IBM IMS High Performance Pointer Checker for z/OS
3.1

User's Guide

SC19-2401-06

Note:

Before using this information and the product it supports, read the information in “Notices” on page 811.

Seventh Edition (September 2021)

This edition applies to Version 3.1 of IBM IMS High Performance Pointer Checker for z/OS (program number 5655-U09) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces SC19-2401-05.

© Copyright International Business Machines Corporation 2000, 2021.
US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

About this information..... xi

Part 1. Introduction and product setup.....1

Chapter 1. Overview of IMS HP Pointer Checker..... 3
What's new in IMS HP Pointer Checker..... 3
What does IMS HP Pointer Checker do?..... 7
IMS HP Pointer Checker terminology..... 8
Functional enhancements in IMS HP Pointer Checker 3.1..... 9
Support for IMS Tools Knowledge Base..... 14
Service updates and support information..... 14
Product documentation and updates..... 14
Accessibility features for IMS HP Pointer Checker..... 16

Chapter 2. Configuring IMS HP Pointer Checker..... 17
Processing environment..... 17
Compatibility and migration considerations..... 19
Migration from IMS HP Pointer Checker 2.1 or 2.2..... 19
Migration from IMS HP Pointer Checker 1.1..... 19
Compatibility of HISTORY data sets..... 22
Configuration tasks..... 22
Configuring the environment to store reports in IMS Tools KB..... 23
Configuring HD Pointer Checker to use with IMS Database Recovery Facility..... 24
Setting up the ISPF interface for DB Historical Data Analyzer..... 26
Configuring IMS Tools Online System Interface for Space Monitor..... 28

Part 2. HD Pointer Checker utility..... 29

Chapter 3. Overview of HD Pointer Checker..... 31
Program functions..... 31
Program structure..... 34
Processes and data flow..... 34

Chapter 4. Using the HD Pointer Checker processor..... 39
Restrictions and considerations..... 39
General restrictions..... 39
Restrictions and considerations by database organization types..... 39
Restrictions when using image copy data sets as input..... 40
Restrictions for the HASH Check function..... 41
Considerations for running HD Pointer Checker in multiple-step jobs..... 41
Restrictions for calling Space Monitor..... 41
Restrictions for the Integrated DB Sensor function..... 42
Restrictions and considerations for running HD Pointer Checker when the IMS management of ACBs is enabled..... 42
Considerations for calling HD Pointer Checker from IMS Database Reorganization Expert..... 43
Restrictions and considerations for calling HD Pointer Checker from IMS Database Recovery Facility..... 43
Running HD Pointer Checker..... 43
Job control language..... 44
FABPMAIN EXEC statement..... 44

FABPMAIN DD statements..... 47
Dynamic allocation of database data sets and image copy data sets.....67
Dynamic allocation of HD Pointer Checker work data sets..... 68
JCL procedures..... 69
Input..... 107
FABPMAIN PROCCTL data set.....107
FABPMAIN BLKMAPIN data set..... 147
FABPMAIN HPSRETCD data set..... 148
Output.....151
Report reference for HD Pointer Checker..... 151
Messages to operator..... 168
PRIMAPRT data set..... 169
STATIPRT data set..... 174
VALIDPRT data set.....214
EVALUPRT data set..... 230
EVALUPR2 data set..... 246
EVALIPRT data set..... 248
SNAPPIT data set..... 255
SUMMARY data set..... 261
DBSRCPRT data set..... 264
DBMAPPRT data set..... 265

Chapter 5. Using Disk Address Analyzer..... 267
FABPCHRO JCL.....267
FABPCHRO CTL input data set..... 268
FABPCHRO PRT output data set..... 269
Control Card Format report..... 269
Control Card and Pointer Information report.....269

Chapter 6. HD Pointer Checker Site Default Generation utility..... 271
Functions..... 271
Setting site default values for HD Pointer Checker..... 271
FABPTGEN JCL..... 274
FABPTGEN PROCCTL data set..... 275

Chapter 7. JCL examples for HD Pointer Checker..... 279
Example 1: (Standard database analysis) Prevention..... 279
Example 2: (Standard database analysis) Corrupted database..... 281
Example 3: (Standard database analysis) Prevention with HASH..... 283
Example 4: (Standard database analysis) Multiple jobs..... 284

Chapter 8. Operational strategy recommended for HD Pointer Checker.....287

Chapter 9. HD Pointer Checker online considerations..... 289

Chapter 10. DBRC and HD Pointer Checker..... 291

Chapter 11. Database repair guidelines..... 293
Why pointers are important..... 293
How a database can become corrupted.....293
Various methods of repairing a corrupted database.....295
Repairing a database by using HD Pointer Checker and zapping..... 296
Image-copying the corrupted databases..... 296
Running HD Pointer Checker on the corrupted databases.....296
Obtaining dumps of the invalid block.....297
Analyzing the results..... 297
Repairing the databases.....302
Image-copying the repaired databases.....303

Running HD Pointer Checker on the image copy of the repaired databases..... 303
Repairing HALDB partition reorganization numbers and duplicate ILKs..... 304

Chapter 12. Reported by HD Pointer Checker slack bytes, unknown data, and T2 errors.....307
Database format for slack bytes.....307
How IMS reclaims space.....307
Validation of free space element..... 309
T2 errors..... 309

Chapter 13. Estimating runtime resources.....311
Estimating the sizes of work data sets for HD Pointer Checker automatically..... 311
Estimating the sizes of work data sets for HD Pointer Checker manually.....312
Running HD Pointer Checker with PTRCHK=NO.....313
Estimating the size of MERGINnn..... 313
Estimating the sizes of additional data sets..... 314
Dividing the *nn* data sets into scan groups..... 317
Converting the results to proper space units.....317
Estimating the storage needed for HD Pointer Checker manually..... 318

Chapter 14. Performance tips for HD Pointer Checker.....319

Chapter 15. HD Pointer Checker options for debugging.....321
OPTION statement.....321

Part 3. HD Tuning Aid utility..... 325

Chapter 16. Overview of HD Tuning Aid.....327
Program functions.....327
Program structure..... 328
Data flow.....328

Chapter 17. Using HD Tuning Aid..... 331
Restrictions and considerations..... 331
Running HD Tuning Aid..... 331
Job control language.....332
FABTROOT JCL..... 332
DFSORT JCL..... 336
FABTRAPS JCL.....337
JCL procedures.....337
Input..... 340
FABTROOT CTL data set..... 340
DFSORT SYSIN data set.....347
Output.....348
FABTROOT PR8 data set..... 348
FABTRAPS PR9 data set.....351
FABTRAPS PR9X data set.....353
FABTROOT PR10 data set..... 354
FABTROOT RAPSIN data set..... 354

Chapter 18. JCL examples for HD Tuning Aid..... 359
Example 1: Running HD Tuning Aid with HD Pointer Checker..... 359
Example 2: Iterative tuning analysis..... 359
Example 3: Running HD Tuning Aid under IMS..... 360
Example 4: Control statements for PHDAM..... 362
Example 5: Analyzing conversion to PHDAM..... 363
Example 6: Analyzing conversion to HDAM.....364
Example 7: Running HD Tuning Aid in an IMS-managed ACBs environment.....365

Part 4. DB Historical Data Analyzer utility.....367

Chapter 19. Overview of DB Historical Data Analyzer.....369
Program functions.....369
Program structure.....370
Data flow.....370

Chapter 20. Using DB Historical Data Analyzer in the MVS batch environment.....375
Restrictions and considerations.....375
Running DB Historical Data Analyzer.....375
Preparing a HISTORY data set.....376
Running a DB Historical Data Analyzer job.....379
Job control language.....380
FABGHIST JCL.....380
Input.....381
HISTIN data set.....381
Control member data set (SPMNMBR).....389
Output.....389
HISTMSG data set.....389
HISTPRT data set.....390

Chapter 21. Using the Export Utility.....413
Restrictions and considerations.....413
Running the Export Utility.....414
FABGXEXP JCL.....414
Input.....415
HISTORY data set (HISTORY).....415
HISTIN data set.....416
FABGRECI data set.....420
Output.....442
HISTMSG data set.....442
HISTPRT data set.....443
FABGEXPF data set (Flat File).....445

Chapter 22. Using DB Historical Data Analyzer in the TSO/ISPF environment.....451
Restrictions and considerations.....451
Invoking DB Historical Data Analyzer.....452
Runtime data set requirements.....452
Starting a dialog with DB Historical Data Analyzer.....453
Sample TSO Command List (FABGCMD0).....454
Panels and operations.....455
Panel structure.....455
Obtaining a graph chart.....455
Understanding DB Historical Data Analyzer panels.....458
Descriptions of the panels.....459
Output (HD Analysis Graph).....472
Customizing a graph chart through ICU.....473

Chapter 23. JCL examples for DB Historical Data Analyzer.....477
Example 1: Reorganizing the HISTORY data set.....477
Example 2: Deleting entries from the HISTORY data set.....478
Example 3: Producing an HD Analysis report.....479
Example 4: Producing the HD Pointer Checker Summary report.....479
Example 5: Creating predefined flat records.....480
Example 6: Creating user-defined flat records.....481

Part 5. Space Monitor utility.....483

Chapter 24. Overview of Space Monitor..... 485
Program functions.....485
Program structure..... 487
Data flow.....487

Chapter 25. Using Space Monitor.....489
Restrictions and considerations..... 489
Restrictions.....489
Considerations for using the HISTORY data set..... 489
Considerations for HALDB Online Reorganization (OLR).....490
Consideration for IMS online full-function database data sets..... 490
Running Space Monitor..... 490
Job control language.....491
FABKSPMN JCL.....491
JCL procedure (FABKSPMP).....497
Input..... 498
Control member data set (SPMNMBR)..... 498
SPMNIN data set..... 505
FABKCTL data set..... 506
Output.....512
Space Monitor Graph Record data set (SPMNSPDT)..... 512
SPMNPRT data set.....513
SPMNPRTW data set.....526
SPMNMSG data set.....529

Chapter 26. JCL examples for Space Monitor.....531
Example 1: Using the SPMNIN data set to monitor space 531
Example 2: Using the SPMNMBR data set to monitor space 532
Example 3: Using the FABKCTL data set to monitor space..... 533
Example 4: Increasing buckets on Space Monitor graph record..... 533

Chapter 27. Available data set extents and last space..... 535
Available data set extents.....535
Last space.....539

Chapter 28. Space Monitor Site Default Generation utility..... 541
Functions..... 541
Setting site default values for Space Monitor.....541
FABKTGEN JCL..... 544
FABKTGEN SPMNIN data set.....545
FABKTGEN FABKCTL data set.....547

Part 6. DB Segment Restructure utility..... 549

Chapter 29. Overview of DB Segment Restructure..... 551
Program functions.....551
Program structure..... 551
Data flow.....552

Chapter 30. Using DB Segment Restructure.....553
Restrictions and considerations..... 553
Restrictions..... 553
Considerations for HALDB Online Reorganization..... 554
Considerations for data set compatibility among related utilities..... 554

Planning for DB Segment Restructure....555
Preparing steps for DB Segment Restructure (non-HALDBs)....555
Preparing steps for DB Segment Restructure (HALDBs)....557
Running the DB Segment Restructure programs....558
Job control language....558
FABRUNLD JCL....559
FABRRELD JCL....560
Input....562
FABRUNLD SYSIN data set....562
FABRRELD SYSIN data set....564
Output....566
FABRUNLD SYSPRINT data set....566
FABRRELD SYSPRINT data set....567
Unloaded database....568

Chapter 31. JCL examples for DB Segment Restructure....569
Example 1: How to restructure physical databases....569
Example 2: How to restructure databases with logical relationships....573
Example 3: How to change the hierarchy of a database....578
Example 4: How to convert an HDAM database to HIDAM....581
Example 5: How to split database segments....581

Chapter 32. User exit routines....585
Techniques....585
Interface....585

Chapter 33. Conversion to DEDB....591
Converting to a DEDB with DB Segment Restructure....591
FABRRELD JCL (conversion to DEDB)....592

Part 7. Reference....595

Chapter 34. Layout of KEYSIN data set record....597

Chapter 35. Layout of HISTORY data set record....599

Chapter 36. How to read syntax diagrams....601

Part 8. Troubleshooting....603

Chapter 37. Messages and codes....605
HD Pointer Checker messages and codes....605
HD Pointer Checker abend codes....605
HD Pointer Checker return codes....605
HD Pointer Checker messages....606
HD Tuning Aid messages and codes....731
HD Tuning Aid abend codes....731
HD Tuning Aid return codes....731
HD Tuning Aid messages....731
DB Historical Data Analyzer messages and codes....751
DB Historical Data Analyzer abend codes....751
DB Historical Data Analyzer return codes....751
DB Historical Data Analyzer messages: TSO/ISPF environment....752
DB Historical Data Analyzer messages: MVS Batch environment....758
Space Monitor messages and codes....772
Space Monitor abend codes....772
Space Monitor return codes....772

Space Monitor messages....773
DB Segment Restructure messages and codes....793
DB Segment Restructure abend codes....793
DB Segment Restructure return codes....793
DB Segment Restructure messages....794

Chapter 38. Gathering diagnostic information....803

Chapter 39. Diagnostics Aid....805
How to run Diagnostics Aid with JCL....805
Load Module/Macro APAR Status report....806
Load Module APAR Status report....806
Macro APAR Status report....806
Diagnostics Aid messages and codes....807
Diagnostics Aid return codes....807
Diagnostics Aid abend codes....807
Diagnostics Aid messages....807

Notices....811

Index....815

About this information

IBM® IMS High Performance Pointer Checker for z/OS® (also referred to as IMS High Performance Pointer Checker or IMS HP Pointer Checker) helps you to analyze, diagnose, and repair corrupted databases quickly.

These topics provide instructions for installing, configuring, and using IMS HP Pointer Checker.

These topics are designed for system programmers, application programmers, system analysts, database administrators, computer operators, and technical support personnel, who are involved in database management, maintenance, and performance tuning, and who need to know how to operate the utilities of IMS HP Pointer Checker perform these tasks:

- Understand the functions of IMS High Performance Pointer Checker
- Configure your IMS High Performance Pointer Checker environment
- Run and use IMS High Performance Pointer Checker
- Diagnose and recover from IMS High Performance Pointer Checker problems

IMS HP Pointer checker is a component of the IBM IMS Database Solution Pack for z/OS and IBM IMS Database Utility Solution for z/OS. IMS HP Pointer Checker is also available as a separately orderable product.

Before using this book, you should understand basic IMS concepts, the IMS environment, and your installation's IMS system.

Always check the IMS Tools Product Documentation page for complete product documentation resources:

https://www.ibm.com/support/pages/node/712955

The IMS Tools Product Documentation page includes:

- Links to IBM Documentation for the user guides ("HTML")
- Links to the PDF versions of the user guides ("PDF")
- Program Directories for IMS Tools products
- Recent updates to the user guide, known as "Tech docs" ("See updates to this information!")
- Technical notes from IBM Software Support, known as "Tech notes"
- White papers that describe product business scenarios and solutions

© Copyright IBM Corp. 2000, 2021

Part 1. Introduction and product setup

IBM IMS High Performance Pointer Checker for z/OS (also referred to as IMS HP Pointer Checker) provides utilities to help ensure that IMS databases are operational and ready for use.

The following topics introduce the utilities of IMS HP Pointer Checker and describe the processing environment, compatibilities and migration, and configuration tasks for IMS HP Pointer Checker.

Topics:

- Chapter 1, “Overview of IMS HP Pointer Checker,” on page 3
- Chapter 2, “Configuring IMS HP Pointer Checker,” on page 17

© Copyright IBM Corp. 2000, 2021

Chapter 1. Overview of IMS HP Pointer Checker

IMS HP Pointer Checker provides utilities that are designed to help ensure that IMS databases are operational, tuned, repaired, and ready for use.

IMS HP Pointer Checker provides the following utilities:

- HD Pointer Checker
- HD Tuning Aid
- DB Historical Data Analyzer
- Space Monitor
- DB Segment Restructure

The following topics introduce the functions that are provided by IMS HP Pointer Checker.

Topics:

- "What's new in IMS HP Pointer Checker" on page 3
- "What does IMS HP Pointer Checker do?" on page 7
- "IMS HP Pointer Checker terminology" on page 8
- "Functional enhancements in IMS HP Pointer Checker 3.1" on page 9
- "Support for IMS Tools Knowledge Base" on page 14
- "Service updates and support information" on page 14
- "Product documentation and updates" on page 14
- "Accessibility features for IMS HP Pointer Checker" on page 16

What's new in IMS HP Pointer Checker

This topic summarizes the technical changes for this edition.

New and changed information is indicated by a vertical bar (|) to the left of a change. Editorial changes that have no technical significance are not noted.

Revision markers follow these general conventions:

- Only technical changes are marked; style and grammatical changes are not marked.
- If part of an element, such as a paragraph, syntax diagram, list item, task step, or figure is changed, the entire element is marked with revision markers, even though only part of the element might have changed.
- If a topic is changed by more than 50%, the entire topic is marked with revision markers (so it might seem to be a new topic, even though it is not).

Revision markers do not necessarily indicate all the changes made to the information because deleted text and graphics cannot be marked with revision markers.

SC19-2401-06 (September 2021)

Description	Related APARs
Updated message FABP3879E.	PH37674

© Copyright IBM Corp. 2000, 2021

SC19-2401-05 (February 2021)

Description	Related APARs
HD Pointer Checker (HDPC): Support secondary index databases with overflow data sets under IMS Database Recovery Facility. For more information, see the following topics: • "Restrictions and considerations for calling HD Pointer Checker from IMS Database Recovery Facility" on page 43 • "Summary of index database checking" on page 143	PH00083
HD Pointer Checker (HDPC): GROUPDIGITS keyword to disable digit grouping in Database Statistics reports and Partition Statistics reports. For more information, see "PROC statement" on page 108.	PH07469
HD Pointer Checker (HDPC): HD Pointer Checker stand-alone jobs can run in an IMS environment where the IMS management of ACBs is enabled. For more information, see the following topics: • "Software requirements" on page 17 • "Restrictions and considerations for running HD Pointer Checker when the IMS management of ACBs is enabled" on page 42 • "FABPMAIN EXEC statement" on page 44 • "FABPMAIN DD statements" on page 47	PH13966
HD Pointer Checker (HDPC): IMS OSAM data set encryption support.	PH17855, PH24727, PH29749
HD Tuning Aid (HDTA): IMS managed ACBs Support. For more information, see the following topics: • "Software requirements" on page 17 • "FABTROOT JCL" on page 332 • "Example 7: Running HD Tuning Aid in an IMS-managed ACBs environment" on page 365	PI93975
Space Monitor (SPMN): IMS OSAM data set encryption support.	PH24727

SC19-2401-04 (July 2018)

Description	Related APARs
IMS 15 support.	PI73056
HD Pointer Checker (HDPC): HD Pointer Checker stand-alone jobs (FABPMAIN jobs) can run in an IMS environment where the IMS management of ACBs is enabled. For more information, see "Additional requirements for running HD Pointer Checker when the IMS management of ACBs is enabled" on page 46.	PI34148
HD Pointer Checker (HDPC): OVERFLOW and PRIMEDB keywords, which were mandatory keywords, have been changed to optional keywords. For more information, see "DATABASE statement" on page 125.	PI46110
HD Pointer Checker (HDPC): IMSDALIB DD statement specifies the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. For more information, see "DD statement description" on page 60.	PI70429

Description	Related APARs
HD Pointer Checker (HDPC): Additional information is printed in the DB Record Distribution Statistics report. This information provides a summary of root segments. For more information, see "DB Record Distribution Statistics report" on page 197.	PI79702
HD Pointer Checker (HDPC): Added instructions to set up security for the HD Pointer Checker subordinate address space. This step pertains to using HD Pointer Checker with IMS Database Recovery Facility. For more information, see "Configuring HD Pointer Checker to use with IMS Database Recovery Facility" on page 24.	N/A
Space Monitor (SPMN): New keyword, IMSCATHLQ, has been added for the PROC statement of the FABKCTL data set. Use this keyword when you run Space Monitor in an IMS environment where the IMS management of ACBs is enabled. For more information, see "PROC statement" on page 506.	PI90966

SC19-2401-03 (February 2015)

Description	Related APARs
IMS HP Pointer Checker can run under IMS 14. The utilities of IMS HP Pointer Checker can process 8 GB OSAM data sets of HALDB.	PI27563
HD Pointer Checker (HDPC): You can generate repair information records that you use as input to the ILK Repair utility (of IMS Database Repair Facility) to repair HALDB databases that have corrupted HALDB partition reorganization numbers, duplicate indirect list keys (ILKs), or potentially duplicate ILKs. For more information, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.	PM97584
HD Pointer Checker (HDPC): The SENSOR_HOME=YES option for DB Sensor has been enhanced to collect an additional data element. For more information, see the description about the SENSOR_HOME keyword in "PROC statement" on page 108.	PI08977
HD Pointer Checker (HDPC): You can specify the SMS parameters for dynamically allocating HD Pointer Checker work data sets in SMS environments. You can also estimate the sizes of work data sets that will be used in an HD Pointer Checker job before you run the pointer check job. For more information, see the following topics: • WKDATACLASS, WKSTORCLASS, and WKHLQ keywords in "PROC statement" on page 108 • "Estimating the sizes of work data sets for HD Pointer Checker automatically" on page 311	PI17805

SC19-2401-02

Description	Related APARs
IMS 12 support.	PM21945
IMS 13 support.	PM75255
HD Pointer Checker (HDPC): You can check the pointers that point to the logical records that contain non-unique keys in the overflow data set of a secondary index database. For more information, see "Secondary index of non-HALDB" on page 144.	PM28799

Description	Related APARs
HD Pointer Checker (HDPC): You can run HD Pointer Checker on OSAM data sets of IMS databases and image copy data sets that are allocated on extended address volumes (EAVs).	PM46322
HD Pointer Checker (HDPC): You can use the Integrated DB Sensor to collect sensor data and store the data in the IMS Tools KB Sensor Data repository within HD Pointer Checker jobs. You can also use Space Monitor to monitor the latest space utilization of VSAM data sets of IMS online full-function databases within HD Pointer Checker jobs. For more information, see “Collecting sensor data with the Integrated DB Sensor function” on page 34 and “Calling Space Monitor” on page 33.	PM50160
HD Pointer Checker (HDPC): You can check whether HALDB partition reorganization numbers are corrupted, and whether incorrect indirect list keys (ILKs) exist. For more information, see the description of the DUPILKCHK keyword in “PROC statement” on page 108.	PM61429
HD Pointer Checker (HDPC): You can check the pointers in IMS catalog databases. For more information, see “FABPMAIN EXEC statement” on page 44.	PM64745
HD Pointer Checker (HDPC): You can use the Index Key Check function to check the index keys of databases that have /CK fields, which are defined by the SUBSEQ operand of the XDFLD statement. For more information, see the description of the IXKEYCKCHK keyword in “PROC statement” on page 108.	PM70216
HD Pointer Checker (HDPC): You can request HD Pointer Checker to generate the HD Pointer Checker Message Summary report when HD Pointer Checker is called within IMS Database Reorganization Expert jobs or IMS Database Recovery Facility jobs.	PM90989
Space Monitor (SPMN): You can specify the Space Monitor input control statements in the FABKCTL data set. FABKCTL supports keyword-style control statements, so coding the control statements in the FABKCTL data set is easier than coding the control statements in other data sets. For more information, see “FABKCTL data set” on page 506.	PM79078

SC19-2401-01

Description	Related APARs
IMS 11 support.	PK74300
HD Pointer Checker (HDPC): HD Pointer Checker supports Extended Address Volume (EAV). By this enhancement, several fields in the HD Pointer Checker reports are changed. For more information, see “HD Pointer Checker enhancements” on page 9.	PK73041
HD Pointer Checker (HDPC): Several fields are added to the DB Record Distribution Statistics report and the Partition Statistics and Database Statistics report of HD Pointer Checker. For more information, see “HD Pointer Checker enhancements” on page 9.	PK96437
HD Pointer Checker (HDPC): The HASH Check function of the HD Pointer Checker utility can be used in IMS Online Reorganization Facility jobs. For the HD Pointer Checker reports that can be printed in an IMS Online Reorganization Facility job, see “HD Pointer Checker reports from IMS Online Reorganization Facility jobs” on page 162.	N/A

Description	Related APARs
HD Pointer Checker (HDPC): Additional HD Pointer Checker reports are enabled for IMS Tools KB. See “HD Pointer Checker enhancements” on page 9 for the list of HD Pointer Checker reports that can be stored in IMS Tools KB.	PM15122, PM16141
Space Monitor (SPMN): Space Monitor supports VSAM data sets that are allocated on EAVs. For more information, see “Space Monitor enhancements” on page 13.	PK88523
Space Monitor (SPMN): Space Monitor supports extended-format VSAM data sets that are larger than 4 GB. For more information, see “Space Monitor enhancements” on page 13.	PK95690
Space Monitor (SPMN): Space Monitor can monitor IMS full-function database data sets. For more information, see “Space Monitor enhancements” on page 13.	PM21360
Information about functional enhancements in IMS HP Pointer Checker 3.1 is added. See “Functional enhancements in IMS HP Pointer Checker 3.1” on page 9.	N/A
Compatibility information between IMS HP Pointer Checker 2.x and 3.1 is added. See “Migration from IMS HP Pointer Checker 2.1 or 2.2” on page 19.	N/A
Product migration information is moved into Chapter 2, “Configuring IMS HP Pointer Checker,” on page 17. See “Compatibility and migration considerations” on page 19.	N/A
Topics in Chapter 9, “HD Pointer Checker online considerations,” on page 289 and Chapter 10, “DBRC and HD Pointer Checker,” on page 291 are modified to provide more detailed information.	N/A
Description of the Space Analysis by Data Set report, the Summary of Data Sets by Volume report, and the Space Monitor Graph report is updated to provide more detailed information. See “Output” on page 512.	N/A

What does IMS HP Pointer Checker do?

IMS HP Pointer Checker provides utilities that help you ensure that your IMS databases have the highest availability by checking for potential problems early and often.

HD Pointer Checker utility
This utility detects and reports problems of direct and/or other types of pointers. These reports pinpoint both the errors and their locations within IMS databases. It also produces many reports to help in tuning databases such as redundant space in IMS databases.

HD Tuning Aid utility
This utility produces reports that describe the distribution of root segments in HDAM, HIDAM, PHDAM, or PHIDAM databases. It also produces a report that gives summary information about High Availability Large Databases (HALDBs).

DB Historical Data Analyzer utility
This utility helps you analyze the status and historical trend of IMS full-function database data sets that HD Pointer Checker supports. Historical trend here means the change in various aspects of IMS full-function database data sets (for example, the use of space, size/number of database segments, or size/number of database blocks) from the past.

DB Historical Data Analyzer uses the following data that is collected by HD Pointer Checker and Space Monitor:

- Statistics information produced by HD Pointer Checker
- Space allocation information produced by Space Monitor

DB Historical Data Analyzer has a utility called the Export Utility. The Export Utility exports the data collected by HD Pointer Checker to flat records, which can be processed by user application programs.

Space Monitor utility
This utility helps you forecast potential space utilization problems of IMS full-function database data sets that HD Pointer Checker supports, and OS data sets (including VSAM data sets).

Note: The term *OS data sets* used in these topics includes VSAM data sets. It generally means non-IMS data sets in these topics.

DB Segment Restructure utility
This utility changes the format of segment data within any existing full-function database including HALDB. The main function is to modify databases in ways that exceed the capabilities of the standard IMS utilities. One such task would be changing the hierarchy in a database.

When you use DB Segment Restructure, there is no need to write a program to reformat segment data.

IMS HP Pointer Checker terminology

IMS HP Pointer Checker information includes several unique terms that you need to understand before you begin to use IMS HP Pointer Checker.

To make this information easier to read, the version and release levels of IMS are abbreviated, as follows:

- IMS 14 refers to IMS 14.1 and IMS Database Value Unit Edition 14.1.
- IMS 15 refers to IMS 15.1 and later, and IMS Database Value Unit Edition 15.1 and later.

The various versions of IMS are referred to simply as IMS, except where distinctions among them need to be made.

The following abbreviations are used for the utilities of IMS HP Pointer Checker:

DBHDA
DB Historical Analyzer

DBSR
DB Segment Restructure

HDPC
Hierarchical Direct Pointer Checker. Also referred to as HD Pointer Checker.

HDTA
HD Tuning Aid

SPMN
Space Monitor

The following table lists the short names that are used for full product names in this information.

Table 1. Product short names

Product short name	Product name
Autonomics Director	IBM IMS Tools Base for z/OS Autonomics Director
DB Sensor	The generic name for the Database Sensor component provided by the following products: • IBM IMS Database Solution Pack for z/OS • IBM IMS Database Utility Solution for z/OS
IMS	Database Manager of one of the currently supported versions of IMS
IMS Database Reorganization Expert	IBM IMS Database Reorganization Expert for z/OS 4.1 (5655-S35)
IMS Database Repair Facility or IMS DBRF	IMS Database Repair Facility (included in this product)

Table 1. Product short names (continued)

Product short name	Product name
IMS Database Solution Pack	IBM IMS Database Solution Pack for z/OS 2.2 or later (5655-DSP)
IMS Database Utility Solution	IBM IMS Database Utility Solution for z/OS 1.1 or later (5655-DBU)
IMS Database Recovery Facility or IMS DRF	IBM IMS Recovery Solution Pack for z/OS IMS Database Recovery Facility
IMS HP Image Copy or IMS HPIC	IBM IMS High Performance Image Copy for z/OS 4.2 (5655-N45)
IMS HP Pointer Checker	IBM IMS High Performance Pointer Checker for z/OS 3.1 (5655-U09) (this product)
IMS HP Pointer Checker 2.2	IBM IMS High Performance Pointer Checker for z/OS 2.2 (5655-K53)
IMS HP Pointer Checker 1.1	IBM IMS High Performance Pointer Checker for OS/390® 1.1 (5655-E09)
IMS Library Integrity Utilities or IMS LIU	IBM IMS Library Integrity Utilities for z/OS 2.2 (5655-U08)
IMS Online Reorganization Facility or IMS ORF	IBM IMS Database Solution Pack for z/OS IMS Online Reorganization Facility
IMS Recovery Solution Pack	IBM IMS Recovery Solution Pack for z/OS 2.1 (5655-ISR)
IMS Tools Base	IBM IMS Tools Base for z/OS 1.6 or later (5655-V93)
IMS Tools KB Output repository	Output repository of IBM IMS Tools Knowledge Base
IMS Tools Knowledge Base or IMS Tools KB	IBM IMS Tools Base for z/OS IMS Tools Knowledge Base
IMS Tools KB server	Server of IBM IMS Tools Base IMS Tools Knowledge Base
IMS Tools Online System Interface or TOSI	IBM IMS Tools Base for z/OS IMS Tools Online System Interface

Functional enhancements in IMS HP Pointer Checker 3.1

The utilities that are provided in IMS HP Pointer Checker 3.1 have been enhanced to provide improved functionality and usability.

The following subsections describe the major functional enhancements in IMS HP Pointer Checker 3.1. For information about the functions that were enhanced in the prior versions or releases, see the user's guide of the prior versions.

Subsections:

- "HD Pointer Checker enhancements" on page 9
- "HD Tuning Aid enhancements" on page 13
- "Space Monitor enhancements" on page 13

HD Pointer Checker enhancements

HD Pointer Checker (HDPC) provides the following new functions:

- A new report, HD Pointer Checker Message Summary report, is introduced in this version of the product. The HD Pointer Checker Message Summary report summarizes all the warning and error messages

in a single report in an easy-to-view format. This report, which is generated in the SUMMARY DD, provides the name of the database in which an error was detected, the identification number of the error message, and the name of the report in which the error message is shown.

This report provides you with a quick and easy way to begin analyzing the cause of the error. When an error occurs, you can use this report first to identify the error.

- In the prior version of the product, the Index Key Check function could not verify index keys when a source segment in an indexed database is split into prefix portion and data portion. This limitation has been removed in this version of the product. You can now use the Index Key Check function of HDPC to verify index keys even when a source segment in an indexed database is split into prefix portion and data portion.
- In the prior version of the product, the Symbolic Pointer Checking function could verify the symbolic pointers in a secondary index database only when an index target segment is a root segment. This limitation has been removed in this version of the product. In this version of the product, the Symbolic Pointer Checking has been enhanced so that it can verify the symbolic pointers in a secondary index database even when an index target segment is a dependent segment.
- HDPC has been enhanced to run the EPSCHK evaluation processes in parallel for HALDBs. Now when you run HDPC for multiple HALDBs with the EPSCHK=YES option enabled, the elapsed time is reduced. Additionally, the SORTIL and SORTOL DD statements are no longer needed in the HDPC JCL statements.
- APAR PK73041 provides support for the VSAM data sets of an IMS database that is allocated on an extended address volume (EAV). EAV, which is supported in z/OS 1.10 and later, is a type of DASD storage that has 65,521 or more cylinders per volume.

  The length of the CYLS/DEVICE field in the following reports has been increased from 5 bytes to 9 bytes so that the number of cylinders for the VSAM data set that is allocated on an EAV can be fully displayed.

  – Scan of HISAM Database report
  – Scan of Index Database report
  – Validation of a Pointer to a Target at SCAN report

  The format to display the DASD address has also been changed from CCHHRR to cccCCCCHRR in the following reports:

  – Validation of a Pointer to a Target at SCAN report
  – Validation of a Pointer to a Target at CHECK report
  – Control Card/Pointer Information report
- APAR PM46322 enhances HD Pointer Checker to support OSAM data sets of IMS databases and image copy data sets that are allocated on extended address volumes (EAVs).
- APAR PK96437 adds the following information in the DB Record Distribution Statistics report:

  – The BLOCKS WITHOUT ROOT SEGMENTS IN RAA field

    This field shows the number of blocks that do not have root segments in the root addressable area (RAA).

  – The Summary of Dependent Segments Distribution part

    This part contains the following fields:

    - NUMBER OF DEPENDENTS IN AS SAME BLOCK AS ROOT
    - AVERAGE DEPS IN AS SAME BLOCK AS ROOT PER ROOT
    - NUMBER OF DEPENDENTS IN THE DIFFERENT BLOCK TO ROOT

  For more information about these fields, see “DB Record Distribution Statistics report” on page 197.

  This APAR also adds the following information in the SUMMARY OF VL SEGMENT SIZES part of the Partition Statistics report and the Database Statistics report:

  – <= AVERAGE

    This identifier marks the size range that includes the average length of the variable-length segments.

– MORE THAN 90 PERCENT OF SEGMENT OCCURRENCES ARE INCLUDED IN THE RANGE *xxxxxx* - *xxxxxx*

  This message shows the size range in which more than 90% occurrences belong to.

For more information, see "Partition Statistics report and Database Statistics report" on page 203.

- APAR PM90989 enhances HDPC to print the HD Pointer Checker Message Summary report in the SUMMARY data set in IMS Database Reorganization Expert jobs and IMS Database Recovery Facility jobs.
- By APAR PM15122, PM16141,and PM90989, HDPC has been enhanced to store additional HDPC reports in the Output repository of IMS Tools Knowledge Base.

  The following additional HDPC reports can be stored in each run mode:

  – In the Standard Check in an HDPC stand-alone (FABPMAIN) job:
    - HD Pointer Checker Message Summary report
    - Scan of HISAM Database report
    - Scan of Index Database report
    - Validation of a Pointer to a Target at SCAN report
    - Validation of a Pointer to a Target at CHECK report
    - Evaluation of All Pointer to the Same Target report
    - Evaluation of Index Pointers and Keys report
    - Pointer Chain Reconstruction report
    - Evaluation of Symbolic Pointer report
    - EPS Healing report
    - Evaluation of ILKS report
    - Block Map and Block Dump report
    - Environment report (for primary and secondary indexes)
    - Run time option report (for primary and secondary indexes)
  – In the HASH Check in an HDPC stand-alone (FABPMAIN) job:
    - HD Pointer Checker Message Summary report
    - Scan of HISAM Database report
    - Scan of Index Database report
    - Validation of a Pointer to a Target at SCAN report
    - HASH Evaluation report
    - Block Map and Block Dump report
    - Environment report (for primary and secondary indexes)
    - Run time option report (for primary and secondary indexes)
  – In the single-step HASH Check under IMS HP Image Copy:
    - HD Pointer Checker Message Summary report
    - Scan of HISAM Database report
    - Scan of Index Database report
    - Validation of a Pointer to a Target at SCAN report
    - HASH Evaluation report
    - Block Map and Block Dump report
    - Environment report (for primary and secondary indexes)
    - Run time option report (for primary and secondary indexes)

  - In the HASH Check under IMS Database Reorganization Expert:
    - HD Pointer Checker Message Summary report
    - Scan of HISAM Database report
    - Scan of Index Database report
    - Validation of a Pointer to a Target at SCAN report
    - HASH Evaluation report
    - Environment report (for primary and secondary indexes)
    - Run time option report (for primary and secondary indexes)
  - In the HASH Check under IMS Database Recovery Facility:
    - HD Pointer Checker Message Summary report
    - Scan of HISAM Database report
    - Scan of Index Database report
    - Validation of a Pointer to a Target at SCAN report
    - HASH Evaluation report
    - Block Map and Block Dump report
    - Environment report (for primary and secondary indexes)
    - Run time option report (for primary and secondary indexes)

  For details about the reports that can be stored in the Output repository of IMS Tools Knowledge Base, see "Report reference for HD Pointer Checker" on page 151.

  Important : After you apply APAR PM15122, you must register all the reports that HDPC can store in IMS Tools Knowledge Base. Sample JCL for the registration, FABPIRG1, is provided as a member in the SHPSSAMP data set. Even if IMS HP Pointer Checker 3.1 has been already defined in the IMS Tools KB registry by using the ADDPROD statement of the IMS Tools KB product administration utility (HKTAPRA0), you must run the JCL. The JCL can be run multiple times so that you can run the JCL again to register all the reports that can be stored in the repository. For details, see "Configuring the environment to store reports in IMS Tools KB" on page 23.
- APAR PM28799 enhances HD Pointer Checker to check the pointers that point to the logical records containing non-unique keys in the overflow data set of a secondary index database. This check is done during the Standard Check and the HASH Check processes.
- APAR PM50160 adds Integrated DB Sensor function support. You can collect sensor data and store the data in the IMS Tools KB Sensor Data repository within HD Pointer Checker jobs. For more information, see "Collecting sensor data with the Integrated DB Sensor function" on page 34.

  This APAR also enables the Space Monitor process, when called from HD Pointer Checker, to monitor the latest space utilization of VSAM data sets of IMS online full-function databases through the IMS Tools Online System Interface. For more information, see "Calling Space Monitor" on page 33.
- APAR PM61429 enhances HD Pointer Checker to check whether HALDB partition reorganization numbers are corrupted, and whether incorrect indirect list keys (ILKs) exist. HALDB partition reorganization numbers can become corrupted by inappropriate reorganization procedures and cause incorrect ILKs. You can use the new DUPILKCHK=YES keyword on the PROC statement to activate this check. For more information, see "PROC statement" on page 108.
- APAR PM64745 adds support for IMS catalog databases. You can run HD Pointer Checker stand-alone jobs to check the pointers in IMS catalog databases. For more information about coding JCL to process IMS catalog databases, see "FABPMAIN EXEC statement" on page 44 and "FABPMAIN DD statements" on page 47.
- APAR PM70216 enhances the Index Key Check function of the Standard Check function to support databases that have /CK fields, which are defined by the SUBSEQ operand of the XDFLD statement. You can specify the IXKEYCKCHK keyword on the PROC statement to check index keys of such databases. For more information, see "PROC statement" on page 108.

- APAR PM97584 enhances HD Pointer Checker to generate repair information records. These records can be used as input to the ILK Repair utility of IMS Database Repair Facility to repair HALDB databases that have corrupted HALDB partition reorganization numbers, duplicate indirect list keys (ILKs), or potentially duplicate ILKs. For more information, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.
- APAR PI17805 enhances HD Pointer Checker to support SMS parameters for dynamically allocating HD Pointer Checker work data sets in SMS environments. Also, new processing type, PROC TYPE=ESTIMATE_WK, is supported to estimate the sizes of work data sets that will be used in a pointer check job. For more information, see the following topics:
  - WKDATACLASS, WKSTORCLASS, and WKHLQ keywords in "PROC statement" on page 108
  - "Estimating the sizes of work data sets for HD Pointer Checker automatically" on page 311

HD Tuning Aid enhancements

HD Tuning Aid (HDTA) provides the following new functions:

- The Assigned Roots per RAP report of HDTA has been enhanced with a new Distribution of RAP Chain Length part. This part provides estimation of the length and the distribution of the HDAM or PHDAM RAP chains when randomizing parameters are changed for a database. You can use this information to simulate the length and the distribution of the HDAM or PHDAM RAP chains without actually changing a DBD.
- HDTA has been enhanced to provide more accurate average values (up to one decimal place) in the following fields of the reports:
  - Actual Roots per Block report
    - AVG. COUNT OF ROOTS PER ACTIVE BLOCK
  - Assigned Roots per RAP report
    - AVG. COUNT OF ROOTS ON ACTIVE RAP
    - AVG. COUNT OF ROOTS PER TOTAL RAP
    - AVG. COUNT OF ROOTS PER SYNONYM CHAIN
  - Assigned Roots per Block report
    - AVG. COUNT OF ROOTS PER ACTIVE BLOCK

Space Monitor enhancements

Space Monitor provides the following new functions:

- APAR PK88523 allows you to monitor space utilization on a VSAM data set that is allocated on an extended address volume (EAV). EAV, which is supported by z/OS 1.10, is a type of DASD storage that has 65,521 or more cylinders per volume. This APAR introduces the following changes:
  - When you run Space Monitor for a VSAM data set on an EAV, 3390-A* is displayed in the device type field of the DASD volume.
  - The layout of the Total DASD Utilization by Volume/Device-Type report has been changed to display the number of cylinders for a VSAM data set on an EAV.
- APAR PM50160 enhances Space Monitor to monitor space utilization of non-VSAM data sets that are allocated on extended address volumes (EAVs).
- APAR PK95690 allows you to monitor the space utilization on an extended-format VSAM data set whose size is larger than 4 GB. The layouts of the following reports have been changed to display the total number of CIs in a data set:
  - Space Analysis by Data Set report
  - Space Monitor Exception report

- APAR PM21360 enables Space Monitor to monitor the latest space utilization of the VSAM data sets of IMS online full-function databases by using IMS Tools Online System Interface. For more information, see “Monitoring IMS online full-function database data sets” on page 485.
- APAR PM79078 adds support for the FABKCTL data set, which contains the input control statements for Space Monitor. FABKCTL supports keyword-style control statements, so coding the control statements in the FABKCTL data set is easier than coding the control statements in other data sets. For more information, see “FABKCTL data set” on page 506.

Support for IMS Tools Knowledge Base

IMS Tools Knowledge Base is an IMS Tools product that provides common services for storing and viewing reports that are generated by other participating IMS Tools products.

To fully participate in the IMS Tools KB information management environment, each IMS tool must be enabled to communicate with the IMS Tools KB server. An enabled IMS tool can automatically send its generated reports to the IMS Tools KB repository. This version of IMS HP Pointer Checker is enabled to participate in the IMS Tools KB environment.

See “Configuring the environment to store reports in IMS Tools KB” on page 23 for the configuration information to use IMS Tools KB.

Service updates and support information

Service updates and support information for this product, including software fix packs, PTFs, frequently asked questions (FAQs), technical notes, troubleshooting information, and downloads, are available from the web.

To find service updates and support information, see the following website:

IBM Support: IMS High Performance Pointer Checker for z/OS

Product documentation and updates

IMS Tools information is available at multiple places on the web. You can receive updates to IMS Tools information automatically by registering with the IBM My Notifications service.

Information on the web

Always refer to the IMS Tools Product Documentation web page for complete product documentation resources:

https://www.ibm.com/support/pages/node/712955

The IMS Tools Product Documentation web page includes:

- Links to IBM Documentation for the user guides ("HTML")
- PDF versions of the user guides ("PDF")
- Program Directories for IMS Tools products
- Recent updates to the user guides, referred to as "Tech docs" ("See updates to this information!")
- Technical notes from IBM Software Support, referred to as "Tech notes"
- White papers that describe product business scenarios and solutions

IBM Redbooks® publications that cover IMS Tools are available from the following web page:

http://www.redbooks.ibm.com

The IBM Information Management System website shows how IT organizations can maximize their investment in IMS databases while staying ahead of today's top data management challenges:

https://www.ibm.com/software/data/ims/

Receiving documentation updates automatically

To automatically receive automated emails that notify you when new technote documents are released, when existing product documentation is updated, and when new product documentation is available, you can register with the IBM My Notifications service. You can customize the service so that you receive information about only those IBM products that you specify.

To register with the My Notifications service:

1. Go to http://www.ibm.com/support/mysupport
2. Enter your IBM ID and password, or create one by clicking **register now**.
3. When the My Notifications page is displayed, click **Subscribe** to select those products that you want to receive information updates about. The IMS Tools option is located under **Software** > **Information Management**.
4. Click **Continue** to specify the types of updates that you want to receive.
5. Click **Submit** to save your profile.

How to send your comments

Your feedback helps IBM to provide quality information. Send any comments that you have about this book or other IMS Tools documentation to comments@us.ibm.com. Include the name and version number of the product and the title and number of the book. If you are commenting on specific text, list the location of the text (for example, a chapter, topic, or section title).

Related publications

Information in these topics refers to information in other publications using shortened versions of the publication titles.

The following table contains a list of IMS tools publications referred to by their short titles.

Short title	Title
IMS Database Reorganization Expert User's Guide	*IBM IMS Database Reorganization Expert for z/OS 4.1 User's Guide* (SC19-1137)
IMS Database Repair Facility for IMS Solution Packs User's Guide	*IBM IMS Database Repair Facility for IMS Solution Packs User's Guide* (SC19-2916)
IMS High Performance Image Copy User's Guide	*IBM IMS High Performance Image Copy for z/OS 4.2 User's Guide* (SC19-2756)
IMS High Performance Prefix Resolution User's Guide	*IBM IMS High Performance Prefix Resolution for z/OS 3.1 User's Guide* (SC18-9230)
IMS Index Builder User's Guide	*IBM IMS Index Builder for z/OS 3.1 User's Guide* (SC18-9101)
IMS Library Integrity Utilities User's Guide	*IBM IMS Library Integrity Utilities for z/OS 2.2 User's Guide* (SC19-3979)
IMS Online Reorganization Facility User's Guide	*IBM IMS Database Solution Pack for z/OS 2.2 IMS Online Reorganization Facility User's Guide* (SC27-9039)
IMS Recovery Solution Pack IMS Database Recovery Facility User's Guide and Reference	*IBM IMS Recovery Solution Pack for z/OS 2.1 IMS Database Recovery Facility User's Guide and Reference* (SC27-8441)
IMS Solution Packs Data Sensor User's Guide	*IBM IMS Solution Packs Data Sensor User's Guide (SC19-3283)*
Management Console User's Guide	*IBM Management Console for IMS and Db2® for z/OS 1.1 User's Guide (SC27-6714)*

Short title	Title
Tools Base Autonomics Director User's Guide	*IBM Tools Base for z/OS 1.6 Autonomics Director User's Guide (SC19-4376)*
Tools Base IMS Tools Common Services User's Guide	*IBM Tools Base for z/OS 1.6 IMS Tools Common Services User's Guide (SC19-4371)*
Tools Base IMS Tools Knowledge Base User's Guide	*IBM Tools Base for z/OS 1.6 IMS Tools Knowledge Base User's Guide (SC19-4372)*
Tools Base Policy Services User's Guide	*IBM Tools Base for z/OS 1.6 Policy Services User's Guide (SC19-4374)*

Accessibility features for IMS HP Pointer Checker

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use a software product successfully.

Accessibility features

The major accessibility feature of the product is the keyboard-only operation for ISPF editors. It uses the standard TSO/ISPF interface.

Keyboard navigation

You can access the IMS ISPF panel functions by using a keyboard or keyboard shortcut keys.

For information about navigating the IMS ISPF panels using TSO/E or ISPF, refer to the following publications for information about accessing ISPF interfaces:

- *z/OS ISPF User's Guide, Volume 1*
- *z/OS TSO/E Primer*
- *z/OS TSO/E User's Guide*

These guides describe how to use ISPF, including the use of keyboard shortcuts or function keys (PF keys), include the default settings for the PF keys, and explain how to modify their functions.

IBM and accessibility

See the IBM Human Ability and Accessibility Center at http://www.ibm.com/able for more information about the commitment that IBM has to accessibility.

Chapter 2. Configuring IMS HP Pointer Checker

Before you use the utilities of IMS HP Pointer Checker, you must install the product and, if necessary, migrate from an earlier release and configure the environment to use certain features of the utilities.

Use the following checklist to complete installation, migration, and configuration of IMS HP Pointer Checker.

Table 2. Installation, migration, and configuration checklist for IMS HP Pointer Checker

Status	Task
	1. Install this product. For information about hardware and software requirements of this product, see "Processing environment" on page 17.
	2. If you have been using an earlier version of IMS HP Pointer Checker, complete the migration tasks. For more information, see "Compatibility and migration considerations" on page 19.
	3. Configure the environment. The utilities of IMS HP Pointer Checker can be used without configuration. However, certain functions require the environment to be configured accordingly. For more information, see "Configuration tasks" on page 22.

Processing environment

Verify that your hardware and software meet or exceed the minimum requirements, and install IMS HP Pointer Checker by using the SMP/E RECEIVE, APPLY, and ACCEPT commands.

Complete information about installation requirements, prerequisites, and procedures for IMS HP Pointer Checker is in the *Program Directory for IBM IMS High Performance Pointer Checker for z/OS 3.1 (GI10-8783)*.

Hardware requirements

The hardware requirements are the same as those for IMS.

For DB Historical Data Analyzer, the option to produce charts on a display terminal requires a terminal that is supported by GDDM Interactive Chart Utility (ICU).

Software requirements

IMS HP Pointer Checker for z/OS 3.1 operates in z/OS 2.1 (5650-ZOS) or later.

IMS HP Pointer Checker for z/OS 3.1 requires one of the currently supported versions of IMS or IMS Database Value Unit Edition.

The following list provides the software requirements for each utility:

HD Pointer Checker utility

DFSORT (Data Facility Sort), which is a part of z/OS, or a functionally equivalent sort and merge program is required.

The following list provides conditional requirements:

- To use the MAPDBD or the DECODEDBD functions, one of the following products must be installed:
  - IBM IMS Library Integrity Utilities for z/OS 2.2 or later (5655-U08)

© Copyright IBM Corp. 2000, 2021

  - IMS Library Integrity Utilities (5655-U08) in IBM IMS Database Solution Pack for z/OS 2.2 or later (5655-DSP)
  - IMS Library Integrity Utilities (5655-U08) in IBM IMS Database Utility Solution for z/OS 2.1 or later (5698-DUL)
- To use the full-function database HASH Check option within an image copy job, one of the following products must be installed:
  - IBM IMS High Performance Image Copy for z/OS 4.2 (5655-N45)
  - IMS High Performance Image Copy (5655-N45) in IBM IMS Database Solution Pack for z/OS 2.2 or later (5655-DSP)
  - IMS High Performance Image Copy (5655-N45) in IBM IMS Database Utility Solution for z/OS 1.1 or later (5655-DBU)
  - IMS High Performance Image Copy (5655-N45) in IBM IMS Recovery Solution Pack for z/OS 2.1 or later (5655-ISR)
- To use the HASH Check option in an IMS Database Reorganization Expert job, one of the following products must be installed:
  - IBM IMS Database Reorganization Expert for z/OS 4.1 (5655-S35)
  - IMS Database Reorganization Expert (5655-S35) in IBM IMS Database Solution Pack for z/OS 2.2 or later (5655-DSP)
  - IMS Database Reorganization Expert (5655-S35) in IBM IMS Database Utility Solution for z/OS 1.1 or later (5655-DBU)
- To use the HASH Check option in an IMS Online Reorganization Facility job, IMS Online Reorganization Facility in IBM IMS Database Solution Pack for z/OS 2.2 (5655-DSP) must be installed.
- To use the HASH Check option in an IMS Database Recovery Facility job, IMS Database Recovery Facility in IBM IMS Recovery Solution Pack for z/OS 2.1 (5655-ISR) or later must be installed.
- If the IMS management of ACBs is enabled, IBM IMS Tools Base for z/OS 1.6 or later must be installed.
- To store reports in the IMS Tools KB Output repository, IMS Tools Knowledge Base in IBM IMS Tools Base for z/OS 1.6 or later (5655-V93) must be installed.
- To use the Integrated DB Sensor function, the Database Sensor component in one of the following products must be installed:
  - IBM IMS Database Solution Pack for z/OS 2.2 or later (5655-DSP)
  - IBM IMS Database Utility Solution for z/OS 1.1 or later (5655-DBU)

HD Tuning Aid utility

- DFSORT (Data Facility Sort), which is a part of z/OS, or a functionally equivalent sort and merge program is required.
- If the IMS management of ACBs is enabled, IBM IMS Tools Base for z/OS 1.6 or later must be installed.

DB Historical Data Analyzer utility

Requires GDDM-PGF, which is a part of z/OS, to optionally produce charts on a display terminal.

Space Monitor utility

DFSORT (Data Facility Sort), which is a part of z/OS, or a functionally equivalent sort and merge program is required.

To monitor space utilization statistics about IMS online full-function database data sets, the IMS Tools Online System Interface that is provided in IBM IMS Tools Base for z/OS 1.6 or later (5655-V93) must be installed.

To provide control statements through the FABKCTL data set when the IMS management of ACBs is enabled, IBM IMS Tools Base for z/OS 1.6 or later must be installed.

Compatibility and migration considerations

Certain considerations apply when you migrate from an earlier version or release of IMS HP Pointer Checker.

The following topics discuss migration considerations, the compatibility of the utilities, and the compatibility of the HISTORY data set among different versions of the product. To migrate from an earlier release, review the following topics and complete the migration tasks.

Migration from IMS HP Pointer Checker 2.1 or 2.2

This information summarizes the compatibility and migration considerations for migrating from IMS HP Pointer Checker 2.1 or 2.2.

JCL, procedures, and input control statements that are used in IMS HP Pointer Checker 2.1 and 2.2 can be used in this version of the product. The HISTORY data set and the KEYSIN data set that are used in 2.1 and 2.2 can also be used in this version of the product.

Migration from IMS HP Pointer Checker 1.1

This information summarizes the compatibility and migration considerations for migrating from IMS HP Pointer Checker 1.1.

Subsections:

- "HD Pointer Checker" on page 19
- "HD Tuning Aid" on page 21
- "DB Historical Data Analyzer, Space Monitor, and DB Segment Restructure" on page 21

HD Pointer Checker

The following information summarizes the compatibility and the migration tasks for HD Pointer Checker.

For details about control statements and job control language used in IMS HP Pointer Checker 1.1, read the *IMS High Performance Pointer Checker for OS/390 1.1 User's Guide Volume 1 (SC27-0921)*.

Input control statements

PROCCTL

The control statements in the PROCCTL data set that are used in IMS HP Pointer Checker 1.1 can be used in this product.

Cataloged procedures

FABPP, FABPPD, and FABPPTA

The cataloged procedures FABPP, FABPPD, and FABPPTA supplied in IMS HP Pointer Checker 1.1 can be used with the load modules in this product. Some work data sets are no longer used. It is recommended that you delete them.

FABPPM, FABPPMD, and FABPPTAM

The cataloged procedures FABPPM, FABPPMD, and FABPPTAM supplied in IMS HP Pointer Checker 1.1 cannot be used. These cataloged procedures must be replaced with the procedures supplied with this product.

Recommendation for users running in multiple steps:

It is strongly recommend that you use the single-step (that is, PROC TYPE=ALL) job as in FABPPD, instead of continue using your multiple-step (that is PROC TYPE=SCAN and CHECK) job by modifying it because by using the single-step job, the performance is better, the total size of the work data sets becomes smaller, and the JCL statements are simpler. For the same reason, we recommend that you use FABPPTA rather than FABPPTAM.

User-customized cataloged procedures

If you have tailored cataloged procedures to meet your requirements and fit your environment, and have coded the scan, sort, merge, and check steps, you need to delete the sort and merge

steps, because the sort and merge steps are removed since IMS HP Pointer Checker 2.1. Also, it is better that you delete the SORTMERG= option in the PROCCTL data set because the option is ignored and you will need to change DDs of the work data sets. For more information about the DD statements for the work data set, see "FABPMAIN DD statements" on page 47.

JCL

Single-step (PROC TYPE=ALL in PROCCTL data set)
HD Pointer Checker JCL with PROC TYPE=ALL in the PROCCTL data set used in IMS HP Pointer Checker 1.1 can be used with this product. Some work data sets are no longer used in IMS HP Pointer Checker 3.1; it is recommended that you delete them.

Multiple-step (PROC TYPE=SCAN and TYPE=CHECK in PROCCTL data set)
If there is any sort and merge steps between steps PROC TYPE=SCAN and TYPE=CHECK, the JCL cannot be used because the sort and the merge steps are no longer used. The sort and merge steps are the steps invoked by PGM=SORT.

If there is no sort or merge steps between steps PROC TYPE=SCAN and TYPE=CHECK, the JCL can be used.

If more than two scan steps are invoked and the output work data sets are combined into one check step, the JCL cannot be used. The input DD names of the check step have been changed.

For the procedure recommended by IBM, see Recommendation for users running in multiple steps.

PROC TYPE=BLKMAP process JCL
If you process TYPE=BLKMAP, you must specify CHECKREC=YES in TYPE=ALL or TYPE=CHECK job, which is the preprocess of TYPE=BLKMAP.

OUTPUT data sets

KEYSIN data set
The KEYSIN data set that has been used in IMS HP Pointer Checker 1.1 is supported in this product.

HISTORY data set
The HISTORY data set that has been used in IMS HP Pointer Checker 1.1 is supported in this product. For information about the compatibility of HISTORY data sets, see "Compatibility of HISTORY data sets" on page 22.

IMS Image Copy Extensions full-function database HASH Check
JCL and catalog procedures of IBM IMS Image Copy Extensions for z/OS full-function database HASH Check function that were used with IMS HP Pointer Checker 1.1 can be used with the load modules of this product.

Work data sets
Some work data sets have been removed or the format has been changed as follows:

- HDRECS, SORTIN, SORTEX, and RECOUT are removed from the single-step process (TYPE=ALL).
- HDRECS, SORTIN, and RECOUT are removed from the multiple-step processes (TYPE=SCAN and CHECK).
- MERGIN has been changed to RECFM=VB from RECFM=FB, LRECL=40.

If the DD names of removed data sets or the previous formats are specified, HD Pointer Checker can bypass them. But it is recommended to remove such DDs because they waste DASD space.

The following DD names are changed.

Table 3. Changed DD names

Old name	New name
MERGIN	MERGIN01
SORTEX	SORTEX01

Table 3. Changed DD names (continued)

Old name	New name
MERGIN2	MERGI201
SORTEX2	SORTE201
SORTIL	SORTIL01

IMS HP Pointer Checker 3.1 replaces old DD names with new ones during its processing. If both old and new names are specified, the new one is used. Therefore, delete the old names from your JCL.

Important: New DD names are predefined in the FABPP procedure of IMS HP Pointer Checker 3.1, and old names will be ignored even if you specify them in your JCL. Change, therefore, the old names to new ones in your JCL.

IMS HP Pointer Checker 3.1 provides a new parameter, SCANGROUP=. It enables a parallel scan of data sets and improves performance. If you use more than two scan groups, you need to know new DD names of work data sets MERGIN*xx* and others. For more information about SCANGROUP and DD statements, see "DATABASE statement" on page 125 and "FABPMAIN DD statements" on page 47.

DFSORT work data sets

SORTWK*nn*, which are DFSORT work data set DD names, have been changed to SORTWK*nn*, SRTXWK*nn*, and SRTEWK*nn*. *nn* is a two-digit number. These work data sets are allocated dynamically by DFSORT. But if you specify SORTWK*nn* in your JCL for some reason (for example, the sizes are too large to be allocated dynamically) you might need to change the DD names.

HD Tuning Aid

The following information summarizes the compatibility and the migration tasks for HD Tuning Aid.

Input control statements

CTL

The control statements in the CTL data set used in IMS HP Pointer Checker 1.1 can be used in this product.

SYSIN for DFSORT

The control statements in the SYSIN data set, which are the input to DFSORT used in IMS HP Pointer Checker 1.1, can be used in this product.

Cataloged procedures

FABPPTA

The cataloged procedure FABPPTA, a combination of the HD Pointer Checker utility and the HD Tuning Aid utility, that has been supplied in IMS HP Pointer Checker 1.1 can be used with the load modules in this product.

FABPPTAM

The cataloged procedure FABPPTAM, a combination of the HD Pointer Checker utility and the HD Tuning Aid utility, has been changed in the HD Pointer Checker part. You must use the new one. For more information, see "HD Pointer Checker" on page 19.

DB Historical Data Analyzer, Space Monitor, and DB Segment Restructure

JCL to run the DB Historical Data Analyzer utility, the Space Monitor utility, or the DB Segment Restructure utility of IMS HP Pointer Checker 1.1 can be used in this version of the product.

Compatibility of HISTORY data sets

Depending on the options you have activated or set to HISTORY data sets, HISTORY data sets have several incompatibilities. This information summarizes these incompatibilities.

For details about the options and values, see “OPTION control statement” on page 386 of DB Historical Data Analyzer.

Format (MULTIENT=YES | NO)

The usage of the key field of the HISTORY data sets depends on whether you have activated multiple entries option. The activation is controlled by specifying MULTIENT=YES or MULTIENT=NO when you update HISTORY data sets. If a user application program processes the HISTORY data sets, considerations for the key field and handling of the entries depending on the option are required.

For more information about the MULTIENT option, see “OPTION control statement” on page 386. For more information about the key field, see “Format of the HISTORY data set records” on page 376.

Record types (EXPORTABLE=YES | NO)

If exportable option is activated, a new format of history record entries will be created. The activation is controlled by specifying EXPORTABLE=YES or EXPORTABLE=NO when you update HISTORY data sets. The new format is compatible with the existing records, and it is not public. It is referred to as a non-public history record.

If a user application program processes the HISTORY data sets, it should bypass the non-public records. The non-public history record is identified by the public format flag in the record. For more information about the flag, see “Format of the HISTORY data set records” on page 376.

Once the non-public records are created, the records will not be deleted even if the exportable option is deactivated. To delete them, run the delete function of the FABGHIST program.

For more information about the EXPORTABLE option, see “OPTION control statement” on page 386.

Lock mechanism (HISTLOCK=GROUP | DATASET)

The HD Pointer Checker jobs are serialized to update a HISTORY data set by the ENQ macro. Different RNAME parameters of the ENQ macro are used depending on whether you have set the HISTORY lock option to GROUP or DATASET. The setting can be changed by specifying HISTLOCK=GROUP or HISTLOCK=DATASET when you update HISTORY data sets. If you define resources of the HISTORY data sets in Global Resource Serialization (GRS) or an equivalent product, you need to specify the correct names.

For more information about the HISTLOCK option, see “OPTION control statement” on page 386.

Format (MULTIIMSID=YES | NO)

The usage of the key field of the HISTORY data sets depends on whether you have enabled the Multiple-IMSID option. The status is controlled by the specification of MULTIIMSID=YES or MULTIIMSID=NO while updating HISTORY data sets. If a user application program processes the HISTORY data sets, considerations for the key field and handling of the entries depending on the option are required.

For more information about the MULTIIMSID option, see “OPTION control statement” on page 386. For more information about the key field, see “Format of the HISTORY data set records” on page 376.

Configuration tasks

You can use the utilities of IMS HP Pointer Checker without configuration. However, the functions listed in the following table require the environment to be configured accordingly.

The configuration tasks that you must complete vary based on the functions of IMS HP Pointer Checker that you will use. Review the following table and perform only the configuration tasks that apply to your usage. These configuration tasks are not mandatory tasks; you can skip the configuration task if you do not intend to use the associated function.

Table 4. IMS HP Pointer Checker configuration tasks

Task	What you can do by completing this task
Configure the environment to store reports in IMS Tools KB For more information, see "Configuring the environment to store reports in IMS Tools KB" on page 23.	By completing this task, you can store the reports generated in HD Pointer Checker jobs in the Output repository of IMS Tools Knowledge Base. Even if you have already registered an earlier version of IMS HP Pointer Checker with IMS Tools Knowledge Base, you must register the new version of the product.
Configure HD Pointer Checker to use with IMS Database Recovery Facility For more information, see "Configuring HD Pointer Checker to use with IMS Database Recovery Facility" on page 24.	By completing this task, you can call HD Pointer Checker from IMS Database Recovery Facility jobs.
Set up the ISPF interface for DB Historical Data Analyzer For more information, see "Setting up the ISPF interface for DB Historical Data Analyzer " on page 26.	By completing this task, you can display HD Analysis Graph charts on TSO terminals.
Configure IMS Tools Online System Interface for Space Monitor For more information, see "Configuring IMS Tools Online System Interface for Space Monitor" on page 28.	By completing this task, you can monitor IMS online full-function database data sets.

Configuring the environment to store reports in IMS Tools KB

Before you can store the reports generated in HD Pointer Checker jobs in the IMS Tools KB Output repository, you must configure IMS Tools Knowledge Base. In addition to HD Pointer Checker reports, when Space Monitor is called within HD Pointer Checker jobs, Space Monitor reports are also stored in the IMS Tools KB Output repository.

About this task

When you complete this procedure, you can use the ISPF user interface to view, print, and manage reports that are generated by IMS HP Pointer Checker and that are stored in the IMS Tools Knowledge Base repository.

For the reports that can be stored in the IMS Tools KB Output repository, see "Reports generated by HD Pointer Checker" on page 151 and "Reports generated by Space Monitor" on page 155.

Important: Even if you are migrating from an earlier version of IMS HP Pointer Checker and you have already registered the earlier version of IMS HP Pointer Checker, you must register the new version of the product. This registration process does not remove the previous definition; the previous version of IMS HP Pointer Checker also works with IMS Tools KB.

Procedure

Complete the following steps to configure the IMS Tools KB environment:

1. Install IBM IMS Tools Base IMS Tools Knowledge Base.
2. Set up an IMS Tools KB server.

   For the instructions, see the topic "Configuring IMS Tools Knowledge Base" in the *Tools Base Configuration Guide for IMS*.

3. Register IMS HP Pointer Checker with IMS Tools Knowledge Base so that IMS HP Pointer Checker reports can be stored in the IMS Tools Knowledge Base repository.
   a) Use the IMS Tools Knowledge Base product administration utility (HKTAPRA0) to register IMS HP Pointer Checker, as described in the topic "Registering products" in the *Tools Base Configuration Guide for IMS*. The product definition table for registering IMS HP Pointer Checker is FAB$RDP0.

      Tip: IMS HP Pointer Checker provides sample JCL (FABPITKB JCL) in the SHPSSAMP data set, which you can use to register IMS HP Pointer Checker with IMS Tools Knowledge Base.

   b) Follow the instructions in the topic "Listing registered products and reports" in the *Tools Base Configuration Guide for IMS* to list the registered products and reports, and ensure that IMS HP Pointer Checker (the product ID is DP) has been added.
4. If needed, add the RECON.

   Follow the instructions in the topic "RECON ID (locale) administration" in the *Tools Base Configuration Guide for IMS*.
5. Verify communication with the IMS Tools Knowledge Base server.

   Verify that the systems that you will run IMS HP Pointer Checker on will have XCF communications with the IMS Tools Knowledge Base server and that the FPQ subsystem is started on each of these systems. In the *Tools Base Configuration Guide for IMS*, see the topic "Defining IMS Tools KB to the operating system".
6. Request that IMS HP Pointer Checker write reports to the IMS Tools Knowledge Base repository.

   Code the following PROC statement keywords in IMS HP Pointer Checker JCL:

   - ITKBSRVR keyword: Specify the name of the IMS Tools Knowledge Base server XCF group name.
   - ITKBLOAD keyword: If needed, specify the IMS Tools Knowledge Base load module data set.

   These keywords direct IMS HP Pointer Checker to communicate to the IMS Tools Knowledge Base server so that IMS HP Pointer Checker reports can be stored in the IMS Tools Knowledge Base repository. For details about the PROC statement, see “PROC statement” on page 108.

Configuring HD Pointer Checker to use with IMS Database Recovery Facility

You can run the HD Pointer Checker HASH Check function in IMS Database Recovery Facility jobs.

About this task

IMS Database Recovery Facility can call the HD Pointer Checker HASH Check function. To run HD Pointer Checker in IMS Database Recovery Facility jobs, you must tailor HD Pointer Checker for IMS Database Recovery Facility.

Related reading: For additional information to run the HASH Check function in IMS Database Recovery Facility, see the *IMS Recovery Solution Pack IMS Database Recovery Facility User's Guide and Reference*.

Procedure

Complete the following steps to tailor HD Pointer Checker for IMS Database Recovery Facility:

1. APF-authorize the IMS HP Pointer Checker load module library (SHPSLMD0).

   In the IMS Database Recovery Facility environment, the HD Pointer Checker program runs as an authorized program facility (APF) program.
2. Modify the FABPATH0 procedure, the FABPATHZ procedure, or both procedures.

   IMS HP Pointer Checker provides two procedures; FABPATH0 and FABPATHZ. These procedures build environmental setting for the HASH pointer checking. See “FABPATH0 and FABPATHZ procedures” on page 25 for more information about the procedures and the JCL requirements for modifying the procedures.
3. Add the procedure to one of the libraries in the SYS1.PROCLIB concatenation.
4. Set up security for the HD Pointer Checker subordinate address space.

When IMS Database Recovery Facility calls the HD Pointer Checker HASH Check function, IMS HP Pointer Checker starts the procedure, which initiates HD Pointer Checker subordinate address space. To initiate the subordinate address space under a security system, you must authorize the subordinate address space. To do so, define the STARTED class profiles that correspond to the procedure names and refresh the STARTED class. You can use the following commands. If a different procedure name is used to start the HD Pointer Checker subordinate address space, replace the procedure name in the RDEFINE command.

```
RDEFINE STARTED FABPATH0.* STDATA(USER(userid))
RDEFINE STARTED FABPATHZ.* STDATA(USER(userid))
SETROPTS RACLIST(STARTED) REFRESH
```

You can also use the started procedures table ICHRIN03 to associate started procedures with user IDs instead of using the RDEFINE STARTED command.

The user ID (*userid*) that is associated with the started task job requires the READ access authority to the following data sets:

- The library that contains the IMS HP Pointer Checker load modules
- The IMS RESLIB
- The library that contains the HALDB partition selection exit routine if you process a HALDB and the HALDB uses a HALDB partition selection exit routine
- The library that contains the DBD load modules
- The RECON data sets

FABPATH0 and FABPATHZ procedures

IMS HP Pointer Checker provides two procedures (FABPATH0 and FABPATHZ) for building environmental setting for the HASH pointer checking.

When IMS Database Recovery Facility calls the HASH Check function, HD Pointer Checker starts the procedure, which initiates a subordinate address apace as a started task to build environmental setting for the HASH pointer checking.

If you specify a procedure name in IMS Database Recovery Facility master address space JCL, HD Pointer Checker starts that procedure. If you do not specify a procedure name in IMS Database Recovery Facility master address space JCL, HD Pointer Checker starts the following procedure:

- If the job name that is assigned to a procedure that HD Pointer Checker starts is specified in IMS Database Recovery Facility master address space JCL, HD Pointer Checker starts the FABPATHZ procedure.
- If the job name that is assigned to a procedure that HD Pointer Checker starts is not specified in IMS Database Recovery Facility master address space JCL, HD Pointer Checker starts the FABPATH0 procedure.

The following figures show examples for the FABPATH0 procedure and the FABPATHZ procedure.

```
//FABPATH0 PROC  HPPCLIB1=,HPPCLIB2=
//ATH0PROC EXEC  PGM=FABPAUTH
//STEPLIB  DD DISP=SHR,DSN=&HPPCLIB1
//         DD DISP=SHR,DSN=HALDB partition selection exit
//         DD DISP=SHR,DSN=&HPPCLIB2
//SYSUDUMP DD SYSOUT=*
```

```
//FABPATHZ PROC L1=,L2=
//ATHZPROC EXEC  PGM=FABPAUTH
//STEPLIB  DD DISP=SHR,DSN=&L1
//         DD DISP=SHR,DSN=HALDB partition selection exit
//         DD DISP=SHR,DSN=&L2
//SYSUDUMP DD SYSOUT=*
```

The FABPATHZ procedure differs from the FABPATH0 procedure in the following respects:

- Parameter L1= is used instead of HPPCLIB1

- Parameter L2= is used instead of HPPCLIB2

The following EXEC and DD statements are used:

EXEC statement
A required statement. Specify the EXEC statement as follows:

```
EXEC PGM=FABPAUTH
```

STEPLIB DD
A required statement. In the FABPATH0 procedure, specify two DD statements as follows:

```
//STEPLIB  DD DISP=SHR,DSN=&HPPCLIB1
//         DD DISP=SHR,DSN=&HPPCLIB2
```

In the FABPATHZ procedure, specify two DD statements as follows:

```
//STEPLIB  DD DISP=SHR,DSN=&L1
//         DD DISP=SHR,DSN=&L2
```

&HPPCLIB1 in FABPATH0 or &L1 in FABPATHZ is used for the IMS HP Pointer Checker load module library. &HPPCLIB2 in FABPATH0 or &L2 in FABPATHZ is used for the IMS RESLIB.

Do not remove or override these DSN parameters (&HPPCLIB1, &HPPCLIB2, &L1, and &L2). HD Pointer Checker obtains the data set names from the IMS Database Recovery Facility master address space JCL and passes the data set names to these parameters. The data sets must be cataloged.

If you process a HALDB, and the HALDB uses a partition selection exit routine, FABPATH0 or FABPATHZ refers to the partition selection exit module. It is required that you do either of the following tasks:

- Store the partition selection exit module in the IMS RESLIB.
- Add a DD statement to the STEPLIB concatenation, and specify a data set name that contains the partition selection exit module.

SYSUDUMP
This optional output data set defines the output from a system ABEND dump routine. It is used only when a dump is required. Though optional, it is recommended that you include this data set.

In addition, FABPATH0 and FABPATHZ refer to the IMS and RECON*x* DD statements. These DD statements are basically not required in the procedure JCL. HD Pointer Checker obtains the data set names from the IMS Database Recovery Facility master address space JCL. The data sets must be cataloged.

The contents of the IMS and RECON DD statements are as follows:

IMS DD
The data set that contains the DBD load modules.

RECON1, RECON2, and RECON3 DDs
RECON data sets

If IMS and RECON*x* DD statements are specified in the FABPATH0 or FABPATHZ JCL, the data set names in the FABPATH0 or FABPATHZ JCL are used.

Setting up the ISPF interface for DB Historical Data Analyzer

The ISPF interface of the DB Historical Data Analyzer utility must be customized before it can be used.

Procedure

Complete these steps to set up the DB Historical Data Analyzer ISPF interface:

1. Modify the logon procedure.
   a) Ensure that the Graphical Data Display Manager (GDDM) library can be accessed as a PDS library by the TSO terminal user.

Unless the GDDM target library is specified as a link library, you must change the existing, or define a new, TSO logon procedure to contain a STEPLIB DD statement that refers to the GDDM program library (GDDMLOAD). For more information, see the GDDM products documentation.

b) Concatenate the IMS HP Pointer Checker data sets for panels and messages with the corresponding ISPF/PDF data sets. Also, allocate the IMS HP Pointer Checker data set for programs in the ISPF link library (ddname ISPLLIB) in your TSO logon procedure.

   For example, specify as follows:

```
//ISPMLIB   DD DSN=HPS.SHPSMLIB,DISP=SHR
//             DSN=ISP.SISPMENU,DISP=SHR
//ISPPLIB   DD DSN=HPS.SHPSPLIB,DISP=SHR
//             DSN=ISP.SISPMENU,DISP=SHR
//ISPLLIB   DD DSN=HPS.SHPSLMD0,DISP=SHR
```

c) If you use ISPPALT and ISPMALT for DBCS, allocate the IMS HP Pointer Checker data set to ISPPALT and ISPMALT.

For more information about ISPF, see the *z/OS ISPF User's Guide, Volume 1*.

You can also allocate these data sets by coding appropriate TSO ALLOCATE commands. By using this method, you do not need to modify your TSO logon procedure. In this case, you must allocate the data sets before you invoke ISPF.

2. Modify the command list (CLIST).

   DB Historical Data Analyzer provides a sample command list (CLIST) to allocate data sets and to invoke DB Historical Data Analyzer. This sample CLIST is named FABGCMD0 and is provided in the SHPSCLIB data set. For FABGCMD0, see Figure 191 on page 454. You might need to copy this sample CLIST to your command procedure data set, and modify it to meet your installation requirements.

3. Modify the ISPF/PDF Primary Option Menu panel.

   You can modify the ISPF Primary Option Menu panel (ISR@PRIM) to add an entry so that you can invoke DB Historical Data Analyzer by a selection code.

   The following sample ISPF Primary Option Menu has been modified to invoke DB Historical Data Analyzer by selecting option D. This option starts processing by invoking a command procedure. The FABGCMD0 CLIST can be used to start the dialog processing.

```
%-----------------------  ISPF/PDF PRIMARY OPTION MENU  ------------------------
%OPTION  ===>_ZCMD                                                             +
%                                                        +USERID   - &ZUSER
%   0 +ISPF PARMS  - Specify terminal and user parameters   +TIME     - &ZTIME
%   1 +BROWSE      - Display source data or output listings +TERMINAL - &ZTERM
%   2 +EDIT        - Create or change source data           +PF KEYS  - &ZKEYS
%   3 +UTILITIES   - Perform utility functions
%   4 +FOREGROUND  - Invoke language processors in foreground
%   5 +BATCH       - Submit job for language processing
%   6 +COMMAND     - Enter TSO command or CLIST
%   7 +DIALOG TEST - Perform dialog testing
%   8 +LM UTILITIES- Perform library administrator utility functions
%   9 +IBM PRODUCTS- Additional IBM program development products
%   C +CHANGES     - Display summary of changes for this release
%   D +DBHDA       - Invoke DB Historical Data Analyzer dialog
%   T +TUTORIAL    - Display information about ISPF/PDF
%   X +EXIT        - Terminate ISPF using log and list defaults
%
+Enter%END+command to terminate ISPF.
%
)INIT
  .HELP = ISR00003
  &ZPRIM = YES        /* ALWAYS A PRIMARY OPTION MENU      */
  &ZHTOP = ISR00003   /* TUTORIAL TABLE OF CONTENTS        */
  &ZHINDEX = ISR91000 /* TUTORIAL INDEX - 1ST PAGE         */
  VPUT (ZHTOP,ZHINDEX) PROFILE
)PROC
&ZQ = &Z
  IF (&ZCMD ¬= ' '
    &ZQ = TRUNC(&ZCMD,'.')
    IF (&ZQ = ' '
      .MSG = ISRU000
   &ZSEL = TRANS( &ZQ
                0,'PANEL(ISPOPTA)'
                1,'PGM(ISRBRO) PARM(ISRBRO01)'
                2,'PGM(ISREDIT) PARM(P,ISREDM01)'
                3,'PANEL(ISRUTIL)'
                4,'PANEL(ISRFPA)'
                5,'PGM(ISRJB1) PARM(ISRJPA) NOCHECK'
                6,'PGM(ISRPTC)'
                7,'PGM(ISRYXDR) NOCHECK'
                8,'PANEL(ISRLPRIM)'
                9,'PANEL(ISRDIIS)'
                C,'PGM(ISPTUTOR) PARM(ISR00005)'
                D,'CMD(FABGCMD0)'
                T,'PGM(ISPTUTOR) PARM(ISR00000)'
              ' ','  '
                X,'EXIT'
                *,'?' )
   &ZTRAIL = .TRAIL
 )END
```

Configuring IMS Tools Online System Interface for Space Monitor

IMS Tools Online System Interface, which is provided as a component of IMS Tools Base, is a general-purpose command interface that allows IMS tools to interface with IMS. By using IMS Tools Online System Interface, Space Monitor can monitor the latest VSAM statistics about IMS full-function database data sets even when the IMS database data sets are online.

Procedure

To monitor IMS online full-function database data sets, you must complete the configuration of IMS Tools Online System Interface in advance if that has not yet been performed.

For instructions for configuring IMS Tools Online System Interface, see the *Tools Base Configuration Guide for IMS*.

Part 2. HD Pointer Checker utility

The HD Pointer Checker utility validates databases, detecting any potential pointer problems and reporting them. Disk Address Analyzer prints the absolute disk address of user-specified relative byte address.

Use the following topics to learn about and use the HD Pointer Checker utility and Disk Address Analyzer.

Topics:

- Chapter 3, “Overview of HD Pointer Checker,” on page 31
- Chapter 4, “Using the HD Pointer Checker processor,” on page 39
- Chapter 5, “Using Disk Address Analyzer,” on page 267
- Chapter 6, “HD Pointer Checker Site Default Generation utility,” on page 271
- Chapter 7, “JCL examples for HD Pointer Checker,” on page 279
- Chapter 8, “Operational strategy recommended for HD Pointer Checker,” on page 287
- Chapter 9, “HD Pointer Checker online considerations,” on page 289
- Chapter 10, “DBRC and HD Pointer Checker,” on page 291
- Chapter 11, “Database repair guidelines,” on page 293
- Chapter 12, “Reported by HD Pointer Checker slack bytes, unknown data, and T2 errors,” on page 307
- Chapter 13, “Estimating runtime resources,” on page 311
- Chapter 14, “Performance tips for HD Pointer Checker,” on page 319
- Chapter 15, “HD Pointer Checker options for debugging,” on page 321

© Copyright IBM Corp. 2000, 2021

Chapter 3. Overview of HD Pointer Checker

The HD Pointer Checker utility detects and reports problems of direct pointers and other types of pointers. The reports generated by HD Pointer Checker pinpoint both the errors and their locations within IMS databases. HD Pointer Checker also produces many reports to help in database tuning such as redundant space in IMS databases.

You can use the HD Pointer Checker utility to:

- Monitor databases regularly to detect either direct pointer errors or the need for a database reorganization.
- Analyze a corrupted database as part of the repair process, thus reducing the diagnostic and repair time spent by programmers or analysts.

Topics:

- "Program functions" on page 31
- "Program structure" on page 34
- "Processes and data flow" on page 34

Program functions

The following subsections explain the program functions of the HD Pointer Checker utility.

Subsections:

- "Detecting errors in a database" on page 31
- "Describing the database" on page 32
- "Printing HDAM, HIDAM, PHDAM, or PHIDAM database blocks" on page 33
- "Finding absolute disk addresses" on page 33
- "Finding all pointers to a target segment" on page 33
- "Creating history records" on page 33
- "Storing reports in the IMS Tools KB Output repository" on page 33
- "Calling Space Monitor" on page 33
- "Collecting sensor data with the Integrated DB Sensor function" on page 34

Detecting errors in a database

Detecting errors in a database is the primary function of HD Pointer Checker.

HD Pointer Checker finds errors by checking direct pointers (physical pointers, logical pointers, hierarchical pointers, pointers to free space, and index pointers) in IMS full-function databases.

The supported databases are as follows:

- HDAM databases
- HIDAM primary and index databases
- PHDAM databases
- PHIDAM primary and index databases
- HISAM (including SHISAM) databases
- HDAM and HIDAM secondary index databases
- PHDAM and PHIDAM secondary index databases (PSINDEX)

© Copyright IBM Corp. 2000, 2021

HD Pointer Checker checks the consistency between direct pointers and the Relative Bytes Address (RBA) of segments and free space.

HD Pointer Checker provides the following two methods to check pointers:

Standard Check function
HD Pointer Checker compares the pointers and RBAs of the pointed segments one by one.

HASH Check function
HD Pointer Checker compares the sum of pointer values with the sum of RBAs of the pointed segments, rather than comparing each of the pointer values and segments one by one.

The Standard Check function takes more DASD and CPU resource and takes longer elapsed time than the HASH Check function. The HASH Check function provides fast pointer checking. However, it does not show the details of errors, and some optional functions are not available for the HASH Check function. Therefore, the HASH Check function is more suitable for regular checking while the Standard Check function is recommended when checking for some more important points. For example, you can use the Standard Check function to identify the location of an error that is found in a HASH Check.

HD Pointer Checker has the following optional checks in addition to the direct pointer check:

Index Key Check function
Detects incorrect index keys for the following databases:

- HIDAM and PHIDAM primary index database
- Secondary index database for HDAM, HIDAM, HISAM, PHDAM, and PHIDAM

Symbolic Pointer Checking
Detects the missing and errors in the symbolic LP pointers and the secondary index symbolic pointers.

HALDB EPS Checking
Detects the inconsistency among the HALDB extended pointer sets, indirect pointers in the indirect list data set (ILDS), and the RBAs of pointed segments.

HALDB Reorganization Number Verification
Detects errors in HALDB partition reorganization numbers by comparing the reorganization numbers in the HALDB partitions with the reorganization numbers in the RECON data sets.

HALDB Duplicate ILKs Checking
Checks whether HALDB partition reorganization numbers in HALDB partitions are corrupted, and whether incorrect ILKs exist in HALDB databases. This check is done by comparing the reorganization numbers in the HALDB partitions with the reorganization numbers in all ILKs in the HALDB database. HALDB partition reorganization numbers can become corrupted by inappropriate reorganization procedures and cause incorrect ILKs.

If errors are detected in the direct pointer checking and the optional checking, HD Pointer Checker reports the pointer errors. When a pointer error is reported, this means that the database is damaged.

Other than pointer errors, HD Pointer Checker reports T2 errors, if a database contains redundant spaces that are not segments nor free spaces. Such a space is called *T2 record* in HD Pointer Checker. When a T2 error is reported, it does not mean that the database is damaged but just indicates that there is some redundant space in the database. When HD Pointer Checker detects a pointer error or a T2 error, it notifies it by a message and return code. Optionally, it sends a notification message to TSO user IDs.

For information about T2 errors, see Chapter 12, “Reported by HD Pointer Checker slack bytes, unknown data, and T2 errors,” on page 307.

Describing the database

HD Pointer Checker prints a detailed description of the condition of the IMS database. The description includes comprehensive statistical information about pointers, segments, and free space.

Printing HDAM, HIDAM, PHDAM, or PHIDAM database blocks

HD Pointer Checker prints hexadecimal and character dumps of database control intervals or blocks. Each dump includes a map of all the segments and free space elements in the block, as well as the relative byte address (RBA) for each printed line.

Finding absolute disk addresses

HD Pointer Checker converts relative byte addresses (RBAs) into the corresponding absolute disk addresses. It calculates the cylinder, track, record, and offset for each input RBA.

You can also print the absolute disk addresses of user-specified RBAs by running Disk Address Analyzer (FABPCHRO program) in a stand-alone job. For more information, see Chapter 5, “Using Disk Address Analyzer,” on page 267.

Finding all pointers to a target segment

HD Pointer Checker lists the RBAs of all pointers (in other segments, possibly in other databases) that point to a specific target segment.

Creating history records

The results of an HD Pointer Checker run are stored in the HISTORY data set as a historical record. For details, see “Creating a HISTORY data set ” on page 378.

Storing reports in the IMS Tools KB Output repository

You can store the reports of HD Pointer Checker and, when Space Monitor is called from an HD Pointer Checker job, Space Monitor reports in the IMS Tools KB Output repository. To store the reports, you must set up the environment. For more information, see “Configuring the environment to store reports in IMS Tools KB” on page 23.

Calling Space Monitor

HD Pointer Checker can call the Space Monitor utility and process the following functions:

- Monitor and log data set space utilization
- Describe space utilization

The Space Monitor function is called when the SPMNIN and SPMNSPDT DD statements are specified in FABPMAIN JCL, or when the SPMNSPDT DD statement and OPTION SPMN=YES is specified in the PROCCTL data set.

If you want to monitor the latest space utilization of VSAM data sets of IMS online full-function databases, you must specify PGM=FABPPC00 in the EXEC statement and call Space Monitor by setting SPMN=YES on an OPTION statement.

If you want to store Space Monitor reports in the IMS Tools KB Output repository, you must call Space Monitor by specifying SPMN=YES on the OPTION statement.

Related reading:

- Chapter 24, “Overview of Space Monitor,” on page 485
- “Restrictions for calling Space Monitor” on page 41
- “FABPMAIN EXEC statement” on page 44
- “FABPMAIN DD statements” on page 47
- “FABPMAIN PROCCTL data set” on page 107

Collecting sensor data with the Integrated DB Sensor function

You can invoke the Integrated DB Sensor function to store sensor data while running HD Pointer Checker.

When the Integrated DB Sensor function is called, DB Sensor collects statistics about IMS databases and stores the data in the IMS Tools Knowledge Base Sensor Data repository. The stored data can be used by Autonomics Director, Policy Services, and Management Console for database analysis and tuning purposes.

To store statistics about IMS databases, DB Sensor scans databases and collects information about the characteristics of the organization of the data in each database. It also collects information from the system catalog, VSAM catalog, and Volume Table of Contents (VTOC). DB Sensor stores this information as *sensor data* in the Sensor Data repository.

The data in the Sensor Data repository is used in Autonomics Director jobs to monitor and maintain the health, performance, and recoverability of the database. In Autonomics Director jobs, policy evaluation of Policy Services is internally called to evaluate the database state based on the stored sensor data. When the jobs end, you can use Management Console to view graphical visualization and charting of sensor data, any exceptions that were detected by the policy evaluations, and recommendations for resolving the exceptions.

IMS Tools Knowledge Base, Policy Services, and Autonomics Director are provided in IBM IMS Tools Base for z/OS. For more information about these tools, see the following information:

- *Tools Base Autonomics Director User's Guide*
- *Tools Base IMS Tools Knowledge Base User's Guide*
- *Tools Base Policy Services User's Guide*
- *Management Console User's Guide*

To invoke DB Sensor, specify PGM=FABPPC00 in the EXEC statement and SENSOR=Y on the PROC statement in the PROCCTL DD.

Related reading:

- “Restrictions for the Integrated DB Sensor function” on page 42
- “FABPMAIN EXEC statement” on page 44
- “PROC statement” on page 108

Program structure

The HD Pointer Checker processor (FABPMAIN) runs under the IMS batch region controller (DFSRRC00) and controls all of the HD Pointer Checker processes except for the Disk Address Analyzer (FABPCHRO program).

The FABPCHRO program runs as a batch job. The FABPCHRO program prints the absolute disk address of user-specified relative byte address.

HD Pointer Checker can run with multiple IMS versions and releases without reinstalling the product, as long as the version and release are supported.

Processes and data flow

The HD Pointer Checker processor (FABPMAIN) controls and invokes all or some of the following HD Pointer Checker processes and DFSORT processes as one job based on the control statements.

In a typical HD Pointer Checker job (single-step job), the following processes are run:

- SCAN process
- CHECK process
- BLOCKMAP process (this process is run only when pointer errors are detected)

Subsections:

- "SCAN process" on page 35
- "CHECK process" on page 35
- "BLOCKMAP process" on page 36
- "Data flow" on page 36

SCAN process

The SCAN process reads the input database data sets or image copy data sets. The process also includes the following processes:

For HISAM
The SCAN process creates sort records, or sums hash values for pointers and segments in the HISAM databases.

For INDEX and PSINDEX
The SCAN process creates sort records and key records for pointers in the HIDAM and PHIDAM primary index and secondary index databases. It also sums up hash values for pointers to the HIDAM, PHIDAM, and primary databases.

For HDAM, HIDAM, PHDAM, and PHIDAM
The SCAN process creates sort records, or sums up hash values for pointers and segments in the HDAM, HIDAM, PHDAM, and PHIDAM databases. It also creates both key records for source segments and root segment key records in the HDAM, HIDAM, PHDAM, and PHIDAM databases for the Index Key check. The root segment key records are also created in the KEYSIN data set.

The SCAN process also:

- Reads RECON data sets and validates the HALDB partition reorganization numbers (HALDB Reorganization Number Verification).
- Prints statistical information, database error messages, and error-correction data (maps and dumps of database blocks).
- Runs DFSORT (or its equivalent program), and sorts all of the sort records.

CHECK process

The CHECK process includes the following processes:

HASH Check
This process matches the hash totals of pointers and segments generated by the SCAN process (HISAM, INDEX, and HDAM/HIDAM/PHDAM/PHIDAM processes) to give a general indication of database integrity.

Validate/Evaluate
This process validates pointers, evaluates segments, prints database error messages, and creates a control record for each database error.

Index Key Check
This process matches key data between index pointer segments and HIDAM/PHIDAM root segments, or HISAM, HDAM, HIDAM, PHDAM, or PHIDAM pointer source segments. This process also prints database error messages.

Symbolic Pointer Checking
This process validates symbolic LP pointers and secondary index symbolic pointers.

EPS Healing and Checking
This process refers to the indirect list data set (ILDS) and validates the inconsistency among the HALDB Extended Pointer Sets, indirect pointers in the ILDS, and the RBAs of pointed segments.

HALDB Duplicate ILKs Checking
This process checks for corrupted HALDB partition reorganization numbers and incorrect ILKs.

BLOCKMAP process

The BLOCKMAP process prints error-correction data (pointers to segments with errors, and the maps and dumps of database blocks that contain the segments with errors). This process can run as a separate job (or job step) on the control statements.

Data flow

The following figure shows the data flow for HD Pointer Checker.

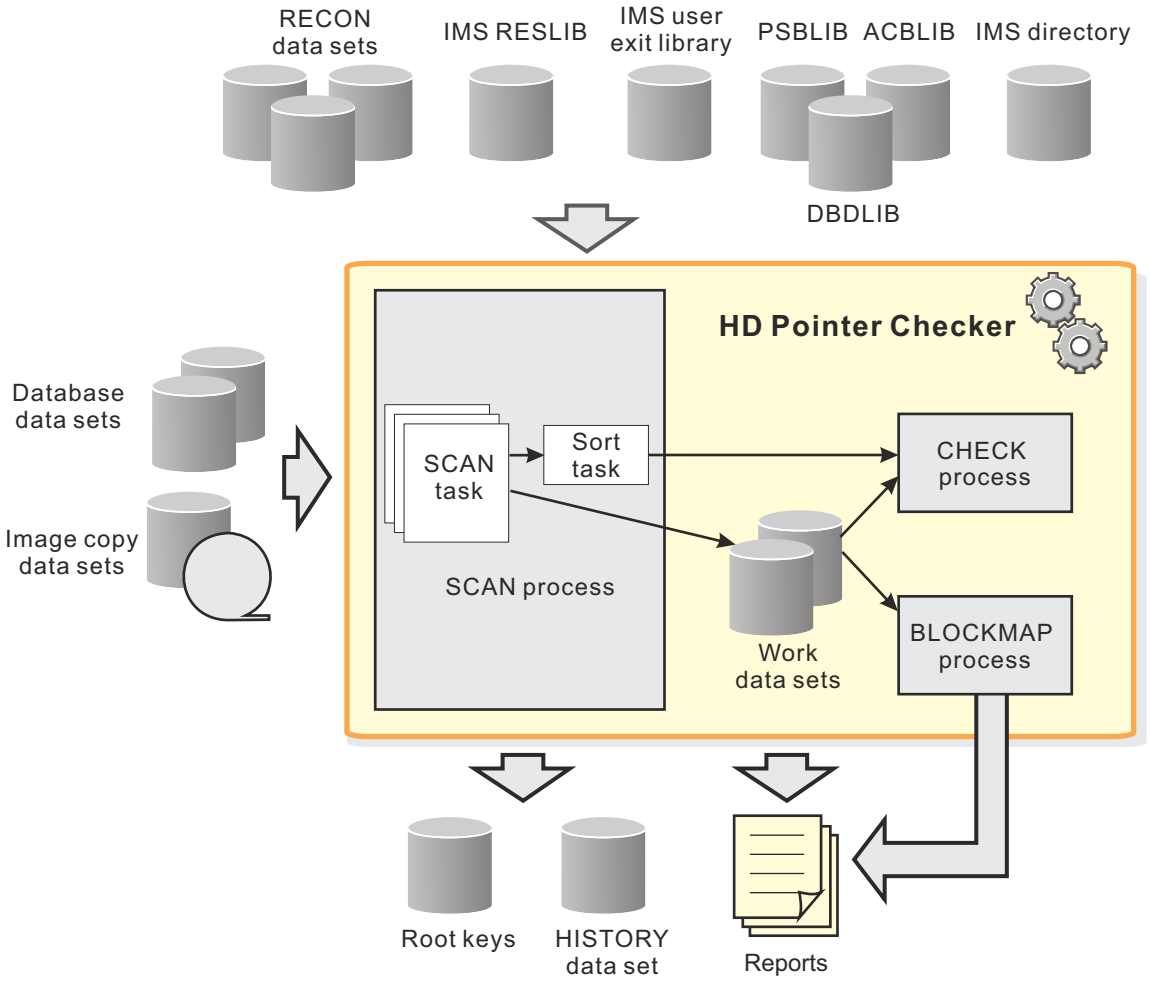


Figure 1. Data flow for HD Pointer Checker

The three processes of HD Pointer Checker (SCAN, CHECK, and BLOCKMAP processes) are typically run in a single job step as shown in the figure. This execution type is referred to as *single-step job*. They can also be separated into multiple job steps or multiple jobs. Such execution type is referred to as *multiple-step job*.

You can specify the execution type by using the PROCCTL PROC TYPE keyword. PROC TYPE=ALL specifies to run all these processes in a single-step job. If you want to run these processes individually or in a multiple-step job, use PROC TYPE=SCAN, TYPE=CHECK, or TYPE=BLKMAP. For more information about the TYPE keyword, see “PROC statement” on page 108.

Recommendation: It is strongly recommended that you run these processes in a single-step job (that is, specify PROC TYPE=ALL, and not PROC TYPE=SCAN and PROC TYPE=CHECK) because if you run them in a same job step, the JCL statements will be simpler, the performance will improve, and the total size of the work data sets will be smaller.

You can run HD Pointer Checker for several databases in a single run. The best way is to run with a minimal set of logically related databases in one job.

Important: It is important to include *all* logically related databases and index databases in the same run. Otherwise, the pointer checking will be incomplete, and huge number of invalid error messages might result.

In a typical job stream, the following HD Tuning Aid programs and sort program are also run:

- FABTROOT program prints the Actual Roots Per Block report and creates sort records to be used to create other reports.
- DFSORT (or its equivalent program) sorts all of the sort records from the previous job step.
- FABTRAPS program prints the Assigned Roots Per Rap report and the Assigned Roots Per Block report.

Disk Address Analyzer (FABPCHRO program) is usually run in a stand-alone job. The FABPCHRO program prints the absolute disk address of user-specified relative byte addresses. For more information, see Chapter 5, “Using Disk Address Analyzer,” on page 267.

The following table can be used as a guide in selecting the proper job process.

Table 5. Selecting job steps for HD Pointer Checker and HD Tuning Aid

Job function	Job processes	Applicable database
Checking pointers	FABPMAIN	This process accepts any combination of databases.
Checking pointers and root-segment locations	1. FABPMAIN 2. FABTROOT 3. DFSORT 4. FABTRAPS	The FABPMAIN process accepts any combination of databases. FABTROOT, DFSORT, and FABTRAPS processes accept HDAM, HIDAM, PHDAM, and PHIDAM databases.
Finding disk addresses	FABPCHRO	Any database

Chapter 4. Using the HD Pointer Checker processor

The HD Pointer Checker processor (FABPMAIN) runs under the IMS batch region controller (DFSRRC00) as one job step, and controls all of the HD Pointer Checker processes.

A typical job stream runs both HD Pointer Checker and the HD Tuning Aid. See Chapter 16, “Overview of HD Tuning Aid,” on page 327 for details about the HD Tuning Aid utility.

Topics:

- “Restrictions and considerations” on page 39
- “Running HD Pointer Checker” on page 43
- “Job control language” on page 44
- “Input” on page 107
- “Output” on page 151

Restrictions and considerations

Before you use the HD Pointer Checker utility, review the following restrictions and considerations.

General restrictions

The following restrictions apply to using the HD Pointer Checker utility.

The HD Pointer Checker can be used for the following IMS databases:

- HDAM
- PHDAM
- HIDAM and primary index databases
- PHIDAM and primary index databases
- HISAM databases
- HDAM, HIDAM, and HISAM secondary index databases
- PHDAM and PHIDAM secondary index databases (PSINDEX)

HD Pointer Checker does not support IMS Partition DB (5697-A06, 5697-D85) or any other products with an equivalent function.

HD Pointer Checker checks pointers pairwise: It looks at a pointer and its target to determine if there is an error. It does not look at all segments in the entire twin chain at the same time. Errors can sometimes occur in a way that can "fool" the HD Pointer Checker into thinking there are no errors. For instance, the PP pointer of a child segment might point to the wrong parent—that is to say the pointer points to the correct segment type, but the wrong key. However, this situation is extremely rare.

Restrictions and considerations by database organization types

Certain restrictions and considerations apply when you run the HD Pointer Checker utility for specific database organization types.

Subsections:

- “SHISAM and HISAM databases” on page 40
- “HDAM, HIDAM, PHDAM, and PHIDAM databases whose size is greater than 4 GB” on page 40
- “HALDB databases” on page 40
- “Secondary index databases” on page 40

© Copyright IBM Corp. 2000, 2021

SHISAM and HISAM databases

- HD Pointer Checker supports SHISAM databases. Because SHISAM databases have no direct pointers, no pointer checking is done. However, several reports presenting various segment information about SHISAM databases are generated.
- HD Pointer Checker supports HISAM databases. However, the direct-address pointers in the HISAM databases can be validated correctly only after an initial load or a reorganization. DL/I does not set a delete flag in the logical record in a HISAM overflow data set when the record is deleted. Therefore, the deleted logical record remains in the HISAM database. Alternatively, DL/I deletes the direct-address pointer that points the logical record. Therefore, in such a case, there is no direct-address pointer pointing to the logical record. HD Pointer Checker cannot determine correctly, such status caused by the segment deletion or some kind of pointer error. HD Pointer Checker determines the status as correct. When some logical records in the overflow data set of HISAM database are not pointed to by any of the direct address pointers, HD Pointer Checker writes message FABP0973W or FABP1992W to the report and returns RC=00.

HDAM, HIDAM, PHDAM, and PHIDAM databases whose size is greater than 4 GB

For an HDAM or an HIDAM database that uses OSAM access method, a database data set with an even-numbered block size might exceed 4 GB. For a PHDAM or a PHIDAM database that uses OSAM access method, the data set size of the database that is registered as DSORG=OSAM8G in RECON data sets might also exceed 4 GB. In such a case, the following rule applies:

- The highest bit (bit 33) of an RBA with a capacity of 8 GB must be moved to the lowest unused bit position (bit 1). You should use the 32-bit value to show the original RBA.

  For example, to specify the hexadecimal value x'10000F000' as a 32-bit odd value, specify as follows:

  ```
  BLOCKDUMP=(0000F001,001)
  ```

  Do not use a 32-bit odd value to specify an original odd RBA. An odd value is interpreted by the HD Pointer Checker utility as an RBA beyond 4 GB.

HALDB databases

- If an online reorganization has not completed, there will be a HALDB in two active sets of data sets (both A-J&X and M-V&Y), and HD Pointer Checker cannot be run for those HALDBs.
- Pointer checking is not performed for HALDB partitions that are marked as disabled in the RECON data sets.

Secondary index databases

When checking the suppressed index pointer segment, the following restrictions apply:

- The suppressed segment is checked during the scan of the INDEXed database.
- When a /CK field is specified on the SUBSEQ operand of the XDFLD statement, HD Pointer Checker cannot get the field data. If the Secondary Index Database Maintenance Exit routine refers to a /CK field, the result is unpredictable.

Restrictions when using image copy data sets as input

The following restrictions apply when the input to the HD Pointer Checker is an image copy data set.

- HD Pointer Checker accepts the following types of image copy as input database data set:
  - A batch image copy
  - A compressed batch image copy taken with IMS HP Image Copy
  - An SMSNOCIC type image copy and an SMSOFFLC type image copy (Exception: SMSNOCIC type image copy of an encrypted database data set is not supported. If used, the result is unpredictable.)

  - A Fast Recovery image copy taken with IMS HP Image Copy 4.1 or later
- HD Pointer Checker can process the following image copies. However, if the database is updated while image copy is being taken, HD Pointer Checker might detect pointer errors even if there are actually no pointer errors.
  - An online image copy
  - A concurrent image copy taken by a batch image copy or IMS HP Image Copy
  - An SMSCIC type image copy and an SMSONLC type image copy (Exception: SMSCIC type image copy of an encrypted database data set is not supported. If used, the result is unpredictable.)
- HD Pointer Checker does not support Database Image Copy 2 (IC2) image copy data sets that contain multiple image copies. For more information about online image copy and concurrent image copy, see Chapter 9, "HD Pointer Checker online considerations," on page 289.
- If the input to the HD Pointer Checker is a batch image copy data set created from an OSAM LDS data set, HD Pointer Checker assumes that the OSAM LDS data set has the extended addressability attribute defined and determines the size limit for the database data set.

Restrictions for the HASH Check function

The following restrictions apply when you run HASH check.

- A pointer value must correspond to the RBA of the segment to which the pointer points. The sum of the pointer values for a specific pointer type also must correspond to the sum of the RBAs of the given segment type.
- The location of the errors cannot be determined precisely.
- Pointer value errors might theoretically compensate, but the probability to make such compensations is extremely low.
- Errors on the following pointer types cannot be detected by the HASH Check function:
  - Index pointers in PSINDEX, or logical pointers in HALDB, because the index list entry (ILE) in the indirect list data set (ILDS) is not checked
  - Symbolic pointers
- If /CK fields are defined by the SUBSEQ operand of the XDFLD statement of the primary database, the Index Key Check cannot be done between that database and its associated secondary index databases.

Considerations for running HD Pointer Checker in multiple-step jobs

In TYPE=SCAN and TYPE=CHECK job steps, take note of the following considerations.

- Performance is lower and sizes of the work data sets are larger than a TYPE=ALL job.
- The JCL statements are more complex than in the TYPE=ALL job.
- When the scan steps, which are composed of multiple jobs, run in a ULU region, be careful when specifying independent—that is, with neither logical nor index relation—databases. For details, see the description of message FABP2104E in Chapter 37, "Messages and codes," on page 605.

Because these restrictions or notices do not apply to the TYPE=ALL job, it is strongly recommend that you select the TYPE=ALL job. To do so, specify PROC TYPE=ALL in the PROCCTL statement.

Restrictions for calling Space Monitor

The following restrictions apply when calling the Space Monitor utility from an HD Pointer Checker job.

Space Monitor can be called from the HD Pointer Checker FABPMAIN program, the single-step HASH checking option of IMS HP Image Copy, and IMS Online Reorganization Facility. However, Space Monitor cannot be called from HD Pointer Checker when it is run in the following environments:

- The multiple-step HASH checking option of IMS HP Image Copy
- IMS Database Reorganization Expert

- IMS Database Recovery Facility

When you enable Space Monitor to monitor IMS online full-function databases, the following restrictions apply:

- You cannot run HD Pointer Checker in the IMS region controller program (DFSRRC00). PGM=FABPPC00 must be specified on the EXEC statement instead of DFSRRC00.
- If you specify the SPMNIN DD statement in FABPMAIN JCL, and if Space Monitor is called, Space Monitor cannot monitor the latest space utilization of VSAM data sets of IMS online full-function databases. Space Monitor must be called with the SPMN keyword of the OPTION statement.

For more information about these parameters, see the following topics:

- “FABPMAIN EXEC statement” on page 44
- “FABPMAIN DD statements” on page 47
- “FABPMAIN PROCCTL data set” on page 107

Restrictions for the Integrated DB Sensor function

Certain restrictions apply when the Integrated DB Sensor function is used in HD Pointer Checker jobs.

When DB Sensor is called from HD Pointer Checker, the following restrictions apply:

- Image copy data sets cannot be specified as input database data sets.
- Only a several of data sets of the database cannot be specified as input database data sets. All the data sets of the database must be specified as the input.
- HD Pointer Checker cannot run in the IMS region controller program (DFSRRC00). PGM=FABPPC00 must be specified on the EXEC statement instead of DFSRRC00.
- HD Pointer Checker can be executed in the DBB region only if the IMS management of ACBs is enabled.

For more information about using the Integrated DB Sensor function, see “FABPMAIN EXEC statement” on page 44 and “FABPMAIN PROCCTL data set” on page 107.

Certain considerations apply when collecting sensor data from IMS online full-function databases. For more information, see the considerations topics in the *IMS Solution Packs Data Sensor User's Guide*.

Restrictions and considerations for running HD Pointer Checker when the IMS management of ACBs is enabled

The following restrictions apply when the IMS management of ACBs is enabled.

- HD Pointer Checker does not support IMS catalogs that are not registered to the DBRC RECON data sets when EXEC PGM=FABPPC00 is specified.
- When you run HD Pointer Checker in the ULU region, you must specify a DBD name on the PARM parameter of the EXEC statement. The DBD name can be of any DBD name that is specified on the DATABASE statements of the PROCCTL DD statement.
- If you use an alias name for the IMS catalog, you must specify EXEC PGM=DFSRRC00 and run HD Pointer Checker in the DBB region.

For information about the IMS management of ACBs, see the topic "IMS management of ACBs" in *IMS System Definition*.

Considerations for calling HD Pointer Checker from IMS Database Reorganization Expert

Certain considerations apply when the HD Pointer Checker utility is called from an IMS Database Reorganization Expert job.

When HD Pointer Checker is called from IMS Database Reorganization Expert 4.1, string "N/A" is set to the database data set name fields in HD Pointer Checker reports. For the data set names, see the data set information report of IMS Database Reorganization Expert.

Restrictions and considerations for calling HD Pointer Checker from IMS Database Recovery Facility

The following restriction and consideration apply when the HD Pointer Checker utility is called from IMS Database Recovery Facility.

- If HIDAM primary index databases and secondary index databases are built by IMS Index Builder during an IMS Database Recovery Facility job, string "N/A" is set to the index database data set name fields in HD Pointer Checker reports. For the data set names, see IMS Index Builder reports.
- If secondary index databases with an overflow data set are built by IMS Index Builder during an IMS Database Recovery Facility job, HASH Check cannot be done for the pointers that point to logical records in the overflow data set.

Running HD Pointer Checker

To check database pointers with HD Pointer Checker, select a JCL procedure to use or prepare JCL of your own.

About this task

The following procedure describes how to code JCL for HD Pointer Checker.

You can also refer to the JCL examples provided in Chapter 7, “JCL examples for HD Pointer Checker,” on page 279.

Procedure

1. Determine whether to use a JCL procedure or to prepare JCL of your own.
2. Determine the processing type for the job.

   See “Processes and data flow” on page 34 and determine the processing type for the job; either single-step job or multiple-step job.

   Recommendation: It is strongly recommended that you use single-step job because if you run the processes in a same job step, the JCL statements will be simpler, the performance will improve, and the total size of the work data sets will be smaller.

   If you want to use a JCL procedure, see “JCL procedures” on page 69 for a list of JCL procedures that are distributed with the product and select the appropriate JCL procedure.
3. Code the JCL statements. If you use a JCL procedure, modify the JCL procedure to suit your environment.
   a) Code or modify the EXEC statement by referring to “FABPMAIN EXEC statement” on page 44.
   b) Code or modify the DD statements by referring to “FABPMAIN DD statements” on page 47.
4. Code the control statements in the PROCCTL data set.
   a) Code the PROC statement.

      Code the TYPE keyword to specify the processing type and, if necessary, code other keywords on the PROC statement.

For more information about the keywords for the PROC statement, see “PROC statement” on page 108.

b) Code the DATABASE statements.

If you specify TYPE=ALL or TYPE=SCAN on the PROC statement, you must specify the DB keyword. If necessary, code other keywords on the DATABASE statement.

For more information about the keywords for the DATABASE statement, see “DATABASE statement” on page 125.

c) Code other statements in the PROCCTL data set.

You can code OPTION, REPORT, and END statements. For more information about these statements, see the following topics:

- “OPTION statement” on page 131
- “REPORT statement” on page 139
- “END statement” on page 143

5. If you specified the HISTORY=YES on the OPTION statement, prepare a HISTORY data set.

The HISTORY data set is required when the HISTORY=YES option is used. If you do not have the HISTORY data set yet, allocate the HISTORY data set and use the DB Historical Data Analyzer utility to initialize it. For more information about preparing a HISTORY data set, see “Preparing a HISTORY data set” on page 376.

6. Submit the job.
7. Interpret the output reports.

See “Output” on page 151 for descriptions of the HD Pointer Checker reports.

What to do next

IMS HP Pointer Checker provides the HD Pointer Checker Site Default Generation utility. By using this utility, you can set your own default value for the PROCCTL statement. Use this utility if you want to change the system default values of the HD Pointer Checker control statements. For more information, see Chapter 6, “HD Pointer Checker Site Default Generation utility,” on page 271.

Job control language

The following topics contain information about the job control language (JCL) of HD Pointer Checker.

FABPMAIN EXEC statement

To run the HD Pointer Checker processor (FABPMAIN), supply an EXEC statement with PARM parameters.

Subsections:

- “EXEC statement format” on page 44
- “Additional requirements for processing IMS catalog databases” on page 46
- “Additional requirements for running HD Pointer Checker when the IMS management of ACBs is enabled” on page 46

EXEC statement format

You can run the HD Pointer Checker processor (FABPMAIN) with two methods.

The first method is to run the FABPMAIN program in the IMS region controller program (DFSRRC00). To use this method, specify PGM=DFSRRC00 in the EXEC statement and specify parameters for the IMS region controller program as follows:

```
//        EXEC PGM=DFSRRC00,
//            PARM=(region,FABPMAIN,psbname,,,,,,,,,,dbrc,N,
//            ,,,,,,,,,imsplex,,'DBRCGRP=dbrcgrp')
```

The other method is to run the FABPMAIN program in the FABPPC00 program. In this method, the FABPMAIN program runs under the IMS region controller program (DFSRRC00) internally. To use this method, specify PGM=FABPPC00 in the EXEC statement and specify parameters for the IMS region controller program as follows:

```
//        EXEC PGM=FABPPC00,
//            PARM=(region,FABPMAIN,psbname,,,,,,,,,,dbrc,N,
//            ,,,,,,,,,imsplex,,'DBRCGRP=dbrcgrp')
```

Requirement: To use the Integrated DB Sensor function or to monitor the latest VSAM statistics of IMS online full-function databases with the Space Monitor process that is called within an HD Pointer Checker job, you must run the FABPMAIN program in the FABPPC00 program.

With both methods, the number of commas after *psbname* is 11. The PARM parameter has the same format as that used in the DLIBATCH or the DBBBATCH procedure. For information about the format, see *IMS System Definition*.

The following subparameters can be specified for PARM:

region
Required parameter that specifies an IMS region type. The possible values are ULU, DLI, or DBB.

ULU
Runs HD Pointer Checker as a utility batch program region (ULU region) by using the DBD library.

DLI
Runs an offline DL/I batch processing program region (DLI region) by using the PSB and DBD libraries.

DBB
Runs an offline DL/I batch processing program region (DBB region) by using the ACB library.

Requirement: To use the Integrated DB Sensor function when the IMS management of ACBs is not enabled, specify ULU or DLI.

psbname
Specifies the PSB name that contains the PCB of the processing databases. The PSB name must be defined as a PSB with LANG=ASSEM, LANG=COBOL, or LANG=PL/I. It must refer directly or indirectly to all input databases. The PSB, in which less than 2,500 of database data sets are referred to, can be used in the HD Pointer Checker run.

It is required if DLI or DBB is specified for the region parameter. It is not required if ULU is specified for the region parameter.

dbrc
Specifies whether the Database Recovery Control facility is to be used. The possible values are Y or N.

Y
Uses the Database Recovery Control facility

N
Does not use the Database Recovery Control facility

When HD Pointer Checker runs in the following condition, you must specify Y:

- HISTORY=Y is specified in the PROCCTL data set.
- The database to process is a HALDB.
- If you specify an image copy data set as input and you omit the image copy data set DD statement. HD Pointer Checker refers to the RECON data set for the image copy data set name and allocates the data set dynamically.

imsplex
Specifies the IMSplex name that is used in the IMS DBRC SCI registration. If the IMSplex name is set in the RECON data sets, you must supply the IMSplex name by either of the following methods:

- Specify the IMSplex name on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

DBRCGRP=*dbrcgrp*
Specifies the DBRC group ID that is used in the IMS DBRC SCI registration. If the DBRC group ID is set in the RECON data sets, you must supply the DBRC group ID by either of the following methods:

- Specify the DBRC group ID on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

Additional requirements for processing IMS catalog databases

When you process an IMS catalog database, the following additional requirements must be met:

- If the IMS catalog database to be processed is registered in the RECON data sets, and an alias is not defined for that database, you can run HD Pointer Checker for that IMS catalog database in the same manner as it is run for HALDBs.
- When you run HD Pointer Checker against an IMS catalog database in the DLI or DBB region, you must specify one of the IMS catalog PSBs (DFSCP000, DFSCP001, or DFSCP002), which are provided by IMS, for the *psbname* parameter.
- When you run HD Pointer Checker for an IMS catalog database that is not registered in the RECON data set or that has an alias defined, specify the DFSDF parameter for the PARM parameter. The DFSDF parameter must be enclosed in single quotes. The value must be the 3-character suffix (*xxx*) of the DFSDF*xxx* member (in IMS.PROCLIB data set) that contains the names of unregistered IMS catalog databases. For example:

```
//         EXEC PGM=DFSRRC00,
//              PARM=(DLI,FABPMAIN,psbname,,,,,,,,,,dbrc,N,
//            ,,,,,,,,,,,'DFSDF=xxx')
```

- When you run HD Pointer Checker in a ULU region with DBRC=N for an IMS catalog database that is not registered in the RECON data set, specify DFSCD000 for the DBD name for the IMS catalog database. For example:

```
//         EXEC PGM=DFSRRC00,
//               PARM=(ULU,FABPMAIN,DFSCD000,,,,,,,,,,N,N,
//             ,,,,,,,,,,,'DFSDF=xxx')
```

  If you define an alias name for the IMS catalog database, specify the alias name instead of DFSCD000.

If you specify the library that contains the Catalog Definition exit routine (DFS3CDX0) in the STEPLIB DD statement, you do not need to specify the DFSDF=*xxx* parameter.

Additional requirements for running HD Pointer Checker when the IMS management of ACBs is enabled

To run HD Pointer Checker when the IMS management of ACBs is enabled, specify the EXEC statement in any of the following formats:

ULU region

```
//         EXEC PGM=DFSRRC00,
//              PARM=(ULU,FABPMAIN,dbdname,,,,,,,,,,dbrc,N,
//               ,,,,,,,,,,,'DFSDF=xxx')
```

```
//        EXEC PGM=FABPPC00,
//             PARM=(ULU,FABPMAIN,dbdname,,,,,,,,,,dbrc,N,
//             ,,,,,,,,,,'DFSDF=xxx')
```

DLI or DBB region

```
//        EXEC PGM=DFSRRC00,
//             PARM=(region,FABPMAIN,psbname,,,,,,,,,,dbrc,N,
//             ,,,,,,,,,,'DFSDF=xxx')
```

```
//        EXEC PGM=FABPPC00,
//             PARM=(region,FABPMAIN,psbname,,,,,,,,,,dbrc,N,
//             ,,,,,,,,,,'DFSDF=xxx')
```

Requirements:

- To run HD Pointer Checker in the ULU region, you must specify a DBD name on the PARM parameter of the EXEC statement. The DBD name can be of any DBD name that is specified on DATABASE statements of the PROCCTL DD statement.
- If you use an alias name for the IMS catalog, you must specify EXEC PGM=DFSRRC00 and run HD Pointer Checker in the DBB region.

If you specify the library that contains the Catalog Definition exit routine (DFS3CDX0) on the STEPLIB DD statement, you do not need to specify the DFSDF=*xxx* parameter.

FABPMAIN DD statements

The DD statement requirements differ by the type of HD Pointer Checker processing (single-step job or multiple-step job), which is controlled by the TYPE keyword of the PROC statement.

If you want to run HD Pointer Checker in a single-step job, the parameter for the TYPE keyword is ALL.

If you want to run the SCAN process, the CHECK process, and the BLOCKMAP process of HD Pointer Checker individually, the parameter for the TYPE keyword is either SCAN, CHECK, or BLKMAP.

Recommendation:

It is strongly recommended that you use PROC TYPE=ALL and not PROC TYPE=SCAN and PROC TYPE=CHECK. By using PROC TYPE=ALL, the JCL statements will be simpler, the performance will improve, and the total size of the work data sets will be smaller.

Multiple jobs are not recommended because the specification of work data sets is complicated. If you must do so, however, refer to the examples in “Example 4: (Standard database analysis) Multiple jobs” on page 284.

To code the DD statements, see the topic that corresponds to the processing type that you request:

- “DD statements for PROC TYPE=ALL” on page 47
- “DD statements for PROC TYPE=SCAN” on page 51
- “DD statements for PROC TYPE=CHECK” on page 55
- “DD statements for PROC TYPE=BLKMAP” on page 58
- “DD statement description” on page 60

DD statements for PROC TYPE=ALL

To run the SCAN process and the CHECK process (and the BLOCKMAP process when applicable) in one job step, code the DD statements summarized in the following tables.

DD statements for input data sets, output data sets, and work data sets must be coded in the JCL stream. Use the tables in the following subsections to identify the DD statements to specify in the JCL. For a complete description of the DD statements, see “DD statement description” on page 60.

Subsections:

- “DD statements for input and output data sets” on page 48

- “DD statements for calling Space Monitor” on page 50
- “DD statements for HD Pointer Checker work data sets” on page 50

DD statements for input and output data sets

The following table shows the input and the output data sets used by HD Pointer Checker when PROC TYPE=ALL is specified.

Table 6. Input and output DD statements for PROC TYPE=ALL

DD name	Use	Format	Need	Additional requirements
STEPLIB	Input	PDS	Required	
DFSRESLB	Input	PDS	Required	
DFSVSAMP	Input	-	Required	
PROCCTL	Input	LRECL=80	Required	
HPSRETCD	Input	LRECL=80	Optional	
IMS	Input	PDS	Optional	You must specify this DD statement when the job runs in the ULU or the DLI region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSACB	Input	PDS	Optional	You must specify this DD statement when the job runs in the DBB region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSDALIB	Input	PDS	Optional	This data set contains the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. When you specify EXEC PGM=FABPPC00 and you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. This DD statement is effective when you specify EXEC PGM=FABPPC00. Otherwise, this DD statement is ignored.
IMS2	Input	PDS	Optional	
DFSHDBSC	Input	-	Optional	This data set is required when either of the following conditions is met: • HD Pointer Checker processes an IMS catalog database that is not registered in the RECON data sets. • The IMS management of ACBs is enabled and the IMS catalog database is not registered in the RECON data sets. If you omit this DD statement, the DFSHDBSC data set is dynamically allocated by the DFSMDA member in the MDA library on the STEPLIB DD statement.

Table 6. Input and output DD statements for PROC TYPE=ALL (continued)

DD name	Use	Format	Need	Additional requirements
PROCLIB	Input	PDS	Optional	You must specify this data set when you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter.
ddname	Input	-	Optional	If you omit this DD statement, the database data set or image copy data set is dynamically allocated.
RECON*x* (*x*=1 - 3)	Input	-	Optional	These data sets are required when you run HD Pointer Checker against a HALDB or when you want to have image copy data sets allocated dynamically. If you omit these DD statements, the RECON data sets are allocated dynamically.
HISTORY	Input output	VSAM KSDS	Optional	If you specify the HISTORY=YES option on the OPTION statement, you must code this DD statement.
KEYSIN	Output	-	Optional	If you specify the KEYSIN=YES option on the PROC statement, you must code this DD statement.
FABPILK	Output	RECFM=FB LRECL=80	Optional	You must specify this DD statement if you specify the REPAIRILK=YES option on the PROC statement.
IEFRDER	Output	See Note	Required	
PRIMAPRT	Output	LRECL=133	Required	
STATIPRT	Output	LRECL=133	Required	
VALIDPRT	Output	LRECL=133	Required	
EVALUPRT	Output	LRECL=133	Required	
EVALUPR2	Output	LRECL=133	Optional	When the following PROC statement options are specified, reports are written to this data set: • SYMIXCHK=YES • SYMLPCHK=YES If you specify these PROC statement options but omit this DD statement, the data set is dynamically allocated.
EVALIPRT	Output	LRECL=133	Optional	You must specify this DD statement when you process HALDBs.
SNAPPIT	Output	LRECL=133	Required	
SUMMARY	Output	LRECL=133	Required	
DBSRCPRT	Output	SYSOUT	Optional	When the DECODEDBD=YES option is specified on the REPORT statement, reports are written to this data set. If you specify DECODEDBD=YES but omit this DD statement, the data set is dynamically allocated.

Table 6. Input and output DD statements for PROC TYPE=ALL (continued)

DD name	Use	Format	Need	Additional requirements
DBMAPPRT	Output	SYSOUT	Optional	When the MAPDBD=YES option is specified on the REPORT statement, reports are written to this data set. If you specify MAPDBD=YES but omit this DD statement, the data set is dynamically allocated.
SYSOUT*nn* (*nn*=01 - 99)	Output	SYSOUT	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SORTWK*nn*, SRTSWK*nn*, SRTXWK*nn*, SRTEWK*nn*, SRTKWK*nn*, SRTCWK*nn*, SRTRWK*nn*	Work	-	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SYSUDUMP	Output	SYSOUT	Optional	

Note: For information about the attributes of log data sets, see the topic about the attributes of IMS data sets in *IMS Installation*.

DD statements for calling Space Monitor

The following table summarizes the DD statements for calling Space Monitor.

Table 7. DD statements for calling Space Monitor (PROC TYPE=ALL)

DD name	Use	Format	Need	Additional requirements
SPMNIN	Input	LRECL=80	Optional	If you specify SPMN=YES on the OPTION statement, you can omit this DD statement.
SPMNSPDT	Input output	Fixed record length	Optional	If you want to call Space Monitor, you must code this DD statement.

DD statements for HD Pointer Checker work data sets

Table 8 on page 51 shows the work data sets used by HD Pointer Checker when PROC TYPE=ALL is specified.

In the table, *nn* in DD names corresponds to scan group number specified by the SCANGROUP option of the DATABASE statement. The default value of the option is 1. Each scan task uses one work data set. For example, if SCANGROUP=1 and SCANGROUP=2 are specified, *xxxxxx*01 and *xxxxxx*02 data sets are used. The ddname in brackets is used in HD Pointer Checker 1.1. If the old-version ddname is specified in the JCL, it is used instead of the *xxxxxx*01 data set. If ddnames in both styles, for example MERGIN and MERGIN01, are specified in the JCL, only the *xxxxxx*01 data set is used.

HD Pointer Checker dynamically allocates certain work data sets as temporary data sets when the corresponding DD statements are not coded in the JCL stream. See the Description column to find out which data sets can be allocated dynamically. For more information about dynamic allocation of work data sets, see "Dynamic allocation of HD Pointer Checker work data sets" on page 68.

Table 8. Work data set DD statements for PROC TYPE=ALL

DD name	Use	Format	Need	Description
MERGIN*nn* (MERGIN)	Work	RECFM=VB	Optional	Code these DD statements when either of the following PROC statement options is used: • HASH=NO (default) • HASH=FORCE You can omit these DD statements if you want to have the data sets allocated dynamically.
MERGI2*nn* (MERGIN2)	Work	RECFM=VB	Optional	Code these DD statements when both of the following PROC statement options are used: • IXKEYCHK=YES • HASH=NO (default) You can omit these DD statements if you want to have the data sets allocated dynamically.
SORTE2*nn* (SORTEX2)	Work	RECFM=VB	Optional	Code these DD statements when both of the following PROC statement options are used: • IXKEYCHK=YES • HASH=NO (default) You can omit these DD statements if you want to have the data sets allocated dynamically.
IXKEY	Work	RECFM=VB	Optional	Code this DD statement when both of the following PROC statement options are used: • IXKEYCHK=YES • HASH=NO (default) You can omit this DD statement if you want to have the data set allocated dynamically.
CHECKREC	Work or output	RECFM=FB LRECL=40	See the description column	Code this DD statement if you specify CHECKREC=YES on the PROC statement. If you specify CHECKREC=NO (default), you can omit this DD statement; the data set is dynamically allocated. When CHECKREC=NO is specified, this data set is used as a work data set. When CHECKREC=YES is specified, this data set is used as an output data set.
JRM	Work	RECFM=FB LRECL=40	Required	Always code this DD statement.

DD statements for PROC TYPE=SCAN

To run only the SCAN process, code the DD statements summarized in the following tables.

DD statements for input data sets, output data sets, and work data sets must be coded in the JCL stream. Use the tables in the following subsections to identify the DD statements to specify in the JCL. For a complete description of the DD statements, see “DD statement description” on page 60.

Subsections:

- “DD statements for input and output data sets” on page 52

- “DD statements for calling Space Monitor” on page 54
- “DD statements for HD Pointer Checker work data sets” on page 54

DD statements for input and output data sets

The following table shows the input and the output data sets used by HD Pointer Checker when PROC TYPE=SCAN is specified.

Table 9. Input and output DD statements for PROC TYPE=SCAN

DD name	Use	Format	Need	Additional requirements
STEPLIB	Input	PDS	Required	
DFSRESLB	Input	PDS	Required	
DFSVSAMP	Input	-	Required	
PROCCTL	Input	LRECL=80	Required	
HPSRETCD	Input	LRECL=80	Optional	
IMS	Input	PDS	Optional	You must specify this DD statement when the job runs in the ULU or the DLI region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSACB	Input	PDS	Optional	You must specify this DD statement when the job runs in the DBB region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSDALIB	Input	PDS	Optional	This data set contains the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. When you specify EXEC PGM=FABPPC00 and you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. This DD statement is effective when you specify EXEC PGM=FABPPC00. Otherwise, this DD statement is ignored.
IMS2	Input	PDS	Optional	
DFSHDBSC	Input	-	Optional	This data set is required when either of the following conditions is met: • HD Pointer Checker processes an IMS catalog database that is not registered in the RECON data sets. • The IMS management of ACBs is enabled and the IMS catalog database is not registered in the RECON data sets. If you omit this DD statement, the DFSHDBSC data set is dynamically allocated by the DFSMDA member in the MDA library on the STEPLIB DD statement.

Table 9. Input and output DD statements for PROC TYPE=SCAN (continued)

DD name	Use	Format	Need	Additional requirements
PROCLIB	Input	PDS	Optional	You must specify this data set when you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter.
ddname	Input	-	Optional	If you omit this DD statement, the database data set or image copy data set is dynamically allocated.
RECON*x* (*x*=1 - 3)	Input	-	Optional	These data sets are required when you run HD Pointer Checker against a HALDB or when you want to have image copy data sets allocated dynamically. If you omit these DD statements, the RECON data sets are allocated dynamically.
HISTORY	Input output	VSAM KSDS	Optional	If you specify the HISTORY=YES option on the OPTION statement, you must code this DD statement.
KEYSIN	Output	-	Optional	If you specify the KEYSIN=YES option on the PROC statement, you must code this DD statement.
IEFRDER	Output	See Note	Required	
PRIMAPRT	Output	LRECL=133	Required	
STATIPRT	Output	LRECL=133	Required	
VALIDPRT	Output	LRECL=133	Required	
EVALUPRT	Output	LRECL=133	Required	
EVALUPR2	Output	LRECL=133	Optional	When the following PROC statement options are specified, reports are written to this data set: • SYMIXCHK=YES • SYMLPCHK=YES If you specify these PROC statement options but omit this DD statement, the data set is dynamically allocated.
EVALIPRT	Output	LRECL=133	Optional	You must specify this DD statement when you process HALDBs.
SNAPPIT	Output	LRECL=133	Required	
SUMMARY	Output	LRECL=133	Required	
DBSRCPRT	Output	SYSOUT	Optional	When the DECODEDBD=YES option is specified on the REPORT statement, reports are written to this data set. If you specify DECODEDBD=YES but omit this DD statement, the data set is dynamically allocated.
DBMAPPRT	Output	SYSOUT	Optional	When the MAPDBD=YES option is specified on the REPORT statement, reports are written to this data set. If you specify MAPDBD=YES but omit this DD statement, the data set is dynamically allocated.

Table 9. Input and output DD statements for PROC TYPE=SCAN (continued)

DD name	Use	Format	Need	Additional requirements
SYSOUT*nn* (*nn*=01 - 99)	Output	SYSOUT	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SORTWK*nn*, SRTSWK*nn*, SRTXWK*nn*, SRTEWK*nn*, SRTKWK*nn*, SRTCWK*nn*	Work	-	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SYSUDUMP	Output	SYSOUT	Optional	

Note: For information about the attributes of log data sets, see the topic about the attributes of IMS data sets in *IMS Installation*.

DD statements for calling Space Monitor

The following table summarizes the DD statements for calling Space Monitor.

Table 10. DD statements for calling Space Monitor (PROC TYPE=SCAN)

DD name	Use	Format	Need	Additional requirements
SPMNIN	Input	LRECL=80	Optional	If you specify SPMN=YES on the OPTION statement, you can omit this DD statement.
SPMNSPDT	Input output	Fixed record length	Optional	If you want to call Space Monitor, you must code this DD statement.

DD statements for HD Pointer Checker work data sets

Table 11 on page 54 shows the work data sets used by HD Pointer Checker when PROC TYPE=SCAN is specified. These data sets are generated by the SCAN process and become the input for the CHECK process (PROC TYPE=CHECK) that follows. You must specify them on the JCL DD statement because they are not allocated dynamically by HD Pointer Checker.

In the table, *nn* in DD names corresponds to scan group number specified by the SCANGROUP option of the DATABASE statement. The default value of the option is 1. Each scan task uses one work data set. For example, if SCANGROUP=1 and SCANGROUP=2 are specified, *xxxxxx*01 and *xxxxxx*02 data sets are used.

The ddname in brackets is used in HD Pointer Checker 1.1. If the old-version ddname is specified in the JCL, it is used instead of the *xxxxxx*01 data set. If ddnames in both styles, for example MERGIN and MERGIN01, are specified in the JCL, only the *xxxxxx*01 data set is used.

Table 11. Work data set DD statements for PROC TYPE=SCAN

DD name	Use	Format	Need	Description
MERGIN*nn* (MERGIN)	Output	RECFM=VB	Optional	Code these DD statements when either of the following PROC statement options is used (see Note): • HASH=NO (default) • HASH=FORCE

Table 11. Work data set DD statements for PROC TYPE=SCAN (continued)

DD name	Use	Format	Need	Description
MERGI2*nn* (MERGIN2)	Output	RECFM=VB	Optional	Code these DD statements when both of the following PROC statement options are used (see Note): • IXKEYCHK=YES • HASH=NO (default)
SORTE2*nn* (SORTEX2)	Output	RECFM=VB	Optional	Code these DD statements when both of the following PROC statement options are used (see Note): • IXKEYCHK=YES • HASH=NO (default)
SORTIL*nn*	Output	RECFM=VB	Optional	Code these DD statements when EPSCHK=YES is specified on the PROC statement (see Note.)
SORTEX01 (SORTEX)	Output	RECFM=FB LRECL=40	Required	Always code this DD statement.

Note: If the scan of multiple database data sets or ICDSs are run in multiple jobs, specify the same keyword for the option in each SCAN job.

DD statements for PROC TYPE=CHECK

To run only the CHECK process (and the BLOCKMAP process when applicable), code the DD statements summarized in the following tables.

DD statements for input data sets, output data sets, and work data sets must be coded in the JCL stream. Use the tables in the following subsections to identify the DD statements to specify in the JCL. For a complete description of the DD statements, see "DD statement description" on page 60.

Subsections:

- "DD statements for input and output data sets" on page 55
- "DD statements for HD Pointer Checker work data sets" on page 57

DD statements for input and output data sets

The following table shows the input and the output data sets used by HD Pointer Checker when PROC TYPE=CHECK is specified.

Table 12. Input and output DD statements for PROC TYPE=CHECK

DD name	Use	Format	Need	Additional requirements
STEPLIB	Input	PDS	Required	
DFSRESLB	Input	PDS	Required	
DFSVSAMP	Input	-	Required	
PROCCTL	Input	LRECL=80	Required	
HPSRETCD	Input	LRECL=80	Optional	
IMS	Input	PDS	Optional	You must specify this DD statement when the job runs in the ULU or the DLI region. However, this statement is not required when the IMS management of ACBs is enabled.

Table 12. Input and output DD statements for PROC TYPE=CHECK (continued)

DD name	Use	Format	Need	Additional requirements
IMSACB	Input	PDS	Optional	You must specify this DD statement when the job runs in the DBB region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSDALIB	Input	PDS	Optional	This data set contains the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. When you specify EXEC PGM=FABPPC00 and you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. This DD statement is effective when you specify EXEC PGM=FABPPC00. Otherwise, this DD statement is ignored.
DFSHDBSC	Input	-	Optional	This data set is required when either of the following conditions is met: • HD Pointer Checker processes an IMS catalog database that is not registered in the RECON data sets. • The IMS management of ACBs is enabled and the IMS catalog database is not registered in the RECON data sets. If you omit this DD statement, the DFSHDBSC data set is dynamically allocated by the DFSMDA member in the MDA library on the STEPLIB DD statement.
PROCLIB	Input	PDS	Optional	You must specify this data set when you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter.
ddname	Input	-	Optional	If you omit this DD statement, the database data set or image copy data set is dynamically allocated.
RECON*x* (*x*=1 - 3)	Input	-	Optional	These data sets are required when you run HD Pointer Checker against a HALDB or when you want to have image copy data sets allocated dynamically. If you omit these DD statements, the RECON data sets are allocated dynamically.
HISTORY	Input output	VSAM KSDS	Optional	If you specify the HISTORY=YES option on the OPTION statement, you must code this DD statement.
IEFRDER	Output	See Note	Required	
PRIMAPRT	Output	LRECL=133	Required	
STATIPRT	Output	LRECL=133	Required	
VALIDPRT	Output	LRECL=133	Required	
EVALUPRT	Output	LRECL=133	Required	

Table 12. Input and output DD statements for PROC TYPE=CHECK (continued)

DD name	Use	Format	Need	Additional requirements
EVALIPRT	Output	LRECL=133	Optional	You must specify this DD statement when you process HALDBs.
SNAPPIT	Output	LRECL=133	Required	
SUMMARY	Output	LRECL=133	Required	
SYSOUT*nn* (*nn*=01 - 99)	Output	SYSOUT	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SORTWK*nn*, SRTSWK*nn*, SRTXWK*nn*, SRTEWK*nn*, SRTKWK*nn*, SRTCWK*nn*	Work	-	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SYSUDUMP	Output	SYSOUT	Optional	

Note: For information about the attributes of log data sets, see the topic about the attributes of IMS data sets in *IMS Installation*.

DD statements for HD Pointer Checker work data sets

Table 13 on page 57 shows the work data sets used by HD Pointer Checker when PROC TYPE=CHECK is specified.

For *nn* in DD names, specify serial numbers starting from 01 for each data set generated by the preceding TYPE=SCAN processes. The serial number to assign might not match the number that was assigned to each data set in the preceding scan job. For how to specify the numbers, see "Example 4: (Standard database analysis) Multiple jobs" on page 284.

The ddname in brackets is used in HD Pointer Checker 1.1. If the old-version ddname is specified in the JCL, it is used instead of the *xxxxxx*01 data set. If ddnames in both styles, for example MERGIN and MERGIN01, are specified in the JCL, only the *xxxxxx*01 data set is used.

HD Pointer Checker dynamically allocates certain work data sets as temporary data sets when the corresponding DD statements are not coded in the JCL stream. See the Description column to find out which data sets can be allocated dynamically. These work data sets are allocated on the disk by using the UNIT=SYSALLDA parameter. The number of requested volumes that are dynamically allocated is calculated based on the input data set size. The minimum number of volumes is two.

If dynamic allocation fails, the parameter information is shown in message FABP3988E. Check the required volume counts displayed in the message. However, if the target database is so large, the size of each temporary work data set might not be enough. In such a case, you must specify the size needed on the DD statement in the JCL. See "Estimating the sizes of work data sets for HD Pointer Checker manually" on page 312.

Table 13. Work data set DD statements for PROC TYPE=CHECK

DD name	Use	Format	Need	Description
MERGIN*nn* (MERGIN)	Input	RECFM=VB	Optional	Code these input work data sets if the HASH Check function was not used in the preceding Scan jobs.

Table 13. Work data set DD statements for PROC TYPE=CHECK (continued)

DD name	Use	Format	Need	Description
MERGI2*nn* (MERGIN2)	Input	RECFM=VB	Optional	Code these input work data sets if the preceding Scan jobs were run with both of the following PROC statement options: • IXKEYCHK=YES • HASH=NO (default)
SORTE2*nn* (SORTEX2)	Input	RECFM=VB	Optional	Code these input work data sets if the preceding Scan jobs were run with both of the following PROC statement options: • IXKEYCHK=YES • HASH=NO (default)
SORTIL*nn* (SORTIL)	Input	RECFM=VB	Optional	Code these input work data sets if the preceding Scan jobs were run with the EPSCHK=YES (default value for HALDBs) option.
SORTEX*nn* (SORTEX)	Input	RECFM=FB LRECL=40	Required	Always code these DD statements.
IXKEY	Output	RECFM=VB	Optional	Code this work data set if the preceding Scan jobs were run with both of the following PROC statement options: • IXKEYCHK=YES • HASH=NO (default) You can omit this DD statement if you want to have the data set allocated dynamically.
CHECKREC	Work or output	RECFM=FB LRECL=40	See the description column	Code this DD statement if you specify CHECKREC=YES on the PROC statement. If you specify CHECKREC=NO (default), you can omit this DD statement; the data set is dynamically allocated. When CHECKREC=NO is specified, this data set is used as a work data set. When CHECKREC=YES is specified, this data set is used as an output data set.
JRM	Output	RECFM=FB LRECL=40	Required	Always code this DD statement.

DD statements for PROC TYPE=BLKMAP

To run only the BLOCKMAP process, code the DD statements summarized in the following tables.

DD statements for input data sets, output data sets, and work data sets must be coded in the JCL stream. Use the tables in the following subsections to identify the DD statements to specify in the JCL. For a complete description of the DD statements, see “DD statement description” on page 60.

Subsections:

- “DD statements for input and output data sets” on page 59
- “DD statements for HD Pointer Checker work data sets” on page 60

DD statements for input and output data sets

The following table shows the input and the output data sets used by HD Pointer Checker when PROC TYPE=BLKMAP is specified.

Table 14. Input and output DD statements for PROC TYPE=BLKMAP

DD name	Use	Format	Need	Additional requirements
STEPLIB	Input	PDS	Required	
DFSRESLB	Input	PDS	Required	
DFSVSAMP	Input	-	Required	
PROCCTL	Input	LRECL=80	Required	
BLKMAPIN	Input	LRECL=80	Required	
HPSRETCD	Input	LRECL=80	Optional	
IMS	Input	PDS	Optional	You must specify this DD statement when the job runs in the ULU or the DLI region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSACB	Input	PDS	Optional	You must specify this DD statement when the job runs in the DBB region. However, this statement is not required when the IMS management of ACBs is enabled.
IMSDALIB	Input	PDS	Optional	This data set contains the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. When you specify EXEC PGM=FABPPC00 and you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. This DD statement is effective when you specify EXEC PGM=FABPPC00. Otherwise, this DD statement is ignored.
DFSHDBSC	Input	-	Optional	This data set is required when either of the following conditions is met: • HD Pointer Checker processes an IMS catalog database that is not registered in the RECON data sets. • The IMS management of ACBs is enabled and the IMS catalog database is not registered in the RECON data sets. If you omit this DD statement, the DFSHDBSC data set is dynamically allocated by the DFSMDA member in the MDA library on the STEPLIB DD statement.
PROCLIB	Input	PDS	Optional	You must specify this data set when you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter.

Table 14. Input and output DD statements for PROC TYPE=BLKMAP (continued)

DD name	Use	Format	Need	Additional requirements
ddname	Input	-	Optional	If you omit this DD statement, the database data set or image copy data set is dynamically allocated.
RECON*x* (*x*=1 - 3)	Input	-	Optional	These data sets are required when you run HD Pointer Checker against a HALDB or when you want to have image copy data sets allocated dynamically. If you omit these DD statements, the RECON data sets are allocated dynamically.
IEFRDER	Output	See Note	Required	
PRIMAPRT	Output	LRECL=133	Required	
STATIPRT	Output	LRECL=133	Required	
VALIDPRT	Output	LRECL=133	Required	
EVALUPRT	Output	LRECL=133	Required	
SNAPPIT	Output	LRECL=133	Required	
SUMMARY	Output	LRECL=133	Required	
SORTWK*nn*, SRTSWK*nn*, SRTXWK*nn*, SRTEWK*nn*, SRTKWK*nn*, SRTCWK*nn*	Work	-	Optional	If you omit these DD statements, the data sets are dynamically allocated.
SYSUDUMP	Output	SYSOUT	Optional	

Note: For information about the attributes of log data sets, see the topic about the attributes of IMS data sets in *IMS Installation*.

DD statements for HD Pointer Checker work data sets

The following table shows the work data set used by HD Pointer Checker when PROC TYPE=BLKMAP is specified.

Table 15. Work data set DD statement for PROC TYPE=BLKMAP

DD name	Use	Format	Need	Description
CHECKREC	Input	RECFM=FB LRECL=40	Required	Always code this DD statement. This input work data set is created in the preceding Check jobs.

DD statement description

This reference topic provides a complete description of the FABPMAIN DD statements.

Subsections:

- "DD statements for input and output data sets" on page 61
- "DD statements for calling Space Monitor" on page 65
- "DD statements for work data sets" on page 65

DD statements for input and output data sets

STEPLIB DD

This DD defines the following input data sets:

- The library that contains the IMS HP Pointer Checker load modules (required)
- IMS Tools Base library (SGLXLOAD) of IMS Tools Base 1.6 or later if the IMS management of ACBs is enabled
- IMS RESLIB (required)
- The library that contains the partition selection exit routine (optional)
- The library that contains the DFSMDA members for dynamic allocation (optional)

  Tip: If you specify EXEC PGM=FABPPC00 and you do not want to APF-authorize the library that contains the DFSMDA members for the database data sets of non-HALDBs and RECON data sets, specify the MDA library on the IMSDALIB DD statement.

  Requirements:

  – To use the DFSMDA member for allocating the IMS catalog partition definition data set (DFSHDBSC), specify the MDA library on the STEPLIB DD statement.

  – To use the DFSMDA member for allocating the system data sets of the IMS catalog, including the IMS directory data sets, the bootstrap data set, and the staging data set, specify the MDA library on the STEPLIB DD statement.
- The library that contains the DBRC SCI Registration exit routine (optional)
- The library that contains the Catalog Definition exit routine (optional)

To use the following functions with HD Pointer Checker, you must concatenate the appropriate load module libraries to the STEPLIB DD:

- The IMS Library Integrity Utilities library, to print DBD source code or DBD map to the report
- The IMS Tools Knowledge Base library, to store the reports in the IMS Tools KB Output repository
- The following additional libraries to use the Integrated DB Sensor function:

  – The IMS Database Solution Pack library or the IMS Database Utility Solution library (SHPSLMD0 data set, which includes DB Sensor)

  – The IMS Tools Knowledge Base library

  – The IMS Tools Online System Interface and IMS Generic Exits libraries, to collect the latest VSAM statistics from IMS online full-function databases
- The IMS Tools Online System Interface and IMS Generic Exits libraries, to monitor the latest VSAM statistics from IMS online full-function databases by using Space Monitor

Requirements:

- If the input you are using is an image copy data set compressed by IMS HP Image Copy, the STEPLIB DD data set also must contain the data compression module, FABJCMP1 or FABJCMP2, that was used when the image copy was taken.
- If you specify PGM=FABPPC00 on the EXEC statement, all of the libraries that are specified on the STEPLIB DD statement must be APF-authorized.

DFSRESLB DD

This required input data set contains the IMS load modules.

DFSVSAMP DD

This required input data set contains the buffer information required by the DL/I buffer handler.

Recommendation: It is recommended that you specify the minimum required number of buffers and the minimum required buffer size in the DFSVSAMP data set.

PROCCTL DD
This required input data set contains the user-specified control statements that define the process type, process options, and databases to be processed by the HD Pointer Checker processor. For more information, see "FABPMAIN PROCCTL data set" on page 107.

BLKMAPIN DD
This input data set contains the user-specified control statements that are processed by the BLOCKMAP processor. This DD statement is required when TYPE=BLKMAP is specified. For more information, see "FABPMAIN BLKMAPIN data set" on page 147.

HPSRETCD DD
This optional input data set contains the control statements that you specify to define the return code of the HD Pointer Checker processor. For more information, see "FABPMAIN HPSRETCD data set" on page 148.

IMS DD
This optional input data set is a library (partitioned data set) that contains your PSB and DBD load modules. It is required when HD Pointer Checker runs with ULU or DLI specified in the EXEC parameter except when the IMS management of ACBs is enabled. If ULU is specified, it must contain the DBD library. If DLI is specified, it must contain the PSB and DBD libraries. It must contain all DBDs that are referenced (either directly or indirectly) by your PSB. If your PSB and DBDs are not in the same library, all appropriate libraries must be concatenated. When the IMS management of ACBs is enabled, HD Pointer Checker ignores this DD statement.

IMSACB DD
This optional input data set is the IMS.ACBLIB (partitioned data set). You must code this DD statement if HD Pointer Checker runs in the DBB region except when the IMS management of ACBs is enabled. When the IMS management of ACBs is enabled, HD Pointer Checker ignores this DD statement.

IMSDALIB DD
This optional input data set contains the DFSMDA members for dynamically allocating the database data sets of non-HALDBs and RECON data sets. This DD statement is effective when you specify EXEC PGM=FABPPC00. Otherwise, this DD statement is ignored.

When you specify EXEC PGM=FABPPC00, all the data sets in the STEPLIB concatenation, including the MDA library, must be APF-authorized. If you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. If DFSMDA members are found in both the STEPLIB DD and the IMSDALIB DD, the DFSMDA member found in the IMSDALIB DD is used.

IMS2 DD
This optional input data set is a library (a partitioned data set) that contains the following user exit load modules:

- HDAM and PHDAM randomizing modules. It is processed when you process the HDAM/PHDAM databases and when you check the HDAM/PHDAM home addresses.
- Segment edit/compression exit routine, if it is specified in the DBD.
- Secondary index maintenance exit routine, if it is specified in the DBD.
- FABPZWTO, if you want to use the FABPZWTO routine.

Requirement: If you specify PGM=FABPPC00 on the EXEC statement, all of the libraries that are specified on the IMS2 DD statement must be APF-authorized.

Note: When IMS2 DD statement is omitted, the user exit load modules are loaded from the STEPLIB, JOBLIB, or LINKLIST library.

DFSHDBSC DD
This optional input data set is the IMS catalog partition definition data set.

You must specify the data set in which the IMS catalog database is defined when either of the following conditions is true:

- The IMS management of ACBs is enabled and the IMS catalog database is not registered in the RECON data sets.

- You run HD Pointer Checker for an IMS catalog database that is not registered in the RECON data sets.

If you omit this DD statement, the DFSHDBSC data set is allocated dynamically by the DFSMDA member. In this case, the DFSMDA member found in the STEPLIB DD is used for dynamic allocation.

PROCLIB DD

This optional input data set is the IMS PROCLIB data set.

You must specify the IMS PROCLIB data set that contains the DFSDF*xxx* member when you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter.

***ddname* DD**

This optional input data set is the IMS database data set. There is one DD statement for each HISAM, index (the HIDAM index or the secondary index), HDAM, HIDAM, PHDAM, PHIDAM, or PSINDEX database data set to be processed. You must use the ddname that is specified in the DBD.

The actual data set can be a real database, an image copy, an image copy compressed with IMS HP Image Copy, a Fast Recovery image copy taken with IMS HP Image Copy, or an image copy taken with the Database Image Copy 2 utility (DFSUDMT0).

The DATASET=REAL|IMAGECOPY parameter of the DATABASE statement in the PROCCTL data set must match the type of the specified data set. If *ddname* DD is not specified, HD Pointer Checker allocates dynamically the database data sets or the image copy data sets to be processed. For details, see "Dynamic allocation of database data sets and image copy data sets" on page 67.

Recommendation: It is recommended that you omit the DD statement for database data set or image copy data set because an appropriate database data set or the latest image copy data set will be selected and allocated dynamically by HD Pointer Checker.

Consideration for Online Reorganization (OLR) of HALDB:

If the database is online reorganization capable and you need to process the data set other than the one allocated dynamically, do as follows:

- For the real database data set, specify the DD name of the active DBDS.
- For the image copy data set, specify the DD name that matches the DD parameter of the DATABASE statement in the PROCCTL data set. If DD=*ALL is specified or the DD parameter is omitted, the DD name is assumed as that of the A through J or X data set group.

RECON*x* DD

These optional data sets make up the DBRC RECON data sets. RECON data sets are required when you run HD Pointer Checker against a HALDB or when you want to have image copy data sets allocated dynamically. If you omit these DD statements, the RECON data sets are allocated dynamically by the DFSMDA member. In this case, the DFSMDA member found in the STEPLIB DD or IMSDALIB DD is used for dynamic allocation. If DFSMDA members are found in both the STEPLIB DD and the IMSDALIB DD, the DFSMDA member found in the IMSDALIB DD is used.

HISTORY DD

This optional data set defines the HISTORY data set (VSAM KSDS), which is the input to the DB Historical Data Analyzer utility and the Space Monitor utility of IMS HP Pointer Checker.

This data set is required if the HISTORY option is specified on the OPTION statement. The HISTORY data set must be allocated and initialized by the DB Historical Data Analyzer utility before you start an HD Pointer Checker run. DISP=SHR must be used.

If a multiple entries option of the HISTORY data set is activated by the DB Historical Data Analyzer utility, one or more database data set entries are taken per day.

For more information about the HISTORY data set, see "HISTORY data set (HISTORY)" on page 376.

KEYSIN DD

This optional output data set contains root segment keys that are used by module FABTROOT of the HD Tuning Aid utility. The LRECL, BLKSIZE, and RECFM must be coded on the DD statement. The data set is required when KEYSIN=YES is specified on the OPTION statement in the PROCCTL data set.

RECFM=VB is recommended.

FABPILK DD
This output data set contains the repair information records for repairing corrupted HALDB partition reorganization numbers, duplicate ILKs, and potentially duplicate ILKs in HALDB databases. This data set is required by the ILK Repair utility of IMS Database Repair Facility when you repair HALDB databases with such problems. For more information about repairing such problems, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.

This DD statement must be specified if you specify REPAIRILK=YES on the PROC statement in the PROCCTL data set. The data set that is specified by this DD statement must have the following attributes: RECFM=FB, LRECL=80.

IEFRDER DD
This required statement defines the primary system log data set. When HD Pointer Checker runs in a ULU region, you can code this DD as DUMMY.

When HD Pointer Checker runs in a DLI or DBB region, you can code DUMMY in most cases, however, you must specify the log data set when both of the following conditions are met:

- DBRC is active
- The referred PCB has an update intent PROCOPT

PRIMAPRT DD
This required output data set contains the primary reports that are produced by the HISAM, INDEX, HDAM/HIDAM, PHDAM/PHIDAM, and PSINDEX processes. If the BLKSIZE is coded on the DD statement, it must be a multiple of 133.

STATIPRT DD
This required output data set contains some of the statistical reports that the HISAM, HDAM/HIDAM, and PHDAM/PHIDAM processes produce. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

VALIDPRT DD
This required output data set contains the legends and the validation reports produced by the HISAM, INDEX, HDAM/HIDAM, PHDAM/PHIDAM, PHIDAM, and CHECK processes. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

EVALUPRT DD
This required output data set contains evaluation reports (produced by the CHECK process, the HASH option, or the Index Key option) and the Pointer Chain Reconstruction report (produced by the BLOCKMAP process). If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

EVALUPR2 DD
This optional output data set contains evaluation reports (produced by the SYMIXCHK and SYMLPCHK options of the PROC statement). If this DD statement is omitted, HD Pointer Checker writes the reports to SYSOUT=*. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

EVALIPRT DD
This optional data set contains the reports issued by the EPS healing process and the evaluation of ILKs process. If BLKSIZE is coded, it must be a multiple of 133. You must specify this DD statement when you process HALDBs.

SNAPPIT DD
This required output data set contains the block maps and block dumps that the HDAM/HIDAM, PHDAM/PHIDAM, and BLOCKMAP processes produce. It also contains a dump of some internal control blocks used in the HISAM, INDEX, HDAM/HIDAM, PHDAM/PHIDAM, and PSINDEX processes. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

SUMMARY DD
This required output data set contains the HD Pointer Checker Summary report produced by the HD Pointer Checker processor. It also contains the HD Pointer Checker Message Summary report. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

DBSRCPRT DD
This optional output data set contains the messages and the DBD sources produced by IMS Library Integrity Utilities if DECODEDBD=YES is specified on the REPORT statement. This data set is dynamically allocated if the DD statement in the JCL is omitted and if DECODEDBD=YES is specified on the REPORT statement.

DBMAPPRT DD
This optional output data set contains the messages and the DBD maps produced by IMS Library Integrity Utilities if MAPDBD=YES is specified on the REPORT statement. This data set is dynamically allocated if the DD statement in the JCL is omitted and if MAPDBD=YES is specified on the REPORT statement.

SYSOUT*nn* DD (*nn*=01 - 99)
This optional output data set contains the messages that are produced by DFSORT. If the DD statements in the JCL are omitted, these data sets are dynamically allocated by HD Pointer Checker.

SORTWK*nn* DD, SRTSWK*nn* DD, SRTXWK*nn* DD, SRTEWK*nn* DD, SRTKWK*nn* DD, SRTCWK*nn* DD, SRTRWK*nn* DD (*nn*=01 or greater)
DFSORT uses intermediate storage data sets. If the DD statements in the JCL are omitted, these data sets are dynamically allocated by DFSORT. The value *nn* is numbered by DFSORT. For more information about how to code these DD statements, see *z/OS DFSORT Application Programming Guide*.

SYSUDUMP DD
This optional output data set defines the output from a system ABEND dump routine. It is used only when a dump is required. Although optional, it is recommended that you include this data set.

DD statements for calling Space Monitor

HD Pointer Checker can call Space Monitor when SPMNIN and SPMNSPDT DD statements are specified in FABPMAIN JCL, or when the SPMNSPDT DD statement and OPTION SPMN=YES is specified in the PROCCTL data set.

SPMNIN DD
This optional input data set contains the control statements for the Space Monitor utility.

The SPMNMBR DD and FABKCTL DD statements, which are DD statements for Space Monitor, cannot be specified for the FABPMAIN JCL. Only SPMNIN can be used.

SPMNSPDT DD
This input and output sequential data set is the Space Monitor graph record data set. If you want to call Space Monitor, you must code this DD statement.

For more information about these DD statements, see "FABKSPMN JCL" on page 491.

DD statements for work data sets

MERGIN*nn* DD
These data set are generated by the SCAN process of HISAM, HDAM, HIDAM, PHDAM, PHIDAM (excluding primary index), and secondary indexes that have an overflow data set.

The data sets are used as the input for the CHECK process. They are not used in the following processes:

- HASH Check
- Scan tasks that are used solely for primary indexes or secondary indexes that have no overflow data sets

MERGI2*nn* DD
These optional work data sets are generated by the SCAN process of the index target segment in HDAM, HIDAM, PHDAM, or PHIDAM when PROC TYPE=ALL or TYPE=SCAN is specified with IXKEYCHK=YES and HASH=NO. These data sets are used as an input for the CHECK process.

SORTE2*nn* DD
These optional work data sets are generated by the SCAN process of the index source segment in HISAM, HDAM, HIDAM, PHDAM, PHIDAM, and the index database when PROC TYPE=ALL or TYPE=SCAN is specified with IXKEYCHK=YES and HASH=NO. These data sets are used as an input for the CHECK process.

SORTIL*nn* DD
These optional work data sets are generated by the SCAN process when TYPE=SCAN is specified with EPSCHK=YES (the default option for HALDBs) and the target database is PHDAM or PHIDAM that has logical relationships, or PSINDEX. These data sets are used as an input for the CHECK process.

SORTEX01 DD
This data set is generated by the SCAN process when PROC TYPE=SCAN is specified. One data set is created in each TYPE=SCAN step. It becomes an input for the CHECK process that is specified with PROC TYPE=CHECK.

SORTEX*nn* DD
These input data sets are used by the CHECK process when PROC TYPE=CHECK is specified. The SORTEX01 data set is generated in advance by each scan job. Specify that data set as SORTEX*nn* DD (where *nn* is a serial number, starting from 01).

IXKEY DD
This work data set is used in the CHECK process when PROC TYPE=ALL or TYPE=SCAN is specified with IXKEYCHK=YES and HASH=NO.

CHECKREC DD
A data set that is generated by the CHECK process to create maps and dumps of the database. When you specify PROC TYPE=ALL or PROC TYPE=CHECK, the specification of the DD statement differs depending on the value you specify for the CHECKREC keyword.

When CHECKREC=YES
This data set is required for the input of the process PROC TYPE=BLKMAP. You must specify this DD on the JCL statement because HD Pointer Checker does not allocate it dynamically.

When CHECKREC=NO
Because the size of the data set is small, HD Pointer Checker allocates it dynamically. You do not need to specify this DD on the JCL statement.

If you specify PROC TYPE=BLKMAP, the CHECKREC data set generated for CHECKREC=YES in the preceding process PROC TYPE=ALL or TYPE=CHECK is required as input.

JRM DD
A required work data set that contains the control statements that are generated by the CHECK process and used by the BLOCKMAP process. LRECL must be 40, and BLKSIZE must be a multiple of 40.

Besides these data sets, HD Pointer Checker allocates the following data sets dynamically and uses them as temporary data sets. You do not need to specify them in the JCL stream, but you must not use these names in your JCL statements because they are used by HD Pointer Checker.

- STATIP*nn* DD (*nn*=01, 02, 03, ...)
- VALIDP*nn* DD (*nn*=01, 02, 03, ...)
- SNAPPI*nn* DD (*nn*=01, 02, 03, ...)
- EVALIP*nn* DD (*nn*=01, 02, 03, ...)
- FSESTA*nn* DD (*nn*=01, 02, 03, ...)
- FSESTAT DD
- LIUIN, LIUOUT, LIUPRINT, LIUPUNCH

For other DD statements used by IMS Library Integrity Utilities when REPORT DECODEDBD=YES or MAPDBD=YES is specified, see the *IMS Library Integrity Utilities User's Guide*.

For DB Sensor DD statements (used when SENSOR=YES is specified), see the *IMS Solution Packs Data Sensor User's Guide*.

As a general rule, DD names that start with HKT are reserved for IBM use.

Dynamic allocation of database data sets and image copy data sets

HD Pointer Checker provides the dynamic allocation function that is invoked when you omit the DD statement for database data sets or image copy data sets.

DISP=SHR is used to allocate the data sets.

The following subsections describe how HD Pointer Checker dynamically allocates the data sets that are required for its run.

Subsections:

- "Database data sets of non-HALDBs" on page 67
- "Database data sets of HALDBs" on page 67
- "Image copy data sets" on page 67
- "Consideration for using tapes" on page 68

Database data sets of non-HALDBs

The database data sets of HDAM, HIDAM, HISAM, SHISAM, and index databases are dynamically allocated by use of the DFSMDA member in the MDA library.

When you specify EXEC PGM=FABPPC00, specify the MDA library on the STEPLIB or the IMSDALIB DD statement. All the data sets that are defined in the STEPLIB concatenation, including the MDA library, must be APF-authorized. If you do not want to APF-authorize the MDA library, use the IMSDALIB DD statement to specify the MDA library. If DFSMDA members are found in both the STEPLIB DD and the IMSDALIB DD, the DFSMDA member found in the IMSDALIB DD is used.

When you specify EXEC PGM=DFSRRC00, specify the MDA library on the STEPLIB DD statement. The MDA library does not require APF-authorization. If you specify the IMSDALIB DD statement, the IMSDALIB DD statement is ignored.

The NODYNALLOC statement in DFSVSM*xx* member is not referred to.

DISP=SHR is used, regardless of the definitions in DFSMDA, to allocate the data sets.

The data sets need to be cataloged. DBRC=Y is not required.

A shared secondary index database has multiple database names. If only some database names are defined in the DFSMDA member, specify those databases before other databases in the DATABASE statement of the PROCCTL data set.

Database data sets of HALDBs

The database data sets of PHDAM, PHIDAM, and PSINDEX databases are dynamically allocated by use of the information in the RECON data set.

DISP=SHR is used, regardless of the definitions in RECON, to allocate the data sets.

The data sets need to be cataloged. DBRC=Y is required.

When a database is online reorganization capable, the active set of DBDS registered in the RECON is allocated dynamically with the active DD name.

Image copy data sets

The image copy data sets of both non-HALDB and HALDB are dynamically allocated by use of the information in the RECON data set.

- If two or more image copies are registered, the latest data set is used.
- If secondary image copy is registered, the primary image copy is used.

- If the image copy is a GDG data set, the absolute generation and version numbers are used as the data set name.

DISP=SHR is used, regardless of definitions in RECON, to allocate the data sets.

DBRC=Y is required.

- If CATDS is specified in the RECON, HD Pointer Checker uses the information in the system catalog. The data sets need to be cataloged.
- If NOCATDS is specified in the RECON, HD Pointer Checker uses the volume serial number and the file sequence number that are registered in the RECON. If ICUNIT is specified in the OPTION statement in the PROCCTL data set, the unit name is used. If ICUNIT is not specified, the unit name is retrieved from the RECON. The data sets do not need to be cataloged.

When a database is online reorganization capable, the newest image copy data set of the data set groups (A-J&X) and (M-V&Y) that is registered in the RECON is allocated dynamically. And the DD name is used as same name at the time of the image copy was taken.

Consideration for using tapes

If two or more data sets are stacked in a tape, all data sets in the tape must be allocated dynamically or all DD statements of data sets in the tape must be specified apparently in JCL.

Dynamic allocation of HD Pointer Checker work data sets

When the DD statements for HD Pointer Checker work data sets are not coded in the JCL stream, HD Pointer Checker dynamically allocates work data sets as temporary data sets.

These work data sets are allocated on DASD volumes by using the UNIT=SYSALLDA parameter. The size and volume count for the work data sets are determined based on the database data set size or the WKDATACLASS, WKSTORCLASS, and WKHLQ keyword parameters:

- If *NO is used for the three keywords, HD Pointer Checker calculates the space size parameter and the volume count parameter based on the database data set size or the OPTION DSSIZE parameter in the PROCCTL data set. The minimum number of volumes is two. When the work data sets are dynamically allocated, HD Pointer Checker prints message FABP1101I in the PROCCTL Statement report. The space size information for the dynamic allocation is shown in message FABP1101I.
- For other cases, HD Pointer Checker applies the space size parameter and the volume count parameter that are defined in the data class. When the work data sets are dynamically allocated, HD Pointer Checker prints message FABP1102I in the PROCCTL Statement report.

If the space or the number of volumes for each work data set is not enough, the HD Pointer Checker job might fail with an abend code such as B37. In such a case, provide either of the following information and rerun the job:

- Specify the appropriate data class, storage class, and high-level qualifier (*hlq*) for the work data sets by coding the WKDATACLASS, WKSTORCLASS, and WKHLQ keywords on the PROC statement.
- Specify the DD statement and the size that is required for the data set on the DD statement in the HD Pointer Checker JCL.

For more information about the keywords, see the following topics:

- For information about WKDATACLASS, WKSTORCLASS, and WKHLQ keywords, see “PROC statement” on page 108.
- For information about the DSSIZE keyword, see “OPTION statement” on page 131.

Tip: You can estimate the approximate sizes of work data sets before you run the pointer check job. For instructions, see “Estimating the sizes of work data sets for HD Pointer Checker automatically” on page 311.

JCL procedures

To run HD Pointer Checker, use the IBM-supplied cataloged procedures or prepare a similar procedure of your own. The use of the IBM supplied cataloged procedures avoids the need for maintaining many large sets of HD Pointer Checker JCL.

Tip: Maintaining many large sets of JCL is an error-prone activity which can be avoided by using cataloged JCL procedures.

Subsections:

- "List of HD Pointer Checker JCL procedures" on page 69
- "Tips for selecting JCL procedures" on page 70

List of HD Pointer Checker JCL procedures

The following tables summarize the cataloged procedures. These cataloged procedures are provided in the HPS.SHPSSAMP library. JCL procedure for Disk Address Analyzer is not provided.

Table 16. HD Pointer Checker JCL procedures for single-step job

Procedure name	Job function
FABPP	Checks pointers. This procedure uses a PSB. The work data sets are defined in the procedure.
FABPPD	Checks pointers. This procedure uses a DBD. The work data sets are not defined in the procedure; HD Pointer Checker dynamically allocates them.
FABPPA	Checks pointers. This procedure uses a PSB. The job runs in the DBB region by using ACBLIB. HD Pointer Checker dynamically allocates the work data sets.
FABPPTA	Checks pointers and root-segment locations. This procedure uses a PSB.
FABPC	Checks pointers. This procedure uses a PSB. The work data sets are defined in the procedure. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.
FABPCD	Checks pointers. This procedure uses a DBD. The work data sets are not defined in the procedure; HD Pointer Checker dynamically allocates them. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.
FABPCTA	Checks pointers and root-segment locations. This procedure uses a PSB. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.

Table 17. HD Pointer Checker JCL procedures for multiple-step job

Procedure name	Job function
FABPPM	Checks pointers in multiple job steps. This procedure uses a PSB.
FABPPMD	Checks pointers in multiple job steps. This procedure uses a DBD.
FABPPTAM	Checks pointers in multiple job steps and root-segment locations. This procedure uses a PSB.
FABPCM	Checks pointers in multiple job steps. This procedure uses a PSB. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.
FABPCMD	Checks pointers in multiple job steps. This procedure uses a DBD. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.
FABPCTAM	Checks pointers in multiple job steps and root-segment locations. This procedure uses a PSB. Use this procedure if you want DB Sensor to store sensor data or Space Monitor to monitor IMS online full-function databases while checking pointers.

Tips for selecting JCL procedures

Refer to the following tips when you select the JCL procedure to use:

- To run HD Pointer Checker and HD Tuning Aid in a same job, use one of the following procedures:
  - “Procedure FABPPTA” on page 76
  - “Procedure FABPCTA” on page 93
- To run only the HD Pointer Checker, use a procedure that is similar to the following procedures:
  - “Procedure FABPP” on page 71
  - “Procedure FABPPD” on page 72
  - “Procedure FABPPA” on page 74
- To run HD Pointer Checker and store sensor data by using the Integrated DB Sensor function, or to run HD Pointer Checker and monitor IMS online full-function databases by using the Space Monitor utility, use a procedure that is similar to the following procedures:
  - “Procedure FABPC” on page 89
  - “Procedure FABPCD” on page 91

These procedures are examples of general-purpose procedures that can be used in verifying and analyzing IMS full-function databases.

The examples in Chapter 7, “JCL examples for HD Pointer Checker,” on page 279 assume that the IBM supplied cataloged procedures are used.

Procedure FABPP

The FABPP procedure runs only HD Pointer Checker. FABPP includes control statements for allocating the work data sets.

You must supply the PSB for this procedure.

```
//*******************************************************************  00010000
//*   Licensed Materials - Property of IBM                          *  00020000
//*                                                                 *  00030000
//*   5655-U09                                                      *  00040000
//*                                                                 *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.    *  00060000
//*                                                                 *  00070000
//*   US Government Users Restricted Rights - Use,                  *  00080000
//*   duplication or disclosure restricted by GSA ADP               *  00090000
//*   Schedule Contract with IBM Corp.                              *  00100000
//*                                                                 *  00110000
//*******************************************************************  00120000
//        PROC PSB=,                          PSBNAME                  00130000
//        DBRC=N,                             DBRC=Y IF HALDB PROCESS  00140000
//        KEYS='NULLFILE',                    DS NAME IF GENERATE KEYSIN 00150000
//        KEYSVOL=,                           VOL NAME OF KEYSIN       00160000
//        KEYSU='SYSDA',                      UNIT  FOR  KEYSIN DATA SET 00170000
//        KEYSCYL='1,1',                      SPACE FOR  KEYSIN DATA SET 00180000
//        U=SYSDA,                            UNIT  FOR  WORK DATA SETS  00190000
//        CYL='1,1',                          SPACE FOR  WORK DATA SETS  00200000
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET     00210000
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET     00220000
//        SORTIL='&&SORTIL',                  DS NAME IF HALDB PROCESS 00230000
//        SORTOL='&&SORTOL',                  DS NAME IF HALDB PROCESS 00240000
//        PRTBLK=0,                           BLKSIZE OF PRINT DATA SETS 00250000
//        PRTBLK2=0,                          BLKSIZE OF FSESTAT DATA SET 00260000
//        SORTBLK=0,                          BLKSIZE OF SORT RECORS   00270000
//        IXKBLK=0,                           BLKSIZE OF IXKEY RECORS  00280000
//        HISTORY='NULLFILE',                 HISTORY DATA SET         00290000
//        USERLIB='USER.LOADLIB',             USER RANDOMIZER          00300000
//        DBDLIB='IMSVS.DBDLIB',              <<--------<              00310000
//        PSBLIB='IMSVS.PSBLIB',              <<--------<              00320000
//        RESLIB='IMSVS.RESLIB',              <<--------<              00330000
//        DBTLIB='HPS.SHPSLMD0',              <<--------<              00340000
//        DBTSRC='HPS.SHPSSAMP(FABPVSAM)'     <<--------<              00350000
//*------------------------------------------------------------------* 00360000
//HDPCPRO EXEC PGM=DFSRRC00,                                           00370000
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'                00380000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                    00390000
//          DD DSN=&RESLIB,DISP=SHR                                    00400000
//          DD DSN=&USERLIB,DISP=SHR                                   00410000
//*------------------------------------------------------------------* 00420000
//* FOR IMS DATA SETS                                                  00430000
//*------------------------------------------------------------------* 00440000
//IMS       DD DSN=&PSBLIB,DISP=SHR                                    00450000
//          DD DSN=&DBDLIB,DISP=SHR                                    00460000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                    00470000
//          DD DSN=&USERLIB,DISP=SHR                                   00480000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                    00490000
//DFSVSAMP  DD DSN=&DBTSRC,DISP=SHR                                    00500000
//IEFRDER   DD DUMMY                                                   00510000
```

Figure 2. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPP) (Part 1 of 2)

```
//*-------------------------------------------------------------------* 00530000
//* REPORTS                                                             00540000
//*-------------------------------------------------------------------* 00550000
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00560000
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00570000
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00580000
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00582000
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00585000
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00610000
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00620000
//SYSUDUMP  DD SYSOUT=A                                                 00640000
//*-------------------------------------------------------------------* 00650000
//* HISTORICAL ANALYSIS DATA SETS                                       00660000
//*-------------------------------------------------------------------* 00670000
//HISTORY   DD DSN=&HISTORY,DISP=SHR                                    00680000
//*-------------------------------------------------------------------* 00690000
//* SORT RECORDS                                                        00700000
//*-------------------------------------------------------------------* 00710000
//MERGIN01  DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),                     00810000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00820000
//             DCB=(BLKSIZE=&SORTBLK)                                   00840000
//*-------------------------------------------------------------------* 00870000
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES            00880000
//*-------------------------------------------------------------------* 00890000
//SORTE201  DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),             00900000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               00910000
//MERGI201  DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),             00930000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               00940000
//*-------------------------------------------------------------------* 00960000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                    00970000
//*-------------------------------------------------------------------* 00980000
//KEYSIN    DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),                       00990000
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,     01000000
//             DCB=(RECFM=VB)                                           01010000
//*-------------------------------------------------------------------* 01040000
//* FOR EPS HEALING PROCESS                                            * 01050000
//*-------------------------------------------------------------------* 01060000
//SORTIL01  DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),                      01070000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               01080000
//*-------------------------------------------------------------------* 01220000
//* FOR CHECK PROCESS                                                   01230000
//*-------------------------------------------------------------------* 01240000
//SORTOL    DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),                    01250000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               01270000
//IXKEY     DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),                    01290000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              01310000
//             DCB=(BLKSIZE=&IXKBLK)                                    01315000
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                  01320000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2           01325000
//*-------------------------------------------------------------------* 01330000
//* FOR CHECK AND BLKMAP PROCESS                                        01340000
//*-------------------------------------------------------------------* 01350000
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                      01360000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              01370000
//             DCB=(BLKSIZE=&SORTBLK)                                   01380000
//*-------------------------------------------------------------------* 01390000
```

Figure 3. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPP) (Part 2 of 2)

Procedure FABPPD

The FABPPD procedure corresponds to FABPP. Both procedures check pointers; FABPPD, though, provides for dynamic PSB generation and allocation of dynamic sort work data set.

The DBD parameter of the FABPPD procedure is not required.

```
//*******************************************************************  00010000
//*   Licensed Materials - Property of IBM                          *  00020000
//*                                                                 *  00030000
//*   5655-U09                                                      *  00040000
//*                                                                 *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.    *  00060000
//*                                                                 *  00070000
//*   US Government Users Restricted Rights - Use,                  *  00080000
//*   duplication or disclosure restricted by GSA ADP               *  00090000
//*   Schedule Contract with IBM Corp.                              *  00100000
//*                                                                 *  00110000
//*******************************************************************  00120000
//        PROC DBD=,                        DBDNAME                    00130000
//        DBRC=N,                           DBRC=Y IF HALDB PROCESS    00140000
//        KEYS='NULLFILE',                  DS NAME IF GENERATE KEYSIN 00150000
//        KEYSVOL=,                         VOL NAME OF KEYSIN         00160000
//        KEYSU='SYSDA',                    UNIT  FOR  KEYSIN DATA SET 00170000
//        KEYSCYL='1,1',                    SPACE FOR  KEYSIN DATA SET 00180000
//        U=SYSDA,                          UNIT  FOR  WORK DATA SETS  00190000
//        CYL='1,1',                        SPACE FOR  WORK DATA SETS  00200000
//        PRTBLK=0,                         BLKSIZE OF PRINT DATA SETS 00210000
//        PRTBLK2=0,                        BLKSIZE OF FSESTAT DATA SET00220000
//        SORTBLK=0,                        BLKSIZE OF SORT RECORS     00230000
//        HISTORY='NULLFILE',               HISTORY DATA SET           00240000
//        USERLIB='USER.LOADLIB',           USER RANDOMIZER            00250000
//        DBDLIB='IMSVS.DBDLIB',            <<--------<                00260000
//        RESLIB='IMSVS.RESLIB',            <<--------<                00270000
//        DBTLIB='HPS.SHPSLMD0',            <<--------<                00280000
//        DBTSRC='HPS.SHPSSAMP(FABPVSAM)'   <<--------<                00290000
//*------------------------------------------------------------------* 00300000
//HDPCPRO EXEC PGM=DFSRRC00,                                           00310000
//            PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N'                00320000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                    00330000
//          DD DSN=&RESLIB,DISP=SHR                                    00340000
//          DD DSN=&USERLIB,DISP=SHR                                   00350000
//*------------------------------------------------------------------* 00360000
//* FOR IMS DATA SETS                                                  00370000
//*------------------------------------------------------------------* 00380000
//IMS       DD DSN=&DBDLIB,DISP=SHR                                    00390000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                    00400000
//          DD DSN=&USERLIB,DISP=SHR                                   00410000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                    00420000
//DFSVSAMP  DD DSN=&DBTSRC,DISP=SHR                                    00430000
//IEFRDER   DD DUMMY                                                   00440000
```

Figure 4. HD Pointer Checker JCL procedure with dynamic allocation (FABPPD) (Part 1 of 2)

```
//*-------------------------------------------------------------------* 00460000
//* REPORTS                                                             00470000
//*-------------------------------------------------------------------* 00480000
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00490000
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00500000
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00510000
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00512000
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00515000
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00540000
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00550000
//SYSUDUMP  DD SYSOUT=A                                                 00570000
//*-------------------------------------------------------------------* 00580000
//* HISTORICAL ANALYSIS DATA SETS                                       00590000
//*-------------------------------------------------------------------* 00600000
//HISTORY   DD DSN=&HISTORY,DISP=SHR                                    00610000
//*-------------------------------------------------------------------* 00620000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                    00630000
//*-------------------------------------------------------------------* 00640000
//KEYSIN    DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),                       00650000
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,     00660000
//             DCB=(RECFM=VB)                                           00670000
//*-------------------------------------------------------------------* 00675000
//* FOR CHECK PROCESS                                                   00680000
//*-------------------------------------------------------------------* 00685000
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                  00690000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2           00695000
//*-------------------------------------------------------------------* 00700000
//* FOR CHECK AND BLKMAP PROCESS                                        00710000
//*-------------------------------------------------------------------* 00720000
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                      00730000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00740000
//             DCB=(BLKSIZE=&SORTBLK)                                   00750000
//*-------------------------------------------------------------------* 00760000
```

Figure 5. HD Pointer Checker JCL procedure with dynamic allocation (FABPPD) (Part 2 of 2)

Procedure FABPPA

The FABPPA procedure runs only the HD Pointer Checker in an IMS DBB region.

You must specify a PSB name and an ACBLIB data set. HD Pointer Checker obtains information about the PSB and all DBDs referred to by the PSB from the ACBLIB. This procedure contains no DD statements for work data sets; HD Pointer Checker allocates them dynamically.

The following figure shows the procedure FABPPA.

```
//*******************************************************************  00010000
//*   Licensed Materials - Property of IBM                          *  00020000
//*                                                                 *  00030000
//*   5655-U09                                                      *  00040000
//*                                                                 *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.    *  00060000
//*                                                                 *  00070000
//*   US Government Users Restricted Rights - Use,                  *  00080000
//*   duplication or disclosure restricted by GSA ADP               *  00090000
//*   Schedule Contract with IBM Corp.                              *  00100000
//*                                                                 *  00110000
//*******************************************************************  00120000
//        PROC PSB=,                        PSB NAME                   00130000
//        DBRC=N,                           DBRC=Y IF HALDB PROCESS    00140000
//        KEYS='NULLFILE',                  DS NAME IF GENERATE KEYSIN 00150000
//        KEYSVOL=,                         VOL NAME OF KEYSIN         00160000
//        KEYSU='SYSDA',                    UNIT  FOR  KEYSIN DATA SET 00170000
//        KEYSCYL='1,1',                    SPACE FOR  KEYSIN DATA SET 00180000
//        U=SYSDA,                          UNIT  FOR  WORK DATA SETS  00190000
//        CYL='1,1',                        SPACE FOR  WORK DATA SETS  00200000
//        PRTBLK=0,                         BLKSIZE OF PRINT DATA SETS 00210000
//        PRTBLK2=0,                        BLKSIZE OF FSESTAT DATA SET00220000
//        SORTBLK=0,                        BLKSIZE OF SORT RECORS     00230000
//        HISTORY='NULLFILE',               HISTORY DATA SET           00240000
//        USERLIB='USER.LOADLIB',           USER RANDOMIZER            00250000
//        ACBLIB='IMSVS.ACBLIB',            <<--------<                00260000
//        RESLIB='IMSVS.RESLIB',            <<--------<                00270000
//        DBTLIB='HPS.SHPSLMD0',            <<--------<                00280000
//        DBTSRC='HPS.SHPSSAMP(FABPVSAM)'   <<--------<                00290000
//*-----------------------------------------------------------------* 00300000
//HDPCPRO EXEC PGM=DFSRRC00,                                          00310000
//            PARM='DBB,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'               00320000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                   00330000
//          DD DSN=&RESLIB,DISP=SHR                                   00340000
//          DD DSN=&USERLIB,DISP=SHR                                  00350000
//*-----------------------------------------------------------------* 00360000
//* FOR IMS DATA SETS                                                 00370000
//*-----------------------------------------------------------------* 00380000
//IMSACB    DD DSN=&ACBLIB,DISP=SHR                                   00390000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                   00400000
//          DD DSN=&USERLIB,DISP=SHR                                  00410000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                   00420000
//DFSVSAMP  DD DSN=&DBTSRC,DISP=SHR                                   00430000
//IEFRDER   DD DUMMY                                                  00440000
```

Figure 6. HD Pointer Checker JCL procedure running with ACBLIB (FABPPA) (Part 1 of 2)

```
//*-------------------------------------------------------------------* 00450000
//* REPORTS                                                             00460000
//*-------------------------------------------------------------------* 00470000
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00480000
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00490000
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00500000
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00510000
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00520000
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00530000
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00540000
//SYSUDUMP  DD SYSOUT=A                                                 00550000
//*-------------------------------------------------------------------* 00560000
//* HISTORICAL ANALYSIS DATA SETS                                       00570000
//*-------------------------------------------------------------------* 00580000
//HISTORY   DD DSN=&HISTORY,DISP=SHR                                    00590000
//*-------------------------------------------------------------------* 00600000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                    00610000
//*-------------------------------------------------------------------* 00620000
//KEYSIN    DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),                       00630000
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,     00640000
//             DCB=(RECFM=VB)                                           00650000
//*-------------------------------------------------------------------* 00660000
//* FOR CHECK PROCESS                                                   00670000
//*-------------------------------------------------------------------* 00680000
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                  00690000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2           00700000
//*-------------------------------------------------------------------* 00710000
//* FOR CHECK AND BLKMAP PROCESS                                        00720000
//*-------------------------------------------------------------------* 00730000
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                      00740000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00750000
//             DCB=(BLKSIZE=&SORTBLK)                                   00760000
//*-------------------------------------------------------------------* 00770000
```

Figure 7. HD Pointer Checker JCL procedure running with ACBLIB (FABPPA) (Part 2 of 2)

Procedure FABPPTA

The FABPPTA procedure runs HD Pointer Checker and HD Tuning Aid sequentially. The procedure includes control statements for the allocation of the work data sets.

You must supply the PSB for this procedure.

```
//*********************************************************************  00010000
//*   Licensed Materials - Property of IBM                            *  00020000
//*                                                                   *  00030000
//*   5655-U09                                                        *  00040000
//*                                                                   *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.      *  00060000
//*                                                                   *  00070000
//*   US Government Users Restricted Rights - Use,                    *  00080000
//*   duplication or disclosure restricted by GSA ADP                 *  00090000
//*   Schedule Contract with IBM Corp.                                *  00100000
//*                                                                   *  00110000
//*********************************************************************  00120000
//        PROC PSB=,                          PSB NAME                   00130000
//        DBRC=Y,                             DBRC=Y IF HALDB PROCESS    00140000
//        HDTA02P=,                           PARAM FOR STEP HDTA02      00150000
//        U=SYSDA,                            UNIT  FOR  WORK DATA SETS  00160000
//        CYL='1,1',                          SPACE FOR  WORK DATA SETS  00170000
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET     00180000
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET     00190000
//        SORTIL='&&SORTIL',                  DS NAME IF HALDB PROCESS   00200000
//        SORTOL='&&SORTOL',                  DS NAME IF HALDB PROCESS   00220000
//        PRTBLK=0,                           BLKSIZE OF PRINT DATA SETS 00224000
//        PRTBLK2=0,                          BLKSIZE OF FSESTAT DATA SET00228000
//        SORTBLK=0,                          BLKSIZE OF SORT RECORS     00230000
//        IXKBLK=0,                           BLKSIZE OF IXKEY RECORS    00236000
//        HISTORY='NULLFILE',                 HISTORY DATA SET           00240000
//        USERLIB='USER.LOADLIB',             USER RANDOMIZER            00270000
//        DBDLIB='IMSVS.DBDLIB',              <<--------<                00280000
//        PSBLIB='IMSVS.PSBLIB',              <<--------<                00290000
//        RESLIB='IMSVS.RESLIB',              <<--------<                00300000
//        DBTLIB='HPS.SHPSLMD0',              <<--------<                00310000
//        DBTSRC='HPS.SHPSSAMP'               <<--------<                00320000
//*-------------------------------------------------------------------* 00330000
//HDPCPRO EXEC PGM=DFSRRC00,                                            00340000
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'                 00350000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                     00360000
//          DD DSN=&RESLIB,DISP=SHR                                     00370000
//          DD DSN=&USERLIB,DISP=SHR                                    00380000
//*-------------------------------------------------------------------* 00390000
//* FOR IMS DATA SETS                                                   00400000
//*-------------------------------------------------------------------* 00410000
//IMS       DD DSN=&PSBLIB,DISP=SHR                                     00420000
//          DD DSN=&DBDLIB,DISP=SHR                                     00430000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                     00440000
//          DD DSN=&USERLIB,DISP=SHR                                    00450000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                     00460000
//DFSVSAMP  DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                           00470000
//IEFRDER   DD DUMMY                                                    00480000
```

Figure 8. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPPTA) (Part 1 of 3)

```
//*-------------------------------------------------------------------* 00500000
//* REPORTS                                                             00510000
//*-------------------------------------------------------------------* 00520000
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00530000
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00540000
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00550000
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00560000
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00570000
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00580000
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                    00590000
//SYSUDUMP  DD SYSOUT=A                                                 00610000
//*-------------------------------------------------------------------* 00620000
//* HISTORICAL ANALYSIS DATA SETS                                       00630000
//*-------------------------------------------------------------------* 00640000
//HISTORY   DD DSN=&HISTORY,DISP=SHR                                    00650000
//*-------------------------------------------------------------------* 00660000
//* SORT RECORDS                                                        00670000
//*-------------------------------------------------------------------* 00680000
//MERGIN01  DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),                     00780000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00790000
//             DCB=(BLKSIZE=&SORTBLK)                                   00800000
//*-------------------------------------------------------------------* 00840000
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES            00850000
//*-------------------------------------------------------------------* 00860000
//SORTE201  DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),             00870000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               00880000
//MERGI201  DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),             00900000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               00910000
//*-------------------------------------------------------------------* 00930000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                    00940000
//*-------------------------------------------------------------------* 00950000
//KEYSIN    DD DSN=&&KEYSIN,DISP=(NEW,PASS,DELETE),                     00960000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00970000
//             DCB=(RECFM=VB)                                           00980000
//*-------------------------------------------------------------------* 01010000
//* FOR EPS HEALING PROCESS                                           * 01020000
//*-------------------------------------------------------------------* 01030000
//SORTIL01  DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),                      01040000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               01050000
//*-------------------------------------------------------------------* 01190000
//* FOR CHECK PROCESS                                                   01200000
//*-------------------------------------------------------------------* 01210000
//SORTOL    DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),                    01220000
//             UNIT=&U,SPACE=(CYL,(&CYL))                               01240000
//IXKEY     DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),                    01260000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              01280000
//             DCB=(BLKSIZE=&IXKBLK)                                    01285000
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                  01290000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2           01295000
```

Figure 9. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPPTA) (Part 2 of 3)

```
//*-------------------------------------------------------------------* 01300000
//* FOR CHECK AND BLKMAP PROCESS                                      01310000
//*-------------------------------------------------------------------* 01320000
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                      01330000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                            01340000
//             DCB=(BLKSIZE=&SORTBLK)                                 01350000
//*-------------------------------------------------------------------* 01360000
//HDTA01  EXEC PGM=DFSRRC00,                                          01370000
//             PARM='DLI,FABTROOT,&PSB,,,,,,,,,,&DBRC,N',             01380000
//             REGION=1000K,TIME=(,30)                                01390000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                   01400000
//          DD DSN=&RESLIB,DISP=SHR                                   01410000
//IMS       DD DSN=&DBDLIB,DISP=SHR                                   01420000
//          DD DSN=&PSBLIB,DISP=SHR                                   01430000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                   01440000
//          DD DSN=&USERLIB,DISP=SHR                                  01450000
//IEFRDER   DD DUMMY,DCB=BLKSIZE=1408                                 01460000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                   01470000
//DFSVSAMP  DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                         01480000
//RAPSIN    DD DSN=&&RAPSIN,UNIT=&U,                                  01490000
//             DISP=(NEW,PASS,DELETE),                                01500000
//             SPACE=(CYL,(&CYL)),                                    01510000
//             DCB=(LRECL=42,RECFM=FB)                                01520000
//PR8       DD SYSOUT=A                                               01530000
//PR10      DD SYSOUT=A                                               01540000
//KEYSIN    DD DSN=&&KEYSIN,DISP=(OLD,DELETE,DELETE)                  01550000
//SYSUDUMP  DD SYSOUT=A                                               01560000
//*-------------------------------------------------------------------* 01570000
//HDTA02  EXEC PGM=SORT,PARM='&HDTA02P',COND=((2,LT,HDPCPRO),         01580000
//             (0,LT,HDTA01))                                         01590000
//SORTIN    DD DSN=&&RAPSIN,DISP=(OLD,DELETE,DELETE)                  01600000
//SORTOUT   DD DSN=&&KEYSOUT,UNIT=&U,                                 01610000
//             DISP=(NEW,PASS,DELETE),                                01620000
//             SPACE=(CYL,(&CYL)),                                    01630000
//             DCB=(LRECL=42,RECFM=FB)                                01640000
//SORTWK01  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01650000
//SORTWK02  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01660000
//SORTWK03  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01670000
//SORTWK04  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01680000
//SORTWK05  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01690000
//SORTWK06  DD UNIT=&U,SPACE=(CYL,(&CYL))                             01700000
//SYSOUT    DD SYSOUT=A                                               01710000
//SYSIN     DD DSN=&DBTSRC(FABPSORT),DISP=SHR                         01720000
//*-------------------------------------------------------------------* 01730000
//HDTA03  EXEC PGM=FABTRAPS,COND=((2,LT,HDPCPRO),(0,LT,HDTA01),       01740000
//             (0,LT,HDTA02))                                         01750000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                   01760000
//PR9       DD SYSOUT=A                                               01770000
//PR9X      DD SYSOUT=A                                               01780000
//KEYSOUT   DD DSN=&&KEYSOUT,DISP=(OLD,DELETE,DELETE)                 01790000
//SYSUDUMP  DD SYSOUT=A                                               01800000
//*-------------------------------------------------------------------* 01810000
```

Figure 10. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPPTA) (Part 3 of 3)

Procedure FABPPM

The FABPPM procedure runs only HD Pointer Checker. FABPPM includes control statements for allocating the work data sets. This procedure checks pointers in multiple job steps.

You must supply the PSB for this procedure.

Restriction: EPSCHK=YES cannot be specified with this procedure.

```
//*********************************************************************  00010000
//*   Licensed Materials - Property of IBM                            *  00020000
//*                                                                   *  00030000
//*   5655-U09                                                        *  00040000
//*                                                                   *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.      *  00060000
//*                                                                   *  00070000
//*   US Government Users Restricted Rights - Use,                    *  00080000
//*   duplication or disclosure restricted by GSA ADP                 *  00090000
//*   Schedule Contract with IBM Corp.                                *  00100000
//*                                                                   *  00110000
//*********************************************************************  00120000
//        PROC PSB=,                      PSBNAME                        00130000
//        DBRC=N,                         DBRC=Y IF HALDB PROCESS        00140000
//        KEYS='NULLFILE',                DS NAME IF GENERATE KEYSIN     00150000
//        KEYSVOL=,                       VOL NAME OF KEYSIN             00160000
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET       00170000
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET      00180000
//        U=SYSDA,                        UNIT FOR WORK DATA SETS        00190000
//        CYL='1,1',                      SPACE FOR WORK DATA SETS       00200000
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET       00208000
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET       00210000
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS    00220000
//        SORTOL='&&SORTOL',                 DS NAME IF HALDB PROCESS    00230000
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS     00232000
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET    00235000
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS        00237000
//        HISTORY='NULLFILE',             HISTORY DATA SET               00240000
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,              00250000
//*                                       SEGMENT COMPACTION EXIT AND    00260000
//*                                       INDEX MAINTENANCE EXIT         00265000
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY                    00270000
//        PSBLIB='IMSVS.PSBLIB',          PSB LIBRARY                    00280000
//        RESLIB='IMSVS.RESLIB',                                         00290000
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY                    00300000
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET             00310000
//*********************************************************************  00320000
//* DB SCAN STEP                                                        00330000
//*********************************************************************  00340000
//HDPCSCAN EXEC PGM=DFSRRC00,                                           00350000
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'                00360000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                      00370000
//         DD DSN=&RESLIB,DISP=SHR                                      00380000
//         DD DSN=&USERLIB,DISP=SHR                                     00390000
```

Figure 11. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPM) (Part 1 of 3)

```
//*-------------------------------------------------------------------* 00400000
//* FOR IMS DATA SETS                                                 00410000
//*-------------------------------------------------------------------* 00420000
//IMS      DD DSN=&PSBLIB,DISP=SHR                                    00430000
//         DD DSN=&DBDLIB,DISP=SHR                                    00440000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    00450000
//         DD DSN=&USERLIB,DISP=SHR                                   00460000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    00470000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          00480000
//IEFRDER  DD DUMMY                                                   00490000
//*-------------------------------------------------------------------* 00510000
//* REPORTS                                                           00520000
//*-------------------------------------------------------------------* 00530000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00540000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00550000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00560000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00570000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00580000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00590000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00600000
//SYSUDUMP DD SYSOUT=A                                                00610000
//*-------------------------------------------------------------------* 00620000
//* HISTORY ANALYSIS DATA SET                                         00630000
//*-------------------------------------------------------------------* 00640000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                   00650000
//*-------------------------------------------------------------------* 00660000
//* SORT RECORDS                                                      00670000
//*-------------------------------------------------------------------* 00680000
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),                    00720000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                             00730000
//            DCB=(BLKSIZE=&SORTBLK)                                  00750000
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),                    00780000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                  @PN04801 00790000
//            DCB=(BLKSIZE=&SORTBLK)                                  00790500
//*-------------------------------------------------------------------* 00791000
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES          00793000
//*-------------------------------------------------------------------* 00794000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),            00796000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00797000
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),            00799000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00800000
//*-------------------------------------------------------------------* 00802000
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES                         00803000
//*-------------------------------------------------------------------* 00805000
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),                     00806000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00808000
//*-------------------------------------------------------------------* 00810000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                  00820000
//*-------------------------------------------------------------------* 00830000
//KEYSIN   DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),                      00840000
//            UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,    00850000
//            DCB=(RECFM=VB)                                          00860000
```

Figure 12. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPM) (Part 2 of 3)

```
//*******************************************************************  01350000
//* CHECK STEP                                                        01360000
//*******************************************************************  01370000
//HDPCCHK  EXEC PGM=DFSRRC00,                                         01380000
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N',             01390000
//             COND=(4,LT,HDPCSCAN)                                   01400000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                    01410000
//         DD DSN=&RESLIB,DISP=SHR                                    01420000
//         DD DSN=&USERLIB,DISP=SHR                                   01430000
//*-----------------------------------------------------------------* 01440000
//* FOR IMS DATA SETS                                                 01450000
//*-----------------------------------------------------------------* 01460000
//IMS      DD DSN=&PSBLIB,DISP=SHR                                    01470000
//         DD DSN=&DBDLIB,DISP=SHR                                    01480000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    01490000
//         DD DSN=&USERLIB,DISP=SHR                                   01500000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    01510000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          01520000
//IEFRDER  DD DUMMY                                                   01530000
//*-----------------------------------------------------------------* 01560000
//* REPORTS                                                           01570000
//*-----------------------------------------------------------------* 01580000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01590000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01600000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01610000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01620000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01630000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01640000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01650000
//SYSUDUMP DD SYSOUT=A                                                01660000
//*-----------------------------------------------------------------* 01710000
//* HISTORY ANALYSIS DATA SET                                         01720000
//*-----------------------------------------------------------------* 01730000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                   01740000
//*-----------------------------------------------------------------* 01740600
//* FOR CHECK PROCESS                                                 01741000
//*-----------------------------------------------------------------* 01741900
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)                   01742000
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)                   01743000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)           01743900
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)           01744000
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)                    01745000
//SORTOL   DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),                   01745900
//             UNIT=&U,SPACE=(CYL,(&CYL))                             01746000
//IXKEY    DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),                   01747000
//             UNIT=&U,SPACE=(CYL,(&CYL))                             01747900
//FSESTAT  DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                 01748000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2         01749000
//*-----------------------------------------------------------------* 01750000
//* FOR CHECK AND BLKMAP PROCESS                                      01760000
//*-----------------------------------------------------------------* 01770000
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                     01790000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                            01800000
//             DCB=(BLKSIZE=&SORTBLK)                                 50000000
```

Figure 13. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPM) (Part 3 of 3)

Procedure FABPPMD

The FABPPMD procedure corresponds to FABPPM. Both procedures check pointers in multiple job steps; FABPPMD, though, provides for dynamic PSB generation.

The DBD parameter of the FABPPMD procedure is not required.

```
//*********************************************************************  00010000
//*   Licensed Materials - Property of IBM                            *  00020000
//*                                                                   *  00030000
//*   5655-U09                                                        *  00040000
//*                                                                   *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.      *  00060000
//*                                                                   *  00070000
//*   US Government Users Restricted Rights - Use,                    *  00080000
//*   duplication or disclosure restricted by GSA ADP                 *  00090000
//*   Schedule Contract with IBM Corp.                                *  00100000
//*                                                                   *  00110000
//*********************************************************************  00120000
//        PROC DBD=,                      DBDNAME                        00130000
//        DBRC=N,                         DBRC=Y IF HALDB PROCESS        00140000
//        KEYS='NULLFILE',                DS NAME IF GENERATE KEYSIN     00150000
//        KEYSVOL=,                       VOL NAME OF KEYSIN             00160000
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET       00170000
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET      00180000
//        U=SYSDA,                        UNIT FOR WORK DATA SETS        00190000
//        CYL='1,1',                      SPACE FOR WORK DATA SETS       00200000
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET       00210000
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET       00220000
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS    00230000
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS     00232000
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET    00235000
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS        00237000
//        HISTORY='NULLFILE',             HISTORY DATA SET               00240000
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,              00250000
//*                                       SEGMENT COMPACTION EXIT AND    00260000
//*                                       INDEX MAINTENANCE EXIT         00265000
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY                    00270000
//        RESLIB='IMSVS.RESLIB',                                         00280000
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY                    00290000
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET             00300000
//*********************************************************************  00310000
//* DB SCAN STEP                                                        00320000
//*********************************************************************  00330000
//HDPCSCAN EXEC PGM=DFSRRC00,                                           00340000
//             PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N'                00350000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                      00360000
//         DD DSN=&RESLIB,DISP=SHR                                      00370000
//         DD DSN=&USERLIB,DISP=SHR                                     00380000
```

Figure 14. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPMD) (Part 1 of 3)

```
//*-------------------------------------------------------------------* 00390000
//* FOR IMS DATA SETS                                                 00400000
//*-------------------------------------------------------------------* 00410000
//IMS      DD DSN=&DBDLIB,DISP=SHR                                    00420000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    00430000
//         DD DSN=&USERLIB,DISP=SHR                                   00440000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    00450000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          00460000
//IEFRDER  DD DUMMY                                                   00470000
//*-------------------------------------------------------------------* 00490000
//* REPORTS                                                           00500000
//*-------------------------------------------------------------------* 00510000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00520000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00530000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00540000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00550000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00560000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00570000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   00580000
//SYSUDUMP DD SYSOUT=A                                                00590000
//*-------------------------------------------------------------------* 00600000
//* HISTORY ANALYSIS DATA SET                                         00610000
//*-------------------------------------------------------------------* 00620000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                   00630000
//*-------------------------------------------------------------------* 00640000
//* SORT RECORDS                                                      00650000
//*-------------------------------------------------------------------* 00660000
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),                    00700000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                             00710000
//            DCB=(BLKSIZE=&SORTBLK)                                  00730000
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),                    00760000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                  @PN04801 00770000
//            DCB=(BLKSIZE=&SORTBLK)                                  00770500
//*-------------------------------------------------------------------* 00771000
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES          00773000
//*-------------------------------------------------------------------* 00774000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),            00776000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00777000
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),            00779000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00780000
//*-------------------------------------------------------------------* 00782000
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES                         00783000
//*-------------------------------------------------------------------* 00785000
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),                     00786000
//            UNIT=&U,SPACE=(CYL,(&CYL))                              00788000
//*-------------------------------------------------------------------* 00790000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                  00800000
//*-------------------------------------------------------------------* 00810000
//KEYSIN   DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),                      00820000
//            UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,    00830000
//            DCB=(RECFM=VB)                                          00840000
```

Figure 15. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPMD) (Part 2 of 3)

```
//*******************************************************************  01330000
//* CHECK STEP                                                        01340000
//*******************************************************************  01350000
//HDPCCHK  EXEC PGM=DFSRRC00,                                         01360000
//             PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N',             01370000
//             COND=(4,LT,HDPCSCAN)                                   01380000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                    01390000
//         DD DSN=&RESLIB,DISP=SHR                                    01400000
//         DD DSN=&USERLIB,DISP=SHR                                   01410000
//*-----------------------------------------------------------------* 01420000
//* FOR IMS DATA SETS                                                 01430000
//*-----------------------------------------------------------------* 01440000
//IMS      DD DSN=&DBDLIB,DISP=SHR                                    01450000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    01460000
//         DD DSN=&USERLIB,DISP=SHR                                   01470000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    01480000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          01490000
//IEFRDER  DD DUMMY                                                   01500000
//*-----------------------------------------------------------------* 01530000
//* REPORTS                                                           01540000
//*-----------------------------------------------------------------* 01550000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01560000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01570000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01580000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01590000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01600000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01610000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01620000
//SYSUDUMP DD SYSOUT=A                                                01630000
//*-----------------------------------------------------------------* 01680000
//* HISTORY ANALYSIS DATA SET                                         01690000
//*-----------------------------------------------------------------* 01700000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                   01710000
//*-----------------------------------------------------------------* 01710900
//* FOR CHECK PROCESS                                                 01711000
//*-----------------------------------------------------------------* 01712000
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)                   01713000
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)                   01714000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)           01715000
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)           01716000
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)                    01717000
//FSESTAT  DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                 01718000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2         01719000
//*-----------------------------------------------------------------* 01720000
//* FOR CHECK AND BLKMAP PROCESS                                      01730000
//*-----------------------------------------------------------------* 01740000
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                     01760000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                            01770000
//             DCB=(BLKSIZE=&SORTBLK)                                 50000000
```

Figure 16. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPMD) (Part 3 of 3)

Procedure FABPPTAM

The FABPPTAM procedure runs HD Pointer Checker and HD Tuning Aid sequentially. The procedure includes control statements for allocating the work data sets. This procedure checks pointers in multiple job steps.

You must supply the PSB for this procedure.

Restriction: EPSCHK=YES cannot be specified with this procedure.

```
//*******************************************************************  00010000
//*   Licensed Materials - Property of IBM                          *  00020000
//*                                                                 *  00030000
//*   5655-U09                                                      *  00040000
//*                                                                 *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.    *  00060000
//*                                                                 *  00070000
//*   US Government Users Restricted Rights - Use,                  *  00080000
//*   duplication or disclosure restricted by GSA ADP               *  00090000
//*   Schedule Contract with IBM Corp.                              *  00100000
//*                                                                 *  00110000
//*******************************************************************  00120000
//        PROC PSB=,                      PSBNAME                     00130000
//        DBRC=Y,                         FOR HDTA WHEN HALDB         00140000
//        HDTA02P=,                       PERM FOR STEP HDTA02P       00150000
//        KEYSVOL=,                       VOL NAME OF KEYSIN          00160000
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET    00170000
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET   00180000
//        U=SYSDA,                        UNIT FOR WORK DATA SETS     00190000
//        CYL='1,1',                      SPACE FOR WORK DATA SETS    00200000
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET    00208000
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET    00210000
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS 00220000
//        SORTOL='&&SORTOL',                 DS NAME IF HALDB PROCESS 00230000
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS  00232000
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET 00235000
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS     00237000
//        HISTORY='NULLFILE',             HISTORY DATA SET            00240000
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,           00250000
//*                                       SEGMENT COMPACTION EXIT AND 00260000
//*                                       INDEX MAINTENANCE EXIT      00265000
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY                 00270000
//        PSBLIB='IMSVS.PSBLIB',          PSB LIBRARY                 00280000
//        RESLIB='IMSVS.RESLIB',                                      00290000
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY                 00300000
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET          00310000
```

Figure 17. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPTAM) (Part 1 of 4)

```
//*********************************************************************** 00320000
//* DB SCAN STEP                                                          00330000
//*********************************************************************** 00340000
//HDPCSCAN EXEC PGM=DFSRRC00,                                             00350000
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'                   00360000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                        00370000
//         DD DSN=&RESLIB,DISP=SHR                                        00380000
//         DD DSN=&USERLIB,DISP=SHR                                       00390000
//*--------------------------------------------------------------------* 00400000
//* FOR IMS DATA SETS                                                     00410000
//*--------------------------------------------------------------------* 00420000
//IMS      DD DSN=&PSBLIB,DISP=SHR                                        00430000
//         DD DSN=&DBDLIB,DISP=SHR                                        00440000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                        00450000
//         DD DSN=&USERLIB,DISP=SHR                                       00460000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                        00470000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                              00480000
//IEFRDER  DD DUMMY                                                       00490000
//*--------------------------------------------------------------------* 00510000
//* REPORTS                                                               00520000
//*--------------------------------------------------------------------* 00530000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00540000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00550000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00560000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00570000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00580000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00590000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                       00600000
//SYSUDUMP DD SYSOUT=A                                                    00610000
//*--------------------------------------------------------------------* 00620000
//* HISTORY ANALYSIS DATA SET                                             00630000
//*--------------------------------------------------------------------* 00640000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                       00650000
//*--------------------------------------------------------------------* 00660000
//* SORT RECORDS                                                          00670000
//*--------------------------------------------------------------------* 00680000
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),                        00720000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                                 00730000
//            DCB=(BLKSIZE=&SORTBLK)                                      00750000
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),                        00780000
//            UNIT=&U,SPACE=(CYL,(&CYL)),                    @PN04801 00790000
//            DCB=(BLKSIZE=&SORTBLK)                                      00790500
//*--------------------------------------------------------------------* 00791000
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES              00793000
//*--------------------------------------------------------------------* 00794000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),                00796000
//            UNIT=&U,SPACE=(CYL,(&CYL))                                  00797000
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),                00799000
//            UNIT=&U,SPACE=(CYL,(&CYL))                                  00800000
//*--------------------------------------------------------------------* 00802000
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES                             00803000
//*--------------------------------------------------------------------* 00805000
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),                         00806000
//            UNIT=&U,SPACE=(CYL,(&CYL))                                  00808000
//*--------------------------------------------------------------------* 00810000
//* FOR SCAN WITH HDAM/HIDAM PROCESS                                      00820000
//*--------------------------------------------------------------------* 00830000
//KEYSIN   DD DSN=&KEYSIN,DISP=(NEW,CATLG,DELETE),                        00840000
//            UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,        00850000
//            DCB=(RECFM=VB)                                              00860000
```

Figure 18. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPTAM) (Part 2 of 4)

```
//*******************************************************************  01350000
//* CHECK STEP                                                        01360000
//*******************************************************************  01370000
//HDPCCHK  EXEC PGM=DFSRRC00,                                         01380000
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N',             01390000
//             COND=(4,LT,HDPCSCAN)                                   01400000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                    01410000
//         DD DSN=&RESLIB,DISP=SHR                                    01420000
//         DD DSN=&USERLIB,DISP=SHR                                   01430000
//*-----------------------------------------------------------------* 01440000
//* FOR IMS DATA SETS                                                 01450000
//*-----------------------------------------------------------------* 01460000
//IMS      DD DSN=&PSBLIB,DISP=SHR                                    01470000
//         DD DSN=&DBDLIB,DISP=SHR                                    01480000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    01490000
//         DD DSN=&USERLIB,DISP=SHR                                   01500000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    01510000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          01520000
//IEFRDER  DD DUMMY                                                   01530000
//*-----------------------------------------------------------------* 01560000
//* REPORTS                                                           01570000
//*-----------------------------------------------------------------* 01580000
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01590000
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01600000
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01610000
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01620000
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01630000
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01640000
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0                   01650000
//SYSUDUMP DD SYSOUT=A                                                01660000
//*-----------------------------------------------------------------* 01710000
//* HISTORY ANALYSIS DATA SET                                         01720000
//*-----------------------------------------------------------------* 01730000
//HISTORY  DD DSN=&HISTORY,DISP=SHR                                   01740000
//*-----------------------------------------------------------------* 01740600
//* FOR CHECK PROCESS                                                 01741000
//*-----------------------------------------------------------------* 01741900
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)                   01742000
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)                   01743000
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)           01743900
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)           01744000
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)                    01745000
//SORTOL   DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),                   01745900
//             UNIT=&U,SPACE=(CYL,(&CYL))                             01746000
//IXKEY    DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),                   01747000
//             UNIT=&U,SPACE=(CYL,(&CYL))                             01747900
//FSESTAT  DD  DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),                01748000
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2         01749000
//*-----------------------------------------------------------------* 01750000
//* FOR CHECK AND BLKMAP PROCESS                                      01760000
//*-----------------------------------------------------------------* 01770000
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),                     01790000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                            01800000
//             DCB=(BLKSIZE=&SORTBLK)                                 01820000
```

Figure 19. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPTAM) (Part 3 of 4)

```
//******************************************************************** 01840000
//* FABTROOT STEP                                                    * 01850000
//******************************************************************** 01860000
//HDTA01  EXEC PGM=DFSRRC00,                                          01870000
//             PARM='DLI,FABTROOT,&PSB,,,,,,,,,,&DBRC,N',             01880000
//             REGION=1000K,TIME=(,30),                               01890000
//             COND=((4,LT,HDPCSCAN),(2,LT,HDPCCHK))                  01900000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                    01910000
//         DD DSN=&RESLIB,DISP=SHR                                    01920000
//IMS      DD DSN=&DBDLIB,DISP=SHR                                    01930000
//         DD DSN=&PSBLIB,DISP=SHR                                    01940000
//IMS2     DD DSN=&RESLIB,DISP=SHR                                    01950000
//         DD DSN=&USERLIB,DISP=SHR                                   01960000
//IEFRDER  DD DUMMY,DCB=BLKSIZE=1408                                  01970000
//DFSRESLB DD DSN=&RESLIB,DISP=SHR                                    01980000
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                          01990000
//RAPSIN   DD DSN=&&RAPSIN,UNIT=&U,                                   02000000
//             DISP=(NEW,PASS,DELETE),                                02010000
//             SPACE=(CYL,(&CYL)),                                    02020000
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)                   02030000
//PR8      DD SYSOUT=A                                                02040000
//PR10     DD SYSOUT=A                                                02050000
//KEYSIN   DD DSN=&&KEYSIN,DISP=(OLD,DELETE,DELETE)                   02060000
//SYSUDUMP DD SYSOUT=A                                                02070000
//******************************************************************** 02080000
//* RAPSIN SORT STEP                                                 * 02090000
//******************************************************************** 02100000
//HDTA02   EXEC PGM=SORT,PARM='&HDTA02P',COND=((2,LT,HDPCSCAN),       02110000
//              (2,LT,HDPCCHK),(0,LT,HDTA01))                         02120000
//*------------------------------------------------------------------* 02130000
//* SORT RECORDS                                                     * 02140000
//*------------------------------------------------------------------* 02150000
//SORTIN   DD DSN=&&RAPSIN,DISP=(OLD,DELETE,DELETE)                   02160000
//SORTOUT  DD DSN=&&KEYSOUT,UNIT=&U,DISP=(NEW,PASS,DELETE),           02170000
//             SPACE=(CYL,(&CYL)),                                    02180000
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)                   02190000
//*------------------------------------------------------------------* 02200000
//* SORT STATEMENT AND OUTPUT                                        * 02210000
//*------------------------------------------------------------------* 02220000
//SYSOUT   DD SYSOUT=A                                                02230000
//SYSIN    DD DSN=&DBTSRC(FABPSORT),DISP=SHR                          02240000
//*------------------------------------------------------------------* 02250000
//* SORT WORK                                                        * 02260000
//*------------------------------------------------------------------* 02270000
//SORTWK01 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02280000
//SORTWK02 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02290000
//SORTWK03 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02300000
//SORTWK04 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02310000
//SORTWK05 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02320000
//SORTWK06 DD UNIT=&U,SPACE=(CYL,(&CYL))                              02330000
//******************************************************************** 02340000
//* FABTRAPS STEP                                                    * 02350000
//******************************************************************** 02360000
//HDTA03   EXEC PGM=FABTRAPS,COND=((2,LT,HDPCSCAN),                   02370000
//              (2,LT,HDPCCHK),(0,LT,HDTA01),(0,LT,HDTA02))           02380000
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR                                    02390000
//KEYSOUT  DD DSN=&&KEYSOUT,DISP=(OLD,DELETE,DELETE)                  02400000
//PR9      DD SYSOUT=A                                                02410000
//PR9X     DD SYSOUT=A                                                02420000
//SYSUDUMP DD SYSOUT=A                                                02430000
```

Figure 20. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPPTAM) (Part 4 of 4)

Procedure FABPC

The FABPC procedure runs HD Pointer Checker and stores sensor data by using the Integrated DB Sensor function, or runs HD Pointer Checker and monitors the latest space utilization of VSAM data sets of IMS online full-function databases by using Space Monitor and the IMS Tools Online System Interface.

You must supply the PSB for this procedure.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC PSB=,                          PSBNAME
//        DBRC=N,                             DBRC=Y IF HALDB PROCESS
//        KEYS='NULLFILE',                    DS NAME IF GENERATE KEYSIN
//        KEYSVOL=,                           VOL NAME OF KEYSIN
//        KEYSU='SYSDA',                      UNIT  FOR  KEYSIN DATA SET
//        KEYSCYL='1,1',                      SPACE FOR  KEYSIN DATA SET
//        U=SYSDA,                            UNIT  FOR  WORK DATA SETS
//        CYL='1,1',                          SPACE FOR  WORK DATA SETS
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET
//        SORTIL='&&SORTIL',                  DS NAME IF HALDB PROCESS
//        SORTOL='&&SORTOL',                  DS NAME IF HALDB PROCESS
//        PRTBLK=0,                           BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                          BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                          BLKSIZE OF SORT RECORS
//        IXKBLK=0,                           BLKSIZE OF IXKEY RECORS
//        HISTORY='NULLFILE',                 HISTORY DATA SET
//        USERLIB='USER.LOADLIB',             USER RANDOMIZER
//        ITKBLIB='ITKB.LOADLIB',             ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',            TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',              <<--------<
//        PSBLIB='IMSVS.PSBLIB',              <<--------<
//        RESLIB='IMSVS.RESLIB',              <<--------<
//        DBTLIB='HPS.SHPSLMD0',              <<--------<
//        DBTSRC='HPS.SHPSSAMP(FABPVSAM)'     <<--------<
//*-----------------------------------------------------------------*
//HDPCPRO EXEC PGM=FABPPC00,
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR
//          DD DSN=&ITKBLIB,DISP=SHR
//          DD DSN=&TOSILIB,DISP=SHR
//          DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
```

Figure 21. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPC) (Part 1 of 2)

```
//*-------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-------------------------------------------------------------------*
//IMS       DD DSN=&PSBLIB,DISP=SHR
//          DD DSN=&DBDLIB,DISP=SHR
//IMS2      DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP  DD DSN=&DBTSRC,DISP=SHR
//IEFRDER   DD DUMMY
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP  DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORICAL ANALYSIS DATA SETS
//*-------------------------------------------------------------------*
//HISTORY   DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* SORT RECORDS
//*-------------------------------------------------------------------*
//MERGIN01  DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES
//*-------------------------------------------------------------------*
//SORTE201  DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//MERGI201  DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN    DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,
//             DCB=(RECFM=VB)
//*-------------------------------------------------------------------*
//* FOR EPS HEALING PROCESS                                           *
//*-------------------------------------------------------------------*
//SORTIL01  DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-------------------------------------------------------------------*
//SORTOL    DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//IXKEY     DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&IXKBLK)
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
//*-------------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-------------------------------------------------------------------*
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------
*
```

Figure 22. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPC) (Part 2 of 2)

Procedure FABPCD

The FABPCD procedure runs HD Pointer Checker and stores sensor data by using the Integrated DB Sensor function, or runs HD Pointer Checker and monitors the latest space utilization of VSAM data sets of IMS online full-function databases by using Space Monitor and IMS Tools Online System Interface. This procedure generates a PSB dynamically and allocates the sort work data set dynamically.

The DBD parameter of the FABPCD procedure is not required.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC DBD=,                          DBDNAME
//        DBRC=N,                             DBRC=Y IF HALDB PROCESS
//        KEYS='NULLFILE',                    DS NAME IF GENERATE KEYSIN
//        KEYSVOL=,                           VOL NAME OF KEYSIN
//        KEYSU='SYSDA',                      UNIT  FOR  KEYSIN DATA SET
//        KEYSCYL='1,1',                      SPACE FOR  KEYSIN DATA SET
//        U=SYSDA,                            UNIT  FOR  WORK DATA SETS
//        CYL='1,1',                          SPACE FOR  WORK DATA SETS
//        PRTBLK=0,                           BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                          BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                          BLKSIZE OF SORT RECORS
//        HISTORY='NULLFILE',                 HISTORY DATA SET
//        USERLIB='USER.LOADLIB',             USER RANDOMIZER
//        ITKBLIB='ITKB.LOADLIB',             ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',            TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',              <<--------<
//        RESLIB='IMSVS.RESLIB',              <<--------<
//        DBTLIB='HPS.SHPSLMD0',              <<--------<
//        DBTSRC='HPS.SHPSSAMP(FABPVSAM)'     <<--------<
//*------------------------------------------------------------------*
//HDPCPRO EXEC PGM=FABPPC00,
//             PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N'
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR
//          DD DSN=&ITKBLIB,DISP=SHR
//          DD DSN=&TOSILIB,DISP=SHR
//          DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
//*------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*------------------------------------------------------------------*
//IMS       DD DSN=&DBDLIB,DISP=SHR
//IMS2      DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP  DD DSN=&DBTSRC,DISP=SHR
//IEFRDER   DD DUMMY
```

Figure 23. HD Pointer Checker JCL procedure with dynamic allocation (FABPCD) (Part 1 of 2)

```
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP  DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORICAL ANALYSIS DATA SETS
//*-------------------------------------------------------------------*
//HISTORY   DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN    DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,
//             DCB=(RECFM=VB)
//*-------------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-------------------------------------------------------------------*
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
//*-------------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-------------------------------------------------------------------*
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
```

Figure 24. HD Pointer Checker JCL procedure with dynamic allocation (FABPCD) (Part 2 of 2)

Procedure FABPCTA

The FABPCTA procedure runs HD Pointer Checker and HD Tuning Aid sequentially. In the HD Pointer Checker process, sensor data is collected and stored by the Integrated DB Sensor function, or the latest space utilization of VSAM data sets of IMS online full-function databases is monitored by Space Monitor and the IMS Tools Online System Interface.

You must supply the PSB for this procedure.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC PSB=,                          PSB NAME
//        DBRC=Y,                             DBRC=Y IF HALDB PROCESS
//        HDTA02P=,                           PARAM FOR STEP HDTA02
//        U=SYSDA,                            UNIT  FOR  WORK DATA SETS
//        CYL='1,1',                          SPACE FOR  WORK DATA SETS
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET
//        SORTIL='&&SORTIL',                  DS NAME IF HALDB PROCESS
//        SORTOL='&&SORTOL',                  DS NAME IF HALDB PROCESS
//        PRTBLK=0,                           BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                          BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                          BLKSIZE OF SORT RECORS
//        IXKBLK=0,                           BLKSIZE OF IXKEY RECORS
//        HISTORY='NULLFILE',                 HISTORY DATA SET
//        USERLIB='USER.LOADLIB',             USER RANDOMIZER
//        ITKBLIB='ITKB.LOADLIB',             ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',            TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',              <<--------<
//        PSBLIB='IMSVS.PSBLIB',              <<--------<
//        RESLIB='IMSVS.RESLIB',              <<--------<
//        DBTLIB='HPS.SHPSLMD0',              <<--------<
//        DBTSRC='HPS.SHPSSAMP'               <<--------<
//*-------------------------------------------------------------------*
//HDPCPRO EXEC PGM=FABPPC00,
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR
//          DD DSN=&ITKBLIB,DISP=SHR
//          DD DSN=&TOSILIB,DISP=SHR
//          DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
```

Figure 25. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPCTA) (Part 1 of 3)

```
//*-------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-------------------------------------------------------------------*
//IMS       DD DSN=&PSBLIB,DISP=SHR
//          DD DSN=&DBDLIB,DISP=SHR
//IMS2      DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP  DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER   DD DUMMY
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY   DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP  DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORICAL ANALYSIS DATA SETS
//*-------------------------------------------------------------------*
//HISTORY   DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* SORT RECORDS
//*-------------------------------------------------------------------*
//MERGIN01  DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES
//*-------------------------------------------------------------------*
//SORTE201  DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//MERGI201  DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN    DD DSN=&&KEYSIN,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(RECFM=VB)
//*-------------------------------------------------------------------*
//* FOR EPS HEALING PROCESS                                           *
//*-------------------------------------------------------------------*
//SORTIL01  DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-------------------------------------------------------------------*
//SORTOL    DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//IXKEY     DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&IXKBLK)
//FSESTAT   DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
```

Figure 26. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPCTA) (Part 2 of 3)

```
//*-------------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-------------------------------------------------------------------*
//JRM       DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
//HDTA01  EXEC PGM=DFSRRC00,
//             PARM='DLI,FABTROOT,&PSB,,,,,,,,,,&DBRC,N',
//             REGION=1000K,TIME=(,30)
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR
//          DD DSN=&RESLIB,DISP=SHR
//IMS       DD DSN=&DBDLIB,DISP=SHR
//          DD DSN=&PSBLIB,DISP=SHR
//IMS2      DD DSN=&RESLIB,DISP=SHR
//          DD DSN=&USERLIB,DISP=SHR
//IEFRDER   DD DUMMY,DCB=BLKSIZE=1408
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP  DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//RAPSIN    DD DSN=&&RAPSIN,UNIT=&U,
//             DISP=(NEW,PASS,DELETE),
//             SPACE=(CYL,(&CYL)),
//             DCB=(LRECL=42,RECFM=FB)
//PR8       DD SYSOUT=A
//PR10      DD SYSOUT=A
//KEYSIN    DD DSN=&&KEYSIN,DISP=(OLD,DELETE,DELETE)
//SYSUDUMP  DD SYSOUT=A
//*-------------------------------------------------------------------*
//HDTA02  EXEC PGM=SORT,PARM='&HDTA02P',COND=((2,LT,HDPCPRO),
//             (0,LT,HDTA01))
//SORTIN    DD DSN=&&RAPSIN,DISP=(OLD,DELETE,DELETE)
//SORTOUT   DD DSN=&&KEYSOUT,UNIT=&U,
//             DISP=(NEW,PASS,DELETE),
//             SPACE=(CYL,(&CYL)),
//             DCB=(LRECL=42,RECFM=FB)
//SORTWK01  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK02  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK03  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK04  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK05  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK06  DD UNIT=&U,SPACE=(CYL,(&CYL))
//SYSOUT    DD SYSOUT=A
//SYSIN     DD DSN=&DBTSRC(FABPSORT),DISP=SHR
//*-------------------------------------------------------------------*
//HDTA03  EXEC PGM=FABTRAPS,COND=((2,LT,HDPCPRO),(0,LT,HDTA01),
//             (0,LT,HDTA02))
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR
//PR9       DD SYSOUT=A
//PR9X      DD SYSOUT=A
//KEYSOUT   DD DSN=&&KEYSOUT,DISP=(OLD,DELETE,DELETE)
//SYSUDUMP  DD SYSOUT=A
//*-------------------------------------------------------------------*
```

Figure 27. HD Pointer Checker and HD Tuning Aid JCL procedure using the HD Pointer Checker processor (FABPCTA) (Part 3 of 3)

Procedure FABPCM

The FABPCM procedure runs HD Pointer Checker and stores sensor data by using the Integrated DB Sensor function, or runs HD Pointer Checker and monitors the latest space utilization of VSAM data sets of IMS online full-function databases by using Space Monitor and the IMS Tools Online System Interface. This procedure checks pointers in multiple job steps.

You must supply the PSB for this procedure.

Restriction: EPSCHK=YES cannot be specified with this procedure.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC PSB=,                      PSBNAME
//        DBRC=N,                         DBRC=Y IF HALDB PROCESS
//        KEYS='NULLFILE',                DS NAME IF GENERATE KEYSIN
//        KEYSVOL=,                       VOL NAME OF KEYSIN
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET
//        U=SYSDA,                        UNIT FOR WORK DATA SETS
//        CYL='1,1',                      SPACE FOR WORK DATA SETS
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS
//        SORTOL='&&SORTOL',                 DS NAME IF HALDB PROCESS
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS
//        HISTORY='NULLFILE',             HISTORY DATA SET
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,
//*                                       SEGMENT COMPACTION EXIT AND
//*                                       INDEX MAINTENANCE EXIT
//        ITKBLIB='ITKB.LOADLIB',         ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',        TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY
//        PSBLIB='IMSVS.PSBLIB',          PSB LIBRARY
//        RESLIB='IMSVS.RESLIB',
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET
```

Figure 28. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCM) (Part 1 of 3)

```
//*********************************************************************
//* DB SCAN STEP
//*********************************************************************
//HDPCSCAN EXEC PGM=FABPPC00,
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&ITKBLIB,DISP=SHR
//         DD DSN=&TOSILIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//*-------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-------------------------------------------------------------------*
//IMS      DD DSN=&PSBLIB,DISP=SHR
//         DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-------------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* SORT RECORDS
//*-------------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),                    @PN04801
//             DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES
//*-------------------------------------------------------------------*
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES
//*-------------------------------------------------------------------*
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN   DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),
//             UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,
//             DCB=(RECFM=VB)
```

Figure 29. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCM) (Part 2 of 3)

```
//*******************************************************************
//* CHECK STEP
//*******************************************************************
//HDPCCHK  EXEC PGM=DFSRRC00,
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N',
//             COND=(4,LT,HDPCSCAN)
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//*-----------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-----------------------------------------------------------------*
//IMS      DD DSN=&PSBLIB,DISP=SHR
//         DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-----------------------------------------------------------------*
//* REPORTS
//*-----------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-----------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-----------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-----------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-----------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)
//SORTOL   DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//IXKEY    DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//FSESTAT  DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
//*-----------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-----------------------------------------------------------------*
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
```

Figure 30. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCM) (Part 3 of 3)

Procedure FABPCMD

You can use the FABPCMD procedure to run HD Pointer Checker and to store sensor data by using the Integrated DB Sensor function, or to run HD Pointer Checker and monitor the latest space utilization of VSAM data sets of IMS online full-function databases by using Space Monitor and the IMS Tools Online System Interface. This procedure checks pointers in multiple job steps and generates the PSB dynamically.

The DBD parameter of the FABPCMD procedure is not required.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC DBD=,                      DBDNAME
//        DBRC=N,                         DBRC=Y IF HALDB PROCESS
//        KEYS='NULLFILE',                DS NAME IF GENERATE KEYSIN
//        KEYSVOL=,                       VOL NAME OF KEYSIN
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET
//        U=SYSDA,                        UNIT FOR WORK DATA SETS
//        CYL='1,1',                      SPACE FOR WORK DATA SETS
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS
//        HISTORY='NULLFILE',             HISTORY DATA SET
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,
//*                                       SEGMENT COMPACTION EXIT AND
//*                                       INDEX MAINTENANCE EXIT
//        ITKBLIB='ITKB.LOADLIB',         ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',        TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY
//        RESLIB='IMSVS.RESLIB',
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET
//*******************************************************************
//* DB SCAN STEP
//*******************************************************************
//HDPCSCAN EXEC PGM=FABPPC00,
//             PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N'
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&ITKBLIB,DISP=SHR
//         DD DSN=&TOSILIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
```

Figure 31. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCMD) (Part 1 of 3)

```
//*-------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-------------------------------------------------------------------*
//IMS      DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-------------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* SORT RECORDS
//*-------------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL)),
//            DCB=(BLKSIZE=&SORTBLK)
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL)),                    @PN04801
//            DCB=(BLKSIZE=&SORTBLK)
//*-------------------------------------------------------------------*
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES
//*-------------------------------------------------------------------*
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL))
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES
//*-------------------------------------------------------------------*
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL))
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN   DD DSN=&KEYS,DISP=(NEW,CATLG,DELETE),
//            UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,
//            DCB=(RECFM=VB)
```

Figure 32. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCMD) (Part 2 of 3)

```
//*******************************************************************
//* CHECK STEP
//*******************************************************************
//HDPCCHK  EXEC PGM=DFSRRC00,
//             PARM='ULU,FABPMAIN,&DBD,,,,,,,,,,&DBRC,N',
//             COND=(4,LT,HDPCSCAN)
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//*-----------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-----------------------------------------------------------------*
//IMS      DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-----------------------------------------------------------------*
//* REPORTS
//*-----------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-----------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-----------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-----------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-----------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)
//FSESTAT  DD DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
//*-----------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-----------------------------------------------------------------*
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
```

Figure 33. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCMD) (Part 3 of 3)

Procedure FABPCTAM

The FABPCTAM procedure runs HD Pointer Checker and HD Tuning Aid sequentially. In the HD Pointer Checker process, sensor data is collected and stored by the Integrated DB Sensor function, or the latest space utilization of VSAM data sets of IMS online full-function databases is monitored by Space Monitor and the IMS Tools Online System Interface. This procedure checks pointers in multiple job steps.

You must supply the PSB for this procedure.

Restriction: EPSCHK=YES cannot be specified with this procedure.

```
//*******************************************************************
//*   Licensed Materials - Property of IBM                          *
//*                                                                 *
//*   5655-U09                                                      *
//*                                                                 *
//*   Copyright IBM Corporation 2011. All rights reserved.          *
//*                                                                 *
//*   US Government Users Restricted Rights - Use,                  *
//*   duplication or disclosure restricted by GSA ADP               *
//*   Schedule Contract with IBM Corp.                              *
//*                                                                 *
//*******************************************************************
//        PROC PSB=,                      PSBNAME
//        DBRC=Y,                         FOR HDTA WHEN HALDB
//        HDTA02P=,                       PERM FOR STEP HDTA02P
//        KEYSVOL=,                       VOL NAME OF KEYSIN
//        KEYSU='SYSDA',                  UNIT FOR KEYSIN DATA SET
//        KEYSCYL='1,1',                  SPACE FOR KEYSIN DATA SET
//        U=SYSDA,                        UNIT FOR WORK DATA SETS
//        CYL='1,1',                      SPACE FOR WORK DATA SETS
//        SORT2=,            SORT2='DUMMY,' IF NO SORTEX2 DATA SET
//        MERG2=,            MERG2='DUMMY,' IF NO MERGIN2 DATA SET
//        SORTIL='&&SORTIL',                 DS NAME IF HALDB PROCESS
//        SORTOL='&&SORTOL',                 DS NAME IF HALDB PROCESS
//        PRTBLK=0,                       BLKSIZE OF PRINT DATA SETS
//        PRTBLK2=0,                      BLKSIZE OF FSESTAT DATA SET
//        SORTBLK=0,                      BLKSIZE OF SORT RECORDS
//        HISTORY='NULLFILE',             HISTORY DATA SET
//        USERLIB='USER.LOADLIB',         USER RANDOMIZER ,
//*                                       SEGMENT COMPACTION EXIT AND
//*                                       INDEX MAINTENANCE EXIT
//        ITKBLIB='ITKB.LOADLIB',         ITKB LOAD LIBRARY
//        TOSILIB='TOSI.SHKTLOAD',        TOSI LOAD LIBRARY
//        DBDLIB='IMSVS.DBDLIB',          DBD LIBRARY
//        PSBLIB='IMSVS.PSBLIB',          PSB LIBRARY
//        RESLIB='IMSVS.RESLIB',
//        DBTLIB='HPS.SHPSLMD0',          HPS LIBRARY
//        DBTSRC='HPS.SHPSSAMP'           BUFF PARM DATA SET
```

Figure 34. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCTAM) (Part 1 of 4)

```
//*******************************************************************
//* DB SCAN STEP
//*******************************************************************
//HDPCSCAN EXEC PGM=FABPPC00,
//             PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N'
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&ITKBLIB,DISP=SHR
//         DD DSN=&TOSILIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//*-----------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-----------------------------------------------------------------*
//IMS      DD DSN=&PSBLIB,DISP=SHR
//         DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-----------------------------------------------------------------*
//* REPORTS
//*-----------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-----------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-----------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-----------------------------------------------------------------*
//* SORT RECORDS
//*-----------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),
//             DCB=(BLKSIZE=&SORTBLK)
//MERGIN01 DD DSN=&&MERGIN,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL)),                    @PN04801
//             DCB=(BLKSIZE=&SORTBLK)
//*-----------------------------------------------------------------*
//* SPECIFY SORTEX2 AND MERGIN2 FOR SCAN WITH IXKEYCHK = YES
//*-----------------------------------------------------------------*
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
//*-----------------------------------------------------------------*
//* SPECIFY SORTIL FOR SCAN WITH EPSCHK = YES
//*-----------------------------------------------------------------*
//SORTIL01 DD DSN=&SORTIL,DISP=(NEW,PASS,DELETE),
//             UNIT=&U,SPACE=(CYL,(&CYL))
```

Figure 35. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCTAM) (Part 2 of 4)

```
//*-------------------------------------------------------------------*
//* FOR SCAN WITH HDAM/HIDAM PROCESS
//*-------------------------------------------------------------------*
//KEYSIN   DD DSN=&KEYSIN,DISP=(NEW,CATLG,DELETE),
//            UNIT=&KEYSU,SPACE=(CYL,(&KEYSCYL)),VOL=SER=&KEYSVOL,
//            DCB=(RECFM=VB)
//*******************************************************************
//* CHECK STEP
//*******************************************************************
//HDPCCHK  EXEC PGM=DFSRRC00,
//            PARM='DLI,FABPMAIN,&PSB,,,,,,,,,,&DBRC,N',
//            COND=(4,LT,HDPCSCAN)
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//*-------------------------------------------------------------------*
//* FOR IMS DATA SETS
//*-------------------------------------------------------------------*
//IMS      DD DSN=&PSBLIB,DISP=SHR
//         DD DSN=&DBDLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//IEFRDER  DD DUMMY
//*-------------------------------------------------------------------*
//* REPORTS
//*-------------------------------------------------------------------*
//PRIMAPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//STATIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//VALIDPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALUPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//EVALIPRT DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SNAPPIT  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SUMMARY  DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK,OUTLIM=0
//SYSUDUMP DD SYSOUT=A
//*-------------------------------------------------------------------*
//* HISTORY ANALYSIS DATA SET
//*-------------------------------------------------------------------*
//HISTORY  DD DSN=&HISTORY,DISP=SHR
//*-------------------------------------------------------------------*
//* FOR CHECK PROCESS
//*-------------------------------------------------------------------*
//SORTEX01 DD DSN=&&SORTEX,DISP=(OLD,DELETE,DELETE)
//MERGIN01 DD DSN=&&MERGIN,DISP=(OLD,DELETE,DELETE)
//SORTE201 DD &SORT2.DSN=&&SORTEX2,DISP=(OLD,DELETE,DELETE)
//MERGI201 DD &MERG2.DSN=&&MERGIN2,DISP=(OLD,DELETE,DELETE)
//SORTIL01 DD DSN=&SORTIL,DISP=(OLD,DELETE,DELETE)
//SORTOL   DD DSN=&SORTOL,DISP=(NEW,DELETE,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL))
//IXKEY    DD DSN=&&IXKEY,DISP=(NEW,DELETE,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL))
//FSESTAT  DD  DSN=&&FSESTAT,DISP=(NEW,DELETE,DELETE),
//            UNIT=&U,SPACE=(CYL,(2,2)),DCB=BLKSIZE=&PRTBLK2
//*-------------------------------------------------------------------*
//* FOR CHECK AND BLKMAP PROCESS
//*-------------------------------------------------------------------*
//JRM      DD DSN=&&JRM,DISP=(NEW,DELETE,DELETE),
//            UNIT=&U,SPACE=(CYL,(&CYL)),
//            DCB=(BLKSIZE=&SORTBLK)
```

Figure 36. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCTAM) (Part 3 of 4)

```
//*********************************************************************
//* FABTROOT STEP
//*********************************************************************
//HDTA01  EXEC PGM=DFSRRC00,
//             PARM='DLI,FABTROOT,&PSB,,,,,,,,,,&DBRC,N',
//             REGION=1000K,TIME=(,30),
//             COND=((4,LT,HDPCSCAN),(2,LT,HDPCCHK))
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//         DD DSN=&RESLIB,DISP=SHR
//IMS      DD DSN=&DBDLIB,DISP=SHR
//         DD DSN=&PSBLIB,DISP=SHR
//IMS2     DD DSN=&RESLIB,DISP=SHR
//         DD DSN=&USERLIB,DISP=SHR
//IEFRDER  DD DUMMY,DCB=BLKSIZE=1408
//DFSRESLB DD DSN=&RESLIB,DISP=SHR
//DFSVSAMP DD DSN=&DBTSRC(FABPVSAM),DISP=SHR
//RAPSIN   DD DSN=&&RAPSIN,UNIT=&U,
//             DISP=(NEW,PASS,DELETE),
//             SPACE=(CYL,(&CYL)),
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)
//PR8      DD SYSOUT=A
//PR10     DD SYSOUT=A
//KEYSIN   DD DSN=&&KEYSIN,DISP=(OLD,DELETE,DELETE)
//SYSUDUMP DD SYSOUT=A
//*********************************************************************
//* RAPSIN SORT STEP
//*********************************************************************
//HDTA02   EXEC PGM=SORT,PARM='&HDTA02P',COND=((2,LT,HDPCSCAN),
//              (2,LT,HDPCCHK),(0,LT,HDTA01))
//*-------------------------------------------------------------------*
//* SORT RECORDS
//*-------------------------------------------------------------------*
//SORTIN   DD DSN=&&RAPSIN,DISP=(OLD,DELETE,DELETE)
//SORTOUT  DD DSN=&&KEYSOUT,UNIT=&U,DISP=(NEW,PASS,DELETE),
//             SPACE=(CYL,(&CYL)),
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)
//*-------------------------------------------------------------------*
//* SORT STATEMENT AND OUTPUT
//*-------------------------------------------------------------------*
//SYSOUT   DD SYSOUT=A
//SYSIN    DD DSN=&DBTSRC(FABPSORT),DISP=SHR
//*-------------------------------------------------------------------*
//* SORT WORK
//*-------------------------------------------------------------------*
//SORTWK01 DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK02 DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK03 DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK04 DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK05 DD UNIT=&U,SPACE=(CYL,(&CYL))
//SORTWK06 DD UNIT=&U,SPACE=(CYL,(&CYL))
//*********************************************************************
//* FABTRAPS STEP
//*********************************************************************
//HDTA03   EXEC PGM=FABTRAPS,COND=((2,LT,HDPCSCAN),
//              (2,LT,HDPCCHK),(0,LT,HDTA01),(0,LT,HDTA02))
//STEPLIB  DD DSN=&DBTLIB,DISP=SHR
//KEYSOUT  DD DSN=&&KEYSOUT,DISP=(OLD,DELETE,DELETE)
//PR9      DD SYSOUT=A
//PR9X     DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
```

Figure 37. HD Pointer Checker JCL procedure using the HD Pointer Checker processor (FABPCTAM) (Part 4 of 4)

Input

The following topics describe all the input that you must specify to run the HD Pointer Checker processor (FABPMAIN). It includes the conventions for coding control statements for the PROCCTL data set.

FABPMAIN PROCCTL data set

The FABPMAIN PROCCTL data set contains your description of the processing to be done by HD Pointer Checker.

Format

This control data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set. It must contain 80-byte, fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

This data set can contain one or more combinations of five types of statements; PROC, DATABASE, OPTION, REPORT, and END. These statements can be coded as shown in the following figure.

```
//PROCCTL DD *
 PROC     TYPE=ALL,DBORG=ALL
 OPTION   ERRLIMIT=YES,DIAGDUMP=ERROR,HISTORY=YES,KEYSIN=NO,
          T2CHK=(0,7),ZEROCTR=NO    COMMENT
 REPORT   RUNTM=YES,INTST=YES,INTFS=YES,DBDIST=YES,BITMAP=NO,
          FSEMAP=YES,MAXFSD=YES
* COMMENT STATEMENTS
 DATABASE DB=HDAMDB01,DD=HDAMDS01
  OPTION  ERRLIMIT=YES,DIAGDUMP=ERROR,HISTORY=YES,KEYSIN=YES,
          T2CHK=(0,20),ZEROCTR=YES
  REPORT  RUNTM=YES,INTST=YES,INTFS=YES,DBDIST=YES,BITMAP=YES,
          FSEMAP=YES,MAXFSD=YES
/*
```

Figure 38. Example of control statement format in PROCCTL data set

Control statement syntax

Follow these coding conventions when you write control statements in the PROCCTL data set:

- A control statement can be coded onto one or more control statement records. Statement names (those are, PROC, DATABASE, OPTION, REPORT, and END), keywords, and keyword values must be coded within column 2 and column 72. A statement name must be the first entry in the control statement.
- Keywords and their values follow the statement name separated by one or more blanks. A statement name and the first keyword must be written in the same control statement record. When more than one keyword is coded, they must be separated by commas. No blanks are allowed between the keywords and the commas, or between the keywords and their values.

  Keywords can be continued onto one or more following control statement records. The control statement starting with a statement name must be completed with a keyword with its value, including the comma that follows it. Then keywords can be continued onto another control statement records begin in any column from 2.

  Keywords are not positional parameters; they can be specified in any order of sequence.

  A null value is not allowed for any keyword value.
- Comments can follow the last keyword value on each control statement record, separated by at least one blank.
- A comment line must begin with an asterisk in column 1.

The following figure shows the control statement syntax.

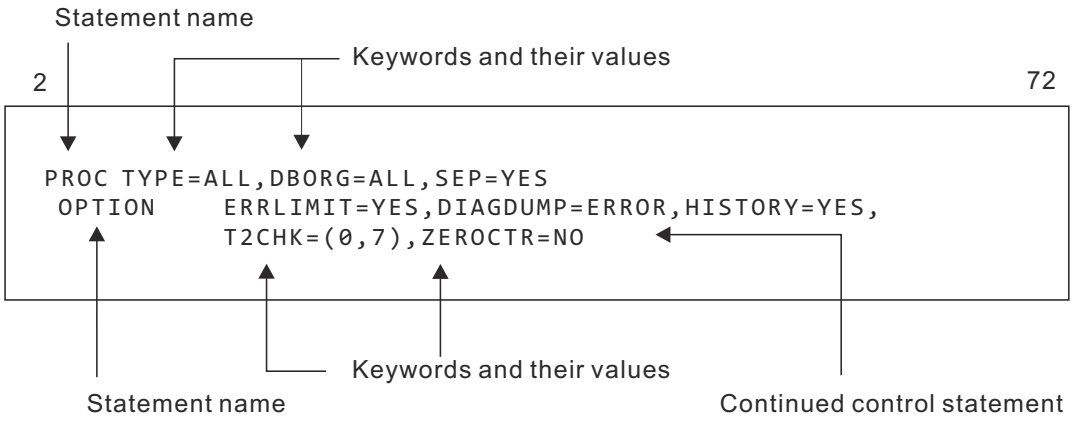


Figure 39. Control statement syntax for PROCCTL

Note: On the control statement, use uppercase alphabetic characters, numeric characters, and the following special characters:

- Asterisk (*)
- Comma (,)
- Equal sign (=)
- Parentheses ( )

PROC statement

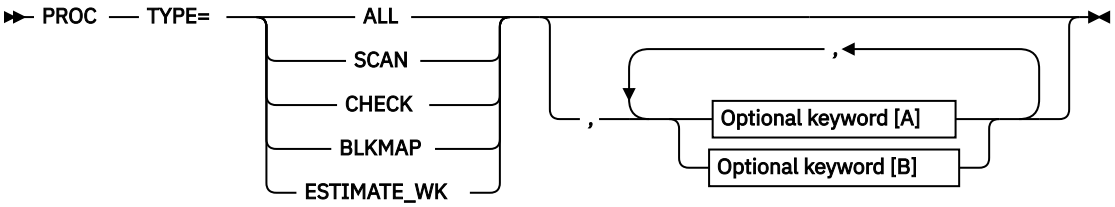
The PROC statement specifies the options for all databases to be processed. There must be only one PROC statement, and it must be the first control statement in the PROCCTL data set.

Subsections:

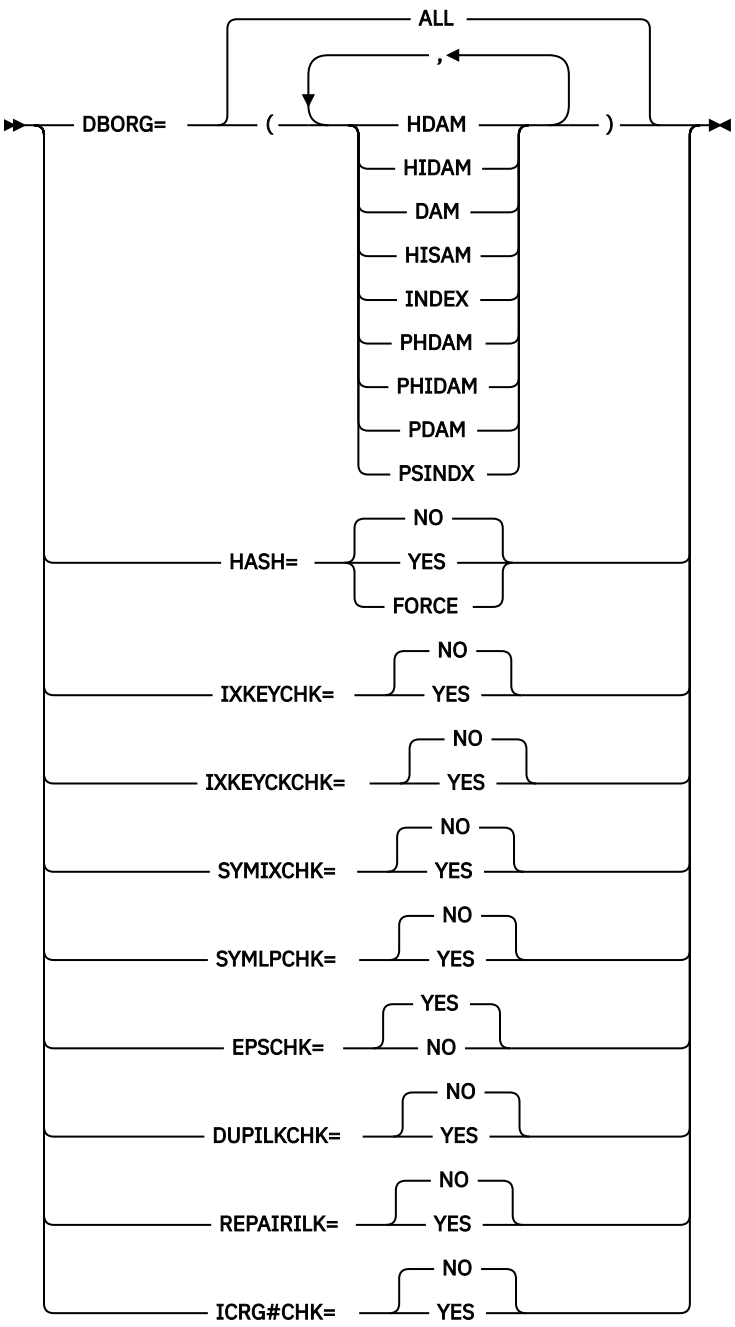
- “Syntax” on page 108
- “Keywords” on page 110

Syntax

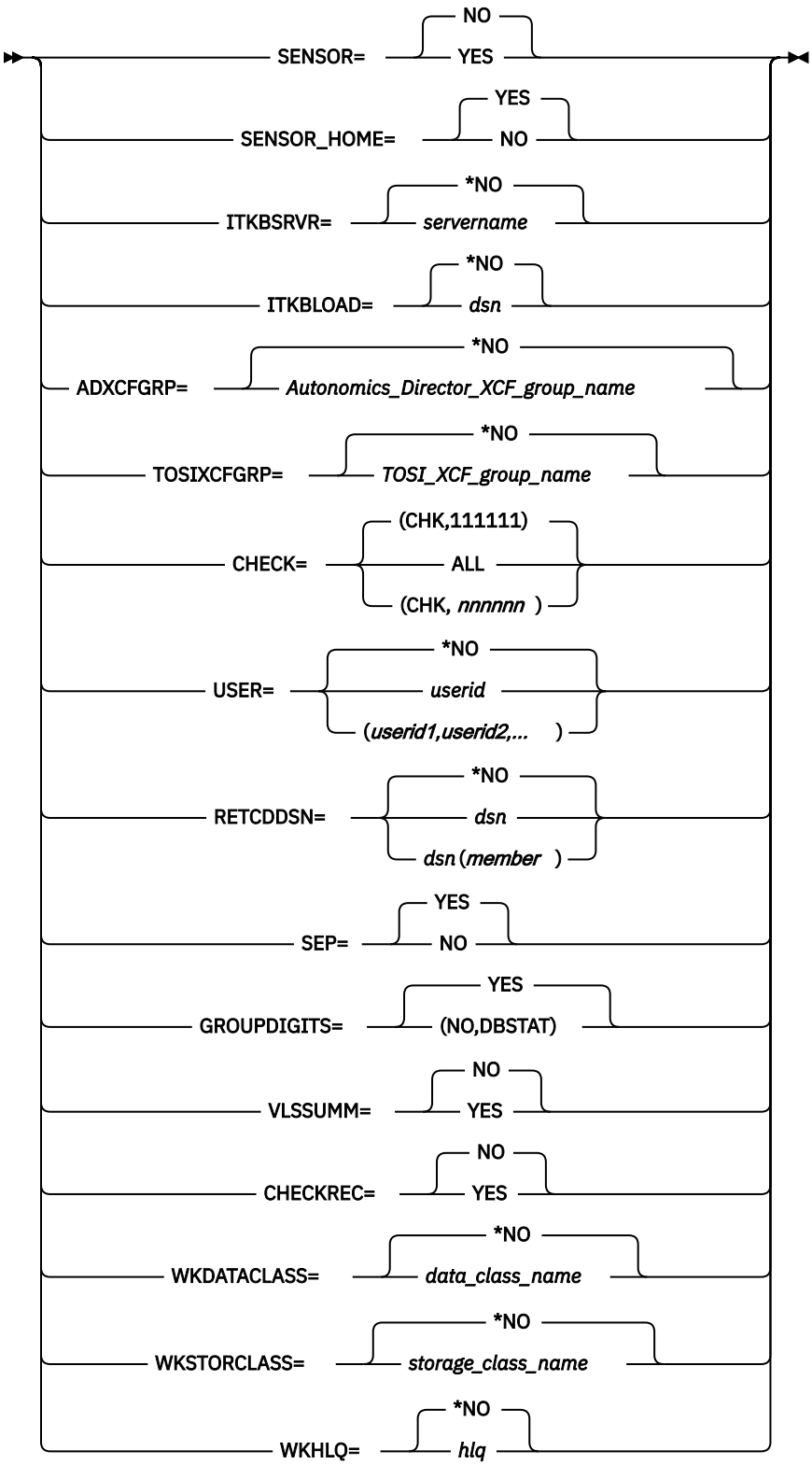
The following syntax diagram shows the keywords for the PROC statement.



Optional keywords [A]



Optional keywords [B]



Keywords

The following keywords can be specified on the PROC statement:

TYPE=
Specifies the type of the process to be done. This keyword is a required keyword.

Recommendation: It is strongly recommended that you use PROC TYPE=ALL and not PROC TYPE=SCAN and CHECK because by using PROC TYPE=ALL, the performance and the size of work data sets will improve and the JCL statements are more simple.

ALL
Specifies that all of the following processes are run by HD Pointer Checker:

- SCAN process
- CHECK process
- BLOCKMAP process (This process is run only when pointer errors are detected.)

SCAN
Specifies that only the SCAN process is run by HD Pointer Checker.

CHECK
Specifies that the following processes are run by HD Pointer Checker:

- CHECK process
- BLOCKMAP process (This process is run only when pointer errors are detected.)

BLKMAP
Specifies that a stand-alone BLOCKMAP process is run by HD Pointer Checker.

This process uses the BLKMAPIN data set, which contains the user specified control statement records, and the CHECKREC data set, which contains all sorted records, as the input.

Before you run the BLOCKMAP process, you must run either the TYPE=ALL process or the TYPE=CHECK process, with CHECKREC=YES, and you must retain the CHECKREC data set.

ESTIMATE_WK
Specifies to estimate the approximate sizes of the work data sets without scanning or checking database pointers.

HD Pointer Checker estimates the sizes of the work data sets that will be dynamically allocated by HD Pointer Checker in a TYPE=ALL job. The sizes of the work data sets that are associated with the following DD statements are estimated:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

For more information about these work data sets, see “DD statements for work data sets” on page 65.

For an instruction to estimate the sizes of work data sets with the ESTIMATE_WK parameter, see “Estimating the sizes of work data sets for HD Pointer Checker automatically” on page 311.

For more information about these processes, see “Processes and data flow” on page 34.

DBORG=
Specifies one or more database types to be processed. At least one database data set group of the DBORG parameter must be specified by the succeeding DATABASE statements.

This option can be specified when TYPE=ALL or TYPE=SCAN is specified.

If you specify TYPE=ALL, and INDEX or PSINDEX for the DBORG parameter to process an index database, you must include database type for the indexed database. This means, you cannot process index database only.

ALL
Specifies that all types of databases (HDAM, HIDAM, HISAM, INDEX, PHDAM, PHIDAM, and PSINDEX) specified by the succeeding DATABASE statements are to be processed. DBORG=ALL

is the default value. If DBORG=ALL is specified with any other parameters, other parameters are ignored.

HDAM
Specifies that the HDAM databases specified by the DATABASE statements are to be processed.

HIDAM
Specifies that the primary databases of the HIDAM databases that are specified by the DATABASE statements are to be processed.

DAM
Specifies that the HDAM, HIDAM, PHDAM, and PHIDAM databases that are specified by the DATABASE statements are to be processed. If DAM is specified with HDAM, HIDAM, PHDAM, or PHIDAM parameters, these parameters are ignored.

HISAM
Specifies that the HISAM (including SHISAM) databases that are specified by the DATABASE statements are to be processed.

INDEX
Specifies that the HIDAM index, the secondary index databases, the PHIDAM index, and the PSINDEX databases that are specified by the DATABASE statements are to be processed.

PHDAM
Specifies that PHDAM databases specified by the DATABASE statement are to be processed.

PHIDAM
Specifies that PHIDAM databases specified by the DATABASE statement are to be processed. The primary index databases pointed to by the PHIDAM database are also to be processed.

PDAM
Specifies that the PHDAM and PHIDAM databases that are specified by the DATABASE statements are processed. If PDAM is specified with PHDAM or PHIDAM parameters, PHDAM or PHIDAM parameters are ignored.

PSINDX
Specifies that PSINDEX databases specified by the DATABASE statement are to be processed.

HASH=
Specifies whether you want to check the pointers by use of the HASH Check function.

This option can be specified when TYPE=ALL or SCAN is specified. When HASH=YES or FORCE is specified, INCORE=YES and EPSCHK=YES are ignored and set to NO.

YES
Specifies that all databases specified by the succeeding DATABASE statements are to be processed by the HASH Check function without in-core pointer checking. The HASH Check function provides an extra fast pointer-checking capability.

The HASH Check function has certain restrictions. If the HASH Check function is not applicable to some databases because of restrictions, the job ends. For the restrictions, see the following topics:

- "Restrictions for the HASH Check function" on page 41
- For HD Tuning Aid restrictions, see "Restrictions and considerations" on page 331.

NO
Specifies to run the Standard Check. HD Pointer Checker creates the segment and pointer sort records without using the HASH Check function. This is the comprehensive technique for pointer checking; however, more CPU and I/O time is required. HASH=NO is the default value.

FORCE
Specifies that the HASH Check function applies to the databases that are not subject to restrictions, but the databases that are not applicable to the HASH Check function are processed using the standard pointer checking technique. HD Pointer Checker analyzes each specified database data set group to check if the HASH Check function is applicable or not.

IXKEYCHK=

Specifies whether to check the pointers and the key data by use of the Index Key Check function.

If this option is not specified, only the pointers of the primary or the secondary index databases are checked. The Index Key Check function checks not only the pointers, but also the key data of the primary and secondary index databases, against the associated segment RBA and the source key data of the primary databases.

This option can be specified when TYPE=ALL or SCAN is specified.

Abbreviation KEYCHK and IKEYCHK can be used for IXKEYCHK.

YES

Specifies that the Index Key check is to be applied to the databases. Index databases and associated primary databases must be specified in the succeeding DATABASE statements. If a primary database is indexed in more than one index database or vice versa, this option applies only to the specified database.

If /CK fields are defined by the SUBSEQ operand of the XDFLD statement, the Index Key Check is done only when IXKEYCHK=YES and IXKEYCKCHK=YES are specified.

NO

Specifies that the Index Key Check function is not to be performed. Only pointers in a primary or a secondary index are checked. IXKEYCHK=NO is the default value.

IXKEYCKCHK=

Specifies whether to run the Index Key Check function to check the keys in the primary database that has /CK fields defined by the SUBSEQ operand of the XDFLD statement, and the keys in the associated secondary index databases.

This keyword is effective when TYPE=ALL, HASH=NO, and IXKEYCHK=YES are specified.

YES

Run the Index Key Check function to check the keys in the primary database that has /CK fields defined, and the keys in the associated secondary index databases.

Secondary index databases and their associated primary databases must be specified on the DATABASE statements.

NO

Do not run the Index Key Check function against databases that have /CK fields. IXKEYCKCHK=NO is the default value.

The following figure is a conceptual diagram that shows how HD Pointer Checker checks the index keys when IXKEYCKCHK=YES is specified.

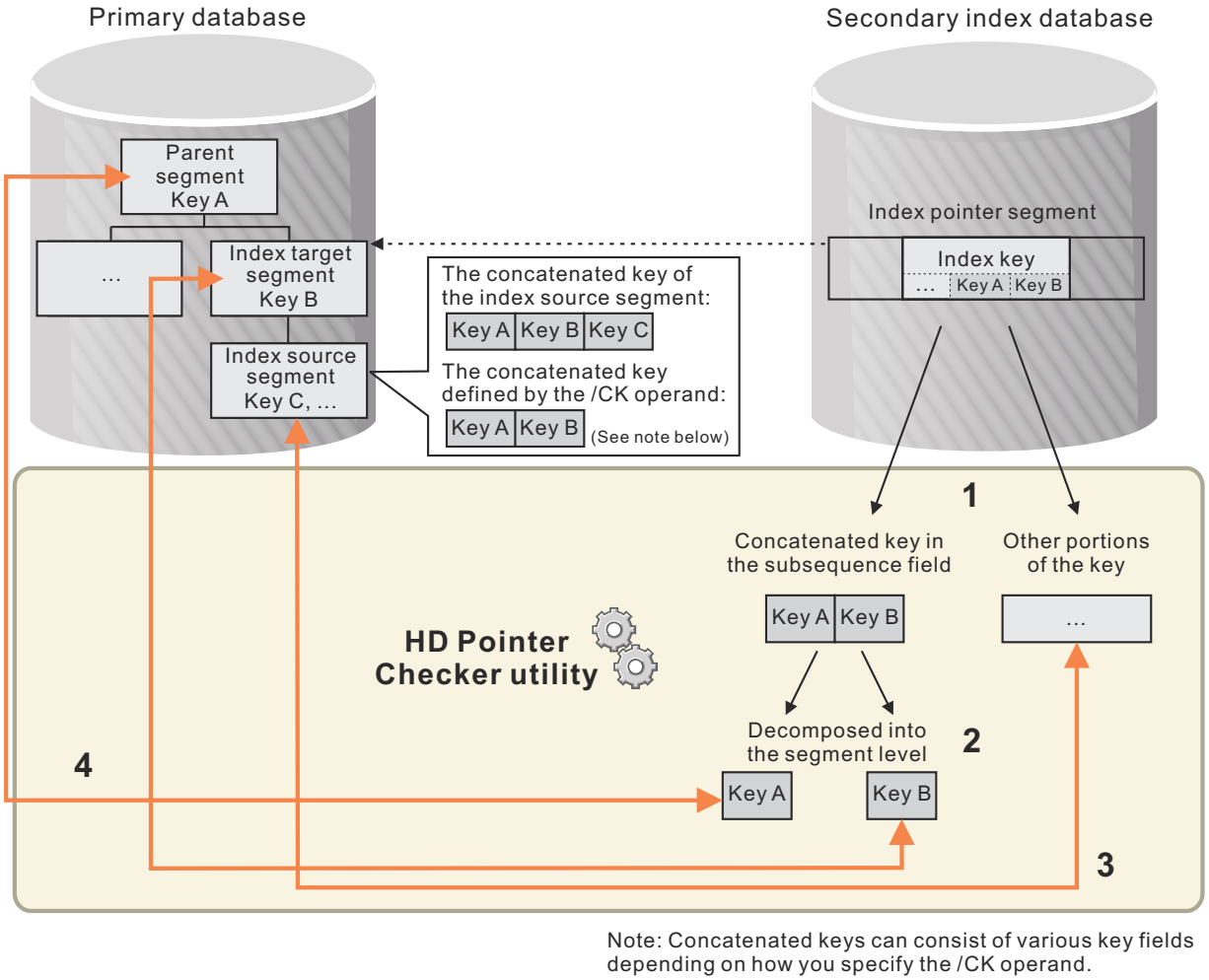


Figure 40. Conceptual diagram: How HD Pointer Checker checks index keys when IXKEYCKCHK=YES

When IXKEYCKCHK=YES is specified, HD Pointer Checker processes each index key as follows:

1. Decomposes the index key of the index pointer segment into the following two portions:
   - Concatenated key in the subsequence field
   - Other portions of the key
2. Decomposes the concatenated key into the segment level.
3. Compares the other portions of the key with the portion of the corresponding key in index source segments.
4. Compares the decomposed keys with the keys of the corresponding segments in the primary database.

Concatenated keys in the subsequence field are compared at the segment level. Index keys are not compared as a whole.

SYMIXCHK=

Specifies whether to validate the symbolic pointers in secondary index databases and the key data. When the target segment is not a root segment, HD Pointer Checker decomposes the symbolic pointers into segment level of keys, and checks the keys. Combination of keys is not checked.

This option can be specified when TYPE=ALL and HASH=NO are specified.

YES

Specifies to validate the symbolic pointers. Index databases and associated primary databases must be specified in the DATABASE statements.

NO
Specifies not to validate the symbolic pointers. SYMIXCHK=NO is the default value.

SYMLPCHK=
Specifies whether to check the symbolic LP pointers. If both direct LP and symbolic LP pointers are defined in the logical child, both are validated. When the target segment is not a root segment, HD Pointer Checker decomposes the symbolic pointers into segment level of keys, and checks the keys. Combination of keys is not checked.

This option can be specified when TYPE=ALL and HASH=NO is specified.

YES
Specifies to validate the symbolic LP pointers. Both the databases having logical parent segment and logical child segments must be specified in the DATABASE statements.

NO
Specifies not to validate the symbolic LP pointers. SYMLPCHK=NO is the default value.

EPSCHK=
This keyword specifies whether EPS evaluation is done for the HALDB.

The EPS evaluation validates the following pointers:

- The LP pointers or the paired LC pointers
- Pointers in secondary indexes (PSINDEXes)

After the target partition is reorganized or migrated, some of the target RBAs in these pointers might be outdated. The latest RBA information is stored in an ILE (indirect list entry). The ILEs are in an ILDS. HD Pointer Checker validates EPS by referring to the ILEs as follows:

- EPS healing

  If the pointer has the outdated RBA value, HD Pointer Checker revises the RBA with reference to the corresponding ILE. The revised RBA value is validated in the CHECK process. If there is no corresponding ILE, the reason is probably that either an ILK (indirect list key) in the source segment, or the index of ILDS has been corrupted, and HD Pointer Checker identifies the trouble as a pointer error.

- ILK checking

  ILKs are contained in the source segment, ILE, and the target segment. These three objects are related to each other by the ILK value. During the CHECK process, HD Pointer Checker checks whether the ILK in the source segment and the ILK in the target segments are equivalent. As was just explained, the ILK in the ILE is checked during EPS healing.

This keyword can be specified if TYPE=ALL or TYPE=SCAN is specified. If HASH=YES is specified, this keyword is ignored.

EPS evaluation is effective only for HALDBs. If EPSCHK=YES is specified and a non-HALDB is included in the DATABASE statement, this keyword does not affect the non-HALDB.

YES
EPS is checked. EPSCHK=YES is the default value.

NO
EPS is not checked.

DUPILKCHK=
Enables HALDB Duplicate ILKs Checking. When enabled, HALDB partition reorganization numbers in HALDB partitions are checked for corruption and whether incorrect indirect list keys (ILKs) exist.

HALDB partition reorganization numbers can become corrupted by inappropriate reorganization procedures, and cause incorrect ILKs. For information about HALDB partition reorganization numbers and how they can become corrupted, see the topic "HALDB partition reorganization numbers" in *IMS Database Administration*.

This keyword can be specified if TYPE=ALL or TYPE=SCAN is specified. When HASH=NO and EPSCHK=YES are specified, this keyword is effective.

YES
Checks whether HALDB partition reorganization numbers are corrupted and whether incorrect ILKs exist.

NO
Do not check HALDB partition reorganization numbers and ILKs. DUPILKCHK=NO is the default value.

Consider specifying DUPILKCHK=YES if any of the following conditions are met:

- If a HALDB has logical relationships or secondary indexes (PSINDEXes).
- If the database was being used without the HALDB reorganization number verification function of IMS. Especially, consider specifying DUPILKCHK=YES after performing one or more of the following tasks:
  - Initialized the partitions of the HALDB after the partitions were used
  - Added partitions to the HALDB
  - Changed a high key that defines a boundary between partitions of the HALDB

  The HALDB reorganization number verification function of IMS is activated by specifying the REORGV parameter on the INIT.RECON command or the CHANGE.RECON command. If the REORGV parameter is not specified on these commands, the default (the HALDB reorganization number verification function of IMS deactivated) is used.
- If you encounter errors that are related to indirect list data sets (ILDSs) during a HALDB reorganization and if you want to analyze the cause of the errors.

When this check is enabled, HD Pointer Checker processes the HALDB, its indirect list data sets (ILDSs), and its related databases, including logically related databases and PSINDEXes, and detects the following incorrect ILKs:

Duplicate ILKs
If a HALDB partition reorganization number becomes corrupted and if the database was continuously used under such condition, ILKs might become duplicated. If you reorganize a database that has duplicate ILKs, either the reorganization fails or the data that has the duplicate ILK becomes inaccessible. HD Pointer Checker detects duplicate ILKs to prevent such conditions.

Incorrect ILKs that occur due to a corrupted HALDB partition reorganization number
If a HALDB is reorganized appropriately, the partition reorganization number in an ILK is equal to or lower than the HALDB partition reorganization number of the partition. However, if a HALDB is reorganized by inappropriate reorganization procedures, the HALDB partition reorganization number of the partition might become corrupted. In such a case, the partition reorganization number in an ILK might become greater than the HALDB partition reorganization number of the partition. If a HALDB is continuously used under such condition, ILKs whose partition reorganization number is greater than the HALDB partition reorganization number of the partition can become duplicated. HD Pointer Checker refers such ILKs as *potentially duplicate ILKs*.

HD Pointer Checker detects potentially duplicate ILKs and also detects, for each partition, what the reorganization number of the partition should be. You can figure out the appropriate reorganization number of the partition from the Reorganization Number Information part of the Evaluation of ILKS report.

As described in the topic "HALDB partition reorganization numbers" in *IMS Database Administration*, these two types of incorrect ILKs do not cause immediate problems. However, if you later reorganize the database partitions, the reorganization fails or you are likely to lose data.

When HD Pointer Checker detects these types of ILKs, it reports them as errors and prints the details in the Evaluation of ILKS report (in the Duplicate ILKs Information part and the Reorganization Number Information part). These ILKs cannot be repaired by the standard IMS recovery methods or by reorganizing the database. Reorganizing a database that has such ILKs can cause database

corruption. Therefore, before reorganizing the database, repair these ILKs and the corrupted reorganization number of the partition.

Considerations for specifying HALDBs and HALDB partitions on DATABASE statements
To ensure that all the incorrect ILKs are detected, specify both the HALDB database and its related databases, including logically related databases and PSINDEXes, on the DATABASE statement.

- If a HALDB contains only the target segments of unidirectional logical relationships, PSINDEXes, or both, and if you specify to check only several partitions, HD Pointer Checker quickly checks duplicate ILKs within the specified partitions. When the number of partitions is limited, the job runs faster, but HD Pointer Checker cannot accurately determine whether the HALDB partition reorganization numbers are corrupted and whether potentially duplicate ILKs exist within the entire HALDB. Therefore, if you want to ensure that all the incorrect ILKs are detected, specify all the partitions of the HALDB.
- If you are planning to add partitions, delete partitions, or change boundaries between partitions during a reorganization of a HALDB, you must detect all the incorrect ILKs before the reorganization, even if the HALDB contains only the target segments of unidirectional logical relationships, PSINDEXes, or both. To ensure that all the incorrect ILKs are detected, specify all the partitions of the HALDB.

REPAIRILK=
Specifies whether to generate repair information records for HALDB databases that contain corrupted HALDB partition reorganization numbers, duplicate ILKs, or potentially duplicate ILKs. Such errors can be detected by running the HD Pointer Checker utility with the DUPILKCHK=YES option. Use the REPAIRILK keyword when you detect such errors with the DUPILKCHK=YES option.

The generated records are required by the ILK Repair utility of IMS Database Repair Facility to repair HALDB databases that have such errors. For a complete procedure to repair such databases, see “Repairing HALDB partition reorganization numbers and duplicate ILKs” on page 304.

This keyword can be specified if TYPE=ALL, HASH=NO, EPSCHK=YES, and DUPILKCHK=YES are all specified.

YES
Generates repair information records in the data set that is specified by the FABPILK DD statement. The FABPILK DD statement must be specified.

NO
Do not generate repair information records. REPAIRILK=NO is the default value.

ICRG#CHK=
Specifies whether to do the HALDB Reorganization Number Verification for image copy data sets.

IMS maintains the HALDB partition reorganization numbers in the RECON data set and the partition data set. IMS validates these numbers to maintain the correctness of HALDB partitions. The HALDB partition reorganization validation is enabled by the INIT.RECON REORGV command or the CHANGE.RECON REORGV command.

HD Pointer Checker also validates the reorganization numbers, when the HALDB Reorganization Number Verification is enabled. If the partition data set contains a lower reorganization number than the RECON, HD Pointer Checker issues message FABP1097E in the Validation of a Pointer to a Target at Scan report telling that the ILDS rebuild is required.

HD Pointer Checker always validates the reorganization numbers when the input is a real database data set. In the mean time, HD Pointer Checker does the validation optionally for the image copy data set because the reorganization number in the image copy data set is obsolete if the database is reorganized. It is recommended that you validate the reorganization numbers immediately after taking an image copy.

This option can be specified when TYPE=ALL or TYPE=SCAN is specified. This option is available for HALDB (PHDAM or PHIDAM database) image copy data sets. This option is ignored for real database data sets and non-HALDBs.

YES
Specifies to do the HALDB Reorganization Number Verification for the image copy data set.

NO
Specifies not to do the HALDB Reorganization Number Verification for the image copy. ICRG#CHK=NO is the default value.

SENSOR=
Specifies whether DB Sensor stores sensor data in the Sensor Data repository of IMS Tools KB.

This keyword can be specified when TYPE=ALL or TYPE=SCAN is specified.

YES
DB Sensor stores sensor data in the Sensor Data repository of IMS Tools KB during the HD Pointer Checker process.

When you specify SENSOR=YES, ensure that:

- The IMS Tools KB server XCF group name is specified on the ITKBSRVR keyword.
- ITKBLOAD keyword is not specified.

NO
Sensor data is not stored. SENSOR=NO is the default value.

SENSOR_HOME=
Specifies whether to collect the data elements that are related to root segment distribution and store them in the Sensor Data repository of IMS Tools KB.

If SENSOR=YES is not specified, this keyword is ignored.

YES
Collects the following data elements and stores them in the Sensor Data repository of IMS Tools KB:

- DB_NUM_ROOT_NOHOME
- DB_PCT_NUM_ROOT_NOHOME
- DB_AVG_LEN_SYNONYM_CHAIN

SENSOR_HOME=YES is the default value.

Consideration: When you specify SENSOR_HOME=YES, a randomizer is called to collect data for these data elements. Therefore, when SENSOR_HOME=YES is specified, the CPU time and the elapsed time will increase compared to when SENSOR_HOME=NO is specified.

NO
Does not collect the data elements that are related to root segment distribution.

Restrictions:

- If the key compression option of the Segment Edit/Compression exit routine is specified for the root segment, these data elements are not collected even when SENSOR_HOME=YES is specified.
- If you specify RMNAME=(*rand*,*rap*,0,bytes) or if you omit the third operand of the RMNAME parameter in the DBD macro, the number of root addressable area (RAA) blocks is defined as zero in the HDAM or PHDAM DBD. In this case, these data elements are not collected even when SENSOR_HOME=YES is specified.

The data elements that are additionally collected when SENSOR_HOME=YES are useful factors for determining the need of database reorganization. For more information about these data elements, see the topic "GLOBAL command keywords for FF Stand-alone DB Sensor" in the *IMS Solution Packs Data Sensor User's Guide*.

ITKBSRVR=
Specifies the IMS Tools Base Knowledge Base server XCF group name. HD Pointer Checker reports are stored in the IMS Tools KB Output repository that is managed by the IMS Tools KB server in the XCF group. When SENSOR=YES is also specified, DB Sensor stores sensor data in the Sensor Data repository that is managed by the same IMS Tools KB server.

servername
HD Pointer Checker stores reports in the IMS Tools KB Output repository of the specified server. When SENSOR=YES is also specified, DB Sensor stores sensor data in the Sensor Data repository of IMS Tools KB.

***NO**
HD Pointer Checker does not store reports in the IMS Tools KB Output repository. ITKBSRVR=*NO is the default value.

ITKBLOAD=
Specifies the IMS Tools KB load module data set that is to be used by HD Pointer Checker.

This keyword cannot be specified if SENSOR=YES is specified. If SENSOR=YES is specified, the IMS Tools KB load module library must be specified in the STEPLIB concatenations.

dsn
Specifies the name of the IMS Tools KB load module data set that is to be used by HD Pointer Checker.

***NO**
The IMS Tools KB modules are loaded from the private library or the system library of the job. ITKBLOAD=*NO is the default value.

ADXCFGRP=
Specifies whether to send a notification to Autonomics Director. Autonomics Director uses the notification as a trigger to schedule a policy evaluation.

If you want Autonomics Director to schedule a policy evaluation, you must specify the name of the Autonomics Director XCF group with this keyword.

If SENSOR=YES is not specified, this keyword is ignored.

Autonomic_Director_XCF_group_name
Specify the Autonomics Director XCF group name. DB Sensor sends sensor data notification to Autonomics Director after storing sensor data in the Sensor Data repository of IMS Tools KB.

If you specify the Autonomics Director XCF group, you must also specify DBRC=YES.

***NO**
DB Sensor does not send sensor data notification to Autonomics Director. ADXCFGRP=*NO is the default value.

TOSIXCFGRP=
Specifies whether to monitor the latest VSAM statistics of IMS online full-function database data sets by using the IMS Tools Online System Interface.

If you specify SPMN=YES, SENSOR=YES, or both, and if you specify the IMS Tools Online System Interface XCF group name, Space Monitor, DB Sensor, or both request the IMS Tools Online System Interface to monitor the latest VSAM statistics of the online database data sets.

Because this keyword is effective for online databases, this keyword is ignored if you specify the keyword for offline databases. Also, if SENSOR=YES or SPMN=YES is not specified, this keyword is ignored.

If you specify SENSOR=YES or SPMN=YES, and you want to collect the latest VSAM statistics for an online database, you must specify the name of the IMS Tools Online System Interface XCF group with this keyword.

TOSI_XCF_group_name
XCF group name for the IMS Tools Online System Interface. The XCF group name is an alphanumeric character string, which begins with TOI and is followed by the characters that are defined on the XCFGROUP parameter in the IMS Tools Online System Interface PROCLIB member.

For details about the XCFGROUP parameter and the IMS Tools Online System Interface PROCLIB member, see the *Tools Base IMS Tools Common Services User's Guide*.

***NO**
The latest VSAM statistics for online database data sets are not monitored. TOSIXCFGRP=*NO is the default value.

CHECK=
Specifies whether to check certain kinds of pointers or whether to print all input records in the CHECK process. If this option is not supplied, it results in complete pointer checking without generating any unnecessary reports.

This option can be specified when TYPE=ALL or TYPE=CHECK is specified.

ALL
Specifies that all input records in the CHECK process and all error messages are to be printed. If this option is specified, an extremely large report is generated.

(CHK,*nnnnnn*)
Specifies whether to check certain kinds of pointers by the CHECK processor. You can control the pointer checking with the 6-digit *nnnnnn* part:

Position
Description

1
This control byte indicates whether to check HIDAM index pointers. Use one of the following codes:

1
HIDAM/PHIDAM index pointers are checked. Use this selection to run HD Pointer Checker. 1 is the default value.

0
HIDAM/PHIDAM index pointers are not checked.

This control byte is in effect when HASH=NO is specified. If 0 is specified for this control byte with HASH=YES, this value is ignored.

2
This control byte indicates whether to check physical pointers. Use one of the following codes:

1
Physical pointers are checked. Use this selection to run HD Pointer Checker. 1 is the default value.

0
Physical pointers are not checked.

This control byte is in effect when HASH=NO and INCORE=NO. If 0 is specified for this control byte with HASH=YES or INCORE=YES, this value is ignored.

3
This control byte indicates whether to check logical pointers. Use one of the following codes:

1
Logical pointers are checked. This value is the *recommended* value to run HD Pointer Checker. 1 is the default value.

0
Logical pointers are not checked.

This control byte is in effect when both HASH=YES and HASH=NO are specified. This control byte is also in effect when INCORE=NO. If 0 is specified for this control byte with INCORE=YES, this value is ignored.

To specify 0 on position 3, specify INCORE=NO on the OPTION statement.

4
This control byte indicates whether to check the counter field versus the number of logical child segments. Use one of the following codes:

1

Check the counter field versus the number of logical child segments. Use this selection to run HD Pointer Checker. 1 is the default value.

0

Do not check the counter field versus the number of logical child segments.

This control byte is in effect when HASH=NO is specified. If 0 is specified for this control byte with HASH=YES, this value is ignored.

5

This control byte indicates whether to check physically paired segments in Bidirectional Physically Paired Logical Relationship. Use one of the following codes:

1

Physically paired segments are checked. Use this selection to run HD Pointer Checker. 1 is the default value.

0

Physically paired segments are not checked.

Important: This control byte must not be turned off.

This control byte is in effect when HASH=NO is specified. If 0 is specified for this control byte with HASH=YES, this value is ignored.

6

This control byte indicates whether to print all hash formulas, regardless of whether they apply to the segment type or not.

1

No printing is generated. 1 is the default value.

0

Printing is generated.

This control byte is in effect when HASH=YES is specified. If 0 is specified for this control byte with HASH=NO, this value is ignored.

USER=

Specifies TSO user IDs. HD Pointer Checker sends a notification message to the TSO users when it detects pointer errors or T2 errors in a database.

***userid* or (*userid1,userid2,....., userid20*)**

Specify up to 20 TSO user IDs. If the specified TSO user is not logged on to TSO or is disconnected from the terminal, the message is discarded.

You can also specify the special value *JOBUSR as one of these user IDs. This value will be converted to the user ID of the submitter of the job when HD Pointer Checker runs.

HD Pointer Checker does not check whether the specified TSO user is correct. If an incorrect ID is specified, HD Pointer Checker will attempt to send the notification to the user ID and the message will be discarded.

TSO user ID is effective when TYPE=ALL, SCAN, or CHECK is specified on the PROC statement.

***NO**

Notification message is not sent to the TSO user. USER=*NO is the default value.

RETCDDSN=

Specify the data set name or the data set name and the member name that includes HPSRETCD control statements.

You can change the return codes of FABPMAIN by using the RETCDDSN control statements. HD Pointer Checker provides two methods to change the return codes: an HPSRETCD DD statement in JCL or the RETCDDSN parameter. If both the HPSRETCD DD statement and the RETCDDSN parameter are specified, HD Pointer Checker uses the specification in the HPSRETCD DD statement.

For more information about HPSRETCD, see “FABPMAIN HPSRETCD data set” on page 148.

dsn* or *dsn(member)
Specify the data set name, or specify the data set name and the member name for the partitioned data set.

***NO**
RETCDDSN data set is not provided. RETCDDSN=*NO is the default value.

SEP=
Specifies whether to generate the separator pages for HD Pointer Checker reports.

This option can be specified with any TYPE= specification.

YES
Specifies that the separator pages are generated for each data set for the reports. SEP=YES is the default value.

NO
Specifies that the separator pages are not generated.

GROUPDIGITS=
Specifies whether to enable or disable digit grouping for the numeric values printed in Database Statistics reports and Partition Statistics reports. This option can be specified when TYPE=ALL or TYPE=SCAN is specified.

YES
Enables digit grouping and uses comma (,) as the digit grouping symbol. For example, a value of 1,000,000 is printed as 1,000,000. GROUPDIGITS=YES is the default value.

(NO,DBSTAT)
Disables digit grouping. For example, a value of 1,000,000 is printed as 1000000. This option allows to print numeric values that are greater than the maximum value a report field can display when digit grouping is enabled.

VLSSUMM=
Specifies whether to print "Summary of VL Segment Sizes" in the Partition Statistics report and the Database Statistics report. If VLSSUMM=YES is specified, "Summary of VL Segment Sizes" is printed for every partition and database.

This option can be specified when TYPE=ALL or SCAN in specified.

YES
Print "Summary of VL Segment Sizes".

NO
Do not print "Summary of VL Segment Sizes". VLSSUMM=NO is the default value.

CHECKREC=
Specifies the CHECKREC data set to be created. The CHECKREC data set contains work records for printing the maps and dumps of database blocks, and is used in step TYPE=BLKMAP, which follows it.

This option can be specified with TYPE=ALL or CHECK.

YES
Specifies to create the CHECKREC data set.

NO
Specifies not to create the CHECKREC data set. CHECKREC=NO is the default value.

WKDATACLASS=
Specifies the name of the data class for the work data sets that HD Pointer Checker dynamically allocates as temporary data sets.

This option can be specified when TYPE=ALL is specified. When SMS is not active, this option is ignored and set to *NO.

data_class_name
Specifies the name of the data class to be used for dynamically allocating the work data sets that are associated with the following DD statements:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

For more information about these work data sets, see "DD statements for work data sets" on page 65.

The data class must have sufficient space and appropriate volume count so that the work data sets can be allocated.

Tip: Before you run the pointer check job, you can estimate the approximate sizes of work data sets. You can do so by running HD Pointer Checker with the TYPE=ESTIMATE_WK option or by manually calculating them. For instructions, see Chapter 13, "Estimating runtime resources," on page 311.

***NO**
Specifies that a data class is not passed to the dynamic allocation macro when HD Pointer Checker dynamically allocates the work data sets. WKDATACLASS=*NO is the default value.

Consideration: The value that you specify with this keyword might be overridden by the data class that is assigned by your ACS routine.

The size and volume count for the work data sets depend on the parameters on the WKDATACLASS, WKSTORCLASS, and WKHLQ keywords:

- If WKDATACLASS=*NO, WKSTORCLASS=*NO, and WKHLQ=*NO are passed to HD Pointer Checker, HD Pointer Checker determines the size and volume count for the work data sets based on the sizes of input database data sets.
- If one or more of these keywords are passed to HD Pointer Checker with a parameter other than *NO, the size and volume count are determined based on the data class that is specified by the parameters or by your ACS routine. In this case, you must ensure that the data class has sufficient space and volume count and that the storage group has sufficient number of DASD volumes so that all the work data sets are allocated without errors.

WKSTORCLASS=
Specifies the name of the storage class for the work data sets that HD Pointer Checker dynamically allocates as temporary data sets.

This option can be specified when TYPE=ALL is specified. When SMS is not active, this option is ignored and set to *NO.

storage_class_name
Specifies the name of the storage class to be used for dynamically allocating the work data sets that are associated with the following DD statements:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

For more information about these work data sets, see "DD statements for work data sets" on page 65.

Tip: Before you run the pointer check job, you can estimate the approximate sizes of work data sets. You can do so by running HD Pointer Checker with the TYPE=ESTIMATE_WK option or by

manually calculating them. For instructions, see Chapter 13, “Estimating runtime resources,” on page 311.

***NO**
Specifies that a storage class is not passed to the dynamic allocation macro when HD Pointer Checker dynamically allocates the work data sets. WKSTORCLASS=*NO is the default value.

Consideration: The value that you specify with this keyword might be overridden by the storage class that is assigned by your ACS routine.

The size and volume count for the work data sets depend on the parameters on the WKDATACLASS, WKSTORCLASS, and WKHLQ keywords:

- If WKDATACLASS=*NO, WKSTORCLASS=*NO, and WKHLQ=*NO are passed to HD Pointer Checker, HD Pointer Checker determines the size and volume count for the work data sets based on the sizes of input database data sets.
- If one or more of these keywords are passed to HD Pointer Checker with a parameter other than *NO, the size and volume count are determined based on the data class that is specified by the parameters or by your ACS routine. In this case, you must ensure that the data class has sufficient space and volume count and that the storage group has sufficient number of DASD volumes so that all the work data sets are allocated without errors.

WKHLQ=
Specifies the high-level qualifier for the work data sets that HD Pointer Checker dynamically allocates as temporary data sets.

This option can be specified when TYPE=ALL is specified. When SMS is not active, this option is ignored and set to *NO.

hlq
Specifies the high-level qualifier to be used for dynamically allocating the work data sets that are associated with the following DD statements:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

The value can be up to 20 bytes in length.

HD Pointer Checker dynamically allocates the work data sets by using the following naming rule:
DSN=*hlq*.J*nnnnn*.T*hhmmss*.*ddname*

where:

hlq
The value that you specify on the WKHLQ keyword.

nnnnn
The job number of the HD Pointer Checker job.

hhmmss
The time stamp.

ddname
The DD name of the work data set.

For more information about these work data sets, see “DD statements for work data sets” on page 65.

***NO**
HD Pointer Checker dynamically allocates the work data sets as z/OS temporary data sets. WKHLQ=*NO is the default value.

The size and volume count for the work data sets depend on the parameters on the WKDATACLASS, WKSTORCLASS, and WKHLQ keywords:

- If WKDATACLASS=*NO, WKSTORCLASS=*NO, and WKHLQ=*NO are passed to HD Pointer Checker, HD Pointer Checker determines the size and volume count for the work data sets based on the sizes of input database data sets.
- If one or more of these keywords are passed to HD Pointer Checker with a parameter other than *NO, the size and volume count are determined based on the data class that is specified by the parameters or by your ACS routine. In this case, you must ensure that the data class has sufficient space and volume count and that the storage group has sufficient number of DASD volumes so that all the work data sets are allocated without errors.

DATABASE statement

A DATABASE statement specifies the database name and data set groups to be processed, and the options.

One or more DATABASE statements can be specified in any order in the PROCCTL data set, but must follow a PROC statement.

It is not necessary to specify the DATABASE statement if the TYPE=CHECK or BLKMAP is specified in the PROC statement.

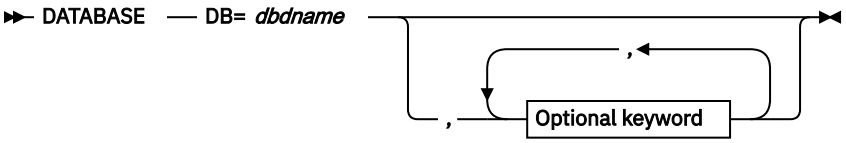
If TYPE=ALL is specified in the PROC statement, you must specify the DATABASE statements of all logically related and index-related databases. Otherwise, the job ends with an error message.

Subsections:

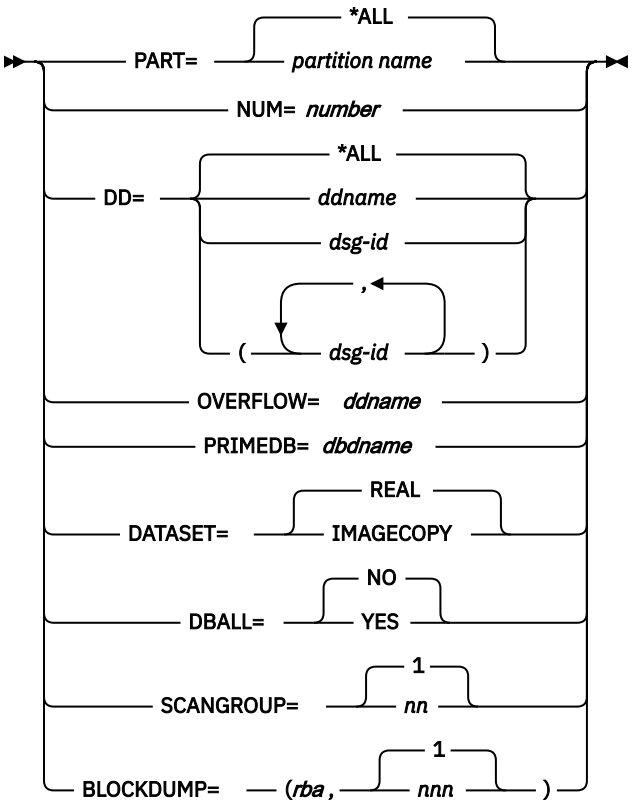
- "Syntax" on page 125
- "Keywords" on page 126
- "How to specify multiple DATABASE statements for a HALDB" on page 130

Syntax

The following syntax diagram shows the keywords for the DATABASE statement.



Optional keywords



Keywords

The following keywords can be specified on the DATABASE statement:

DB=*dbdname*
Specifies the dbdname (as coded in your DBD) of the HISAM, HIDAM index or the secondary index databases, the HDAM, the HIDAM, the PHDAM, the PHIDAM, or the PSINDEX to be processed. This keyword is a required keyword.

PART=
Specifies the partition to be processed.

This statement is applicable to HALDBs only.

***ALL**
All partitions, except for the partitions that are marked as disabled in the RECON data sets, are processed. PART=*ALL is the default value.

partition name
Only the specified partition is processed.

NUM=
Specifies the number of partitions to be processed. The partitions specified with the NUM keyword are processed in the partition selection order. If the number specified with the NUM keyword is larger than the actual partition number, HD Pointer Checker processes up to the last partition without issuing an error message.

This keyword is applicable to HALDBs only.

This value is applicable only if PART=*partition name* is specified.

DD=

ddname
Specifies the ddname (as coded in your DBD) of the HDAM, HIDAM, KSDS part of the HISAM data set group, or the index database to be processed.

***ALL**
For a non-HALDB, this option specifies to process all data sets in the database. For a HALDB, it specifies to process all data sets in the partition that is specified by PART=. DD=*ALL is the default value.

***dsg-id* or (*dsg-id1*, *dsg-id2*,...)**
Specifies the data set group to be processed. This option is applicable to HALDBs only. Letters A through J, M through V, X and Y can be specified for *dsg-id*. The letter L cannot be specified. If EPSCHK=YES is effective, ILDS can be evaluated automatically.

Consideration for Online Reorganization capable HALDBs
When DATASET=REAL is specified, HD Pointer Checker ignores the DD parameter and assumes that the data set to process is the active DBDS. For what happens when DATASET=IMAGECOPY is specified, read about Consideration for an Online Reorganization (OLR) of HALDB and "Dynamic allocation of database data sets and image copy data sets" on page 67.

Examples of combination of PART=, NUM=, and DD= for a HALDB:

- In the following example, all data set groups in all partitions are processed because the default value *ALL is used for PART= and DD=:

```
DATABASE DB=HALDB1
```

- In the following example, data set groups specified on DD= in all partitions are processed:

```
DATABASE DB=HALDB1,PART=*ALL,DD=A
```

Because DD=A is specified, data set group A is processed in all the partitions.

- In the following example, all data set groups in PART1 and the following partition are processed:

```
DATABASE DB=HALDB1,PART=PART1,NUM=2,DD=*ALL
```

For more information about specifying the DATABASE statements for a HALDB, see "How to specify multiple DATABASE statements for a HALDB" on page 130.

OVERFLOW=*ddname*
Specifies the ddname (as coded in your DBD) of the ESDS of the HISAM data set group, or the index database.

You can omit this keyword when HD Pointer Checker runs as a stand-alone job. In this case, HD Pointer Checker sets the ddname of the ESDS of the HISAM database or the index database.

Abbreviations OFLOW and OVFLW can be used for OVERFLOW.

PRIMEDB=*dbdname*
Specifies the dbdname of the primary database indexed by the HIDAM index or the secondary index database to be processed.

You can omit this keyword when HD Pointer Checker runs as a stand-alone job. In this case, HD Pointer Checker sets the dbdname of the primary database that is indexed by the HIDAM index or the secondary index database.

DATASET=
Specifies the type of input database.

Abbreviations DS for DATASET, and IC and ICOPY for IMAGECOPY can be used.

REAL
Specifies that the input database is a real database. DATASET=REAL is the default value.

IMAGECOPY
Specifies that the input database is an image copy.

If the input database is an image copy, you must specify this parameter even if TYPE=CHECK or BLKMAP is specified.

For the types of image copies that HD Pointer Checker accepts as input, see "Restrictions when using image copy data sets as input" on page 40.

Notes:

- If the image copy supplied as an input is any of the following types, HD Pointer Checker identifies the type of image copy by checking its record format (RECFM):
  - Batch image copy created by the IMS Database Image Copy utility (RECFM=VB)
  - Compressed batch image copy created by IMS HP Image Copy (RECFM=VB)
  - SMSNOCIC type image copy created by the IMS Database Image Copy 2 utility (RECFM=U)
- An SMSNOCIC type image copy has no DBD name or DD name information in the header record. Therefore, HD Pointer Checker cannot verify the image copy with it. The HD Pointer Checker issues the message FABP1365I with the name of the dumped data set name in the image copy so that you can verify the image copy with it.

Consideration for image copies of HALDBs

If you reorganize the HALDB after taking an image copy, specify EPSCHK=NO in the PROC statement because index list entries (ILE) in the indirect list data set (ILDS) are updated by the reorganization and they are inconsistent with the image copy. The ILDS is not referred to if EPSCHK=NO is specified.

If IMAGECOPY is specified for the PHIDAM database, the primary index database is not checked because an image copy cannot be created for the primary index database.

DBALL=

Specifies whether to process all logically related databases to the one specified in the DB keyword.

This option can be specified when TYPE=ALL or SCAN is specified in the PROC statement.

YES

All logically related databases and index databases are processed. However, the following restrictions apply:

- When HASH=YES is specified in the PROC statement, secondary index database and PSINDEX database are not processed.
- When the DBORG keyword is specified, only databases of the specified organization are processed.

DB=*dbdname* must be specified. DATASET= and SCANGROUP= are available. PART=, NUM=, DD=, OVERFLOW=, PRIMEDB=, and BLOCKDUMP= are not effective even if they are specified.

NO

Only the databases that are specified in the DB keyword are processed. DBALL=NO is the default value.

When multiple DATABASE statements are specified, either DBALL=YES or DBALL=NO can be selected for each DATABASE statement. However, the following restrictions apply when databases that are associated with DBALL=YES are specified by another DATABASE statement.

- When DBALL=YES is specified by another statement, the first DBALL=YES in the logically related databases is effective and the subsequent DBALL=YES specifications are ignored.
- When DBALL=NO is specified by another statement, only database data sets that are specified with DBALL=NO are processed with the options specified in the DATABASE statements.
- Two or more DATABASE statements with same DBD name and DBALL=YES option will result in error.

SCANGROUP=

Specify this parameter when you want to read in parallel the database data sets or image copy data sets. Specify a 1- or 2-digit number for *nn*, where *nn* is a number greater than 01. If you specify different numbers for the DATABASE statements, they are read in parallel. If you specify the same number for them, they are read sequentially.

Example 1

In the following case, for example, HD Pointer Checker reads *dd1* and *dd2* in parallel:

```
DATABASE DB=database1,DD=dd1,SCANGROUP=01
DATABASE DB=database1,DD=dd2,SCANGROUP=02
```

Example 2

In the following case, for example, HD Pointer Checker reads *dd1* and *dd2* sequentially in SCANGROUP=01, and *dd3* and *dd4* sequentially in SCANGROUP=02, but processes SCANGROUP 01 and 02 in parallel:

```
DATABASE DB=database1,DD=dd1,SCANGROUP=01
DATABASE DB=database1,DD=dd2,SCANGROUP=01
DATABASE DB=database2,DD=dd3,SCANGROUP=02
DATABASE DB=database2,DD=dd4,SCANGROUP=02
```

HD Pointer Checker decides, and so you cannot specify, the order of processing within a scan group (SCANGROUP).

A subtask is attached for each scan group. This subtask is called a scan task. The number specified for each scan group is also used as the suffix of the work data set of each scan task. The ddname of the MERGIN*nn* data set used by the scan task of SCANGROUP=2 would be MERGIN02.

To process an image copy on a tape, use the same scan group number for data sets on the same volume serial. The number of tape units must be more than or equal to the total number of scan groups. In the previous examples, you must prepare at least two tape units.

If you specify KEYSIN=YES, specify the same scan group number for data sets that have root segments.

You can specify the scan group number only if TYPE=ALL or TYPE=SCAN is specified. The maximum number that you can specify for scan group is 99, and the default is 1. If you do not specify the scan group number, or if you specify the same number for all DATABASE statements, all data sets are read sequentially.

Running many scan tasks causes more resources to be used by HD Pointer Checker. For more information, see “Estimating the storage needed for HD Pointer Checker manually” on page 318.

BLOCKDUMP=

Requests to print the maps, dumps, and the addresses of the database blocks. A maximum of 100 BLOCKDUMP parameters can be specified in the DATABASE statement. The format of the dump is specified by the DUMPFORM parameter in the OPTION statement.

When this option is specified, HISTORY=YES cannot be specified.

This option can be specified when TYPE=ALL or SCAN is specified. It is only effective for HDAM, HIDAM, PHDAM, and PHIDAM databases.

Important: If this option is specified, the pointer is not checked for the specified database data set.

Abbreviations BDUMP and BLKDUMP can be used for BLOCKDUMP.

rba

Specifies the relative byte address (RBA) of the first block to be dumped. The RBA of any byte within the block can be used. Code eight hexadecimal digits, with leading zeros, if necessary.

nnn

Specifies the number of consecutive blocks that are mapped, dumped, and started at the relative byte address specified by the RBA parameter. The maximum value is 999 and the minimum value is 1. The default value is 1.

For an RBA beyond 4 GB, you should specify a 32-bit odd value based on the over 4-GB RBA rule.

For example, to specify the hexadecimal value x'10000F000' as a 32-bit odd value, specify as follows:

```
BLOCKDUMP=(0000F001,001)
```

The value BDUMP=(0000F000) is equivalent to BLOCKDUMP=(0000F000,001).

How to specify multiple DATABASE statements for a HALDB

Multiple DATABASE statements specified for a HALDB are allowed, but there are some points to be careful.

- When multiple DATABASE statements are specified for a HALDB, you must specify the partition name by partition selection order. The partition selection order is the order returned from the partition selection.
- When HASH=NO and EPSCHK=YES are specified in the PROCCTL data set and a logical relationship or a PSINDEX database is defined in a HALDB, you cannot check the subset partitions of the HALDB.

  Because logical pointers and index pointers point to target segments across databases or partition boundaries, all partitions and databases must be checked at once. The examples presented in this topic are for the HALDBs without logical relationships or PSINDEX databases.
- The same partition can be specified in different DATABASE statements. When you specify PART=*ALL or NUM=, however, make sure it is as follows:

Example: Error case

```
//PROCCTL DD *
    PROC TYPE=ALL
    DATABASE DB=HALDB1,PART=*ALL
    DATABASE DB=HALDB1,PART=HALDBP1
/*
```

This is an error; the specification for HALDBP1 on PART= is a duplicate.

```
//PROCCTL DD *
    PROC TYPE=ALL
    DATABASE DB=HALDB1,PART=HALDBP1,NUM=2
    DATABASE DB=HALDB1,PART=HALDBP2
/*
```

Suppose HALDB1 has two partitions in the following order: HALDBP1, HALDBP2. This is an error; the specification for HALDBP2 on PART= is a duplicate.

Example: Normal case

```
//PROCCTL DD *
    PROC TYPE=ALL
    DATABASE DB=HALDB1,PART=HALDBP1,NUM=2
    DATABASE DB=HALDB1,PART=HALDBP4
/*
```

Suppose HALDB1 has four partitions in the following order: HALDBP1, HALDBP2, HALDBP3, HALDBP4. This is valid. The partition name HALDBP1, HALDBP2, and HALDBP4 are processed. The partition name HALDBP3 is skipped.

```
//PROCCTL DD *
    PROC TYPE=ALL
    DATABASE DB=HALDB1,PART=HALDBP1,DD=(A,B,C)
    DATABASE DB=HALDB1,PART=HALDBP2,DD=*ALL
/*
```

Suppose HALDB1 has two partitions in the following order: HALDBP1, HALDBP2. This is valid. The data set group A, B, and C of HALDBP1 are processed. All data set groups in HALDBP2 are processed.

```
//PROCCTL DD *
    PROC TYPE=ALL
    DATABASE DB=HALDB1,PART=HALDBP1,DD=(A,B),SCANGROUP=01
    DATABASE DB=HALDB1,PART=HALDBP1,DD=C,SCANGROUP=02
```

To read the data set groups in parallel, the same partition name is specified in two DATABASE statements. Each data set group can be specified in only one statement.

OPTION statement

An OPTION statement can be specified following a PROC statement or a DATABASE statement.

Explicitly specified keyword values and default option values in an OPTION statement that follows a PROC statement specify the options for the entire database to be processed.

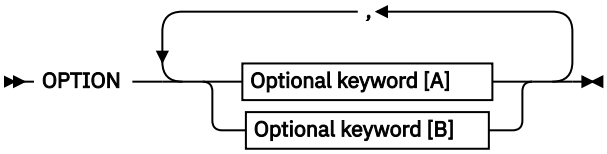
Explicitly specified keyword values in an OPTION statement that follows a DATABASE statement override a previously specified option of an OPTION statement that follows a PROC statement. These override options affect only one database data set group in a preceding DATABASE statement.

Subsections:

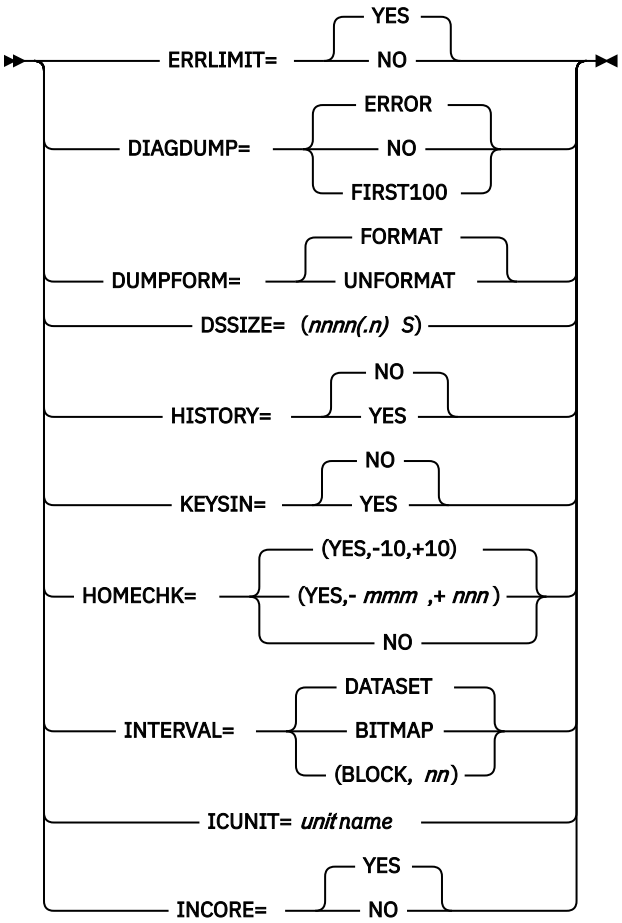
- "Syntax" on page 131
- "Keywords" on page 132

Syntax

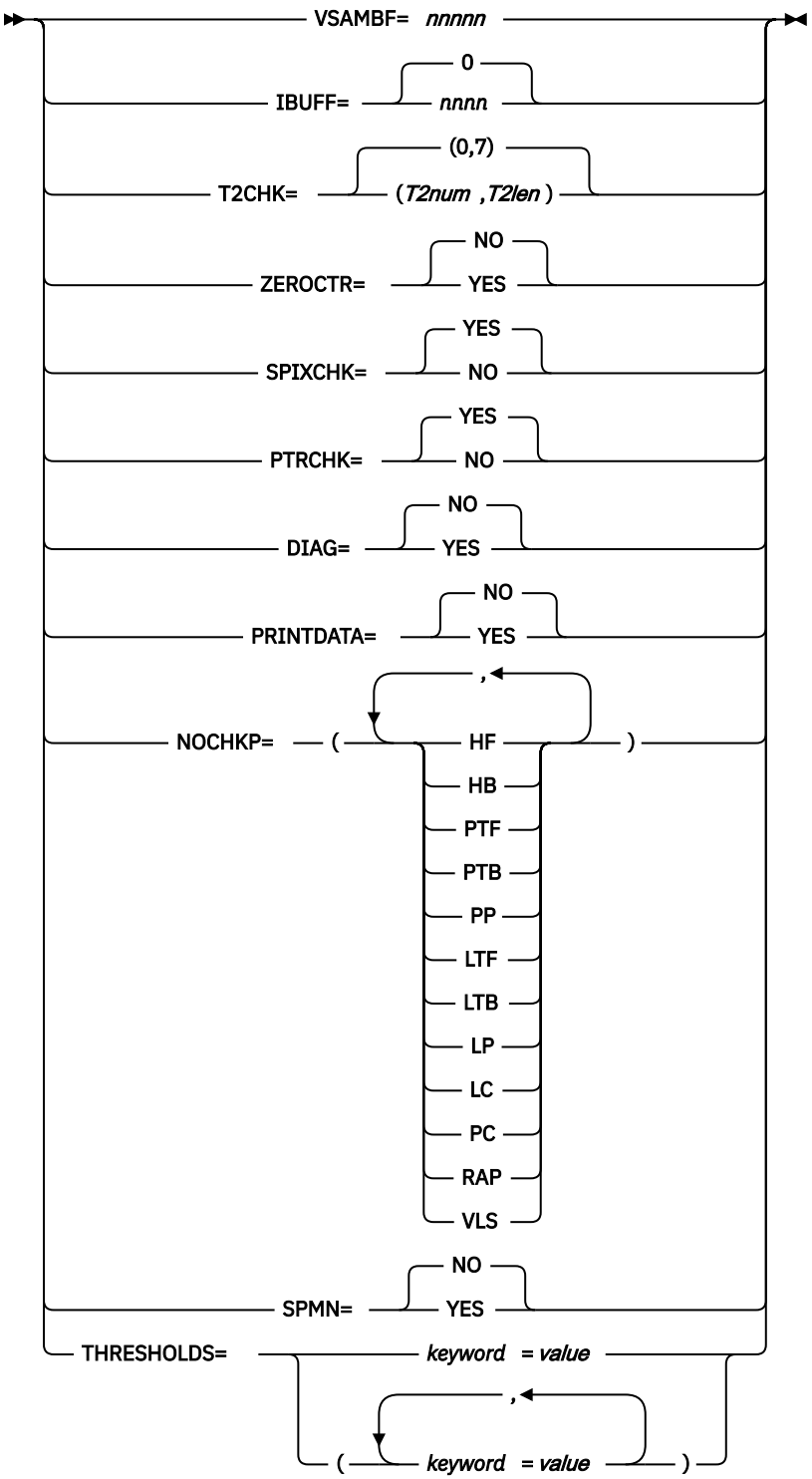
The following syntax diagram shows the keywords for the OPTION statement.



Optional keywords [A]



Optional keywords [B]



Keywords

The following keywords can be specified on the OPTION statement:

ERRLIMIT=

Specifies whether to limit the number of database error messages that will be printed during the SCAN or CHECK processes. It is effective only for HDAM, HIDAM, PHDAM, and PHIDAM databases.

This option can be specified when TYPE=ALL, SCAN, or CHECK is specified in the PROC statement. If this option is specified with TYPE=SCAN, this option is passed to the CHECK process for the database

data set that will run as another job. If this option is specified with TYPE=CHECK, this option is effective during the CHECK process.

YES
The number of printed database error messages is limited to 100 in each of the SCAN process and CHECK process. ERRLIMIT=YES is the default value.

NO
All database error messages are printed.

DIAGDUMP=
Specifies whether to print the block maps and dumps for the database blocks.

The format of the dump is specified by the DUMPFORM parameter of the OPTION statement.

This option can be specified with any TYPE= specification. It is effective only for HDAM and HIDAM databases.

Abbreviations DDUMP for DIAGDUMP, and F100 for FIRST100 can be used.

NO
No block map and dump are printed for the database data set.

ERROR
A block map and dump for a database data set block having an error is printed.

A maximum of 100 maps and dumps reports will be printed for each database data set through the HD Pointer Checker run. If ERRLIMIT=YES is specified and the total number of error messages for the data set reaches 100, the block map and dump function for the data set is suppressed, even if the number of maps and dumps reports does not reach to 100. DIAGDUMP=ERROR is the default value.

FIRST100
Block maps and dumps of the first 100 blocks, except the first IMS control block and bitmap blocks for the database data set, are printed unconditionally. This option is effective only with TYPE=ALL and SCAN. If this option is specified with TYPE=CHECK or BLKMAP, ERROR parameter is used to override this parameter.

DUMPFORM=
Specifies the dump format you want to print block dumps with.

This option can be specified when DIAGDUMP=ERROR or FIRST100 is specified in the OPTION statement, or the BLOCKDUMP parameter is specified in the DATABASE statement. This option can be specified with any TYPE specification.

Abbreviations DF, DUMPF, and DFORM for DUMPFORM, UF and UNFMT for UNFORMAT, and F and FMT for FORMAT can be used.

FORMAT
Specifies the formatted dumps to be printed. DUMPFORM=FORMAT is the default value.

UNFORMAT
Specifies the unformatted dumps to be printed.

DSSIZE=
This parameter is used in conjunction with dynamic space allocation for the work data sets. This parameter is effective only when WKDATACLASS=*NO, WKSTORCLASS=*NO, and WKHLQ=*NO are applied to the job.

If the OPTION statement follows the DATABASE statement, specify the total of the database data set sizes in the DATABASE statement.

If the OPTION statement follows the PROC statement, specify the maximum size for database data sets of all sizes.

Example 1
If HDAMDD1 is 1 GB and HDAMDD2 is 2 GB, specify as follows:

```
PROC TYPE=ALL
DATABASE DB=HDAM1,DD=(HDAMDD1,HDAMDD2)
OPTION DSSIZE=3G
```

Example 2

If all of the following conditions are true, specify as shown in this example.

- HDAMDD1 is less than 2G
- The sum of HIDAMDD1 and HIDAMDD2 is 2G
- The sum of the data sets of HALDB1 is less than 2G

```
PROC TYPE=ALL
OPTION DSSIZE=2G
DATABASE DB=HDAM1,DD=HDAMDD1
DATABASE DB=HIDAM1,DD=(HIDAMDD1,HIDAMDD2)
DATABASE DB=HALDB1,PART=*ALL,DD=*ALL
```

Attention: In example 2, the sizes of HDAM1 and HALDB1 are assumed to be 2 G each. Therefore, IMS HP Pointer Checker prepares the work data sets for a total size of 6 G. This might waste too much DASD space. We recommend that you specify the DSSIZE values after each DATABASE statement.

The override convention for the DSSIZE parameter follows the established protocol for the parameters in the OPTION statement. The parameters in an OPTION statement which follows a DATABASE statement override the parameters in any OPTION statement that follows the PROC statement.

If the input data set is a tape Image Copy, specify the original database data set size for the DSSIZE parameter.

If no DSSIZE parameter is provided and the database data set or image copy data set is on DASD, HD Pointer Checker estimates the space requirements for work data sets on the basis of the database data set or image copy data set size found in the VSAM catalog or in the DSCB in the VTOC. If the image copy data set is on tape, the data set labels contains no size information. Then for a tape data set HD Pointer Checker uses one of the following as the default size:

- If the input data set is a tape Image Copy of the index database data set, the default size is 1 GB.
- If the input data set is a tape Image Copy of data set other than the index database data set, the default size is 4 GB.

nnnn* or *nnnn.n
The size can be specified either as a 1-4 digit integer value or as a decimal value with a maximum of one decimal position.

The maximum value of *nnnn.n* is dependent on the scale factor.

- For K, M, or G scales, the maximum value is 9999.9
- For X scales, the maximum value is 9.9

S
The scale value can be represented by one of the following characters:

K
Kilobytes: The size value is 1000 times *nnnn.n*

M
Megabytes: The size value is 1,000,000 times *nnnn.n*

G
Gigabytes: The size value is 1,000,000,000 times *n.n*

X
Times: The size value is *n.n* times the default or calculated value.

Use the X option when the dynamic allocation of a data set is too small, resulting in frequent reallocation and restart.

The size of the work data set is adjusted by use of the primary quantity and the secondary quantity for allocation. For each of these, specify the value one-tenth the size of the estimated total. For example, if DSSIZE is 4 GB, the primary quantity has the ability to process 400 MB. The work data set will reach the estimated size of 4 GB after allocation is done 10 times.

The size of each primary and secondary quantity is given in an FABP1101I message in the PROCCTL Statement report or the DMB Directory report.

The SORTWK*nn*, SRTXWK*nn*, and SRTEWK*nn* data sets are allocated dynamically by the DFSORT program, and so the size of these work data sets are not controlled by the DSSIZE parameter.

HISTORY=

Specifies whether to update the HISTORY data set for the database data sets to be analyzed. When HISTORY=YES is specified, the HISTORY data set is required.

If the multiple entries option of the HISTORY data set is active, one or more database data set records are recorded per day. For more information about the multiple entries option, see the description of the MULTIENT keyword in "OPTION control statement" on page 386.

This option can be specified when TYPE=ALL or SCAN is specified.

This option cannot be specified when the following parameters are effective:

- On the DATABASE statement:
  - BLOCKDUMP parameter
- On the OPTION statement:
  - HOMECHK=NO
  - NOCHKP parameter

An abbreviation HIST can be used for HISTORY.

YES
The HISTORY data set for the database data sets to be analyzed is updated.

NO
The HISTORY data set is not updated. HISTORY=NO is the default value.

Serialization of HISTORY data sets
The HD Pointer Checker jobs are serialized to update the HISTORY data sets by using the ENQ macro. The RNAME parameter of the macro depends on the HISTORY lock option. The HISTORY lock option is set by the HISTLOCK parameter of the FABGHIST program of DB Historical Data Analyzer.

For details of the HISTLOCK option, see the description of HISTLOCK keyword in "OPTION control statement" on page 386.

KEYSIN=

Specifies whether to write the KEYSIN data set. This data set is used as the input to HD Tuning Aid.

This option can be specified when TYPE=ALL or SCAN is specified. It is effective only for HDAM, HIDAM, PHDAM, or PHIDAM databases.

YES
The KEYSIN data set is generated.

NO
The KEYSIN data set is not generated. KEYSIN=NO is the default value.

HOMECHK=

Specifies whether to print the DISTRIBUTION OF ROOT SEGMENTS part in the DB Record Distribution Statistics report. It is printed for HDAM or PHDAM, and only for the data set group that contains root segments.

This option can be specified when TYPE=ALL or SCAN is specified. This option is effective when REPORT DBDIST=YES is specified (default value for DBDIST). When HOMECHK=NO is specified, HISTORY=YES cannot be specified.

(YES,*-mmm*,*+nnn*)
The DISTRIBUTION OF ROOT SEGMENTS part is printed. YES is the default value. If YES, *mmm* is the backward distance from the Home Block (1 - 999) and *nnn* is the forward distance from the Home Block (1 - 999). The sign "+" can be omitted. The default value is (YES,-10,+10).

NO
The DISTRIBUTION OF ROOT SEGMENTS part is not printed.

INTERVAL=
Specifies whether to define the interval at which the Interval Statistics report and the Interval Free Space Summary report are produced.

This option can be specified when TYPE=ALL or SCAN is specified on the PROC statement, and when INTFS=YES or INTST=YES is specified on the REPORT statement. It is effective only for HDAM, HIDAM, PHDAM, or PHIDAM databases.

Abbreviations DS for DATASET, BM, BITM, and BMAP for BITMAP, and BLK for BLOCK can be used.

DATASET
The reports are produced for the entire database data set only once. INTERVAL=DATASET is the default value.

BITMAP
The reports are produced each time a bitmap block is processed.

(BLOCK,*nn*)
The number times 100 is the number of blocks that is processed between statistics interval. To code this field, you must include two decimal digits. Use leading zeros, if necessary.

ICUNIT=
Specifies the name of the unit in which the image copy data set resides, if the uncataloged image copy data set is to be allocated dynamically. This option can be specified when TYPE=ALL or SCAN is specified.

This option is referred to only when ddname DD of the image copy data set is omitted from the JCL, and NOCATDS is specified in the RECON data set.

For details, refer to “Dynamic allocation of database data sets and image copy data sets” on page 67.

INCORE=
Specifies whether you use the in-core pointer checking where possible, or you postpone the pointer checking until the CHECK process is run. With the in-core checking option, pointers are checked as many times as possible in the SCAN process. This minimizes the CPU, I/O, and the run time used by HD Pointer Checker.

The pointers that are not checked by using the in-core checking are checked in the CHECK process. The CHECKREC data set used input for CHECK process and the BLOCKMAP process does not contain the sorted records for the pointers that were checked with the in-core checking.

If this run finds some unexpected pointer errors, the listing produced by the BLOCKMAP process might be incomplete.

If the BLOCKMAP processor runs as a separate job or a job step that uses the BLKMAPIN and CHECKREC data set as input, the pointers that were checked with the in-core checking option are not listed.

This option can be specified when TYPE=ALL or SCAN is specified. It is effective for HDAM, HIDAM, PHDAM, or PHIDAM databases. When the HASH option is effective, INCORE=NO is forced.

YES
The in-core pointer checking is used where possible. INCORE=YES is the default value.

NO
The in-core pointer checking is not used.

VSAMBF=
Specifies the number of I/O buffers that VSAM is to use for the data records of VSAM database data sets and encrypted OSAM database data sets. The maximum value is 99999, and the minimum is 1.

If no AMP parameter or IBUFF keyword is specified in a DD statement, the buffers specified with this operand apply to all the VSAM database data sets and encrypted OSAM database data sets. Those buffers are obtained when the data set is opened and freed when it is closed. The total number of buffers depends on the block size of the database data set. If you do not specify this parameter or the AMP parameter, HD Pointer Checker uses the IBUFF keyword by default. The AMP parameter is substituted for the IBUFF and the VSAMBF keyword. If both VSAMBF and IBUFF keywords are specified, the value of IBUFF keyword is used. This option can be used only with the TYPE=ALL and SCAN parameters and is effective only for VSAM database data sets and encrypted OSAM database data sets.

Be careful when specifying this parameter because:

- The region size will increase when buffer space is specified.
- An excessive number of buffers might cause an open error for the database data set.

IBUFF=
Specifies the size, in kilobytes, of the I/O buffer area for an input database data set or image copy data set. The maximum value is 9999, and the minimum is 0. However, the maximum number of buffers in a non-VSAM data set is 255. Thus the buffer sizes can actually range up to 255 times the size of a block.

The default size for OSAM, VSAM, and the image copy data set on DASD is an equivalent size of 10 tracks on DASD space. The default size for an image copy data set on tape is 640 KB. If 0 is specified, or no value is specified, the default is assumed. If BUFNO in DCB, or BUFND in AMP, is specified on the database DD statement in the JCL, the IBUFF option is ignored.

For an indirect list data set (ILDS) of HALDB, the IBUFF option does not apply. HD Pointer Checker uses 100 buffers for an ILDS unless BUFND in AMP is specified on the JCL DD statement.

This option can be used only with the TYPE=ALL and SCAN parameters.

T2CHK=
Specifies the two threshold values that will define how the slack bytes or unknown data is treated as T2 records.

This option can be specified when TYPE=ALL or SCAN is specified.

T2num
Specifies the maximum number of T2 records (whose length is more than T2len) that are ignored (suppressed) and not considered to be errors. If the number of generated T2 records exceeds the threshold value, all T2 records are considered to be errors. The maximum value is 99 and the minimum value is 0. The default value is 0.

This option is effective only for HISAM, HDAM, HIDAM, PHDAM, or PHIDAM databases.

T2len
Specifies the maximum length of the T2 which is not considered to be an error. The maximum value is 99, and the minimum value is 1. The default value is 7.

This option is effective only for HDAM and HIDAM databases. The value specified for the HISAM database does not cause an error, but is ineffective.

For example, T2CHK=(,3) is equivalent to T2CHK=(0,3). T2CHK=(10,) is equivalent to T2CHK=(10,7). T2CHK=(10) is equivalent to T2CHK=(10,7).

ZEROCTR=
Requests to report the segment that has a counter field with zero value.

You can specify this option when you also specify TYPE=ALL or SCAN. This option is effective only for HDAM, HIDAM, PHDAM, or PHIDAM databases. This option is not effective when you specify HASH=YES or HASH=FORCE on the PROC statement.

YES
The segment with zero counter field is reported to the Evaluation of All Pointers to the Same Target report. This option might result in an extremely large report.

NO
The segment with zero counter field is not reported. ZEROCTR=NO is the default value.

SPIXCHK=
Specifies whether to check the suppressed segment by use of the secondary index maintenance exit routine.

This option can be specified when TYPE=ALL or SCAN is specified. It is effective only for the sparse indexing database when the secondary index maintenance exit routine is used.

YES
Suppressed segment check performs using a secondary index maintenance Exit routine. SPIXCHK=YES is the default value.

NO
Suppressed segment check is not performed.

PTRCHK=
Specifies whether to check the pointers.

This option can be specified when TYPE=SCAN is specified.

YES
The pointers are checked. PTRCHK=YES is the default value.

NO
The pointers are not checked. Only database statistics reports are printed.

When INCORE=YES is specified, the incore pointer checking is done even if PTRCHK=NO is specified. The default value of the INCORE option is YES. If you want to suppress the incore pointer checking, specify not only PTRCHK=NO but also INCORE=NO.

DIAG=
This option must be used for debugging purpose only. For details, see Chapter 15, “HD Pointer Checker options for debugging,” on page 321.

PRINTDATA=
This option must be used for debugging purpose only. For details, see Chapter 15, “HD Pointer Checker options for debugging,” on page 321.

NOCHKP=
This option must be used for debugging purpose only. For details, see Chapter 15, “HD Pointer Checker options for debugging,” on page 321.

SPMN=
Specifies whether HD Pointer Checker calls Space Monitor.

YES
HD Pointer Checker calls Space Monitor. Space Monitor monitors the data sets of the databases that are specified by the associated DATABASE statements.

To monitor IMS online full-function databases, specify the TOSI XCF group name on the TOSIXCFGRP= keyword of the PROC statement.

NO
HD Pointer Checker does not call Space Monitor.

THRESHOLDS=
Specifies the threshold values for Space Monitor. You can specify the keyword and its value as a pair. Separate each pair with a comma and enclose the entire specification of the pairs with parentheses.

The following table shows the values you can specify.

Table 18. Keywords and values for the THRESHOLDS parameter

Keyword	Value	Default value	Description
EXTENTS=	0 - 99 or NO	10	Warning threshold value for the number of extents.
FREESPC%=	0 - 100 or NO	10	Warning threshold value for the percentage of free space.
AVAILEXT=	0 - 50 or NO	10	Warning threshold value for the number of available extents.
LASTEXT=	YES or NO	YES	If YES is specified and the data set uses the last extent, a warning message for this data set is shown in the Space Monitor Exception report.
USEDSPC%=	0 - 100 or NO	90	Warning threshold value for the percentage of space used.
VOLEXT=	YES or NO	YES	If YES is specified and not enough space is left on the DASD volume for the data set to extend, a warning message for this data set is shown in the Space Monitor Exception report.
CASPLIT%=	0 - 100 or NO	50	Warning threshold value for the percentage of CA splits.
CISPLIT%=	0 - 100 or NO	50	Warning threshold value for the percentage of CI splits.
REORGINTVL=	0 - 999 or NO	NO	Warning threshold value for the number of days that can pass without a database reorganization.
DSSIZE%=	0 - 100 or NO	90	Warning threshold value for the percentage of the space used by data sets within the maximum size.
DSSIZE=	0 - 9999 or NO	NO	Warning threshold value for the data set size in the units of MB.

REPORT statement

A REPORT statement can be specified following a PROC statement and a DATABASE statement.

Explicitly specified keyword values and default option values of a REPORT statement that follows a PROC statement specify the options for all databases to be processed.

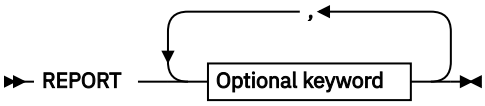
Explicitly specified keyword values of a REPORT statement following a DATABASE statement override a previously specified option of a REPORT statement following a PROC statement. These override options affect only one database data set group in a DATABASE statement.

Subsections:

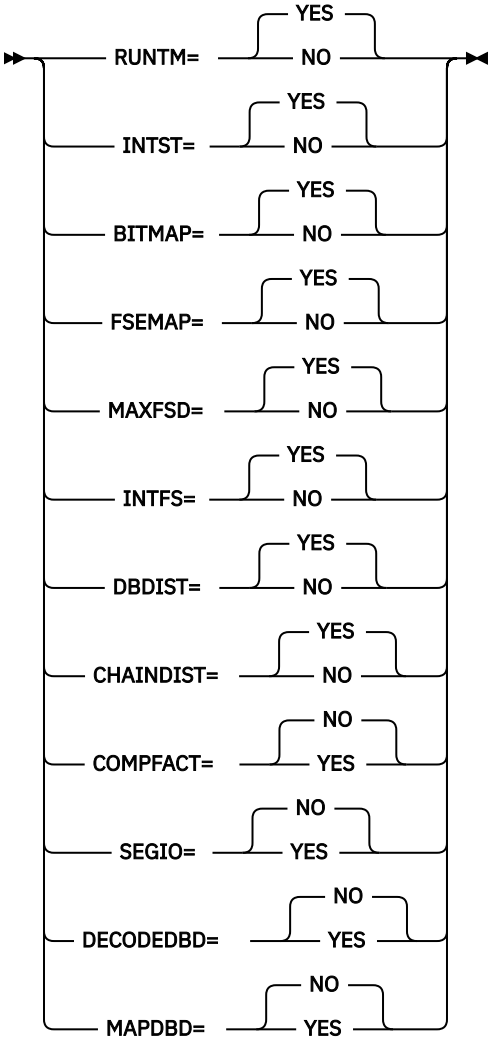
- “Syntax” on page 139
- “Keywords” on page 140

Syntax

The following syntax diagram shows the keywords for the REPORT statement.



Optional keywords



Keywords

The following keywords can be specified on the REPORT statement:

RUNTM=
Specifies whether to generate the separator page for DB/DSG reports. The separator page contains the runtime options used in the job.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. RUNTM=YES is the default value.

NO
The report is not generated.

INTST=
Specifies whether to generate the Interval Statistics report for the HDAM, HIDAM, PHDAM, or PHIDAM database. The report is produced each time an interval is processed; the information in the report is added to the next report. That is, the N-th report provides the total information of the 1st-Nth reports.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. INTST=YES is the default value.

NO
The report is not generated.

BITMAP=
Specifies whether to generate the Bit Map Display report for the HDAM, HIDAM, PHDAM, or PHIDAM database.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. BITMAP=YES is the default value.

NO
The report is not generated.

FSEMAP=
Specifies whether to generate the Free Space Map report for the HDAM, HIDAM, PHDAM, or PHIDAM database.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. FSEMAP=YES is the default value.

NO
The report is not generated.

MAXFSD=
Specifies whether to generate the Maximum Free Space Distribution report for the HDAM, HIDAM, PHDAM, or PHIDAM database.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. MAXFSD=YES is the default value.

NO
The report is not generated.

INTFS=
Specifies whether to generate the Interval Free Space Summary report for the HDAM, HIDAM, PHDAM, or PHIDAM database. The report is produced each time an interval is processed and the information in the report is added to the next report. That is, the N-th report provides the total information of the 1st-Nth reports.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. INTFS=YES is the default value.

NO
The report is not generated.

DBDIST=
Specifies whether to generate the DB Record Distribution Statistics report for the HDAM, HIDAM, PHDAM, or PHIDAM database.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The report is generated. DBDIST=YES is the default value.

NO
The report is not generated.

CHAINDIST=
Specifies whether to print the DISTRIBUTION OF RAP CHAIN LENGTHS part in the DB Record Distribution Statistics report.

This option can be specified when TYPE=ALL or SCAN is specified. It is printed for HDAM or PHDAM, and only for the data set group that contains root segments. This option is effective when REPORT DBDIST=YES is specified (default value of DBDIST is DBDIST=YES).

YES
The DISTRIBUTION OF RAP CHAIN LENGTHS is printed. CHAINDIST=YES is the default value.

NO
The DISTRIBUTION OF RAP CHAIN LENGTHS is not printed.

COMPFACT=
Specifies whether to print a compression factor in the VL SEGMENT LENGTH STATISTICS part of the Partition Statistics report and the Database Statistics report.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The compression factor is generated.

NO
The compression factor is not generated. COMPFACT=NO is the default value.

The compression factor is generated, not for every data set group, but for every database. If COMPFACT=YES and NO is specified for the same database in different DATABASE statements, YES is taken.

The compression factor is printed for HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases. If COMPFACT=YES is specified for other database organization types, it is ignored.

SEGIO=
Specifies whether to generate a RATE OF SEGMENT I/O OCCURRENCE part of the Partition Statistics report and the Database Statistics report.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The RATE OF SEGMENT I/O OCCURRENCE part is generated.

NO
The RATE OF SEGMENT I/O OCCURRENCE part is not generated. SEGIO=NO is the default value.

The RATE OF SEGMENT I/O OCCURRENCE part is generated, not for every data set group, but for every database. If SEGIO=YES and NO is specified for the same database in different DATABASE statements, YES is taken.

The RATE OF SEGMENT I/O OCCURRENCE part is generated for HDAM, HIDAM, PHDAM, and PHIDAM databases. If SEGIO=YES is specified for other database organization types, it is ignored.

DECODEDBD=
Specifies whether to print a DBD source code for each database processed by HD Pointer Checker. If you specify DECODEDBD=YES for the REPORT statement under the PROC statement, decoded DBDs are generated for all databases that are processed. If you specify DECODEDBD=YES for the REPORT statement under the DATABASE statement, a decoded DBD is generated for the specified database.

To use this function, you must install IMS Library Integrity Utilities 2.2 or later and specify its library in STEPLIB.

YES
The decoded DBD is generated in a report.

NO
The decoded DBD is not generated. DECODEDBD=NO is the default value.

If HD Pointer Checker runs in the DBB region, IMS Library Integrity Utilities obtains DBD information from IMS.ACBLIB specified in the IMSACB DD statement. If the IMS management of ACBs is enabled, IMS Library Integrity Utilities obtains DBD information from IMS directory data sets.

MAPDBD=

Specifies whether to print a DBD map to a report for each database processed by HD Pointer Checker. To use this function, you must install IMS Library Integrity Utilities and specify its library in STEPLIB.

YES

DBD map is generated in a report.

If the IMS management of ACBs is enabled, HD Pointer Checker ignores MAPDBD=YES and applies MAPDBD=NO.

NO

DBD map is not generated. MAPDBD=NO is the default value.

If HD Pointer Checker runs in a DBB region, IMS Library Integrity Utilities obtains DBD information from IMS.ACBLIB specified in the IMSACB DD statement.

END statement

The END statement can be specified in any order in the PROCCTL data set. The END statement is used to discontinue reading the PROCCTL data set. Any control statements and comments that follow the END statement are ignored in the PROCCTL data set.

It is not necessary to specify the END statement, unless you want to specify the end of the PROCCTL data set explicitly. The END statement is the optional statement which does not have any parameter.

Summary of index database checking

HD Pointer Checker checks several items regarding primary and secondary indexes. What you can check varies depending on how it is run and what you specify on the control statement.

Related reading:

- For information about specifying the PROCCTL control statement, see "FABPMAIN PROCCTL data set" on page 107.
- For information about specifying the ICEIN control statement when running HD Pointer Checker in IMS HP Image Copy, IMS Database Reorganization Expert, or IMS Online Reorganization Facility jobs, see the User's Guide of each product.
- For information about specifying the ADD command or the UTILGBL statement when running HD Pointer Checker in IMS Database Recovery Facility jobs, see the *IMS Recovery Solution Pack IMS Database Recovery Facility User's Guide and Reference*.

If a segment/edit compression routine is defined in the index source segment, specify the data set that contains the segment/edit compression routine in the IMS2 or STEPLIB DD statement to do the index check in an HD Pointer Checker job or IMS HP Image Copy job.

If a secondary index database maintenance exit routine is defined in the index source segment, specify the data set that contains the secondary index database maintenance exit routine in the IMS2 or STEPLIB DD statement to do the index check

The tables in the following subsections show what you can check for each index database type and how to specify it on the control statement. "Yes" indicates that the check is available, and how to specify it is shown in brackets. Even if "Yes" is specified, there are restrictions, which are described in each table.

Subsections:

- "HIDAM primary index" on page 144
- "Secondary index of non-HALDB" on page 144
- "Primary index of HALDB PHIDAM" on page 145
- "Secondary index of HALDB (PSINDEX)" on page 146

HIDAM primary index

For HIDAM primary indexes, the following checks are available:

Basic Check

- Checks the number of root segments and index pointer segments.
- Validates the pointer values (RBA of the root segment) of the index pointer segments.

Index Key Check

Validates the key values of the index pointer segments.

Table 19. HIDAM primary index

Function	HD Pointer Checker processor (FABPMAIN)		Single Step HASH Check option run from IMS HP Image Copy	HASH Check option run from IMS Database Reorganization Expert	HASH Check option run from IMS Online Reorganization Facility	HASH Check option run from IMS Database Recovery Facility
	PROCCTL PROC HASH=NO	PROCCTL PROC HASH=YES	ICEIN HDPC=Y	ICEIN HDPC=Y	ICEIN HDPC=Y or PTRCHECK(Y)	ADD PC()
Basic Check	Yes (DATABASE statement of the index database) (Required)	Yes (DATABASE statement of the index database)	Yes (Specify the index database in ICEIN)	Yes (Specify the index database in ICEIN)	Yes (Specify the index database in ICEIN or specify the HIDAM database and PTRCHECK(Y) in HRFSYSIN)	Yes (Specify the index database or the BLD_PRIMARY option)
Index Key Check	Yes (PROC IXKEYCHK=YES)	Yes (PROC IXKEYCHK=YES) (See 1)	Yes (GLOBAL IXKEYCHK=YES) (See 1)	Yes (GLOBAL IXKEYCHK=YES) (See 1 and 2)	Yes (GLOBAL IXKEYCHK=YES in ICEIN) (See 1 and 2))	No

Notes:

1. If some of the root segments are split to prefix and data portions and physically deleted, HASH Check of index key is not done.
2. HASH Check is not done for the index database in IMS Database Reorganization Expert and IMS Online Reorganization Facility jobs when the root segments are compressed with a segment/edit compression routine.

Secondary index of non-HALDB

For secondary indexes of non-HALDBs, the following checks are available:

Basic Check

- Checks the number of index source segments and index pointer segments.
- Validates the pointer values (RBA of the index target segment) of the index pointer segments.
- When the index database has an overflow data set, validates the pointers that point to the logical records in the overflow data set.

Index Key Check

Validates the key values of the index pointer segments.

Symbolic Pointer Check

Validates the symbolic index pointers.

Suppressed Segment Check

Checks that the index pointer segments are suppressed correctly by using the secondary index maintenance exit routine.

Table 20. Secondary index of non-HALDB

Function	HD Pointer Checker processor (FABPMAIN)		Single Step HASH Check option run from IMS HP Image Copy	HASH Check option run from IMS Database Reorganization Expert	HASH Check option run from IMS Online Reorganization Facility	HASH Check option run from IMS Database Recovery Facility
	PROCCTL PROC HASH=NO	**PROCCTL PROC HASH=YES**	**ICEIN HDPC=Y**	**ICEIN HDPC=Y**	**ICEIN HDPC=Y or PTRCHECK(Y)**	**ADD PC()**
Basic Check	Yes (DATABASE statement of the index database) (See 4 and 6)	YES (DATABASE statement of the index database) (See 1, 3, and 4)	Yes (Specify the index database in ICEIN) (See 1 and 3)	Yes (Specify the index database in ICEIN) (See 1, 2, and 3)	Yes (Specify the index database in ICEIN or specify an indexed database and PTRCHECK(Y) in HRFSYSIN) (See 1, 2, and 3)	Yes (Specify the index database or the BLD_SECONDARY() option) (See 1, 3, and “9” on page 145)
Index Key Check	Yes (PROC IXKEYCHK=YES) (See 5 and 8)	YES (PROC IXKEYCHK=YES) (See 5 and 7)	YES (GLOBAL IXKEYCHK=YES) (See 7)	YES (GLOBAL IXKEYCHK=YES) (See 2 and 7)	YES (GLOBAL IXKEYCHK=YES in ICEIN) (See 2 and 7)	No
Symbolic Pointer Check	Yes (PROC SYMIXCHK=YES)	No	No	No	No	No
Suppressed Segment Check	Yes (OPTION SPIXCHK=YES)	Yes (OPTION SPIXCHK=YES)	Yes (This check is done with the Basic Check)	Yes (This check is done with the Basic Check)	Yes (This check is done with the Basic Check)	No

Notes:

1. RBA check is possible only when index source segment and index target segment are in the same segment, or when the index target segment is the parent segment of index source segment. However, if index target segment is the parent segment of index source segment, and the index source segment does not have a PP pointer, RBA check is not done.
2. HASH Check is not done for the index database in IMS Database Reorganization Expert and IMS Online Reorganization Facility jobs when the source segments are compressed with a segment/edit compression routine.
3. When the index source segment is variable-length, and if there is a segment that is split and physically deleted in any of the index source segments, and if there is a segment whose index is suppressed in any of the index source segments, the HASH Check for the index database cannot be done, and message FABP4025W is issued.
4. When the secondary index database maintenance exit is defined in the index source segment, the Basic Check for the following factors is done only when SPIXCHK=YES is also specified:
   - The numbers of the index source segments and the index pointer segments
   - The values of the pointers that point to the index target segments
   - The values of the pointers that point to the logical records in the overflow data set when the index database has an overflow data set
5. When the secondary index database maintenance exit is defined on the index source segment, the Index Key Check is done only when SPIXCHK=YES is also specified.
6. If symbolic index pointer is used, the RBA of the index target segment is not validated.
7. If the following index is used, HASH Check of index key is not done:
   - A /CK field is specified on the SUBSEQ operand of the XDFLD statement.
   - Some of the source segments are split to prefix and data portions and physically deleted.
8. If /CK fields are defined by the SUBSEQ operand of the XDFLD statement, the Index Key Check is done only when IXKEYCHK=YES and IXKEYCKCHK=YES are specified.
9. When secondary index databases with an overflow data set are built by IMS Index Builder during the IMS Database Recovery Facility job, only the following factors are checked by the Basic Check:
   - The numbers of the index source segments and the index pointer segments
   - The values of the pointers that point to the index target segments

Primary index of HALDB PHIDAM

For primary indexes of HALDB PHIDAM databases, the following checks are available:

Basic Check

- Checks the number of root segments and index pointer segments.
- Validates the pointer values (RBA of the root segment) of the index pointer segments.

Index Key Check

Validates the key values of the index pointer segments.

Table 21. Primary index of HALDB PHIDAM

Function	HD Pointer Checker processor (FABPMAIN)				Single Step HASH Check option run from IMS HP Image Copy	HASH Check option run from IMS Database Reorganization Expert	HASH Check option run from IMS Online Reorganization Facility	HASH Check option run from IMS Database Recovery Facility
	PROCCTL PROC HASH=NO DATABASE DATASET= REAL	PROCCTL PROC HASH=NO DATABASE DATASET= IMAGECOPY	PROCCTL PROC HASH=YES DATABASE DATASET= REAL	PROCCTL PROC HASH=YES DATABASE DATASET= IMAGECOPY	ICEIN HDPC=Y	ICEIN HDPC=Y	ICEIN HDPC=Y or PTRCHECK(Y)	ADD PC()
Basic Check	Yes (DATABASE statement of the PHIDAM database) (Required)	No (ignored even if the DATABASE statement of the PHIDAM database is specified.)	Yes (DATABASE statement of the PHIDAM database) (Required)	No (ignored even if the DATABASE statement of the PHIDAM database is specified.)	No	No	No	No
Index Key Check	Yes (PROC IXKEYCHK= YES)	No	YES (PROC IXKEYCHK= YES) (See Note)	No	No	No	No	No

Note: If some of the root segments are split to prefix and data portions and physically deleted, HASH Check of index key is not done.

Secondary index of HALDB (PSINDEX)

For secondary indexes of HALDBs (PSINDEXes), the following checks are available:

Basic Check

- Checks the number of index source segments and index pointer segments.
- Validates the pointer values of the index pointer segments.

Index Key Check

Validates the key values of the index pointer segments.

EPS Check

Validates whether the relationship among the index target segments, the index list entries (ILE) in the indirect list data set (ILDS), and the index pointer segments are correct.

Suppressed Segment Check

Checks that the index pointer segments are suppressed correctly by using the secondary index maintenance exit routine.

Table 22. Secondary index of HALDB (PSINDEX)

Function	HD Pointer Checker processor (FABPMAIN)		Single Step HASH Check option run from IMS HP Image Copy	HASH Check option run from IMS Database Reorganization Expert	HASH Check option run from IMS Online Reorganization Facility	HASH Check option run from IMS Database Recovery Facility
	PROCCTL PROC HASH=NO	PROCCTL PROC HASH=YES	ICEIN HDPC=Y	ICEIN HDPC=Y	ICEIN HDPC=Y or PTRCHECK(Y)	ADD PC()
Basic Check	Yes (DATABASE statement of the index database) (See 1)	No	No	No	No	No
Index Key Check	Yes (PROC IXKEYCHK=YES) (See 2, 3, and 4)	No	No	No	No	No
EPS Check	Yes (PROC EPSCHK=YES) (See 5)	No	No	No	No	No
Suppressed Segment Check	Yes (OPTION SPIXCHK=YES)	No	No	No	No	No

Table 22. Secondary index of HALDB (PSINDEX) (continued)

Function	HD Pointer Checker processor (FABPMAIN)		Single Step HASH Check option run from IMS HP Image Copy	HASH Check option run from IMS Database Reorganization Expert	HASH Check option run from IMS Online Reorganization Facility	HASH Check option run from IMS Database Recovery Facility
	PROCCTL PROC HASH=NO	PROCCTL PROC HASH=YES	ICEIN HDPC=Y	ICEIN HDPC=Y	ICEIN HDPC=Y or PTRCHECK(Y)	ADD PC()

Notes:

1. When the secondary index database maintenance exit is defined on the index source segment, the Basic Check is done only when SPIXCHK=YES is also specified.
2. When the secondary index database maintenance exit is defined on the index source segment, the Index Key Check is done only when SPIXCHK=YES is also specified.
3. The Index Key Check is done only when EPSCHK=YES is also specified.
4. If /CK fields are defined by the SUBSEQ operand of the XDFLD statement, the Index Key Check is done only when IXKEYCHK=YES and IXKEYCKCHK=YES are specified.
5. If Image Copy is the input, specify EPSCHK=NO because the contents of ILDS will be changed by the HALDB reorganization after taking the image copy.

   If a HALDB reorganization was not done after taking an image copy, EPS Check will become effective. HD Pointer Checker does not check whether the HALDB was reorganized or not after taking an image copy. Therefore, select EPSCHK=YES or NO depending on whether a reorganization was done. The default value is EPSCHK=YES; to disable EPS Check, specify EPSCHK=NO explicitly.

FABPMAIN BLKMAPIN data set

The FABPMAIN BLKMAPIN data set contains your description of the processing to be done by the BLOCKMAP processor. It contains the target relative byte addresses (RBAs). The BLOCKMAP processor prints a list of all pointers that point to each target RBA.

The target RBAs specified can be the RBAs of segments that have undamaged as well as damaged pointers.

Usually, sufficient information about pointer chaining for a pointer error is automatically produced during an HD Pointer Checker run in the TYPE=ALL or TYPE=CHECK process. If you need information about the pointer chains of other segments, use the BLKMAPIN data set and the CHECKREC data set as the input in TYPE=BLKMAP; a stand-alone run of the BLOCKMAP process.

To list pointers that are free of errors, you must include as input the CHECKREC data set created by specifying CHECKREC=YES in the TYPE=ALL or TYPE=SCAN process. Also be careful about the following considerations:

- When IN-CORE pointer checking is done, all pointers validated in memory are discarded from the CHECKREC data set and they are not printed in the BLOCKMAP process.
- When HASH pointer checking is done, pointer information is not generated in the CHECKREC data set or printed in the BLOCKMAP process.

If you need to see all the pointers, rerun the pointer checker with no HASH pointer checking or no IN-CORE pointer checking.

Subsections:

- “Format” on page 147
- “Record format” on page 148

Format

This control data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set. It must contain one 80-byte fixed-length record for each target RBA to be processed. BLKSIZE, if coded, must be a multiple of 80.

The BLKMAPIN data set can be coded as shown in the following figure.

```
//BLKMAPIN DD *
00100001 A0003FC7D
00100001 B00600CD8
002     0100000400
002     0200000812
/*
1  4    9 11
```

Figure 41. Format of the BLKMAPIN data set

Record format

There is only one record type in the BLKMAPIN data set.

Position
Description

1
The 3-digit field contains the database number. The field contains hexadecimal digits.

4
If HALDB, the 5-digit field contains the partition ID. The field contains decimal digits. If non-HALDB, this field must be blank.

9
If non-HALDB, the 2-digit field contains data set group number. The field contains hexadecimal digit. If HALDB, the 1-digit field contains data set group number contains a character.

11
This 8-digit field contains the target RBA. This field contains eight hexadecimal digits with leading zeros (if needed).

FABPMAIN HPSRETCD data set

The FABPMAIN HPSRETCD data set contains your specification for the return code that is returned by HD Pointer Checker.

The HPSRETCD statements are not applied when the processing type of the job is TYPE=ESTIMATE_WK.

Format

This control data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set. It must contain 80-byte, fixed-length records. If the optional BLKSIZE is coded, it must be a multiple of 80.

The HPSRETCD data set contains (HDPC) statements. These control statements can be coded as shown in the following figure.

```
//HPSRETCD  DD  *
(HDPC)
  T2ERROR=12,DBERROR=16,
  PROCERROR=20
```

Figure 42. Sample control statement format in the HPSRETCD data set

Control statement syntax

Follow these coding conventions when you write control statements in the HPSRETCD data set:

- You must code an (HDPC) statement in the first line of the HPSRETCD data set, and you must code keywords and their values on the second or subsequent lines.
- You must code the (HDPC) statement, keywords, and their values within columns 2 and 72.
- When you code multiple keywords, they must be separated by commas.

  No blanks are allowed between the keywords and the commas, or between the keywords and their values. You can continue keywords onto one or more of the following control statement records.

- Keywords are not positional; you can specify them in any order of sequence. You cannot specify a null value for any keyword.
- Comments can follow the last keyword value on each control statement record, separated by at least one blank.
- A comment statement must begin with an asterisk in column 1.
- The only statement name that you can use within parentheses is HDPC, as in (HDPC). If (HPIC) is specified, HD Pointer Checker recognizes that the statement is for IMS HP Image Copy, and ignores the subsequent parameters. If none of the above word is specified in parentheses, HD Pointer Checker recognizes it as a syntax error.

The following figure shows the control statement syntax for the HPSRETCD data set.

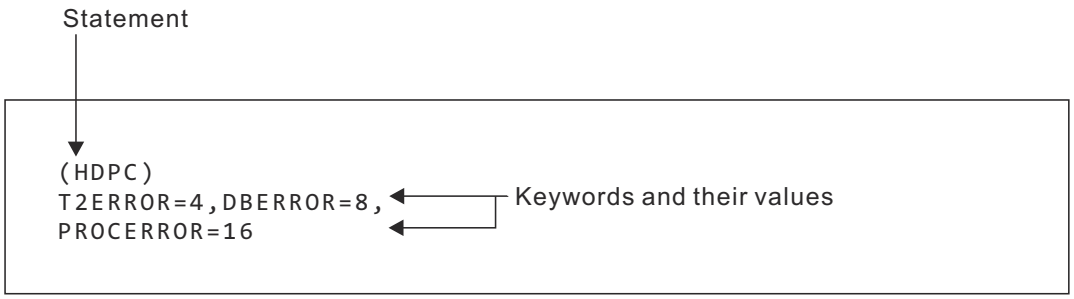


Figure 43. Control statement syntax: HPSRETCD

(HDPC) statement

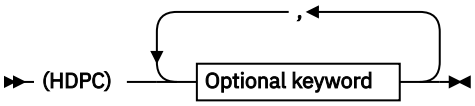
The (HDPC) statement specifies the options for return codes. You can specify only one (HDPC) statement, and it must be the first statement in the HPSRETCD data set.

Subsections:

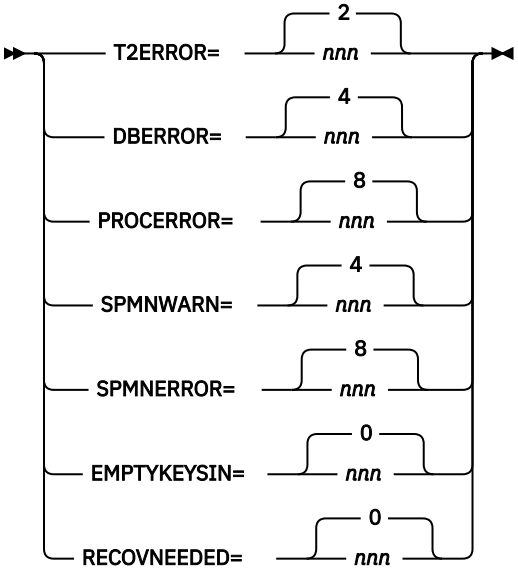
- "Syntax" on page 149
- "Keywords" on page 150

Syntax

The (HDPC) statement contains optional parameters that are specified by the keywords shown in the following syntax diagram.



Optional keywords



Keywords

T2ERROR=
Specify the return code when the T2 (unknown data) error is detected. *nnn* is from 0 to 999. The default value is 2.

DBERROR=
Specify the return code when a database error is detected. *nnn* is from 0 to 999. The default value is 4.

PROCERROR=
Specify the return code when the PROCCTL statement error is detected. *nnn* is from 0 to 999. The default value is 8.

SPMNWARN=
If Space Monitor detects warning return code 4, HD Pointer Checker returns the return code specified by this parameter. The original return code is 4. *nnn* is from 0 to 999. The default value is 4.

SPMNERROR=
If Space Monitor detects warning return code 8, HD Pointer Checker returns the return code specified by this parameter. The original return code is 8. *nnn* is from 0 to 999. The default value is 8.

EMPTYKEYSIN=
Specify the return code that is to be issued when no KEYSIN record is generated. *nnn* is from 0 to 999. The default value is 0. IBM recommends that you use this keyword only when KEYSIN=YES is specified in the PROCCTL statement of HD Pointer Checker. HD Pointer Checker returns the return code of the EMPTYKEYSIN keyword even in the case of normal end, because no KEYSIN record is generated when KEYSIN=NO is specified.

RECOVNEEDED=
Specify the return code when a database or a partition to be checked is registered in the RECON data set and is marked as recovery needed. When the value is not 0 and a database or a partition is marked as recovery needed, message FABP2122I is issued. This keyword is available when HD Pointer Checker runs with DBRC=YES. *nnn* is from 0 to 999. The default value is 0.

Notes:

- SPMNWARN and SPMNERROR are effective when they are specified in FABPMAIN TYPE=ALL or TYPE=SCAN JCL.
- If more than one of the above errors are detected, the highest return code is returned by HD Pointer Checker.

Output

HD Pointer Checker primary output consists of messages and reports.

These messages and reports are described in detail in the following topics. HD Pointer Checker also produces some work data sets, but these work data sets are not described in these topics.

Report reference for HD Pointer Checker

HD Pointer Checker produces a variety of reports in the output data sets.

HD Pointer Checker reports from HDPC stand-alone jobs

This reference topic summarizes the reports that are produced in HD Pointer Checker stand-alone jobs.

Important: The order that the reports are produced is the same order of the DD statements specified in JCL. However, the order of the data sets in the following tables, is the recommended order to get the reports efficiently.

Subsections:

- "Reports generated by HD Pointer Checker" on page 151
- "Reports generated by Space Monitor" on page 155

Reports generated by HD Pointer Checker

The following table summarizes the HD Pointer Checker reports that are produced when HD Pointer Checker is run as a stand-alone job.

The "Stored in the IMS Tools KB repository?" column shows whether the report is stored in the IMS Tools KB Output repository when the IMS Tools KB server XCF group is specified (ITKBSRVR=*servername* on the PROC statement).

Note: When TYPE=ESTIMATE_WK is applied, only the reports in the PRIMAPRT data set are printed.

Table 23. HD Pointer Checker reports: HDPC stand-alone (FABPMAIN) job

Data set	Report	PROCCTL statement and parameter for printing report	Report is printed?	Stored in the IMS Tools KB repository?
PRIMAPRT	Separator page for start of HD Pointer Checker		Printed	Not stored
	DMB Directory		Printed	Stored
	PROCCTL Statements		Printed	Not stored
	HPSRETCD Statements		Printed	Not stored

Table 23. HD Pointer Checker reports: HDPC stand-alone (FABPMAIN) job (continued)

Data set	Report	PROCCTL statement and parameter for printing report	Report is printed?	Stored in the IMS Tools KB repository?
STATIPRT	Separator page for statistics	PROC SEP=YES	Printed	Not stored
	Separator page for DB/DSG	REPORT RUNTM=YES	Printed	Stored
	HISAM Data Set Statistics		Printed	Stored
	HISAM Segment Level Statistics		Printed	Stored
	Interval Statistics	REPORT INTST=YES	Printed	Stored
	Bit Map Display	REPORT BITMAP=YES	Printed	Stored
	Free Space Map	REPORT FSEMAP=YES	Printed	Stored
	Maximum Free Space Distribution	REPORT MAXFSD=YES	Printed	Stored
	Interval Free Space Summary	REPORT INTFS=YES	Printed	Stored
	HD Data Set Statistics		Printed	Stored
	DB Record Distribution Statistics	REPORT DBDIST=YES OPTION INCORE=YES OPTION HOMECHK=YES REPORT CHAINDIST=YES	Printed	Stored
	Separator page for Partition Statistics	PROC SEP=YES	Printed	Not stored
	Partition Statistics	PROC VLSSUMM=YES REPORT COMPFACT=YES REPORT SEGIO=YES	Printed	Stored
	Separator page for Database Statistics	PROC SEP=YES	Printed	Not stored
	Database Statistics	PROC VLSSUMM=YES REPORT COMPFACT=YES REPORT SEGIO=YES	Printed	Stored

Table 23. HD Pointer Checker reports: HDPC stand-alone (FABPMAIN) job (continued)

Data set	Report	PROCCTL statement and parameter for printing report	Report is printed?	Stored in the IMS Tools KB repository?
VALIDPRT	Separator page for validation	PROC SEP=YES	Printed	Not stored
	Scan of HISAM Database		Printed	Stored
	Scan of Index Database		Printed	Stored
	Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/ PHDAM/PHIDAM)		Printed	Stored
	Legend for Scan and Validation		Printed (not printed when HASH Check)	Not stored
	Description of All Scanned Databases		Printed (not printed when HASH Check)	Not stored
	Validation of a Pointer to a Target at CHECK		Printed (not printed when HASH Check)	Stored
	Legend for Check Process Validation		Printed (not printed when HASH Check)	Not stored

Table 23. HD Pointer Checker reports: HDPC stand-alone (FABPMAIN) job (continued)

Data set	Report	PROCCTL statement and parameter for printing report	Report is printed?	Stored in the IMS Tools KB repository?
EVALUPRT	Separator page for evaluation	PROC SEP=YES	Printed	Not stored
	Evaluation of All Pointers to the Same Target		Printed (not printed when HASH Check)	Stored
	Legend for Check Process Evaluation		Printed (not printed when HASH Check)	Not stored
	Check Process Total		Printed (not printed when HASH Check)	Not stored
	HASH Evaluation	PROC HASH=YES	Printed only when HASH Check	Stored
	Evaluation of Index Pointers and Keys	PROC IXKEYCHK=YES and HASH=NO	Printed (not printed when HASH Check)	Stored
	Database Repair Guidelines	(printed only when database errors are detected)	Printed	Not stored
	Separator page for reconstruction	PROC SEP=YES	Printed (not printed when HASH Check)	Not stored
	DMB Directory and Control Card Format	(printed only when FABPMAIN TYPE=BLKMAP)	Not printed	Not stored
	Pointer Chain Reconstruction	(printed only when database errors are detected)	Printed (not printed when HASH Check)	Stored
	Legend for Reconstruction	(printed only when database errors are detected)	Printed (not printed when HASH Check)	Not stored
EVALUPR2	Evaluation of Symbolic Pointer	PROC SYMLPCHK=YES PROC SYMIXCHK=YES	Printed (not printed when HASH Check)	Stored

Table 23. HD Pointer Checker reports: HDPC stand-alone (FABPMAIN) job (continued)

Data set	Report	PROCCTL statement and parameter for printing report	Report is printed?	Stored in the IMS Tools KB repository?
EVALIPRT	Separator page for EPS Healing and Evaluation of ILKs	PROC SEP=YES PROC EPSCHK=YES	Printed (not printed when HASH Check)	Not stored
	EPS Healing	PROC EPSCHK=YES	Printed (not printed when HASH Check)	Stored
	Evaluation of ILKs	PROC EPSCHK=YES	Printed (not printed when HASH Check)	Stored
SNAPPIT	Separator page for Block Map and Dumps	PROC SEP=YES	Printed	Not stored
	Block Map and Block Dump	DATABASE BLOCKDUMP= (and printed when database errors are detected)	Printed	Stored
SUMMARY	Separator page for summary	PROC SEP=YES	Printed	Not stored
	HD Pointer Checker Summary		Printed	Stored
	HD Pointer Checker Message Summary		Printed	Stored
DBSRCPRT	Messages	REPORT DECODEDBD=YES	Printed	Not stored
	DBD Source	REPORT DECODEDBD=YES	Printed	Not stored
DBMAPPRT	Messages	REPORT MAPDBD=YES	Printed	Not stored
	DBD Map	REPORT MAPDBD=YES	Printed	Not stored

Reports generated by Space Monitor

If OPTION SPMN=YES (on the PROCCTL statement) is specified together with the SPMNSPDT DD statement, or DD statements SPMNIN and SPMNSPDT are specified, additional output data sets are generated by Space Monitor. For the output DD statements of Space Monitor, see "Job control language" on page 491.

The following Space Monitor reports are stored in the IMS Tools KB Output repository when PROC ITKBSRVR=*servername* and OPTION SPMN=YES are specified on the PROCCTL statement:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Space Monitor Exception report
- Space Monitor Messages

HD Pointer Checker reports from IMS HP Image Copy jobs

This reference topic summarizes the reports that are produced by HD Pointer Checker when it is called in IMS HP Image Copy jobs.

Important: The order that the reports are produced is the same order of the DD statements specified in JCL. However, the order of the data sets in the following table, is the recommended order to get the reports efficiently.

Subsections:

- "Reports generated by HD Pointer Checker" on page 156
- "Reports generated by Space Monitor" on page 159

Reports generated by HD Pointer Checker

The following table summarizes which HD Pointer Checker reports are produced when HD Pointer Checker is called by an IMS HP Image Copy job with the HASH Check option.

The "Stored in the IMS Tools KB repository?" column shows whether the report is stored in the IMS Tools KB Output repository when the IMS Tools KB server XCF group name is specified (ITKBSRVR=*servername* on the ICEIN control statement) in single-step HASH Check.

For more information about the ICEIN control statements, see the *IMS High Performance Image Copy User's Guide*.

Table 24. HD Pointer Checker reports: IMS HP Image Copy job

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
PRIMAPRT	Separator page for start of HD Pointer Checker		Printed	Not stored
	DMB Directory		Printed	Stored
	PROCCTL Statements		Printed (see Note 1)	Not stored
	HPSRETCD Statements		Not printed	Not stored

Table 24. HD Pointer Checker reports: IMS HP Image Copy job (continued)

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
STATIPRT	Separator page for statistics		Printed	Not stored
	Separator page for DB/DSG		Printed	Stored
	HISAM Data Set Statistics		Printed	Stored
	HISAM Segment Level Statistics		Printed	Stored
	Interval Statistics		Printed	Stored
	Bit Map Display	BITMAP	Printed	Stored
	Free Space Map	FSEMAP	Printed	Stored
	Maximum Free Space Distribution	MAXFSD	Printed	Stored
	Interval Free Space Summary		Printed	Stored
	HD Data Set Statistics		Printed	Stored
	DB Record Distribution Statistics	HOMECHK=YES DBDIST DEPDIST CHAINDIST	Printed (see Note 2)	Stored
	Separator page for Partition Statistics		Printed	Not stored
	Partition Statistics	VLSSUMM COMPFACT SEGIO	Printed (see Note 3)	Stored
	Separator page for Database Statistics		Printed	Not stored
	Database Statistics	VLSSUMM COMPFACT SEGIO	Printed (see Note 3)	Stored
VALIDPRT	Separator page for validation		Printed	Not stored
	Scan of HISAM Database		Printed	Stored
	Scan of Index Database		Printed	Stored
	Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/ PHDAM/PHIDAM)		Printed	Stored
	Legend for Scan and Validation		Not printed	Not stored
	Description of All Scanned Databases		Not printed	Not stored
	Validation of a Pointer to a Target at CHECK		Not printed	Not stored
	Legend for Check Process Validation		Not printed	Not stored

Table 24. HD Pointer Checker reports: IMS HP Image Copy job (continued)

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
EVALUPRT	Separator page for evaluation		Printed	Not stored
	Evaluation of All Pointers to the Same Target		Not printed	Not stored
	Legend for Check Process Evaluation		Not printed	Not stored
	Check Process Total		Not printed	Not stored
	HASH Evaluation		Printed	Stored
	Evaluation of Index Pointers and Keys		Not printed	Not stored
	Database Repair Guidelines	(printed only when database errors are detected)	Printed	Not stored
	Separator page for reconstruction		Not printed	Not stored
	DMB Directory and Control Card Format		Not printed	Not stored
	Pointer Chain Reconstruction		Not printed	Not stored
	Legend for Reconstruction		Not printed	Not stored
EVALUPR2	Evaluation of Symbolic Pointer		Not printed	Not stored
EVALIPRT	Separator page for EPS Healing and Evaluation of ILKs		Not printed	Not stored
	EPS Healing		Not printed	Not stored
	Evaluation of ILKs		Not printed	Not stored
SNAPPIT	Separator page for Block Map and Dumps	(printed only when database errors are detected)	Printed	Not stored
	Block Map and Block Dump	(printed only when database errors are detected)	Printed	Stored
SUMMARY	Separator page for summary		Printed	Not stored
	HD Pointer Checker Summary		Printed	Stored
	HD Pointer Checker Message Summary		Printed	Stored
DBSRCPRT	Messages		Not printed	Not stored
	DBD Source		Not printed	Not stored
DBMAPPRT	Messages		Not printed	Not stored
	DBD Map		Not printed	Not stored

Table 24. HD Pointer Checker reports: IMS HP Image Copy job (continued)

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?

Notes:

1. Format is different from FABPMAIN.
2. Not printed for HASH Check in multiple-step HASH Check.
3. The compression factor is not printed for HASH Check in multiple-step HASH Check.

Reports generated by Space Monitor

When SPMN=YES is specified on the ICEIN control statement, additional output data sets are generated by Space Monitor. For the output DD statements of Space Monitor, see “Job control language” on page 491.

When SPMN=YES and ITKBSRVR=*servername* are specified on the ICEIN control statement, the following Space Monitor reports are stored in the IMS Tools KB Output repository:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Space Monitor Exception report
- Space Monitor Messages

HD Pointer Checker reports from IMS Database Reorganization Expert jobs

This reference topic summarizes the reports that are produced by HD Pointer Checker when it is called in IMS Database Reorganization Expert jobs.

Certain considerations apply when HD Pointer Checker is called from IMS Database Reorganization Expert jobs. For more information, see “Considerations for calling HD Pointer Checker from IMS Database Reorganization Expert” on page 43.

Important: The order that the reports are produced is the same order of the DD statements specified in JCL. However, the order of the data sets in the following table, is the recommended order to get the reports efficiently.

The following table summarizes which HD Pointer Checker reports are produced when HD Pointer Checker is called by an IMS Database Reorganization Expert job with the HASH Check option.

The "Stored in the IMS Tools KB repository?" column shows whether the report is stored in the IMS Tools KB Output repository when the IMS Tools KB server XCF group name is specified (ITKBSRVR=*servername* in the HPSIN DD of IMS Database Reorganization Expert).

For more information about the control statements of IMS Database Reorganization Expert or IMS HP Image Copy, see the *IMS Database Reorganization Expert User's Guide* or the *IMS High Performance Image Copy User's Guide*.

Table 25. HD Pointer Checker reports: IMS Database Reorganization Expert job

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
PRIMAPRT	Separator page for start of HD Pointer Checker		Printed	Not stored
	DMB Directory		Printed	Stored
	PROCCTL Statements		Printed (see Note 1)	Not stored
	HPSRETCD Statements		Not printed	Not stored
STATIPRT	Separator page for statistics		Printed	Not stored
	Separator page for DB/DSG		Printed	Stored
	HISAM Data Set Statistics		Printed	Stored
	HISAM Segment Level Statistics		Printed	Stored
	Interval Statistics		Printed	Stored
	Bit Map Display	BITMAP	Printed	Stored
	Free Space Map	FSEMAP	Printed	Stored
	Maximum Free Space Distribution	MAXFSD	Printed	Stored
	Interval Free Space Summary		Printed	Stored
	HD Data Set Statistics		Printed	Stored
	DB Record Distribution Statistics		Not printed	Not stored
	Separator page for Partition Statistics		Printed	Not stored
	Partition Statistics	VLSSUMM SEGIO	Printed (see Note 2)	Stored
	Separator page for Database Statistics		Printed	Not stored
	Database Statistics	VLSSUMM SEGIO	Printed (see Note 2)	Stored

Table 25. HD Pointer Checker reports: IMS Database Reorganization Expert job (continued)

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
VALIDPRT	Separator page for validation		Printed	Not stored
	Scan of HISAM Database		Printed	Stored
	Scan of Index Database		Printed	Stored
	Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/ PHDAM/PHIDAM)		Printed	Stored
	Legend for Scan and Validation		Not printed	Not stored
	Description of All Scanned Databases		Not printed	Not stored
	Validation of a Pointer to a Target at CHECK		Not printed	Not stored
	Legend for Check Process Validation		Not printed	Not stored
EVALUPRT	Separator page for evaluation		Printed	Not stored
	Evaluation of All Pointers to the Same Target		Not printed	Not stored
	Legend for Check Process Evaluation		Not printed	Not stored
	Check Process Total		Not printed	Not stored
	HASH Evaluation		Printed	Stored
	Evaluation of Index Pointers and Keys		Not printed	Not stored
	Database Repair Guidelines	(printed only when database errors are detected)	Printed	Not stored
	Separator page for reconstruction		Not printed	Not stored
	DMB Directory and Control Card Format		Not printed	Not stored
	Pointer Chain Reconstruction		Not printed	Not stored
	Legend for Reconstruction		Not printed	Not stored
EVALUPR2	Evaluation of Symbolic Pointer		Not printed	Not stored
EVALIPRT	Separator page for EPS Healing and Evaluation of ILKs		Not printed	Not stored
	EPS Healing		Not printed	Not stored
	Evaluation of ILKs		Not printed	Not stored

Table 25. HD Pointer Checker reports: IMS Database Reorganization Expert job (continued)

Data set	Report	ICEIN HDPC= and (HOMECHK=) keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
SNAPPIT	Separator page for Block Map and Dumps	(printed only when database errors are detected)	Printed	Not stored
	Block Map and Block Dump	(printed only when database errors are detected)	Printed	Not stored
SUMMARY	Separator page for summary		Printed	Not stored
	HD Pointer Checker Summary		Printed	Stored
	HD Pointer Checker Message Summary		Printed	Stored
DBSRCPRT	Messages		Not printed	Not stored
	DBD Source		Not printed	Not stored
DBMAPPRT	Messages		Not printed	Not stored
	DBD Map		Not printed	Not stored

Notes:

1. Format is different from FABPMAIN.
2. The compression factor is not printed.

HD Pointer Checker reports from IMS Online Reorganization Facility jobs

This reference topic summarizes the reports that are produced by HD Pointer Checker when it is called in IMS Online Reorganization Facility jobs.

Important: The order that the reports are produced is the same order of the DD statements specified in JCL. However, the order of the data sets in the following table, is the recommended order to get the reports efficiently.

Subsections:

- "Reports generated by HD Pointer Checker" on page 162
- "Reports generated by Space Monitor" on page 165

Reports generated by HD Pointer Checker

The following table summarizes which HD Pointer Checker reports are produced when HD Pointer Checker is called by an IMS Online Reorganization Facility job with the HASH Check option.

The "Stored in the IMS Tools KB repository?" column shows whether the report is stored in the IMS Tools KB Output repository when the IMS Tools KB server XCF group name is specified (ITKBSERVER(*servername*) keyword in HRFSYSIN DD of IMS Online Reorganization Facility).

For more information about the control statements of IMS Online Reorganization Facility or IMS HP Image Copy, see the *IMS Online Reorganization Facility User's Guide* or the *IMS High Performance Image Copy User's Guide*.

Table 26. HD Pointer Checker reports: IMS Online Reorganization Facility job

Data set	Report	ICEIN HDPC= or PTRCHECK keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
PRIMAPRT	Separator page for start of HD Pointer Checker		Printed	Not stored
	DMB Directory		Printed	Stored
	PROCCTL Statements		Printed (see Note 1)	Not stored
	HPSRETCD Statements		Not printed	Not stored
STATIPRT	Separator page for statistics		Printed	Not stored
	Separator page for DB/DSG		Printed	Stored
	HISAM Data Set Statistics		Printed	Stored
	HISAM Segment Level Statistics		Printed	Stored
	Interval Statistics		Printed	Stored
	Bit Map Display	BITMAP	Printed	Stored
	Free Space Map	FSEMAP	Printed	Stored
	Maximum Free Space Distribution	MAXFSD	Printed	Stored
	Interval Free Space Summary		Printed	Stored
	HD Data Set Statistics		Printed	Stored
	DB Record Distribution Statistics	DBDIST DEPDIST	Printed (see Note 2)	Stored
	Separator page for Partition Statistics		Printed	Not stored
	Partition Statistics	VLSSUMM SEGIO	Printed (see Note 3)	Stored
	Separator page for Database Statistics		Printed	Not stored
	Database Statistics	VLSSUMM SEGIO	Printed (see Note 3)	Stored

Table 26. HD Pointer Checker reports: IMS Online Reorganization Facility job (continued)

Data set	Report	ICEIN HDPC= or PTRCHECK keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
VALIDPRT	Separator page for validation		Printed	Not stored
	Scan of HISAM Database		Printed	Stored
	Scan of Index Database		Printed	Stored
	Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/ PHDAM/PHIDAM)		Printed	Stored
	Legend for Scan and Validation		Not printed	Not stored
	Description of All Scanned Databases		Not printed	Not stored
	Validation of a Pointer to a Target at CHECK		Not printed	Not stored
	Legend for Check Process Validation		Not printed	Not stored
EVALUPRT	Separator page for evaluation		Printed	Not stored
	Evaluation of All Pointers to the Same Target		Not printed	Not stored
	Legend for Check Process Evaluation		Not printed	Not stored
	Check Process Total		Not printed	Not stored
	HASH Evaluation		Printed	Stored
	Evaluation of Index Pointers and Keys		Not printed	Not stored
	Database Repair Guidelines	(printed only when database errors are detected)	Printed	Not stored
	Separator page for reconstruction		Not printed	Not stored
	DMB Directory and Control Card Format		Not printed	Not stored
	Pointer Chain Reconstruction		Not printed	Not stored
	Legend for Reconstruction		Not printed	Not stored
EVALUPR2	Evaluation of Symbolic Pointer		Not printed	Not stored
EVALIPRT	Separator page for EPS Healing and Evaluation of ILKs		Not printed	Not stored
	EPS Healing		Not printed	Not stored
	Evaluation of ILKs		Not printed	Not stored

Table 26. HD Pointer Checker reports: IMS Online Reorganization Facility job (continued)

Data set	Report	ICEIN HDPC= or PTRCHECK keywords for printing report	Report is printed?	Stored in the IMS Tools KB repository?
SNAPPIT	Separator page for Block Map and Dumps	(printed only when database errors are detected)	Printed	Not stored
	Block Map and Block Dump	(printed only when database errors are detected)	Printed	Stored
SUMMARY	Separator page for summary		Printed	Not stored
	HD Pointer Checker Summary		Printed	Stored
	HD Pointer Checker Message Summary		Printed	Stored
DBSRCPRT	Messages		Not printed	Not stored
	DBD Source		Not printed	Not stored
DBMAPPRT	Messages		Not printed	Not stored
	DBD Map		Not printed	Not stored

Note:

1. Format is different from FABPMAIN.
2. The following information is not printed:
   - DISTRIBUTION OF ROOT SEGMENTS
   - DISTRIBUTION OF RAP CHAIN LENGTHS
3. The compression factor is not printed.

Reports generated by Space Monitor

When SPMN=YES is specified on the ICEIN control statement, additional output data sets are generated by Space Monitor. For the output DD statements of Space Monitor, see "Job control language" on page 491.

When SPMN=YES is specified on the ICEIN control statement and the ITKBSERVER(*servername*) keyword is specified on the HRFSYSIN DD statement, the following Space Monitor reports are stored in the IMS Tools KB Output repository:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Space Monitor Exception report
- Space Monitor Messages

HD Pointer Checker reports from IMS Database Recovery Facility jobs

This reference topic summarizes the reports that are produced by HD Pointer Checker when it is called in IMS Database Recovery Facility jobs.

Important: The order that the reports are produced is the same order of the DD statements specified in JCL. However, the order of the data sets in the following table, is the recommended order to get the reports efficiently.

The following table summarizes which HD Pointer Checker reports are produced when HD Pointer Checker is called by an IMS Database Recovery Facility job with the HASH Check option.

The "Stored in the IMS Tools KB repository?" column shows whether the report is stored in the IMS Tools KB Output repository when the IMS Tools KB server XCF group name is specified (ITKBSRVR(*servername*) in the IMS Database Recovery Facility UTILGBL statement).

For more information about the UTILGBL statement and the ADD PC() parameters of IMS Database Recovery Facility, see the *IMS Recovery Solution Pack IMS Database Recovery Facility User's Guide and Reference*.

Table 27. HD Pointer Checker reports: IMS Database Recovery Facility job

Data set	Report	ADD PC() parameters for printing report	Report is printed?	Stored in the IMS Tools KB repository?
PRIMAPRT	Separator page for start of HD Pointer Checker		Printed	Not stored
	DMB Directory		Printed	Stored
	PROCCTL Statements		Printed	Not stored
	HPSRETCD Statements		Not printed	Not stored
STATIPRT	Separator page for statistics		Not printed	Not stored
	Separator page for DB/DSG	RUNTM(YES)	Printed	Stored
	HISAM Data Set Statistics		Printed	Stored
	HISAM Segment Level Statistics		Printed	Stored
	Interval Statistics	INTST(YES)	Printed	Stored
	Bit Map Display	BITMAP(YES)	Printed	Stored
	Free Space Map	FSEMAP(YES)	Printed	Stored
	Maximum Free Space Distribution	MAXFSD(YES)	Printed	Stored
	Interval Free Space Summary	INTFS(YES)	Printed	Stored
	HD Data Set Statistics		Printed	Stored
	DB Record Distribution Statistics		Not printed	Not stored
	Separator page for Partition Statistics		Not printed	Not stored
	Partition Statistics		Not printed	Not stored
	Separator page for Database Statistics		Not printed	Not stored
	Database Statistics		Not printed	Not stored

Table 27. HD Pointer Checker reports: IMS Database Recovery Facility job (continued)

Data set	Report	ADD PC() parameters for printing report	Report is printed?	Stored in the IMS Tools KB repository?
VALIDPRT	Separator page for validation		Not printed	Not stored
	Scan of HISAM Database		Printed	Stored
	Scan of Index Database		Printed	Stored
	Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/ PHDAM/PHIDAM)		Printed	Stored
	Legend for Scan and Validation		Not printed	Not stored
	Description of All Scanned Databases		Not printed	Not stored
	Validation of a Pointer to a Target at CHECK		Not printed	Not stored
	Legend for Check Process Validation		Not printed	Not stored
EVALUPRT	Separator page for evaluation		Not printed	Not stored
	Evaluation of All Pointers to the Same Target		Not printed	Not stored
	Legend for Check Process Evaluation		Not printed	Not stored
	Check Process Total		Not printed	Not stored
	HASH Evaluation		Printed	Stored
	Evaluation of Index Pointers and Keys		Not printed	Not stored
	Database Repair Guidelines	(printed only when database errors are detected)	Printed	Not stored
	Separator page for reconstruction		Not printed	Not stored
	DMB Directory and Control Card Format		Not printed	Not stored
	Pointer Chain Reconstruction		Not printed	Not stored
	Legend for Reconstruction		Not printed	Not stored
EVALUPR2	Evaluation of Symbolic Pointer		Not printed	Not stored
EVALIPRT	Separator page for EPS Healing and Evaluation of ILKs		Not printed	Not stored
	EPS Healing		Not printed	Not stored
	Evaluation of ILKs		Not printed	Not stored

Table 27. HD Pointer Checker reports: IMS Database Recovery Facility job (continued)

Data set	Report	ADD PC() parameters for printing report	Report is printed?	Stored in the IMS Tools KB repository?
SNAPPIT	Separator page for Block Map and Dumps		Not printed	Not stored
	Block Map and Block Dump	(printed only when database errors are detected)	Printed	Stored
SUMMARY	Separator page for summary		Not printed	Not stored
	HD Pointer Checker Summary		Printed	Stored
	HD Pointer Checker Message Summary		Printed	Stored
DBSRCPRT	Messages		Not printed	Not stored
	DBD Source		Not printed	Not stored
DBMAPPRT	Messages		Not printed	Not stored
	DBD Map		Not printed	Not stored

Messages to operator

HD Pointer Checker writes some messages to inform the operator about the status of the job. These messages also appear on the job log in the output run listing.

The customized messages can be written to the operator console by the FABPZWTO user exit routine by editing the information in HD Pointer Checker summary report. See the member FABPZWTO of the sample exit routine that is provided in the HPS.AHPSSAMP library.

Format

The messages that are written to the operator console are described in Chapter 37, “Messages and codes,” on page 605. The following figure illustrates the kinds of messages that the operator sees.

```
21.45.36 JOB02419  +FABP1440I SCAN OF DB: HDAMDB2  DSG: 01 IN PROGRESS     @ BLOCK          1  TIME=21.45.36
21.45.36 JOB02419  +FABP1440I SCAN OF DB: TPFOH3   PID: 00001 DSG:  A IN PROGRESS @ BLOCK        1 TIME=21.45.36
21.45.36 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS @ BLOCK        1 TIME=21.45.36
21.45.37 JOB02419  +FABP1440I SCAN OF DB: TPFOH2   PID: 00001 DSG:  A IN PROGRESS @ BLOCK        1 TIME=21.45.37
21.45.37 JOB02419  +FABP1410I SCAN OF DB: TPFOX1   PID: 00001 DSG:  A IN PROGRESS                 TIME=21.45.37
21.45.37 JOB02419  +FABP1370I SCAN OF DB: HISAMDB1 DSG: 01 IN PROGRESS                        TIME=21.45.37
21.45.37 JOB02419  +FABP1450I SCAN OF DB: TPFOH3   PID: 00001 DSG:  A COMPLETED   @ BLOCK     1469 TIME=21.45.37
21.45.37 JOB02419  +FABP1420I SCAN OF DB: TPFOX1   PID: 00001 DSG:  A COMPLETED                 TIME=21.45.37
21.45.37 JOB02419  +FABP1450I SCAN OF DB: HDAMDB2  DSG: 01 COMPLETED       @ BLOCK       2474  TIME=21.45.37
21.45.38 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS @ BLOCK     3977 TIME=21.45.38
21.45.38 JOB02419  +FABP1440I SCAN OF DB: TPFOH2   PID: 00001 DSG:  A IN PROGRESS @ BLOCK     4009 TIME=21.45.38
21.45.38 JOB02419  +FABP1450I SCAN OF DB: TPFOH2   PID: 00001 DSG:  A COMPLETED   @ BLOCK     4409 TIME=21.45.38
21.45.38 JOB02419  +FABP1380I SCAN OF DB: HISAMDB1 DSG: 01 COMPLETED                        TIME=21.45.38
21.45.38 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS @ BLOCK     7953 TIME=21.45.38
21.45.39 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS @ BLOCK    11929 TIME=21.45.39
21.45.39 JOB02419  +FABP1410I SCAN OF DB: TPFOH2   PID: 00001 DSG:  X IN PROGRESS                 TIME=21.45.39
21.45.39 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS @ BLOCK    15905 TIME=21.45.39
21.45.39 JOB02419  +FABP1420I SCAN OF DB: TPFOH2   PID: 00001 DSG:  X COMPLETED                 TIME=21.45.39
21.45.39 JOB02419  +FABP1450I SCAN OF DB: TPFOH1   PID: 00001 DSG:  A COMPLETED   @ BLOCK    19844 TIME=21.45.39
21.45.40 JOB02419  +FABP1440I SCAN OF DB: TPFOH1   PID: 00001 DSG:  B IN PROGRESS @ BLOCK        1 TIME=21.45.40
21.45.40 JOB02419  +FABP1450I SCAN OF DB: TPFOH1   PID: 00001 DSG:  B COMPLETED   @ BLOCK      734 TIME=21.45.40
21.45.43 JOB02419  +FABP1480I EVAL OF DB: HDAMDB2  DSG: 01 IN PROGRESS                       TIME=21.45.43
21.45.43 JOB02419  +FABP1490I EVAL OF DB: HDAMDB2  DSG: 01 COMPLETED                       TIME=21.45.43
21.45.43 JOB02419  +FABP1480I EVAL OF DB: HISAMDB1 DSG: 01 IN PROGRESS                       TIME=21.45.43
21.45.43 JOB02419  +FABP1490I EVAL OF DB: HISAMDB1 DSG: 01 COMPLETED                       TIME=21.45.43
21.45.43 JOB02419  +FABP1480I EVAL OF DB: TPFOH1   PID: 00001 DSG:  A IN PROGRESS                 TIME=21.45.43
21.45.44 JOB02419  +FABP1490I EVAL OF DB: TPFOH1   PID: 00001 DSG:  A COMPLETED                 TIME=21.45.44
21.45.44 JOB02419  +FABP1480I EVAL OF DB: TPFOH1   PID: 00001 DSG:  B IN PROGRESS                 TIME=21.45.44
21.45.44 JOB02419  +FABP1490I EVAL OF DB: TPFOH1   PID: 00001 DSG:  B COMPLETED                 TIME=21.45.44
21.45.44 JOB02419  +FABP1480I EVAL OF DB: TPFOH3   PID: 00001 DSG:  A IN PROGRESS                 TIME=21.45.44
21.45.44 JOB02419  +FABP1490I EVAL OF DB: TPFOH3   PID: 00001 DSG:  A COMPLETED                 TIME=21.45.44
21.45.44 JOB02419  +FABP1480I EVAL OF DB: TPFOH2   PID: 00001 DSG:  A IN PROGRESS                 TIME=21.45.44
21.45.44 JOB02419  +FABP1490I EVAL OF DB: TPFOH2   PID: 00001 DSG:  A COMPLETED                 TIME=21.45.44
21.45.45 JOB02419  +FABP0001I ********************************************************************************
21.45.45 JOB02419  +FABP0001I                                                                              *
21.45.45 JOB02419  +FABP0001I HD POINTER CHECKER ENDED NORMALLY                                            *
21.45.45 JOB02419  +FABP0001I                                                                              *
21.45.45 JOB02419  +FABP0001I ********************************************************************************
21.45.45 JOB02419  DFS627I IMS RTM CLEANUP ( EOT ) COMPLETE FOR JS MANUHPC2.HDPCRUN .HDPCPRO ,RC=00
```

Figure 44. HD Pointer Checker job log

If Space Monitor is called, the result of Space Monitor is shown by the WTO message displayed after the HD Pointer Checker's end message. The following figure shows the HD Pointer Checker job log with Space Monitor.

```
FABP0001I ********************************************************************************
FABP0001I                                                                              *
FABP0001I HD POINTER CHECKER ENDED NORMALLY                                            *
FABP0001I                                                                              *
FABP0001I ********************************************************************************
FABP0007I SPACE MONITOR ENDED NORMALLY
```

Figure 45. HD Pointer Checker job log with Space Monitor

PRIMAPRT data set

The PRIMAPRT data set contains primary reports generated by HD Pointer Checker processor (FABPMAIN).

The following reports are generated in this data set:

- Separator page for start of HD Pointer Checker reports
- DMB Directory report
- PROCCTL Statements report
- HPSRETCD Statements report

Separator page for the start of HD Pointer Checker reports

The separator page contains the title, "HD Pointer Checker," and indicates that HD Pointer Checker started the processing.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "SEPARATOR PAGE FOR START OF HDPC"                    PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1



     HHH      HHH  DDDDDDDD
     HHH      HHH  DDDDDDDDDD
      HH      HH    DD     DDD
      HH      HH    DD      DD
      HH      HH    DD      DD
      HH      HH    DD      DD
      HHHHHHHHHH    DD      DD
      HHHHHHHHHH    DD      DD
      HHHHHHHHHH    DD      DD
      HH      HH    DD      DD
      HH      HH    DD      DD
      HH      HH    DD      DD
      HH      HH    DD     DDD
     HHH      HHH  DDDDDDDDDD
     HHH      HHH  DDDDDDDD

     PPPPPPPP          OOOO       IIIIIIIIII   NNN     NNNN  TTTTTTTTTTT  EEEEEEEEEE   RRRRRRRR
     PPPPPPPPP      OOOOOOOO     IIIIIIIIII   NNN     NNNN  TTTTTTTTTTT  EEEEEEEEEE   RRRRRRRRR
      PP     PPP    OOO    OOO       II        NN      NN   TT   TT   TT  EE           RR     RRR
      PP      PP    OO      OO       II        NNN     NN        TT       EE           RR      RR
      PP      PP    OO      OO       II        NNNN    NN        TT       EE           RR      RR
      PP      PP    OO      OO       II        NNNNN   NN        TT       EE           RR      RR
      PP     PPP    OO      OO       II        NNNNNN  NN        TT       EE   EEE     RR     RRR
      PPPPPPPPP     OO      OO       II        NN NNNN NN        TT       EEEEEEEE     RRRRRRRRR
      PPPPPPP       OO      OO       II        NN  NNNNNN        TT       EE   EEE     RRRRRRR
      PP            OO      OO       II        NN   NNNNN        TT       EE           RR RRR
      PP            OO      OO       II        NN    NNNN        TT       EE           RR  RRR
      PP            OO      OO       II        NN     NNN        TT       EE           RR   RRR
      PP            OOO    OOO       II        NN      NN        TT       EE           RR    RRR
     PPPP            OOOOOOOO     IIIIIIIIII   NNNN    NNN       TTTT     EEEEEEEEEE   RRRR   RRRR
     PPPP              OOOO       IIIIIIIIII   NNNN    NNN       TTTT     EEEEEEEEEE   RRRR   RRRR

        CCCC      HHH      HHH  EEEEEEEEEE       CCCC      KKKK    KKKK  EEEEEEEEEE   RRRRRRRR
      CCCCCCCC    HHH      HHH  EEEEEEEEEE     CCCCCCCC    KKKK    KKKK  EEEEEEEEEE   RRRRRRRRR
     CCC    CCC    HH       HH    EE          CCC    CCC    KK      KK    EE           RR     RRR
     CC      CC    HH       HH    EE          CC      CC    KK     KK     EE           RR      RR
     CC     CCC    HH       HH    EE          CC     CCC    KK    KK      EE           RR      RR
     CC     CCC    HH       HH    EE          CC     CCC    KK   KK       EE           RR      RR
     CC            HHHHHHHHHH    EE   EEE    CC            KK  KK        EE   EEE     RR     RRR
     CC            HHHHHHHHHH    EEEEEEEE    CC            KKKKK         EEEEEEEE    RRRRRRRRR
     CC            HHHHHHHHHH    EE   EEE    CC            KK  KK        EE   EEE     RRRRRRR
     CC     CCC    HH       HH    EE          CC     CCC    KK   KK       EE           RR RRR
     CC     CCC    HH       HH    EE          CC     CCC    KK    KK      EE           RR  RRR
     CC      CC    HH       HH    EE          CC      CC    KK     KK     EE           RR   RRR
     CCC    CCC    HH       HH    EE          CCC    CCC    KK      KK    EE           RR    RRR
      CCCCCCCC    HHH      HHH  EEEEEEEEEE     CCCCCCCC    KKKK    KKKK  EEEEEEEEEE   RRRR   RRRR
        CCCC      HHH      HHH  EEEEEEEEEE       CCCC      KKKK    KKKK  EEEEEEEEEE   RRRR   RRRR
```

Figure 46. PRIMAPRT: Separator page for the start of HD Pointer Checker reports

DMB Directory report

This report contains environment information and a list of all the databases that are defined (either explicitly or implicitly) by the PSB or DBD. This report is generated by the SCAN process.

Subsections:

- "Report example" on page 170
- "Report field description" on page 171

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                          "DMB DIRECTORY"                                    PAGE:     1
5655-U09                                                     DATE: 07/07/2020  TIME: 15.59.40                         FABPMAIN - V3.R1


ENVIRONMENT
-----------
  CPU MODEL        : 2964
  OPERATING SYSTEM : z/OS   V02.02.00
  IMS LEVEL        : VER 14 REL 1.0
  IMS REGION       : ULU (DBD INPUT)
  IMS ID           : SYS1

DBD NAME  DB-ORG  ACCESS  DB#  DBLG#
--------  ------  ------  ---  -----
HDAMDB2   HDAM    VSAM    001   001
HISAMDB1  HISAM   VSAM    002   001
TPFOH1    PHDAM   VSAM    003   002
TPFOH3    PHDAM   VSAM    004   002
TPFOH2    PHIDAM  VSAM    005   002
TPFOX1    PSINDX  VSAM    006   002



NOTE :
----

   DBLG#: - DBLG# (DATABASE LOGICAL GROUP NUMBER) INDICATES THAT PHYSICAL DATABASES WITH
            THE SAME DBLG# ARE LOGICALLY RELATED TO EACH OTHER.  IT IS IMPORTANT TO INCLUDE
            ALL LOGICALLY RELATED DATABASES EXCEPT SECONDARY DATABASE IN THE SAME CHECK
            PROCESS RUN.  OTHERWISE MANY VALIDATION/EVALUATION ERRORS MAY OCCUR.

          - SUMMARY REPORT SHOWS THAT ALL LOGICALLY RELATED DATABASES ARE PROCESSED BY THE
            SAME JOB RUN OR NOT.

          - IT IS NOT APPLICABLE TO LOGICAL DATABASE.

   HISAM: - HISAM DATABASES CAN ONLY BE VALIDATED CORRECTLY AFTER INITIAL LOAD OR DATABASE
            REORGANIZATION.

            REASON:
              - DL/I DOES NOT SET THE DELETE FLAG IN HISAM OVERFLOW RECORDS AFTER RECORDS ARE
                DELETED. THESE RECORDS ARE LOCATED BY THE POINTER CHECKER AS "ACTIVE",
                ALTHOUGH THEY ARE INACTIVE TO DL/I.

            LOGICAL RELATIONSHIPS:
              - IF THE HISAM DATABASE IS LOGICALLY CONNECTED TO AN HD DATABASE, ONLY THE
                HISAM DATABASE NEEDS TO BE REORGANIZED.

              - IF THE REORGANIZATION FAILS DUE TO AN ERROR IN THE SCAN OF THE HD DATABASE
                BY IMS, EVALUATE THE HD DATABASE SEPARATELY.
```

Figure 47. PRIMAPRT: DMB Directory report

Report field description

The report fields are as follows:

ENVIRONMENT
This part shows environment information as follows:

CPU MODEL and OPERATING SYSTEM
Self-explanatory

IMS LEVEL
The IMS version and release level of the specified the IMS.RESLIB

IMS REGION
The IMS region type such as DLI, DBB, and ULU

IMS ID
The IMS subsystem ID

The value of the IMS REGION and IMS ID fields are shown when HD Pointer Checker runs under the IMS batch region controller (DFSRRC00). Otherwise, 'N/A' is shown.

The columns of the succeeding list are as follows:

DBD NAME
The name of the DBD load module

DB-ORG
The type of database organization: HISAM, SHISAM, HIDAM, HDAM, PHIDAM, PHDAM, PSINDEX, INDEX, or LOGICAL

ACCESS
The access method used by the database (VSAM or OSAM)

DB#
The database number (in hexadecimal) used to identify the database throughout the HD Pointer Checker run

DBLG#
The database logical group number which indicates that physical databases with the same database logical group number are logically related to each other. See the NOTE section in this report.

PROCCTL Statements report

This report indicates all control statements of the current HD Pointer Checker run. These control statements have been specified in the PROCCTL data set.

The following control statements are reported:

- PROC statement
- OPTION statement
- REPORT statement
- DATABASE statement
- END statement

For pointer check jobs, this report provides the information about the work data sets at the time of dynamic allocation with either FABP1101I messages or FABP1102I messages. In each FABP1101I message, the SPACE parameter that was passed to the dynamic allocation macro is shown.

When the processing type of the job is TYPE=ESTIMATE_WK, this report contains the ESTIMATED SIZES OF WORK DATA SETS part. This part provides approximate sizes of work data sets that HD Pointer Checker will dynamically allocate in the pointer check job.

Subsections:

- "Report examples" on page 172
- "Report field description: ESTIMATED SIZES OF WORK DATA SETS part" on page 173

Report examples

The following figures show examples of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "PROCCTL STATEMENTS REPORT"                         PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1


0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

  PROC     TYPE=ALL,DBORG=ALL,SEP=YES,
           EPSCHK=YES,IXKEYCHK=YES,VLSSUMM=YES,
           SYMIXCHK=YES,SYMLPCHK=YES,ICRG#CHK=YES
  OPTION   HISTORY=YES
  REPORT   SEGIO=YES
  DATABASE DB=HDAMDB2,DD=HDAMDS4,SCANGROUP=01
  DATABASE DB=HISAMDB1,DD=HISAMDS1,OVERFLOW=HISAMDS2,SCANGROUP=01
  DATABASE DB=TPFOH1,PART=*ALL,DD=*ALL,SCANGROUP=03
  DATABASE DB=TPFOH2,PART=*ALL,DD=*ALL,SCANGROUP=04
  DATABASE DB=TPFOX1,PART=*ALL,DD=*ALL,SCANGROUP=05
  DATABASE DB=TPFOH3,PART=*ALL,DD=*ALL,SCANGROUP=06
  END
FABP1101I WORK DATA SET CHECKREC DYNAMIC ALLOCATION SPACE=(TRACK,(00030,00030))
FABP1101I WORK DATA SET IXKEY    DYNAMIC ALLOCATION SPACE=(TRACK,(00173,00173))
FABP1101I WORK DATA SET MERGIN03 DYNAMIC ALLOCATION SPACE=(TRACK,(00150,00150))
FABP1101I WORK DATA SET MERGIN04 DYNAMIC ALLOCATION SPACE=(TRACK,(00109,00109))
FABP1101I WORK DATA SET MERGI204 DYNAMIC ALLOCATION SPACE=(TRACK,(00150,00150))
FABP1101I WORK DATA SET SORTE204 DYNAMIC ALLOCATION SPACE=(TRACK,(00150,00150))
FABP1101I WORK DATA SET MERGIN06 DYNAMIC ALLOCATION SPACE=(TRACK,(00097,00097))
```

Figure 48. PRIMAPRT: PROCCTL Statements report

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "PROCCTL STATEMENTS REPORT"                          PAGE:     1
5655-U09                                                  DATE: 06/02/2020  TIME: 17.29.08                       FABPMAIN - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

 PROC TYPE=ESTIMATE_WK,IXKEYCHK=YES
 DATABASE DB=HDAMDB2,DD=HDAMDS4
 DATABASE DB=HISAMDB1,DD=HISAMDS1,OVERFLOW=HISAMDS2
 DATABASE DB=TPFOH1,PART=*ALL,DD=*ALL
 DATABASE DB=TPFOH2,PART=*ALL,DD=*ALL
 DATABASE DB=TPFOX1,PART=*ALL,DD=*ALL
 DATABASE DB=TPFOH3,PART=*ALL,DD=*ALL
 END

ESTIMATED SIZES OF WORK DATA SETS
---------------------------------
DD NAME   ESTIMATED SIZE (CYLS)
--------  ---------------------
MERGIN01                1,000  <= MAXIMUM SIZE
MERGI201                   36
SORTE201                  143
CHECKREC                    5
IXKEY                     241
--------  ---------------------
TOTAL                   1,425
```

Figure 49. PRIMAPRT: PROCCTL Statements report (processing type TYPE=ESTIMATE_WK)

Report field description: ESTIMATED SIZES OF WORK DATA SETS part

This part provides approximate sizes of work data sets that HD Pointer Checker will dynamically allocate in the pointer check job. The sizes of the work data sets that are associated with the following DD statements are shown:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

nn in DD names corresponds to the scan group number specified by the SCANGROUP option of the DATABASE statement. The default value of the option is 1.

HD Pointer Checker calculates the size of the space that is required for each work data set based on the sizes of input database data sets or the OPTION DSSIZE parameter.

The report fields of the ESTIMATED SIZES OF WORK DATA SETS part are as follows:

DD NAME
DD name for the work data set.

ESTIMATED SIZE (CYLS)
The approximate size of the work data set in cylinders.

Tip: You can use this information to determine the appropriate size and volume count when you specify the work data sets by using DD statements.

For CHECKREC DD, this field shows the size when CHECKREC=NO is specified. For the data set size that is required when CHECKREC=YES is specified, see “Estimating the size of the work data set for CHECKREC=YES (CHECKREC)” on page 316.

<= MAXIMUM SIZE
This indicator shows the maximum data set size that is required among all the work data sets. Even when multiple work data sets require the maximum data set size, the indicator appears once in the first row.

Tip: You can use this indicator to determine the data class that has the adequate space and volume count parameters so that the largest work data sets can be allocated.

TOTAL
The sum of the estimated data set sizes in cylinders.

Tip: You can use this information to select a storage group and ensure that the storage group has sufficient number of DASD volumes defined.

HPSRETCD Statements report

This report is generated when you specify the HPSRETCD data set. The report shows all of the control statements that were specified in the HPSRETCD data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "HPSRETCD STATEMENTS REPORT"                        PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


0.......1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

(HDPC)
T2ERROR=4,
DBERROR=8,
PROCERROR=16
FABP2099I RETURN CODE 04 WILL BE RETURNED IF T2ERROR      IS DETECTED
FABP2099I RETURN CODE 08 WILL BE RETURNED IF DBERROR      IS DETECTED
FABP2099I RETURN CODE 16 WILL BE RETURNED IF PROCERROR    IS DETECTED
```

Figure 50. PRIMAPRT: HPSRETCD Statements report

STATIPRT data set

The STATIPRT data set contains statistical reports produced by the HD Pointer Checker processor (FABPMAIN).

The following reports are generated in this data set:

- Separator page for statistics reports
- Separator page for DB/DSG reports
- HISAM Data Set Statistics report
- HISAM Segment Level Statistics report
- Interval Statistics report
- Bit Map Display report
- Free Space Map report
- Maximum Free Space Distribution report
- Interval Free Space Summary report
- HD Data Set Statistics report
- DB Record Distribution Statistics report
- Separator page for Partition Statistics reports
- Partition Statistics report
- Separator page for Database Statistics reports
- Database Statistics report

These reports are printed as one set for each database data set group except the separator page for statistics reports.

Separator page for statistics reports

The separator page contains the title of "Statistics Report," and indicates that statistics reports will follow this page.

This page is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

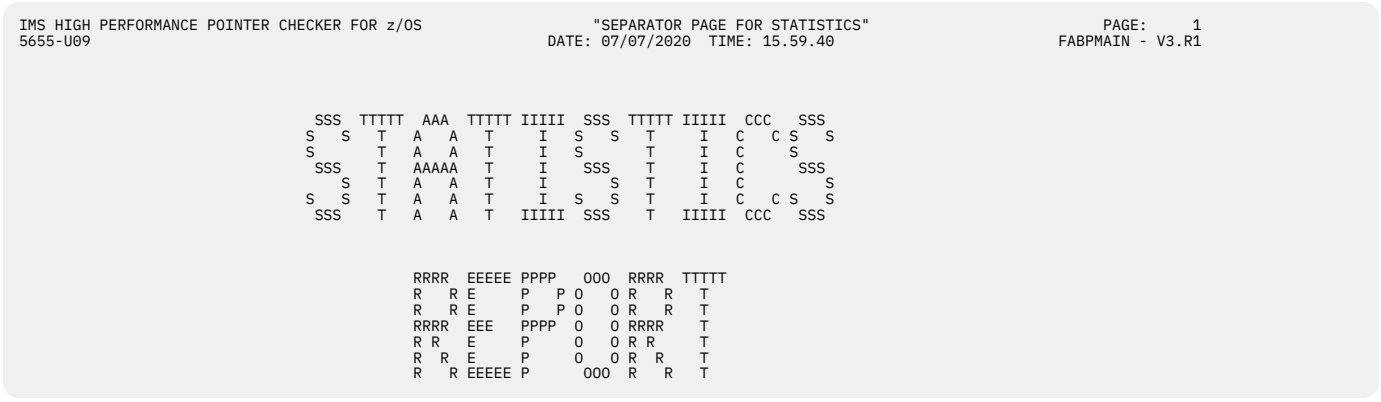


Figure 51. STATIPRT: Separator page for statistics reports

Separator page for DB/DSG reports

This separator page indicates that HD Pointer Checker started processing of the database or data set group described in this report.

The separator page is produced unless RUNTM=NO is specified on the REPORT statement.

This separator has two types of formats:

- Figure 52 on page 176 shows the general format, which is generated when TYPE=ALL or SCAN is specified on the PROC statement as input for the PROCCTL data set.
- Figure 53 on page 176 is generated when BLOCKDUMP keyword is specified on the DATABASE statement.

Subsections:

- “Report example” on page 175
- “Report field descriptions” on page 177

Report example

The following figures show examples of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "SEPARATOR PAGE FOR DB/DSG"                          PAGE:     1
5655-U09                                                  DATE: 02/22/2020  TIME: 09.56.33                      FABPMAIN - V3.R1


  TTTTT PPPP  FFFFF  OOO  H   H   1                                TTTTT PPPP  FFFFF  OOO  H   H   1    AAA   AAA
    T   P   P F     O   O H   H  11                                  T   P   P F     O   O H   H  11   A   A A   A
    T   P   P F     O   O H   H   1                                  T   P   P F     O   O H   H   1   A   A A   A
    T   PPPP  FFF   O   O HHHHH   1                                  T   PPPP  FFF   O   O HHHHH   1   AAAAA AAAAA
    T   P     F     O   O H   H   1                                  T   P     F     O   O H   H   1   A   A A   A
    T   P     F     O   O H   H   1                                  T   P     F     O   O H   H   1   A   A A   A
    T   P     F      OOO  H   H 11111                                T   P     F      OOO  H   H 11111 A   A A   A

  DDDD  BBBB   # #              000   000   333                     DDDD   SSS   GGG   # #                    AAA
  D   D B   B #####             0   0 0   0 3   3                    D   D S   S G   G #####                  A   A
  D   D B   B  # #              0  00 0  00     3                    D   D S     G     # #                    A   A
  D   D BBBB   # #              0 0 0 0 0 0   33                    D   D  SSS  G GGG  # #                    AAAAA
  D   D B   B  # #              00  0 00  0     3                    D   D     S G G G  # #                    A   A
  D   D B   B #####             0   0 0   0 3   3                    D   D S   S G   G #####                  A   A
  DDDD  BBBB   # #               000   000   333                     DDDD   SSS   GGG   # #                    A   A


RUN TIME OPTION FOR DB/DSG
--------------------------


  DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A   PART ID: 00001 REORG#: 00001
                    DSG#:  A PRIM DD:  TPFOH1AA  DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

  PROC STATEMENT                  DATABASE STATEMENT                OPTION STATEMENT                  REPORT STATEMENT
  --------------                  ------------------                ----------------                  ----------------

  TYPE        = ALL               DB       = TPFOH1                 ERRLIMIT  = YES                   RUNTM     = YES
  DBORG       = PHDAM             DD       = TPFOH1AA               DIAGDUMP  = ERROR                 INTST     = YES
  HASH        = NO                OVERFLOW = N/A                    DUMPFORM  = FORMAT                BITMAP    = YES
  IXKEYCHK    = NO                DATASET  = REAL                   HISTORY   = YES                   FSEMAP    = YES
  IXKEYCKCHK  = NO                SCANGROUP= 03                     HOMECHK   = (YES,-010,010)        MAXFSD    = YES
  SEP         = YES                                                 INTERVAL  = DATASET               INTFS     = YES
  VLSSUMM     = N/A                                                 INCORE    = YES                   DBDIST    = YES
  CHECK       = (CHK,111111)                                        KEYSIN    = NO                    CHAINDIST = YES
  EPSCHK      = YES                                                 T2CHK     = (00,07)               DECODEDBD = NO
  CHECKREC    = NO                                                  ZEROCTR   = NO                    MAPDBD    = NO
  ICRG#CHK    = N/A                                                 DIAG      = NO                    COMPFACT  = NO
  RETCDDSN    = *NO                                                 PRINTDATA = NO                    SEGIO     = NO
  ITKBSRVR    = FPQSVRS0                                            PTRCHK    = YES
  ITKBLOAD    = *NO                                                 NOCHKP    =
  SENSOR      = YES                                                 VSAMBF    = N/A
  SENSOR_HOME = YES                                                 DSSIZE    =
  TOSIXCFGRP  = TOIHPC0                                             ICUNIT    = N/A
  ADXCFGRP    = *NO                                                 IBUFF     = 10TRK
  DUPILKCHK   = YES                                                 SPMN      = NO
  REPAIRILK   = NO
  WKDATACLASS = *NO
  WKSTORCLASS = *NO
  WKHLQ       = *NO
  GROUPDIGITS = YES
  USER        = *NO


FABP2084I I/O BUFFER OF DD: TPFOH1AA (CI/BLOCK SIZE:    512) IS    245 KBYTE
```

Figure 52. STATIPRT: Separator page for DB/DSG reports (General format)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "SEPARATOR PAGE FOR DB/DSG"                          PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 09.44.00                      FABPMAIN - V3.R1



  H   H DDDD   AAA  M   M DDDD  BBBB   222                          H   H DDDD   AAA  M   M DDDD   SSS    4
  H   H D   D A   A M   M D   D B   B 2   2                         H   H D   D A   A M   M D   D S   S 4 4
  H   H D   D A   A MM MM D   D B   B     2                         H   H D   D A   A MM MM D   D S     4 4
  HHHHH D   D AAAAA M M M D   D BBBB    2                          HHHHH D   D AAAAA M M M D   D  SSS  4 4
  H   H D   D A   A M   M D   D B   B  2                           H   H D   D A   A M   M D   D     S 44444
  H   H D   D A   A M   M D   D B   B 2                            H   H D   D A   A M   M D   D S   S   4
  H   H DDDD  A   A M   M DDDD  BBBB  22222                        H   H DDDD  A   A M   M DDDD   SSS    4


  DDDD  BBBB   # #              000   000    1                     DDDD   SSS   GGG   # #              000    1
  D   D B   B #####             0   0 0   0  11                    D   D S   S G   G #####            0   0  11
  D   D B   B  # #              0  00 0  00   1                     D   D S     G     # #              0  00   1
  D   D BBBB   # #              0 0 0 0 0 0   1                     D   D  SSS  G GGG  # #              0 0 0   1
  D   D B   B  # #              00  0 00  0   1                     D   D     S G G G  # #              00  0   1
  D   D B   B #####             0   0 0   0   1                     D   D S   S G   G #####            0   0   1
  DDDD  BBBB   # #               000   000  11111                   DDDD   SSS   GGG   # #               000  11111


RUN TIME OPTION FOR DB/DSG
--------------------------

  DBNAME: HDAMDB2   DB#: 001 DSG#: 01  PRIM DD: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4
                                       OVER DD:           DSNAME:


  BLOCKDUMP= (00002400,001)


  DUMP NO.    FROM    =      1
  DUMP NO.    TO      =      1
  TOTAL BLOCKS DUMPED =      1
```

Figure 53. STATIPRT: Separator page for DB/DSG reports (Blockdump option format)

Report field descriptions

The report fields are as follows:

DBNAME
The name of the DBD as coded on the NAME keyword of the DBD macro

DB#
The database number (in hexadecimal) that identifies the database being processed

PARTNAME
Partition name

PARTID
Partition ID

REORG#
Partition reorganization number (reorganization number)

The reorganization number is shown only for data set group A. "N/A" is shown for groups other than group A, as same as for other reports.

DSG#
For non-HALDB, the data set group number (in hexadecimal). For HALDB that identifies the database being processed, the data set group ID (in an alphabetic character).

DDNAME
The ddname as coded on the DD1 keyword or OVFLW keyword of the DATASET macro in the DBD

DSNAME
The name of the data sets being processed

DBORG
The organization type of the database

These heading fields are common among the HD Pointer Checker reports that are described in the topics under "Output" on page 151. The detailed descriptions of these headings are not repeated where they appear again.

The remaining report fields are as follows:

PROC STATEMENT
Actual options being processed, which are specified on the PROC statement

DATABASE STATEMENT
Actual options being processed, which are specified on the DATABASE statement

OPTION STATEMENT
Actual options being processed, which are specified on the OPTION statement

REPORT STATEMENT
Actual options being processed, which are specified on the REPORT statement

BLOCKDUMP
The values specified with BLOCKDUMP=(*rba,nnn*) on the DATABASE statement

DUMP NO.
The dump number to be reported in the succeeding Block Map and Block Dump report

TOTAL BLOCKS DUMPED
The total number of blocks to be reported in the succeeding Block Map and Block Dump report

HISAM Data Set Statistics report

This report contains information about the HISAM (including SHISAM) data set.

The report contains the following parts:

- The DATA SET SUMMARY part shows the database data set information.
- The SPACE USE ANALYSIS part shows status of the use of the data set.

- The third part shows various totals for each segment type. This part is referred to as *segment occurrences* part.

This report is produced for each data set specified on the DATABASE statement in the PROCCTL data set.

Subsections:

- "Report example" on page 178
- "Report field description: Common header part" on page 179
- "Report field description: DATA SET SUMMARY" on page 179
- "Report field description: SPACE USE ANALYSIS" on page 180
- "Report field description: Segment occurrences part" on page 181

Report example

The following figures show an example of this report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HISAM DATA SET STATISTICS REPORT"                    PAGE:     1
5655-U09                                                  DATE: 07/28/2020  TIME: 09.56.33                      FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01

DATA SET SUMMARY(PRIMARY)
-------------------------
  DBD NAME                        = HISAMDB1
  DB NUMBER                       = 002
  DATABASE ORGANIZATION           = HISAM
  ACCESS METHOD                   = VSAM KSDS
  DDNAME OF DATA SET              = HISAMDS1
  DSNAME OF DATA SET              = TESTDS.PUBLIC.SAMPLE.HISAMDS1
  BLOCK SIZE                      =  8,192
  RECORD SIZE                     =    510
  DATA SET CREATION DATE          = 07/06/2020
                    TIME          = N / A

DATA SET SUMMARY(OVERFLOW)
--------------------------
  ACCESS METHOD                   = VSAM ESDS
  DDNAME OF DATA SET              = HISAMDS2
  DSNAME OF DATA SET              = TESTDS.PUBLIC.SAMPLE.HISAMDS2
  BLOCK SIZE                      =  8,192
  RECORD SIZE                     =    512
  DATA SET CREATION DATE          = 07/06/2020
                    TIME          = 17:35:40

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HISAM DATA SET STATISTICS REPORT"                    PAGE:     2
5655-U09                                                  DATE: 07/28/2020  TIME: 09.56.33                      FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01

SPACE USE ANALYSIS(PRIMARY)
---------------------------
  TOTAL NUMBER OF LOGICAL RECORDS               =         130
  NUMBER OF LOGICAL RECORDS WITH FREE SPACE     =           5
  SEGMENT SIZE RANGE FOR THIS DATA SET(FROM DBD) =         102 TO    177
  TOTAL BYTES OF SPACE                          =         73,728  100.0 %  0.000 GB (   0.0 % OF 4 GB LIMIT )
  SEGMENT PREFIX                                =          2,280    3.1 %
  SEGMENT DATA                                  =         57,377   77.8 %
  SEGMENT PAD                                   =              0    0.0 %
  FREE SPACE (USABLE)                           =          7,747   10.5 %
  FREE SPACE (NOT USABLE)                       =          5,584    7.6 %
  UNKNOWN DATA                                  =              0    0.0 %
  DL/I OVERHEAD                                 =            650    0.9 %
  VSAM CI OVERHEAD                              =             90    0.1 %
  NUMBER OF LOGICAL RECORDS ERROR DETECTED      =              0

SPACE USE ANALYSIS(OVERFLOW)
----------------------------
  TOTAL NUMBER OF LOGICAL RECORDS               =      21,260
  NUMBER OF LOGICAL RECORDS WITH FREE SPACE     =       1,158
  SEGMENT SIZE RANGE FOR THIS DATA SET(FROM DBD) =         102 TO    177
  TOTAL BYTES OF SPACE                          =     11,624,448  100.0 %  0.011 GB (   0.3 % OF 4 GB LIMIT )
  SEGMENT PREFIX                                =        247,842    2.1 %
  SEGMENT DATA                                  =      9,474,932   81.5 %
  SEGMENT PAD                                   =              0    0.0 %
  FREE SPACE (USABLE)                           =        162,847    1.4 %
  FREE SPACE (NOT USABLE)                       =      1,610,155   13.9 %
  UNKNOWN DATA                                  =              0    0.0 %
  DL/I OVERHEAD                                 =        114,492    1.0 %
  VSAM CI OVERHEAD                              =         14,180    0.1 %
  NUMBER OF LOGICAL RECORDS ERROR DETECTED      =              0
```

Figure 54. STATIPRT: HISAM Data Set Statistics report (Part 1 of 2)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HISAM DATA SET STATISTICS REPORT"                    PAGE:     3
5655-U09                                                 DATE: 07/28/2020  TIME: 09.56.33                      FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01  DSNAME: TESTDS.PUBLIC.SAMPLE.HISAMDS1


ROOT SEGMENT NAME = ROOT
ROOT SEG KEY NAME = ROOTF1       ROOT SEG KEY LENGTH-1 =     009    START POSITION OF KEY-1 =    000


 SC SEGNAME        OCCUR     OVERFLW     PL-DLTS     P-DLETS     L-DLETS  PFX LNG  DAT LNG  SEG LNG  R  U  L  E  S
                                                                                                  I D R  N-SEQ
                                                                                                         INSRT

 01 ROOT             130           0           0           0           0        6      100      106  L L L   LAST
 02 DEP1            9100        8952           0           0           0        6      100      106  L L L   LAST
 03 DEP12          13706       13605           0           0           0        2     117V      119  L L L   LAST
 04 DEP121          6841        6794           0           0           0        2      99V      101  L L L   LAST
 05 DEP1211         6812        6798           0           0           0        2      80V       82  L L L   LAST
 06 DEP122         13593       13567           0           0           0        2      92V       94  L L L   LAST
 07 DEP1221        13593       13585           0           0           0        2      80V       82  L L L   LAST
 08 DEP123         20324       20300           0           0           0        2      80V       82  L L L   LAST
 09 DEP2           22502       22416           0           0           0        2      79V       81  L L L   LAST
               ----------  ----------
 TOTALS           106601      106017


NOTE : - 'OVERFLOW' COUNT IN HISAM IS COUNT OF SEGMENTS IN OSAM/ESDS DATA SET
----
       - 'V' INDICATES THAT 'DAT LNG' AND 'SEG LNG' SHOW AVERAGE VALUES
         FOR A VARIABLE LENGTH SEGMENT (IF ANY)
```

Figure 55. STATIPRT: HISAM Data Set Statistics report (Part 2 of 2)

Report field description: Common header part

In each part, the following information is printed:

DBNAME DB# DSG#
The name of the DBD, the database number (in hexadecimal), the data set group number (in hexadecimal)

Report field description: DATA SET SUMMARY

This part shows information about the database data set. If the data set is an image copy, DSNAME OF DATA SET and DATA SET CREATION DATE TIME show the information about the image copy data set.

DBD NAME
The name of the DBD as coded on the NAME keyword of the DBD macro

DB NUMBER
The database number (in hexadecimal) used to identify the database throughout the HD Pointer Checker run

DATABASE ORGANIZATION
The IMS database organization type used for this database: HDAM, HIDAM, PHDAM, or PHIDAM

ACCESS METHOD
The access method used for this database: VSAM or OSAM

DDNAME OF DATA SET
The DD name of this database data set

DSNAME OF DATA SET
The name of the database data set. If the processed data set is an image copy, this field shows the name of the image copy data set.

BLOCK SIZE
The data set block size for OSAM or CI size for VSAM

RECORD SIZE
The data set record size

DATA SET CREATION DATE TIME
The date and time when this data set was created. If the data set is an image copy, it shows the date and time of the image copy data set. If the data set is a real database of VSAM KSDS or a Fast Recovery image copy, it shows "N/A".

Report field description: SPACE USE ANALYSIS

This part shows the status of space use for each data set.

TOTAL NUMBER OF LOGICAL RECORDS
The number of logical records read by the SCAN processor in this data set

NUMBER OF LOGICAL RECORDS WITH FREE SPACE
The number of logical records that has enough free space to store the smallest segment that is registered in the database. The smallest segment is a segment whose minimum length is what is specified in "SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD)".

SEGMENT SIZE RANGE FOR THIS DATA SET (FROM DBD)
The maximum and minimum segment lengths of the segments in this data set

The segment length is the prefix length plus the data length. The data length is a numeric value specified in the SEGM statement in the DBD. For a variable-length segment, the maximum segment size is taken as the data length. For a fixed-length segment that has been made longer than the segment size in the DBD by the segment edit/compress facility, the segment size in the DBD is taken as the segment data length. The increase in the maximum length of the fixed-segment which is edited by the segment edit/compression facility is ignored.

If a fixed-length segment is defined with a segment edit/compression exit, the minimum length of the segment is the prefix length plus the minimum value of BYTES= in DBD.

TOTAL BYTES OF SPACE
The following items are shown:

- The database data set size in bytes
- The percentage of the database data set size to the total size (always 100.0%)
- The database data set size in Gigabytes
- The percentage of database data set size to the maximum size
- The database data set size limit

SEGMENT PREFIX
The number of bytes in the prefix and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

SEGMENT DATA
The number of bytes of data and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

SEGMENT PAD
The number of bytes of segment pad and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). If the length of the variable segment is less than the MIN value in the DBD, the difference is counted as a segment pad.

Note: A deleted segment that is marked as deleted in a delete byte is reported in segment prefix, segment data, and segment pad, because the segment is not physically deleted.

FREE SPACE (USABLE)
The sum of the following values and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE):

- Unused area in a logical record that has enough length to store the minimum length dependent segment. The segment length is the prefix length plus the data length. The data length is a numeric value specified in the SEGM statement in the DBD.

  For a variable-length segment, the maximum segment size is taken as the data length.

  If a fixed-length segment is defined with a segment edit/compression exit, the minimum length of the segment is the prefix length plus the minimum value of BYTES= in DBD.

  For a fixed-length segment that has been made longer than the segment size in the DBD by the segment edit/compress facility, the segment size in the DBD is taken as the segment data

length. The increase in the maximum length of the fixed-segment, which is edited by a segment edit/compression facility is ignored.

- Unused area in the VSAM CI that has enough length to contain one or more logical records.

FREE SPACE (NOT USABLE)
The sum of the following values and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE):

- Unused area in a logical record that does not have enough length to contain the shortest dependent segment.
- Unused area in a VSAM CI that does not have enough length to contain a logical record.

UNKNOWN DATA
The number of bytes of unknown data, and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

The unknown data is contiguous bytes that cannot be classified as segment, free space, DL/I OVERHEAD, or VSAM CI OVERHEAD.

DL/I OVERHEAD
The sum of the following values and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE):

- The first 4 bytes in a logical record that are a direct-address pointer to the next logical record in the database record.
- A 1-byte segment code of 0, which shows the last segment in the logical record has been reached.
- The size of the first CI that is reserved for VSAM (only for VSAM)

VSAM CI OVERHEAD
The sum of RDFs and CIDFs in the VSAM CIs and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

NUMBER OF LOGICAL RECORDS ERROR DETECTED
The number of logical records in which some error has been detected by HD Pointer Checker

Report field description: Segment occurrences part

The third part of this report shows various totals for each segment type:

DBNAME DB# DSG# DSNAME
The name of the DBD, the database number (in hexadecimal), the data set group number (in hexadecimal), and the name of the primary data set

ROOT SEGMENT NAME
The value coded on the NAME keyword of the SEGM macro that defines the root segment

ROOT SEG KEY NAME
The value coded on the NAME keyword of the FIELD macro that defines the key field on the root segment

ROOT SEG KEY LENGTH-1
The value coded on the BYTES keyword (of the FIELD macro that defines the key field on the root segment) minus 1

START POSITION OF KEY-1
The value coded on the START keyword (of the FIELD macro that defines the key field on the root segment) minus 1

SC
The segment code (in hexadecimal) of this segment

SEGNAME
The segment name, as coded on the SEGM macro in the DBD, of this segment

OCCUR
The number of occurrences of this segment in the data set group

OVERFLW
The number of occurrences of this segment in the overflow (ESDS or OSAM) part of the data set group

PL-DLTS
The number of occurrences of this segment that is flagged as both physically and logically deleted (bits 5 and 6 of the delete byte are on)

P-DLETS
The number of occurrences of this segment that is flagged as physically and not logically deleted (bit 5 of the delete byte is on, and bit 6 is off)

L-DLETS
The number of occurrences of this segment that is flagged as logically and not physically deleted (bit 6 of the delete byte is on, and bit 5 is off)

PFX LNG
The number of bytes (in decimal) of the prefix part of this segment

DAT LNG
The number of bytes (in decimal) of the data part of this segment. If this number is followed by a V, then it indicates that this is a variable-length segment and that this is the average number of bytes in the data part of this segment. If DAT LNG is an average value, then so is SEG LEN.

SEG LNG
The total number of bytes (in decimal) of this segment. For a variable-length segment, this is the average segment length.

RULES
The rules used for insertion, deletion, and replacement of occurrences of this segment type:

I
The path type that must be used to insert occurrences of this type (for segments participating in a logical relationship)

D
The path type that must be used to delete occurrences of this type (for segments participating in a logical relationship)

R
The path type that must be used to replace occurrences of this type (for segments participating in a logical relationship)

N-SEQ INSRT
Where new occurrences of this segment type are inserted into their physical database (for segments with no sequence field or a non-unique sequence field)

HISAM Segment Level Statistics report

This report contains various totals for each segment type in the HISAM (including SHISAM) data set group. This report is produced for each data set specified on the DATABASE statement in the PROCCTL data set.

Subsections:

- "Report example" on page 182
- "Report field description" on page 183

Report example

The following figure shows an example of this report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "HISAM SEGMENT LEVEL STATISTICS REPORT"                    PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01  DSNAME:  TESTDS.PUBLIC.SAMPLE.HISAMDS1


<---- SOURCE ---->     <---- TARGET ---->
DB  DG SC SEGNAME  PTR DB  DG SC SEGNAME  EXTERNAL


002 01 01 ROOT
                   CTR                         9100
                   *LC 001 01 02 DEP1

002 01 02 DEP1
   (PHYS. PAIRED)   LP 001 01 01 ROOT         9100

002 01 03 DEP12        NO POINTERS

002 01 04 DEP121       NO POINTERS

002 01 05 DEP1211      NO POINTERS

002 01 06 DEP122       NO POINTERS

002 01 07 DEP1221      NO POINTERS

002 01 08 DEP123       NO POINTERS

002 01 09 DEP2         NO POINTERS

THE NUMBER OF DIRECT-ADDRESS POINTERS POINTING TO LOGICAL RECORDS IN THE OVERFLOW DATA SET
  IN PRIMARY DATA SET  =         130
  IN OVERFLOW DATA SET =      21,130



NOTE : THE *LP AND *LC ENTRIES (IF ANY) COMPLETE THE DISPLAY OF ALL LOGICAL RELATIONSHIPS
----
          *LP SHOWS THAT THE SOURCE (LCHILD) HAS A SYMB LP PTR TO ITS TARGET (LPARENT)
          *LC SHOWS THAT THE SOURCE (LPARENT) HAS A CTR FIELD (THE NUMBER OF LOGICAL CHILDREN)
```

Figure 56. STATIPRT: HISAM Segment Level Statistics report

Report field description

The report fields are as follows:

DBNAME DB# DSG# DSNAME
The name of the DBD, the database number (in hexadecimal), the data set group number (in hexadecimal), and the name of the data set

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

SEGNAME
The segment name, as coded in the SEGM macro in the DBD, of the segment that is the target of a pointer

PTR
The type of pointer such as LP, LTF, LTB, LCF, and LCL

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the target of a pointer

SC
The segment code (in hexadecimal) of the target of a pointer

SEGNAME
The segment name, as coded in the SEGM macro in the DBD, of the segment that is the target of a pointer

EXTERNAL
The number of pointers that point to another data set

Interval Statistics report

This report contains various totals for each segment type in the HIDAM or HDAM data set group.

The report is produced each time an interval (defined by the INTERVAL keyword on the OPTION statement) is processed. Each value in the report is the cumulative value of each interval that has been reported before, and will be accumulated to the next report.

It is produced unless INTST= NO is specified on the REPORT statement as input for the PROCCTL data set. This report is available only for HD databases.

Subsections:

- "Report example" on page 184
- "Report field description" on page 184

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "INTERVAL STATISTICS REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                        FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                 DBORG: HDAM

INTERVAL: START BLOCK          1
          END   BLOCK       2474


             -------------- BASE --------------  ------------ OVERFLOW ------------                                ---- RULES ----
SC SEGNAME   OCCURRENCES SPLIT-PRFX  SPLIT-DATA  OCCURRENCES SPLIT-PRFX  SPLIT-DATA  PL-DLETS   P-DLETS   L-DLETS   I  D  R  INSERT

01 ROOT              70           0           0           0           0           0         0         0         0   L  L  L   LAST
02 DEP1             120           0           0        8980           0           0         0         0         0   L  L  L   LAST
03 DEP2              90           0           0        8827           0           0         0         0         0   L  L  L   LAST
             ----------  ----------  ----------  ----------  ----------  ----------
TOTALS              280           0           0       17807           0           0


NOTE :  - VIRTUAL SEGMENTS ARE NOT SHOWN
----
        - 'OVERFLOW' COUNT IN HDAM/PHDAM IS COUNT OF SEGMENTS BEYOND ROOT ADDRESSABLE AREA

        - 'OVERFLOW' COUNT IN HIDAM/PHIDAM IS COUNT OF SEGMENTS BEYOND HIGH RBA AT LAST REORGANIZATION OR INITIAL LOAD
```

Figure 57. STATIPRT: Interval Statistics report

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

INTERVAL: START BLOCK, END BLOCK
The beginning number and the ending number of the interval block to be reported

SC
The segment code (in hexadecimal) of this segment

SEGNAME
The segment name, as coded on the SEGM macro in the DBD, of this segment

BASE
The information for the occurrences, the prefix, and the data part of this segment in the base part of the data set group

OVERFLOW
The information for the occurrences, the prefix, and the data part of this segment in the overflow (ESDS or OSAM) part of the data set group is described. For HDAM, overflow blocks are those whose addresses are larger than the maximum that the randomizing routine can return. For HIDAM, overflow blocks are those whose RBAs are greater than that of the block that contains the root segment whose sequence field is all high values.

The number of occurrences in OVERFLOW is applicable to a primary data set group only.

The following three fields pertain to each of BASE and OVERFLOW:

OCCURRENCES
The number of occurrences of this segment in the data set group

SPLIT-PRFX
The number of prefix parts of this segment whose prefix and data parts are separated

SPLIT-DATA
The number of data parts of this segment whose prefix and data parts are separated

PL-DLETS
The number of occurrences of this segment that are flagged as both physically and logically deleted (bits 5 and 6 of the delete byte are on)

P-DLETS
The number of occurrences of this segment that are flagged as physically and not logically deleted (bit 5 of the delete byte is on, and bit 6 is off)

L-DLETS
The number of occurrences of this segment that are flagged as logically and not physically deleted (bit 6 of the delete byte is on, and bit 5 is off)

RULES
The rules used for insertion, deletion, and replacement of occurrences of this segment type:

I
The path type that must be used to insert occurrences of this type (for segments participating in a logical relationship)

D
The path type that must be used to delete occurrences of this type (for segments participating in a logical relationship)

R
The path type that must be used to replace occurrences of this type (for segments participating in a logical relationship)

INSERT
Where new occurrences of this segment type are inserted into their physical database (for segments with no sequence field or a non-unique sequence field)

Bit Map Display report

This report contains the entire bitmap (printed in binary) of all bit-map blocks for the database data set group.

This report is produced unless BITMAP=NO is specified on the REPORT statement. This report is available only for HD databases.

Subsections:

- "Report example" on page 186
- "Report field description" on page 186

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "BIT MAP DISPLAY REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                    FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4

BIT MAP   BLOCK #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
BLOCK NO.          12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678

       1        0  01110011011111010001111111011101011111101111101101011111111011111111111111111111111111111110111110111
              100  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              200  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              300  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              400  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              500  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              600  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              700  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              800  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
              900  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1000  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1100  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1200  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1300  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1400  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1500  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1600  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1700  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1800  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             1900  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             2000  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             2100  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             2200  00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
             2300  00000000000000000000000011111111111111111111111111111111111111111111111111111111111111111111111111111
             2400  11111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111


BLOCKS W/O SPACE =       2243            BLOCKS WITH SPACE =        231                    NO OF BIT MAPS =          1


BEGINNING OF OVERFLOW =        101


NOTE : A '1' MEANS THE CI OR BLOCK HAS ENOUGH SPACE TO STORE THE    122 BYTES LONG SEGMENT
----
```

Figure 58. STATIPRT: Bit Map Display report

Report field description

The report fields are as follow:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
: The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

BIT MAP BLOCK NO.
: The block number which contains a bitmap

The rest of the report is self-explanatory. The following field might be of special interest:

BEGINNING OF OVERFLOW
: For a primary data set group, this field shows the block number where overflow blocks begin for HDAM databases. For secondary data set groups, this field shows the next block number of the current maximum block number.

Free Space Map report

This report contains information about the percentage of free space in each block or control interval (CI) in the database.

This report is produced once per each data set group that is processed, unless FSEMAP=NO is specified on the REPORT statement as input for the PROCCTL data set. This report is available only for HD databases.

Subsections:

- “Report example” on page 187
- “Report field description” on page 187

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "FREE SPACE MAP REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                    FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001           DBORG: PHDAM


THE PERCENT OF THE BLOCK THAT IS FREE SPACE IS REPRESENTED BY A SINGLE CHARACTER, AS FOLLOWS:


   SYMBOL:   -   0      1      2      3      4      5      6      7      8      9      *
      %  :   0  1-9   10-19  20-29  30-39  40-49  50-59  60-69  70-79  80-89  90-99   100

   END OF DATA BLOCKS = $


         EACH ENTRY IN THE TABLE BELOW IS THE PERCENT OF THE BLOCK THAT IS FREE SPACE

BIT MAP   BLOCK #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
BLOCK NO.          123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

       1        0  -11001-00-1110100100301-012000--010210-1-00000--0--1-110000-0010-011---130001-2002010-1000-11-110-00
              100  0-0000-11300-100-0-100-11110-1000000101000000012-1-010100--00001-00--1-00000-1-100--41-01--1001000-
              200  1100041000140l0-03001-1-11102020-1-00110102-000430-00201011002-0010-3-1-0-13-0-00433100-00001-210111
              300  -00003---0002-10400-000-00-0----0-00001--0101----031--010001-10-00000--02000-0300000--000--0---01010
              400  013-20120---0-0001000000-010100-001-10010-010100-40-0000-00-3-1-1100111003010-12100-1--100-00--00-0-
              500  400-00000011-0010-0-0000011201-101000-0-----010110-01-00-30-01000000100--0-1-0-12-011410-04-21100-11
              600  2100-00-1000040010000-110100-4001111-0-0-101--10102000000-010--110100010-10000000001030100010-0-0-
              700  00-00-0000010310110-1200--1-1-0120-000010-12-0-0020001011--20-0000030010-0000-110-0013---00--11-0000
              800  1013110-100401-10010110010-0210-00-00--000121400101201131-10-0-110-0000-00000-2-10--3011-10001102301
              900  1-000013000040-01041-0110000--01000010-000--0010000-100-10110--0100-001001110-3-1-0-1-1-1100-01--30-

------ For formatting purposes, several lines have been deleted.------

             2600  00-00010-10-0--00--1-000-001000-00-0100-00-000-010101012-00--4000001001--011-100-01-0011310020000100
             2700  --00-0-100001100000--100-0101001--010001001-0------000001000-0-0-010000000--010-0-100-0--000001--02-
             2800  100-1--000000-10010001---0-0001000-032110--00000-200410-1-1-101-1000-1031010000000310-000-00-0-00-10
             2900  1-1-110-0100100--1010----0000--01100-00--0--1101000030-0-0-000-010-00-000-1-0000010210-00011-01-0002
             3000  1000-011010-1023-114001-0--1010011010-0--010-010011001--000-1001---100-10100-0-00021000011010-20-000
             3100  10111101010000l300110-00021-0101100001100-0--13-0010200-0010-10002020-0100-000-02101031000-02001-000
             3200  00000100101-0000000000-0000011111103032-1-1010-10--000-011001-0001000-00301-0010020-10011-0010000-10
             3300  200000000010121-10-0002--100001000110100000--010000010000-001001200-10000001-0--01---100-121100201001
             3400  0000013210--110000001000-10011-1---200100000100--2-0000-010000000-10001010100030--0100-0000-1010001-
             3500  0--00-2-0000-0-1--00010100000-02201401-0--101-002--10--00010010-01001000--000---00-1000-000-0020-011

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "FREE SPACE MAP REPORT"                          PAGE:     5
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                    FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

BIT MAP   BLOCK #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
BLOCK NO.          123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

           18000  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18100  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18200  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18300  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18400  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18500  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18600  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18700  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18800  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           18900  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           19000  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           19100  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           19200  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           19300  000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
           19400  000000000000000000000011111111111111111111111111111111111111111111111111111111111111111111111111111111
           19500  11111111111111111111111111111111111111111111111115**********************************************************
           19600  **************************************************************************************************************
           19700  **************************************************************************************************************
           19800  ******************************************$
```

Figure 59. STATIPRT: Free Space Map report

Report field description

The report fields are as follow:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
: The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

BIT MAP BLOCK NO.
: The block number which contains a bitmap

The rest of the report is self-explanatory.

Maximum Free Space Distribution report

This report contains information about the free space elements for each block or CI in the database.

The following information is reported:

- The length of the longest free space element in the block or CI
- The number of free space elements in the block or CI

This report is produced unless MAXFSD= NO is specified on the REPORT statement as input for the PROCCTL data set. This report is available only for HD databases.

Subsections:

- "Report example" on page 188
- "Report field description" on page 189

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "MAXIMUM FREE SPACE DISTRIBUTION REPORT"                  PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4

THE NUMBER OF FREE SPACE ELEMENTS (FSE'S) IN THE BLOCK IS REPRESENTED BY A SINGLE CHARACTER, AS FOLLOWS:


   SYMBOL:  BLANK  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z  *
   COUNT :   0/1   2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28+


           EACH ENTRY IN THE TABLE BELOW IS THE LENGTH OF THE LONGEST FSE & THE NUMBER OF FSE'S IN THE BLOCK

 BLOCK #     1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20

       0     0  1008  1008  1008    44    80  1008  1008    68  1008   532  1008   544  1008    56  1008    68    68    56  1008
      20   544  1008  1008   532   532  1008    56   544   544   532    68  1008    56  1008   532   520   544  1008  1008    56
      40  1008   544   532   544   544    68   532  1008    44  1008    56   544  1008   532  1008  1008  1008  1008  1008    68
      60   544   532   544   532  1008   532  1008   532  1008   520  1008  1008   544   520  1008  1008  1008   544  1008   544
      80  1008  1008  1008  1008   544   544   532   532  1008  1008    56   544  1008   520  1008  1008    56   544  1008  1008
     100    84    84    84    72    84    84    84    96    84   108    84    96    84    84    72    84    96    84    84    96
     120    96    84    72    84    96    72    96    84    84    72    84    96    96    72    84    84    72    60    60    96
     140    72    60    84    84    84   108    72    84    96    72    84    84    72    84    60    96    96    72    96    84
     160    96    84    84    84    96    96    84    96    72    84    84    72   108    96    84    96    84    96    96    84
     180    84    72    72    60    96    96    84    84    60    96    96    84    72    96    84    96    72    96    84    96

------ For formatting purposes, several lines have been deleted.------

     600    72   108    84    84    60    84    72    96    72    72    84    84    96    96    60    72    72    96    84    84
     620    72    84    60   108    84    84    96    72    96    72    84    72    96    72    84    84    72    84    84    84
     640    84    72    84    72    84    96    72    96    96    96    84    84    96    72    72    96    96    60    84    84
     660    72    84    96    96    96    84    84    72    84    84    96    84    96    84    96    72    96    96    72    72
     680    96    72    84    84    84    72    84    48    96    84    96    84    96    96    96    84   108    84    84    72
     700    84    96    72    84    84    96    72    96    96    60    96    72    84    72    72    96    84    96    72    84
     720    60    84    60    72    84    84    84    96    72    84    96    84    84    84    84    84    96    96    60    84
     740    96    84    84    84    72    84    72    96    96    60    96    72    96    96    72    96    84    84    84    84
     760    84    84    72    60    96    72    96    84    96    84    96    96    60    84    84    84   108    72    72    84
     780    84    84    72    84    84    96    84    96    84    72    72    84    84    96    72    72    96    72    84    84
     800    84    72    84    72    84    96    96    96    84    96    96    60    96    72    84    96    84    84    96    96

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "MAXIMUM FREE SPACE DISTRIBUTION REPORT"                  PAGE:     3
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4

 BLOCK #     1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20

    1820    60    84    84    60    84    96    60    96    96    72    96    72    96    72    96    72    84    72    84    72
    1840    72    60    84    36    84    96    84    72    72    84    84    72    84    84    72    96    72    84    72    84
    1860    84    96    84    96    84    84    84    84    84    84    72    72    84    84    96    72    96    84    84    96
    1880    84    84    84    72    84    84    96    96    96    84    84    84   108    84    96    84    84    84    84   108
    1900    72    84    96    84    96    96    84    84    84    96    84    72    84    84    72    96    84    96    84    60
    1920    96    96    84    96    72    96    84    72    84    84    96    72    96    84    72    84    96    84    96    84
    1940    96    72    96    72    84    84    96    96    96    72    96    72    96    72    84    84    96    72    84    84
    1960    60    96    96    96    72    96    72    84    96    96    84    60    84    96    72    84    84    96    96    72
    1980    96    96    72    84    72    84    84    84    96    84    84    72    84    72    72    96    84    84    84    84
    2000    96    84    84    72    84    84    84    84    72    84    72    72    96    84    84    84    84    84    96    84

------ For formatting purposes, several lines have been deleted.------

    2280    72    84    96    84    72    96    84    72    84    72    96    84    84    72    72    84    96    84    96    84
    2300    84    60    84    84    84    84    84    84    72    84    84    60    96    72    96    84    84    72    84    96
    2320    84    84    60    84    96   206  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2340  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2360  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2380  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2400  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2420  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2440  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
    2460  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012  1012
```

Figure 60. STATIPRT: Maximum Free Space Distribution report

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

Each entry in the map is six digits: a 5-digit FSE length followed by a 1-digit FSE count symbol

Interval Free Space Summary report

This report contains a summary of the free space for each processing interval defined by INTERVAL keyword on the OPTION statement in histogram format.

The report is produced each time an interval (defined by INTERVAL keyword on the OPTION statement) is processed. Each value in the report is the cumulative value of each interval that has been reported before, and will be accumulated to the next report.

This report is produced unless INTFS= NO is specified on the REPORT statement as input for the PROCCTL data set. This report is separated into two pages. This report is available only for HD databases.

Subsections:

- "Report example" on page 189
- "Report field description" on page 190

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "INTERVAL FREE SPACE SUMMARY REPORT"                    PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                DBORG: HDAM


INTERVAL: START BLOCK           1
          END   BLOCK        2474


  FREE SPACE (BYTES)       # OF FSE     # OF BLOCKS     TOTAL BYTES    AVG FSE LEN   CUMUL # OF FSE


     NO FREE SPACE                              1

       1 TO   20                0               0               0           0            2473
      21 TO   40                1               1              36          36            2473
      41 TO   60              130             130            7628          58            2472
      61 TO   80              510             510           36704          71            2342
      81 TO  100             1563            1563          138528          88            1832
     101 TO  120               38              38            4104         108             269
     121 TO  140                0               0               0           0             231
     141 TO  160                0               0               0           0             231
     161 TO  180                0               0               0           0             231
     181 TO  200                0               0               0           0             231

------ For formatting purposes, several lines have been deleted.------

     501 TO  550               36              36           19320         536             230
     551 TO  600                0               0               0           0             194
     601 TO  650                0               0               0           0             194
     651 TO  700                0               0               0           0             194
     701 TO  750                0               0               0           0             194
     751 TO  800                0               0               0           0             194
     801 TO  850                0               0               0           0             194
     851 TO  900                0               0               0           0             194
     901 TO  950                0               0               0           0             194
     951 TO 1000                0               0               0           0             194

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "INTERVAL FREE SPACE SUMMARY REPORT"                    PAGE:     2
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4   DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                DBORG: HDAM

  FREE SPACE (BYTES)       # OF FSE     # OF BLOCKS     TOTAL BYTES    AVG FSE LEN   CUMUL # OF FSE

    1001 TO 1100              194             194          196144         1011             194
    1101 TO 1200                0               0               0           0               0
    1201 TO 1300                0               0               0           0               0
    1301 TO 1400                0               0               0           0               0
    1401 TO 1500                0               0               0           0               0
    1501 TO 1600                0               0               0           0               0
    1601 TO 1700                0               0               0           0               0
    1701 TO 1800                0               0               0           0               0
    1801 TO 1900                0               0               0           0               0
    1901 TO 2000                0               0               0           0               0
    2001 TO 2200                0               0               0           0               0
    2201 TO 2400                0               0               0           0               0
    2401 TO 2600                0               0               0           0               0
    2601 TO 2800                0               0               0           0               0
    2801 TO 3000                0               0               0           0               0
    3001 TO 3200                0               0               0           0               0
    3201 TO 3400                0               0               0           0               0
    3401 TO 3600                0               0               0           0               0
    3601 TO 3800                0               0               0           0               0
    3801 TO 4000                0               0               0           0               0
    4001 TO                     0               0               0           0               0

     TOTALS                  2473           N / A          402670       N / A           N / A


                                                                      % OF TOTAL BLOCKS

    TOTAL FREE SPACE IN BYTES                      =           402670             15

    COUNT OF BLOCKS WITHOUT FREE SPACE             =                1              0

    COUNT OF BLOCKS CONTAINING REUSABLE FREE SPACE =              231              9

    COUNT OF EMPTY BLOCKS                          =              194              7

    REUSABLE FREE SPACE BYTES (BITMAP)             =           215670              8

NOTE :  THESE STATISTICS REPORT ALL FREE SPACE RANGES.
----    THE BIT MAP STATISTICS REPORT ONLY SPACE FOR THE LONGEST SEGMENT IN THE DATA SET GROUP
```

Figure 61. STATIPRT: Interval Free Space Summary report

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

INTERVAL: START BLOCK, END BLOCK
The beginning number and the ending number of the interval block to be reported

The following six fields are the column headings of the histograms:

FREE SPACE (BYTES)
This column defines the histogram classes. Each class is 20 bytes wide.

 # OF FSE
The number of free space elements (whose lengths are in the current histogram class) that were found up to the end of this processing interval

Note: The sum of the entries in this column is the total number of free space elements detected by the SCAN processor.

 # OF BLOCKS
The number of database blocks or CIs that contain free space elements (whose lengths are in the current histogram class) that were found up to the end of this processing interval

Note: Some blocks might contain more than one free space element. Because this can cause some blocks to be counted in more than one "# OF BLOCKS" entry, the sum of all the entries in this column might be greater than the total number of blocks processed.

TOTAL BYTES
The total number of bytes of free space from all free space elements (whose lengths are in the current histogram class) that were found up to the end of this processing interval

Note: The sum of the entries in this column is the total number of bytes of free space detected by the SCAN processor.

AVG FSE LEN
The average length of all free space elements (whose lengths are in the current histogram class) that were found up to the end of this processing interval

CUMUL # OF FSE
The number of free space elements (whose lengths are in the current histogram class or in a larger histogram class) that were found up to the end of this processing interval

The remaining fields in this report are self-explanatory.

HD Data Set Statistics report

This report provides information about the data set. If the database is a HALDB, this report provides information about each partition.

The report consists of the following parts:

- The Data Set Group Summary part shows information about the database data set and the root segments. If the data set is an image copy, DSNAME OF DATA SET and DATA SET CREATION DATE TIME show the information about the image copy data set.
- The Block/CI Summary part shows the status of the use of a block or CI.
- The Space Use Analysis part shows the status of the use of the data set.
- The Segment Occurrences/Split part shows various totals for each segment type.

This report is available only for HD databases.

Subsections:

- “Report example” on page 192
- “Report field description: Common header part” on page 193
- “Report field description: DATA SET GROUP SUMMARY” on page 193
- “Report field description: BLOCK/CI SUMMARY” on page 195
- “Report field description: SPACE USE ANALYSIS” on page 195
- “Report field description: SEGMENT OCCURRENCES/SPLIT” on page 197

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                  "HD DATA SET STATISTICS REPORT"                        PAGE:     1
5655-U09                                                    DATE: 07/28/2020  TIME: 09.56.33                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

DATA SET GROUP SUMMARY
----------------------
  DBD NAME                        = TPFOH1
  DB NUMBER                       = 003
  DATABASE ORGANIZATION           = PHDAM
  ACCESS METHOD                   = VSAM ESDS
  PARTITION NAME                  = TPFOH1A
  PARTITION ID                    = 00001
  NUMBER OF PARTITIONS IN DATABASE = 00001
  PARTITION HIGH KEY              = X'FFFFFFFFFFFFFFFF'
  DDNAME OF DATA SET              = TPFOH1AA
  DATA SET GROUP ID               = A
  NUMBER OF DATA SET GROUPS       = 02
  DSNAME OF DATA SET              = TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001
  BLOCK SIZE                      =    512
  RECORD SIZE                     =    505
  DATA SET CREATION DATE          = 07/06/2020
                    TIME          = 17:36:50

  ROOT SEGMENT NAME               = AROOTLV1
  ROOT SEGMENT KEY NAME           = AROOTNO
  ROOT SEGMENT KEY LENGTH-1       =      7
  ROOT SEGMENT KEY OFFSET         =      2
  DIRECT ALGORITHM NAME           = DFSHDC40
  HIGH BLOCK NUMBER               =       4,500
  RAPS PER BLOCK                  =           1
  TOTAL RAPS                      =       4,500
  BYTE LIMIT COUNT                = NO LIMIT
  NUMBER OF KEY RECORDS WRITTEN   =           0
  COUNT OF RAPS NOT USED
   IN ALLOCATED BLOCKS            =         410

BLOCK/CI SUMMARY
----------------
  TOTAL NUMBER OF BLOCKS             =      19,845  100.0 %
  COMPLETELY FULL (NO FSE)           =       3,209   16.2 %
  PARTIALLY FULL (1 OR MORE SEGMENTS) =      16,341   82.3 %
  EMPTY (FORMATTED BUT NO SEGMENTS)  =           0    0.0 %
  UNUSED (NOT FORMATTED)             =         294    1.5 %
  VSAM BLOCK 0                       =           1    0.0 %
  BLOCKS POINTER OR T2 ERROR DETECTED =          0
  BLOCKS WITH SLACK BYTES            =       2,810
  NUMBER OF SLACK BYTES              =      32,271

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                  "HD DATA SET STATISTICS REPORT"                        PAGE:     2
5655-U09                                                    DATE: 07/28/2020  TIME: 09.56.33                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

SPACE USE ANALYSIS
------------------
  TOTAL NUMBER OF BLOCKS                          =      19,845
  NUMBER OF BLOCKS WITH FREE SPACE                =      16,635
  NUMBER OF FREE SPACE ELEMENTS                   =      16,763
  NUMBER OF FSE THAT WILL HOLD LARGEST SEGMENT    =         295
  NUMBER OF FSE TOO SMALL FOR SMALLEST SEGMENT    =      15,018
  SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD)      =         130 TO    246
  FREE SPACE BLOCK EVERY N BLOCKS (FROM DBD)      =           0
  % FSPC WITHIN EACH BLOCK (FROM DBD)             =           0
  FREE SPACE SCAN CYLINDERS (FROM DBD)            = NO SCAN
  TOTAL BYTES OF SPACE                            =     10,160,640  100.0 %  0.009 GB (   0.2 % OF 4 GB LIMIT )
  SEGMENT PREFIX                                  =      2,279,194   22.4 %
  SEGMENT DATA                                    =      6,442,650   63.4 %
  SEGMENT PAD                                     =        257,778    2.5 %
  FREE SPACE (USABLE)                             =        418,212    4.1 %
  FREE SPACE (NOT USABLE)                         =        489,678    4.8 %
  SLACK                                           =         32,271    0.3 %
  UNKNOWN DATA                                    =              0    0.0 %
  DL/I OVERHEAD                                   =        101,949    1.0 %
  VSAM CI OVERHEAD                                =        138,908    1.4 %
```

Figure 62. STATIPRT: HD Data Set Statistics report (Part 1 of 2)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HD DATA SET STATISTICS REPORT"                      PAGE:     3
5655-U09                                                 DATE: 07/28/2020  TIME: 09.56.33                      FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001


             -------------- BASE --------------  ------------ OVERFLOW ------------                              ---- RULES ----
SC SEGNAME   OCCURRENCES SPLIT-PRFX  SPLIT-DATA  OCCURRENCES SPLIT-PRFX  SPLIT-DATA  PL-DLETS   P-DLETS   L-DLETS   I  D  R  INSERT

01 AROOTLV1        4270           0           0        6730           0           0         0         0         0   L  L  L   LAST
02 ADEP1LV2           5           0           0         215           0           0         0         0         0   L  L  L   LAST
04 ADEP3LV2        4485           0           0       12055           0           0         0         0         0   L  L  L   LAST
05 ADEP4LV3        4418           0           0       12099           0           0         0         0         0   L  L  L   LAST
06 ADEP5LV3        2250           0           0        6045           0           0         0         0         0   L  L  L   LAST
07 ADEP6LV4        5492         161           2       15081          99         258         0         0         0   L  L  L   LAST
08 ADEP7LV5           0           0           0        6892           0           0         0         0         0   L  L  L   LAST
             ----------  ----------  ----------  ----------  ----------  ----------
TOTALS            20920         161           2       59117          99         258


NOTE : - VIRTUAL SEGMENTS ARE NOT SHOWN
----
       - 'OVERFLOW' COUNT IN HDAM/PHDAM IS COUNT OF SEGMENTS BEYOND ROOT ADDRESSABLE AREA

       - 'OVERFLOW' COUNT IN HIDAM/PHIDAM IS COUNT OF SEGMENTS BEYOND HIGH RBA AT LAST REORGANIZATION OR INITIAL LOAD
```

Figure 63. STATIPRT: HD Data Set Statistics report (Part 2 of 2)

Report field description: Common header part

The following fields are shown in each page of the report:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

Report field description: DATA SET GROUP SUMMARY

This part shows information about the database data set. If the data set is an image copy, DSAME and DATA SET CREATION DATE TIME show the information about the image copy data set. Figure 62 on page 192 shows an example of the Data Set Group Summary part in the HD Data Set Statistics report.

The report fields of the Data Set Group Summary part are as follows:

DBD NAME
The name of the DBD as coded on the NAME keyword of the DBD macro

DB NUMBER
The database number (in hexadecimal) used to identify the database throughout the HD Pointer Checker run

DATABASE ORGANIZATION
The IMS database organization type used for this database (HDAM, HIDAM, PHDAM, or PHIDAM)

ACCESS METHOD
The access method used for this database: VSAM, OSAM, or OSAM LDS

PARTITION NAME
The name of this partition. It is printed for HALDB.

PARTITION ID
The ID of partition (in decimal) assigned by IMS. It is printed for HALDB

NUMBER OF PARTITIONS IN DATABASE
The number of partitions (in decimal) defined in this HALDB

PARTITION SELECTION EXIT NAME
The name of the user-supplied partition selection module, as coded on the PSNAME keyword of the DBD macro, of this HALDB

PARTITION SELECTION STRING
The partition selection string of this partition in this HALDB

PARTITION HIGH KEY
The partition high key of this partition in the HALDB

DDNAME OF DATA SET
The DD name of this database data set

DATA SET GROUP NUMBER
The data set group number (in hexadecimal). It is only for non-HALDB.

DATA SET GROUP ID
The data set group ID (in an alphabetic character). It is only for HALDB.

NUMBER OF DATA SET GROUPS
Total number of data set groups

DSNAME OF DATA SET
The name of database data set, or if the processed data set is an image copy, the name of the image copy data set

BLOCK SIZE
The block size for OSAM or CI size for VSAM

RECORD SIZE
The data set record size

DATA SET CREATION DATE TIME
The date and time when this data set was created. If the data set is an image copy, the date and time the image copy data set was made are given. If the data set is a real database of OSAM or a Fast Recovery image copy, the time shows "N/A".

The following fields are printed only for the data set that contains root segments:

ROOT SEGMENT NAME
The value coded on the NAME keyword of the SEGM macro that defines the root segment

ROOT SEGMENT KEY NAME
The key name of the root segment

ROOT SEGMENT KEY LENGTH-1
The value coded on the BYTES keyword (of the FIELD macro that defines the key field on the root segment) minus 1

ROOT SEGMENT KEY OFFSET
The offset from the segment start position to the key start position. The value coded on the START keyword (of the FIELD macro that defines the key field on the root segment) minus 1.

DIRECT ALGORITHM NAME
The name of the user-supplied randomizing module, as coded on the RMNAME keyword of the DBD macro. It is only for HDAM or PHDAM database.

HIGH BLOCK NUMBER
The maximum relative block number that the randomizing module is permitted to produce, as coded on the RMNAME keyword of the DBD macro. It is only for HDAM or PHDAM database.

RAPS PER BLOCK
The number of root anchor points in each CI or each block in the root addressable area, as coded on the RMNAME keyword of the DBD macro. It is only for HDAM or PHDAM database.

TOTAL RAPS
The number of RAPS in this database data set or partition. It is only for HDAM or PHDAM database.

BYTE LIMIT COUNT
The maximum number of bytes of database record that can be stored into the root addressable area in a series of inserts unbroken by a call to another database record, as coded on the RMNAME keyword of the DBD macro. It is only for HDAM or PHDAM database.

The following two fields reflect the results of the SCAN process:

NUMBER OF KEY RECORDS WRITTEN
The number of records written by the SCAN processor to the KEYSIN data set (for use by the HD Tuning Aid utility)

COUNT OF RAPS NOT USED IN ALLOCATED RAA
The number of root anchor points in this data set group or partition that do not point to any root segment. It is only for HDAM or PHDAM database.

Report field description: BLOCK/CI SUMMARY

This part shows the status of the use of a block or CI for each data set. Figure 62 on page 192 shows an example of the Block/CI Summary part in the HD Data Set Statistics report.

The report fields of the Block/CI Summary part are as follows:

TOTAL NUMBER OF BLOCKS
The number of blocks or CIs read in this data set group or partition by the SCAN processor

COMPLETELY FULL (NO FSE)
The number of blocks or CIs that contain no free space element, and what percentage it makes of the total

PARTIALLY FULL (1 OR MORE SEGMENTS)
The number of blocks or CIs that contain both segment data and free space elements, and what percentage it makes of the total

EMPTY (FORMATTED BUT NO SEGMENTS)
The number of blocks or CIs that are formatted and contain no segment data, and what percentage it makes of the total

UNUSED (NOT FORMATTED)
The number of blocks or CIs that are not used by DL/I, and what percentage it makes of the total

VSAM BLOCK 0
The first block of a VSAM data set. It is only for VSAM.

BLOCKS POINTER OR T2 ERROR DETECTED
The number of blocks or CIs that contain pointer errors or T2 errors that were detected by the SCAN processor

BLOCKS WITH SLACK BYTES
The number of blocks or CIs containing slack bytes that were detected by the SCAN processor. Slack bytes represent an area in the data part of a segment that could not be classified as either segments or free space. The length of slack bytes is equal to or less than the T2len specification of the OPTION T2CHK keyword.

NUMBER OF SLACK BYTES
The number of blocks with slack bytes whose length is less than that specified by the OPTION T2CHK keyword

BLOCKS ADDED SINCE LAST LOAD/RELOAD
The number of blocks or CIs added after the initial load or the last reorganization. They are in a block or a CI higher than the high key root segment. It is only for HIDAM or PHIDAM.

Report field description: SPACE USE ANALYSIS

This part shows the status of the space use for each data set. Figure 62 on page 192 contains a sample of the Space Use Analysis part in the HD Data Set Statistics report.

The report fields of the Space Use Analysis part are as follows:

TOTAL NUMBER OF BLOCKS
The number of blocks or CIs scanned by the SCAN processor in this data set group or partition

NUMBER OF BLOCKS WITH FREE SPACE
The number of blocks in this data set group or partition that contain at least one free space element each

NUMBER OF FREE SPACE ELEMENTS
The number of free space elements in this data set group or partition

NUMBER OF FSE THAT WILL HOLD LARGEST SEGMENT
The number of free space elements (FSEs) that can hold the largest segment in this data set group or partition. The largest segment indicates the segment that has the longest value in SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD).

NUMBER OF FSE TOO SMALL FOR SMALLEST SEGMENT
The number of FSEs whose lengths are less than the smallest segment in this data set group or partition. These spaces will not be used by DL/I until they are reclaimed. See "How IMS reclaims space" on page 307. The smallest segment is the segment that has the shortest value in SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD).

SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD)
The maximum and minimum segment lengths of the segments in this data set group

The segment length is the prefix length plus the data length. The data length is a numeric value specified in the BYTES keyword in the SEGM statement in the DBD. For a variable-length segment, the maximum segment size that is specified in the BYTES keyword in the SEGM statement is taken as the data length.

If a segment edit/compression exit is defined, by the COMPRTN keyword, to a segment, the actual segment length can be longer or shorter than the length in the BYTES keyword. However, HD Pointer Checker uses the length in the BYTES keyword, as previously described, to calculate the maximum and minimum segment lengths in this report. For example, even if the segment edit/compression routine is defined to a fixed-length segment, and it makes segments with segment length that is longer than the segment length in the BYTES keyword, HD Pointer Checker uses the length in the BYTES keyword.

FREE SPACE BLOCK EVERY N BLOCKS (FROM DBD)
The "free block frequency factor", as coded on the FRSPC keyword of the DATASET macro in the DBD. It specifies that every N-th CI or block in this data set group is left as free space during the load or reorganization of a database.

% FREE SPACE WITHIN EACH BLOCK (FROM DBD)
The free space percentage factor. It is specified by FRSPC in the DBD DATASET statement. It shows the percentage of free space size in each block or CI.

FREE SPACE SCAN CYLINDERS (FROM DBD)
The number of direct-access device cylinders to be scanned when searching for available storage space during segment insertions, as coded in the SCAN keyword of the DATASET macro in the DBD.

TOTAL BYTES OF SPACE
The following items are shown:

- The database data set size in bytes
- The percentage of the database data set size to the total size (always 100.0%)
- The database data set size in Gigabytes
- The percentage of database data set size to the maximum size
- The database data set size limit

SEGMENT PREFIX
The number of bytes of segment prefix and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

SEGMENT DATA
The number of bytes of segment data and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE)

SEGMENT PAD
The number of bytes of segment pad and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). Within a block or a CI, the starting point of a segment or a free space element is always at an even boundary. Therefore, if a segment length is odd, one byte is added

before the next segment or free space element. This one byte is called the *segment pad*. If the variable segment length is less than the MIN value in the DBD, the difference is also counted as a segment pad.

FREE SPACE (USABLE)
The number of bytes of usable free space and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). The free space usable indicates that the length of the free space is sufficient to store the minimum length segment in this data set group or partition. The minimum segment length is the shortest value in "SEGMENT SIZE RANGE FOR THIS DSG (FROM DBD)".

FREE SPACE (NOT USABLE)
The number of bytes of free space not usable and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). Free space is not usable if its length is less than the minimum length segment in this data set group or partition.

SLACK
The number of bytes of slack and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). The slack bytes make up an area in the data part of a segment that can be classified as neither segments nor free space. The length of the slack bytes is equal to or less than the T2len specification of the OPTION T2CHK keyword.

UNKNOWN DATA
The number of bytes of unknown data, and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE). The unknown data are contiguous bytes that cannot be classified as either segments or free space and that are longer than the T2len specification of the OPTION T2CHK keyword.

DL/I OVERHEAD
Total sum of the following bytes and what percentage it makes of the database data set size (TOTAL BYTES OF SPACE):

- Bitmap block
- FSEAP: Four bytes for each block or CI
- RAP: Four bytes for each RAP
- Pointer from the prefix of the split segment to the data: four bytes for each split segment
- Segment code and delete byte in the data of a split segment: two bytes for each split segment
- The size of the first CI that is reserved for VSAM (only for VSAM)

VSAM CI OVERHEAD (Only for VSAM)
The sum of the bytes in the RDF and CIDF fields, which are the last seven length fields in each CI. In addition to these seven bytes, the last byte of each CI, which precedes each RDF or CIDF field, is also counted in the CI overhead.

Report field description: SEGMENT OCCURRENCES/SPLIT

This part shows various totals for each segment type. Figure 63 on page 193 is an example of the Segment Occurrences/Split part in the HD Data Set Statistics report.

The report fields of the Segment Occurrences/Split part are same as the fields of the Interval Statistics report. For a description of the fields of the Segment Occurrences/Split part, see “Interval Statistics report” on page 184.

DB Record Distribution Statistics report

This report contains statistics about database record distribution.

The following information is included in the report:

- Statistics about the locations of HDAM or PHDAM root segment
- How long and how the HDAM or PHDAM RAP chains are distributed
- The number of dependents stored in the same block or CI as their root segment

- The number of dependents stored in the same block or CI as their segment code, and the percentage of each that is included in the root block.

This report is produced unless you specify DBDIST=NO on the REPORT statement, or INCORE=NO on the OPTION statement. This report is available only for HD databases. This report provides information about the data set. If the database is HALDB, this report provides information about each partition.

For report examples, see “Report example” on page 198.

For report field descriptions, see the following subsections:

- “First portion of the report” on page 200
- “DISTRIBUTION OF ROOT SEGMENTS (HDAM/PHDAM ONLY)” on page 200
- “DISTRIBUTION OF RAP CHAIN LENGTHS (HDAM/PHDAM ONLY)” on page 201
- “SUMMARY OF DEPENDENT SEGMENTS DISTRIBUTION” on page 201

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS             "DB RECORD DISTRIBUTION STATISTICS REPORT"                  PAGE:     1
5655-U09                                                 DATE: 05/09/2020  TIME: 01.10.41                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 001 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00002  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

TOTAL NUMBER OF SEGMENTS (ROOTS + DEPENDENTS) IN THE DATA SET =       66976
MAXIMUM ROOTS PER BLOCK                                       =           7
BLOCKS WITHOUT ROOT SEGMENTS IN RAA                           =        1766

DISTRIBUTION OF ROOT SEGMENTS (HDAM/PHDAM ONLY)
-----------------------------------------------
                          NUMBER OF
  LOCATION                ROOTS        PERCENTAGE
  ----------------------  ----------   ----------
  HOME BLOCK - ( 11-   )           0      0.0 %
  HOME BLOCK -   10                0      0.0 %
  HOME BLOCK -    9                0      0.0 %
  HOME BLOCK -    8                0      0.0 %
  HOME BLOCK -    7                0      0.0 %
  HOME BLOCK -    6                0      0.0 %
  HOME BLOCK -    5                0      0.0 %
  HOME BLOCK -    4                0      0.0 %
  HOME BLOCK -    3                3      0.0 %
  HOME BLOCK -    2                7      0.1 %
  HOME BLOCK -    1              118      1.1 %
  HOME BLOCK                   2,500     22.7 %
  HOME BLOCK +    1                0      0.0 %
  HOME BLOCK +    2                1      0.0 %
  HOME BLOCK +    3                2      0.0 %
  HOME BLOCK +    4                1      0.0 %
  HOME BLOCK +    5                0      0.0 %
  HOME BLOCK +    6                0      0.0 %
  HOME BLOCK +    7                0      0.0 %
  HOME BLOCK +    8                0      0.0 %
  HOME BLOCK +    9                0      0.0 %
  HOME BLOCK +   10                1      0.0 %
  HOME BLOCK + ( 11-   )       1,768     16.1 %
  OVERFLOW                     6,599     60.0 %
  ----------------------  ----------   ----------
  TOTAL                       11,000    100.0 %

TOTAL NUMBER OF ROOT SEGMENTS                                 =       11000  100.0 %
NUMBER OF ROOT SEGMENTS IN HOME BLOCKS                        =        2500   22.7 %
NUMBER OF ROOT SEGMENTS NOT IN HOME BLOCKS                    =        8500   77.3 %

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS             "DB RECORD DISTRIBUTION STATISTICS REPORT"                  PAGE:     2
5655-U09                                                 DATE: 05/09/2020  TIME: 01.10.41                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 001 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00002  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

DISTRIBUTION OF RAP CHAIN LENGTHS (HDAM/PHDAM ONLY)
---------------------------------------------------
  CHAIN    NUMBER      NUMBER      PERCENTAGE   CUMULATIVE
  LENGTH   OF RAPS     OF ROOTS    OF ROOTS     PERCENTAGE
  ------   ---------   ---------   ----------   ----------
     1           978         978      8.9 %        8.9 %
     2         1,148       2,296     20.9 %       29.8 %
     3           899       2,697     24.5 %       54.3 %
     4           575       2,300     20.9 %       75.2 %
     5           298       1,490     13.5 %       88.7 %
     6           134         804      7.3 %       96.0 %
     7            36         252      2.3 %       98.3 %
     8            15         120      1.1 %       99.4 %
     9             7          63      0.6 %      100.0 %
    10             0           0      0.0 %      100.0 %
    11             0           0      0.0 %      100.0 %
    12             0           0      0.0 %      100.0 %
    13             0           0      0.0 %      100.0 %
    14             0           0      0.0 %      100.0 %
    15+            0           0      0.0 %      100.0 %
  ------   ---------   ---------   ----------   ----------
  TOTAL        4,090      11,000    100.0 %

  RAPS USED (ACTIVE)              =       4,090   90.9 %
  RAPS NOT USED                   =         410    9.1 %
  TOTAL RAPS                      =       4,500  100.0 %

  MAXIMUM ROOTS PER RAP           =           9
  AVERAGE ROOTS PER ACTIVE RAP    =         2.7
  AVERAGE ROOTS PER TOTAL RAP     =         2.4

  NUMBER OF SYNONYM CHAINS        =       3,112
  AVERAGE ROOTS PER SYNONYM CHAIN =         3.2
```

Figure 64. STATIPRT: DB Record Distribution Statistics report (Part 1 of 2)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS             "DB RECORD DISTRIBUTION STATISTICS REPORT"                  PAGE:     3
5655-U09                                                  DATE: 05/09/2020  TIME: 01.10.41                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 001 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00002  DSG#:  A  DDNAME: TPFOH1AA
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001

SUMMARY OF DEPENDENT SEGMENTS DISTRIBUTION
------------------------------------------

 NUMBER OF DEPENDENTS IN AS SAME BLOCK AS ROOT       =        3745
 AVERAGE DEPS IN AS SAME BLOCK AS ROOT PER ROOT      =         2.1
 NUMBER OF DEPENDENTS IN THE DIFFERENT BLOCK TO ROOT =       52231

DISTRIBUTION OF DEPENDENT SEGMENTS IN ROOT BLOCK
------------------------------------------------

--------------------------------------------------------------------------------
#ROOTS WITH 00  DEPS    =        9246          #ROOTS WITH 12  DEPS    =           0
#ROOTS WITH 01  DEPS    =         403          #ROOTS WITH 13  DEPS    =           0
#ROOTS WITH 02  DEPS    =         711          #ROOTS WITH 14  DEPS    =           0
#ROOTS WITH 03  DEPS    =         640          #ROOTS WITH 15  DEPS    =           0
#ROOTS WITH 04  DEPS    =           0          #ROOTS WITH 16  DEPS    =           0
#ROOTS WITH 05  DEPS    =           0          #ROOTS WITH 17  DEPS    =           0
#ROOTS WITH 06  DEPS    =           0          #ROOTS WITH 18  DEPS    =           0
#ROOTS WITH 07  DEPS    =           0          #ROOTS WITH 19  DEPS    =           0
#ROOTS WITH 08  DEPS    =           0          #ROOTS WITH 20  DEPS    =           0
#ROOTS WITH 09  DEPS    =           0          #ROOTS WITH 21  DEPS    =           0
#ROOTS WITH 10  DEPS    =           0          #ROOTS WITH 22  DEPS    =           0
#ROOTS WITH 11  DEPS    =           0          #ROOTS WITH 23  DEPS    =           0
                                               #ROOTS WITH 24+ DEPS    =           0
--------------------------------------------------------------------------------
                                               #ROOTS IN THE DATA SET  =       11000
DISTRIBUTION OF DEPENDENT SEGMENTS BY SEGMENT CODE
--------------------------------------------------

SEGMENT CODE   #DEPS IN    #DEPS IN    PERCENTAGE           SEGMENT CODE   #DEPS IN    #DEPS IN    PERCENTAGE
               ROOT BLOCK  ALL BLOCKS  (ROOT/ALL)                          ROOT BLOCK  ALL BLOCKS  (ROOT/ALL)
-------------  ----------  ----------  ----------           -------------  ----------  ----------  ----------
(SEGCODE 02 )          30         900        3.33           (SEGCODE 13 )       N / A       N / A       N / A
(SEGCODE 03 )           0           0         .00           (SEGCODE 14 )       N / A       N / A       N / A
(SEGCODE 04 )        1735       16421       10.56           (SEGCODE 15 )       N / A       N / A       N / A
(SEGCODE 05 )        1557       16422        9.48           (SEGCODE 16 )       N / A       N / A       N / A
(SEGCODE 06 )         423        8303        5.09           (SEGCODE 17 )       N / A       N / A       N / A
(SEGCODE 07 )           0        8369         .00           (SEGCODE 18 )       N / A       N / A       N / A
(SEGCODE 08 )           0        5561         .00           (SEGCODE 19 )       N / A       N / A       N / A
(SEGCODE 09 )       N / A       N / A       N / A           (SEGCODE 20 )       N / A       N / A       N / A
(SEGCODE 10 )       N / A       N / A       N / A           (SEGCODE 21 )       N / A       N / A       N / A
(SEGCODE 11 )       N / A       N / A       N / A           (SEGCODE 22 )       N / A       N / A       N / A
(SEGCODE 12 )       N / A       N / A       N / A           (SEGCODE 23 )       N / A       N / A       N / A
                                                            (SEGCODE 24+)       N / A       N / A       N / A
-------------  ----------  ----------  ----------           -------------  ----------  ----------  ----------
                                                           #DEPS IN THE DS        3745       55976        6.69
```

Figure 65. STATIPRT: DB Record Distribution Statistics report (Part 2 of 2)

First portion of the report

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of this data set group, the name of the data set, and the organization type of the data set

MAXIMUM ROOTS PER BLOCK
The maximum number of root segments contained in one Block (OSAM DB) or CI (VSAM DB)

BLOCKS WITHOUT ROOT SEGMENTS IN RAA
The number of blocks that do not have root segments in the root addressable area (RAA)

DISTRIBUTION OF ROOT SEGMENTS (HDAM/PHDAM ONLY)

This part shows how the HDAM or PHDAM roots were distributed relative to their home block. If the distribution of the root segment part is requested with the OPTION HOMECHK=(YES,-*nnn*,+*mmm*) option in the PROCCTL statement, HD Pointer Checker generates it. If the database is PHDAM, HD Pointer Checker generates the part for each partition.

Note: When the prefix and data parts of an HDAM or a PHDAM root segment are separated, HD Pointer Checker uses the block that contains the data part as its location.

LOCATION
The block location, relative to the home block, where the root segment was found. The locations, within -200 to +200 block to the home block, are indicated by every one block. The locations, relatively lower than -200 and upper than +200 to the home block, are indicated by every 100 blocks.

NUMBER OF ROOTS
The number of roots that were placed within the associated relative block

PERCENTAGE
The percentage of roots that were placed within the associated relative block

TOTAL NUMBER OF ROOT SEGMENTS
The total number of root segments, and the total percentage of root segments (always 100.0%)

NUMBER OF ROOT SEGMENTS IN HOME BLOCKS
The number of root segments that are stored in the same blocks as they are assigned by the randomizing routine, and what percentage it makes of the total number of root segments

NUMBER OF ROOT SEGMENTS NOT IN HOME BLOCKS
The number of root segments that are not stored in the same blocks as they are assigned by the randomizing routine, and what percentage it makes of the total number of root segments

DISTRIBUTION OF RAP CHAIN LENGTHS (HDAM/PHDAM ONLY)

This part shows how long and how distributed the HDAM or PHDAM RAP chains are. HD Pointer Checker generates this part if so requested by the REPORT CHAINDIST option in the PROCCTL statement.

CHAIN LENGTH
The number of roots that were randomized to a particular RAP. A chain length of 1 means the number of roots that has no synonym root.

NUMBER OF RAPS
The number of RAPs that have this chain length

NUMBER OF ROOTS
The total number of roots involved in this chain length

PERCENTAGE OF ROOTS
The percentage of the total number of roots involved in this chain length

CUMULATIVE OF PERCENTAGE
The cumulated value of PERCENTAGE OF ROOTS

RAPS USED (ACTIVE)
The number of RAPS one or more of whose roots are randomized

RAPS NOT USED
The number of RAPS whose roots are not randomized

TOTAL RAPS
The total number of roots in this HDAM database or PHIDAM partition

MAXIMUM ROOTS PER RAP
The maximum number of the chain length. If the number exceeds 254, it is displayed as 255+.

AVERAGE ROOTS PER ACTIVE RAP
The average number of roots per RAP that is active

AVERAGE ROOT PER TOTAL RAP
The average number of roots per total RAPs

NUMBER OF SYNONYM CHAINS
The total number of synonym chains. The number of chains whose length is one is not included.

AVERAGE ROOTS PER SYNONYM CHAINS
The total number of synonym roots for synonym chains divided by the total number of synonym chains. Neither the number of roots nor the number of chains whose length is one is included.

SUMMARY OF DEPENDENT SEGMENTS DISTRIBUTION

This part shows the summary of dependent segments distribution.

NUMBER OF DEPENDENTS IN AS SAME BLOCK AS ROOT
The number of dependent segment occurrences that are in the same block as root segment occurrence

AVERAGE DEPS IN AS SAME BLOCK AS ROOT PER ROOT
The average number of dependent segment occurrences that are in the same block as root segment occurrence

NUMBER OF DEPENDENTS IN THE DIFFERENT BLOCK TO ROOT
The number of dependent segment occurrences that locate in a different block from root segment occurrence

DISTRIBUTION OF DEPENDENT SEGMENTS IN ROOT BLOCK
This part shows the number of root segments that have exactly 0, 1, ..., 23, or 24+ dependent segments in the same block. It also shows the total number of root segments in this data set group or partition.

DISTRIBUTION OF DEPENDENT SEGMENTS BY SEGMENT CODE
This part shows the number of dependent segments with segment code 2, 3, ..., 23, or 24+ that are stored in the same block as their root segment. It also shows the number of dependent segments with segment code 2, 3, ..., 23, or 24+ in this data set group or partition.

The following three fields are headings for DISTRIBUTION OF DEPENDENT SEGMENTS BY SEGMENT CODE:

#DEPS IN ROOT BLOCK
The number of dependent segments in the root block in which the segments exist

#DEPS IN ALL BLOCKS
The number of dependent segments in all blocks

PERCENTAGE (ROOT/ALL)
The percentage of the above values; #DEPS IN ROOT BLOCK to #DEPS IN ALL BLOCKS

This part also shows the total number of dependent segments in this data set group.

Separator page for Partition Statistics reports

This separator page contains the title "Partition Statistics," the DBD name, the partition name, the DB number, and the partition ID. It signifies that the Partition statistics reports will follow.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "SEPARATOR PAGE FOR PARTITION STATISTICS"                 PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1



  PPPP   AAA  RRRR  TTTTT IIIII TTTTT IIIII  OOO  N   N       SSS  TTTTT  AAA  TTTTT IIIII  SSS  TTTTT IIIII  CCC   SSS
  P   P A   A R   R   T     I     T     I   O   O N   N      S   S   T   A   A   T     I   S   S   T     I   C   C S   S
  P   P A   A R   R   T     I     T     I   O   O NN  N      S       T   A   A   T     I   S       T     I   C     S
  PPPP  AAAAA RRRR    T     I     T     I   O   O N N N       SSS    T   AAAAA   T     I    SSS    T     I   C      SSS
  P     A   A R R     T     I     T     I   O   O N  NN          S   T   A   A   T     I       S   T     I   C         S
  P     A   A R  R    T     I     T     I   O   O N   N      S   S   T   A   A   T     I   S   S   T     I   C   C S   S
  P     A   A R   R   T   IIIII   T   IIIII  OOO  N   N       SSS    T   A   A   T   IIIII  SSS    T   IIIII  CCC   SSS


       TTTTT PPPP  FFFFF  OOO  H   H   1                          TTTTT PPPP  FFFFF  OOO  H   H   1    AAA
         T   P   P F     O   O H   H  11                            T   P   P F     O   O H   H  11   A   A
         T   P   P F     O   O H   H   1                            T   P   P F     O   O H   H   1   A   A
         T   PPPP  FFF   O   O HHHHH   1                            T   PPPP  FFF   O   O HHHHH   1   AAAAA
         T   P     F     O   O H   H   1                            T   P     F     O   O H   H   1   A   A
         T   P     F     O   O H   H   1                            T   P     F     O   O H   H   1   A   A
         T   P     F      OOO  H   H 11111                          T   P     F      OOO  H   H 11111 A   A


       DDDD  BBBB   # #              000   000   333               PPPP  IIIII DDDD        000   000   000   000    1
       D   D B   B ######           0   0 0   0 3   3              P   P   I   D   D      0   0 0   0 0   0 0   0  11
       D   D B   B  # #             0  00 0  00     3              P   P   I   D   D      0  00 0  00 0  00 0  00   1
       D   D BBBB   # #             0 0 0 0 0 0   33              PPPP    I   D   D      0 0 0 0 0 0 0 0 0 0 0 0   1
       D   D B   B  # #             00  0 00  0     3              P       I   D   D      00  0 00  0 00  0 00  0   1
       D   D B   B ######           0   0 0   0 3   3              P       I   D   D      0   0 0   0 0   0 0   0   1
       DDDD  BBBB   # #              000   000   333               P     IIIII DDDD        000   000   000   000  11111
```

Figure 66. STATIPRT: Separator page for Partition Statistics reports

Separator page for Database Statistics reports

This separator page contains the title "Database Statistics," the DBD name, and the DB number. It signifies that the Database Statistics reports will follow.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

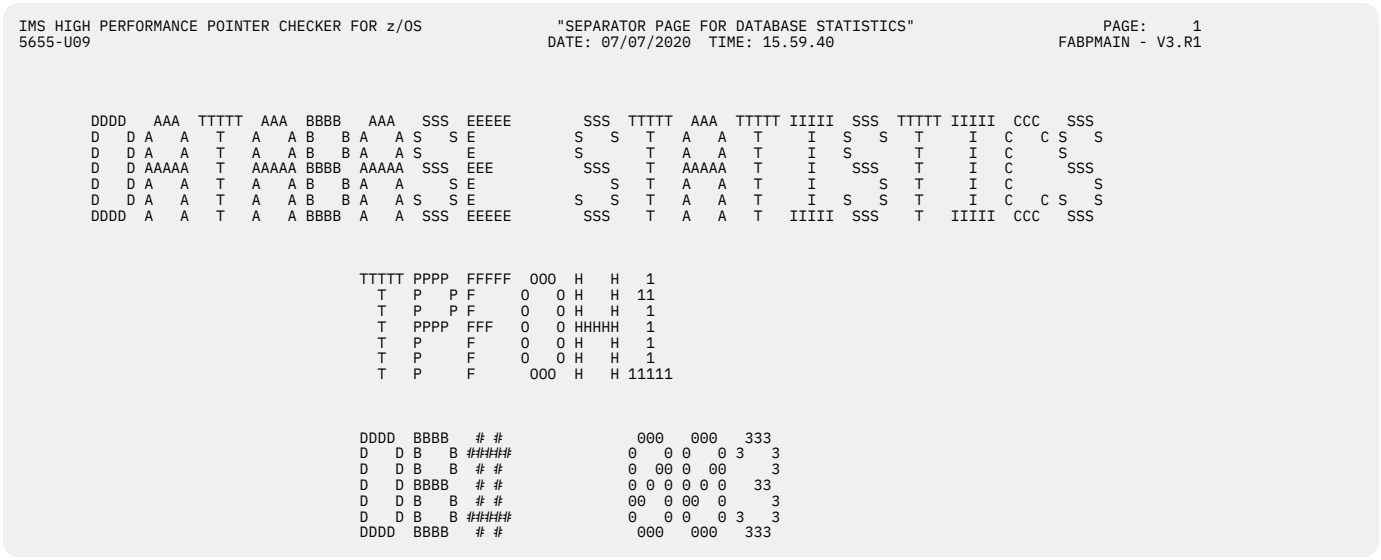


Figure 67. STATIPRT: Separator page for Database Statistics reports

Partition Statistics report and Database Statistics report

The Partition Statistics report is printed only for HALDBs, and it is printed for each partition. The Database Statistics report is printed for each database.

Each of these reports contains the following parts:

- Database Record Statistics and Database Record Statistics by data set group: Various average values of database record
- Segment and Pointer Statistics: Various information about segments and pointers
- Total Pointer Statistics: Summary of pointers
- Rate of Segment I/O Occurrence: The probability of doing I/O when getting access to a target segment from a source segment
- VL Segment Length Statistics: Various information about variable-length segments
- VL Segment Split Statistics: Various information about split segments
- Summary of VL Segment Sizes: Summary of the variable-length segments

Subsections:

- “Report example” on page 204
- “Report field description: DATABASE RECORD STATISTICS” on page 207
- “Report field description: DATABASE RECORD STATISTICS BY DATA SET GROUP” on page 208
- “Report field description: SEGMENT AND POINTER STATISTICS” on page 208
- “Report field description: TOTAL POINTER STATISTICS” on page 210
- “Report field description: RATE OF SEGMENT I/O OCCURRENCE” on page 210
- “Report field description: VL SEGMENT LENGTH STATISTICS” on page 210
- “Report field description: VL SEGMENT SPLIT STATISTICS” on page 212

- “Report field description: SUMMARY OF VL SEGMENT SIZES” on page 213

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                        PAGE:     1
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                      FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                    DBORG: PHDAM


DATABASE RECORD STATISTICS
--------------------------
         SEGMENT                <---- SEGMENT LENGTH --->  <-AVERAGE OCCURRENCES->   AVG LENGTH   CUMULATIVE
SC LV DG NAME     OCCURRENCES  PRFX  +   DATA  =   TOTAL    PER ROOT   PER PARENT   /DB RECORD      LENGTH
-- -- -- -------- -----------  ----   -------    -------  ----------  -----------   ----------   ----------
01 01  A AROOTLV1      11,000    34      65.2V      99.2         1.0                      99.2         99.2
02 02  A ADEP1LV2         220    50      80.6V     130.6         0.0          0.0          2.6        101.8
03 02  B ADEP2LV2         220    50     100.0      150.0         0.0          0.0          3.0        104.8
04 02  A ADEP3LV2      16,540    26     200.0      226.0         1.5          1.5        339.8        444.6
05 03  A ADEP4LV3      16,517    22      14.7V      36.7         1.5          1.0         55.1        499.7
06 03  A ADEP5LV3       8,295    30      14.0V      44.0         0.8          0.5         33.2        532.9
07 04  A ADEP6LV4      20,573    26      32.2V      58.2         1.9          2.5        108.8        641.7
08 05  A ADEP7LV5       6,892    46     200.0      246.0         0.6          0.3        154.1        795.8
-- -- -- -------- -----------  ----   -------    -------  ----------  -----------   ----------   ----------
TOTALS                80,257                                AVERAGE DB RECORD LENGTH =        795.8
                                                   AVERAGE DB RECORD PREFIX LENGTH =        208.1
                                 AVERAGE DB RECORD LENGTH INCLUDING SEGMENT PAD =        810.3


NOTE : 'V' INDICATES THAT 'DATA' SHOW AVERAGE VALUES FOR A VARIABLE LENGTH SEGMENT (IF ANY)

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                        PAGE:     1
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                      FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                    DBORG: PHDAM


DATABASE RECORD STATISTICS BY DATA SET GROUP
--------------------------------------------
         SEGMENT                <---- SEGMENT LENGTH --->  <-AVERAGE OCCURRENCES->   AVG LENGTH   CUMULATIVE
DG SC LV NAME     OCCURRENCES  PRFX  +   DATA  =   TOTAL    PER ROOT   PER PARENT   /DB RECORD      LENGTH
-- -- -- -------- -----------  ----   -------    -------  ----------  -----------   ----------   ----------
 A 01 01 AROOTLV1      11,000    34      65.2V      99.2         1.0                      99.2         99.2
   02 02 ADEP1LV2         220    50      80.6V     130.6         0.0          0.0          2.6        101.8
   04 02 ADEP3LV2      16,540    26     200.0      226.0         1.5          1.5        339.8        441.6
   05 03 ADEP4LV3      16,517    22      14.7V      36.7         1.5          1.0         55.1        496.7
   06 03 ADEP5LV3       8,295    30      14.0V      44.0         0.8          0.5         33.2        529.9
   07 04 ADEP6LV4      20,573    26      32.2V      58.2         1.9          2.5        108.8        638.7
   08 05 ADEP7LV5       6,892    46     200.0      246.0         0.6          0.3        154.1        792.8

 B 03 02 ADEP2LV2         220    50     100.0      150.0         0.0          0.0          3.0          3.0
-- -- -- -------- -----------  ----   -------    -------  ----------  -----------   ----------   ----------
TOTALS                80,257                                AVERAGE DB RECORD LENGTH =        795.8
                                                   AVERAGE DB RECORD PREFIX LENGTH =        208.1
                                 AVERAGE DB RECORD LENGTH INCLUDING SEGMENT PAD =        810.3


NOTE : 'V' INDICATES THAT 'DATA' SHOW AVERAGE VALUES FOR A VARIABLE LENGTH SEGMENT (IF ANY)
```

Figure 68. STATIPRT: Database Statistics report (Part 1 of 4)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                        PAGE:     2
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                      FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                      DBORG: PHDAM


SEGMENT AND POINTER STATISTICS
------------------------------
<---- SOURCE ----> <-> <---- TARGET ----> <------------------------------ COUNT OF POINTERS ------------------------------>  PROB.
                                          <-NOT USED-> <------------------------------ USED ------------------------------>  OF IO
          SEGMENT  PTR           SEGMENT   (ZERO                    IN SAME   <------------ NOT IN SAME BLOCK ------------>
DB  DG SC NAME     TYP DB  DG SC NAME       POINTER)       TOTAL      BLOCK      TOTAL     BLOCK-1     BLOCK+1      BEYOND
------------------ --- ------------------ -----------  ----------   ---------   ---------   ---------   ---------   ---------  -----
                   RAP 003  A 01 AROOTLV1         410       4,090       2,343       1,747           0          16       1,731   0.43

003  A 01 AROOTLV1 PTF 003  A 01 AROOTLV1       4,090       6,910         700       6,210           6          12       6,192   0.90
                   PTB 003  A 01 AROOTLV1       4,090       6,910         700       6,210          12           6       6,192   0.90
                   PCF 003  A 02 ADEP1LV2      10,780         220           4         216           0           0         216   0.98
                   PCF 003  B 03 ADEP2LV2      10,780         220                                                             1.00
                   PCF 003  A 04 ADEP3LV2       2,764       8,236       3,456       4,780           5       2,133       2,642   0.58
                   PCL 003  A 04 ADEP3LV2       2,764       8,236       1,165       7,071          19       1,626       5,426   0.86
                   VLS 003  A 01 AROOTLV1           0           0           0           0           0           0           0   0.00
                   *LC 004  A 02 CDEP1LV2

003  A 02 ADEP1LV2 PTF 003  A 02 ADEP1LV2         220           0           0           0           0           0           0   0.00
  (UNI-DIRECTNL)   PTB 003  A 02 ADEP1LV2         220           0           0           0           0           0           0   0.00
                    PP 003  A 01 AROOTLV1           0         220           4         216           0           0         216   0.98
                   VLS 003  A 02 ADEP1LV2           0           0           0           0           0           0           0   0.00
                   ELP 005  A 01 BROOTLV1                     220                                                             1.00

003  B 03 ADEP2LV2 PTF 003  B 03 ADEP2LV2         220           0           0           0           0           0           0   0.00
  (PHYS. PAIRED)   PTB 003  B 03 ADEP2LV2         220           0           0           0           0           0           0   0.00
                    PP 003  A 01 AROOTLV1           0         220                                                             1.00
                   ELP 004  A 01 CROOTLV1                     220                                                             1.00
                   ELC 004  A 02 CDEP1LV2                     220                                                             1.00

003  A 04 ADEP3LV2 PTF 003  A 04 ADEP3LV2       8,236       8,304         932       7,372          16       6,103       1,253   0.89
                    PP 003  A 01 AROOTLV1           0      16,540       3,456      13,084       3,876          25       9,183   0.79
                   PCF 003  A 05 ADEP4LV3       5,512      11,028       9,750       1,278         353         384         541   0.12
                   PCF 003  A 06 ADEP5LV3       8,245       8,295       7,792         503          64         255         184   0.06

003  A 05 ADEP4LV3 PTF 003  A 05 ADEP4LV3      11,028       5,489       5,059         430          31         167         232   0.08
                   PTB 003  A 05 ADEP4LV3      11,028       5,489       5,059         430         167          31         232   0.08
                    PP 003  A 04 ADEP3LV2           0      16,517      14,370       2,147         820         521         806   0.13
                   VLS 003  A 05 ADEP4LV3           0           0           0           0           0           0           0   0.00

003  A 06 ADEP5LV3 CTR                                     6,892
                   PTF 003  A 06 ADEP5LV3       8,295           0           0           0           0           0           0   0.00
                   PTB 003  A 06 ADEP5LV3       8,295           0           0           0           0           0           0   0.00
                    PP 003  A 04 ADEP3LV2           0       8,295       7,792         503         255          64         184   0.06
                   PCF 003  A 07 ADEP6LV4       1,403       6,892       5,583       1,309         210         525         574   0.19
                   VLS 003  A 06 ADEP5LV3           0           0           0           0           0           0           0   0.00
                   *LC 003  A 08 ADEP7LV5

003  A 07 ADEP6LV4 PTF 003  A 07 ADEP6LV4       6,892      13,681      10,233       3,448         835         743       1,870   0.25
                    PP 003  A 06 ADEP5LV3           0      20,573      12,082       8,491       3,631       1,498       3,362   0.41
                   PCF 003  A 08 ADEP7LV5      13,681       6,892           0       6,892           0           0       6,892   1.00

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                        PAGE:     3
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                      FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                      DBORG: PHDAM

<---- SOURCE ----> <-> <---- TARGET ----> <------------------------------ COUNT OF POINTERS ------------------------------>  PROB.
                                          <-NOT USED-> <------------------------------ USED ------------------------------>  OF IO
          SEGMENT  PTR           SEGMENT   (ZERO                    IN SAME   <------------ NOT IN SAME BLOCK ------------>
DB  DG SC NAME     TYP DB  DG SC NAME       POINTER)       TOTAL      BLOCK      TOTAL     BLOCK-1     BLOCK+1      BEYOND


------------------ --- ------------------ -----------  ----------   ---------   ---------   ---------   ---------   ---------  -----
                   PCL 003  A 08 ADEP7LV5      13,681       6,892           0       6,892           0           0       6,892   1.00
                   VLS 003  A 07 ADEP6LV4           0         260           1         259           4           0         255   1.00

003  A 08 ADEP7LV5 PTF 003  A 08 ADEP7LV5       6,892           0           0           0           0           0           0   0.00
  (UNI-DIRECTNL)    PP 003  A 07 ADEP6LV4           0       6,892           0       6,892           0           0       6,892   1.00
                   ELP 003  A 06 ADEP5LV3                   6,892                                                             1.00
```

Figure 69. STATIPRT: Database Statistics report (Part 2 of 4)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                         PAGE:     4
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                       FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                      DBORG: PHDAM


TOTAL POINTER STATISTICS
------------------------
                    <--- POINTER TYPE ---> <------------------------------ COUNT OF POINTERS ------------------------------->
                                           <-NOT USED-> <------------------------------ USED ------------------------------->
                                            (ZERO                        IN SAME   <------------ NOT IN SAME BLOCK ------------>
                                             POINTER)       TOTAL         BLOCK      TOTAL     BLOCK-1     BLOCK+1      BEYOND
                    ---------------------- -----------  ----------   ---------   ---------   ---------   ---------   ---------
                    PTF                          45,873      34,384      16,924      17,460         888       7,025       9,547
                    PTB                          23,853      12,399       5,759       6,640         179          37       6,424
                     PP (SAME DBDS)                   0      69,037      37,704      31,333       8,582       2,108      20,643
                        (NOT SAME DBDS)               0         220
                    LTF                               0           0           0           0           0           0           0
                    LTB                               0           0           0           0           0           0           0
                     LP (SAME DBDS)                   0           0           0           0           0           0           0
                        (NOT SAME DBDS)               0       7,332
                     PH                               0           0           0           0           0           0           0
                    LCF (SAME DBDS)                   0           0           0           0           0           0           0
                        (NOT SAME DBDS)               0           0
                    LCL (SAME DBDS)                   0           0           0           0           0           0           0
                        (NOT SAME DBDS)               0           0
                    PCF (SAME DBDS)              42,385      41,563      26,585      14,978         632       3,297      11,049
                        (NOT SAME DBDS)          10,780         220
                    PCL (SAME DBDS)              16,445      15,128       1,165      13,963          19       1,626      12,318
                        (NOT SAME DBDS)               0           0
                    *LP (SAME DBDS)                   0           0           0           0           0           0           0
                        (NOT SAME DBDS)               0           0
                    ---------------------- -----------  ----------   ---------   ---------   ---------   ---------   ---------
                    TOTALS (SAME DBDS)           128,556     172,511      88,137      84,374      10,300      14,093      59,981
                           (NOT SAME DBDS)        10,780       7,772

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                         PAGE:     5
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                       FABPMAIN - V3.R1

DBNAME: TPFOH1    DB#: 003                                                                                      DBORG: PHDAM

RATE OF SEGMENT I/O OCCURRENCE
------------------------------

  RAP TO ROOT : 0.427

  AROOTLV1 -+-0.982--> ADEP1LV2
   0.899    |           0.000
            |
            +-1.000--> ADEP2LV2
            |           0.000
            |
            +-0.719--> ADEP3LV2 -+-0.116--> ADEP4LV3
                        0.888    |           0.078
                                 |
                                 +-0.061--> ADEP5LV3 ---0.190--> ADEP6LV4 ---1.000--> ADEP7LV5
                                             0.000               0.252               0.000

NOTE :  THE NUMBERS IN THE HIERARCHICAL DIAGRAM SHOW THE PROBABILITY OF DOING I/O WHEN ACCESSING A TARGET SEGMENT FROM A SOURCE
----    SEGMENT.
          - THE NUMBER BELOW THE SEGMENT NAME SHOWS THE PROBABILITY OF DOING I/O WHEN ACCESSING A TARGET SEGMENT FROM A SOURCE
            SEGMENT OF THE SAME SEGMENT TYPE.
          - THE NUMBER IN THE ARROW SHOWS THE PROBABILITY OF DOING I/O WHEN ACCESSING A TARGET SEGMENT FROM A SOURCE SEGMENT
            OF A DIFFERENT SEGMENT TYPE.
          - THE NUMBER IN PARENTHESES BELOW THE SEGMENT SHOWS THE PROBABILITY OF DOING I/O WHEN ACCESSING A TARGET SEGMENT FROM A
            SOURCE SEGMENT THAT IS RELATED TO BY A HIERARCHICAL POINTER.
        THE NUMBER *XX SHOWS CONTINUATION TO THE NEXT FIGURE OF TREE.

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                         PAGE:     6
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                       FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                      DBORG: PHDAM


VL SEGMENT LENGTH STATISTICS
----------------------------
   SEGMENT                      PREFIX  <--- DATA LENGTH  --->  <---- OCCURRENCES ---->  <- COMPRESSION  ->
SC NAME      TYPE  OCCURRENCES  LENGTH  MIN    MAX     AVERAGE  LENGTH<MIN  LENGTH>=MIN  EXIT NAME  FACTOR
-- --------  ----  -----------  ------  -----  -----   -------  ----------  -----------  ---------  -------
01 AROOTLV1   V         11,000      34     30    100      65.2           0       11,000
02 ADEP1LV2   V            220      50     40    120      80.6           0          220
05 ADEP4LV3   VC        16,517      22     30    200      14.7      16,517            0  DFSCMPX0   N/AVAIL
06 ADEP5LV3   FC         8,295      30      4    110      14.0           0        8,295  DFSCMPX0   N/AVAIL
07 ADEP6LV4   V         20,573      26     30    200      32.2           0       20,573
-- --------  ----  -----------  ------  -----  -----   -------  ----------  -----------  ---------  -------
TOTALS                  56,605
```

Figure 70. STATIPRT: Database Statistics report (Part 3 of 4)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                         PAGE:     7
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                          DBORG: PHDAM


VL SEGMENT SPLIT STATISTICS
---------------------------
   SEGMENT                                                                  <----------- PREFIX AND DATA  ----------->
SC NAME      TYPE  OCCURRENCES  NOT SPLIT             SPLIT                 IN SAME BLOCK         NOT IN SAME BLOCK
-- --------  ----  -----------  --------------------  --------------------  --------------------  --------------------
01 AROOTLV1   V         11,000       11,000  100.0 %           0    0.0 %           0    0.0 %           0    0.0 %
02 ADEP1LV2   V            220          220  100.0 %           0    0.0 %           0    0.0 %           0    0.0 %
05 ADEP4LV3   VC        16,517       16,517  100.0 %           0    0.0 %           0    0.0 %           0    0.0 %
06 ADEP5LV3   FC         8,295        8,295  100.0 %           0    0.0 %           0    0.0 %           0    0.0 %
07 ADEP6LV4   V         20,573       20,313   98.7 %         260    1.3 %           1    0.4 %         259   99.6 %
-- --------  ----  -----------  --------------------  --------------------  --------------------  --------------------
TOTALS                56,605       56,345   99.5 %         260    0.5 %           1    0.4 %         259   99.6 %

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "DATABASE STATISTICS REPORT"                         PAGE:     8
5655-U09                                                  DATE: 08/14/2020  TIME: 17.25.39                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003                                                                                          DBORG: PHDAM


SUMMARY OF VL SEGMENT SIZES
---------------------------
   SEGMENT                                    CUMULATIVE
SC NAME          SIZE RANGE  OCCURRENCES  PERCENTAGE  PERCENTAGE
-- -------- ---------------  -----------  ----------  ----------
01 AROOTLV1     30 -     32          465      4.2 %      4.2 %
                33 -     36          608      5.5 %      9.8 %
                37 -     39          482      4.4 %     14.1 %
                40 -     43          607      5.5 %     19.7 %
                44 -     46          424      3.9 %     23.5 %
                47 -     50          611      5.6 %     29.1 %
                51 -     53          478      4.3 %     33.4 %
                54 -     57          598      5.4 %     38.8 %
                58 -     60          458      4.2 %     43.0 %
                61 -     64          658      6.0 %     49.0 %
                65 -     68          628      5.7 %     54.7 % <= AVERAGE
                69 -     71          441      4.0 %     58.7 %
                72 -     75          625      5.7 %     64.4 %
                76 -     78          480      4.4 %     68.8 %
                79 -     82          657      6.0 %     74.7 %
                83 -     85          439      4.0 %     78.7 %
                86 -     89          623      5.7 %     84.4 %
                90 -     92          444      4.0 %     88.4 %
                93 -     96          624      5.7 %     94.1 %
                97 -    100          650      5.9 %    100.0 %
-- -------- ---------------  -----------  ----------  ----------
TOTALS          30 -    100       11,000    100.0 %


AVERAGE SEGMENT LENGTH=      65.2

MORE THAN 90 PERCENT OF SEGMENT OCCURRENCES ARE INCLUDED IN THE RANGE     65 -     68
```

Figure 71. STATIPRT: Database Statistics report (Part 4 of 4)

Report field description: DATABASE RECORD STATISTICS

This part shows the average values of database record in the partition or database.

SC
Segment code (in hexadecimal)

LV
Segment Level (in decimal)

DG
The data set group number (in hexadecimal) for non-HALDB, or the data set group ID (in an alphabetic character) for HALDB, which identifies the database data set containing the segment

SEGNAME
The name of segment coded in SEGM= in DBD

OCCURRENCES
The number of occurrences of this segment

SEGMENT LENGTH
The length of this segment. Shows the following information:

PRFX
The length of the prefix part of this segment

DATA
The data part length of this segment. "V" after the numeric means that this segment is of either variable length or fixed length with a segment edit/compression facility, and the size is the average length of the data part.

TOTAL
The sum of the prefix part and the data part of this segment

AVERAGE OCCURRENCES
The average number of occurrences. Shows the following information:

PER ROOT
The number of occurrences of the segments in each database record

PER PARENT
The number of occurrences of the segments in each parent

AVERAGE LENGTH / DB RECORD
The sum of the bytes of the segments in each database record

CUMULATIVE LENGTH
The cumulative value of AVERAGE LENGTH / DB RECORD

AVERAGE DB RECORD LENGTH
The average length of database records. Both prefix parts and data parts of all segment types are included.

AVERAGE DB RECORD PREFIX LENGTH
The average lengths of prefixes in database records

AVERAGE DB RECORD LENGTH INCLUDING SEGMENT PAD
The average length of database records. Prefix part, data part, and padding area of all segment types are included.

Report field description: DATABASE RECORD STATISTICS BY DATA SET GROUP

This part shows the average values of database record in the partition or database in the order of the data set group. This part is printed only for HDAM, HIDAM, PHDAM and PHIDAM. All fields in this part except the following field are the same as the DATABASE RECORD STATISTICS part.

CUMULATIVE LENGTH
The cumulative value of AVERAGE LENGTH/DB RECORD for each data set group

Report field description: SEGMENT AND POINTER STATISTICS

This part contains the following information:

- A map of the prefix of each segment type that is defined for the partition or database
- A map of the logical relationships for each segment type that is defined for the partition or database
- The total number of pointer types for each segment type in the partition or database

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the source of the pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

SEGNAME
The segment name, as coded on the SEGM macro in the DBD, of the segment that contains the pointer

PTR TYP
The type of pointer such as RAP, CTR, PTF, PTB, PP, PCF, PCL, LTF, LTB, LP, LCF, LCL, *LP, *LC, HF, HB, and VLS. The following two values show the existence of a logical relationship when no direct pointer exists:

***LP**
The source segment is a logical child, and the target segment is its logical parent. There is no direct logical parent pointer; instead, the source segment has a symbolic pointer (the logical parent concatenated key) to its logical parent.

***LC**
The source segment is a logical parent, and the target segment is its logical child. There is no logical child pointer.

The VLS pointer points from the prefix to the data in a split segment. The count of VLS pointers in SAME BLOCK is the number of split segments that have prefix and data in the same block. The number of split segments that have prefix and data in different blocks is the count in TOTAL of NO IN SAME BLOCK.

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

SC
The segment code (in hexadecimal) of the target of a pointer

SEGNAME
The segment name, as coded on the SEGM macro in the DBD, of the target of a pointer

COUNT OF POINTERS
Each kind of pointer is totaled according to the following classes:

NOT USED (ZERO POINTER)
The number of unused pointers that do not point to any target. Unused pointers contain the value zero.

USED
The information of used pointers that point to targets. Used pointers contain non-zero values.

TOTAL
The number of pointers used. It contains pointers to target segments outside this data set.

IN SAME BLOCK
The number of pointers that point to the block containing the pointer

Note: This does not include the number of dependent segments that are in the same block as their root segment.

NOT IN SAME BLOCK
Information about pointers that point to different blocks within the same data set

TOTAL
The number of pointers not in the same block

BLOCK-1
The number of pointers that point to the block immediately before the block containing the pointer

BLOCK+1
The number of pointers that point to the block immediately after the block containing the pointer

BEYOND
The number of pointers that point to blocks (in the same data set) that is not adjacent to or the same as the block containing the pointer

The following field can be used to indicate whether the database needs reorganization:

PROB OF IO
The probability of doing I/O when accessing a target segment via the indicated pointer. This is computed by the following formula: If the target and the pointer are not in the same data set:

P=1
otherwise:
P = 1 - (S/T)

Where:
S = the number of pointers in the same block as their target

T = the total number of pointers

Report field description: TOTAL POINTER STATISTICS

This part presents the number of pointers for each pointer type.

For a description of each field, see "Report field description: SEGMENT AND POINTER STATISTICS" on page 208.

Report field description: NOTE

This part is the notification for Segment and Pointer Statistics and Total Pointer Statistics. This part is printed only once, after Total Pointer Statistics.

Report field description: RATE OF SEGMENT I/O OCCURRENCE

This part shows the probability of doing I/O when getting access to a target segment from a source segment.

RAP TO ROOT
The probability of doing I/O when getting access to a root segment from RAP

The probabilities are shown in a hierarchical diagram of the database record structure.

- The number below the segment name shows the probability of doing I/O when getting access to a target segment from a source segment of the same segment type. If NT is specified for the segment, *.*** is shown instead of the number.
- The number in the arrow shows the probability of doing I/O when getting access to a target segment from a source segment of a different segment type.
- The number in parentheses below the segment shows the probability of doing I/O when getting access to a target segment from a source segment that is related to by a hierarchical pointer. The probability is shown only for a physical path. It is not shown for a logical relationship.

This part is generated when SEGIO=YES is specified in the REPORT statement of the PROCCTL data set.

Report field description: VL SEGMENT LENGTH STATISTICS

This part presents information on the number of occurrences and segment length of variable-length segments. It also contains fixed-length segments compressed by the segment edit/compression exit routine. If no variable-length segment or compressed fixed-length segment is defined in the database, this part is not printed.

SC
Segment code (in hexadecimal)

SEGMENT NAME
The segment name, as coded on the SEGM macro in the DBD

TYPE
This field shows the segment that is defined as fixed length or variable length, and a segment edit/compression exit routine is specified in the DBD

FC
The segment is defined as fixed length, and a segment edit/compression exit routine is defined. The actual segment length is variable because the segment length can be changed by the segment edit/compression exit routine.

V
The segment is variable length and a segment edit/compression exit routine is not defined

VC
The segment is variable length and a segment edit/compression exit routine is defined

OCCURRENCES
The number of occurrences of the following segments

PREFIX LENGTH
Prefix length of this segment

DATA LENGTH
The following information about the data length of this segment:

MIN
The minimum length of the data that can be stored in the database, including the segment length and the padded area. For a fixed-length segment, if you have specified that a segment edit/compress facility is to be used, this field can contain different values, depending on the values in COMPRTN=.

- When COMPRTN=(,,) or COMPRTN=(,,,*max*) is coded, the MIN field is always 4 bytes.
- When COMPRTN=(,,,*pad size*,PAD) is coded, the MIN field is *pad size*.

MAX
The maximum length of the data that can be stored in the database, including the segment length and the padded area. For a variable-length segment, the value in this field is the same as the maximum coded on BYTES= in the DBD. For a fixed-length segment, if you have specified that a segment edit/compress facility is to be used, this field can contain different values, depending on the values in COMPRTN=.

If COMPRTN=(,,) or COMPRTN=(,,,*max*) is coded, one of the following values is used:

- If *max* is 10 or greater, the MAX field is the value of BYTES= plus *max*.
- If *max* is less than 10 or is not coded, the MAX field is the value of BYTES= plus 10 because IMS allows the segment edit/compression routine to increase the length of the segment by up to 10 bytes.

When COMRTN=(,,,*pad size*,PAD) is coded, one of the following values is used:

- If *pad size* adds 10 or more bytes to the value specified in BYTES=, the value in the MAX field is *pad size*.
- If *pad size* is less than 10 length additional to the value specified in BYTES=, the MAX is the value of BYTES= plus 10.

AVERAGE
The average length of occurrences of the segment in the database, partition, or database. It contains only the segment length. If the segment is edited by the segment edit/compression exit, the segment length that has been edited is used.

OCCURRENCES
The number of occurrences of the following segments. For a compressed segment, the length of data that has been compressed is used for comparison.

LENGTH < MIN
The number of occurrences of segments, whose data lengths are less than the minimum

LENGTH >= MIN
The number of occurrences of segments, whose data lengths are equal to or greater than the minimum

COMPRESSION EXIT NAME
The name of the segment edit/compression exit routine, as coded on COMPRTN= in the DBD

COMPRESSION FACTOR
If a segment edit/compression exit routine is specified for this segment, the data compression factor is shown in the column.

The compression factor is calculated by the following formula:

```
Bytes before compression - Bytes after compression
--------------------------------------------------
               Bytes before compression
```

Bytes before compression

- If the segment is fixed length and compressed, the value shows the specified length in BYTES= operand of SEGM statement in DBDGEN.
- If the segment is variable length and compressed, the value shows the average length of the data portion of all segments before compression.

Bytes after compression

It is the average length of the data portion of all segments after compression. This length is the same as the length when the segments are stored in the databases.

Notes:

1. If the bytes after compression is greater than before compression, a negative number is shown.
2. When segment is variable length with a segment/edit compression exit (TYPE column is VC), HD Pointer Checker calls the segment edit/compression exit routine to obtain the length of the data portion before compression. It is required that you specify the load module library that contains the user exit for the IMS2 DD or the STEPLIB DD in the JCL.

The compression factor is shown when COMPFACT=YES is specified in the REPORT statement of the PROCCTL data set. When COMPFACT=NO is specified, N/AVAIL is shown in the column.

If a segment edit/compression routine is not defined in the segment, blank is set in this column.

Report field description: VL SEGMENT SPLIT STATISTICS

This part presents information on the split variable length segment for each segment type. It also contains fixed-length segment compressed by the segment edit/compress facility. If no variable-length segment or compressed fixed-length segment is defined in the database, this part is not printed.

SC
Segment code (in hexadecimal)

SEGMENT NAME
The segment name, as coded on the SEGM macro in the DBD

TYPE
This field shows the segment that is defined as fixed length or variable length, and a segment edit/compression exit routine that is specified in the DBD

FC
The segment is defined as fixed length, and a segment edit/compression exit routine is defined. The actual segment length is variable because the segment length can be changed by the segment edit/compression exit routine.

V
The segment is variable length and a segment edit/compression exit routine is not defined.

VC
The segment is variable length and a segment edit/compression exit routine is defined.

OCCURRENCES
The number of occurrences of this segment

NOT SPLIT
The number of occurrences that are not split, and what percentage it makes of the total

SPLIT
The number of occurrences that are split, and what percentage it makes of the total

PREFIX AND DATA
The following information about the prefix and data of split segments:

IN SAME BLOCK
The number of occurrences of both prefix part and data part that exist in the same block, and what percentage it makes of the number of split segments

NOT IN SAME BLOCK
The number of occurrences of data part that exist in a different block from the prefix part, and what percentage it makes of the number of splits

Report field description: SUMMARY OF VL SEGMENT SIZES

This part presents the distribution of the variable segment length for each segment type. It also contains fixed-length segment compressed by the segment edit/compress facility. If no variable-length segment or compressed fixed-length segment is defined in the database, this part is not printed. This part is printed when requested by OPTION VLSSUMM=YES in the PROCCTL data set.

SC
Segment code (in hexadecimal)

SEGMENT NAME
The segment name, as coded on the SEGM macro in the DBD

SIZE RANGE
The size (in bytes) range of the part of the variable-length segment to be reported. For compressed segment, the length after compression is used for the size. The shortest and the longest sizes are actual values detected in the database, not extracted from the DBD. This report divides the size range into 20.

Note: In the following cases, however, the size range might become less than 20 or the size range might not be fixed.

- The maximum segment length specified in the SEGM statement for the DBD exceeds a certain value
- The segment length is distributed within a certain narrow range

<= AVERAGE
This text in the SUMMARY OF VL SEGMENT SIZES marks the average length range

MORE THAN 90 PERCENT OF SEGMENT OCCURRENCES ARE INCLUDED IN THE RANGE *xxxxxx* - *xxxxxx*.
This text shows the size range that more than 90% occurrences belong to.

OCCURRENCES
The number of occurrences that fall into this range

PERCENTAGE
The percentage of occurrences of this range, and what percentage it makes of the total

CUMULATIVE PERCENTAGE
The cumulative value of PERCENTAGE

AVERAGE SEGMENT LENGTH
The average length of the data part in segments of this type in this partition or database

The summary of VL segment sizes is shown when VLSSUMM=YES is specified in the PROC statement of the PROCCTL data set.

VALIDPRT data set

The VALIDPRT data set contains validation reports and legends produced by the HD Pointer Checker processor (FABPMAIN).

The following reports are generated in this data set:

- Separator page for validation reports
- Scan of HISAM Database report
- Scan of Index Database report
- Validation of a Pointer to a Target at SCAN (HDAM/HIDAM) report
- Legend for Scan and Validation report
- Description of All Scanned Database report
- Validation of a Pointer to a Target at CHECK report
- Legend for Check Process validation report

Separator page for validation reports

This separator page contains the title of "Validation Report," and indicates that validation reports follow this page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "SEPARATOR PAGE FOR VALIDATION"                     PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                    FABPMAIN - V3.R1



                              V   V  AAA  L     IIIII DDDD   AAA  TTTTT IIIII  OOO  N   N
                              V   V A   A L       I   D   D A   A   T     I   O   O N   N
                              V   V A   A L       I   D   D A   A   T     I   O   O NN  N
                              V   V AAAAA L       I   D   D AAAAA   T     I   O   O N N N
                              V   V A   A L       I   D   D A   A   T     I   O   O N  NN
                               V V  A   A L       I   D   D A   A   T     I   O   O N   N
                                V   A   A LLLLL IIIII DDDD  A   A   T   IIIII  OOO  N   N


                                        RRRR  EEEEE PPPP   OOO  RRRR  TTTTT
                                        R   R E     P   P O   O R   R   T
                                        R   R E     P   P O   O R   R   T
                                        RRRR  EEE   PPPP  O   O RRRR    T
                                        R R   E     P     O   O R R     T
                                        R  R  E     P     O   O R  R    T
                                        R   R EEEEE P      OOO  R   R   T
```

Figure 72. VALIDPRT: Separator page for validation reports

Scan of HISAM Database report

This report contains a summary description of the HISAM database and a list of errors that were detected in the SCAN process.

This report contains the following kinds of information:

- A summary description of a primary data set (VSAM KSDS) and an overflow data set (VSAM ESDS) of the HISAM (including SHISAM) database
- A list of errors that were detected by the SCAN processor in those data sets
- The total number of records (of various types) that were involved in the processing of the HISAM (including SHISAM) database

This report is produced for each data set specified on the DATABASE statement in the PROCCTL data set.

Subsections:

- “Report example” on page 215
- “Report field description” on page 215

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "SCAN OF HISAM DATABASE REPORT"                      PAGE:     1
5655-U09                                                  DATE: 07/06/2020  TIME: 15.50.57                      FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01  DSNAME: TESTDS.PUBLIC.SAMPLE.HISAMDS1


DATABASE ORGANIZATION  = HISAM
ACCESS METHOD          = VSAM KSDS/ESDS


PRIME  (DDNAME: HISAMDS1)
-----


REAL DATABASE    ( CREATED: 07/06/2020 )

  DB BLOCKSIZE         =    8192   (X'2000') (CI-SIZE)
  DB LRECL             =     510   (X'01FE')
  DB DEVICE TYPE (REAL)= 3390       CYLS/DEVICE =      3339  TRKS/CYL =  15  MAXIMUM BLOCKSIZE = 32760  MAXIMUM TRACK LENGTH = 58786
  DB PHYS.BLKS/TRACK   =       6
  DB INDEX KEYLENGTH-1 =       9

   <---- TARGET ----> <---- SOURCE ---->     <---------------------------------- ERROR MESSAGES ----------------------------------->
TP DB  DG RBA      SC DB  DG RBA      SC PTR NUMBER    DESCRIPTION


FABP1040I NO ERRORS DETECTED
```

Figure 73. VALIDPRT: Scan of HISAM Database report (Primary part)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "SCAN OF HISAM DATABASE REPORT"                      PAGE:     2
5655-U09                                                  DATE: 07/06/2020  TIME: 15.50.57                      FABPMAIN - V3.R1


DBNAME: HISAMDB1  DB#: 002 DSG#: 01  DSNAME: TESTDS.PUBLIC.SAMPLE.HISAMDS2


OVERFLOW  (DDNAME: HISAMDS2)
--------


REAL DATABASE    ( CREATED: 07/06/2020 )

  DB BLOCKSIZE         =    8192   (X'2000') (CI-SIZE)
  DB LRECL             =     512   (X'0200')
  DB DEVICE TYPE (REAL)= 3390       CYLS/DEVICE =      3339  TRKS/CYL =  15  MAXIMUM BLOCKSIZE = 32760  MAXIMUM TRACK LENGTH = 58786
  DB PHYS.BLKS/TRACK   =       6
  DB INDEX KEYLENGTH-1 =       9

   <---- TARGET ----> <---- SOURCE ---->     <---------------------------------- ERROR MESSAGES ----------------------------------->
TP DB  DG RBA      SC DB  DG RBA      SC PTR NUMBER    DESCRIPTION


FABP1040I NO ERRORS DETECTED


TOTALS
------

T1 (SEGMENT HAVING VALID SEGMENT CODE) =       106601
T2 (UNKNOWN DATA)                      =            0
T5 (TARGET OF POINTER IS MISSING)      =            0
T8 (POINTER IN HISAM KSDS)             =          278
T9 (POINTER IN HISAM ESDS)             =        30082
TA (KEY OF INDEX SOURCE SEGMENT)       =            0
TC (NUMBER OF ISS, LC, AND SUM OF CTR) =            3
TT (TARGET OF SYMBOLIC POINTER)        =          130
TU (LPCK IN SYMBOLIC LP POINTER)       =         9100
HASH RECORDS                           =            0
KSDS RECORDS                           =          130
ESDS RECORDS                           =        21260
```

Figure 74. VALIDPRT: Scan of HISAM Database report (Overflow part and totals)

Report field description

The report fields are as follows:

DBNAME DB# DSG# DSNAME
The name of the DBD, the database number (in hexadecimal), the data set group number (in hexadecimal), and the name of the data set

DATABASE ORGANIZATION
This field indicates that the database is a HISAM database. For VSAM databases, it also indicates whether it contains unique keys or duplicate keys.

ACCESS METHOD
This field indicates how many data sets comprise this database and what their access methods are (VSAM KSDS or ESDS).

PRIME or OVERFLOW DDNAME
The ddname as coded on the DD1 keyword or OVFLW keyword of the DATASET macro in the DBD

DB BLOCKSIZE
The block size or CI size of the database data set

DB LRECL
The logical record length of the database data set

DB DEVICE TYPE
The device type on which the database data set is located

If the specified data set is an image copy database data set, the following four fields are not applicable:

CYLS/DEVICE
The number of cylinders on the device on which the database data set is located

TRKS/CYL
The number of tracks on one cylinder on the device on which the database data set is located

MAXIMUM BLOCKSIZE
The largest block size allowed on the device on which the database data set is located

MAXIMUM TRACK LENGTH
The length of one track on the device on which the database data set is located

DB PHYS.BLKS/TRACK
The number of database blocks or CIs that are on one track on the device on which the database data set is located

DB INDEX KEYLENGTH-1
The executable length of the key field (that is, key length - 1)

TP
The type of record. The HD Pointer Checker classifies its work records into types (T1, T2, and so on).

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the segment that contains the pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

PTR
The type of pointer such as LP, LTF, LTB, LCF, and LCL

ERROR MESSAGES
The following two fields pertain to error messages:

NUMBER
The message number. You can find information about each message in Chapter 37, “Messages and codes,” on page 605.

DESCRIPTION
The message text

TOTAL
The following totals are contained in this report:

T1
The number of valid database segments that were detected by the SCAN processor in this HISAM data set group

T2
The number of areas containing slack bytes that were detected by the SCAN processor in this HISAM data set group

T5
The number of pointers whose target is missing that were detected by the SCAN in this data set group

T8
The number of pointers that were detected by the SCAN processor in the primary (KSDS) part of this HISAM data set group

T9
The number of pointers that were detected by the SCAN processor in the overflow (ESDS or OSAM) part of this HISAM data set group

TA
The number of keys of index source segment occurrences that are detected by the SCAN processor

TC
The number of index source segment (ISS) occurrences, logical children, and the sum of CTR values that are detected by the SCAN processor

TT
The number of segment occurrences that are pointed to by symbolic pointers that are detected by the SCAN processor

TU
The number of logical parent's concatenated keys (LPCK) that are detected by the SCAN processor

HASH RECORDS
The number of HASH records that were scanned by the SCAN processor

KSDS RECORDS
The number of logical records that were detected by the SCAN processor in the primary (KSDS) part of this HISAM (including SHISAM) data set group

ESDS RECORDS
The number of logical records that were detected by the SCAN processor in the overflow (ESDS) part of this HISAM data set group

Scan of Index Database report

This report contains a summary description of the index database and a list of errors that were detected in the SCAN process.

This report contains the following kinds of information:

- A summary description of data sets (VSAM KSDS and ESDS) of the index database

  Note: The VSAM ESDS is used only when a secondary index database has duplicate keys.
- A list of errors that were detected by the SCAN processor in those data sets
- The total number of records (of various types) that were involved in the processing of the index database

This report is produced for each data set specified on the DATABASE statement in the PROCCTL data set. It contains at least one page for each data set.

Subsections:

- "Report example" on page 218
- "Report field description" on page 219

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "SCAN OF INDEX DATABASE REPORT"                      PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1


DBNAME: TPFOX1    DB#: 006 PARTNAME: TPFOX1A  PART ID: 00001 REORG#: N / A  DSG#:  A
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001


DATABASE ORGANIZATION  = INDEX (UNIQUE KEYS)
ACCESS METHOD          = VSAM KSDS


INDEXED DATABASE       = TPFOH2


SECONDARY INDEX DEFINITION
--------------------------

  SOURCE SEGMENT NAME               =  BDEP1LV2
  TARGET SEGMENT NAME               =  BROOTLV1
  SPARSE INDEX                      =        NO


INDEX  (DDNAME: TPFOX1AA)
-----


REAL DATABASE    ( CREATED: 07/06/2020 )

  DB BLOCKSIZE         =     512   (X'0200') (CI-SIZE)
  DB LRECL             =      54   (X'0036')
  DB DEVICE TYPE (REAL)= 3390       CYLS/DEVICE =      3339  TRKS/CYL =  15  MAXIMUM BLOCKSIZE = 32760  MAXIMUM TRACK LENGTH = 58786
  DB PHYS.BLKS/TRACK   =      49
  DB INDEX KEYLENGTH-1 =      15

   <------- TARGET -------> <-------------------------- SOURCE -------------------------> <----------- MESSAGES ------------------->
TP DB  PID   DG RBA      SC DB  DG RBA      SC PTR RRN      CHAIN  KEY                    NUMBER    DESCRIPTION



FABP1180I SCAN COMPLETED
```

Figure 75. VALIDPRT: Scan of Index Database report (Index)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                  "SCAN OF INDEX DATABASE REPORT"                        PAGE:     2
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1

DBNAME: TPFOX1    DB#: 006 PARTNAME: TPFOX1A  PART ID: 00001 REORG#: N / A  DSG#:  A
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001

   <------- TARGET -------> <-------------------------- SOURCE -------------------------> <----------- MESSAGES ------------------->
TP DB  PID   DG RBA      SC DB  DG RBA      SC PTR RRN      CHAIN  KEY                    NUMBER    DESCRIPTION


TOTALS
------

INDEX    :  TOTAL VALID SEGMENTS                          =         9178
            TOTAL DELETED SEGMENTS                        =            0
            T6 (POINTER RECORD IN INDEX DATABASE)         =         9178
            HASH RECORDS                                  =            0

OVERFLOW :  TOTAL VALID SEGMENTS                          =            0
            TOTAL DELETED SEGMENTS                        =            0
            T7 (POINTER RECORD IN INDEX OVERFLOW DATABASE) =            0
            HASH RECORDS                                  =            0

            T3 (POINTER RECORD IN INDEX AND OVERFLOW)      =            0
            TU (SYMBOLIC POINTER RECORD IN INDEX AND OVERFLOW)
                                                          =            0
            TC (NUMBER OF INDEX POINTER SEGMENT TYPES)    =            1
```

Figure 76. VALIDPRT: Scan of Index Database report (Overflow)

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DSNAME
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) of the index database, and the name of the data set. The reorganization number is always shown as N/A (Not Applicable).

DATABASE ORGANIZATION
This field indicates that the database is an index database. For VSAM databases, it also indicates whether it contains unique keys or duplicate keys.

ACCESS METHOD
This field indicates how many data sets comprise this database and what their access methods are (VSAM KSDS or ESDS)

INDEXED DATABASE
The name of the DBD, as coded on the NAME keyword of the DATASET macro in the DBD, of the *primary* database that is being indexed

SECONDARY INDEX DEFINITION
The following information about the secondary index definitions is in this report:

SOURCE SEGMENT NAME
The name of the index source segment

TARGET SEGMENT NAME
The name of the index target segment

SPARSE INDEX
Whether sparse indexing is defined or not (YES or NO). If sparse indexing is defined, the following information is given:

NULL VALUE
The value of a user-supplied NULLVAL=

SECONDARY INDEX MAINTENANCE EXIT
The name of a user-supplied secondary index maintenance exit routine

INDEX or OVERFLOW DDNAME
The ddname, as coded on the DD1 keyword or OVFLW keyword of the DATASET macro in the DBD, of the *index* database

DB BLOCKSIZE
The block size or CI size of the database data set

DB LRECL
The logical record length of the database data set

DB DEVICE TYPE
The device type on which the database data set is located

If the specified data set is an image copy database data set, the following four fields are not applicable:

CYLS/DEVICE
The number of cylinders on the device on which the database data set is located

TRKS/CYL
The number of tracks on one cylinder on the device on which the database data set is located

MAXIMUM BLOCKSIZE
The largest block size allowed on the device on which the database data set is located

MAXIMUM TRACK LENGTH
The length of one track on the device on which the database data set is located

DB PHYS.BLKS/TRACK
The number of database blocks or CIs that are on one track on the device on which the database data set is located

DB INDEX KEYLENGTH-1
The executable length of the key field (that is, key length - 1)

TP
The type of record. The HD Pointer Checker classifies its work records into types (T6, T7, and so on).

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

PID
The partition ID (in decimal) that identifies the partition containing the target of a pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following eight fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the segment that contains the pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer. This field is always '01' for index databases.

PTR
The type of pointer

IN:
Index

OF:
Index, Overflow

SX:
Secondary Index

SXO:
Secondary Index, Overflow

RRN
The relative-record number (in hexadecimal) of the segment that contains the pointer

CHAIN
The pointer (in hexadecimal) to the next index or overflow record

KEY
The key field (in character format) in the index segment. If the key length is longer than 30 bytes, only the first 30 bytes are printed.

MESSAGES
The following two fields pertain to messages:

NUMBER
The message number. You can find information about each message in Chapter 37, "Messages and codes," on page 605.

DESCRIPTION
The message text

TOTALS
The following totals are contained in this report:

INDEX: TOTAL VALID SEGMENTS
The number of valid database segments that were detected by the SCAN processor in the VSAM KSDS part of this index database

OVERFLOW: TOTAL VALID SEGMENTS
The number of valid database segments that were detected by the SCAN processor in the overflow (VSAM ESDS) part of this index database

TOTAL DELETED SEGMENT
The number of deleted database segments that were detected by the SCAN processor in the primary or overflow part of this index database

T6 (POINTER RECORD IN INDEX DATABASE)
The number of pointers that were detected by the SCAN processor in the VSAM KSDS part of this index database

T7 (POINTER RECORD IN INDEX OVERFLOW DATABASE)
The number of pointers that were detected by the SCAN processor in the overflow (VSAM ESDS) part of this index database

HASH RECORDS
The number of HASH records that were created by the SCAN processor in the primary or overflow part of this index database

T3 (POINTER RECORD IN INDEX AND OVERFLOW)
The number of pointers that point to the logical records in the overflow data set of this secondary index database. These pointers are identified by the SCAN processor.

TC (NUMBER OF INDEX POINTER SEGMENT TYPES)
The number of index pointer segment types that the SCAN processor detected in this data set

Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/PHDAM/PHIDAM) report

This report contains a summary description of the HD database and a list of errors that were detected in the SCAN process.

This report contains the following kinds of information:

- A summary description of the database data set group
- A list of errors that were detected by the SCAN processor in that data set group
- The total number of records (of various types) that were involved in the processing of the data set group

This report is produced for each database data set group specified on the DATABASE statement in the PROCCTL data set for an HD database. It contains at least one page for each of its data sets. It is not produced when HASH=YES is specified on the PROC statement.

Subsections:

- "Report example" on page 222
- "Report field description" on page 222

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS           "VALIDATION OF A POINTER TO A TARGET AT SCAN REPORT"            PAGE:     1
5655-U09                                                   DATE: 07/13/2020  TIME: 10.59.50                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4          DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4


DATABASE ORGANIZATION  = HDAM
ACCESS METHOD          = VSAM ESDS


REAL DATABASE    ( CREATED: 07/06/2020 )

  DB BLOCKSIZE         =    1024   (X'0400') (CI-SIZE)
  DB LRECL             =    1017   (X'03F9')
  DB DEVICE TYPE (REAL)= 3390      CYLS/DEVICE =      3339  TRKS/CYL =  15  MAXIMUM BLOCKSIZE = 32760  MAXIMUM TRACK LENGTH = 58786
  DB PHYS.BLKS/TRACK   =      33


   DUMP<---- TARGET ----> <---- SOURCE ----> <----------- ADDRESS OF POINTER ----------->
TP NO. DB  DG RBA      SC DB  DG RBA      SC   BLOCK# VOLUME cccCCCCHRR OFST PTR RBA
                                                                                <-------------- ERROR MESSAGES -------------->
                                                                                NUMBER    DESCRIPTION

T0 001 001 01 00015008                              84 PMR004    02BE213 0008           FABP0030E BAD FREE SPACE ELEMENT

T2 001 001 01 00015008 00                           84 PMR004    02BE213 0008           FABP0410E 03F0 (HEX) BYTES OF UNKNOWN DATA
T5 OUT 001 01 0001FF6A 03 001 01 000158FC 03      126 PMR004    02BE215 00FE PTF 000158FE
                                                                                       FABP0960E TARGET IS NOT A VALID SEGMENT
T5 OUT 001 01 00027808 01 001 01 00007804 00      157 PMR004    02BE01F 0004 RAP 00007804
                                                                                       FABP0960E TARGET IS NOT A VALID SEGMENT
T5 002 001 01 0003D17E 02 001 01 0003D004 02      244 PMR004    02BE70E 0006 PTF 0003D006
                                                                                       FABP0960E TARGET IS NOT A VALID SEGMENT


TOTALS
------

T0 RECORD FOR EACH FREE SPACE RANGE                  =           2473          T2LEN                            =              7
T1 TARGET HAVING VALID SEGMENT CODE                  =          18087          T2NUM                            =              0
T2 UNKNOWN DATA                                      =              1          # OF RECS LESS THAN EQUAL T2LEN  =              0
T3 POINTER RECORD TO BE VALIDATED IN CHECK PROCESS   =           9234          # OF RECS BETWEEN 8 AND T2LEN    =          N / A
T4 TARGET POINTER HAS UNEXPECTED SEGMENT CODE        =              0          % T2 LENGTH IN ALL BLOCKS        =            0.0
T5 TARGET OF POINTER IS MISSING                      =              3          TOTAL T2 LENGTH                  =           1008
TA KEY OF INDEX SOURCE SEGMENT                       =              0
TC NUMBER OF ISS, LC, AND SUM OF CTR FIELD VALUE     =              3
TT TARGET OF SYMBOLIC POINTER                        =             70
TU LPCK IN SYMBOLIC LP POINTER                       =           9100
HASH RECORDS                                         =              0
TS TOTAL POINTERS CHECKED (TARGET IN SAME BLOCK)     =          29041
TX TOTAL POINTERS CHECKED (TARGET IN ADJACENT BLOCK) =           6943
POINTER ERRORS FROM IN-CORE CHECK                    =              5
HIGHEST RBA                                          =       00245ABC
TOTAL BLOCKS                                         =           2474
% POINTERS VALIDATED FROM IN-CORE CHECK              =           79.5
```

Figure 77. VALIDPRT: Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/PHDAM/PHIDAM) report

Report field description

The record fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the ddname of the primary database, and the name of the data set

DATABASE ORGANIZATION
This field indicates whether the database is HIDAM or HDAM

ACCESS METHOD
This field indicates whether the database is VSAM/ESDS, OSAM, or OSAM LDS

DB BLOCKSIZE
The block size or CI size of the database data set

DB LRECL
The logical record length of the database data set

DB DEVICE TYPE
The device type on which the database data set is located

If the specified data set is an image copy database data set, the following four fields are not applicable:

CYLS/DEVICE
The number of cylinders on the device on which the database data set is located

TRKS/CYL
The number of tracks on one cylinder on the device on which the database data set is located

MAXIMUM BLOCKSIZE
The largest block size allowed on the device on which the database data set is located

MAXIMUM TRACK LENGTH
The length of one track on the device on which the database data set is located

DB PHYS.BLKS/TRACK
The number of database blocks or CIs that are on one track on the device on which the database data set is located

TP
The type of record. The HD Pointer Checker classifies its work records into types (T0, T1, and so on).

DUMP NO.
The relative block number of the block or CI that contains the invalid pointer or error. It is the same number as the dump number in the Block Map/ Block Dump report.

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

PID
The partition ID (in decimal) that identifies the partition containing the target of a pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer

SOURCE
The segment containing the pointer (also called the source of the pointer). The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

ADDRESS OF POINTER
The following six fields all pertain to the pointer:

BLOCK#
The relative block number of the block or CI that contains the pointer

Note: The first bitmap is always in block 1, regardless of whether the database is OSAM or VSAM/ESDS; therefore, block 0 does not exist for OSAM databases.

VOLUME
The volume serial number of the device that contains the pointer

cccCCCCHRR
The actual direct access address of the record that contains the pointer. This is a 10-digit hexadecimal number. ccc is the high-order 12 bits of the cylinder number. The value of ccc is printed when the dasd volume is an Extended Address Volume (EAV). It is padded with blank for non-EAV volume. CCCC is the low-order 16 bits of the cylinder number, H is the track number, and RR is the record number.

OFST
The hexadecimal displacement of the pointer within its record

PTR
The type of pointer such as PTF, PTB, PP, PCF, PCL, LTF, LTB, LP, LCF, LCL, HF, and HB

RBA
The relative byte address (in hexadecimal) of the pointer

ERROR MESSAGES
The following two fields pertain to error messages:

NUMBER
The message number. You can find information about each message in Chapter 37, “Messages and codes,” on page 605.

DESCRIPTION
The message text

TOTALS
The following totals are contained in this report:

T0
The number of valid free space elements that were detected by the SCAN processor in this data set group

T1
The number of valid database segments that were detected by the SCAN processor in this data set group

T2
The number of areas containing slack bytes that were detected by the SCAN processor in this data set group. Slack bytes represent an area in the data part of a segment that could not be classified as either segments or free space.

T3
The number of pointers that were detected by the SCAN processor in this data set group and that will be validated in the CHECK process

T4
The number of pointers that were detected by the SCAN processor in this data set group whose target has an unexpected segment code

T5
The number of pointers that were detected by the SCAN processor in this data set group whose target is missing

TA
The number of keys of index source segment which were detected by the SCAN processor

TC
The number of index source segment types that the SCAN processor detected in this data set group

HASH RECORDS
The number of HASH records that were scanned by the SCAN processor

TS TOTAL POINTERS CHECKED (TARGET IN SAME BLOCK)
The number of pointers that were detected by the SCAN processor in this data set group that were verified and whose target was in the same block as the pointer

TX TOTAL POINTERS CHECKED (TARGET IN ADJACENT BLOCK)
The number of pointers that were detected by the SCAN processor in this data set group that were verified and whose target was in a block adjacent to the block containing the pointer

POINTER ERRORS FROM IN-CORE CHECK
The number of pointer error messages that were printed in this report

HIGHEST RBA
The relative byte address of the last segment in the data set group

TOTAL BLOCKS
The number of database blocks or CIs that were processed by the SCAN processor

% POINTERS VALIDATED FROM IN-CORE CHECK
The percentage of all pointers in this data set group that were checked by the SCAN processor

T2LEN
The maximum length of T2 record which is not considered to be error. This length has been specified with T2CHK parameter on the OPTION statement (the default value is 7).

T2NUM
The maximum number of the T2 records which are not considered to be error. This number has been specified with T2CHK parameter on the OPTION statement (the default value is 0).

 # OF RECS LESS THAN EQUAL T2LEN
The number of T2 records whose length is less than or equal to the specified T2LEN

 # OF RECS BETWEEN 8 AND T2LEN
The number of T2 records whose length is between 8 and the specified T2LEN

% T2 LENGTH IN ALL BLOCKS
The percentage of the total length of T2 records in this data set group

TOTAL T2 LENGTH
The total length of T2 records

Legend for Scan and Validation report

This report contains a brief description of the headings and abbreviations used in the Scan of HISAM Database report, the Scan of Index Database report, and the Validation of a Pointer to a Target at SCAN (HDAM/HIDAM) report.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "LEGEND FOR SCAN / VALIDATION REPORT"                    PAGE:     1
5655-U09                                                 DATE: 07/06/2020  TIME: 15.50.57                      FABPMAIN - V3.R1


TP ..... RECORD TYPE (T1, T2, ETC.)

  T0 ..... RECORD FOR EACH FREE SPACE RANGE
  T1 ..... SEGMENT HAVING VALID SEGMENT CODE
  T2 ..... SLACK BYTES MORE THAN SPECIFIED T2LEN (UNKNOWN DATA)
  T3 ..... POINTER RECORD TO BE VALIDATED IN CHECK PROCESS
  T4 ..... TARGET POINTER HAS UNEXPECTED SEGMENT CODE
  T5 ..... TARGET OF POINTER IS MISSING
  T6 ..... POINTER IN INDEX DATABASE
  T7 ..... POINTER IN INDEX OVERFLOW DATABASE
  T8 ..... POINTER IN HISAM KSDS
  T9 ..... POINTER IN HISAM ESDS
  TA ..... KEY OF INDEX SOURCE SEGMENT
  TC ..... NUMBER OF ISS, IPS, LC, AND SUM OF COUNTER VALUE
  TT ..... TARGET OF SYMBOLIC POINTER
  TU ..... SYMBOLIC POINTER

DUMP NO. . BLK MAP/DUMP NUMBER FOR PTR/TGT IN SAME BLK, ELSE "OUT"

TARGET OF POINTER:

  DB ..... DATABASE NUMBER OF TARGET SEGMENT
  DG ..... DATA SET GROUP OF TARGET SEGMENT
  RBA .... RELATIVE BYTE ADDRESS OF TARGET SEGMENT
  SC ..... SEGMENT CODE OF TARGET SEGMENT
     ..... ACTUAL (IF TP=T1) OR EXPECTED TARGET SEGMENT CODE

SOURCE OF POINTER:

  DB ..... DATABASE NUMBER OF SEGMENT CONTAINING POINTER
  DG ..... DATA SET GROUP OF SEGMENT CONTAINING POINTER
  RBA .... RELATIVE BYTE ADDRESS OF SEGMENT CONTAINING POINTER
  SC ..... SEGMENT CODE OF SEGMENT CONTAINING POINTER
  PTR..... POINTER TYPE
  RRN..... RELATIVE RECORD NUMBER OF INDEX OR OVERFLOW POINTER
  CHAIN .. POINTER TO NEXT INDEX OR OVERFLOW RECORD
  KEY .... FIRST 30 BYTES OF KEY

DISK ADDRESS OF POINTER:

  BLOCK# . BLOCK CONTAINING POINTER
  VOLUME . DIRECT ACCESS VOLUME ID
  cccCCCCHRR OFST .. DASD ADDRESS OF POINTER (IF YOU REFER OR CHANGE THE DATABASE CONTENTS BY AMASPZAP, CONVERT THE VALUE FORM THE
                     cccCCCCHRR FORMAT INTO THE CCCCHHHHRR FORMAT.)
  PTR .... POINTER TYPE
  RBA .... RBA OF POINTER IN ERROR

ERROR MESSAGES:

  NUMBER . ERROR MESSAGE NUMBER
  DESCRIPTION .. SHORT DESCRIPTION OF ERROR
```

Figure 78. VALIDPRT: Legend for Scan and Validation report

Description of All Scanned Databases report

This report contains a list of all the databases that were scanned during the HD Pointer Checker run.

Subsections:

- "Report example" on page 226
- "Report field description" on page 227

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "DESCRIPTION OF ALL SCANNED DATABASE REPORT"                 PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME   PARTITION PARTITION DDNAME   DB# DSG# DBLG# DB-ORGANIZATION   ACCESS    BLKSIZ LRECL DBTYPE CRT-DATE   CRT-TIME DVCTYPE
         NAME      ID

HDAMDB2                     HDAMDS4  001  01   001  HDAM              VSAM ESDS   1024  1017  REAL  2020.07.06 17.36.26 3390
HISAMDB1                    HISAMDS1 002  01   001  HISAM             VSAM KSDS   8192   510  REAL  2020.07.06  N/AVAIL 3390
HISAMDB1                    HISAMDS2 002  01   001  HISAM       OFLW  VSAM ESDS   8192   512  REAL  2020.07.06 17.35.40 3390
TPFOH1   TPFOH1A   00001     TPFOH1AA 003   A   002  PHDAM             VSAM ESDS    512   505  REAL  2020.07.06 17.36.50 3390
TPFOH1   TPFOH1A   00001     TPFOH1AB 003   B   002  PHDAM             VSAM ESDS    512   505  REAL  2020.07.06 17.36.50 3390
TPFOH3   TPFOH3A   00001     TPFOH3AA 004   A   002  PHDAM             VSAM ESDS    512   505  REAL  2020.07.06 17.38.30 3390
TPFOH2   TPFOH2A   00001     TPFOH2AA 005   A   002  PHIDAM            VSAM ESDS    512   505  REAL  2020.07.06 17.38.16 3390
TPFOH2   TPFOH2A   00001     TPFOH2AX 005   X   002  PHIDAM IDX        VSAM KSDS    512    14  REAL  2020.07.06  N/AVAIL 3390
TPFOX1   TPFOX1A   00001     TPFOX1AA 006   A   002  PSINDEX           VSAM KSDS    512    54  REAL  2020.07.06  N/AVAIL 3390

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "DESCRIPTION OF ALL SCANNED DATABASE REPORT"                 PAGE:     2
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


PROGRAM FUNCTIONS
-----------------

CHECK PROCESS PERFORMS THE FOLLOWING POINTER CHECKS:

BASIC: (VALIDATION OF A POINTER TO A TARGET)
-----
       - VALIDATE POINTERS TO TARGET
       - DETECT MISSING TARGETS
       - DETECT TARGET IN FREE SPACE
       - DETECT TARGET SEGMENT CODE INVALID
       - DETECT DUPLICATE POINTERS TO TARGET
         (EXCEPT LP AND PP)
       - DETECT INVALID COMBINATIONS OF POINTERS TO TARGET

COMPREHENSIVE: (EVALUATION OF ALL PTRS TO SAME TARGET)
-------------
       - DETECT UNREFERENCED SEGMENTS
       - VERIFY INDEX TO HIDAM/PHIDAM ROOT PRESENT
       - VERIFY REQUIRED PHYSICAL POINTERS TO TARGET
       - VERIFY REQUIRED LOGICAL  POINTERS TO TARGET
       - CHECK COUNTER FIELD AGAINST ACTUAL LCHILD COUNT
       - VERIFY CORRESPONDING PHYSICALLY PAIRED SEGS PRESENT

          *****   W A R N I N G   *****

       COMPREHENSIVE CHECKS CAN ONLY BE MADE CORRECTLY
       IF ALL RELATED DATABASES, DATA SET GROUPS AND
       REQUIRED POINTERS HAVE BEEN SCANNED.

       IF ALL THE REQUIRED DATABASES, HAVE NOT BEEN SCANNED
       SPURIOUS MESSAGES WILL BE PRODUCED UNLESS
       INFO IS SUPPLED TO TURN OFF THE CHECKS NOT DESIRED
       CHECK=(CHK,NNNNNN)
          POSITION 1: 1 IF INDEX TO HIDAM/PHIDAM ROOT CHECK  (DEFAULT)
                      0 IF NO INDEX TO HIDAM/PHIDAM ROOT CHECK
          POSITION 2: 1 CHK FOR REQUIRED PHYS PTRS    (DEFAULT)
                      0 IF NO PHYSICAL PTR CHECK
          POSITION 3: 1 CHK FOR REQUIRED LOG. PTRS    (DEFAULT)
                      0 IF NO LOGICAL PTR CHECK
          POSITION 4: 1 CHECK CTR VERSUS #LCHILD(S)   (DEFAULT)
                      0 IF NO CTR/LCHILD COUNT CHECK
          POSITION 5: 1 VERIFY PHYS PAIRED SEGS       (DEFAULT)
                      0 IF NO PHYSICALLY PAIRED SEG CHECK
          POSITION 6: 1 DO NOT PRINT HASH FORMULAS    (DEFAULT)
                      0 PRINT HASH FORMULAS
```

Figure 79. VALIDPRT: Description of All Scanned Database report

Report field description

The report fields are as follows:

DBNAME
The name of the DBD as coded on the NAME keyword of the DBD macro

PARTITION NAME
The name of the partition

PARTITION ID
The partition ID (in decimal) that identifies the partition

DDNAME
The ddname as coded on the DD1 keyword or OVFLW keyword of the DATASET macro in the DBD

DB#
The database number (in hexadecimal) that identifies the database

DSG#
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database data set group

DBLG#
The database logical group number which indicates that physical databases with the same database logical group number are logically related to each other

DB-ORGANIZATION
The type of database organization (HISAM, HIDAM, HDAM, INDEX, and so on)

ACCESS
The access method used by the database (VSAM, OSAM, OSAM LDS, or ISAM, and so on)

BLKSIZ
The block size or CI size of the database data set

LRECL
The logical record length of the database data set

DBTYPE
Indicates whether the database data set is a real database or an image copy database

CRT-DATE
The date on which the data set was created (if available)

CRT-TIME
The time at which the data set was created (if available)

DVCTYPE
The device type on which the database data set is located

Validation of a Pointer to a Target at CHECK report

This report contains a list of errors that were detected in the CHECK process.

This report contains the following kinds of information:

- A list of errors that were detected by the CHECK processor in each data set group
- Various totals

This report is produced for each primary database that was scanned by the SCAN processor. This report is not produced when HASH=YES is specified on the PROC statement in the PROCCTL data set.

Subsections:

- "Report example" on page 228
- "Report field description" on page 228

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS          "VALIDATION OF A POINTER TO A TARGET AT CHECK REPORT"           PAGE:     1
5655-U09                                                  DATE: 07/13/2020  TIME: 10.59.50                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01
-----------------------------------

   <---- TARGET ----> <---- SOURCE ----->  <----------- ADDRESS OF POINTER -----------> <-------------- ERROR MESSAGES -------------->
TP DB  DG RBA      SC DB  DG RBA      SC    BLOCK# VOLUME cccCCCCHRR OFST PTR RBA      NUMBER    DESCRIPTION

T5 001 01 00000004 03 001 01 00028004 03       160 PMR004    02BE41D 0006 PTF 00028006 FABP0960E TARGET IS NOT A VALID SEGMENT
T5 001 01 00003008 01 001 01 00050004 02       320 PMR004    02BE918 000E  PP 0005000E FABP0950E TARGET IS IN FREE SPACE
T3 001 01 00007F3A 02 001 01 00079072 02       484 PMR004    02BEE17 0078 PTB 00079078 FABP0785E PTB/HB POINT TO END OF CHAIN
T5 001 01 0000D15A 02 001 01 0001D2B0 02       116 PMR004    02BE312 02B6 PTB 0001D2B6 FABP0960E TARGET IS NOT A VALID SEGMENT
T2 001 01 00015008 30                           84 PMR004    02BE213 0008              FABP0410E 03F0 (HEX) BYTES OF UNKNOWN DATA
T5 001 01 02007C08 01 001 01 00007C04 00        31 PMR004    02BE020 0004 RAP 00007C04 FABP0960E TARGET IS NOT A VALID SEGMENT

FABP0020I #VALIDATION ERRORS DETECTED =         6
```

Figure 80. VALIDPRT: Validation of a Pointer to a Target at CHECK report

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) and the ddname

TP
The type of record that is printed on this line. HD Pointer Checker classifies its work records into types (T0, T1, and so on).

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer. This can also be the expected segment code, if the target is in error.

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) that identifies the database containing the segment that contains the pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

ADDRESS OF POINTER
The following six fields all pertain to the pointer itself:

BLOCK#
The relative block number of the block or CI that contains the pointer

Note: The first bitmap is always in block 1, regardless of whether the database is OSAM or VSAM/ESDS. So block 0 does not exist for OSAM databases.

VOLUME
The volume serial number of the device that contains the pointer

cccCCCCHRR
The actual direct access address of the record that contains the pointer. This is a 10-digit hexadecimal number. ccc is the high-order 12 bits of the cylinder number. The value of ccc is printed when the dasd volume is an Extended Address Volume (EAV). It is padded with blank for non-EAV volume. CCCC is the low-order 16 bits of the cylinder number, H is the track number, and RR is the record number.

OFST
The hexadecimal displacement of the pointer within its record

PTR
The type of pointer such as PTF, PTB, PP, PCF, PCL, LTF, LTB, LP, LCF, LCL, HF, HB, IN, INO, SX, and SXO

RBA
The relative byte address (in hexadecimal) of the pointer

ERROR MESSAGES
The following two fields pertain to error messages:

NUMBER
The message number. You can find information about each message in Chapter 37, “Messages and codes,” on page 605.

DESCRIPTION
The message text

Legend for Check Process Validation report

This report contains a brief description of the headings and abbreviations used in the Validation of a Pointer to a Target at CHECK report.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "LEGEND FOR CHECK PROCESS VALIDATION REPORT"                PAGE:     1
5655-U09                                                  DATE: 07/06/2020  TIME: 15.50.57                       FABPMAIN - V3.R1


TP ...... RECORD TYPE (T1, T2, ETC.)

TARGET OF POINTER:

DB ...... DATABASE NUMBER OF TARGET SEGMENT
DG ...... DATA SET GROUP NUMBER OF TARGET SEGMENT
RBA ..... RELATIVE BYTE ADDRESS OF TARGET SEGMENT
SC ...... ACTUAL SEGCODE OF TGT (IF TP=T1), ELSE EXPECTED TGT SC

SOURCE OF POINTER:

DB ...... DATABASE NUMBER OF SEGMENT CONTAINING POINTER
DG ...... DATA SET GROUP NUMBER OF SEGMENT CONTAINING POINTER
RBA ..... RELATIVE BYTE ADDRESS OF SEGMENT CONTAINING POINTER
SC ...... SEGMENT CODE OF SEGMENT CONTAINING POINTER

DISK ADDRESS OF POINTER:

BLOCK# .. BLOCK CONTAINING POINTER
VOLUME .. DIRECT ACCESS VOLUME ID
cccCCCCHRR OFST .. ADDR OF PTR IN ERROR (IF YOU REFER OR CHANGE THE DATABASE CONTENTS BY AMASPZAP, CONVERT THE VALUE FORM THE
                   cccCCCCHRR FORMAT INTO TO THE CCCCHHHHRR FORMAT.)

PTR ..... POINTER TYPE
RBA ..... RBA OF POINTER IN ERROR

ERROR MESSAGES:

NUMBER ... ERROR MESSAGE NUMBER
DESCRIPTION .. SHORT DESCRIPTION OF ERROR

***** SNAP OF BLOCKS CONTAINING ERRORS, WHERE TGT AND PTR TO TGT ARE NOT IN THE SAME BLOCK

      1. USE BLOCK DUMP OPTION BY SPECIFYING BLOCKDUMP PARAMETER IN DATABASE STATEMENT
      2. OS UTILITIES
      3. VSAM ACCESS METHOD SERVICES

***** CTL RECORDS ARE WRITTEN TO BLKMAP PROCESS FOR:

      1. ALL POINTERS POINTING TO A SEG CONTAINING BAD POINTERS
      2. ALL POINTERS POINTING TO THE SEG WHICH IS POINTED AT BY A BAD POINTER
      3. ALL POINTERS POINTING TO A SEG WITH BAD CTR VALUES

***** PSEUDO ERROR MESSAGES MAY BE GENERATED WHEN INDEX OVERFLOW DATA SET PTR'S ARE VALIDATED/EVALUATED

CAUSE: DL/I DOES NOT SET THE DELETE FLAG IN INDEX OVERFLOW RECORD AFTER ROOT DELETION
       THESE RECORDS ARE LOCATED BY THE PTR CHECKER AS 'ACTIVE', ALTHOUGH THEY ARE INACTIVE TO DL/I
```

Figure 81. VALIDPRT: Legend for Check Process Validation report

EVALUPRT data set

The EVALUPRT data set contains evaluation reports produced by the HD Pointer Checker processor (FABPMAIN).

The following reports are generated in this data set:

- Separator page for evaluation reports
- Evaluation of All Pointers to the Same Target report

- Legend for Check Process Evaluation report
- Check Process Total report
- HASH Evaluation report
- Evaluation of Index Pointers and Keys report
- Database Repair Guidelines report
- Separator page for reconstruction reports
- DMB Directory and Control Card Format report
- Pointer Chain Reconstruction report
- Legend for Reconstruction report

Separator page for evaluation reports

This separator page contains the title of "Evaluation Report", and indicates that evaluation reports will follow the page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

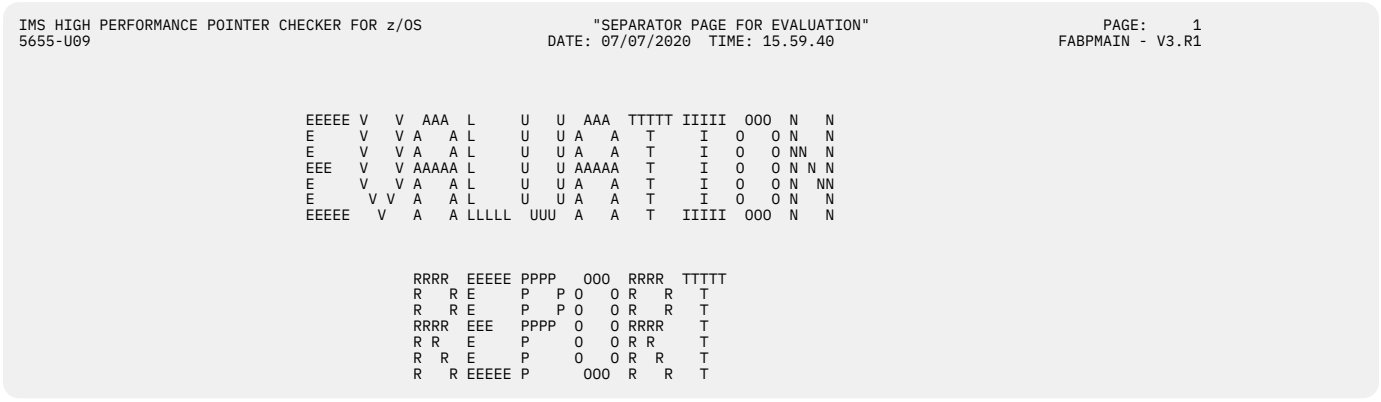


Figure 82. EVALUPRT: Separator page for evaluation reports

Evaluation of All Pointers to the Same Target report

This report contains a list of errors that were detected in the CHECK process and, if index databases are defined, information about index counts and indexed databases.

This report contains the following kinds of information:

- A list of errors that were detected by the CHECK processor in each data set group
- Various totals

This report is produced for each primary database that was scanned by the SCAN processor. This report is not produced when HASH=YES is specified on the PROC statement as input for the PROCCTL data set.

Subsections:

- “Report example” on page 231
- “Report field description” on page 232

Report example

The following figures show an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS          "EVALUATION OF ALL POINTERS TO THE SAME TARGET REPORT"          PAGE:     1
5655-U09                                                 DATE: 07/13/2020  TIME: 10.59.50                       FABPMAIN - V3.R1


DBNAME: HDAMDB2   DB#: 001 DSG#: 01  DDNAME: HDAMDS4

   <---- TARGET ---->  SEGM    PHYS  LOGICAL COUNTER  LCHILD  #PHY PAIRED SEG  <----------------- ERROR MESSAGES ------------------>
TP DB  DG RBA      SC  PTRS   PT2TGT PT2TGT  VALUE    COUNT   POINTING TO TGT  NUMBER    DESCRIPTION

T1 001 01 00003408 01  FLG=E0 PHY=02 LOG=04  CTR=0082 LC=0082 LP=0082 PP=0081  FABP0540E PAIRED LOG. CHILD > PHYS. CHILD
T1 001 01 00007808 01  FLG=E0 PHY=00 LOG=04  CTR=0082 LC=0082 LP=0082 PP=0082  FABP0480E NO RAP/H/T TO RT
T1 001 01 00007C08 01  FLG=E0 PHY=10 LOG=04  CTR=0082 LC=0082 LP=0082 PP=0082  FABP0480E NO RAP/H/T TO RT
T1 001 01 00007C08 01  FLG=E0 PHY=10 LOG=04  CTR=0082 LC=0082 LP=0082 PP=0082  FABP0800E PTB WITH NO CORRESPONDING PTF
T1 001 01 00011008 01  FLG=E0 PHY=02 LOG=04  CTR=7FFF LC=0082 LP=0082 PP=0082  FABP0050E COUNTER VALUE > NUMBER OF LCHILD
T1 001 01 0001596A 03  FLG=60 PHY=04 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0430E NO H/T/PC TO DEPENDENT
T1 001 01 0001D15A 02  FLG=70 PHY=20 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0860E PTF WITH NO CORRESPONDING PTB
T1 001 01 00028004 03  FLG=60 PHY=24 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0860E PTF WITH NO CORRESPONDING PTB
T1 001 01 0003D07E 02  FLG=70 PHY=10 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0430E NO H/T/PC TO DEPENDENT
T1 001 01 0003D07E 02  FLG=70 PHY=10 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0800E PTB WITH NO CORRESPONDING PTF
T1 001 01 00079072 02  FLG=70 PHY=10 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0430E NO H/T/PC TO DEPENDENT
T1 001 01 00079072 02  FLG=70 PHY=10 LOG=00  CTR= N/A LC= N/A LP= N/A PP= N/A  FABP0800E PTB WITH NO CORRESPONDING PTF

FABP0010I #EVALUATION ERRORS DETECTED           =       12

FABP1200I COUNT OF LCHILD SEGS (PHYS. PAIRD) WITH SYMB LP PTRS FROM DATA SET INTO OTHER DB(S) =      9100

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS          "EVALUATION OF ALL POINTERS TO THE SAME TARGET REPORT"          PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


DBNAME: TPFOH2    DB#: 005 PARTNAME: TPFOH2A  PART ID: 00001 REORG#: 00001  DSG#:  A  DDNAME: TPFOH2AA

   <---- TARGET ---->  SEGM    PHYS  LOGICAL COUNTER  LCHILD  #PHY PAIRED SEG  <----------------- ERROR MESSAGES ------------------>
TP DB  DG RBA      SC  PTRS   PT2TGT PT2TGT  VALUE    COUNT   POINTING TO TGT  NUMBER    DESCRIPTION


INDEX SEGMENT COUNTS STATISTICS
-------------------------------


     INDEX DATABASE NAME       =  TPFOH2
     INDEXED DATABASE NAME     =  TPFOH2
     INDEX SOURCE SEGMENT NAME =  BROOTLV1
     INDEX TARGET SEGMENT NAME =  BROOTLV1
     SPARSE INDEX              =        NO

     NUMBER OF INDEX POINTER SEGMENT                  =            9000
     NUMBER OF INDEX SOURCE SEGMENT                   =            9000
     NUMBER OF SUPPRESSED SEGMENT (NULLVAL)           =           N / A
     NUMBER OF SUPPRESSED SEGMENT (SEC IDX MAINT EXIT) =          N / A
     NUMBER OF SUPPRESSED SEGMENT (VL SHORT SEGMENT)   =          N / A

INDEX SEGMENT COUNTS STATISTICS
-------------------------------


     INDEX DATABASE NAME       =  TPFOX1
     INDEXED DATABASE NAME     =  TPFOH2
     INDEX SOURCE SEGMENT NAME =  BDEP1LV2
     INDEX TARGET SEGMENT NAME =  BROOTLV1
     SPARSE INDEX              =        NO

     NUMBER OF INDEX POINTER SEGMENT                  =            9178
     NUMBER OF INDEX SOURCE SEGMENT                   =            9178
     NUMBER OF SUPPRESSED SEGMENT (NULLVAL)           =           N / A
     NUMBER OF SUPPRESSED SEGMENT (SEC IDX MAINT EXIT) =          N / A
     NUMBER OF SUPPRESSED SEGMENT (VL SHORT SEGMENT)   =          N / A

FABP0010I #EVALUATION ERRORS DETECTED           =        0

FABP1050I #LP SEGMENTS WITH ZERO CTR FIELD      =     8999


FABP1040I NO ERRORS DETECTED
```

Figure 83. EVALUPRT: Evaluation of All Pointers to the Same Target report

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME
: The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) and the ddname

TP
: The type of record that is printed on this line. The HD Pointer Checker classifies its work records into types (T0, T1, and so on).

TARGET
: The target of a pointer. The following four fields all pertain to it:

  DB
  : The database number (in hexadecimal) that identifies the database containing the target of a pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer. This can also be the expected segment code, if the target is in error.

The following six fields show various totals and flags that pertain to the segment:

SEGM PTRS
A flag (from the DBD) showing the pointers contained in the segment. Bit settings are as follows:

Bit
Pointer

0 (X'80')
CTR: Logical child counter

1 (X'40')
PTF: Physical twin forward

2 (X'20')
PTB: Physical twin backward

3 (X'10')
PP: Physical parent

4 (X'08')
LTF: Logical twin forward

5 (X'04')
LTB: Logical twin backward

6 (X'02')
LP: Logical parent

7 (X'01')
H: Hierarchical

PHYS PT2TGT
A flag indicating the physical pointers to the segment that were detected by the SCAN and CHECK processes. Bit settings are as follows:

Bit
Pointer

0 (X'80')
HF: Hierarchical forward

1 (X'40')
HB: Hierarchical backward

2 (X'20')
PTF: Physical twin forward

3 (X'10')
PTB: Physical twin backward

4 (X'08')
PCF: Physical child first

5 (X'04')
PCL: Physical child last

6 (X'02')
RAP: Root anchor point

7 (X'01')
VLS: Pointer to data part of a split (variable—length) segment

LOGICAL PT2TGT
A flag indicating the logical pointers to the segment that were detected by the SCAN and CHECK processes. Bit settings are as follows:

Bit
Pointer

0 (X'80')
LTF: Logical twin forward

1 (X'40')
LTB: Logical twin backward

2 (X'20')
LCF: Logical child first

3 (X'10')
LCL: Logical child last

4 (X'08')
LP: Logical parent

5 (X'04')
PP: Physical parent

6 (X'02')
IN/SX: HIDAM primary index pointer or secondary index pointer

7 (X'01')
SXO: Secondary index pointer from overflow

COUNTER VALUE
The value of the logical child counter in the segment

LCHILD COUNT
The number of logical children (from unidirectional and physically paired logical children) detected by the SCAN processor for the segment

#PHY PAIRED SEG POINTING TO TGT

LP=
The number of logical parent pointers (from physically paired logical children) detected by the SCAN and CHECK processors to the segment

PP=
The number of physical parent pointers (from physically paired logical children) detected by the SCAN and CHECK processors to the segment

ERROR MESSAGES
The following two fields pertain to error messages:

NUMBER
The message number. You can find information about each message in Chapter 37, “Messages and codes,” on page 605.

DESCRIPTION
The message text

INDEX SEGMENT COUNTS STATISTICS
This report contains the following information about index counts and indexed databases:

INDEX DATABASE NAME
The name of the INDEX DBD

INDEXED DATABASE NAME
The name of the INDEXed DBD

INDEX SOURCE SEGMENT NAME
The name of the index source segment

INDEX TARGET SEGMENT NAME
The name of the index target segment

SPARSE INDEX
Whether sparse indexing is defined or not (YES or NO)

NUMBER OF INDEX POINTER SEGMENT
The number of index pointer segments

NUMBER OF INDEX SOURCE SEGMENT
The number of index source segments

NUMBER OF SUPPRESSED SEGMENT (NULLVAL)
The number of index pointer segments that are suppressed by NULLVAL=

NUMBER OF SUPPRESSED SEGMENT (SEC IDX MAINT EXIT)
The number of index pointer segments that are suppressed by the Secondary Index Maintenance Exit routine

NUMBER OF SUPPRESSED SEGMENT (VL SHORT SEGMENT)
The number of index pointer segments that are suppressed by the missing index source segment data of the search field for the index pointer segment

Legend for Check Process Evaluation report

This report contains a brief description of the headings and abbreviations used in the Evaluation of All Pointers to the Same Target report.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "LEGEND FOR CHECK PROCESS EVALUATION REPORT"                PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1


EVALUATION OF POINTERS TO SAME TARGET
-------------------------------------

TP ....... RECORD TYPE

TARGET SEGMENT:

DB ....... TARGET DATABASE NUMBER
DG ....... TARGET DATA SET GROUP NUMBER
RBA ...... RBA OF TARGET SEGMENT
SC ....... SEGMENT CODE OF TARGET SEGMENT

SEGM ..... (FLG) FLAG FROM DBD SHOWING POINTERS IN THIS SEG (COMBINATIONS OF POINTERS WILL SHOW DIFFERENT HEX PRINTOUTS)
PTRS       BIT  PTR   PRINTS AS (HEX)         BIT  PTR   PRINTS AS (HEX)
            0 = CTR       80                   4 = LTF       08
            1 = PTF       40                   5 = LTB       04
            2 = PTB       20                   6 = LP        02
            3 = PP        10                   7 = H         01

PHYS ..... (PHY) PHYSICAL POINTERS DETECTED TO THIS SEG
PT2TGT     BIT  PTR   PRINTS AS (HEX)         BIT  PTR   PRINTS AS (HEX)
            0 = HF        80                   4 = PCF       08
            1 = HB        40                   5 = PCL       04
            2 = PTF       20                   6 = RAP       02
            3 = PTB       10                   7 = VLS       01

LOGICAL .. (LOG) LOGICAL POINTERS DETECTED TO THIS SEG
PT2TGT     BIT  PTR   PRINTS AS (HEX)         BIT  PTR   PRINTS AS (HEX)
            0 = LTF       80                   4 = LP        08
            1 = LTB       40                   5 = PP        04
            2 = LCF       20                   6 = IN/SX     02
            3 = LCL       10                   7 = OF/SXO    01

COUNTER VALUE ... (CTR) VALUE IN SEGMENT SHOWING NUMBER OF
           LOGICAL CHILDREN POINTING TO THIS SEGMENT

LCHILD COUNT .... (LC) COUNT OF LOGICAL CHILDREN POINTING TO THIS SEGMENT
           IN A UNI-DIR. OR PHYS. PAIRED LOGICAL RELATIONSHIP

#PHY PAIRED SEG POINTING TO TARGET ... (LP) COUNT OF LP POINTERS
           FROM PHYSICALLY PAIRED SEGMENTS POINTING TO THIS SEGMENT
           (PP) COUNT OF PP POINTERS FROM PHYSICALLY PAIRED SEGMENTS
           TO THIS SEGMENT

ERROR MESSAGES:

NUMBER ... ERROR MESSAGE NUMBER
DESCRIPTION .. SHORT DESCRIPTION OF ERROR
```

Figure 84. EVALUPRT: Legend for Check Process Evaluation report

Check Process Total report

This report contains the counts of the various work records that were generated during this HD Pointer Checker run.

Subsections:

- “Report example” on page 236
- “Report field description” on page 236

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "CHECK PROCESS TOTAL REPORT"                        PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1


POINTER ERRORS WHERE TARGET IS NOT IN SAME BLOCK    =                0

T0 (FREE SPACE ELEMENT)                             =            25844
T1 (SEGMENT HAVING VALID SEGMENT CODE)              =           228604
T2 (UNKNOWN DATA)                                   =                0
T3 (POINTER WHOSE TARGET WAS NOT VALIDATED IN SCAN) =            72508
T4 (TARGET OF POINTER HAS UNEXPECTED SEGMENT CODE)  =                0
T5 (TARGET OF POINTER IS MISSING)                   =                0
T6-T9 (CUMULATED TOTAL OF POINTER TYPES BELOW)      =            48539
T6 (POINTER IN HIDAM/PHIDAM OR SEC. INDEX)
T7 (POINTER IN HIDAM/PHIDAM OR SEC. INDEX OVERFLOW)
T8 (POINTER IN HISAM KSDS)
T9 (POINTER IN HISAM ESDS)
TC (NUMBER OF ISS, IPS, LC, AND SUM OF CTR FIELD)   =                7
HASH RECORDS                                        =                0

INPUT COUNT                                         =           375495

PTRS POINTING TO OTHER DATABASES                    =                0


*** IF THE COUNT OF PTRS POINTING TO OTHER DB(S) NOT ZERO,
    EITHER ALL RELATED DATABASES WERE NOT SCANNED,

              - OR -

    ALL PTR/TGT RECS WERE NOT CREATED FOR/PASSED TO CHECK PROCESS
```

Figure 85. EVALUPRT: Check Process Total report

Report field description

The report fields are as follows:

T0
The number of valid free space elements detected by the SCAN processor

T1
The number of valid database segments detected by the SCAN processor

T2
The number of areas containing slack bytes detected by the SCAN processor. Slack bytes represent an area in the data part of a segment that could not be classified as either segments or free space.

T3
The number of pointers detected and not validated by the SCAN processor

T4
The number of pointers detected whose target has an unexpected segment code

T5
The number of pointers detected whose target is missing

T6-T9
The total of T6, T7, T8, and T9 pointer types

T6
The pointers detected by the SCAN processor in the VSAM KSDS part of a HIDAM index or secondary index database

T7
The pointers detected by the SCAN processor in the overflow (VSAM ESDS) part of a HIDAM or secondary index database

T8
The pointers detected by the SCAN processor in the primary (VSAM KSDS) part of a HISAM database

T9
The pointers detected by the SCAN processor in the overflow (VSAM ESDS) part of a HISAM database

TC
The number of index source segment occurrences, the number of index pointer occurrences, the number of logical children, and the sum of counter field value in logical parents that are detected by the SCAN processor

HASH RECORDS
The number of HASH records created by the HASH Check option

INPUT COUNT
The number of work records read by the CHECK processor

PTRS POINTING TO OTHER DATABASES
The number of the pointers pointing to other databases and detected by the SCAN processor

HASH Evaluation report

This report contains messages issued by the HD Pointer Checker processor (FABPMAIN) through the HASH Check.

Subsections:

- "Report example" on page 237
- "Report field description" on page 237

Report example

The following figure shows an example of the report. For information about each message, see Chapter 37, "Messages and codes," on page 605.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "HASH EVALUATION REPORT"                        PAGE:     1
5655-U09                                                  DATE: 07/13/2020  TIME: 11.07.51                    FABPMAIN - V3.R1

FABP1959E MISMATCH BETWEEN RAPS & PTF POINTERS TO ROOT SEGMENT: ROOT     AND TARGET RBA VALUES
FABP1996E COUNTER VALUE IN LP (SEGMENT: ROOT    ) IS NOT EQUAL TO THE NUMBER OF LOGICAL CHILDREN
FABP1997E MISMATCH BETWEEN LP POINTERS AND LOGICAL PARENT RBA VALUES (DB: HDAMDB2  SEGMENT: ROOT    )
FABP1960E THE NUMBER OF SEGMENTS: DEP1     IS NOT EQUAL TO THE NUMBER OF THE PTF POINTERS
FABP1961E MISMATCH BETWEEN PTF POINTERS IN SEGMENT: DEP1     AND TARGET RBA VALUES
FABP1962E THE NUMBER OF SEGMENTS: DEP1     IS NOT EQUAL TO THE NUMBER OF THE PTB POINTERS
FABP1963E MISMATCH BETWEEN PTB POINTERS IN SEGMENT: DEP1     AND TARGET RBA VALUES
FABP1966E THE NUMBER OF SEGMENTS: DEP1     IS NOT EQUAL TO THE NUMBER OF ITS PTF POINTERS & PCF POINTERS IN THE PARENT: ROOT
FABP1967E MISMATCH BETWEEN PTF POINTERS IN SEGMENT: DEP1     & PCF POINTERS IN PARENT: ROOT     AND TARGET RBA VALUES
FABP1969E MISMATCH BETWEEN PTB POINTERS IN SEGMENT: DEP1     & PCL POINTERS IN PARENT: ROOT     AND TARGET RBA VALUES
FABP1970E MISMATCH BETWEEN PP POINTERS IN THE LAST PHYSICAL CHILD: DEP1     AND RBA VALUES OF PARENT: ROOT     WITH NON-ZERO PCF
FABP1974E THE NO. OF THE LAST SEGMENTS IN TWIN CHAINS: DEP1     IS NOT EQUAL TO THE NO. OF THE PCL POINTERS IN PARENT: ROOT
FABP1975E MISMATCH BETWEEN PCL POINTERS IN PARENT: ROOT     AND RBA VALUES OF THE LAST SEGMENT IN TWIN CHAINS: DEP1
FABP1982E MISMATCH BETWEEN PP POINTERS IN THE LAST PHYSICAL CHILD: DEP1     AND RBA VALUES OF PARENT: ROOT     WITH NON-ZERO PCL
FABP1960E THE NUMBER OF SEGMENTS: DEP2     IS NOT EQUAL TO THE NUMBER OF THE PTF POINTERS
FABP1961E MISMATCH BETWEEN PTF POINTERS IN SEGMENT: DEP2     AND TARGET RBA VALUES
FABP1962E THE NUMBER OF SEGMENTS: DEP2     IS NOT EQUAL TO THE NUMBER OF THE PTB POINTERS
FABP1963E MISMATCH BETWEEN PTB POINTERS IN SEGMENT: DEP2     AND TARGET RBA VALUES
FABP1966E THE NUMBER OF SEGMENTS: DEP2     IS NOT EQUAL TO THE NUMBER OF ITS PTF POINTERS & PCF POINTERS IN THE PARENT: DEP1
FABP1967E MISMATCH BETWEEN PTF POINTERS IN SEGMENT: DEP2     & PCF POINTERS IN PARENT: DEP1     AND TARGET RBA VALUES
FABP1974E THE NO. OF THE LAST SEGMENTS IN TWIN CHAINS: DEP2     IS NOT EQUAL TO THE NO. OF THE PCL POINTERS IN PARENT: DEP1
FABP1975E MISMATCH BETWEEN PCL POINTERS IN PARENT: DEP1     AND RBA VALUES OF THE LAST SEGMENT IN TWIN CHAINS: DEP2
FABP2001I EVAL OF DB: HDAMDB2  DB#: 001            DSG#: 01 COMPLETED  ERRORS:     22 TOTAL (      5 SEV.     15 PHY.      2 LOG.)

FABP2001I EVAL OF DB: HISAMDB1 DB#: 002            DSG#: 01 COMPLETED  ERRORS:      0 TOTAL (      0 SEV.      0 PHY.      0 LOG.)

FABP2002I                                               RUN COMPLETED  ERRORS:     22 TOTAL

FABP2008E ERRORS WERE DETECTED ON RAP, PHYSICAL CHILD/TWIN POINTER, OR HIERARCHICAL POINTER CHAIN

FABP2004E ERRORS WERE DETECTED IN LOGICAL RELATIONSHIP POINTERS

FABP2005E ERRORS WERE DETECTED ON PHYSICAL CHILD/TWIN POINTER OR HIERARCHICAL POINTER CHAIN
```

Figure 86. EVALUPRT: HASH Evaluation report

Report field description

The record fields are as follows:

ERRORS
The report heading for the following kinds of errors:

TOTAL
The total number of errors

SEVERE
The number of errors in physical child/twin pointer chain

PHYSICAL
The number of errors in physical hierarchical path

LOGICAL
The number of errors in logical relationship pointers

Evaluation of Index Pointers and Keys report

This report contains information about the errors in index pointers and keys that were detected through the Index Key Check process.

This report is produced when IXKEYCHK=YES and HASH=NO are specified on the PROC statement, and all index databases to be checked are specified on the DATABASE statements.

The following errors can be detected and reported with messages in this report, when the index database is either of the following types:

- A primary index database of HIDAM
- A secondary index database using a direct pointing, and the segment type of an index source segment (ISS) is the same as the one of index target segments (ITS)

Missing index pointer
If there is no index pointer segment whose pointer value is equal to the RBA of the index target segment, this segment is missing an index pointer.

This segment is reported by message FABP2020E with its key value.

Invalid index key
If the pointer value of the index pointer segment is equal to the RBA of the index target segment, and the key value of the index pointer segment is not equal to the key value of source segment or the root key value of HIDAM root segment, this index pointer segment contains an invalid index key.

This segment and index pointer segment are reported by message FABP2021E with its key value.

Invalid index pointer
If there is no index target segment pointed by the index pointer segment, this index pointer segment contains an invalid index pointer.

This segment is reported by message FABP2022E with its key value.

Invalid index key length
If the length of the index key from DBD (SRCH field and SUBSEQ field) is unmatched with the length of index key in T6, T7, or TA record, this record is reported by message FABP2025E, and index key checking is skipped for the remaining sort records within the same database data set group with message FABP2027E.

The following errors can be detected and reported with messages in this report, when the index database is either of the following types:

- A secondary index database that uses a symbolic pointing
- A secondary index database that uses a direct pointing, and the segment type of an ISS is not the same as the one of ITS

Invalid index key, missing index pointer, or invalid index pointer
If the number of index source segments is not equal to one of index pointer segments that contain the same key value, there is a missing index pointer, an invalid index key, or an invalid index pointer in the database.

The segments that contain the same index key are reported by message FABP2023E or FABP2024E.

Invalid index key length
If the length of the index key from DBD (SRCH filed and SUBSEQ field) is unmatched with the length of index key in T6, T7, or TA record, this record is reported by message FABP2025E, and index key checking is skipped for the remaining sort records within the same database data set group with message FABP2027E.

Subsections:

- "Report example" on page 239
- "Report field description" on page 239

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS           "EVALUATION OF INDEX POINTERS AND KEYS REPORT"                PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1


DBNAME: TPFOH2    DB#: 005 PARTNAME: TPFOH2A  PART ID: 00001 REORG#: 00001 DSG#:  A
DSNAME: TESTDS.PUBLIC.SAMPLE.TPFOH2.A00001           DBORG: PHIDAM
-------------------------------------------------------------------------------------

< ERROR > <> <> <------ TARGET ------> <------- SOURCE -------> DBD<----------------------- KEY VALUE (HEX) ----------------------->
 MESSAGE  TP KL DB  DG SC XD  RBA      DB  PID   DG RBA      SC KL   SRC= : KEY FROM SOURCE SEGMENT,  IDX= : KEY FROM INDEX SEGMENT


TOTALS
------
MESSAGE   DESCRIPTION                                                  NUMBER OF ERRORS
--------- -----------------------------------------------------------  ----------------


FABP1040I NO ERRORS DETECTED
```

Figure 87. EVALUPRT: Evaluation of Index Pointers and Keys report

In addition, the following report is also printed when IXKEYCKCHK=YES is specified.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS           "EVALUATION OF INDEX POINTERS AND KEYS REPORT"                PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 13.32.20                      FABPMAIN - V3.R1


DBNAME: PHDMDB5   DB#: 001 PARTNAME: PHDMD5A  PART ID: 00001 REORG#: 00001 DSG#:  B
DSNAME: TEMPDS.HPPC310.TSTV0002.PHDMDB5.B00001       DBORG: PHDAM
-------------------------------------------------------------------------------------

< ERROR > <> <---- TARGET ----> <----------- SOURCE -----------> <----- VALUE (HEX) OF CK IN SUBSEQUENCE FIELD INDEX SEGMENT ------>
 MESSAGE  TP DB  DG SC SEGNAME  DB  PID   DG SC RBA      OFST KL

FABP2033E TL 001 02 03 DEP2LEV2 002 00001 01 01 00000000 0038 0A C4C5D7F2F0F0F0F0 F1F1


TOTALS
------
MESSAGE   DESCRIPTION                                                  NUMBER OF ERRORS
--------- -----------------------------------------------------------  ----------------

FABP2033E THE TARGET SEGMENT THAT CONTAINS THE KEY WAS NOT FOUND               1
```

Figure 88. EVALUPRT: Evaluation of Index Pointers and Keys report (when IXKEYCKCHK=YES)

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DSNAME
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) and the name of the data set name

ERROR MESSAGE
Error message detected through the Index Key Check process. If no message is placed in this field, this line is the part of the preceding message.

TP
The type of record that is written on work data sets (T1, T6, T7, or TA is reported)

KL
The index key length

TARGET
The target of an index pointer. The following five fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of an index pointer

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

SC
The segment code (in hexadecimal) of the target of an index pointer

XD
First 1 byte is the database number (in hexadecimal) of index database. The last 1 byte is a constant value specified by CONST parameter on XDFLD statement of DBDGEN. If CONST parameter is not specified, the last 1 byte is not reported.

RBA
The relative byte address (in hexadecimal) of the target of an index pointer

SOURCE
The segment that contains index key. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of an index pointer

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains index key

SC
The segment code (in hexadecimal) of the target of an index pointer

DBD KL
The index key field length specified by DBD

KEY VALUE (HEX)
The key value (in hexadecimal) extracted from the database

SRC=
The key value extracted from index target database. It is contained in type A (TA) record.

IDX=
The key value extracted from index database. It is contained in type 6 or 7 (T6 or T7) record.

If IXKEYCKCHK=YES is specified and if an error is found in the portion of the index key other than the concatenated key (defined by the /CK operand), this field shows information about the index key in which the error is found. In this case, the concatenated key field is displayed with asterisks (*). For information about how the index keys are checked, see the diagram in the IXKEYCKCHK keyword description in “PROC statement” on page 108.

When IXKEYCKCHK=YES is specified on the PROC statement, in addition to the report shown in Figure 87 on page 239, the report shown in Figure 88 on page 239 is also printed. This report shows information about the portions of the keys that were detected as errors after checking the decomposed keys with their corresponding segment keys in the primary database. If no errors are found, only the header of the report is shown. For information about how the index keys are checked, see the IXKEYCKCHK keyword description in "PROC statement" on page 108.

The following fields are shown in the report:

DBNAME DB# PARTNAME PART ID REORG# DSG# DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition ID, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), the name of the data set, and the database organization type

ERROR MESSAGE
If an error is found while checking the concatenated keys that are defined by /CK fields, this field shows the corresponding error message ID

TP
The type of record that is printed on this line. The HD Pointer Checker classifies its work records into types (TK or TL).

TARGET
This field provides information about the segment in the primary database. The indicated segment is expected to contain the segment key that corresponds to the decomposed key, but the segment key is not found in the segment. The field consists of the following items:

DB
The database number (in hexadecimal) that identifies the database that contains the segment

DG
The data set group number (in hexadecimal) that identifies the database that contains the segment

SC
The segment code (in hexadecimal) of the segment

SEGNAME
The name of the segment

SOURCE
This field provides information about the index pointer segment that contains the decomposed key whose corresponding key was not found in the target segment in the primary database. This field consists of the following items:

DB
The database number (in hexadecimal) that identifies the database that contains the index pointer segment

PID
The partition ID (in decimal) that identifies the partition that contains the index pointer segment

DG
The data set group number (in hexadecimal) that identifies the database data set that contains the index pointer segment

SC
The segment code (in hexadecimal) of the index pointer segment

RBA
The RBA (in hexadecimal) of the index pointer segment

OFST
The offset (in hexadecimal) from the beginning of the index pointer segment to the start position of the decomposed key

KL
The length (in hexadecimal) of the decomposed key

VALUE (HEX) OF CK IN SUBSEQUENCE FIELD OF INDEX SEGMENT
The value (in hexadecimal) of the decomposed key. The decomposed key value is extracted from the subsequence field of the index pointer segment.

TOTALS
The error or information message issued during this process. The number of messages issued is also shown.

Database Repair Guidelines report

This report contains a brief summary of suggested steps to take when you have to repair a broken database.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "DATABASE REPAIR GUIDELINES REPORT"                    PAGE:     1
5655-U09                                                DATE: 06/09/2020  TIME: 17.43.15                      FABPMAIN - V3.R1


1. MAKE AN IMAGE COPY OF THE DAMAGED DATABASES
2. RUN POINTER CHECKER TO DETECT POSSIBLE DATABASE ERRORS
     BE SURE TO CHECK ALL LOGICALLY RELATED DATABASES
3. OBTAIN DUMPS OF ALL DATABASE BLOCKS THAT MAY NEED TO BE REPAIRED
     RUN POINTER CHECKER TYPE=SCAN WITH BLOCKDUMP OPTION
     TO GET DUMPS OF HDAM/PHDAM OR HIDAM/PHIDAM DATABASE BLOCKS
     RUN IDCAMS (OR SOME OTHER UTILITY) TO GET DUMPS OF INDEX OR HISAM DATABASE BLOCKS
4. CAREFULLY ANALYZE THE ERROR CONDITIONS TO DETERMINE THE BEST METHOD TO REPAIR THE DATABASES
     IF POSSIBLE, USE IMS TEST PROGRAM DFSDDLT0 TO DUPLICATE THE PROBLEM AND VERIFY THAT AN ABEND
     CONDITION EXISTS
5. REPAIR THE DATABASES
     RECOMMENDED METHOD IS TO USE IMS RECOVERY UTILITIES TO REPAIR DATABASES
     IF QUALIFIED PERSONNEL ARE AVAILABLE AND IF THE NUMBER OF DATABASE ERRORS IS SMALL, THEN
     SPZAP MAY BE USED TO MAKE THE REPAIRS
        IBM IMS DATABASE REPAIR FACILITY (IMS DBRF) MAY BE USED BY SUPPLYING RELATIVE BYTE ADDRESS
        FUNCTION=ZB OF THE UTILITY CONTROL FACILITY (DFSUCF00) MAY BE USED BY SUPPLYING A RELATIVE BYTE ADDRESS
        PROGRAM AMASPZAP OF THE OS SERVICE AIDS MAY BE USED BY SUPPLYING AN ABSOLUTE DISK ADDRESS
6. MAKE AN IMAGE COPY OF THE REPAIRED DATABASES
7. RUN POINTER CHECKER WITH THE IMAGE COPY TO VERIFY THAT THE DATABASE REPAIRS WERE SUCCESSFUL
```

Figure 89. EVALUPRT: Database Repair Guidelines report

Separator page for reconstruction reports

This separator page contains the title of "Reconstruction Report," and indicates reports for reconstruction will follow the page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "SEPARATOR PAGE FOR RECONSTRUCTION REPORT"                PAGE:     1
5655-U09                                                DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1



                PPPP   OOO  IIIII N   N TTTTT EEEEE RRRR              CCC  H   H  AAA  IIIII N   N
                P   P O   O   I   N   N   T   E     R   R            C   C H   H A   A   I   N   N
                P   P O   O   I   NN  N   T   E     R   R            C     H   H A   A   I   NN  N
                PPPP  O   O   I   N N N   T   EEE   RRRR             C     HHHHH AAAAA   I   N N N
                P     O   O   I   N  NN   T   E     R R              C     H   H A   A   I   N  NN
                P     O   O   I   N   N   T   E     R  R             C   C H   H A   A   I   N   N
                P      OOO  IIIII N   N   T   EEEEE R   R             CCC  H   H A   A IIIII N   N


                RRRR  EEEEE  CCC   OOO  N   N  SSS  TTTTT RRRR  U   U  CCC  TTTTT IIIII  OOO  N   N
                R   R E     C   C O   O N   N S   S   T   R   R U   U C   C   T     I   O   O N   N
                R   R E     C     O   O NN  N S       T   R   R U   U C       T     I   O   O NN  N
                RRRR  EEE   C     O   O N N N  SSS    T   RRRR  U   U C       T     I   O   O N N N
                R R   E     C     O   O N  NN      S   T   R R   U   U C       T     I   O   O N  NN
                R  R  E     C   C O   O N   N S   S   T   R  R  U   U C   C   T     I   O   O N   N
                R   R EEEEE  CCC   OOO  N   N  SSS    T   R   R  UUU   CCC    T   IIIII  OOO  N   N


                              RRRR  EEEEE PPPP   OOO  RRRR  TTTTT
                              R   R E     P   P O   O R   R   T
                              R   R E     P   P O   O R   R   T
                              RRRR  EEE   PPPP  O   O RRRR    T
                              R R   E     P     O   O R R     T
                              R  R  E     P     O   O R  R    T
                              R   R EEEEE P      OOO  R   R   T
```

Figure 90. EVALUPRT: Separator page for reconstruction reports

DMB Directory and Control Card Format report

This report contains a list of all the databases that were defined (either explicitly or implicitly) by your PSB.

It is only produced when TYPE=BLKMAP is specified on the PROC statement.

Subsections:

- “Report example” on page 243
- “Report field description” on page 244

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "DMB DIRECTORY / CONTROL CARD FORMAT REPORT"                PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 16.10.58                      FABPMAIN - V3.R1


DB NAME            DB NUMBER         PARTITION ID     DSG NUMBER       DBLG NUMBER

HDAMDB2               001                                 01               001
HISAMDB1              002                                 01               001


CONTROL CARD FORMAT
-------------------

COLUMNS  1-18: XXXNNNNNYYZZZZZZZZ

               XXX = DATABASE NUMBER
             NNNNN = PARTITION ID
                      IF NON-HALDB, FILL WITH BLANK
                      IF HALDB, DECIMAL DIGITS
                YY = DATA SET GROUP NUMBER
                      IF NON-HALDB, HEXADECIMAL DIGITS
                      IF HALDB, 'A-J' FOLLOWING ONE BLANK
          ZZZZZZZZ = RBN IN PRINTABLE HEX OF
                     A SEGMENT FOR WHICH ALL
                     POINTERS TO THE SAME SEGMENT
                     ARE TO BE PRINTED


COMMENTS TO FOLLOWING PRINT OUTPUT
----------------------------------

WITH CONTROL CARD   : PRINTS ALL POINTERS TO
                      SPECIFIED RBA

WITHOUT CONTROL CARD: PRINTS ALL POINTERS TO A
                      POINTER WHOSE TGT WAS BAD

                ***  W A R N I N G  ***

      IF IN-CORE POINTER CHECKING WAS DONE, ALL
      POINTERS VALIDATED IN MEMORY HAVE BEEN
      DISCARDED.

      IF HASH CHECKING WAS DONE, NO POINTER
      INFORMATION HAS BEEN CREATED.

      TO SEE ANY POINTER, RERUN POINTER CHECKER
      WITH NEITHER THE HASH NOR THE IN-CORE
      POINTER VALIDATION.
```

Figure 91. EVALUPRT: DMB Directory and Control Card Format report

Report field description

The report fields are as follows:

DB NAME
The name of the DBD load module

DB NUMBER
The database number (in hexadecimal) used to identify the database throughout the HD Pointer Checker run

PARTITION ID
The partition ID (in decimal) that identifies the partition

DSG NUMBER
The data set group number (in hexadecimal) that identifies the database data set group throughout the HD Pointer Checker run

DBLG NUMBER
The database logical group number (in hexadecimal) that identifies the database logical group throughout the HD Pointer Checker run

Pointer Chain Reconstruction report

This report contains a list of all pointers that point to segments containing an invalid pointer.

When the BLOCKMAP processor runs as a separate job (or a job step) using the BLKMAPIN data set and the CHECKREC data set as input, this report contains a list of the pointers that point to each target RBA specified in the BLKMAPIN data set. The CHECKREC data set, which is created with INCORE=NO during the SCAN process, is required as the input to list all the pointers.

Subsections:

- "Report example" on page 245
- "Report field description" on page 245

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                  "POINTER CHAIN RECONSTRUCTION"                        PAGE:     1
5655-U09                                                    DATE: 07/13/2020  TIME: 10.59.50                      FABPMAIN - V3.R1


   DUMP <------- TARGET -------> <------------- SOURCE -------------->
TP NO   DB  PID   DG RBA      SC DB  PID   DG RBA      SC PTR RRN
                                                        <------------------------------- MESSAGES -------------------------------->
                                                        NUMBER    DESCRIPTION


   0003 001       01 00002D76                           FABP1320I INPUT RECORD FROM JRM FILE
T1      001       01 00002D76 03                        FABP1330I ADDRESS FOUND IN WORK DATA SET
T3      001       01 00002D76 03 001       01 001DDF36 03 PTB
                                                        FABP1340I SEGMENT POINTS TO ABOVE INPUT ADDRESS

                                                        FABP1280I NO MORE RECORDS FOR SPECIFIED RBA

   0004 001       01 00003408                           FABP1320I INPUT RECORD FROM JRM FILE
T1      001       01 00003408 01                        FABP1330I ADDRESS FOUND IN WORK DATA SET
T3      001       01 00003408 01 001       01 000500EC 02  PP
                                                        FABP1340I SEGMENT POINTS TO ABOVE INPUT ADDRESS
T3      001       01 00003408 01 001       01 00050166 02  PP
                                                        FABP1340I SEGMENT POINTS TO ABOVE INPUT ADDRESS

------ For formatting purposes, several lines have been deleted.------

   0013 001       01 00079072                           FABP1320I INPUT RECORD FROM JRM FILE
T1      001       01 00079072 02                        FABP1330I ADDRESS FOUND IN WORK DATA SET

                                                        FABP1280I NO MORE RECORDS FOR SPECIFIED RBA

   0014 001       01 00245ABC                           FABP1320I INPUT RECORD FROM JRM FILE
T1      001       01 00245ABC 03                        FABP1330I ADDRESS FOUND IN WORK DATA SET

                                                        FABP1280I NO MORE RECORDS FOR SPECIFIED RBA

FABP1290I END OF FILE ON CONTROL DATA SET
```

Figure 92. EVALUPRT: Pointer Chain Reconstruction report

Report field description

The report fields are as follows:

TP
The type of record. The HD Pointer Checker classifies its work records into types (T1, T2, and so on).

DUMP NO.
The relative block number of the block or CI that contains the invalid pointer or error. It is the same number as the dump number in the Block Map/ Block Dump reports.

TARGET
The target of a pointer. The following four fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the target of a pointer

PID
The partition ID (in decimal) that identifies the partition containing the target of a pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the target of a pointer. This is the actual value of the pointer itself.

SC
The segment code (in hexadecimal) of the target of a pointer

SOURCE
The segment that contains the pointer (also called the source of the pointer). The following six fields all pertain to it:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the pointer

PID
The partition ID (in decimal) that identifies the partition containing the target of a pointer

DG
The data set group number (in hexadecimal) or the data set group ID (in an alphabetic character) that identifies the database containing the target of a pointer

RBA
The relative byte address (in hexadecimal) of the segment that contains the pointer

SC
The segment code (in hexadecimal) of the segment that contains the pointer

PTR
The type of pointer

RRN
The relative-record number (for an index or overflow pointer)

MESSAGES
The following two fields pertain to error messages:

NUMBER
The message number. You can find information about each message in Chapter 37, “Messages and codes,” on page 605.

DESCRIPTION
The message text

Legend for Reconstruction report

This report contains a brief description of the headings and abbreviations used in the Pointer Chain Reconstruction report.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "LEGEND FOR RECONSTRUCTION REPORT"                    PAGE:     1
5655-U09                                                DATE: 07/07/2020  TIME: 15.59.40                      FABPMAIN - V3.R1


TP ...... RECORD TYPE (T1, T2, ETC.)
DUMP NO.. DUMP NUMBER IN BLOCK MAP/BLOCK DUMP REPORT

TARGET OF POINTER:

DB ...... DATABASE NUMBER OF TARGET SEGMENT
PID...... PARTITION ID OF TARGET SEGMENT
DG ...... DATA SET GROUP OF TARGET SEGMENT
RBA ..... RELATIVE BYTE ADDRESS OF TARGET SEGMENT
SC ...... SEGMENT CODE OF TARGET SEGMENT

SOURCE OF POINTER:

DB ...... DATABASE NUMBER OF SEGMENT CONTAINING POINTER
PID...... PARTITION ID OF SEGMENT CONTAINING POINTER
DG ...... DATA SET GROUP OF SEGMENT CONTAINING POINTER
RBA ..... RBN OF SEGMENT CONTAINING POINTER
SC ...... SEGMENT CODE OF SEGMENT CONTAINING POINTER
PTR ..... POINTER TYPE
RRN ..... RELATIVE RECORD NUMBER OF INDEX OR OVERFLOW POINTER

MESSAGES:

NUMBER .. MESSAGE NUMBER
DESCRIPTION .. SHORT DESCRIPTION OF MESSAGE
```

Figure 93. EVALUPRT: Legend for Reconstruction report

EVALUPR2 data set

The EVALUPR2 data set contains the Evaluation of Symbolic Pointers report produced by the HD Pointer Checker processor (FABPMAIN).

Evaluation of Symbolic Pointers report

This report contains the evaluation result of symbolic pointer and its target segments.

This report is produced when SYMLPCHK=YES, SYMIXCHK=YES, or both options are specified on the PROC statement and when the databases have symbolic pointers to be checked.

Subsections:

- “Report example” on page 247
- “Report field description” on page 247

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "EVALUATION OF SYMBOLIC POINTERS REPORT"                    PAGE:     1
5655-U09                                                 DATE: 07/04/2020  TIME: 21.29.52                       FABPMAIN - V3.R1


DBNAME: HIDAMDB1  DB#: 001  DDNAME: HIDAMDS1  DSG#: 01  DSNAME: TEMPDS.HPPC220.RAFP2201.HIDAMDS1             DBORG: HIDAM

ERROR        <---- TARGET ----> <-------- SOURCE ---------> PTR
MESSAGE   TP DB  DG SC SEGNAME  DB  DG SC SEGNAME  RBA      TYP SYMBOLIC POINTER VALUE
--------- -- ------------------ -------------------------- --- ------------------------------------------------------------------------
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000198 SX  RKEY1
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000000 SX  RKEY1
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 000000CC SX  RKEY1
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000330 SX  RKEY2
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 000003FC SX  RKEY2
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000264 SX  RKEY2
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000594 SX  RKEY3
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 00000660 SX  RKEY3
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 000004C8 SX  RKEY3
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 000007F8 SX  RKEY4
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 000008C4 SX  RKEY4
FABP2035E TU 001 01 01 ROOT0001 003 01 01 INDEXSEG 0000072C SX  RKEY4

TOTALS
------
MESSAGE   DESCRIPTION                                                    NUMBER OF ERRORS
--------- ------------------------------------------------------------  ----------------
FABP2035E TARGET OF SYMBOLIC INDEX POINTER NOT FOUND                                 12
--------- ------------------------------------------------------------  ----------------
                                                                TOTAL                12
```

Figure 94. EVALUPR2: Evaluation of Symbolic Pointers report

Report field description

DBNAME DB# DDNAME DSG# DSNAME DBORG
The name of the DBD, the database number (in hexadecimal), the data set group number (in hexadecimal), the name of data set, and the database organization type

ERROR MESSAGE
The error message that is generated and detected during the symbolic pointer evaluation process. If no message number is printed in the field, this line is part of the preceding message.

TP
The type of record that is printed on this line. The HD Pointer Checker classifies its work records into types (T1, T3, and so on).

TARGET
This is information about the pointer target of the symbolic pointer. It consists of four items:

DB
The database number (in hexadecimal) that identifies the database that contains the target segment

DG
The data set group number (in hexadecimal) that identifies the database that contains the target segment

SC
The segment code (in hexadecimal) of the target segment

SEGNAME
The segment name of the target segment

SOURCE
The segment that contains the symbolic pointer (also called the source of the symbolic pointer). It consists of the following items:

DB
The database number (in hexadecimal) that identifies the database that contains the source segment

DG
The data set group number (in hexadecimal) that identifies the database that contains the source segment

SC
The segment code (in hexadecimal) of the source segment

SEGNAME
The segment name of the source segment

RBA
The RBA (in hexadecimal) of the index segment

PTR TYPE
The type of symbolic pointer. The type can be either of the following values:

LP
Logical parent

SX
Secondary index

SYMBOLIC POINTER VALUE
The symbolic pointer value (in hexadecimal or character)

TOTALS
The error or information message issued during the symbolic pointer evaluation process. The number of messages issued is also shown.

EVALIPRT data set

The EVALIPRT data set contains reports that are generated during the EPS healing process and the evaluation of ILKs process. These reports are produced by the HD Pointer Checker processor (FABPMAIN).

This data set contains the following reports:

- Separator page for EPS Healing reports and Evaluation of ILKS reports
- EPS Healing report
- Evaluation of ILKS report

Separator page for EPS Healing reports and Evaluation of ILKs reports

This separator page contains the title of "Separator page for EPS Healing reports and Evaluation of ILKs reports" and indicates reports for EPS Healing and Evaluation of ILKs will follow the page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS          "SEPARATOR PAGE FOR EPS HEALING AND EVALUTION OF ILKS"          PAGE:     1
5655-U09                                                 DATE: 07/07/2020  TIME: 15.59.40                       FABPMAIN - V3.R1



        EEEEE PPPP   SSS       H   H EEEEE  AAA  L     IIIII N   N  GGG         AAA  N   N DDDD
        E     P   P S   S      H   H E     A   A L       I   N   N G   G       A   A N   N D   D
        E     P   P S          H   H E     A   A L       I   NN  N G           A   A NN  N D   D
        EEE   PPPP   SSS       HHHHH EEE   AAAAA L       I   N N N G GGG       AAAAA N N N D   D
        E     P         S      H   H E     A   A L       I   N  NN G G G       A   A N  NN D   D
        E     P     S   S      H   H E     A   A L       I   N   N G   G       A   A N   N D   D
        EEEEE P      SSS       H   H EEEEE A   A LLLLL IIIII N   N  GGG       A   A N   N DDDD


        EEEEE V   V  AAA  L     U   U  AAA  TTTTT IIIII  OOO  N   N       OOO  FFFFF       IIIII L     K   K  SSS
        E     V   V A   A L     U   U A   A   T     I   O   O N   N       O   O F             I   L     K  K  S   S
        E     V   V A   A L     U   U A   A   T     I   O   O NN  N       O   O F             I   L     K K   S
        EEE   V   V AAAAA L     U   U AAAAA   T     I   O   O N N N       O   O FFF           I   L     KK     SSS
        E     V   V A   A L     U   U A   A   T     I   O   O N  NN       O   O F             I   L     K K       S
        E      V V  A   A L     U   U A   A   T     I   O   O N   N       O   O F             I   L     K  K  S   S
        EEEEE   V   A   A LLLLL  UUU  A   A   T   IIIII  OOO  N   N        OOO  F           IIIII LLLLL K   K  SSS


                                      RRRR  EEEEE PPPP   OOO  RRRR  TTTTT
                                      R   R E     P   P O   O R   R   T
                                      R   R E     P   P O   O R   R   T
                                      RRRR  EEE   PPPP  O   O RRRR    T
                                      R R   E     P     O   O R R     T
                                      R  R  E     P     O   O R  R    T
                                      R   R EEEEE P      OOO  R   R   T
```

Figure 95. EVALIPRT: Separator page for EPS Healing reports and Evaluation of ILKS reports

EPS Healing report

This report contains the errors for ILEs against each EPS through the EPS healing process.

This report is produced when EPSCHK=YES is specified on the PROC statement and the database having EPS are checked.

If there is no ILE whose ILK is equal to the ILK embedded in the EPS, the ILE is missing. The EPS whose ILK does not exist in ILDS is reported by message FABP2100E.

Subsections:

- “Report example” on page 249
- “Report field description” on page 250

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "EPS HEALING REPORT"                          PAGE:     1
5655-U09                                                      DATE: 07/07/2020  TIME: 15.59.40                FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001
-------------------------------------------------------------------------

< ERROR > <> <---- TARGET ----> <------- SOURCE -------> <PTR> <- ILK VALUE(HEX) ->
 MESSAGE  TP DB  DG SC RBA      DB  PID   DG RBA      SC
FABP1040I NO ERRORS DETECTED

INPUT RECORDS SUMMARY
---------------------
  RECORD TYPE                    DIRECT        INDIRECT           TOTAL
  ---------------------- --------------- --------------- ---------------
  TH (LP/PAIRED LC PTR)            7,332               0           7,332
  TJ (PSINDEX POINTER)                 0               0               0
  ---------------------- --------------- --------------- ---------------
  TOTAL                            7,332               0           7,332

  NOTE : DIRECT:   POINTER RECORD DIRECTLY POINTS TO ITS TARGET.
  ----   INDIRECT: POINTER RECORD POINTS TO ITS TARGET WITH REFERENCE TO AN ILDS(INDIRECT LIST DATA SET).

OUTPUT RECORDS SUMMARY
----------------------
  RECORD TYPE             NO. OF RECORDS
  ---------------------- ---------------
  T3 (LP POINTER)                 7,112
  T3 (PAIRED LC POINTER)            220
  T6 (PSINDEX POINTER)                0
  ---------------------- ---------------
  TOTAL                           7,332

ILDS ACCESS
-----------
  READ RECORDS         =              0
```

Figure 96. EVALIPRT: EPS Healing report

Report field description

DBNAME DB# PART NAME PART ID REORG#
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition ID, and partition reorganization number

ERROR MESSAGE
Error messages detected through the EPS healing process

TP
The type of record that is written on work data sets (TH or TJ is reported)

TARGET
Information about the pointer target of EPS. It consists of four items:

DB
The database number (in hexadecimal) that identifies the database containing the target of EPS

DG
The data set group ID (in an alphabetic character) that identifies the database containing the target of EPS

SC
The segment code (in hexadecimal) of the target of EPS

RBA
The relative byte address (in hexadecimal) of the target of EPS

SOURCE
The segment that contains the EPS (also called the source of the EPS). It consists of five items:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the EPS

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the EPS

DG
The data set group ID (in an alphabetic character) that identifies the database containing the segment that contains the EPS

RBA
The relative byte address (in hexadecimal) of the segment that contains the EPS

SC
The segment code (in hexadecimal) of the segment that contains the EPS

PTR
The type of pointer that resides in the EPS. The type can be either of the following values:

LP
Logical parent

PLC
Physically paired logical child

SX
Secondary index

ILK VALUE(HEX)
The ILK of that target segment that resides in the EPS of source segment is printed

TOTALS
The error message issued during the EPS healing process. The number of the messages is also given.

INPUT RECORDS SUMMARY
Statistics information about input records of EPS Healing process of this target partition. The input record is one of the following pointers:

- The LP pointer or the paired LC pointer that points to this partition
- The pointer in secondary indexes (PSINDEXes) that points to this partition

These pointers might refer to the ILK (indirect list key) in the ILDS data set.

RECORD TYPE
The record type of the input records

DIRECT
The number of pointer records each of which has the latest RBA of its target segment. HD Pointer Checker does not refer to the indirect list data set (ILDS).

INDIRECT
The number of pointer records that do not have the latest RBAs. To get the latest RBAs HD Pointer Checker refers to the indirect list data set (ILDS).

TOTAL
The total number of input pointer records

OUTPUT RECORDS SUMMARY
Statistics information about output records for the EPS Healing Process of this target partition.

RECORD TYPE
The record type of the output records

RECORDS
The number of output pointer records

ILDS ACCESS
The number of indirect list data set records referred to in the EPS Healing Process of this target partition

Evaluation of ILKS report

This report contains the errors for ILKs that reside in the EPS and its target segment.

This report is produced when EPSCHK=YES is specified on the PROC statement and the databases having EPS are checked. If the ILK in the EPS is different from the ILK of its target segment, message FABP2101E is generated.

Subsections:

- “Report example” on page 251
- “Report field description” on page 252
- “Report field description: DUPLICATE ILKS INFORMATION part” on page 253
- “Report field description: REORG# INFORMATION part” on page 254

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "EVALUATION OF ILKS REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 15.59.40                        FABPMAIN - V3.R1


DBNAME: TPFOH1    DB#: 003 PARTNAME: TPFOH1A  PART ID: 00001 REORG#: 00001  DSG#:  A
-------------------------------------------------------------------------------------

< ERROR > <> <---- TARGET ----> <------- SOURCE -------> <PTR> <-- ILK VALUE -->
 MESSAGE  TP DB  DG SC RBA      DB  PID   DG RBA      SC             (HEX)

FABP1040I NO ERRORS DETECTED


IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "EVALUATION OF ILKS REPORT"                          PAGE:     1
5655-U09                                                  DATE: 04/20/2020  TIME: 10.08.02                        FABPMAIN - V3.R1

DBNAME: PHDMDB5   DB#: 001
--------------------------

DUPLICATE ILKS INFORMATION
--------------------------
< ERROR > <> <-- ILK VALUE --> <------- TARGET -------> <------- SOURCE -------> <PTR>
 MESSAGE  TP       (HEX)       DB  PID   DG SC RBA      DB  PID   DG RBA      SC
FABP2148E T1 00003408 00010003 001 00003  A 02 00003408
          T3 00003408 00010003 001 00003  A 02 00003408 002 00001  A 0001D15A 02   LP
FABP2147E T1 0000100E 00020002 001 00002  A 02 0000100E
          T1 0000100E 00020002 001 00003  A 02 0000809A
          T3 0000100E 00020002 001 00002  A 02 0000100E 002 00001  A 00007C08 02   LP
          T3 0000100E 00020002 001 00003  A 02 0000809A 002 00001  A 0001596A 02   LP
FABP2148E T1 0003D17E 00030005 001 00002  A 02 0003D17E
          T3 0003D17E 00030005 001 00002  A 02 0003D17E 002 00001  A 0004E772 02   LP

REORG# INFORMATION
------------------
PARTITION NAME  MAX REORG# OF ILK  REORG# OF PARTITION
--------------  -----------------  -------------------
PHDMD5A                         3                    2
PHDMD5B                         2                    2
PHDMD5C                         5                    2
FABP2149E MAX REORG# OF ILK >= REORG# OF PARTITION

TOTALS
------
MESSAGE   DESCRIPTION                                                    NUMBER OF ERRORS
--------- -----------------------------------------------------------  ----------------
FABP2147E DUPLICATE ILKS WERE FOUND IN THE DATABASE                           1
FABP2148E POTENTIAL DUPLICATE ILK WAS FOUND IN THE DATABASE                   2
```

Figure 97. EVALIPRT: Evaluation of ILKS report

Report field description

DBNAME DB# PARTITION NAME PARTITION ID DSG#
The name of the DBD, the database number (in hexadecimal), the name of the partition, the partition ID, and the data set group ID (in an alphabetic character)

ERROR MESSAGE
The error message is generated and detected during the ILK evaluation process. If no message number is printed in the field, this line is a part of the preceding message.

TP
The type of record that is printed on this line. The HD Pointer Checker classifies its work records into types (T1, T3 and so on).

TARGET
This is information about the pointer target of EPS. It consists of four items:

DB
The database number (in hexadecimal) that identifies the database containing the target of EPS

DG
The data set group ID (in an alphabetic character) that identifies the database containing the target of EPS

SC
The segment code (in hexadecimal) of the target of EPS

RBA
The relative byte address (in hexadecimal) of the segment that contains the EPS

SOURCE
The segment that contains the EPS (also called the source of the EPS). It consists of five items:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the EPS

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the EPS

DG
The data set group ID (in an alphabetic character) that identifies the database containing the segment that contains the EPS

RBA
The relative byte address (in hexadecimal) of the segment that contains the EPS

SC
The segment code (in hexadecimal) of the segment that contains the EPS

PTR
The type of pointer that resides in the EPS. The type can be either of the following values:

LP
Logical parent

PLC
Physically paired logical child

SX
Secondary index

ILK VALUE(HEX)
ILK value (hex)

ILK=
ILK in the prefix of the target segment or in the EPS of the source segment

TOTALS
The error or information message issued during the ILK evaluation process. The number of messages is also given.

Report field description: DUPLICATE ILKS INFORMATION part

This part shows information about duplicate ILKs or potentially duplicate ILKs.

When DUPILKCHK=YES is specified on the PROC statement, ILK information (see Figure 97 on page 252) is printed for each PHDAM or PHIDAM database that contains the target segments of a logical relationship or a secondary index (PSINDEX). If a duplicate ILK or a potentially duplicate ILK is detected, message FABP2147E or FABP2148E is printed in this report.

The report fields of the Duplicate ILKs Information part are as follows:

ERROR MESSAGE
If a duplicate ILK or a potentially duplicate ILK is found, this field shows the corresponding message ID.

TP
The type of the record that is printed on this line. HD Pointer Checker classifies its work records into types (T1, T3, and T6).

ILK VALUE (HEX)
ILK value (in hexadecimal) in the prefix portion of the target segment or in the EPS of the source segment

- If message FABP2147E is printed in the ERROR MESSAGE field, this field shows the duplicate ILK.
- If message FABP2148E is printed in the ERROR MESSAGE field, this field shows the potentially duplicate ILK.

TARGET
This field provides information about the pointer target of EPS. It consists of five items:

DB
The database number (in hexadecimal) that identifies the database containing the target of EPS

PID
The partition ID (in decimal) that identifies the partition containing the target of EPS

DG
The data set group ID (in an alphabetic character) that identifies the database data set containing the target of EPS

SC
The segment code (in hexadecimal) of the target of EPS

RBA
The relative byte address (in hexadecimal) of the target of EPS

SOURCE
The segment that contains the EPS (also called as the source of the EPS). It consists of five items:

DB
The database number (in hexadecimal) that identifies the database containing the segment that contains the EPS

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the EPS

DG
The data set group ID (in an alphabetic character) that identifies the database data set containing the segment that contains the EPS

RBA
The relative byte address (in hexadecimal) of the segment that contains the EPS

SC
The segment code (in hexadecimal) of the segment that contains the EPS

PTR
The type of pointer that resides in the EPS. The type can be either of the following values:

LP
Logical parent

PLC
Physically paired logical child

SX
Secondary index

Report field description: REORG# INFORMATION part

This part shows information about the partitions whose partition reorganization number is corrupted. This part is printed only when DUPILKCHK=YES is specified on the PROC statement and duplicate ILKs or potentially duplicate ILKs are detected.

The report fields of the Reorganization Number Information part are as follows:

PARTITION NAME
The name of the partition

MAX REORG# OF ILK
The maximum partition reorganization number among all the ILKs that contain the partition ID of this partition

REORG# OF PARTITION
The partition reorganization number that is stored in the partition data set of this partition

The partition reorganization number must be greater than the maximum partition reorganization number among all the ILKs that contain the partition ID of this partition.

TOTALS
The error messages that are issued during the HALDB Duplicate ILKs Checking process. The number of the messages is also provided.

SNAPPIT data set

The SNAPPIT data set contains block maps and block dumps produced by the HD Pointer Checker processor (FABPMAIN).

This data set contains the following reports:

- Separator page for Block Map and Dumps reports
- Block Map and Block Dump report

Separator page for Block Map and Dumps reports

This separator page contains the title of "Block Map and Dumps Report," and indicates that block maps and dumps reports will follow the page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS              "SEPARATOR PAGE FOR BLOCK MAP AND DUMPS"                  PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 09.44.00                       FABPMAIN - V3.R1



        BBBB  L      OOO   CCC  K   K       M   M  AAA  PPPP         AAA  N   N DDDD       DDDD  U   U M   M PPPP   SSS
        B   B L     O   O C   C K  K        M   M A   A P   P       A   A N   N D   D      D   D U   U M   M P   P S   S
        B   B L     O   O C     K K         MM MM A   A P   P       A   A NN  N D   D      D   D U   U MM MM P   P S
        BBBB  L     O   O C     KK          M M M AAAAA PPPP        AAAAA N N N D   D      D   D U   U M M M PPPP   SSS
        B   B L     O   O C     K K         M   M A   A P           A   A N  NN D   D      D   D U   U M   M P         S
        B   B L     O   O C   C K  K        M   M A   A P           A   A N   N D   D      D   D U   U M   M P     S   S
        BBBB  LLLLL  OOO   CCC  K   K       M   M A   A P           A   A N   N DDDD       DDDD   UUU  M   M P      SSS


                                          RRRR  EEEEE PPPP   OOO  RRRR  TTTTT
                                          R   R E     P   P O   O R   R   T
                                          R   R E     P   P O   O R   R   T
                                          RRRR  EEE   PPPP  O   O RRRR    T
                                          R R   E     P     O   O R R     T
                                          R  R  E     P     O   O R  R    T
                                          R   R EEEEE P      OOO  R   R   T
```

Figure 98. SNAPPIT: Separator page for Block Map and Dumps reports

Block Map and Block Dump report

These reports are used to analyze database blocks or CIs in order to determine the best way to repair them.

These reports are produced in the following case of HD Pointer Checker run:

- BLOCKDUMP=(*rba,nnn*) is specified on the DATABASE statement. This option is used as a stand-alone program to print the specified blocks of the block maps and block dumps from HDAM or HIDAM database in SCAN process.
- DIAGDUMP=FIRST100 is specified on the OPTION statement with TYPE=ALL, or TYPE=SCAN. Reports are produced for the block maps and block dumps of the first 100 blocks except first IMS control block.
- DIAGDUMP=ERROR is specified on the OPTION statement with TYPE=ALL, TYPE=SCAN, TYPE=CHECK, or TYPE=BLKMAP.

Reports are produced when the invalid pointer or error is detected during the validation of a pointer to a target at SCAN process. Reports are also produced when the control data set that contains pointer chaining information exists during the pointer chain reconstruction at BLOCKMAP process.

There are three formats for this report, one for the block map, and two for the block dump. When DUMPFORM=FORMAT (default) of OPTION statement is specified in the PROCCTL data set, the report for the block dump is printed in the *logical formatted block dump format* (Figure 101 on page 257). When

DUMPFORM=UNFORMAT is specified, it is printed in the *unformatted dump format* (Figure 102 on page 257).

Subsections:

- “Report example: Block map” on page 256
- “Report example: Logical formatted block dump” on page 256
- “Report example: Unformatted block dump” on page 257
- “Report field description” on page 257

Report example: Block map

The following figures show examples of the report that include the block map.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "BLOCK MAP / BLOCK DUMP REPORT"                      PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 09.44.00                      FABPMAIN - V3.R1


DBNAME: HDAMDB2    DB#: 001  DSG#: 01   DDNAME: HDAMDS4    DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                    DUMP NO. 0001
BLOCK#:        9 BLKRBA:     2400            DATABASE ORGANIZATION: HDAM

      STORAGE   TYPE(HEX)          RBA      ADDRESS   FLAGS   SC  COUNTERS         LENGTH ROOT#     TYPE(CHAR)

      8761000   40C6E2C1D7404040  00002400  08C1BC00  000000  00  0000000000000000  0000  0000      ( FSAP   )
      8761026   40D9C1D740404040  00002404  08C1BC04  000000  00  0000000000000000  0000  0000      ( RAP    )
      876104C   D9D6D6E340404040  00002408  08C1BC08  0000E0  01  0082000000000000  007A  001C      (ROOT    )
      8761072   C4C5D7F140404040  00002482  08C1BC82  000070  02  0000000000000000  007A  000C      (DEP1    )
      8761098   C4C5D7F240404040  000024FC  08C1BCFC  000060  03  0000000000000000  006E  000C      (DEP2    )
      87610BE   C4C5D7F240404040  0000256A  08C1BD6A  000060  03  0000000000000000  006E  000C      (DEP2    )
      87610E4   D9D6D6E340404040  000025D8  08C1BDD8  0000E0  01  0082000000000000  007A  002C      (ROOT    )
      876110A   C4C5D7F140404040  00002652  08C1BE52  000070  02  0000000000000000  007A  000C      (DEP1    )
      8761130   C4C5D7F240404040  000026CC  08C1BECC  000060  03  0000000000000000  006E  000C      (DEP2    )
      8761156   C4C5D7F140404040  0000273A  08C1BF3A  000070  02  0000000000000000  007A  000C      (DEP1    )
      876117C   C6D9C5C540E2D7C3  000027B4  08C1BFB4  000000  00  0000000000000000  0044  0000      (FREE SPC)
        83654   E2C8D6D9E340C6E2  000027F8  08C1BFF8  000000  00  0000000000000000  0001  0000      (SHORT FS)
      87611A2   E5E2C1D440C3E3D3  000027F9  08C1BFF9  000000  00  0000000000000000  0000  0000      (VSAM CTL)
```

Figure 99. SNAPPIT: Block Map and Dumps report

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "BLOCK MAP / BLOCK DUMP REPORT"                      PAGE:     3
5655-U09                                                 DATE: 07/04/2020  TIME: 21.29.52                      FABPMAIN - V3.R1


DBNAME: SINDXDB1   DB#: 003  DSG#: 01   DDNAME: SINDXDS1   DSNAME: TEMPDS.HPPC220.RAFP2201.SINDXDS1                 DUMP NO. 0002
BLOCK#:      N/A BLKRBA:        0            DATABASE ORGANIZATION: 2NDARY INDX

      STORAGE   TYPE(HEX)          RBA      ADDRESS   FLAGS   SC  COUNTERS         LENGTH ROOT#     TYPE(CHAR)

      C042000   E2C5C740D7C6E740  00000000  0C0DF000  000000  01  0000000000000000  0001   N/A      (SEG PFX )
      C042026   C9D5C4E740D2C5E8  00000001  0C0DF001  000000  01  0000000000000000  000A   N/A      (INDX KEY)
      C04204C   E2E8D440D7E3D940  0000000B  0C0DF00B  000000  01  0000000000000000  008A   N/A      (SYM PTR )
      C042072   D6E3C840C4C1E3C1  00000095  0C0DF095  000000  01  0000000000000000  0037   N/A      (OTH DATA)
```

Figure 100. SNAPPIT: Block Map and Block Dump report (Index)

Report example: Logical formatted block dump

The following figure shows an example of the logical formatted block dump report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "BLOCK MAP / BLOCK DUMP REPORT"                        PAGE:     2
5655-U09                                                 DATE: 07/10/2020  TIME: 09.44.00                       FABPMAIN - V3.R1


DBNAME: HDAMDB2    DB#: 001  DSG#: 01   DDNAME: HDAMDS4    DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                      DUMP NO. 0001
BLOCK#:        9 BLKRBA:     2400           DATABASE ORGANIZATION: HDAM

    RBA  OFFSET

    2400 0000  03B40000                                                                  *....                           *
    2404 0004  00002408                                                                  *....                           *
    2408 0008  01000000 00820000 25D80000 00000000 2482000C 755AF0F0 F0F0F0F0 F0F0F2F2   *.........Q............0000000022*
         0028  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   00002448   SAME AS ABOVE
         0068  40404040 40404040 40404040 40404040 40404040 40404040 40404040 4040       *                               *
    2482 0082  0200000B F55A0000 00000000 24080000 24FC0000 256AF0F0 F0F0F0F0 F0F0F0F1   *....5.................0000000001*
         00A2  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   000024C2   SAME AS ABOVE
         00E2  40404040 40404040 40404040 40404040 40404040 40404040 0000               *                         ..    *
    24FC 00FC  03000000 256A0000 0000F0F0 F0F0F0F0 F2F6F4F9 40404040 40404040 40404040   *..........0000002649           *
         011C  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   0000253C   SAME AS ABOVE
         015C  40404040 40404040 40404040 0000                                          *           ..                  *
    256A 016A  03000000 00000000 24FCF0F0 F0F0F0F0 F2F6F5F0 40404040 40404040 40404040   *..........0000002650           *
         018A  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   000025AA   SAME AS ABOVE
         01CA  40404040 40404040 40404040 0000                                          *                 ..            *
    25D8 01D8  01000000 00820000 C5F00000 24080000 26520011 E8ECF0F0 F0F0F0F0 F0F0F3F3   *........E0..........Y.0000000033*
         01F8  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   00002618   SAME AS ABOVE
         0238  40404040 40404040 40404040 40404040 40404040 40404040 4040               *                               *
    2652 0252  02000000 273A0000 00000000 25D80000 26CC0000 26CCF0F0 F0F0F0F0 F0F0F0F1   *.............Q........0000000001*
         0272  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   00002692   SAME AS ABOVE
         02B2  40404040 40404040 40404040 40404040 40404040 40404040 0000               *                         ..    *
    26CC 02CC  03000000 00000000 0000F0F0 F0F0F0F0 F4F0F2F8 40404040 40404040 40404040   *..........0000004028           *
         02EC  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   0000270C   SAME AS ABOVE
         032C  40404040 40404040 40404040 0000                                          *           ..                  *
    273A 033A  02000011 615A0000 26520000 25D80000 00000000 0000F0F0 F0F0F0F0 F0F0F0F2   *..../........Q........0000000002*
         035A  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040   *                               *
     LINE   0000277A   SAME AS ABOVE
         039A  40404040 40404040 40404040 40404040 40404040 40404040 0000               *                         ..    *
    27B4 03B4  00000044 00000000 00000000 00000000 00000000 00000000 00000000 00000000   *................................*
         03D4  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000   *................................*
         03F4  00000000                                                                 *....                           *
    27F8 03F8  00                                                                       *.                              *
    27F9 03F9  0003F903 F90000                                                          *..9.9..                        *
```

Figure 101. SNAPPIT: Block Map and Block Dump report (Block Dump: Logical formatted)

Report example: Unformatted block dump

The following figure shows an example of the unformatted block dump report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "BLOCK MAP / BLOCK DUMP REPORT"                        PAGE:     2
5655-U09                                                 DATE: 07/10/2020  TIME: 09.44.08                       FABPMAIN - V3.R1


DBNAME: HDAMDB2    DB#: 001  DSG#: 01   DDNAME: HDAMDS4    DSNAME: TESTDS.PUBLIC.SAMPLE.HDAMDS4                      DUMP NO. 0001
BLOCK#:        9 BLKRBA:     2400           DATABASE ORGANIZATION: HDAM

    RBA  OFFSET

    2400 0000  03B40000 00002408 01000000 00820000   25D80000 00000000 2482000C 755AF0F0 *.................Q............00*
    2420 0020  F0F0F0F0 F0F0F2F2 40404040 40404040   40404040 40404040 40404040 40404040 *00000022                        *
    2440 0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   00002460   SAME AS ABOVE
    2480 0080  40400200 000BF55A 00000000 00002408   000024FC 0000256A F0F0F0F0 F0F0F0F0 *  ....5.................00000000*
    24A0 00A0  F0F14040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *01                              *
    24C0 00C0  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
    24E0 00E0  40404040 40404040 40404040 40404040   40404040 40404040 40400000 03000000 *                         ......*
    2500 0100  256A0000 0000F0F0 F0F0F0F0 F2F6F4F9   40404040 40404040 40404040 40404040 *......0000002649              *
    2520 0120  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   00002540   SAME AS ABOVE
    2560 0160  40404040 40404040 00000300 00000000   000024FC F0F0F0F0 F0F0F2F6 F5F04040 *        ............0000002650  *
    2580 0180  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   000025A0   SAME AS ABOVE
    25C0 01C0  40404040 40404040 40404040 40404040   40404040 40400000 01000000 00820000 *                          ..........*
    25E0 01E0  C5F00000 24080000 26520011 E8ECF0F0   F0F0F0F0 F0F0F3F3 40404040 40404040 *E0..........Y.0000000033        *
    2600 0200  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   00002620   SAME AS ABOVE
    2640 0240  40404040 40404040 40404040 40404040   40400200 0000273A 00000000 000025D8 *                    .............Q*
    2660 0260  000026CC 000026CC F0F0F0F0 F0F0F0F0   F0F14040 40404040 40404040 40404040 *........0000000001              *
    2680 0280  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   000026A0   SAME AS ABOVE
    26C0 02C0  40404040 40404040 40400000 03000000   00000000 0000F0F0 F0F0F0F0 F4F0F2F8 *          ............0000004028*
    26E0 02E0  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   00002700   SAME AS ABOVE
    2720 0320  40404040 40404040 40404040 40404040   40404040 40404040 00000200 0011615A *                         ....../.*
    2740 0340  00002652 000025D8 00000000 00000000   F0F0F0F0 F0F0F0F0 F0F24040 40404040 *.......Q........0000000002      *
    2760 0360  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40404040 *                               *
     LINE   00002780   SAME AS ABOVE
    27A0 03A0  40404040 40404040 40404040 40404040   40400000 00000044 00000000 00000000 *                   ..............*
    27C0 03C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000 *................................*
    27E0 03E0  00000000 00000000 00000000 00000000   00000000 00000000 000003F9 03F90000 *............................9.9..*
```

Figure 102. SNAPPIT: Block Map and Block Dump report (Block Dump: Unformatted)

Report field description

The report fields are as follows:

DBNAME DB# PARTNAME PART ID REORG# DSG# DDNAME DSNAME
The name of the DBD, the database number (in hexadecimal), the name of the partition, partition id, partition reorganization number, the data set group number (in hexadecimal) or the data set group ID (in an alphabetic character), ddname and the name of the data set name

DUMP NO.
The dump number to be reported

BLOCK#
The relative block number of the block or CI that contains the pointer

Note: The first bitmap is always in block 1, regardless of whether the database is OSAM or VSAM/ESDS; thus, block 0 does not exist for OSAM databases.

BLKRBA
The relative byte address of the first byte in the block or CI

DATABASE ORGANIZATION
The organization type of the database or the type of the index database

The block map is a list of all the segments and free space elements that the HD Pointer Checker found in the block. Each entry is 32 bytes long. This report contains a hexadecimal and character dump of the block map. The record fields pertaining only to the format of the block map are as follows:

STORAGE
The memory address of the first byte in the line of the block map

TYPE(HEX)
The segment type of the area defined by this block map entry. If the entry describes a free space element, it contains "FREE SPC".

RBA
The relative byte address (RBA) of the area defined by this block map entry

ADDRESS
The address in memory of the area defined by this block map entry

FLAGS
The flags for the pointers in the segments defined by this block map

First Byte
A flag showing the physical pointers to the segment defined by this block map entry that were detected by the SCAN processor. Bit settings are as follows:

Bit
Pointer

0 (X'80')
HF: Hierarchical forward

1 (X'40')
HB: Hierarchical backward

2 (X'20')
PTF: Physical twin forward

3 (X'10')
PTB: Physical twin backward

4 (X'08')
PCF: Physical child first

5 (X'04')
PCL: Physical child last

6 (X'02')
RAP: Root anchor point

7 (X'01')
VLS: Pointer to data part of a split (variable-length) segment

Second Byte
A flag showing the logical pointers to the segment defined by this block map entry that were detected by the SCAN processor. Bit settings are as follows:

Bit
Pointer

0 (X'80')
LTF: Logical twin forward

1 (X'40')
LTB: Logical twin backward

2 (X'20')
LCF: Logical child first

3 (X'10')
LCL: Logical child last

4 (X'08')
LP: Logical parent

5 (X'04')
PP: Physical parent

6 (X'02')
IN: HIDAM index pointer

Third Byte
A flag showing the pointers contained in the segment defined by this block map entry. Bit settings are as follows:

Bit
Pointer

0 (X'80')
CTR: Logical child counter

1 (X'40')
PTF: Physical twin forward

2 (X'20')
PTB: Physical twin backward

3 (X'10')
PP: Physical parent

4 (X'08')
LTF: Logical twin forward

5 (X'04')
LTB: Logical twin backward

6 (X'02')
LP: Logical parent

7 (X'01')
HF: Hierarchical forward

SC
The segment code of the segment defined by this block map entry

COUNTERS
The two-byte field counters for the segments defined by this block map entry

Position 0 - 1
The value of the logical child counter in the segment defined by this block map entry

Position 2 - 3
The number of logical children (from unidirectional and physically paired logical children) detected by the SCAN processor for the segment defined by this block map entry

Position 4 - 5
The number of logical parent pointers (from physically paired logical children) detected by the SCAN processor to the segment defined by this block map entry

Position 6 - 7
The number of physical parent pointers (from physically paired logical children) detected by the SCAN processor to the segment defined by this block map entry

LENGTH
The length of the segment, free space element, short free space and unknown defined by this block map entry

ROOT#
The root number (in packed decimal) in this block that owns the segment defined by this block map entry

TYPE(CHAR)
The description of this mapped item in character image

segment name
The segment name

FSAP
Free space anchor point

RAP
Root anchor point

SHORT FS
Free space that is not formatted into a free space element

UNKNOWN
Data that cannot be classified as segment data or a free space element, and that is too long to be considered as a short free space element

VSAM CTL
VSAM control area

When an index database is dumped, the following items are shown:

DOS
The field is present when DOSCOMP is specified in DBD

RECCHAIN
The pointer to the overflow data set

SEG PFX
Segment prefix of the index segment starting with a deleted byte

INDX KEY
Index key

SYM PTR
Symbolic pointer

OTH DATA
Space in an index segment record

The block dump is a hexadecimal and character dump of one database or CI. The record fields pertaining only to the format of the block dump are as follows:

RBA
The relative byte address of the first byte of the physical block dump in the same line

OFFSET
The hexadecimal displacement of the first byte in the same line

SUMMARY data set

The SUMMARY data set contains summary reports produced by the HD Pointer Checker processor (FABPMAIN).

This data set contains the following reports:

- Separator page for HD Pointer Checker Summary reports
- HD Pointer Checker Summary report
- HD Pointer Checker Message Summary report

Separator page for HD Pointer Checker Summary reports

This separator page contains the title of "HD Pointer Checker Summary Report," and indicates the HD Pointer Checker Summary report will follow the page.

This report is produced unless SEP=NO is specified on the PROC statement as input for the PROCCTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "SEPARATOR PAGE FOR SUMMARY"                          PAGE:     1
5655-U09                                              DATE: 07/07/2020  TIME: 15.59.40                        FABPMAIN - V3.R1



            H   H DDDD       PPPP   OOO  IIIII N   N TTTTT EEEEE RRRR         CCC  H   H EEEEE  CCC  K   K EEEEE RRRR
            H   H D   D      P   P O   O   I   N   N   T   E     R   R       C   C H   H E     C   C K  K  E     R   R
            H   H D   D      P   P O   O   I   NN  N   T   E     R   R       C     H   H E     C     K K   E     R   R
            HHHHH D   D      PPPP  O   O   I   N N N   T   EEE   RRRR        C     HHHHH EEE   C     KK    EEE   RRRR
            H   H D   D      P     O   O   I   N  NN   T   E     R R         C     H   H E     C     K K   E     R R
            H   H D   D      P     O   O   I   N   N   T   E     R  R        C   C H   H E     C   C K  K  E     R  R
            H   H DDDD       P      OOO  IIIII N   N   T   EEEEE R   R        CCC  H   H EEEEE  CCC  K   K EEEEE R   R


                     SSS  U   U M   M M   M  AAA  RRRR  Y   Y       RRRR  EEEEE PPPP   OOO  RRRR  TTTTT
                    S   S U   U M   M MM  MM A   A R   R Y   Y      R   R E     P   P O   O R   R   T
                    S     U   U MM MM M M MM A   A R   R Y   Y      R   R E     P   P O   O R   R   T
                     SSS  U   U M M M M M M AAAAA RRRR   YYY       RRRR  EEE   PPPP  O   O RRRR    T
                        S U   U M   M M   M A   A R R     Y        R R   E     P     O   O R R     T
                    S   S U   U M   M M   M A   A R  R    Y        R  R  E     P     O   O R  R    T
                     SSS   UUU  M   M M   M A   A R   R   Y        R   R EEEEE P      OOO  R   R   T
```

Figure 103. SUMMARY: Separator page for HD Pointer Checker Summary reports

HD Pointer Checker Summary report

This report contains the summary of the HD Pointer Checker run.

This report is produced at the end of the HD Pointer Checker run if TYPE=ALL, SCAN, or CHECK is specified on the PROC statement as input for the PROCCTL data set.

Subsections:

- “Report example” on page 261
- “Report field descriptions” on page 262

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "HD POINTER CHECKER SUMMARY"                        PAGE:     1
5655-U09                                                  DATE: 07/28/2020  TIME: 09.56.33                          FABPMAIN - V3.R1


DBNAME/        DDNAME/          C-DATE/    D-DATE/    D-TIME    CHK-DATE/  CHK-TIME/ DATA-SET SIZE     F-SPACE %/  DETECTED ERRORS
DB# DSG# DBLG# DB-ORGANIZATION  ACCM BLKSZ LRECL DBTYPE DEVICE  %SEGMS IN OFLW       CYL'S     BYTES     BYTES     TOTAL  UNKNOWN
--- ---- ----- ---------------  ---- ----- ----- ------ ------  -------------------  ----   ---------  ----------  -----  -------

HDAMDB2        HDAMDS4          07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33                          8 %
001 01   001   HDAM             ESDS  1024  1017   REAL  3390    98                     5     2534400      215670      0        0

HISAMDB1       HISAMDS1         07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33
002 01   001   HISAM            KSDS  8192   510   REAL  3390    99                   N/A                               0        0

HISAMDB1       HISAMDS2         07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33
002 01   001   HISAM       OFLW ESDS  8192   512   REAL  3390    N/A                  N/A                               0        0


IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS               "HD POINTER CHECKER SUMMARY (HALDB)"                     PAGE:     1
5655-U09                                                  DATE: 07/28/2020  TIME: 09.56.33                          FABPMAIN - V3.R1


DBNAME/   PARTNAME/ DDNAME/     C-DATE/    D-DATE/    D-TIME    CHK-DATE/  CHK-TIME/ DATA-SET SIZE     F-SPACE %/  DETECTED ERRORS
DB# PID  DSG# DBLG# DB-ORG      ACCM BLKSZ LRECL DBTYPE DEVICE  %SEGMS IN OFLW       CYL'S     BYTES     BYTES     TOTAL  UNKNOWN
--- ---- ---- ----- ----------- ---- ----- ----- ------ ------  -------------------  ----   ---------  ----------  -----  -------

TPFOH1    TPFOH1A   TPFOH1AA    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33                          1 %
003 00001 A   002   PHDAM       ESDS   512   505   REAL  3390    73                    27    10160640      147298      0        0

TPFOH1    TPFOH1A   TPFOH1AB    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33                         87 %
003 00001 B   002   PHDAM       ESDS   512   505   REAL  3390    0                      1      376320      329850      0        0

TPFOH3    TPFOH3A   TPFOH3AA    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33                         37 %
004 00001 A   002   PHDAM       ESDS   512   505   REAL  3390    65                     2      752640      280350      0        0

TPFOH2    TPFOH2A   TPFOH2AA    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33                         10 %
005 00001 A   002   PHIDAM      ESDS   512   505   REAL  3390    0                      6     2257920      241226      0        0

TPFOH2    TPFOH2A   TPFOH2AX    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33
005 00001 X   002   PHIDAM IDX  KSDS   512    14   REAL  3390    0                    N/A                               0        0

TPFOX1    TPFOX1A   TPFOX1AA    07/06/2020 07/28/2020 09.56.33  07/28/2020 09.56.33
006 00001 A   002   PSINDEX     KSDS   512    54   REAL  3390    0                    N/A                               0        0
```

Figure 104. SUMMARY: HD Pointer Checker Summary report

Report field descriptions

The reports fields are as follows:

DBNAME
The name of the DBD as coded on the NAME keyword of the DBD macro

DB#
The database number (in hexadecimal) that identifies the database processed throughout the HD Pointer Checker run

PID
The partition ID (in decimal) that identifies the partition containing the segment that contains the pointer

PARTNAME
The name of the partition

DSG#
The data set group number (in hexadecimal) that identifies the database processed throughout the HD Pointer Checker run

DBLG#
The database logical group number which indicates that physical databases with the same database logical group number are logically related to each other

DDNAME
The ddname as coded on the DD1 keyword or OVFLW keyword of the DATASET macro in the DBD

DB-ORGANIZATION
The type of database organization (HISAM, HIDAM, HDAM, INDEX, LOGICAL, and so on)

C-DATE
The date when the database data set was actually created. If the specified data set is an image copy database data set, this is the date when the image copy database data set was created.

ACCM
The type of access method

BLKSZ
The block size

D-DATE
The date when the SCAN process was performed if the specified data set is a real database data set or a Fast Recovery image copy data set. If the specified data set is an image copy database data set, this is the date when the image copy database data set was created.

D-TIME
The time when the SCAN process was performed if the specified data set is a real database data set. If the specified data set is an image copy database data set, this is the time when the image copy database data set was created.

LRECL
The logical record length of the database data set

DBTYPE
Indicates whether the database data set is a real database or an image copy data set. If an image copy data set that has been created more than five days older than the date when the SCAN process was done, the indicator "*" follows the image copy indicator "IMGCPY".

DEVICE
The device type of a real database or the type of the image copy database data set (that is, TAPE or DASD) if an image copy database data set is used

CHK-DATE
The date when the CHECK process was done

CHK-TIME
The time when the CHECK process was done

%SEGMS IN OFLW
The percentage of segments in the overflow (ESDS or OSAM) part of the data set group

DATA-SET SIZE
The data set size that is used by IMS

CYL'S
The data set size in cylinders. This is the round up value of the number of scanned Cls/blocks divided by the number of physical blocks per cylinder for the particular DASD.

BYTES
The data set size in bytes. The number of scanned Cls/blocks multiplied by the length of the Cl/block.

F-SPACE
The reusable free space in the database as indicated by FSEs that can hold the longest segment in the data set group

%
The percentage of the reusable free space in the data set that is the percentage of F-SPACE in bytes against DATA-SET SIZE in bytes

BYTES
The F-SPACE in bytes (See Figure 61 on page 190)

DETECTED ERRORS
The number of errors detected throughout the HD Pointer Checker run is shown by the following fields:

TOTAL
The total number of errors which include unknown areas (that is, T2 records)

UNKNOWN
The total number of unknown areas (T2 records)

When DETECTED ERRORS TOTAL and UNKNOWN overflow, values 9999 are shown with an asterisk in the fields.

HD Pointer Checker Message Summary report

This report contains the message summary report of the HD Pointer Checker run.

This report is produced at the end of the HD Pointer Checker run if TYPE=ALL, SCAN, or CHECK is specified on the PROC statement as input for the PROCCTL data set. This report summarizes all warning and error messages that are reported by the HD Pointer Checker run. The WTO messages are reported with report name "WTO MESSAGE".

Subsections:

- “Report example” on page 264
- “Report field description” on page 264

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS            "HD POINTER CHECKER MESSAGE SUMMARY REPORT"                PAGE:     1
5655-U09                                                  DATE: 07/07/2020  TIME: 13.40.35                      FABPMAIN - V3.R1


ERROR MESSAGES
--------------
DBNAME    PARTNAME  DDNAME    MESSAGE ID  REPORT NAME
HDAMDB1             HDAMDB1A  FABP0410E   VALIDATION OF A POINTER TO A TARGET AT SCAN REPORT
HDAMDB1             HDAMDB1A  FABP0410E   VALIDATION OF A POINTER TO A TARGET AT CHECK REPORT
HDAMDB1             HDAMDB1A  FABP0960E   VALIDATION OF A POINTER TO A TARGET AT SCAN REPORT
HDAMDB1             HDAMDB1A  FABP1470E   WTO MESSAGE
HDAMDB1             HDAMDB1A  FABP1510E   WTO MESSAGE
HDAMDB1             HDAMDB1B  FABP0410E   VALIDATION OF A POINTER TO A TARGET AT SCAN REPORT
HDAMDB1             HDAMDB1B  FABP0410E   VALIDATION OF A POINTER TO A TARGET AT CHECK REPORT
HDAMDB1             HDAMDB1B  FABP0470E   EVALUATION OF ALL POINTERS TO THE SAME TARGET REPORT
HDAMDB1             HDAMDB1B  FABP0960E   VALIDATION OF A POINTER TO A TARGET AT SCAN REPORT
HDAMDB1             HDAMDB1B  FABP1470E   WTO MESSAGE
HDAMDB1             HDAMDB1B  FABP1510E   WTO MESSAGE

WARNING MESSAGES
----------------
DBNAME    PARTNAME  DDNAME    MESSAGE ID  REPORT NAME
HDAMDB1                       FABP1090W   DATABASE STATISTICS REPORT
```

Figure 105. SUMMARY: HD Pointer Checker Message Summary report

Report field description

The reports fields are as follows:

DBNAME
The name of the DBD as coded on the NAME keyword of the DBD macro

PARTNAME
The name of the partition

DDNAME
The ddname as coded on the DD1 keyword or the OVFLW keyword of the DATASET macro in the DBD

MESSAGE ID
The message IDs of the reported warning or error messages

REPORT NAME
The report name in which the messages are reported

DBSRCPRT data set

The DBSRCPRT data set contains the report that is produced when REPORT DECODEDBD=YES is specified.

This report has the following two parts:

Messages
This part contains FABN*nnnn* messages issued by the DBD reversal function of IMS Library Integrity Utilities. Figure 106 on page 265 shows an example of this part.

DBD source
This part contains the DBD source decoded by the DBD reversal function of IMS Library Integrity Utilities. Because the logical record length is 133 and the report header is added per page, it cannot be used as input of the IMS DBDGEN utility. Figure 107 on page 265 shows an example of this part.

For details about FABN*nnnn* messages and the DBD source, read about the DBD/PSB/ACB Reversal utility in the *IMS Library Integrity Utilities User's Guide*.

The following figures show examples of the reports.

```
IMS LIBRARY INTEGRITY UTILITIES - DBD/PSB/ACB REVERSAL                "MESSAGES"                                    PAGE:     1
5655-U08                                              DATE: 05/13/2020  TIME: 13.28.24                       FABNDCOD - V2.R2

FABN0032I MEMBER HDAMDB1  PROCESSED
```

Figure 106. DBSRCPRT: Messages report

```
IMS LIBRARY INTEGRITY UTILITIES - DBD/PSB/ACB REVERSAL              "DBD SOURCE"                                    PAGE:     1
5655-U08                                              DATE: 05/13/2020  TIME: 13.28.24                       FABNDCOD - V2.R2
       TITLE   'ASSEMBLE OF DBDNAME=HDAMDB1  '
*        DSNAME=TESTDS.HPC.DBDLIB
*        VOL=IMSHPS
*        DBDGEN DATE 05/13/2020 TIME 13.28
       DBD     NAME=HDAMDB1,ACCESS=(HDAM,VSAM),                       C
               RMNAME=(DFSHDC40,1,5,500),PASSWD=YES,                  C
               VERSION=,           DATE 05/13/03 TIME 13.28           C
               EXIT=((*,LOG,KEY,DATA,NOPATH,(CASCADE,KEY,DATA,NOPATH)))
*********************************************************************
*        DATASET GROUP NUMBER 1                                     *
*********************************************************************
DSG001 DATASET DD1=HDAMDS1,SIZE=(1024),SCAN=3
*********************************************************************
*        SEGMENT NUMBER 1                                           *
*********************************************************************
       SEGM    NAME=ROOT,PARENT=0,BYTES=100,RULES=(LLL,LAST),         C
               PTR=(TWIN,,,,)
       FIELD   NAME=(ROOTF1,SEQ,U),START=1,BYTES=10,TYPE=C
       FIELD   NAME=(ROOTF2),START=11,BYTES=20,TYPE=C
       FIELD   NAME=(ROOTF3),START=31,BYTES=4,TYPE=C
*********************************************************************
*        SEGMENT NUMBER 2                                           *
*********************************************************************
       SEGM    NAME=DEP1,PARENT=((ROOT,)),BYTES=100,RULES=(LLL,LAST),  C
               PTR=(TWIN,,,,)
       FIELD   NAME=(DEP1F1),START=1,BYTES=10,TYPE=C
       FIELD   NAME=(DEP1F2),START=11,BYTES=5,TYPE=C
*********************************************************************
*        SEGMENT NUMBER 3                                           *
*********************************************************************
       SEGM    NAME=DEP2,PARENT=((ROOT,)),BYTES=100,RULES=(LLL,LAST),  C
               PTR=(TWIN,,,,)
       FIELD   NAME=(DEP2F1),START=1,BYTES=10,TYPE=C
       FIELD   NAME=(DEP2F2),START=11,BYTES=5,TYPE=C
       FIELD   NAME=(DEP2F3),START=16,BYTES=25,TYPE=C
       FIELD   NAME=(DEP2F4),START=41,BYTES=10,TYPE=C
       DBDGEN
       FINISH
       END
```

Figure 107. DBSRCPRT: DBD source report

DBMAPPRT data set

The DBMAPPRT data set contains the report that is produced when REPORT MAPDBD=YES is specified.

This report has the following two parts:

Messages
This part contains FABM*nnnn* messages issued by the DBD map function of IMS Library Integrity Utilities. Figure 108 on page 266 shows an example of this part.

DBD map
This part contains the DBD maps that are created by the DBD map function of IMS Library Integrity Utilities. The maps depict the hierarchical structure of databases as described in the DBDs. Figure 109 on page 266 shows an example of this part.

For details about FABM*nnnn* messages and DBD maps, read about the DBD/PSB/ACB Mapper utility in the *IMS Library Integrity Utilities User's Guide*.

The following figures show examples of the reports.

```
IMS LIBRARY INTEGRITY UTILITIES - DBD/PSB/ACB MAPPER                    "MESSAGES"                                      PAGE:     1
5655-U08                                                   DATE: 03/19/2020  TIME: 17.13.05                        FABMDMAP - V2.R2
FABM0034I MEMBER HDAMDB1  PROCESSED
```

Figure 108. DBMAPPRT: Messages report

```
IMS LIBRARY INTEGRITY UTILITIES - DBD/PSB/ACB MAPPER                  "DBD MAP"                                         PAGE:   A
5655-U08                                                   DATE: 03/19/2020  TIME: 17.13.05                        FABMDMAP - V2.R2
  DBDNAME=HDAMDB1   VOLUME=IMSHPS  DSNAME=TESTDS.HPC.DBDLIB
  DBDMAP OF HDAMDB1                                                          ACCESS=HDAM VSAM


                                                          ***********
                                                          *   ROOT  *
                                                          *******001*
                                                         ._____|______.
                                                         |            |
                                                   ***********  ***********
                                                   *   DEP1  *  *   DEP2  *
                                                   *******002*  *******003*
```

Figure 109. DBMAPPRT: DBD Map report

Chapter 5. Using Disk Address Analyzer

The FABPCHRO program is a single job step program which prints the absolute disk address of user-specified relative byte address. It runs as a batch job.

The following topics describe JCL requirements and all other input you must supply to run the FABPCHRO program. These topics also describe the output data set and reports produced by the FABPCHRO program.

Topics:

- "FABPCHRO JCL" on page 267
- "FABPCHRO CTL input data set" on page 268
- "FABPCHRO PRT output data set" on page 269

FABPCHRO JCL

To run FABPCHRO, supply the EXEC statement and appropriate DD statements.

The following table summarizes the DD statements.

Table 28. FABPCHRO DD statements

DDNAME	Use	Format	Need
CTL	Input	LRECL=80	Required
ddname	Input		Required
PRT	Output	LRECL=133	Required
SYSUDUMP	Output	SYSOUT	Optional

EXEC
This statement must be in the following format:

```
//     EXEC PGM=FABPCHRO
```

PRT DD
This required output data set contains the reports produced by FABPCHRO. If BLKSIZE is coded on the DD statement, it must a multiple of 133.

CTL DD
This required input data set contains your description of the processing to be done by module FABPCHRO. It describes the databases that will be processed, and it contains the RBAs for which absolute disk addresses are needed.

***ddname* DD**
This input data set is an IMS database data set and a DD statement exists for every database data set that you want to process. Use the ddname that is specified in the DBD. The actual data set must be a real database. Image copy is not a valid input for FABPCHRO. Do not provide a DD statement for any image copy data set.

For a VSAM data set, the AMP parameter can be used to specify the number of VSAM I/O buffers.

For an OSAM data set, the DCB=BUFNO parameter can be used to specify the number of I/O buffers.

Be careful when you specify this parameter because:

- The region size will also increase when buffer space is specified
- The excessive number of buffers can cause an open error for the database data set.

© Copyright IBM Corp. 2000, 2021

SYSUDUMP DD (or SYSABEND)
This DD defines output from a system ABEND dump routine. It is used only when a dump is required.

No cataloged procedure is provided for printing absolute disk addresses (module FABPCHRO) because the JCL for that program is very simple.

FABPCHRO CTL input data set

The CTL data set contains your description of the processing to be done by module FABPCHRO. It contains target relative byte addresses (RBAs). Module FABPCHRO prints the absolute disk address for each input target RBA.

Format

This control data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set. It must contain one 80-byte, fixed-length record for each target RBA to be processed. BLKSIZE, if coded, must be a multiple of 80. The CTL data set can be coded as shown in the following figure.

```
//CTL       DD *
DSFACHO0  0000069A
DSFACHO0  0CCCCC9A
DSFACHO0  0000079A
DSSCHHV0  00000900            VSAM
DSSCHHV0  00001000            VSAM
DSSCHXI0  00000000
DSSCHXI0  00000053
DSSCHXI0  000000CF
DSSCHXI0  000018CF
DSSCHXI0  00002000
/*
```

Figure 110. Example of the FABPCHRO CTL data set

There is only one record type in the CTL data set. The following figure shows the format of the CTL data set.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789

 ddname    rba                 accessm
```

Figure 111. Format of the FABPCHRO CTL data set

Position
Description

1
This 8-digit field contains the (left-aligned) DDNAME of the database that contains the target RBA.

11
This 8-digit field contains the target RBA. This field is hexadecimal, with leading zeros (if needed).

31
This 4-digit field indicates the access method used for the database that contains the target RBA. Use one of the following codes:

VSAM
If the data set is a VSAM data set or an encrypted OSAM database data set, specify VSAM.

Blank
If the data set is an OSAM data set, leave this field blank.

Note: If you code this field incorrectly, results are unpredictable.

FABPCHRO PRT output data set

The PRT data set contains all of the reports produced by the FABPCHRO program.

The following reports are produced:

- Control Card Format report
- Control Card and Pointer Information report

Control Card Format report

This report contains a brief description of the format of the FABPCHRO control statement.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "CONTROL CARD FORMAT REPORT"                     PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 10.54.21                   FABPCHRO - V3.R1


COLUMNS  1- 8: DDNAME

COLUMNS 11-18: RBA IN PRINTABLE HEX

COLUMNS 31-34: 'VSAM' IF VSAM DATA SET
               '    ' IF OSAM DATA SET
```

Figure 112. FABPCHRO: Control Card Format report

Control Card and Pointer Information report

This report contains the user's input control statements, the resulting disk addresses, and a summary of data set extents.

Subsections:

- "Report example" on page 269
- "Report field description" on page 269

Report example

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS          "CONTROL CARD/POINTER INFORMATION REPORT"              PAGE:     1
5655-U09                                               DATE: 07/10/2020  TIME: 10.54.21                   FABPCHRO - V3.R1


     C O N T R O L   C A R D                    P O I N T E R   I N F O R M A T I O N

0        1         2         3          DDNAME     RBA     BLKSIZE    BLOCK#  VOLUME cccCCCCHRR OFST
12345678901234567890123456789012345678901234     --------  --------  -------  --------  ------ ---------- ----

HISAMDS1 00000001             VSAM      HISAMDS1  0000001   X'2000'         0  PMR004    0259001 0010

HISAMDS1 00000002             VSAM      HISAMDS1  0000002   X'2000'         0  PMR004    0259001 0020

HISAMDS1 00000003             VSAM      HISAMDS1  0000003   X'2000'         0  PMR004    0259001 0030

HISAMDS1 00000004             VSAM      HISAMDS1  0000004   X'2000'         0  PMR004    0259001 0040

HISAMDS1 00000005             VSAM      HISAMDS1  0000005   X'2000'         0  PMR004    0259001 0050


SUMMARY OF EXTENTS FOR HISAMDS1

VOLSER  LOW-cccCCCCH  HIGH-cccCCCCH
-----------------------------------
PMR004         02590          028AE
```

Figure 113. FABPCHRO: Control Card and Pointer Information report

Report field description

The report fields are as follows:

DDNAME
The ddname used on the input database data set.

RBA
The target relative byte address for which an absolute disk address is desired.

For an RBA beyond 4 GB, it is a 32-bit odd value based on the over 4-GB RBA rule.

For example, the hexadecimal value x'10000F000' is shown as 0000F001.

BLKSIZE
The block size or CI size of the input database data set.

BLOCK#
The relative physical record number of the block or CI that contains the target relative byte address.

Notes:

- The first block in an OSAM data set is BLOCK#=1.
- The first block in a VSAM data set is BLOCK#=0.
- For a VSAM data set with CI size larger than 4096, BLOCK# is not the same as the CI number.
- This field is *not* the same as the BLOCK# fields in the pointer error messages (see this field under "Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/PHDAM/PHIDAM) report" on page 222 and "Validation of a Pointer to a Target at CHECK report" on page 228).

VOLUME
The volume serial number of the device that contains the target relative byte address.

cccCCCCHRR
The actual direct access address of the record that contains the target relative byte address. This is a 10-digit hexadecimal number. ccc is the high-order 12 bits of the cylinder number. The value of ccc is printed when the dasd volume is an Extended Address Volume (EAV). It is padded with blank for non-EAV volume. CCCC is the low-order 16 bits of the cylinder number, H is the track number, and RR is the record number.

OFST
The hexadecimal displacement of the target relative byte address within its physical record.

Note: This is not necessarily the offset from the beginning of a VSAM CI. It is the offset from the beginning of the VSAM physical record. If your CI size is greater than 4096, these are not the same.

The following fields pertain to the summary of data set extents:

VOLSER
The volume serial number of the device that contains an extent of the input database data set.

LOW-cccCCCCH
The lowest cylinder and track on the extent described by this report line.

HIGH-cccCCCCH
The highest cylinder and track on the extent described by this report line.

Chapter 6. HD Pointer Checker Site Default Generation utility

The HD Pointer Checker Site Default Generation utility (HDPC Site Default Generation utility) enables you to use your own default value for the PROCCTL control statements. It runs as a batch job.

The following topics describe how to generate and use the PROCCTL site default table.

Topics:

- "Functions" on page 271
- "Setting site default values for HD Pointer Checker" on page 271
- "FABPTGEN JCL" on page 274
- "FABPTGEN PROCCTL data set" on page 275

Functions

The HDPC Site Default Generation utility has two functions; generating and reporting the PROCCTL site default table.

Generating the PROCCTL site default table

The HDPC Site Default Generation utility analyzes the PROCCTL control statements and generates a source code for the PROCCTL site default table. You can create a site default table by assembling and link-editing the source code. For an instruction to create and use a site default table, see "Setting site default values for HD Pointer Checker" on page 271.

The HD Pointer Checker PROCCTL site default table is available only when HD Pointer Checker runs as a stand-alone utility. It is not available when the HASH Check option is called in the IMS HP Image Copy job, the IMS Database Reorganization Expert job, the IMS Database Recovery Facility job, or the IMS Online Reorganization Facility job.

IMS HP Image Copy has its own site default table. To set the site default in the IMS HP Image Copy job, use the IMS HP Image Copy site default generation utility. For more information, see the *IMS High Performance Image Copy User's Guide*.

Reporting the PROCCTL site default table

The HDPC Site Default Generation utility reads the PROCCTL site default table and prints the site default values that are set in the reports.

Setting site default values for HD Pointer Checker

To set site default values for HD Pointer Checker, you run the HDPC Site Default Generation utility (FABPTGEN).

About this task

The following figure shows the process flow of how to use the PROCCTL site default table.

© Copyright IBM Corp. 2000, 2021

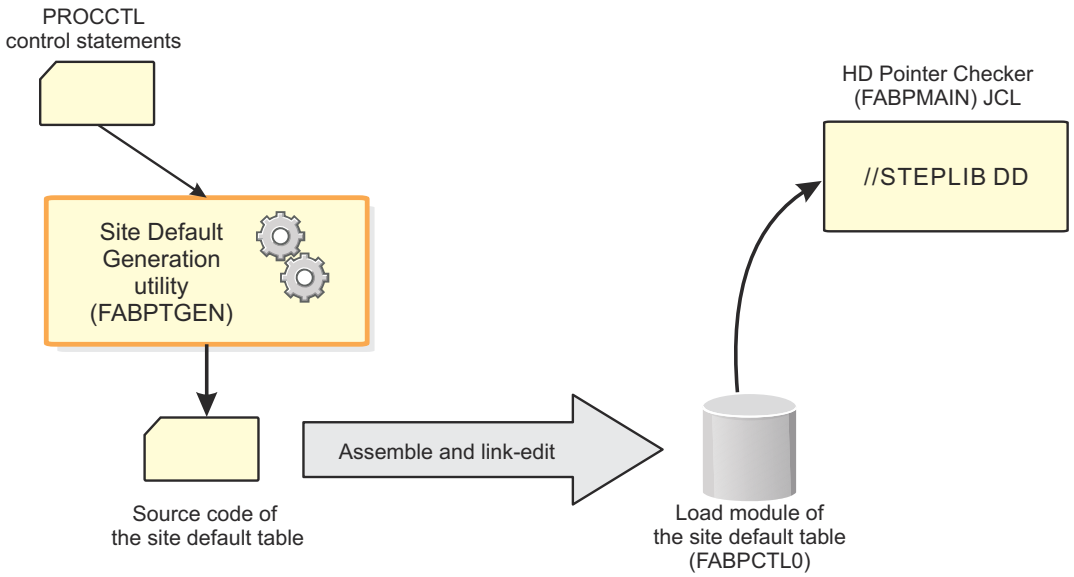


Figure 114. Process flow of PROCCTL site default table creation

Procedure

1. Prepare JCL for the HDPC Site Default Generation utility (FABPTGEN).

   Sample JCL (Figure 115 on page 273) that runs the FABPTGEN program is provided in the SHPSSAMP data set that is provided by the product. The member name is FABPDFL1. Use the sample or prepare similar JCL of your own.

   For FABPTGEN JCL requirements, see "FABPTGEN JCL" on page 274.
2. In the PROCCTL data set, code the control statements for which you want to change its default value.

   For a list of control statements that you can specify for the Site Default Generation utility, see "FABPTGEN PROCCTL data set" on page 275.
3. Run the HDPC Site Default Generation utility job step to create a source code of the PROCCTL site default table (FABPCTL0).

   The FABPDFL1 sample JCL creates a source code and then assembles and link-edits the source code. Therefore, if you use FABPDFL1, you can omit Step "4" on page 272.
4. Assemble and link the FABPCTL0 source code.

   To create the site default table module FABPCTL0, assemble and link the SYSPUNCH that is generated by FABPTGEN.

   For SYSIN of the assemble job step, specify the SYSPUNCH data set that is generated in the FABPTGEN. In the link-edit job step, it is recommended that you use AMODE=31, RMODE=ANY instead of the default AMODE=24, RMODE=24 by adding MODE=31 and RMDE=ANY to the EXEC statement PARM list.
5. Concatenate the load module library in which FABPCTL0 resides to the STEPLIB of HD Pointer Checker FABPMAIN JCL.

   When FABPMAIN finds the name FABPCTL0 in the STEPLIB libraries, HD Pointer Checker loads it and uses it as the default value of the PROCCTL statement.

   If you specify a value in the PROCCTL control statement in the HD Pointer Checker FABPMAIN JCL, you can override the site default value at run time.

   The HD Pointer Checker PROCCTL site default table is available only when HD Pointer Checker runs as a stand-alone utility. It is not available when the HASH Check option is called in the IMS HP Image Copy job, the IMS Database Reorganization Expert job, the IMS Database Recovery Facility job, or the IMS Online Reorganization Facility job.

IMS HP Image Copy has its own site default table. To set the site default in the IMS HP Image Copy job, use the IMS HP Image Copy site default generation utility. For more information, see the *IMS High Performance Image Copy User's Guide*.

Example

The following figure shows the contents of FABPDFL1 for creating the FABPCTL0 source code and assembling and link-editing the source code.

```
//FABPDFL1 JOB ...........
//*********************************************************************
//*   Licensed Materials - Property of IBM                            *
//*                                                                   *
//*   5655-U09                                                        *
//*                                                                   *
//*   Copyright IBM Corp. 2008 All Rights Reserved.                   *
//*                                                                   *
//*   US Government Users Restricted Rights - Use,                    *
//*   duplication or disclosure restricted by GSA ADP                 *
//*   Schedule Contract with IBM Corp.                                *
//*                                                                   *
//*********************************************************************
//* FABPDFL1:                                                         *
//*   HD Pointer Checker Site Default Generation Utility (PARM='GEN')*
//*   Sample JCL                                                      *
//*                                                                   *
//*   This is a sample JCL for running Site Default Generation        *
//*   Utility. It generates the site default table of HD Pointer      *
//*   Checker.                                                        *
//*                                                                   *
//*   This JCL consists of the following steps:                       *
//*     1) Generate the site default table source code                *
//*     2) Assemble the site default table                            *
//*     3) Link-Edit the site default table module                    *
//*********************************************************************
//*
//*********************************************************************
//*  FABPTGEN - HDPC SITE DEFAULT GENARATION UTILITY
//*  ( PARM='GEN' SAMPLE PROCEDURE )
//*********************************************************************
//HDPCTGEN PROC HLQ='HPS'
//*--------------------------------------------------------------------
//*  CREATE SOURCE CODE OF SITE DEFAULT TABLE
//*--------------------------------------------------------------------
//G        EXEC PGM=FABPTGEN,PARM='GEN'
//STEPLIB  DD   DISP=SHR,DSN=&HLQ..SHPSLMD0
//SYSPUNCH DD   DISP=(NEW,PASS,DELETE),DSN=&&SOURCE,
//             DCB=(RECFM=FB,BLKSIZE=800),SPACE=(TRK,(1,1)),UNIT=SYSDA
//SYSPRINT DD   SYSOUT=*
//SYSUDUMP DD   DUMMY
```

Figure 115. JCL example for creating the site default table module FABPCTL0 (FABPDFL1) (Part 1 of 2)

```
//*-------------------------------------------------------------------
//*  ASSEMBLE & LINK ==> SITE DEFAULT TABLE MODULE (FABPCTL0)
//*-------------------------------------------------------------------
//ASM      EXEC PGM=ASMA90,COND=(4,LT,G),
//             PARM='OBJECT,NODECK,LIST,XREF(SHORT)'
//SYSLIN   DD   DISP=(,PASS),UNIT=SYSDA,SPACE=(CYL,(5,5,0)),
//             DCB=(BLKSIZE=400),DSN=&&OBJECT
//SYSUT1   DD   DISP=(,DELETE),UNIT=SYSDA,SPACE=(CYL,(10,5))
//SYSPUNCH DD   DUMMY
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   DISP=(OLD,DELETE,DELETE),DSN=&&SOURCE
//*
//L        EXEC PGM=IEWL,COND=(4,LT,ASM),REGION=4096K,
//             PARM='LIST,REFR,REUS,AMODE=31,RMODE=ANY'
//SYSPRINT DD   SYSOUT=*
//SYSLIN   DD   DISP=(OLD,DELETE,DELETE),DSN=&OBJECT
//*
//         PEND
//*
//*-------------------------------------------------------------------*
//*  FABPTGEN (PARM='GEN') - HDPC SITE DEFAULT GENARATION UTILITY     *
//*-------------------------------------------------------------------*
//GO       EXEC HDPCTGEN,HLQ=HPS
//*-------------------------------------*
//* SPECIFY SITE DEFAULT VALUES         *
//*-------------------------------------*
//G.PROCCTL DD  *
 PROC TYPE=ALL
 OPTION HISTORY=YES
 REPORT COMPFACT=YES,SEGIO=YES
 END
/*
//L.SYSLMOD DD  DISP=SHR,DSN=HPS.TABLELIB(FABPCTL0)
//*
//
```

Figure 116. JCL example for creating the site default table module FABPCTL0 (FABPDFL1) (Part 2 of 2)

FABPTGEN JCL

To run the HDPC Site Default Generation utility (FABPTGEN), supply an EXEC statement with the PARM parameters and appropriate DD statements.

The following table summarizes the DD statements.

Table 29. FABPTGEN DD statements

DDNAME	Use	Format	When EXEC PARM='GEN'	When EXEC PARM='REPORT'
STEPLIB	Input	PDS	Required	Required
PROCCTL	Input	LRECL=80	Required	
SYSPUNCH	Output	LRECL=80	Required	
SYSPRINT	Output	LRECL=133	Required	Required
SYSABEND or SYSUDUMP	Output	LRECL=133	Optional	Optional

EXEC

This statement must be in the following format:

```
//     EXEC PGM=FABPTGEN,PARM='parm'
```

Specify GEN or REPORT for *parm*.

GEN

Specifies to generate a site default table. This value is the default.

REPORT

Specifies to print the site default values stored in the site default table.

Sample JCL that run the FABPTGEN program with PARM='GEN' and PARM='REPORT' are provided in the SHPSSAMP data set that is provided by the product. The member names are FABPDFL1 and FABPDFL2.

STEPLIB DD
This required input data set contains the IMS HP Pointer Checker load module library. When PARM='REPORT' is specified in the EXEC statement, you must also specify the data set that includes the site default table module member (FABPCTL0).

PROCCTL DD
This is a required data set when PARM='GEN' is specified in the EXEC statement. The format is the same as the FABPMAIN PROCCTL statement. Specify this input data set to include your own default values for the PROCCTL control statements.

SYSPUNCH DD
This is a required output data set when PARM='GEN' is specified in the EXEC statement.

An assembler source code of the site default table will be produced in this data set. The following DCB parameters must be specified:

RECFM=F or FB
LRECL=80
BLKSIZE=80 or multiple of 80

SYSPRINT DD
This is a required output data set. The PROCCTL statements report and the site default values report will be printed in this data set. You can specify SYSOUT=* (or JES output class name) instead of a data set name.

PROCCTL statements report
This report contains the control statements that you specified in the PROCCTL data set. It is generated when FABPTGEN generates the PROCCTL site default table.

Site default values report
This report prints the site default values that are stored in the PROCCTL site default table.

SYSUDUMP DD (or SYSABEND)
This defines the output for a system ABEND dump routine. It is used only when a dump is required.

FABPTGEN PROCCTL data set

The PROCCTL control statements are required to generate the PROCCTL site default table.

Specify keywords of which you want to change the default values from the HD Pointer Checker's system default value to your own suitable value. The HDPC Site Default Generation utility analyzes PROC, OPTION, REPORT, and DATABASE statements, and sets the site default values.

The keywords that are available for the HDPC Site Default Generation utility are shown in the following subsections. You can specify some of the keywords. If keywords are omitted, HD Pointer Checker system default values will be used. For a description of each keyword, see “FABPMAIN PROCCTL data set” on page 107.

In the following tables, the keywords indicated with No in column marked "Can specify site default value?" cannot be specified in the PROCCTL data set. The HDPC Site Default Generation utility ignores such keywords.

Subsections:

- “PROC statement” on page 276
- “OPTION statement” on page 276
- “REPORT statement” on page 277
- “DATABASE statement” on page 278
- “Example” on page 278

PROC statement

This statement is required. The following table shows the keywords that are available for this statement.

Table 30. Keywords available for the site default in the PROC statement

Keyword	System default value of HD Pointer Checker	Can specify site default value?
TYPE	(None)	Yes. This keyword is required. (Only ALL or SCAN)
DBORG	ALL	Yes
HASH	NO	Yes
IXKEYCHK	NO	Yes
IXKEYCKCHK	NO	Yes
SYMIXCHK	NO	Yes
SYMLPCHK	NO	Yes
EPSCHK	YES	Yes
DUPILKCHK	NO	Yes
REPAIRILK	NO	No
ICRG#CHK	NO	Yes
SENSOR	NO	Yes
SENSOR_HOME	YES	Yes
ITKBSRVR	*NO	Yes
ITKBLOAD	*NO	Yes
ADXCFGRP	*NO	Yes
TOSIXCFGRP	*NO	Yes
CHECK	(CHK,111111)	No
USER	*NO	Yes
RETCDDSN	*NO	Yes
SEP	YES	Yes
GROUPDIGITS	YES	Yes
VLSSUMM	NO	Yes
CHECKREC	NO	No
WKDATACLASS	*NO	Yes
WKSTORCLASS	*NO	Yes
WKHLQ	*NO	Yes

OPTION statement

This statement is optional. The OPTION statement can be specified before and after the DATABASE statement. However, the HDPC Site Default Generation utility analyzes only the OPTION statement before the DATABASE statement, and ignores the rest.

Table 31. The keywords available for the site default in the OPTION statement

Keyword	System default value of HD Pointer Checker	Can specify site default value?
ERRLIMIT	YES	No
DIAGDUMP	ERROR	Yes
DSSIZE	(None)	No
DUMPFORM	FORMAT	Yes
HISTORY	NO	Yes
HOMECHK	YES	Yes
ICUNIT	(None)	Yes
INCORE	YES	Yes
INTERVAL	DATASET	Yes
VSAMBF	(None)	Yes
IBUFF	10 TRK	Yes
KEYSIN	NO	Yes
T2CHK	(0,7)	Yes
ZEROCTR	NO	Yes
DIAG	NO	No
PRINTDATA	NO	No
NOCHKP	(None)	No
SPIXCHK	YES	Yes
PTRCHK	YES	Yes
SPMN	NO	Yes
THRESHOLDS	See “OPTION statement” on page 131 for the system default value of each keyword.	Yes

REPORT statement

This statement is optional. The REPORT statement can be specified before and after the DATABASE statement. However, the HDPC Site Default Generation utility analyzes only the REPORT statement before the DATABASE statement and ignores the rest.

Table 32. The keywords available for the site default in the REPORT statement

Keyword	System default value of HD Pointer Checker	Can specify site default value?
RUNTM	YES	Yes
INTST	YES	Yes
BITMAP	YES	Yes
FSEMAP	YES	Yes
MAXFSD	YES	Yes

Table 32. The keywords available for the site default in the REPORT statement (continued)

Keyword	System default value of HD Pointer Checker	Can specify site default value?
INTFS	YES	Yes
DBDIST	YES	Yes
CHAINDIST	YES	Yes
COMPFACT	NO	Yes
SEGIO	NO	Yes
DECODEDBD	NO	Yes
MAPDBD	NO	Yes

DATABASE statement

This statement is optional. More than one DATABASE statements can be specified. However, HDPC Site Default Generation utility will analyze only the first statement and ignores the rest of the statements.

Table 33. The keywords available for the site default in the DATABASE statement

Keyword	System default value of HD Pointer Checker	Can specify site default value?
DB	(None)	No
PART	*ALL	No
NUM	(None)	No
DD	*ALL	No
OVERFLOW	(None)	No
PRIMEDB	(None)	No
DATASET	REAL	Yes
SCANGROUP	1	No
BLOCKDUMP	(None)	No
DBALL	No	Yes

Example

The statements underlined in the following figure show the effective statements and keyword for setting the site defaults.

```
PROC TYPE=ALL,HASH=YES           <= Site default
  OPTION HISTORY=YES             <= Site default
  REPORT BITMAP=NO               <= Site default
DATABASE DB=dbdname1,DATASET=IC  <= Site default can only be specified for
                                    DATASET= in the DATABASE statement
  OPTION HISTORY=YES
  REPORT BITMAP=YES
DATABASE DB=dbdname1,DATASET=IC
  OPTION HISTORY=YES
  REPORT DBDIST=NO
END
```

Figure 117. Example of the FABPTGEN PROCCTL control statement

Chapter 7. JCL examples for HD Pointer Checker

There are many ways to use the HD Pointer Checker utility. The examples given in the following topics represent some of the common things that they can do. By studying and understanding these examples, you can learn the techniques to monitor the condition of your databases.

Topics:

- "Example 1: (Standard database analysis) Prevention" on page 279
- "Example 2: (Standard database analysis) Corrupted database" on page 281
- "Example 3: (Standard database analysis) Prevention with HASH" on page 283
- "Example 4: (Standard database analysis) Multiple jobs" on page 284

Example 1: (Standard database analysis) Prevention

This example shows how to run HD Pointer Checker and HD Tuning Aid as a preventive measure.

This example shows a typical way when you perform a regularly scheduled run (see Chapter 11, "Database repair guidelines," on page 293).

```
//EXAMPLE1 JOB --- use normal job statement parameters here ---
//*
//JOBLIB DD DSN=HPS.SHPSLMD0,DISP=SHR
//       DD DSN=IMSVS.RESLIB,DISP=SHR
//*
//*
//PCRUN   EXEC FABPPTA,
//             PSB=PSBSMUAL
//* ------------------------------------------------------------------------
//HDPCPRO.PROCCTL DD *
 PROC TYPE=ALL,EPSCHK=YES
  OPTION KEYSIN=YES,ERRLIMIT=YES,INCORE=YES
  DATABASE DB=DSSTUIVN,DD=DSSTUIV0,OVERFLOW=DSSTUIV1,DATASET=IMAGECOPY
  DATABASE DB=DSSCHXIN,DD=DSSCHXI0,PRIMEDB=DSSCHHVN,DATASET=IMAGECOPY
  DATABASE DB=DSFACXVN,DD=DSFACXV0,PRIMEDB=DSFACHON,DATASET=IMAGECOPY
  DATABASE DB=DSFDAXVN,DD=DSFDAXV0,OVERFLOW=DSFDAXV1,PRIMEDB=DSFACHON,
           DATASET=IMAGECOPY
  DATABASE DB=DSSCHHVN,DD=DSSCHHV0,DATASET=IMAGECOPY
  DATABASE DB=DSFACHON,DD=DSFACHO0,DATASET=IMAGECOPY
  DATABASE DB=DSCRSDVN,DD=DSCRSDV0,DATASET=IMAGECOPY
  DATABASE DB=DSCRSDVN,DD=DSCRSDV1,DATASET=IMAGECOPY
  DATABASE DB=DSCLSDVN,DD=DSCLSDV0,DATASET=IMAGECOPY
  DATABASE DB=PHDAM0A1,PART=*ALL,DATASET=IMAGECOPY
  DATABASE DB=PHDAM0B1,PART=*ALL,DATASET=IMAGECOPY
  DATABASE DB=PHIDAM01,PART=*ALL,DD=(A,B,C),DATASET=IMAGECOPY
  DATABASE DB=PHIDAM01,PART=*ALL,DD=X,DATASET=REAL
  DATABASE DB=PSINDEX1,PART=*ALL,DATASET=IMAGECOPY
 END
/*
//* ------------------------------------------------------------------------
```

Figure 118. HD Pointer Checker example 1: JCL for HD Pointer Checker

The major consideration points are as follows:

- Specify TYPE=ALL on the PROC statement.

  This parameter creates sort records for pointers and segments in all the databases you specify. This parameter also causes all the databases that you specify to be checked and the database error messages to be printed.
- Specify EPSCHK=YES, or do not specify EPSCHK keyword on the PROC statement.

  This specification causes extended pointer set (EPS) to be evaluated. The sort records for pointers that reside in EPS are created. The EPS check function checks not only the pointers (direct and indirect pointers) but also ILKs included in the EPS against the target segment and the ILE (indirect list entry).

© Copyright IBM Corp. 2000, 2021

- Specify KEYSIN=YES on the OPTION statement.

  This parameter causes the KEYSIN data set to be created. Because the IBM supplied cataloged procedure (FABPPTA) runs HD Tuning Aid (in addition to HD Pointer Checker), the input data set for HD Tuning Aid must be created by HD Pointer Checker.
- Specify ERRLIMIT=YES on the OPTION statement.

  This parameter causes only the first 100 messages to be printed (ERRLIMIT=YES is the default). If you want to print all error messages, specify ERRLIMIT=NO. However, if your databases are large and have many errors, a certain processing time is required to print all of the messages.
- Specify INCORE=YES, or do not specify INCORE keyword on the OPTION statement.

  This parameter specifies to check as many pointers as possible in the SCAN process. This minimizes the CPU in general, I/O, and run time used by HD Pointer Checker. If this run uncovers some (unexpected) pointer errors, the listing that is produced by the BLOCKMAP process might be incomplete.
- Specify DATASET=IMAGECOPY on the DATABASE statement.

  This parameter specifies to run with an image copy data set as input database. You do not want to affect database users with your HD Pointer Checker run. By using image copy data set, you can schedule your HD Pointer Checker job whenever you want, without having any effect on the real databases.
- You do not need to specify DD statements for the database data set or the image copy data set. The data sets to be processed are dynamically allocated, according to the specifications in the DFSMDA or the RECON data sets.
- You must specify DATASET=REAL for PHIDAM primary index, if you want to check the primary index database. Because image copy cannot be taken for the primary index database.
- You do not need to specify any other optional parameter on the control statements.

  Do not turn off the checking of certain pointers. All pointers should be verified by this HD Pointer Checker run.

A special consideration point for processing a large database is as follows:

- Specify SCANGROUP= on the DATABASE statement.

  The scan tasks with different scan group numbers are processed in parallel. This option shortens scan time. Especially when your database is a HALDB with many partitions, consider the use of the SCANGROUP= option.

Example 2: (Standard database analysis) Corrupted database

Refer to this example to run HD Pointer Checker when a database is damaged.

```
//EXAMPLE2 JOB --- use normal job statement parameters here ---
//*
//JOBLIB DD DSN=HPS.SHPSLMD0,DISP=SHR
//       DD DSN=IMSVS.RESLIB,DISP=SHR
//*
//*
//PCRUN   EXEC FABPP,
//             PSB=PSBSMUAL
//* ------------------------------------------------------------------------
//HDPCPRO.PROCCTL DD *
 PROC TYPE=ALL,EPSCHK=YES
  OPTION ERRLIMIT=NO,INCORE=NO,DIAGDUMP=ERROR
  DATABASE DB=DSSTUIVN,DD=DSSTUIV0,OVERFLOW=DSSTUIV1
  DATABASE DB=DSSCHXIN,DD=DSSCHXI0,PRIMEDB=DSSCHHVN
  DATABASE DB=DSFACXVN,DD=DSFACXV0,PRIMEDB=DSFACHON
  DATABASE DB=DSFDAXVN,DD=DSFDAXV0,OVERFLOW=DSFDAXV1,PRIMEDB=DSFACHON
  DATABASE DB=DSSCHHVN,DD=DSSCHHV0
  DATABASE DB=DSFACHON,DD=DSFACHO0
  DATABASE DB=DSCRSDVN,DD=DSCRSDV0
  DATABASE DB=DSCRSDVN,DD=DSCRSDV1
  DATABASE DB=DSCLSDVN,DD=DSCLSDV0
  DATABASE DB=PHDAM0A1,PART=*ALL,DATASET=IMAGECOPY
  DATABASE DB=PHDAM0B1,PART=*ALL,DATASET=IMAGECOPY
  DATABASE DB=PHIDAM01,PART=*ALL,DD=(A,B,C),DATASET=IMAGECOPY
  DATABASE DB=PHIDAM01,PART=*ALL,DD=X,DATASET=REAL
  DATABASE DB=PSINDEX1,PART=*ALL,DATASET=IMAGECOPY
/*
//* ------------------------------------------------------------------------
```

Figure 119. HD Pointer Checker example 2: JCL for HD Pointer Checker

The major consideration points are:

- Specify TYPE=ALL on the PROC statement.

  This parameter creates sort records for pointers and segments in all the databases specified. This parameter also checks all the databases specified and prints the database error messages.
- Specify EPSCHK=YES, or do not specify EPSCHK keyword on the PROC statement.

  This specification causes extended pointer set (EPS) to be evaluated. The sort records for pointers that reside in EPS are created. The EPS check function checks not only the pointers (direct and indirect pointers) but also ILKs included in the EPS against the target segment and the ILE (indirect list entry).
- Specify ERRLIMIT=NO on the OPTION statement.

  This parameter causes all error messages to be printed. Only the first 100 messages are printed, whether ERRLIMIT=YES is specified or ERRLIMIT=keyword is not specified at all.
- Specify INCORE=NO on the OPTION statement.

  This specification means that you are not checking the pointers in the SCAN process. The actual pointer checking is done in the CHECK process. Because you might wind up fixing the database with zapping, you might need the listing produced by the BLOCKMAP processor. This listing is complete only if the in-core checking is not used.
- Specify DIAGDUMP=ERROR on the OPTION statement.

  This specification means that a block map and dump for a database data set block, which contains an error, is printed.
- Specify DATASET=REAL, or not specify DATASET keyword on the DATABASE statement.

  This specification means that you are running with real databases (not image copies) as input. Because you might wind up fixing the database with zapping, you might need the absolute disk addresses of the invalid pointers. These are available only when real databases are used as the input.

- You do not need to specify DD statements for the database data set or the image copy data set. The data sets to be processed are dynamically allocated, according to the specifications in the DFSMDA or the RECON data sets.
- You must specify DATASET=REAL for PHIDAM primary index, if you want to check the primary index database. Because image copies cannot be taken for the primary index database.
- Specify SCANGROUP= on the DATABASE statement. The scan tasks with different scan group numbers are processed in parallel. This specification shortens the scan time.
- Do not specify any other optional parameter on the control statements.

  Do not turn off the checking of certain pointers. When your database is broken, all kind of pointer checking should be done.

Example 3: (Standard database analysis) Prevention with HASH

Refer to this example when you want to use the HASH Check function to know that the database you are going to use is in an operable state.

```
//EXAMPLE4 JOB --- use normal job statement parameters here ---
//*
//JOBLIB DD DSN=HPS.SHPSLMD0,DISP=SHR
//       DD DSN=IMSVS.RESLIB,DISP=SHR
//*
//*
//PCRUN   EXEC FABPP,
//             PSB=PSBGRAL
//* ------------------------------------------------------------------------
//PROCCTL  DD  *
  PROC TYPE=ALL,HASH=FORCE
  OPTION ERRLIMIT=NO
  DATABASE DB=DBPID10,DD=DSID10,DATASET=IMAGECOPY,SCANGROUP=01
  DATABASE DB=DBPIX10,DD=DSIX10,PRIMEDB=DBPID10,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPSX10,DD=DSSX10,PRIMEDB=DBPID10,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPSX11,DD=DSSX11,PRIMEDB=DBPID10,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPID20,DD=DSID20,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPIX20,DD=DSIX20,PRIMEDB=DBPID20,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPHD30,DD=DSHD30,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPHD30,DD=DSHD31,DATASET=IMAGECOPY,
  SCANGROUP=01
  DATABASE DB=DBPHS40,DD=DSHS40,OVERFLOW=DSHS41,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPID50,DD=DSID50,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPIX50,DD=DSIX50,PRIMEDB=DBPID50,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPHD60,DD=DSHD60,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPID70,DD=DSID70,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPIX70,DD=DSIX70,PRIMEDB=DBPID70,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPSX70,DD=DSSX70,PRIMEDB=DBPID70,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPSX71,DD=DSSX70,PRIMEDB=DBPID70,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPHD80,DD=DSHD80,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPHD90,DD=DSHD90,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=DBPHSA0,DD=DSHSA0,OVERFLOW=DSHSA1,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=PHDAM0A1,PART=*ALL,DATASET=IMAGECOPY,
  SCANGROUP=02
  DATABASE DB=PHDAM0B1,PART=*ALL,DATASET=IMAGECOPY,
  SCANGROUP=02
  END
/*
```

Figure 120. HD Pointer Checker example 3: JCL for HD Pointer Checker

Go through the following steps:

- Specify TYPE=ALL on the PROC statement. This parameter creates the sort records for pointers and segments in all the specified databases. This parameter also checks the specified databases and prints a message when an error is found.
- Specify HASH=FORCE on the PROC statement. This parameter makes the HASH Check function apply to the databases that are not subject to the restrictions, but the databases that are not applicable to the HASH Check function are processed using the standard pointer checking technique.

  INCORE=NO is forced when the HASH Check function is active. EPSCHK=NO is forced when the HASH Check function is active.

- Specify ERRLIMIT=NO on the OPTION statement. This parameter causes all error messages to be printed. Only the first 100 messages are printed if ERRLIMIT=YES is specified or if ERRLIMIT=keyword is not specified at all.
- Specify DATASET=IMAGECOPY on the DATABASE statement. This parameter indicates that you are running the application with an image copy data set as the input database and you don't want to affect other database users with your HD Pointer Checker run. Using the image copy data set allows you to schedule your HD Pointer Checker job whenever you want, without having any effect on the real databases.
- Specify SCANGROUP= on the DATABASE statement. The scan tasks with different scan group numbers are processed in parallel. This shortens scan time.
- You do not need to specify DD statements for the database data set or the image copy data set. The data sets to be processed are dynamically allocated, according to the specifications in the DFSMDA or the RECON data sets.

You do not need to specify any other optional parameter on the control statements.

Do not turn off the checking of certain pointers. All pointers should be verified by this HD Pointer Checker run.

Example 4: (Standard database analysis) Multiple jobs

You can divide HD Pointer Checker job into two process jobs, SCAN and CHECK, and redivide the SCAN job into multiple jobs. But, usually, it is not recommended to run in multiple jobs.

Important: The JCL examples provided in this topic are not recommended. If, however, you have problems of region size as described as follows, do as the example shows.

If you encounter a shortage of region size, which can be caused by too many database data sets, you might have to run the jobs in multiple SCAN jobs and a CHECK job. You can evade the region shortage problem by running the SCAN in multiple jobs. To validate the pointers, you need to process in one CHECK job all databases that have logical or index relationship. After all of the SCAN jobs are completed, specify all work data sets written by the SCAN jobs as input for the CHECK job. The CHECK job must be run in a single job.

If you do not have such problems with the region size, it is strongly recommended that you run HD Pointer Checker in a single job by using TYPE=ALL rather than run it in multiple jobs. When you do so, the performance is better, the total size of the work data sets becomes smaller, and the JCL statements are simpler.

In both SCAN and CHECK jobs, you do not need to specify DD statements for the database data set or the image copy data set. The data sets to be processed are dynamically allocated, according to the specifications in the DFSMDA or the RECON data sets.

SCAN job

In this job, HD Pointer Checker scans the databases and creates work data sets.

```
 //EXAMPL31 JOB --- use appropriate job statement parameters here --- //*
 //PCRUN   EXEC FABPP,
 //             PSB=PSBSMUAL
 //PROCCTL  DD  *
   PROC TYPE=SCAN,EPSCHK=YES,IXKEYCHK=YES
   DATABASE DB=DSSTUIVN,DD=DSSTUIV0,OVERFLOW=DSSTUIV1,
   SCANGROUP=01
   DATABASE DB=DSSCHXIN,DD=DSSCHXI0,PRIMEDB=DSSCHHVN,
   SCANGROUP=01
   DATABASE DB=DSFACXVN,DD=DSFACXV0,PRIMEDB=DSFACHON,
   SCANGROUP=01
   DATABASE DB=DSFDAXVN,DD=DSFDAXV0,OFLOW=DSFDAXV1,PRIMEDB=DSFACHON,
   SCANGROUP=01
   DATABASE DB=PHDAM0A1,PART=*ALL,SCANGROUP=02
   DATABASE DB=PHDAM0B1,PART=*ALL,SCANGROUP=02
   DATABASE DB=PHIDAM01,PART=*ALL,DD=(A,B,C),SCANGROUP=02
   DATABASE DB=PHIDAM01,PART=*ALL,DD=X,SCANGROUP=02
   DATABASE DB=PSINDEX1,PART=*ALL,SCANGROUP=02
/*
//* DD STATEMENTS FOR SORTEX01 WORK DATA SETS HERE:
//SORTEX01 DD DSN=HPS.JOB1.SORTEX01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//*
//* DD STATEMENTS FOR WORK DATA SETS OF SCANGROUP 01 HERE:
//MERGIN01 DD DSN=HPS.JOB1.MERGIN01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
//SORTIL01 DD DSN=HPS.JOB1.SORTIL01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//MERGI201 DD DSN=HPS.JOB1.MERGI201,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//SORTE201 DD DSN=HPS.JOB1.SORTE201,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//*
//* DD STATEMENTS FOR WORK DATA SETS OF SCANGROUP 02 HERE:
//MERGIN02 DD DSN=HPS.JOB1.MERGIN02,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
//SORTIL02 DD DSN=HPS.JOB1.SORTIL02,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//MERGI202 DD DSN=HPS.JOB1.MERGI202,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//SORTE202 DD DSN=HPS.JOB1.SORTE202,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
```

Figure 121. HD Pointer Checker example 4: JCL-1 for multiple SCAN jobs of HD Pointer Checker

```
 //EXAMPL32 JOB --- use appropriate job statement parameters here --- //*
 //PCRUN   EXEC FABPP,
 //             PSB=PSBSMUAL
 //PROCCTL  DD  *
   PROC TYPE=SCAN,EPSCHK=YES,IXKEYCHK=YES
   DATABASE DB=DSSCHHVN,DD=DSSCHHV0,SCANGROUP=01
   DATABASE DB=DSFACHON,DD=DSFACHO0,SCANGROUP=01
   DATABASE DB=DSCRSDVN,DD=DSCRSDV0,SCANGROUP=01
   DATABASE DB=DSCRSDVN,DD=DSCRSDV1,SCANGROUP=01
   DATABASE DB=DSCLSDVN,DD=DSCLSDV0,SCANGROUP=01
/*
//* DD STATEMENTS FOR SORTEX01 WORK DATA SETS HERE:
//SORTEX01 DD DSN=HPS.JOB2.SORTEX01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//*
//* DD STATEMENTS FOR WORK DATA SETS OF SCANGROUP 01 HERE:
//MERGIN01 DD DSN=HPS.JOB2.MERGIN01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
//SORTIL01 DD DSN=HPS.JOB2.SORTIL01,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//MERGI201 DD DSN=HPS.JOB2.MERGI201,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
//SORTE201 DD DSN=HPS.JOB2.SORTE201,DISP=(NEW,CATLG,DELETE),
//  UNIT=SYSALLDA,SPACE=(CYL,(50,50))
```

Figure 122. HD Pointer Checker example 4: JCL-2 for HD Pointer Checker multiple SCAN jobs

The major considerations are:

- Specify TYPE=SCAN on the PROC statement.

  This parameter creates sort records for pointers and segments in work data sets.

- Specify the DD statements of the work data set as a permanent data set. When you use the FABPP, FABPPD, or FABPPA procedure, the work data sets are allocated as temporary ones. You need to specify the data set names explicitly.

  For the necessary work data sets, see "DD statements for PROC TYPE=SCAN" on page 51.
- Optional parameters to be specified.

  You might need to specify optional parameters on the control statements, depending on whether your purpose is the prevention run or the broken database checking run. Refer to "Example 1: (Standard database analysis) Prevention" on page 279 and "Example 2: (Standard database analysis) Corrupted database" on page 281.

CHECK job

HD Pointer Checker validates and evaluates by using the work data sets that were created in the SCAN jobs. Then HD Pointer Checker continues the internal sort and the BLOCKMAP process.

```
//EXAMPL33 JOB --- use appropriate job statement parameters here --- //*
//PCRUN   EXEC FABPP,
//             PSB=PSBSMUAL
//HDPCSCAN.PROCCTL  DD  *
  PROC TYPE=CHECK
/*
//* DD STATEMENTS FOR SORTEXnn FROM SCAN JOBS HERE:
//SORTEX01 DD DSN=HPS.JOB1.SORTEX01,DISP=(OLD,DELETE)
//SORTEX02 DD DSN=HPS.JOB2.SORTEX01,DISP=(OLD,DELETE)
//*
//* DD STATEMENTS OF WORK DATA SETS FROM SCAN JOBS HERE:
//MERGIN01 DD DSN=HPS.JOB1.MERGIN01,DISP=(OLD,DELETE)
//MERGIN02 DD DSN=HPS.JOB1.MERGIN02,DISP=(OLD,DELETE)
//MERGIN03 DD DSN=HPS.JOB2.MERGIN01,DISP=(OLD,DELETE)
//SORTIL01 DD DSN=HPS.JOB1.SORTIL01,DISP=(OLD,DELETE)
//SORTIL02 DD DSN=HPS.JOB1.SORTIL02,DISP=(OLD,DELETE)
//SORTIL03 DD DSN=HPS.JOB2.SORTIL01,DISP=(OLD,DELETE)
//MERGI201 DD DSN=HPS.JOB1.MERGI201,DISP=(OLD,DELETE)
//MERGI202 DD DSN=HPS.JOB1.MERGI202,DISP=(OLD,DELETE)
//MERGI203 DD DSN=HPS.JOB2.MERGI201,DISP=(OLD,DELETE)
//SORTE201 DD DSN=HPS.JOB1.SORTE201,DISP=(OLD,DELETE)
//SORTE202 DD DSN=HPS.JOB1.SORTE202,DISP=(OLD,DELETE)
//SORTE203 DD DSN=HPS.JOB2.SORTE201,DISP=(OLD,DELETE)
```

Figure 123. HD Pointer Checker example 4: JCL-3 for HD Pointer Checker multiple CHECK job

- Specify TYPE=CHECK on the PROC statement.
- Specify all work data sets (SORTEX*nn*, MERGIN*nn*, SORTIL*nn*, SORTE2*nn*, and MERGI2*nn*) created by the SCAN jobs as the input for the check.

  For the CHECK JCL, assign a serial number starting from 01 for *nn*, which might be different from *nn* of the SCAN jobs.

  In this example, the following three MERGIN*nn* data sets are created in the two SCAN jobs:

  ```
  //MERGIN01 DD DSN=HPS.JOB1.MERGIN01,DISP=(NEW,CATLG,DELETE),
  //  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
  ...
  //MERGIN02 DD DSN=HPS.JOB1.MERGIN02,DISP=(NEW,CATLG,DELETE),
  //  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
  ...
  //MERGIN01 DD DSN=HPS.JOB2.MERGIN01,DISP=(NEW,CATLG,DELETE),
  //  UNIT=SYSALLDA,SPACE=(CYL,(100,100))
  ```

  Therefore, in the CHECK job, MERGIN*nn* DD statements must be specified as follows:

  ```
  //MERGIN01 DD DSN=HPS.JOB1.MERGIN01,DISP=(OLD,DELETE)
  //MERGIN02 DD DSN=HPS.JOB1.MERGIN02,DISP=(OLD,DELETE)
  //MERGIN03 DD DSN=HPS.JOB2.MERGIN01,DISP=(OLD,DELETE)
  ```

Chapter 8. Operational strategy recommended for HD Pointer Checker

The following information outlines some methods that can help an installation become more effective and more efficient in the use of IMS. These methods help increase database availability and integrity, while saving time for the programmer and the analyst.

Subsections:

- "Good operating procedures" on page 287
- "At reorganization time" on page 287
- "During general use of the database" on page 287
- "While disabling HALDB partitions" on page 288
- "During development" on page 288
- "During regression testing" on page 288

Good operating procedures

In order to use IMS successfully, establish and implement sound operating procedures. Especially important are sound backup and recovery method. DBRC can be very helpful in this area.

At reorganization time

All IMS databases need to be reorganized occasionally. In order to use HD Pointer Checker most effectively, adopt the following procedure for reorganizing the databases:

1. Reorganize the database.
2. Create the image copy.
3. Begin production use of the database.
4. Run HD Pointer Checker (and HD Tuning Aid) with image copy input.
5. Print and *retain* HD Pointer Checker (and HD Tuning Aid) listings.

By running HD Pointer Checker with image copy input, the following factors are verified:

- The database has no errors. Its IMS structure is valid.
- The image copy tape is usable. Tapes are prone to operator errors. Once you successfully read the image copy data set, you will be greatly confident that you could use it for recovery if necessary.

During general use of the database

Between reorganizations, the following procedures help minimize difficulty and maximize performance:

1. Make image copies regularly.
2. Run HD Pointer Checker (and HD Tuning Aid) regularly with image copy input.
3. Compare the listings with the reorganization-time listings.

It is important to run HD Pointer Checker (and HD Tuning Aid) regularly. Run them every *n* days or every *n* image copies. How often you run them depends on how valuable the data is and how often it is updated.

A key reason for regular HD Pointer Checker runs is to discover any database damage quickly. If database damage is found shortly after it occurs, the repair process is usually much easier. For example, pointer errors (if left untreated) can spread rapidly. If such errors are found early, the correction requires much less of the programmer, analyst, or both's time.

© Copyright IBM Corp. 2000, 2021

HD Pointer Checker and HD Tuning Aid print a lot of performance-related information. In some ways, the reorganization-time listing represents the best possible condition of your database. By comparing your current run listing with the listing made immediately after reorganization, you can evaluate the changes that have occurred. These changes can help explain changes experienced in recent database performance (response-time increase, EXCP increase, and so on).

Use this information to help determine when to reorganize a database. This can help in either of these two ways:

1. It can indicate the need for an earlier-than-planned reorganization.
2. It can indicate that a planned reorganization is unnecessary.

In either case, computer resources are saved.

While disabling HALDB partitions

When you disable HALDB partitions, you can run HD Pointer Checker to check the pointers.

To use HD Pointer Checker effectively while you disable HALDB partitions, run HD Pointer Checker with the Standard Check function before each image copy step. If the HALDB has logical relationships, index relationships, or both, specify the HALDB database and its logically related databases and PSINDEXes on the DATABASE statements to ensure that the databases have no errors. Instead of specifying the HALDB database names individually with multiple DATABASE statements, you can specify DBALL=YES on the DATABASE statement.

For more information about the steps to disable HALDB partitions, see the topic "Disabling HALDB partitions" in *IMS Database Administration*.

During development

When developing an application with a new database, include the creation of suitable HD Pointer Checker (and HD Tuning Aid) JCL as part of the development process. By setting up HD Pointer Checker jobs before the database goes into production, create these types of jobs in advance:

- HD Pointer Checker (and HD Tuning Aid) with real database input (no-in-core checking)
- HD Pointer Checker (and HD Tuning Aid) with image copy input (in-core checking)
- HD Pointer Checker with real database input (dumping blocks)
- FABPCHRO with real database input (finding disk addresses)

During regression testing

When installing a new release level of system such as IMS and z/OS, most installations run a series of tests before placing the new release into production. These regression tests should *always* include an HD Pointer Checker run against *all* of the databases (using image copy input). The data is too important to take any risks. HD Pointer Checker is a critical part of database protection and recovery process. Be sure that you are prepared to debug a database error, if the need arises.

Chapter 9. HD Pointer Checker online considerations

HD Pointer Checker can run for IMS online databases. However, HD Pointer Checker might not generate accurate results under certain conditions. Incomplete insert, replace, or delete operations typically cause HD Pointer Checker to detect false pointer errors.

To increase the likelihood of achieving accurate results, the following three methods are provided:

- "Running HD Pointer Checker for IMS online databases while the databases are not being updated or, at least, when the databases are scarcely updated" on page 289
- "Running HD Pointer Checker while the database is quiesced" on page 289
- "Running IMS HP Image Copy in pseudo online pointer check mode" on page 289

Running HD Pointer Checker for IMS online databases while the databases are not being updated or, at least, when the databases are scarcely updated

If HD Pointer Checker detects pointer errors in IMS online databases, try running HD Pointer Checker again for the databases. If the pointer error was caused by an incomplete database update operation, the error might not be present in the second run. However, if the same pointer error is detected in the same pointer in the second run, the database likely has a pointer error.

Consecutive HD Pointer Checker run listings must be compared. Whenever the same error message occurs on two consecutive run listings, you can be sure it is a real error. Then analyze the errors and repair the databases. How to do this is described in Chapter 11, "Database repair guidelines," on page 293. All error messages that are not present on the following HD Pointer Checker run are quite likely to be a result of incomplete database updating. Typically, you can ignore such error messages because they do not represent database corruption. Although this technique is cumbersome and error-prone, it can be used successfully with due attention.

Running HD Pointer Checker while the database is quiesced

To keep the database online as much as possible and achieve accurate pointer checking results, you can use the database quiesce function and the FlashCopy® function. The FlashCopy function requires less time to create a copy of data set. For example, you can make the database quiesced and take an image copy with the FlashCopy function. When the image copy is taken, release the quiesce (the database becomes available when quiesce is released) and run HD Pointer Checker for the image copy data set. In this way, you can shorten the time that a database is unavailable.

The advantage of this method is that you can achieve accurate pointer checking results. However, this method requires additional DASD space for FlashCopy, and you must run separate steps to quiesce the database, create FlashCopy, and run pointer check.

For information about the database quiesce function, see *IMS Operations and Automation*.

Running IMS HP Image Copy in pseudo online pointer check mode

IMS HP Image Copy provides the functions to make online databases temporarily unavailable (they are taken offline or quiesced) and to run HASH checking. Pseudo online pointer check mode uses these IMS HP Image Copy functions to provide accurate HASH checking results for online databases.

The advantage of this method is that you can achieve accurate pointer checking results within one IMS HP Image Copy job step. Therefore, you do not need to manually issue IMS commands to stop or restart the databases. The disadvantages are that additional DASD space is required for FlashCopy, and only HASH checking is available.

The following restrictions apply to HASH checking:

© Copyright IBM Corp. 2000, 2021

- HASH checking checks the pointers briefly. If a pointer error is detected in an IMS HP Image Copy job, stop the database and run HDPC stand-alone job for the database to analyze the pointer error.
- For HALDBs, HASH checking checks the physical pointers, but it does not check the logical pointers and PSINDEX databases.

Here is a sample scenario to efficiently check the pointers by using pseudo online check mode: Run the IMS HP Image Copy job in pseudo online pointer check mode for online databases on a regular basis, and run HD Pointer Checker stand-alone job for offline databases during the batch window.

For details about pseudo online pointer check mode, see "Pointer checking for online full-function databases" in the *IMS High Performance Image Copy User's Guide*.

Chapter 10. DBRC and HD Pointer Checker

Certain considerations apply when running HD Pointer Checker with DBRC.

The HD Pointer Checker processor (FABPMAIN) of the HD Pointer Checker runs under the IMS batch region controller (DFSRRC00) to refer to certain DL/I control blocks. Even with this method, HD Pointer Checker does not access databases through DL/I calls.

IMS (DFSRRC00) treats HD Pointer Checker the same way it treats any other batch application program. IMS calls DBRC to obtain authorization. If authorization is denied, a DFS047A message is issued and HD Pointer Checker cannot be processed.

To avoid DBRC authorization failure, use one of the following methods:

- “Run HD Pointer Checker in a ULU region without a DBD name” on page 291
- “Specify DBRC=N” on page 291
- “Use PROCOPT=G or GO PCB” on page 291

If you cannot apply any of these methods, and if you encounter a DBRC authorization failure, run HD Pointer Checker after the cause of authorization failure has been resolved or after the job that has DBRC authorization ends.

Run HD Pointer Checker in a ULU region without a DBD name

The simplest method to avoid DBRC authorization failure is to use a ULU region and not specify a DBD name. The following figure shows an example.

```
//HDPCPRO  EXEC PGM=DFSRRC00,
//              PARM='ULU,FABPMAIN,,,,,,,,,,,Y,N'
```

Figure 124. EXEC parameter to avoid the DBRC authorization problem

The first position in PARM is the region type, and the third position is the DBD name. Specify ULU in the first position, and do not specify a value for the third position. Because the DBD name that might be specified in the third position is not used by the HD Pointer Checker program, the third parameter can be omitted. When you specify a DBD name in the third position, IMS attempts to obtain DBRC authorization for the database, which might cause an authorization failure.

Important: When ULU is specified, do not specify a DBD name on the third parameter

Specify DBRC=N

Another method to avoid authorization failure is to inactivate DBRC. DBRC is required for HD Pointer Checker under certain conditions (see “FABPMAIN EXEC statement” on page 44 for information about these conditions). If your HD Pointer Checker job does not meet these conditions, you can specify DBRC=N. The 14th position of the PARM= parameter is for DBRC.

Note: If DBRC=(FORCE) was defined in the IMSCTRL macro during IMS installation, DBRC is always active, even if you specify N to the 14th position in the PARM parameter.

Use PROCOPT=G or GO PCB

If you cannot use a ULU region or set DBRC=N (which means you need to use a DLI or DBB region with DBRC=Y), specify the name of the PSB that contains PROCOPT=G or GO PCB of the processing database. The PSB name is in the third position of the PARM parameter of DFSRRC00 that is specified in the EXEC statement. You can decrease the possibility of a DBRC authorization failure by using PROCOPT=G or GO PCB. Even if you use PROCOPT=G or GO PCB, DBRC can deny authorization depending on the database status. If authorization is denied, run HD Pointer Checker after the cause of authorization failure has been resolved.

© Copyright IBM Corp. 2000, 2021

Chapter 11. Database repair guidelines

The following topics provide guidelines for repairing a database. Use the information to understand why you need database repair and how you can repair your database.

Topics:

- "Why pointers are important" on page 293
- "How a database can become corrupted" on page 293
- "Various methods of repairing a corrupted database" on page 295
- "Repairing a database by using HD Pointer Checker and zapping" on page 296
- "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304

Why pointers are important

Before you repair a database, you must understand why database pointers are important.

The basic structure of an IMS database segment is shown in Figure 125 on page 293. It is a product-sensitive programming interface. See "Programming interface information" on page 812 to understand the restrictions associated with this type of materials.

Each segment contains two distinct parts: the prefix part and the data part. The *data* part contains the information that is used and processed by your application programs. The *prefix* part contains control information (including direct pointers) that is used by IMS. IMS uses these pointers to access database segments. It follows a chain of pointers to navigate through the database.

PSPI

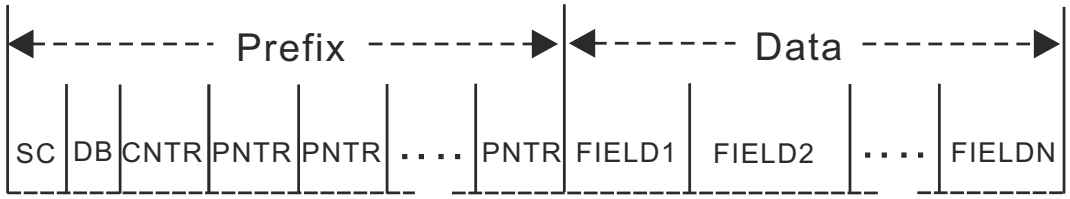


Figure 125. IMS segment structure

PSPI

The pointers that are contained in the segment prefixes are called *direct pointers*. Each direct pointer contains a 4-byte address of a target segment. IMS calculates the expected segment code of a target segment before attempting to access it. If the actual value stored at the pointer address is not the expected segment code, then the IMS buffer handler issues an 85x abend. In the online environment, an 85x abend error causes a *pseudo* abend to be issued by the buffer handler. A *fatal abend* is issued in the batch IMS environment.

How a database can become corrupted

Human error is the most common cause of a corrupted database. The following table shows the most common ways that pointer errors are introduced into IMS databases.

Although the list is not all-inclusive, the errors most commonly reported by users are explained in the following table.

© Copyright IBM Corp. 2000, 2021

Table 34. Ways pointers get damaged

Cause of damage	When it happens
Update with wrong DBD (ACB)	JCL error in batch job
Improper recovery procedures	Missing log
Improper reorganization procedures	Misuse of an incorrect reorganization procedure
Failure to use emergency restart	After cancel, abend, or power failure
Failure to run batch backout	After cancel or abend
Software errors	
Hardware errors	Unnoticed I/O error

Subsections:

- "Updating with the wrong DBD (or ACB)" on page 294
- "Improper recovery procedures" on page 294
- "Improper reorganization procedures" on page 294
- "Failure to use emergency restart" on page 295
- "Failure to run Batch Backout" on page 295
- "Software errors" on page 295
- "Hardware errors" on page 295

Updating with the wrong DBD (or ACB)

DBD is the road map that IMS uses to interpret the database block. If a database is updated with a wrong DBD, results are unpredictable, and pointer errors might occur.

This is usually the result of a JCL error. A test DBD library could be accidentally used in a production update job. Production databases might be accidentally used in a test job. This usually occurs in batch jobs.

Improper recovery procedures

Using improper recovery procedures is a common way pointers get damaged. When running the IMS Database Change Accumulation utility and the Database Recovery utility, it is important to include all of the log tapes. If a log data set is omitted from the recovery process, a corrupted database is the likely result.

When recovering a database, IMS restores segments, pointers, and free space elements. If a log is left out of a recovery attempt, then a segment could be stored in the range of an incorrectly restored free space element.

Usually, IMS reclaims the free space and creates or updates a free space element when a segment is deleted. All pointers pointing to targets that are in the free space area are set to zero. If a log is left out of a recovery attempt, then these pointers might not get set to zero.

Improper reorganization procedures

Using improper reorganization procedures is a common way that databases get damaged. In this case, generally, you can recover the database from the image copy that was taken before the reorganization.

However, when a HALDB is reorganized by improper reorganization procedures, HALDB partition reorganization numbers in the partition can become corrupted or ILKs can become incorrect. For example, if the HALDB reorganization number verification function of IMS is not enabled and either a reorganization fails to increment the reorganization number of a partition correctly or a segment that has

a low reorganization number in its EPS is moved into a partition and lowers the reorganization number of the destination partition, reorganization numbers can become corrupted. In this case, you cannot repair the corrupted partition reorganization numbers by using the standard IMS recovery methods. For more information, see the description of the DUPILKCHK keyword in “PROC statement” on page 108.

For information about HALDB partition reorganization numbers and how they can become corrupted, see the topic "HALDB partition reorganization numbers" in *IMS Database Administration*.

Failure to use emergency restart

Emergency restart is an extension of IMS’s normal restart process. It is initiated by a master terminal operator command whenever it is necessary to restart IMS after an IMS, z/OS, hardware, or power failure. It should also be used whenever a prior execution of the IMS system was not terminated with a successful checkpoint.

If there is a power failure, the memory contents are lost (IMS buffers, too). If the system is brought back up without emergency restart, the database is probably damaged. Database changes made by in-flight transactions do not get backed out.

If the operator cancels the IMS DB/DC or CICS®/IMS DB control region, the situation is similar to that of a power failure. If the system is brought back up without emergency restart, the database is probably damaged.

Failure to run Batch Backout

If the IMS Batch Backout utility is not run when it is necessary, a corrupted database is the likely result. A batch backout might be needed after a batch job is canceled or abnormally terminates. The circumstances under which this utility must be run are described in the *IMS Database Administration*.

Software errors

Software errors in z/OS or IMS *program*s could result in pointer errors.

Hardware errors

Hardware failures could also result in pointer errors. If the operator does not notice an I/O error message and recover it appropriately, the database could be damaged.

Various methods of repairing a corrupted database

When a database is discovered to be corrupted, you must repair it immediately.

There are three basic ways:

Use standard IMS recovery methods
: This is the best way to repair a database. It requires much less expertise, and usually can be accomplished in less time.

Modify the database manually with a zapping utility
: This method requires a lot of expertise to accomplish successfully. It is highly error-prone, even when done by an experienced programmer. The person who decides where and how to zap the database must have a good knowledge of the internal formats of IMS databases.

Reorganize the database
: This method can be used only for certain kinds of errors involving logical pointers or counter fields.

There are times when it is impossible to repair a database with standard IMS recovery methods. For example, when HALDB databases contain corrupted HALDB partition reorganization numbers, duplicate ILKs, or potentially duplicate ILKs. In this case, the HD Pointer Checker and the IMS Database Repair Facility are very valuable tools for the systems programmer or database administrator.

It might also be desirable to use zapping methods when your recovery job is known to be long. You can determine that you can analyze the database errors and repair them with zaps in a shorter time than is required to recover the databases. If you have expertise in the use of IMS, this can be a cost-effective way to repair a large database.

Repairing a database by using HD Pointer Checker and zapping

Use the following topics to repair a database by using HD Pointer Checker and zapping.

Note: To repair corrupted HALDB partition reorganization numbers, duplicate ILKs, and potentially duplicate ILKs in HALDB databases, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.

Perform the following steps:

1. Image-copy the corrupted databases.
2. Run HD Pointer Checker on the corrupted databases.
3. Obtain dumps of the invalid block.
4. Analyze the results.
5. Repair the databases.
6. Image-copy the repaired databases.
7. Run HD Pointer Checker on the image copy of the repaired databases.

Image-copying the corrupted databases

Before beginning the repair process, it is mandatory to make back-up image copies of your databases.

Procedure

Back up all databases that are in any way connected with those databases that have errors. If you make a mistake during the repair process, the databases can be recovered from these image copies. This guards against inadvertent loss of more data.

Important: Do not, under any circumstances, omit this step.

Running HD Pointer Checker on the corrupted databases

Run HD Pointer Checker to find out where the databases are damaged.

Procedure

All databases that are in any way connected with the damaged databases must be checked with HD Pointer Checker.

The recommended control statements that should be used are shown in the following figure.

```
  PROC TYPE=ALL
  OPTION INCORE=NO,ERRLIMIT=NO
***HISAM***
  DATABASE DB=dbdname,DD=ddname,OVERFLOW=ddname
***INDEX DB (HISAM INDEX/SECONDARY INDEX***
  DATABASE DB=dbdname,DD=ddname,OVERFLOW=ddname,PRIMEDB=dbdname
***HIDAM/HDAM***
  DATABASE DB=dbdname,DD=ddname
```

Figure 126. Control statements: Database repair with HD Pointer Checker

- Notice that HD Pointer Checker is run using the real databases as input (that is, DATASET=IMAGECOPY is not specified on the DATABASE statement). This ensures that the absolute disk addresses of the invalid pointers are printed on HD Pointer Checker reports. Because the databases are probably

down anyway (because of the damage), this might not have an adverse effect on production. If it is appropriate, image copy input can still be used.

- When INCORE=NO is specified on the OPTION statement, in-core pointer checking is not done. This is necessary even though it requires more CPU and elapsed time. Complete the results from the BLOCKMAP process, which can be achieved when TYPE=ALL is specified on the PROC statement. This is the only way to make it happen.
- ERRLIMIT=NO on the OPTION statement causes a message to be printed for every error that is detected. Normally, you want to see every error message, even if there are several hundred of them. If there is an excessively large number of messages generated, limit the number that are printed by specifying ERRLIMIT=YES or not specifying the ERRLIMIT keyword at all.

Obtaining dumps of the invalid block

In order to debug a corrupted database, obtain a dump of the block containing the segment pointing to the damaged area.

Procedure

You should use IDCAMS to dump the block for HISAM or the index databases. For details about IDCAMS, see *z/OS DFSMS Access Method Services for Catalogs*.

The best way to get the dump for the HDAM or the HIDAM databases is to specify BLOCKDUMP=(*rba*,*nnn*) on the DATABASE statement. This statement provides a block dump and a block map. The dump provided by this BLOCKDUMP option is easier to use than comparable IDCAMS dumps when repairing a database error. By using this dump, you will be able to know how the block is deblocked by the BLOCKDUMP option and you can understand the error messages better.

The control statement format is shown in the following figure.

```
PROC TYPE=SCAN
DATABASE DB=dbdname,DD=ddname,BLOCKDUMP=(rba,nnn)
```

Figure 127. Control statements: Database repair with BLOCKDUMP

Analyzing the results

When the error messages and the dumps of all appropriate database blocks are obtained from HD Pointer Checker, do some analysis.

About this task

The purposes of this analysis are to:

- Find the real errors
- Determine the best repair method
- Rebuild the database to correct the problem
- Investigate the cause of the problem

Finding the real errors

The HD Pointer Checker often produces more error messages than there are errors. This results because the error messages describe what HD Pointer Checker "thinks" the errors are.

For example, the occurrence of a particular error might cause several other error messages. Therefore, repairing one place in the database might eliminate several error messages. Your own analysis must always be the final judge of what is wrong with the database.

Sometimes the damage is extensive enough to cause HD Pointer Checker to incorrectly deblock part of a block. When this happens, a lot of totally invalid error messages might be produced. There is no substitute for human intelligence in a situation like this.

It is possible to get error messages describing situations that are not really errors. An "orphan" segment is a good example of this. If a "segment" that is not the target of any pointer is found, an error message is printed. Because IMS can never access such a segment, this is (in some respects) not really an error. It is merely unreclaimed free space. Such an "error" disappears when the database is reorganized.

The important thing is to determine exactly where the real errors are.

Some of the HD Pointer Checker reports help you perform this task. The HISAM Segment Level Statistics report and the Segment and Pointer Statistics report show what the prefix of each segment looks like. The HD Tuning Statistics report gives the lengths of the prefix and data part of the segments. These reports are useful aids when looking at dumps of database blocks.

Error conditions reported by HD Pointer Checker should be analyzed carefully before taking any action. HD Pointer Checker can detect and report error conditions that both would and would not cause IMS abends. This occurs because HD Pointer Checker uses DFP access methods rather than IMS to find segments (targets) or validate pointers in a database. Some of the "errors" reported by HD Pointer Checker could be removed by a normal database reorganization.

Attention: A database can be corrupted, even if it cannot be made to abends.

Sometimes you can use the IMS Test Program (DFSDDLT0) to duplicate problems and verify that an existing abend condition must be corrected. This technique must be used carefully. It is very easy to construct catastrophically corrupted databases for which IMS cannot be made to abend with DFSDDLT0.

Determining the best repair method

When the place and type of errors are detected, determine the repair method.

Attention: Do not try to repair a database by "zapping" without a good knowledge of internal IMS database formats.

Repair the database using the following ways:

- “Applying IMS recovery utilities” on page 298
- “Zapping” on page 298
- “Reorganization” on page 299

Applying IMS recovery utilities

When possible, database recovery is the accepted way to correct database errors.

Zapping

Zapping means modifying or changing parts of a database using some means other than the standard IMS database calls. Any of the following programs are an acceptable of "zapping" the databases:

- IMS Database Repair Facility (see the *IMS Database Repair Facility for IMS Solution Packs User's Guide*)
- AMASPZAP (see *z/OS Service Aid*)
- IMS Utility Control Facility (see *IMS Database Utilities*)

Select "zapping" as a database repair method for one of these two reasons:

- It may be the only technique available. For example, if the image copy or log is damaged, database recovery is impossible.
- It may be the fastest way to get the databases back online. If only a few pointer error conditions must be corrected, and if qualified personnel are available to repair the database, "zapping" can provide significant savings in time.

The formats of the various IMS database records are described in *IMS Diagnosis*.

Reorganization

Under certain circumstances, reorganizing the database can correct an invalid pointer condition. The following points must be considered:

- The HD Reorganization Unload utility issues unqualified GN calls to read a database. If the invalid pointer is a physical child or physical twin pointer, the GN call fails. Therefore, reorganization cannot be used.
- Logical parent or logical twin pointers are rebuilt using reorganization. However, the logical parent pointer might be followed by DL/I during unload. If the logical child segment contains the logical parent pointer (PTR=LP) and the concatenated key of the logical parent is not physically stored, DL/I follows the bad logical parent pointer to construct the concatenated key of the logical parent. This causes an abend.
- If DBR is specified for Database Prereorganization and logical parent pointers exist in a database, the HD Reorganization Unload utility saves the old logical parent pointer. During the reload process, this pointer is placed in the type 10 work data set record. The reload or scan of the logical parent database creates type 00 records containing the old RBA of the logical parent segment. Database Prefix Resolution then sorts and matches the two records using those two fields. Bad logical parent pointers produce the error message DFS879I.
- When the user runs HD Reorganization Unload and HD Reorganization Reload and specifies the DBIL statement for the Database Prereorganization utility for a logical child or logical parent database, HD Reorganization Unload saves the logical parent concatenated key instead of the logical parent pointer in the type 10 work data set record. HD Reorganization Reload or Database Scan of the logical parent database saves the logical parent concatenated key in the type 00 work data set record. Database Prefix Resolution sorts and matches the records using these fields. In this manner, the records match, and the new logical parent pointers are created.
- When the DBIL statement is specified for a database, it must also be specified for a database containing a logical child whose logical parent resides in the DBIL database. Consider the example in Figure 128 on page 299. If DBIL is specified for database DB2, also specify DBIL for DB1. This can have a cascading effect through many databases. DBIL means "initial load" to the utilities. By definition, if DB2 is being "initially loaded," segment B could not have previously existed. Therefore, no attempt to resolve the B-to-C relationship is made unless DBIL is specified for DB1.

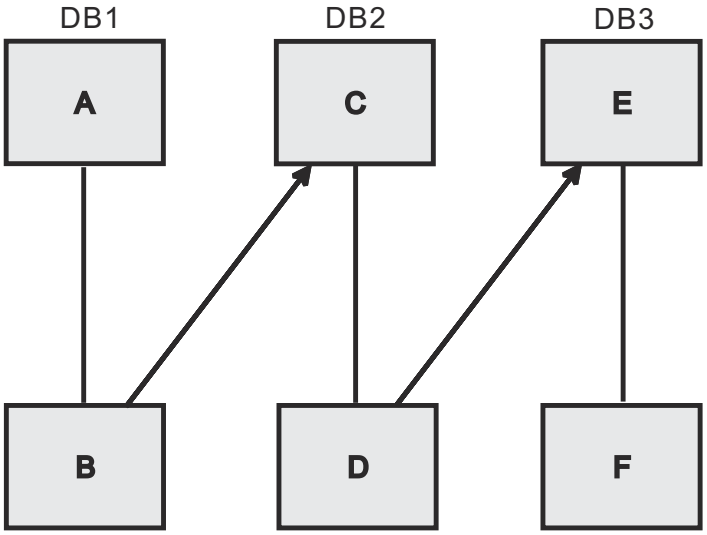


Figure 128. DBIL Example 1

- Reorganization can also be used to reset faulty counters. It is necessary to use DBIL for Database Prereorganization. It is mandatory that the logical parent database and *all* databases containing logical children of the logical parent be unloaded and reloaded with DBIL. This allows Database Prefix Resolution to count all the logical children and ensures that the correct value is placed into the counter by Database Prefix Update.

If the logical child database contains another logical child segment type whose logical parent resides in yet another database, that logical parent database must be reorganized with DBIL.

Reorganize all three databases in Figure 129 on page 300, specifying DBIL for each. If DB1 or DB3 is omitted, is specified as DBR=, or is scanned, the counter is invalid.

Reorganize all three databases in Figure 130 on page 300, specifying DBIL for each, if a bad counter exists in either DB1 or DB3.

Note: As a standard practice, DBR should be specified for Database Prereorganization when reorganizing. It is the most efficient in terms of sorting during the Database Prefix Resolution step.

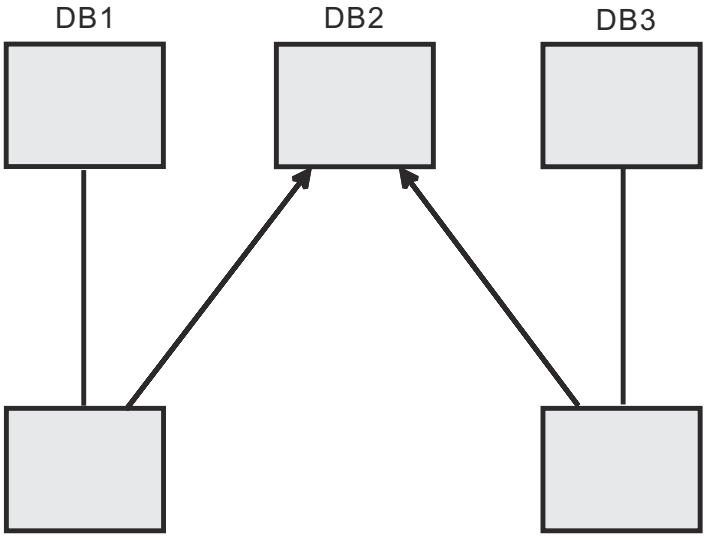


Figure 129. DBIL Example 2

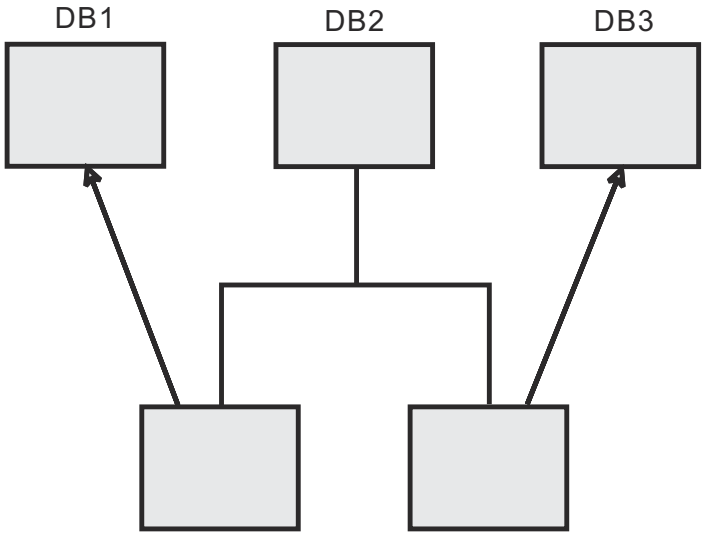


Figure 130. DBIL Example 3

Rebuilding the databases to correct the problem

This topic explains how to repair a database by zapping the HD primary databases only. If an index database is damaged, rebuild it by reorganizing the primary database or by using some other means.

A database can be repaired by using the IMS recovery utilities, or by modifying the contents of the database with a ZAP utility (such as IMS Database Repair Facility). Normally, the IMS recovery utilities should be used (rather than zapping pointers) to recover the databases. Sometimes, zapping might be required or desirable.

The following table lists the abbreviations and full names of pointers.

Table 35. Abbreviations and full names of pointers

Pointer	Description
HF	Hierarchic Forward
HB	Hierarchic Backward
PTF	Physical Twin Forward
PTB	Physical Twin Backward
PP	Physical Parent
LTF	Logical Twin Forward
LTB	Logical Twin Backward
LP	Logical Parent
LCF	Logical Child First
LCL	Logical Child Last
PCF	Physical Child First
PCL	Physical Child Last
IN	Index
OF	Index, Overflow
SX	Secondary Index
SXO	Secondary Index, Overflow
RAP	Root Anchor Point
VLS	Variable Length Segment (Split)

Subsections:

- "ZAPPING" on page 301
- "Inherent problems" on page 302
- "How to use HD Pointer Checker" on page 302
- "Pointers that help in repair" on page 302

ZAPPING

Pointer zapping might be necessary when the user attempts to unload a database via the IMS HD Reorganization Unload utility. The database will then end abnormally with a return code of 85x. This could happen if a physical pointer is damaged (PTF or PCF). Zapping might also be necessary when the previous image copy has been lost or destroyed, or when the log tape is missing.

Pointer zapping is desirable when the user has a very large database that might require a long time to recover or reorganize.

The goal of zapping is to make the database structurally correct to IMS. If the pointer and the target are arbitrarily hooked to achieve this goal, delete the database record (and reinsert any lost data) when the system is backed up.

Inherent problems

Usually, database damages are concentrated to one or two database blocks. Some problems are inherent in repairing IMS databases because of the flexibility IMS offers the user in selecting the pointers.

To save DASD space, the database might have only forward pointers for dependent segments. This makes repair much more difficult than if the user selected both forward and backward twin pointers. The probability of both the forward and backward chains being broken is much less than the probability of only the forward chain being broken. To identify the parent of a dependent segment is very difficult unless the two segments are connected by a physical parent (PP) pointer.

The end of a twin chain is indicated by a PTF or LTF pointer with a value of binary zero. If you have a dangling chain, indicated by the FABP0960E error message, you could consider zapping the PTF or LTF pointer to zero and end the chain there. Zapping a pointer to zero might cause some unexpected results - especially if the segments in the chain are targets of a secondary index or a logical relationship.

How to use HD Pointer Checker

Before zapping a segment, it is necessary to understand the total effect that the zap can have. Knowing which segments point to the segment to be zapped helps design zaps that do not introduce new errors into the database. When TYPE=ALL is specified on the PROC statement as input for the PROCCTL data set, HD Pointer Checker prints a list of all segments that point to the 'invalid' segments; that is, segments identified in your HD Pointer Checker error messages. (This list can be incomplete if you run HD Pointer Checker with in-core pointer checking.) Analyze carefully each pointer that points to the segment to be zapped. Consider the effect that the zap has on all segments pointing to the about-to-be-changed segment.

Pointers that help in repair

Physical parent-child relationship
: The physical parent (PP) pointer can be used to find the physical parent of a dependent segment. The physical child first (PCF) pointer can be used to find the start of a physical twin chain. The physical child last (PCL) pointer can be used to find the end of a physical twin chain.

Logical parent-child relationship
: The logical parent (LP) pointer can be used to find the logical parent of a dependent segment. The logical child first (LCF) pointer can be used to find the start of a logical twin chain. The logical child last (LCL) pointer can be used to find the end of a logical twin chain.

Because these pointers are in a parent-child relationship, if one of them is broken, you might be able to reconstruct the broken chain by starting from either the parent, or the child, depending on which pointer is valid.

Investigating the cause of the problem

You must conduct a thorough investigation to determine the exact cause of the database damage experienced. If the original source of the problem is not corrected, it will almost certainly happen again.

Usually, to find out how a database became damaged is not easy. A database damage is not noticeable until online transactions abend. To find out what happened, study the console logs for operation in previous hours.

Repairing the databases

When the repair method is determined, repair the database.

Procedure

Create and run the batch job that repairs the databases using the particular method selected. If "recovery" or "reorganization" is selected as repair technique, use standard IMS techniques. Before using a "zapping" program, you must decide what changes result in a "clean" database.

Always zap the minimum number of bytes that result in a clean database. Sometimes it is necessary to reorganize the database after the zapping to complete the repair. It is a good practice to do a reorganization after a zap, even if technically it would not be required to obtain a valid database.

The objective of the repair step is to obtain databases that are valid from an IMS standpoint. If data was lost because of either the damage or the repair method, re-create that data. Use IMS application programs or DFSDDLT0, after the repair process has been completed.

Image-copying the repaired databases

After completing the repair process, create back-up image copies of your databases.

Procedure

At the end of the repair process, it is mandatory that you make back-up image copies of your databases. All databases that have been changed in any way must be backed up.

Important: Do not, under any circumstances, omit this step.

Running HD Pointer Checker on the image copy of the repaired databases

Before using the repaired databases, you must ensure that the databases are repaired correctly.

About this task

Important: Do not, under any circumstances, omit this step.

Procedure

Before bringing the databases back online, verify that the databases are valid, from an IMS standpoint. The best way to do this is to run HD Pointer Checker, using the new image copies as input. Two very important facts are verified in this way:

- The databases are completely repaired and contain no errors.
- The image copies are usable.

An HD Pointer Checker run should show no errors. All return codes must be zero.

Run HD Pointer Checker to ensure all the errors have been cleaned up and new ones have not been introduced. You can easily add some new damage of your own. If an error is made in zapping pointers, messages like the following messages might appear:

```
PTx & PTy POINT TO SAME TARGET
LTx & LTy POINT TO SAME TARGET
MORE THAN 1 PTx (TO SAME TARGET)
```

The message terms "PT*x* & PT*y*" and "LT*x* & LT*y*" represent various combinations of invalid pointers to a target.

Repairing HALDB partition reorganization numbers and duplicate ILKs

If you identify corrupted HALDB partition reorganization numbers, duplicate ILKs, or potentially duplicate ILKs in your HALDB databases, you can repair them by running the HD Pointer Checker utility and then the ILK Repair utility of IMS Database Repair Facility.

Before you begin

This procedure is for repairing corrupted HALDB partition reorganization numbers, duplicate ILKs, and potentially duplicate ILKs that are detected by the DUPILKCHK=YES option. Run the HD Pointer Checker utility with the DUPILKCHK=YES option and ensure that such errors are reported.

About this task

This task repairs corrupted HALDB partition reorganization numbers, duplicate ILKs, and potentially duplicate ILKs in the corrupted HALDB databases, in their logically related databases, and in their PSINDEX databases.

HALDB partition reorganization numbers are stored in data set group A of the partitions. If a HALDB partition reorganization number becomes corrupted, it might cause duplicate ILKs or potentially duplicate ILKs that can lead to data loss. Therefore, it is important to repair corrupted HALDB partition reorganization numbers and ILKs when they are found.

Procedure

1. Take offline the corrupted HALDB databases, their logically related databases, and their PSINDEX databases, and stop using the databases.
2. Correct the pointer errors and T2 errors, if any, in the HALDB databases.

   If the HALDB databases have pointer errors or T2 errors other than corrupted HALDB partition reorganization numbers, duplicate ILKs, or potentially duplicate ILKs, correct these errors.

   If the databases were reorganized, restore the databases to the state that they were in before the database reorganization, and then continue with the repair process.
3. Create image copies of the corrupted HALDB databases, their logically related databases, and their PSINDEX databases.

   You can use these image copies to recover the databases if a problem occurs during the repair process.
4. Run the HD Pointer Checker utility with the REPAIRILK=YES option for the HALDB databases.

   The HD Pointer Checker utility generates repair information records for the HALDB databases in the FABPILK data set.

   To enable the REPAIRILK=YES option, the following conditions must be met:

   - The FABPILK DD statement is specified in the HD Pointer Checker utility JCL.
   - TYPE=ALL, HASH=NO, EPSCHK=YES, and DUPILKCHK=YES are all specified on the PROC statement.
   - All the HALDB databases, including logically related databases and PSINDEX databases, are specified by DATABASE statements.

     Tip: Instead of specifying HALDB database names individually with multiple DATABASE statements, you can specify DBALL=YES on the DATABASE statement. This specification causes the HD Pointer Checker utility to process all the related databases.
   - DATASET=IMAGECOPY is not specified on the DATABASE statements. Image copies cannot be used as input.

   For more information about these keywords, see “FABPMAIN PROCCTL data set” on page 107.

Use the following JCL example to run the HD Pointer Checker utility with REPAIRILK=YES. In this example, the PHDAM0A1 database is the HALDB database with errors and the database has logical relationships.

```
//EXAMPLE1 JOB --- use normal job statement parameters here ---
//*
//PCRUN EXEC FABPPD,
// DBRC=Y
//*
//* ------------------------------------------------------------------------
//PROCCTL DD *
  PROC TYPE=ALL,DBORG=ALL,HASH=NO,EPSCHK=YES,DUPILKCHK=YES,REPAIRILK=YES
  DATABASE DB=PHDAM0A1,PART=*ALL,DATASET=REAL,DBALL=YES
  END
/*
//FABPILK DD DISP=SHR,DSN=HPS.FABPILK
```

5. Run the ILK Repair utility of IMS Database Repair Facility to repair the HALDB databases.

   When you code the JCL statements for the ILK Repair utility, specify the FABPILK data set that was created in step “4” on page 304 as input for the utility.

   For more information, see the topic "Running the ILK Repair utility" in the *IMS Database Repair Facility for IMS Solution Packs User's Guide*.
6. Delete and define the indirect list data sets (ILDSs) for the partitions of the HALDB databases. Then, run the IMS HALDB Index/ILDS Rebuild utility (DFSPREC0) to rebuild the ILDSs.

   Complete this step for each HALDB partition that you identified from the ILK Repair utility report in step “5” on page 305.

   For more information about the IMS HALDB Index/ILDS Rebuild utility (DFSPREC0), see *IMS Database Utilities*.
7. Consider activating the HALDB reorganization number verification function of IMS.

   Recommendation: If this function is not enabled yet, consider enabling it because it ensures the consistency of HALDB partition reorganization numbers and prevents duplicate ILKs and potentially duplicate ILKs. For more information see the topic "HALDB partition reorganization numbers" in *IMS Database Administration*.
8. Run the HD Pointer Checker utility with the DUPILKCHK=YES option for the HALDB databases, their logically related databases, and their PSINDEX databases, and verify that all the errors are resolved.
9. Create image copies of the repaired HALDB databases including logically related HALDB databases and related PSINDEX databases.
10. Restart the repaired HALDB databases.

Results

During this procedure, HALDB partition reorganization numbers in data set group A of the HALDB partitions are corrected. When updates are made to the repaired partitions or the repaired partitions are reorganized, IMS updates the HALDB partition reorganization numbers that are stored in RECON data sets with the correct numbers.

Chapter 12. Reported by HD Pointer Checker slack bytes, unknown data, and T2 errors

The following topics provide information about slack bytes, unknown data, and T2 errors.

Topics:

- "Database format for slack bytes" on page 307
- "How IMS reclaims space" on page 307
- "Validation of free space element" on page 309
- "T2 errors" on page 309

Database format for slack bytes

The following figures show the formats of HDAM and HIDAM control intervals.

OSAM database blocks have exactly the same format, except that the RDF/CIDF fields are not present. If a HIDAM root segment has twin backward pointers, then the RAP area is not present.

Figure 131. HDAM bitmap block format (Root addressable area)

Figure 132. HDAM bitmap block format (Overflow area)

Figure 133. HDAM non-bitmap block format (Root addressable area)

Figure 134. HDAM non-bitmap block format (Overflow area)

Figure 135. HIDAM bitmap block format

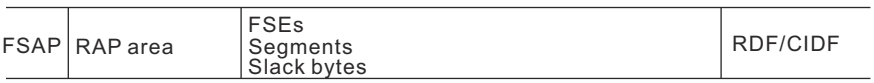


Figure 136. HIDAM non-bitmap block format

How IMS reclaims space

Use this topic to understand how IMS reclaims space.

This topic describes Diagnosis, Modification, and Tuning Information. See "Programming interface information" on page 812 to understand the restrictions associated with this type of material.

© Copyright IBM Corp. 2000, 2021

DMTI

Disk space is often reclaimed by IMS so that it can be reused at a later time. This can happen in the following situations:

- IMS deletes a segment from the database.
- IMS replaces a variable-length segment, and the replacement is shorter than the original.
- IMS replaces a variable-length segment, the replacement is longer than the original, and a split segment is created.

There are two ways that IMS releases the no-longer-used disk space:

- If at least 8 bytes are released, IMS creates a free space element.
- If fewer than 8 bytes are released, IMS treats the space as slack bytes.

A free space element is subject to use by IMS at any time. Slack bytes are never reused by IMS. The only way to eliminate them is to reorganize the database.

A single DL/I delete or replace call can generate a maximum of seven slack bytes. It is possible to generate more than seven consecutive slack bytes by using several delete or replace calls. The following example illustrates how this might happen. The following figure shows the status of the database after the three operations.

1. Database contains a 100-byte variable-length segment.
2. Replace the 100-byte segment with a 94-byte segment. Six slack bytes occupy the 6 bytes that follow the updated segment.
3. Replace the 94-byte segment with a 90-byte segment. Four slack bytes occupy the 4 bytes that follow the updated segment. Now a total of 10 slack bytes follow the 90-byte segment.

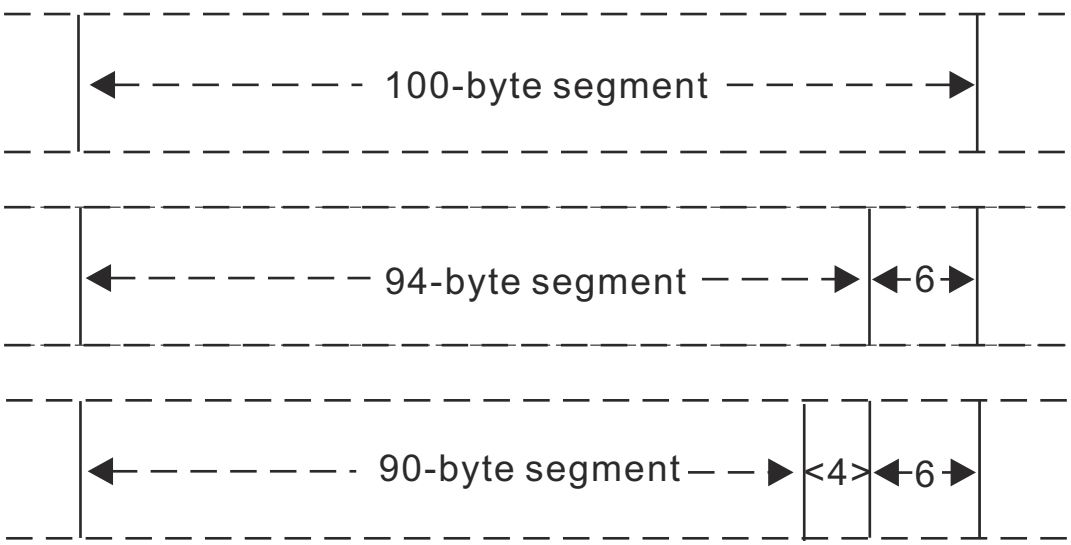


Figure 137. How more than seven slack bytes can occur

DMTI

Validation of free space element

HD Pointer Checker validates the free space element (FSE). The FSE is a prefix of a free space, and contains the length of the free space and the pointer to the next FSE address as shown in the following figure.

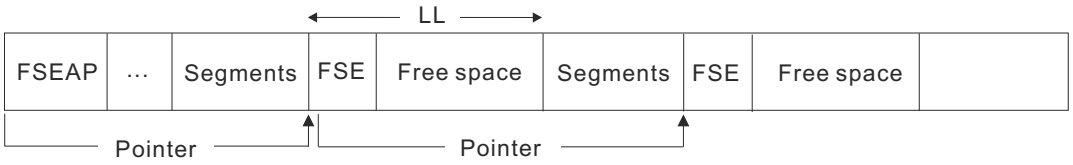


Figure 138. Structure of the free space element (FSE)

HD Pointer Checker checks whether the length and pointer information are correct or not. However, HD Pointer Checker does not check the contents of the free space following the FSE. IMS might clear the free space with X'00' or it might leave the values that are contained in the existing segment data. HD Pointer Checker, therefore, regards any data contained in the free space following the FSE as correct.

T2 errors

HD Pointer Checker prints an error message every time it detects an occurrence of more than seven slack bytes (this is the default). This scenario shows that error message FABP0410E (also known as a T2 error) can occur as a result of normal, valid delete or replace operations. T2 errors that occur this way are *not* really errors.

T2 errors can also be the result of the following database damage:

- The wrong DBD might have been used to scan the database.
- An improper recovery attempt might have been made to recover the database.

Therefore, you must analyze an occurrence of more than seven slack bytes. However, the specification of the T2CHK option in the PROCCTL data set will allow the user to easily ignore the short and/or known T2s that are not really errors. The way to specify the T2CHK option is described in "FABPMAIN PROCCTL data set" on page 107.

The T2 information is reported by the following reports:

- Scan of HISAM Database report produced by the SCAN processor
- Validation of a Pointer to a Target at SCAN report produced by the SCAN processor
- Validation of a Pointer to a Target report produced by the CHECK processor.

If only T2 errors are detected for the database throughout HD Pointer Checker run, the return code for HD Pointer Checker run is set to 2. The T2 errors are reported in the HD Pointer Checker Summary report.

Subsections:

- "T2 processing" on page 309
- "T2CHK option" on page 310
- "What should be done for T2 errors" on page 310

T2 processing

After HD Pointer Checker reads a database block (using either the VSAM or QSAM access method), it classifies each byte in the block. It does this during a sequential pass over the block.

Each segment or free space element is expected to be followed by another segment or free space element. If an invalid segment code is found to be following a segment or free space element, HD Pointer Checker assumes that a slack byte has been detected. HD Pointer Checker now tries to locate the next valid segment or free space element. It does this by testing every second byte for a valid segment code. (Because segments always begin on bytes with even relative byte addresses, it is sufficient to test every

other byte.) Once a valid segment code (or free space element) is found, and a rudimentary validity check is satisfied, HD Pointer Checker assumes it is back on track in its deblocking scan of the database block. If the number of bytes of unknown data it detects is more than seven (the default value), an error message is printed.

It is possible that HD Pointer Checker might not get back on track correctly. A coincidence that fools the program could occur. If this happens, other error messages that are not valid might appear. In practice, such a coincidence is very rare.

T2CHK option

By using the T2CHK option, the user can easily ignore the short and/or known T2s that are not really errors in HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases. For this option, the following specifications are needed:

- The minimum value of T2 record length to be reported (for HDAM, HIDAM, PHDAM, and PHIDAM).

  This causes the T2 record whose length is shorter than the specified minimum value not to be reported. It allows the user to ignore short T2s that might not be really errors.
- The maximum number of T2 records not to be reported (for HISAM, HDAM, HIDAM, PHDAM, and PHIDAM).

  By specifying T2 record threshold value for this specification, the known T2 is not reported. It allows the user to ignore known T2s that might not be really errors and will continue to be present until the database reorganization.

For a description of the T2CHK option, see “OPTION statement” on page 131.

What should be done for T2 errors

If T2 error messages appear in your HD Pointer Checker reports, investigate them and determine their cause. Use HD Pointer Checker block maps and block dumps to verify whether the slack bytes were caused by normal update operations.

If only normal operations have caused the T2 errors, do one of the following:

- Ignore the T2 messages (because they are not actual errors).
- Reorganize the database (which eliminates all slack bytes).

If it is ascertained that the unknown data could not have occurred naturally, repair the database. Refer to Chapter 11, “Database repair guidelines,” on page 293 for instructions on how to repair databases.

Chapter 13. Estimating runtime resources

Use the following topics to estimate the runtime resources of HD Pointer Checker.

Topics:

- "Estimating the sizes of work data sets for HD Pointer Checker automatically" on page 311
- "Estimating the sizes of work data sets for HD Pointer Checker manually" on page 312
- "Estimating the storage needed for HD Pointer Checker manually" on page 318

Estimating the sizes of work data sets for HD Pointer Checker automatically

HD Pointer Checker can estimate the approximate sizes of some work data sets that HD Pointer Checker dynamically allocates in a pointer check job. You can use the estimates to specify the data class, storage class, or the DD statements for the work data sets.

About this task

By running an HD Pointer Checker job with processing type TYPE=ESTIMATE_WK, you can estimate the approximate sizes required for the work data sets that will be dynamically allocated by HD Pointer Checker in a TYPE=ALL job. The sizes of the work data sets that are associated with the following DD statements are estimated:

- MERGIN*nn*
- MERGI2*nn*
- SORTE2*nn*
- CHECKREC
- IXKEY

For the sizes of other work data sets, you can estimate them manually. See "Estimating the sizes of work data sets for HD Pointer Checker manually" on page 312.

Procedure

1. Create JCL for HD Pointer Checker or select existing HD Pointer Checker JCL. You can use JCL that has PROC TYPE=ALL or PROC TYPE=SCAN as the processing type.

   For information about creating JCL, see "Running HD Pointer Checker" on page 43.

   You must ensure that the DD statements, except for the DD statements for work data sets, are correctly coded. Also, ensure that the control statements are correctly coded.

   The sizes of work data sets and whether a work data set is used depends on which statements are coded in the JCL. Ensure that all the statements that you will use in the pointer check job are present in the JCL. However, the DD statements for work data sets do not need to be coded at this point. When HD Pointer Checker estimates the sizes of work data sets, it does not refer to the DD statements associated with work data sets.
2. Create a copy of the JCL and modify the copy as follows:
   a) Change TYPE=ALL or TYPE=SCAN to TYPE=ESTIMATE_WK in the PROCCTL data set. For more information about the TYPE=ESTIMATE_WK option, see "PROC statement" on page 108.
   b) If the input data set is a tape image copy, specify the original database data set size for the OPTION DSSIZE parameter.
3. Submit the JCL.

© Copyright IBM Corp. 2000, 2021

HD Pointer Checker estimates the size that is required for each work data set based on the sizes of input database data sets or the OPTION DSSIZE parameter if the parameter is specified.

4. Browse the PROCCTL statement report and locate the ESTIMATED SIZES OF WORK DATA SETS part.

   The ESTIMATED SIZES OF WORK DATA SETS part contains the estimated size for each work data set. See “PROCCTL Statements report” on page 172 to interpret the PROCCTL statement report.

What to do next

If you want to specify the data class, storage class, or DD statements for the work data sets, specify them in the original JCL. Then, submit the original JCL to run the pointer check job.

Estimating the sizes of work data sets for HD Pointer Checker manually

This topic explains how to estimate the size of the work data sets for HD Pointer Checker.

When HD Pointer Checker runs with the Standard Check (that is, with no HASH checking) several work data sets are required. In the following cases, you will need to estimate the sizes of the work data sets:

- If TYPE=ALL is specified, HD Pointer Checker allocates the work data sets dynamically. In most cases, you do not need to specify the DD statements for the work data sets because HD Pointer Checker estimates the size of work data sets on the basis of the size of the database data sets or the DSSIZE specifications. If there is not enough space on the disks, you will get a dynamic allocation error or a B37 abend when allocating the work data sets. In this case, you must specify the DD statements for the work data sets.
- If TYPE=SCAN is specified, HD Pointer Checker does not allocate the work data sets dynamically; you must specify the DD statements for the work data sets.
- If CHECKREC=YES is specified, CHECKREC DD is also required, but it is not allocated dynamically by HD Pointer Checker; you must specify the CHECKREC DD statement.

When HD Pointer Checker runs with HASH checking, the work data sets used are very small. Do one or two of the following:

- If TYPE=ALL is specified, HD Pointer Checker allocates the work data sets dynamically. You do not need to specify any DD statements for the work data sets.
- If TYPE=SCAN is specified, you must specify the SORTEX01 DD statement. SPACE=(TRK,(1,1)) is enough.
- If CHECKREC=YES is specified, you must specify the CHECKREC DD statement. SPACE=(TRK,(1,1)) is enough.

All work data sets are sequential data sets. They can be allocated on either a tape or a disk. To run HD Pointer Checker successfully with work data sets on a disk, make sure each work data set has enough space for all of its records. Otherwise, the job terminates abnormally.

Because an HD Pointer Checker job often runs for a relatively long time, it is important that you allocate the spaces correctly at the outset. To estimate the sizes of the spaces, follow the steps shown below. The following topics give guidelines to help you estimate the sizes of the HD Pointer Checker work data sets on the basis of these steps.

1. Run HD Pointer Checker with PTRCHK=NO.
2. Estimate the size of MERGIN*nn*.
3. If necessary, estimate the sizes of additional data sets:
   - Estimate the size of data set for the TYPE=SCAN process.
   - Estimate the sizes of the data sets for the IXKEYCHK=YES process.
   - Estimate the sizes of the data sets for the EPSCHK=YES process.
   - Estimate the size of the data set for the CHECKREC=YES process.

4. Divide the *nn* data sets into scan groups.
5. Convert the results to proper space units.

Running HD Pointer Checker with PTRCHK=NO

By running HD Pointer Checker with the PTRCHK=NO option, you can generate statistics reports for estimating the runtime resources.

Procedure

Run HD Pointer Checker with PROC TYPE=SCAN and OPTION PTRCHK=NO to obtain some statistics reports that contain information for the estimation. For options other than TYPE=SCAN and PTRCHK=NO, specify the same values as in an actual run.

To calculate the sizes of the work data sets, fill in the worksheets 1 and 2 (Table 36 on page 313 and Table 37 on page 313) by following the instructions. To fill in the worksheets, refer to the statistics reports.

Table 36. Worksheet 1 for estimating the sizes of the work data sets

A. DB name	B. DB organization	C. Total number of segments	D. Total number of FSEs	E. Total number of internal pointers	F. Total number of external pointers	G. Total number of index target segments in indexed DB (ITS=ISS)	H. Total number of index source segments in indexed DB	I. Total number of index pointer segments in index DB	J. Total number of pointers in EPS

Table 37. Worksheet 2 for estimating the sizes of the work data sets

A. DB name	i. MERGIN*nn*	ii. SORTEX01	iii. MERGI2*nn*	iv. SORTE2*nn*	v. IXKEY	vi. SORTIL*nn*	vii. CHECKREC

By referring to the DMB Directory report, fill in columns A and B for all databases.

Column A: DB name
Fill in the names of the databases in column A, by referring to the DBD NAME field in the report.

Column B: DB organization
Fill in the organization types of the databases in column B, by referring to the DBD-ORG field in the report.

For other columns, the guidelines for estimation are described in the following topics.

Estimating the size of MERGINnn

HD Pointer Checker always uses MERGIN*nn*. To calculate the value for MERGIN*nn* in worksheet 2, complete the following procedure.

Procedure

To fill in the worksheets in “Running HD Pointer Checker with PTRCHK=NO” on page 313, complete the following steps.

1. Fill in column C for all databases other than the primary index and PSINDEX databases, and column D for all databases other than the index database.

Column C: Total number of segments
For HISAM, HDAM, HIDAM, PHDAM, or PHIDAM, see the DATABASE RECORD STATISTICS part in the Database Statistics report. For a non-HALDB secondary index database, see the TOTALS part in the Scan of Index Database report. The reports show the total occurrences of segments. Put that number in column C in worksheet 1.

Column D: Total number of FSEs
See the NUMBER OF FREE SPACE ELEMENTS field in the HD Data Set Statistics report. Because this report is printed per data set, add the values of the FSEs of all data sets in the database. Put the sum in column D in worksheet 1.

2. Calculate MERGIN*nn* in worksheet 2 by using the following formula:

```
MERGINnn = 36 x C + 22 x D Bytes
```

Figures must be taken from columns C and D of the same database row in worksheet 1. The same applies for other columns in worksheet 2, which are explained in the following topics.

What to do next

If you do not specify IXKEYCHK=YES, EPSCHK=YES, or CHECKREC=YES, only MERGIN*nn* is used. Go to “Dividing the nn data sets into scan groups” on page 317.

Estimating the sizes of additional data sets

Use the following topics to estimate the sizes of additional data sets.

About this task

To fill in the worksheets in “Running HD Pointer Checker with PTRCHK=NO” on page 313, complete the following steps.

Estimating the size of the work data set for TYPE=SCAN (SORTEX01)

The SORTEX01 data set is needed in the TYPE=SCAN process. To calculate the value for SORTEX01 in worksheet 2, complete the following procedure.

Procedure

1. Fill in columns E and F in worksheet 1.

Column E: Total number of internal pointers
For an HD database (including HALDBs) or a HISAM database, see the TOTAL POINTER STATISTICS part in the Database Statistics report, and put the following value in column E:

- If you specify INCORE=YES, the value of the BEYOND column in the row TOTALS (SAME DBDS)
- If you specify INCORE=NO, the value of the TOTAL column under USED in the row TOTALS (SAME DBDS)

For an index database, see the TOTALS part in the Scan of Index Database report, and put the following value in column E:

- If column B is INDEX, the sum of the value of TOTAL VALID SEGMENTS of INDEX and twice the value of TOTAL VALID SEGMENTS of OVERFLOW
- If column B is PSINDEX, the sum of TOTAL VALID SEGMENTS of INDEX for all partitions

Column F: Total number of external pointers
Take the value of the column TOTAL in the row TOTALS (NOT SAME DBDS). The row TOTALS (NOT SAME DBDS) is next to the row TOTALS (SAME DBDS). Put the value in column F.

2. Calculate SORTEX01 in worksheet 2 by the following formula:

```
SORTEX01 = 40 x (E + F) Bytes
```

Estimating the sizes of the work data sets for IXKEYCHK=YES (MERGI2nn, SORTE2nn, and IXKEY)

Follow these instructions to estimate the sizes of the data sets that are needed when you specify PROC IXKEYCHK=YES and HASH=NO.

Procedure

1. Estimate the size of MERGI2*nn*.

   Records are written in MERGI2*nn* during the SCAN process of TYPE=ALL or TYPE=SCAN. To calculate the value for MERGI2*nn* in worksheet 2, complete the following steps:

   a) Fill in column G in worksheet 1.

   Column G: Total number of index target segments in indexed DB (ITS=ISS)
   From the Scan of Index Database report, obtain the following values for each index database:

   - For primary index database, the sum of TOTAL VALID SEGMENTS of INDEX and OVERFLOW.
   - For secondary index database, do as follows if SOURCE SEGMENT NAME and TARGET SEGMENT NAME under the title SECONDARY INDEX DEFINITION are the same.
     - If column B is INDEX, the sum of TOTAL VALID SEGMENTS of INDEX and OVERFLOW.
     - If column B is PSINDEX, the sum of TOTAL VALID SEGMENTS of INDEX for all partitions.

   In this report, you will find the corresponding indexed database in the INDEXED DATABASE row. Put the above values in column G of the row for the indexed database in worksheet 1. If the indexed database has two or more target segment types, add up the values for all index databases, and put the sum in column G.

   Note: Fill in column G in the row for the *indexed* database, not for the *index* database.

   b) Calculate MERGI2*nn* in worksheet 2 by the following formula:

   ```
   MERGI2nn = 34 x G Bytes
   ```

2. Estimate the size of SORTE2*nn*.

   Records are written in SORTE2*nn* during the SCAN process TYPE=ALL or TYPE=SCAN. To calculate the value for SORTE2*nn* in worksheet 2, complete the following steps:

   a) Fill in columns H and I in worksheet 1.

   Columns H and I: Total number of index source segments in indexed DB and total number of index pointer segments in index DB
   From the Scan of Index Database report, obtain the following values:

   - If column B is INDEX, the sum of TOTAL VALID SEGMENTS of INDEX and OVERFLOW.
   - If column B is PSINDEX, the sum of TOTAL VALID SEGMENTS of INDEX for all partitions.

   In this report, you will find the corresponding indexed database in the INDEXED DATABASE row. Put the above value in column H of the row for the indexed database in worksheet 1. With the same value, also fill in column I of the row for the index database in worksheet 1.

   Note: Fill in column H in the row for the *indexed* database, not for the *index* database. If the indexed database has two or more source segment types, sum up the values of all index databases.

   b) Calculate SORTE2*nn* in worksheet 2 by the following formula:

   For indexed database:

   ```
   SORTE2nn = (56 + key length ) x H  Bytes
   ```

For index database:

```
SORTE2nn = (56 + key length ) x I  Bytes
```

Where *key length* is the value shown in the DB INDEX KEYLENGTH-1 column plus 1.

3. Estimate the size of IXKEY.

   IXKEY is used during the CHECK process TYPE=ALL or TYPE=CHECK. Only one data set is allocated for it. To calculate the value for IXKEY in worksheet 2, complete the following step:

   a) Calculate IXKEY in worksheet 2 from the values of MERGIN2*nn* and SORTE2*nn* in worksheet 2, as follows:

```
IXKEY = (SUM of MERGI2nn) + (SUM of SORTE2nn)
```

Estimating the sizes of the work data sets for EPSCHK=YES (SORTILnn)

Follow these instructions to estimate the sizes of the data sets that are needed when you specify EPSCHK=YES. The following processes are required only for HALDBs that have logical or index relationships.

Procedure

Estimate the size of SORTIL*nn*.

Records are written in SORTIL*nn* during the SCAN process of TYPE=SCAN. To calculate the value for SORTIL*nn* in worksheet 2, complete the following steps:

1. Fill in column J in worksheet 1.

   Column J: Total number of pointers in EPS
   Put the following value in column J:

   - If column B is PSINDEX, the same number as in column I.
   - If column B is PHDAM or PHIDAM, see the SEGMENT AND POINTER STATISTICS part in the Database Statistics report. Take the values in TOTAL under USED from the ELP and the ELC rows, and add up the values for all segments in the database. Put the sum in column J.

2. Calculate SORTIL*nn* in worksheet 2 by the following formula:

   - If IXKEYCHK=YES is specified for PSINDEX:

```
SORTILnn = (56 + key length) x J Bytes
```

     Where *key length* is the value shown in DB INDEX KEYLENGTH-1 field of the Scan of Index Database report plus 1.

   - If IXKEYCHK= NO is specified:

```
SORTILnn = 44 x J Bytes
```

Estimating the size of the work data set for CHECKREC=YES (CHECKREC)

Records are written in CHECKREC during the CHECK process TYPE=ALL or TYPE=CHECK. Only one data set is allocated for it in an HD Pointer Checker job.

Procedure

To calculate the value for CHECKREC in worksheet 2, add all values of MERGIN*nn* and SORTEX01 in worksheet 2 as follows:

```
CHECKREC = SUM of ( MERGINnn + SORTEX01 )
```

Dividing the *nn* data sets into scan groups

Estimate the sizes of the work data sets with suffix *nn* that are used by each scan group.

Procedure

Refer to the following examples to make these estimates:

Example 1

Assume that you specify DBA and DBB to be processed by scan group 01, and DBC to be processed by scan group 02. Also assume that each database requires MERGIN*nn* as shown in the following worksheet.

Table 38. Worksheet 2 for Example 1

A. DB name	i. MERGIN*nn*	ii. SORTEX01	iii. MERGI2*nn*	iv. SORTE2*nn*	v. IXKEY	vi. SORTIL*nn*	vii. CHECKREC
DBA	1000						
DBB	2000						
DBC	5000						

You can estimate the size of MERGIN01 and MERGIN02 as follows:

- Size of MERGIN01= 1000 + 2000 = 3000 bytes
- Size of MERGIN02= 5000 bytes

Example 2

In addition to the assumptions made in Example 1, assume that DBA has two data sets, and the size of data set 1 is 1 GB and that of data set 2 is 4 GB. Also assume that you specify the processing of each scan group as follows:

- Scan group 01: Data set 1 of DBA, and DBB
- Scan group 02: Data set 2 of DBA, and DBC

The MERGIN*nn* for each data set of DBA requires the following size:

- For data set 1: (1000 x 1G/(1G+4G)) = 200 bytes
- For data set 2: (1000 x 4G/(1G+4G)) = 800 bytes

Then your estimates of the sizes of MERGIN01 and MERGIN02 will be as follows:

- Size of MERGIN01 = 200 + 2000 = 2200 bytes
- Size of MERGIN02 = 800 + 5000 = 5800 bytes

You can estimate the sizes of other work data sets with suffix *nn* in the same way as you did for MERGIN*nn*. For SORTEX01, which is used per scan job step, however, you need to estimate the size as follows:

- If you run all of SCAN processes in one job, add all SORTEX01 columns.
- If you run the SCAN processes in multiple job steps, divide worksheet 2 by scan jobs and calculate SORTEX01, MERGIN*nn*, and the other work data sets by each worksheet.

Converting the results to proper space units

The calculations in the preceding topics give the sizes of all the large HD Pointer Checker work data sets in bytes. In order to use them for your JCL, you need to convert these figures to appropriate space units.

Procedure

If you are using a disk for your work data sets, convert them into cylinder units. If you are using a tape, convert them into tape reel units. Make sure that you provide enough volume for the spaces.

Estimating the storage needed for HD Pointer Checker manually

To estimate the amount of storage required for HD Pointer Checker, use the following formulas. The storage size depends on certain options in the PROCCTL data set.

Procedure

Use these formulas for rough estimation. The storage size actually required might differ from the estimated value.

Below 16 MB

2.5 MB + number of scan groups x 250 KB

Above 16 MB

REPORT CHAINDIST=NO

- For 10 or fewer scan groups:
  - (1) PROC HASH=YES

    ```
    10 MB + number of scan groups x 1.2 MB
    ```

  - (2) PROC HASH=NO (NO is the default value of the HASH option.)

    ```
    (1) + 2.8 MB
    ```

  - (3) PROC IXKEYCHK=YES

    ```
    (2) + 2 x 2.8 MB
    ```

  - (4) EPSCHK=YES (YES is the default value of the EPSCHK option for HALDB.)

    ```
    (2) + 2.8 MB
    ```

- For more than 10 scan groups:

  Use 280 K instead of 2.8 MB in formulas (1) to (4).

REPORT CHAINDIST=YES

Note: YES is the default value of the CHAINDIST option.

When an HDAM database or PHDAM database is processed, a number of bytes equal to the number of RAPs in the database need to be added to the formulas 1 through 4. The additional area is used only while a data set that has root segments is being scanned; it disappears as soon as the scan is completed. Therefore, if you process more than two HDAMs or PHDAMs serially within a scan group, the maximum size of the additional storage is equal to the maximum number of RAPs in the databases. If you process more than two HDAMs or PHDAMs in parallel in different scan groups, the additional storage size is the sum of the number of RAPs of all databases.

The number of RAPs can be calculated by the following formula:

```
(Number of RAPs per block) x (Number of blocks in RAA)
```

Chapter 14. Performance tips for HD Pointer Checker

Learn certain methods for improving the performance of HD Pointer Checker.

Certain options in a PROCCTL data set might affect performance. For details about each option, see “FABPMAIN PROCCTL data set” on page 107.

Subsections:

- “Parallel scan of data set” on page 319
- “HASH Check” on page 319
- “INCORE Check” on page 319
- “Other options that affect performance” on page 319

Parallel scan of data set

In general, most of the elapsed time for an HD Pointer Checker job is spent on reading database data sets or image copy data sets. You can reduce the elapsed time by reading the data sets in parallel. To call for parallel reading, use the SCANGROUP option in a DATABASE statement, and specify a different scan group number for each data set. For more information, see “DATABASE statement” on page 125.

HASH Check

A HASH Check is a quick and rough pointer-checking function that considerably improves the elapsed time. To run the HASH Check, specify HASH=YES in a PROC statement. It can determine only whether a database contains errors; it cannot identify any broken pointer or segment. For more information, see “PROC statement” on page 108.

It is recommended that you run the HASH Check in regular operations, and run the Standard Check only when errors are detected in a HASH Check. The default is HASH=NO.

INCORE Check

An INCORE Check is enabled by the INCORE option in an OPTION statement. When it is specified, pointers that point near segments are checked in a SCAN process. Generally, this option might considerably reduce the elapsed time by reducing CPU time of CHECK. However, the increase in the SCAN CPU time is sometimes though rarely, greater than the reduction of CPU time of CHECK, and it makes the elapsed time longer. The default is INCORE=YES. For more information, see “OPTION statement” on page 131.

Other options that affect performance

The three options just discussed can yield a relatively large improvement in performance. The following options might have less effect.

Options that might improve performance when the default is accepted:

PROC CHECKREC, IXKEYCHK
OPTION KEYSIN
REPORT COMPFACT

Options that might improve performance when NO is specified (the default for each of these options is YES):

PROC EPSCHK, VLSSUMM
OPTION SPIXCHK, HOMECHK, CHAINDIST

© Copyright IBM Corp. 2000, 2021

With the IBUFF option in an OPTION statement, in general, the default value gives the best performance. The best value, however depends on the system.

If you have enough real storage, you can improve the performance of the Standard Check with PROC TYPE=ALL by using VIO for files MERGIN*nn*. This greatly speeds the CHECK process. You request VIO by supplying DD statements for files MERGIN*nn*. By default, HD Pointer Checker allocates MERGIN*nn* on disk.

Chapter 15. HD Pointer Checker options for debugging

The keywords for the OPTION statement that are described in the following topic is generally used for debugging purpose only. If this option is specified, you might get an extremely large report, or some pointer errors undetected.

Topics:

- "OPTION statement" on page 321

OPTION statement

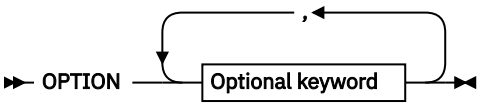
HD Pointer Checker supports certain debugging options. These options can be activated by coding the keywords and their values on the OPTION statement.

Subsections:

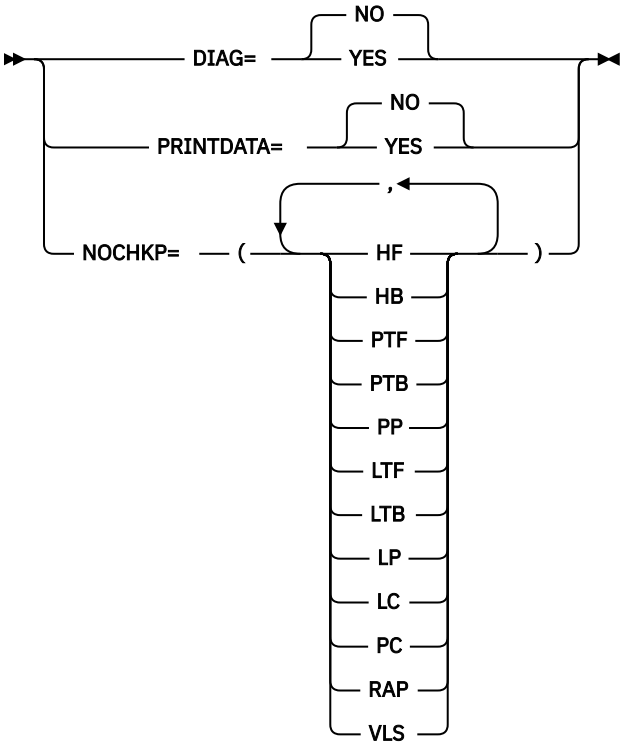
- "Syntax" on page 321
- "Keywords" on page 322

Syntax

The following syntax diagram shows the OPTION statement keywords that can be used for debugging purposes.



Optional keywords



© Copyright IBM Corp. 2000, 2021

Keywords

DIAG=
Specifies whether to print dumps of some internal control blocks. This option must be used for debugging purpose only.

This option can be specified when TYPE=ALL or SCAN is specified.

YES
The dumps of some internal control blocks are printed.

NO
Any dump of the internal control blocks is not printed. DIAG=NO is the default.

PRINTDATA=
Specifies whether to print the pointer data that is extracted by the program. If you specify YES, you might get an extremely large report that will be of little use. This option must be used for debugging purpose only.

This option can be specified when TYPE=ALL or SCAN is specified.

Abbreviations PDATA and PD can be used for PRINTDATA.

YES
The extracted pointer data is printed.

NO
Any extracted pointer data is not printed. PRINTDATA=NO is the default.

NOCHKP=
Specifies whether to bypass the checking of certain kinds of pointers. This option must be used for debugging purpose only.

This option can be specified for HDAM and HIDAM databases and can be specified when TYPE=ALL or SCAN is specified.

When this option is specified, HISTORY=YES cannot be specified.

If this option is not specified, that is, when the default values are used, HD Pointer Checker checks all applicable pointers. The NOCHKP field in the separator page for DB/DSG reports contains blank.

HF (or PHF)
Specifies that hierarchical forward pointers are not checked.

HB (or PHB)
Specifies that hierarchical backward pointers are not checked.

PTF
Specifies that physical twin forward pointers are not checked.

PTB
Specifies that physical twin backward pointers are not checked.

PP
Specifies that physical parent pointers are not checked.

LTF
Specifies that logical twin forward pointers are not checked.

LTB
Specifies that logical twin backward pointers are not checked.

LP
Specifies that logical parent pointers are not checked.

LC
Specifies that logical child pointers are not checked.

PC
Specifies that physical child pointers are not checked.

RAP
Specifies that root anchor point (RAP) pointers are not checked.

VLS
Specifies that variable-length split pointers are not checked.

Part 3. HD Tuning Aid utility

The HD Tuning Aid utility evaluates data distribution and setup parameters to help optimize performance.

Use the following topics to learn about and use the HD Tuning Aid utility.

Topics:

- Chapter 16, “Overview of HD Tuning Aid,” on page 327
- Chapter 17, “Using HD Tuning Aid,” on page 331
- Chapter 18, “JCL examples for HD Tuning Aid,” on page 359

© Copyright IBM Corp. 2000, 2021

Chapter 16. Overview of HD Tuning Aid

The HD Tuning Aid utility produces reports that describe the distribution of root segments in HDAM, HIDAM, PHDAM, or PHIDAM databases. It also produces a report that contains summary information about a High Availability Large Database (HALDB).

Typical uses of the HD Tuning Aid utility are evaluations of the following factors for performance and tuning analysis:

- Current randomizer performance in HDAM or PHDAM databases
- Current root segment locations in HIDAM or PHIDAM databases
- Potential randomizer performance in HDAM or PHDAM databases
- Potential randomizer performance in HIDAM or PHIDAM databases that could be converted to HDAM or PHDAM

HD Tuning Aid can estimate the actual performance of partition selection for PHDAM or PHIDAM and randomizing parameter for PHDAM.

It can also estimate the performance of the following types of conversion:

- Conversion from an HDAM, HIDAM, or PHIDAM database to a PHDAM database
- Changing the number of partitions of a PHDAM database
- Changing the partition selection and/or the DBD randomizing parameters
- Conversion from a PHDAM or a PHIDAM database to an HDAM database

When the database to be processed is a HALDB, or when a simulation of conversion to a HALDB is processed, HD Tuning Aid generates reports for each partition in addition to the ordinary reports by database.

Topics:

- "Program functions" on page 327
- "Program structure" on page 328
- "Data flow" on page 328

Program functions

The HD Tuning Aid utility produces reports that describe the distribution of root segments in HDAM, HIDAM, PHDAM, or PHIDAM databases.

These reports include:

- The Actual Roots per Block report prints the actual number of roots that are stored in each database block.
- The Assigned Roots per Block report prints the number of roots that are randomized to each block.
- The Assigned Roots per RAP report prints the number of roots that are randomized to each root anchor point (RAP).

The last two of these reports are produced only for HDAM or PHDAM.

HD Tuning Aid also produces a report that gives summary information about HALDB:

- HALDB Process Summary report prints summary information about the processed partitions.

© Copyright IBM Corp. 2000, 2021

Program structure

HD Tuning Aid consists of two programs plus a DFSORT execution.

- FABTROOT produces the Actual Roots per Block report. It also creates the RAPSIN data set that is used as input to DFSORT.
- DFSORT is used to sort the RAPSIN data set.
- FABTRAPS produces the Assigned Roots per RAP report and the Assigned Roots per Block report.

If any of the following conditions are met, the FABTROOT program must be run under the IMS batch region controller:

- The database is a HALDB.
- The database is a non-HALDB and a user randomizing routine requires access to IMS control blocks.
- The IMS management of ACBs is enabled.

Otherwise, both programs (FABTROOT and FABTRAPS) run as standard batch jobs.

HD Tuning Aid can run with multiple IMS versions/releases without reinstalling the product, as far as the version/release is supported.

Data flow

The data flow of HD Tuning Aid differs by the type of database to be processed.

Data flow for non-HALDB

The following figure shows the HD Tuning Aid data flow for a non-HALDB.

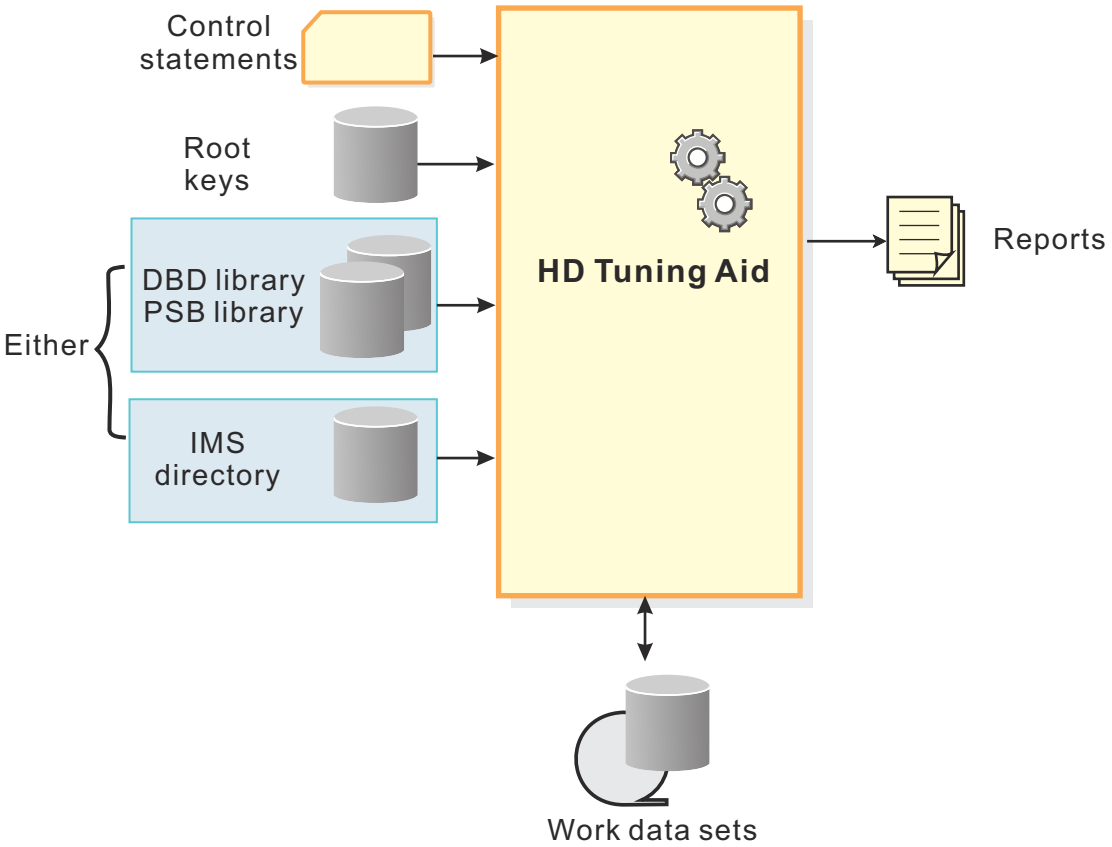


Figure 139. HD Tuning Aid data flow for non-HALDB

The HD Tuning Aid reads control statements from the CTL data set, root keys from a data set that is created by the SCAN process of HD Pointer Checker, and information about processing databases from the DBD/PSB library of IMS or from the IMS directory. The process consists of three JOB steps. Some of the reports are generated by the first step. To create the rest of the reports, the first step writes data into a work data set, which is passed to DFSORT utilities to be sorted and fed to the last step.

Data flow for HALDB

The following figure shows the HD Tuning Aid data flow for a HALDB. In case of a HALDB, the HD Tuning Aid gets access to the RECON data sets and IMS RESLIB to retrieve information about the HALDB.

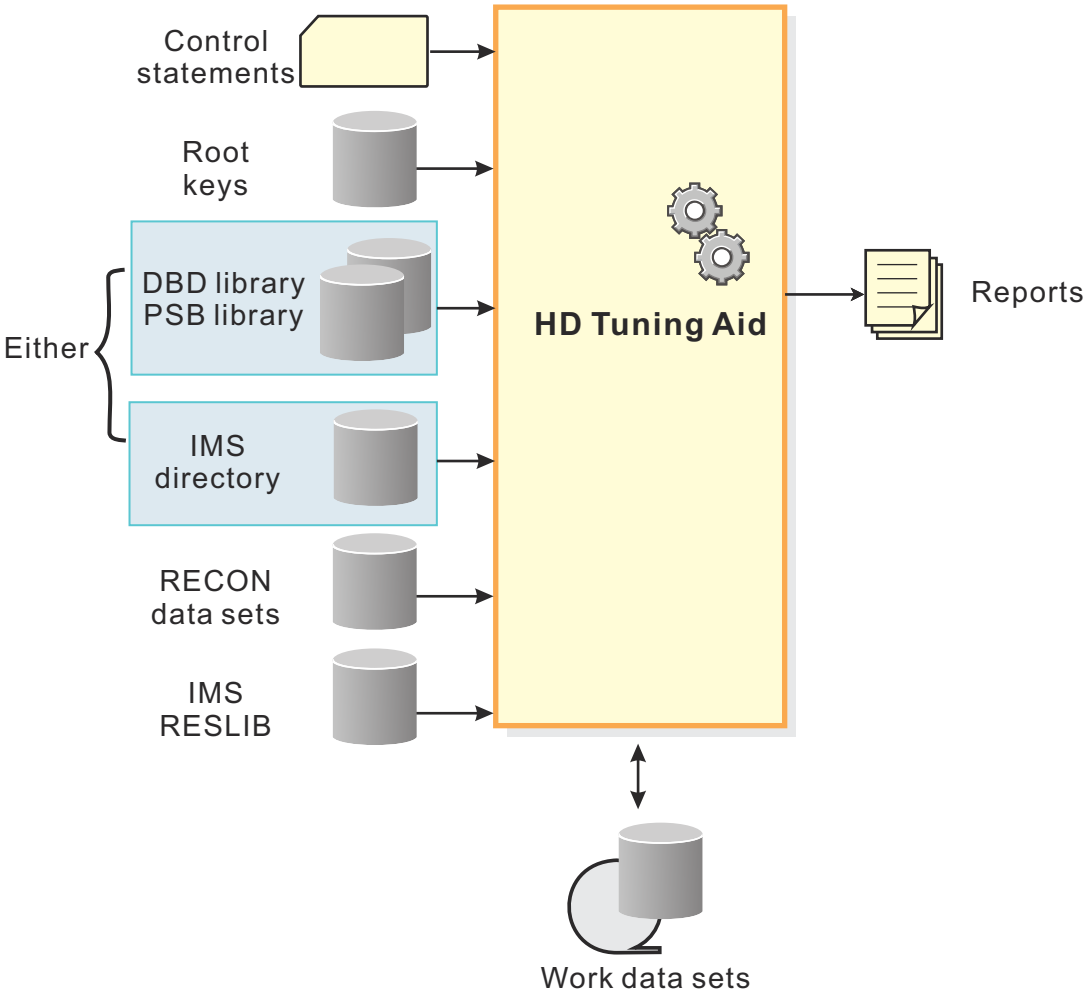


Figure 140. HD Tuning Aid data flow for HALDB

Chapter 17. Using HD Tuning Aid

The following topics describe how to use the HD Tuning Aid utility.

Topics:

- "Restrictions and considerations" on page 331
- "Running HD Tuning Aid" on page 331
- "Job control language" on page 332
- "Input" on page 340
- "Output" on page 348

Restrictions and considerations

Certain restrictions and considerations apply to using the HD Tuning Aid utility.

HD Tuning Aid is applicable only to HDAM, HIDAM, PHDAM, or PHIDAM databases.

Your randomizing routine might have its own restrictions that can affect the way you must run HD Tuning Aid. It must be capable of processing the key values that you provide as input. If your randomizer refers to IMS control blocks, you are required to run HD Tuning Aid under the IMS batch region controller.

If the IMS management of ACBs is enabled, you must run HD Tuning Aid under the IMS batch region controller.

Keep in mind the following points when processing HALDBs:

- If you use multiple KEYSIN data sets created by multiple HD Pointer Checker runs, you must make sure that all the KEYSIN data sets you specify on the KEYSIN DD statement are concatenated in ascending order of the database number and partition ID.
- HD Tuning Aid can accept all or some of the partitions of a PHDAM or PHIDAM database as input. If you want to run an HD Tuning Aid job for particular partitions, first run an HD Pointer Checker job against those partitions to create a desired KEYSIN data set.
- When you process the KEYSIN data set of PHIDAM or PHDAM, or simulate conversion to PHDAM, you must run the HD Tuning Aid job under the IMS batch environment and specify DBRC=Y for PARM=(DLI,FABTROOT,&PSB,,,,,,,,,,Y,N) of DFSRRC00. Also, RECON data sets are required. If the RECON data sets are not defined as dynamic allocation data sets, you must specify them in RECON*x* DD of step DFSRRC00.
- If the input PHIDAM or PHDAM database uses a partition selection exit, you must put the load module in the STEPLIB data set. If you intend to simulate the process that uses highkey without using the partition selection exit, you must put the load module in the STEPLIB data set. If you want to simulate the process by using another partition selection exit, you must put the partition selection exit in the IMS2 data set.

Running HD Tuning Aid

To run HD Tuning Aid, select a JCL procedure to use or prepare JCL of your own.

About this task

The following procedure describes how to code JCL for HD Tuning Aid.

To use HD Tuning Aid, you must run three programs. They can be run in either a single job or in several jobs. However, it is usually much easier to run all the steps in one job.

A typical job stream runs both the HD Pointer Checker and HD Tuning Aid. The HD Tuning Aid part of such a job contains the following steps:

© Copyright IBM Corp. 2000, 2021

FABTROOT
This program prints the Actual Roots per Block report and creates sort records that are used to create other reports.

DFSORT
This product sorts all of the sort records from the previous job step.

FABTRAPS
This HD Tuning Aid program prints the Assigned Roots per Rap report and the Assigned Roots per Block report.

Related reading:
For information about using the DFSORT utility, see the *z/OS DFSORT Application Programming Guide*.

Procedure

To use HD Tuning Aid, complete the following steps:

1. Determine whether to use a JCL procedure or to prepare JCL of your own.

   If you want to use the JCL procedure that is distributed with the product, select a JCL procedure. A summary of JCL procedures is provided in "JCL procedures" on page 337.
2. Code the JCL statements for the two HD Tuning Aid steps and the DFSORT step. If you use a JCL procedure, also modify the JCL procedure to suit your environment.

   For the JCL requirements, see "Job control language" on page 332. You can refer to the examples in Chapter 18, "JCL examples for HD Tuning Aid," on page 359 to code the JCL statements.
3. Code the input data for the HD Tuning Aid program FABTROOT and DFSORT.

   See "Input" on page 340 to code the input data sets.
4. Make a test run.
5. Interpret the output reports to verify that the process has completed successfully.

   See "Output" on page 348 for the reports generated by HD Tuning Aid.
6. Place the run JCL (and input data) into production use.

   Once the production JCL is created and stored, HD Tuning Aid can easily be run by using the stored JCL.

Job control language

The HD Tuning Aid utility supports two methods for running the utility.

The methods are:

- As a standard (non-IMS) batch job
- Under the IMS batch region controller

The two procedures need different JCL. HALDB can be processed in the IMS batch region controller.

FABTROOT JCL

To run FABTROOT, supply an EXEC statement PARM and the appropriate DD statements.

The following table (Table 39 on page 332) summarizes the DD statements that are appropriate for all FABTROOT runs. The subsequent table (Table 40 on page 333) summarizes the extra DD statements that you need if you run FABTROOT under IMS.

Table 39. FABTROOT DD statements for all runs

DDNAME	Use	Format	Need
STEPLIB	Input	PDS	Required

Table 39. FABTROOT DD statements for all runs (continued)

DDNAME	Use	Format	Need
IMS	Input	PDS	Optional
IMS2	Input	PDS	Required
KEYSIN	Input		Required
CTL	Input	LRECL=80	Optional
PR8	Output	LRECL=133	Required
RAPSIN	Output	LRECL=42	Required
SYSUDUMP	Output	SYSOUT	Optional

Table 40. Additional FABTROOT DD statements for IMS runs

DDNAME	Use	Format	Need
DFSRESLB	Input	PDS	Required
DFSVSAMP	Input		Required
RECON*x*	Input	Recon data set	Optional
PROCLIB	Input	PDS	Optional
DFSHDBSC	Input	PDS	Optional
SYSPRINT	Output	SYSOUT	Required
PR10	Output	LRECL=133	Optional
IEFRDER	Not used	DUMMY	Required

EXEC

If you are running this program as a standard MVS™ batch program, code as follows:

```
//     EXEC PGM=FABTROOT,PARM=NOIMS
```

If you are running this program as an IMS batch program, this statement must be in the following form:

```
//        EXEC PGM=DFSRRC00,
//             PARM=(DLI,FABTROOT,psbname,,,,,,,,,,dbrc,N,
//             ,,,,,,,,,imsplex,,'DBRCGRP=dbrcgrp')
```

To process a HALDB, you must run the program as an IMS batch program.

The PARM parameter has the same format as that used in the DLIBATCH procedure. For information about the DLIBATCH procedure, see *IMS System Definition*.

The following subparameters can be specified for PARM:

psbname

Specifies the name of the PSB that contains the PCB of the processing databases. The PSB name must be defined as a PSB with LANG=ASSEM, LANG=COBOL, or LANG=PL/I. It must refer directly or indirectly to all input databases.

dbrc

Specifies whether the Database Recovery Control facility is used.

Y

Use the Database Recovery Control facility

N
Do not use the Database Recovery Control facility

Requirement: To process a HALDB database, *dbrc* must be Y.

Tip: If DBRC=Y is specified and another job that has DBRC authorization exists, the DBRC authorization might be denied, and a DFS047A message might be issued in the HD Tuning Aid job. To avoid this problem, specify the name of the PSB that contains the PROCOPT=G PCB of the database. If the DBRC authorization problem occurs with PROCOPT=G PCB, rerun HD Tuning Aid after the job that has the DBRC authorization ends.

imsplex
Specifies the IMSplex name that is used in the IMS DBRC SCI registration. If the IMSplex name is set in the RECON data sets, you must supply the IMSplex name by either of the following methods:

- Specify the IMSplex name on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

DBRCGRP=*dbrcgrp*
Specifies the DBRC group ID that is used in the IMS DBRC SCI registration. If the DBRC group ID is set in the RECON data sets, you must supply the DBRC group ID by either of the following methods:

- Specify the DBRC group ID on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

Additional requirement when the IMS management of ACBs is enabled
When the IMS management of ACBs is enabled, run HD Tuning Aid under the IMS batch region controller and specify the DFSDF= parameter for the PARM= parameter. The value must be the 3-character suffix (*xxx*) of the DFSDF*xxx* member (in IMS.PROCLIB data set) that enables IMS-managed ACBs.

For example:

```
//        EXEC PGM=DFSRRC00,
//             PARM='DLI,FABTROOT,psbname,,,,,,,,,,dbrc,N,
//             ,,,,,,,,,,,DFSDF=xxx'
```

If you specify the library that contains the Catalog Definition exit routine (DFS3CDX0) in the STEPLIB DD statement, you do not need to specify the DFSDF=*xxx* parameter.

STEPLIB DD
When the utility runs as a standard MVS batch program, this statement defines the IMS HP Pointer Checker production library (required).

When the utility runs as an IMS batch program, this statement defines the following input data sets:

- IMS HP Pointer Checker production library (required)
- IMS RESLIB (required)
- The library that contains the DFSMDA members for dynamic allocation (optional)
- The library that contains the partition selection exit routine if a partition selection exit is defined to your input PHDAM or PHIDAM database in the RECON data sets
- IMS Tools Base library (SGLXLOAD) of IMS Tools Base 1.6 or later if the IMS management of ACBs is enabled
- The library that contains the Catalog Definition exit routine (optional)

IMS DD

This required input data set is a library (partitioned data set) that contains your PSB and DBD load modules. It must contain all DBDs that are referenced (either directly or indirectly) by your PSB. If your PSB and DBDs are not in the same library, all appropriate libraries must be concatenated.

If the IMS management of ACBs is enabled, you do not need to specify this DD statement. If the HD Tuning Aid utility finds this DD statement, the utility ignores the statement.

IMS2 DD

This required input data set is a library (partitioned data set) containing the randomizing modules. If a partition selection exit name is specified in CTL DD statements, IMS2 data set must contain the partition selection exit module defined in CTL.

KEYSIN DD

This required input data set contains root segment keys that are written by the SCAN process of HD Pointer Checker.

CTL DD

This optional input data set contains the values of DBD parameters and or partition selections that you want to override. This optional input data set contains your overrides of certain DBD parameters. Use this data set whenever you want to perform iterative analysis of randomizer performance. It describes the databases that are processed. It also contains optional user's requests for printing the reports.

PR8 DD

This required output data set contains the reports produced by module FABTROOT. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

RAPSIN DD

This required output data set contains HDAM block/RAP assignments for all keys that are in the KEYSIN data set. BLKSIZE, if coded, must be a multiple of 42.

SYSUDUMP DD

This statement defines output from a system abend dump routine. It is used only when a dump is required. Although optional, it is highly recommended that you include this data set.

DFSRESLB DD

This statement defines the data set that contains the IMS load modules. This statement is applicable only if you are running this program as an IMS batch program, in which case it is required.

DFSVSAMP DD

This input data set contains the buffer information required by the DL/I buffer handler. This statement is applicable only if you are running this program as an IMS batch program, in which case it is required.

RECON*x* DD

These optional data sets are the RECON data set. They are required when the input DBDs are HALDB and when RECON data sets are not allocated dynamically.

PROCLIB DD

This statement defines the library that contains all IMS generated cataloged procedures and jobs. This statement is applicable only if you are running this program as an IMS batch program, in which case it is optional. If it is omitted, a warning message might be issued by IMS. You can ignore this warning message.

If you specify the DFSDF=*xxx* subparameter on the EXEC PARM parameter, you must specify the IMS PROCLIB data set that contains the DFSDF*xxx* member.

DFSHDBSC DD

This optional input DD statement points to the IMS catalog partition definition data set. When the IMS management of ACBs is enabled and an IMS catalog database is not registered in the RECON data set, you must specify the IMS catalog partition definition data set in which the IMS catalog database is defined. If you omit this DD statement, the DFSHDBSC data set is allocated dynamically by the DFSMDA member.

SYSPRINT DD
This output data set contains messages produced by IMS. Because the HD Tuning Aid's IMS activity consists only of a GSCD call, no data is usually written to the SYSPRINT data set. This statement is applicable only if you are running this program as an IMS batch program, in which case it is required.

PR10 DD
This data set is optional and applicable only for HALDB. This optional output data set contains reports produced by FABTROOT. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

IEFRDER DD
This statement defines the primary system log data set. This statement is applicable only if you are running this program as an IMS batch program, in which case it is required and should be coded as DUMMY.

DFSORT JCL

To run DFSORT, supply the EXEC statement and appropriate DD statements.

The following table summarizes the DD statements.

Table 41. DFSORT DD statements

DDNAME	Use	Format	Need
SORTIN	Input	LRECL=42	Required
SYSIN	Input		Required
SORTOUT	Output	LRECL=42	Required
SYSOUT	Output	SYSOUT	Required
SYSUDUMP	Output	SYSOUT	Optional
SORTWK01	Work data set		Required
SORTWK02	Work data set		Required
SORTWK03	Work data set		Required
SORTWK04	Work data set		Required
SORTWK05	Work data set		Required
SORTWK06	Work data set		Required

EXEC
This statement must be in the following form:

```
//     EXEC PGM=SORT
```

SORTIN DD
This input data set is the RAPSIN data set created by FABTROOT.

SYSIN DD
This input data set contains DFSORT control statements. The sort parameter is "SORT FIELDS=(1,8,BI,A)."

SORTOUT DD
This output data set contains the sorted records. LRECL must be 42, and BLKSIZE must be a multiple of 42.

SYSOUT DD
This output data set contains the messages produced by DFSORT.

SYSUDUMP DD (or SYSABEND)
This defines output from a system abend dump routine. It is used only for debugging, when a dump is required.

SORTWK*nn* DD
These are intermediate storage data sets used by DFSORT. See the *z/OS DFSORT Application Programming Guide* for more information on how to code SORTWK*nn* DD statements.

FABTRAPS JCL

To run FABTRAPS, supply the EXEC statement and appropriate DD statements.

The following table summarizes the DD statements that are appropriate for all FABTRAPS runs.

Table 42. FABTRAPS DD statements

DDNAME	Use	Format	Need
KEYSOUT	Input	LRECL=42	Required
PR9	Output	LRECL=133	Required
PR9X	Output	LRECL=133	Required
SYSUDUMP	Output	SYSOUT	Optional

EXEC
The EXEC statement must be in the following form:

```
//     EXEC PGM=FABTRAPS
```

KEYSOUT DD
This required input data set contains the root keys that are sorted.

PR9 DD
This required output data set contains reports produced by module FABTRAPS. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

PR9X DD
This required output data set contains reports produced by module FABTRAPS. If BLKSIZE is coded on the DD statement, it must be a multiple of 133.

SYSUDUMP DD
This statement defines output from a system abend dump routine. It is used only when a dump is required. Although optional, it is highly recommended that you include this data set.

JCL procedures

To run HD Tuning Aid, use the IBM-supplied cataloged procedures or prepare similar procedures of your own.

The following IBM-supplied cataloged procedures can be used:

- “Procedure FABPPTA” on page 76
- “Procedure FABPPTAM” on page 85
- “JCL procedure for MVS batch (FABTMVS)” on page 338
- “JCL procedure under IMS (FABTIMS)” on page 339

A procedure like the one shown in “Procedure FABPPTA” on page 76 is recommended because it runs both HD Pointer Checker and HD Tuning Aid at the same time. To run only HD Tuning Aid, use a procedure similar to that shown in the following subsections:

- “JCL procedure for MVS batch (FABTMVS)” on page 338
- “JCL procedure under IMS (FABTIMS)” on page 339

The examples that are provided in Chapter 18, “JCL examples for HD Tuning Aid,” on page 359 assume that the IBM-supplied cataloged procedures are used.

FABTMVS procedure cannot be used for HALDBs. Only FABTIMS or FABPPTA can be used for HALDBs.

JCL procedure for MVS batch (FABTMVS)

```
//*****************************************************************  00010000
//*   Licensed Materials - Property of IBM                        *  00020000
//*                                                               *  00030000
//*   5655-U09                                                    *  00040000
//*                                                               *  00050000
//*   Copyright IBM Corp. 2000, 2008 All Rights Reserved.         *  00060000
//*                                                               *  00070000
//*   US Government Users Restricted Rights - Use,                *  00080000
//*   duplication or disclosure restricted by GSA ADP             *  00090000
//*   Schedule Contract with IBM Corp.                            *  00100000
//*                                                               *  00110000
//*****************************************************************  00120000
//        PROC U=SYSDA,                  UNIT FOR WORK DATA SETS     00130000
//             CYL='1,1',               SPACE FOR WORK DATA SETS     00140000
//             PARM2=,                        PARM FOR DFSORT       00150000
//             PRTBLK=6118,  (133*46) BLKSIZE OF PRINT DATA SETS     00160000
//             TEMPBLK=8400,  (42*200) BLKSIZE OF WORK DATA SETS     00170000
//             KEYSIN=,           DSN OF INPUT FILE OF ROOT KEYS     00180000
//             DBDLIB='IMSVS.DBDLIB',               <<--------<     00190000
//             USERLIB='IMSVS.RESLIB',     <<--< USER RANDOMIZER     00200000
//             RESLIB='IMSVS.RESLIB',               <<--------<     00210000
//             DBTSRC='HPS.HPSSAMP',                <<--------<     00220000
//             DBTLIB='HPS.SHPSLMD0'                <<--------<     00230000
//*-------------------------------------------------------------     00240000
//* HD TUNING AID - BATCH MVS                                       00250000
//*    USE THIS PROCEDURE IF THE RANDOMIZER DOES NOT NEED           00260000
//*    ACCESS TO IMS CONTROL BLOCKS.  IBM MODULES DFSHDC10,         00270000
//*    DFSHDC20, DFSHDC30, AND DFSHDC40 USE THIS PROCEDURE.         00280000
//*-------------------------------------------------------------     00290000
//STEP1   EXEC PGM=FABTROOT,PARM=NOIMS                              00300000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                 00310000
//RAPSIN    DD DSN=&&RAPSIN,DISP=(,PASS,DELETE),                    00320000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                          00330000
//             DCB=BLKSIZE=&TEMPBLK                                 00340000
//IMS       DD DSN=&DBDLIB,DISP=SHR                                 00350000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                 00360000
//          DD DSN=&USERLIB,DISP=SHR                                00370000
//PR8       DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                         00380000
//KEYSIN    DD DSN=&KEYSIN,DISP=OLD                                 00390000
//SYSUDUMP  DD SYSOUT=A                                             00400000
```

Figure 141. HD Tuning Aid JCL procedure for MVS batch (FABTMVS) (Part 1 of 2)

```
//*-------------------------------------------------------------     00410000
//STEP2   EXEC PGM=SORT,PARM='&PARM2',COND=(0,LT,STEP1)             00420000
//SORTIN    DD DSN=*.STEP1.RAPSIN,DISP=(OLD,DELETE,DELETE),         00430000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)             00440000
//SORTOUT   DD DSN=&&KEYSOUT,DISP=(,PASS,DELETE),                   00450000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                          00460000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)             00470000
//SORTWK01  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00480000
//SORTWK02  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00490000
//SORTWK03  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00500000
//SORTWK04  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00510000
//SORTWK05  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00520000
//SORTWK06  DD UNIT=&U,SPACE=(CYL,(&CYL))                           00530000
//SYSOUT    DD SYSOUT=A                                             00540000
//SYSIN     DD DSN=&DBTSRC(FABPSORT),DISP=SHR                       00550000
//*-------------------------------------------------------------     00560000
//STEP3   EXEC PGM=FABTRAPS,COND=(0,LT,STEP2)                       00570000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                 00580000
//PR9       DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                         00590000
//PR9X      DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                         00600000
//KEYSOUT   DD DSN=*.STEP2.SORTOUT,DISP=(OLD,DELETE,DELETE),        00610000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)             00620000
//SYSUDUMP  DD SYSOUT=A                                             00630000
//*-------------------------------------------------------------     00640000
```

Figure 142. HD Tuning Aid JCL procedure for MVS batch (FABTMVS) (Part 2 of 2)

JCL procedure under IMS (FABTIMS)

```
//*******************************************************************  00010000
//*   Licensed Materials - Property of IBM                          *  00020000
//*                                                                 *  00030000
//*   5655-U09                                                      *  00040000
//*                                                                 *  00050000
//*   Copyright IBM Corp. 2000, 2008 All Rights Reserved.           *  00060000
//*                                                                 *  00070000
//*   US Government Users Restricted Rights - Use,                  *  00080000
//*   duplication or disclosure restricted by GSA ADP               *  00090000
//*   Schedule Contract with IBM Corp.                              *  00100000
//*                                                                 *  00110000
//*******************************************************************  00120000
//        PROC PSB=,                                    PSB NAME      00130000
//             DBRC=N,                        DBRC=Y OR DBRC=N        00140000
//             U=SYSDA,                UNIT FOR WORK DATA SETS        00150000
//             CYL='1,1',              SPACE FOR WORK DATA SETS       00160000
//             PARM2=,                   PARM FOR DFSORT              00170000
//             PRTBLK=6118,  (133*46) BLKSIZE OF PRINT DATA SETS      00180000
//             TEMPBLK=8400,  (42*200) BLKSIZE OF WORK DATA SETS      00190000
//             KEYSIN=,          DSN OF INPUT FILE OF ROOT KEYS       00200000
//             DBDLIB='IMSVS.DBDLIB',               <<--------<       00210000
//             PSBLIB='IMSVS.PSBLIB',               <<--------<       00220000
//             USERLIB='IMSVS.RESLIB',     <<--< USER RANDOMIZER      00230000
//             RESLIB='IMSVS.RESLIB',               <<--------<       00240000
//             DBTSRC='HPS.HPSSAMP',                <<--------<       00250000
//             DBTLIB='HPS.SHPSLMD0'                <<--------<       00260000
//*-------------------------------------------------------------       00270000
//* HD TUNING AID - UNDER IMS                                         00280000
//*    USE THIS PROCEDURE ONLY IF THE RANDOMIZER NEEDS                00290000
//*    ACCESS TO IMS CONTROL BLOCKS.                                  00300000
//*-------------------------------------------------------------       00310000
//STEP1   EXEC PGM=DFSRRC00,                                          00320000
//             PARM='DLI,FABTROOT,&PSB,,,,,,,,,,&DBRC,N',             00330000
//             REGION=1000K,TIME=(,30)                                00340000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                   00350000
//          DD DSN=&RESLIB,DISP=SHR                                   00360000
//SYSUDUMP  DD SYSOUT=A                                               00370000
//RAPSIN    DD DSN=&&RAPSIN,DISP=(,PASS,DELETE),                      00380000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                            00390000
//             DCB=BLKSIZE=&TEMPBLK                                   00400000
//IMS       DD DSN=&DBDLIB,DISP=SHR                                   00410000
//          DD DSN=&PSBLIB,DISP=SHR                                   00420000
//IMS2      DD DSN=&RESLIB,DISP=SHR                                   00430000
//          DD DSN=&USERLIB,DISP=SHR                                  00440000
//*         DD DSN=USER.IMS.RANLIB,DISP=SHR                           00450000
//IEFRDER   DD DUMMY,DCB=BLKSIZE=1408                                 00460000
//DFSRESLB  DD DSN=&RESLIB,DISP=SHR                                   00470000
//DFSVSAMP  DD DSN=&DBTSRC(FABPVSAM),DISP=SHR                         00480000
//PR8       DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                           00490000
//PR10      DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                           00500000
//KEYSIN    DD DSN=&KEYSIN,DISP=OLD                                   00510000
```

Figure 143. HD Tuning Aid JCL procedure under IMS (FABTIMS) (Part 1 of 2)

```
//*-------------------------------------------------------------        00520000
//STEP2   EXEC PGM=SORT,PARM='&PARM2',COND=(0,LT,STEP1)                 00530000
//SORTIN    DD DSN=*.STEP1.RAPSIN,DISP=(OLD,DELETE,DELETE),             00540000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)                 00550000
//SORTOUT   DD DSN=&&KEYSOUT,DISP=(,PASS,DELETE),                       00560000
//             UNIT=&U,SPACE=(CYL,(&CYL)),                              00570000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)                 00580000
//SORTWK01  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00590000
//SORTWK02  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00600000
//SORTWK03  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00610000
//SORTWK04  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00620000
//SORTWK05  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00630000
//SORTWK06  DD UNIT=&U,SPACE=(CYL,(&CYL))                               00640000
//SYSOUT    DD SYSOUT=A                                                 00650000
//SYSIN     DD DSN=&DBTSRC(FABPSORT),DISP=SHR                           00660000
//*-------------------------------------------------------------        00670000
//STEP3   EXEC PGM=FABTRAPS,COND=(0,LT,STEP2)                           00680000
//STEPLIB   DD DSN=&DBTLIB,DISP=SHR                                     00690000
//SYSUDUMP  DD SYSOUT=A                                                 00700000
//PR9       DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                             00710000
//PR9X      DD SYSOUT=A,DCB=BLKSIZE=&PRTBLK                             00720000
//KEYSOUT   DD DSN=*.STEP2.SORTOUT,DISP=(OLD,DELETE,DELETE),            00730000
//             DCB=(LRECL=42,BLKSIZE=&TEMPBLK,RECFM=FB)                 00740000
//*-------------------------------------------------------------        00750000
```

Figure 144. HD Tuning Aid JCL procedure under IMS (FABTIMS) (Part 2 of 2)

Input

The following topics describe all the input that you must specify to run HD Tuning Aid. This includes the control statement data sets (CTL DD or SYSIN DD).

FABTROOT CTL data set

The FABTROOT CTL data set contains your description of the processing to be done by the HD Tuning Aid utility. It describes the databases that will be processed, and it contains optional user's requests.

Use the CTL data set when you analyze potential DBD changes. The CTL data set is used to override certain DBD parameters. This enables you to analyze the effects of changing some of the randomization parameters without actually reorganizing your database. If control statements are supplied, only the Actual Roots per Block report is not produced.

You also use the CTL data set when you are analyzing potential partition selection changes for HALDB. This enables you to analyze the effects of changing partition selection without actually reorganizing your database.

Format

This control data set usually resides in the input stream. However, it can be defined as a sequential data set or as a member of a partitioned data set. It must contain one 80-byte fixed-length record for each database that you want to process. BLKSIZE, if coded, must be a multiple of 80. The order of the control statements is not significant; they can be specified in any order. The CTL data set can be coded as shown in the following figure.

```
//STEP1.CTL DD *
SD144P    DFSHDC40 0001000  004  08192  001  007  03000  HDAM
/*
```

Figure 145. Format of the FABTROOT CTL data set

The CTL statement can include three statements: %OPTION, DB, and PART.

The %OPTION statement specifies the runtime option for this utility. The DB statement and the PART statement override certain DBD parameters. The DB statement is specified for each database. The maximum number that you can specify is 100. The PART statement must be coded after each DB statement.

To process a HALDB, you must specify the DB statement, and optionally PART statements. The DB statement gives information that affects all partitions of HALDB. The PART statement gives individual information on each partition. The specification by the PART statement overrides the specification of the DB statement.

%OPTION statement

This optional statement specifies the runtime option of this utility. If it is specified, it must be the first statement in the CTL data set.

```
         1         2         3         4         5
12345678901234567890123456789012345678901234567890123456789012345678
------------------------------------------------------------
%OPTION x
```

Position
Description

1 - 7
The keyword %OPTION is required.

8
Blank

9
Optional. Specify the type of codes to be returned when the KEYSIN data set is empty:

I
Code 0 is returned with message FABT3522I.

W
Code 4 is returned with message FABT3522W.

E
Code 8 is returned with message FABT3522E. E is the default value.

Blank
The same as E.

10 - 72
Blanks

DB statement

Specify this statement for each database to override certain DBD parameters. If this statement is specified for a HALDB, the statement affects all the partitions of the HALDB.

The maximum number of DB statements that can be specified is 100.

The following subsections describe the syntax of the first line and the second line of the DB statement.

Subsections:

- "DB statement: Line 1" on page 341
- "DB statement: Line 2" on page 344

DB statement: Line 1

This statement can be specified for both HALDB and non-HALDB. It gives the values of changing randomizing parameters for a database, and controls reports to be printed.

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
dbdname kpmod      rbn      anch blksz  kst  kln  bytes  HDAM PARTINI--S
                                                        PHDAMPARTDELPSH
                                                             AUTOINI
```

Position
Description

1
Required. Left-aligned. The name of the DBD for the database to be processed.

9
Optional. This field can contain either of the following two codes:

1
The keys for this database are skipped.

Blank
The keys for this database are processed. Blank is the default value.

10
Optional. This field can contain either of the following two codes:

1
Discontinue reading the control statements. Any control statements that follow this control statement are not effective.

Blank
Continue reading the control statements. Blank is the default value.

11
Optional. 1 - 8 characters, left-aligned. The name of a user-supplied randomizing module. This field is used to override the (default) DBD value.

20
Optional. Used to override the (default) DBD value. It must contain the maximum relative block number that you want to allow a randomizing module to produce for this database. This value determines the number of control intervals or blocks in the root addressable area. It must be a 7-digit, unsigned decimal integer (with leading zeros if needed).[1]

29
Optional. Used to override the (default) DBD value. It contains the number of RAPs desired in each control interval or block in the root addressable area. It must be a 3-digit, unsigned decimal integer (with leading zeros if needed).[1]

34
Optional. Used to override the (default) DBD value. It contains the database block size (or control interval size). It must be a 5-digit, unsigned decimal integer (with leading zeros if needed).[1]

41
Optional. Used to override the (default) DBD value. This value must be the starting position of the key field in bytes relative to the beginning of the segment. It must be a 3-digit, unsigned decimal integer (with leading zeros if needed). The starting position for the first byte of a fixed-length segment is 001.

46
Optional. Used to override the (default) DBD value. This value must be the length of the root segment's key field in bytes. It must be a 3-digit, unsigned decimal integer (with leading zeros if needed).

51
Optional. Used to override the (default) DBD value. This must be the maximum number of bytes of a database record that can be stored in the root addressable area. It also must be continuous, and not interrupted by calls to another database record. It must be a 5-digit, unsigned decimal integer (with leading zeros if needed).[1]

58
Optional. This field can contain one of the following three kinds of strings:

[1] The override value applies to all partitions except those otherwise specified in the PART statement.

HDAM
This entry indicates that the input DBD is not HDAM. This optional field is used to override the database organization that is specified in DBD. If the input DBD is not HDAM, but must be simulated as HDAM, this field is required.

PHDAM
This entry indicates that the input DBD is not PHDAM. This optional field is used to override the database organization that is specified in the DBD. If the input DBD is not PHDAM, but must be simulated as PHDAM, this field is required. The PARTINI or AUTOINI is also required at column 63.

Blank
No override of the database organization. Blank is the default value.

Requirement: If HDAM or PHDAM is coded in column 58, all DBD parameters must be specified in the DB statement or the PART statement.

63
Optional. This option is effective when the database simulates as PHDAM. This field can contain one of the following four kinds of strings:

PARTINI
This entry indicates that each partition definition must be followed and simulated as a PHDAM database. The partition definitions using PART statements are needed for all partitions.

PARTDEL
This entry indicates that the input DBD is PHDAM or PHIDAM and simulated as an HDAM database. No following PART statement is needed.

AUTOINI
This entry indicates HD Tuning Aid to assign the partition names automatically, and to simulate a PHDAM database. Only partition high keys or partition selection strings are required in the PART statement. [2]

Blank
Blank means that there is to be no partition deletion or partition initialization. Blank is the default.

70
Optional. This option is effective when the database simulates as PHDAM. This field can contain one of the following three codes:

-
This option requests that the DBD Parameters and Overrides reports are not printed.

P
This option requests that the DBD Parameters and Overrides reports be printed with partition override information.

Blank
This option requests that the DBD Parameters and Overrides reports be printed without the partition information. Blank is the default value.

71
Optional. This statement is effect when the database simulates as PHDAM. This field can contain one of the following three codes:

-
This option requests that the HALDB Process Summary report not be printed.

S
This option requests that the HALDB Process Summary report be printed with all partition information.

[2] If 'AUTOINI' is specified, HD Tuning Aid assigns the partition names automatically. The naming rule is that the first three characters are the same as the first three characters of the database name and the last four characters are assigned numbers from 0001 to 1001, in ascending order.

Blank
This option requests that HALDB Process Summary report be printed with any root key assigned partition information. Blank is the default value.

72
Optional. This statement is effective when the database simulates as PHDAM. If the input DBD is not PHDAM, S or H is required. This field can contain one of three codes:

S
This option requests that the partition selection exit module name be changed or that the partition selection method be replaced with the partition selection exit.

Requirement: The name of the new partition selection exit module must be defined on the second line of the DB statement.

H
This option requests that the method for partition selection be replaced with the high key method.

Blank
This option requests that the method for partition selection not be replaced.

DB statement: Line 2

This statement is effective when the database simulates a PHDAM.

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
          pselexnm
```

Position
Description

11
Optional. 1 - 8 characters, left-aligned. The name of a user-supplied partition selection exit module. It is used to override the value in the RECON data set. If "S" is specified in column 72 of the preceding DB statement, this field is required.

PART statement (for HALDBs)

This optional statement can be specified when you process a HALDB. A PART statement, if used, must be coded after each DB statement. This statement affects each partition and overrides certain DBD parameters.

The options specified by the PART statement override the options that are specified by the DB statement.

The following subsections describe the syntax of the first and the second line of the PART statement.

Subsections:

- “PART statement: Line 1” on page 344
- “PART statement: Line 2 and subsequent lines” on page 346

PART statement: Line 1

This statement is effective when the database simulates as PHDAM.

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
 partnm   mod      rbn      anch blksz            bytes  ADD         - +
                                                        DEL
```

This statement specifies the DBD parameters for a certain partition.

If "PARTINI" is specified on the DB statement, this statement is required. If "AUTOINI" is specified on the DB statement, this statement is not required.

Position
Description

2
Required if this line is coded. 1 - 7 characters, left-aligned. The name of the partition to be processed. If you want to simulate change of parameters or deletion of a partition, specify the name of the partition that actually exists. If you want to simulate conversion of a database to a PHDAM or add a new partition to a PHDAM, do not specify a name of a partition that actually exists.

11
Optional. 1 - 8 characters, left-aligned. The name of a user-supplied randomizing module for this partition. This field is used to override the (default) DBD value.

20
Optional. This field is used to override the (default) DBD value. It gives the maximum relative block number that you want to allow a randomizing module to produce. This value determines the number of control intervals or blocks in the root addressable area of a partition. It must be a 7-digit, unsigned decimal integer (with leading zeros if needed).

29
Optional. This field is used to override the (default) DBD value. It contains the number of RAPs desired in each control interval or block in the root addressable area of a partition. It must be a 3-digit, unsigned decimal integer (with leading zeros if needed).

34
Optional. This field is used to override the (default) DBD value. This field contains the database block size (or the control interval size). It must be a 5-digit, unsigned decimal integer (with leading zeros if needed).

51
Optional. This field is used to override the (default) DBD value. This must be the maximum number of bytes of a database record that can be stored in the root addressable area by continuous ISRT calls not interrupted by calls to another database record. It must be a 5-digit, unsigned decimal integer (with leading zeros if needed).

58
Optional. This field can contain one of the following three kinds of strings:

ADD
This optional field requests that a new partition be added to the PHDAM database. [3]

Requirement: If ADD is specified, ensure that the following conditions are satisfied:

- All DBD parameters must be specified by the DB statement or the PART statement.
- The partition selection string or high key must be specified by the PART statement line 2 or subsequent lines.

DEL
This optional field requests that this partition be deleted from the PHDAM database.

Blank
This means to change the randomizing or partitioning parameter of the existence partition. Blank is the default value.

70
Optional. This option is ignored when "-" is specified in column 70 in the DB statement. This field can contain one of the following two codes:

[3] HD Tuning Aid assigns a partition ID to an additional partition continuously. But, the partition IDs are not continuous if the partition deletion operations have been issued. The assigned partition ids by HD Tuning Aid might not be as same as the actual partition IDs assigned by IMS.

-
Does not print the "DBD Parameters and Overrides reports" partition information for this partition.

Blank
Prints the "DBD Parameters and Overrides reports" partition information for this partition. Blank is the default value.

72
Optional. This field can contain one of following two codes:

+
This option indicates that the partition selection string or the partition high key is coded on the next line.

Blank
This option indicates that the partition selection string or the partition high key is not coded on the next line.

PART statement: Line 2 and subsequent lines

This statement is effective when the database simulates as PHDAM.

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------------
 X'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx'       +
 C'ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc'+
```

These statements give the partition selection string or the high key.

If "AUTOINI" or "PARTINI" is specified on the DB statement, or "ADD" is specified on the PART statement line 1, these statements are required.

The column 72 of PART statement line 1 is required if these statements exist.

Position
Description

2
Required if this line is coded. Can contain one of the following codes:

X
Specify strings as hexadecimal code.

C
Specify string as character.

3

'
Required if this line is coded. Start a string.

4
Required if this line is coded. Specify a partition high key or a partition selection string. The string can be as long as up to column 70 in each line. If a string exceeds that length, it can be split and continued on the next line. Then every line of the string must start with C' or X', and end with an apostrophe (').

72
Optional. This field is coded as follows:

+
This option indicates that the partition selection string or the partition high key is continued to the next line.

Blank
This option indicates that the partition selection string or the partition high key ends on this line.

Considerations for HALDBs

When the input database is a HALDB and a partition selection exit is used, complete the following steps:

1. Store the partition selection exit routine defined to the RECON data set in a STEPLIB data set.
2. Store the partition selection exit routine specified by the CTL statement in the IMS2 data set.

The original partition selection exit in the STEPLIB is invoked in the following sequence:

1. Invoked with the INIT parameter
2. Invoked with the FIRST parameter
3. Invoked with the NEXT parameter

If the partition selection exit or the partition selection string is specified in the CTL statement, the original partition selection exit is invoked with the TERM parameter. Then the partition selection exit in the IMS2 is invoked.

DFSORT SYSIN data set

The DFSORT SYSIN data set contains DFSORT program control statements. They define the type of sort operation to be performed and the sort control fields to be used.

Subsections:

- "Format" on page 347
- "SORT control statement" on page 347
- "END control statement" on page 347

Format

This control data set usually is defined as a sequential data set or as a member of a partitioned data set; however, it can also reside in the input stream. It usually contains 80-byte, fixed-length records. This data set must not be defined as RECFM=U.

The SYSIN data set can be coded as shown in the following figure. Two control statements (SORT and END) are required.

```
//SYSIN     DD *
 SORT   FIELDS=(1,8,BI,A),FILSZ=En
 END
/*
```

Figure 146. Format of the DFSORT SYSIN data set

SORT control statement

The SORT statement is required. It describes the control fields (in the input records) on which the program will sort.

- The FIELDS=(1,8,BI,A) operand is required. It must be coded as shown in Figure 146 on page 347.
- The FILSZ=E*n* operand is optional. It helps optimize DFSORT main storage and intermediate storage allocation/use. *n* is the estimated number of records to be sorted.

END control statement

The END statement causes DFSORT to discontinue reading the SYSIN data set. It is optional.

For a detailed description of the DFSORT program, see the *z/OS DFSORT Application Programming Guide*.

Output

The HD Tuning Aid output consists of some printed reports and a work data set.

These reports are contained in the following data sets:

- PR8: produced by FABTROOT
- PR9: produced by FABTRAPS
- PR9X: produced by FABTRAPS
- PR10: produced by FABTROOT

The following data set is a work data set:

- RAPSIN: produced by FABTROOT

FABTROOT PR8 data set

This data set contains all reports produced by module FABTROOT.

- Control Card Format report
- Control Card report
- DBD Parameters and Overrides report
- Actual Roots per Block report

Format

This data set contains 133-byte, fixed-length records, and block size (if coded in your JCL) must be a multiple of 133. Code your DD statement as follows:

```
//PR8       DD SYSOUT=A
```

Control Card Format report

This report describes the fields on the records in the CTL data set. It is printed for the convenience of the user.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA              "CONTROL CARD FORMAT REPORT"                        PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 15.21.05                       FABTROOT - V3.R1

>>> DB STATEMENT  **** FIRST LINE ****

COLUMNS  1- 8: DBD NAME OF KEY FILE TO BE RANDOMIZED

*** FOLLOWING FIELDS OPT - USED TO OVERRIDE DEFAULT DB DEFINITION

COLUMN      9: 1     - IF THIS KEY FILE IS TO BE SKIPPED
               BLANK - PROCESS THIS KEY FILE (DEFAULT)
COLUMN     10: 1     - IF STOP AFTER THIS KEY FILE PROCESSED
               BLANK - CONTINUE PROCESSING KEY FILE (DEFAULT)
COLUMNS 11-18: HDAM ALGORITHM NAME
COLUMNS 20-26: NUMBER OF BLOCKS IN ROOT ADDRESSABLE AREA
COLUMNS 29-31: NUMBER OF RAPS PER BLOCK
COLUMNS 34-38: BLOCK SIZE
COLUMNS 41-43: STARTING POSITION IN SEGMENT (POS. 1 = 001)
COLUMNS 46-48: KEY LENGTH
COLUMNS 51-55: BYTE LIMIT
COLUMNS 58-62: HDAM    - HIDAM, PHDAM, PHIDAM CONVERT TO HDAM
               PHDAM   - HDAM, HIDAM, PHIDAM CONVERT TO PHDAM
COLUMNS 63-69: PARTINI - HDAM, HIDAM CONVERT TO PARTITIONED HDAM
                         OR PHDAM
               PARTDEL - PARTITIONED DB OR HALDB CONVERT TO HDAM
               AUTOINI - HDAM, HIDAM CONVERT TO PHDAM USING
                         AUTOMATIC PARTITION DEFINITION
COLUMN     72: S       - USE OR CHANGE PARTITION SELECTION EXIT
               H       - USE OR CHANGE PARTITION HIGH KEY

*** FOLLOWING FIELDS OPT - USED TO REQUEST REPORT DISPLAY

COLUMN     70: FOR DBD PARAMETERS AND OVERRIDES REPORT
               -     - DO NOT PRINT
               BLANK - PRINT FOR WHOLE DATABASE (DEFAULT)
               P     - PRINT FOR WHOLE DATABASE AND EACH
                       PARTITIONS
COLUMN     71: FOR HALDB PROCESS SUMMARY REPORT
               -     - DO NOT PRINT
               BLANK - PRINT FOR EACH PARTITIONS RANDOMIZED
                       SOME DATA (DEFAULT)
               S     - PRINT FOR EACH PARTITIONS

*** LEADING ZEROES REQUIRED IN ALL NUMERIC FIELDS

*** FIELDS STARTING IN COLUMNS 20, 29, 34, 41, 46
    AND 51 MUST NOT BE ZERO IF GIVEN

*** IF INPUT KEY FILE IS HIDAM OR PHIDAM, 58-62 = 'HDAM' OR
    'PHDAM' AND GIVE ** ALL ** OTHER PARAMETERS, NO DEFAULTS
    FROM HIDAM OR PHIDAM DBDS ARE USED

>>> DB STATEMENT **** SECOND LINE ****

*** FOLLOWING FIELDS OPT - USED TO OVERRIDE DEFAULT DB DEFINITION

COLUMNS 11-18: PARTITION SELECTION EXIT NAME

>>> PART STATEMENT **** FOR HALDB : FIRST LINE ****

*** FOLLOWING FIELDS OPT - USED TO OVERRIDE DEFAULT DB DEFINITION

COLUMNS  2- 9: PARTITION NAME
COLUMNS 58-60: ADD     - ADD THIS PARTITION
               DEL     - DELETE THIS PARTITION
COLUMN     72: +       - USE OR CHANGE PARTITION HIGH KEY OR
                         PARTITION SELECTION STRING

*** FOLLOWING FIELD OPT - USED TO REQUEST REPORT DISPLAY

COLUMN     70: FOR DBD PARAMETERS AND OVERRIDES REPORT
               -       - DO NOT PRINT FOR THIS PARTITION
               BLANK   - PRINT FOR THIS PARTITION

*** LEADING ZEROES REQUIRED IN ALL NUMERIC FIELDS

*** FIELDS STARTING IN COLUMNS 11, 20, 29, 34 AND 51 IS SAME AS
    DB STATEMENT


>>> PART STATEMENT **** FOR HALDB : SECOND LINE ****

*** FOLLOWING FIELDS OPT - USED TO OVERRIDE DEFAULT DB DEFINITION

COLUMNS  2-71: PARTITION HIGH KEY OR PARTITION SELECTION STRING
COLUMN     72: +        - CONTINUE SPECIFIED VALUES TO NEXT LINE


>>> PART STATEMENT **** FOR PARTITIONED DB ****

*** FOLLOWING FIELDS OPT - USED TO OVERRIDE DEFAULT DB DEFINITION

COLUMNS 11-18: PARTITION DDNAME
COLUMNS 20-26: NUMBER OF BLOCKS IN ROOT ADDRESSABLE AREA FOR
                         THIS PARTITION
COLUMNS 34-38: BLOCK SIZE FOR THIS PARTITION
```

Figure 147. FABTROOT: Control Card Format report

Control Card report

This report contains a printed copy of the control statement that the user provided in the CTL data set.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA               "CONTROL CARD REPORT"                          PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 15.21.05                       FABTROOT - V3.R1



0.......1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

T0902001 DFSHDC40 0000002 002 16384 001 008 00150 PHDAMAUTOINIPSH
 C'00000001'
```

Figure 148. FABTROOT: Control Card report

DBD Parameters and Overrides report

This report contains a printed copy of the DBD parameters that were used in the HD Tuning Aid job.

Any parameters that were overridden by the user's control statement are flagged.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA         "DBD PARAMETERS AND OVERRIDES REPORT"                    PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 15.21.05                       FABTROOT - V3.R1


***  DBNAME: TPFOH1    ***


     VALUES SHOWN BELOW OBTAINED FROM DBD AND RECON BY DEFAULT,  ** INDICATES VALUE SUPPLIED FROM CONTROL STATEMENT

            DBDNAME..................  TPFOH1                 DIRECT ALGORITHM NAME...   DFSHDC40 **
            DATABASE ORGANIZATION...     PHDAM                HIGH BLOCK NUMBER.......    (PART)
            ACCESS METHOD...........      VSAM                RAPS PER BLOCK..........    (PART)
            BLOCK SIZE..............   (PART)                 TOTAL RAPS..............    (PART)
            PRIME DDNAME............   (PART)                 BYTE LIMIT COUNT........    (PART)
            FSPC BLK, EVERY N BLKS..   (PART)                 % FSPC WITHIN EACH BLK..    (PART)
            ROOT SEGMENT NAME.......  AROOTLV1               ROOT SEGMENT KEY NAME...   AROOTNO
            ROOT SEGMENT KEY LENGTH.        8                 START POSITION OF KEY...          3
            PARTITION SELECTION EXIT NAME
                                .....      N/A

            (PART) : NO VALUE ASSIGNED BECAUSE OF HIGH AVAILABILITY LARGE DB

FOLLOWING PARTITION REPORTS ARE PRINTED IN ORDER OF PARTITION SELECTION

FABT3601I      11000 TYPE K RECORDS PROCESSED

FABT3602I      11000 TYPE R RECORDS CREATED

FABT3545I ACTUAL ROOTS/BLOCK MAP WILL NOT BE REPRINTED

FABT3525I PROCESSING COMPLETED FOR THIS DATABASE

FABT3535I END-OF-FILE ON CONTROL FILE OR STOP REQUEST
```

Figure 149. FABTROOT: DBD Parameters and Overrides report

Actual Roots per Block report

This report describes where root segments are physically stored in your HDAM, HIDAM, PHDAM, or PHIDAM database.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA           "ACTUAL ROOTS PER BLOCK REPORT"                      PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 16.22.33                       FABTROOT - V3.R1


***  DBNAME: HDAMDB2   ***

            DBDNAME..................  HDAMDB2                DIRECT ALGORITHM NAME...   DFSHDC40
            DATABASE ORGANIZATION...      HDAM                HIGH BLOCK NUMBER.......        100
            ACCESS METHOD...........      VSAM                RAPS PER BLOCK..........          1
            BLOCK SIZE..............      1024                TOTAL RAPS..............        100


COUNT OF 0-35 REPRESENTED AS FOLLOWS:
  SYMBOL:     1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z
  COUNT : 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
COUNT GREATER THAN 35 =  *
END OF DATA BLOCKS    =  $


        EACH ENTRY IN THE TABLE BELOW REPRESENTS THE ACTUAL NUMBER OF ROOTS THAT ARE STORED IN THE CORRESPONDING BLOCK
                                                                    -----
 BLOCK #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
          12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901

       0 |    22  2 1 1 2 222 1  11 21112 2 111  2 111121 2 21 1     21111 1 1 1  11   1 1    1111  21 1  21
     100 |$


          COUNT OF BLOCKS WITHOUT ROOTS        =       47          COUNT OF BLOCKS WITH MORE THAN 35 ROOTS =        0

          AVG. COUNT OF ROOTS PER ACTIVE BLOCK =      1.3          MAX. COUNT OF ROOTS IN ONE BLOCK        =        2


FABT3601I         70 TYPE K RECORDS PROCESSED

FABT3602I         70 TYPE R RECORDS CREATED

FABT3525I PROCESSING COMPLETED FOR THIS DATABASE
```

Figure 150. FABTROOT: Actual Roots per Block report

FABTRAPS PR9 data set

This data set contains the Assigned Roots per RAP report produced by module FABTRAPS.

Format

This data set contains 133-byte, fixed-length records. Block size (if coded in your JCL) must be a multiple of 133. Code your DD statement as follows:

```
//PR9       DD SYSOUT=A
```

Assigned Roots per RAP report

This report contains a map of all root anchor points (RAPs) in the database. It gives the actual number of root segments that are randomized to each RAP. It also includes some numbers that attribute to the status of RAPs and the Distribution of RAP Chain Length report.

When the CTL data set is used, the Distribution of RAP Chain Length report reflects the change of DBD parameters.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA            "ASSIGNED ROOTS PER RAP REPORT"                          PAGE:     1
5655-U09                                                     DATE: 06/25/2020  TIME: 10.41.55                         FABTRAPS - V3.R1


***  DBNAME: HDAMDB01  ***


             DBDNAME................. HDAMDB01               DIRECT ALGORITHM NAME...   DFSHDC40
             DATABASE ORGANIZATION...     HDAM               HIGH BLOCK NUMBER.......        255
             ACCESS METHOD...........     VSAM               RAPS PER BLOCK..........          3
             BLOCK SIZE..............     1024               TOTAL RAPS..............        765


COUNT OF 0-35 REPRESENTED AS FOLLOWS:
  SYMBOL:     1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z
  COUNT : 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
COUNT GREATER THAN 35 =  *
END OF DATA BLOCKS    =  $


         EACH ENTRY IN THE TABLE BELOW REPRESENTS THE NUMBER OF ROOTS THAT HAVE RANDOMIZED TO THE CORRESPONDING RAP
                                                                 -----
  RAP #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
         12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

      0 |                                                                  A                   P
    100 |                                                                                      U
    200 |  F    K                                  1  P            F      P   Z        K                5
    300 |                P      U                     PU               P                          5
    400 |                     F                K               *                                          U
    500 |                                                                          *
    600 |                                F                  A                      U   K
    700 |                         A        *                            U  $


          COUNT OF RAPS USED (ACTIVE)       =         30          COUNT OF RAPS WITH MORE THAN 1 ROOT     =         29


          COUNT OF RAPS NOT USED            =        735          COUNT OF RAPS WITH MORE THAN 35 ROOTS   =          3

          AVG. COUNT OF ROOTS ON ACTIVE RAP =       22.3          MAX. COUNT OF ROOTS ON ONE RAP          =         50

          AVG. COUNT OF ROOTS PER TOTAL RAP =         .9          AVG. COUNT OF ROOTS PER SYNONYM CHAIN   =       23.0

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA            "ASSIGNED ROOTS PER RAP REPORT"                          PAGE:     2
5655-U09                                                     DATE: 06/25/2020  TIME: 10.41.55                         FABTRAPS - V3.R1


DISTRIBUTION OF RAP CHAIN LENGTHS
---------------------------------
  CHAIN    NUMBER      NUMBER      PERCENTAGE   CUMULATIVE
  LENGTH   OF RAPS     OF ROOTS    OF ROOTS     PERCENTAGE
  ------   ---------   ---------   ----------   ----------
     1            1           1      0.1 %        0.1 %
     2            0           0      0.0 %        0.1 %
     3            0           0      0.0 %        0.1 %
     4            0           0      0.0 %        0.1 %
     5            2          10      1.5 %        1.6 %
     6            0           0      0.0 %        1.6 %
     7            0           0      0.0 %        1.6 %
     8            0           0      0.0 %        1.6 %
     9            0           0      0.0 %        1.6 %
    10            3          30      4.5 %        6.1 %
    11            0           0      0.0 %        6.1 %
    12            0           0      0.0 %        6.1 %
    13            0           0      0.0 %        6.1 %
    14            0           0      0.0 %        6.1 %
    15            4          60      9.0 %       15.1 %
    16            0           0      0.0 %       15.1 %
    17            0           0      0.0 %       15.1 %
    18            0           0      0.0 %       15.1 %
    19            0           0      0.0 %       15.1 %
    20            4          80     12.0 %       27.1 %
    21            0           0      0.0 %       27.1 %
    22            0           0      0.0 %       27.1 %
    23            0           0      0.0 %       27.1 %
    24            0           0      0.0 %       27.1 %
    25            6         150     22.4 %       49.5 %
    26            0           0      0.0 %       49.5 %
    27            0           0      0.0 %       49.5 %
    28            0           0      0.0 %       49.5 %
    29            0           0      0.0 %       49.5 %
    30            6         180     26.9 %       76.4 %
    31            0           0      0.0 %       76.4 %
    32            0           0      0.0 %       76.4 %
    33            0           0      0.0 %       76.4 %
    34            0           0      0.0 %       76.4 %
    35            1          35      5.2 %       81.6 %
    36+           3         123     18.4 %      100.0 %
  ------   ---------   ---------   ----------   ----------
  TOTAL          30         669    100.0 %


FABT3602I        669 TYPE R RECORDS PROCESSED


NOTE :  SYNONYM - ANY ROOT RANDOMIZED TO THE SAME RAP  (RAP COUNT GREATER THAN 1)
----


FABT3700I NO MORE RECORDS FOR THIS FILE
```

Figure 151. FABTRAPS: Assigned Roots per RAP report

FABTRAPS PR9X data set

This data set contains the Assigned Roots per Block report produced by module FABTRAPS.

Format

This data set contains 133-byte, fixed-length records, and block size (if coded in your JCL) must be a multiple of 133. Code your DD statement as follows:

```
//PR9X      DD SYSOUT=A
```

Assigned Roots per Block report

This report contains a map of all blocks (or control intervals) in the database. It gives the actual number of root segments that are randomized to each block. It also includes some totals.

The following figure shows an example of the report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA          "ASSIGNED ROOTS PER BLOCK REPORT"                    PAGE:     1
5655-U09                                                DATE: 05/10/2020  TIME: 15.21.06                      FABTRAPS - V3.R1


***  DBNAME: TPFOH1    ***


            DBDNAME..................... TPFOH1                 DIRECT ALGORITHM NAME...     (PART)
            DATABASE ORGANIZATION...    PHDAM                  HIGH BLOCK NUMBER.......     (PART)
            ACCESS METHOD...........     VSAM                  RAPS PER BLOCK..........     (PART)
            BLOCK SIZE..............   (PART)                   TOTAL RAPS..............     (PART)
            PARTITION SELECTION EXIT NAME
                               .....    N / A


            (PART) : NO VALUE ASSIGNED BECAUSE OF HIGH AVAILABILITY LARGE DB


FOLLOWING PARTITION REPORTS ARE PRINTED IN ORDER OF PARTITION SELECTION


***  PARTITION NAME: TPFOH1A  ***


            PARTITION ID............        1                  DIRECT ALGORITHM NAME...   DFSHDC40
            BLOCK SIZE..............      512                  HIGH BLOCK NUMBER.......       4500
                                                              RAPS PER BLOCK..........          1
            PARTITION HIGH KEY.............                   TOTAL RAPS..............       4500
            X'FFFFFFFFFFFFFFFF'


COUNT OF 0-35 REPRESENTED AS FOLLOWS:
  SYMBOL:     1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  G  H  I  J  K  L  M  N  O  P  Q  R  S  T  U  V  W  X  Y  Z
  COUNT : 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
COUNT GREATER THAN 35 =  *
END OF DATA BLOCKS    =  $


         EACH ENTRY IN THE TABLE BELOW REPRESENTS THE NUMBER OF ROOTS THAT HAVE RANDOMIZED TO THE CORRESPONDING BLOCK
                                                              -----
 BLOCK #  0........1.........2.........3.........4.........5.........6.........7.........8.........9.........0
          12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

       0 | 1 131132325314422321111 12116322222123212 421 33223251514323231251132313141142134121451113121433313 4
     100 |5 5432114 34323242 113117333122223232124143516 213432523543112412452332311321235425372 222223 2123352
     200 |11433 24223 33413 232513221321242221216321233 4 12 321322241 1325212 121115  1263  155325112411241 14

------ For formatting purposes, several lines have been deleted.------


    4300 |54231311133362143 22524 13623225232116313431236 34255332323333  3144151 23334 2122123 23 51732232242
    4400 |11 344  44134114423221434323241121 52131 43161121135723424622251233233521 1 24 26232 162436245341333
    4500 |$


          COUNT OF BLOCKS WITHOUT ROOTS        =      410          COUNT OF BLOCKS WITH MORE THAN 35 ROOTS =        0

          AVG. COUNT OF ROOTS PER ACTIVE BLOCK =      2.6          MAX. COUNT OF ROOTS IN ONE BLOCK        =        9


FABT3601I         70 TYPE K RECORDS PROCESSED

FABT3602I         70 TYPE R RECORDS CREATED


FABT3525I PROCESSING COMPLETED FOR THIS DATABASE
```

Figure 152. FABTRAPS: Assigned Roots per Block report

FABTROOT PR10 data set

This data set contains the HALDB Process Summary report.

HALDB Process Summary report

This report describes which partitions were processed by HD Tuning Aid.

The following figure shows an example of the HALDB Process Summary report for PHDAM. The processed partition is indicated by an asterisk (*) in the "P" column. The "P" means that it is processed.

The format of this report can be controlled by column 71 of the DB statement line-1 in the CTL data set. If no control statement is specified in the CTL data set, only the processed partitions are displayed in this report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - HDTA        "HALDB PROCESS SUMMARY REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 15.21.05                     FABTROOT - V3.R1

*** DBDNAME: TPFOH1   ***
  DBDNAME.......................... TPFOH1
  DATABASE ORGANIZATION.............    PHDAM
  ACCESS METHOD.....................     VSAM
  NUMBER OF PARTITIONS DEFINED......        1
  NUMBER OF PARTITIONS PROCESSED....        1
  PARTITION SELECTION EXIT..........      N/A

*** PARTITIONS LISTED IN ORDER OF PARTITION SELECTION ***

  P SEQ   NAME         ID  PARTITION HIGH KEY

  * 0001  TPFOH1A       1  X'FFFFFFFFFFFFFFFF'
```

Figure 153. FABTROOT: HALDB Process Summary report

FABTROOT RAPSIN data set

The RAPSIN data set contains the block/RAP assignments used by module FABTRAPS to produce the randomization reports.

Subsections:

- “Format” on page 354
- “Record types” on page 354
- “Header record” on page 356
- “Part record” on page 356
- “Highkey record” on page 357
- “RAP record” on page 357

Format

This data set is a sequential data set with RECFM=FB and LRECL=42. BLKSIZE must be coded on the DCB parameter of your DD statement.

Record types

There are four record types in the RAPSIN data set:

- Header record: one per database.
- Part record: one per partition.
- Highkey record: more than one per partition.
- RAP record: one per root segment.

HD Tuning Aid uses Header record and RAP record for non-HALDB, and uses all types of records for HALDB.

The data set can contain records of more than one database. All records for a single database are contiguous. The following two figures show how the data set is organized. It is a product-sensitive

programming interface. See “Programming interface information” on page 812 to understand the restrictions associated with this type of material.

PSPI

```
_____________________________________________________________
Header record for first database
_____________________________________________________________
Part record of first partition for first database
_____________________________________________________________
Highkey record of first partition for first database
_____________________________________________________________
RAP record of first partition for first database
_____________________________________________________________
RAP record of first partition for first database
_____________________________________________________________
........
_____________________________________________________________
........
_____________________________________________________________
Part record of second partition for first database
_____________________________________________________________
Highkey record of second partition for first database
_____________________________________________________________
RAP record of second partition for first database
_____________________________________________________________
RAP record of second partition for first database
_____________________________________________________________
........
_____________________________________________________________
Header record for second database
_____________________________________________________________
Part record of first partition for second database
_____________________________________________________________
Highkey record of first partition for second database
_____________________________________________________________
RAP record of first partition for second database
_____________________________________________________________
.......
_____________________________________________________________
```

Figure 154. RAPSIN data set format

```
_____________________________________________________________
Header record for first database
_____________________________________________________________
RAP record for first database
_____________________________________________________________
RAP record for first database
_____________________________________________________________
RAP record for first database
_____________________________________________________________
... ... ...
_____________________________________________________________
Header record for second database
_____________________________________________________________
RAP record for second database
_____________________________________________________________
RAP record for second database
_____________________________________________________________
RAP record for second database
_____________________________________________________________
... ... ...
_____________________________________________________________
Header record for third database
_____________________________________________________________
RAP record for third database
_____________________________________________________________
RAP record for third database
_____________________________________________________________
RAP record for third database
_____________________________________________________________
... ... ...
_____________________________________________________________
```

Figure 155. RAPSIN data set format

PSPI

Header record

The following table shows the header record of the FABTROOT RAPSIN data set.

Table 43. Header record of the FABTROOT RAPSIN data set

Position	Length	Description
1	2	Database number in hexadecimal
3	2	Zero in hexadecimal
5	8	DBD name
13	4	Database block size in hexadecimal
17	1	C'V' if the database is VSAM
18	1	C'1' if the database is HDAM C'2' if the database is HIDAM C'3' if the database is PHDAM C'4' if the database is PHIDAM
19	8	Module name of partition selection exit
27	8	Randomizing module name
35	4	RAA block number in hexadecimal
39	2	RAP number in each control interval or block (in hexadecimal)
41	2	RESERVED

Part record

The following table shows the part record of the FABTROOT RAPSIN data set.

Table 44. Part record of the FABTROOT RAPSIN data set

Position	Length	Description
1	2	Database number in hexadecimal
3	2	Partition number in hexadecimal Partition definition order for PDB Partition selection order for HALDB
5	8	ZERO in hexadecimal
13	4	Database block size in hexadecimal
17	8	DD name in case of PDB Partition name in case of HALDB
25	2	Partition ID for HALDB
27	8	Randomizing module name
35	4	RAA block number in hexadecimal
39	2	RAP number in each control interval or block (in hexadecimal)

Table 44. Part record of the FABTROOT RAPSIN data set (continued)

Position	Length	Description
41	2	Reserved

Highkey record

The following table shows the highkey record of the FABTROOT RAPSIN data set.

Table 45. Highkey record of the FABTROOT RAPSIN data set

Position	Length	Description
1	2	Database number in hexadecimal
3	2	Partition selection order in hexadecimal
5	3	ZERO in hexadecimal
8	1	Sequence number in Highkey record
9	34	Partition high key string or partition selection string

RAP record

The following table shows the RAP record of the FABTROOT RAPSIN data set.

Table 46. RAP record of the FABTROOT RAPSIN data set

Position	Length	Description
1	2	Database number in hexadecimal
3	2	Data set group number for non-HALDB Partition selection order for HALDB (in hexadecimal)
5	3	Block number (in hexadecimal) to which this root segment is randomized
8	1	RAP number (in hexadecimal) to which this root segment is randomized
9	1	C’R’
10	4	Relative byte address (in hexadecimal) at which this root segment is randomized
14	29	The first 29 bytes of the sequence field of this root

Chapter 18. JCL examples for HD Tuning Aid

There are many ways to use the HD Tuning Aid utility. The examples in the following topics represent some of the typical tasks that HD Tuning Aid can perform. By studying and understanding these examples, you can learn the techniques to use to monitor the condition of your databases.

Topics:

- "Example 1: Running HD Tuning Aid with HD Pointer Checker" on page 359
- "Example 2: Iterative tuning analysis" on page 359
- "Example 3: Running HD Tuning Aid under IMS" on page 360
- "Example 4: Control statements for PHDAM" on page 362
- "Example 5: Analyzing conversion to PHDAM" on page 363
- "Example 6: Analyzing conversion to HDAM" on page 364
- "Example 7: Running HD Tuning Aid in an IMS-managed ACBs environment" on page 365

Example 1: Running HD Tuning Aid with HD Pointer Checker

This example shows how to run HD Pointer Checker and HD Tuning Aid together. Run HD Tuning Aid as in the example when you are performing your regularly scheduled HD Pointer Checker run.

When you run HD Tuning Aid this way, do not use any HD Tuning Aid control statements. All of the control statements and JCL in the following figure apply to HD Pointer Checker.

```
//EXAMPLE1 JOB --- use normal job statement parameters here ---
//*
//JOBLIB DD DSN=HPS.SHPSLMD
//       DD DSN=IMSVS.RESLIB,DISP=SHR
//*
//*
//PCRUN   EXEC FABPPTA,
//             PSB=PSBSMUAL
//* ------------------------------------------------------------------------
//HDPCPRO.PROCCTL DD *
 PROC TYPE=ALL
  OPTION KEYSIN=YES,ERRLIMIT=NO,INCORE=YES
  DATABASE DB=DSSTUIVN,DD=DSSTUIV0,OVERFLOW=DSSTUIV1,DATASET=IMAGECOPY
  DATABASE DB=DSSCHXIN,DD=DSSCHXI0,PRIMEDB=DSSCHHVN,DATASET=IMAGECOPY
  DATABASE DB=DSFACXVN,DD=DSFACXV0,PRIMEDB=DSFACHON,DATASET=IMAGECOPY
  DATABASE DB=DSFDAXVN,DD=DSFDAXV0,OVERFLOW=DSFDAXV1,PRIMEDB=DSFACHON,
           DATASET=IMAGECOPY
  DATABASE DB=DSSCHHVN,DD=DSSCHHV0,DATASET=IMAGECOPY
  DATABASE DB=DSFACHON,DD=DSFACHO0,DATASET=IMAGECOPY
  DATABASE DB=DSCRSDVN,DD=DSCRSDV0,DATASET=IMAGECOPY
  DATABASE DB=DSCRSDVN,DD=DSCRSDV1,DATASET=IMAGECOPY
  DATABASE DB=DSCLSDVN,DD=DSCLSDV0,DATASET=IMAGECOPY
```

Figure 156. HD Tuning Aid example 1: JCL

KEYSIN is an optional parameter of the OPTION statement. When KEYSIN=YES is specified, HD Pointer Checker creates the KEYSIN data set that is used as input to HD Tuning Aid.

See "JCL procedures" on page 69 for a description of the FABPPTA cataloged JCL procedure and the HD Pointer Checker aspects of this example.

Example 2: Iterative tuning analysis

In this example, an HDAM database (SD148P) and an HIDAM database (SD144P) are being analyzed. The purpose of the analysis is to determine good values for the DBD parameters that pertain to randomization.

Once the analysis is complete, the DBDs will be changed accordingly, and the databases will be reorganized. SD144P will be converted to HDAM organization.

© Copyright IBM Corp. 2000, 2021

It is assumed that the KEYSIN data set contains root keys for both databases (SD148P and SD144P). The following figure shows the JCL and control statements that must be coded by the user.

```
//EXAMPLE2  JOB --- use normal job statement parameters here ---
//*
//TUNE1   EXEC FABTIMS,
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.TEST.KEYSIN',          INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB'
//STEP1.CTL DD *
SD144P    DFSHDC40  001000  004  08192  001  007  03000  HDAM
SD148P    DFSHDC40  001500  002  04096
//TUNE2   EXEC FABTIMS,
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.TEST.KEYSIN',          INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB'
//STEP1.CTL DD *
SD144P    DFSHDC20  001000  004  08192  001  007  03000  HDAM
SD148P    DFSHDC20  001500  002  04096
/*
//
```

Figure 157. HD Tuning Aid example 2: JCL

HD Tuning Aid is being run twice for each database. Because module FABTROOT only makes one pass through the KEYSIN data set, HD Tuning Aid must be run twice. Each execution of HD Tuning Aid processes both databases once.

Because SD144P is an HIDAM DBD, it is required that *all* fields on the control statement be used, even if the actual DBD value is not being changed.

Example 3: Running HD Tuning Aid under IMS

In this example, an HDAM database (DBDP33J) is being analyzed to examine the effects of changing the size of the root addressable area. The randomizing routine accesses some IMS control blocks, so HD Tuning Aid must be run under IMS.

The following figure shows the JCL and control statements that must be coded by the user. It is assumed that the KEYSIN data set (HPS.DBDP33J.KEYSIN) has been created in an earlier HD Pointer Checker job.

```
//EXAMPLE3  JOB --- use normal job statement parameters here ---
//*
//TUNE1   EXEC FABTIMS,
//             PSB=P33J001G,                          PSB NAME
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.DBDP33J.KEYSIN',       INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB',
//             PSBLIB='HPS.TEST.PSBLIB'
//TUNE2   EXEC FABTIMS,
//             PSB=P33J001G,                          PSB NAME
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.DBDP33J.KEYSIN',       INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB',
//             PSBLIB='HPS.TEST.PSBLIB'
//STEP1.CTL DD *
DBDP33J             001000  004
/*
//TUNE3   EXEC FABTIMS,
//             PSB=P33J001G,                          PSB NAME
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.DBDP33J.KEYSIN',       INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB',
//             PSBLIB='HPS.TEST.PSBLIB'
//STEP1.CTL DD *
DBDP33J             002000  002
/*
//TUNE4   EXEC FABTIMS,
//             PSB=P33J001G,                          PSB NAME
//             CYL='10,10',             SPACE FOR WORK FILES
//             PARM2='SIZE=(MAX)',           PARM FOR DFSORT
//             KEYSIN='HPS.DBDP33J.KEYSIN',       INPUT KEYS
//             DBDLIB='HPS.TEST.DBDLIB',
//             PSBLIB='HPS.TEST.PSBLIB'
//STEP1.CTL DD *
DBDP33J             001500  003
/*
//
```

Figure 158. HD Tuning Aid example 3: JCL

HD Tuning Aid is being run four times as follows:

- Step TUNE1 runs HD Tuning Aid with no control statements. This produces the following reports:
  1. Actual Roots per Block report
  2. Assigned Roots per Block report
  3. Assigned Roots per RAP report
- Steps TUNE2, TUNE3, and TUNE4 run HD Tuning Aid with a control statement. They produce the following reports:
  1. DBD Parameters and Overrides report
  2. Assigned Roots per Block report
  3. Assigned Roots per RAP report

Because module FABTROOT only makes one pass through the KEYSIN data set, HD Tuning Aid must be run several times to do this kind of iterative analysis.

Because DBDP33J is an HDAM DBD, only the DBD parameters that are being overridden need to be specified on the FABTROOT control statement. This example produces reports based on changing two DBD parameters:

- The number of blocks in the root addressable area
- The number of root anchor points per block.

Example 4: Control statements for PHDAM

The following subsections provide example control statements for PHDAM.

Subsections:

- “Changing randomizing parameters for all partitions consistently” on page 362
- “Changing randomizing parameters for individual partitions” on page 362
- “Changing the high key value of partition” on page 362
- “Changing the partition selection” on page 362
- “Adding and deleting some partitions” on page 363

Changing randomizing parameters for all partitions consistently

This example shows how to change the randomizing parameters for all partitions consistently.

SAMPDB1 is a PHDAM database. This set of CTL statements is the simulation of changing the randomizer name of each partition. HD Tuning Aid assigns the same randomizer name to each partition.

```
//CTL DD *
SAMPDB1    DFSHDC40
/*
```

Changing randomizing parameters for individual partitions

This example shows how to change the randomizing parameters for individual partitions.

This example is for an input PHDAM database with two partitions. Change only the randomizer name of the first partition.

```
//CTL DD *
SAMPDB1
 SAMPP1    DFSHDCAA
/*
```

Changing the high key value of partition

This example shows how to change the high key value of a partition.

SAMPDB1 is a PHDAM database. This example shows how to change the high key value of a specific partition.

```
//CTL DD *
SAMPDB1
 SAMPP1    DFSHDCAA                                                  +
 C'12340000000000000100000000'                                       +
 C'00000000000000000000000000000000'
/*
```

The partition high key is assigned as

```
1234000000000000100000000000000000000000000000000000000000.
```

Changing the partition selection

This example shows how to change the partition selection.

SAMPDB1 is a PHDAM database. This example shows how to a change a partition selection from a high key selection to a partition selection exit.

```
//CTL DD *
SAMPDB1                                                              S
        DFSPSE00
 SAMPP1                                                              +
 C'12340000000000000000000'
 SAMPP2                                                              +
 C'56789000000000000000000'
/*
```

Adding and deleting some partitions

This example shows how to add and delete partitions.

SAMPDB1 is a PHDAM database. This is an example of two additions to and one deletion for a PHDAM.

```
//CTL  DD *
SAMPDB1
 SAMPP4   RMOD3    1000     10   4096            0      ADD          +
 C'300'
 SAMPP5   RMOD4    2000     20   2048            0      ADD          +
 C'700'
 SAMPP1                                                 DEL
/*
```

The following table shows the original configuration of the PHDAM database.

Table 47. Original configuration of the PHDAM database

Part name	Part ID	High key	Randomizer	*rbn*	*anch*	*blksz*	bytes
SAMPP1	1	300	RMOD1	1,000	40	4,096	0
SAMPP2	2	500	RMOD2	1,000	20	2,048	0
SAMPP3	3	600	RMOD2	2,000	30	2,048	100

The following table shows the modified configuration of PHDAM database that is to be used by HD Tuning Aid for its simulation.

Table 48. Modified configuration of PHDAM database (Adding and deleting some partitions)

Part name	Part ID	High key	Randomizer	*rbn*	*anch*	*blksz*	bytes
SAMPP2	2	500	RMOD2	1,000	20	2,048	0
SAMPP3	3	600	RMOD2	2,000	30	2,048	100
SAMPP4	4	300	RMOD3	1,000	10	4,096	0
SAMPP5	5	700	RMOD4	2,000	20	2,048	0

Example 5: Analyzing conversion to PHDAM

The examples in the following subsections show two methods for converting from HDAM, HIDAM, or PHIDAM to PHDAM.

Subsections:

- "Defining individual partition" on page 363
- "Defining all partitions consistently: Simple method" on page 364

Defining individual partition

This example shows how to define an individual partition.

In this example, HD Tuning Aid simulates a PHDAM database. The PHDAM has three partitions, and each of them has different DBD parameters.

```
//CTL  DD *
SAMPDB1            1000                                  PHDAMPARTINI  H
 SAMPP1   RMOD1             40   4096            0                    +
 C'300'
 SAMPP2   RMOD2             20   2048            0                    +
 C'500'
 SAMPP3   RMOD2    2000     30   2048          100                    +
 C'600'
/*
```

The following table shows the modified configuration of PHDAM database that is to be used by HD Tuning Aid for its simulation.

Table 49. Modified configuration of PHDAM database (Defining individual partition)

Part name	Part ID	High key	Randomizer	*rbn*	*anch*	*blksz*	bytes
SAMPP1	1	300	RMOD1	1,000	40	4,096	0
SAMPP2	2	500	RMOD2	1,000	20	2,048	0
SAMPP3	3	600	RMOD2	2,000	30	2,048	100

Defining all partitions consistently: Simple method

This example shows how to define all partitions consistently.

In this example, HD Tuning Aid simulates a PHDAM database. The PHDAM has three partitions, and all three have the same DBD parameters. Partition names are automatically assigned by HD Tuning Aid. Partition high key strings are required for every partition individually.

```
//CTL  DD *
SAMPDB1   RMOA0    1000     10   2048            0     PHDAMAUTOINI  H
 C'300'
 C'500'
 C'600'
/*
```

The following table shows the modified configuration of PHDAM database that is to be used by HD Tuning Aid for its simulation.

Table 50. Modified configuration of PHDAM database (Defining all partitions consistently)

Part name	Part ID	High key	Randomizer	*rbn*	*anch*	*blksz*	bytes
SAM0001	1	300	RMOA0	1,000	10	2,048	0
SAM0002	2	500	RMOA0	1,000	10	2,048	0
SAM0003	3	600	RMOA0	1,000	10	2,048	0

If 'AUTOINI' is specified, HD Tuning Aid assigns the partition name automatically. HD Tuning Aid follows the rule that the first three characters are the same as in the database name and the last four characters are numbered from 0001 to 1001, in ascending order.

Example 6: Analyzing conversion to HDAM

This example shows how to evaluate the conversion from PHDAM or PHIDAM to HDAM.

The following figure shows the procedure for evaluation of conversion from PHDAM or PHIDAM to HDAM.

```
//CTL  DD *
SAMPDB1   RMOA0    1000     10   2048            0     HDAM PARTDEL
/*
```

Example 7: Running HD Tuning Aid in an IMS-managed ACBs environment

This JCL example shows how to run HD Tuning Aid to evaluate data distribution of databases when the IMS management of ACBs is enabled.

Points to be considered:

- The HD Tuning Aid utility must be executed under the IMS batch region controller.
- Specify the DFSDF=CAT parameter for the PARM= parameter on the EXEC statement. In this example, it is assumed that the DFSDFCAT member enables IMS-managed ACBs and that this member exists in the data set (HPS.TEST.PROCLIB) that is specified to the PROCLIB DD.
- The IMS Tools Base library (SGLXLOAD) of IMS Tools Base 1.6 or later is specified on the STEPLIB DD statement.
- In this example, it is assumed that the KEYSIN data set (HPS.TEST.KEYSIN) has been created in an earlier HD Pointer Checker job and contains root keys for the databases to be analyzed.

```
//STEP1   EXEC PGM=DFSRRC00,
//     PARM='DLI,FABTROOT,P33J001G,,,,,,,,,,Y,N,,,,,,,,,,,DFSDF=CAT',
//             REGION=1000K,TIME=(,30)
//STEPLIB   DD DSN=HPS.SHPSLMD0,DISP=SHR
//          DD DSN=ITKBHLQ.SGLXLOAD,DISP=SHR
//          DD DSN=IMSVS.RESLIB,DISP=SHR
//SYSUDUMP  DD SYSOUT=A
//RAPSIN    DD DSN=&&RAPSIN,DISP=(,PASS,DELETE),
//             UNIT=SYSDA,SPACE=(CYL,(10,10)),
//             DCB=BLKSIZE=8400
//IMS2      DD DSN=IMSVS.RESLIB,DISP=SHR
//IEFRDER   DD DUMMY,DCB=BLKSIZE=1408
//DFSRESLB  DD DSN=IMSVS.RESLIB,DISP=SHR
//DFSVSAMP  DD DSN=HPS.SHPSSAMP(FABPVSAM),DISP=SHR
//PR8       DD SYSOUT=A,DCB=BLKSIZE=6118
//PR10      DD SYSOUT=A,DCB=BLKSIZE=6118
//KEYSIN    DD DSN=HPS.TEST.KEYSIN,DISP=OLD
//PROCLIB   DD DSN=HPS.TEST.PROCLIB,DISP=SHR
//RECON1    DD DSN=HPS.TEST.RECON1,DISP=SHR
//RECON2    DD DSN=HPS.TEST.RECON2,DISP=SHR
//RECON3    DD DSN=HPS.TEST.RECON3,DISP=SHR
//*-------------------------------------------------------------
//STEP2   EXEC PGM=SORT,PARM='',COND=(0,LT,STEP1)
//SORTIN    DD DSN=*.STEP1.RAPSIN,DISP=(OLD,DELETE,DELETE),
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)
//SORTOUT   DD DSN=&&KEYSOUT,DISP=(,PASS,DELETE),
//             UNIT=SYSDA,SPACE=(CYL,(10,10)),
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)
//SORTWK01  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SORTWK02  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SORTWK03  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SORTWK04  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SORTWK05  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SORTWK06  DD UNIT=SYSDA,SPACE=(CYL,(10,10))
//SYSOUT    DD SYSOUT=A
//SYSIN     DD DSN=HPS.SHPSSAMP(FABPSORT),DISP=SHR
//*-------------------------------------------------------------
//STEP3   EXEC PGM=FABTRAPS,COND=(0,LT,STEP2)
//STEPLIB   DD DSN=HPS.SHPSLMD0,,DISP=SHR
//SYSUDUMP  DD SYSOUT=A
//PR9       DD SYSOUT=A,DCB=BLKSIZE=6118
//PR9X      DD SYSOUT=A,DCB=BLKSIZE=6118
//KEYSOUT   DD DSN=*.STEP2.SORTOUT,DISP=(OLD,DELETE,DELETE),
//             DCB=(LRECL=42,BLKSIZE=8400,RECFM=FB)
```

Figure 159. HD Tuning Aid example: IMS-managed ACBs environment

Part 4. DB Historical Data Analyzer utility

The DB Historical Data Analyzer utility reports data that is captured during HD Pointer Checker and Space Monitor operations and provides trending, usage, and other types of statistical analysis.

Use the following topics to learn about and use the DB Historical Data Analyzer utility.

Topics:

- Chapter 19, “Overview of DB Historical Data Analyzer,” on page 369
- Chapter 20, “Using DB Historical Data Analyzer in the MVS batch environment,” on page 375
- Chapter 21, “Using the Export Utility,” on page 413
- Chapter 22, “Using DB Historical Data Analyzer in the TSO/ISPF environment,” on page 451
- Chapter 23, “JCL examples for DB Historical Data Analyzer,” on page 477

© Copyright IBM Corp. 2000, 2021

Chapter 19. Overview of DB Historical Data Analyzer

DB Historical Data Analyzer assists IMS users to analyze the status and historical trend of IMS full-function database data sets which HD Pointer Checker supports.

Historical trend here means the change in various aspects of IMS full-function database data sets (for example, the use of space, size/number of database segments, or size/number of database blocks) from the past.

DB Historical Data Analyzer uses data collected by HD Pointer Checker and Space Monitor as follows:

- Statistics information produced by HD Pointer Checker
- Space allocation information produced by Space Monitor

You can use the DB Historical Data Analyzer utility to:

- Obtain a concise summary report of HD Pointer Checker output
- Obtain a graph, chart, or table image that shows the trend of space allocation/use and other database analysis data of IMS full-function database data sets

DB Historical Data Analyzer has a utility called Export Utility. Export Utility exports the data collected by HD Pointer Checker to flat records, which can be processed by a user's application program.

Topics:

- "Program functions" on page 369
- "Program structure" on page 370
- "Data flow" on page 370

Program functions

The DB Historical Data Analyzer utility can be run in the MVS batch environment or in the TSO/ISPF environment.

DB Historical Data Analyzer uses the data produced by HD Pointer Checker to create the following reports when the program is run as a batch job:

- HISTORY Data Set by DB-DS report, which shows all the entries in the HISTORY data set by database data set order.
- HISTORY Data Set by Key Date report, which shows all the entries in the HISTORY data set by the HD Pointer Checker run date order.
- HD Pointer Checker Summary report, which shows the summary of HD Pointer Checker run results for all the specified database data sets.
- HD Analysis report, which shows concise data of the HD Pointer Checker run results for each database data set.

In addition to creating these reports, DB Historical Data Analyzer, when run under TSO/ISPF, creates HD Analysis graph, which shows the trend of various aspects of a database data set (such as the amount of free space, total number of segment occurrences, and the percentage of blocks with free space) on a graphic terminal, in the form of a graph, chart, or table.

The HD Analysis graph contains the data collected by the two IMS HP Pointer Checker components: HD Pointer Checker and Space Monitor.

To produce graph charts, the Interactive Chart Utility (ICU) of Graphical Data Display Manager Presentation Graphic Feature is a prerequisite, and this program must be run under TSO/ISPF. A hardcopy can also be obtained on printers supported by GDDM.

© Copyright IBM Corp. 2000, 2021

DB Historical Data Analyzer uses a HISTORY data set as its input. HISTORY data sets are VSAM KSDS data sets that contain the IMS database data set statistics and analysis information obtained from the HD Pointer Checker output data.

DB Historical Data Analyzer has the following functions to maintain the HISTORY data set:

- Initializing the HISTORY data set
- Updating options of the HISTORY data set
- Reorganizing the HISTORY data set
- Deleting entries from the HISTORY data set

The Export Utility is a subcomponent of DB Historical Data Analyzer. It runs as a batch job. The Export Utility is used to export the database statistics data from the HISTORY data set (produced by HD Pointer Checker) to a flat file that can be processed by user application programs.

Program structure

The program structure of DB Historical Data Analyzer is described separately for the MVS batch environment and TSO/ISPF environment.

MVS batch environment

DB Historical Data Analyzer consists of one load module (FABGHIST).

Export Utility

Export Utility consists of FABGXEXP and several load modules. Export Utility runs as a batch job. FABGXEXP is the first program that runs in the job step.

TSO/ISPF environment

DB Historical Data Analyzer consists of several ISPF panel modules, message modules, and two load modules (FABGPANL and FABGGRAF).

FABGP000 is the first panel module invoked by TSO/ISPF ISPSTART command to start the dialog with DB Historical Data Analyzer. The two load modules, FABGPANL and FABGGRAF, are called during the dialog. FABGGRAF invokes ICU to generate and display the HD Analysis graph.

Data flow

DB Historical Data Analyzer operates in either MVS batch environment or TSO/ISPF environment.

Subsections:

- “Data flow in MVS batch environment” on page 370
- “Data flow of Export Utility” on page 371
- “Data flow in TSO/ISPF environment” on page 372

Data flow in MVS batch environment

The following figure shows the general data flow of DB Historical Data Analyzer when it is run in the MVS batch environment.

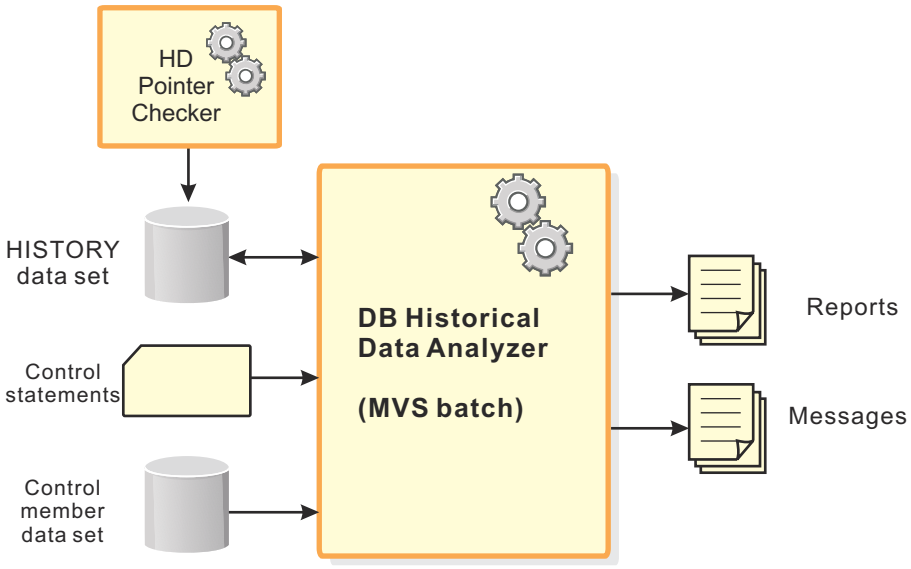


Figure 160. Data flow for DB Historical Data Analyzer (MVS Batch)

- DB Historical Data Analyzer uses IMS database data set statistics and analysis information maintained in the *HISTORY data set*. The HISTORY data set contains the data collected by HD Pointer Checker.

  DB Historical Data Analyzer provides functions to initialize, reorganize, and delete entries from the HISTORY data set.
- You describe the function to be performed by this utility in the input data stream or in a data set in the form of *control statements*. Control statements describe the functions, the database data sets, or both that are to be processed.
- If the previously mentioned control statement contains a MEMBER keyword parameter, DB Historical Data Analyzer refers to the *control member data set*, which contains the names of database data sets to be processed. This is the same data set as is used by the Space Monitor utility of IMS HP Pointer Checker.
- DB Historical Data Analyzer produces the following four types of reports:
  - HISTORY Data Set by DB-DS report
  - HISTORY Data Set by Key Date report
  - HD Pointer Checker Summary report
  - HD Analysis report

Data flow of Export Utility

The following figure shows the general data flow of the Export Utility.

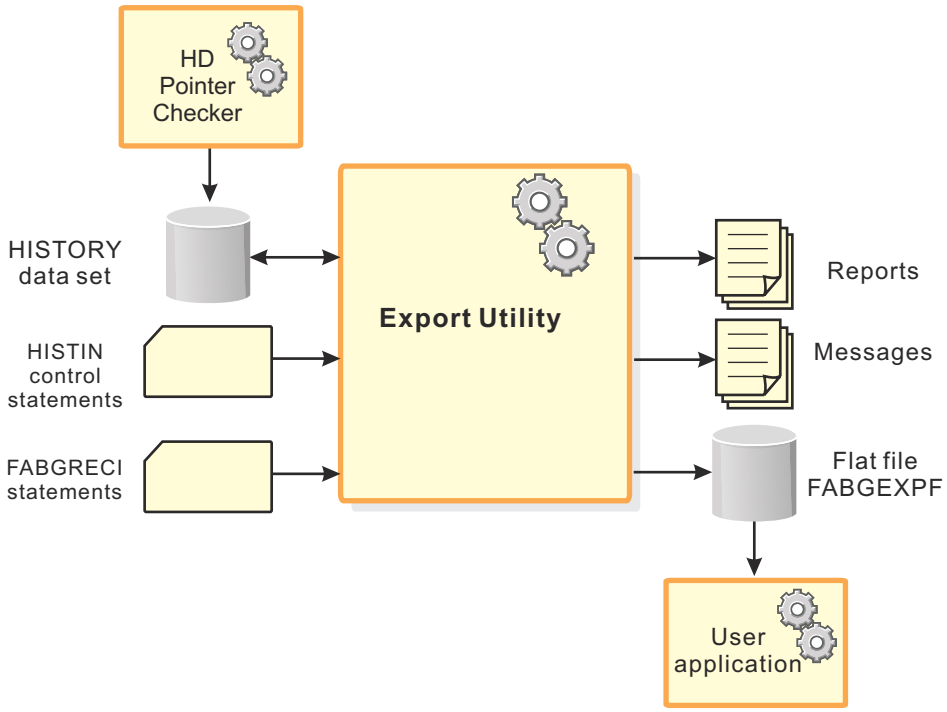


Figure 161. Data flow of the Export Utility

- The Export Utility uses IMS database data set statistics and analysis information maintained in the HISTORY data set. The HISTORY data set contains the data collected by HD Pointer Checker.

  The Export Utility exports data from the HISTORY data set to a sequential file. The exported file is referred to as a *flat file*, and the record is referred to as a *flat record*. User's application can process the flat records as an input data.
- The flat record can be created in a format that is specified by the user or a predefined format provided by the Export Utility. The definition of a user's format is referred to as a *flat record definition*. The flat record definitions are stored in the FABGRECI data set.
- The user describes the function to be run by this utility in the input data stream or in a data set in the form of the HISTIN control statements.
- Export Utility produces the following reports:
  - HISTORY Data Set Message report
  - FABGRECI Statement report
  - History Attribute report
  - History Export Summary report

Data flow in TSO/ISPF environment

The following figure shows the general data flow of DB Historical Data Analyzer when it is run in the TSO/ISPF environment.

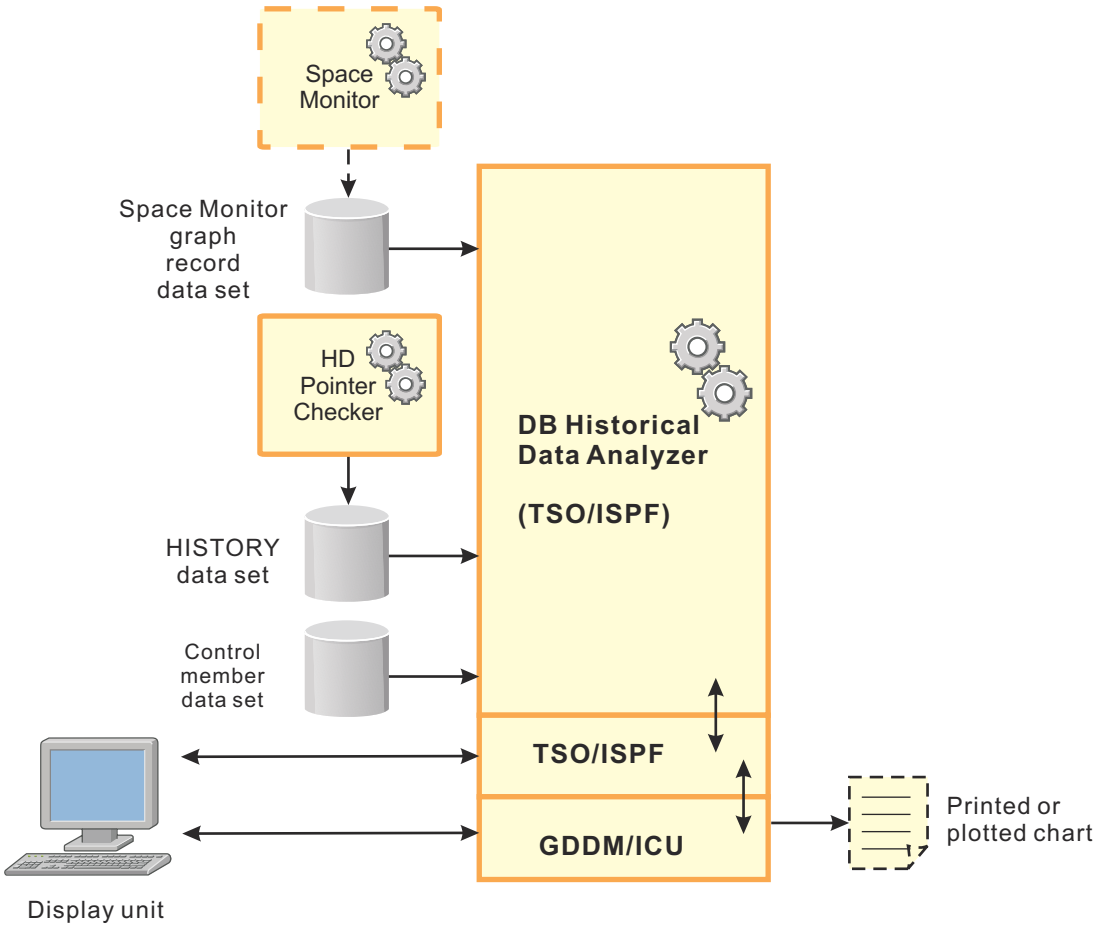


Figure 162. Data flow for DB Historical Data Analyzer (TSO/ISPF)

- When run in the TSO/ISPF environment, DB Historical Data Analyzer uses two data sets from other IMS HP Pointer Checker utilities. One is the *HISTORY data set*, which contains the entries created by HD Pointer Checker. The other is the *Space Monitor graph record data set*, created by the Space Monitor utility, which contains space management information. The Space Monitor graph record data set is optional.
- DB Historical Data Analyzer refers to the *control member data set*, which contains the names of database data sets. This is the same data set as is used by the Space Monitor utility. This control member data set is optional.
- The user operates from a display unit and selects necessary items on the panels to specify the type of chart to create.
- DB Historical Data Analyzer retrieves the necessary information from the HISTORY data set and the Space Monitor graph record data set, and passes it to GDDM Interactive Chart Utility (ICU). Then the ICU generates a chart (HD Analysis graph) and displays it on a display unit. The user can then communicate with ICU interactively to customize the chart format, if necessary, or print a hardcopy of the chart on a printer supported by GDDM.

Chapter 20. Using DB Historical Data Analyzer in the MVS batch environment

The following topics describe how to run the FABGHIST program of DB Historical Data Analyzer in the MVS batch environment.

For the operation of this program in the TSO/ISPF environment, see Chapter 22, “Using DB Historical Data Analyzer in the TSO/ISPF environment,” on page 451. For the operation of the Export Utility, see Chapter 21, “Using the Export Utility,” on page 413.

Topics:

- “Restrictions and considerations” on page 375
- “Running DB Historical Data Analyzer” on page 375
- “Job control language” on page 380
- “Input” on page 381
- “Output” on page 389

Restrictions and considerations

The following restrictions and considerations apply when you use DB Historical Data Analyzer in the MVS batch environment.

Restrictions

- A database whose attribute has been changed by DBD regeneration cannot be treated in the same way as before DBD regeneration. In this situation, all HISTORY data set entries for the database must be deleted before the database is processed by HD Pointer Checker. Otherwise, the results are unpredictable. This also applies to the migration situation from non-HALDB to HALDB.
- DB Historical Data Analyzer applies only to the following database organizations:
  - HDAM
  - HIDAM (primary and index)
  - HISAM (including SHISAM)
  - Secondary index
  - PHDAM (partitioned HDAM)
  - PHIDAM (partitioned HIDAM)
  - PSINDEX (partitioned secondary index)

  Indirect list data sets (ILDS) used for PHDAM and PHIDAM are not analyzed.
- The HISTORY data set must be periodically reorganized to avoid performance problems with DB Historical Data Analyzer and the shortage of the available space on the HISTORY data set.

Considerations for HALDB Online Reorganization (OLR)

- For a HALDB partition that is OLR capable, the utility shows the DD names and database data set names of the active data set groups (either (A-J&X) or (M-V&Y)) at the time of HD Pointer Checker's run.
- The utility can work while a HALDB partition is in cursor-active status.

Running DB Historical Data Analyzer

Complete the following steps to run DB Historical Data Analyzer in the MVS batch environment.

© Copyright IBM Corp. 2000, 2021

Preparing a HISTORY data set

Before you can run a DB Historical Data Analyzer job, you must prepare a HISTORY data set.

HISTORY data set (HISTORY)

HISTORY data sets are VSAM KSDS data sets that contain the IMS database data set statistics and analysis information obtained from the HD Pointer Checker output data.

This data set is used for creating reports or exporting. It is also used as an input to Space Monitor.

DB Historical Data Analyzer has the following functions to maintain the HISTORY data set:

- Initializing the HISTORY data set
- Updating options of the HISTORY data set
- Reorganizing the HISTORY data set
- Deleting entries from the HISTORY data set

You can invoke these functions with the control statements specified in the HISTIN data set (see “HISTIN data set” on page 381).

The HISTORY data set has four optional attributes, EXPORTABLE, MULTIENT, HISTLOCK, and MULTIIMSID. For more information about these options, see “OPTION control statement” on page 386.

See the following topics for JCL examples:

- To initialize the HISTORY data set, see “Creating a HISTORY data set ” on page 378.
- To change the options of the HISTORY data set, see “Changing the options of the HISTORY data set ” on page 379.
- To reorganize the HISTORY data set, see “Example 1: Reorganizing the HISTORY data set ” on page 477.
- To delete entries from the HISTORY data set, see “Example 2: Deleting entries from the HISTORY data set” on page 478.

Format of the HISTORY data set records

This topic describes product-sensitive programming interface information. See “Programming interface information” on page 812 to understand the restrictions associated with this type of material.

PSPI

The key of the HISTORY data set record is concatenation of the following fields and the length of key field is 23 byte:

Date
The date on which the specified real database data set was scanned by HD Pointer Checker. If an image copy is used, it is the date when the image copy data set was created.

Database name
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD.

Partition name
The name of the partition as defined through the IMS HALDB Partition Definition Utility (DFSHALDB). If the database is a non-HALDB, this field is filled with binary zeros.

Data set group number
The ordinal number of the data set group.

In case of a database data set record, this field consists of two fields.

Sequential number within a day
The first byte of the data set group number. It is the sequential number of database data set entry within a day. The sequential number starts with X'00', therefore, the value of this field will be the

same as the other records, if only one entry is stored per day. When the Multiple-IMSID option is enabled, the top bit is turned on.

Data Set Group number
The second one byte is the ordinal number of the data set group. When the Multiple-IMSID option is enabled, the first 4 bits indicate the IMSID number and the next 4 bits indicate the DSG number.

IMSID number
The IMSID number is the number assigned for each IMSID entry in the IMS record. IMSID record is created when the Multiple-IMSID option is enabled.

Record sequence number
The ordinal number of the record within the entry. (One entry consists of multiple records.)

The first byte after the key and the 24th-byte field (offset 23 X'17') contains the following data:

Public format flag
Contains the flag showing whether this record is a public format. If this field is X'00', it is a record made public to the user. If it is other than X'00', it is a non-public record. If EXPORTABLE=YES, some of the history record entries are generated in non-public format. In user applications, ignore and do not process the non-public records. Refer to Record types (EXPORTABLE=YES/NO) for the details of the public and non-public format.

PSPI

See Chapter 35, “Layout of HISTORY data set record,” on page 599 for the detailed layout of the public record.

Estimating the size of the HISTORY data set

You can estimate the size of the HISTORY data set before creating it.

About this task

This step is optional. Complete this step only if you want to estimate the size of the HISTORY data set before creating it.

Procedure

Use the following formula to calculate the total number of records in a HISTORY data set and the data set size. The quotient is rounded up.

```
Total number of records = N1 + N2 + N3
Size = total number of records x 240

N1 =  ( A / 32 ) + A * B * ( C / 9 )

n2 =  ((A * B) / 25 ) + (A * B) * ( 2 + D / 2 )

n3 = A * B ( 2 + ( D + E ) / 3 )
```

Figure 163. Formula to estimate the size of the HISTORY data set

N1 through N3 and A though E used in these formulae mean as follows:

N1
Calculate N1, which can be calculated as in the formula.

N2
Calculate n2, which can be calculated as in the formula, for each database data set that is to be processed by HD Pointer Checker. N2 is the total of n2 of all database data sets.

N3
Calculate N3 only when you export the contents of the HISTORY data set to a flat file (EXPORTABLE=YES) by Export Utility. Calculate n3, which can be calculated as in the formula, for

each database data set that is to be processed by HD Pointer Checker. N3 is the total of n3 of all database data sets.

A:
Number of HD Pointer Checker processing days that is recorded in the HISTORY data set.

B:
Number of HD Pointer Checker processing per day. If MULTIENT=NO is specified, it is always 1.

C:
Number of database data sets processed by one HD Pointer Checker run.

D:
Number of segment types contained in the database data set.

E:
Sum of number of pointer types that segment types in the database data set have.

Creating a HISTORY data set

To create a HISTORY data set and initialize the data set, complete the following procedure.

Procedure

Allocate and initialize a VSAM KSDS for the HISTORY data set.

DB Historical Data Analyzer provides a function to initialize the HISTORY data set.

The following figure presents a JCL example for allocating and initializing the HISTORY data set. The following parameters are required for the DEFINE CLUSTER command:

- INDEXED
- UNIQUE
- KEYS(23,0)
- SHAREOPTIONS(3,3)
- RECORDSIZE(240,240)

```
//************************************************
//**  ALLOCATE HISTORY DATA SET                 **
//************************************************
//ALLOC   EXEC PGM=IDCAMS
//SYSPRINT  DD SYSOUT=A
//SYSIN     DD *
  DEFINE CLUSTER ( NAME(HIST.HISTORY) -
                   VOLUMES(IMSDBT) CYLINDERS(3,2) -
                   INDEXED UNIQUE KEYS(23,0) -
                   SHAREOPTIONS(3,3) -
                   RECORDSIZE(240,240) -
                   CONTROLINTERVALSIZE(4096) ) -
         DATA    ( NAME(HIST.HISTORY.DATA) ) -
         INDEX   ( NAME(HIST.HISTORY.INDEX) )
/*
//************************************************
//**  INITIALIZE HISTORY DATA SET               **
//************************************************
//INIT    EXEC PGM=FABGHIST
//STEPLIB   DD DISP=SHR,DSN=HPS.SHPSLMD0
//HISTORY   DD DISP=OLD,DSN=HIST.HISTORY
//HISTPRT   DD SYSOUT=A
//HISTMSG   DD SYSOUT=A
//SYSUDUMP  DD SYSOUT=A
//HISTIN    DD *
  PROC TYPE=CREATE
  ENDPROC
/*
```

Figure 164. JCL example for creating a HISTORY data set

Changing the options of the HISTORY data set

To change the options of the HISTORY data set, complete the following procedure.

About this task

This step is optional. Complete this step only if you want to change the attributes of the HISTORY data set.

Procedure

Verify that the attributes of the HISTORY data set are appropriate. If necessary, change the attributes. The attributes can be changed by coding an OPTION statement.

At the time of initialization, attributes of the HISTORY data set are follows:

- MULTIENT option is "NO"

  The multiple entries option is inactive. In this status, one database data set entry per day is recorded in the HISTORY data set.
- EXPORTABLE option is "NO"

  The HISTORY data set is not exportable. In this status, the Export Utility does not export data from the HISTORY data set.
- HISTLOCK option is "GROUP"

  The HISTORY lock attribute is set to "GROUP". In this status, the HD Pointer Checker job issues ENQ MACRO with QNAME=FAB@HIST, RNAME=FAB@HIST, and SCOPE=SYSTEMS, before updating the HISTORY data set.
- MULTIIMSID option is "NO"

  The Multiple-IMSID option is disabled. In this status, the IMSID parameter of the DBHDA PROC statement is ignored.

The following figure shows an example JCL stream for changing options of the HISTORY data set. This step is optional.

```
//UPDATE  EXEC PGM=FABGHIST
//STEPLIB   DD DISP=SHR,DSN=HPS.SHPSLMD0
//HISTORY   DD DISP=OLD,DSN=HIST.HISTORY
//HISTPRT   DD SYSOUT=A
//HISTMSG   DD SYSOUT=A
//SYSUDUMP  DD SYSOUT=A
//HISTIN    DD *
  PROC TYPE=UPDATE
  OPTION MULTIENT=YES,EXPORTABLE=YES,HISTLOCK=DATASET,
         MULTIIMSID=YES
  ENDPROC
```

Figure 165. JCL example for changing options for a HISTORY data set

For more information about the OPTION statement, see “OPTION control statement” on page 386.

Running a DB Historical Data Analyzer job

To run DB Historical Data Analyzer as a batch job, complete the steps in this topic.

Procedure

1. Make sure that HD Pointer Checker is run in advance to create entries in the HISTORY data set.
2. Specify control statements to describe the functions to be performed. The control statements can reside in the input stream, or in a data set called HISTIN. See “HISTIN data set” on page 381 for a description of control statement specifications.

3. Ensure that a control member data set exists, if a MEMBER= keyword is coded on the control statement. See “Control member data set (SPMNMBR)” on page 389 for a description of this data set.
4. Code the JCL as described in “Job control language” on page 380.

   You can refer to the following JCL examples to code the JCL statements:

   - “Example 3: Producing an HD Analysis report” on page 479
   - “Example 4: Producing the HD Pointer Checker Summary report” on page 479
5. Run the DB Historical Data Analyzer job.

Job control language

To run DB Historical Data Analyzer in the MVS batch environment, you must prepare JCL for the FABGHIST program.

FABGHIST JCL

To run DB Historical Data Analyzer, supply an EXEC statement and the appropriate DD statements.

The following table summarizes the DD statements.

Table 51. DB Historical Data Analyzer DD statements

DDNAME	Use	Format	Need
HISTORY	Input/Output	KSDS	Required
HISTIN	Input	LRECL=80	Required
SPMNMBR	Input	PDS	Optional
HISTPRT	Output	LRECL=133	Required
HISTMSG	Output	LRECL=133	Required
SYSUDUMP	Output	SYSOUT	Optional

EXEC
This statement must be in the following form:

```
//      EXEC PGM=FABGHIST
```

HISTORY DD
This required VSAM KSDS data set contains the summary information of the HD Pointer Checker run results. This data set must be allocated before you run DB Historical Data Analyzer.

DISP=OLD must be used if you want to maintain the HISTORY data set by specifying TYPE=CREATE, DELETE, UPDATE, or REORG on the PROC control statement. Otherwise, DISP=SHR should be used.

HISTIN DD
This required input data set contains control statements, which describe your specification of the processing to be done by DB Historical Data Analyzer.

SPMNMBR DD
This optional input partitioned data set (PDS) contains one or more members, each of which consists of one or more control statements from Space Monitor.

This data set is required only when the MEMBER keyword of the DATABASE statement in the HISTIN data set is specified; otherwise, this DD statement is ignored even if coded.

HISTPRT DD
This required output data set contains reports. BLKSIZE, if coded, must be a multiple of 133.

HISTMSG DD
This required output data set contains messages. BLKSIZE, if coded, must be a multiple of 133.

SYSUDUMP DD
This statement defines output from a system abend dump routine. It is used only when a dump is required. Although optional, it is recommended that you include this data set.

Input

The following topics describe all the input data sets that are required in order to run DB Historical Data Analyzer in the MVS batch environment. This includes the control statement data set (HISTIN DD).

HISTIN data set

This data set contains the user's description of the processing to be done by DB Historical Data Analyzer through the batch job.

Format

This data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set. It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

This data set can contain one or more combinations of three types of control statements: PROC, DATABASE, and ENDPROC. Control statements can be coded as shown in the following figure.

```
//HISTIN DD *
 PROC TYPE=SUMMARY
  DATABASE DB=DB01,DD=DD01
  DATABASE DB=DB02,DD=DD02
 ENDPROC
 PROC TYPE=ANALYSIS
  DATABASE MEMBER=APPL01
 ENDPROC
 PROC TYPE=DELETE
  DATABASE DB=DB03,DD=DD03,FROM=08102020,TO=08312020
 ENDPROC
 PROC TYPE=REORG
 ENDPROC
/*
```

Figure 166. HISTIN control statement example

Control statement syntax

The following description presents the coding conventions that you must follow in writing control statements in the HISTIN data set:

- A control statement can be coded onto one or more control statement records. Control statement names (PROC, DATABASE, and ENDPROC), keywords, and keyword values must be coded within column 2 and column 72. A control statement name must be the first entry in the control statement.
- Keywords and their values follow the control statement name, separated by one or more blanks (ENDPROC has no keywords.) A control statement name and the first keyword must be written in the same control statement record. When more than one keyword is coded, they must be separated by commas. No blanks are allowed between the keywords and the commas, or between the keywords and their values.

  Keywords can be continued onto more than one control statement record. In this case, the control statement that starts with a control statement name must be completed with a keyword with its value, including a comma that follows the value. The succeeding keywords can be continued onto the following control statement records that begin in any column from column 2.

  Keywords are not positional parameters; they can be specified in any order.

  A null value is not allowed for any keyword value.

- Comments can follow the last keyword value on each control statement record, separated by at least one blank.
- A comment statement must begin with an asterisk in column 1.

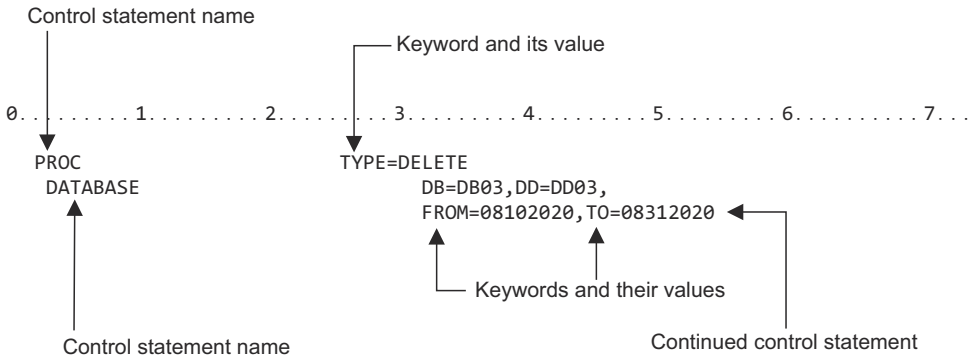


Figure 167. Example: Control statement format in HISTIN data set

Notational conventions

The following symbols must be coded as they appear in the command format:

- Comma (,)
- Equal sign (=)

PROC control statement

The PROC control statement specifies the function to be run. One or more PROC control statements can be specified at a time.

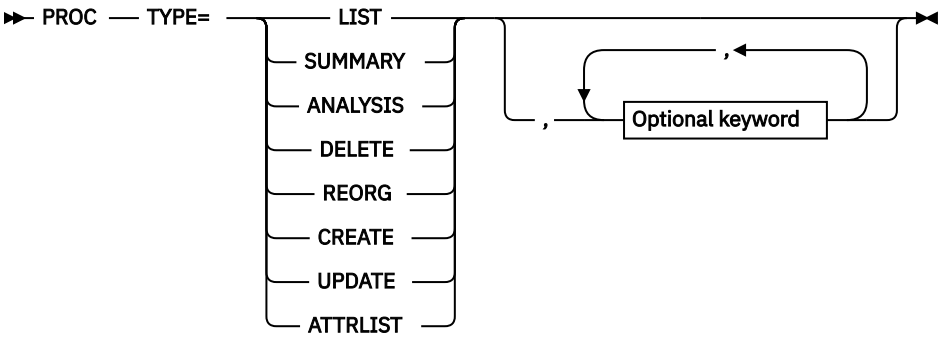
In terms of TYPE=SUMMARY, ANALYSIS, and DELETE, each PROC control statement can be followed by one or more DATABASE control statements. TYPE=UPDATE needs to be followed by an OPTION statement. Each PROC control statement must have a matching ENDPROC control statement.

Subsections:

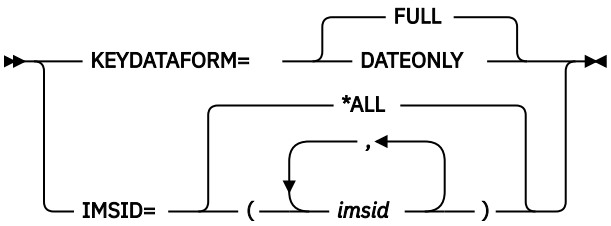
- “Syntax” on page 382
- “Keywords” on page 383

Syntax

The following syntax diagram shows the keywords for the PROC statement.



Optional keywords



Keywords

The following keywords can be specified on the PROC statement:

TYPE=
Specifies the type of process to be performed.

LIST
Specifies to generate two types of reports: The HISTORY Data Set by DB-DS report and HISTORY Data Set by Key Date report.

A DATABASE control statement is not required (if coded, it is ignored).

SUMMARY
Specifies to generate the HD Pointer Checker Summary report.

This report summarizes the HD Pointer Checker run results for all the database data sets specified by the succeeding DATABASE control statements. The summary data for each database data set group is obtained from its last entry in the HISTORY data set, which is usually the result of the most recent HD Pointer Checker run for the database data set group.

When TYPE=SUMMARY is specified, FROM and/or TO parameters are not required for the associated DATABASE control statements (if coded, they are ignored). If DATABASE control statements are not specified, the report will contain information of all the database data sets that have entries in the HISTORY data set.

ANALYSIS
Specifies to generate the HD Analysis report for each database data set group specified by the succeeding DATABASE control statements. If DATABASE control statements are not specified, a report is printed for each database data set group that has entries in the HISTORY data set, using each of their latest entries.

DELETE
Specifies to delete entries from the HISTORY data set. At least one DATABASE control statement must follow.

REORG
Specifies to reorganize the HISTORY data set. A DATABASE control statement is not required (if coded, it is ignored).

CREATE
Specifies to initialize a new HISTORY data set. A DATABASE control statement is not required (if coded, it is ignored).

Notes:

- The multiple entries option is inactive at initialization time. If you want to store multiple database data set entries per day, you need to run the FABGHIST program with the TYPE=UPDATE and OPTION MULTIENT=YES control statement.
- The exportable option is inactive at initialization time. If you want to run Export Utility, you must run the FABGHIST program with the TYPE=UPDATE and OPTION EXPORTABLE=YES control statement.
- The HISTORY lock option is set as GROUP at initialization. If you use more than one HISTORY data set among the HD Pointer Checker jobs, it is recommended that you change the HISTORY

lock option by running the FABGHIST program with the TYPE=UPDATE and the OPTION HISTLOCK=DATASET control statement.

- The Multiple-IMSID option is disabled at initialization time. If you want to use the IMSID parameter of the DBHDA PROC statement, you need to enable the Multiple-IMSID option by running the FABGHIST program with the TYPE=UPDATE and the OPTION MULTIIMSID=YES control statements.

UPDATE
Change the HISTORY data set option. The optional value is specified by the OPTION control statement.

ATTRLIST
Specifies to generate the HISTORY Attribute report. A DATABASE control statement is not required.

KEYDATAFORM=
Specifies the format of the data that will be printed in the KEYDATA fields of the HISTORY Data Set by Key Date report and the HISTORY Data Set by DB-DS report. This option is supported only for the TYPE=LIST process.

FULL
The data in the KEYDATA fields are shown with date and time. Each HISTORY data set record is shown in the report. This is the default.

DATEONLY
The data in the KEYDATA fields are shown with date only. When HISTORY data set records of the same DBNAME/DDNAME exist within the same day but with different time, they are shown as one entry in the report.

IMSID=
The report is sorted by IMSIDs. This parameter can be specified for TYPE=LIST, SUMMARY, ANALYSIS, or DELETE, and takes affect only when the Multiple-IMSID option is enabled. In case of TYPE=DELETE, you can specify the IMSIDs of the records in the HISTORY data set that are to be deleted.

(*ims1*,*ims2*,...)
Specifies IMSIDs to be reported or to be deleted. You can specify up to 10 IMSIDs.

***ALL**
Records in the HISTORY data set of any IMSIDs are the target of the processing. This is the default when the Multiple-IMSID option is enabled.

DATABASE control statement

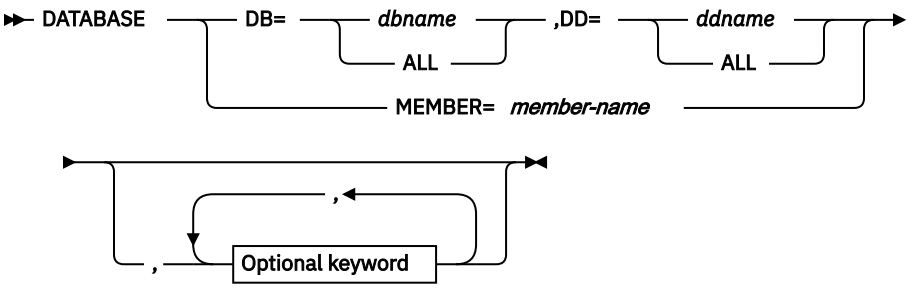
The DATABASE control statement specifies the database data set to be processed. A DATABASE control statement, if coded, must be preceded by a PROC control statement.

Subsections:

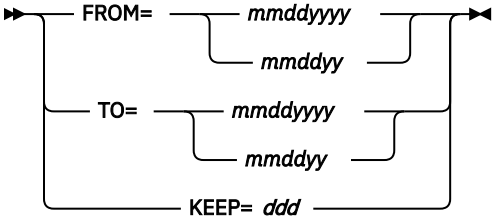
- “Syntax” on page 384
- “Keywords” on page 385

Syntax

The following syntax diagram shows the keywords for the DATABASE statement.



Optional keywords



Keywords

The following keywords can be specified on the DATABASE statement:

DB=

Specifies the name of the DBD to be processed. ALL can be specified to process all the database data set groups that have entries in the HISTORY data set.

For HALDB, specify the master database name.

This parameter must be specified if the MEMBER keyword is *not* specified. This parameter has no default value.

DD=

Specifies the ddname of the database data set group to be processed. ALL can be specified to process all the database data set groups of the DBD specified by the DB keyword. If the database data set group consists of a primary data set and an overflow data set, either of them can be specified.

For HALDB, specify each ddname created by the concatenation of the partition name and the data set suffix character, A through J or X.

For a HALDB that is Online Reorganization (OLR) capable, you can specify the data set suffix character M through V or Y, as well as A through J or X.

Whichever suffix is specified, DB Historical Data Analyzer searches and processes both A and M sides of the history record entries. Therefore, the statistics in the report shows the side that was active when HD Pointer Checker created the history record entry.

This parameter must be specified if the DB keyword is specified. If DB=ALL is specified, DD=ALL must be specified. This parameter has no default value.

MEMBER=*member-name*

Specifies the member name of the SPMNMBR data set that contains one or more Space Monitor control statements. All the database data sets specified in the control statements of the member are processed. If non-IMS data sets are specified in the SPMNMBR data set, they are ignored.

This parameter must be specified if the DB keyword is *not* specified.

FROM=*mmddyyyy* or *mmddyy*

Specifies the date of the entry within this database data set group; the processing starts with this entry. If this parameter is not specified, processing starts with the first entry within this database data set group. If neither the "FROM=" nor "TO=" keyword is specified, only the most recent entry is processed.

The FROM date must be either in the form "*mmddyyyy*" or "*mmddyy*" (*mm*=month, *dd*=date, *yyyy* or *yy*=year). IBM recommends using *mmddyyyy* format for correct specification of a year later than 1999.

If TYPE=SUMMARY is specified for the preceding PROC control statement, this keyword is not required (if coded, it is ignored).

TO=*mmddyyyy* or *mmddyy*
Specifies the date of the entry within this database data set group; the processing ends on this entry. If this parameter is not specified, processing ends on the last entry within this database data set group. If neither the "FROM=" nor "TO=" keyword is specified, only the most recent entry is processed.

The TO date must be either in the form "*mmddyyyy*" or "*mmddyy*" (*mm*=month, *dd*=date, *yyyy* or *yy*=year). IBM recommends using *mmddyyyy* format for correct specification of a year later than 1999.

If TYPE=SUMMARY is specified for the preceding PROC control statement, this keyword is not required (if coded, it is ignored).

KEEP=*ddd*
Specifies the retention days of the history records of this database data set group. The minimum number is 1 and the maximum number is 999. Specify this parameter with TYPE=DELETE in the preceding PROC control statement. The FABGHIST program will delete the history records of which life time exceeds these retention days. For example, if the FABGHIST program runs with KEEP=10 and today is January 23, the records created before January 13 will be deleted.

To delete the history records, you must specify either KEEP= or a set of FROM= and TO=.

If this parameter is specified when TYPE=DELETE is not specified, it is ignored.

OPTION control statement

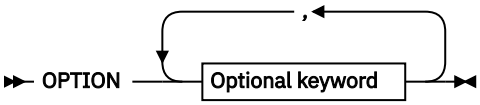
An OPTION control statement specifies an option for the HISTORY data set. The OPTION control statement must be preceded by a TYPE=UPDATE control statement.

Subsections:

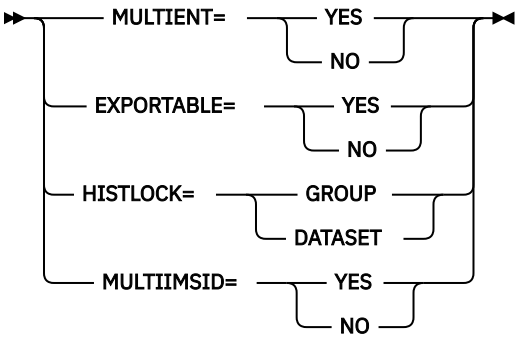
- “Syntax” on page 386
- “Keywords” on page 387

Syntax

The following syntax diagram shows the keywords for the OPTION statement.



Optional keywords



Keywords

The following keywords can be specified on the OPTION statement:

MULTIENT=

Specifies to store multiple database data set entries per day in the HISTORY data set. You can change the multiple entries option at any time of the day.

YES

Activates the multiple database data set entries per day. After YES is specified, HD Pointer Checker keeps more than one database data set entries per day. The entries can be stored up to a maximum of 25 entries per day. The updates over 25th entries will not override or be recorded.

NO

Deactivates the multiple database data set entries per day. HD Pointer Checker stores only one entry per day in the HISTORY data set. If there are more than one time of HD Pointer Checker run for the database data set with HISTORY=YES option in a day, the entry is overridden.

At the time the HISTORY data set created, MULTIENT is set to NO.

When multiple database data set entries are stored per day, DB Historical Database Analyzer does as follows:

- Batch job processes the multiple entries. Multiple data for one day will be shown in the DB Historical Data Analyzer reports.
- The ISPF GDDM interface does not process the multiple entries. The last data of the day is shown on the GDDM panel.
- Export Utility exports the multiple entries.

Notes:

- Even if MULTIENT=NO is specified, the multiple entries already written are not removed from the HISTORY data set. If you need to delete the existing entries, run the FABGHIST program with the TYPE=DELETE control statement.
- If some entries already exist for the day, and you specify MULTIENT=NO, the existing entries remain but the last entry is overridden by the update information.
- There is a compatibility issue for selecting MULTIENT=YES. For details, see Format (MULTIENT=YES/NO).

EXPORTABLE=

Specifies the HISTORY data set to be processed by Export Utility.

YES

Change the HISTORY data set to exportable. When EXPORTABLE is set to YES, HD Pointer Checker creates the exportable history records. Export Utility processes the HISTORY data set, if EXPORTABLE is set to YES.

NO

Change the HISTORY data set to unexportable. When EXPORTABLE is set to NO, HD Pointer Checker creates the unexportable history records, and Export Utility does not export data. If EXPORTABLE is set to NO, Export Utility does not process the HISTORY data set.

At the time the HISTORY data set created, EXPORTABLE is set to NO.

Notes:

- Even if the HISTORY data set is exportable, Export Utility cannot process the history record entries that were created during unexportable status.
- Any of the existing history records are not deleted by changing this attribute. If you want to delete them, run the FABGHIST program with the TYPE=DELETE control statement.
- Even if exportable records remain in the HISTORY data set, of which EXPORTABLE attribute is NO, Export Utility does not process the records.

- There is a compatibility issue for selecting EXPORTABLE=YES. For details, see Record types (EXPORTABLE=YES/NO).

HISTLOCK=

Specifies the HISTORY lock option. The HD Pointer Checker jobs are serialized to update a HISTORY data set by the ENQ and DEQ macros. The HISTORY lock option is an optional function for selecting a minor name of an ENQ macro for serialization of updating HISTORY data sets.

GROUP

HD Pointer Checker issues the ENQ macro with the following parameters:

```
QNAME (major name) = CL8'FAB@HIST'
RNAME (minor name) = CL8'FAB@HIST'
CONTROL TYPE       = EXCLUSIVE
SCOPE              = SYSTEMS
```

DATASET

HD Pointer Checker issues the ENQ macro with the following parameters:

```
QNAME (major name) = CL8'FAB@HIST'
RNAME (minor name) = CL44'(HISTORY data set name)'
CONTROL TYPE       = EXCLUSIVE
SCOPE              = SYSTEMS
```

When the HISTORY data set is created, HISTLOCK is set to GROUP.

If more than one HISTORY data set has the GROUP attribute, the HD Pointer Checker jobs issue the ENQ macro with the same RNAME. It makes all the HD Pointer Checker jobs get into the same queue, that is for a group HISTORY data sets, and only one HD Pointer Checker job can update the HISTORY data set at a time.

By specifying HISTLOCK=DATASET to the HISTORY data sets, the HD Pointer Checker jobs get into individual queue of each HISTORY data set, and update each HISTORY data set in parallel.

GROUP is for keeping compatibility with lower level of HD Pointer Checker. It is recommended that you select HISTLOCK=DATASET.

MULTIIMSID=

Specifies the Multiple-IMSID option.

YES

Changes the HISTORY data set to enable the Multiple-IMSID option. When the Multiple-IMSID option is enabled, the DB Historical Data Analyzer report shows each HISTORY record entry sorted by IMSIDs. Only the HISTORY records that are stored by HD Pointer Checker while Multiple-IMSID is enabled are reported. HISTORY data set can have up to 15 different IMSIDs.

NO

Changes the HISTORY data set to disable the Multiple-IMSID option. Only the HISTORY records that are stored by HD Pointer Checker while Multiple-IMSID is disabled are reported. DB Historical Data Analyzer reports the HISTORY data set entries without sorting by IMSIDs. When HISTORY data set is created by the TYPE=CREATE option, the Multiple-IMSID option is disabled.

Notes:

- When Multiple-IMSID option is enabled, DBHDA processes only the HISTORY data set records that are stored by HD Pointer Checker while the option is enabled. When the option is disabled, DB Historical Data Analyzer processes only the records that are stored while the option is disabled. This also applies to the DELETE operation.
- There is a compatibility issue for selecting MULTIIMSID=YES. For details, see Format (MULTIIMSID=YES/NO).

ENDPROC control statement

The ENDPROC control statement specifies the end of the user's specification by a PROC control statement. Each PROC control statement must have an associated ENDPROC control statement.

The syntax of the ENDPROC control statement is shown in the following figure.

This control statement has no keywords.

Control member data set (SPMNMBR)

This input data set is an OS-partitioned data set (PDS), whose members contain one or more control statements. Each control statement describes a database data set to be analyzed by DB Historical Data Analyzer.

This data set is the same as the one used by Space Monitor (SPMNMBR data set).

This data set is required when the MEMBER keyword of the DATABASE control statement is specified in the HISTIN data set.

Note: Control statements that define non-IMS data sets are ignored.

For more information about the format of the control statements, see “Control member data set (SPMNMBR)” on page 498.

Output

The following topics describe the output that DB Historical Data Analyzer produces when it is run as a batch job.

HISTMSG data set

This data set contains the HISTORY Data Set Message report.

HISTORY Data Set Message report

This report shows the control statements specified in the HISTIN data set.

The following control statements are reported:

- PROC statement
- DATABASE statement
- OPTION statement
- ENDPROC statement

This report also shows messages from the DB Historical Data Analyzer FABGHIST program.

The following figure shows an example of the HISTORY Data Set Message report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA          "HISTORY DATA SET MESSAGE REPORT"                    PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 17.37.24                      FABGHIST - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

 PROC TYPE=ATTRLIST
 ENDPROC

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = ATTRLIST)
 PROC TYPE=ANALYSIS
 ENDPROC

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = ANALYSIS)
 PROC TYPE=LIST
 ENDPROC

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = LIST    )
 PROC TYPE=SUMMARY
 ENDPROC

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = SUMMARY )

FABG1000I FABGHIST ENDED NORMALLY
```

Figure 168. HISTMSG: HISTORY Data Set Message report

HISTPRT data set

This data set contains the reports generated by DB Historical Data Analyzer.

The following reports are generated in this data set:

- HISTORY Data Set by Key Date report
- HISTORY Data Set by DB-DS report
- HD Pointer Checker Summary report
- HD Analysis report
- History Attribute report

HISTORY Data Set by Key Date report

This report contains a list of all the entries in the HISTORY data set sorted by the key date and time.

DB Historical Data Analyzer generates this report when TYPE=LIST is specified for the PROC control statement in the HISTIN data set.

Subsections:

- “Report example” on page 390
- “Report field description” on page 390

Report example

The following figure shows an example of the HISTORY Data Set by Key Date report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA       "HISTORY DATA SET BY KEY DATE REPORT"                 PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1


KEY DATA      DBNAME   DDNAME         DBNAME   DDNAME         DBNAME   DDNAME         DBNAME   DDNAME         DBNAME   DDNAME
----------    -------- --------       -------- --------       -------- --------       -------- --------       -------- --------
07/10/2020    HDAMDB2  HDAMDS4        HISAMDB1 HISAMDS1       HISAMDB1 HISAMDS2       TPFOH1   TPFOH1AA       TPFOH1   TPFOH1AB
  17:33:53    TPFOH2   TPFOH2AA       TPFOH2   TPFOH2AX       TPFOH3   TPFOH3AA       TPFOX1   TPFOX1AA
```

Figure 169. HISTPRT: HISTORY Data Set by Key Date report

Report field description

This report contains the following information:

KEY DATA
The date and time when the real database data set of the database was scanned by the HD Pointer Checker run. If an image copy data set is processed instead of the real database data set, the time stamp of the image copy data set is used.

DBNAME
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DDNAME
The ddname of the data set group.

(*)
This indicator shows that the associated database data set was scanned, but that the HD Pointer Checker validation/evaluation has not been performed yet.

(E)

Attention: This indicator shows that the entry is invalid and needs to be deleted by the PROC TYPE=DELETE statement. An invalid HISTORY data set entry might be created when HD Pointer Checker run fails while processing the database data set group, and a rerun is not done for the same database data set group on the same day.

HISTORY Data Set by DB-DS report

This report contains a list of all the entries of the HISTORY data set sorted by the database data set name.

DB Historical Data Analyzer generates this report when TYPE=LIST is specified for the PROC control statement in the HISTIN data set.

Subsections:

- "Report example" on page 391
- "Report field description" on page 391

Report example

The following figure shows an example of the HISTORY Data Set by DB-DS report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA          "HISTORY DATA SET BY DB-DS REPORT"                    PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1


DBNAME   DDNAME      ENTRIES (SHOWN BY KEY DATA)
-------- --------    ------------------------------------------------------------------------------------------------------------
HDAMDB2  HDAMDS4     07/10/2020-17:33:53
HISAMDB1 HISAMDS1    07/10/2020-17:33:53
HISAMDB1 HISAMDS2    07/10/2020-17:33:53
TPFOH1   TPFOH1AA    07/10/2020-17:33:53
TPFOH1   TPFOH1AB    07/10/2020-17:33:53
TPFOH2   TPFOH2AA    07/10/2020-17:33:53
TPFOH2   TPFOH2AX    07/10/2020-17:33:53
TPFOH3   TPFOH3AA    07/10/2020-17:33:53
TPFOX1   TPFOX1AA    07/10/2020-17:33:53
```

Figure 170. HISTPRT: HISTORY Data Set by DB-DS report

Report field description

This report contains the following information:

DBNAME
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DDNAME
The ddname of the data set group.

ENTRIES (SHOWN BY KEY DATE)
The date and time when the real database data set of the database was scanned by the HD Pointer Checker run. If an image copy data set is processed instead of the real database data set, the time stamp of the image copy data set is used.

(*)
This indicator shows that the associated database data set was scanned on this date, but that the HD Pointer Checker validation/evaluation has not been performed yet.

(E)

Attention: This indicator shows that the entry is invalid and needs to be deleted by the PROC TYPE=DELETE statement. An invalid HISTORY data set entry might be created when HD Pointer Checker run fails while processing the database data set group, and a rerun is not done for the same database data set group on the same day.

HD Pointer Checker Summary report

This report summarizes the entire HD Pointer Checker run results. Two lines of information are produced for each database data set processed by the HD Pointer Checker run.

DB Historical Data Analyzer generates this report when TYPE=SUMMARY is specified for the PROC control statement in the HISTIN data set.

The summary data for each database data set group is retrieved from its last entry in the HISTORY data set, which is usually the result of the *most recent* HD Pointer Checker run (with HISTORY=YES option) for the database data set group.

This report is also generated at the end of the HD Pointer Checker run with TYPE=ALL, SCAN, or CHECK option. For a detailed description of the runs, see the parameter description of “PROC statement” on page 108.

Subsections:

- “Report example” on page 392
- “Report field description” on page 392

Report example

The following figure shows an example of the HD Pointer Checker Summary report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA        "HD POINTER CHECKER SUMMARY REPORT"                    PAGE:     1
5655-U09                                              DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1


DBNAME/        DDNAME/          C-DATE/    D-DATE/    D-TIME/   CHK-DATE/  CHK-TIME/ DATA-SET SIZE     F-SPACE %/  DETECTED ERRORS
DB# DSG# DBLG# DB-ORGANIZATION  ACCM BLKSZ LRECL DBTYPE DEVICE  %SEGMS IN OFLW       CYL'S     BYTES     BYTES     TOTAL  UNKNOWN
--- ---- ----- ---------------  ---- ----- ----- -------------  -------------------  ----   ---------  ----------  -----  -------

HDAMDB2        HDAMDS4          07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53                          8 %
N/A 01   N/A   HDAM             ESDS  1024  1017   REAL  3390    98                     5     2533376      215670     0         0

HISAMDB1       HISAMDS1         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53
N/A 01   N/A   HISAM            KSDS  8192   510   REAL  3390    99                                                  0         0

HISAMDB1       HISAMDS2         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53
N/A 01   N/A   HISAM       OFLW ESDS  8192   510   REAL  3390    N/A                                                 0         0

TPFOH1         TPFOH1AA         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53                          1 %
N/A  A   N/A   PHDAM            ESDS   512   505   REAL  3390    73                    27    10160128      147298     0         0

TPFOH1         TPFOH1AB         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53                         87 %
N/A  B   N/A   PHDAM            ESDS   512   505   REAL  3390     0                     1      375808      329850     0         0

TPFOH2         TPFOH2AA         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53                         10 %
N/A  A   N/A   PHIDAM           ESDS   512   505   REAL  3390     0                     6     2257408      241226     0         0

TPFOH2         TPFOH2AX         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53
N/A  X   N/A   PHIDAM IDX       KSDS   512    14   REAL  3390    N/A

TPFOH3         TPFOH3AA         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53                         37 %
N/A  A   N/A   PHDAM            ESDS   512   505   REAL  3390    65                     2      752128      280350     0         0

TPFOX1         TPFOX1AA         07/06/2020 07/10/2020 17.33.53  07/10/2020 17.33.53
N/A  A   N/A   PSINDEX          KSDS   512    54   REAL  3390    N/A
```

Figure 171. HISTPRT: HD Pointer Checker Summary report

Report field description

This report contains the following information:

DBNAME
Name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DDNAME
DDname of the data set group.

C-DATE
The date when the database data set was actually created (if available). If the specified database data set is an image copy data set, this is the date when the image copy database data set was created.

D-DATE, D-TIME
If the specified data set is a real database data set, then these are the date and time when HD Pointer Checker SCAN process was performed.

If the specified data set is an image copy database data set, then these are the date and time when the image copy data set was created.

CHK-DATE, CHK-TIME
Date and time when HD Pointer Checker CHECK process was performed.

DATA-SET SIZE
Data set size shown in cylinders (CYL'S) and in bytes (BYTES).

This field applies to HDAM and HIDAM databases.

F-SPACE
Amount of reusable database free space according to the bitmap block. The value is shown in bytes (BYTES) and in percentage (%).

This field applies to HDAM and HIDAM databases.

DETECTED ERRORS
The total number of errors is shown under TOTAL. This includes the total number of unknown areas (T2 records), which is shown under UNKNOWN.

KEY
Error type indicator. It indicates an error of the index key check.

HASH
Error type indicator. It indicates an error found during the HASH Check.

For a detailed description of the T2 record, index key check, and HASH Check, see “Detecting errors in a database” on page 31.

DB#
Database number used to identify the database throughout the HD Pointer Checker run. This field always shows "N/A."

DSG#
Data set group number. It is the ordinal number of the data set group. 1 to 10 is shown for non-HALDB, A to J and X for HALDB.

DBLG#
Database logical group number which indicates that physical databases with the same database logical group number are logically related to each other. This number is used throughout the HD Pointer Checker run. This field always shows "N/A."

DB-ORGANIZATION
IMS database organization used for this database. One of the following texts is shown:

- SHISAM
- HISAM
- HISAM OFLW
- HDAM
- HIDAM
- HIDAM INDEX
- HIDAM INDEX OFLW
- 2NDARY INDX
- 2NDARY INDX OFLW
- SHR 2ND IDX

- SHR 2ND IDX OFLW
- PHDAM
- PHIDAM
- PHIDAM IDX
- PSINDEX

ACCM
Access method used for this database data set (OSAM, ESDS, or KSDS).

BLKSZ
Block size or control interval (CI) size of the database data set.

LRECL
Logical record length of the database data set.

DBTYPE
Type (REAL or IMGCPY) of database data set.

REAL
Indicates the real database data set

IMGCPY
Indicates the image copy data set. If an image copy is used as an input data set, and if it was more than five days old when HD Pointer Checker SCAN process was performed, an asterisk * is shown after IMGCPY.

DEVICE
Device type of the database data set. If an image copy data set is used, the type of the image copy data set (TAPE or DASD) is shown.

%SEGMS IN OFLW
Percentage of segments in the overflow area.

This field applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

HD Analysis report

This report contains concise information of HD Pointer Checker output that is maintained in the HISTORY data set.

The major advantages of this report are:

- Volume of HD Pointer Checker output can be reduced.

  Many of the HD Pointer Checker reports are produced by options. The user, however, can request the HD Analysis report instead of requesting the other HD Pointer Checker reports to reduce the volume of output.
- Analysis of the HD Pointer Checker output becomes much easier.
- All essential data for each database data set is summarized in one to several pages, depending on the number of dependent segment types.

DB Historical Data Analyzer generates this report when TYPE=ANALYSIS is specified for the PROC control statement in the HISTIN data set. DB Historical Data Analyzer generates this report *for each HALDB partition*, *for each database data set group*, and *for each date and time*. In other words, if the HISTORY data set has three entries for a database data set group within the period specified by the FROM or TO parameters of the associated DATABASE control statement, three reports are generated for the database data set group.

If the PROC control statement with TYPE=ANALYSIS option has no associated DATABASE control statements, DB Historical Data Analyzer generates this report for each database data set group in the HISTORY data set, using their latest entries in the HISTORY data set.

This report contains the following information about the specified database data set group of the specified date and of the previous date, if it exists:

- Report heading
- Database description
- HD Pointer Checker run time options
- Database data set space utilization
- HISAM statistics
- HIDAM index statistics or partitioned HIDAM (PHIDAM) index statistics
- Secondary index statistics or partitioned secondary index (PSINDEX) statistics
- Pointer validation
- Free space statistics
- Segment distribution statistics
- HD tuning statistics
- Segment and pointer occurrences

Notes:

- The information to be provided on the report varies depending on the type of database data set group. For example, for a primary index database, only the information under the headings "REPORT HEADING", "DATABASE DESCRIPTION," "RUN TIME OPTION," "SPACE UTILIZATION," and "HIDAM INDEX STATISTICS" are generated.
- In the following description, the term *DB* indicates database.

Subsections:

- “Report examples” on page 395
- “Report field description: Heading” on page 401
- “Report field description: DATABASE DESCRIPTION” on page 402
- “Report field description: ENVIRONMENT” on page 403
- “Report field description: RUN TIME OPTION” on page 403
- “Report field description: SPACE UTILIZATION” on page 404
- “Report field description: HISAM (or HIDAM INDEX or SECONDARY INDEX) STATISTICS” on page 404
- “Report field description: POINTER VALIDATION” on page 405
- “Report field description: FREE SPACE STATISTICS” on page 405
- “Report field description: SEGMENT DISTRIBUTION STATISTICS” on page 406
- “Report field description: HD TUNING STATISTICS” on page 407
- “Report field description: SEGMENT AND POINTER OCCURRENCES” on page 409

Report examples

The following figures show examples of the HD Analysis report.

- “HD Analysis report for a HISAM database” on page 396
- “HD Analysis report for a PHDAM database primary data set group” on page 397
- “HD Analysis report for a PHDAM database secondary data set group” on page 399
- “HD Analysis report for a PHIDAM database” on page 400
- “HD Analysis report for a PHIDAM index database” on page 401
- “HD Analysis report for a PSINDEX database” on page 401

HD Analysis report for a HISAM database

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     1
5655-U09                                          DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1


DBNAME: HISAMDB1   DDNAME: HISAMDS1   DSG#: 01         *** H I S A M  DB ***
                                                                                    SPECIFIED DATA       PREVIOUS DATA

                                                                                  DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                    ENVIRONMENT                               TIME:   17:33:53     TIME:  NONE
-------------------------------------   -----------                             (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : HISAM            IMSID                           =                  SYS1
ACCESS METHOD          : KSDS/ESDS      RUN TIME OPTION
PRIME DD NAME          : HISAMDS1       ---------------
OVERFLOW DD NAME       : HISAMDS2         HASH                            =                    NO
INPUT DATABASE         : REAL             EPSCHK                          =                   N/A
CREATION DATE          : 07/06/2020       IXKEYCHK                        =                   N/A
REAL DATABASE DEVICE   : 3390             SYMIXCHK                        =                    NO
BLOCK SIZE             :  8192            SYMLPCHK                        =                   YES
LOGICAL RECORD LENGTH  :   510            HOMECHK                         =                   N/A
KEY LENGTH             :    10            INCORE                          =                   N/A
                                          T2CHK                           =                 (00,07)
                                          ZEROCTR                         =                    NO
                                        SPACE UTILIZATION
                                        -----------------                                 PRIME  OVFLOW
                                          TYPE                            =                CYLS    CYLS
                                          PRIMARY ALLOCATION              =                  50      50
                                          SECONDARY ALLOCATION            =                  50      20
                                          EXTENTS                         =                   1       1
                                          ALLOCATED SPACE (TRKS)          =                 750     750
                                          USED SPACE      ( % )           =                 0 %    29 %
                                          CI-SPLITS                       =                   0
                                          CA-SPLITS                       =                   0
                                        POINTER VALIDATION
                                        ------------------
                                          EVALUATION ERRORS IN CHECK PROCESSING   =                     0

                                        HISAM STATISTICS
                                        ----------------
                                          TOTAL SEGMENTS IN PRIME DB              =                   584
                                          DELETED SEGMENTS IN PRIME DB            =                     0
                                          POINTERS IN PRIME DB (T8 RECORDS)       =                   278
                                          TOTAL SEGMENTS IN OVERFLOW DB           =                106017
                                          DELETED SEGMENTS IN OVERFLOW DB         =                     0
                                          POINTERS IN OVERFLOW DB (T9 RECORDS)    =                 30082

                                        SEGMENT DISTRIBUTION STATISTICS
                                        -------------------------------
                                          SEGMENTS IN DATA SET                    =                106601
                                          ROOT SEGMENTS                           =                   130
                                          DEPENDENT SEGMENTS                      =                106471
                                          ROOTS WITH NO DEPENDENTS IN SAME BLOCK  =             0     0 %
                                          AVG. DATABASE RECORD LENGTH             =                 74927

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     2
5655-U09                                          DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1


SEGMENT AND POINTER OCCURRENCES
-------------------------------

SC  SEGNAME   ------ POINTER TYPES -------  PAIRING    --- LENGTH ----  ------ OCCURRENCES ------
               C P P P L L L P P L L E * *      TARGT
               T T T P T T P C C C C P L L  TP  DB SC  PREFIX  ACT-MAX  TOTAL       OCC/RT
              .R.F.B. .F.B. .F.L.F.L.S.P.C             SEGMENT          OVERFLOW
--  --------  ----------------------------  -- --- --  ------- -------  ----------- -------------

01  ROOT       X                          X                   6     106           130           1.0
                                                             106                     0

02  DEP1                   X                P 001 01        6     106          9100          70.0
                                                             106                8952

03  DEP12                                                      2     177         13706         105.4
                                                            120V                13605

04  DEP121                                                     2     142          6841          52.6
                                                            102V                 6794

05  DEP1211                                                    2     102          6812          52.4
                                                             82V                 6798

06  DEP122                                                     2     132         13593         104.5
                                                             94V                13567

07  DEP1221                                                    2     102         13593         104.5
                                                             82V                13585

08  DEP123                                                     2     102         20324         156.3
                                                             82V                20300

09  DEP2                                                       2     102         22502         173.0
                                                             82V                22416
```

Figure 172. HISTPRT: HD Analysis report (HISAM database)

HD Analysis report for a PHDAM database primary data set group

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA              "HD ANALYSIS REPORT"                          PAGE:     1
5655-U09                                        DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1


DBNAME: TPFOH1     DDNAME: TPFOH1AA   DSG#:  A          *** P R I M E  DB ***
                                                                                    SPECIFIED DATA       PREVIOUS DATA

                                                                                  DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                      ENVIRONMENT                              TIME:   17:33:53     TIME:  NONE
-----------------------------------       -----------                           (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : PHDAM              IMSID                          =                  SYS1
ACCESS METHOD          : ESDS             RUN TIME OPTION
PRIME DD NAME          : TPFOH1AA         ---------------
INPUT DATABASE         : REAL               HASH                           =                    NO
CREATION DATE          : 07/06/2020         EPSCHK                         =                   YES
REAL DATABASE DEVICE   : 3390               IXKEYCHK                       =                    NO
BLOCK SIZE             :   512              SYMIXCHK                       =                    NO
LOGICAL RECORD LENGTH  :   505              SYMLPCHK                       =                    NO
KEY LENGTH             :     8              HOMECHK                        =                   YES
                                            INCORE                         =                   YES
                                            T2CHK                          =                 (00,07)
                                            ZEROCTR                        =                    NO
                                          SPACE UTILIZATION
                                          -----------------
                                            TYPE                           =                  CYLS
                                            PRIMARY ALLOCATION             =                    50
                                            SECONDARY ALLOCATION           =                    50
                                            EXTENTS                        =                     1
                                            ALLOCATED SPACE (TRKS)         =                   750
                                            USED SPACE      ( % )          =                  54 %
                                          POINTER VALIDATION
                                          ------------------
                                            VALIDATION ERRORS IN SCAN PROCESSING    =              0
                                            VALIDATION ERRORS IN CHECK PROCESSING   =              0
                                            EVALUATION ERRORS IN CHECK PROCESSING   =              0
                                            TOTAL BLOCKS IN DATA SET                =          19844
                                            HIGH RBA IN HEX                         =       00098BC04
                                            HIGH RBA IN DEC                         =       10009604
                                            % POINTERS VALIDATED IN MEMORY          =         72.1 %

                                          FREE SPACE STATISTICS
                                          ---------------------
                                            FREE SPACE ELEMENTS                     =          16763
                                            BLOCKS WITH SPACE (BITMAP)              =    295     1 %
                                            REUSABLE FREE SPACE (BITMAP)            =  147298     1 %
                                            NOT REUSABLE FREE SPACE (BITMAP)        =  760592     7 %
                                            EMPTY BLOCKS                            =     294     1 %

                                          SEGMENT DISTRIBUTION STATISTICS
                                          ------------------------------
                                            SEGMENTS IN DATA SET                    =          80037
                                            ROOT SEGMENTS                           =          11000
                                            DEPENDENT SEGMENTS                      =          69037
                                            ROOTS WITH NO DEPENDENTS IN SAME BLOCK  =    7543    68 %
                                            AVG. COUNT OF DEPS IN SAME BLK AS ROOT  =             2.5
                                            DEPENDENTS NOT IN SAME BLOCK WITH ROOT  =   60244    87 %
```

Figure 173. HISTPRT: HD Analysis report (PHDAM database primary data set group) (Part 1 of 2)

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     2
5655-U09                                              DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1

                                                                                                  SPECIFIED DATA       PREVIOUS DATA

                                                                                                DATE: 07/10/2020     DATE:  NONE
                                        HD TUNING STATISTICS                                     TIME:   17:33:53     TIME:  NONE
                                        --------------------                                  (CREATED BY: HDPC)   (CREATED BY: NONE)
                                          DIRECT ALGORITHM NAME                  =                      DFSHDC40
                                          LONGEST SEGMENT IN DATA SET            =                           246
                                          HIGH BLOCK NUMBER IN RAA               =                          4500
                                          RAPS PER BLOCK                         =                             1
                                          TOTAL RAPS                             =                          4500
                                          BYTE LIMIT COUNT                       =                           N/A
                                          AVG. DATABASE RECORD LENGTH            =                           793
                                          FREE SPACE SCAN CYLINDERS              =                             0
                                          FSPC BLK. EVERY N BLKS                 =                             0
                                          % FSPC WITHIN EACH BLK                 =                             0
                                          NO. KEY RECORDS WRITTEN                =                             0

                                          ROOTS IN HOME BLOCK                    =                  2991    27 %
                                          ROOTS 1 BLOCK AWAY                     =                    35     0 %
                                          ROOTS BEYOND                           =                  1244    11 %
                                          ROOTS IN OVERFLOW                      =                  6730    61 %

                                          BLOCKS WITHOUT ROOTS IN RAA            =                  1436    31 %
                                          AVG. COUNT OF ROOTS PER ACT. BLK IN RAA =                                1.3
                                          AVG. COUNT OF ROOTS PER ACTIVE RAP     =                                2.6
                                          COUNT OF RAPS NOT USED                 =                   410     9 %

SEGMENT AND POINTER OCCURRENCES
-------------------------------

SC  SEGNAME   ------ POINTER TYPES -------  PAIRING    --- LENGTH ----  ------ OCCURRENCES ------  --- COUNT OF POINTERS -----------
               C P P P L L L P P L L E * *      TARGT                                                --- POINTING TO ------
               T T T P T T P C C C C P L L  TP  DB SC  PREFIX  ACT-MAX  TOTAL       OCC/RT         SAME BLOCK  ADJ-BLOCKS  TOTAL
              .R.F.B. .F.B. .F.L.F.L.S.P.C             SEGMENT          OVERFLOW                   BEYOND     EXTERNAL
--  --------  ----------------------------  -- --- --  ------- -------  ----------- -------------  ---------- ----------  ----------

    * RAP *                                                                                                    2343         16        4090
                                                                                                               1731          0

01  AROOTLV1     X X         3 1                          34     134         11000           1.0        6025       3819       30732
                                                          99V                 6730                      20668        220

02  ADEP1LV2     X X X               X       U 005 01     50     170           220           0.0           4          0         440
                                                         131V                  215                       216        220

04  ADEP3LV2     X   X       2                            26     226         16540           1.5       21930      11076       44167
                                                         226                 12055                      11161          0

05  ADEP4LV3     X X X                                    22      38         16517           1.5       24488       1737       27495
                                                          37V                12099                       1270          0

06  ADEP5LV3   X X X X       1                            30      44          8295           0.7       13375       1054       15187
                                                          44V                 6045                        758          0

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     3
5655-U09                                              DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1


SEGMENT AND POINTER OCCURRENCES
-------------------------------

SC  SEGNAME   ------ POINTER TYPES -------  PAIRING    --- LENGTH ----  ------ OCCURRENCES ------  --- COUNT OF POINTERS -----------
               C P P P L L L P P L L E * *      TARGT                                                --- POINTING TO ------
               T T T P T T P C C C C P L L  TP  DB SC  PREFIX  ACT-MAX  TOTAL       OCC/RT         SAME BLOCK  ADJ-BLOCKS  TOTAL
              .R.F.B. .F.B. .F.L.F.L.S.P.C             SEGMENT          OVERFLOW                   BEYOND     EXTERNAL
--  --------  ----------------------------  -- --- --  ------- -------  ----------- -------------  ---------- ----------  ----------

07  ADEP6LV4     X   X       1 1                          26     226         20573           1.8       22316       6711       48298
                                                          58V                15081                      19271          0

08  ADEP7LV5     X   X               X       U 003 06     46     246          6892           0.6           0          0       13784
                                                         246                  6892                       6892       6892
```

Figure 174. HISTPRT: HD Analysis report (PHDAM database primary data set group) (Part 2 of 2)

HD Analysis report for a PHDAM database secondary data set group

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     1
5655-U09                                        DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1


DBNAME: TPFOH1     DDNAME: TPFOH1AB   DSG#:  B          *** P R I M E  DB ***
                                                                                      SPECIFIED DATA       PREVIOUS DATA

                                                                                    DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                    ENVIRONMENT                                  TIME:   17:33:53     TIME:  NONE
----------------------------------      -----------                                (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : PHDAM            IMSID                                =                SYS1
ACCESS METHOD          : ESDS           RUN TIME OPTION
PRIME DD NAME          : TPFOH1AB       ---------------
INPUT DATABASE         : REAL             HASH                               =                  NO
CREATION DATE          : 07/06/2020       EPSCHK                             =                 YES
REAL DATABASE DEVICE   : 3390             IXKEYCHK                           =                  NO
BLOCK SIZE             :   512            SYMIXCHK                           =                  NO
LOGICAL RECORD LENGTH  :   505            SYMLPCHK                           =                  NO
KEY LENGTH             :     8            HOMECHK                            =                 YES
                                          INCORE                             =                 YES
                                          T2CHK                              =              (00,07)
                                          ZEROCTR                            =                  NO
                                        SPACE UTILIZATION
                                        -----------------
                                          TYPE                               =                CYLS
                                          PRIMARY ALLOCATION                 =                  50
                                          SECONDARY ALLOCATION               =                  50
                                          EXTENTS                            =                   1
                                          ALLOCATED SPACE (TRKS)             =                 750
                                          USED SPACE      ( % )              =                 2 %
                                        POINTER VALIDATION
                                        ------------------
                                          VALIDATION ERRORS IN SCAN PROCESSING    =                  0
                                          VALIDATION ERRORS IN CHECK PROCESSING   =                  0
                                          EVALUATION ERRORS IN CHECK PROCESSING   =                  0
                                          TOTAL BLOCKS IN DATA SET                =                734
                                          HIGH RBA IN HEX                         =          000009604
                                          HIGH RBA IN DEC                         =              38404
                                          % POINTERS VALIDATED IN MEMORY          =              0.0 %

                                        FREE SPACE STATISTICS
                                        ---------------------
                                          FREE SPACE ELEMENTS                =                733
                                          BLOCKS WITH SPACE (BITMAP)         =        660    89 %
                                          REUSABLE FREE SPACE (BITMAP)       =     329850    87 %
                                          NOT REUSABLE FREE SPACE (BITMAP)   =       3650     0 %
                                          EMPTY BLOCKS                       =        659    89 %

                                        SEGMENT DISTRIBUTION STATISTICS
                                        -------------------------------
                                          SEGMENTS IN DATA SET               =                220
                                          ROOT SEGMENTS                      =                N/A
                                          DEPENDENT SEGMENTS                 =                220
                                          ROOTS WITH NO DEPENDENTS IN SAME BLOCK  =           N/A
                                          AVG. COUNT OF DEPS IN SAME BLK AS ROOT  =           N/A
                                          DEPENDENTS NOT IN SAME BLOCK WITH ROOT  =           N/A

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA               "HD ANALYSIS REPORT"                          PAGE:     2
5655-U09                                        DATE: 07/10/2020  TIME: 17.37.25                        FABGHIST - V3.R1

                                                                                      SPECIFIED DATA       PREVIOUS DATA

                                                                                    DATE: 07/10/2020     DATE:  NONE
                                        HD TUNING STATISTICS                         TIME:   17:33:53     TIME:  NONE
                                        --------------------                       (CREATED BY: HDPC)   (CREATED BY: NONE)
                                          AVG. DATABASE RECORD LENGTH        =                  3
                                          LONGEST SEGMENT IN DATA SET        =                150

SEGMENT AND POINTER OCCURRENCES
-------------------------------

SC  SEGNAME   ------ POINTER TYPES -------  PAIRING    --- LENGTH ----  ------ OCCURRENCES ------  --- COUNT OF POINTERS -----------
               C P P P L L L P P L L E * *      TARGT                                                --- POINTING TO ------
               T T T P T T P C C C C P L L  TP  DB SC  PREFIX  ACT-MAX  TOTAL       OCC/RT         SAME BLOCK  ADJ-BLOCKS  TOTAL
              .R.F.B. .F.B. .F.L.F.L.S.P.C             SEGMENT          OVERFLOW                   BEYOND     EXTERNAL
--  --------  ----------------------------  -- --- --  ------- -------  ----------- --------------  ---------- ----------  ----------

03  ADEP2LV2     X X X              X       P 004 01      50     150           220           0.0           0          0         660
                                                        150                     0                         0        660
```

Figure 175. HISTPRT: HD Analysis report (PHDAM database secondary data set group)

HD Analysis report for a PHIDAM database

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA                "HD ANALYSIS REPORT"                                PAGE:     1
5655-U09                                                   DATE: 07/10/2020  TIME: 17.37.25                          FABGHIST - V3.R1


DBNAME: TPFOH2     DDNAME: TPFOH2AA   DSG#:  A          *** P R I M E  DB ***
                                                                                                  SPECIFIED DATA       PREVIOUS DATA

                                                                                                DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                      ENVIRONMENT                                           TIME:   17:33:53     TIME:  NONE
-------------------------------------     -----------                                         (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : PHIDAM             IMSID                                  =                      SYS1
ACCESS METHOD          : ESDS             RUN TIME OPTION
PRIME DD NAME          : TPFOH2AA         ---------------
INPUT DATABASE         : REAL               HASH                                   =                        NO
CREATION DATE          : 07/06/2020         EPSCHK                                 =                       YES
REAL DATABASE DEVICE   : 3390               IXKEYCHK                               =                       YES
BLOCK SIZE             :   512              SYMIXCHK                               =                        NO
LOGICAL RECORD LENGTH  :   505              SYMLPCHK                               =                        NO
KEY LENGTH             :     8              HOMECHK                                =                       YES
                                            INCORE                                 =                       YES
                                            T2CHK                                  =                    (00,07)
                                            ZEROCTR                                =                        NO
                                          SPACE UTILIZATION
                                          -----------------
                                            TYPE                                   =                      CYLS
                                            PRIMARY ALLOCATION                     =                        50
                                            SECONDARY ALLOCATION                   =                        50
                                            EXTENTS                                =                         1
                                            ALLOCATED SPACE (TRKS)                 =                       750
                                            USED SPACE      ( % )                  =                      12 %
                                          POINTER VALIDATION
                                          ------------------
                                            VALIDATION ERRORS IN SCAN PROCESSING   =                         0
                                            VALIDATION ERRORS IN CHECK PROCESSING  =                         0
                                            EVALUATION ERRORS IN CHECK PROCESSING  =                         0
                                            TOTAL BLOCKS IN DATA SET               =                      4409
                                            HIGH RBA IN HEX                        =                  0001EACCA
                                            HIGH RBA IN DEC                        =                    2010314
                                            % POINTERS VALIDATED IN MEMORY         =                     99.6 %

                                          FREE SPACE STATISTICS
                                          ---------------------
                                            FREE SPACE ELEMENTS                    =                      4407
                                            BLOCKS WITH SPACE (BITMAP)             =               484    10 %
                                            REUSABLE FREE SPACE (BITMAP)           =            241226    10 %
                                            NOT REUSABLE FREE SPACE (BITMAP)       =            158474     7 %
                                            EMPTY BLOCKS                           =               482    10 %

                                          SEGMENT DISTRIBUTION STATISTICS
                                          -------------------------------
                                            SEGMENTS IN DATA SET                   =                     18178
                                            ROOT SEGMENTS                          =                      9000
                                            DEPENDENT SEGMENTS                     =                      9178
                                            ROOTS WITH NO DEPENDENTS IN SAME BLOCK =              5356    59 %
                                            AVG. COUNT OF DEPS IN SAME BLK AS ROOT =                       1.3
                                            DEPENDENTS NOT IN SAME BLOCK WITH ROOT =              4394    47 %

IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA                "HD ANALYSIS REPORT"                                PAGE:     2
5655-U09                                                   DATE: 07/10/2020  TIME: 17.37.25                          FABGHIST - V3.R1

                                                                                                  SPECIFIED DATA       PREVIOUS DATA

                                                                                                DATE: 07/10/2020     DATE:  NONE
                                          HD TUNING STATISTICS                                  TIME:   17:33:53     TIME:  NONE
                                          --------------------                                (CREATED BY: HDPC)   (CREATED BY: NONE)
                                            DIRECT ALGORITHM NAME                  =                      N / A
                                            LONGEST SEGMENT IN DATA SET            =                        122
                                            HIGH BLOCK NUMBER IN RAA               =                       4409
                                            RAPS PER BLOCK                         =                          0
                                            TOTAL RAPS                             =                          0
                                            BYTE LIMIT COUNT                       =                        N/A
                                            AVG. DATABASE RECORD LENGTH            =                        200
                                            FREE SPACE SCAN CYLINDERS              =                          0
                                            FSPC BLK. EVERY N BLKS                 =                          0
                                            % FSPC WITHIN EACH BLK                 =                          0
                                            NO. KEY RECORDS WRITTEN                =                          0

                                            BLOCKS WITHOUT ROOTS IN RAA            =               613    13 %
                                            COUNT OF RAPS NOT USED                 =                 0     0 %

SEGMENT AND POINTER OCCURRENCES
-------------------------------

SC  SEGNAME   ------ POINTER TYPES -------  PAIRING    --- LENGTH ----  ------ OCCURRENCES ------  --- COUNT OF POINTERS -----------
               C P P P L L L P P L L E * *      TARGT                                                --- POINTING TO ------
               T T T P T T P C C C C P L L  TP  DB SC  PREFIX  ACT-MAX  TOTAL       OCC/RT         SAME BLOCK  ADJ-BLOCKS  TOTAL
              .R.F.B. .F.B. .F.L.F.L.S.P.C             SEGMENT          OVERFLOW                   BEYOND     EXTERNAL
--  --------  ----------------------------  -- --- --  ------- -------  ----------- -------------  ---------- ----------  ----------

01  BROOTLV1   X X X         1                            26      76          9000           1.0       14053       9726       24037
                                                          76                     0                       258          0

02  BDEP1LV2     X X X                                    22     122          9178           1.0        9506       5952       15458
                                                         122                     0                         0          0
```

Figure 176. HISTPRT: HD Analysis report (PHIDAM database)

HD Analysis report for a PHIDAM index database

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA              "HD ANALYSIS REPORT"                          PAGE:     1
5655-U09                                        DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1


DBNAME: TPFOH2     DDNAME: TPFOH2AX   DSG#:  X          *** PRIMARY  I N D E X  DB ***
                                                                                  SPECIFIED DATA       PREVIOUS DATA

                                                                               DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                    ENVIRONMENT                            TIME:   17:33:53     TIME:  NONE
-------------------------------------   -----------                          (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : PHIDAM IDX       IMSID                          =                SYS1
ACCESS METHOD          : KSDS           RUN TIME OPTION
INDEXED PRIME DB NAME  : TPFOH2         ---------------
INDEX DD NAME          : TPFOH2AX         HASH                           =                  NO
OVERFLOW DD NAME       :                  EPSCHK                         =                  NO
INPUT DATABASE         : REAL             IXKEYCHK                       =                 YES
CREATION DATE          : 07/06/2020       SYMIXCHK                       =                  NO
REAL DATABASE DEVICE   : 3390             SYMLPCHK                       =                  NO
BLOCK SIZE             :   512            HOMECHK                        =                 N/A
LOGICAL RECORD LENGTH  :    14            INCORE                         =                 N/A
KEY LENGTH             :     8            T2CHK                          =                 N/A
                                          ZEROCTR                        =                 N/A
                                        SPACE UTILIZATION
                                        -----------------                              PRIME
                                          TYPE                           =               CYLS
                                          PRIMARY ALLOCATION             =                 20
                                          SECONDARY ALLOCATION           =                 10
                                          EXTENTS                        =                  1
                                          ALLOCATED SPACE (TRKS)         =                300
                                          USED SPACE      ( % )          =                2 %
                                          CI-SPLITS                      =                  0
                                          CA-SPLITS                      =                  0

                                        HIDAM INDEX STATISTICS
                                        ----------------------
                                          TOTAL SEGMENTS IN PRIME DB             =                    9001
                                          DELETED SEGMENTS IN PRIME DB           =                       0
                                          POINTERS IN PRIME DB (T6 RECORDS)      =                    9001
                                          TOTAL SEGMENTS IN OVERFLOW DB          =                       0
                                          DELETED SEGMENTS IN OVERFLOW DB        =                       0
                                          POINTERS IN OVERFLOW DB (T7 RECORDS)   =                       0
                                          TOTAL OSAM/ESDS BLOCKS/CIS IN DB       =                       0
```

Figure 177. HISTPRT: HD Analysis report (PHIDAM index database)

HD Analysis report for a PSINDEX database

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA              "HD ANALYSIS REPORT"                          PAGE:     1
5655-U09                                        DATE: 07/10/2020  TIME: 17.37.25                      FABGHIST - V3.R1

DBNAME: TPFOX1     DDNAME: TPFOX1AA   DSG#:  A          *** SECONDARY  I N D E X  DB ***
                                                                                  SPECIFIED DATA       PREVIOUS DATA

                                                                               DATE: 07/10/2020     DATE:  NONE
DATABASE DESCRIPTION                    ENVIRONMENT                            TIME:   17:33:53     TIME:  NONE

-------------------------------------   -----------                          (CREATED BY: HDPC)   (CREATED BY: NONE)
DATABASE ORGANIZATION  : PSINDEX          IMSID                          =                SYS1
ACCESS METHOD          : KSDS           RUN TIME OPTION
INDEXED PRIME DB NAME  : TPFOH2         ---------------
INDEX DD NAME          : TPFOX1AA         HASH                           =                  NO
OVERFLOW DD NAME       :                  EPSCHK                         =                 YES
INPUT DATABASE         : REAL             IXKEYCHK                       =                 YES
CREATION DATE          : 07/06/2020       SYMIXCHK                       =                  NO
REAL DATABASE DEVICE   : 3390             SYMLPCHK                       =                  NO
BLOCK SIZE             :   512            HOMECHK                        =                 N/A
LOGICAL RECORD LENGTH  :    54            INCORE                         =                 N/A
KEY LENGTH             :    16            T2CHK                          =                 N/A
                                          ZEROCTR                        =                 N/A
                                        SPACE UTILIZATION
                                        -----------------                              PRIME
                                          TYPE                           =               CYLS

...
...

                                          CA-SPLITS                      =                  0


                                        SECONDARY INDEX STATISTICS
                                        --------------------------
                                          TOTAL SEGMENTS IN PRIME DB             =                    9178
                                          DELETED SEGMENTS IN PRIME DB           =                       0
                                          POINTERS IN PRIME DB (T6 RECORDS)      =                    9178
                                          TOTAL SEGMENTS IN OVERFLOW DB          =                       0
                                          DELETED SEGMENTS IN OVERFLOW DB        =                       0
                                          POINTERS IN OVERFLOW DB (T7 RECORDS)   =                       0
                                          TOTAL OSAM/ESDS BLOCKS/CIS IN DB       =                       0
                                          POINTERS TO RECORDS IN OVERFLOW DB     =                       0
```

Figure 178. HISTPRT: HD Analysis report (PSINDEX database)

Report field description: Heading

Report heading applies to all database organizations. The following fields are included in the report heading:

DBNAME
Name of the DBD as coded in the NAME keyword of the DBD macro.

DDNAME
DDname of this data set group.

DSG#
Data set group number. It is the ordinal number of the data set group. 1 to 10 is shown for non-HALDB, A to J or X for HALDB.

****** database organization ******
Database organization type. One of the following texts is shown:

***** HISAM DB *****
HISAM database

***** PRIME DB *****
HDAM, HIDAM, PHDAM database, or the data set group A-J of PHIDAM database

***** PRIMARY INDEX DB *****
HIDAM index database, or the data set group X of PHIDAM database

***** SECONDARY INDEX DB *****
Secondary Index database, or PSINDEX database

SPECIFIED DATA
The data of which the date and time when the actual database data set was scanned by HD Pointer Checker or, if an image copy data set was used, when the image copy data set was created. Under this heading, actual data of each item is shown.

PREVIOUS DATA
The data of which the date and time of the ***previous*** HD Pointer Checker run when the actual database data set was scanned or, if an image copy data set was used, when the image copy data set was created. Under this heading, actual data of each item of the previous run is shown, if it exists in the HISTORY data set.

Report field description: DATABASE DESCRIPTION

This section applies to all database organizations. The following fields are included in this section:

DATABASE ORGANIZATION
IMS database organization used for this database. One of the following texts is shown:

- SHISAM
- HISAM
- HDAM
- HIDAM
- HIDAM INDEX
- 2NDARY INDX
- SHR 2ND IDX
- PHDAM
- PHIDAM
- PHIDAM IDX
- PSINDEX

ACCESS METHOD
Access method used for this database data set. One of the following texts is shown:

- OSAM
- KSDS
- KSDS/ESDS

- ESDS

PRIME DD NAME
DDname of this data set group. This field applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

INDEXED PRIME DB NAME
Name of the DBD (as coded in the NAME keyword of the DBD macro in the DBD) of the prime database that is being indexed.

This field applies only to index databases.

INDEX DD NAME
DDname (as coded in the DD1 keyword of the DATASET macro in the DBD) of the index database.

This field applies only to index databases.

OVERFLOW DD NAME
DDname (as coded in the OVFLW keyword of the DATASET macro in the DBD) of this data set group.

This field applies only to HISAM and index databases. The field is left blank if the database has no overflow data set.

INPUT DATABASE
Data set type of this database data set group (REAL, IMGCPY(TAPE), or IMGCPY(DASD)) used for the HD Pointer Checker run.

CREATION DATE
Date when the database data set group was actually created (if available). If the specified database data set is an image copy data set, this is the date when the image copy was created.

The following fields (REAL DATABASE DEVICE, BLOCK SIZE, LOGICAL RECORD LENGTH, and KEY LENGTH) are the data for the primary data set of the database data set group.

REAL DATABASE DEVICE
Type of the device on which the data set resides.

This field is left blank if an image copy data set is used.

BLOCK SIZE
Block size or control interval (CI) size of the database data set.

LOGICAL RECORD LENGTH
Logical record length of the database data set.

KEY LENGTH
Root key length of the database data set.

Report field description: ENVIRONMENT

This section applies to all database organizations. The following field is included in this section:

IMSID
IMSID of the IMS subsystem in which the database data set was scanned by HD Pointer Checker.

Report field description: RUN TIME OPTION

This section applies to all database organizations. The following HD Pointer Checker runtime options are shown:

- HASH
- EPSCHK
- IXKEYCHK
- HOMECHK
- INCORE

- T2CHK
- ZEROCTR

For a detailed description of the options, see the parameter description of "PROC statement" on page 108 and "OPTION statement" on page 131.

Report field description: SPACE UTILIZATION

This section applies to all database organizations.

For HISAM and index databases, space utilization information is shown under the two headings (PRIME and OVFLOW). Under the heading PRIME, space utilization information of the primary data set is shown. Under the heading OVFLOW, space utilization information of the overflow data set is shown.

The following fields are included in this section:

TYPE
Space allocation type (TRKS: allocated by unit of track; CYLS: allocated by unit of cylinder).

PRIMARY ALLOCATION
Primary allocation in cylinders or in tracks.

SECONDARY ALLOCATION
Secondary allocation in cylinders or in tracks.

EXTENTS
Number of extents.

ALLOCATED SPACE (TRKS)
Total allocated space shown in the unit of tracks.

USED SPACE (%)
Percentage of the used space within the allocated space.

CI-SPLITS
Total number of CI splits detected.

This field applies only to the primary data sets of the secondary index databases.

CA-SPLITS
Total number of CA splits detected.

This field applies only to the primary data sets of the secondary index databases.

Report field description: HISAM (or HIDAM INDEX or SECONDARY INDEX) STATISTICS

This section applies to HISAM databases, HIDAM index databases, secondary index databases, the data set group X of PHIDAM databases, and PSINDEX databases.

The following fields are the descriptions of the database data set:

TOTAL SEGMENTS IN PRIME DB
Number of database segments that were detected in the primary data set of the database.

DELETED SEGMENTS IN PRIME DB
Number of deleted segments that were detected in the primary data set of the database.

POINTERS IN PRIME DB (T6 RECORDS)
Number of pointers that were detected in the KSDS part of this index database.

This field applies only to index databases.

POINTERS IN PRIME DB (T8 RECORDS)
Number of pointers that were detected in the KSDS part of this HISAM data set group.

This field applies only to HISAM databases.

TOTAL SEGMENTS IN OVERFLOW DB
Number of database segments that were detected in the overflow data set of the database.

DELETED SEGMENTS IN OVERFLOW DB
Number of deleted segments that were detected in the overflow data set of the database.

POINTERS IN OVERFLOW DB (T7 RECORDS)
Number of pointers that were detected in the overflow (ESDS or OSAM) part of this index database.

This field applies only to index databases.

POINTERS IN OVERFLOW DB (T9 RECORDS)
Number of pointers that were detected in the overflow (ESDS or OSAM) part of this HISAM data set group.

This field applies only to HISAM databases.

TOTAL OSAM/ESDS BLOCKS/CIS IN DB
Number of blocks or control intervals in OSAM/ESDS index database overflow data set.

This field applies only to index databases.

POINTERS TO RECORDS IN OVERFLOW DB
Number of pointers to logical records in the overflow data set that were detected in this secondary index database.

This field applies only to secondary index databases.

Report field description: POINTER VALIDATION

This section applies to HDAM, HIDAM, PHDAM, and PHIDAM databases. The following fields contain pointer validation and evaluation of the HD Pointer Checker run:

VALIDATION ERRORS IN SCAN PROCESSING
Total number of validation errors detected in SCAN process.

VALIDATION ERRORS IN CHECK PROCESSING
Total number of validation errors detected in CHECK process.

EVALUATION ERRORS IN CHECK PROCESSING
Total number of evaluation errors detected in CHECK process. If KEY is shown, it indicates that errors were detected during the index key check. If HASH is shown, it indicates that errors were detected during the HASH Check.

TOTAL BLOCKS IN DATA SET
Number of database data set blocks or control intervals that were processed by HD Pointer Checker.

HIGH RBA IN HEX
Relative byte address of the last segment in the data set group shown in hexadecimal.

HIGH RBA IN DEC
Relative byte address of the last segment in the data set group shown in decimal.

% POINTERS VALIDATED IN MEMORY
Percentage of pointers validated by in-core check of the SCAN process. When the HASH Check function has been selected, this field shows N/A.

Report field description: FREE SPACE STATISTICS

This section applies to HDAM, HIDAM, PHDAM, and PHIDAM databases. The following fields contain statistical information about the free space:

FREE SPACE ELEMENTS
Number of free space elements in this data set group.

BLOCKS WITH SPACE (BITMAP)
Number of blocks with space from the viewpoint of bitmaps, and its percentage within the data set in this data set group.

REUSABLE FREE SPACE (BITMAP)
Amount of reusable free space from the viewpoint of bitmaps, and its percentage within the data set in this data set group.

Note: Reusable free space is a free space element equal to or larger than the longest segment in the data set (as defined in the DBD).

NOT REUSABLE FREE SPACE (BITMAP)
Amount of nonreusable free space from the viewpoint of bitmaps, and its percentage within the data set in this data set group.

Note: Nonreusable free space is a free space element smaller than the longest segment in the data set (as defined in the DBD).

EMPTY BLOCKS
Number of empty blocks and its percentage within the data set in this data set group.

Report field description: SEGMENT DISTRIBUTION STATISTICS

This section applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases. The following fields contain statistical information about segment distribution:

SEGMENTS IN DATA SET
Number of segments in this data set group.

ROOT SEGMENTS
Number of root segments in this data set group.

DEPENDENT SEGMENTS
Number of dependent segments in this data set group.

ROOTS WITH NO DEPENDENTS IN SAME BLOCK
Number of root segments that have no dependent segment in the same block as their root segment, and its percentage within the total number of root segments that have dependent segments (in the case of HISAM, it is the percentage within the total number of root segments).

This field applies to the primary data set groups of HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

When the data set group is processed by the HASH Check function in FABPMAIN, this field shows N/A because that function forces INCORE=NO.

When a DEPDIST keyword is not specified in the single-step HASH checking option of IMS HP Image Copy, this field shows N/A.

AVG. COUNT OF DEPS IN SAME BLK AS ROOT
Average number of dependent segments that are in the same block as their root segment.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

When the data set group is processed by the HASH Check function in FABPMAIN, this field shows N/A because that function forces INCORE=NO.

When a DEPDIST keyword is not specified in the single-step HASH checking option of IMS HP Image Copy, this field shows N/A.

DEPENDENTS NOT IN SAME BLOCK WITH ROOT
Number of dependent segments that are not in the same block as their root segment, and its percentage within the total number of dependent segments.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

When the data set group is processed by the HASH Check function in FABPMAIN, this field shows N/A because that function forces INCORE=NO.

When a DEPDIST keyword is not specified in the single-step HASH checking option of IMS HP Image Copy, this field shows N/A.

AVG. DATABASE RECORD LENGTH
Average length of a database record (including prefix and data portions of all segments). This does not include segments that are in the secondary data set group of the database.

This field applies only to the primary data set groups of HISAM databases.

Report field description: HD TUNING STATISTICS

The following fields contain HD tuning statistics information. This section applies to HDAM, HIDAM, PHDAM, and PHIDAM databases.

DIRECT ALGORITHM NAME
Name of the randomizing module, as coded in the RMNAME keyword of the DBD macro.

This field applies to the primary data set groups of HDAM and PHDAM databases.

LONGEST SEGMENT IN DATA SET
Length of the longest segment in this data set group.

HIGH BLOCK NUMBER (IN RAA)
If HDAM, this is the maximum relative block number in the root addressable area (RAA) that the randomizing module is permitted to produce (as coded in the RMNAME keyword of the DBD macro) in this database.

If HIDAM, this is the total number of blocks in the data set group.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

RAPS PER BLOCK
If HDAM, this is the number of root anchor points (RAPs) in each CI (or block) in the root addressable area (as coded in the RMNAME keyword of the DBD macro) of this database.

If HIDAM, this field always shows 1.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

TOTAL RAPS
Product of HIGH BLOCK NUMBER and RAPS PER BLOCK.

```
TOTAL RAPS = (HIGH BLOCK NUMBER) × (RAPS PER BLOCK)
```

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

BYTE LIMIT COUNT
Maximum number of bytes of a database record that can be stored into the root addressable area in a series of inserts unbroken by a call to another database record (as coded in the RMNAME keyword of the DBD macro) of this HDAM and PHDAM database. N/A indicates that no limit is placed for the maximum number of bytes of a database record.

This field applies to the primary data set groups of HDAM and PHDAM databases.

AVG. DATABASE RECORD LENGTH
Average length of a database record (including prefix and data portions of all segments). This does not include segments that are in another data set group of the database.

This field does not apply to the secondary data set group when HD Pointer Checker did not process the data set group with the primary data set group of the same database simultaneously.

FREE SPACE SCAN CYLINDERS
Number of direct-access device cylinders to be scanned when searching for available storage space during segment insertion operations (as coded in the SCAN keyword of the DATASET macro in the DBD) of this data.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

FSPC BLK. EVERY N BLKS
"free block frequency factor" (as coded in the FRSPC keyword of the DATASET macro in the DBD) of this data set group. It specifies that every N-th control interval or block in this data set group is left as free space during database load or reorganization.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

% FSPC WITHIN EACH BLK
"free block frequency factor" (as coded in the FRSPC keyword of the DATASET macro in the DBD) of this data set group. It specifies the minimum percentage of each control interval or block in this data set group that is left as free space during database load or reorganization.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

NO. KEY RECORDS WRITTEN
Number of records written by the SCAN process to the KEYSIN data set (for use by the HD Tuning Aid utility).

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

ROOTS IN HOME BLOCK
Number of HDAM root segments that are stored in the same blocks as they are assigned by the randomizing routine, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM and PHDAM databases.

ROOTS 1 BLOCK AWAY
Number of HDAM root segments that are stored in the blocks that immediately precede or follow the blocks to which they are randomized, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM and PHDAM databases.

ROOTS BEYOND
Number of HDAM root segments that are stored in the blocks that are neither adjacent to nor the same as the blocks to which they are randomized, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM and PHDAM databases.

ROOTS IN OVERFLOW
Number of HDAM root segments that are stored in the blocks that are not in the root addressable area of the database, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM and PHDAM databases.

BLOCKS WITHOUT ROOT (IN RAA)
Total number of blocks (in RAA, in the case of HDAM) which has root anchor points but has no root segments, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

AVG. COUNT OF ROOTS PER ACT. BLK IN RAA
Average count of root segments per active block in root addressable area of the HDAM data set.

This field applies to the primary data set groups of HDAM and PHDAM databases.

AVG. COUNT OF ROOTS PER ACTIVE RAP
Average count of root segments per active root anchor points of the HDAM data set.

This field applies to the primary data set groups of HDAM and PHDAM databases.

COUNT OF RAPS NOT USED
Total number of root anchor points that do not chain any root segments yet, and its percentage within the data set of this data set group.

This field applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

Report field description: SEGMENT AND POINTER OCCURRENCES

This section applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases. The following fields contain segment and pointer occurrence information:

SC
Segment code (in hexadecimal) of the segment.

SEGNAME
Segment name (as coded in the SEGM macro in the DBD) of the segment.

POINTER TYPES
Type of pointer (CTR, PTF, PTB, PP, LTF, LTB, LP, PCF, PCL, LCF, LCL, EPS *LP, *LC). The number shown under each pointer type indicates the count of each pointer type in the prefix of the segment. If value X is shown, it means only one pointer type for the segment type.

CTR
Counter.

PTF
Physical twin forward. If value H is shown, it means hierarchical twin forward.

PTB
Physical twin backward. If value H is shown, it means hierarchical twin backward.

PP
Physical parent.

LTF
Logical twin forward.

LTB
Logical twin backward.

LP
Logical parent.

PCF
Physical child first.

PCL
Physical child last.

LCF
Logical child first.

LCL
Logical child last.

EPS
Extended pointer set (HALDB)

The following two values show the existence of a logical relationship when no direct pointer exists:

***LP**
The source segment is a logical child, and the target segment is its logical parent. There is no direct logical parent pointer. Instead, the source segment has a symbolic pointer (the logical parent concatenated key) to its logical parent.

***LC**
The source segment is a logical parent, and the target segment is its logical child. There is no logical child pointer.

PAIRING
This field shows the logical relationship of the segment.

TP
Indicates the type of the logical relationship.

U indicates that the segment has a unidirectional logical relationship.

P indicates that the segment has a bidirectional, physically paired logical relationship.

V indicates that the segment has a bidirectional, virtually paired logical relationship.

TARGT
Identifies the target segment of the database with which the specified segment has a logical relationship.

DB is the database number (in hexadecimal) that identifies the target database. This number used to identify the database throughout the HD Pointer Checker run.

SC is the segment code (in hexadecimal) that identifies the target segment.

PRFX LGTH
Prefix length of the segment.

SEGM LGTH
Length of the segment (including prefix). If the segment has a variable length, it shows the average length of the segment and the character 'V' follows the length value.

ACTUAL MAX. SEGMENT LENGTH
Actual maximum length of the segment in the database data set (including prefix).

TOTAL OCCURRENCES
Total number of occurrences of the segment in the database data set.

OCCURRENCE IN OVERFLW
Total number of occurrences of the segment that are in the overflow area.

OCC/RT
Average number of occurrences of the segment per root.

COUNT OF POINTERS POINTING TO
This section applies to HDAM, HIDAM, PHDAM, and PHIDAM databases. This is the total number of pointers that point to the target segments that are in the following blocks:

SAME-BLK
Number of pointers that point to the blocks containing the pointer.

ADJ-BLKS
Number of pointers that point to the blocks that immediately precede or follow the blocks containing the pointer.

BEYOND
Number of pointers that point to the blocks (in the same data set) that are neither adjacent to nor the same as the blocks containing the pointer.

EXTERNAL
Number of pointers that point to the blocks in another data set.

TOTAL PTRS
Total number of pointers that the specified segment contains.

This section applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

History Attribute report

This report contains an attribute information of the HISTORY data set that is specified in the HISTORY DD statement.

DB Historical Data Analyzer generates this report when TYPE=ATTRLIST is specified for the PROC control statement in the HISTIN data set.

Report example

The following figure shows an example of the History Attribute report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBHDA              "HISTORY ATTRIBUTE REPORT"                          PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 17.37.25                       FABGHIST - V3.R1


OPTION              STATUS
-----------------   ------------------------------------------------------------------------------------------------------------
EXPORTABLE          NO
MULTIENT            YES
HISTLOCK            GROUP
MULTIIMSID          NO
```

Figure 179. HISTPRT: History Attribute report

Report field description

This report shows the current status of the following optional attributes:

EXPORTABLE

YES
The HISTORY data set can be exportable by Export Utility.

NO
The HISTORY data set cannot be exportable by Export Utility.

MULTIENT

YES
By running HD Pointer Checker with history option multiple times a day, more than one database data set entries can be stored in the HISTORY data set for each day.

NO
Only one database data set entries can be stored in the HISTORY data set for each day.

HISTLOCK

GROUP
GROUP is selected for the HISTORY lock option.

DATASET
DATASET is selected for the HISTORY lock option.

MULTIIMSID

YES
The Multiple-IMSID option is enabled.

NO
The Multiple-IMSID option is disabled.

Chapter 21. Using the Export Utility

The following topics describe how to run the Export Utility of DB Historical Data Analyzer. The Export Utility can be run as a batch job, but it cannot be run in the TSO/ISPF environment.

For the operation of FABGHIST program of DB Historical Data Analyzer, see Chapter 20, "Using DB Historical Data Analyzer in the MVS batch environment," on page 375. For the operation of DB Historical Data Analyzer in the TSO/ISPF environment, see Chapter 22, "Using DB Historical Data Analyzer in the TSO/ISPF environment," on page 451.

Topics:

- "Restrictions and considerations" on page 413
- "Running the Export Utility" on page 414
- "FABGXEXP JCL" on page 414
- "Input" on page 415
- "Output" on page 442

Restrictions and considerations

The following restrictions and considerations apply when you use the Export Utility.

Restrictions

- A database whose attribute has been changed by DBD regeneration cannot be treated in the same way as before DBD regeneration. In this situation, all HISTORY data set entries for the database must be deleted before the database is processed by HD Pointer Checker. Otherwise, the results are unpredictable. This also applies to the migration situation from non-HALDB to HALDB.
- The Export Utility supports the following database organizations:
  - HDAM
  - HIDAM (excluding index)
  - HISAM (including SHISAM)
  - PHDAM (partitioned HDAM)
  - PHIDAM (partitioned HIDAM)

  The data of the following database organization are not processed:
  - HIDAM and PHIDAM indexes
  - Secondary index
  - PSINDEX (partitioned secondary index)
  - Indirect List Data Sets (ILDS) used for PHDAM and PHIDAM
- The Export Utility can process the historical records created by HD Pointer Checker that was run in the following environment:
  - IMS HP Pointer Checker 2.1 or 2.2 (5655-K53), or 3.1 (5655-U09)
  - IMS HP Image Copy 3.2 (5655-K96) or later
  - IMS HP Image Copy 4.1 (5655-N45) or later
  - IMS Parallel Reorganization 3.1 (5655-M28) or later
  - IMS Database Reorganization Expert 4.1 (5655-S35)
- The HISTORY data set must be periodically reorganized to avoid performance problems with DB Historical Data Analyzer and the shortage of the available space on the HISTORY data set.

© Copyright IBM Corp. 2000, 2021

Considerations for HALDB Online Reorganization (OLR)

- For a HALDB partition that is OLR capable, the utility shows the DD names and database data set names of the active data set groups (either (A-J&X) or (M-V&Y)) at the time of HD Pointer Checker's run.
- The utility can work while a HALDB partition is in cursor-active status.

Running the Export Utility

The Export Utility, FABGXEXP program, exports data from the HISTORY data set to a flat file.

Procedure

To run the Export Utility, complete the following steps:

1. Allocate and initialize a VSAM KSDS for the HISTORY data set.

   DB Historical Data Analyzer, FABGHIST program, provides a function to initialize the HISTORY data set.

   Run the FABGHIST program specifying TYPE=UPDATE OPTION EXPORTABLE=YES to activate the EXPORTABLE option.

   For descriptions about creating HISTORY data sets and changing the attributes, see "PROC control statement" on page 382.
2. Make sure that HD Pointer Checker is run in advance to create entries in the HISTORY data set.
3. If you want to create the flat records in the user-defined format, prepare the flat record definition statements.

   The statements can reside in a member of a data set called FABGRECI. For the description of the flat record definitions, see "FABGRECI data set" on page 420. For an example for using flat record definitions, see "Example 6: Creating user-defined flat records" on page 481.

   If you want to create the flat records in the predefined format provided by IMS HP Pointer Checker, you do not need to prepare the FABGRECI data set. For an example for using the predefined format, see "Example 5: Creating predefined flat records" on page 480.
4. Specify control statements to describe the functions to be run.

   The control statements can reside in the input stream, or in a data set called HISTIN. See "HISTIN data set" on page 416 for the description of control statement specifications.

   If you want to do syntax checking for the flat record definitions, run the Export Utility with specifying TYPE=CHECK in the HISTIN data set. The flat records are not created, but the syntax checking is done.
5. Code the JCL as described in "FABGXEXP JCL" on page 414. Then run the Export Utility job.

   You can also refer to the JCL examples in Chapter 23, "JCL examples for DB Historical Data Analyzer," on page 477 to code the JCL statements.

FABGXEXP JCL

To run the Export Utility, supply an EXEC statement and the appropriate DD statements.

The following table summarizes the DD statements.

Table 52. Export Utility DD statements

DDNAME	Use	Format	Need
HISTORY	Input	KSDS	Optional
HISTIN	Input	LRECL=80	Required
HISTMSG	Output	LRECL=133	Required
HISTPRT	Output	LRECL=133	Required

Table 52. Export Utility DD statements (continued)

DDNAME	Use	Format	Need
FABGEXPF	Output	DSORG=PS RECFM=VB	Optional
FABGRECI	Input	PDS LRECL=80 DSORG=PO	Optional

EXEC
This statement must be in the following form:

```
//          EXEC PGM=FABGXEXP
```

HISTORY DD
This VSAM KSDS data set contains the summary information of the HD Pointer Checker run results. This data set must be allocated before you run Export Utility.

DISP=SHR should be used.

It is required if TYPE=EXPORT is specified in the HISTIN data set.

HISTIN DD
This required input data set contains control statements, which describe your specification of the processing to be done by Export Utility.

HISTMSG DD
This required output data set contains a report and messages. BLKSIZE, if coded, must be a multiple of 133.

HISTPRT DD
This required output data set contains reports and messages. BLKSIZE, if coded, must be a multiple of 133.

FABGEXPF DD
This output data set is referred to as a flat file. It contains the flat records that are exported from the HISTORY data set. If TYPE=EXPORT is specified in the HISTIN data set, it is required.

FABGRECI DD
This optional data set is a partitioned data set. Each member contains the flat file definitions. The flat file definitions describe the user-defined format of flat records.

A member name cannot be specified in the DD statement. Specify as in the following example:

```
//FABGRECI   DD   DISP=SHR,DSN=fabgreci.data.set
```

If you want to generate the flat records in the predefined formats, do not specify this data set.

If you want to generate the flat records in the user-defined format, you must specify this data set.

Input

The following topics describe all the input data sets that are required to run the Export Utility.

HISTORY data set (HISTORY)

The Export Utility exports data from this HISTORY data set to a flat file (FABGEXPF data set).

For more information about the HISTORY data set, see “HISTORY data set (HISTORY)” on page 376.

HISTIN data set

The HISTIN data set for the Export Utility contains the user's description of the processing to be done by the Export Utility.

Format

This data set usually resides in the input stream. However, it can also be defined as a sequential data set or as a member of a partitioned data set.

It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

This data set can contain one PROC statement and one or more DATABASE and OPTION statements. Control statements can be coded as shown in the following figure.

```
//HISTIN  DD  *
  PROC TYPE=EXPORT,MEMBER=(MEMB01,MEMB02,MEMB05),DBORG=(HDAM,HIDAM)
    OPTION IMSID=SYS1,
           FROM=12122019,TO=03032020
   DATABASE DB=DBA
   DATABASE DB=DBB
/*
```

Figure 180. HISTIN control statements example

Unlike in the case of FABGHIST, the ENDPROC statement is not required for FABGXEXP. Do not specify ENDPROC.

Control statement syntax

The control statement syntax is the same as the syntax for the HISTIN data set of the DB Historical Data Analyzer utility.

For the coding convention, see “Control statement syntax” on page 381.

Notational conventions

The following symbols must be coded as they appear in the command format:

- Comma (,)
- Equal sign (=)

PROC control statement

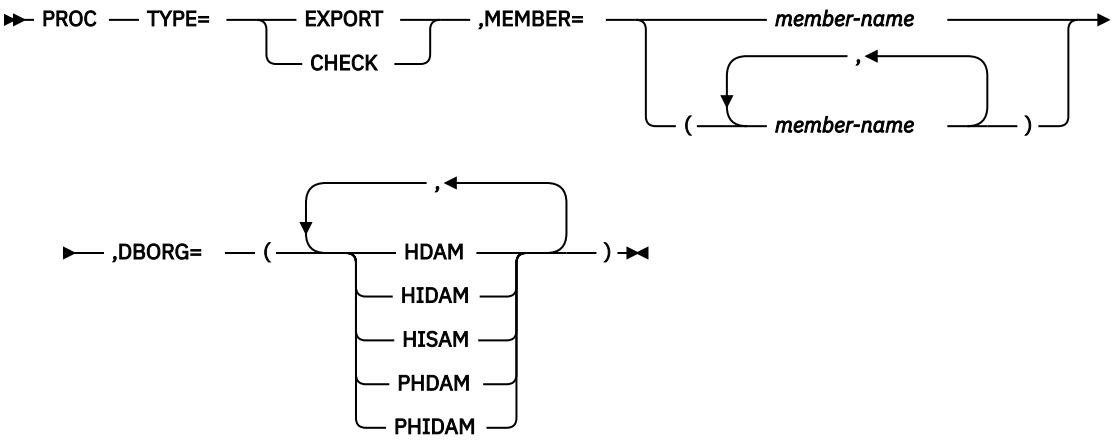
The PROC control statement of the Export Utility specifies the function to be run. One PROC control statement can be specified at a time.

Subsections:

- “Syntax” on page 416
- “Keywords” on page 417

Syntax

The following syntax diagram shows the keywords for the PROC statement.



TYPE=, MEMBER=, and DBORG= are required for the PROC statement.

Keywords

The following keywords can be specified on the PROC statement:

TYPE=
Specifies the type of the process to be run.

EXPORT
Specifies to export data from the HISTORY data set to flat records in a flat file. The flat file is specified in the FABGEXPF DD statement.

When TYPE=EXPORT is specified, the PROC control statement can be followed by one or more DATABASE control statements and OPTION control statements.

HISTORY, FABGEXPF, HISTPRT, and HISTMSG DD statements are required.

CHECK
Specifies to check the syntax in flat record definitions in the FABGRECI statement. You can see the result of syntax checking in the FABGRECI Statement report in the HISTPRT data set. DATABASE statement or OPTION statement of the HISTIN control statement is not required.

FABGRECI, HISTMSG, and HISTPRT DD statements are required. HISTORY or FABGEXPF DD statement is not required because data is not exported.

It is recommended that you run the Export Utility with TYPE=CHECK for the syntax checking before running it with TYPE=EXPORT.

MEMBER=
Specifies one or more member names of the predefined flat records or the user-defined flat record definition members. The flat record is generated in the format defined in these members. Specify at least one member. You can specify multiple member names up to 20.

When you generate the flat records in the predefined format, specify the member names listed in “Predefined flat records” on page 446.

When you generate the flat records in user-defined format, specify the member names in the FABGRECI partitioned data set, which contains the flat record definitions.

To specify one member, you can either enclose the member name within parentheses or not. For example, either MEMBER=HDPC0001 or MEMBER=(HDPC001) can be used. To specify multiple members, enclose the member names within parentheses. For example, specify as MEMBER=(HDPC0002,HDPC0003).

DBORG=
Specifies one or more database organizations to be exported.

You must specify at least one database organization type.

To specify one database organization, you can either enclose the name within parentheses or not. For example, either DBORG=HDAM or DBORG=(HDAM) can be used. To specify more than one name, enclose the names within parentheses. For example, specify as DBORG=(HDAM,HIDAM).

DATABASE control statement

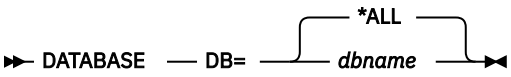
The DATABASE control statement of the Export Utility specifies the database to be processed. A DATABASE control statement, if coded, must be preceded by a PROC control statement.

Subsections:

- "Syntax" on page 418
- "Keyword" on page 418

Syntax

The following syntax diagram shows the keyword for the DATABASE statement.



Keyword

The following keyword can be specified on the DATABASE statement:

DB=

Specifies the name of the DBD to be processed. For HALDB, specify the master database name.

If you specify *ALL, all database entries with the database organization that is specified by the DBORG= in the PROC statement are processed.

The default value is *ALL.

If the DATABASE statement is not specified, it is assumed that *ALL is specified.

OPTION control statement

The OPTION control statement of the Export Utility specifies additional options for selecting the entries to be exported.

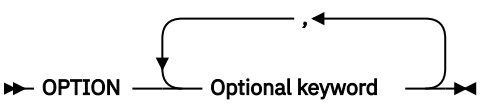
The OPTION control statement can be preceded by a PROC control statement or a DATABASE control statement. If it is preceded by the PROC control statement, the specifications are effective for all of the databases. If it is preceded by the DATABASE control statement, the specifications are effective only for the database specified by the DATABASE statement. If the OPTION statements are preceded by both the PROC and the DATABASE control statements, the specifications preceded by the DATABASE statement override the one preceded by the PROC statement and becomes effective for the database specified by the DATABASE statement.

Subsections:

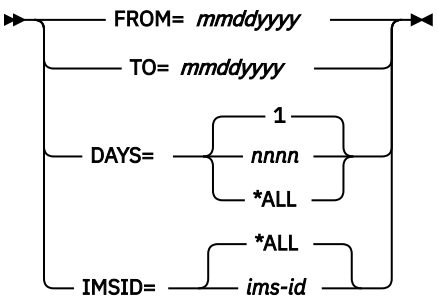
- "Syntax" on page 418
- "Keywords" on page 419

Syntax

The following syntax diagram shows the keywords for the OPTION statement.



Optional keywords



Keywords

The following keywords can be specified on the OPTION statement:

FROM=
Optional. Specifies the start date of the record entry that you want to export. Specifies the start date for the exporting process. The FROM date must be in the form "*mmddyyyy*" (*mm*=month, *dd*=date, *yyyy*=year).

TO=
Optional. Specifies the end date of the record entry that you want to export. The TO date must be in the form "*mmddyyyy*" (*mm*=month, *dd*=date, *yyyy*=year).

DAYS=
Optional. Specify the number of days. Export Utility processes entries for the latest *nnnn* days within the database. If *ALL is specified, Export Utility processes entries for all dates.

DAYS determines the days for each database. The valid specified range for the DAYS parameter is 1 - 1000.

Example 1

HDAMDBA contains entries for 01/01/2020, 01/02/2020, 01/03/2020 in the HISTORY data set, and HDAMDBB contains entries for 01/02/2020, 01/03/2020, 01/04/2020.

If DAYS=3 is specified as shown in the following example:

```
PROC TYPE=EXPORT,MEMBER=MEM01,DBORG=HDAM
OPTION DAYS=3
DATABASE DB=HDAMDBA
DATABASE DB=HDAMDBB
```

HDAMDBA exports entries for 01/01/2020, 01/02/2020, 01/03/2020, and HDAMDBB exports entries for 01/02/2020, 01/03/2020, 01/04/2020.

Example 2

HDAMDBA contains entries for 01/01/2020, 01/02/2020, 01/03/2020 in the HISTORY data set, and HDAMDBB contains entries for 01/02/2020, 01/03/2020, 01/04/2020. (The same assumption as in Example 1.)

If none of the date options are specified, the last entry for each database is exported, therefore, 01/03/2020 for HDAMDBA and 01/04/2020 for HDAMDBB.

```
PROC TYPE=EXPORT,MEMBER=MEM01,DBORG=HDAM
DATABASE DB=HDAMDBA
DATABASE DB=HDAMDBB
```

If the MULTIENT option for the HISTORY data set is specified as YES, and there are multiple database entries for a day, all entries with the specified date will be exported.

Consideration for the date options:
You can specify the date option, which is "FROM=" and "TO=" combination or "DAYS=", for selecting the entries. If you specify only "FROM=", Export Utility processing starts with the specified date entry

and ends on the last entry. If you specify only "TO=", Export Utility processing starts with the first entry and ends on the specified date entry.

If you do not specify any of them, Export Utility assumes DAYS=1 and the latest date entry within the database is exported.

IMSID=

Optional. Specify IMS ID of IMS system on which Export Utility processes. Only one IMS ID can be specified. If *ALL is specified or if IMSID= is not specified, all IMSIDs are processed.

If "IMSID=" is specified with the date option ("FROM=" and "TO=" combination, or "DAYS="), Export Utility selects the entries by the date at first, and then selects the specified IMSID within the selected entries.

For example, if HDAMDBA has the entries of July 1 with IMSA, July 2 with IMSA, and July 3 with IMSB and the following control statements are specified, Export Utility selects the entries by the last 2 days, July 2 with IMSA and July 3 with IMSB, and then selects the entry that has IMSA. Therefore, the entry of July 2 with IMSA is exported.

```
PROC TYPE=EXPORT,MEMBER=MEM01,DBORG=HDAM
OPTION DAYS=02,IMSID=IMSA
DATABASE DB=HDAMDBA
```

FABGRECI data set

This data set contains the flat record definitions for user-defined flat records.

This data set is an optional data set when TYPE=EXPORT is specified in the HISTIN data set. When this data set is not specified or DUMMY is specified, the flat records are created in the predefined formats provided by IMS HP Pointer Checker.

This data set is required when TYPE=CHECK is specified in the HISTIN data set.

Format

It is a partitioned data set that contains one or more members. A member contains the flat record definition statements for a flat record.

It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

The member contains one RECORD statement and some FIELD statements. Statements can be coded in a member of the FABGRECI data set as shown in the following figure.

```
RECORD TYPE=DSG,RECID=05
 FIELD NAME=DBDNAME,ATTR=C,LEN=008   DB NAME (CL8)
 FIELD NAME=DDNAME,ATTR=C,LEN=008    PRIMARY DDNAME (CL8)
 FIELD NAME=LRECL,ATTR=X,LEN=002     LRECL (XL2)
 FIELD ATTR=X,LEN=005,VALUE=000001
```

Figure 181. Flat record definition (Example)

From this example definition, the flat record shown in the following figure is generated in the FABGEXPF data set.

```
C8C9C4D4 C4C2F140 C8C9C4D4 C4E2F140   07F90000 000001                    *HIDMDB1 HIDMDS1 .......        *
C8C9C4D4 C4C2F140 C8C9C4D4 C4E2F240   07F90000 000001                    *HIDMDB1 HIDMDS2 .......        *
C8C9C4D4 C4C2F140 C8C9C4D4 C4E2F340   07F90000 000001                    *HIDMDB1 HIDMDS3 .......        *
```

Figure 182. Flat record (Example)

Flat record definition syntax

The following description presents the coding conventions that you must follow in writing the flat record definition statements (definition statements) in the FABGRECI data set:

- A definition statement can be coded onto one or more lines. Definition statement names (RECORD and FIELD), keywords, and keyword values must be coded within column 2 and column 72. A definition statement name must be the first entry in the definition statement.
- Keywords and their values follow the definition statement name, separated by one or more blanks. A definition statement name and the first keyword must be written in the same definition statement record. When more than one keyword is coded, they must be separated by commas. No blanks are allowed between the keywords and the commas, or between the keywords and their values.

  Keywords can be continued onto more than one definition statement record. In this case, the definition statement that starts with a definition statement name must be completed with a keyword with its value, including a comma that follows it. The succeeding keywords can be continued onto the following definition statement records that begin in any column from column 2.

  Keywords are not positional parameters; they can be specified in any order.

  A null value is not allowed for any keyword value.
- Comments can follow the last keyword value on each definition statement record, separated by at least one blank.
- A comment statement must begin with an asterisk in column 1.

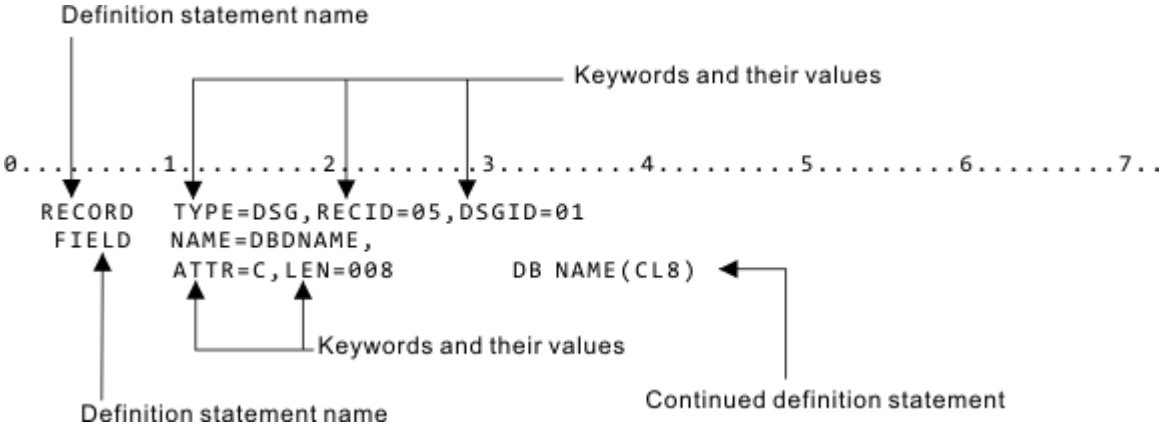


Figure 183. Example: Definition statement format in FABGRECI data set

Notational conventions

The following symbols must be coded as they appear in the syntax format:

- Comma (,)
- Equal sign (=)

RECORD definition statement

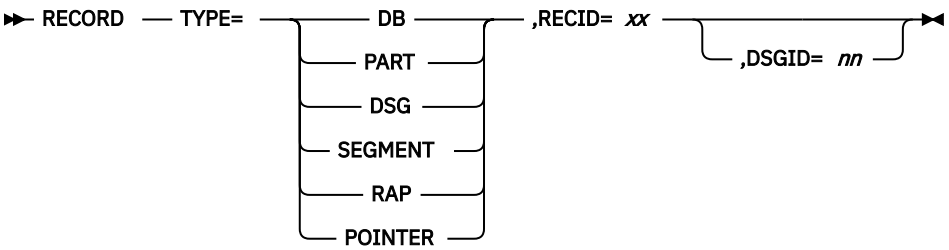
The RECORD definition statement (RECORD statement) must be specified on the first line of a member of the FABGRECI data set. The RECORD statement can be followed by one or more FIELD statements.

Subsections:

- "Syntax" on page 421
- "Keywords" on page 422

Syntax

The following syntax diagram shows the keywords for the RECORD statement.



Keywords

The following keywords can be specified on the RECORD statement:

TYPE=
Required. Specifies the type of flat record.

DB
Specifies to generate the flat record for each database. The fields contained in this record show the information of whole database.

FIELD NAME=DBDNAME statement must be specified for this record type.

PART
Specifies to generate the flat record for each partition of HALDB. It can be specified to a HALDB. The fields contained in this record show the information of each partition.

FIELD NAME=PARTID statement must be specified for this record type.

DSG
Specifies to generate the flat record for each data set group. The fields contained in this record show the information of each data set group.

For HALDB, the flat record is generated per data set group and per partition. For example,

- If three data set groups are defined to non-HALDB, three flat records are created.
- If three data set groups are defined to HALDB and two partitions are defined to the HALDB, six flat records are created in total.

FIELD NAME=DSGID must be specified for this record type.

SEGMENT
Specifies to generate the flat record for each segment type. The fields contained in this record show the information of each segment type.

For HALDB, the flat record is generated per segment type and per partition.

FIELD NAME=SEGNAME statement must be specified with this record type.

RAP
Specifies to generate the flat record for each RAP (Root Anchor Point). The fields contained in this record show the information of RAP.

For HALDB, the flat record is generated per partition.

FIELD NAME=PTRTYPE must be specified with this record type.

POINTER
Specifies to generate the flat record for each the pointer types. The fields contained in this record show the information of each pointer type. For HALDB, the flat record is generated per pointer type and per partition.

FIELD NAME=PTRTYPE must be specified for this record type.

RECID=*xx*
Required. Specifies an identifier for the flat record. *xx* is two alphanumeric characters. This ID can be stored in the flat record.

DSGID=*nn*
Optional. Specifies a data set group number. *nn* is one of decimal numbers from 1 to 10. If this parameter is not specified, the flat records are generated from all of the data set groups. If this parameter is specified, the flat records are generated from the specified data set group.

In case of HALDB, the data set group is usually referred to by an alphabet (A, B, ... or, J). However, specify this parameter by a decimal number. For example, to process data set group A, specify DSGID=1. The flat records are generated for the specified data set group for every partition. You can only specify DSGID=*nn* when TYPE=DSG is specified.

FIELD definition statement

The FIELD definition statement (FIELD statement) specifies the fields that are stored in a flat file. One or more FIELD statements are required in the FABGRECI member. The fields are stored in the flat record in the order of the FIELD statements.

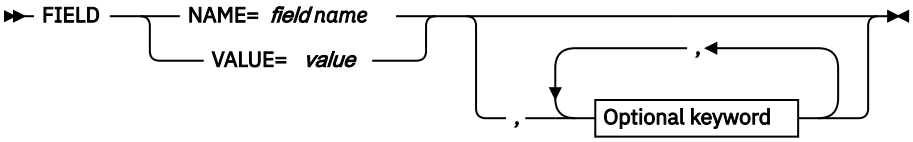
The maximum number of fields in one flat record is 255. The maximum total length of the fields in one flat record is 32752 bytes.

Subsections:

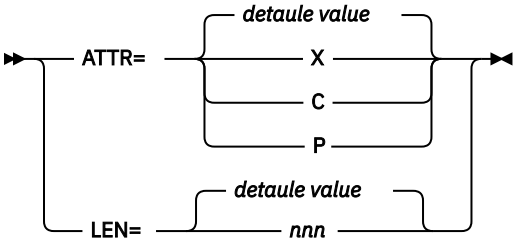
- "Syntax" on page 423
- "Keywords" on page 423
- "Field names" on page 425

Syntax

The following syntax diagram shows the keywords for the FIELD statement.



Optional keywords



Keywords

The following keywords can be specified on the FIELD statement:

NAME=
Specify the field name that is listed in Table 53 on page 425 through Table 63 on page 442.

Either "NAME=" or "VALUE=" is required.

ATTR=
Specify the attribute for the field.

X
The field is stored into the flat record in hexadecimal.

C
The field is stored into the flat record in character.

P
The field is stored into the flat record in packed decimal.

If "NAME=" is specified and this parameter is not specified, the default attribute of the field is taken. The default attribute of each field name is described in Table 53 on page 425 through Table 63 on page 442.

If "VALUE=" is specified, it is required that you specify X, C, or P. No default value is taken.

LEN=
Specify the length of the field.

The length is how many bytes there are in the field. For packed decimal attribute, specify the length in bytes, not the number of digits. For example, specify LEN=16 for 31 digit packed decimal number.

If "NAME=" is specified and this parameter is not specified, the default length of the field is taken. The default length and maximum length of each field are described in Table 53 on page 425 through Table 63 on page 442.

If "VALUE=" is specified, it is required that you specify the length. The maximum length is as follows:

- For character or hexadecimal attribute, the maximum length is 256.
- For packed decimal attribute, the maximum length is 16.

Export Utility checks the overflow condition of each field and issues a warning message according to the following rules:

- In the TYPE=CHECK run of Export Utility, the length check is done. If there is a possibility of overflow, it is notified by RC=02 and a message from Export Utility.
- In the TYPE=EXPORT run of Export Utility, field overflow is checked for every attribute while exporting the data. If an overflow is caused, it is notified by RC=04 and message from Export Utility. If the specified length is shorter than the actual field, the data is truncated as follows:
  - For character attribute, the specified number of characters are stored from the left in the flat record and the rest is truncated.
  - For hexadecimal or packed decimal attribute, the number of digits are stored from the low-order digits and the rest is truncated.

If the specified length is longer than the actual data, no message will be issued. The following data is padded to the extra column:

- For character attribute, the right columns are padded with blank (X'40').
- For hexadecimal or packed decimal attribute, the left columns are padded with X'00'.

VALUE=
Specify the specific value to be stored in the flat record. The "ATTR=" and "LEN=" are required for this parameter. For example, if "FIELD VALUE='ABC',LEN=3,ATTR=C " is specified, string 'ABC' is stored in the flat record.

The value has the following rules:

- For character attribute, the character must be enclosed in quotation marks ''. The maximum number of characters specified in the value is 32. Blank can be specified in the value, but you cannot use an apostrophe (').
- For hexadecimal attribute, the length of value must be a multiple of 2 and the maximum length is 32. (This means 16 byte long field.) The value can be specified from 01 to FF....FF (32 Fs).
- For packed decimal attribute, the value can be specified up to 31 digits signed decimal.

You can specify a larger or a shorter number to LEN= than the actual value length. The padding and truncated rules are described in the descriptions for the LEN parameter.

Field names

The field names that can be specified in the FIELD statement are described in Table 53 on page 425 through Table 63 on page 442.

The field names can be specified in the order you like.

Table 53. Record ID field

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
RECID	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: N/A	Record ID, which is assigned for the predefined flat record, or defined in the flat record definitions

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for the IMS environment and runtime information when HD Pointer Checker SCAN process is run.

Table 54. Field names for the IMS environment and runtime information when HD Pointer Checker SCAN process is run

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
SCANDATE	Character: 7	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 7 • Hexadecimal: N/A • Packed decimal: 4	SCAN year and date by HD Pointer Checker: *yyyyddd*
SCANTIME	Hexadecimal: 3	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 3 • Packed decimal: N/A	SCAN time: X'*hhmmss*'
SCANDATE5	Character: 5	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 5 • Hexadecimal: N/A • Packed decimal: 3	SCAN Julian date: *yyddd*
SCANYEA4	Character: 4	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 4 • Hexadecimal: N/A • Packed decimal: 3	SCAN year (4-digit number): *yyyy*

Table 54. Field names for the IMS environment and runtime information when HD Pointer Checker SCAN process is run (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
SCANYEA2	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN year (Low-order 2-digit number): *yy*
SCANDAYJ	Character: 3	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 3 • Hexadecimal: N/A • Packed decimal: 2	SCAN Julian date: *ddd*
SCANMNTH	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN month: *mm*
SCANDAY	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN day: *dd*
SCANHOUR	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN hour: *hh*
SCANMINT	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN minute: *mm*
SCANSCND	Character: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: N/A • Packed decimal: 2	SCAN second: *ss*
IMSID	Character: 4	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 4 • Hexadecimal: N/A • Packed decimal: N/A	IMS ID

Table 54. Field names for the IMS environment and runtime information when HD Pointer Checker SCAN process is run (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
IMSVER	Character: 5	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 5 • Hexadecimal: N/A • Packed decimal: N/A	IMS Version
IMSVER2	Character: 6	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 6 • Hexadecimal: N/A • Packed decimal: N/A	Extended IMS Version
DBRCOPT	Character: 1	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 1 • Hexadecimal: N/A • Packed decimal: N/A	DBRC=Y or N when HD Pointer Checker runs "Y" or "N" is set

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for DBD information.

Table 55. Field names for DBD information

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
DBDNAME	Character: 8	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Database name
PARTNAME	Character: 7	• PART • DSG • SEGM • RAP • PTR	• PHDAM • PHIDAM	• Character: 7 • Hexadecimal: N/A • Packed decimal: N/A	Partition name
PARTID	Character: 4	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 4 • Hexadecimal: 2 • Packed decimal: N/A	Partition ID
DBORG	Character: 6	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 6 • Hexadecimal: N/A • Packed decimal: N/A	Database organization: SHISAM, HISAM, HIDAM, HDAM, PHIDAM, PHDAM

Table 55. Field names for DBD information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
ACCESS	Character: 4	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 4 • Hexadecimal: N/A • Packed decimal: N/A	Access method
DBRECN	Character: 1	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 1 • Hexadecimal: N/A • Packed decimal: N/A	DBD registered in the RECON "Y" or "N" is set
DBDSIZE	Hexadecimal: 2	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	DBD size
DBDDATE	Character: 16	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 16 • Hexadecimal: N/A • Packed decimal: N/A	DBD assemble date
NO_OF_DSG	Hexadecimal: 1	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The number of DSG defined in the DBD
NO_OF_SEG	Hexadecimal: 1	• DB • PART • DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The number of segment types defined in the DBD
PINDXNM	Character: 8	• DB • PART • DSG • SEGM • RAP • PTR	HIDAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Name of primary index DBD of HIDAM

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for randomizing parameters defined in the DBD. The values in the following table are set only when DSG=01. Otherwise, blank (X'40') or null (X'00') is set.

Table 56. Field names for randomizing parameters defined in the DBD

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
RANDNAME	Character: 8	DSG	• HDAM • PHDAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Randomizer name
NO_OF_RAA	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of RAA
NO_OF_RAP	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	The number of RAP
NO_OF_BYTLIM	Hexadecimal: 2	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Byte limit

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for statistics of RAPs, root segments, and database records. The values in the following table are set only when DSG=01. Otherwise, blank (X'40') or null (X'00') is set. For non-HALDBs, the values for each database are set. For HALDBs, the values for each partition are set.

Table 57. Field names for statistics of RAPs, root segments, and database records

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_ACTRAP	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of active RAPs
NO_OF_NOUSRAP	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of not used RAPs
NO_OF_TOTROTRA	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in RAA For HIDAM or PHIDAM, the number of root segment occurrences is stored.
NO_OF_ROTHOME	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in HOME BLOCK If you want to set this field, run HD Pointer Checker with the HOMECHK=YES or the CHAINDIST=YES option.
NO_OF_ROTHOM1	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in RAA within (HOME BLOCK+1) and (HOME BLOCK-1) If you want to set this field, run HD Pointer Checker with the HOMECHK=YES or the CHAINDIST=YES option.
NO_OF_ROTBYND	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in RAA that exist above (HOME BLOCK+1) and under (HOME BLOCK-1) If you want to set this field, run HD Pointer Checker with the HOMECHK=YES or the CHAINDIST=YES option.

Table 57. Field names for statistics of RAPs, root segments, and database records (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_RAAWOROT	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks without root segment in RAA
AVDBREC	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	Average database record length
NO_OF_ROTWODEP	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences that are in the same block as the dependent segment occurrences If you want to set this field, run HD Pointer Checker with the HASH=NO and the INCORE=YES options. If you want to set this field, specify DEPDIST in the ICEIN statement and run single-step HASH checking option of IMS HP Image Copy.
NO_OF_DEPWOROT	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of dependent segment occurrences that are in different blocks than the root segment block If you want to set this field, run HD Pointer Checker with the HASH=NO and the INCORE=YES options. If you want to set this field, specify DEPDIST in the ICEIN statement and run single-step HASH checking option of IMS HP Image Copy.
NO_OF_AVDEP	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Average count of dependent segment occurrences in the same block If you want to set this field, run HD Pointer Checker with the HASH=NO and the INCORE=YES options. If you want to set this field, specify DEPDIST in the ICEIN statement and run single-step HASH checking option of IMS HP Image Copy.
NO_OF_SYNRAP	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of RAPs with synonym If you want to set this field, run HD Pointer Checker with the DBDIST=YES and the CHAINDIST=YES options.
NO_OF_ROTNOHOM	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in blocks other than HOME BLOCK If you want to set this field, run HD Pointer Checker with the HOMECHK=YES option.

Table 57. Field names for statistics of RAPs, root segments, and database records (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_ROTSYN	Hexadecimal: 4	DSG	• HDAM • PHDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences in the synonym chain If you want to set this field, run HD Pointer Checker with the DBDIST=YES and the CHAINDIST=YES options.
MXROTBLK	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 8	The maximum number of root segment occurrences per block
OVSEG%	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The percentage of segment occurrences in overflow

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for statistics of segments. The values in the following table are set whatever DSG ID is specified. For non-HALDBs, the values for each database are set. For HALDBs, the values for each partition are set.

Table 58. Field names for statistics of segments

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_TOTROTDB	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of root segment occurrences
NO_OF_TOTDEPDB	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of dependent segment occurrences

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for data set group and data set space information. The value for each data set is set. For HALDBs, each DSG information is generated per partition.

Table 59. Field names for data set group and data set space information

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
DSGID	Character: 2	• DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: 1 • Packed decimal: N/A	Data Set Group identifier in 2-digit numbers from 01 to 10

Table 59. Field names for data set group and data set space information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
DSGIDCHR	Character: 1	• DSG • SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 1 • Hexadecimal: N/A • Packed decimal: N/A	Data Set Group identifier in character • For HALDB, character A to J, or M to V • For non-HALDB, 1 to 9, or A
DDNAME	Character: 8	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	DD name
DSNAME	Character: 44	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 44 • Hexadecimal: N/A • Packed decimal: N/A	Database data set name or image copy data set name
SCANCYL	Hexadecimal: 1	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The number of direct-access device cylinders to be scanned when searching for available storage space during segment insertion operations
FBFF	Hexadecimal: 1	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The free block frequency factor (fbff) specified in DBD
FSPF	Hexadecimal: 1	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The free space percentage factor (fspf) specified in DBD
BLKSIZE	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Data set block size
LRECL	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Data set lrecl
ALOCTYPE	Character: 1	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 1 • Hexadecimal: N/A • Packed decimal: N/A	Data set allocation type C'C': CYL C'T': TRK C'B': BLK
NO_OF_PALC	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	Primary allocation quantity of direct-access storage required for the data set

Table 59. Field names for data set group and data set space information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_SALC	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	Secondary allocation quantity of direct-access storage required for the data set
NO_OF_ALCSPC	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: N/A	The number of allocated tracks for the data set
NO_OF_USESPC	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: N/A	The number of tracks used by the data set
NO_OF_EXTENT	Hexadecimal: 1	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The number of data set extents
NO_OF_CISPLT	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	The number of VSAM CI split
NO_OF_CASPLT	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	The number of VSAM CA split
CREDATE	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: N/A	Data set creation date: X'*yyyymmdd*'
CRETIME	Hexadecimal: 3	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 3 • Packed decimal: N/A	Data set creation time: X'*hhmmss*'
HIRBA	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	High used RBA in the data set

Table 59. Field names for data set group and data set space information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
INCORE%	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	The percentage of pointers validated in the incore checking If you want to set this field, run HD Pointer Checker with the HASH=NO and INCORE=YES options.
SUMSPC	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Allocated bytes for the data set
FREEBYT	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	Free space bytes in the data set
ALCCYL	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	Allocated cylinders for the data set If you want to set this field, run HD Pointer Checker with the DATASET=REAL option.
USEDDS%	Character: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 5 • Hexadecimal: N/A • Packed decimal: N/A	Used rate to the data set capacity
OVUSEDDS%	Character: 5	DSG	HISAM	• Character: 5 • Hexadecimal: N/A • Packed decimal: N/A	Used rate to the data set capacity of overflow data set

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for statistics of a data set group (For HISAM, information of a primary data set). The value for each data set is set. For HALDBs, each DSG information is generated per partition.

Table 60. Field names for statistics of a data set group (For HISAM, information of a primary data set)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
DSGMXSGL	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Maximum length of segment in the data set
DSGMNSGL	Hexadecimal: 2	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Minimum length of segment in the data set

Table 60. Field names for statistics of a data set group (For HISAM, information of a primary data set) (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_UNKNOWN	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of unknown data. For HISAM database, this field is set only for a primary data set. **Note:** If the number of unknown data exceeds 32767 (X'00007FFF'), X'FFFFFFFF' is set in this field.
NO_OF_TOTPRSG	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences in the data set (HISAM only)
NO_OF_DELPRSG	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of deleted segment occurrences in the data set (HISAM only)
NO_OF_TOTBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of CIs or blocks in the data set
NO_OF_BMBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of bitmap blocks in the data set
NO_OF_EMPBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of empty blocks in the data set
NO_OF_BLKWOFSE	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks without FSE in the data set
NO_OF_BLKWFSE	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks with FSE and segment occurrences in the data set
NO_OF_VSAMCI	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of VSAM CI#0 in the data set
NO_OF_ERRBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks with error in the data set
NO_OF_SLKBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks with slack bytes in the data set

Table 60. Field names for statistics of a data set group (For HISAM, information of a primary data set) (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_ADDBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks added after initial load or reorganization in the data set
NO_OF_AVALFSE	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of FSEs that has enough length to store the longest segment in the data set
NO_OF_NAVLFSE	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of FSEs that are too short to store the shortest segment in the data set
NO_OF_NSEGBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of blocks with no segment in the data set
NO_OF_UNFMBLK	Hexadecimal: 4	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of unformatted blocks in the data set
SUMSLK	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of slack bytes in the data set
SUMPRE	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of segment prefixes in the data set
SUMDAT	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of segment data in the data set
SUMPAD	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of segment padding areas in the data set
SUMAVFSE	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total bytes of usable free space in the data set. Here, *usable free space* indicates space that has sufficient length to store the shortest segment in the data set group.

Table 60. Field names for statistics of a data set group (For HISAM, information of a primary data set) (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
SUMNAFSE	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total bytes of free space that is not usable in the data set. Here, *free space that is not usable* indicates space that does not have sufficient length to store the shortest segment in the data set group.
SUMUNKOW	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of unknown data in the data set
SUMOVHED	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of DL/I overhead in the data set
SUMVSMBT	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of VSAM CTL in the data set
SUMOVFSE	Hexadecimal: 5	DSG	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 5 • Packed decimal: 8	Total byte of FSEs in overflow area in the data set

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for data set information of HISAM overflow.

Table 61. Field names for data set information of HISAM overflow

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
OVDDNM	Character: 8	DSG	HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Overflow DD name
OVDSNM	Character: 44	DSG	HISAM	• Character: 44 • Hexadecimal: N/A • Packed decimal: N/A	Overflow data set name or image copy data set name
OVBLKSZ	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Block size of overflow data set
OVLRECL	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	LRECL of overflow data set
OVALOCTP	Character: 1	DSG	HISAM	• Character: 1 • Hexadecimal: N/A • Packed decimal: N/A	Allocation type of overflow data set C'C': CYL C'T': TRK C'B': BLK

Table 61. Field names for data set information of HISAM overflow (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_OVPALC	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	Primary allocation quantity of direct-access storage required for overflow data set
NO_OF_OVSALC	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	Secondary allocation quantity of direct-access storage required for overflow data set
NO_OF_OVUNKNOWN	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of unknown data in an overflow data set of HISAM database. **Note:** If the number of unknown data exceeds 32767 (X'00007FFF'), X'FFFFFFFF' is set in this field.
NO_OF_OVEXTNT	Hexadecimal: 1	DSG	HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	The number of overflow data set extents
NO_OF_OVCISPT	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	The number of overflow data set CI split
NO_OF_OVCASPT	Hexadecimal: 2	DSG	HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: N/A	The number of overflow data set CA split
NO_OF_OVALCSP	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: N/A	The number of allocated tracks for the overflow data set
NO_OF_OVUSESP	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: N/A	The number of tracks used in the overflow data set
NO_OF_TOTOVSG	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences in the overflow data set
NO_OF_DELOVSG	Hexadecimal: 4	DSG	HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of deleted segment occurrences in the overflow data set

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for segment information. For non-HALDBs, the values for each database are set. For HALDBs, the values for each partition are set.

Table 62. Field names for segment information

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
SEGNAME	Character: 8	• SEGM • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Segment name

Table 62. Field names for segment information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
SEGCODE	Hexadecimal: 1	• SEGM • RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	Segment code
SEGLVL	Hexadecimal: 1	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 2 • Hexadecimal: 1 • Packed decimal: N/A	Segment hierarchical level
SEGPPCD	Hexadecimal: 1	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 1 • Packed decimal: N/A	Segment code of physical parent
SEGPRE	Hexadecimal: 2	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Length of segment prefix part
SEGDAT	Hexadecimal: 2	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Length of segment data part
ACTMXVLS	Hexadecimal: 2	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Actual maximum length of the segment data
ACTMNVLS	Hexadecimal: 2	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Actual minimum length of the segment data
NO_OF_TOTOCC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of the segment occurrences
NO_OF_TOTOVOC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences in the overflow area or the data set

Table 62. Field names for segment information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_TOTSPOC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences that are split
NO_OF_DEFSPOC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences that are split into different blocks
NO_OF_SEGMINCT	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences that are shorter than the minimum length
NO_OF_TOTSEGLN	Packed decimal: 8	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: N/A • Packed decimal: 8	Total length of segment occurrences
TOTNOCMP	Packed decimal: 8	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: N/A • Packed decimal: 8	Total length of segment occurrences The length before it is edited by the segment edit/compression exit routine. If you want to set this field, run HD Pointer Checker with the COMPFACT=YES option.
NO_OF_SEGBSOCC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences in the base area • For HISAM, the base area means a primary data set • For the first data set group of HDAM or PHDAM, the base area means RAA • For the first data set group of HIDAM or PHIDAM, the base area means the blocks below the high key • Other than the previous conditions, the base area is whole area of the database data set
NO_OF_SEGBSSPL	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment split prefixes in the base area
NO_OF_SEGBSSDT	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment split data in the base area

Table 62. Field names for segment information (continued)

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
NO_OF_SEGOVOCC	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment occurrences in the overflow area • For HISAM, the overflow area means an overflow data set • For the first data set group of HDAM or PHDAM, the overflow area means an overflow area beyond the RAA • For the first data set group of HIDAM or PHIDAM, the overflow area means the blocks beyond the High key • Other than the previous conditions, no value is set for the overflow area. Null X'00' or zero is set in the field
NO_OF_SEGOVSPL	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment split prefixes in the overflow area
NO_OF_SEGOVSDT	Hexadecimal: 4	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of segment split data in the overflow area
COMPNAM	Character: 8	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Segment edit/compression exit routine name
AVESGLN	Hexadecimal: 2	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 2 • Packed decimal: 4	Average length of segment occurrences
COMPFACT	Character: 6	SEGM	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 6 • Hexadecimal: N/A • Packed decimal: N/A	Compression factor For the formula of compression factor, see COMPRESSION FACTOR. If you want to set this field, run HD Pointer Checker with the COMPFACT=YES option.

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

The following table shows the field names for pointer information. For non-HALDBs, the values for each database are set. For HALDBs, the values for each partition are set.

Table 63. Field names for pointer information

Field name	Default attribute and length （in bytes）	Record type that can be specified	Effective database organization Note	Allowable attributes and maximum length (in bytes)	Description
PTRTYPE	Character: 3	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 3 • Hexadecimal: N/A • Packed decimal: N/A	Pointer type: HF, HB, PTF, PTB, PP, LTF, LTB, LP, LCF, LCL, PCF, PCL, RAP, VLS, ELP, ELC
TSEGNAME	Character: 8	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: 8 • Hexadecimal: N/A • Packed decimal: N/A	Target segment name
NO_OF_BLKM1CT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in the preceding block
NO_OF_SAMECT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in the same block
NO_OF_BLKP1CT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in the following block
NO_OF_BYNDCT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in blocks other than itself and the adjacent blocks within the data set
NO_OF_EXTRNCT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in blocks in other data sets
NO_OF_DIFBCT	Hexadecimal: 4	• RAP • PTR	• HDAM • HIDAM • PHDAM • PHIDAM • HISAM	• Character: N/A • Hexadecimal: 4 • Packed decimal: 8	The number of pointers pointing to segments in a different block

Note: Blank (X'40') or null (X'00') is set for the database organizations that are not listed in the Effective database organization column.

Output

The following topics describe the output that the Export Utility produces.

HISTMSG data set

This output data set contains the HISTORY Data Set Message report.

HISTORY Data Set Message report

This report shows the control statements specified in the HISTIN data set.

The following control statements are reported:

- PROC statement
- OPTION statement
- DATABASE statement

This report also shows the following messages from the Export Utility:

- Warning and errors in analyzing the HISTIN control statements
- A result of the Export Utility run

The following figure shows an example of the HISTORY Data Set Message report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HISTORY DATA SET MESSAGE REPORT"                     PAGE:     1
5655-U09                                                 DATE: 07/10/2020  TIME: 18.59.05                      FABGXEXP - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

    PROC TYPE=EXPORT,MEMBER=(MEMB01,MEMB02,MEMB05),DBORG=(HDAM,HIDAM)
    OPTION IMSID=SYS1, FROM=12122019,TO=03032020
    DATABASE DB=DSSCHHVN
    DATABASE DB=DSSCHXIN
    DATABASE DB=DSFACHON
    DATABASE DB=DSFACXVN
    OPTION IMSID=ALL
    DATABASE DB=DSSTUIVN
    DATABASE DB=DSCRSDVN
    DATABASE DB=DSCRSDVN
    DATABASE DB=DSCLSDVN
    DATABASE DB=DSFDAXVN

------ For formatting purposes, several lines have been deleted.------

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = EXPORT  )
```

Figure 184. HISTORY Data Set Message report

HISTPRT data set

This data set contains the following reports: FABGRECI Statement report, History Attribute report, History Export Summary report.

FABGRECI Statement report

This report shows the name of FABGRECI member and the flat record definition statements that are specified in the member.

The member name is shown in the MEMBER NAME( ). The next lines are the statements in the member.

The following statements are reported:

- RECORD statement
- FIELD statement

This report also shows warning and error messages issued during analysis of the FABGRECI statement syntax and creating flat records.

The following figure shows an example of the FABGRECI Statement report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                    "FABGRECI STATEMENT REPORT"                         PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 18.59.05                      FABGXEXP - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

MEMBER NAME(FABPR001)
 RECORD TYPE=DB,RECID=A1
  FIELD NAME=DBDNAME,ATTR=C,LEN=8
  FIELD NAME=SCANDATE,ATTR=P,LEN=4
  FIELD NAME=SCANTIME,ATTR=X,LEN=3
  FIELD NAME=PARTID,ATTR=C,LEN=4
  FIELD VALUE=00,ATTR=X,LEN=1
  FIELD VALUE=' ',ATTR=C,LEN=1
  FIELD NAME=RECID,ATTR=C,LEN=2
  FIELD VALUE=00,ATTR=X,LEN=1
  FIELD NAME=IMSVER,ATTR=C,LEN=5
  FIELD NAME=IMSID,ATTR=C,LEN=4
  FIELD NAME=DBORG,ATTR=C,LEN=6
  FIELD NAME=ACCESS,ATTR=C,LEN=4
  FIELD VALUE=00,ATTR=X,LEN=1
  FIELD NAME=DBDSIZE,ATTR=X,LEN=2
  FIELD NAME=DBDDATE,ATTR=C,LEN=16
  FIELD NAME=DBRCOPT,ATTR=C,LEN=1
  FIELD NAME=DBRECN,ATTR=C,LEN=1
  FIELD NAME=PINDXNM,ATTR=C,LEN=8
  FIELD VALUE=00,ATTR=X,LEN=30
```

Figure 185. HISTPRT: FABGRECI Statement report

History Attribute report

This report contains an attribute information of the HISTORY data set that is specified in the HISTORY DD statement.

The Export Utility generates this report when TYPE=EXPORT is specified on the PROC control statement in the HISTIN data set.

For a description of this report, see “History Attribute report” on page 410.

History Export Summary report

This report summarizes the result of the exporting processes. This report shows the number of flat records that were exported for each database.

The Export Utility generates this report when TYPE=EXPORT is specified for the PROC control statement in the HISTIN data set.

Subsections:

- “Report example” on page 444
- “Report field description” on page 444

Report example

The following figure shows an example of the History Export Summary report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS                "HISTORY EXPORT SUMMARY REPORT"                     PAGE:     1
5655-U09                                                  DATE: 07/10/2020  TIME: 18.59.05                      FABGXEXP - V3.R1


HISTORY  DSNAME: TESTDS.PUBLIC.SAMPLE.HISTORY
FABGEXPF DSNAME: TESTDS.PUBLIC.SAMPLE.FLATADATA

DBDNAME                         = HISAMDB1
IMS ID                          = *ALL
DATE                            = 07/10/2020    - 07/10/2020


MEMBER   RECORD  RECORD    RECORD               COUNT
NAME     ID      TYPE      LENGTH          OF RECORDS
-------- ------- ------- -------- --------------------
FABPR001 A1      DB          102                    1
FABPR002 A2      DSG         138                    1
-------- ------- ------- -------- --------------------
                                                    2

---------------------------------- --------------------
TOTAL COUNT OF RECORDS                              2
```

Figure 186. HISTPRT: History Export Summary report

Report field description

This report contains the following information:

HISTORY DSNAME
Name of the HISTORY data set. It is specified on the HISTORY DD statement in the Export Utility FABGXEXP JCL. The data in this data set is exported by Export Utility.

FABGEXPF DSNAME
Name of the flat file. It is specified on the FABGEXPF DD statement in the Export Utility FABGXEXP JCL. The flat records exported by Export Utility are stored in this data set.

DBD NAME
DBD name (database name) that is processed by Export Utility.

IMS ID
IMS ID that is processed by Export Utility.

EXPORTED DATE
Entries in the HISTORY data set that were taken by HD Pointer Checker in this period, are exported by Export Utility.

MEMBER NAME
Member name. If the FABGRECI DD statement is specified, this is a member name of the FABGRECI data set. If the FABGRECI DD statement is not specified, this is a predefined format member name.

RECORD ID
Record ID of the flat record. If the FABGRECI DD statement is specified, this is the value specified in the RECORD statement in the FABGRECI member. If the FABGRECI DD statement is not specified, this is the ID assigned by the predefined format.

RECORD TYPE
Record type of the flat record. If the FABGRECI DD statement is specified, this is the value specified in the RECORD statement in the FABGRECI member. If the FABGRECI DD statement is not specified, this is the record type assigned by the predefined format.

RECORD LENGTH
Data record length of the flat record. The flat record is a variable length record.

COUNTS of RECORDS
Number of flat records that are exported.

The subtotal number of flat records for the DBD is shown at the bottom of each DBD part.

TOTAL COUNTS OF RECORDS
Grand total number of flat records for all DBDs. It is shown on the last line of this report.

FABGEXPF data set (Flat File)

The FABGEXPF data set contains flat records that are generated by the Export Utility. This data set is referred to as a flat file.

This data set is required when TYPE=EXPORT is specified on the PROC statement in the HISTIN data set.

This data set is a sequential data set. The record is a variable length and the maximum length is 32,752 bytes.

There are two kinds of flat records:

- Predefined flat records
- User-defined flat records

Each of the records is described in the following subsections. Restrictions and considerations are also described in the subsections.

Subsections:

- "Predefined flat records" on page 446
- "User-defined flat records" on page 446
- "Restrictions" on page 446
- "Considerations" on page 447

- “Example 1: Case of a Non-HALDB” on page 447
- “Example 2: Case of a HALDB” on page 448

Predefined flat records

If DUMMY is specified for the FABGRECI DD statement, or if the FABGRECI DD statement is not specified for the Export Utility FABGXEXP JCL, the flat records are generated in the predefined formats. These records are referred to as a predefined flat record.

The formats summarized in the following table are prepared by the Export Utility.

Table 64. Predefined flat records

Member name	Record type	Record ID	Contents
FABPR001	DB	A1	DBD information
FABPR002	DSG	A2	Data set group information -1
FABPR003	DSG	A3	Data set group information -2
FABPR004	SEGMENT	A4	Segment information -1
FABPR005	SEGMENT	A5	Segment information -2
FABPR006	RAP	A6	RAP information
FABPR007	POINTER	A7	Pointer information

To create the predefined flat record, specify the name to the MEMBER= on the PROC statement of the HISTIN data set. For an example of the HISTIN data set, see “Example 5: Creating predefined flat records” on page 480.

The contents of the predefined members are stored in a sample library. They are described in the same syntax rules as the flat file record definitions. The syntax rule is described in “FABGRECI data set” on page 420.

The predefined formats cannot be changed. If you want to change the format, see “User-defined flat records” on page 446.

User-defined flat records

When the FABGRECI data set is specified in the Export Utility FABGXEXP JCL, the flat records are generated in the user-defined formats. This record is referred to as a user-defined flat record.

For how to define the format, see “FABGRECI data set” on page 420.

Restrictions

The following restrictions are common to the predefined flat record and the user-defined flat record.

The following items are not supported by the Export Utility.

- Database
  - A primary index of HIDAM or PHIDAM database
  - A secondary index database
  - A partitioned secondary index (PSINDEX) of HALDB
  - An indirect list data set (ILDS) of HALDB
- Segment Type
  - A virtual logical child segment
- Pointer Type

- Symbolic pointer
- Index pointer
- HISAM direct-address pointer
- Counter field

Note: The supported pointer types are follows:

- Hierarchical Forward pointer (HF)
- Hierarchical Backward pointer (HB)
- Physical Twin Forward pointer (PTF)
- Physical Twin Backward pointer (PTB)
- Physical Parent pointer (PP)
- Logical Twin Forward pointer (LTF)
- Logical Twin Backward pointer (LTB)
- Logical Parent pointer (LP)
- Logical Child First pointer (LCF)
- Logical Child Last pointer (LCL)
- Physical Child First pointer (PCF)
- Physical Child Last pointer (PCL)
- Pointer to a data part of Variable Length Split segment (VLS)
- RBA pointer to logical parent in an extended pointer set of HALDB (ELP)
- RBA pointer to paired logical child for bidirectional logical relationships of HALDB (ELC)

Considerations

The following considerations are common to the predefined flat record and the user-defined flat record.

The sequence of flat records stored in the flat file has the following rules:

- The flat records will be sorted in the order of the database names in EBCDIC order. If there are multiple records of the same database name, the records will be in ascending order of the date.
- Within the same date, flat records will be in the order that they were specified for MEMBER= in the HISTIN control statement.
- If multiple flat records are generated from the same MEMBER, the order of the records will differ as follows according to the record type.
  - If TYPE=PART, in EBCDIC order of partition name
  - If TYPE=DSG, in ascending order of data set group
  - If TYPE=SEGMENT, in ascending order of segment code
  - If TYPE=POINTER, in the order that the pointers are within the segment prefix
- By using the OPTION IMSID parameter of the HISTIN control statement, you can create flat records of a specific IMSID. Note that, however, flat records cannot be sorted in the order of IMSID. They will be in the order they were stored in the History record entries, that is the order HD Pointer Checker created the entries.

Example 1: Case of a Non-HALDB

The following figure shows an example of the specification, for a non-HALDB, to generate a flat file.

```
//HISTIN  DD    *
PROC TYPE=EXPORT,
 MEMBER=(MEMDB,,MEMDSG,MEMSEG,MEMPTR),DBORG=HDAM
OPTION FROM=01012020,TO=12312020
DATABASE DB=HDAMDBA
DATABASE DB=HDAMDBB
/*

FABGRECI contains the following members:
MEMDB: RECORD TYPE=DB
MEMDSG: RECORD TYPE=DSG
MEMSEG: RECORD TYPE=SEGMENT
MEMPTR: RECORD TYPE=POINTER
```

Figure 187. Example specification for a non-HALDB to generate a flat file

With this specification, flat records will be generated in the following order in a flat file:

```
HDAMDBA,01/01/2020 flat record generated from MEMDB
HDAMDBA,01/01/2020 DSG A flat record generated from MEMDSG
HDAMDBA,01/01/2020 DSG B flat record generated from MEMDSG
HDAMDBA,01/01/2020 Segment Code=01 segment flat record generated from MEMSEG
HDAMDBA,01/01/2020 Segment Code=02 segment flat record generated from MEMSEG
HDAMDBA,01/01/2020 Segment Code=03 segment flat record generated from MEMSEG
HDAMDBA,01/01/2020 PTF pointer flat record generated from MEMPTR
HDAMDBA,01/01/2020 PTB pointer flat record generated from MEMPTR
HDAMDBA,01/01/2020 PCF pointer flat record generated from MEMSEG
HDAMDBA,01/01/2020 PCL pointer flat record generated from MEMSEG

HDAMDBA,01/02/2020 flat record generated from MEMDB
           :
           :
HDAMDBB,01/01/2020 flat record generated from MEMDB
            :
HDAMDBB,01/02/2020 flat record generated from MEMDB
            :
```

Figure 188. Flat file generated for a non-HALDB

Example 2: Case of a HALDB

The following figure shows an example of the specification, for a HALDB, to generate a flat file.

For HALDB, the records of DSG, SEGMENT, and POINTER types will be sorted by the partition ID, and sorted by each order.

```
//HISTIN  DD    *
PROC TYPE=EXPORT,
 MEMBER=(MEMDB,MEMPART,MEMDSG,MEMSEG,MEMPTR),DBORG=PHDAM
OPTION FROM=01012020,TO=12312020
DATABASE DB=PHDAMA
DATABASE DB=PHDAMB
/*

FABGRECI contains the following members:
MEMDB: RECORD TYPE=DB
MEMPART: RECORD TYPE=PART
MEMDSG: RECORD TYPE=DSG
MEMSEG: RECORD TYPE=SEGMENT
MEMPTR: RECORD TYPE=POINTER
```

Figure 189. Example specification for a HALDB to generate a flat file

With this specification, flat records will be generated in the following order in a flat file:

```
PHDAMDBA,01/01/2020 flat record generated from MEMDB
PHDAMDBA,01/01/2020 partition id A flat record generated from MEMPART
PHDAMDBA,01/01/2020 partition id B flat record generated from MEMPART
PHDAMDBA,01/01/2020 partition id A DSG A flat record generated from MEMDSG
PHDAMDBA,01/01/2020 partition id A DSG B flat record generated from MEMDSG
PHDAMDBA,01/01/2020 partition id B DSG A flat record generated from MEMDSG
PHDAMDBA,01/01/2020 partition id B DSG B flat record generated from MEMDSG
PHDAMDBA,01/01/2020 partition id A Segment Code=01 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id A Segment Code=02 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id A Segment Code=03 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id B Segment Code=01 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id B Segment Code=02 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id B Segment Code=03 segment flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id A PTF pointer flat record generated from MEMPTR
PHDAMDBA,01/01/2020 partition id A PTB pointer flat record generated from MEMPTR
PHDAMDBA,01/01/2020 partition id A PCF pointer flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id A PCL pointer flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id B PTF pointer flat record generated from MEMPTR
PHDAMDBA,01/01/2020 partition id B PTB pointer flat record generated from MEMPTR
PHDAMDBA,01/01/2020 partition id B PCF pointer flat record generated from MEMSEG
PHDAMDBA,01/01/2020 partition id B PCL pointer flat record generated from MEMSEG
PHDAMDBA,01/02/2020 flat record generated from MEMDB
           :
           :
PHDAMDBB,01/01/2020 flat record generated from MEMDB
           :
PHDAMDBB,01/02/2020 flat record generated from MEMDB
           :
```

Figure 190. Flat file generated for a HALDB

Chapter 22. Using DB Historical Data Analyzer in the TSO/ISPF environment

In the TSO/ISPF environment, DB Historical Data Analyzer provides a function to create charts to show the historical trend of various aspects of IMS full-function database data set groups.

The statistical data to be shown on the charts is obtained from the HISTORY data set produced by HD Pointer Checker and the Space Monitor graph record data set produced by Space Monitor.

The charts are displayed on your TSO terminal as the result of a dialog with DB Historical Data Analyzer and ICU through panels. The hard copies of the charts can also be obtained on printers that GDDM supports using GDDM provided printing utilities.

By using the ICU standard functions, you can generate any of the nine types of chart: line graph, surface chart, histogram, bar chart, pie chart, venn diagram, polar chart, tower chart, and table chart. The charts show database analysis information about the following major subjects:

- Database blocks
- Database free space
- Database segments
- Database root segments
- Database root segments and dependent segments
- Database records
- Space allocation

Topics:

- "Restrictions and considerations" on page 451
- "Invoking DB Historical Data Analyzer" on page 452
- "Panels and operations" on page 455
- "Output (HD Analysis Graph)" on page 472
- "Customizing a graph chart through ICU" on page 473

Restrictions and considerations

The following restrictions and considerations apply when you use DB Historical Data Analyzer in the TSO/ISPF environment.

Restrictions

- A database whose attribute has been changed by DBD regeneration cannot be treated in the same way as before DBD regeneration. In this situation, all HISTORY data set entries for the database must be deleted before the database is processed by HD Pointer Checker. Otherwise, the results are unpredictable. This also applies to the migration situation from non-HALDB to HALDB.
- DB Historical Data Analyzer applies only to the following database organizations:
  - HDAM
  - HIDAM (primary and index)
  - HISAM (including SHISAM)
  - Secondary index
  - PHDAM (partitioned HDAM)
  - PHIDAM (partitioned HIDAM)

© Copyright IBM Corp. 2000, 2021

  - PSINDEX (partitioned secondary index)

  Indirect list data sets (ILDS) used for PHDAM and PHIDAM are not analyzed.
- In order to produce graph charts, Interactive Chart Utility (ICU) of Graphical Data Display Manager Presentation Graphic Feature is a prerequisite, and this program must be run under TSO/ISPF.
- The database administrator must be familiar with the functions and operations of TSO/ISPF and GDDM Interactive Chart Utility (ICU) to produce the HD Analysis graph.
- While running DB Historical Data Analyzer in the TSO/ISPF environment, you cannot invoke DB Historical Data Analyzer from the DB Historical Data Analyzer panel, or have two dialog sessions in the split screen mode.
- The HISTORY data set must be periodically reorganized to avoid performance problems with DB Historical Data Analyzer and the shortage of the available space on the HISTORY data set.

Considerations for HALDB Online Reorganization (OLR)

- For a HALDB partition that is OLR capable, the utility shows the DD names and database data set names of the active data set groups (either (A-J&X) or (M-V&Y)) at the time of HD Pointer Checker's run.
- The utility can work while a HALDB partition is in cursor-active status.

Invoking DB Historical Data Analyzer

To run DB Historical Data Analyzer in the TSO/ISPF environment, you must ensure that your environment is set up correctly.

Before you begin

Ensure that the steps in “Setting up the ISPF interface for DB Historical Data Analyzer ” on page 26 are completed.

Procedure

1. Complete the following steps as the preparation for invoking DB Historical Data Analyzer:
   a) Ensure that the TSO logon procedure is customized to contain GDDM program libraries and, optionally, the IMS HP Pointer Checker system library.
   b) Allocate the required IMS HP Pointer Checker system libraries by issuing either a CLIST command or a TSO ALLOCATE command after the TSO session is established, if the required IMS HP Pointer Checker system library is not yet defined in the TSO logon procedure.
2. Complete the following steps to invoke DB Historical Data Analyzer:
   a) Allocate the data sets that are required at run time using TSO ALLOCATE commands.

      For more information about allocating the data sets, see “Runtime data set requirements” on page 452.
   b) Start a dialog with DB Historical Data Analyzer as an ISPF application.

      For more information, see “Starting a dialog with DB Historical Data Analyzer” on page 453.

Runtime data set requirements

To run DB Historical Data Analyzer, the following data sets must be allocated in advance by using the appropriate TSO ALLOCATE commands.

GDDM data set requirements are shown in the following table.

Table 65. Runtime data set requirements (GDDM data sets)

Data set	Optional or Required	Description
ADMSYMBL	Required	This is the GDDM symbol set data set used by ICU. DISP=SHR must be used to allocate the data set.
ADMCFORM	Optional	This is the GDDM chart format data set used by ICU. DISP=SHR or OLD can be used to allocate the data set.
ADMCDATA	Optional	This is the GDDM chart data data set used by ICU. DISP=SHR or OLD can be used to allocate the data set.
ADMGDF	Optional	This is the GDDM GDF (graphic data format) data set used by ICU. DISP=SHR or OLD can be used to allocate the data set.

For a description of these data sets, see the documentations of GDDM products.

DB Historical Data Analyzer requires the data sets shown in the following table.

Table 66. Runtime data set requirements (DB Historical Data Analyzer data sets)

Data set	Optional or Required	Description
HISTORY	Required	This is the HISTORY data set. DISP=SHR must be used to allocate the data set. For the description of the data set, refer to "HISTORY data set (HISTORY)" on page 376.
SPMNMBR	Optional	This is the control member data set. This data set is for the user of Space Monitor. It is required if you want to select a database data set by the member name of this data set. DISP=SHR must be used to allocate the data set. For the description of the data set, refer to "Control member data set (SPMNMBR)" on page 389.
SPMNSPDT	Optional	This is the Space Monitor graph record data set. It is required if you want to display a chart on space allocation. This data set is created and maintained by Space Monitor. DISP=SHR must be used to allocate the data set. For a description of the data set, see "Space Monitor Graph Record data set (SPMNSPDT)" on page 512.

Starting a dialog with DB Historical Data Analyzer

DB Historical Data Analyzer is invoked as an ISPF application in the TSO/ISPF environment.

Before you begin

Ensure that the data sets described in "Runtime data set requirements" on page 452 are allocated before starting a dialog with DB Historical Data Analyzer.

Procedure

DB Historical Data Analyzer can be invoked in several different ways as follows:

- If ISPF is not started, issue the following command to start the dialog:

```
ISPSTART PANEL(FABGP000)
```

- If the ISPF session is already started, run a command procedure (CLIST) that contains the following ISPEXEC command:

```
ISPEXEC SELECT PANEL(FABGP000) NEWAPPL
```

You can also invoke DB Historical Data Analyzer in the following simple ways, if you customize DB Historical Data Analyzer:

- If you customize and install the sample FABGCMD0 CLIST (see “Sample TSO Command List (FABGCMD0) ” on page 454) distributed with IMS HP Pointer Checker in your TSO CLIST library, run FABGCMD0.
- If your ISPF/PDF Primary Option Menu panel is customized to invoke FABGCMD0, enter the selection code in the **OPTION** field and press ENTER.

Note: For more information about customizing DB Historical Data Analyzer, see “Setting up the ISPF interface for DB Historical Data Analyzer ” on page 26.

Results

When DB Historical Data Analyzer is invoked, the logo panel is displayed, and you can proceed to the "Historical Analysis Primary Menu" panel. For the description of the panels, see “Panels and operations” on page 455.

Sample TSO Command List (FABGCMD0)

A simple way to invoke DB Historical Data Analyzer is to use a CLIST.

The following figure presents a sample CLIST that allocates all the required data sets and then invokes DB Historical Data Analyzer. Data set names shown in the CLIST might need to be modified to meet the requirements of your GDDM ICU and IMS HP Pointer Checker installation.

```
/************************************************************/
/*                                                          */
/* SAMPLE CLIST FOR DB HISTORICAL DATA ANALYZER INVOCATION */
/*                                                          */
/************************************************************/
/*                                                          */
/* SYMBOL SETS ARE REQUIRED FOR GDDM BASE AND PGF.          */
  ALLOCATE FILE(ADMSYMBL) DATASET(GDDMSYM) SHR
/*                                                          */
/* ICU WHICH IS PART OF PGF.                                */
  ALLOCATE FILE(ADMCFORM) DATASET(ADMCFORM) SHR
/*                                                          */
/* ICU WHICH IS PART OF PGF.                                */
  ALLOCATE FILE(ADMCDATA) DATASET(ADMCDATA) SHR
/*                                                          */
/* GDF FILE IS FOR GDDM BASE AND THE ICU.                   */
  ALLOCATE FILE(ADMGDF) DATASET(ADMGDF) SHR
/*                                                          */
/* SPACE MONITOR CONTROL MEMBER DATA SET                    */
  ALLOCATE FILE(SPMNMBR) DATASET('SPMN.MEMBER') SHR
/*                                                          */
/* DB HISTORICAL DATA ANALYZER HISTORY DATA SET             */
  ALLOCATE FILE(HISTORY) DATASET('HIST.HISTORY') SHR
/*                                                          */
/* SPACE MONITOR GRAPH RECORD DATA SET                      */
  ALLOCATE FILE(SPMNSPDT) DATASET('SPMN.SPDT') SHR
/*                                                          */
/* INVOKING DB HISTORICAL DATA ANALYZER                     */
  IF &SYSISPF=ACTIVE THEN +
    ISPEXEC SELECT PANEL(FABGP000) NEWAPPL
  ELSE +
    ISPSTART PANEL(FABGP000)
/*                                                          */
  FREE FILE(ADMSYMBL)
  FREE FILE(ADMCFORM)
  FREE FILE(ADMCDATA)
  FREE FILE(ADMGDF)
  FREE FILE(SPMNMBR)
  FREE FILE(HISTORY)
  FREE FILE(SPMNSPDT)
/*                                                          */
```

Figure 191. Sample TSO Command List (FABGCMD0)

Panels and operations

By using the panels described in the following topics, you can perform interactive operations.

Panel structure

The overall panel structure for DB Historical Data Analyzer is shown in the following figure.

The numbers shown in the figure are used to identify the panels throughout the following topics.

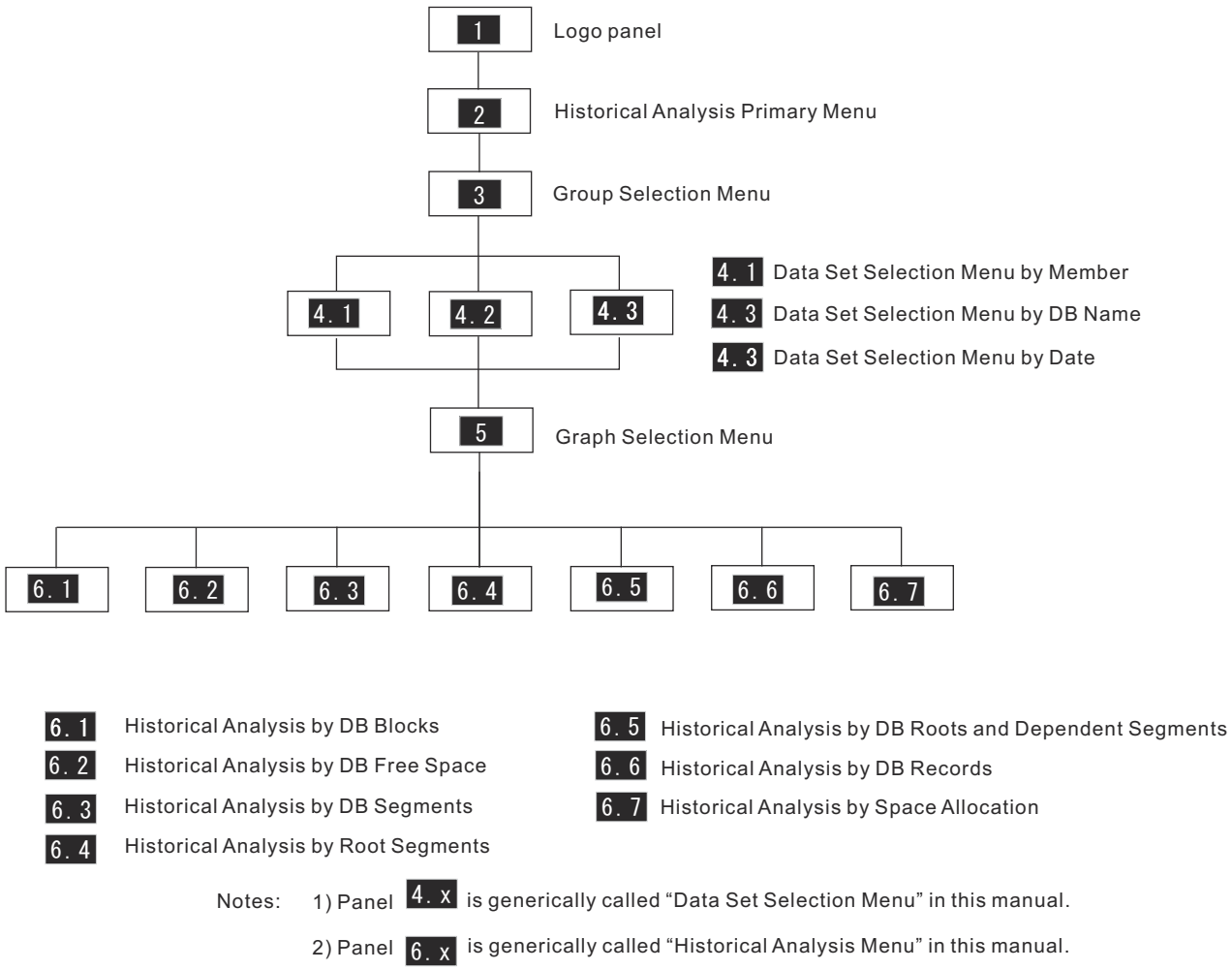


Figure 192. DB Historical Data Analyzer panel structure

Obtaining a graph chart

Follow the steps shown the following topics to obtain a graph chart through a dialog with DB Historical Data Analyzer.

Step 1: Selecting a way to obtain a database data set name list

On the "Group Selection Menu" panel, select one of the following ways to obtain a database data set name list, from which you can select one database data set.

Procedure

- If you are using Space Monitor and have your own Space Monitor control member data set (SPMNMBR), you can use this data set to obtain the name list. In this case, select Group 1 on the "Group Selection Menu" panel, and specify a member name of the SPMNMBR data set.

- If you know the database name and/or ddname of the database data set you want to process, select Group 2 on the "Group Selection Menu" panel, and specify the database name and/or ddname.

  If you know only the database name, leave the ddname field blank. Then all the data sets of the specified database are listed.
- If you know only the date when the real databases were processed by HD Pointer Checker, you can obtain the name list using this date as the key. Select Group 3 on the "Group Selection Menu" panel, and specify the date.
- If you have no idea how to select the database data set, you can list all the database data sets in the HISTORY data set. To do this, select Group 2 on the "Group Selection Menu" panel, and leave the DB name and DD name fields blank. This way, you can obtain the name list of all database data sets in the HISTORY data set.

Step 2: Selecting a database data set

When a database data set name list is obtained, select a database data set.

Procedure

Select one database data set on one of the "Data Set Selection Menu" panels (panel 4.x in Figure 192 on page 455).

Step 3: Selecting a major database analysis item

When a database data set is selected, select a major database analysis item.

Procedure

On the "Graph Selection Menu" panel, select one major subject from the seven major database analysis items. For instance, if you want to see the historical trend of the database free space use of the specified database data set group, select **DB Free Space**.

DB Blocks
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *blocks (or CIs)*. This item applies to HDAM, HIDAM, PHDAM, and PHIDAM (except for the DSG-X) data set groups.

DB Free Space
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *free space*. This item applies to HDAM, HIDAM, PHDAM, and PHIDAM (except for the DSG-X) data set groups.

DB Segments
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *database segments*. This item applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM (except for the DSG-X) data set groups.

DB Root Segments
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *database root segments*. This item applies to the primary data set groups of the HDAM and PHDAM databases.

DB Root and Dependent Segments
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *database root segments and their dependent segments*. This item applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

DB Records
Select this item if you want to analyze the historical trend of the database data set group from the aspect of *database records*. This item applies to the primary data set groups of HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

Space Allocation

Select this item if you want to analyze the historical trend of the database data set group from the aspect of *space allocation*. This item applies to all database data sets (HISAM, HDAM, HIDAM, PHDAM, PHIDAM, and index databases) that have entries in the Space Monitor graph records data set (SPMNSPDT).

Space allocation information is obtained from the Space Monitor graph record data set (SPMNSPDT), which is created and maintained by Space Monitor.

The following table shows the major database analysis items and the database types supported.

Table 67. Major database analysis items and supported database types

Major database analysis items	HISAM	HDAM	HIDAM	Index
1. DB Blocks	N	Y	Y	N
2. DB Free Space	N	Y	Y	N
3. DB Segments	Y (see Note a)	Y (see Note b)	Y (see Note b)	N
4. DB Root Segments	N	Y (see Note c)	N	N
5. DB Root and Dependent Segments	N	Y (see Note c)	Y (see Note c)	N
6. DB Records	Y (see Note c)	Y (see Note c)	Y (see Note c)	N
7. Space Allocation	Y	Y	Y	Y

Notes:

a. Indicates that some detailed items in this major item group are not applicable or applicable only to the primary data set groups.

b. Indicates that some detailed items in this major item group are applicable only to the primary data set groups.

c. Indicates that this major item group is applicable only to the primary data set groups.

d. PHDAM is included in the **HDAM** column header.

e. PHIDAM DSG A-J is included in the **HIDAM** column header.

f. PHIDAM DSG-X and PSINDEX are included in the **Index** column header.

Step 4: Selecting detailed database analysis items

On each major database analysis item, you can further select detailed items that are actually displayed on the graph chart. For example, if you choose *DB free space* as the major item, you can select one of the three detailed items: the total number of free space elements, total bytes of free space, or percentage of free space in the data set.

Procedure

Select detailed database analysis items on one of the "Historical Analysis Menu" panels (panel 6.x in Figure 192 on page 455).

Step 5: Customizing a graph chart through ICU

Finally you get a chart (line graph) of the detailed database analysis items you selected.

Procedure

Through a dialog with GDDM ICU, you can modify the chart to make it more suitable for your use. For the description of the data that is passed from DB Historical Data Analyzer to GDDM ICU, see “Customizing a graph chart through ICU” on page 473.

Understanding DB Historical Data Analyzer panels

Before starting operations on the DB Historical Data Analyzer panels, learn about the ISPF commands that can assist your ISPF operations.

- ISPF commands are supported in DB Historical Data Analyzer panels. Because the HELP, END, RETURN, UP, and DOWN commands are used during the panel operations, it is recommended that you assign these commands to program function (PF) keys.
- The jump function "=X" is supported in any panels except for the Logo panel. "=X" is used to exit from DB Historical Data Analyzer.
- "Scroll==>" field can be set as any other ISPF panels.
- The ISPF PF key assignments are also effective during DB Historical Data Analyzer dialog. If you want to change the default assignments, use the ISPF **KEYS** command.

  Note: The **END** command must be assigned to a PF key before you start a dialog with DB Historical Data Analyzer.
- It is recommended that you display the PF key definitions at the bottom of the panel by using the ISPF **PFSHOW** command.
- The ISPF **HELP** command provides online help information of the DB Historical Data Analyzer panels. The HELP command is supported on any panels except for the Logo panel. Once in the HELP, press ENTER to scroll the panels, if necessary, and enter the END or RETURN command to return to the panel on which you entered the HELP command.

Descriptions of the panels

Use the following reference topics to learn about the DB Historical Data Analyzer panels.

Logo

The following figure shows the logo panel that is displayed when you start a dialog with DB Historical Data Analyzer.

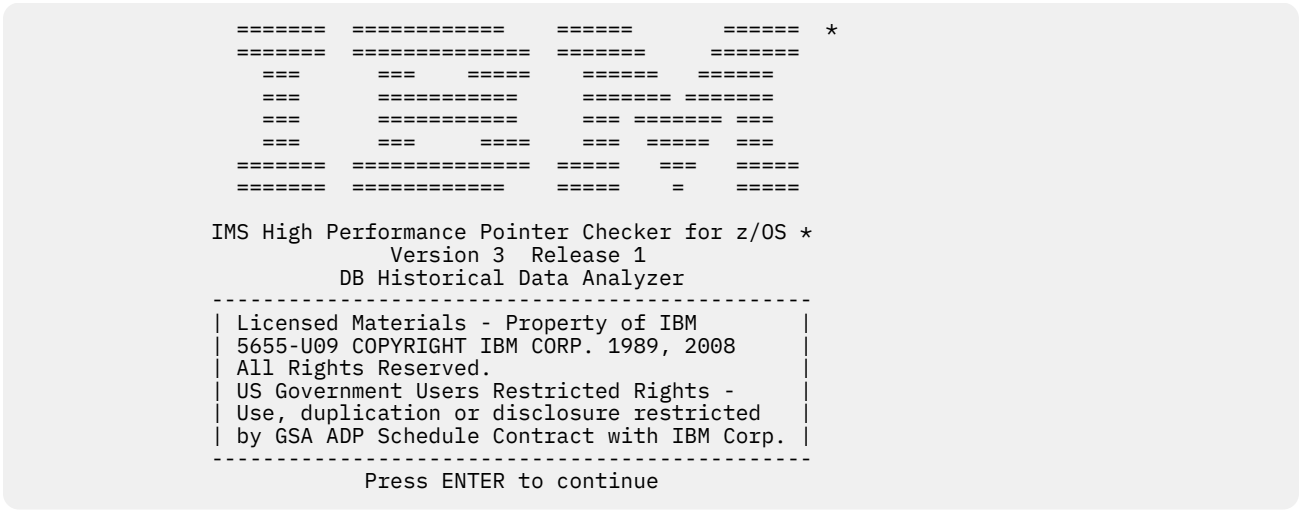


Figure 193. Logo

Press Enter to proceed to the next panel, or END to cancel.

Historical Analysis Primary Menu

This panel shows the functions supported by DB Historical Data Analyzer.

The following figure shows the **Historical Analysis Primary Menu** panel.

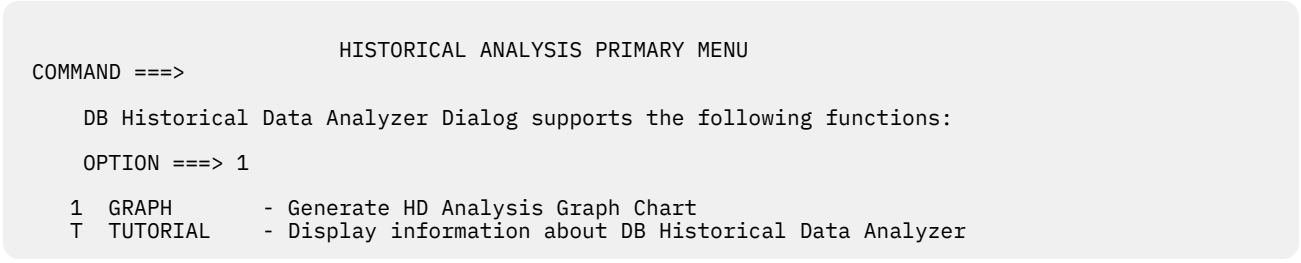


Figure 194. Historical Analysis Primary Menu

Select Option 1 (GRAPH) and press Enter to proceed to the **Group Selection Menu** panel, or select Option T (TUTORIAL) to see the tutorial for panel operation. Or, enter END to return to the Logo panel.

Group Selection Menu

This panel is displayed following the **Historical Analysis Primary Menu** panel. On this panel, select one of the three ways to obtain a database data sets name list.

The following figure shows the **Group Selection Menu** panel.

```
                              GROUP SELECTION MENU
COMMAND ===>

    Select the desired group and press ENTER.

    GROUP ===> _

    1. Member name = ________
    2. DB name     = ________ DD name = ________
    3. Date        = __ / __ / ____

       Note:  Member name: - Specify the member name that contains the database
                             data set name-list to be processed.
              DB name    : - Specify the database name to be processed.
                           - If a database name is not specified, all databases
                             are processed.
              DD name    : - Specify a DD name that identifies the database data
                             set to be processed.
                           - If a DD name is not specified, all data sets of the
                             specified database are processed.
              Date       : - Specify the date when database data sets to be
                             processed were scanned.
                           - Input format is "MM/DD/YYYY"
```

Figure 195. Group Selection Menu

Select a group number (1, 2, or 3), and specify the associated fields. Press Enter to proceed to the next panel, or enter END to return to the **Historical Analysis Primary Menu** panel.

Group 1
Select this group if you have SPMNMBR data set, and want to list all the database data sets in a member of this data set. When you select Group 1, specify the following field:

Member name =
Specifies the member name in SPMNMBR data set. All the database data sets specified by the control statements in the member are listed on **Data Set Selection Menu by Member** panel (see "Data Set Selection Menu by Member" on page 461).

Control statements that describe non-IMS data sets, or invalid control statements are ignored.

Group 2
Select this group if you want to list all the database data sets that have a particular database name, ddname, or both. All the database data sets that have the specified database name and/or ddname are listed on **Data Set Selection Menu by DB Name** panel (see "Data Set Selection Menu by DB Name" on page 462). When you select Group 2, specify the following fields:

DB name =
Specifies the database name of the database data sets you want to list. For HALDB, the master database name should be used.

Note: If you choose this Group 2 and leave the DB name field blank, all the databases in the HISTORY data set are listed.

DD name =
Specifies the ddname of the database data sets you want to list within the specified database. For HALDB, use the ddname created by concatenating the partition name and the DSG suffix character (A-J, X). If no ddname is specified, all the data sets of the specified database are listed. If Group 2 is selected and only the ddname is specified, an error message is issued.

Group 3
Select this group if you want to list all the database data sets that were processed by HD Pointer Checker on a particular date (see note). All the database data sets that have HISTORY data set records of the specified date are listed on **Data Set Selection Menu by Date** panel (see "Data Set Selection Menu by Date" on page 463).

Selecting this group is useful if you do not remember the database name but do know when the database was processed by HD Pointer Checker.

Note: If an image copy data set is used, this is the date when the image copy data set was created.

When you select Group 3, specify the following field:

Date =
Specifies the date of the HISTORY data set record. The input format is *MM*/*DD*/*YYYY*, where *MM* is the month, *DD* is the date, and *YYYY* is the year.

Data Set Selection Menu by Member

This panel is displayed when you select "1" (Member name) on the **Group Selection Menu** panel. On this panel, select one database data set to be processed from the database data set name list.

Note: Database data sets that are specified by the control statements but have no entries in the HISTORY data set are not shown on the panel.

The panel shown in the following figure assumes that the user specified "HISTCARD" as the member name on the **Group Selection Menu** panel. The member name is shown on the panel.

```
                        DATA SET SELECTION MENU BY MEMBER            ROW 1 OF 2
COMMAND ===>                                                      SCROLL ===> PAGE

    Member name = HISTCARD

    Enter S (select) command in the Cmd field of one database data set
    to be processed and press ENTER.

Cmd DB-name   DD-name   DSG  DB-organization  Access    IMSID
_   DSCRSDVN  DSCRSDV0  01   HDAM             ESDS      SYS1
_   DSCRSDVN  DSCRSDV1  02   HDAM             ESDS      SYS1
****************************** BOTTOM OF DATA  ********************************
```

Figure 196. Data Set Selection Menu by Member

Enter UP or DOWN to scroll up or down the database data set name list, if necessary. Enter the S (select) command in the Cmd field of the selected database data set, and press Enter. The **Graph Selection Menu** panel is displayed (see “Graph Selection Menu” on page 464). Enter END to return to the **Group Selection Menu** panel.

The list of database data sets shown on this panel contains the following information:

DB-name
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DD-name
The ddname of this data set group.

DSG
The data set group number. It is the ordinal number of the data set group. 1 to 10 is shown for non-HALDB, A to J and X for HALDB.

DB-organization
The IMS organization used for this database. One of the following texts is shown:

- SHISAM
- HISAM
- HISAM OFLW
- HDAM
- HIDAM
- HIDAM INDEX
- HIDAM INDEX OFLW
- 2NDARY INDX

- 2NDARY INDX OFLW
- SHR 2ND IDX
- SHR 2ND IDX OFLW
- PHDAM
- PHIDAM
- PHIDAM IDX
- PSINDEX

Access
The method used for access to this database data set (OSAM, ESDS, or KSDS).

IMSID
The IMSID of the database data set is displayed when the Multiple-IMSID option is enabled. Otherwise, no data is displayed.

Data Set Selection Menu by DB Name

This panel is displayed when you select "2" (DB name, DD name) on the **Group Selection Menu** panel. On this panel, select one database data set from the database data set name list.

The following panel assumes that the user specified "DSCRSDVN" as the DB name on the **Group Selection Menu** panel. The DB name is shown on the panel.

```
                      DATA SET SELECTION MENU BY DB NAME           ROW 1 OF 2
COMMAND ===>                                                    SCROLL ===> PAGE

    DB name     = DSCRSDVN  DD name =

    Enter S (select) command in the Cmd field of one database data set
    to be processed and press ENTER.

Cmd DB-name   DD-name   DSG  DB-organization  Access    IMSID
_   DSCRSDVN  DSCRSDV0  01   HDAM             ESDS      SYS1
_   DSCRSDVN  DSCRSDV1  02   HDAM             ESDS      SYS1
****************************** BOTTOM OF DATA  ********************************
```

Figure 197. Data Set Selection Menu by DB Name

Enter UP or DOWN to scroll up or down the database data set name list, if necessary. Enter the S (select) command in the Cmd field of the selected database data set, and press Enter. The **Graph Selection Menu** panel is displayed (see “Graph Selection Menu” on page 464). Enter END to return to the **Group Selection Menu** panel.

The list of database data sets shown on this panel contains the following information:

DB-name
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DD-name
The ddname of this data set group.

DSG
The data set group number. It is the ordinal number of the data set group. 1 to 10 is shown for non-HALDB, A to J and X for HALDB.

DB-organization
The IMS organization used for this database. One of the following texts is shown:

- SHISAM
- HISAM
- HISAM OFLW
- HDAM

- HIDAM
- HIDAM INDEX
- HIDAM INDEX OFLW
- 2NDARY INDX
- 2NDARY INDX OFLW
- SHR 2ND IDX
- SHR 2ND IDX OFLW
- PHDAM
- PHIDAM
- PHIDAM IDX
- PSINDEX

Access
The method used for access to this database data set (OSAM, ESDS, or KSDS).

IMSID
The IMSID of the database data set is displayed when the Multiple-IMSID option is enabled. Otherwise, no data is displayed.

Data Set Selection Menu by Date

This panel is displayed when you select "3" (Date) on the **Group Selection Menu** panel. On this panel, select one database data set from the list of database data sets of the specified date.

The following panel assumes that the user specified "10/07/2020" as the date on the **Group Selection Menu** panel. The date is shown on the panel.

```
                        DATA SET SELECTION MENU BY DATE           RAW 1 OF 11
COMMAND ===>                                                   SCROLL ===> PAGE

    Date        = 10 / 07 / 2020

    Enter S (select) command in the Cmd field of one database data set
    to be processed and press ENTER.

Cmd DB-name   DD-name   DSG  DB-organization  Access    IMSID
_   DSCLSDVN  DSCLSDV0  01   HDAM             ESDS      SYS1
_   DSCRSDVN  DSCRSDV0  01   HDAM             ESDS      SYS1
_   DSCRSDVN  DSCRSDV1  02   HDAM             ESDS      SYS1
_   DSFACHON  DSFACHO0  01   HIDAM            OSAM      SYS1
_   DSFACXVN  DSFACXV0  01   HIDAM INDEX      KSDS      SYS1
_   DSFDAXVN  DSFDAXV0  01   2NDARY INDX      KSDS      SYS1
_   DSFDAXVN  DSFDAXV1  01   2NDARY INDX OFLW ESDS      SYS1
_   DSSCHHVN  DSSCHHV0  01   HIDAM            ESDS      SYS1
_   DSSCHXIN  DSSCHXI0  01   HIDAM INDEX      KSDS      SYS1
_   DSSTUIVN  DSSTUIV0  01   HISAM            KSDS      SYS1
_   DSSTUIVN  DSSTUIV1  01   HISAM       OFLW ESDS      SYS1
****************************** BOTTOM OF DATA ********************************
```

Figure 198. Data Set Selection Menu by Date

Enter UP or DOWN to scroll up or down the database data set name list, if necessary. Enter the S (select) command in the Cmd field of the selected database data set, and press Enter. The **Graph Selection Menu** panel is displayed. Enter END to return to the **Group Selection Menu** panel.

The list of database data sets shown on this panel contains the following information:

DB-name
The name of the DBD as coded in the NAME keyword of the DBD macro in the DBD that was processed by the HD Pointer Checker run.

DD-name
The ddname of this data set group.

DSG
The data set group number. It is the ordinal number of the data set group. 1 to 10 is shown for non-HALDB, A to J and X for HALDB.

DB-organization
The IMS organization used for this database. One of the following texts is shown:

- SHISAM
- HISAM
- HISAM OFLW
- HDAM
- HIDAM
- HIDAM INDEX
- HIDAM INDEX OFLW
- 2NDARY INDX
- 2NDARY INDX OFLW
- SHR 2ND IDX
- SHR 2ND IDX OFLW
- PHDAM
- PHIDAM
- PHIDAM IDX
- PSINDEX

Access
The method used for access to this database data set (OSAM, ESDS, or KSDS).

IMSID
The IMSID of the database data set is displayed when the Multiple-IMSID option is enabled. Otherwise, no data is displayed.

Graph Selection Menu

This panel is displayed when you select a database data set on the **Data Set Selection Menu by Member**, **Data Set Selection Menu by DB Name**, or **Data Set Selection Menu by Date** panel.

The following figure shows the **Graph Selection Menu** panel.

```
                              GRAPH SELECTION MENU
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select an item and press ENTER.

  ITEM NUMBER  ===> _

    1. DB Blocks
    2. DB Free Space
    3. DB Segments
    4. DB Root Segments
    5. DB Root and Dependent Segments
    6. DB Records
    7. Space Allocation
```

Figure 199. Graph Selection Menu

Select an item and press Enter, or enter END to return to the previous panel.

DB Historical Data Analyzer creates charts to see the trend of the IMS full-function database data set on the following seven items:

The entry information of a selected database data set shown on this panel contains the following information:

1st Entry
The key date entry of the oldest HISTORY data set records of the selected database data set that was processed by the HD Pointer Checker run.

Last Entry
The key date entry of the newest HISTORY data set records of the selected database data set that was processed by the HD Pointer Checker run.

Entries
The number of key date entries of the selected database data set.

Note: If an image copy data set is used by the HD Pointer Checker run, the date is when the image copy data set was created.

1. DB Blocks
Provides the historical trend of the database data set group from the aspect of blocks (or CIs). This item applies to HDAM, HIDAM, PHDAM, and PHIDAM (except for DSG-X) data set groups.

2. DB Free Space
Provides the historical trend of the database data set group from the aspect of free space. This item applies to HDAM, HIDAM, PHDAM, and PHIDAM (except for DSG-X) data set groups.

3. DB Segments
Provides the historical trend of the database data set group from the aspect of database segments. This item applies to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM (except for DSG-X) data set groups.

4. DB Root Segments
Provides the historical trend of the database data set group from the aspect of database root segments. This item applies to the primary data set groups of the HDAM and PHDAM databases.

If you select this item, **Historical Analysis by Root Segments** panel is displayed (see “Historical Analysis by Root Segments” on page 468).

5. DB Root and Dependent Segments
Provides the historical trend of the database data set group from the aspect of database root segments and their dependent segments. This item applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

If you select this item, **Historical Analysis by DB Roots and Dependent Segments** panel is displayed (see “Historical Analysis by DB Roots and Dependent Segments” on page 469).

6. DB Records
Provides the historical trend of the database data set group from the aspect of database records. This item applies to the primary data set groups of HISAM, HDAM, HIDAM, PHDAM and PHIDAM databases.

If you select this item, **Historical Analysis by DB Records** panel is displayed. (see “Historical Analysis by DB Records” on page 471).

7. Space Allocation
Provides the historical trend of the database data set group from the aspect of space allocation. This item applies to all database data sets (HISAM, HDAM, HIDAM, PHDAM, PHIDAM, and index databases) that have entries in the Space Monitor graph records data set (SPMNSPDT).

Space allocation information is obtained from the Space Monitor graph record data set (SPMNSPDT), which is created and maintained by Space Monitor.

If you select this item, **Historical Analysis by Space Allocation** panel is displayed (see “Historical Analysis by Space Allocation” on page 471).

Historical Analysis by DB Blocks

On this panel, you can select detailed items of database data set blocks/CIs analysis information. DB Historical Data Analyzer shows the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

The following figure shows the **Historical Analysis by DB Blocks** panel.

```
                        HISTORICAL ANALYSIS BY DB BLOCKS
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _         Enter S in front of items to be processed.

                  1. _ Total number of blocks
                     _ Total number of blocks with reusable free space
                     _ Total number of blocks with no reusable free space
                     _ Total number of empty blocks

                  2.   Total bytes of reusable free space

                  3. _ Percent of blocks with reusable free space
                     _ Percent of empty blocks

  ENTRIES TO BE SELECTED

          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 200. Historical Analysis by DB Blocks

Select a group number (1 to 3), and select one or more items under the selected group, if necessary. Press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1

- Total number of blocks/CIs
- Total number of blocks/CIs that have reusable free space from the viewpoint of bitmaps
- Total number of blocks/CIs that have no reusable free space from the viewpoint of bitmaps. Non-reusable free space is a free space element smaller than the longest segment in the data set (as defined in the DBD).
- Total number of empty blocks/CIs

Group number 2
Total bytes of reusable free space

Group number 3

- The percentage of blocks/CIs that have reusable free space from the viewpoint of bitmaps within the total number of blocks/CIs
- The percentage of empty blocks/CIs within the total number of blocks/CIs

The dates shown on this panel are:

From Date
This default date is the key date entry of the last one year old (actually 372 days) of HISTORY data set record or the key date entry of the first HISTORY data set record if the oldest record was created within a year.

Specify the desired date if necessary.

Note: The from date might be adjusted because the range between "From Date" and "To Date" must be a multiple of 12.

To Date
This default date is the key date entry of the latest HISTORY data set record of the selected database data set.

Specify the desired date if necessary.

Note: If an image copy data set is used by the HD Pointer Checker run, the date is when the image copy data set was created.

Historical Analysis by DB Free Space

On the panel, you can select detailed items of free space analysis information. DB Historical Data Analyzer shows the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

The following figure shows the **Historical Analysis by DB Free Space** panel.

```
                      HISTORICAL ANALYSIS BY DB FREE SPACE
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _

                  1.   Total number of free space elements

                  2.   Total bytes of free space

                  3.   Percent of free space in data set

  ENTRIES TO BE SELECTED

          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 201. Historical Analysis by DB Free Space

Select a group number (1 to 3) and press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

Group number 1
Total number of free space elements

Group number 2
Total bytes of free space

Group number 3
The percentage of free space within the data set

Historical Analysis by DB Segments

On this panel, you can select detailed items of database segment analysis information. DB Historical Data Analyzer shows the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

The following figure shows the **Historical Analysis by DB Segments** panel.

```
                      HISTORICAL ANALYSIS BY DB SEGMENTS
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _         Enter S in front of items to be processed.

                  1. _ Total number of segments
                     _ Total number of dependent segments
                     _ Total number of segments by segment code
                  2.   Percent of root segments
                  3.   Occurrence of segments per root by segment code
                  4.   Length of longest segment
                  5.   Average length of segments by segment code

  ENTRIES TO BE SELECTED

          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 202. Historical Analysis by DB Segments

Select a group number (1 to 5), and select one or more items under the selected group, if necessary. Press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1

- Total number of segments
- Total number of dependent segments
- Total number of segments by segment code

These items are applicable to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM DSG A-J.

Group number 2
Percentage of root segments within the total number of segments. This item applies to the primary data set groups of HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

Group number 3
Occurrence of segments per root by segment code. This item applies to the primary data set groups of HISAM, HDAM, HIDAM, PHDAM, and PHIDAM databases.

Group number 4
Length of the longest segment. This item applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

Group number 5
Average length of segments by segment code. These items are applicable to HISAM, HDAM, HIDAM, PHDAM, and PHIDAM DSG A-J.

Tip: If you select items related to segment code (for example, *total number of segments by segment code*), you might get a busy chart if the database data set group has many segment codes. In such a case, consider excluding an appropriate number of segment codes on the ICU panel 2.3 to make the chart more simple and clear.

Historical Analysis by Root Segments

On this panel, you can select detailed items of root segment analysis information. DB Historical Data Analyzer shows the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

This panel applies only to the primary data set groups of HDAM and PHDAM databases.

The following figure shows the **Historical Analysis by Root Segments** panel.

```
                      HISTORICAL ANALYSIS BY ROOT SEGMENTS
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _         Enter S in front of items to be processed.

                  1. _ Total number of root segments
                     _ Total number of roots in home block
                     _ Total number of roots 1 block away from home block
                     _ Total number of roots beyond home block and adjacent
                     _ Total number of roots in overflow

                  2. _ Percent of roots in home block
                     _ Percent of roots 1 block away from home block
                     _ Percent of roots beyond home block and adjacent
                     _ Percent of roots in overflow

  ENTRIES TO BE SELECTED
          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 203. Historical Analysis by Root Segments

Select a group number (1 or 2), and select one or more items under the selected group. Press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1

- Total number of root segments
- Total number of root segments that are stored in the same blocks as they are assigned by the randomizing routine
- Total number of root segments that are stored in the blocks that immediately precede or follow the blocks to which they are randomized
- Total number of root segments that are stored in the blocks that are neither adjacent to nor the same as the blocks to which they are randomized
- Total number of root segments that are stored in the overflow area (blocks that are not in the root addressable area of the database)

Group number 2

- Percentage of root segments that are stored in the same blocks as they are assigned by the randomizing routine, within the total number of root segments
- Percentage of root segments that are stored in the blocks that immediately precede or follow the blocks to which they are randomized, within the total number of root segments
- Percentage of root segments that are stored in the blocks that are neither adjacent to nor the same as the blocks to which they are randomized, within the total number of root segments
- Percentage of root segments that are stored in the overflow area (blocks that are not in the root addressable area of the database), within the total number of root segments

Historical Analysis by DB Roots and Dependent Segments

On this panel, you can select detailed analysis items of root segments and their dependent segments. DB Historical Data Analyzer will show the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

The following figure shows the **Historical Analysis by DB Roots and Dependent Segments** panel.

```
            HISTORICAL ANALYSIS BY DB ROOTS AND DEPENDENT SEGMENTS
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _         Enter S in front of items to be processed.

                  1. _ Total number of roots
                     _ Total number of roots with no dependents in same block
                  2. _ Total number of dependent segments in same block with
                       root
                  3.   Average number of dependent segments in same block
                       with root
                  4. _ Percent of root with no dependents in same block
                     _ Percent of dependent segments not in same block
                       with root

  ENTRIES TO BE SELECTED
          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 204. Historical Analysis by DB Roots and Dependent Segments

Select a group number (1 to 4), and select one or more items under the selected group, if necessary. Press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1

- Total number of root segments
- Total number of root segments that have no dependent segments in the same block as their root segments

Group number 2
Total number of dependent segments that are in the same block as their root segments

Group number 3
Average number of dependent segments that are in the same block as their root segments

Group number 4

- Percentage of root segments that have no dependent segments in the same block as their root segments, within the total number of root segments that have dependent segments.
- Percentage of dependent segments that are not in the same block as their root segments, within the total number of dependent segments

When the data set group is processed by the HASH Check function, the following values in this panel are shown as zero, because the HASH Check function forces INCORE=NO:

Group number 1
Total number of roots with no dependents in same block

Group number 2
Total number of dependent segments in same block with root

Group number 3
Average number of dependent segments in same block with root

Group number 4

- Percent of root with no dependents in same block
- Percent of dependent segments not in same block with root

Historical Analysis by DB Records

On this panel, you can select detailed items of database record analysis information. DB Historical Data Analyzer shows the historical trend of the selected items for the database data set group identified by the DBNAME and DDNAME fields.

The following figure shows the **Historical Analysis by DB Records** panel.

```
                      HISTORICAL ANALYSIS BY DB RECORDS
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _

                  1.   Total number of records (roots)

                  2.   Average length of records

  ENTRIES TO BE SELECTED

          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 205. Historical Analysis by DB Records

Select a group number (1 or 2), then press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1
Total number of database records (this is the same as the total number of root segments)

Group number 2
Average length of database records, including prefix and data portions of all segments. (This does not include segments that are in the secondary data set group of the database.) This item applies to the primary data set groups of HDAM, HIDAM, PHDAM, and PHIDAM databases.

Historical Analysis by Space Allocation

On this panel, you can select detailed items of space allocation analysis information. DB Historical Data Analyzer will show the historical trend of the selected items for the database data set identified by the DBNAME and DDNAME fields.

Space management information is obtained from the Space Monitor graph record data set (SPMNSPDT), which is created and maintained by Space Monitor.

The following figure shows the **Historical Analysis by Space Allocation** panel.

```
                    HISTORICAL ANALYSIS BY SPACE ALLOCATION
COMMAND ===>

  DBNAME = DSCRSDVN   DDNAME = DSCRSDV0   DSG = 01     1st Entry  = 03/26/2019
  DB-ORG = HDAM                           ACC = ESDS   Last Entry = 10/07/2020
                                                       Entries    = 00076
  Select one of the following groups and press ENTER.

  GROUP NUMBER ===> _         Enter S in front of items to be processed.

                  1. _ Total number of cylinders allocated
                     _ Total number of cylinders as used space
                     _ total number of cylinders as IMS data

                  2. _ Percent of cylinders as used space
                     _ Percent of cylinders as IMS data

  ENTRIES TO BE SELECTED

          From Date = 10 / 01 / 2019    May specify the desired date
          To Date   = 10 / 07 / 2020    Input format is "MM/DD/YYYY"
```

Figure 206. Historical Analysis by Space Allocation

Select a group number (1 or 2), and select one or more items under the selected group. Press Enter to pass the control to ICU, or enter END to return to the **Graph Selection Menu** panel.

The items shown on this panel are:

Group number 1

- The space allocated for the database data set
- The space used for the database data set
- The space used as IMS data in the database data set

  Note: Because the unit of space is shown by cylinders, if the data set is allocated by tracks, the amount of space is rounded off to cylinders

Group number 2

- Percentage of used space within the total space allocated for the database data set
- Percentage of space used as IMS data in the database data set, within the total space allocated for the database data set

Output (HD Analysis Graph)

As the result of a dialog with DB Historical Data Analyzer through panels, DB Historical Data Analyzer generates a line graph at first by passing control to GDDM Interactive Chart Utility (ICU).

Then you can generate other types of charts through ICU operation using the same data that DB Historical Data Analyzer provides. You can also customize the chart using ICU; for example, change the title, color, or the size of the chart.

The X-axis of the chart always shows intervals by key dates; when the default values of date fields are used, key dates of the last one year or from the date of the first entry to the date of the last entry if the oldest data was created within a year for the specified database data set group. The unit of the Y axis is "TOTAL NUMBER", "PERCENT" or others depending on the items selected.

For a detailed description, see “Customizing a graph chart through ICU” on page 473.

The following figure shows a sample output of a line graph. This sample assumes that the user selected Group 1 on the **Historical Analysis by DB Blocks** panel, and selected *Total number of blocks* and *Total number of blocks with no reusable free space* as the detailed database analysis items.

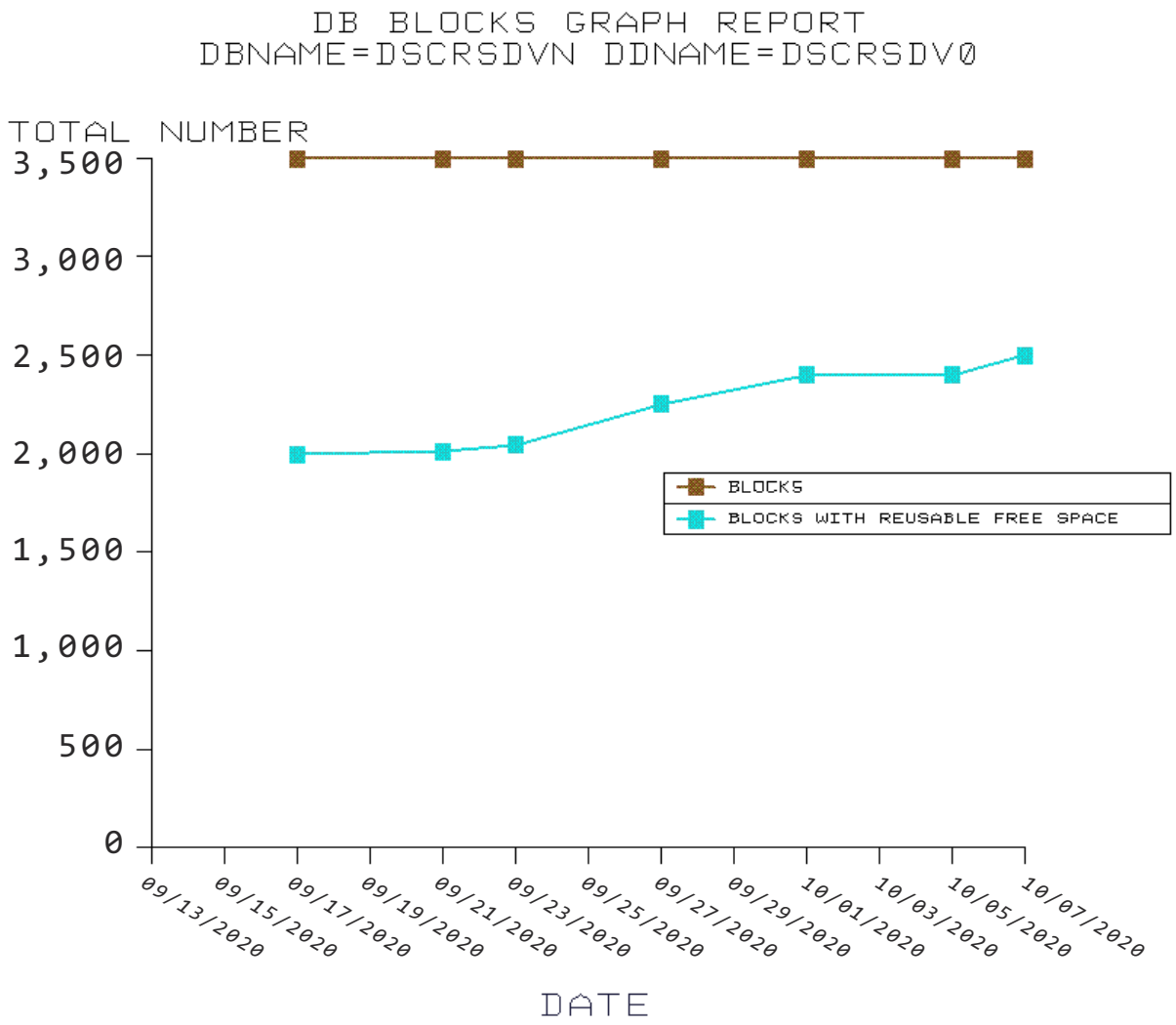


Figure 207. Example: HD Analysis graph

When you exit from ICU, you return to one of the **Historical Analysis Menu** panels (panel 6.x in Figure 192 on page 455) that you last made a dialog with.

Customizing a graph chart through ICU

After you select detailed database analysis items on one of the **Historical Analysis Menu** panels, DB Historical Data Analyzer passes the collected data and control to GDDM ICU to generate a line graph chart.

Note: Historical Analysis Menu panels are shown as panel 6.x in Figure 192 on page 455.

Once the line graph chart is displayed, you can modify the graph to make it more suitable for your use through a dialog with GDDM ICU.

The following subsections present the graph data that is passed from DB Historical Data Analyzer to GDDM ICU:

Subsections:

- "Chart heading (ICU Panel 5.1)" on page 474
- "Data group names (ICU Panel 2.3)" on page 474
- "Data manipulation (ICU Panel 2.2)" on page 474
- "X-axis title (ICU Panel 4.1)" on page 475

- "X-axis scale and range (ICU Panel 4.3)" on page 475
- "X-axis label values (ICU Panel 4.4.1)" on page 475
- "X-axis attribute (ICU Panel 4.4.2)" on page 475
- "X-axis markings (ICU Panel 4.5)" on page 475
- "Y-axis title (ICU Panel 4.1)" on page 475
- "Y-axis scale and range (ICU Panel 4.3)" on page 476
- "Y-axis label values (ICU Panel 4.4)" on page 476
- "Y-axis markings (ICU Panel 4.5)" on page 476
- "Legend position and format (ICU Panel 5.3)" on page 476

Chart heading (ICU Panel 5.1)

Heading text contains characters for two heading lines. The first line contains the major database analysis item name which was selected on the **Graph Selection Menu** panel. The second line contains the database name (DBNAME=) and ddname (DDNAME=), which were selected on one of the **Data Set Selection Menu** panels (panel 4.x in Figure 192 on page 455).

Data group names (ICU Panel 2.3)

The detailed database analysis item names selected on one of the **Historical Analysis Menu** panels (panel 6.x in Figure 192 on page 455) appear as a legend of the chart.

DB Historical Data Analyzer provides these item names as *long data group names* for the legend.

Tip: If you select items related to segment code (for example, *total number of segments by segment code*) on **Historical Analysis by DB Segments** panel, you might get a busy chart if the database data set group has many segment codes. Legend might contain too many items, and the following ICU message might be displayed as well:

```
ADM0511 W NOT ENOUGH ROOM TO DRAW ALL KEYS.
ONE OR MORE WERE OMITTED
```

In such a case, you should exclude an appropriate number of segment codes on the ICU panel 2.3 to make the chart more simple and clear.

Data manipulation (ICU Panel 2.2)

All the collected data for the detailed database analysis items are shown on the ICU panel 2.2 as Y values. If the collected data value is greater than 16,777,210, the value is expressed by a floating point number (such as 1.67772E+07).

Each X element represents the data collection date. The X value associated with each X element is calculated by DB Historical Data Analyzer from the data collection date, in order to draw a correct chart.

The first X element represents the oldest data collection date and its X value is the smallest. The last X element represents the latest data collection date and has the largest X value, which is same as the X-axis range value.

X-axis range is from zero to a multiple of 12, and one range value represents one day. (See "X-axis scale and range (ICU Panel 4.3)" on page 475).

Example: In the sample of HD Analysis graph (see Figure 207 on page 473), the data collection period is from 09/17/2020 to 10/07/2020 (there are 21 days within the period). So the X-axis range is determined as 0 to 24, because 24 is the value that is greater than 21 and a multiple of 12. X value 24 represents the latest data collection date; 10/07/2020. Consequently, X value 0 is determined to represent 09/13/2020, which is 24 days before 10/07/2020.

You can exclude or delete data of some dates in order to make the graph chart look neat. You should not, however, exclude or delete data of the *latest* collection date; otherwise, X-axis label does not show the correct date position on the graph chart.

X labels represent actual data collection dates. These X labels are not used for X-axis labels due to the difficulty to adjust X-axis tick marks and X-axis labels. For the description of the X-axis labels, refer to "X-axis label values (ICU Panel 4.4.1)" on page 475.

X-axis title (ICU Panel 4.1)

DB Historical Data Analyzer uses the characters DATE for the X-axis title text.

X-axis scale and range (ICU Panel 4.3)

DB Historical Data Analyzer provides Axis Scale Type = 1 (Linear).

X-axis range is determined based on the period between the oldest data collection date and the latest data collection date. The range is adjusted to a multiple of 12 so that *13 tick marks* (there are 12 intervals in the range) can always be set on the X-axis.

If the oldest data collection date is more than one year before the latest data collection date, the maximum period is adjusted to one year (actually 12 X 31 = 372 days) and the data that was collected more than one year before will be ignored when the default option is used.

X-axis label values (ICU Panel 4.4.1)

DB Historical Data Analyzer provides X-axis labels as your own labels. For every X-axis tick mark, the corresponding data collection date is assigned as a label. The X-axis labels are displayed in MM/DD/YYYY format.

For example, if data collection period is from 09/17/2020 to 10/07/2020, then X-axis range is from 0 to 24 and X-axis interval for 13 tick marks is 2. These 13 tick marks are set on X-axis positions 0, 2, ..., 24, and the corresponding X-axis labels that DB Historical Data Analyzer provides are 09/13/2020, 09/15/2020, ..., 10/05/2020, 10/07/2020. You can change these label texts but must not delete any of them, because each X-axis label corresponds to each X-axis tick mark.

X-axis attribute (ICU Panel 4.4.2)

X axis character mode is set to 3 (scaled, exact positioning), X-axis character width multiplier is set to 0.7, and X-axis rotation angle is set to -30 degrees, in order to display 13 X-axis labels at all times. These values should not be changed.

X-axis markings (ICU Panel 4.5)

DB Historical Data Analyzer determines the X-axis interval between major tick marks in order to show maximum 13 X-axis major tick marks (X-axis start position and end position are also treated as tick marks) on the graph chart.

Y-axis title (ICU Panel 4.1)

One of the following Y-axis titles are provided, depending on the selected detailed database analysis items group:

- TOTAL NUMBER
- TOTAL BYTES
- PERCENT
- LENGTH
- AVERAGE LENGTH
- AVERAGE NUMBER

- OCCURRENCE/ROOT

Y-axis scale and range (ICU Panel 4.3)

DB Historical Data Analyzer provides SCALE = 1 for linear axes. Y-axis range is determined by ICU based on the actual Y values.

Y-axis label values (ICU Panel 4.4)

Label Type = 1 (multiplied by 1) is used so that Y-axis labels generated are numeric values.

Y-axis markings (ICU Panel 4.5)

Default values are applied to determine the interval between major tick marks for Y-axis.

Legend position and format (ICU Panel 5.3)

The ICU default settings are used for the legend position and format. You can change these setting options in ICU panel 5.3 if you want to move the position of, or change the size of the legend. You can even suppress the display of the legend.

Chapter 23. JCL examples for DB Historical Data Analyzer

You can use the following JCL examples when you prepare JCL for the DB Historical Data Analyzer utility and the Export Utility.

Topics:

- "Example 1: Reorganizing the HISTORY data set " on page 477
- "Example 2: Deleting entries from the HISTORY data set" on page 478
- "Example 3: Producing an HD Analysis report" on page 479
- "Example 4: Producing the HD Pointer Checker Summary report" on page 479
- "Example 5: Creating predefined flat records" on page 480
- "Example 6: Creating user-defined flat records" on page 481

Example 1: Reorganizing the HISTORY data set

This example contains JCL for reorganizing the HISTORY data set.

In this example, a backup copy of the HISTORY data set is created in Step 1, and then the data set is reorganized in Step 2. The HISTORY data set entries are listed out before and after the reorganization to make sure that the contents of the data set are not changed logically.

DISP=OLD must be used for the HISTORY DD statement.

Subsections:

- "Step 1: Making a backup copy of the HISTORY data set" on page 477
- "Step 2: Reorganizing the HISTORY data set" on page 478

Step 1: Making a backup copy of the HISTORY data set

The following JCL example makes a backup copy of the HISTORY data set.

```
//*******************************************
//** DEFINE BACKUP HISTORY DATA SET          **
//*******************************************
//DEFINE   EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=A
//SYSIN    DD  *
  DELETE (HIST.HISTORY.BACKUP) CLUSTER
  SET MAXCC = 0
  DEFINE CLUSTER (NAME(HIST.HISTORY.BACKUP) -
                  INDEXED KEYS(23,0) UNIQUE SHAREOPTIONS(3 3) -
                  VOL(IMSDBT) CYLINDERS(2,1) -
                  RECORDSIZE(240,240) -
                  CONTROLINTERVALSIZE(4096)) -
         DATA    (NAME(HIST.HISTORYD.BACKUP)) -
         INDEX   (NAME(HIST.HISTORYI.BACKUP))
/*
//COPY     EXEC PGM=IDCAMS,COND=(0,LT)
//SYSPRINT DD  SYSOUT=A
//INFILE   DD  DISP=OLD,DSN=HIST.HISTORY
//OUTFILE  DD  DISP=OLD,DSN=HIST.HISTORY.BACKUP
//SYSIN    DD  *
  REPRO  INFILE(INFILE)  OUTFILE(OUTFILE)
/*
```

Figure 208. DB Historical Data Analyzer example 1: Reorganizing the HISTORY data set (Step 1)

© Copyright IBM Corp. 2000, 2021

Step 2: Reorganizing the HISTORY data set

The following JCL example reorganizes the HISTORY data set.

```
//*******************************************
//** REORGANIZE HISTORY DATA SET            **
//*******************************************
//REORG    EXEC  PGM=FABGHIST,COND=(0,LT)
//STEPLIB  DD DSN=HPS.SHPSLMD0,DISP=SHR
//HISTORY  DD DSN=HIST.HISTORY,DISP=OLD
//HISTPRT  DD SYSOUT=A
//HISTMSG  DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//HISTIN   DD  *
 PROC TYPE=LIST      ** LIST CONTENTS BEFORE REORG
 ENDPROC
 PROC TYPE=REORG     ** REORGANIZE HISTORY DS
 ENDPROC
 PROC TYPE=LIST      ** LIST CONTENTS AFTER REORG
 ENDPROC
/*
```

Figure 209. DB Historical Data Analyzer example 1: Reorganizing the HISTORY data set (Step 2)

Example 2: Deleting entries from the HISTORY data set

This example contains JCL for deleting entries from the HISTORY data set.

In this example, entries in the HISTORY data set are listed out before and after entries are deleted, to make sure that the specified entries are deleted.

The JCL example specifies the deletion of:

- All entries of the database name DB01 from January 1 in 2020 to the current date
- Each entry of the ddname DB02DD01 and DB02DD02 of database DB02 which was created most recently
- All entries of the ddname DB03DD01 of database name DB03 created in March 2020
- Entries of the ddname DB04DD01 of database name DB04 that are created more than 100 days ago

DISP=OLD must be used for the HISTORY DD statement.

```
//*******************************************
//** DELETING HISTORY DATA SET ENTRIES      **
//*******************************************
//DELETE   EXEC  PGM=FABGHIST
//STEPLIB  DD DSN=HPS.SHPSLMD0,DISP=SHR
//HISTORY  DD DSN=HIST.HISTORY,DISP=OLD
//HISTPRT  DD SYSOUT=A
//HISTMSG  DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//HISTIN   DD  *
 PROC TYPE=LIST      ** LIST CONTENTS BEFORE DELETION
 ENDPROC
 PROC TYPE=DELETE    ** DELETE HISTORY DS ENTRIES
   DATABASE DB=DB01,DD=ALL,FROM=01012020
   DATABASE DB=DB02,DD=DB02DD01
   DATABASE DB=DB02,DD=DB02DD02
   DATABASE DB=DB03,DD=DB03DD01,FROM=03012020,TO=03312020
   DATABASE DB=DB04,DD=DB04DD01,KEEP=100
 ENDPROC
 PROC TYPE=LIST      ** LIST CONTENTS AFTER DELETION
 ENDPROC
/*
```

Figure 210. DB Historical Data Analyzer example 2: Deleting entries from a HISTORY data set

Example 3: Producing an HD Analysis report

This example contains JCL for running HD Pointer Checker and producing the HD Analysis reports in the same job. This method is very useful to reduce the output reports of HD Pointer Checker.

The first step is the HD Pointer Checker run; all the optional output reports are suppressed by the REPORT control statement.

The second step generates the HD Analysis reports for all database data sets that are scanned by HD Pointer Checker. In the DATABASE control statements for DB Historical Data Analyzer, all database data sets that are processed in the first step (by HD Pointer Checker) must be specified.

DISP=SHR must be used for the HISTORY DD statement.

```
//*********************************************************
//**  HD POINTER CHECKER RUN                              **
//*********************************************************
//PCRUN   EXEC FABPP,REGION=4000K,
//             PSB=PSBSMUAL,
//             HISTORY='HIST.HISTORY',
//             DBDLIB='IMS.DBDLIB',
//             PSBLIB='IMS.PSBLIB',
//             RESLIB='IMS.RESLIB',
//             DBTLIB='HPS.SHPSLMD0',
//             DBTSRC='FAB.SAMPLE(FABVSAMP)'
//*            ----------------------------------------------------
//HDPCPRO.PROCCTL  DD *
  PROC TYPE=ALL
   REPORT   RUNTM=NO,DBDIST=NO,BITMAP=NO,FSEMAP=NO,MAXFSD=NO,
            INTST=NO,INTFS=NO
   OPTION   HISTORY=YES
   DATABASE DB=DSCRSDVN,DD=DSCRSDV0,DATASET=IMAGECOPY
   DATABASE DB=DSCRSDVN,DD=DSCRSDV1,DATASET=IMAGECOPY
   DATABASE DB=DSCLSDVN,DD=DSCLSDV0,DATASET=IMAGECOPY
   END
/*
//HDPCPRO.DSCRSDV0 DD DSN=SAMPLE.DSCRSDV0.IMGCOPY,DISP=OLD
//HDPCPRO.DSCRSDV1 DD DSN=SAMPLE.DSCRSDV1.IMGCOPY,DISP=OLD
//HDPCPRO.DSCLSDV0 DD DSN=SAMPLE.DSCLSDV0.IMGCOPY,DISP=OLD
//*
//*********************************************************************
//*   DB HIST                                                         *
//*********************************************************************
//HIST1  EXEC PGM=FABGHIST
//STEPLIB  DD DSN=HPS.SHPSLMD0,DISP=SHR
//HISTORY  DD DSN=HIST.HISTORY,DISP=SHR
//HISTPRT  DD SYSOUT=A
//HISTMSG  DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//HISTIN  DD *
 PROC TYPE=SUMMARY
 ENDPROC
 PROC TYPE=ANALYSIS
   DATABASE DB=DSCRSDVN,DD=DSCRSDV0
   DATABASE DB=DSCRSDVN,DD=DSCRSDV1
   DATABASE DB=DSCLSDVN,DD=DSCLSDV0
 ENDPROC
/*
```

Figure 211. DB Historical Data Analyzer example 3: Producing an HD Analysis report after HD Pointer Checker run

Example 4: Producing the HD Pointer Checker Summary report

This example contains JCL for producing the HD Pointer Checker Summary report for the specified database data sets.

In this example, the results of the last HD Pointer Checker run, for all the database data sets specified in the member APPL01, are summarized.

Note: DEDB data set specifications are ignored.

Subsections:

- “Step 1: Creating a member in the SPMNMBR data set” on page 480
- “Step 2: Producing the HD Pointer Checker Summary report” on page 480

Step 1: Creating a member in the SPMNMBR data set

DB Historical Data Analyzer creates a member (APPL01) in the SPMNMBR data set.

```
//FPPROC  EXEC  PGM=IEBUPDTE,PARM=NEW
//SYSPRINT DD SYSOUT=A
//SYSUT2   DD DSN=SPMN.MEMBER,DISP=OLD
//SYSIN   DD  DATA,DLM=@@
./ ADD  NAME=APPL01,LIST=ALL
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DL/I DATABASE DATA SET GROUP FOR APPL01
*-DBD--* *-DD---* *-DATA SET NAME --------------------------* AABBB CC
DSSCHHVN DSSCHHV0 SAMPLE.DSSCHHV0                             13 20  7
DSFACHON DSFACHO0 SAMPLE.DSFACHO0
DSCRSDVN DSCRSDV0 SAMPLE.DSCRSDV0                             13 20  7
DSCRSDVN DSCRSDV1 SAMPLE.DSCRSDV1
DSCLSDVN DSCLSDV0 SAMPLE.DSCLSDV0
*
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DEDB AREA DATA SET GROUP FOR APPL01
*-N/A--* *-N/A--* *-DATA SET NAME --------------------------* AABBB CC
                  SAMPLE.DB01AR01
                  SAMPLE.DB01AR02
                  SAMPLE.DB02AR01
                  SAMPLE.DB02AR02
                  SAMPLE.DB02AR03
@@
//*
```

Figure 212. DB Historical Data Analyzer example 4: Creating a member in the SPMNMBR data set (Step 1)

Step 2: Producing the HD Pointer Checker Summary report

Using the SPMNMBR data set created in the previous step, DB Historical Data Analyzer produces the HD Pointer Checker Summary report.

```
//*********************************************
//** PRODUCE HD POINTER CHECKER SUMMARY REPORT **
//*********************************************
//SUMM     EXEC  PGM=FABGHIST
//STEPLIB  DD DSN=HPS.SHPSLMD0,DISP=SHR
//HISTORY  DD DSN=HIST.HISTORY,DISP=SHR
//SPMNMBR  DD DSN=SPMN.MEMBER,DISP=SHR
//HISTPRT  DD SYSOUT=A
//HISTMSG  DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//HISTIN   DD  *
 PROC TYPE=SUMMARY
   DATABASE MEMBER=APPL01
 ENDPROC
  /*
```

Figure 213. DB Historical Data Analyzer example 4: Producing the HD Pointer Checker Summary report (Step 2)

Example 5: Creating predefined flat records

This example contains JCL for the Export Utility. It creates predefined flat records.

Do not specify the FABGRECI DD statement for using the predefined formats. Specify the predefined member name to MEMBER= in the HISTIN data set.

In this example, the format FABPR001 and FABPR002 are used as the predefined member name.

```
//*-------------------------------------------------------------------*
//*  EXPORT UTILITY                                                   *
//*-------------------------------------------------------------------*
//EXPORT   EXEC PGM=FABGXEXP
//STEPLIB  DD DISP=SHR,DSN=hppc.shpslmd0
//HISTORY  DD DISP=SHR,DSN=history.dataset
//FABGEXPF DD DISP=NEW,SPACE=(TRK,(1,1)),UNIT=SYSALLDA,
//         DSN=flat.file
//HISTMSG  DD SYSOUT=*
//HISTPRT  DD SYSOUT=*
//HISTIN   DD *
  PROC TYPE=EXPORT,MEMBER=(FABPR001,FABPR002),DBORG=(HDAM,HIDAM)
/*
//SYSUDUMP DD SYSOUT=*
```

Figure 214. Export utility example: Creating predefined flat records

Example 6: Creating user-defined flat records

This example contains JCL for the Export Utility. It creates user-defined flat records.

Specify the FABGRECI DD statement for using user-defined formats, and specify the member name to MEMBER= in the HISTIN data set. In this example, formats *member01* and *member02* are used.

```
//*-------------------------------------------------------------------*
//*  EXPORT UTILITY                                                   *
//*-------------------------------------------------------------------*
//EXPORT   EXEC PGM=FABGXEXP
//STEPLIB  DD DISP=SHR,DSN=hppc.shpslmd0
//HISTORY  DD DISP=SHR,DSN=history.dataset
//FABGRECI DD DISP=SHR,DSN=fabgreci.dataset
//FABGEXPF DD DISP=NEW,SPACE=(TRK,(1,1)),UNIT=SYSALLDA,
//         DSN=flat.file
//HISTMSG  DD SYSOUT=*
//HISTPRT  DD SYSOUT=*
//HISTIN   DD *
  PROC TYPE=EXPORT,MEMBER=(member01,member02)
/*
//SYSUDUMP DD SYSOUT=*
```

Figure 215. Export utility example: Creating the user-defined flat records

Part 5. Space Monitor utility

The Space Monitor utility provides information about data set space utilization.

Use the following topics to learn about and use the Space Monitor utility.

Topics:

- Chapter 24, “Overview of Space Monitor,” on page 485
- Chapter 25, “Using Space Monitor,” on page 489
- Chapter 26, “JCL examples for Space Monitor,” on page 531
- Chapter 27, “Available data set extents and last space,” on page 535
- Chapter 28, “Space Monitor Site Default Generation utility,” on page 541

© Copyright IBM Corp. 2000, 2021

Chapter 24. Overview of Space Monitor

The Space Monitor utility assists the users to forecast potential space utilization problems of IMS full-function database data sets that HD Pointer Checker supports, and OS data sets (including VSAM data sets).

Note: The term *OS data sets* used in this user's guide includes VSAM data sets. It generally means non-IMS data sets in this guide.

Frequent (usually daily) use of this utility helps you prevent system abend conditions due to:

- More space is needed, but none is available
- More space is needed, but the limit of the extent has been reached

When the Space Monitor utility detects these conditions, it notifies such conditions by return codes. Optionally, it sends a notification message to TSO user IDs.

Topics:

- "Program functions" on page 485
- "Program structure" on page 487
- "Data flow" on page 487

Program functions

The Space Monitor utility monitors space utilization in data sets and reports the space utilization status.

Subsections:

- "Monitoring and logging data set space utilization" on page 485
- "Monitoring IMS online full-function database data sets" on page 485
- "Describing space utilization" on page 486

Monitoring and logging data set space utilization

Space Monitor examines DASD VTOCs and VSAM catalog entries of user-specified data sets to monitor the space utilization of IMS full-function database data sets and OS data sets.

For IMS full-function database data sets, Space Monitor also uses database analysis information that is collected by HD Pointer Checker to monitor the space utilization from the viewpoint of IMS data. IMS DEDB area data sets are treated simply as VSAM data sets.

The collected data is logged into a data set as the space management information and is used to produce a graph report, which shows the most recent trend of space utilization. The collected data of the IMS full-function database data sets is also used by DB Historical Data Analyzer.

Monitoring IMS online full-function database data sets

Space Monitor monitors IMS full-function database data sets by analyzing DASD VTOCs and VSAM catalog entries whether they are offline or online. If the VSAM data set is of an IMS online full-function database, Space Monitor needs to collect the latest space utilization information about the VSAM data set of the online database from IMS online systems in addition to collecting information from the VSAM catalogs because the latest space utilization information is not reflected in the VSAM catalog entries while the database data set is online.

To monitor the latest space utilization statistics about VSAM data sets of an online database, you must request Space Monitor to use IMS Tools Online System Interface. When you request Space Monitor to use IMS Tools Online System Interface, in addition to collecting information from the VSAM catalogs, Space Monitor collects the most current space utilization information from IMS online systems (where IMS Tools

© Copyright IBM Corp. 2000, 2021

Online System Interface is used) in a sysplex. Then, based on the collected data, Space Monitor generates reports that contain the latest space utilization statistics.

For information about how to use IMS Tools Online System Interface in Space Monitor, see the following topics:

- “Configuring IMS Tools Online System Interface for Space Monitor” on page 28
- “Consideration for IMS online full-function database data sets” on page 490
- “TOSI control statement” on page 499

Describing space utilization

Space Monitor produces the following six types of reports to describe the space analysis data:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Total DASD Utilization by Volume/Device-Type report
- Legend report
- Space Monitor Graph report
- Space Monitor Exception report

Program structure

Space Monitor consists of one load module (FABKSPMN), which runs as a batch job.

Data flow

The following figure shows the data flow of the Space Monitor utility.

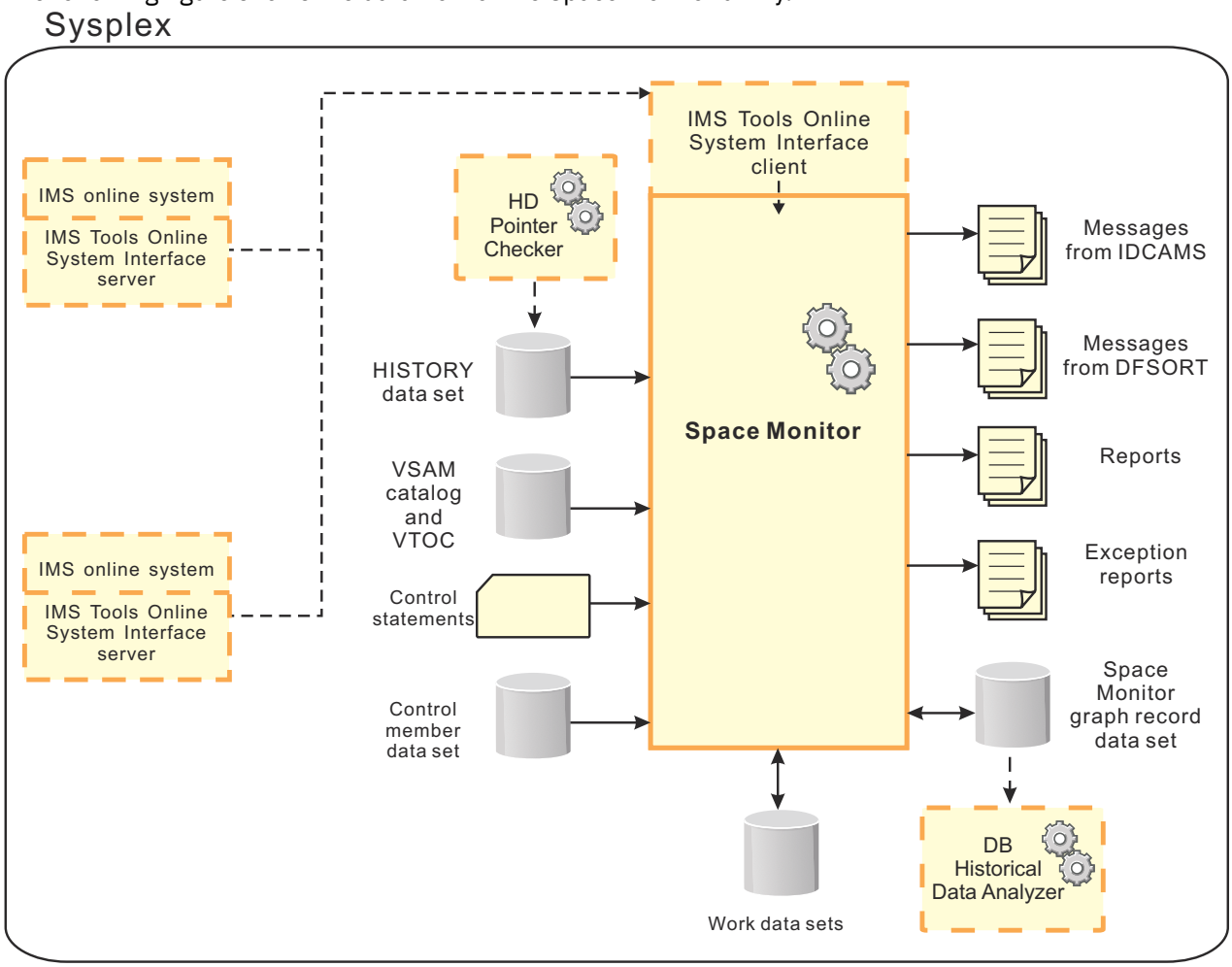


Figure 216. Data flow for Space Monitor

- If you want to obtain IMS related information for the IMS full-function database data sets or you want to monitor VSAM data sets of IMS online full-function databases, HD Pointer Checker (with HISTORY=YES option) must be run in advance (before running Space Monitor) at least once for the database data sets to create entries in the HISTORY data set. Space Monitor uses the HISTORY data set as the input data set.
- You must specify the database data sets, OS data sets, or both to be monitored. They are specified by the control statements in the FABKCTL data set, the SPMNIN data set, or in the SPMNMBR data set. SPMNMBR data set (also referred to as *control member data set*) is a partitioned data set whose members contain one or more control statements.

  Tip: FABKCTL supports keyword-style control statements. Therefore, coding the control statements in the FABKCTL data set is easier than coding the control statements in other data sets.
- Space Monitor monitors the DASD VTOCs and VSAM catalog entries for the user-specified data sets. To monitor a VSAM data set of an IMS online full-function database, Space Monitor must be run with IMS Tools Online System Interface enabled. When IMS Tools Online System Interface is enabled, Space Monitor uses IMS Tools Online System Interface to collect the space utilization information also from the IMS online systems. Then, Space Monitor logs the space management information in the Space

Monitor graph record data set (SPMNSPDT). This data set maintains multiple entries of data for each data set to keep the Space Monitor information of the previous runs.

This data set is also used by DB Historical Data Analyzer.

- Space Monitor produces various types of reports, such as Space Analysis by Data Set report, Summary of Data Sets by Volume report, Total DASD Utilization by Volume/Device-Type report, Space Monitor Exception report, and Legend report. In addition, Space Monitor uses the SPMNSPDT data set information to produce a Space Monitor Graph report, which is a scatter plot that shows the most recent trend of space utilization of the user-specified data sets.

Chapter 25. Using Space Monitor

Use the following topics to monitor space utilization of data sets with the Space Monitor utility.

Topics:

- "Restrictions and considerations" on page 489
- "Running Space Monitor" on page 490
- "Job control language" on page 491
- "Input" on page 498
- "Output" on page 512

Restrictions and considerations

Certain restrictions and considerations apply when using Space Monitor.

Restrictions

The following restrictions apply when you use Space Monitor.

- The following data sets are not supported:
  - Data set that resides on a tape
  - Multivolume data set that resides on more than one device type
  - OSAM multivolume data set whose block size or record length is not equal for all volumes
  - Extended sequential data set
  - Extended-format striped data set
- All the data sets you want to monitor must be cataloged, and the DASDs on which the data sets are allocated must be mounted in advance.
- In the case of partitioned data set extended (PDSE), *used space* is always treated as all, even if there is some free space.
- If IMS database data set is reloaded to a new data set whose device type is different from the old data set, space information of the old data set cannot be maintained correctly.
- The same data set cannot be processed more than once in one Space Monitor job step. Therefore, in the case of a shared index database, only one secondary index can be monitored in a job step.
- Space information of the VSAM KSDS index component is not monitored.
- The indirect list data set (ILDS) of a HALDB must be monitored as a non-IMS data set; leave the DB name and DD name columns in the Space Monitor control statement blank.
- The following databases are not supported if the FABKCTL data set is used for providing Space Monitor control statements:
  - IMS catalog database that has an alias name other than DFSC assigned.
  - IMS catalog database that is not registered to the DBRC RECON data sets.

Considerations for using the HISTORY data set

To monitor IMS database data sets, Space Monitor uses the records that are stored in the HISTORY data set. These records are created by the HD Pointer Checker utility.

The following considerations apply for using a HISTORY data set.

- The following information is obtained from the HISTORY data set:
  - IMS data in the Space Monitor Exception report and the Space Analysis by Data Set report

© Copyright IBM Corp. 2000, 2021

– IMS data in the Space Monitor Graph report

Refer to the description of each report for which field is regarded as IMS data.

- To obtain the IMS data, HD Pointer Checker must be run before the Space Monitor run if they are to be monitored; in this case, HD Pointer Checker (with HISTORY=YES option) must be run in advance at least once for the database data set to create entries in the HISTORY data set.
- In order to obtain correct IMS data, it is recommended that HD Pointer Checker is run regularly so that up-to-date history record entries are always maintained in the HISTORY data set.
- HISTORY data set can have multiple database data set entries for a day, however, Space Monitor cannot process multiple entries. Space Monitor prints the last data of the day in the reports.
- To obtain REORGDATE, it is required to register the database to DBRC and to run the HD Pointer Checker with DBRC=Y.
- If the HISTORY data set is not specified, or if no entry exists for the database data set in the HISTORY data set, then the data set to be monitored will be treated simply as an OS data set.

Considerations for HALDB Online Reorganization (OLR)

The following Space Monitor considerations apply in regard to HALDB Online Reorganization.

- Space Monitor can run while a HALDB partition is in cursor-active status.
- For a HALDB that is Online Reorganization (OLR) capable, specifications to the statement in SPMNMBR or SPMNIN data set should be done as follows:

  DD name
  Specify either DD name of DSG ID=A through J, or M through V. Whichever suffix is specified, Space Monitor searches and processes both A and M sides of the history record entries. Therefore, the Reorganization date and IMS data show the side that was active when HD Pointer Checker created the history record entry.

  Data set name
  Specify the data set name of DSG ID=A through J, or M through V. Space Monitor takes space information for the specified data set. However, if the specified data set does not exist, Space Monitor searches the data set of the other side.

Consideration for IMS online full-function database data sets

To generate the Space Monitor reports with the latest space utilization statistics for VSAM data sets of IMS online full-function databases, the following considerations apply:

- The HISTORY data set must be specified in Space Monitor JCL. An HD Pointer Checker job must be run with the HISTORY=YES option for the database data sets in advance (at least once) before running Space Monitor.
- The IMS Tools Online System Interface must be enabled and be requested in the Space Monitor job. See “Configuring IMS Tools Online System Interface for Space Monitor” on page 28 for information about configuring the IMS Tools Online Interface, and “TOSI control statement” on page 499 for information about requesting the IMS Tools Online System Interface.
- A Space Monitor job must be run while the database data sets are not being updated or, at least, when the database data sets are scarcely updated.

Running Space Monitor

To run Space Monitor, use the IBM supplied cataloged procedure or prepare JCL of your own.

About this task

The following procedure describes how to code JCL for Space Monitor.

Procedure

To use Space Monitor, complete the following steps:

1. If IMS database data sets are to be monitored, ensure that HD Pointer Checker (with HISTORY=YES option) is run against the database data sets in advance (at least once) to create entries in the HISTORY data set. Otherwise, the database data sets are treated as OS data sets.
2. Determine whether to use a JCL procedure or to prepare JCL of your own.

   If you want to use the JCL procedure that is distributed with the product, see "JCL procedure (FABKSPMP)" on page 497.
3. Code the JCL statements. If you use a JCL procedure, also modify the JCL procedure to suit your environment.

   For the JCL requirements, see "Job control language" on page 491. You can also refer to the JCL examples in Chapter 26, "JCL examples for Space Monitor," on page 531 to code the JCL statements.
4. Specify the data sets to be monitored in the FABKCTL data set, the control member data set (SPMNMBR), or in the SPMNIN data set.

   See "Input" on page 498 to code the input data sets.
5. Run the Space Monitor job.
6. Interpret the outputs to verify that the process completed successfully.

   See "Output" on page 512 to interpret Space Monitor output.

What to do next

IMS HP Pointer Checker provides the Space Monitor Site Default Generation utility. By using this utility, you can set your own default value for the Space Monitor control statements. Use this utility if you want to change the system default values of the Space Monitor control statements. For more information, see Chapter 28, "Space Monitor Site Default Generation utility," on page 541.

Job control language

Use the following topics to code JCL for Space Monitor jobs.

FABKSPMN JCL

JCL for the FABKSPMN program must satisfy certain JCL requirements.

Subsections:

- "EXEC and DD statements" on page 491
- "Space requirements for work data sets" on page 496
- "Data sets that can be dynamically allocated" on page 496

EXEC and DD statements

To run Space Monitor, supply an EXEC statement and the appropriate DD statements that define input and output data sets. The following table summarizes the DD statements.

Table 68. Space Monitor DD statements

DDNAME	Use	Format	Need
STEPLIB	Input	PDS	Required
IMS	Input	PDS	Optional
IMSDALIB	Input	PDS	Optional

Table 68. Space Monitor DD statements (continued)

DDNAME	Use	Format	Need
RECON1, RECON2, RECON3	Input	VSAM	Optional
HISTORY	Input	KSDS	Optional
FABKCTL	Input	LRECL=80	Optional (see Note)
SPMNMBR	Input	PDS	Optional (see Note)
SPMNIN	Input	LRECL=80	Optional (see Note)
SPMNANAL	Output	LRECL=133	Optional
SPMNSUMM	Output	LRECL=133	Optional
SPMNDASD	Output	LRECL=133	Optional
SPMNLGND	Output	LRECL=133	Optional
SPMNGRAF	Output	LRECL=133	Optional
SPMNPRT	Output	LRECL=133	Optional
SPMNPRTW	Output	LRECL=133	Optional
SPMNMSG	Output	LRECL=133	Optional
SPMNSPDT	Input/Output	Fixed record length	Required
SPMNCREC	Work data set	LRECL=160	Optional
SPMNCVOL	Work data set	LRECL=160	Optional
SORTIN	Work data set	LRECL=160	Optional
SYSOUT	Output	SYSOUT	Optional
SORTWK01-03	Work data set	LRECL=160	Optional
SYSUDUMP	Output	SYSOUT	Optional

Note: You must specify a FABKCTL, an SPMNMBR, or an SPMNIN DD statement.

EXEC

If you use the SPMNMBR data set or the SPMNIN data set to specify Space Monitor input control statements, this statement must be in the following format:

```
//      EXEC PGM=FABKSPMN,PARM=member_name
```

PARM parameter specifies the member of the SPMNMBR data set. The member contains control statements for the data sets to be monitored by Space Monitor.

If the EXEC PARM parameter is *not* specified, control statements must be specified in the data set that is defined by the SPMNIN DD statement.

If you use the FABKCTL data set to specify Space Monitor input control statements, the EXEC statement must be in the following format:

```
//      EXEC PGM=FABKSPMN
```

You can optionally specify the IMSPLEX and DBRCGRP for the PARM parameter as follows:

```
//      EXEC PGM=FABKSPMN,PARM='IMSPLEX=imsplex,DBRCGRP=dbrcgrp'
```

IMSPLEX=*imsplex*
Specifies the IMSplex name that is to be used in IMS DBRC SCI registration.

DBRCGRP=*dbrcgrp*
Specifies the DBRC group identifier that is to be used in IMS DBRC SCI registration.

STEPLIB DD
This DD defines the following input data sets:

- IMS HP Pointer Checker production library (required)
- IMS Tools Online System Interface and IMS Generic Exits libraries (optional)
- IMS Tools Base library (SGLXLOAD) (optional)
- IMS MDA library (optional)
- IMS RESLIB (optional)

Requirements:

- If you want to monitor the latest VSAM statistics about the IMS online full-function database data sets, you must specify the IMS Tools Online System Interface and IMS Generic Exits libraries in the STEPLIB concatenations, and the libraries that are specified in the STEPLIB DD statement must be APF-authorized.
- If you use the FABKCTL data set, you must specify the IMS RESLIB. In addition, specify the MDA library that has the definitions for the database and the data sets to be monitored in the STEPLIB or the IMSDALIB.
- If you specify the IMSCATHLQ keyword on the PROC statement, specify the SGLXLOAD library of IMS Tools Base 1.6 or later.
- If the IMSplex name and the DBRC group ID are set in the RECON data sets, you must supply the IMSplex name and the DBRC group ID by either of the following methods:
  - Specify the IMSplex name and the DBRC group ID on the EXEC statement.
  - Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

IMS DD
This optional input data set defines the IMS DBD library.

If you use the FABKCTL data set, you must specify the IMS DBDLIB that contains the DBD load module specified in the DATABASE statements. However, you can omit this DD statement when you specify the IMSCATHLQ keyword. When the IMSCATHLQ keyword is specified, Space Monitor ignores this DD statement.

IMSDALIB DD
This optional input data set defines the IMS MDA library.

If you use the FABKCTL data set, you must specify the MDA library that contains the data set definitions for the data sets to be monitored in the STEPLIB or the IMSDALIB.

When you use the IMS Tools Online System Interface, all the data sets that are defined in the STEPLIB concatenation, including the MDA library, must be APF-authorized. However, if you do not want to APF-authorize the MDA library, you can specify the MDA library on IMSDALIB DD. If both STEPLIB and IMSDALIB contain the MDA library, IMSDALIB is used.

RECON*x* DD
Specify RECON1, RECON2, and RECON3 data sets. These data sets are optional input data sets.

When you use the FABKCTL data set, Space Monitor retrieves the names of HALDB and DEDB data sets to be monitored from RECON1, RECON2, and RECON3 data sets.

When the RECON data set names are defined in the MDA library that is specified on the IMSDALIB or STEPLIB DD statement, you can omit the RECON*x* DD statements.

HISTORY DD
This optional input data set defines the HISTORY data set (VSAM KSDS), which contains summary information of the HD Pointer Checker run.

For more information about this data set, see "HISTORY data set (HISTORY)" on page 376.

You must use DISP=SHR for this data set.

To monitor the latest VSAM statistics about IMS online full-function database data sets, you must run HD Pointer Checker with the HISTORY=YES option for the database data sets in advance, and specify the HISTORY data set in Space Monitor JCL. If you have already run HD Pointer Checker with the HISTORY=YES option for the database data sets, you do not need to run the HD Pointer Checker job.

FABKCTL DD
This optional input data set contains the control statements.

When you specify the FABKCTL data set, you cannot specify the SPMNMBR or the SPMNIN data set.

SPMNMBR DD
This optional input partitioned data set (PDS) contains the member whose name is specified by the EXEC PARM parameter. This DD statement is effective when EXEC PARM= is specified and the FABKCTL DD statement is not specified.

SPMNIN DD
This optional input data set contains the control statements. This DD statement is effective when EXEC PARM= is not specified and the FABKCTL DD statement is not specified.

SPMNANAL DD
This optional output data set contains the Space Analysis by Data Set report.

SPMNSUMM DD
This optional output data set contains the Summary of Data Sets by Volume report.

SPMNDASD DD
This optional output data set contains the Total DASD Utilization by Volume/Device-Type report.

SPMNLGND DD
This optional output data set contains the Legend report.

SPMNGRAF DD
This optional output data set contains the Space Monitor Graph report.

These five data sets contain 133-byte fixed-length records. These data sets can reside on a tape, a direct-access device, or a printer; or they can be routed through the output stream. If BLKSIZE is coded in the DD statement, it must be a multiple of 133. However, it is recommended that you use:

```
//SPMNANAL     DD SYSOUT=A
//SPMNSUMM     DD SYSOUT=A
//SPMNDASD     DD SYSOUT=A
//SPMNLGND     DD SYSOUT=A
//SPMNGRAF     DD SYSOUT=A
```

To suppress any of these reports, delete the corresponding DD statement or specify DUMMY for the DD statement.

SPMNPRT DD
This optional output data set contains the following reports produced by Space Monitor:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Total DASD Utilization by Volume/Device-Type report
- Legend report
- Space Monitor Graph report

If you want to get all the Space Monitor reports, use this data set. If you want to get selective reports, use a combination of the SPMNANAL, SPMNSUMM, SPMNDASD, SPMNLGND, and SPMNGRAF data

sets, instead. If you use both of the SPMNPRT data set and some of the others, you will get duplicate reports.

This data set contains 133-byte fixed-length records. This data set can reside on a tape, a direct-access device, or a printer; or it can be routed through the output stream. If BLKSIZE is coded in the DD statement, it must be a multiple of 133. However, it is recommended that you use:

```
//SPMNPRT      DD SYSOUT=A
```

If DUMMY is specified on the DD statement, the reports are not generated. Do not specify DUMMY on the DD statement, unless you want to suppress generation of the report.

If this DD is not specified and you suppress or code DUMMY for the following DD statements, SYSOUT stream is dynamically allocated for the SPMNPRT DD:

- SPMNANAL
- SPMNSUMM
- SPMNDASD
- SPMNLGND
- SPMNGRAF

SPMNPRTW DD

This optional output data set contains the Space Monitor Exception report. The data set contains 133-byte fixed-length records. It can reside on a tape, direct-access device, or printer, or can be routed through the output stream. If BLKSIZE is coded in the DD statement, it must be a multiple of 133. However, it is recommended that you use:

```
//SPMNPRTW     DD SYSOUT=A
```

If DUMMY is specified on the DD statement, the reports are not generated. Do not specify DUMMY on the DD statement, unless you want to suppress generation of the report.

If this DD is not specified, SYSOUT stream is dynamically allocated for this DD.

SPMNMSG DD

This output data set contains messages issued by Space Monitor. The data set contains 133-byte fixed-length records. This data set can reside on a tape, direct-access device, or printer, or can be routed through the output stream. If BLKSIZE is coded in the DD statement, it must be a multiple of 133. However, it is recommended that you use:

```
//SPMNMSG     DD SYSOUT=A
```

If DUMMY is specified on the DD statement, the reports are not generated. Do not specify DUMMY on the DD statement, unless you want to suppress generation of the report.

If this DD is not specified, SYSOUT stream is dynamically allocated for this DD.

SPMNSPDT DD

This required input/output sequential data set is the Space Monitor graph record data set. It contains one Space Monitor record for each data set to be monitored. Each record contains multiple entries of data to keep the Space Monitor information of the previous runs. The number of entries to be created is defined by the logical record length of the data set, which is specified by the user.

This data set should reside on a direct-access device, and must have fixed-length records. You should use DISP=(MOD,KEEP,KEEP).

For more information, see “Space Monitor Graph Record data set (SPMNSPDT)” on page 512.

SPMNCREC DD

This work data set contains data set space allocation information records that are collected while analyzing DASD VTOC and VSAM catalog.

If this DD is not specified, the data set is allocated dynamically. For information about dynamic allocation parameters, see “Data sets that can be dynamically allocated” on page 496.

SPMNCVOL DD
This work data set contains volume information records that are generated while analyzing DASD VTOC and VSAM catalog.

If this DD is not specified, the data set is allocated dynamically. For information about dynamic allocation parameters, see “Data sets that can be dynamically allocated” on page 496.

SORTIN DD
This work data set contains data set space allocation information records that are produced while analyzing DASD VTOC and VSAM catalog. This data set is used as the input to DFSORT (Data Facility Sort), which is called internally by Space Monitor.

If this DD is not specified, the data set is allocated dynamically. For information about dynamic allocation parameters, see “Data sets that can be dynamically allocated” on page 496.

SYSOUT DD
This output data set contains the messages produced by DFSORT (Data Facility Sort), which is called internally by Space Monitor.

If this DD is not specified, SYSOUT stream is dynamically allocated for this DD.

SORTWK01/02/03 DD
These are intermediate storage data sets used by DFSORT (Data Facility Sort), which is called internally by Space Monitor. See *z/OS DFSORT Application Programming Guide* for more information about how to code SORTWK*nn* DD statements.

If these DDs are not specified, the data sets are allocated dynamically. For information about dynamic allocation parameters, see “Data sets that can be dynamically allocated” on page 496.

SYSUDUMP DD
This optional output data set defines an output from a system abend dump routine. It is used only when a dump is required. Although optional, it is recommended that you include this data set.

Space requirements for work data sets

The following table summarizes the space requirements for the various work data sets that are created by Space Monitor.

Table 69. Space Monitor data set sizes

DDNAME	Space requirements (bytes)
SPMNCREC	(number of data sets + number of extents) × 160
SORTIN	(same as SPMNCREC)
SPMNCVOL	(number of volumes × 2 + number of extents) × 100
SORTWK01 - 03	(space for SPMNCREC) × 2 / 3

Data sets that can be dynamically allocated

The data sets specified by the DD statements in the following table are allocated dynamically, if they are not specified on the JCL statement.

The UNIT and SPACE parameter values are described in the following table. If space is not available in the specified UNIT, code the DD statements in the JCL.

Table 70. DDs for which dynamic allocation is available

DDNAME	Dynamic allocation parameters
SPMNCREC	UNIT=SYSALLDA,SPACE=(CYL,(10,1))
SPMNCVOL	UNIT=SYSALLDA,SPACE=(CYL,(10,1))
SORTIN	UNIT=SYSALLDA,SPACE=(CYL,(10,1))
SORTWK01-03	UNIT=SYSALLDA,SPACE=(CYL,(10,1)) for each
SPMNPRT	SYSOUT=*
SPMNPRTW	SYSOUT=*
SPMNMSG	SYSOUT=*
SYSOUT	SYSOUT=*

JCL procedure (FABKSPMP)

To run Space Monitor, use the IBM-supplied cataloged procedure FABKSPMP or prepare a similar procedure of your own. Procedure FABKSPMP is provided as a member in the SHPSSAMP data set.

Chapter 26, “JCL examples for Space Monitor,” on page 531 assumes that this IBM-supplied cataloged procedure is used.

The following figure shows the FABKSPMP JCL procedure.

```
//*********************************************************************  00010000
//*   Licensed Materials - Property of IBM                            *  00020000
//*                                                                   *  00030000
//*   5655-U09                                                        *  00040000
//*                                                                   *  00050000
//*   Copyright IBM Corporation 2000, 2008. All rights reserved.      *  00060000
//*                                                                   *  00070000
//*   US Government Users Restricted Rights - Use,                    *  00080000
//*   duplication or disclosure restricted by GSA ADP                 *  00090000
//*   Schedule Contract with IBM Corp.                                *  00100000
//*                                                                   *  00110000
//*********************************************************************  00120000
//         PROC MEMBER=,                        FOR MEMBER NAME         00130000
//             STEPLIB='HPS.SHPSLMD0',          FOR STEPLIB DS          00140000
//             HISTORY='HPS.HIST.HISTORY',      FOR HISTORY DS          00150000
//             SPMNSPD='HPS.SPMN.SPDT',         FOR SPMNSPDT DS         00160000
//             SPMNMBR='NULLFILE'               FOR SPMNMBR DS          00170000
//S        EXEC PGM=FABKSPMN,PARM='&MEMBER'                             00180000
//STEPLIB  DD  DSN=&STEPLIB,DISP=SHR                                    00190000
//HISTORY  DD  DSN=&HISTORY,DISP=SHR                                    00200000
//SPMNSPDT DD  DSN=&SPMNSPD,DISP=(MOD,KEEP,KEEP)                        00210000
//SPMNMBR  DD  DSN=&SPMNMBR,DISP=SHR                                    00220000
//SPMNCREC DD  UNIT=SYSDA,SPACE=(CYL,(10,1)),                           00230000
//             DCB=(RECFM=FBA,LRECL=160,BLKSIZE=12800)                  00240000
//SPMNCVOL DD  UNIT=SYSDA,SPACE=(CYL,(10,1)),                           00250000
//             DCB=(RECFM=FB,LRECL=100,BLKSIZE=13000)                   00260000
//SORTIN   DD  UNIT=SYSDA,SPACE=(CYL,(10,1)),                           00270000
//             DCB=(RECFM=FB,LRECL=160,BLKSIZE=12800)                   00280000
//SORTWK01 DD  UNIT=SYSDA,SPACE=(CYL,(10,1))                            00290000
//SORTWK02 DD  UNIT=SYSDA,SPACE=(CYL,(10,1))                            00300000
//SORTWK03 DD  UNIT=SYSDA,SPACE=(CYL,(10,1))                            00310000
//SYSOUT   DD  SYSOUT=A                                                 00320000
//SYSPRINT DD  SYSOUT=A                                                 00330000
//SPMNPRT  DD  SYSOUT=A                                                 00340000
//SPMNPRTW DD  SYSOUT=A                                                 00350000
//SPMNMSG  DD  SYSOUT=A                                                 00360000
//*------------------------------------------------------------------   00370000
```

Figure 217. Space Monitor JCL procedure (FABKSPMP)

Parameters in the JCL procedure are as follows:

MEMBER=
Specifies the member name of the SPMNMBR data set that contains control statements. This parameter is optional. If this parameter is omitted or no member name is specified, control statements must be specified in the data set that is defined by the FABKCTL or the SPMNIN DD statement.

STEPLIB=
Specifies the name of the IMS HP Pointer Checker load module library. This parameter is optional. The default is 'HPS.SHPSLMD0'.

HISTORY=
Specifies the name of the HISTORY data set. This parameter is optional. If 'NULLFILE' is specified, the data sets to be monitored are treated as OS data sets. The default is 'HIST.HISTORY'.

SPMNSPD=
Specifies the name of the SPMNSPDT data set. This parameter is optional. The default is 'SPMN.SPDT'.

SPMNMBR=
Specifies the name of the control member data set. This parameter is optional. This parameter is required only when the MEMBER parameter is specified. Otherwise, this data set is ignored even if it is coded. The default is 'NULLFILE' (member is not specified).

Input

Space Monitor uses one of the three input data sets (FABKCTL, SPMNMBR, or SPMNIN), in which the user specifies control statements. The following topics describe these data sets and the control statement format.

Control member data set (SPMNMBR)

SPMNMBR data set specifies the data sets to be monitored. The members of this partitioned data set contain control statements. This data set is required only when the PARM parameter of the EXEC statement is specified.

This data set is also used by DB Historical Data Analyzer.

Format

This data set must be defined as a partitioned data set. It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

```
%TOSI    TOIIMSA  Y
%USER    USER001 USER002 USER003 USER004 USER005 USER006 USER007
%USER    USER008  *** IMS DATABASE DATA SETS ***
%IMSID   SYS1
DSSTUIVN DSSCHX   SAMPLE.DSSTUIVN                        12 20 10
DSSCHHVN DSSCHH   SAMPLE.DSSCHHVN                        13 30  7
DSFACHON DSFACH   SAMPLE.DSFACHON
DSCRSDVN DSCRS1   SAMPLE.DSCRSDV1                        13 20  7
DSCRSDVN DSCRS2   SAMPLE.DSCRSDV2
```

Record format

Each member contains one or more control statements up to 2003 (excluding comment statements). The following figure shows the record format of control statements:

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 %TOSI    xcfgroup y
 %USER    user001 user002 user003 user004 user005 user006 user007
 %USER    user008 user009 user010 user011 user012 user013 user014
 %USER    user015 user016 user017 user018 user019 user020
 %IMSID   ims1
 dbname   ddname   dsname                                        aabbb cc
 -        pp q rrr s ttt uuu vvv xxx sizez
```

The control statement is an 80-byte card image record that specifies the IMS database data set or OS data set to be monitored by this utility.

There are four types of control statements; TOSI control statement, user control statement, IMSID control statement, and data set control statement.

TOSI control statement
The TOSI control statement specifies the XCF group name that is used by IMS Tools Online System Interface and whether to monitor the latest VSAM statistics about IMS online full-function database data sets by using IMS Tools Online System Interface. This statement must be specified before the data set control statements.

User control statement
User control statement for specifying TSO user IDs. It is an optional control statement. Space Monitor will send notification messages to the TSO users, when it detects threshold exceptions in the monitoring data sets. Specify the user control statements so that they precede the data set control statements. You can specify up to three statements.

Note: The user control statements are effective in Space Monitor, but not effective in DB Historical Data Analyzer. If they are specified to DB Historical Data Analyzer, they will be ignored.

IMSID control statement
The IMSID control statement specifies the IMSID of the database data set that is specified by the data set control statement. Only one IMSID can be specified. This statement is required only when the Multiple-IMSID option is enabled and should be placed before any of the data set control statements.

Data set control statement
Data set control statement specifies the data set that Space Monitor monitors. At least one data set control statement is required.

If the database is composed of more than one physical data set (for example, a HISAM primary data set and overflow data set), a set of one data set control statements must be specified for each physical data set, which is represented by the DD1, DD2, or OVFLW parameter in DBD.

The set of data set control statements consists of two statements. The first one contains the database and data set information and some threshold control fields. The second one contains more threshold control fields. If the second statement is omitted, the default values are taken. You can specify up to 2000 statements.

TOSI control statement

Specify the XCF group name for IMS Tools Online System Interface, and whether to monitor the latest VSAM statistics about IMS online full-function database data sets that are specified by data set control statements.

The TOSI control statement must be specified before data set control statements.

Important: To monitor the latest VSAM statistics about IMS online full-function database data sets, you must run HD Pointer Checker with the HISTORY=YES option for the database data sets in advance, and specify the HISTORY data set in the Space Monitor JCL (If you have already run HD Pointer Checker with the HISTORY=YES option for the database data sets, you do not need to run the HD Pointer Checker job.)

If the HISTORY data set is not specified or no entry exists for the database data sets in the HISTORY data set, Space Monitor does not use IMS Tools Online System Interface. In this case, Space Monitor generates reports based on the space utilization data that is collected from the VSAM catalogs. Because the VSAM

catalogs might not hold the most current data, the Space Monitor reports might not reflect the latest space utilization statistics.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 %TOSI    xcfgroup y
```

Position
Description

1 - 5
Specify %TOSI. This word indicates that this statement is a TOSI control statement.

6 - 9
Blank

10 - 17
Specify the XCF group name for IMS Tools Online System Interface to communicate with IMS online systems. The XCF group name is an alphanumeric character string, which begins with 'TOI' and is followed by the characters that are defined on the XCFGROUP parameter in the IMS Tools Online System Interface PROCLIB member.

For details about the XCFGROUP parameter and the IMS Tools Online System Interface PROCLIB member, see the *Tools Base IMS Tools Common Services User's Guide*.

For example, if XCFGROUP=IMSA is defined in the IMS Tools Online System Interface PROCLIB member, specify TOIIMSA as the XCF group name.

18
Blank

19
Specify Y or N. The default value is Y.

Y
If you want to monitor VSAM data set of IMS online full-function database, specify Y.

Space Monitor collects the most current VSAM statistics about IMS online full-function database data sets by using IMS Tools Online System Interface. The following VSAM statistics are collected from the IMS online systems:

- The High-allocated RBA value
- The High-used-RBA value
- The number of CI splits
- The number of CA splits

Space Monitor generates reports based on these VSAM statistics and the VSAM catalog entries. See "Space Analysis by Data Set report" on page 513 for information about the report fields that reflect the collected VSAM statistics.

N
Space Monitor does not use IMS Tools Online System Interface.

20 - 80
Blanks

User control statement

Specify TSO user IDs. If Space Monitor detects threshold exceptions when monitoring databases, it will send notification messages.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 %USER    user001 user002 user003 user004 user005 user006 user007
 %USER    user008 user009 user010 user011 user012 user013 user014
 %USER    user015 user016 user017 user018 user019 user020
```

Position
Description

1 - 5
Specify, left-aligned, a word %USER. This word indicates that this statement is a user control statement.

6 - 9
Blanks

10 - 16
Specify, left-aligned, TSO user ID.

17
Blank

18 - 64
Repeat TSO user ID (seven columns) and one blank.

Maximum of three statements and 20 user IDs can be specified. Space Monitor will send the messages to all of the TSO user IDs. If some of TSO users are not logged on or are disconnected from their terminals, the messages to the TSO users will be discarded.

You can also specify the special value *JOBUSR as one of these user IDs. This value will be converted to the user ID of the submitter of a JOB when Space Monitor runs.

If you do not need to send notification to TSO user IDs, do not specify this statement or specify *NO in positions 10 - 12.

IMSID control statement

Specify the IMSID of the database data set that is specified by the data set control statement. Only one IMSID can be specified. This statement is required only when the Multiple-IMSID option is enabled and should be placed before any of the data set control statements.

When this file is specified by the MEMEBER parameter of the DATABASE statement of the HISTIN data set of DBHDA, IMSID control statement is ignored.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 %IMSID   ims1
```

Position
Description

1 - 6
Specify, left-aligned, a word %IMSID. This word indicates that this statement is an IMSID control statement.

7 - 9
Blanks

10 - 13
Specify the IMSID for the database data sets.

14 - 80
Blanks

Data set control statement

Specify a data set name and threshold values. Then, Space Monitor will monitor the data set and detects any threshold exceptions.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 dbname   ddname   dsname                                          aabbb cc
 -        pp q rrr s ttt uuu vvv xxx sizez
```

The following subsections describe the syntax of the first and second statements of the data set control statement.

Subsections:

- "First statement" on page 502
- "Second statement" on page 503

First statement

Position
Description

1 - 8
Specify, left-aligned, the name of the DBD to be processed. It is required only for an IMS full-function database data set. For HALDB, specify the master database name. For a non-IMS data set and DEDB, if used, it must be left blank.

An asterisk (*) in column 1 indicates a comment statement.

10 - 17
Specify, left-aligned, the ddname to be processed. It is required only for an IMS full-function database data set. For a HALDB, specify the ddname created with the concatenation of the partition name and the DSG suffix character, A through J or X. You cannot specify the ddname of the indirect list data set (ILDS).

For a HALDB that is Online Reorganization (OLR) capable, you can specify the DSG suffix character M through V or Y, as well as A through J or X.

Whichever suffix is specified, Space Monitor searches and processes history record entries of both A and M sides. Therefore, HD Pointer Checker writes to a report the statistics of the side that was active when the History record entry was created.

19 - 62
Specify, left-aligned, the data set name. For an IMS full-function database data set, this name must correspond to the ddname to be processed.

For a HALDB that is Online Reorganization (OLR) capable, if the specified database data set does not exist, Space Monitor searches for the other of database data set, (A-J&X) or (M-V&Y).

64 - 65
Specify the warning threshold value for the number of extents. If the number of extents in the data set reaches or passes this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. A leading blank or leading zero can be used. The minimum value is 0, and the maximum value is 99.

To turn off the threshold analysis for the number of extents, enter two asterisks (`'**'`).

The default value is 10.

66 - 68
Specify the warning threshold value for the percentage of free space. If the percentage of free space in the data set reaches or drops below this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 100.

To turn off the threshold analysis for the percentage of free space, enter three asterisks (`'***'`).

The default value is 10.

70 - 71
Specify the warning threshold value for the number of days without an HD Pointer Checker run with HISTORY=YES option. HD Pointer Checker creates an entry in the HISTORY data set when HISTORY=YES option is specified.

If the most recent HD Pointer Checker run with HISTORY=YES option for the database data set was done earlier than this threshold period, a warning message for this database data set is shown in the Space Monitor Exception report.

The value must be right-aligned. A leading blank or leading zero can be used.

This field applies only to the IMS full-function database data sets. The minimum value is 0, and the maximum value is 99.

To analyze this threshold, the database data set entries must exist in the HISTORY data set.

To turn off the threshold analysis for the number of days without running HD Pointer Checker with HISTORY=YES option, enter two asterisks (′**′).

The default value is 14.

Second statement

Position
Description

1
This field indicates whether this is the second statement. If this is the second statement, specify '-'. The first statement must precede this one.

10 - 11
Specify the warning threshold value for the number of available extents. If the number of available extents in the data set reaches or drops below this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. A leading blank or leading zero can be used. The minimum value is 0, and the maximum value is 50.

To turn off the threshold analysis for the number of extents, enter two asterisks (′**′).

The default value is 10.

For the details of the available extents, read Chapter 27, “Available data set extents and last space,” on page 535.

13
Specify 'Y' or '*'. If 'Y' is specified and the data set uses the last extent, a warning message for this data set is shown in the Space Monitor Exception report.

To turn off the threshold analysis for the last extension, enter one asterisk ('*').

The default value is 'Y'.

For the details of the last extent, read Chapter 27, “Available data set extents and last space,” on page 535.

15 - 17
Specify the warning threshold value for the percentage of space used. The value indicates the ratio of the used space to the allocated space in the data set on the volume. If the percentage of space used reaches or passes this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 100.

To analyze this threshold, the database data set entries must exist in the HISTORY data set.

To turn off the threshold analysis for the space use, enter three asterisks ('***').

The default value is 90.

19

Specify 'Y' or '*'. If 'Y' is specified and not enough space is left on the DASD volume for the data set to extend, a warning message for this data set is shown in the Space Monitor Exception report.

For the details of the last space, read Chapter 27, “Available data set extents and last space,” on page 535.

To turn off the threshold analysis for the last space, enter one asterisk (`'*'`).

The default value is 'Y'.

21 - 23

Specify the warning threshold value for the percentage of CA splits. The value indicates the ratio of the number of CA splits to the used control areas. If the percentage of CA splits of the data set reaches or passes this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 100.

To analyze this threshold, the database data set must be a KSDS and its entries must exist in the HISTORY data set.

To turn off the threshold analysis for the percentage of CA split, enter three asterisks (`'***'`).

The default value is 50.

25 - 27

Specify the warning threshold value for the percentage of CI splits. The value indicates the ratio of the number of CI splits to the used control intervals. If the percentage of CI splits of the data set reaches or passes this threshold, a warning message for this data set is show in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 100.

To analyze this threshold, the database data set must be a KSDS and its entries must exist in the HISTORY data set.

To turn off the threshold analysis for CI split, enter three asterisks (`'***'`).

The default value is 50.

29 - 31

Specify the warning threshold value for the number of days that can pass without a database reorganization.

If the number of days since most recent reorganization exceeds this threshold, a warning message for this database data set is shown in the Space Monitor Exception report.

To analyze this threshold, the following steps are required in advance to run Space Monitor:

1. Register the database to DBRC.
2. Run HD Pointer Checker against the database with DBRC=Y and HISTORY=YES.
3. Specify the HISTORY data set in the Space Monitor JCL.

The value must be right-aligned. Leading blanks or leading zeros can be used.

This field applies only to the IMS full-function database data set. The minimum value is 0, and the maximum value is 999.

To turn off the threshold analysis for the number of days that can pass without the reorganization, enter three asterisks (`'***'`).

The default value is "do not monitor the threshold analysis."

33-35
Specify the warning threshold value for the percentage of the data set used space within the maximum size. The value must be the ratio of the used space to the maximum size of the IMS database data set.

The maximum size is as follows:

- For an OSAM data set of a non-HALDB HD database whose block size is an even number or an OSAM data set of a HALDB that is registered as DSORG=OSAM8G in RECON data sets, the maximum size is 8 GB.
- For other database data set than above, the maximum size is 4 GB. (1 GB is 1,024 MB)

If the percentage to the data set size limit reaches or exceeds this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 100.

This threshold is effective for an IMS full-function database. To analyze this threshold, the database data set entries must exist in the HISTORY data set.

To turn off the threshold analysis for the data set limit, specify three asterisks (`'***'`).

The default value is 90.

37-40
Specify the warning threshold value for the data set size. You can specify the unit of the value in column 41.

If the data set size reaches or exceeds this threshold, a warning message for this data set is shown in the Space Monitor Exception report.

The value must be right-aligned. Leading blanks or leading zeros can be used. The minimum value is 0, and the maximum value is 9999.

To turn off the threshold analysis for the data set size, specify four asterisks (`'****'`).

The default value is that no analyzing is done for the threshold, so leaving the field blanks has the same effect as specifying four asterisks.

41
Specify the unit of the data set size that is specified in columns 37-40.

- M for MB (1 MB is 1,024 KB = 1,048,576 byte)
- G for GB (1 GB is 1,024 MB)
- T for TB (1 TB is 1,024 GB)

The default value is M.

SPMNIN data set

This optional input data set contains control statements. This data set is required only when the PARM parameter of the EXEC statement is not specified.

Subsections:

- "Format" on page 505
- "Record format" on page 506

Format

This data set usually resides in the input stream. However, it can be defined either as a sequential data set or as a member of a partitioned data set. It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

```
//SPMNIN   DD *
DSSTUIVN DSSCHX   SAMPDS                                  12020 10
/*
```

Record format

The record format of this data set is the same as that of the control member data set (SPMNMBR). See “Control member data set (SPMNMBR)” on page 498.

FABKCTL data set

This optional input data set contains control statements that specify the name of the IMS database to monitor.

With FABKCTL, you can use keyword-style control statements to specify Space Monitor control statements. In addition, you do not need to specify data set names but only the database name. Therefore, compared to using SPMNMBR or SPMNIN, FABKCTL simplifies the coding of Space Monitor control statements.

When the IMS management of ACBs is not enabled, Space Monitor retrieves data set names from the IMS DBDLIB library, the MDA library, and RECON data sets. You must specify these IMS resources in Space Monitor JCL.

When the IMS management of ACBs is enabled, Space Monitor retrieves data set names from the IMS directory, the MDA library, and RECON data sets. You must specify the MDA library and RECON data sets in Space Monitor JCL, but because the IMS directory is dynamically allocated during the Space Monitor job, you do not need to explicitly specify the IMS directory in Space Monitor JCL.

For more information about specifying the IMS resources, see “FABKSPMN JCL” on page 491.

Restriction: FABKCTL does not support data sets that are not defined in the IMS resources.

Format

This data set usually resides in the input stream. However, it can be defined either as a sequential data set or as a member of a partitioned data set. It must contain 80-byte fixed-length records. BLKSIZE, if coded, must be a multiple of 80.

Four types of statements can be specified in this data set: PROC, OPTION, DATABASE, and END statements. When an asterisk (*) is put in the first column, the line is treated as a comment line.

The following figure shows an example of the FABKCTL data set:

```
//FABKCTL DD *
*
 PROC USER=(USER001,USER002),TOSIXCFGRP=TOIZZZZ,IMSID=SYSA
 OPTION THRESHOLDS=(EXTENTS=14,DSSIZE%=98)
   DATABASE DB=HDAM,DD=*ALL
   DATABASE  DB=HDAMDB2
    OPTION THRESHOLDS=DSSIZE%=90
   END
/*
```

PROC statement

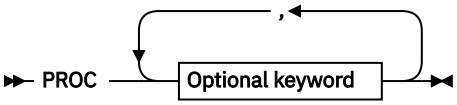
The PROC statement for Space Monitor specifies the function to be run. One PROC statement can be specified at a time.

Subsections:

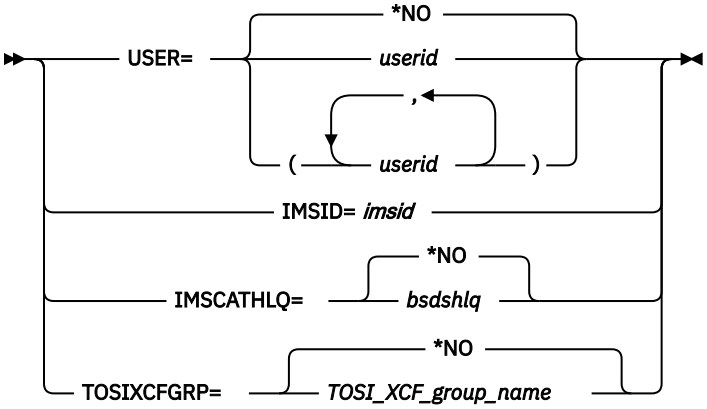
- “Syntax” on page 507
- “Keywords” on page 507

Syntax

The following syntax diagram shows the keywords for the PROC statement.



Optional keywords



Keywords

The following keywords can be specified on the PROC statement:

USER=

This optional keyword specifies TSO user IDs. Space Monitor sends a notification message to the TSO users when an exception is detected in database data sets.

***userid* or (*userid1,userid2,....., userid20*)**

Specify up to 20 TSO user IDs.

If the specified TSO user is not logged on to TSO or is disconnected from the terminal, the notification message is discarded.

You can also specify ∗J0BUSR as one of these user IDs. This value is converted to the user ID of the submitter of the Space Monitor job.

Space Monitor does not check whether the specified TSO user IDs are correct. If an incorrect ID is specified, Space Monitor attempts to send the notification to the user ID and then discards the message.

***NO**

Notification message is not sent to the TSO user. USER=*NO is the default value.

IMSID=

This optional keyword specifies the IMSID to capture the database historical records from the History data set. One IMSID can be specified. The IMSID keyword is effective only when the History data set has the Multiple-IMSID option enabled.

IMSCATHLQ=

This optional keyword specifies the high-level qualifier of the bootstrap data set (BSDS), which is one of the system-managed data sets that is associated with the IMS catalog. When the IMS management of ACBs is enabled, specify the high-level qualifier of the BSDS.

bsdshlq

Reads DBDs from the IMS directory instead of DBD libraries by using IMS Tools Catalog Interface. *bsdshlq* specifies the high-level qualifier of the BSDS.

***NO**
Reads DBDs from the DBD library that is specified in the IMS DD statement. IMSCATHLQ=*NO is the default value.

TOSIXCFGRP=
This optional keyword specifies whether to monitor the latest VSAM statistics of IMS online full-function database data sets by using the IMS Tools Online System Interface. Because this keyword is effective only for online databases, you can omit this keyword when you process offline databases.

TOSI_XCF_group_name
Specify the XCF group name for the IMS Tools Online System Interface. The XCF group name is an alphanumeric character string, which begins with TOI and is followed by the characters that are defined on the XCFGROUP parameter in the IMS Tools Online System Interface PROCLIB member.

For more information about the XCFGROUP parameter and the IMS Tools Online System Interface PROCLIB member, see the *Tools Base IMS Tools Common Services User's Guide*.

***NO**
The latest VSAM statistics of online database data sets are not monitored. TOSIXCFGRP=*NO is the default value.

OPTION statement

The OPTION statement for Space Monitor is an optional statement that specifies the threshold values for monitoring data sets.

This statement can be specified following a PROC statement or a DATABASE statement:

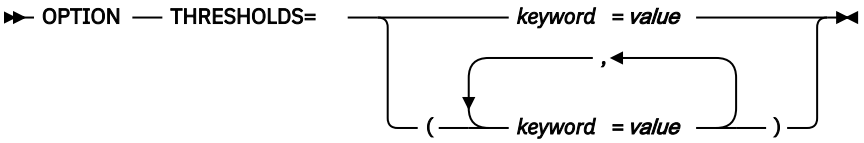
- Explicitly specified keyword values and default option values in an OPTION statement that follows a PROC statement specify the options for the entire database.
- Explicitly specified keyword values in an OPTION statement that follows a DATABASE statement override the previously specified option in the OPTION statement that follows a PROC statement. These override options affect only one database that is specified in the preceding DATABASE statement.

Subsections:

- “Syntax” on page 508
- “Keywords” on page 508

Syntax

The following syntax diagram shows the keyword for the OPTION statement.



Keywords

The following keyword can be specified on the OPTION statement:

THRESHOLDS=
Specifies the threshold values for Space Monitor. You can specify the keyword and its value as a pair. Separate each pair with a comma and enclose the entire specification of the pairs with parentheses.

The following table shows the values you can specify to monitor each factor. The right column shows whether a HISTORY record is required to monitor the factor.

Table 71. Keywords and values for the THRESHOLDS parameter (Space Monitor)

Keyword	Value	Default value	Description	HISTORY is required?
EXTENTS=	0 - 99 or NO	10	Warning threshold value for the number of extents.	No
FREESPC%=	0 - 100 or NO	10	Warning threshold value for the percentage of free space.	Yes
AVAILEXT=	0 - 50 or NO	10	Warning threshold value for the number of available extents.	No
LASTEXT=	YES or NO	YES	If YES is specified and the data set uses the last extent, a warning message for this data set is shown in the Space Monitor Exception report.	No
USEDSPC%=	0 - 100 or NO	90	Warning threshold value for the percentage of space used.	Yes
VOLEXT=	YES or NO	YES	If YES is specified and not enough space is left on the DASD volume for the data set to extend, a warning message for this data set is shown in the Space Monitor Exception report.	No
CASPLIT%=	0 - 100 or NO	50	Warning threshold value for the percentage of CA splits.	No
CISPLIT%=	0 - 100 or NO	50	Warning threshold value for the percentage of CI splits.	No
REORGINTVL=	0 - 999 or NO	NO	Warning threshold value for the number of days that can pass without a database reorganization.	Yes
DSSIZE%=	0 - 100 or NO	90	Warning threshold value for the percentage of the space used by data sets within the maximum size.	Yes
DSSIZE=	*valueunit* or NO • *value* is 0 - 9999 • *unit* is M, G, or T	NO	Warning threshold value for the data set size in the units of MB, GB, or TB. If a unit is not specified, M (MB) is used.	No
HDPCDAYS=	0 - 99 or NO	NO	Warning threshold value for the number of days that can pass without running HD Pointer Checker with the HISTORY=YES option.	Yes

DEDB, Fast Path secondary index, and HALDB ILDS data sets are treated as VSAM data sets. The monitoring factors that require a HISTORY record, which is generated by the HD Pointer Checker utility, cannot be monitored for DEDBs, Fast Path secondary indexes, and HALDB ILDS data sets because such resources are not supported by the HD Pointer Checker utility.

Threshold values are meaningless for DEDBs for the following reasons:

- Extents are allocated at DEDB initialization time by the IMS DEDB Initialization utility and no extents are dynamically obtained after the initialization.

- The IMS DEDB Initialization utility initializes the entire space that is allocated, so there is no space that is referred to as free space by the OS file management system.

DATABASE statement

The DATABASE statement for Space Monitor is a required statement that specifies the database name.

Space Monitor monitors the database data sets that belong to the database.

You do not need to specify the data set names. Space Monitor retrieves the data set names from the RECON data sets and DFSMDA members as follows:

- For HALDBs, Space Monitor obtains the names of database data sets, index data sets, and ILDS data sets from the RECON data sets. Space Monitor does not obtain the data set names of disabled partitions when the FABKCTL data set is used as input.
- For full-function databases, Space Monitor obtains the names of database data sets and index database data sets from the DFSMDA members.
- For DEDBs, Space Monitor obtains the area data set names from the RECON data sets first, and then from the DFSMDA members.
- For Fast Path Secondary indexes, Space Monitor obtains the data set names from the DFSMDA members.

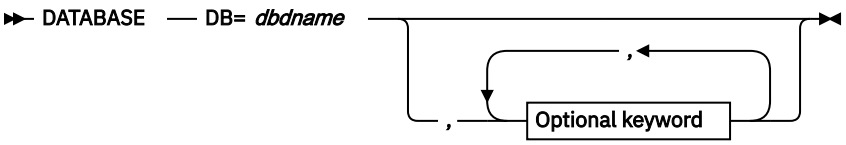
One or more DATABASE statements can be specified in any order in the FABKCTL data set, but must follow a PROC statement.

Subsections:

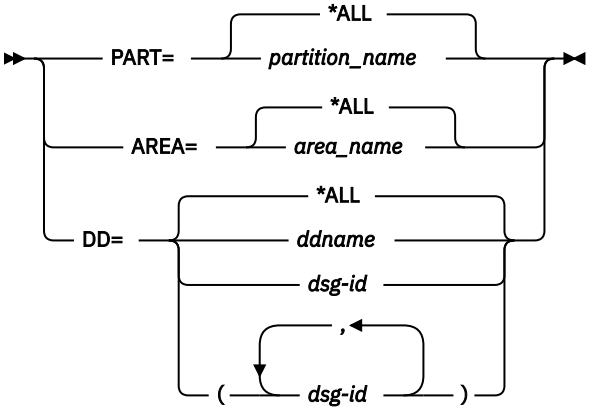
- "Syntax" on page 510
- "Keywords" on page 510

Syntax

The following syntax diagram shows the keywords for the DATABASE statement.



Optional keywords



Keywords

The following keywords can be specified on the DATABASE statement:

DB=

Specifies a database with the *dbdname* as coded in your DBD. This keyword is required. Space Monitor monitors the database data sets that belong to the specified database.

You can specify the following database organization types:

- HISAM, SHISAM, HDAM, HIDAM
- HIDAM primary index
- Secondary index
- PHDAM, PHIDAM
- Partitioned secondary index (PSINDEX)
- DEDB
- Fast Path secondary index

PART=

Specifies the name of the partition to be processed. This statement can be used for HALDBs (PHDAM, PHIDAM, or PSINDEX).

***ALL**

All partitions, except for the partitions that are marked as disabled in the RECON data sets, are processed. PART=*ALL is the default.

partition_name

Only the specified partition is processed.

AREA=

Specifies the DDname of the area to be processed. This statement can be used only for DEDBs.

***ALL**

All areas are processed. AREA=*ALL is the default.

area_name

Only the specified area is processed.

DD=

Specifies the data set group to be processed.

***ALL**

For a non-HALDB, this option specifies to process all data sets in a database. For a HALDB, it specifies to process all data sets in the partition specified by PART=. DD=*ALL is the default.

ddname

Specifies the ddname (as coded in your DBD) of the HDAM, HIDAM, HISAM data set group, the HIDAM primary index, or secondary index database to be processed.

***dsg-id* or (*dsg-id1, dsg-id2,...*)**

Specifies data set group to be processed. This option can be used only for HALDBs. The following letters can be specified:

- A through J or M through V, which are symbols of data set groups.
- L, which is the symbol of ILDS.
- X or Y, which is a symbol of PHIDAM primary index.

Consideration for Online Reorganization capable HALDBs

When the HALDB is Online Reorganization capable, Space Monitor determines the active side by RECON information and monitors the active side data sets. If you need to monitor the other side, specify the letters explicitly.

END statement

The END statement for Space Monitor is used to discontinue reading the FABKCTL data set.

The END statement can be specified in any order in the FABKCTL data set. You do not need to specify the END statement, unless you want to specify the end of the FABKCTL data set explicitly. The END statement is an optional statement that does not have any keywords.

Output

Space Monitor generates outputs in the following data sets.

Space Monitor Graph Record data set (SPMNSPDT)

This data set is an OS sequential data set that contains Space Monitor graph records. One record is created for each data set, and each record consists of a prefix, multiple entries of data (referred to as *buckets*), and a suffix.

For HALDB partitions, the data for any (M-V&Y) data set is merged into the record for the corresponding (A-J&X) data set.

One bucket contains one day's space management information, such as the number of cylinders allocated, the number of cylinders used from the viewpoint of an OS data set, the number of cylinders used for IMS data (applicable only to the IMS database data sets), and the date when the data was collected.

This data set is used as an input data set for producing graph reports.

Requirements: You should allocate enough space for this data set to maintain space allocation information for all the IMS database data sets and/or OS data sets you want to monitor in your system environment.

This data set should reside on a direct-access device, and must have fixed-length records. If blocked, the block size must be a multiple of the logical record length.

Use DISP=(MOD,KEEP,KEEP) for this data set. If this data set is to be allocated and used for the first time, the SPACE parameter must be specified.

Format

Each Space Monitor record consists of a prefix, multiple entries of data, and a suffix.

The following figure shows the format of the Space Monitor record.

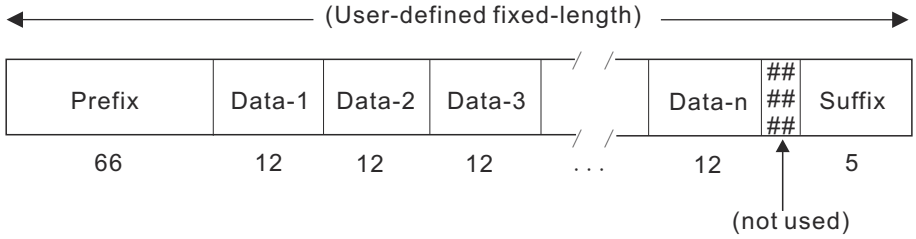


Figure 218. Format of the Space Monitor record

Total number of buckets in a record is calculated as shown in the following figure.

$$\text{Number of buckets} = \frac{\text{(Logical record length) - (Prefix length) - (Suffix length)}}{\text{(Bucket length)}}$$

Note: Prefix length = 65
Suffix length = 5
Bucket length = 12

Figure 219. Formula to calculate the total number of buckets in a record

Therefore, if you want to maintain 90 days' space management information for each data set to be monitored, the required logical record length of the SPMNSPDT data set is calculated as shown in the following figure.

$$\frac{\text{LRECL - 66 - 5}}{12} = 90 \longrightarrow \text{LRECL = 1151}$$

Figure 220. Example of calculating the total number of buckets in a record

SPMNPRT data set

This output data set contains Space Monitor reports.

In this data set, the following reports are generated:

- Space Analysis by Data Set report
- Summary of Data Sets by Volume report
- Total DASD Utilization by Volume/Device-Type report
- Legend report
- Space Monitor Graph report

Space Analysis by Data Set report

Use this report to analyze the space utilization of data sets that were specified by the user. Entries are sorted in alphabetic order of the database name (DBNAME) and data set ddname (DDNAME).

Subsections:

- "Report example" on page 513
- "Report field description" on page 514

Report example

The following figure shows an example of the Space Analysis by Data Set report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN          "SPACE ANALYSIS BY DATA SET REPORT"                    PAGE:     1
5655-U09                                                DATE: 07/11/2020  TIME: 18.05.23                      FABKSPMN - V3.R1

 MEMBER NAME : N/A
 ----------------------

 DBNAME         DDNAME      DSNAME                                        DBORG ACCM   CISP   CASP  UNIT     REORGDATE    HDPCDATE
 TYP    PRI    SEC EXT AEXT     ALLOC %FSP %NRUS   TOTBLK  BLKSZ LRECL  MXSEG ACTMX      ROOTS   TOTALSEG VOLSER EXT     ALLOC %USE
        DATASET SIZE    %SZ
 --- ------ ------ --- --- --------- ---- ----- --------- ----- ----- ------ -----  ----------  --------- ------ --- --------- ----

                        TESTDS.PUBLIC.SAMPLE.VSAM01                                  N/A    N/A  3390-3          N/A          N/A
 CYL      3      2   1  237         3  100 N/A          0   4096   240   N/A    N/A        N/A        N/A SYS001   1          3    0
 CYL      3      2                                                                                    SYS002   0          0    0

                   0  *****

 HDAMDB2        HDAMDS4     TESTDS.PUBLIC.SAMPLE.HDAMDS4                    HDAM ES-U    N/A    N/A  3390-3  07/06/2020  07/10/2020
 CYL     50     50   1  118         50   91   7       2475   1024  1017   122    122         70      18087 SYS004   1         50   10

           2,534,400    0.1

 HISAMDB1       HISAMDS1    TESTDS.PUBLIC.SAMPLE.HISAMDS1                  HISAM KS-U      0      0  3390-3  07/06/2020  07/10/2020
 CYL     50     50   1  118         50   98 N/A          90   8192   510   N/A    N/A        130        584 SYS004   1         50    2

             737,280    0.0

 HISAMDB1       HISAMDS2    TESTDS.PUBLIC.SAMPLE.HISAMDS2                  HISAM ES-U    N/A    N/A  3390-3  07/06/2020  07/10/2020
 CYL     50     20   1  118         50   68 N/A        1419   8192   512   N/A    N/A          0     106017 SYS004   1         50   32

          11,624,448    0.3

 TPFOH1         TPFOH1AA    TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001           PHDAM ES-U    N/A    N/A  3390-3  07/06/2020  07/10/2020
 CYL     50     50   1  118         50   47   7      19845    512   505   246    246      11000      80037 SYS004   1         50   54

          10,160,640    0.2

 TPFOH2         TPFOH2AA    TESTDS.PUBLIC.SAMPLE.TPFOH2.A00001           PHIDAM ES-U    N/A    N/A  3390-3  07/06/2020  07/10/2020
 CYL     50     50   1  118         50   89   7       4410    512   505   122    122       9000      18178 SYS02D   1         50   12

           2,257,920    0.1

 TPFOH2         TPFOH2AX    TESTDS.PUBLIC.SAMPLE.TPFOH2.X00001           PHINDX KS-U      0      0  3390-3      NONE    07/10/2020
 CYL     20     10   1  118         20   98 N/A         735    512    14   N/A    N/A        N/A        9001 SYS02E   1         20    5

             376,320    0.0

 TPFOH3         TPFOH3AA    TESTDS.PUBLIC.SAMPLE.TPFOH3.A00001           PHDAM ES-U    N/A    N/A  3390-3  07/06/2020  07/10/2020
 CYL     50     20   1  118         50   97   7       1470    512   505   150    150       5000       5220 SYS02F   1         50    4

             752,640    0.0

 TPFOX1         TPFOX1AA    TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001           PSINDX KS-U      0      0  3390-3  07/06/2020  07/10/2020
 CYL     10     10   1  118         10   87 N/A        1470    512    54   N/A    N/A        N/A        9178 SYS02F   1         10   20

             752,640    0.0
```

Figure 221. SPMNPRT: Space Analysis by Data Set report

Report field description

This report contains the following information for each database data set and OS data set that is specified on the control statements.

In the report field description, the following abbreviations are used:

Table 72. Legend for reading the report field description

Abbreviation	Description
(G)	Indicates that the data is general information
(T)	Indicates that the data is space analysis data of an IMS online full-function database data set, which is obtained by using IMS Tools Online System Interface (this data is not available for OS data sets)
(H)	Indicates that it is HD Pointer Checker analysis data (this data is not available for OS data sets) To obtain the data marked (H), HISTORY data set must be specified in the Space Monitor JCL and the database data set entry must exist in the HISTORY data set.
(S)	Indicates that it is space analysis data

Note: For OS data sets, the IMS related information is not applicable.

MEMBER NAME
Name of the member specified by the EXEC PARM parameter. If no member name is specified by the EXEC PARM parameter (that is, control statements are specified in the FABKCTL or SPMNIN data set), N/A is shown. (G)

DBNAME
Name of the database. This field is left blank in the case of an OS data set. (G)

DDNAME
DDname of the data set. This field is left blank in the case of an OS data set. (G)

DSNAME
Name of the data set (G)

DBORG
Database organization (H)

One of the following texts is shown:

HDAM, HIDAM, HISAM, SHISAM, PINDX (HIDAM index), SINDX (secondary index), PHDAM, PHIDAM, PHINDX (PHIDAM index), PSINDX

This field is left blank if the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set.

ACCM
Access method (H)

One of the following texts is shown:

OSAM, LDS, KS-U, KS-S, ES-U, ES-S (KS=VSAM KSDS, ES=VSAM ESDS, U=UNIQUE, S=SUBALLOCATION, LDS=VSAM LINEAR)

This field is left blank if the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set.

UNIT
DASD device type (G)

If an asterisk * is marked after device type, for example 3390-A*, it means Extended Address Volume (EAV).

TYP
Space allocation type: CYL (cylinders), TRK (tracks), or BLK (blocks) (S)

PRI
Primary allocation (cylinders, tracks, or blocks) (S)

SEC
Secondary allocation (cylinders, tracks, or blocks) (S)

EXT
Total number of extents on the data set (S)

AEXT
Number of available extents. It shows the smaller of the two values: that per volume or that for the entire data set. (S)

For more information, see Chapter 27, “Available data set extents and last space,” on page 535.

ALLOC
Total space allocated on the data set (cylinders, tracks or blocks) (S)

For OSAM multivolume data set, if the space allocation type is different for each volume, Space Monitor selects the unit for reporting the total allocation (cylinder, track, or block). The unit is shown in parentheses just below the allocation value.

%FSP
Percentage of the usable free space within the allocated space (G, T, H)

For HDAM, HIDAM, PHDAM, and PHIDAM database data sets, usable free space is calculated as shown in the following figure and is illustrated in Figure 227 on page 519.

```
Usable free space = (difference between the allocated space and DATASET SIZE)
                    + (usable free space managed by IMS)
```

Figure 222. Formula to calculate usable free space (HDAM, HIDAM, PHDAM, and PHIDAM)

The usable free space is calculated by using two factors of free space. The first factor is the difference in free space between the allocated space and DATASET SIZE. For a VSAM data set, this value is calculated as follows: `(high-allocated-RBA) - (high-used-RBA)`

The second factor is the free spaces that are chained by FSEAPs and FSEs, and in which IMS can store a segment (shown as usable free space managed by IMS in the formula). This value is obtained from the HISTORY data set. If the HISTORY data set is not specified in the Space Monitor JCL, Space Monitor ignores the second factor and calculates the usable free space based only on the first factor. In this case, the data set is treated as an OS data set.

For index database data sets, usable free space is calculated as shown in the following figure. If the HISTORY data set is not specified in the Space Monitor JCL, the data set is treated as an OS data set, and the usable free space is calculated as shown in Figure 224 on page 516 and is illustrated in Figure 227 on page 519.

```
Usable free space = allocated space -
                   (total number of segments x logical record length)
```

Figure 223. Formula to calculate usable free space (index database data set)

Note: Total number of segments for a shared index database is the sum of segments only for the specified DBNAME on the control statement.

For HISAM database data sets and OS data sets, usable free space is calculated as shown in the following figure and is illustrated in Figure 227 on page 519.

```
Usable free space = (difference between the allocated space and DATASET SIZE)
```

Figure 224. Formula to calculate usable free space (HISAM database data set and OS data set)

For a VSAM data set, this value is calculated as follows: `(high-allocated-RBA) - (high-used-RBA)`

An asterisk (*) after %FSP indicates that the imbedded free space is not accurate because the HD Pointer Checker run with the HISTORY=YES option is obsolete (older than the warning threshold value specified in the SPMNMBR, SPMNIN, or FABKCTL data set).

%NRUS
Percentage of nonreusable free space managed by IMS, which are chained by FSEAPs and FSEs (G, H)

This field applies to HDAM, HIDAM, PHDAM, and PHIDAM database data sets.

An asterisk (*) after %NRUS indicates that the nonreusable free space is not accurate because the HD Pointer Checker run with the HISTORY=YES option is obsolete (older than the warning threshold value specified in the SPMNMBR, SPMNIN, or FABKCTL data set).

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

TOTBLK
Total number of blocks in the data set (G, T)

BLKSZ
Block size or control interval (CI) size (G)

LRECL
Logical record length (G)

MXSEG
Longest segment length in the data set, including the segment prefix as defined in DBD (H)

This field applies to HDAM, HIDAM, PHDAM, and PHIDAM database data sets.

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

ACTMX
Size of the longest segment detected by HD Pointer Checker in this data set (H)

This field applies to HDAM, HIDAM, PHDAM, and PHIDAM database data sets.

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

CISP
Number of VSAM control interval (CI) splits that have occurred for the data set. This field applies only to the data set with ACCM=KS-U or KS-S. (T, H)

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

CASP
Number of VSAM control area (CA) splits that have occurred for the data set. This field applies only to the data set with ACCM=KS-U or KS-S. (T, H)

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

ROOTS
Number of root segments in this database data set (H)

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

TOTALSEG
Total number of segments in this database data set, including roots (H)

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field shows 'N/A'.

REORGDATE
Date of the most recent reorganization (H)

If the reorganization date does not exist in the HISTORY data set, this field shows 'NONE'.

An asterisk (*) after REORGDATE indicates that the imbedded reorganization date might not be accurate because the HD Pointer Checker run with the HISTORY=YES option is obsolete (older than the warning threshold value specified in the SPMNMBR, SPMNIN, or FABKCTL data set).

HDPCDATE
Date of the most recent HD Pointer Checker run (with HISTORY=YES option) that created an entry in the HISTORY data set (H)

If HD Pointer Checker run date does not exist in the HISTORY data set, this field shows 'NONE'.

An asterisk (*) after the HDPCDATE indicates that the date of the HD Pointer Checker run with HISTORY=YES option is obsolete (older than the warning threshold value specified in the SPMNMBR, SPMNIN, or FABKCTL data set).

In the following fields (VOLSER, EXT, ALLOC, and %USE), the information is shown for each volume, in the case of a multivolume data set.

VOLSER
Volume serial number of the data set (S)

EXT
Number of extents on the volume (S)

ALLOC
Allocated space on the volume (S)

%USE
Percentage of used space within the allocated space on the volume (T, S)

This value is calculated as shown in the following figure. For a VSAM data set, the used space is the high-used-RBA on the volume, and the allocated space is the high-allocated-RBA on the volume.

```
%USE = (used space / allocated space) x 100
```

Figure 225. Formula to calculate the percentage of used space within the allocated space on the volume

DATASET SIZE
The space that is used for the data set in bytes. This is the block or CI size multiplied by the number of the total blocks or CIs in the data set. (T, S)

For a VSAM data set, the space is the high-used-RBA and is illustrated in Figure 227 on page 519.

%SZ
Percentage of the space that is used in the data set to the maximum database data set size (T, H)

This value is calculated as shown in the following figure.

```
%SZ = (DATASET SIZE / maximum data set size) x 100
```

Figure 226. Formula to calculate the percentage of the space that is used in the data set to the maximum data set size

For HDAM and HIDAM database data sets:

- If the data set is an OSAM data set and the block size is even, the maximum size is 8 GB.
- If the data set is a VSAM linear data set (OSAM LDS) and has the extended addressability attribute defined, the maximum size is 8 GB.
- Otherwise, the maximum size is 4 GB.

For PHDAM and PHIDAM database data sets:

- If the data set is an OSAM data set and OSAM8G is specified in the RECON data sets, the maximum size is 8 GB.
- If the data set is a VSAM linear data set (OSAM LDS) with the extended addressability attribute and OSAM8G is specified in the RECON data sets, the maximum size is 8 GB.
- Otherwise, the maximum size is 4 GB.

For other IMS database data sets, the maximum size is 4 GB.

If the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set, this field is printed as asterisks '***...*'.

The following figure provides a brief overview of how a VSAM data set is used. When you analyze the Space Analysis by Data Set report, this figure helps you understand the fields that are printed in the report.

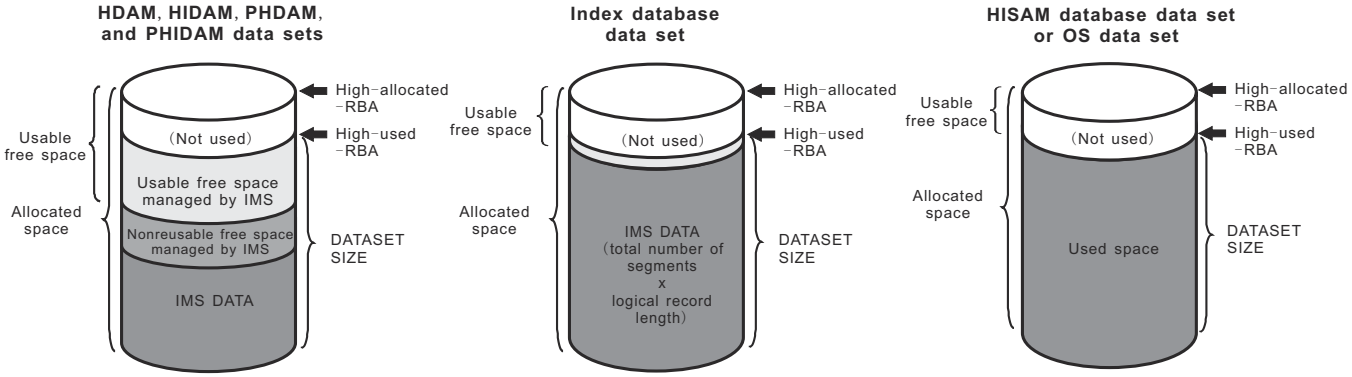


Figure 227. Overview of how a VSAM data set is used: Space Analysis by Data Set report

The following error messages are included in the report if the data set encounters associated error conditions:

******* DASD NOT MOUNTED *******
The DASD which should contain the data set is not mounted, and the space allocation information for the data set is not available.

******* NO VTOC ENTRY ON ANY VOLUME *******
The data set is cataloged but no VTOC entry is found on any volume for the data set. Space allocation information for the data set is not available.

******* DATA SET NOT CATALOGED *******
The data set is not cataloged and the space allocation information for the data set is not available.

******* DATA SET ON TAPE *******
The data set resides on tape and space allocation information for the data set is not available.

******* DATA SET MIGRATED *******
The data set is cataloged but it is migrated. Space allocation information for the data set is not available.

******* DSCB BLOCK SIZE=0 *******
The block size information in DSCB for the data set is zero. Space allocation information for the data set is not available.

******* DATA SET ON UNSUPPORTED DEVICE *******
The data set resides on an unsupported device and space allocation information for the data set is not available.

Summary of Data Sets by Volume report

This report contains a list of data sets by volume. Entries are sorted in alphabetic order of the volume serial number (VOLSER), database name (DBNAME), and data set ddname (DDNAME).

Subsections:

- "Report example" on page 519
- "Report field description" on page 520

Report example

The following figure shows an example of the Summary of Data Sets by Volume report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN        "SUMMARY OF DATA SETS BY VOLUME REPORT"                    PAGE:     1
5655-U09                                                 DATE: 07/01/2020  TIME: 18.05.23                        FABKSPMN - V3.R1

 MEMBER NAME : N/A
 ----------------------

 VOLSER  DBNAME   DDNAME   DSNAME                                          DBORG ACCM UNIT    BLKSZ TYP    PRI    SEC EXT     ALLOC %USE
 ------ -------- -------- ---------------------------------------------- ----- ---- ------- ----- --- ------ ------ --- --------- ----
 SYS001                   TESTDS.PUBLIC.SAMPLE.VSAM01                                 3390-3   4096 CYL      3      2   1         3   0
 SYS002                   TESTDS.PUBLIC.SAMPLE.VSAM01                                 3390-3   4096 CYL      3      2   0         0   0
 SYS004 HDAMDB2  HDAMDS4  TESTDS.PUBLIC.SAMPLE.HDAMDS4                  HDAM ES-U 3390-3   1024 CYL     50     50   1        50  10
        HISAMDB1 HISAMDS1 TESTDS.PUBLIC.SAMPLE.HISAMDS1                HISAM KS-U 3390-3   8192 CYL     50     50   1        50   2
        HISAMDB1 HISAMDS2 TESTDS.PUBLIC.SAMPLE.HISAMDS2                HISAM ES-U 3390-3   8192 CYL     50     20   1        50  32
        TPFOH1   TPFOH1AA TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001           PHDAM ES-U 3390-3    512 CYL     50     50   1        50  54
 SYS02D TPFOH2   TPFOH2AA TESTDS.PUBLIC.SAMPLE.TPFOH2.A00001          PHIDAM ES-U 3390-3    512 CYL     50     50   1        50  12
 SYS02E TPFOH2   TPFOH2AX TESTDS.PUBLIC.SAMPLE.TPFOH2.X00001          PHINDX KS-U 3390-3    512 CYL     20     10   1        20   5
 SYS02F TPFOH3   TPFOH3AA TESTDS.PUBLIC.SAMPLE.TPFOH3.A00001           PHDAM ES-U 3390-3    512 CYL     50     20   1        50   4
        TPFOX1   TPFOX1AA TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001          PSINDX KS-U 3390-3    512 CYL     10     10   1        10  20
```

Figure 228. SPMNPRT: Summary of Data Sets by Volume report

Report field description

This report contains the following information:

In the report field description, the following abbreviation is used:

Table 73. Legend for reading the report field description

Abbreviation	Description
(H)	Indicates that it is HD Pointer Checker analysis data (this data is not available for OS data sets) To obtain the data marked (H), HISTORY data set must be specified in the Space Monitor JCL and the database data set entry must exist in the HISTORY data set.

MEMBER NAME
Name of the member specified by the EXEC PARM parameter. If no member name is specified by the EXEC PARM parameter (that is, control statements are specified in the FABKCTL or SPMNIN data set), N/A is shown.

VOLSER
Volume serial number

DBNAME
Database name. This field is left blank in the case of an OS data set.

DDNAME
Data set ddname. This field is left blank in the case of an OS data set.

DSNAME
Data set name

DBORG
Database organization (H)

One of the following texts is shown:

HDAM, HIDAM, HISAM, SHISAM, PINDX (HIDAM index), SINDX (Secondary index), PHDAM, PHIDAM, PHINDX (PHIDAM index), PSINDX

This field is left blank if the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set.

ACCM
Access method (H)

One of the following texts is shown:

OSAM, LDS, KS-U, KS-S, ES-U, ES-S (KS=VSAM KSDS, ES=VSAM ESDS, U=UNIQUE, S=SUBALLOCATION, LDS=VSAM LINEAR)

This field is left blank if the data set is an OS data set or the HISTORY record entry for the database data set is not found in the HISTORY data set.

UNIT
DASD device type

If an asterisk * is marked after device type, for example 3390-A*, it means Extended Address Volume (EAV).

BLKSZ
Block size or control interval (CI) size

TYP
Space allocation type: CYL (cylinders), TRK (tracks), or BLK (blocks)

PRI
Primary allocation (cylinders, tracks, or blocks)

SEC
Secondary allocation (cylinders, tracks, or blocks)

EXT
Number of extents on the volume

ALLOC
Allocated space on the volume (cylinders, tracks, or blocks)

%USE
Percentage of used space within the total allocated space on the volume

This value is calculated as shown in the following figure. For a VSAM data set, the used space is the high-used-RBA on the volume, and the total allocated space is the high-allocated-RBA on the volume.

```
%USE = (used space / total allocated space) x 100
```

Figure 229. Formula to calculate the percentage of used space within the total allocated space on the volume

Total DASD Utilization by Volume/Device-Type report

This report contains information about DASD utilization by volume and device type.

Subsections:

- "Report example" on page 521
- "Report field description" on page 522

Report example

The following figure shows an example of the Total DASD Utilization by Volume/Device-Type report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN    "TOTAL DASD UTILIZATION BY VOLUME/DEVICE-TYPE REPORT"          PAGE:     1
5655-U09                                                   DATE: 07/01/2020  TIME: 18.05.23                      FABKSPMN - V3.R1

 MEMBER NAME : N/A
 ----------------------

                     SPECIFIED DATA SETS        OTHER               FREE SPACE ON VOLUME
                    -----------------------  ----------  ----------------------------------------
 DEVICE  VOLSER          ALLOC         USED       ALLOC        EMPTY  EXTNTS     CONTIG      CONTIG
 TYPE                     CYLS         CYLS        CYLS         CYLS               CYLS        TRKS
 ------- ------      ---------    ---------    ---------    ---------  ------  ---------  ----------

 3390-3  SYS001             3            0          247         3089      21       2366       35490
         SYS002             0            0            5         3334       1       3334       50012
         SYS004           200           49          552         2587       3       2587       38805
         SYS02D            50            6           14         3275       3       3274       49110
         SYS02E            20            1            4         3315       3       3314       49710
         SYS02F            60            4            4         3275       3       3274       49110

         ------      ---------    ---------    ---------    ---------  ------  ---------  ----------

 (TOTAL)      6           333           60          826        18875
```

Figure 230. SPMNPRT: Total DASD Utilization by Volume/Device-Type report

Report field description

MEMBER NAME
Name of the member specified by the EXEC PARM parameter. If no member name is specified by the EXEC PARM parameter (that is, control statements are specified in the FABKCTL or SPMNIN data set), N/A is shown.

DEVICE TYPE
DASD device type of the volume

VOLSER
Volume serial number

SPECIFIED DATA SETS

ALLOC CYLS
Shows the total number of cylinders allocated for the data sets that are specified by the control statements.

USED CYLS
Shows the total number of cylinders used for the data sets that are specified by the control statements.

OTHER

ALLOC CYLS
Shows the total number of cylinders allocated for the data sets on the volume that are *not* specified by the control statements.

FREE SPACE ON VOLUME

EMPTY CYLS
Shows the number of empty cylinders on the volume.

EXTNTS
Shows the number of free space extents on the volume.

CONTIG CYLS
Shows, in number of cylinders, the largest free space extent on the volume.

CONTIG TRKS
Shows, in number of tracks, the largest free space extent on the volume.

Legend report

This report contains the legend for Space Analysis by Data Set report.

The following figure shows an example of the Legend report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN                  "LEGEND REPORT"                                PAGE:     1
5655-U09                                                  DATE: 07/01/2020  TIME: 18.05.23                      FABKSPMN - V3.R1


 DBNAME     - DATABASE NAME
 DDNAME     - DATA SET DDNAME
 DSNAME     - DATA SET NAME
 DBORG      - DATABASE ORGANIZATION:
              HDAM, HIDAM, HISAM, SHISAM, PINDX(HIDAM INDEX), SINDX(SECONDARY INDEX)
              PHDAM, PHIDAM, PHINDX(PHIDAM INDEX), PSINDX(SECONDARY INDEX)

 ACCM       - ACCESS METHOD:
              OSAM, LDS, KS-U, KS-S, ES-U, ES-S  (KS=VSAM KSDS, ES=VSAM ESDS, U=UNIQUE, S=SUBALLOCATION, LDS=VSAM LINEAR)
 UNIT       - DASD DEVICE TYPE
              AN * AFTER DEVICE TYPE MEANS EXTENDED ADDRESS VOLUME (EAV)

 TYP        - SPACE ALLOCATION TYPE:
              CYL(CYLINDERS), TRK(TRACKS), BLK(BLOCKS)
 PRI        - PRIMARY ALLOCATION IN CYLINDERS, TRACKS, OR BLOCKS
 SEC        - SECONDARY ALLOCATION IN CYLINDERS, TRACKS, OR BLOCKS
 EXT        - NUMBER OF EXTENTS
 AEXT       - COUNT OF AVAILABLE EXTENTS
 ALLOC      - TOTAL ALLOCATED SPACE (CYLINDERS, TRACKS OR BLOCKS)
 %FSP       - PERCENTAGE OF USABLE FREE SPACE RELATIVE TO TOTAL ALLOCATED SPACE:
              USABLE FREE SPACE (FOR HDAM AND HIDAM DATA SETS) =
                REMAINING SPACE BETWEEN LAST BLOCK AND END OF EXTENT
               + USABLE IMBEDDED FREE SPACE ACCORDING TO BIT MAP
              USABLE FREE SPACE (FOR INDEX DB DATA SETS) = ALLOCATED SPACE - (TOTAL NUMBER OF SEGMENTS  X  LOGICAL RECORD LENGTH)
              USABLE FREE SPACE (FOR OTHER DATA SETS) = REMAINING SPACE BETWEEN LAST BLOCK AND END OF EXTENT
              AN * AFTER %FSP MEANS THAT IMBEDDED FREE SPACE NOT COMPUTED BECAUSE OF AN
              OBSOLETE HD POINTER CHECKER RUN WITH HISTORY=YES OPTION (OLDER THAN SPECIFIED LIMIT)
              OR THAT %FSP IS NOT ACCURATE BECAUSE OF A VSAMSTAT FAILURE
 %NRUS      - PERCENTAGE OF NON-REUSABLE FREE SPACE ACCORDING TO BIT MAP
 TOTBLK     - TOTAL BLOCKS IN DATA SET
              AN * AFTER TOTBLK MEANS TOTBLK IS NOT ACCURATE BECAUSE OF A VSAMSTAT FAILURE
 BLKSZ      - BLOCK OR CI SIZE
 LRECL      - LOGICAL RECORD LENGTH
 MXSEG      - LONGEST SEGMENT LENGTH IN DATA SET INCLUDING SEGMENT PREFIX
              AS DEFINED IN DBD
 ACTMX      - SIZE OF THE LONGEST SEGMENT DETECTED BY HD POINTER CHECKER IN THIS DATA SET
 CISP       - VSAM CI SPLITS
              AN * AFTER CISP MEANS CISP IS NOT ACCURATE BECAUSE OF AN INCORRECT VALUE OF VSAM CATALOG OR A VSAMSTAT FAILURE
 CASP       - VSAM CA SPLITS
              AN * AFTER CASP MEANS CASP IS NOT ACCURATE BECAUSE OF AN INCORRECT VALUE OF VSAM CATALOG OR A VSAMSTAT FAILURE
 ROOTS      - NUMBER OF ROOT SEGMENTS IN DATABASE
 TOTALSEG   - TOTAL SEGMENTS IN DATA SET INCLUDING ROOTS IF ANY
 REORGDATE  - REORGANIZATION DATE OF THE DATABASE
              AN * AFTER REORGDATE MEANS REORGDATE IS NOT ACCURATE BECAUSE OF AN
              OBSOLETE HD POINTER CHECKER RUN WITH HISTORY=YES OPTION (OLDER THAN SPECIFIED LIMIT)
 HDPCDATE   - DATE OF THE MOST RECENT HD POINTER CHECKER RUN WITH HISTORY=YES OPTION
              AN * AFTER HDPCDATE MEANS AN HD POINTER CHECKER RUN WITH HISTORY=YES OPTION OLDER THAN SPECIFIED LIMIT
 VOLSER     - SERIAL NUMBER OF VOLUME(S) CONTAINING DATA SET
 EXT        - COUNT OF EXTENTS ON VOLUME
 ALLOC      - ALLOCATED SPACE ON VOLUME
 %USE       - PERCENTAGE OF ALLOCATED SPACE USED
              AN * AFTER %USE MEANS %USE IS NOT ACCURATE BECAUSE OF A VSAMSTAT FAILURE
 DATASET SIZE - DATA SET SIZE = BLOCK OR CI SIZE X TOTAL BLOCKS IN DATA SET
              AN * AFTER DATASET SIZE MEANS DATASET SIZE IS NOT ACCURATE BECAUSE OF A VSAMSTAT FAILURE
 %SZ        - PERCENTAGE OF DATA SET USED WITHIN THE MAXIMUM SIZE LIMIT OF THE DATABASE DATA SET
              AN * AFTER %SZ MEANS %SZ IS NOT ACCURATE BECAUSE OF A VSAMSTAT FAILURE
```

Figure 231. SPMNPRT: Legend report

Space Monitor Graph report

This report is a scatter plot that shows space allocation and use information.

Subsections:

- “Report example” on page 523
- “Report field description” on page 524
- “Interpreting the scatter plot data” on page 525

Report example

The following figure shows an example of the Space Monitor Graph report.

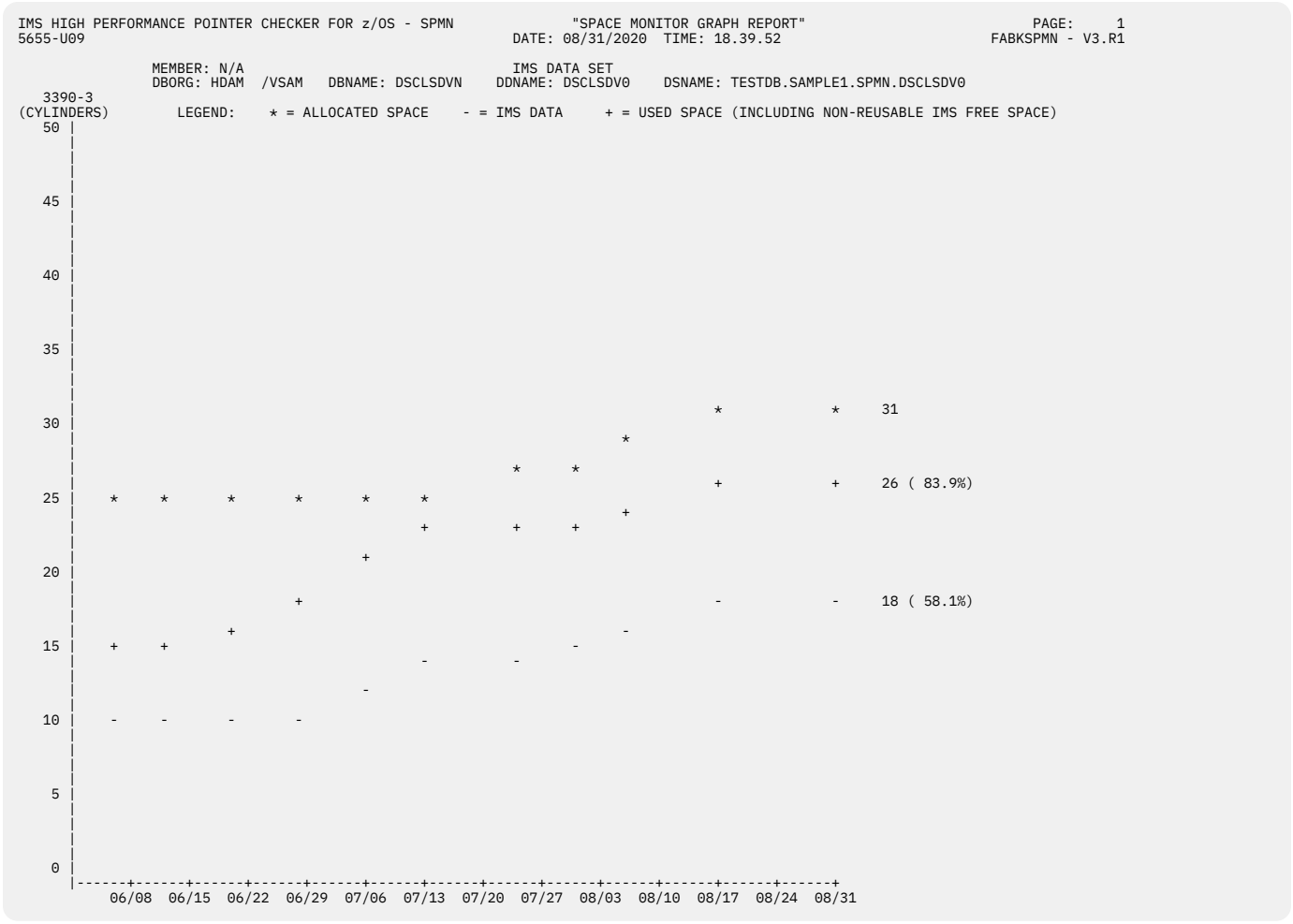


Figure 232. SPMNPRT: Space Monitor Graph report

Report field description

This report contains the following information:

MEMBER
Name of the member specified by the EXEC PARM parameter. If no member name is specified by the EXEC PARM parameter (that is, control statements are specified in the FABKCTL or SPMNIN data set), N/A is shown.

DBORG
Database organization type. The format is:

```
xxxxx/yyyy
```

Where:

xxxxx
HDAM, HIDAM, HISAM, SHISAM, PINDX (HIDAM index), SINDX (secondary index), PHDAM, PHIDAM, PHINDX (PHIDAM index).

yyyy
VSAM or OSAM

In the case of an OS data set, only 'VSAM' or 'NON-VSAM' is shown.

DBNAME
Database name. This field is left blank in the case of an OS data set.

DDNAME
DDname of the data set. This field is left blank in the case of an OS data set.

DSNAME
Data set name

Interpreting the scatter plot data

The scatter plot shows the following data for each data set:

- Allocated space
- Used space
- IMS data (space used for IMS data)

  IMS data is produced only for the IMS full-function database data sets that have entries in the HISTORY data set.

X-axis shows the date. A unit of scale corresponds to one day. The recent 90 days of space information is shown on the graph up to the date of this Space Monitor run.

Y-axis shows the amount of space in cylinders. The maximum and minimum scale values are determined by the maximum and minimum space values. If the maximum space value is more than 99999 cylinders, the maximum scale value is printed as 99999+. A device type is shown at the top of Y-axis. If an asterisk * is marked after device type, for example 3390-A*, it means Extended Address Volume (EAV).

The following is the description of the scatter plot data:

ALLOCATED SPACE
The space allocated for this data set is shown as the asterisk (*) marks.

IMS DATA
The space used as IMS data in this data set is shown as minus (-) marks. For an OS data set, this value is always shown as zero.

The space used as IMS data is as follows, depending on the database type:

- For HDAM and HIDAM databases, it is the total space used by the IMS segments in the data set.
- For index databases, the value is calculated as follows:

  ```
  (Total number of segments in the data set) x (Logical record length)
  ```

  Note: In the case of shared index databases, the space information is reported for one secondary index portion only.
- For HISAM databases, the value is calculated as follows:

  ```
  (Total number of segments in the data set) x (Average segment length)
  ```

  Note: The average segment length is the average for the entire database, including both the primary data set and overflow data set.

USED SPACE
The space used for this data set is shown as plus (+) marks. For VSAM data sets, the space includes VSAM CI splits and CA splits.

For HDAM, HIDAM, PHDAM, and PHIDAM database data sets, USED SPACE is calculated as shown in the following figure and is illustrated in Figure 234 on page 526.

```
USED SPACE = ALLOCATED SPACE - usable free space
```

Figure 233. Formula to calculate USED SPACE (HDAM, HIDAM, PHDAM, and PHIDAM)

For index database data sets, HISAM database data sets, and OS data sets, USED SPACE is the high-used-RBA and is illustrated in Figure 234 on page 526.

For a VSAM data set, USED SPACE is the high-used-RBA.

Notes:

1. On the report, where the asterisk (*) mark intersects other marks (+ or -), the asterisk mark overrides others. Where the plus (+) mark intersects the minus (-) mark, plus mark is shown.
2. If the space that is allocated or used for the data set is more than 99999 cylinders, the amount of the space is shown as 99999+.
3. If the space that is allocated for the data set is more than 99999 cylinders, the percentages of the used space as IMS data and the used space for the data set are shown as N/A%.

The following figure provides a brief overview of how a VSAM data set is used. When you analyze the Graph report, this figure helps you understand the fields that are printed in the report.

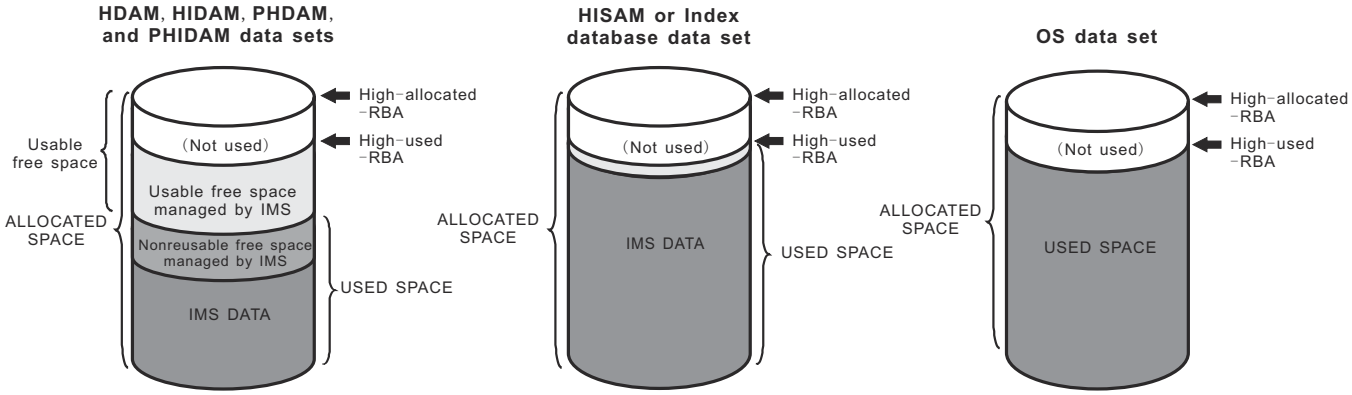


Figure 234. Overview of how a VSAM data set is used: Graph report

SPMNPRTW data set

This output data set contains the Space Monitor Exception report.

Space Monitor Exception report

This report describes the analyzed data set information and the associated threshold warning messages for any of the database data sets and OS data sets.

Entries are sorted in alphabetic order of the database name (DBNAME) and data set ddname (DDNAME).

Subsections:

- “Report example” on page 526
- “Report field description” on page 527

Report example

The following figure shows an example of the Space Monitor Exception report.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN           "SPACE MONITOR EXCEPTION REPORT"                    PAGE:     1
5655-U09                                              DATE: 07/11/2020  TIME: 18.05.23                      FABKSPMN - V3.R1

 MEMBER NAME : N/A
 ----------------------


 DBNAME         DDNAME      DSNAME                                          DBORG ACCM   CISP   CASP  UNIT     REORGDATE    HDPCDATE
 TYP    PRI    SEC EXT AEXT     ALLOC %FSP %NRUS   TOTBLK  BLKSZ LRECL  MXSEG ACTMX      ROOTS   TOTALSEG VOLSER EXT     ALLOC %USE
        DATASET SIZE    %SZ
 --- ------ ------ --- --- --------- ---- ----- --------- ----- ----- ------ -----  ----------  --------- ------ --- --------- ----

 HISAMDB1       HISAMDS1    TESTDS.PUBLIC.SAMPLE.HISAMDS1                   HISAM KS-U        0     0  3390-3 07/06/2020  07/10/2020
 CYL     50     50   1  118        50   98 N/A         90   8192   510   N/A    N/A        130        584 SYS004   1        50    2

             737,280    0.0
 *****  THE NUMBER OF EXTENTS IS MORE THAN OR EQUAL TO  1  *****

 HISAMDB1       HISAMDS2    TESTDS.PUBLIC.SAMPLE.HISAMDS2                   HISAM ES-U      N/A   N/A  3390-3 07/06/2020* 07/10/2020*
 CYL     50     20   1  118        50   68*N/A*      1419   8192   512   N/A    N/A          0     106017 SYS004   1        50   32

          11,624,448    0.3
 *****  LAST HDPC RUN OLDER THAN  0 DAYS  *****

 TPFOH1         TPFOH1AA    TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001              PHDAM ES-U      N/A   N/A  3390-3 07/06/2020  07/10/2020
 CYL     50     50   1  118        50   47   7      19845    512   505   246    246      11000      80037 SYS004   1        50   54
 *****  THE PERCENTAGE OF USED SPACE IS MORE THAN OR EQUAL TO   0 %  *****

          10,160,640    0.2
 *****  THE PERCENTAGE OF FREE SPACE IS LESS THAN OR EQUAL TO  50 %  *****
 *****  THE PERCENTAGE OF DATA SET SIZE TO MAX SIZE IS   0.2 %. IT REACHES OR EXCEEDS   0 %  *****
 *****  DATA SET SIZE REACHES OR EXCEEDS    1 MEGABYTES  *****

 TPFOH2         TPFOH2AA    TESTDS.PUBLIC.SAMPLE.TPFOH2.A00001             PHIDAM ES-U      N/A   N/A  3390-3 07/06/2020  07/10/2020
 CYL     50     50   1  118        50   89   7       4410    512   505   122    122       9000      18178 SYS02D   1        50   12

            2,257,920    0.1
 *****  LAST REORGANIZATION DATE IS MORE THAN   2 DAYS BEFORE  *****

 TPFOX1         TPFOX1AA    TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001             PSINDX KS-U        0     0  3390-3 07/06/2020  07/10/2020
 CYL     10     10   1  118        10   87 N/A        1470    512    54   N/A    N/A         N/A       9178 SYS02F   1        10   20

             752,640    0.0
 *****  CA SPLITS %   0 WHICH REACHES OR EXCEEDS   0 %. TOTAL CA COUNT IS         2  *****
 *****  CI SPLITS %   0 WHICH REACHES OR EXCEEDS   0 %. TOTAL CI COUNT IS      1470  *****
```

Figure 235. SPMNPRTW: Space Monitor Exception report

Report field description

For the description of all the fields in this report, see “Space Analysis by Data Set report” on page 513.

The following messages are included in the report:

******* LARGER THAN 4 GIGABYTES *******
The total space of the data set is equal to or larger than 4 gigabytes for any of the following data sets:

- VSAM data set without the extended addressability attribute
- If the data set is a HALDB data set, VSAM linear data set with NOOSAM8G specified in the RECON data sets
- Non-VSAM data set whose block size is odd

Each field of ALLOC, %FSP, %NRUS, TOTBLK, and %USED is calculated by the total space in the data set, which is treated as X’FFFFFFFF’ (4 gigabytes - 1 byte).

******* LARGER THAN 8 GIGABYTES *******
The total space of the data set is equal to or larger than 8 gigabytes. Each field on ALLOC, %FSP, %NRUS, TOTBLK, and %USED is calculated by the total space in the data set, which is treated as X’1FFFFFFE’ (8 gigabytes - 2 bytes).

******* LAST HDPC RUN OLDER THAN*cc* DAYS *******
The most recent HD Pointer Checker run with HISTORY=YES option for the database data set was done earlier than the warning threshold specified in columns 70-71 of the first control statement for the database data set.

An asterisk (*) is shown after %FSP, %NRUS, and REORGDATE value, showing that these values are not accurate because the HD Pointer Checker run with the HISTORY=YES option is obsolete (older than the specified limit). An asterisk (*) is also shown after the date on the HDPCDATE field showing that the HD Pointer Checker run date is older than the specified limit.

******* THE PERCENTAGE OF FREE SPACE IS LESS THAN OR EQUAL TO *bbb* % *******
The percentage of free space in the data set is equal to or less than the warning threshold value specified in columns 66-68 of the first control statement for the data set.

******* THE NUMBER OF EXTENTS IS MORE THAN OR EQUAL TO *aa* *******
The number of extents of the data set is equal to or greater than the warning threshold value specified in columns 64-65 of the first control statement for the data set.

******* NONE *******
No exceptional conditions were detected for any of the database data sets and/or OS data sets processed.

******* THE NUMBER OF AVAILABLE EXTENTS IS LESS THAN OR EQUAL TO *ppp* (VOLUME LIMIT) ***** or**
******* THE NUMBER OF AVAILABLE EXTENTS IS LESS THAN OR EQUAL TO *ppp* (DATASET LIMIT) *******
The number of available extents in the data set is equal to or less than the warning threshold value specified in columns 10 and 11 of the second control statement for the data set. For either of the following kinds of data set, however, the message is not issued because the extent number used (AEXT) is always zero:

- VSAM data set whose secondary allocation is zero and for which only one volume is defined.
- Non-VSAM data set whose secondary allocation is zero.

******* CA SPLITS %*xxx* WHICH REACHES OR EXCEEDS *ttt* %. TOTAL CA COUNT IS *yyyyyyyyy* *******
The ratio of the number of control area (CA) splits compared to the total number of CAs is equal to or more than the warning threshold value.

```
xxx = (the number of CA splits that have occurred for the data set) / yyyyyyyyy * 100 (%)
```

When the number of CA splits that have occurred for the data set is greater than the total number of CAs, *xxx* is shown as 100 (%).

ttt is the warning threshold value that is specified in columns 21-23 of the second control statement for the data set.

******* CI SPLITS %*xxx* WHICH REACHES OR EXCEEDS *uuu* %. TOTAL CI COUNT IS *yyyyyyyyy* *******
The ratio of the number of control interval (CI) splits compared to the number of CIs is equal to or more than the warning threshold value.

```
xxx = (the number of CI splits that have occurred for the data set) / yyyyyyyyy * 100 (%)
```

yyyyyyyyy is the number of CIs up to the high-used RBA.

When the number of CI splits that have occurred for the data set is greater than the total number of CIs, *xxx* is shown as 100 (%).

uuu is the warning threshold value that is specified in columns 25-27 of the second control statement for the data set.

******* USING LAST EXTENT (VOLUME LIMIT) ***** or**
******* USING LAST EXTENT (DATASET LIMIT) *******
The last extent has been used. To display this message, specify Y in column 13 of the second control statement for the data set; to suppress it, specify * there. For either of the following kinds of data set, however, the message is not issued because the extent number used (AEXT) is always zero:

- VSAM data set whose secondary allocation is zero and to which only one volume is defined.
- Non-VSAM data set whose secondary allocation is zero.

******* THE PERCENTAGE OF USED SPACE IS MORE THAN OR EQUAL TO *rrr* % *******
The percentage of space used on the volume reached or exceeded the warning threshold value specified in columns 15-17 of the second control statement for the data set.

******* LAST REORGANIZATION DATE IS MORE THAN *vvv* DAYS BEFORE *******
The most recent reorganization date of the database data set is earlier than the warning threshold specified in columns 29-31 of the second control statement for the database data set.

******* NO LAST REORGANIZATION DATE *******
The warning threshold value for the reorganization data was specified in columns 29-31 of the second control statement, but the most recent reorganization data does not exist in the HISTORY data set.

******* NO AVAILABLE SPACE *******
The number of extents available is more than zero, but there is no space for extension. This threshold value is controlled in column 19 of the second control statement for the data set. For either of the following kinds of data set, however, the message is not issued because the extent number used (AEXT) is always zero:

- VSAM data set whose secondary allocation is zero and for which only one volume is defined.
- Non-VSAM data set whose secondary allocation is zero.

******* NEXT VOLUME NOT YET SELECTED BY SMS *******
The warning threshold value for the last available space was specified in column 19 of the second control statement, but the available space cannot be calculated because the volume cannot be identified.

This message is issued when no space exists on the current volume and the next volume names is '*'—that is, when the volume name has not been selected by DFSMS/MVS.

******* THE PERCENTAGE OF DATA SET SIZE TO MAX SIZE IS *xxx.x* %. IT REACHES OR EXCEEDS *yyy* % *******
The percentage *xxx.x*—that is, the ratio of the space that is used in the data set to the maximum size of the IMS database data set—is equal to or more than the warning threshold value *yyy* that is specified in column 33-35 of the second control statement for the data set.

******* DATA SET SIZE REACHES OR EXCEEDS *xxxx* MEGABYTES ***** or**
******* DATA SET SIZE REACHES OR EXCEEDS *xxxx* GIGABYTES***** or**
******* DATA SET SIZE REACHES OR EXCEEDS *xxxx* TERABYTES *******
The data set size is equal to or more than the warning threshold value *xxxx* MB, GB, or TB. The warning threshold value is specified in columns 37-40 and column 41 of the second control statement for the data set.

SPMNMSG data set

This output data set contains the Space Monitor Messages report produced by Space Monitor.

Space Monitor Messages report

This report shows all control statements and messages.

The control statements that were specified in the FABKCTL data set, the control member data set (SPMNMBR), or the SPMNIN data set are shown in this report. Messages issued from Space Monitor are also shown in the report.

The following figure shows an example of the report that is printed when the control statements are specified in the control member data set (SPMNMBR) or the SPMNIN data set.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN               "SPACE MONITOR MESSAGES"                        PAGE:     1
5655-U09                                                 DATE: 07/11/2020  TIME: 11.19.55                     FABKSPMN - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

HISAMDB1 HISAMDS1 TESTDS.PUBLIC.SAMPLE.HISAMDS1
HISAMDB1 HISAMDS2 TESTDS.PUBLIC.SAMPLE.HISAMDS2
HDAMDB2  HDAMDS4  TESTDS.PUBLIC.SAMPLE.HDAMDS4
TPFOH1   TPFOH1AA TESTDS.PUBLIC.SAMPLE.TPFOH1.A00001
TPFOH2   TPFOH2AA TESTDS.PUBLIC.SAMPLE.TPFOH2.A00001
TPFOH2   TPFOH2AX TESTDS.PUBLIC.SAMPLE.TPFOH2.X00001
TPFOH3   TPFOH3AA TESTDS.PUBLIC.SAMPLE.TPFOH3.A00001
TPFOX1   TPFOX1AA TESTDS.PUBLIC.SAMPLE.TPFOX1.A00001
                  TESTDS.PUBLIC.SAMPLE.VSAM01

FABK0001I FABKSPMN ENDED NORMALLY
```

Figure 236. SPMNMSG: Space Monitor Messages report (SPMNMBR or SPMNIN)

In the following example, the control statements that are specified in the FABKCTL data set are printed.

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - SPMN               "SPACE MONITOR MESSAGES"                          PAGE:     1
5655-U09                                                 DATE: 07/11/2020  TIME: 10.26.26                      FABKSPMN - V3.R1

0........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

 PROC USER=(USER001,USEER002),TOSIXCFGRP=TOIZZZZ,IMSID=SYSA
 OPTION THRESHOLDS=(EXTENTS=14,DSSIZE%=98)
*    Non-HAL FFDB
   DATABASE DB=COURSEDB
     OPTION THRESHOLDS=DSSIZE%=90
*    HALDB
   DATABASE DB=CUSTHDB,PART=CUSTP1
     OPTION THRESHOLDS=(FREESPC%=20)
*    DEDB
   DATABASE DB=NAMEDB,AREA=*ALL
 END

FABK0001I FABKSPMN ENDED NORMALLY
```

Figure 237. SPMNMSG: Space Monitor Messages report (FABKCTL)

Chapter 26. JCL examples for Space Monitor

Use the following examples to prepare Space Monitor JCL.

Topics:

- “Example 1: Using the SPMNIN data set to monitor space ” on page 531
- “Example 2: Using the SPMNMBR data set to monitor space ” on page 532
- “Example 3: Using the FABKCTL data set to monitor space” on page 533
- “Example 4: Increasing buckets on Space Monitor graph record” on page 533

Example 1: Using the SPMNIN data set to monitor space

In this example, SPMNIN input data set is used to run Space Monitor.

The following figure presents an example of a job in which the SPMNIN input data set is used to monitor several IMS full-function database data sets and DEDB data sets.

```
//SPMN     EXEC SPMN
//S.SPMNIN  DD  *
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DL/I DATABASE DATA SET GROUP FOR APPL01
*-DBD--* *-DD---* *-DATA SET NAME ----------------------------* AABBB CC
DSSCHHVN DSSCHHV0 SAMPLE.DSSCHHV0                               13 20  7
DSFACHON DSFACHO0 SAMPLE.DSFACHO0
DSCRSDVN DSCRSDV0 SAMPLE.DSCRSDV0                               13 20  7
DSCRSDVN DSCRSDV1 SAMPLE.DSCRSDV1
DSCLSDVN DSCLSDV0 SAMPLE.DSCLSDV0
*
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DEDB AREA DATA SET GROUP FOR APPL01
*-N/A--* *-N/A--* *-DATA SET NAME ----------------------------* AABBB CC
                  SAMPLE.DB01AR01
                  SAMPLE.DB01AR02
                  SAMPLE.DB02AR01
                  SAMPLE.DB02AR02
                  SAMPLE.DB02AR03
/*
//*
```

Figure 238. Space Monitor example 1: Using the SPMNIN data set to monitor space

The first and third control statements for the IMS full-function database data sets specify three threshold values explicitly. The warning threshold for the number of extents is 13, the warning threshold for the percentage of free space is 20, and the warning threshold for the number of days without HD Pointer Checker run (with HISTORY=YES option) is 7 for both of the data sets. For all other IMS full-function database data sets, the default values 10, 10, and 14 are applied for these three threshold values.

DEDB data sets are treated simply as VSAM data sets. Threshold values are meaningless for DEDB data sets for the following reasons:

- Extents are allocated at the DEDB initialization time by the IMS DEDB Initialization utility and no extents are dynamically obtained after the initialization.
- The IMS DEDB Initialization utility initializes all space allocated and no OS free space exists.
- HD Pointer Checker does not support DEDB data sets.

© Copyright IBM Corp. 2000, 2021

Example 2: Using the SPMNMBR data set to monitor space

In this example, SPMNMBR input data set is used to run Space Monitor.

Figure 240 on page 532 presents an example of a job in which the SPMNMBR input data set is used to monitor several IMS full-function database data sets and DEDB data sets.

The input control statements are the same as in "Example 1: Using the SPMNIN data set to monitor space " on page 531, and they are specified in the member APPL01 of the SPMN.MEMBER partitioned data set. Figure 239 on page 532 presents an example of an IEBUPDTE utility job in which the member APPL01 is added to the data set SPMN.MEMBER.

```
//FPPROC  EXEC  PGM=IEBUPDTE,PARM=NEW
//SYSPRINT DD SYSOUT=A
//SYSUT2   DD DSN=SPMN.MEMBER,DISP=OLD
//SYSIN   DD  DATA,DLM=@@
./ ADD  NAME=APPL01,LIST=ALL
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DL/I DATABASE DATA SET GROUP FOR APPL01
*-DBD--* *-DD---* *-DATA SET NAME --------------------------* AABBB CC
DSSCHHVN DSSCHHV0 SAMPLE.DSSCHHV0                            13 20  7
DSFACHON DSFACHO0 SAMPLE.DSFACHO0
DSCRSDVN DSCRSDV0 SAMPLE.DSCRSDV0                            13 20  7
DSCRSDVN DSCRSDV1 SAMPLE.DSCRSDV1
DSCLSDVN DSCLSDV0 SAMPLE.DSCLSDV0
*
*        1         2         3         4         5         6         7
*...+....0....+....0....+....0....+....0....+....0....+....0....+....0..
* IMS DEDB AREA DATA SET GROUP FOR APPL01
*-N/A--* *-N/A--* *-DATA SET NAME --------------------------* AABBB CC
                  SAMPLE.DB01AR01
                  SAMPLE.DB01AR02
                  SAMPLE.DB02AR01
                  SAMPLE.DB02AR02
                  SAMPLE.DB02AR03
@@
//*
```

Figure 239. Space Monitor example 2: Creating a member on SPMNMBR data set

```
//SPMN     EXEC SPMN,
//             MEMBER=APPL01,                 FOR MEMBER NAME
//             SPMNMBR='SPMN.MEMBER'          FOR SPMNMBR DS
//*
```

Figure 240. Space Monitor example 2: Using the SPMNMBR data set to monitor space

Example 3: Using the FABKCTL data set to monitor space

The following figure presents an example of a job in which the FABKCTL input data set is used to monitor the data sets of an IMS full-function database, a HALDB, and a DEDB.

```
//SPMN  EXEC PGM=FABKSPMN
//STEPLIB DD DISP=SHR,DSN=HPS.SHPSLMD0
//           DISP=SHR,DSN=IMSVS.SDFSRESL
//IMS     DD DISP=SHR,DSN=dbd library
//IMSDALIB DD DISP=SHR,DSN=mda library
//RECON1 DD DISP=SHR,DSN=recon1 data set
//RECON2 DD DISP=SHR,DSN=recon2 data set
//RECON3 DD DISP=SHR,DSN=recon3 data set
//HISTORY DD DISP=SHR,DSN=history data set
//SPMNSPDT DD DISP=SHR,DSN=spmnspdt data set
//FABKCTL DD  *
 PROC USER=(USER001,USEER002),TOSIXCFGRP=TOIZZZZ,IMSID=SYSA
 OPTION THRESHOLDS=(EXTENTS=14,DSSIZE%=98)
*    Non-HAL FFDB
   DATABASE DB=COURSEDB
     OPTION THRESHOLDS=DSSIZE%=90
*    HALDB
   DATABASE DB=CUSTHDB,PART=CUSTP1
     OPTION THRESHOLDS=(FREESPC%=20)
*    DEDB
   DATABASE DB=NAMEDB,AREA=*ALL
 END
/*
```

Figure 241. Space Monitor example 3: Using the FABKCTL data set to monitor space

In this example:

- The first DATABASE statement (DB=COURSEDB) specifies to monitor the database data sets that belong to the COURSEDB database.
- The second DATABASE statement (DB=CUSTHDB,PART=CUSTP1) specifies to monitor the database data sets (including ILDS) that belong to the CUSTP1 partition of the CUSTHDB database.
- The third DATABASE statement (DB=NAMEDB) specifies to monitor the area data sets that belong to the NAMEDB database.
- Multiple OPTION statements are specified in this JCL. These OPTION statements work as follows:
  - The first OPTION statement specifies the EXTENTS and DSSIZE% threshold values. These threshold values are applied to all DATABASE statements.
  - Other OPTION statements are applied to the DATABASE statement that immediately precedes each OPTION statement.
  - The EXTENTS and DSSIZE% parameters in the first OPTION statement are overridden by other OPTION statements.

Monitoring DSSIZE% requires a HISTORY record to be generated by the HD Pointer Checker utility. However, because the HD Pointer Checker utility does not support DEDBs, HISTORY records cannot be created for DEDBs. Therefore, the DSSIZE% monitoring factor is not valid for DEDBs.

Example 4: Increasing buckets on Space Monitor graph record

This example shows how to increase buckets on the Space Monitor graph record.

Figure 244 on page 534 presents an example of a job to increase the number of buckets on the Space Monitor graph record.

Suppose the logical record length of the original Space Monitor graph record (SPMN.SPDT) is 440, and this length is to be increased to 812. The original record has 30 buckets, as calculated by the formula shown in the following figure.

$$\text{Number of buckets} = \frac{440 - 66 - 5}{12} = 30 \quad \text{(remainder 9)}$$

Figure 242. Sample for calculating the number of buckets in a Space Monitor graph record with original record length

The new Space Monitor graph record (SPMN.SPDT) will contain 61 buckets, calculated as shown in the following figure.

$$\text{Number of buckets} = \frac{812 - 66 - 5}{12} = 61 \quad \text{(remainder 9)}$$

Figure 243. Sample for calculating the number of buckets in a Space Monitor graph record with increased record length

The new record contains the space allocation information copied from the old record. At this time, the prefix, suffix, and the added buckets are not yet reformatted. When Space Monitor accesses the new record, it automatically re-formats these parts.

```
//EXPAND    EXEC PGM=IEBGENER
//SYSPRINT  DD   SYSOUT=A
//SYSUT2    DD DSN=SPMN.SPDTN,DISP=(NEW,KEEP),
//             UNIT=SYSDA,VOL=SER=IMSDBT,SPACE=(TRK,(10,5)),
//             DCB=(RECFM=FB,LRECL=812,BLKSIZE=3248)
//SYSUT1    DD DSN=SPMN.SPDT,DISP=OLD
//SYSIN     DD *
  GENERATE  MAXFLDS=1
    RECORD  FIELD=(440,1,,1)
/*
```

Figure 244. Space Monitor example 4: Increasing buckets on Space Monitor graph record

Chapter 27. Available data set extents and last space

The following topics describe how the Space Monitor utility checks the number of available extents for the data set, and whether there is enough space left or not on the DASD volume.

Topics:

- "Available data set extents" on page 535
- "Last space" on page 539

Available data set extents

The Space Monitor utility calculates the number of available data set extents.

The number of available extents can be calculated as shown in the following figure.

```
(the number of allocatable extents) - (the number of extents allocated)
```

Figure 245. Formula to calculate available extents

The number of allocatable extents is taken as either the number of allocatable extents for the usable volumes or the number of allocatable extents for a data set, whichever is smaller. They can be calculated as shown in the following figure.

```
A. The number of allocatable extents for the usable volumes[Note 1] =
    (Number of extents per volume[Note 2]
    × the number of volumes on that the data set to be allocated)
    + (Maximum number of extents per volume - the number of extents on the current volume)
    + (the number of extents allocated)

B  The number of allocatable extents for a data set =
     Maximum number of extents per data set[Note 3]
```

Figure 246. Formula to calculate the number of allocatable extents for the usable volumes and for a data set

Notes:

1. 'usable volumes' refers to the volumes on that the data set are already allocated and to be allocated.
2. 'Maximum Number of Extents per Volume' is shown in Table 74 on page 535.
3. 'Maximum Number of Extents per Data set' is shown in Table 74 on page 535.

The following table shows the maximum number of extents that Space Monitor utility uses to calculate the number of available extents.

Table 74. Maximum number of extents that Space Monitor utility uses to calculate the number of available extents

Data set type	Maximum number of extents per volume	Maximum number of extents per data set
VSAM	123	251
OSAM	16	• 52 to 60 (62 Note 1) for IMS 13.1 • 120 for IMS 14.1 or later
Others	16	16 x 59

© Copyright IBM Corp. 2000, 2021

Table 74. Maximum number of extents that Space Monitor utility uses to calculate the number of available extents (continued)

Data set type	Maximum number of extents per volume	Maximum number of extents per data set

Note: For IMS V13, the maximum number of extents per OSAM data set is determined as follows:

1. If there is no rotational position sensing (RPS) device, the maximum is 62.
2. If there is a rotational position sensing (RPS) device, the maximum depends on the number of blocks per track, as follows:
   a. The length of OSAM data extent block (DEB)

```
Length of DEB = Length of appendage sector table (5 doublewords fixed)
+ Length of basic DEB (4 doublewords fixed)
+ Length of access method dependent section (2 doublewords fixed)
+ Length of subroutine name section (1 doubleword fixed)
+ Length of standard DEB extents (2 doublewords * number of extents)
+ Length of OSAM extent data (2 doublewords * number of extents)
+ Length of sector table (1 doubleword fixed + [number of blocks per track / 8]
  (round up decimals) doublewords)
```

   b. The maximum number of extents is the number that gives the largest size of DEB within 255 doublewords.

   For example:

   - For the minimum-sized sector table (7 blocks per track), the number of extents is 60.
   - For the maximum-sized sector table (255 blocks per track), the number of extents is 52.

To check whether there is an RPS, UCBSCAN is used and UCB is referred to.

For more information about OSAM, see *IMS Database Administration*.

When the secondary allocation size is zero, the number of available extents for the data set (AEXT) is calculated as follows:

- VSAM data set: AEXT is equivalent to the number of candidate volumes because one extension is allowed for each volume.
- Non-VSAM data set: AEXT is always zero.

The Space Monitor utility monitors whether the last extent has been reached. This is determined in the same way as the available extents. When the remaining extent becomes zero, the last extent has been reached.

For how to specify whether to monitor the available extents and the last extent, see "Control member data set (SPMNMBR)" on page 498.

Examples

The following examples show how to calculate the number of allocatable extents from the number of extents currently allocated. Allocatable extents means the space that can be allocated under the current status of allocation. In these examples, IMS 14 and no rotational position sensing (RPS) device is assumed.

The values A and B that are used in the following examples are calculated by using the formulae shown in Figure 246 on page 535.

Example 1

Assume that the data set type is VSAM and the number of usable volumes is 2.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Total number of extents currently allocated for the data set
123	100	223

The allocatable extents for the data set are 246 because the value of A ((123 - 100) + 223 = 246) is smaller than the value of B (251).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Total number of allocatable extents for the data set
123	123	246

Example 2

Assume that the data set type is VSAM and the number of usable volumes is 3.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Number of extents allocated on volume 3	Total number of extents currently allocated for the data set
123	100	0	223

The allocatable extents for the data set are 251 because the value of A (123 x 1 + (123 - 100) +223=369) is greater than the value of B (251).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Number of allocatable extents on volume 3	Total number of allocatable extents for the data set
123	123	5	251

Example 3

Assume that the data set type is OSAM and the number of usable volumes is 3.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Number of extents allocated on volume 3	Total number of extents currently allocated for the data set
16	16	10	42

The allocatable extents for the data set are 48 because the value of A ((16 - 10) + 42 = 48) is smaller than the value of B (120).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Number of allocatable extents on volume 3	Total number of allocatable extents for the data set
16	16	16	48

Example 4

Assume that the data set type is OSAM and the number of usable volumes is 4.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Number of extents allocated on volume 3	Number of extents allocated on volume 4	Total number of extents currently allocated for the data set
16	16	10	0	42

The allocatable extents for the data set are 64 because the value of A (16 x 1 + (16 - 10) + 42 = 64) is smaller than the value of B (120).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Number of allocatable extents on volume 3	Number of allocatable extents on volume 4	Total number of allocatable extents for the data set
16	16	16	14	64

Example 5

Assume that the data set type is OSAM and the number of usable volumes is 4.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Number of extents allocated on volume 3	Number of extents allocated on volume 4	Total number of extents currently allocated for the data set
1	1	1	0	3

In this case, one extent is allocated on volumes 1 through 3 and no free space exists on volumes 1 and 2. The allocatable extents for the data set are 34 because the value of A (16 x 1 + (16 - 1) + 3 = 34) is smaller than the value of B (120).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Number of allocatable extents on volume 3	Number of allocatable extents on volume 4	Total number of allocatable extents for the data set
1	1	16	16	34

Example 6

Assume that the data set type is OSAM and the number of usable volumes is 4.

The following table shows the number of extents that are currently allocated on each volume for the data set:

Number of extents allocated on volume 1	Number of extents allocated on volume 2	Number of extents allocated on volume 3	Number of extents allocated on volume 4	Total number of extents currently allocated for the data set
1	1	1 [EOF]	1*	4

In this case, OSAM Preallocated function allocated volumes 1 through 4, but data exists only on volumes 1 through 3. Volume 4 (marked *) is empty. No more extent is allocated on volume 3. The allocatable extents for the data set are 19 because the value of A ((16 - 1) + 4 = 19) is smaller than the value of B (120).

The following table shows the number of allocatable extents calculated by Space Monitor:

Number of allocatable extents on volume 1	Number of allocatable extents on volume 2	Number of allocatable extents on volume 3	Number of allocatable extents on volume 4	Total number of allocatable extents for the data set
1	1	1	16	19

Last space

Whether there is enough space for extension on a volume is determined as follows:

- When there is contiguous free space that is larger than the size of extension on the volume, it is determined as there is enough space.

  The size of the extension is as follows:

  – For OSAM, the secondary amount.

  – For VSAM, the primary amount if it is the first extent on the volume, the secondary amount if it is the second or after.

- The volumes searched are as follows:

  – For VSAM, the last volume with extents and candidate volumes are searched.

  – For OSAM, the last volume with extents and the first candidate volume are searched.

  – For VSAM and OSAM undefined volumes (that is, candidate volumes are searched by IDCAMS but no volume has been selected by SMS and so is marked as * on the catalog), a warning message is written in a report.

- Consideration for data sets on Extended Address Volumes (EAVs):

  When Space Monitor calculates whether free space on the volume is enough for the next extension, Space Monitor does not use an actual BPV (breakpoint value) defined in z/OS or DFSMS. Space Monitor assumes the BPV as 10 and calculates the free space as follows:

  – If the data set is not eligible to have extents in the Extended Addressing Space (EAS) or if the data set secondary allocation requested is less than 10 cylinders, Space Monitor assumes that the next extension size is the same as the requested size.

  – If the data set secondary allocation request is greater than or equal to 10, Space Monitor assumes that the next extension size is rounded up to the nearest increment of 21 cylinders.

  The default BPV is 10 cylinders, which means that Space Monitor always treats BPV as the default value.

  When Space Monitor calculates whether free space on the volume has enough space for the next extension, Space Monitor does not assume that the next extension will be allocated on the track-managed space or cylinder-managed space. Space Monitor determines if the largest continuous free space has enough space to store the next extension regardless of whether the free space is in the track-managed space or cylinder-managed space.

  For details of EAV, BPV, track-managed space, and cylinder-managed space, see *z/OS DFSMS Using Data Sets*.

Chapter 28. Space Monitor Site Default Generation utility

The Space Monitor Site Default Generation utility (SPMN Site Default Generation utility) enables you to use your own default value for the Space Monitor control statements. It runs as a batch job.

The following topics describe how to generate and use the site default table of Space Monitor, which is referred to as *SPMN site default table*.

Topics:

- "Functions" on page 541
- "Setting site default values for Space Monitor" on page 541
- "FABKTGEN JCL" on page 544
- "FABKTGEN SPMNIN data set" on page 545
- "FABKTGEN FABKCTL data set" on page 547

Functions

The SPMN Site Default Generation utility has two functions; generating and reporting the SPMN site default table.

Generating the SPMN site default table

The SPMN Site Default Generation utility analyzes the Space Monitor control statements and generates a source code for the SPMN site default table. You can create a site default table by assembling and link-editing the source code. For an instruction to create and use a site default table, see "Setting site default values for Space Monitor" on page 541.

The SPMN site default table is also effective when Space Monitor is called by the SPMNIN DD statement in HD Pointer Checker FABPMAIN JCL or in IMS HP Image Copy FABJMAIN JCL.

Reporting the SPMN site default table

The SPMN Site Default Generation utility reads the SPMN site default table and prints the site default values that are set in the reports.

Setting site default values for Space Monitor

To set site default values for Space Monitor, you run the SPMN Site Default Generation utility (FABKTGEN).

About this task

The following figure shows the process flow of how to use the SPMN site default table.

© Copyright IBM Corp. 2000, 2021

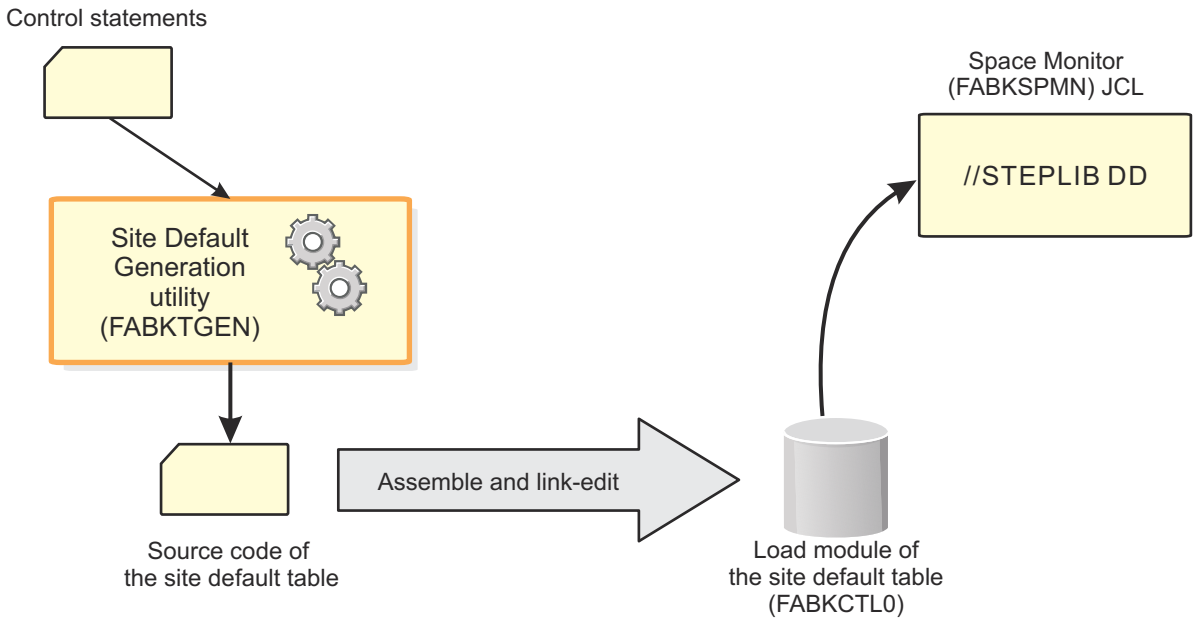


Figure 247. Process flow of SPMN site default table creation

Procedure

1. Prepare JCL for the Space Monitor Site Default Generation utility (FABKTGEN).

   Sample JCL (Figure 248 on page 543) that runs the FABKTGEN program is provided in the SHPSSAMP data set that is provided by the product. The member name is FABKDFL1. Use the sample or prepare similar JCL of your own.

   For FABKTGEN JCL requirements, see "FABKTGEN JCL" on page 544.
2. In the SPMNIN data set or the FABKCTL data set, code the control statements for which you want to change its default value.

   For a list of control statements that you can specify for the Site Default Generation utility, see "FABKTGEN SPMNIN data set" on page 545 or "FABKTGEN FABKCTL data set" on page 547.
3. Run the Space Monitor Site Default Generation utility to create a source code of the SPMN site default table (FABKCTL0).

   The FABKDFL1 sample JCL creates a source code and then assembles and link-edits the source code. Therefore, if you use FABKDFL1, you can omit Step "4" on page 542.
4. Assemble and link edit the FABKCTL0 source code.

   To create the site default table module FABKCTL0, assemble and link-edit the SYSPUNCH that is generated by FABKTGEN.

   For SYSIN of the assemble job step, specify the SYSPUNCH data set that is generated in the FABKTGEN. In the link-edit job step, it is recommended that you use AMODE=31, RMODE=ANY instead of the default values AMODE=24, RMODE=24 by adding MODE=31 and RMDE=ANY to the EXEC statement PARM list.
5. Concatenate the library for the SPMN site default table module (FABKCTL0) to the STEPLIB DD of FABKSPMN runtime JCL.

   When Space Monitor finds a load module with the name FABKCTL0 in the STEPLIB libraries, Space Monitor loads it and uses the values in the FABKCTL0 as defaults of the control statements.

   If you specify a value in the control statement in the SPMNMBR data set, the SPMNIN data set, or the FABKCTL data set in the FABKSPMN JCL, you can override the site default value at run time.

   The SPMN site default table is also effective when Space Monitor is called by the SPMNIN DD statement in HD Pointer Checker FABPMAIN JCL or in IMS HP Image Copy FABJMAIN JCL.

Example

The following figure shows the contents of FABKDFL1 for creating the FABKCTL0 source code and assembling and link-editing the source code.

```
//FABKDFL1 JOB
//*********************************************************************
//*   Licensed Materials - Property of IBM                            *
//*                                                                   *
//*   5655-U09                                                        *
//*                                                                   *
//*   Copyright IBM Corp. 2008 All Rights Reserved.                   *
//*                                                                   *
//*   US Government Users Restricted Rights - Use,                    *
//*   duplication or disclosure restricted by GSA ADP                 *
//*   Schedule Contract with IBM Corp.                                *
//*                                                                   *
//*********************************************************************
//* FABKDFL1:                                                         *
//*   Space Monitor Site Default Generation Utility Sample JCL        *
//*   (PARM='GEN')                                                    *
//*                                                                   *
//*   This is a Sample JCL for running Site Default Utility.          *
//*   It generates the site default table module Space Monitor.       *
//*                                                                   *
//*   This JCL consists of the following steps:                       *
//*     1) Generate the site default table source code                *
//*     2) Assemble the site default table                            *
//*     3) Link-Edit the site default table module                    *
//*********************************************************************
//*
//*********************************************************************
//*  FABKTGEN - SPMN SITE DEFAULT GENARATION UTILITY
//*  ( PARM='GEN' SAMPLE PROCEDURE )
//*********************************************************************
//SPMNTGEN PROC HLQ='HPS'
//*--------------------------------------------------------------------
//*  CREATE SOURCE CODE OF SITE DEFAULT TABLE
//*--------------------------------------------------------------------
//G        EXEC PGM=FABKTGEN,PARM='GEN'
//STEPLIB  DD   DISP=SHR,DSN=&HLQ..SHPSLMD0
//SYSPUNCH DD   DISP=(NEW,PASS,DELETE),DSN=&&SOURCE,
//            DCB=(RECFM=FB,BLKSIZE=800),SPACE=(TRK,(1,1)),UNIT=SYSDA
//SYSPRINT DD   SYSOUT=*
//SYSUDUMP DD   DUMMY
```

Figure 248. Example JCL for creating FABKCTL0 (FABKDFL1) (Part 1 of 2)

```
//*-------------------------------------------------------------------
//*  ASSEMBLE & LINK ==> SITE DEFAULT TABLE MODULE (FABKCTL0)
//*-------------------------------------------------------------------
//ASM      EXEC PGM=ASMA90,COND=(4,LT,G),
//             PARM='OBJECT,NODECK,LIST,XREF(SHORT)'
//SYSLIN   DD   DISP=(,PASS),UNIT=SYSDA,SPACE=(CYL,(5,5,0)),
//             DCB=(BLKSIZE=400),DSN=&&OBJECT
//SYSUT1   DD   DISP=(,DELETE),UNIT=SYSDA,SPACE=(CYL,(10,5))
//SYSPUNCH DD   DUMMY
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   DISP=(OLD,DELETE,DELETE),DSN=&&SOURCE
//*
//L        EXEC PGM=IEWL,COND=(4,LT,ASM),REGION=4096K,
//             PARM='LIST,REFR,REUS,AMODE=31,RMODE=ANY'
//SYSPRINT DD   SYSOUT=*
//SYSLIN   DD   DISP=(OLD,DELETE,DELETE),DSN=&OBJECT
//*
//         PEND
//*
//*-------------------------------------------------------------------*
//*  FABKTGEN (PARM='GEN') - SPMN SITE DEFAULT GENARATION UTILITY     *
//*-------------------------------------------------------------------*
//GO       EXEC SPMNTGEN,HLQ=HPS
//*-------------------------------------*
//* SPECIFY SITE DEFAULT VALUES         *
//*-------------------------------------*
//G.SPMNIN DD  *
%USER    user001 user002 user003 user004 user005 user006 user007
dbname   ddname   dsname                                    aabbb cc
-        pp q rrr s ttt uuu vvv www xxxx
/*
//L.SYSLMOD DD  DISP=SHR,DSN=HPS.TABLELIB(FABKCTL0)
//*
//
```

Figure 249. Example JCL for creating FABKCTL0 (FABKDFL1) (Part 2 of 2)

FABKTGEN JCL

To run the SPMN Site Default Generation utility (FABKTGEN), supply an EXEC statement with the PARM parameters and appropriate DD statements.

The following table summarizes the DD statements for FABKTGEN.

Table 75. FABKTGEN DD statements

DDNAME	Use	Format	When EXEC PARM='GEN'	When EXEC PARM='REPORT'
STEPLIB	Input	PDS	Required	Required
SPMNIN or FABKCTL	Input	LRECL=80	Required	-
SYSPUNCH	Output	LRECL=80	Required	-
SYSPRINT	Output	LRECL=133	Required	Required
SYSABEND or SYSUDUMP	Output	LRECL=133	Optional	Optional

EXEC

This statement must be in the following format:

```
//     EXEC PGM=FABKTGEN,PARM='parm'
```

Specify GEN or REPORT for *parm*:

GEN

Specifies to generate a site default table. This value is the default.

REPORT
Specifies to print the site default values stored in the site default table.

Sample JCL that run the FABKTGEN program with PARM='GEN' and PARM='REPORT' are provided in the SHPSSAMP data set that is provided by the product. The member names are FABKDFL1 and FABKDFL2.

STEPLIB DD
This required input data set contains the IMS HP Pointer Checker load module library. When PARM='REPORT' is specified in the EXEC statement, you must specify the data set that includes the site default table module member (FABKCTL0).

SPMNIN DD
FABKCTL DD
One of these DD statements is required when PARM='GEN' is specified in the EXEC statement. Specify this input data set to include your own default values for the control statements.

The format of SPMNIN is the same as the SPMNIN control statement for FABKSPMN, and the format of FABKCTL is the same as the FABKCTL control statement for FABKSPMN.

SYSPUNCH DD
This DD is a required output data set when PARM='GEN' is specified in the EXEC statement. An assembler source code of the site default table will be produced in this data set. The following DCB parameters must be specified:

RECFM=F or FB
LRECL=80
BLKSIZE=80 or multiple of 80

SYSPRINT DD
This DD is a required output data set. The Space Monitor Messages report will be printed in this data set. You can specify SYSOUT=* (or JES output class name) instead of a data set name.

When FABKTGEN generates the SPMN site default table, the Space Monitor Messages report contains the control statements that you specified in the FABKCTL or SPMNIN data set. When FABKTGEN reports site default values, the Space Monitor Messages report contains the site default values that are stored in the SPMN site default table.

SYSUDUMP DD (or SYSABEND)
This DD defines the output for a system ABEND dump routine. Use this DD statement only when you want to create a dump.

FABKTGEN SPMNIN data set

Use this reference topic to set default values for the SPMNIN control statements.

You can specify the TOSI control statement, USER control statements, the data set control statements, or all the control statements in the SPMNIN data set. Specify your own value to the column that you want to change the default values from the Space Monitor's system default value. The SPMN Site Default Generation utility analyzes the control statements, and stores the site default values in the SPMN site default table (FABKCTL0).

For a description of each statement, see “Control member data set (SPMNMBR)” on page 498.

Subsections:

- “TOSI control statement” on page 546
- “USER control statement” on page 546
- “Data set control statements” on page 546
- “Example” on page 547

TOSI control statement

You can specify the XCF group name that is used by IMS Tools Online System Interface, and whether to monitor the latest VSAM statistics about IMS online full-function database data sets by using IMS Tools Online System Interface. If you specify this control statement, code the control statement before the data set statements.

USER control statement

You can specify up to 20 user IDs. If you specify this control statement, code it before the data set statements.

Data set control statements

You can specify the first statement, or a set of the first and the second statements.

The positions where you can specify your own default value for the site default are described in the following tables. Specify your own default value in each position marked 'Yes.' If values are omitted, the Space Monitor system default values will be used.

Table 76. Positions available for site default in the first statement (SPMNIN site default table)

Position	System default value of Space Monitor	Can specify site default value?	Description
1 - 8	(None)	No (Ignored if specified)	DBD name
10 - 17	(None)	No (Ignored if specified)	DD name
19 - 62	(None)	No (Ignored if specified)	Data set name
64 - 65	10	Yes	Warning threshold value for the number of data set extents
66 - 68	10	Yes	Warning threshold value for the percentage of data set free space
70 - 71	14	Yes	Warning threshold value for the number of days without an HD Pointer Checker run

Table 77. Positions available for site default in the second statement (SPMNIN site default table)

Position	System default value of Space Monitor	Can specify site default value?	Description
01	-	-	"-" (Indicates that it is the second statement. It is required.)
10 - 11	10	Yes	The warning threshold value for the number of available extents
13	Y	Yes	Whether to monitor the data set that uses the last extent
15 - 17	90	Yes	The warning threshold value for the percentage of space used
19	Y	Yes	Whether to monitor if there is enough space left on the DASD volume for the data set to extend

Table 77. Positions available for site default in the second statement (SPMNIN site default table) (continued)

Position	System default value of Space Monitor	Can specify site default value?	Description
21 - 23	50	Yes	The warning threshold value for the percentage of CA splits
25 - 27	50	Yes	The warning threshold value for the percentage of CI splits
29 - 31	***	Yes	The warning threshold value for the number of days that can pass without a database reorganization
33 - 35	90	Yes	The warning threshold value for the percentage of data set that is used within the maximum size limit of the database data set
37 - 40	****	Yes	The warning threshold value for the data set size
41	M	Yes	The unit (M, G, or T) of the data set size • M for MB (1 MB is 1,024 KB = 1,048,576 byte) • G for GB (1 GB is 1,024 MB) • T for TB (1 TB is 1,024 GB)

Example

The part underlined in the following figure shows the effective statements and columns for the site default. For the blank column, the Space Monitor system default value will be used.

```
.........1.........2.........3.........4.........5.........6.........7.........8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

%TOSI    TOIIMSA  Y
%USER    USER001
DB000001 DS000001                                              12080 10
-        01 N 080 Y ___ ___ ___ 080 1000
```

Figure 250. Example of the specification for the site default

FABKTGEN FABKCTL data set

Use this reference topic to set default values for the FABKCTL control statements.

Specify your own parameter for the keywords that you want to change the default values from the Space Monitor's system default value.

You can specify the PROC and OPTION statements, and all their keywords except IMSID. If a DATABASE statement is specified, it is ignored.

If you specify multiple OPTION statements, only the first OPTION statement is used. All subsequent OPTION statements are ignored.

The SPMN Site Default Generation utility analyzes the control statements and stores the site default values in the SPMN site default table (FABKCTL0).

The following example shows the FABKCTL data set for the FABKTGEN program:

```
//FABKCTL DD *
   PROC USER=USER001
   OPTION THRESHOLDS=(EXTENTS=14,DSSIZE%=98)
/*
```

The formats of the statements are the same as the formats used for the FABKSPMN program. For a description of each statement, see “FABKCTL data set” on page 506.

Part 6. DB Segment Restructure utility

The DB Segment Restructure utility provides the capability to add, drop, and otherwise manipulate database segments.

Use the following topics to learn about and use the DB Segment Restructure utility.

Topics:

- Chapter 29, “Overview of DB Segment Restructure,” on page 551
- Chapter 30, “Using DB Segment Restructure,” on page 553
- Chapter 31, “JCL examples for DB Segment Restructure,” on page 569
- Chapter 32, “User exit routines,” on page 585
- Chapter 33, “Conversion to DEDB,” on page 591

© Copyright IBM Corp. 2000, 2021

Chapter 29. Overview of DB Segment Restructure

You can use the DB Segment Restructure utility to change the format of a segment data within any existing full-function database including HALDB. Its main function is to modify databases in ways that exceed the capabilities of the standard IMS utilities.

The DB Segment Restructure utility restructures databases by unloading and then reloading them. The DB Segment Restructure utility can also convert databases between various database organizations.

Topics:

- "Program functions" on page 551
- "Program structure" on page 551
- "Data flow" on page 552

Program functions

The DB Segment Restructure utility provides the functions to change the format of segment data within any existing full-function database and to restructure or convert databases.

The DB Segment Restructure utility performs the following tasks:

- Initializes fields with specific values
- Moves data to different positions in a segment
- Combines segments
- Splits segments

  Note: To split segments, user exit routines can also be used. For more information, see Chapter 32, "User exit routines," on page 585.
- Deletes segments
- Creates a test database using part of a larger database
- Changes database hierarchy
- Converts an HDAM database to HIDAM
- Converts HIDAM and HISAM databases to HDAM
- Converts an HSAM database to HISAM
- Converts HDAM, HIDAM, and HISAM databases to DEDB

Program structure

DB Segment Restructure is made up of two IMS application programs.

FABRUNLD program
FABRUNLD is the unload program. It creates a sequential data set to hold all or part of one or more IMS databases that you specify in either of the following two types of record formats:

- HD unload record format (same as the one used in the IMS HD Reorganization Unload utility)
- DB Segment Restructure unique unload record format

FABRRELD program
FABRRELD is the reload program. It creates new IMS databases from the sequential data set that FABRUNLD created. FABRRELD can reload databases from the input data set created either in the HD unload record format or in the DB Segment Restructure unique unload record format.

Both programs are invoked in AMODE=31 via the DLIBATCH procedure supplied by IMS. For more information about the DLIBATCH procedure, see *IMS System Definition*.

© Copyright IBM Corp. 2000, 2021

However, FABRRELD must be run under the IMS BMP region when it reloads the databases to DEDB. (See Chapter 33, “Conversion to DEDB,” on page 591.)

Database changes are defined with standard control statements. Changes that cannot be made with control statements can sometimes be made with a user exit routine. (One example would be when you want to make changes that are a function of the segment data itself.)

Data flow

The following figure shows the data flow for the DB Segment Restructure programs.

In addition to supplying input through your requested SYSIN data sets, you will also use PSBs and DBDs to control the operation of FABRUNLD and FABRRELD.

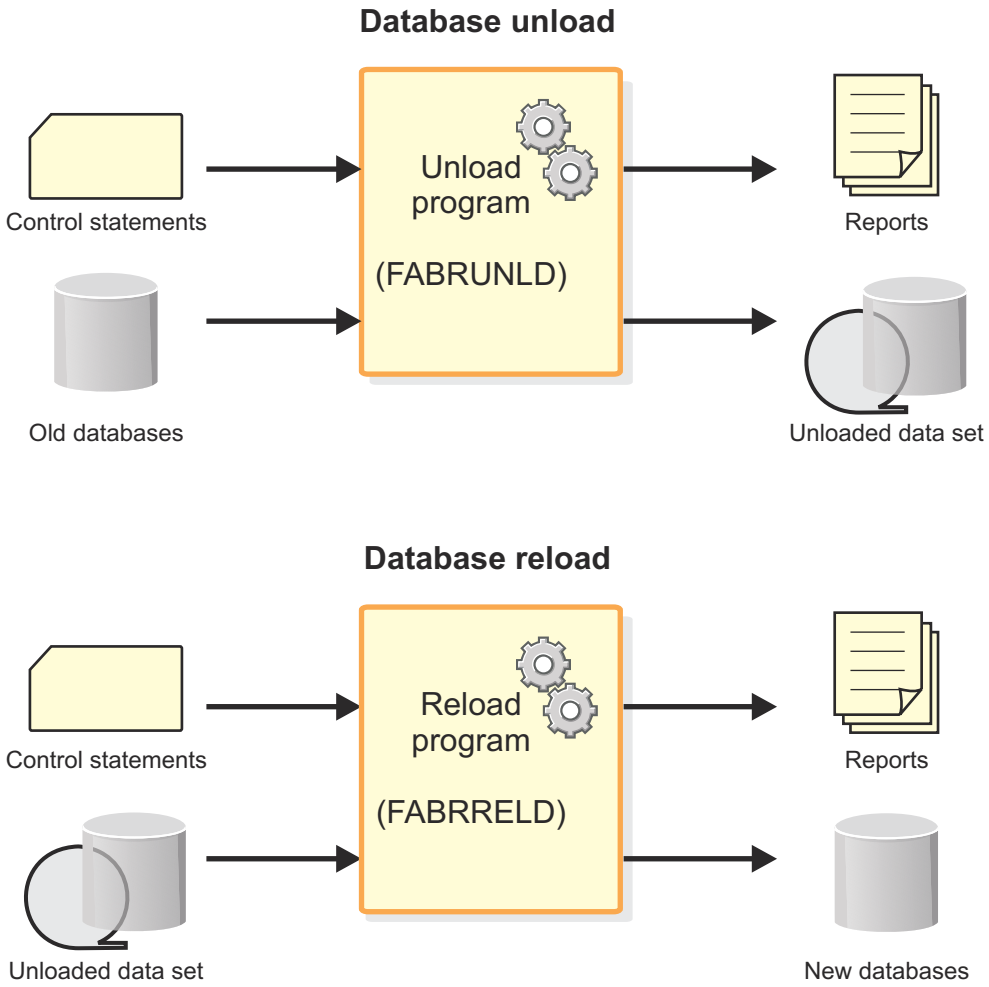


Figure 251. Data flow for DB Segment Restructure

Chapter 30. Using DB Segment Restructure

In order to use DB Segment Restructure, you must also use IMS utilities or functionally equivalent utilities such as IMS Tools products that are included in IMS Database Solution Pack.

For the job steps and job control language (JCL) for converting databases to DEDB, refer to Chapter 33, "Conversion to DEDB," on page 591.

The following topics describe how to use the two DB Segment Restructure programs.

Topics:

- "Restrictions and considerations" on page 553
- "Planning for DB Segment Restructure" on page 555
- "Running the DB Segment Restructure programs" on page 558
- "Job control language" on page 558
- "Input" on page 562
- "Output" on page 566

Restrictions and considerations

Certain restrictions and considerations apply when you use DB Segment Restructure.

Restrictions

The following restrictions apply to DB Segment Restructure.

- DB Segment Restructure is an initial load program. Under some conditions, it can also be used as a database update program. However, DB Segment Restructure is *not* a general-purpose reorganization program.

  The data set, which FABRUNLD has unloaded without specifying the HD record format option, cannot be used for the input data set to the IMS HD Reorganization Reload utility (DFSURGL0).
- Logical relationships require special handling.

  For the IMS Database Prefix Update utility (DFSURGP0) to work correctly in restructuring a database with logical relationships:

  – DB Segment Restructure *must* be run as an initial load program.

  – *All* logically related databases must be processed.

  All logical pointers are maintained by IMS in behalf of DB Segment Restructure, in the manner which is functionally equivalent to the maintenance performed during the IMS HD Reorganization Reload utility (DFSURGL0).
- When converting an HDAM, HIDAM, or HISAM database to DEDB, the DB Segment Restructure reload program FABRRELD must be run under IMS BMP region. (See Chapter 33, "Conversion to DEDB," on page 591.)
- When converting an HDAM, HIDAM, or HISAM database to DEDB, all the segment in the database must be variable-length. (See Chapter 33, "Conversion to DEDB," on page 591.)
- A DB Segment Restructure user exit routine is invoked in AMODE=31. (See Chapter 32, "User exit routines," on page 585.)
- FABRRELD does not support the Data Capture exit routine when reloading a DL/I database. That is, any Data Capture exit routine which is defined to any segment of the DL/I database to be reloaded is not called during the run of FABRRELD.

© Copyright IBM Corp. 2000, 2021

FABRRELD supports the Data Capture exit routine when reloading a DEDB database. That is, FABRRELD runs as a pure BMP region application program, and any Data Capture exit routine which is defined to any segment of the DEDB database is called under the control of the IMS Database Manager.

- DB Segment Restructure supports only HALDBs without logical relationships. A HALDB indexed by Partitioned Secondary Indexes (PSINDEX) is supported as long as it has no logical relationships.
- DB Segment Restructure unloads and reloads the entire HALDB database at once. Partition processing is not supported.
- You must use the DB Segment Restructure unique (DBSR-unique) unload record format to process HALDBs. The HD unloaded data set format is not supported.
- Migration unload and fallback unload for a HALDB is not supported.
- DB Segment Restructure does not support IMS catalog databases.

Considerations for HALDB Online Reorganization

The following DB Segment Restructure considerations apply in regard to HALDB Online Reorganization.

- If HALDB Online Reorganization (OLR) is not completed for the specified partition, DB Segment Restructure abnormally terminates due to the IMS batch region user abend 3303.
- For a HALDB partition that is OLR capable, when FABRRELD runs as an initial load program (by using the PSB that contains PROCOPT=L or PROCOPT=LS on the PCB statement), it always loads the (A-J&X) side. When FABRRELD runs as an update program (by using the PSB that contains PROCOPT=A on the PCB statement), the update is on the active data sets, either (A-J&X) or (M-V&Y).

Considerations for data set compatibility among related utilities

DB Segment Restructure provides the following compatibilities for the unloaded data set with the related utilities.

- With the HD unload record format option specified, the DB Segment Restructure unload program (FABRUNLD) can unload the sequential database data set that will be reloaded by:
  - The DB Segment Restructure reload program (FABRRELD)
  - The IMS HD Reorganization Reload utility, or a functionally equivalent utility such as IMS High Performance Load
- The DB Segment Restructure reload program (FABRRELD) reloads the sequential database data set that was unloaded by:
  - The DB Segment Restructure unload program (FABRUNLD)
  - The IMS HD Reorganization Unload utility, or a functionally equivalent utility such as IMS High Performance Unload
- Physical Sequence Sort for Reload (PSSR) of IMS High Performance Load for z/OS sorts the sequential database data set that is unloaded by DB Segment Restructure with the HD unload record format option specified.
- The DB Segment Restructure programs (FABRUNLD and FABRRELD) do not support the PHD unloaded record format that is used for the unloaded data set to be reloaded into a HALDB. For HALDBs, use the DB Segment Restructure unique unload record format, and reload the data set by FABRRELD.

Note: For the specifications of the HD record format option, see “FABRUNLD SYSIN data set” on page 562.

The following figure shows the relations among the utilities:

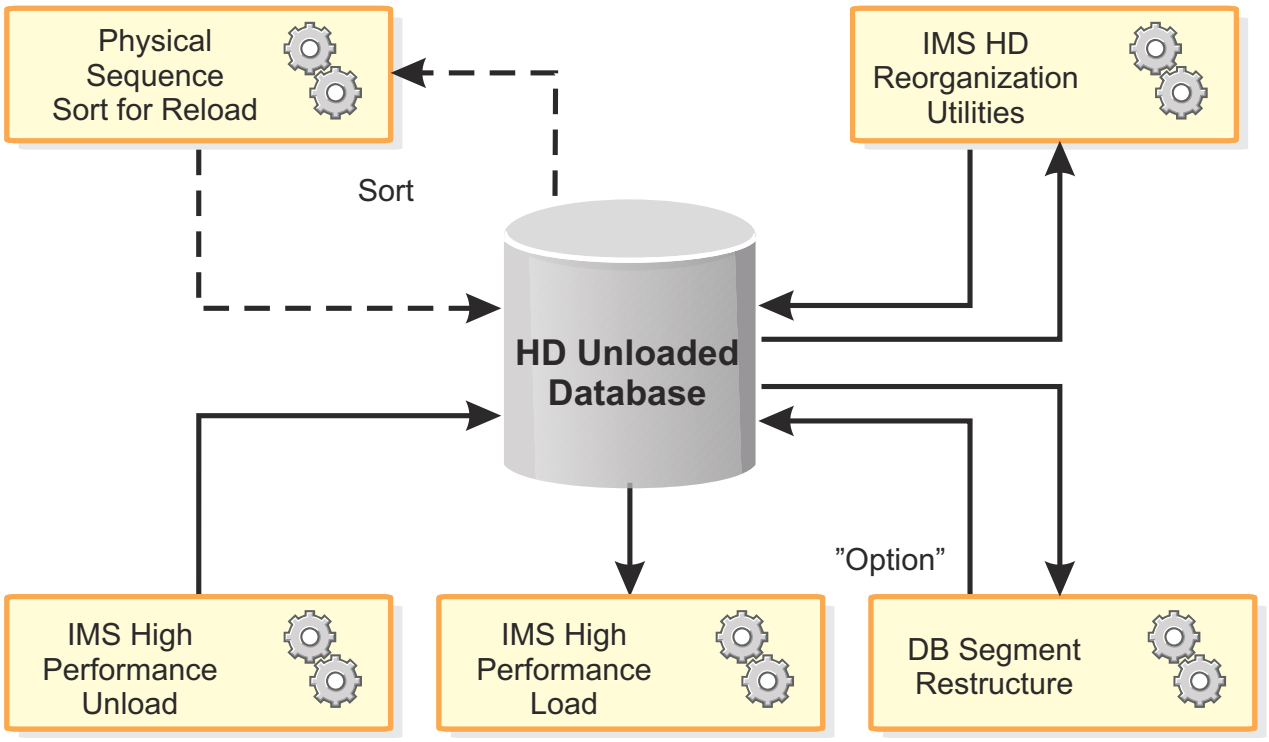


Figure 252. Compatibility of data sets

Related reference

Unloaded database

This sequential data set contains the IMS database that was unloaded by FABRUNLD. FABRRELD uses the data set as input.

Planning for DB Segment Restructure

To restructure databases, you must run the DB Segment Restructure programs and several IMS utilities or functionally equivalent utilities such as IMS Tools products that are included in IMS Database Solution Pack.

About this task

The following topics introduce typical job steps for restructuring databases with the DB Segment Restructure utility.

Preparing steps for DB Segment Restructure (non-HALDBs)

The following procedure includes the job steps that are required to use DB Segment Restructure for a non-HALDB.

About this task

The steps in a DB Segment Restructure job stream vary, depending on the changes that you are making, and on the logical relationships involved. A typical job stream contains some or all of these steps. The steps can be run in a single job or in several jobs. Review these steps, and determine which job steps and utilities to use.

Related reading:

- Chapter 31, “JCL examples for DB Segment Restructure,” on page 569 contains the job steps required for several typical changes.
- See also “Considerations for data set compatibility among related utilities” on page 554.

- For information about typical procedures for restructuring databases, also see *IMS Database Administration*.

For instructions to use the IMS utilities and the tools of IMS Database Solution Pack, see the following information:

- *IMS Database Utilities*
- *IMS High Performance Image Copy User's Guide*
- *IMS High Performance Prefix Resolution User's Guide*
- *IMS Index Builder User's Guide*

Procedure

1. Create a copy of each old database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. If a problem occurs during the DB Segment Restructure process, you will have a *backup* database copy.
2. Run the DB Segment Restructure unload program (FABRUNLD).

   This program creates a sequential data set that contains the old unloaded databases. Always include this step.
3. Optional: Run the IMS Database Prereorganization utility (DFSURPR0).

   This utility creates the DFSURCDS control data set for use by other logical relationship resolution utilities. It also shows any databases that the IMS Database Scan utility will scan during a normal database reorganization.

   Consideration: Do not run the IMS Database Scan utility (DFSURGS0) in a DB Segment Restructure job. If DFSURPR0 shows databases that should be scanned, unload and reload those databases with the DB Segment Restructure programs. Databases that have logical relationships with the databases that FABRRELD is reloading must be reloaded with FABRRELD, too. (See "Restrictions and considerations" on page 553.)
4. Optional: Run the DBDGEN procedure.

   This IMS procedure creates the DBDs (database descriptions) for newly restructured databases.
5. Delete and then define the database data sets.

   Perform this step to delete the old database data sets and allocate new database data sets. Always include this step.
6. Run the DB Segment Restructure reload program (FABRRELD).

   This program creates new restructured databases. Always include this step.
7. Optional: Run the prefix resolution and update utility.

   Perform this step to resolve logical relationships that are defined for the databases. For this step, you can use the IMS Database Prefix Resolution utility (DFSURG10) and the IMS Database Prefix Update utility (DFSURGP0), or IMS HP Prefix Resolution.

   If only secondary index relationships are defined for the databases, you only have to run the IMS Database Prefix Resolution utility (DFSURG10) or IMS HP Prefix Resolution to produce the information that is used as an input in the next step to create the secondary index databases.
8. Optional: Create secondary index databases.

   For this step, you can use the IMS HISAM Reorganization Unload utility (DFSURUL0) and the IMS HISAM Reorganization Reload utility (DFSURRL0), or IMS Index Builder.

9. Create a copy of each new database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. This is the first backup of the new databases.

Preparing steps for DB Segment Restructure (HALDBs)

The following procedure includes the job steps that are required to use DB Segment Restructure for a HALDB.

About this task

The steps in a DB Segment Restructure job stream vary, depending on the changes that you are making. A typical job stream contains some or all of these steps. The steps can be run in a single job or in several jobs. Review these steps, and determine which job steps and utilities to use.

Related reading:

- Chapter 31, "JCL examples for DB Segment Restructure," on page 569 contains the job steps required for several typical changes.
- See also "Considerations for data set compatibility among related utilities" on page 554.
- For information about typical procedures for restructuring databases, also see *IMS Database Administration*.

For instructions to use the IMS utilities and the tools of IMS Database Solution Pack, see the following information:

- *IMS Database Utilities*
- *IMS High Performance Image Copy User's Guide*

Note: The IMS Prefix Resolution utility, the IMS Prefix Update utility, the IMS HISAM Reorganization Unload utility, and the IMS HISAM Reorganization Reload utility are not used for HALDBs.

Procedure

1. Create a copy of each old database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. If a problem occurs during the DB Segment Restructure process, you will have a *backup* database copy.
2. Run the DB Segment Restructure unload program (FABRUNLD).

   This program creates a sequential data set that contains the old unloaded databases. Always include this step.

   For the unloaded data set, specify the DB Segment Restructure unique unload record format.
3. Optional: Run the DBDGEN procedure.

   This IMS procedure creates the DBDs (database descriptions) for newly restructured databases.
4. Optional: Run the Partition Definition Utility.

The IMS ISPF-base utility defines partition definitions, if any partition definition change is needed.

5. Delete and then define the database data sets.

   Perform this step to delete the old database data sets and allocate new database data sets.

   If the partitioned secondary indexes point to the new databases, also delete the old indexes and allocate the new PSINDEXes.

6. Run the IMS Database Prereorganization utility (DFSURPR0).

   This utility performs required partition initialization for the newly defined partition definitions.

7. Run the DB Segment Restructure reload program (FABRRELD).

   This program creates new restructured databases. Always include this step.

   If secondary indexes point to the new restructured databases, they are also created in this step.

8. Create a copy of each new database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. This is the first backup of the new databases.

Running the DB Segment Restructure programs

To restructure databases with DB Segment Restructure, complete the following steps.

Procedure

1. Select the appropriate IMS utilities or functionally equivalent utilities, such as IMS Tools products that are included in IMS Database Solution Pack, to run with DB Segment Restructure.

   See the following topics to determine the steps and utilities for database restructuring:

   - “Preparing steps for DB Segment Restructure (non-HALDBs)” on page 555
   - “Preparing steps for DB Segment Restructure (HALDBs)” on page 557

2. Code JCL for the utilities and for both DB Segment Restructure programs.

   See “Job control language” on page 558 for the JCL requirements of the two programs of DB Segment Restructure. JCL examples are provided in Chapter 31, “JCL examples for DB Segment Restructure,” on page 569.

3. Code the input data for the utilities and both DB Segment Restructure programs.

   See “Input” on page 562 to code input data sets for the two programs of DB Segment Restructure.

4. Run the DB Segment Restructure job.
5. Interpret the output reports to verify that the process completed successfully.

   See “Output” on page 566 to interpret the output from DB Segment Restructure.

Job control language

Use the following reference topics to prepare JCL for running FABRUNLD and FABRRELD.

Both DB Segment Restructure programs, FABRUNLD and FABRRELD, run in an offline DL/I batch processing region, using PSB and DBD libraries. Use the DLIBATCH cataloged procedure to run the programs.

For a description of the DLIBATCH procedure, see *IMS System Definition*.

FABRUNLD JCL

To run FABRUNLD, you must add some additional DD statements and run the DLIBATCH procedure.

The following table shows the FABRUNLD JCL requirements.

Table 78. DD statements for FABRUNLD JCL

DDNAME	Use	Format	Need
IEFRDER	Not used	DUMMY	Required
IEFRDER2	Not used	DUMMY	Required
SYSPRINT	Output	LRECL=133	Required
DFSVSAMP	Input		Required
SYSIN	Input	LRECL=80	Required
dataout	Output		Required
database	Input		Required
RECON*x*	Input/Output		Optional for non-HALDB Required for HALDB

EXEC

Code this statement as:

```
//     EXEC DLIBATCH,MBR=FABRUNLD,PSB=psbname,DBRC=dbrc,
//             IMSPLEX=imsplex,PARM1='DBRCGRP=dbrcgrp'
```

The PSB must have these characteristics:

- It is sensitive only to the segments to be unloaded.
- It contains PROCOPT=G on the PCB statement.
- It contains LANG=ASSEM, LANG=COBOL, or LANG=PL/I on the PSBGEN statement.

You can optionally turn off DBRC by specifying DBRC=N, if it is allowed by the installation standards, or if the database data set is not registered with DBRC.

DBRC=Y is required for HALDB unload.

If the IMSplex name and the DBRC group ID are set in the RECON data sets, you must supply the IMSplex name and the DBRC group ID by either of the following methods:

- Specify the IMSplex name and the DBRC group ID on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

IEFRDER DD

Code the primary system log data set as DUMMY.

IEFRDER2 DD

Code the secondary system log data set as DUMMY.

SYSPRINT DD

This output data set contains the reports produced by FABRUNLD. BLKSIZE, if coded on the DD statement, must be a multiple of 133.

DFSVSAMP DD

This input data set contains the buffer information that the DL/I buffer handler uses.

SYSIN DD

This input data set contains your description of the processing to be done by FABRUNLD. It describes the data to be unloaded. BLKSIZE, if coded on the DD statement, must be a multiple of 80.

***dataout* DD**
This output data set is a sequential data set containing an unloaded database. There is one of these DD statements for each database being unloaded. You can use any ddname for this data set.

DCB information, if coded on the DD statement, should include *both* LRECL and BLKSIZE. LRECL must be at least 16 bytes larger than the longest segment in your database if the HD unload format option is not specified. When the HD unload format option is specified, LRECL must be at least 39 bytes larger than the longest segment. BLKSIZE must be at least 4 bytes larger than LRECL.

FABRUNLD uses the following block size for this data set if block size is not specified on the dataout DD statement:

- For 3380, the default block size is 23 K.
- For 3390, the default block size is 28 K.
- For 9345, the default block size is 22 K.
- For all the other devices, the default is the maximum device capacity.

***database* DD**
This input data set is an IMS database data set. There is one of these DD statements for each database data set being unloaded. Use the ddname specified in the DBD.

RECON1 DD
Defines the first Database Recovery Control (DBRC) RECON data set.

RECON2 DD
Defines the second DBRC RECON data set.

RECON3 DD
Defines the optional DBRC RECON data set used when an error is encountered in RECON1 or RECON2. This RECON data set must be the same RECON data set as the control region is using.

Note: If you use dynamic allocation, do no use these RECON data set ddnames.

FABRRELD JCL

To run FABRRELD, you must provide some additional DD statements and run the DLIBATCH procedure. However, when FABRRELD reloads databases to DEDB, it must be run under BMP region.

The following table shows the FABRRELD JCL requirements.

Table 79. DD statements for FABRRELD JCL

DDNAME	Use	Format	Need
IEFRDER	Not used	DUMMY	Required
IEFRDER2	Not used	DUMMY	Required
SYSPRINT	Output	LRECL=133	Required
DFSVSAMP	Input		Required
SYSIN	Input	LRECL=80	Required
USEREXIT	Input		Optional
datain	Input		Required
database	Output		Required
RECON*x*	Input/Output		Optional for non-HALDB Required for HALDB

EXEC

To run FABRRELD via the DLIBATCH procedure, code this statement as:

```
//     EXEC DLIBATCH,MBR=FABRRELD,PSB=psbname,DBRC=dbrc,
//             IMSPLEX=imsplex,PARM1='DBRCGRP=dbrcgrp'
```

To reload databases to DEDB under BMP region, code this statement as:

```
//     EXEC IMSBATCH,MBR=FABRRELD,PSB=psbname
```

The PSB must have these characteristics:

- It contains PROCOPT=L or PROCOPT=LS (on the PCB statement) if you are using FABRRELD as an initial load program.
- It contains PROCOPT=A (on the PCB statement) if you are using FABRRELD as an update program.
- It contains LANG=ASSEM, LANG=COBOL, or LANG=PL/I on the PSBGEN statement.

You can optionally turn off DBRC by specifying DBRC=N, if it is allowed by the installation standards, or if the database data set is not registered with DBRC.

DBRC=Y is required for HALDB unload.

When you load a HALDB indexed by PSINDEXes, the index pointer segments related to the indexed segment are also loaded into the PSINDEXes at the same time even if you are using PROCOPT=L or LS for the load program run.

If you run FABRRELD through the DLIBATCH procedure and if the IMSplex name and the DBRC group ID are set in the RECON data sets, you must supply the IMSplex name and the DBRC group ID by either of the following methods:

- Specify the IMSplex name and the DBRC group ID on the EXEC statement.
- Specify the library that contains the DBRC SCI Registration exit routine in the STEPLIB DD statement.

IEFRDER DD

Code the primary system log data set as DUMMY. This DD statement is not necessary when reloading databases to DEDB.

IEFRDER2 DD

Code the secondary system log data set as DUMMY. This DD statement is not necessary when reloading databases to DEDB.

SYSPRINT DD

This output data set contains the reports produced by FABRRELD. BLKSIZE, if coded on the DD statement, must be a multiple of 133.

DFSVSAMP DD

This input data set contains the buffer information that the DL/I buffer handler uses. This DD statement is not necessary when reloading databases to DEDB.

SYSIN DD

This input data set contains your description of the processing to be done by FABRRELD. It describes the data to be reloaded. BLKSIZE, if coded on the DD statement, must be a multiple of 80.

USEREXIT DD

This input-partitioned data set contains the user exit routine load modules.

***datain* DD**

This input data set is a sequential data set containing an unloaded database. There is one of these DD statements for each database to be reloaded. You can use any ddname for this data set.

***database* DD**

This output data set is an IMS database data set. There is one of these DD statements for each database data set to be reloaded. Use the ddname specified in the DBD.

RECON1 DD
Defines the first Database Recovery Control (DBRC) RECON data set.

RECON2 DD
Defines the second DBRC RECON data set.

RECON3 DD
Defines the optional DBRC RECON data set used when an error is encountered in RECON1 or RECON2. This RECON data set must be the same RECON data set as the control region is using.

Note: If you use dynamic allocation, do no use these RECON data set ddnames.

Input

Both programs of DB Segment Restructure use a data set of control statements as input.

FABRUNLD SYSIN data set

A single FABRUNLD step can unload one or more databases. The FABRUNLD SYSIN data set specifies which databases are to be unloaded. It also specifies the subset to be extracted from each database.

You can specify either of the following record formats for unloaded databases:

- HD unload record format (same as the one used in the IMS HD Reorganization Unload utility)
- DB Segment Restructure unique unload record format

Format

This data set contains 80-byte fixed-length records, and block size must be a multiple of 80. The data set can be a sequential data set or a member of a partitioned data set.

Control statements

This data set has two types of control statements: a primary request control statement and a continuation request control statement.

Important: *All* fields of control statements must be left-aligned.

Primary request control statement

There must be one primary request control statement for each database to be unloaded by FABRUNLD.

```
0.........1.........2.........3.........4.........5.....//....7.........8
01234567890123456789012345678901234567890123456789012345//678901234567890

                     *ssa----------------------------------------------->
 dbdname    dataout HCssa----------------------------------------------->
                      ssa                           'kfb'
```

Position
Description

1
This required field is the left-aligned name of the DBD for the database to be unloaded.

11
This required field is the left-aligned ddname of the sequential data set to contain the unloaded database. Use any ddname you like.

19
This field is a control byte used for the HD record format option as follows:

H
FABRUNLD unloads the databases to the data sets in the HD unload record format. This record format is compatible with the one of the IMS HD Reorganization Unload utility.

Blank field
FABRUNLD unloads the databases to the data sets in the DB Segment Restructure unique unload record format.

20
This field is a control byte that can contain one of these three codes:

C
The key feedback compare string is specified in a continuation request control statement (which immediately follows the primary request control statement). The segment search argument (SSA) might extend beyond column 50.

*****
There is no key feedback compare string. The SSA might extend beyond column 50.

Blank field
Both the SSA and the key feedback compare string (if any) are on the primary request control statement.

21
This field contains a left-aligned SSA used in an initial get unique call to begin the unload process. If the control byte is blank, this field is contained in columns 21-50. If the control byte is **C** or asterisk (*), this field is contained in columns 21-80.

If the field is blank, the unload process begins with the first segment in the database.

51
This field must be enclosed in single quotes. It contains a left-aligned character string that determines when the unload process ends. The string is compared to the key feedback returned after each database call. If the key feedback data is greater (with a higher collating sequence) than the string, the unload process stops for that database.

If the field is blank and the control byte is not C, the unload process continues until reaching the end of the database.

Continuation request control statement

One continuation request control statement can immediately follow each primary request control statement. Use this if you have a C in column 20 of your primary request control statement.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789

 'kfb'                                  comments
```

Position
Description

1
This field must be enclosed in single quotes. It contains a left-aligned character string that determines when the unload process ends. The string is compared to the key feedback returned after each database call. If the key feedback data is greater (with a higher collating sequence) than the string, the unload process ends for that database.

Use this control statement only when the control byte is C.

41
FABRUNLD does not use this field. You can use it for comments.

FABRRELD SYSIN data set

A single FABRRELD step can reload several databases. The FABRRELD SYSIN data set describes all of the databases to be reloaded. It specifies segments to be restructured, and describes the restructuring to be performed.

Format

This data set contains 80-byte fixed-length records, and block size must be a multiple of 80. The data set can be a sequential data set or a member of a partitioned data set.

Control statements

This data set has three types of control statements: a database request (DB) control statement, a segment request (SEG) control statement, and a change request (CHG) control statement. There must be one DB control statement for each database being reloaded. There must be a SEG control statement for each segment type requiring change. Describe each change with a CHG control statement.

Each DB control statement is followed by any SEG control statement that applies to the database the DB control statement describes. Each SEG control statement is followed by any CHG control statements that apply to the segment that the SEG control statement describes.

Important: *All* control statement fields must be left-aligned.

DB control statement

A DB control statement defines the database to be reloaded. It also defines the data set containing the unloaded database.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789

 DB        dbdname   datain    comments
```

Position
Description

1
Code DB in the first two bytes to identify this as a DB control statement. This field is required.

11
This left-aligned field is the name of the DBD for the database to be reloaded. It is required.

21
This left-aligned field is the ddname of the sequential data set containing the unloaded database. Use any ddname you like. This field is required.

31
FABRRELD does not use this field. This optional field can be used for comments.

SEG control statement

A SEG control statement defines segments that need changes before being loaded into an output database. You can specify up to 50 SEG control statements for each DB control statement.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789

 SEG       oldname   newname   userexit  comments
                               CANCEL
```

Position
Description

1
Code SEG in the first three bytes to identify this as a SEG control statement. There must be a SEG control statement for each segment type that requires change before the segment type can be loaded into the new database. This field is required.

11
This required, left-aligned field is the name of the segment in the old DBD.

21
This is the left-aligned name of the segment in the new DBD. If this field is blank, the segment name in the old DBD (column 11) is used.

31
This field will contain one of the following codes:

userexit
This code is the left-aligned name of the user exit routine that gets control before inserting each occurrence of this segment type.

Blank field
Leave the field blank if a user exit routine is not used for this segment type.

CANCEL
Use this code if this segment type is not to be reloaded into the new database.

41
FABRRELD does not use this field. You can use it for comments.

CHG control statement

Use a CHG control statement for each standard change made to a segment type.

In addition to the changes performed in a user exit routine, there are two types of standard changes that FABRRELD can do:

- Move data from the old segment to different locations within the new segment
- Move literal data to the new segment

Use one CHG control statement for each standard change made to a segment type. CHG control statements do not have to be in a special sequence, but they must immediately follow the affected SEG control statement. You can specify up to 150 CHG control statements for each DB control statement.

Output positions not altered by a CHG control statement contain the corresponding data from the old segment.

```
0.........1.........2.........3.........4.........5.........6.........7.........8
01234567890123456789012345678901234567890123456789012345678901234567890123456789

 CHG       outpos    inpos     length
                     X'xxxxxx...xx'
                     C'character literal...'
```

Position
Description

1
Code CHG in the first three bytes to identify this as a CHG control statement. A CHG control statement is used for each change in the structure of the segment type of the previous SEG control statement. This field is required.

11
This required field is the position in the output segment where data is to be moved. To code this field, you must include five decimal digits. Use leading zeros if necessary. The smallest allowable value is 00001. (This is the first byte in the data portion of the segment.)

21
This required field can contain either a literal or a five-digit number. It defines the data that is moved into the appropriate output segment.

5-digit number
This number is the position in the input segment from which data is moved. To code this field, you must include five decimal digits. The smallest allowable value is 00001. This value represents the first byte in the data part of the segment.

literal
The field can also be a left-aligned character or hex literal. It is moved into each appropriate output segment.

Enclose the literal in single quotes. It can use up to 60 bytes. FABRRELD computes the actual length of the literal. Do not specify input position or length. For each DB control statement, the total number of literal bytes cannot exceed 1500.

Hex literals are specified as X'xxxx...' with an even number of hex digits (0-9, A-F) between the single quotes.

Character literals are specified as either C'char...' or 'char...'. If a quote is needed as part of a character literal, specify it as two consecutive quotes.

31
This entry defines the number of bytes to be moved from the input segment to the output segment. Code the field with five decimal digits, using leading zeros, if necessary. 00001 is the smallest allowable value. Do *not* code this field when you are using a literal.

Output

DB Segment Restructure produces two types of output: printed reports and sequential data sets that contain unloaded databases.

FABRUNLD SYSPRINT data set

FABRUNLD SYSPRINT data set contains two reports: the Control Card Format report and the Control Cards and Messages report.

Format

The format is 133-byte fixed-length records. Block size, if coded in your JCL, must be a multiple of 133. The blocking factor is insignificant, because the data set usually contains only two printed pages. Code your DD statement:

```
//SYSPRINT  DD SYSOUT=A
```

Control Card Format report

This printed report describes the fields in the records contained in the FABRUNLD SYSIN data set.

The following figure shows an example of the Control Card Format report (Unload).

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBSR        "CONTROL CARD FORMAT REPORT"                          PAGE:     1
5655-U09                                                 DATE: 06/22/2020  TIME: 14.44.55                    FABRULD9 - V3.R1


COLUMNS  1- 8: DBD NAME OF DATABASE TO BE UNLOADED   (REQUIRED)
COLUMNS 11-18: DDNAME OF THE OUTPUT SEQ. DATA SET    (REQUIRED)
COLUMN    19 : 'H' HD STANDARD FORMAT REC. IN OUTPUT D/S  (OPT)
               ' ' DBSR UNIQUE FORMAT REC. IN OUTPUT D/S  (OPT)
COLUMN    20 : 'C' KEY FDBK COMP. STRING IN CONT. CARD    (OPT)
               '*' NO COMP. STRING; SSA IN COL. 21-80     (OPT)
               ' ' SSA AND COMP. STRING IN SAME CARD      (OPT)
COLUMNS 21-50: SSA VALUE TO BE USED IN INITIAL GU CALL    (OPT)
       (21-80 IF COL.20 = * OR C)
COLUMNS 51-80: STRING TO BE COMPARED TO KEY FEED BACK     (OPT)
       ( 1-40 IN CONTINUATION CARD IF COL.20 = C)
```

Figure 253. FABRUNLD SYSPRINT: Control Card Format report (Unload)

Control Cards and Messages report

This report contains a printed copy of the complete FABRUNLD SYSIN data set, the number of segments unloaded from each database, and the error messages produced by FABRUNLD.

The following figure shows an example of the Control Cards and Messages report (Unload).

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBSR     "CONTROL CARDS AND MESSAGES REPORT"                        PAGE:     1
5655-U09                                                   DATE: 06/22/2020  TIME: 14.44.55                      FABRULD9 - V3.R1


 <------------------------------ CARD COLUMNS ------------------------------> <------------------- MESSAGES ------------------->
 0.......1.........2.........3.........4.........5.........6.........7.........8
 12345678901234567890123456789012345678901234567890123456789012345678901234567890

 HDAMDB1   UNLD1
                                                                                FABR3524I           30 SEGMENTS UNLOADED
```

Figure 254. FABRUNLD SYSPRINT: Control Cards and Messages report (Unload)

FABRRELD SYSPRINT data set

The FABRRELD SYSPRINT data set contains the following two reports: the Control Card Formats report and the Control Cards and Messages report.

Format

The format is 133-byte fixed-length records. Block size, if coded in your JCL, must be a multiple of 133. The blocking factor is insignificant because the data set usually contains only two printed pages. Code your DD statement as follows:

```
//SYSPRINT  DD SYSOUT=A
```

Control Card Format report

This printed report describes the fields in the records contained in the FABRRELD SYSIN data set.

The following figure shows an example of the Control Card Format report (Reload).

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBSR        "CONTROL CARD FORMAT REPORT"                          PAGE:     1
5655-U09                                                  DATE: 06/22/2020  TIME: 14.36.08                     FABRRLD8 - V3.R1


DB CARD FORMAT

COLUMNS  1- 2: DB SPECIFIES A DATABASE RELOAD        (REQUIRED)
COLUMNS 11-18: DBD NAME OF DATABASE TO BE RELOADED   (REQUIRED)
COLUMNS 21-28: DDNAME OF DATA SET CREATED BY UNLOAD  (REQUIRED)

SEG CARD FORMAT

COLUMNS  1- 3: SEG  SPECIFIES SEGMENT TO BE CHANGED  (REQUIRED)
COLUMNS 11-18: OLD SEGMENT NAME (IN OLD DATABASE)    (OPTIONAL)
COLUMNS 21-28: NEW SEGMENT NAME                      (OPTIONAL)
COLUMNS 31-38: USER EXIT NAME OR CANCEL              (OPTIONAL)

CHG CARD FORMAT

COLUMNS  1- 3: CHG  SPECIFIES CHANGE SEG FORMAT      (REQUIRED)
COLUMNS 11-15: POSITION IN OUTPUT SEG TO MOVE DATA   (REQUIRED)
COLUMNS 21-25: POSITION IN INPUT SEG TO OBTAIN DATA     (*)
COLUMNS 31-35: LENGTH OF DATA TO BE MOVED               (*)
     OR
COLUMNS 21-80: LITERAL TO BE MAPPED INTO OUTPUT POSITION
               SPECIFIED IN COLUMNS 11-15

  (*) SPECIFICATION OF LITERAL IN COLUMNS 21-80 REPLACES THE
      INFO REQUIRED IN COLUMNS 21-25 AND 31-35
```

Figure 255. FABRRELD SYSPRINT: Control Card Format report (Reload)

Control Cards and Messages report

This report contains a printed copy of the complete FABRRELD SYSIN data set, the number of segments reloaded into each database, and the error messages produced by FABRRELD.

The following figure is an example of the Control Cards and Messages report (Reload).

```
IMS HIGH PERFORMANCE POINTER CHECKER FOR z/OS - DBSR     "CONTROL CARDS AND MESSAGES REPORT"                          PAGE:     1
5655-U09                                                   DATE: 06/22/2020  TIME: 14.36.08                       FABRRLD8 - V3.R1


 <------------------------------ CARD COLUMNS ------------------------------> <------------------- MESSAGES ------------------->
 0........1.........2.........3.........4.........5.........6.........7.........8
 12345678901234567890123456789012345678901234567890123456789012345678901234567890


 DB        HISMDB1   RELD1
                                                                                FABR3523I           6 SEGMENTS RELOADED
```

Figure 256. FABRRELD SYSPRINT: Control Cards and Messages report (Reload)

Unloaded database

This sequential data set contains the IMS database that was unloaded by FABRUNLD. FABRRELD uses the data set as input.

FABRUNLD unloads databases into a data set in either of the following two types of record formats:

HD unload record format
With the HD record format option specified on the primary request control statement as input for the FABRUNLD SYSIN data set, FABRUNLD unloads databases into a data set in the HD unload record format. This HD unload record format of the data set is the same as the record format of the data set unloaded by the IMS HD Reorganization Unload utility and its equivalent programs. This data set can be used as input for the IMS HD Reorganization Reload utility and its equivalent programs.

DB Segment Restructure unique unload record format
Without the HD record format option specification, FABRUNLD unloads databases into a data set in the DB Segment Restructure unique unload record format. This data set cannot be used as input for the IMS HD Reorganization Reload utility and its equivalent programs.

Related concepts

Considerations for data set compatibility among related utilities
DB Segment Restructure provides the following compatibilities for the unloaded data set with the related utilities.

Chapter 31. JCL examples for DB Segment Restructure

There are many ways to use the DB Segment Restructure utility. The examples provided in the following topics show some of the typical tasks that DB Segment Restructure can perform. By studying these examples and using them as models, you can use the same techniques to restructure your own databases.

Topics:

- "Example 1: How to restructure physical databases" on page 569
- "Example 2: How to restructure databases with logical relationships" on page 573
- "Example 3: How to change the hierarchy of a database" on page 578
- "Example 4: How to convert an HDAM database to HIDAM" on page 581
- "Example 5: How to split database segments" on page 581

Example 1: How to restructure physical databases

This example shows how to restructure physical databases. The two databases in the example do not have logical relationships.

This example shows how to:

- Use the control statements for FABRUNLD and FABRRELD
- Copy data from one position to another within a segment
- Initialize fields with specific values
- Use user exit routines
- Delete all occurrences of a specific segment type

The following two figures describe the HIDAM database (ORDHIDD) that will be unloaded in this example. Substantial changes are made to four of its segment types during the reload step.

```
DBD       NAME=ORDHIDD,ACCESS=(HIDAM,VSAM)
DATASET   DD1=ESDSDATA,DEVICE=3330,FRSPC=(6,25)
SEGM      NAME=ORDER,PARENT=0,BYTES=50,PTR=TB
FIELD     NAME=(ORDKEY,SEQ,U),BYTES=10,START=1,TYPE=C
LCHILD    NAME=(ORDNDX,ORDHIDX),PTR=INDX
FIELD     NAME=ORDATE,BYTES=6,START=41,TYPE=C
SEGM      NAME=ORDART,PARENT=((ORDER,SNGL)),BYTES=75,             X
           PTR=T,FREQ=3.5
FIELD     NAME=(ARTKEY,SEQ,M),BYTES=8,START=1,TYPE=C
SEGM      NAME=DELIVER,PARENT=((ORDART,SNGL)),BYTES=50,           X
           PTR=T,FREQ=0.7
FIELD     NAME=(DELDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=SCHEDULE,PARENT=((ORDART,SNGL)),BYTES=50,          X
           PTR=T,FREQ=0.25
FIELD     NAME=(SCHEDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=HISTORY,PARENT=((ORDART,SNGL)),BYTES=50,           X
           PTR=T,FREQ=0.3
DBDGEN
FINISH
END
```

Figure 257. DB Segment Restructure example 1: HIDAM DBD

© Copyright IBM Corp. 2000, 2021

```
DBD       NAME=ORDHIDX,ACCESS=(INDEX,VSAM,,DOSCOMP)
DATASET   DD1=KSDSINDX,DEVICE=3330
SEGM      NAME=ORDNDX,BYTES=10,FREQ=100
FIELD     NAME=(NDXKEY,SEQ),BYTES=10,START=1,TYPE=C
LCHILD    NAME=(ORDER,ORDHIDD),INDEX=ORDKEY
DBDGEN
FINISH
END
```

Figure 258. DB Segment Restructure example 1: HIDAM index DBD

The following figure describes the HDAM database (ORDHDAM) that will be unloaded in this example. Changes made by the reload step modify the key field in each root segment.

```
DBD       NAME=ORDHDAM,ACCESS=(HDAM,VSAM),                        X
           RMNAME=(DFSHDC40,2,23,2048)
DATASET   DD1=DATAESDS,DEVICE=3330
SEGM      NAME=REDRO,PARENT=0,BYTES=50,PTR=TB
FIELD     NAME=(ORDKEY,SEQ,U),BYTES=10,START=1,TYPE=C
FIELD     NAME=ORDATE,BYTES=6,START=41,TYPE=C
SEGM      NAME=TRADRO,PARENT=((REDRO,DBLE)),BYTES=75,             X
           PTR=TB,FREQ=3.5
FIELD     NAME=(ARTKEY,SEQ,M),BYTES=8,START=1,TYPE=C
SEGM      NAME=REVILED,PARENT=((TRADRO,DBLE)),BYTES=50,           X
           PTR=TB,FREQ=0.7
FIELD     NAME=(DELDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=ELUDEHCS,PARENT=((TRADRO,DBLE)),BYTES=50,          X
           PTR=TB,FREQ=0.25
FIELD     NAME=(SCHEDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=YROTSIH,PARENT=((TRADRO,DBLE)),BYTES=50,           X
           PTR=TB,FREQ=0.3
DBDGEN
FINISH
END
```

Figure 259. DB Segment Restructure example 1: HDAM DBD

This example includes the following steps:

1. “Creating image copies of the old databases” on page 570
2. “Unloading the databases with FABRUNLD” on page 570
3. “Creating a new HIDAM DBD and a new load PSB” on page 572
4. “Deleting the old database clusters and defining new ones” on page 572
5. “Reloading the databases with FABRRELD” on page 572
6. “Creating image copies of the new databases” on page 573

Because these databases have no logical relationships, the utilities that handle logical relationships are not used in this example.

Creating image copies of the old databases

The standard image-copy job is run. This safeguard avoids the loss of data if an error is made.

Unloading the databases with FABRUNLD

This step unloads two databases.

The following figure shows an example for unloading the two databases.

```
//UNLOAD  EXEC DLIBATCH,MBR=FABRUNLD,PSB=ORDHIDAA,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY
//IEFRDER2  DD DUMMY
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//DATAESDS  DD DISP=OLD,DSN=HPS.ESDSHDAM                                  1
//ESDSDATA  DD DISP=OLD,DSN=HPS.HIDADATA                                  1
//KSDSINDX  DD DISP=OLD,DSN=HPS.HIDAINDX                                  1
//UNLD1     DD DSN=HPS.ORDHIDAM.SRU,DISP=(NEW,CATLG,DELETE),              2
//             UNIT=SYSDA,VOL=SER=TS0013,SPACE=(TRK,(10,10),RLSE),
//             DCB=(LRECL=13000,BLKSIZE=13004)
//UNLD2     DD DSN=HPS.ORDHIDAM.SRU,DISP=(MOD,CATLG,DELETE),              2
//             UNIT=SYSDA,VOL=SER=TS0013,
//             DCB=(LRECL=13000,BLKSIZE=13004)
//UNLD3     DD DSN=HPS.ORDHDAM.SRU,DISP=(NEW,CATLG,DELETE),               2
//             UNIT=SYSDA,VOL=SER=TS0013,SPACE=(TRK,(10,10),RLSE),
//             DCB=(LRECL=13000,BLKSIZE=13004)
//SYSIN     DD *
ORDHDAM   UNLD3   H                                                       3
ORDHIDD   UNLD1                                 '0000000200'              4
ORDHIDD   UNLD2     ORDER   (ORDKEY   =0000000400)                        5
/*
```

Figure 260. DB Segment Restructure example 1: FABRUNLD JCL

Database DD statements

A DD statement is required for each database that is being unloaded.

In this example, the databases being unloaded are DATAESDS and ESDSDATA. A DD statement for the HIDAM index database KSDSINDX is also required (1).

Unloaded database DD statements

Each primary request control statement (in the SYSIN data set) requires a corresponding DD statement.

The ddnames UNLD1, UNLD2, and UNLD3 are used in this example (2), but you can use any legal ddnames. UNLD1 and UNLD2 refer to the same data set. Note the use of "DISP=(MOD..." on the UNLD2 data set. This is necessary because the same database is being unloaded with two primary request control statements. Even though there are actually only two output data sets that contain unloaded databases, three ddnames are required for those data sets in the unload step.

Block size of 13004 is an example only. Use the block size you need.

In this example, the UNLD1 data set and the UNLD2 data set are unloaded in the DB Segment Restructure unique unload record format, but the UNLD3 data set is unloaded in the HD unload record format.

SYSIN data set

The first control statement (in the SYSIN data set) causes the entire ORDHDAM database to be unloaded (3). This is the predefined format for a primary request control statement when you want to unload the complete database.

The second and third control statements unload the ORDHIDD database.

- The second control statement unloads all database records of which root segment key is less than or equal to 0000000200 (4).
- The third control statement unloads all database records of which root segment key is greater than or equal to 0000000400 (5).

All database records except those with a root key between 0000000200 and 0000000400 are unloaded.

To initially load ORDHIDD, the segments must be inserted in hierarchical sequence (because it is an HIDAM database). The two control statements for ORDHIDD are in the order shown so as to be sure that the database to be unloaded is in hierarchical sequence.

For a detailed description of the FABRUNLD control statements, see "FABRUNLD SYSIN data set" on page 562.

Creating a new HIDAM DBD and a new load PSB

In this example, a new DBD for the ORDHIDD database and a new load PSB will be created. Two changes are made to the DBD as follows:

- The DELIVER segment is changed from 50 to 70 bytes in length
- The HISTORY segment is removed

The new PSB is required because the new (restructured) database no longer contains a HISTORY segment.

Deleting the old database clusters and defining new ones

Three databases are deleted and then defined: ORDHDAM, ORDHIDD, and the HIDAM index for ORDHIDD.

Reloading the databases with FABRRELD

This step reloads two databases.

The following figure shows an example for reloading the two databases.

```
//RELOAD  EXEC DLIBATCH,MBR=FABRRELD,PSB=ORDHIDLA,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY
//IEFRDER2  DD DUMMY
//DFSVSAMP  DD DSN=USER.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//USEREXIT  DD DISP=SHR,DSN=HPS.LOAD
//DATAESDS  DD DISP=OLD,DSN=HPS.ESDSHDAM                                  1
//ESDSDATA  DD DISP=OLD,DSN=HPS.HIDADATA                                  1
//KSDSINDX  DD DISP=OLD,DSN=HPS.HIDAINDX                                  1
//RELD1     DD DISP=OLD,DSN=HPS.ORDHDAM.SRU                               2
//RELD2     DD DISP=OLD,DSN=HPS.ORDHIDAM.SRU                              2
//SYSIN     DD *
DB        ORDHDAM   RELD1                                                 3
SEG       REDRO                                                           4
CHG       00001     00008     00001     CHANGE THE KEY FIELD              5
DB        ORDHIDD   RELD2                                                 6
SEG       ORDER                         MOVE DATA WITHIN SEGMENT          7
CHG       00017     00041     00007                                       8
CHG       00029     00001     00010                                       8
SEG       HISTORY             CANCEL    PREVENT LOAD OF THIS SEGMENT      9
SEG       SCHEDULE            EXITASM   USER EXIT ROUTINE                 10
SEG       DELIVER                       ADD LITERAL DATA                  11
CHG       00061     X'00000000'                                           12
CHG       00051     C'NEW FIELD '                                         12
CHG       00065     '      '                                              12
/*
```

Figure 261. DB Segment Restructure example 1: FABRRELD step

Database DD statements
A DD statement for each database (DATAESDS and ESDSDATA) to reload must be specified. Also, a DD statement for the HIDAM index database (KSDSINDX) must be specified (1).

Unloaded database DD statements
Each DB control statement (in the SYSIN data set) requires a corresponding DD statement. The ddnames RELD1 and RELD2 are used in this example (2). Any legal ddnames can be used.

SYSIN data set
The first three records refer to the ORDHDAM database:

- The DB control statement loads the ORDHDAM database with data from the RELD1 unloaded database data set (3).
- The SEG control statement shows that all occurrences of the REDRO segment type are to be restructured (4).
- The CHG control statement replaces the data contained in byte 1 with the data contained in byte 8. Changes are not made to any other bytes. Byte 1 is part of the root key field, so this restructuring

probably changes the hierarchical sequence of the root segments. This does not affect the reload process of an HDAM database (5).

The next ten control statements refer to the ORDHIDD database:

- The DB control statement loads the ORDHIDD database with data from the RELD2 unloaded database data set (6).
- The first SEG control statement shows that restructuring occurs for all occurrences of the ORDER segment type (7).
- The next two CHG control statements define the restructuring as follows (8):
  - Data that was originally contained in bytes 41-47 is moved to bytes 17-23.
  - Data that was originally contained in bytes 1-10 is moved to bytes 29-38.

  Bytes 1-16, 24-28, and 38-50 contain their original data because they do not have CHG control statements.
- The next SEG control statement appears because the database to be unloaded contains HISTORY segments that do not need to be reloaded (9). "CANCEL" in the user exit field tells FABRRELD to skip all HISTORY records.

  Tip: Another way to do this is to make the unload PSB (ORDHIDAA) insensitive to the HISTORY segment by omitting the SENSEG statement for the HISTORY statement. Because the unloaded database would not contain any history segments, this SEG control statement would be unnecessary.
- The next SEG control statement defines a user exit routine (EXITASM) that processes each SCHEDULE segment before reloading into the new database (10).
- The last SEG control statement defines the restructuring for each DELIVER segment (11).
- The CHG control statements define the restructuring as follows (12):
  - Bytes 51-60 contain the character string "NEW FIELD."
  - Bytes 61-64 contain binary zeros.
  - Bytes 65-70 contain blanks.

  Bytes 1-50 contain their original data because they are not mapped by a CHG control statement.

For a detailed description of the FABRRELD control statements, see “FABRRELD SYSIN data set” on page 564.

Creating image copies of the new databases

The standard image-copy job is run. This is the first backup of the new databases.

Example 2: How to restructure databases with logical relationships

This example shows how to restructure two logically related (unidirectional) databases. This example illustrates the steps that use logical relationship utilities with DB Segment Restructure.

In this example, two HDAM databases (ORDHDAM1 and ORDHDAM2) are unloaded. The following two figures describe the databases. The reload step changes the structure of the segments involved in the logical relationship.

```
DBD       NAME=ORDHDAM1,ACCESS=(HDAM,VSAM),                      X
           RMNAME=(DFSHDC40,2,50,450)
DATASET   DD1=ESDSDAT1,DEVICE=3350
SEGM      NAME=ORDER,PARENT=0,BYTES=50,PTR=TB
FIELD     NAME=(ORDKEY,SEQ,U),BYTES=10,START=1,TYPE=C
FIELD     NAME=ORDATE,BYTES=6,START=41,TYPE=C
SEGM      NAME=ORDART,PARENT=((ORDER,DBLE)),BYTES=75,            X
           PTR=TB,FREQ=3.5
FIELD     NAME=(ARTKEY,SEQ,M),BYTES=8,START=1,TYPE=C
LCHILD    NAME=(REVILED,ORDHDAM2),PTR=NONE
SEGM      NAME=DELIVER,PARENT=((ORDART,DBLE)),BYTES=50,          X
           PTR=TB,FREQ=1
FIELD     NAME=(DELDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=SCHEDULE,PARENT=((ORDART,DBLE)),BYTES=50,         X
           PTR=TB,FREQ=1
FIELD     NAME=(SCHEDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=HISTORY,PARENT=((ORDART,DBLE)),BYTES=50,          X
           PTR=TB,FREQ=1
DBDGEN
FINISH
END
```

Figure 262. DB Segment Restructure example 2: Logical parent HDAM DBD

```
DBD       NAME=ORDHDAM2,ACCESS=(HDAM,VSAM),                      X
           RMNAME=(DFSHDC40,2,23,2048)
DATASET   DD1=ESDSDAT2,DEVICE=3350
SEGM      NAME=REDRO,PARENT=0,BYTES=50,PTR=TB
FIELD     NAME=(ORDKEY,SEQ,U),BYTES=10,START=1,TYPE=C
FIELD     NAME=ORDATE,BYTES=6,START=41,TYPE=C
SEGM      NAME=TRADRO,PARENT=((REDRO,DBLE)),BYTES=75,            X
           PTR=TB,FREQ=3.5
FIELD     NAME=(ARTKEY,SEQ,M),BYTES=8,START=1,TYPE=C
SEGM      NAME=REVILED,                                          X
           PARENT=((TRADRO,DBLE),(ORDART,PHYSICAL,ORDHDAM1)),    X
           BYTES=50,PTR=(TB,LT,LP),FREQ=1
FIELD     NAME=(DELDAT,SEQ),BYTES=18,START=1,TYPE=C
SEGM      NAME=ELUDEHCS,PARENT=((TRADRO,DBLE)),BYTES=50,         X
           PTR=TB,FREQ=1
FIELD     NAME=(SCHEDAT,SEQ),BYTES=6,START=1,TYPE=C
SEGM      NAME=YROTSIH,PARENT=((TRADRO,DBLE)),BYTES=50,          X
           PTR=TB,FREQ=1
DBDGEN
FINISH
END
```

Figure 263. DB Segment Restructure example 2: Logical child HDAM DBD

This example includes the following steps:

1. “Creating image copies of the old databases” on page 574
2. “Running the IMS Database Prereorganization utility (DFSURPR0)” on page 574
3. “Unloading the databases with FABRUNLD” on page 575
4. “Deleting the old database clusters and defining new ones” on page 576
5. “Reloading the databases with FABRRELD” on page 576
6. “Running the prefix resolution and update utility” on page 577
7. “Creating image copies of the new databases” on page 578

Creating image copies of the old databases

The standard image-copy job is run. These image copies are the backup copies of the old databases.

Running the IMS Database Prereorganization utility (DFSURPR0)

Because the databases being unloaded and reloaded are connected by a logical relationship, this is a mandatory step. The Database Prereorganization utility produces the DFSURCDS control data set, which contains information about pointers that need to be resolved later (because of the logical relationship). The DFSURCDS control data set is used as input for:

- The FABRRELD initial load
- The IMS Database Prefix Resolution utility, after loading the databases

The IMS Database Prereorganization utility also produces a list of any databases *not* initially loaded that have segments logically related to initially loaded databases. There must be *no* such databases. When DB Segment Restructure restructures a logically related database, all logically related databases *must* be processed by DB Segment Restructure.

The following figure shows IMS Database Prereorganization JCL.

```
//PRERE   EXEC PGM=DFSRRC00,PARM='ULU,DFSURPR0'
//IMS       DD DISP=SHR,DSN=HPS.TEST.DBDLIB
//DFSRESLB  DD DISP=SHR,DSN=IMSVS.RESLIB
//SYSPRINT  DD SYSOUT=A,DCB=BLKSIZE=120
//IEFRDER   DD DUMMY
//DFSURCDS  DD DSN=&&PRERECDS,DISP=(NEW,PASS),
//             UNIT=SYSDA,SPACE=(CYL,(10,1)),
//             DCB=BLKSIZE=1600
//SYSIN     DD *
DBIL=ORDHDAM1
DBIL=ORDHDAM2
/*
```

Figure 264. DB Segment Restructure example 2: Prereorganization JCL

Unloading the databases with FABRUNLD

This step unloads two databases.

The following figure shows an example for unloading the two databases.

```
//DBUNLOAD EXEC DLIBATCH,MBR=FABRUNLD,PSB=ORDHDAMA,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY,UNIT=SYSDA
//IEFRDER2  DD DUMMY,UNIT=SYSDA
//ESDSDAT1  DD DISP=OLD,DSN=HPS.ESDSHDM1                                    1
//ESDSDAT2  DD DISP=OLD,DSN=HPS.ESDSHDM2                                    1
//UNLD1     DD DSN=HPS.ESDSHDM1.RESTRUCT,DISP=(NEW,CATLG,DELETE),           2
//             UNIT=SYSDA,VOL=SER=TS0010,SPACE=(TRK,(10,10),RLSE),
//             DCB=(RECFM=VB,LRECL=1024,BLKSIZE=13004,DSORG=PS)
//UNLD2     DD DSN=HPS.ESDSHDM2.RESTRUCT,DISP=(NEW,CATLG,DELETE),           2
//             UNIT=SYSDA,VOL=SER=TS0010,SPACE=(TRK,(10,10),RLSE),
//             DCB=(RECFM=VB,LRECL=1024,BLKSIZE=13004,DSORG=PS)
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//SYSIN     DD *
ORDHDAM1  UNLD1                                                             3
ORDHDAM2  UNLD2   H                                                         4
/*
```

Figure 265. DB Segment Restructure example 2: FABRUNLD JCL

Database DD statements
A DD statement appears for each database to be unloaded (ESDSDAT1 and ESDSDAT2) (1).

Unloaded database DD statements
Each primary request control statement (in the SYSIN data set) requires a corresponding DD statement. The ddnames UNLD1 and UNLD2 are used in this example, but you can use any legal ddnames (2).

Block size of 13004 is an example only. Use the block size you need.

In this example, the UNLD1 data set is unloaded in the DB Segment Restructure unique unload record format and the UNLD2 data set is unloaded in the HD unload record format.

SYSIN data set
The first control statement (in the SYSIN data set) unloads the complete ORDHDAM1 database (3). This is the predefined format for a primary request control statement when you want to unload the complete database.

The second control statement unloads the complete ORDHDAM2 database (4).

For a detailed description of the FABRUNLD control statements, see “FABRUNLD SYSIN data set” on page 562.

Deleting the old database clusters and defining new ones

This step deletes and defines two databases: ORDHDAM1 and ORDHDAM2.

See the following figure for a JCL example.

```
//ALLOCAT2 EXEC  PGM=IDCAMS
//DDESDS   DD  VOL=SER=TS0010,UNIT=3350,DISP=SHR
//SYSPRINT DD  SYSOUT=A
//SYSIN DD *
 DELETE (HPS.ESDSHDM1)               CLUSTER  ERASE PURGE
 DELETE (HPS.ESDSHDM2)               CLUSTER  ERASE PURGE
 DEFINE  CLUSTER -
               (NAME(HPS.ESDSHDM1) -
                FILE(DDESDS) -
                VOL(TS0010) -
                NONINDEXED -
                RECSZ (2041,2041) -
                CISZ(2048)-
                CYL(2))
 DEFINE  CLUSTER -
               (NAME(HPS.ESDSHDM2) -
                FILE(DDESDS) -
                VOL(TS0010) -
                NONINDEXED -
                RECSZ (2041,2041) -
                CISZ(2048)-
                CYL(2))
/*
```

Figure 266. DB Segment Restructure example 2: IDCAMS JCL

Reloading the databases with FABRRELD

This step reloads two databases.

The following figure shows an example for reloading the two databases.

```
//DBREL   EXEC DLIBATCH,MBR=FABRRELD,PSB=ORDHDAML,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY,UNIT=SYSDA
//IEFRDER2  DD DUMMY,UNIT=SYSDA
//USEREXIT  DD DISP=SHR,DSN=USER.LOAD
//ESDSDAT1  DD DISP=OLD,DSN=HPS.ESDSHDM1                              1
//ESDSDAT2  DD DISP=OLD,DSN=HPS.ESDSHDM2                              1
//RELD1     DD DISP=OLD,DSN=HPS.ESDSHDM1.RESTRUCT                     2
//RELD2     DD DISP=OLD,DSN=HPS.ESDSHDM2.RESTRUCT                     2
//DFSURCDS  DD DSN=&&PRERECDS,DISP=(OLD,PASS)
//DFSURWF1  DD DSN=&&DBRELWF1,DISP=(NEW,PASS),
//             UNIT=SYSDA,SPACE=(CYL,(5,1)),
//             DCB=(RECFM=VB,LRECL=300,BLKSIZE=1200)
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//SYSIN     DD *
DB        ORDHDAM1  RELD1                                           3
SEG       ORDART    ORDART                                          4
CHG       0009      C’CHARACTER LITERAL’                            5
DB        ORDHDAM2  RELD2                                           6
SEG       REVILED                                                   7
CHG       0019      X’000102030405060708090A0B0C0D0E0F’             8
/*
```

Figure 267. DB Segment Restructure example 2: FABRRELD JCL

Database DD statements

A DD statement is required for each database to be reloaded (ESDSDAT1 and ESDSDAT2) (1).

Unloaded database DD statements

Each DB control statement (in the SYSIN data set) requires a corresponding DD statement. The ddnames RELD1 and RELD2 are arbitrary (2). Any legal ddnames can be used.

SYSIN data set

The first three records refer to the ORDHDAM1 database:

- The DB control statement loads the ORDHDAM1 database with data from the RELD1 unloaded database data set (3).
- The SEG control statement restructures all occurrences of the ORDART segment type (4).
- The CHG control statement replaces the data contained in bytes 9 through 25 with the character string "CHARACTER LITERAL." (5) No other bytes are changed.

The next three records refer to the ORDHDAM2 database:

- The DB control statement loads the ORDHDAM2 database with data from the RELD2 unloaded database data set (6).
- The SEG control statement restructures all occurrences of the REVILED segment type (7).
- The CHG control statement replaces the data contained in bytes 19 through 34 with the hexadecimal digits "000102030405060708090A0B0C0D0E0F." (8) No other bytes are changed.

For a detailed description of the FABRRELD control statements, see “FABRRELD SYSIN data set” on page 564.

Running the prefix resolution and update utility

This step resolves logical relationships that are defined for the databases.

For this step, you can use the IMS Database Prefix Resolution utility (DFSURG10) and the IMS Database Prefix Update utility (DFSURGP0), or IMS HP Prefix Resolution.

The following figure shows an example for running the IMS Database Prefix Resolution utility (DFSURG10) and the IMS Database Prefix Update utility (DFSURGP0). Figure 269 on page 578 shows an example for running IMS HP Prefix Resolution.

```
//PREFRES EXEC PGM=DFSURG10
//STEPLIB   DD DISP=SHR,DSN=IMSVS.RESLIB
//SORTLIB   DD DISP=SHR,DSN=SYS1.SORTLIB
//SYSPRINT  DD SYSOUT=A,DCB=BLKSIZE=121
//SYSOUT    DD SYSOUT=A
//SORTWK01  DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//SORTWK02  DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//SORTWK03  DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//DFSURCDS  DD DSN=&&PRERECDS,DISP=(OLD,DELETE)
//DFSURWF2  DD UNIT=SYSDA,SPACE=(CYL,(5,1)),
//             DCB=(RECFM=VB,LRECL=300,BLKSIZE=1200)
//DFSURWF3  DD DSN=&&PRFRSWF3,DISP=(NEW,PASS),
//             UNIT=SYSDA,SPACE=(CYL,(5,1)),
//             DCB=(RECFM=VB,LRECL=300,BLKSIZE=1200)
//DFSURIDX  DD DSN=&&DFSURIDX,DISP=(NEW,PASS),
//             UNIT=SYSDA,SPACE=(CYL,(5,1)),
//             DCB=(RECFM=VB,LRECL=300,BLKSIZE=1200)
//SORTIN    DD DSN=&&DBRELWF1,DISP=(OLD,DELETE)
//*
//PRFUPDT EXEC PGM=DFSRRC00,PARM='ULU,DFSURGP0'
//STEPLIB   DD DISP=SHR,DSN=IMSVS.RESLIB
//IMS       DD DISP=SHR,DSN=HPS.TEST.DBDLIB
//DFSRESLB  DD DISP=SHR,DSN=IMSVS.RESLIB
//DFSURWF3  DD DSN=&&PRFRSWF3,DISP=(OLD,DELETE)
//IEFRDER   DD DUMMY
//SYSPRINT  DD SYSOUT=A,DCB=BLKSIZE=120
//DFSVSAMP  DD DISP=SHR,DSN=HPS.TEST.SOURCE(DFSVSAMP)
//ESDSDAT1  DD DSN=HPS.ESDSHDM1,DISP=OLD
//ESDSDAT2  DD DSN=HPS.ESDSHDM2,DISP=OLD
```

Figure 268. DB Segment Restructure example 2: JCL for IMS Database Prefix Resolution utility and IMS Database Prefix Update utility

```
//HPPR   EXEC PGM=FABYMAIN
//STEPLIB  DD DISP=SHR,DSN=HPPR.SHPSLMD0     HPPR library
//         DD DISP=SHR,DSN=IMSVS.RESLIB
//DFSURWF1 DD DSN=&&DBRELWF1,DISP=(OLD,DELETE)
//DFSURCDS DD DSN=&&PRERECDS,DISP=(OLD,DELETE)
//IMS      DD DISP=SHR,DSN=HPS.TEST.DBDLIB
//FABYPRNT DD SYSOUT=*
//FABYMSG  DD SYSOUT=*
//FABYIN   DD *
  TYPE=LO
  UPDATE=YES
  DBRC=NO
/*
//ESDSDAT1  DD DSN=HPS.ESDSHDM1,DISP=OLD
//ESDSDAT2  DD DSN=HPS.ESDSHDM2,DISP=OLD
```

Figure 269. DB Segment Restructure example 2: JCL for IMS HP Prefix Resolution

Creating image copies of the new databases

The standard image-copy job is run. This is the first backup of the new database.

Example 3: How to change the hierarchy of a database

This example restructures an HDAM database. The example shows how to change the hierarchical structure of a database.

The following figures show the original and changed structures. The position in the hierarchy of the HISTORY segment changes. This causes all the level-3 dependent segments to have different segment codes in the new database.

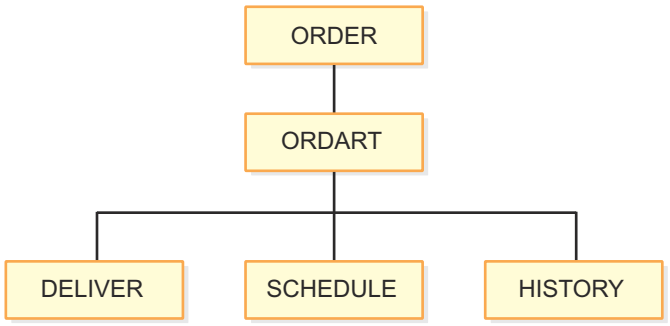


Figure 270. DB Segment Restructure example 3: Original hierarchical structure

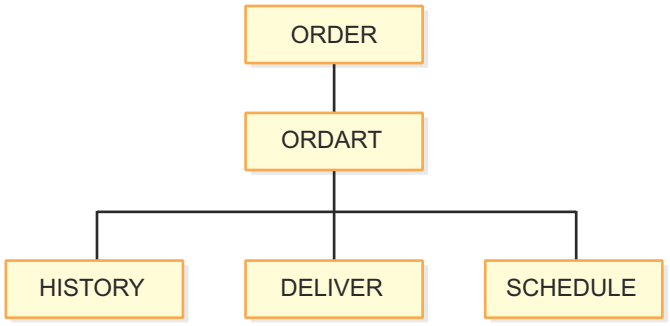


Figure 271. DB Segment Restructure example 3: New hierarchical structure

This example includes the following steps:

1. “Creating an image copy of the old database” on page 579
2. “Unloading the database with FABRUNLD” on page 579
3. “Creating a new DBD and new load and update PSBs” on page 579
4. “Deleting the old database cluster and defining a new one” on page 579

5. “Loading the database with a dummy segment” on page 580
6. “Updating the database with FABRRELD” on page 580
7. “Deleting the dummy segment” on page 580
8. “Creating an image copy of the new database” on page 580

Because there are no logical relationships in the database, there is no need to run any of the utilities that handle logical relationships.

Creating an image copy of the old database

The standard image-copy job is run. This is the first backup of the new database.

Unloading the database with FABRUNLD

This step unloads one database.

The following JCL example unloads the database.

```
//UNLOAD  EXEC DLIBATCH,MBR=FABRUNLD,PSB=ORDHDAMA,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY
//IEFRDER2  DD DUMMY
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//ESDSDATA  DD DISP=OLD,DSN=HPS.ESDSHDAM                                    1
//UNLD1     DD DSN=HPS.ORDHDAM.SRU,DISP=(NEW,CATLG,DELETE),                 2
//             UNIT=SYSDA,VOL=SER=TS0013,SPACE=(TRK,(10,10),RLSE)
//SYSIN     DD *
ORDHDAM   UNLD1                                                           3
/*
```

Figure 272. DB Segment Restructure example 3: FABRUNLD step

Database DD statement
A DD statement is required for the database to be unloaded (ESDSDATA) (1).

Unloaded database DD statements
The primary request control statement (in the SYSIN data set) requires a corresponding DD statement. The ddname UNLD1 is arbitrary; any legal ddname can be used (2).

Because no DCB information is coded on the DD statement, LRECL and BLKSIZE default to the maximum limit allowable for the device.

SYSIN data set
The control statement (in the SYSIN data set) unloads the complete ORDHDAM database (3). This is the predefined format for a primary request control statement when you want to unload the complete database.

For a detailed description of the FABRUNLD control statements, see “FABRUNLD SYSIN data set” on page 562.

Creating a new DBD and new load and update PSBs

To change the hierarchy of the database, we create a new DBD and PSBs. The change moves the HISTORY segment’s SEGM statement and its corresponding FIELD statements. It is moved to immediately follow the ORDART segment.

Deleting the old database cluster and defining a new one

One database (ORDHDAM) is deleted and defined.

Loading the database with a dummy segment

Segments must be inserted in hierarchical sequence during an initial load. The unloaded database contains the segments in their original hierarchical sequence. Therefore, they are in the wrong order for an initial load of the new database because the new hierarchical sequence is different.

Segments can be inserted in any order by an update program. You can use FABRRELD as an update program, if your database was previously initially loaded. In this example, the database is initially loaded with a single "dummy" root segment. The key of this root segment is different from any of those in the original database. An easy way to do this is to use the IMS Test Program (DFSDDLT0), using a load PSB (PROCOPT=L). (For more information, see *IMS Application Programming APIs*.)

Updating the database with FABRRELD

One database is reloaded in this step using an update PSB (PROCOPT=A).

When "FIRST" or "HERE" operand of RULES keyword is specified on the new DBD with no sequence field or with a non-unique sequence field, updating the database with FABRRELD will reverse the order of segment occurrences which is in the unloaded data set.

The following JCL example reloads the database.

```
//RELOAD  EXEC DLIBATCH,MBR=FABRRELD,PSB=ORDHDAMX,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY
//IEFRDER2  DD DUMMY
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//USEREXIT  DD DUMMY
//ESDSDATA  DD DISP=OLD,DSN=HPS.ESDSHDAM                              1
//RELD1     DD DISP=OLD,DSN=HPS.ORDHDAM.SRU                           2
//SYSIN     DD *
DB        ORDHDAM   RELD1                                           3
/*
```

Figure 273. DB Segment Restructure example 3: FABRRELD step

Database DD statement
The reloaded database (ESDSDATA) requires a DD statement (1).

Unloaded database DD statements
The DB control statement (in the SYSIN data set) requires a corresponding DD statement. The ddname of RELD1 is arbitrary; you can use any legal ddname (2).

SYSIN data set
The DB control statement loads the ORDHDAM database with data from the RELD1 unloaded database data set (3).

There are no SEG or CHG statements, because there are no changes to the segment data.

For a detailed description of the FABRRELD control statements, see “FABRRELD SYSIN data set” on page 564.

Deleting the dummy segment

The "dummy" root segment inserted during the initial load of the database is now deleted. An easy way to do this is to use the IMS Test Program (DFSDDLT0), using an update PSB (PROCOPT=A). (For more information, see *IMS Application Programming APIs*.)

Creating an image copy of the new database

The standard image-copy job is run. This is the first backup of the new database.

Example 4: How to convert an HDAM database to HIDAM

In this example, an HDAM database is restructured and converted to a HIDAM database.

When an HDAM database is converted to HIDAM, the hierarchical structure changes. (This is because HIDAM root segments are stored in key sequence, while HDAM root segments are stored in randomized sequence.)

The following steps are required:

1. Create an image copy of the old database.
2. Unload the database with FABRUNLD.
3. Create a new DBD and new load and update PSBs.
4. Delete the old database cluster and define a new one.
5. Load the database with a dummy segment.
6. Update the database with FABRRELD.
7. Delete the dummy segment.
8. Create an image copy of the new database.

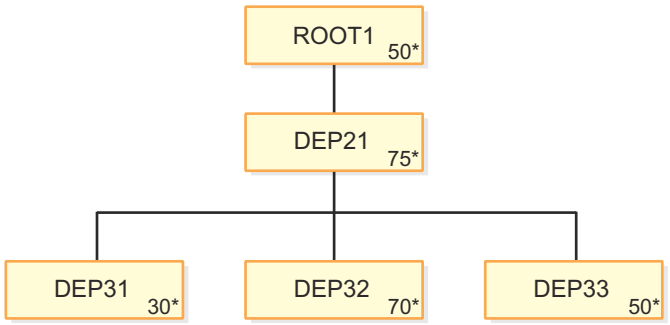
There are no logical relationships in the database, so utilities for logical relationships do not have to be run.

These steps are the same as those of "Example 3: How to change the hierarchy of a database" on page 578, and all JCL and control statements for this example are also the same. See "Example 3: How to change the hierarchy of a database" on page 578 for instructions.

Example 5: How to split database segments

This example restructures an HDAM database. The example shows how to split database segments using the SEG and CHG control statements.

The following figures show a simplified example of the original structure and the split structure.



* : Segment length

Figure 274. DB Segment Restructure example 5: Original hierarchical structure (DBD1DB)

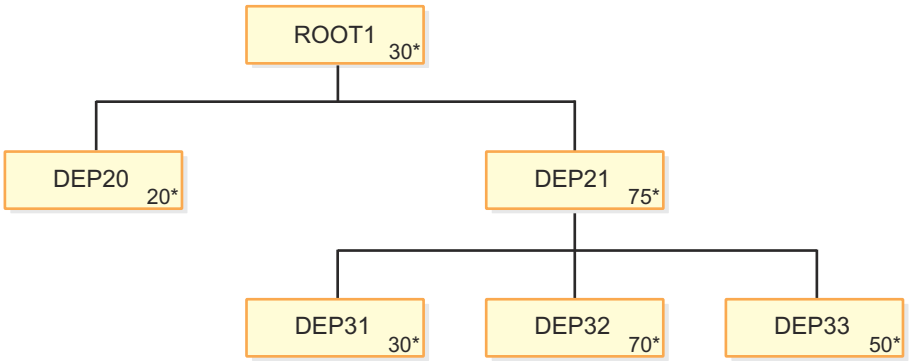


Figure 275. DB Segment Restructure example 5: New hierarchical structure (DBD2DB)

In this example, the root segment (ROOT1) is split into two segments as follows:

- ROOT1 30 Bytes, Containing bytes 01 - 30 of the original ROOT1
- DEP20 20 Bytes, Containing bytes 31 - 50 of the original ROOT1

In this example, DBD for the original hierarchical structure is used to unload the DBD1DB database with FABRUNLD, and a new DBD (DBD2) is used to reload the DBD2DB database with FABRRELD.

This example includes the following steps:

1. Create an image copy of the old database.
2. Unload the database with FABRUNLD.
3. Create a new DBD and new load and update PSBs.
4. Delete the old database cluster and define a new one.
5. Load the database with a dummy segment.
6. Update the database with FABRRELD.
7. Delete the dummy segment.
8. Create an image copy of the new database.

Because there are no logical relationships in the database, there is no need to run any of the utilities that handle logical relationships.

Except for Step 3 and Step 6, the steps are the same as those in “Example 3: How to change the hierarchy of a database” on page 578, and JCL and control statements for the steps are also the same. Refer to “Example 3: How to change the hierarchy of a database” on page 578 for instructions. Instructions for Step 3 and Step 6 are described in this topic.

Subsections:

- “Creating a new DBD and new load and update PSBs” on page 582
- “Updating the database with FABRRELD” on page 582

Creating a new DBD and new load and update PSBs

To split the database segment, you have to create a new DBD (DBD2) and PSBs. Length of ROOT1 is changed to 30 bytes and the new segment DEP20 must have a 20-byte length following the ROOT1 segment.

Updating the database with FABRRELD

One database is reloaded in this step using an update PSB (PROCOPT=A).

The following JCL example reloads the database.

```
//RELOAD  EXEC DLIBATCH,MBR=FABRRELD,PSB=DBD2DBX,
//             DBRC=N,IRLM=N
//IEFRDER   DD DUMMY
//IEFRDER2  DD DUMMY
//DFSVSAMP  DD DSN=HPS.TEST.SOURCE(DFSVSAMP),DISP=SHR
//SYSPRINT  DD SYSOUT=A
//USEREXIT  DD DUMMY
//ESDSDATA  DD DISP=OLD,DSN=HPS.ESDSHDAM                                  1
//RELD1     DD DISP=OLD,DSN=HPS.DBD2DB.SRU                                2
//SYSIN     DD *
DB        DBD2      RELD1                                                 3
SEG       ROOT1                                                           4
CHG       00001     00001     00030                                       4
SEG       ROOT1     DEP20                                                 5
CHG       00001     00031     00020                                       5
/*
```

Figure 276. DB Segment Restructure example 5: FABRRELD step

Database DD statement
The reloaded database (ESDSDATA) requires a DD statement (1).

Unloaded database DD statements
The DB control statement (in the SYSIN data set) requires a corresponding DD statement. The ddname of RELD1 is arbitrary; you can use any legal ddname (2).

SYSIN data set

- The DB control statement loads the DBD2DB database with data from the RELD1 unloaded database data set (3).
- The first pair of SEG and CHG control statements is for the ROOT1 segments and the next pair for the DEP20 segment (4, 5).

To split a segment by control statements, use multiple SEG control statements for the intended segment to be split. Each SEG control statement must be followed by its related CHG statements. The SEG and CHG control statements for all the split parts (new segments) must follow each other. Also, you must make sure that you do not violate IMS rules (that is, try to insert a dependent segment prior to its parent being inserted).

For a detailed description of the FABRRELD control statements, see “FABRRELD SYSIN data set” on page 564.

Tip: Another way to split a segment using DB Segment Restructure is to use a user exit routine. For more information about coding user exit routines, see Chapter 32, “User exit routines,” on page 585.

Chapter 32. User exit routines

The reload program FABRRELD of DB Segment Restructure supports user exit routines.

The following topics describe product-sensitive programming interface information. See “Programming interface information” on page 812 to understand the restrictions associated with this type of material.

PSPI

You can use user exit routines with the DB Segment Restructure reload program FABRRELD for data type conversion, parallel processing of another user data set, data-dependent structure changes, and any algorithm change that cannot be performed via a standard CHG. Each segment type named on a "SEG" record can have one exit routine.

PSPI

Topics:

- “Techniques” on page 585
- “Interface” on page 585

Techniques

Learn the techniques to use a user exit routine with FABRRELD.

PSPI

When FABRRELD begins execution, each exit routine is loaded. After being loaded once, the same copy of the exit routine is invoked one time for each occurrence of its segment type. Because of this, an exit routine’s data areas are maintained throughout the execution of FABRRELD. This allows the exit routine to set switches on one call and to use those switches on another call. The exit routine does not have to be re-enterable.

If more than one exit routine is being used, each must have its own unique name. To use the same routine for more than one segment type, copy the original exit routine and change the CSECT name in the copy.

Before each segment is written to the new database, FABRRELD calls the exit routine. It also calls the exit routine, once when the reload is completed, to let the exit routine do whatever cleanup is necessary. For example, all DCBs opened by the exit routine must be closed.

A FABRRELD exit routine can be coded in Assembler, COBOL, or PL/I. The FABRRELD exit routine is invoked in AMODE=31.

PSPI

Interface

This reference topic describes the interface of the user exit routines.

Subsections:

- “Registers and input parameter lists” on page 585
- “FABRRELD to PL/I exit routine interface” on page 586

Registers and input parameter lists

PSPI

© Copyright IBM Corp. 2000, 2021

Registers must be saved when the exit routine is entered. There is a save area address in register 13 for this purpose. The exit routine must observe standard MVS conventions.

DB Segment Restructure sets these registers before calling the exit routine:

Register
Meaning or Content

R1
Address of input parameter list

R13
Save area address

R14
Return to FABRRELD address

R15
Entry point address of the exit routine.

On return to FABRRELD, restore registers 0 through 14 to their original contents. Register 15 must contain one of the following return codes:

Value
Meaning

0
Insert the segment into the new database.

4
Do not insert the segment into the new database.

8
End processing of this database.

Input is passed to the exit routine via a list of addresses. The following figure shows the list of addresses for a standard call (before writing a segment). Figure 278 on page 586 shows the list of addresses for the final call (when the reload is complete).

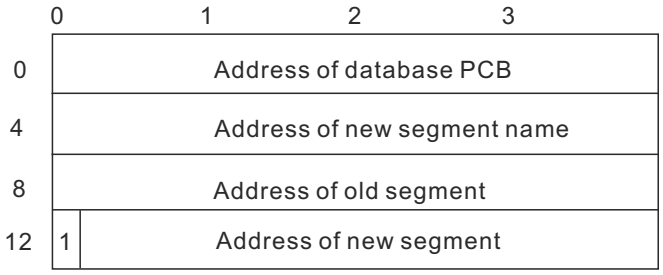


Figure 277. Input parameter list for standard call

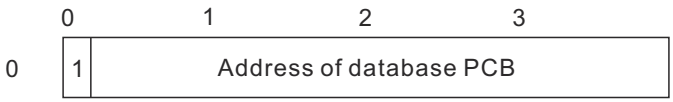


Figure 278. Input parameter list for final call

PSPI

FABRRELD to PL/I exit routine interface

PSPI

The following assembler routine is offered as a sample interface routine to be used in conjunction with a PL/I exit routine. When using PL/I, a special environment is established at each invocation unless the PL/I environment is maintained by the invoking program. The function of this interface routine is to

maintain that PL/I environment. Furthermore, FABRRELD expects a return code in register 15 to indicate disposition of the segment just processed by the exit routine. PL/I has no facility to set a return code in register 15 except at the termination of the PL/I environment which in this case is the end of the job. Therefore, this interface provides the return code from PL/I as set by the PL/I built-in function "PLIRETC."

The following rules must be observed when using this interface:

1. The PL/I routine must be compiled as an external procedure (no "OPTIONS" on the procedure statement).
2. The name on the procedure statement must be "RELDEXIT."
3. The parameters in the PL/I routine must be declared as pointer variables.
4. Based variables should be used to access the data passed by FABRRELD to the exit routine.
5. The built-in function "PLIRETC" should be used to set the return code expected by FABRRELD.
6. The interface routine must be link-edited with the exit routine using the following link-edit control statement:

```
INCLUDE exitlib(RELDEXIT)     RELDEXIT - NORMALLY ON SYSLIN
INCLUDE somelib(RLDTOPLI)     INTERFACE ROUTINE
ENTRY RLDTOPLI                ENTRY POINT IN INTERFACE
NAME whatever                 ANY NAME THE USER CHOOSES
```

7. The module name (whatever) is the exit routine name specified in the PSB control statement.

A sample PL/I exit routine follows the interface routine.

The following figure shows FABRRELD to PL/I exit routine interface.

```
RLDTOPLI  TITILE 'FABRRELD TO PL/I EXIT ROUTINE INTERFACE'
RLDTOPLI  CSECT
R0        EQU    0
R1        EQU    1
R2        EQU    2
R3        EQU    3
R4        EQU    4
R5        EQU    5
R6        EQU    6
R7        EQU    7
R8        EQU    8
R9        EQU    9
R10       EQU    10
R11       EQU    11
R12       EQU    12
R13       EQU    13
R14       EQU    14
R15       EQU    15
          EJECT
          STM    R14,R12,12(R13)       SAVE FABRRELD REGISTERS
          LR     R11,R15               SET UP BASE REG
          USING  RLDTOPLI,R11
          LA     R2,SAVE1              POINT TO NEW SAVEAREA
          ST     R2,8(R13)             SET FORWARD CHAIN
          ST     R13,SAVE1+4           SET BACKWARD CHAIN
          LR     R13,R2                POINT TO NEW SAVEAREA
          GET    FIRSTSW,X'00'         IS THIS FIRST TIME THRU?
          BE     FIRST                 YSE, BR
          L      R13,SAVE2+4           RESTORE PLICALLA REGISTERS
          LM     R14,R12,12(R13)       SAVE BY RLDMAIN
          BR     R15                   AND REENTER RLDMAIN BYPASSING
*                                      THE PL/I INITIALIZATION
          SPACE  2
FIRST     MVI    FIRSTSW,X'FF'         SET FIRST TIME SWITCH
          L      R2,=V(PLIMAIN)        IN SURE CSECT IS INVOKED FROM
          LA     R3,RLDMAIN            PLICALLA
          ST     R3,0(R2)
          L      R15,=V(PLICALLA)      GO TO PL/I TO SET UP PL/I ENV
          BALR   R14,R15
          ABEND  500,DUMP              CONTROL SHOULD NEVER RETURN
          TITLE  'PLIMAIN ROUTINE'
          DS     0D
          DC     C'RLDMAIN',AL1(7)
          ENTRY  RLDMAIN
          SPACE
```

Figure 279. FABRRELD to PL/I exit routine interface (Part 1 of 2)

```
RLDMAIN   DS     0H
          STM    R14,R12,12(R13)       SAVE PL/I REGISTERS
          LR     R2,R15                SET UP BASE REG
          USING  RLDMAIN,R2
          LA     R3,SAVE2              GET ADDRESS OF SAVEAREA
          ST     R3,8(R13)             SET FORWARD CHAIN
          ST     R13,SAVE2+4           SET BACKWARD CHAIN
          MVC    SAVE2+72(8),72(R13)   COPY THE PL/I SLOTS
          LR     R13,R3                SET UP POINTER TO OUR SA
          SPACE
*            CREATE INTERMEDIATE PARM LIST TO SIMULATE PL/I
*            INVOCATION FOR POINTER PARAMETER
          SPACE
          LA     R4,0                  ZERO REG USED TO INDEX MYPARMS
          LA     R5,6                  SET LOOP CONTROL - MAX 6 PARMS
STORLOOP  ST     R1,MYPARMS(R4)        STORE ADDR OF NTH PARM
          TM     0(R1),X'80'           LAST PARM?
          BO     ENDPARMS              YES, BR
          LA     R1,4(R1)              BUMP TO NEXT PARM
          LA     R4,4(R4)              BUMP TO NEXT SLOT IN MYPARMS
          BCT    R5,STORLOOP
          SPACE
          WTO    'MORE THAN 4 PARMS PASSED TO RLDTOPLI'
          ABEND  600,DUMP
          SPACE
ENDPARMS  DS     OH
          LA     R6,MYPARMS(R4)        GET ADDR OF LAST PARM IN LIST
          OI     0(R6),X'80'           INDICATE LAST PARM IN LIST
          LA     R1,MYPARMS            SET R1 -> NEW PARM LIST
          SR     R5,R5                 CLEAR R5 FOR PL/I INVOCATION
          SPACE
          L      R15,=V(RELDEXIT)
          BALR   R14,R15               INVOKE THE PL/I EXIT SUBROUTINE
          SPACE
          L      R13,SAVE1+4           GET ADDR OF FSU II SAVE AREA
          L      R14,12(R13)           RESTORE R14
          LH     R15,X'46'(R12)        PLACE RETURN CODE CREATED IN
*                                      PL/I TCA+X'46' BY THE PLIRETC
*                                      BUILT-IN FUNCTION INTO REG 15
          LM     R0,R12,20(R13)        RESTORE R0 THRU R12
          BR     R14                   RETURN TO FAST SCAN BYPASSING
*                                      THE TERMINAION OF PL/I ENV
          SPACE  3
FIRSTSW   DC     XL1'00'
MYPARMS   DC     6A(0)
SAVE1     DC     20F'0'
SAVE2     DC     20F'0'
          LTORG
          SPACE  3
PLIMAIN   CSECT                        STD FORMAT PLIMAIN CSECT
          DC     V(RLDMAIN)
          DC     F'0'
          END
```

Figure 280. FABRRELD to PL/I exit routine interface (Part 2 of 2)

The following figure shows PL/I exit routine using interface.

```
RELDEXIT:PROC(SEG_PREFIX_PTR,SEG_DATA_PTR,SEG_TABLE_PTR,CON_KEY_PTR)
DCL (SEG_PREFIX_PTR,SEG_DATA_PTR,SEG_TABLE_PTR,CON_KEY_PTR) POINTER;
DCL RETURN_CODE BIN FIXED(31,0) STATIC INIT(0);
DCL (ADDR,PLIRETC) BUILTIN;
DCL 1 SEGTABEL BASED(SEG_TABLE_PTR),
      2 SEGNAME CHAR(8),
      2 SEGCODE BIT(8),
      2 PARCODE BIT(8),
      2 SEGLEVEL BIT(8);
    IF SEGCODE = '00000011'B      /* TEST IF SEGMENT CODE IS X'03' */
       THEN RETURN_CODE = 4;      /*   IF YES BYPASS THIS SEGMENT  */
       ELSE RETURN_CODE = 0;      /*   ELSE ACCEPT THE SEGMENT     */
    CALL PLIRETC(RETURN_CODE);
    END;
```

Figure 281. PL/I exit routine using interface

PSPI

Chapter 33. Conversion to DEDB

When an HDAM, HIDAM, or HISAM database is converted to an IMS Fast Path data entry database (DEDB), certain conditions must be satisfied.

These conditions are:

- The segment of the full-function database must be variable-length.
- DBD, PSB, and ACB must be generated before running FABRRELD to reload DEDB.
- VSAM data sets for the reloaded DEDB areas must be defined by Access Method Services (IDCAMS), and initialized by the IMS DEDB Initialization utility (DBFUMIN0).
- DB Segment Restructure reload program FABRRELD must run under IMS BMP region.

Because FABRRELD issues a SYNC call internally to reuse NBA/OBA buffers, the performance of the reload processing depends on how frequently the SYNC call is issued. The more number of NBA buffers are specified, the less number of SYNC calls are issued, that is, performance is improved. But note that this improved performance might offset the performance of other applications concurrently running under other dependent regions.

Fast Path HSSP can be applied to elicit good performance for reloading DEDB. This can be achieved by specifying PROCOPT=H in a PCB statement of this reload program PSB.

Topics:

- "Converting to a DEDB with DB Segment Restructure" on page 591
- "FABRRELD JCL (conversion to DEDB)" on page 592

Converting to a DEDB with DB Segment Restructure

You must run several programs in order to use DB Segment Restructure to convert an HDAM, HIDAM, or HISAM database to a DEDB.

About this task

The programs can be run in a single job or in several jobs. The steps in a DB Segment Restructure job stream vary, depending on the changes that you are making.

The following steps illustrate the job steps that are required to use DB Segment Restructure. A typical job stream can contain some or all of these steps. Because there are no logical relationships in the database in this job step, there is no need to run any of the utilities that handle logical relationships.

Procedure

1. Create a copy of each old database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. If a problem occurs during the DB Segment Restructure process, you will have a *backup* database copy.
2. Run the DB Segment Restructure unload program (FABRUNLD).

   Always include this step. This program creates a sequential data set that contains the old unloaded databases with current DBDs and PSBs of the full-function database being unloaded.
3. Run DBDGEN, PSBGEN, and ACBGEN.

© Copyright IBM Corp. 2000, 2021

These IMS procedures create the DBDs, the PSBs, and the ACB for new DEDB to be reloaded.

4. Delete and then define the database data sets.

   Always include this step. Perform this step to delete the old database data sets and allocate new DEDB database data sets.

5. Run the IMS DEDB Initialization utility (DBFUMIN0).

   Always include this step. This utility initializes the new DEDB database.

6. Run the DB Segment Restructure reload program (FABRRELD).

   Always include this step. This program creates new restructured databases. This program must run under IMS BMP region.

7. Create a copy of each new database.

   For this step, you can use one of the following utilities:

   - IMS Database Image Copy utility (DFSUDMP0)
   - IMS Online Database Image Copy utility (DFSUICP0)
   - IMS HP Image Copy

   Important: Always include this step. This step is usually included as a safeguard. This is the first backup of the new databases.

FABRRELD JCL (conversion to DEDB)

To convert any full-function database to DEDB, the DB Segment Restructure reload program FABRRELD must run under IMS BMP region.

To run FABRRELD, you must provide some additional DD statements. These are the FABRRELD JCL requirements:

EXEC
Code this statement as:

```
//     EXEC IMSBATCH,
//          MBR=FABRRELD,
//          PSB=psbname
```

The PSB must have these characteristics:

- It contains PROCOPT=I or PROCOPT=A (on the PCB statement) if you are using FABRRELD as an initial load program.
- It contains PROCOPT=A (on the PCB statement) if you are using FABRRELD as an update program.
- It contains LANG=ASSEM, LANG=COBOL, or LANG=PL/I on the PSBGEN statement.

SYSPRINT DD
This output data set contains the reports produced by FABRRELD. BLKSIZE, if coded on the DD statement, must be a multiple of 133.

SYSIN DD
This input data set contains your description of the processing to be done by FABRRELD. It describes the data to be reloaded. BLKSIZE, if coded on the DD statement, must be a multiple of 80.

USEREXIT DD
This input partitioned data set contains the user exit routine load modules.

***datain* DD**
This input data set is a sequential file containing an unloaded database. You can use any ddname for this data set.

***database* DD**
This input data set is an IMS database data set. Use the ddname specified in the DBD.

The following figure shows an example of FABRRELD JCL to convert a full-function database to a DEDB.

```
//RELD    EXEC IMSBATCH,
//             MBR=FABRRELD,
//             PSB=psbname
//SYSPRINT DD  SYSOUT=A
//USEREXIT DD  DUMMY
//DATADEDB DD  DISP=OLD,DSN=HPS.DEDB.DATABASE
//RELD1    DD  DISP=OLD,DSN=HPS.UNLOADED.DATASET
//SYSIN    DD  *
DB        dbdname   RELD1
/*
```

Figure 282. FABRRELD JCL (converting to DEDB)

Part 7. Reference

Use the following topics to understand the layout of KEYSIN and HISTORY data set records.

Topics:

- Chapter 34, “Layout of KEYSIN data set record,” on page 597
- Chapter 35, “Layout of HISTORY data set record,” on page 599
- Chapter 36, “How to read syntax diagrams,” on page 601

© Copyright IBM Corp. 2000, 2021

Chapter 34. Layout of KEYSIN data set record

This reference topic describes the layout of KEYSIN data set records.

The layout for the KEYSIN data set records is a product-sensitive programming interface. See “Programming interface information” on page 812 to understand the restrictions associated with this type of material.

PSPI

The layouts for the KEYSIN header record and the KEYSIN key record can be referenced by using the FABUKEYS macro to map theses records. The macro is a product-sensitive macro provided by HD Pointer Checker, which can be used to present the layout for the KEYSIN data set records. This macro enables customers to write programs for the HD Pointer Checker. Use this macro to request or receive the HD Pointer Checker services.

If you specify RECFM=F or FB on the DCB parameter in the KEYSIN DD statement, the RDW field (first four bytes) is not generated.

PSPI

© Copyright IBM Corp. 2000, 2021

Chapter 35. Layout of HISTORY data set record

This reference topic describes the layout of HISTORY data set records.

This topic describes product-sensitive programming interface information. See “Programming interface information” on page 812 to understand the restrictions associated with this type of material.

PSPI

The layout has the four types of HISTORY data set records. You can use the FABGHIR macro to map these records with the DSECT name HISTREC.

Subsections:

- “HISTORY data set control record” on page 599
- “Database data set (DBDS) table record” on page 599
- “Database data set (DBDS) record” on page 599
- “HD Pointer Checker runtime record” on page 600
- “Macro intended for customer use” on page 600

HISTORY data set control record

This control record contains the following information:

- HD Pointer Checker runtime list which shows all dates of the HD Pointer Checker runs and the number of runs a day
- Number of database data set table records in the HISTORY data set
- Number of database data set records in the HISTORY data set

Database data set (DBDS) table record

This record contains key date list entries. Each entry contains the following information:

- Key date field of the database data set records for the database data set
- Number of database data set records of the same key date for the database data set
- A flag indicating whether HD Pointer Checker CHECK process was done for the database data set

Database data set (DBDS) record

This record contains analysis information of a database data set collected by HD Pointer Checker.

There are three types of database data set records as follows:

Statistics record 1

This is the first record of database data set records with the same key date for the database data set. It contains following information:

- Database description information
- HD Pointer Checker runtime option information
- Pointer validation information
- HISAM, HIDAM index, or secondary index information
- HD Pointer Checker output records count information

© Copyright IBM Corp. 2000, 2021

Statistics record 2

This is the second record of database data set records with the same key date for the database data set.

- Free space statistics information
- Tuning statistics information
- DB records distribution statistics information
- HD Pointer Checker output records count information

Segment statistics record

This is the third or up to 255th record of database data set records with the same key date for the database data set. One record can contain the information of two segments.

- Segments statistics information

HD Pointer Checker runtime record

This record contains the key date and the names of all database data sets processed by the last HD Pointer Checker run in one day.

Macro intended for customer use

The macro identified in this topic is provided to allow a customer installation to write programs that use the services of DB Historical Data Analyzer. Use only this macro to request or receive the services of DB Historical Data Analyzer.

DB Historical Data Analyzer provides only the following product-sensitive macro:

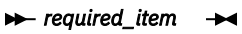
FABGHIR
This macro is used to map the HISTORY data set records with the DSECT name HISTREC.

PSPI

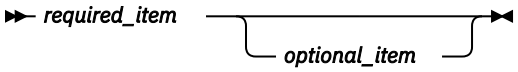
Chapter 36. How to read syntax diagrams

The following rules apply to the syntax diagrams that are used in this information:

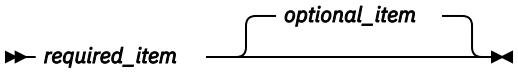
- Read the syntax diagrams from left to right, from top to bottom, following the path of the line. The following conventions are used:
  - The >>--- symbol indicates the beginning of a syntax diagram.
  - The ---> symbol indicates that the syntax diagram is continued on the next line.
  - The >--- symbol indicates that a syntax diagram is continued from the previous line.
  - The --->< symbol indicates the end of a syntax diagram.
- Required items appear on the horizontal line (the main path).



- Optional items appear below the main path.

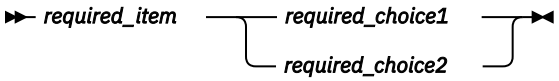


  If an optional item appears above the main path, that item has no effect on the execution of the syntax element and is used only for readability.

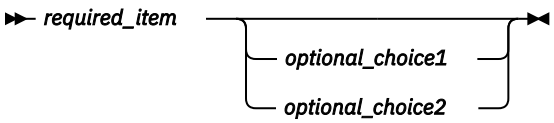


- If you can choose from two or more items, they appear vertically, in a stack.

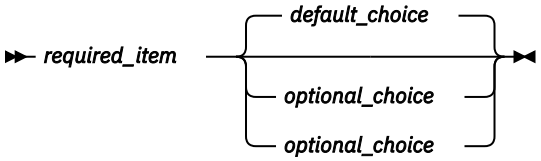
  If you *must* choose one of the items, one item of the stack appears on the main path.



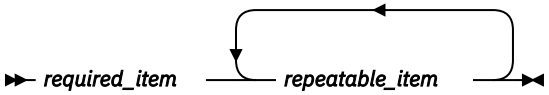
  If choosing one of the items is optional, the entire stack appears below the main path.



  If one of the items is the default, it appears above the main path, and the remaining choices are shown below.

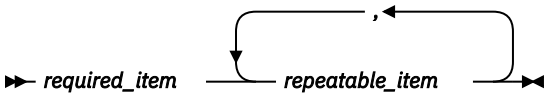


- An arrow returning to the left, above the main line, indicates an item that can be repeated.



© Copyright IBM Corp. 2000, 2021

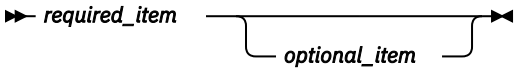
If the repeat arrow contains a comma, you must separate repeated items with a comma.



A repeat arrow above a stack indicates that you can repeat the items in the stack.

- Sometimes a diagram must be split into fragments. The syntax fragment is shown separately from the main syntax diagram, but the contents of the fragment should be read as if they are on the main path of the diagram.

fragment-name



- A b symbol indicates one blank position.
- Keywords, and their minimum abbreviations if applicable, appear in uppercase. They must be spelled exactly as shown. Variables appear in all lowercase italic letters (for example, *column-name*). They represent user-supplied names or values.
- Separate keywords and parameters by at least one space if no intervening punctuation is shown in the diagram.
- Enter punctuation marks, parentheses, arithmetic operators, and other symbols exactly as shown in the diagram.
- Footnotes are shown by a number in parentheses; for example, (1).

Part 8. Troubleshooting

Use the following topics to troubleshoot IMS HP Pointer Checker problems.

Topics:

- Chapter 37, “Messages and codes,” on page 605
- Chapter 38, “Gathering diagnostic information,” on page 803
- Chapter 39, “Diagnostics Aid,” on page 805

© Copyright IBM Corp. 2000, 2021

Chapter 37. Messages and codes

The following topics describe the abend codes, return codes, and messages issued by the five utilities of IMS HP Pointer Checker.

Topics:

- "HD Pointer Checker messages and codes" on page 605
- "HD Tuning Aid messages and codes" on page 731
- "DB Historical Data Analyzer messages and codes" on page 751
- "Space Monitor messages and codes" on page 772
- "DB Segment Restructure messages and codes" on page 793

HD Pointer Checker messages and codes

The following reference topics provide information about the abend codes, return codes, and messages issued by the HD Pointer Checker programs.

HD Pointer Checker abend codes

Every 3*nnn* abend code is accompanied by an FABP3*nnn*E message. (3*nnn* is a four-digit identification number of the abend code and message.) See the associating FABP3*nnn*E message description for the 3*nnn* abend code.

HD Pointer Checker return codes

HD Pointer Checker modules generate return codes to indicate the result of a job.

Subsections:

- "FABPMAIN" on page 605
- "FABPCHRO" on page 606
- "FABPAUTH" on page 606
- "FABPTGEN" on page 606

FABPMAIN

The following list shows the return codes set by FABPMAIN.

Code
Meaning

0
Successfully completed. Your database data sets were successfully processed by FABPMAIN. It does *not* mean that the database is error-free. Your database is valid from an IMS standpoint when TYPE=ALL or CHECK is specified.

2
Successfully completed; defined unknown data (T2) was detected. One of the HD Pointer Checker programs detected an unknown data error that is defined by T2NUM and T2LEN. This return code is issued only when unknown data and no other errors are detected.

4
Successfully completed; database errors were detected. One of the HD Pointer Checker programs detected a database error.

© Copyright IBM Corp. 2000, 2021

8
Did not complete successfully; control statement errors were detected. HD Pointer Checker ends the job.

The return codes are original values, and they are converted to the value specified in the HPSRETCD statement.

Tip: If you specify an HPSRETCD statement, you can change the return codes. For each return code, see "HPSRETCD Statements report" on page 174.

FABPCHRO

The following list shows the return codes set by FABPCHRO.

Code
Meaning

0
Successfully completed.

FABPAUTH

The following list shows the return codes set by FABPAUTH.

Code
Meaning

0
The environmental setting for the HASH pointer checking completed successfully.

16
Severe errors; syntax errors were detected in the HD Pointer Checker PROCCTL statement, which was internally generated by the IMS Database Recovery Facility program. For more information, see HD Pointer Checker "PROCCTL Statement Report", which is printed in the IMS Database Recovery Facility master address space.

FABPTGEN

The following list shows the return codes that are set by FABPTGEN.

Code
Meaning

0
Successfully completed. A report or the default table source is generated.

4
Successfully completed but with warnings. The default table source is generated but some warning messages are issued.

8
Did not complete successfully; control statement errors or other errors were detected. For more information, see the error messages.

HD Pointer Checker messages

Use the information in these messages to help you diagnose and solve HD Pointer Checker problems.

Message format

HD Pointer Checker messages adhere to the following format:

```
FABPnnnnx
```

Where:

FABP
Indicates that the message was issued by HD Pointer Checker

nnnn
Indicates the four-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred. This message requires user action.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

In the message text, you might see lowercase variable names (such as *xxx...*). The variable names take on values when the message appears and might represent such things as:

- The name of a module
- A return code
- A condition code
- A command keyword
- A name or value provided by the user

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABP0001I HD POINTER CHECKER ENDED NORMALLY

Explanation

The HD Pointer Checker job ended normally. Check the HD Pointer Checker Summary report for the detected pointer errors.

System action

This is the normal end of the HD Pointer Checker job with RC=0.

User response

None. This message is informational.

FABP0003E HD POINTER CHECKER ENDED WITH ERRORS

Explanation

HD Pointer Checker detected an error when analyzing an input control statement.

If a FABP0003E message is issued in the single-step or multiple-step HASH checking in IMS HP Image Copy job, locate the FABP4026E message, which indicates that the input database is not supported, in the job log or HD Pointer Checker reports.

System action

HD Pointer Checker ends the job with RC=8.

User response

Correct the error, and rerun the job.

Problem determination

Review the error message in the PROCCTL Statement report.

If the single-step HASH Check option was used in the IMS HP Image Copy job, see the message explanation for FABP4026E.

FABP0004E HD POINTER CHECKER EVALUATION IS NOT PROCESSED

Explanation

HD Pointer Checker did not complete pointer checking because some errors or user abends occurred in the HD Pointer Checker process. This message is issued when HD Pointer Checker is invoked from another product.

System action

Processing continues.

User response

Correct the error, and rerun the job.

Problem determination

Check the error message that is generated by the scan or the evaluation process.

FABP0005I BLOCK MAP PROCESS ENDED NORMALLY

Explanation

The Block Map process ended normally.

System action

This is the normal end of the HD Pointer Checker job with RC=0.

User response

None. This message is informational.

FABP0006E POINTER CHECKING PROCESS WAS NOT PERFORMED FOR ONE OR MORE DATABASES OR DBDS

Explanation

Pointer checking was scheduled in the IMS HP Image Copy job or the IMS Online Reorganization Facility job. However, pointer checking was not performed for one or more database data sets because of IMS HP Image Copy failures. Such database data sets are shown in the preceding FABP2124E messages.

System action

Processing continues.

User response

Locate the FABP2124E messages and identify the database data sets for which pointer checking was not performed. Then, for each identified database data set, locate the corresponding IMS HP Image Copy error message and correct the image copy failure. After you correct all the image copy failures, rerun the job.

FABP0007I SPACE MONITOR ENDED NORMALLY

Explanation

This message is generated when Space Monitor ends successfully.

System action

HD Pointer Checker ends the job with RC=0.

User response

None. This message is informational.

FABP0008W SPACE MONITOR ENDED WITH WARNINGS

Explanation

Either Space Monitor encountered minor error conditions or one or more threshold warning messages were generated in the Space Monitor Exception report.

System action

HD Pointer Checker ends the job with RC=4.

User response

See the other message generated by Space Monitor to determine the nature and causes of the errors detected. If necessary, correct the problem and rerun the job.

FABP0009E SPACE MONITOR ENDED WITH ERRORS

Explanation

Either Space Monitor encountered major error conditions or one or more error messages were generated in the Space Analysis by the Data Set report.

This message is shown in the HPSRETCD Statement report.

System action

HD Pointer Checker ends the job with RC=8.

User response

See the other message generated by Space Monitor to determine the nature and cause of the errors detected. Correct the problem and rerun the job.

FABP0010I #EVALUATION ERRORS DETECTED = *nnn*

Explanation

If *nnn* is not zero, then the database is damaged. At least one segment is pointed to by an incorrect combination of pointers.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0020I #VALIDATION ERRORS DETECTED = *nnn*

Explanation

If *nnn* is not zero, then the database is damaged. At least one pointer or free space element is damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0030E BAD FREE SPACE ELEMENT

Explanation

The database is damaged. The free space element chain is damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0035E BAD FREE SPACE ANCHOR POINT

Explanation

The database is damaged. The free space anchor point (the first 4 bytes in the database block) is incorrect.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0040E COUNTER VALUE < NUMBER OF LCHILD

Explanation

The database is probably damaged. The actual number of logical child segments that point to this target segment is greater than its counter value. This could result in the target segment being deleted before all of its logical child segments are deleted.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job.

If there is a deleted logical child segment in HISAM overflow that does not have the delete flag set, the HD Pointer Checker treats the deleted segment as "active" and issues the reported message. If the HISAM database is logically connected to an HD database, reorganize only the HISAM database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0045W CANNOT VALIDATE # OF LCHILD > 32K

Explanation

HD Pointer Checker cannot validate the actual number of logical child segments that point to this target segment that is greater than 32 K.

System action

Processing continues.

User response

None.

FABP0050E COUNTER VALUE > NUMBER OF LCHILD

Explanation

The database is damaged. The actual number of logical child segments that point to this target segment is less than its counter value. The target segment cannot be physically removed from the database, even if it and all its dependent segments are deleted.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0051E THE SUM OF THE CTR FIELDS (*count1*) IN LP SEGMENT *segname1* DOES NOT EQUAL TO THE NUMBER OF LC (*count2*)

Explanation

The sum of CTR values in logical parent segments (*count1*) is not the same as the number of logical child segment occurrences (*count2*).

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0060W SUM OF COUNTERS > 2,147,483,647

Explanation

The database is probably damaged. While calculating the sum of all counter fields for this segment type, the running sum exceeded 2,147,483,647.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. If there is an error, message FABP0050E or FABP0040E indicates which segment has incorrect counter field.

FABP0070E DISPLAY OF VALIDATION ERROR MESSAGES LIMITED TO 100

Explanation

The database is damaged. More than 100 error messages were generated. ERRLIMIT=YES is specified on the OPTION statement.

System action

Processing continues. No more error messages are printed, but all errors are counted.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0075E DISPLAY OF EVALUATION ERROR MESSAGES LIMITED TO 100

Explanation

More than 100 error or warning messages were generated. ERRLIMIT=YES is specified on the OPTION statement.

System action

Processing continues. No more messages are printed, but all errors are counted.

User response

See the messages listed before this message.

Problem determination

If any error messages were generated, see Chapter 11, “Database repair guidelines,” on page 293 to repair the database.

FABP0090E LCF & (LTF OR LP) TO SAME TARGET

Explanation

The database is damaged. The target of a logical child first pointer is also the target of a logical twin forward or a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCF pointers point to the first logical twin segment in the twin chain. The LTF pointers point only to logical twins after the first one. Therefore, it is illegal to have LCF and LTF pointers to the same target. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LCF and LP pointers to the same target.

FABP0100E LCF & LP POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child first pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have the LCF and LP pointers pointing to the same target.

FABP0110E LCF & LTF POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child first pointer is also the target of a logical twin forward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCF pointers point to the first logical twin segment in the twin chain. The LTF pointers point only to the logical twins after the first one. Therefore, it is illegal to have LCF and LTF pointers to the same target.

FABP0120E LCF IS ZERO & LCL IS NON-ZERO

Explanation

The database is damaged. A segment contains a nonzero logical child last pointer, while its logical child first pointer is zero.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because the LC pointers define the start and end of a logical twin chain, they must either both be zero or both be nonzero.

FABP0130E LCL & (LTB OR LP) TO SAME TARGET

Explanation

The database is damaged. The target of a logical child last pointer is also the target of a logical twin backward or a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCL pointers point to the last logical twin segment in the twin chain. The LTB pointers point only to the logical twins before the last one. Therefore, it is illegal to have LCL and LTB pointers to the same target. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LCL and LP pointers to the same target.

FABP0140E LCL & LP POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child last pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have the LCL and LP pointers pointing to the same target.

FABP0150E LCL & LTB POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child last pointer is also the target of a logical twin backward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCL pointers point to the last logical twin segment in the twin chain. The LTB pointers point only to the logical twins before the last one. Therefore, it is illegal to have LCL and LTB pointers to the same target.

FABP0160E LCL IS ZERO & LCF IS NON-ZERO

Explanation

The database is damaged. A segment contains a nonzero logical child first pointer, while its logical child last pointer is zero.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because the LC pointers define the start and end of a logical twin chain, they must either both be zero or both be nonzero.

FABP0170E LP & (LTF OR LCF) TO SAME TARGET

Explanation

The database is damaged. The target of a logical parent pointer is also the target of a logical twin forward or a logical child first pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LCF and LP pointers or LTF and LP pointers to the same target.

FABP0180E LP & LCF POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child first pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LP and LCF pointers to the same target.

FABP0190E LP & LTF POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin forward pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LP and LTF pointers to the same target.

FABP0195E LP & PAIRED LC POINT TO SAME TARGET

Explanation

The database is damaged. The target of a Paired Logical Child pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LP and Paired LC pointers to the same target.

FABP0200E LP POINTER VALUE IS ZERO

Explanation

The database is damaged. A logical child segment contains zeros in its logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0210E LTB & (LCL OR LP) TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin backward pointer is also the target of a logical child first or a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCL pointers point to the last logical twin segment in the twin chain. The LTB pointers point only to the logical twins before the last one. Therefore, it is illegal to have LCL and LTB pointers to the same target. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LTB and LP pointers to the same target.

FABP0220E LTB & LCL POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin backward pointer is also the target of a logical child first pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCL pointers point to the last logical twin segment in the twin chain. The LTB pointers point only to the logical twins before the last one. Therefore, it is illegal to have LCL and LTB pointers to the same target.

FABP0230E LTB & LP POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin backward pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have the LTB and LP pointers point to the same target.

FABP0240E LTB WITH NO CORRESPONDING LTF

Explanation

The database is damaged. A logical twin backward pointer points to a segment, but there is no logical twin forward pointer to that segment. HD Pointer Checker determined that this segment was not the first logical twin segment in the twin chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0250E LTF & (LCF OR LP) TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin forward pointer is also the target of a logical child first or a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCF pointers point to the first logical twin segment in the twin chain. The LTF pointers point only to the logical twins after the first one. Therefore, it is illegal to have LCF and LTF pointers to the same target. Because a logical child segment cannot also be a logical parent segment, it is illegal to have LP and LTF pointers to the same target.

FABP0260E LTF & LCF POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical child first pointer is also the target of a logical twin forward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The LCF pointers point to the first logical twin segment in the twin chain. The LTF pointers point only to the logical twins after the first one. Therefore, it is illegal to have LCF and LTF pointers to the same target.

FABP0270E LTF & LP POINT TO SAME TARGET

Explanation

The database is damaged. The target of a logical twin forward pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have the LP and LTF pointers to the same target.

FABP0275E PAIRED LC & LP POINT TO SAME TARGET

Explanation

The database is damaged. The target of a Paired Logical Child pointer is also the target of a logical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a logical child segment cannot also be a logical parent segment, it is illegal to have the LP and LTF pointers to the same target.

FABP0280E LTF WITH NO CORRESPONDING LTB

Explanation

The database is damaged. A logical twin forward pointer points to a segment, but there is no logical twin backward pointer to that segment. HD Pointer Checker determined that this segment was not the last logical twin segment in the twin chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0290E MORE THAN 1 LCF TO SAME TARGET

Explanation

The database is damaged. More than one logical child first pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a segment cannot be a logical child in more than one logical relationship, and each segment must have a unique parent, it is illegal to have multiple LCF pointers to a segment.

FABP0300E MORE THAN 1 LCL TO SAME TARGET

Explanation

The database is damaged. More than one logical child last pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Because a segment cannot be a logical child in more than one logical relationship, and each segment must have a unique parent, it is illegal to have multiple LCL pointers to a segment.

FABP0305E MORE THAN 1 IN TO SAME TARGET

Explanation

The database is damaged. Two or more HIDAM or PHIDAM primary index pointers point to the same target. The target is root segment of HIDAM or PHIDAM database.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0310E MORE THAN 1 LTB TO SAME TARGET

Explanation

The database is damaged. More than one logical twin backward pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The logical twin chain is crossed or otherwise damaged.

FABP0315E MORE THAN ONE OF TO SAME TARGET

Explanation

The database is damaged. More than one pointer in the overflow (OSAM) part of a HIDAM index database points to the same target.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job. If only the index database is damaged, you can resolve the problem by reorganizing the HIDAM database; thereby rebuilding the HIDAM index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The correspondence between the HIDAM root segments and the HISAM Index segments must be *bijective*. (The term *bijective* means that there must be exactly the same number of root segments as there are index segments, and each root segment must correspond to a unique index segment.)

FABP0320E MORE THAN 1 LTF TO SAME TARGET

Explanation

The database is damaged. More than one logical twin forward pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The logical twin chain is crossed or otherwise damaged.

FABP0325E MORE THAN 1 SX TO SAME TARGET

Explanation

The database is damaged. The secondary index source and target segments (as defined in the DBDs) are the same, and two secondary index (KSDS) pointers point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0326E NUMBER OF INDEX SOURCE (SC: *xx*) < NUMBER OF INDEX POINTER (DB#: *nnn*)

Explanation

The number of the index source segments is less than that of the index pointer segments is. NUMBER OF INDEX SOURCE means the number of index source segments except the number of segments meeting the conditions of suppressing index pointer segment.

The secondary index database maintenance exit routine cannot be validated by the HD Pointer Checker. If, for example, the secondary index database maintenance exit has some logic that depend on the date and time logic that the segment inserted, HD Pointer Checker cannot reproduce the logic because it depends on the current data and time. Check whether the customer's secondary index database maintenance exit has this kind of logic, and if it has, specify SPIXCHK=NO for the OPTION statement in the PROCCTL data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0327E NUMBER OF INDEX SOURCE (SC: *xxx*) > NUMBER OF INDEX POINTER (DB#: *xxx*)

Explanation

The number of the index source segments is greater than that of the index pointer segments. NUMBER OF INDEX SOURCE means the number of index source segments other than those segments meeting the conditions of suppressing index pointer segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0330E MORE THAN 1 PCF TO SAME TARGET

Explanation

The database is damaged. More than one physical child first pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Each dependent segment must have a unique physical parent. Therefore, there can be at most one physical child first pointer to any segment.

FABP0335E MORE THAN 1 SXO TO SAME TARGET

Explanation

The database is damaged. The secondary index source and target segments (as defined in the DBDs) are the same, and two secondary index overflow (ESDS) pointers point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0340E MORE THAN 1 PCL TO SAME TARGET

Explanation

The database is damaged. More than one physical child last pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Each dependent segment must have a unique physical parent. Therefore, there can be at most one physical child last pointer to any segment.

FABP0350E MORE THAN 1 HB TO SAME TARGET

Explanation

The database is damaged. More than one hierarchical backward pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The hierarchical pointer chain is crossed or otherwise damaged.

FABP0360E MORE THAN 1 HF TO SAME TARGET

Explanation

The database is damaged. More than one hierarchical forward pointer is pointing to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The hierarchical pointer chain is crossed or otherwise damaged.

FABP0370E MORE THAN 1 PTB TO SAME TARGET

Explanation

The database is damaged. More than one physical twin backward pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The physical twin pointer chain is crossed or otherwise damaged.

FABP0380E MORE THAN 1 PTF TO SAME TARGET

Explanation

The database is damaged. More than one physical twin forward pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The physical twin pointer chain is crossed or otherwise damaged.

FABP0390E MORE THAN 1 RAP TO SAME TARGET

Explanation

The database is damaged. More than one root anchor pointer points to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Consider changing all but one of the duplicate RAPs to zero, followed by a database reorganization.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0400E MORE THAN 1 VLS TO SAME TARGET

Explanation

The database is damaged. The VLS pointers from two or more split segments point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0410E *xxxx* (HEX) BYTES OF UNKNOWN DATA

Explanation

The database might be damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293 and Chapter 12, “Reported by HD Pointer Checker slack bytes, unknown data, and T2 errors,” on page 307.

FABP0411E SEGMENT LENGTH FIELD IS INVALID

Explanation

The length field of a variable length segment contains a value outside of the range defined for the segment.

System action

Processing continues. A FABP0410E message that indicates a T2 error and one or more FABP0960E messages that indicate T5 errors will follow in the report.

User response

See the FABP0410E message.

FABP0412E SEGMENT BEYOND THE SIZE LIMIT

Explanation

The database is probably damaged. A segment data is located in the block or CI that exceeds the data set size limit. The maximum size of a database data set is:

- 8 GB when it is an OSAM data set of a non-HALDB with an even number of block size, or when it is an OSAM data set of a HALDB that is registered as DSORG=OSAM8G in RECON data sets
- 4 GB when it is a VSAM data set, an OSAM data set of non-HALDB with an odd number of block size, or an OSAM data set of a HALDB that is registered as DSORG=OSAM in RECON data sets

System action

Processing continues.

User response

The pointers pointing to those segments are incorrect. Repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0413W BYPASS SPACE BEYOND THE *n*GB SIZE LIMIT

Explanation

The database data set is allocated beyond the *n* GB size limit. For an OSAM data set of a non-HALDB with an even-numbered block size or an OSAM data set of a HALDB that is registered as DSORG=OSAM8G in RECON data sets, *n* is 8; otherwise *n* is 4. The HD Pointer Checker bypasses checking of the blocks that exist over *n* GB. If other messages appear with FABP0413W, check the description of the messages. If no message other than FABP0413W appears, the database is not damaged. Then, this message means that the number of blocks allocated to this database exceeds the limit, and no valid segment data exists beyond that limit. This status occurs when some segments were attempted to be inserted beyond the limit.

System action

Processing continues.

User response

None.

FABP0414E THE HALDB IS REGISTERED AS DSORG=OSAM IN RECON BUT SEGMENTS RESIDE BEYOND THE 4 GB BOUNDARY

Explanation

This HALDB supports up to 4 GB of data because the HALDB is registered as DSORG=OSAM in the RECON data sets. However, segment occurrences are found in the block that exceeds 4 GB boundary in the database data set.

System action

Processing continues.

User response

Ensure that the correct RECON data sets and the correct database data sets are used. If not, specify the correct data sets and rerun the HD Pointer Checker job. If the correct data sets are used, this message indicates that the database is damaged. See Chapter 11, “Database repair guidelines,” on page 293 and repair the database. Then, rerun the HD Pointer Checker job.

FABP0415E ROOT KEY IS OUT OF RANGE

Explanation

The HIDAM database is damaged. A root key that is out of range for the partition was found during the HIDAM SCAN process.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0416E THE HALDB IS REGISTERED AS DSORG=OSAM8G IN RECON BUT THE INPUT ICDS IS AN M-SIDE DATA SET

Explanation

This HALDB supports up to 8 GB of data because the HALDB is registered as DSORG=OSAM8G in the RECON data sets. However, the input image copy data sets are M-side data sets. Only A-side data sets are supported when the HALDB supports up to 8 GB of data.

System action

Processing continues, but HD Pointer Checker treats the HALDB as a database that supports up to 4 GB of data and input image copy data sets as M-side data sets.

User response

Ensure that the correct RECON data sets and the correct image copy data sets are used. If not, specify the correct data sets and rerun the HD Pointer Checker job.

If the correct RECON data sets and the correct image copy data sets are used, the following are possible causes:

- If other error messages are issued, the database is damaged. See Chapter 11, “Database repair guidelines,” on page 293 and repair the database. Then, rerun the HD Pointer Checker job.
- If no other error messages are issued, the database is not damaged. The image copy data sets were probably created when the HALDB supported up to 4 GB of data, before the HALDB was changed to support up to 8 GB of data. If you want to use the image copy data sets to recover the HALDB, recover the RECON data sets to the time when the image copy was created and then recover the HALDB.

FABP0417E THE HALDB IS DEFINED AS VSAM IN THE DBD BUT IS REGISTERED AS DSORG=OSAM8G IN RECON

Explanation

HD Pointer Checker detected an inconsistency between the RECON data sets and the DBD. This HALDB is registered in the RECON data sets as a database that uses the OSAM access method. However, in the DBD, the database is defined to use the VSAM access method.

System action

Processing continues, but HD Pointer Checker treats the database data sets as VSAM data sets.

User response

Specify the correct RECON data sets and the correct DBD library, and then rerun the HD Pointer Checker job.

FABP0420I N/A FOR IMAGE COPY

Explanation

Disk address cannot be calculated if input database is image copy.

System action

Processing continues.

User response

None. This message is informational.

FABP0430E NO H/T/PC TO DEPENDENT

Explanation

The database is damaged. A dependent segment exists and is not the target of any hierarchical, twin, or physical child pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0440E NO INDEX POINTER TO THIS ROOT

Explanation

The database is damaged. A root segment in a HIDAM database exists, and there is no segment in the primary index database that points to that root segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Consider reorganizing the HIDAM database, rebuilding the index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0450E NO LTF OR LCF POINTER TO LC

Explanation

The database is damaged. A virtually paired logical child segment exists that is not the target of any logical twin forward or logical child first pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0460E NO HF OR PTF POINTER TO ROOT

Explanation

The database is damaged. Two or more HIDAM root segments that are not the target of any hierarchical forward or physical twin forward pointer were detected. (The first such occurrence is assumed to be the first root in the HIDAM database. Any other occurrence is assumed to be an error.)

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0470E NO POINTERS TO THIS SEGMENT

Explanation

The database is damaged. A valid segment exists that is the target of no pointer. Such a segment, and its dependents, cannot be accessed by IMS.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. To keep the segment, connect it to the correct pointer chains.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. If you reorganize the database, this segment disappears.

FABP0480E NO RAP/H/T TO RT

Explanation

The database is damaged. An HDAM root segment that is not the target of any root anchor point, hierarchical, or physical twin pointer, is found. Such a segment, and its dependents, cannot be accessed by IMS.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. To keep the segment, connect it to the correct pointer chains.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. If you reorganize the database, this segment will disappear.

FABP0490E NO. OF RECORDS WRITTEN FOR POINTER RECONSTRUCTION LIMITED TO 100

Explanation

The database is damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0500E NON-ZERO LTF AT END OF CHAIN

Explanation

The database is damaged. A segment that is not the target of a logical twin backward pointer has a nonzero logical twin forward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. Only the last twin in the chain is not the target of a logical twin backward pointer. Such a segment must have a zero logical twin forward pointer.

FABP0510E NON-ZERO PTF AT END OF CHAIN

Explanation

The database is damaged. A segment that is not the target of a physical twin backward pointer has a nonzero physical twin forward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Only the last twin in the chain is not the target of a physical twin backward pointer. Such a segment must have a zero physical twin forward pointer.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0530E PAIRED LOG. CHILD < PHYS. CHILD

Explanation

The database is damaged. The number of physically paired segments does not match. Fewer logical child segments were detected than physical child segments.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0540E **PAIRED LOG. CHILD > PHYS. CHILD**

Explanation

The database is damaged. The number of physically paired segments does not match. Fewer physical child segments were detected than logical child segments.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0541E **THE OCCURRENCES OF THE PHYSICALLY PAIRED SEGMENT ARE DIFFERENT. *segname1* (*count1*) : *segname2* (*count2*)**

Explanation

The numbers of logical child segment occurrences and paired logical child segment occurrences are not the same among the bidirectional physically paired logical relationship.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0550E **PCF & (HF, PTF, RAP, OR VL)**

Explanation

The database is damaged. An incorrect combination of pointers was detected. In addition to a physical child first pointer, a hierarchical forward, physical twin forward, root anchor point, or variable-length split pointer was detected to this segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0560E **PCF & HF POINT TO SAME TARGET**

Explanation

The database is damaged. Both a physical child first and a hierarchical forward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0570E **PCF & PTF POINT TO SAME TARGET**

Explanation

The database is damaged. Both a physical child first and a physical twin forward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The physical child first pointer identifies this segment as the first twin segment in the twin chain.

Twin forward pointers cannot point to the first twin in the chain.

FABP0580E PCF & RAP POINT TO SAME TARGET

Explanation

The database is damaged. Both a physical child first pointer and a root anchor pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The target of a physical child first pointer must be a dependent segment. The target of a root anchor pointer must be a root segment. Therefore, this combination is illegal.

FABP0590E PCF & VLS POINT TO SAME TARGET

Explanation

The database is damaged. Both a physical child first pointer and a variable-length split pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The pointer to the data part of a split variable-length segment is the only pointer allowed. All other pointers to a split segment must point to the prefix part.

FABP0600E PCF IS ZERO & PCL IS NON-ZERO

Explanation

The database is damaged. This segment contains a nonzero physical child last pointer, and its physical child first pointer is zero.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The physical child’s first and last pointers must both be zero or both be nonzero.

FABP0602E PCF WITH NO CORRESPONDING PTB

Explanation

The database is damaged. A physical child first pointer to this segment was detected, but no corresponding physical twin backward pointer was detected. HD Pointer Checker determined that this segment was not the last in the twin chain.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0604E PCF WITH NO CORRESPONDING HB

Explanation

The database is damaged. A physical child first pointer to this statement was detected, but no corresponding physical hierarchical backward pointer was detected. HD Pointer Checker determined that this segment was not the last in the hierarchical chain.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0610E PCL & (HB OR PTB) TO SAME TARGET

Explanation

The database is damaged. A physical child last pointer and either a hierarchical backward pointer or a physical twin backward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0620E PCL & HB POINT TO SAME TARGET

Explanation

The database is damaged. A physical child last pointer and a hierarchical backward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0630E PCL & PTB POINT TO SAME TARGET

Explanation

The database is damaged. A physical child last pointer and a physical twin backward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0640E PCL IS ZERO & PCF IS NON-ZERO

Explanation

The database is damaged. This segment contains a nonzero physical child first pointer, and its physical child last pointer is zero.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. The physical child’s first and last pointers must both be zero or both be nonzero.

FABP0650E HB & (PTB OR PCL) TO SAME TARGET

Explanation

The database is damaged. A physical hierarchical backward pointer and either a physical twin backward pointer or a physical child last pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0660E HB & PCL POINT TO SAME TARGET

Explanation

The database is damaged. A physical hierarchical backward pointer and a physical child last pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0670E HB & PTB POINT TO SAME TARGET

Explanation

The database is damaged. A physical hierarchical backward pointer and a physical twin backward pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0680E HB WITH NO CORRESPONDING HF

Explanation

The database is damaged. A hierarchical backward pointer points to a segment, but there is no hierarchical forward pointer to that segment. HD Pointer Checker determined that this segment is not the first segment in the hierarchical chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0690E HF & (PTF, PCF, RAP, OR VL)

Explanation

The database is damaged. An incorrect combination of pointers was detected. In addition to a physical hierarchical forward pointer, physical twin forward, physical child first, root anchor point, or variable-length split pointer was detected to this segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0700E HF & PCF POINT TO SAME TARGET

Explanation

The database is damaged. A hierarchical forward pointer and a physical child first pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0710E HF & PTF POINT TO SAME TARGET

Explanation

The database is damaged. A hierarchical forward pointer and a physical twin forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0720E HF & RAP POINT TO SAME TARGET

Explanation

The database is damaged. A hierarchical forward pointer and a root anchor pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0730E HF & VLS POINT TO SAME TARGET

Explanation

The database is damaged. A hierarchical forward pointer and a variable-length split pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0740E HF OR PTF PTR IS ZERO

Explanation

The database is damaged. A HIDAM root segment that is not the end of a twin chain has its hierarchical or physical twin pointer set to zero.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0750E HF WITH NO CORRESPONDING HB

Explanation

The database is damaged. A hierarchical forward pointer points to a segment, but there is no hierarchical backward pointer to that segment. HD Pointer Checker determined that this segment was not the last segment in the hierarchical chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0760E PP POINTER VALUE IS ZERO

Explanation

The database is damaged. A dependent segment contains zeros in its physical parent pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0770E PTB & (HB OR PCL) TO SAME TARGET

Explanation

The database is damaged. A physical twin backward pointer and either a hierarchical backward or a physical child last pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0780E PTB & PCL POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin backward pointer and a physical child last pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0785E PTB/HB POINT TO END OF CHAIN

Explanation

The database is damaged. A physical twin backward pointer or a hierarchical backward pointer points to a segment that has zero value in a physical twin forward or a hierarchical forward pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0790E PTB & HB POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin backward pointer and a hierarchical backward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0800E PTB WITH NO CORRESPONDING PTF

Explanation

The database is damaged. A physical twin backward pointer was detected to this segment, but no corresponding physical twin forward pointer was detected. HD Pointer Checker determined that this segment was not the first in the twin chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0810E PTF & (HF, PCF, RAP, OR VL)

Explanation

The database is damaged. A physical twin forward pointer and either a hierarchical forward pointer, physical child first pointer, root anchor point, or variable-length split pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0820E PTF & PCF POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin forward pointer and a physical child first pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0830E PTF & HF POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin forward pointer and a hierarchical forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0840E PTF & RAP POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin forward pointer and a root anchor pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0850E PTF & VLS POINT TO SAME TARGET

Explanation

The database is damaged. A physical twin forward pointer and a variable-length split pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0860E PTF WITH NO CORRESPONDING PTB

Explanation

The database is damaged. A physical twin forward pointer was detected to this segment, but no corresponding physical twin backward pointer was detected. HD Pointer Checker determined that this segment was not the last in the twin chain.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0870E RAP & (HF, PTF, PCF, OR VL)

Explanation

The database is damaged. A root anchor pointer and either a hierarchical forward, physical twin forward, physical child first, or variable-length split pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0880E RAP & PCF POINT TO SAME TARGET

Explanation

The database is damaged. A root anchor pointer and a physical child first pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0890E RAP & HF POINT TO SAME TARGET

Explanation

The database is damaged. A root anchor pointer and a hierarchical forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0900E RAP & PTF POINT TO SAME TARGET

Explanation

The database is damaged. A root anchor pointer and a physical twin forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0910E RAP & VLS POINT TO SAME TARGET

Explanation

The database is damaged. A root anchor pointer and a variable-length split pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0920E SX & SXO POINT TO SAME TARGET

Explanation

The database is damaged. The secondary index source and target segment (as defined in the DBDs) are the same, and a secondary index (KSDS) pointer and a secondary index overflow (ESDS) pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0930E SXO & SX POINT TO SAME TARGET

Explanation

The database is damaged. The secondary index source and target segment (as defined in the DBDs) are the same, and both a secondary index (KSDS) pointer and a secondary index overflow (ESDS) pointer point to the same target.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0940E TARGET IS AT THE END OF THE BLOCK

Explanation

The database is damaged. The target of this pointer is an impossible byte near the end of the database block.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0950E TARGET IS IN FREE SPACE

Explanation

The database is damaged. This pointer contains an address that is in the range of a valid free space element.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. This segment is likely to be overwritten if IMS tries to insert a segment into this block. It is important to fix this problem immediately.

FABP0960E TARGET IS NOT A VALID SEGMENT

Explanation

The database is damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0970E TARGET IS THE WRONG SEGMENT TYPE

Explanation

The database is damaged. The target of this pointer is a valid segment, but it has the wrong segment code for this particular pointer.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0971E TARGET ISN'T A VALID LOGICAL RECORD

Explanation

The HISAM or the secondary index database is damaged. The logical record corresponding to the direct-address pointer does not exist in the overflow data set. Note that this message can be issued for a normal HISAM database if some segments have been deleted from the HISAM database.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0972E MORE THAN 1 POINTER TO THE SAME RECORD

Explanation

The HISAM or the secondary index database is damaged. More than one direct-address pointer points to the same logical record in the overflow data set. Note that this message can be issued for a normal HISAM database if some segments have been deleted from the HISAM database.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0973W NO POINTER TO THIS OVERFLOW LOGICAL RECORD

Explanation

No direct-address pointer points to the logical record in the overflow data set.

If an application program deleted segment of the HISAM database, the delete flag is not set by DL/I and the space of the deleted segment remains in the database. Therefore, this message is issued for the normal database, and the message can be ignored. However, it is suggested to reorganize the database if a lot of the messages are issued.

If no application program deletes a segment of the HISAM database, the HISAM database is damaged.

System action

Processing continues.

User response

If it is damaged, repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0974E NO POINTER TO THIS OVERFLOW LOGICAL RECORD

Explanation

The secondary index database is damaged. No direct-address pointer points to the logical record in the overflow data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0980E VL & (HF, PTF, PCF, OR RAP)

Explanation

The database is damaged. A pointer to the data part of a split variable-length segment and either a hierarchical forward pointer, physical twin forward pointer, physical child first pointer, or root anchor pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP0990E VLS & PCF POINT TO SAME TARGET

Explanation

The database is damaged. A pointer to the data part of a split variable-length segment and a physical child first pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. It is incorrect for any pointer other than the VLS pointer to point to the data part of a split variable-length segment.

FABP1000E VLS & HF POINT TO SAME TARGET

Explanation

The database is damaged. A pointer to the data part of a split variable-length segment and a hierarchical forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. It is incorrect for any pointer other than the VLS pointer to point to the data part of a split variable-length segment.

FABP1010E VLS & PTF POINT TO SAME TARGET

Explanation

The database is damaged. A pointer to the data part of a split variable-length segment and a physical twin forward pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. It is incorrect for any pointer other than the VLS pointer to point to the data part of a split variable-length segment.

FABP1020E VLS & RAP POINT TO SAME TARGET

Explanation

The database is damaged. A pointer to the data part of a split variable-length segment and a root anchor pointer point to the same target segment.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293. It is incorrect for any pointer other than the VLS pointer to point to the data part of a split variable-length segment.

FABP1030E HIGH KEY NOT FOUND IN THIS PARTITION

Explanation

The partition of the HIDAM database is damaged. The root segment with the high key was not found for the partition during the HIDAM SCAN process.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1040I NO ERRORS DETECTED

Explanation

No damage was detected in this database.

System action

Processing continues.

User response

None. This message is informational.

FABP1050I #LP SEGMENTS WITH ZERO CTR FIELD = *nnnnnnnn*

Explanation

nnnnnnnn is the number of logical parent segments with a counter field of zero. This is not an error.

System action

Processing continues.

User response

None. This message is informational.

FABP1055W SEGMENT WITH ZERO COUNTER FIELD

Explanation

The logical parent segment has a counter field with zero value.

System action

Processing continues.

User response

If the counter field value of the segment should not be zero, the database is probably damaged, repair the database. Ignore this message in other cases.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1060E TARGET SEGMENT CODE INVALID

Explanation

The database is damaged. This pointer points to a valid segment, but the segment code is the wrong value for this particular pointer.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1070W EMPTY DATA SET

Explanation

The HISAM, HDAM, HIDAM, PHDAM, or PHIDAM database data set is empty.

System action

Processing continues.

User response

None.

FABP1071E POINTERS THAT POINT BEYOND EOF WERE DETECTED. THE DATASET SIZE IS X'*xxxxxxxx*'.

Explanation

The database data set or the image copy data set is damaged. The physical pointers that point beyond the End Of File (EOF) of the database data set were detected.

The size of the data set is *xxxxxxxx* bytes in hexadecimal. The values of the pointers are beyond *xxxxxxxx*.

If the size of the data set is between 4 GB and 8 GB, the value of the data set size is expressed by incrementing the last bit by 1. For example, if the data set size is 4.5 GB, the value is printed as X'20000001'.

The following conditions might cause this error:

- Physical pointers are damaged.
- The database data set or the image copy data set has an incorrect EOF.

System action

Processing continues.

User response

Repair the database. If the database data set or the image copy data set has an incorrect EOF, you can fix the error by reorganizing the database. After repairing the database, rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1080I COUNT OF LCHILD SEGS (UNI-DIRECTNL) WITH SYMB LP PTRS FROM DATA SET INTO OTHER DB(s) = *xxx*

Explanation

xxx is the number of logical child segments (in a unidirectional logical relationship) in this data set that have symbolic logical parent pointers.

System action

Processing continues.

User response

None. This message is informational.

FABP1082E TARGET *dsg* IS POINTED BY ODD RBA

Explanation

The pointer contains an odd value for RBA, but the active DBDS of the target partition is A to J. The pointer should contain an even value.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1084E TARGET *dsg* IS POINTED BY EVEN RBA

Explanation

The pointer contains an even value for RBA, but the active DBDS of the target partition is M to V. The pointer must contain an odd value.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1086E POINTER CONTAINS AN ODD VALUE

Explanation

The pointer contains an odd value for RBA, though the database is not capable of online reorganization. The pointer must contain an even value.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1087E HALDB *dbdname* IS REGISTERED AS DSORG=OSAM8G IN RECON BUT THE INPUT DBDS IS AN M-SIDE DATA SET

Explanation

This HALDB supports up to 8 GB of data because the HALDB is registered as DSORG=OSAM8G in the RECON data sets. However, the input database data sets are M-side data sets. Only A-side data sets are supported when HALDB supports up to 8 GB of data.

System action

Processing stops.

User response

Specify the correct RECON data sets and database data sets, and then rerun the HD Pointer Checker job.

FABP1090W NO RECORDS IN THIS DATABASE

Explanation

Your database has no root segment.

System action

Processing continues.

User response

None.

FABP1092W NO ROOT RECORDS FOUND IN SCAN PROCESS

Explanation

The primary data set group was not scanned with this data set group in the SCAN process. HD Pointer Checker cannot correct the root segments information. "OCC/ROOT" and related fields are shown as "N/AVAIL" in the Database Statistics report or the Partition Statistics report.

System action

Processing continues.

User response

None.

FABP1094W **RMOD *rndmname* RETURNED; RC4= *nnnnnnnnn* RC8=*mmmmmmmm* DURING HOME BLOCK CHECK PROCESS**

Explanation

HD Pointer Checker received the indicated number of return code 4/8 from the randomizer routine for the root segments.

System action

Processing continues.

User response

The application program will receive the FM status code and/or abend U812 for the root segment keys by using the specified randomizer routine.

FABP1095W **FP RMOD *rndmname* RETURNED INVALID PART#/RAP# = *nnnnnnnnn* DURING HOME BLOCK CHECK PROCESS**

Explanation

During the Home Block Check process, HD Pointer Checker detected incorrect partition numbers or RAP numbers from the indicated FP randomizer. *nnnnnnnn* indicates the number of segments for which the incorrect value was returned.

System action

Processing continues.

User response

An incorrect randomizer was probably used. Check if the correct one was used, and if not, correct the error and rerun the HD Pointer Checker job.

FABP1096E **PARTITION ID *(nnnn)* IN BITMAP BLOCK IS INCORRECT**

Explanation

Partition ID in FSEAP of the first bitmap is different from RECON.

System action

Processing continues.

User response

Repair the databases, and rerun the HD Pointer Checker job.

Problem determination

FSEAP of the first bitmap block in the data set group A must have a correct partition ID and reorganization number.

FABP1097E **REORG# IN DBDS: *mmmmm* IS NOT EQUAL TO REORG# IN RECON: *nnnnn*. ILDS REBUILD IS RECOMMENDED**

Explanation

The HALDB partition, the image copy data set, or both might be damaged.

The reorganization number in the partition data set is different from the reorganization number in the HALDB Partition Database record in the RECON data sets. The reorganization number in the partition data set is lower than the reorganization number in the RECON data sets. If the HALDB has logical relationships or PSINDEXes, there is also an inconsistency between the HALDB (PHDAM or PHIDAM database) partition and the indirect list data set (ILDS).

System action

Processing continues.

User response

If you specified a real database data set as input for HD Pointer Checker, this message indicates that the HALDB partition is damaged. You must resolve the inconsistency and rerun the HD Pointer Checker job before you use the HALDB partition again. To resolve the inconsistency, it is recommended that you rebuild the ILDS of the HALDB partition with the HALDB Index/ILDS rebuild utility (DFSPREC0) or a functionally equivalent utility. By using such a utility, you can correct inconsistencies in the partition data set, the RECON data sets, and the ILDS at once.

Note: You can use the HALDB Index/ILDS rebuild utility (DFSPREC0) or a functionally equivalent utility even if the HALDB has no logical relationship or PSINDEX. Such a utility corrects the reorganization numbers in the partition data set and the RECON data sets even when no ILDS is used.

If you specified an image copy data set as input for HD Pointer Checker, review the following possible causes and take the recommended action:

- If the HALDB partition was not reorganized after this image copy data set was taken, both the image copy data set and the HALDB partition are damaged. Run HD Pointer Checker for the real database data sets and resolve any inconsistencies.
- If the HALDB partition was reorganized after this image copy was taken, the HALDB partition is not damaged. In this case, because the reorganization number in the image copy data set is obsolete, the reorganization number should not be validated. Specify ICRG#CHK=NO in the PROC statement and rerun the HD Pointer Checker job.

FABP1098E INCORRECT PARTITION ID RETURNED FROM PARTITION SELECTION: *nnnnn*

Explanation

Partitioned ID returned from a partition selection routine is different from RECON.

System action

Processing continues.

User response

Repair the database or partition selection exit, and rerun the HD Pointer Checker job.

Problem determination

The partitioned ID returned from the partition selection routine must be the same partition ID as that in RECON.

FABP1099E PARTITION SELECTION FAILED RC: *rc* RSN: *rsn*

Explanation

During the partition selection process, HD Pointer Checker received an error return code. *rc* is the return code and *rsn* is the reason code from partition selection.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

An incorrect partition high key or a string is defined in RECON, an incorrect partition selection exit is used, or the database is broken.

FABP1101I WORK DATA SET *name* DYNAMIC ALLOCATION SPACE=(*unit*,(*primary*,*secondary*))

Explanation

The work data set *name* has been dynamically allocated with the space specified.

System action

Processing continues.

User response

None. This message is informational.

FABP1102I WORK DATA SET *ddname* IS DYNAMICALLY ALLOCATED

Explanation

The indicated work data set was dynamically allocated.

System action

Processing continues.

User response

None. This message is informational.

FABP1103W THE *parm_name* PARAMETER WAS IGNORED BECAUSE SMS IS NOT ACTIVE

Explanation

The indicated parameter was ignored because SMS is not active.

System action

Because SMS is not active, work data sets are dynamically allocated with the space parameter and the volume count parameter that are calculated by HD Pointer Checker. Processing continues.

User response

If you want to apply the parameter, run the job in an SMS-enabled environment.

FABP1110W THE SYMBOLIC INDEX POINTERS HAVE NOT BEEN CHECKED

Explanation

The symbolic index pointers in the secondary index were not checked. The reason is one of the following:

- The target is not a root segment.
- SYMIXCHK=YES is not specified in the PROCCTL statement.
- TYPE=ALL is not specified in the PROCCTL statement.

System action

Processing continues.

User response

None.

FABP1140I FIRST RECORD OF HIDAM INDEX

Explanation

Information about the first record in your HIDAM index database is printed. This is not an error message.

System action

Processing continues.

User response

None. This message is informational.

FABP1145I LAST RECORD OF HIDAM INDEX

Explanation

This is a message accompanying the message FABP1175E and shows the last record of your HIDAM index.

System action

Processing continues.

User response

None. This message is informational.

FABP1150I FIRST RECORD OF SECONDARY INDEX

Explanation

Information about the first record in your secondary index database is printed. This is not an error message.

System action

Processing continues.

User response

None. This message is informational.

FABP1160I FIRST RECORD OF SHARED SECONDARY INDEX

Explanation

Information about the first record in your shared secondary index database is printed. This is not an error message.

System action

Processing continues.

User response

None. This message is informational.

FABP1170E BAD DELETE FLAG

Explanation

The database is damaged. A segment that has an incorrect delete byte was found by SCAN processor in an index database.

System action

Processing continues.

User response

Repair the database and rerun the HD Pointer Checker job. If only the index database is damaged, you can repair the problem by reorganizing the prime database; thereby rebuilding the index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1171E INVALID PART NUMBER

Explanation

The index is damaged. This message is issued when one of the following occurred:

- The partition number in the index segment is larger than the maximum partition number in the DBD of the target database.
- The partition number in the index segment is zero, when the target database has more than one partition.
- The partition number in the HIDAM primary index database is out of ascending order.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Consider reorganizing the HIDAM database and rebuilding the index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1172I PARTITION ID = X’01’

Explanation

Although the target database has one partition, the partition number in the index segment is X'01',

System action

Processing continues.

User response

None. This message is informational.

FABP1175E LAST INDEX RECORD DOES NOT HAVE A KEY OF ALL X’FF’S

Explanation

The database is damaged. The last record of a HIDAM primary index does not have a key of all X'FF's. Message FABP1145I accompanies this message to show the last record of the HIDAM index.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1176E HIGH KEY NOT FOUND FOR PARTITION#: *nn*

Explanation

The index is damaged. The index segment with the high key was not found for the partition indicated by the number *nn* during the index SCAN process. This message can be issued when partition numbers in the index database are out of ascending order.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Consider reorganizing the HIDAM database and rebuilding the index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1177E INVALID INDEX KEY (OUT OF RANGE)

Explanation

The index is damaged. The index key value in the index segment pointing a partition is out of range for the target partition.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job. Consider reorganizing the HIDAM database and rebuilding the index database at the same time.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1180I SCAN COMPLETED

Explanation

Your index database data set was processed by SCAN processor.

System action

Processing continues.

User response

None. This message is informational.

FABP1185W EMPTY DATA SET

Explanation

An empty index database data set is specified in the DATABASE statement.

System action

Processing continues.

User response

None.

FABP1190W NO ACTIVE SEG'S, ALL LOGICALLY DLTD

Explanation

All segments found in the index database data set are flagged (in their delete bytes) as deleted.

System action

Processing continues.

User response

None.

FABP1200I COUNT OF LCHILD SEGS (PHYS. PAIRED) WITH SYMB LP PTRS FROM DATA SET INTO OTHER DB(S) = *nnn*

Explanation

nnn is the number of logical child segments (in a physically paired, bidirectional logical relationship) in this data set that have symbolic logical parent pointers.

System action

Processing continues.

User response

None. This message is informational.

FABP1210I EXPECTED COUNT OF SYMBOLIC LP POINTERS THAT POINT TO THE DATA SET IN THE SAME DB AND/OR OTHER DB(S) = *nnn*

Explanation

nnn is the number of logical child segments that have symbolic logical parent pointers that point to segments checked by the HD Pointer Checker.

System action

Processing continues.

User response

None. This message is informational.

FABP1220E PREVIOUS OCCURRENCE(S) OF FOLLOWING POINTER TO THIS SEGMENT DETECTED DURING IN-CORE POINTER CHECKING

Explanation

The database is damaged. There are incorrect duplicate pointers to the same segment. At least one of the incorrect pointers is not printed on any report.

System action

Processing continues.

User response

Rerun the HD Pointer Checker job, specifying INCORE=NO on the OPTION statement. This causes all error messages of this kind to be printed. Then repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293. Refer to the specific error messages for more information.

FABP1230I ILLEGAL COMBINATION OF POINTERS TO FOLLOWING SEGMENT DETECTED DURING IN-CORE POINTER CHECKING

Explanation

The database is damaged. There is an incorrect combination of pointers to the same segment. At least one of the incorrect pointers is not printed on any reports.

System action

Processing continues.

User response

Rerun the HD Pointer Checker job, specifying INCORE=NO on the OPTION statement. This causes all error messages of this kind to be printed. Then repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293. Refer to the specific error messages for more information.

FABP1240W **DB: *xxx* DSG: *yy* WAS NOT SCANNED (SEE DMB DIRECTORY)**

Explanation

The indicated HDAM or HIDAM database *xxx* (data set group: *yy*) was not scanned in the SCAN process.

System action

Processing continues.

User response

Add the control statements and JCL for all missing databases, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293. Always process all related databases in a single HD Pointer Checker job. If you omit a database, you are taking a risk that pointer errors will be left undetected.

FABP1250W ***xxx* TARGET POINTERS CANNOT BE VALIDATED. ERRONEOUS EVALUATION MESSAGES MAY BE PRODUCED.**

Explanation

There are *xxx* pointers whose targets are in a database that was not processed by this HD Pointer Checker run.

System action

Processing continues.

User response

Add control statements and JCL for all missing databases, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293. Always process all related databases in a single HD Pointer Checker job. If you omit a related database, you are taking a risk that pointer errors will go undetected.

FABP1260I **DATABASE NUMBER NOT IN INPUT, OR CONTROL RECORD NOT IN SEQUENCE**

Explanation

The specified input record in your JRM or BLKMPIN data set is an address in a database with no type T0, T1, or T2 record (in your CHECKREC data set).

System action

Processing continues.

User response

None. This message is informational.

FABP1265I **PARTITION ID NOT IN INPUT, OR CONTROL RECORD NOT IN SEQUENCE**

Explanation

The specified input record in your JRM or BLKMPIN data set is an address in a database with no type T0, T1, or T2 record (in your CHECKREC data set).

System action

Processing continues.

User response

None. This message is informational.

FABP1270I **NO MORE RECORDS FOR SPECIFIED DATA SET GROUP**

Explanation

There are no more records (in the CHECKREC data set) that refer to the address requested on the JRM or BLKMAPIN data set.

System action

Processing continues.

User response

None. This message is informational.

FABP1280I NO MORE RECORDS FOR SPECIFIED RBA

Explanation

All records on the CHECKREC data set for this RBA (and data set) were processed.

System action

Processing continues.

User response

None. This message is informational.

FABP1290I END OF FILE ON CONTROL DATA SET

Explanation

All records on the JRM or BLKMAPIN data set were processed by BLOCKMAP processor.

System action

Processing continues.

User response

None. This message is informational.

FABP1300I END OF FILE ON CHECKREC DATA SET

Explanation

All records on the CHECKREC data set were processed by BLOCKMAP processor.

System action

Processing continues.

User response

None. This message is informational.

FABP1310I INPUT RECORD FROM BLKMAPIN FILE

Explanation

The information on this report line was read by BLOCKMAP processor from the BLKMAPIN data set.

System action

Processing continues.

User response

None. This message is informational.

FABP1320I INPUT RECORD FROM JRM FILE

Explanation

The information on this report line was read by BLOCKMAP processor from the JRM data set.

System action

Processing continues.

User response

None. This message is informational.

FABP1330I ADDRESS FOUND IN WORK DATA SET

Explanation

The address on this report line was requested on your BLOCKMAP process input (see message FABP1310I or FABP1320I) and was found in the CHECKREC data set.

System action

Processing continues.

User response

None. This message is informational.

FABP1340I SEGMENT POINTS TO ABOVE INPUT ADDRESS

Explanation

The segment identified on this report line contains a direct pointer that points to the address requested

on your BLOCKMAP process input (see message FABP1310I or FABP1320I).

System action

Processing continues.

User response

None. This message is informational.

FABP1345I UP TO 300 RECORDS ARE PRINTED

Explanation

The number of records having the same RBA as the target and generated in the pointer chain reconstruction exceeded 300. The records over 300 are not generated.

System action

Processing continues.

User response

None. This message is informational.

FABP1350W REQUESTED RBA (*xxxxxxxx*) ALREADY SNAPPED ... SKIPPING FOR NEXT CONTROL STATEMENT

Explanation

The RBA (*xxxxxxxx*) specified by BLOCKDUMP parameter on the DATABASE statement is in a block that was already printed.

System action

Processing continues.

User response

None.

FABP1360W SPECIFIED RBA (*xxxxxxxx*) BEYOND DATABASE... SKIPPING FOR NEXT CONTROL STATEMENT

Explanation

The RBA (*xxxxxxxx*) specified by BLOCKDUMP parameter on the DATABASE statement is outside the range of the database.

System action

Processing continues.

User response

None.

FABP1365I INPUT IS IC2. DUMPED DATASET NAME: *dsname*

Explanation

This informational message indicates that the input is an image copy taken with the Database Image Copy 2 utility.

This message shows the data set name of the dumped data set in image copy so that you can verify your data set specification when an error occurs.

System action

Processing continues.

User response

None. This message is informational.

FABP1370I SCAN OF DB: *dbdname* DSG: *xx* IN PROGRESS TIME=*hh.mm.ss*

Explanation

SCAN processor has begun the processing of data set group *xx* of HISAM database *dbdname*. The processing started at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1380I SCAN OF DB: *dbdname* DSG: *xx* COMPLETED TIME=*hh.mm.ss*

Explanation

SCAN processor has completed the processing of data set group *xx* of HISAM database *dbdname*. No errors were detected by SCAN processor. The processing completed at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1390I **SCAN OF DB: *dbdname* DSG: *xx* EMPTY DATA SET TIME=*hh.mm.ss***

Explanation

The processing of data set group *xx* of HISAM database *dbdname* by SCAN processor has completed. The data set is empty. The processing completed at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1400E **SCAN OF DB: *dbdname* DSG: *xx* COMPLETED TIME=*hh.mm.ss* *nnnnnnnn* ERRORS DETECTED**

Explanation

SCAN processor has completed the processing of data set group *xx* of HISAM database *dbdname*. The processing completed at *hh.mm.ss*. *nnnnnnnn* error messages were generated.

System action

Processing continues.

User response

None.

FABP1410I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* IN PROGRESS TIME=*hh.mm.ss***

Explanation

The processing of data set group *xx* of partition ID *xxxxx* of index database *dbdname* by SCAN processor has begun. The processing started at *hh.mm.ss.*

System action

Processing continues.

User response

None. This message is informational.

FABP1420I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED TIME=*hh.mm.ss***

Explanation

The SCAN processor has completed the processing of data set group *xx* of partition ID *xxxxx* of index database *dbdname*, and detected no errors. The processing was completed at *hh.mm.ss.*

System action

Processing continues.

User response

None. This message is informational.

FABP1425E **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED WITH ERRORS TIME=*hh.mm.ss***

Explanation

The SCAN processor has completed the processing of the data set group of partition ID *xxxxx* of index database *dbdname*, and some errors were detected. The processing was completed at *hh.mm.ss.*

System action

Processing continues.

User response

None.

FABP1430I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* EMPTY DATA SET TIME=*hh.mm.ss***

Explanation

The SCAN processor has completed the processing of data set group *xx* of partition ID *xxxxx* of index database *dbdname*. The data set is empty. The processing was completed at *hh.mm.ss.*

System action

Processing continues.

User response

None. This message is informational.

FABP1440I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* IN PROGRESS @ BLOCK *xxx* TIME=*hh.mm.ss***

Explanation

The processing of data set group *xx* of partition ID of HDAM or HIDAM database *dbdname* by the SCAN processor has reached block number *xxx* at *hh.mm.ss.* This message is a status report to help avoid an inappropriate operator cancel of the HD Pointer Checker job.

System action

Processing continues.

User response

None. This message is informational.

FABP1450I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED @ BLOCK *xxx* TIME=*hh.mm.ss***

Explanation

The processing of data set group *xx* of partition ID *xxxxx* of HDAM or HIDAM database *dbdname* by SCAN processor has reached block number *xxx*, and is complete. No errors were detected by the SCAN processor. The processing was completed at *hh.mm.ss.*

System action

Processing continues.

User response

None. This message is informational.

FABP1460I **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* EMPTY DATA SET TIME=*hh.mm.ss***

Explanation

The SCAN processor has completed the processing of data set group *xx* of partition ID *xxxxx* of HDAM or HIDAM database *dbdname*. The data set is empty. The processing was completed at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1470E **SCAN OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED @ BLOCK *xxx* TIME=*hh.mm.ss nnnnnnnnn* ERRORS DETECTED**

Explanation

The processing of data set group *xx* of partition ID *xxxxx* of HDAM or HIDAM database *dbdname* by SCAN processor has reached block number *xxx*, and is complete. The processing was completed at *hh.mm.ss*. *nnnnnnnnn* error messages were generated.

System action

Processing continues.

User response

None.

FABP1475I **DB: *dbdname* PART: *partname* IS NOT PROCESSED**

Explanation

The *partname* partition of the *dbdname* database is not processed by IMS Database Reorganization Expert.

System action

Processing continues.

User response

None. This message is informational.

FABP1480I **EVAL OF DB: *dbdname* PID: *xxxxx* DSG: *xx* IN PROGRESS TIME=*hh.mm.ss***

Explanation

The processing of data set group *xx* of partition ID *xxxxx* of database *dbdname* by CHECK processor has begun. The processing started at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1490I **EVAL OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED TIME=*hh.mm.ss***

Explanation

The CHECK processor has completed the processing of data set group *xx* of partition ID *xxxxx* of database *dbdname*. No errors were detected. The processing completed at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1500I **EVAL OF DB: *dbdname* PID: *xxxxx* DSG: *xx* FAILED (DB#: *nnn*) TIME=*hh.mm.ss* (SEE DMB DIRECTORY)**

Explanation

The CHECK processor has completed the processing of data set group *xx* of partition ID *xxxxx* of database *dbdname* (database number: *nnn*). HD Pointer Checker found pointers to an HDAM or HIDAM database that was not scanned in the SCAN process. The processing ended at *hh.mm.ss*.

System action

Processing continues.

User response

None. This message is informational.

FABP1503E ***nnnnn* ERRORS FOUND IN HASH CHECK OF DB: *dbdname* PID: *xxxxx* DSG: *xx* TIME=*hh.mm.ss***

Explanation

The HASH Check process of data set group *xx* in partition ID *xxxxx*, database *dbdname* has completed at *hh.mm.ss*. and *nnn* errors were found. The *nnnnn* errors are issued during the HASH evaluation process. Errors issued during SCAN processes are reported in separate messages.

System action

Processing continues.

User response

None.

FABP1504E ***nnnnnnn* ERRORS FOUND IN EPS CHECK OF DB: *dbname* PID: *xxxxx* TIME=*hh.mm.ss***

Explanation

The EPS healing process of partition ID *xxxxx* in database *dbdname* completed at *hh.mm.ss*, and *nnnnnnn* errors were reported.

System action

Processing continues.

User response

None.

FABP1505E ***nnnnnnn* ERRORS FOUND IN DUPLICATE ILK CHECK OF DB: *dbname* TIME=*hh.mm.ss***

Explanation

The Duplicate ILK Check process for the indicated database completed at the indicated time. *nnnnnnn* shows the number of errors that were reported.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See the Evaluation of ILKS report generated for the indicated database and check the error message FABP2147E, FABP2148E, or FABP2149E in the report.

FABP1510E **EVAL OF DB: *dbdname* PID: *xxxxx* DSG: *xx* COMPLETED TIME=*hh.mm.ss nnnnnnnnn* ERRORS DETECTED**

Explanation

The CHECK processor has completed the processing of data set group *xx* of partition ID *xxxxx* of database *dbdname*. The processing was completed at *hh.mm.ss*. *nnnnnnnnn* error messages were generated.

System action

Processing continues.

User response

None.

FABP1520W [T2 | POINTER] ERRORS WERE DETECTED DURING POINTER-CHECKER EXECUTION

Explanation

If message text shows "T2 ERRORS", one or more databases contain unknown data (T2) more than the threshold values, which are specified by T2NUM and T2LEN. In this case, pointer error is not detected.

If message text shows "POINTER ERRORS", one or more databases have pointer errors. The databases are probably damaged. In some cases, T2 errors are also detected.

Error messages are printed in some of the HD Pointer Checker reports.

System action

Processing continues with RC= 2 or 4. Return code 2 is returned only when T2 errors are detected. Return code 4 is returned when Pointer errors are detected, or both Pointer and T2 errors are detected.

User response

If the database has T2 errors, consider reorganizing the database to remove the unknown data. If the database has pointer errors, determine the causes of the error messages. If necessary, repair the database.

After the database is reorganized or repaired, rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1531W [DISTRIBUTION OF ROOT SEGMENTS | DISTRIBUTION OF RAP CHAIN LENGTHS] CANNOT BE PRINTED BECAUSE HIGH BLOCK NUMBER IS NOT DEFINED

Explanation

Indicated report cannot be printed because the number of blocks or CIs of root addressable area is not defined in DBDGEN.

System action

Processing continues.

User response

None.

FABP1550I OUTPUT PROCESSING TO THE FABPILK DATA SET IS IN PROGRESS

Explanation

The HD Pointer Checker utility is generating the repair information records in the data set that is specified by the FABPILK DD statement.

System action

Processing continues.

User response

None. This message is informational.

FABP1560I OUTPUT PROCESSING TO THE FABPILK DATA SET WAS COMPLETED

Explanation

The HD Pointer Checker utility finished generating the repair information records. The repair information records are stored in the data set that is specified by the FABPILK DD statement.

System action

Processing continues.

User response

None. This message is informational.

FABP1570I HD POINTER CHECKER IS RUNNING IN AN IMS-MANAGED ACBS ENVIRONMENT. BSDS HLQ=*bsds_hlq*

Explanation

HD Pointer Checker is running in an IMS managed ACBs environment and is referring to the database definitions in the IMS catalog directory data set instead of the DBD, PSB, or ACB libraries. *bsds_hlq* is the high-level qualifier of the bootstrap data set (BSDS) that is used for this run.

System action

Processing continues.

User response

None. This message is informational.

FABP1951E THE NUMBER OF DIRECT-ADDRESS POINTERS IS DIFFERENT FROM THE NUMBER OF LOGICAL RECORDS IN THE OVERFLOW DATA SET

Explanation

The secondary index database is damaged. The number of direct-address pointers that point to logical records in the overflow data set is not equal to the number of the logical records in the overflow data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1952E MISMATCH BETWEEN DIRECT LP POINTERS IN THE LC: *segname* AND RBA VALUES OF LP: *parent* DB: *database*

Explanation

The database is damaged. The Logical Parent (LP) pointers in the *segname* segment occurrences do not point correctly to the Relative Bytes Addresses (RBAs) of the logical parent segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- LP pointers in the *segname* segments
- The parent segment (logical parent of the *segname* segment) occurrences in the *database* database

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1953E MISMATCH BETWEEN PP POINTERS IN THE PHYSICAL CHILD: *segname* AND RBA VALUES OF PARENT: *parent*

Explanation

The database is damaged. Physical Parent (PP) pointers in the *segname* segment occurrences do not point correctly to the Relative Bytes Addresses (RBAs) of the parent segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The parent segment occurrences, which are the physical parents of the *segname* segments
- The Physical Parent (PP) pointers in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1955E INDEX KEY OF [INDEX SOURCE | ROOT] SEGMENTS (DB: *dbname* SEGMENT: *segment*) AND INDEX POINTER SEGMENTS ARE NOT THE SAME

Explanation

The database is damaged. The HASH total of index keys in source segments or ROOT segments does not equal to the HASH total of the index keys in the index pointer segments.

System action

Processing continues.

User response

Correct the database, and rerun the HD Pointer Checker job.

FABP1956E **THE NUMBER OF ROOT SEGMENTS: *segname* IS NOT EQUAL TO THE NUMBER OF PRIMARY INDEX: *indexdb* POINTERS**

Explanation

The PHIDAM or HIDAM database is damaged. The number of the *segname* root segment occurrences in the database must be equal to the number of index pointers in the primary index *indexdb*; however, they are different. The root segment occurrences, primary index pointers, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1957E **MISMATCH BETWEEN PRIMARY INDEX: *indexdb* POINTERS TO ROOT SEGMENT: *segname* AND TARGET RBA VALUES**

Explanation

The PHIDAM or HIDAM database is damaged. The index pointers in the primary index *indexdb* do not point correctly to the RBA values of the *segname* root segment occurrences. The root segments, primary index segments, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1958E **THE NUMBER OF ROOT SEGMENTS: *segname* IS NOT EQUAL TO THE NUMBER OF RAPS & PTF POINTERS**

Explanation

The database is damaged. The number of the *segname* root segment occurrences should be equal to the number of Root Anchor Points (RAPs) and Physical Twin Forward (PTF) pointers; however, they are different. The root segments, RAPs, PTF pointers, or all of them are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1959E **MISMATCH BETWEEN RAPS & PTF POINTERS TO ROOT SEGMENT: *segname* AND TARGET RBA VALUES**

Explanation

The database is damaged. Root Anchor Points (RAPs) and Physical Twin Forward (PTF) pointers do not point correctly to the RBA values of the *segname* root segment occurrences. The root segments, RAPs, PTF pointers, or all of them are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1960E **THE NUMBER OF SEGMENTS: *segname* IS NOT EQUAL TO THE NUMBER OF THE PTF POINTERS**

Explanation

The database is damaged. The number of the *segname* segment occurrences must be equal to the number of Physical Twin Forward (PTF) pointers that point to the segment occurrences. The *segname* segment occurrences, PTF pointers, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1961E **MISMATCH BETWEEN PTF POINTERS IN SEGMENT: *segname* AND TARGET RBA VALUES**

Explanation

The database is damaged. Physical Twin Forward (PTF) pointers do not point correctly to the Relative Byte Addresses (RBAs) of the *segname* segment occurrences. The *segname* segment occurrences, the PTF pointers, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1962E **THE NUMBER OF SEGMENTS: *segname* IS NOT EQUAL TO THE NUMBER OF THE PTB POINTERS**

Explanation

The database is damaged. The number of Physical Twin Backward (PTB) pointers must be equal to the number of the *segname* segment occurrences. The *segname* segment occurrences, the PTB pointers, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1963E **MISMATCH BETWEEN PTB POINTERS IN SEGMENT: *segname* AND TARGET RBA VALUES**

Explanation

The database is damaged. Physical Twin Backward (PTB) pointers does not point correctly to the Relative Byte Addresses (RBAs) of the *segname* segment occurrences. The *segname* segment occurrences, the PTB pointers, or both are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1964E **THE NUMBER OF LTF POINTERS IS NOT EQUAL TO THE NUMBER OF LTB POINTERS IN SEGMENT: *segname***

Explanation

The database is damaged. The number of Logical Twin Forward (LTF) pointers in the *segname* segment occurrences should be equal to the number of Logical Twin Backward (LTB) pointers in the *segname* segment

occurrences. The *segname* segment occurrences, LTF pointers, LTB pointers, or all of them are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1965E **MISMATCH BETWEEN LTF AND LTB POINTERS IN SEGMENT: *segname***

Explanation

The database is damaged. There is inconsistency between the Logical Twin Forward (LTF) pointers and the Logical Twin Backward (LTB) pointers in the *segname* segment occurrences. The *segname* segment occurrences, LTF pointers, LTB pointers, or all are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1966E **THE NUMBER OF SEGMENTS: *segname* IS NOT EQUAL TO THE NUMBER OF ITS PTF POINTERS & PCF POINTERS IN THE PARENT: *parent***

Explanation

The database is damaged. The number of the *segname* segment occurrences must be equal to the number of physical forward pointers that point to the *segname* segment occurrences. Some or all of the following segment occurrences or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Twin Forward (PTF) pointers in the *segname* segment occurrences
- The Physical Child First (PCF) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1967E **MISMATCH BETWEEN PTF POINTERS IN SEGMENT: *segname* & PCF POINTERS IN PARENT: *parent* AND TARGET RBA VALUES**

Explanation

The database is damaged. Physical forward pointers do not point correctly to the *segname* segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Twin Forward (PTF) pointers in the *segname* segment occurrences
- Physical Child First (PCF) pointers in the *parent* segment occurrences, which are parents of the *segname* segments

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1968E **THE NUMBER OF SEGMENTS: *segname* IS NOT EQUAL TO THE**

NUMBER OF ITS PTB POINTERS & PCL POINTERS IN THE PARENT: *parent*

Explanation

The database is damaged. The number of the *segname* segment occurrences should be equal to the number of physical backward pointers. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Twin Backward (PTB) pointers in the *segname* segment occurrences
- Physical Child Last (PCL) pointers in the *parent* segment occurrences, which are parents of the *segname* segments

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1969E **MISMATCH BETWEEN PTB POINTERS IN SEGMENT: *segname* & PCL POINTERS IN PARENT: *parent* AND TARGET RBA VALUES**

Explanation

The database is damaged. Physical backward pointers do not point correctly to the Relative Bytes Addresses (RBAs) of the *segname* segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Twin Backward (PTB) pointers in the *segname* segment occurrences
- The Physical Child Last (PCL) pointers in the *parent* segment occurrences, which are parents of the *segname* segments

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1971E **MISMATCH BETWEEN PP POINTERS IN THE FIRST PHYSICAL CHILD: *segname* AND RBA VALUES OF PARENT: *parent* WITH NON-ZERO PCF**

Explanation

The database is damaged. The Physical Parent (PP) pointers in the *segname* segment occurrences do not point correctly to the Relative Bytes Addresses (RBAs) of the *parent* segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Parent (PP) pointers in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1972E **THE NUMBER OF PREFIX PORTIONS IS NOT EQUAL TO THE NUMBER OF DATA PORTIONS IN SPLIT VARIABLE-LENGTH SEGMENTS: *segname***

Explanation

The database is damaged. Some of *segname* segment occurrences are split into the prefix and the data portion. The number of prefix portions must be equal

to the number of data portions; however, they are different. The *segname* segment occurrences, prefix portions, data portions, or all of them are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1973E **MISMATCH BETWEEN POINTERS TO THE DATA PORTIONS AND RBA VALUES OF THE DATA PORTIONS IN THE SPLIT VL SEGMENT: *segname***

Explanation

The database is damaged. Some of the *segname* segment occurrences are split into the prefix and the data portion. The pointers in the prefix portions do not point correctly to the Relative Byte Addresses (RBAs) of the data portions. The *segname* segment occurrences, prefix portions, data portions, or all of them are damaged.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1974E **THE NO. OF THE LAST SEGMENTS IN TWIN CHAINS: *segname* IS NOT EQUAL TO THE NUMBER OF THE PCL POINTERS IN PARENT: *parent***

Explanation

The database is damaged. The number of Physical Child Last (PCL) pointers in the *parent* segment occurrences must be equal to the number of the last occurrences of the *segname* segment; however, they are different. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segments
- The Physical Child Last (PCL) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1975E **MISMATCH BETWEEN PCL POINTERS IN PARENT: *parent* AND RBA VALUES OF THE LAST SEGMENT IN TWIN CHAINS: *segname***

Explanation

The database is damaged. The Physical Child Last (PCL) pointers in the *parent* segment occurrences do not point correctly to the *segname* segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment occurrences, which are the physical parents of the *segname* segment occurrences
- The Physical Child Last (PCL) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1976E **THE NUMBER OF LC: *segname* IS NOT EQUAL TO THE NUMBER OF ITS LTF POINTERS & LCF POINTERS IN THE LP: *parent* DB: *database***

Explanation

The database is damaged. The number of the *segname* segment occurrences must be equal to the logical forward pointers that point to the *segname* segment occurrences; however, they are different. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment (the logical parent of the *segname* segment) occurrences in the *database* database
- The Logical Twin Forward (LTF) pointers in the *segname* segment occurrences
- The Logical Child First (LCF) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1977E **MISMATCH BETWEEN LTF POINTERS IN LC: *segname* & LCF POINTERS IN LP: *parent* DB: *database* AND TARGET RBA VALUES**

Explanation

The database is damaged. Logical forward pointers do not point correctly to the Relative Bytes Addresses (RBAs) of the *segname* segment occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment (the logical parent of the *segname* segment) occurrences in the *database* database
- The Logical Twin Forward (LTF) pointers in the *segname* segment occurrences
- The Logical Child First (LCF) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1978E **THE NUMBER OF LC: *segname* IS NOT EQUAL TO THE NUMBER OF ITS LTB POINTERS & LCL POINTERS IN THE LP: *parent* DB: *database***

Explanation

The database is damaged. The number of the *segname* segment occurrences must be equal to the logical backward pointers that point to the *segname* segment occurrences; however, they are different. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment (the logical parent of the *segname* segment) occurrences in the *database* database
- The Logical Twin Backward (LTB) pointers in the *segname* segment occurrences
- The Logical Child Last (LCL) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1979E **MISMATCH BETWEEN LTB POINTERS IN LC: *segname* & LCL POINTERS IN LP: *parent***

DB: *database* AND TARGET RBA VALUES

Explanation

The database is damaged. Logical backward pointers do not point correctly to the Relative Bytes Addresses (RBAs) of the logical child segment (the *segname* segment) occurrences. Some or all of the following segments or pointers are damaged:

- The *segname* segment occurrences
- The *parent* segment (the logical parent of the *segname* segment) occurrences in the *database* database
- The Logical Twin Backward (LTB) pointers in the *segname* segment occurrences
- The Logical Child Last (LCL) pointers in the *parent* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1986E **THE NUMBER OF SEGMENT OCCURRENCES IN HIERARCHICAL POINTER CHAINS IS NOT EQUAL TO THE NUMBER OF HF POINTERS (SEGMENT: *segname*)**

Explanation

The database is damaged. The number of segment occurrences, which belong to the hierarchical structure with the *segname* segment at the top, must be equal to the number of Hierarchical Forward (HF) pointers, which link the hierarchical path; however they are different. Some or all of the following segment occurrences or pointers are damaged:

- The *segname* segment occurrences
- The dependent segment occurrences that belong to the *segname* segment on the hierarchical path
- HF pointers, which link the segment occurrences under the hierarchical structure

In addition, the following pointers might be damaged:

- Hierarchical Backward (HB) pointers
- Physical Twin Forward (PTF) pointers and Physical Twin Backward (PTB) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1987E **MISMATCH BETWEEN HF POINTERS AND RBA VALUES OF SEGMENTS IN HIERARCHICAL POINTER CHAINS (SEGMENT: *segname*)**

Explanation

The database is damaged. Hierarchical Forward (HF) pointers do not point correctly to the Relative Byte Addresses (RBAs) of the segment occurrences that belong to the hierarchical structure with the *segname* segments at the top. Some or all of the following segment occurrences or pointers are damaged:

- The *segname* segment occurrences
- The dependent segment occurrences that belong to the *segname* segment on the hierarchical path
- HF pointers, which link the segment occurrences under the hierarchical structure

In addition, the following pointers might be damaged:

- Hierarchical Backward (HB) pointers
- Physical Twin Forward (PTF) pointers and Physical Twin Backward (PTB) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1988E **THE NUMBER OF SEGMENTS IN HIERARCHICAL POINTER CHAINS IS NOT EQUAL TO THE NUMBER OF HB POINTERS (SEGMENT: *segname*)**

Explanation

The database is damaged. The number of segment occurrences, which belong to the hierarchical structure with the *segname* segment at the top, must be equal to the number of Hierarchical Backward (HB) pointers, which link the hierarchical path; however they are different. Some or all of the following segment occurrences or pointers are damaged:

- The *segname* segment occurrences
- The dependent segment occurrences that follow the *segname* segment on the hierarchical path
- HB pointers, which link the segment occurrences under the hierarchical structure

In addition, the following pointers might be damaged:

- Hierarchical Forward (HF) pointers
- Physical Twin Forward (PTF) pointers and Physical Twin Backward (PTB) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1989E **MISMATCH BETWEEN HB POINTERS AND RBA VALUES OF SEGMENTS IN HIERARCHICAL POINTER CHAINS (SEGMENT: *segname*)**

Explanation

The database is damaged. Hierarchical Backward (HB) pointers do not point correctly to the Relative Byte Addresses (RBAs) of the segment occurrences that belong to the hierarchical structure with the *segname* segments at the top. Some or all of the following segment occurrences and pointers are damaged:

- The *segname* segment occurrences
- The dependent segment occurrences that follow the *segname* segment on the hierarchical path
- HB pointers, which link the segment occurrences under the hierarchical structure

In addition, the following pointers might be damaged:

- Hierarchical Forward (HF) pointers
- Physical Twin Forward (PTF) pointers and Physical Twin Backward (PTB) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1990E **THE NO. OF SEGMS IN HIERARCHICAL PTR CHAINS IS NOT EQUAL TO THE NO. OF HF & PCF IN THE PARENT: *parent* (SEGM: *segname*)**

Explanation

The database is damaged. The number of segment occurrences, which belong to the hierarchical structure with the *segname* segment at the top, must be equal to the number of hierarchical forward (HF) pointers and Physical Child First (PCF) pointers. Some or all of the following segment occurrences and pointers are damaged:

- The *parent* segment occurrences that are the physical parent segments of the *segname* segments
- The *segname* segment occurrences
- The dependent segment occurrences that follow the *segname* segment on the hierarchical path
- HF pointers, which link the segment occurrences under the hierarchical structure
- PCF pointers in the *parent* segments, which point to the *segname* segments

In addition, the following pointers might be damaged:

- Hierarchical Backward (HB) pointers
- Physical Twin Forward (PTF) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1991E **MISMATCH BETWEEN HF IN HIERARCHICAL PTR CHAINS (SEGMENT: *segname*) & PCF IN THE PARENT: *parent* AND TARGET RBA VALUES**

Explanation

The database is damaged. Hierarchical Forward (HF) pointers and Physical Child First (PCF) pointers do not point correctly to the Relative Byte Addresses (RBAs) of the segment occurrences that belong to the hierarchical structure with the *segname* segments at the top. Some or all of the following segment occurrences and pointers are damaged:

- The *parent* segment occurrences that are physical parent segments of the *segname* segments
- The *segname* segment occurrences
- The dependent segment occurrences that follow the *segname* segment on the hierarchical path
- HF pointers, which link the segment occurrences under the hierarchical structure
- PCF pointers in the *parent* segments, which point to the *segname* segments

In addition, the following pointers might be damaged:

- Hierarchical Backward (HB) pointers
- Physical Twin Forward (PTF) pointers, which are in the *segname* segment occurrences

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1992W **THE NUMBER OF DIRECT-ADDRESS POINTERS < THE NUMBER OF LOGICAL RECORDS IN THE OVERFLOW DATA SET**

Explanation

The number of direct-address pointers is less than the number of logical records in the HISAM overflow database. It could be that no direct-address pointer points to logical record in the overflow data set.

If an application program deleted segment of the HISAM database, the delete flag is not set by DL/I and the space of the deleted segment remains in the database. Therefore, this message is issued for the normal database, and the message can be ignored. However, it is suggested to reorganize the database if a lot of the deleted segments exists. To know the number of deleted segments, run the HD Pointer Checker FABPMAIN program with HASH=NO.

If no application program deletes a segment in the HISAM database, the HISAM database is damaged.

System action

Processing continues.

User response

If it is damaged, repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1993E **THE NUMBER OF DIRECT-ADDRESS POINTERS > THE NUMBER OF LOGICAL RECORDS IN THE OVERFLOW DATA SET**

Explanation

The HISAM database is damaged. The number of direct-address pointers in the HISAM database is greater than the number of logical records in the overflow data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1994E **THE SUM OF DIRECT-ADDRESS POINTER VALUES IS DIFFERENT FROM THE SUM OF LOGICAL RECORD RBAS IN THE OVERFLOW DATA SET**

Explanation

The HISAM or the secondary index database is damaged. The direct-address pointer values are not equal to the RBAs of the logical record in the overflow data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1995E **MISMATCH BETWEEN THE NUMBER OF SEGMENTS IN SEG (DB: *dbname1* SEGM: *segname1*) AND SEG: (DB: *dbname2* SEGM: *segname2*)**

Explanation

The database is damaged. The number of occurrences of logical child segment is not equal to the occurrences of paired logical child segment in physically paired bidirectional logical relationship. This message is issued for every physically paired bidirectional logical relationship.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1996E **COUNTER VALUE IN LP (SEGMENT: *segment*) IS NOT EQUAL TO THE NUMBER OF LOGICAL CHILDREN**

Explanation

The database is damaged. The actual number of logical child segments is not equal to the counter in the logical parent.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1997E **MISMATCH BETWEEN LP POINTERS AND LOGICAL PARENT RBA VALUES (DB: *dbdname* SEGMENT: *segname*)**

Explanation

The database is damaged. The sum of direct LP pointers is not consistent with the counter value and RBA value.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1998E **THE NUMBER OF INDEX SOURCE SEGMENTS (DB: *dbname* SEGMENT: *segment*) IS NOT EQUAL TO THE NUMBER OF INDEX POINTER SEGMENTS**

Explanation

The database is damaged. The number of index source segments is not equal to the number of index pointer segments. NUMBER OF INDEX SOURCE means the number of index source segments excluding the number of segments that meet the conditions of suppressing index pointer segments.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP1999E **MISMATCH BETWEEN INDEX POINTERS AND TARGET RBA VALUES (DB: *dbname* SEGMENT: *segment*)**

Explanation

The database is damaged. The pointer values in the index pointer segment are not equal to the target segment RBAs.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2001I **EVAL OF DB: *dbdname* DB#: *nnn* PART: NNNNN DSG#: *xx* COMPLETED ERRORS: *t* TOTAL, *s* SEV, *p* PHY, *l* LOG**

Explanation

This message is printed for each data set group *xx* of database *dbdname* (database number *nnn*). The variables in the messages are as follows:

t
Total number of errors.

s
Number of errors in RAP, physical child/twin pointer, and hierarchical pointer chain.

p
Number of other errors in physical child/twin pointer, and hierarchical pointer chain.

l
Number of errors in logical relationship pointers and secondary index pointers.

System action

Processing continues.

User response

Check the messages that follow.

FABP2002I **RUN COMPLETED ERRORS: *t* TOTAL**

Explanation

This message is printed at the end of HASH process. *t* represents the total number of errors.

System action

Processing continues.

User response

Check the messages that follow.

FABP2003I **NO ERRORS DETECTED**

Explanation

All formulas that were evaluated are matched.

System action

Processing continues.

User response

None. This message is informational.

FABP2004E **ERRORS WERE DETECTED IN LOGICAL RELATIONSHIP POINTERS**

Explanation

Error in logical relationship pointers or error in physical path pointers except physical child/twin pointer chain. This error might be acceptable if not all logically related databases were included in the SCAN process.

System action

Processing continues.

User response

Run the HD Pointer Checker job to check the error in detail.

FABP2005E ERRORS WERE DETECTED ON PHYSICAL CHILD/TWIN POINTER OR HIERARCHICAL POINTER CHAIN

Explanation

Error on physical child pointers, physical twin pointers, or hierarchical pointers.

System action

Processing continues.

User response

Run the HD Pointer Checker job with HASH=NO to check the error in detail.

Problem determination

See the message, issued prior to this message, which contains the details of the error.

FABP2006W EVAL OF DB: *dbdname* DB#: *nnn* PID: *ppppp* DSG#: *d* COMPLETED ERRORS: NO SEGMENT FOUND IN SCAN PROCESS

Explanation

No HASH total records are found in the data set group *xx* of input database *dbdname* (database number: *nnn*) data set.

System action

Processing continues.

User response

Rerun the HD Pointer Checker job with HASH=NO option.

FABP2007E ERRORS WERE DETECTED IN SECONDARY INDEX RELATIONSHIP

Explanation

Errors were detected in the HASH Check of secondary index relationship.

System action

Processing continues.

User response

Run the HD Pointer Checker job to check the error in detail.

FABP2008E ERRORS WERE DETECTED ON RAP, PHYSICAL CHILD/TWIN POINTER, OR HIERARCHICAL POINTER CHAIN

Explanation

Error on Root Anchor Points (RAP), physical child pointers, physical twin pointers, or hierarchical pointers.

System action

Processing continues.

User response

Run the HD Pointer Checker job with HASH=NO to check the error in detail.

Problem determination

See the message, issued prior to this message, which contains the details of the error.

FABP2009W "IXKEYCKCHK=YES" IS VALID ONLY WHEN IXKEYCHK=YES IS SPECIFIED

Explanation

IXKEYCKCHK=YES is specified on the PROC statement, but HD Pointer Checker did not run the Index Key Check function because IXKEYCHK=NO is specified. When IXKEYCKCHK=YES is specified, IXKEYCHK=YES must also be specified.

System action

Processing continues as IXKEYCKCHK=NO.

User response

If you want to run the Index Key Check function, specify IXKEYCHK=YES on the PROC statement.

FABP2010I DATABASE *dbdname* IS PROCESSED

Explanation

HD Pointer Checker processes the database that is identified by *dbdname*. This message is issued for the database that is processed by the DBALL=YES keyword of the DATABASE statement.

System action

Processing continues.

User response

None. This message is informational.

FABP2011W DBDS OF ABOVE DATABASE STATEMENT IS TREATED AS "DBALL=NO"

Explanation

HD Pointer Checker treats the database data sets as DBALL=NO because they are already specified with the previous DBALL=YES specification.

System action

Processing continues.

User response

None.

FABP2012E SECONDARY INDEX DATABASE DB: *dbdname* CANNOT BE SCANNED WITH "HASH=YES"

Explanation

The indicated secondary index database *dbdname* and the indexed database are not processed with HASH=YES process option.

System action

Processing stops.

User response

Specify HASH= NO process option, and rerun the HD Pointer Checker job.

FABP2013W DB: *dbdname* DB#: *nnn* DD: *ddname* WAS NOT SCANNED FOR MULTIPLE DATA SET GROUP

Explanation

Multiple data set groups were scanned in the SCAN process, but the indicated data set groups of database *dbdname* was not scanned.

System action

Processing continues.

User response

Make sure you process all multiple data set groups. If you omit any of the multiple data set groups, errors might be left undetected.

FABP2014W DB: *dbdname* DB#: *nnn* WAS NOT SCANNED FOR LOGICALLY RELATED DB DBLG#: *xxx*

Explanation

Multiple logically related data set groups were scanned in the SCAN process, but the indicated data set group *xx* of database *dbdname* (database number *nnn*) was not scanned.

System action

Processing continues.

User response

Make sure you process all logically related databases in the CHECK process. If you omit any of the multiple data set groups, errors might be left undetected.

FABP2015E NO HD DATABASE STATEMENT EXISTS IN DBLG#: *xxx*, CANNOT BE SCANNED WITH "HASH=YES"

Explanation

At least one of the logically related databases (DBLG NO is *xxx*) must be an HD database to run HD Pointer Checker with HASH=YES process option.

System action

Processing stops.

User response

Specify HASH=NO process option, and rerun the HD Pointer Checker job.

FABP2016W **PARTITION DD:*ddname* OF DB:*dbdname* DB#:*nnn* WAS NOT SCANNED FOR LOGICALLY RELATED DB DBLG#:*xxx***

Explanation

Multiple partitions that have direct logical parent pointers were scanned in the SCAN process, but the indicated partition was not scanned.

System action

Processing continues.

User response

Make sure you process all partitions of a database that has direct logical parent pointers. If you omit any partitions, errors might be left undetected.

FABP2017W **SOME PARTITION OF DB: *dbdname* DB#: *nnn* WAS NOT SCANNED FOR LOGICALLY RELATED DB DBLG#: *xxx***

Explanation

Multiple partitions that have direct logical parent pointers were scanned in the SCAN process, but some partitions of a HALDB were not scanned.

System action

Processing continues.

User response

Make sure you process all partitions of a HALDB that have direct logical pointers. If you omit any of the multiple data set groups, errors might be left undetected.

FABP2018I **"DBALL=YES" FORCES TO RUN THE FOLLOWING PROCESSES:**

Explanation

One or more databases are implicitly processed by the DATABASE DBALL=YES statement. FABP2010I messages with database names follow this message.

System action

Processing continues.

User response

None. This message is informational.

FABP2019W **DUPLICATE ILKS CANNOT BE CHECKED WITH EPSCHK=NO**

Explanation

DUPILKCHK=YES is specified on the PROC statement. However, HD Pointer Checker did not check for duplicate ILKs in the HALDB because EPSCHK=NO is also specified.

System action

Processing continues without the HALDB Duplicate ILKs Checking process.

User response

If you want to check duplicate ILKs in the HALDB, specify EPSCHK=YES on the PROC statement.

FABP2020E **MISSING INDEX POINTER SEGMENT**

Explanation

The segment is missing index pointer segment. This message is issued when index target segment type is the same as index source segment type.

System action

Processing continues.

User response

The database is probably damaged. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2021E **INVALID INDEX KEY**

Explanation

The index pointer segment has an incorrect index key. This message is issued when index target segment type is the same as index source segment type.

System action

Processing continues.

User response

The database is probably damaged. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2022E INVALID INDEX POINTER

Explanation

The index pointer does not point to any segment. This message is issued when index target segment type is the same as index source segment type.

System action

Processing continues.

User response

The database is probably damaged. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2023E NUMBER OF INDEX < NUMBER OF SOURCE FOR SAME INDEX KEY

Explanation

The number of index source segments is greater than one of index pointer segments that contain same key value. There is a missing index pointer or a bad index key in the database. This message is issued when an index target segment type is different from an index source segment type.

System action

Processing continues.

User response

The database is probably damaged. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2024E NUMBER OF INDEX > NUMBER OF SOURCE FOR SAME INDEX KEY

Explanation

The number of index source segments is less than one of index pointer segments that contain same key value. There is a missing index pointer or a bad index key in the database. This message is issued when an index target segment type is with a different index source segment type.

System action

Processing continues. Repair the database.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2025E INDEX KEY LENGTH OF REAL DATABASE IS DIFFERENT FROM DBD

Explanation

The length of the index key from DBD (SRCH field and SUBSEQ field) is different from the length of index key in T6, T7, or TA record.

System action

Skip index key checking for this index database and processing continues.

User response

Use correct DBD or sort records, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293 if necessary.

FABP2026E NUMBER OF INDEX DATABASE POINT TO TARGET EXCEED EXPECTED VALUE

Explanation

The number of index databases that point to the target segment is greater than the number that is defined in the DBD. This message is issued when index target segment type is the same as index source segment type.

System action

Processing continues.

User response

Use correct DBD or sort records, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2027E TOTAL NUMBER OF RECORDS SKIPPED BY INDEX KEY CHECKING

Explanation

A length error of the index key is detected with FABP2025E. HD Pointer Checker ends the index key checking for this database data set group and reports the total number of records to be skipped.

System action

Processing continues.

User response

Use correct DBD or sort records, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP2028E DUPLICATE POINTERS AND SOURCE SEGMENTS FOUND

Explanation

Duplicate index pointers (T6 or T7) and source segments (TA) were detected for the same RBA in case of ITS=ISS.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

This problem is probably due to a JCL error. Check the data sets that contain the sort records.

FABP2030E MEMBER: *member-name* NOT FOUND IN *ddname* DATA SET

Explanation

A FIND macro was issued for the indicated *member-name*, and no module with that name was in the indicated *ddname* library.

System action

HD Pointer Checker ends the job with RC=8.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Make sure that the indicated *member-name* is in the correct library.

FABP2031E NO OR INCORRECT RECORDS FROM SCAN PROCESS IN DD: SORTEX01 OR SORTEX

Explanation

During the TYPE=CHECK process, HD Pointer Checker found that the SORTEX01 or SORTEX data set has no record or incorrect records. These records are expected to be created by the preceding TYPE=SCAN process.

System action

HD Pointer Checker ends with return code 08.

User response

Specify the correct SORTEX01 or SORTEX data set and rerun the HD Pointer Checker job.

Problem determination

Check whether the SORTEX01 or SORTEX data set was created by the TYPE=SCAN process, or check whether the data set is specified in the JCL of the TYPE=CHECK process.

FABP2032W INDEX KEY CHECK NOT ALLOWED WITHOUT INDEX DATABASE SPECIFIED

Explanation

The index key checking option is not effective when no primary or secondary index database is specified.

System action

Processing continues as IXKEYCHK=NO is specified for the specified databases.

User response

If you did not specify the DATABASE statement for an index database, correct the error and rerun the HD Pointer Checker job.

Problem determination

Index databases and associating primary databases must be specified on the DATABASE statement when running HD Pointer Checker with the IXKEYCHK=YES option.

FABP2033E THE TARGET SEGMENT THAT CONTAINS THE KEY WAS NOT FOUND

Explanation

A concatenated key, which is defined by a /CK field, was found in the subsequence field of the index pointer segment in the secondary index database. HD Pointer Checker decomposed the concatenated key into the segment level to check the decomposed keys against the corresponding keys of the segment, but the segment that has the key was not found in the primary database. This key is printed in the Evaluation of Index Pointers and Keys report. For information about how the index keys are checked, see the IXKEYCKCHK keyword description in "PROC statement" on page 108.

System action

Processing continues.

User response

The database is corrupted. Repair the database and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293.

FABP2035E TARGET OF SYMBOLIC INDEX POINTER NOT FOUND

Explanation

A symbolic pointer in secondary index was found but the target segment having the corresponding key was not found.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293.

FABP2036E TARGET OF SYMBOLIC LP POINTER NOT FOUND

Explanation

A symbolic LP pointer was found, but the target segment having the corresponding key was not found.

System action

Processing continues.

User response

The database might be corrupted. Repair the database.

Problem determination

See Chapter 11, "Database repair guidelines," on page 293.

FABP2040W IMAGE COPY DATE OLDER THAN LATEST DBDS RECORD DATE FOR DB: *dbdname* PID: *xxxxx* DSG#: *xx*

Explanation

You attempted to process the indicated data set group *xx* of partition ID *xxxxx* of database *dbdname*, which is an image copy. But the creation date of the image copy data set is older than the latest database data set record date for the database data set in the HISTORY data set.

System action

HD Pointer Checker skips processing HISTORY data set for the database data set, and continues processing.

User response

None.

FABP2041E SPECIFIED SPMNMBR DD IS INCORRECT

Explanation

The SPMNMBR DD statement is not supported in HD Pointer Checker.

System action

HD Pointer Checker ends the job with RC=8.

User response

None.

Problem determination

Specify a valid DD name, and rerun the utility.

FABP2042E (HDPC) STATEMENT NOT SPECIFIED

Explanation

There is no (HDPC) statement in the HPSRETCD data set. You must specify one (HDPC) statement.

System action

Processing stops.

User response

Specify a (HDPC) statement, and rerun the HD Pointer Checker job.

Problem determination

Check the HPSRETCD data set.

FABP2043I FOR SOME DBDS, HDPC RUNS WITH HISTORY OPTION MORE THAN *nn* TIMES A DAY

Explanation

Some database data set entries are not recorded, because the number of database data set entries of the day exceeds the maximum number 25.

System action

Processing continues. However, the update after the 25th entry will not be overridden or not be recorded.

User response

None. This message is informational.

Problem determination

See message FABP2044W in the PROCCTL Statement report. The message shows that the data set reaches the maximum number of entries.

FABP2044W THE NUMBER OF DBDS ENTRIES FOR DB: *dbdname* DD: *ddname* IN THE HISTORY DATA SET REACHES *nn*. THE ENTRY IS NOT STORED

Explanation

The number of database data set entries for *dbdname* and *ddname* for today reached the maximum number per day.

System action

Processing continues. The current history information of the database data set is not recorded.

User response

None.

FABP2045W PARTITION DD: *ddname* OF DB: *dbdname* DB#: *nnn* IS NOT SPECIFIED IN DATABASE STATEMENT FOR LOGICALLY RELATED DB DBLG#: *xxx*

Explanation

The partition named is not specified with a DATABASE statement.

System action

Processing continues.

User response

Always process every partition of the database that has direct logical parent pointers. If you omit any partitions, errors might be left undetected.

FABP2046W SOME PARTITION OF DB: *dbdname* DB#: *nnn* IS NOT SPECIFIED IN DATABASE STATEMENT FOR LOGICALLY RELATED DB DBLG#: *xxx*

Explanation

Some partitions of a HALDB are not specified with a DATABASE statement. Logical pointers, index pointers, or EPSs are checked only for the partitions of the HALDB *dbdname* that are specified in the DATABASE

statements. The pointers of other partitions of the HALDB are not checked. The pointer of other partitions must be checked in other HD Pointer Checker jobs.

System action

Processing continues.

User response

To check logical pointers, index pointers, or EPSs of the other partitions, specify the remaining partitions in other HD Pointer Checker jobs and run the jobs with EPSCHK=YES. However, after doing any of the following operations, you should specify all the partitions of the HALDBs that have a logical relationship or an index relationship in the DATABASE statements and run the HD Pointer Checker job with EPSCHK=YES, so that all the partitions are processed at once:

- Delete partitions from a HALDB
- Divide a partition into some partitions
- Change a HALDB partition selection exit routine
- Change the high key value of a partition

FABP2047W **PHIDAM PRIMARY INDEX OF DB: *dbdname* PART: *partname* IS NOT SCANNED BECAUSE OF AN IMAGE COPY**

Explanation

DATASET=IMAGECOPY is specified in the DATABASE statement of a primary index of PHIDAM database. The primary index is not checked.

System action

Processing continues.

User response

The image copy of the PHIDAM primary index cannot be taken by image copy products. Therefore the specification DATASET=IMAGECOPY is ignored. Specify DATASET=REAL to check the primary index of PHIDAM database.

FABP2048I ***ddname1* DD STATEMENT IS IGNORED. *ddname2* DD STATEMENT IS USED**

Explanation

Two work data sets were specified: one that is compatible with IMS HP Pointer Checker 1.1 (*ddname1*) and one for 3.1 (*ddname2*). The one for *ddname1* will be ignored.

System action

Processing continues.

User response

None. This message is informational.

FABP2049I **DBD NAME SPECIFIED IN EXEC PARAMETER IS IGNORED**

Explanation

In an IMS ULU region, HD Pointer Checker ignores the DBD name specified on the PARM parameter on the EXEC statement and uses the DBDs specified on the DATABASE statements of the PROCCTL data set.

System action

Processing continues.

User response

None. This message is informational.

Problem determination

When running in an IMS ULU region, HD Pointer Checker does not require the name of a DBD on the PARM parameter of the EXEC statement. To avoid getting this message, remove the DBD name from the PARM parameter.

FABP2050E **"PROC TYPE= ALL" IS SPECIFIED "BLOCKDUMP" PARAMETER IS SPECIFIED TO SOME DSG'S BUT NOT ALL FOR DB: *dbdname***

Explanation

An incorrect control statement is detected by the control statement syntax checking. Exclusive option is specified for each data set group of the indicated database *dbdname* when TYPE= ALL is specified.

System action

Processing stops. HD Pointer Checker ends the job to avoid the incomplete pointer checking.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

If you specify the BLOCKDUMP option, pointer checking is not done for the one data set group of the multiple data set group specified in the DATABASE statement. Because you request the pointer checking for the other data set group without the BLOCKDUMP option at the same run (TYPE= ALL).

FABP2051W **DB: *dbdname* DB#: *nnn* DD: *ddname* IS NOT SPECIFIED IN DATABASE STATEMENT FOR MULTIPLE DATA SET GROUP.**

Explanation

Multiple data set group was specified in the DATABASE statement, but the indicated multiple data set group of database *dbdname* was not specified in the DATABASE statement.

System action

Processing continues.

User response

Always be sure to process every multiple data set group. If you omit a data set group, you are taking a risk that errors will go undetected.

FABP2052W **DB: *dbdname* DB#: *nnn* IS NOT SPECIFIED IN DATABASE STATEMENT FOR LOGICALLY RELATED DB DBLG#: *xxx***

Explanation

Multiple databases of the logically related database group *xxx* were specified on the DATABASE statement, but the indicated database *dbdname* (database number: *nnn*) was not specified on the DATABASE statement. This message is also issued when the database type specified on DBORG parameter prevents the indicated database *dbdname* (database number: *nnn*) from being processed, even if the database is specified on a DATABASE statement. Logical pointers, index pointers, or EPSs between the indicated database *dbdname* and the logically related database are not checked. These pointers must be checked in other HD Pointer Checker jobs.

System action

Processing continues.

User response

Consider processing all logically related databases to check logical pointers, index pointers, or EPSs. If you omit a database, you are taking a risk that errors will go undetected.

If duplicate ILKs or potentially duplicate ILKs were detected in the related database group, also consider processing all related databases to identify the source segments that contain the duplicate ILK or the potentially duplicate ILK.

FABP2053E **"PROC TYPE= ALL" IS SPECIFIED DB: *dbdname* IS SPECIFIED AS TARGET OF INDEX DB BUT DATABASE STATEMENT FOR TARGET NOT FOUND**

Explanation

The indicated *dbdname* was specified on PRIMEDB parameter of the index DB DATABASE statement. However, the DATABASE statement of the indicated *dbdname* is not found.

System action

Processing stops.

User response

Specify the DATABASE statement of the indicated *dbdname*, and rerun the HD Pointer Checker job.

FABP2054E **"PROC TYPE= ALL" IS SPECIFIED COMBINATION OF DB TYPES SPECIFIED IN "DBORG" PARAMETER IS INVALID FOR "PROC TYPE= ALL"**

Explanation

The indicated database type specified in DBORG parameter must be run with logically related database type when TYPE= ALL is specified.

System action

Processing stops.

User response

Specify the logically related database type in DBORG parameter, and rerun the HD Pointer Checker job. Or change TYPE parameter to SCAN, and rerun the HD Pointer Checker job.

FABP2055E ***parm-value* IS INVALID FOR "*parm-name*" PARAMETER**

Explanation

An incorrect control statement was detected by the control statement syntax checking. The indicated *parm-value* is incorrect for the indicated *parm-name* parameter.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP2056E "PTRCHK=NO" CAN BE SPECIFIED ONLY IF "HASH=NO" AND "IXKEYCHK=NO"

Explanation

An incorrect control statement was detected in the control statement syntax checking. "HASH=YES or FORCE" or "IXKEYCHK= YES" PROC statement parameter and "PTRCHK=NO" OPTION statement parameter cannot be specified at the same run.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the combination error of the control statement.

FABP2057W LOGICALLY RELATED DATABASE GROUP DBLG#: *xxx* ARE SCANNED WITH "HASH=NO"

Explanation

The HASH=FORCE option was specified on the PROC statement, but all data sets of logically related database group *xx* were scanned with the HASH=NO option, because, the secondary index database was specified on the DATABASE statement.

System action

Processing continues.

User response

None.

FABP2058E LOGICAL DATABASE CANNOT BE PROCESSED

Explanation

An incorrect control statement was detected by the control statement syntax checking. The dbdname on the DATABASE statement is the name of a logical DBD.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

The PSB might contain PCBs that reference logical DBDs. Because HD Pointer Checker processes only physical databases, your control statement must refer to the physical DBD.

FABP2059E SPECIFIED DATABASE WAS ALREADY FOUND IN ANOTHER DATABASE STATEMENT

Explanation

An incorrect control statement was detected by the control statement syntax checking. Duplicate DATABASE statements are found in the PROCCTL data set.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Only one DATABASE statement is specified for each database data set group in the PROCCTL data set.

FABP2060E DDNAME SPECIFIED IN "[DD | OVERFLOW]" PARAMETER NOT FOUND IN DMB

Explanation

The ddname in the DD parameter or the OVERFLOW parameter on the control statement is not present in the IMS DMB control block.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

You might have entered the ddname incorrectly on your control statement. It is also possible that you used the wrong PSB name on the EXEC statement PARM. (You can also get this error by running HD Pointer Checker under a different release of IMS from the one used to install IMS HP Pointer Checker.)

FABP2061E "*parm-name*" PARAMETER IS INVALID FOR SPECIFIED DATABASE

Explanation

An incorrect control statement was detected by the control statement syntax checking. The indicated *parm-name* parameter on the DATABASE statement is incorrect.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the DATABASE statement for spelling errors or the combination error of parameters.

FABP2062E DBD NAME SPECIFIED IN "[DB | PRIMEDB]" PARAMETER NOT FOUND IN DMB

Explanation

The *dbdname* in the DB parameter or PRIMEDB parameter on the control statement is not present in the IMS DMB control block.

With dynamic PSB generation, this error message also appears if you specify a database whose DBD member does not exist in the IMS data set.

If the processing database is an IMS catalog database and *dbdname* is an alias name of the IMS catalog database, this message indicates that the Catalog Definition exit routine (DFS3CDX0) is not found in the STEPLIB DD concatenation or that DFSDF=*xxx* is not specified on the EXEC statement of the HD Pointer job step.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

You might have entered the *dbdname* incorrectly on your control statement. It is also possible that you used the wrong PSB name on the EXEC statement PARM. (You can also get this error by running HD Pointer Checker under a different release of IMS than the one used to install IMS HP Pointer Checker.)

If *dbdname* is an alias name of the IMS catalog database, add the library that contains the Catalog Definition exit routine (DFS3CDX0) to the STEPLIB DD concatenation or specify DFSDF=*xxx* in the PARM parameter on the EXEC statement of the HD Pointer Checker job step.

If this error resulted when an unrelated database was encountered on a control statement, remove the DATABASE statements that are not logically related to the first DATABASE statement. Put these statements, if related to each other, in a separate job and run it separately.

FABP2063E DD NOT FOUND FOR *text*

Explanation

text can be:

- DDNAME SPECIFIED IN "DD" PARAMETER
- DB: *dbdname* DD: *ddname*

Because there is no DD statement in your JCL stream that corresponds to the *ddname* that is specified in the control statement, dynamic allocation of the data set is not available. When TYPE=ALL or SCAN is specified in the PROCCTL statement, this message means that the DD name is not defined in the JCL DD statement, in the DFSMDA member, or in the RECON data set.

System action

Processing stops.

User response

Correct your JCL by adding the missing DD statement, or prepare the environment for dynamic allocation, and rerun the HD Pointer Checker job.

Problem determination

If you specified a DD statement, this problem is probably due to a JCL error. Check for spelling mistakes. If you did not specify a DD statement, check DFSMDA or RECON.

FABP2064E "BLOCKDUMP" PARAMETER IS INVALID FOR "PROC TYPE=[CHECK | BLKMAP]"

Explanation

An incorrect control statement was detected by the control statement syntax checking. The BLOCKDUMP parameter on the DATABASE statement cannot be specified when TYPE=CHECK or TYPE=BLKMAP.

System action

Processing stops.

User response

Correct all errors and rerun the job.

Problem determination

The BLOCKDUMP parameter can be specified when TYPE=ALL or TYPE=SCAN is specified.

FABP2065I [IBUFF | VSAMBF] PARAMETER: *nnnnn* OVERRIDDEN BY [BUFND | BUFNO] PARAMETER: *mmmmm* SPECIFIED IN JCL FOR [PRIM | OVER] DD: *dddddddd*

Explanation

The VSAMBF or IBUFF parameter is overridden by the AMP=('BUFND=') or DCB=BUFNO parameter specified in the JCL for the primary DD statement or the overflow DD statement. Here, *nnnnn* is the number of buffers specified by the VSAMBF parameter or the buffer size specified by the IBUFF parameter, and *mmmmm* is the number of buffers specified by the BUFND or BUFNO parameter.

System action

Processing continues.

User response

None. This message is informational.

FABP2066E DUMMY OR NULLFILE SPECIFIED FOR DDNAME: *ddname*

Explanation

DSN=NULLFILE or DUMMY parameter specified for the DD.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Make sure that a DD statement is present for the ddname indicated and that the correct data set is identified.

FABP2067E INVALID NUMBER OF OPERANDS SPECIFIED FOR "*parm-name*" PARAMETER

Explanation

An incorrect control statement was detected when the syntax of the control statement was checked. The number of operands in the indicated *parm-name* parameter on the control statement is incorrect.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement for the combination error in the parameter.

FABP2068E "HASH=YES OR FORCE" AND *parm-name*=YES CANNOT BE SPECIFIED AT THE SAME TIME

Explanation

An incorrect control statement was detected by the control statement syntax checking. HASH=YES or FORCE and *parm-name*= YES cannot be specified in the PROC statement at the same time.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the combination error of the PROC statement.

FABP2069E MORE THAN ONE "*statement-name*" STATEMENT SPECIFIED

Explanation

An incorrect control statement was detected by the control statement syntax checking. You have specified more than one *statement-name* statement in the PROCCTL or HPSRETCD data set.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

There must be only one *statement-name* statement.

FABP2070E "PROC" STATEMENT NOT SPECIFIED

Explanation

An incorrect control statement was detected by the control statement syntax checking. No PROC statement is specified in the PROCCTL data set.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

There must be only one PROC statement, and it must be the first control statement in the PRCCTL data set.

FABP2071E "*parm-name*" PARAMETER IS REQUIRED FOR SPECIFIED DATABASE

Explanation

An incorrect control statement was detected by the control statement syntax checking. No indicated *parm-name* parameter is specified on the DATABASE statement.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Specify the ddname (as coded in DBD) of the overflowed data set for HISAM or index database in OVERFLOW parameter. Specify the *dbdname* of the primary database indexed by the HIDAM index or secondary index database in PRIMEDB parameter.

FABP2072W INDEX KEY CHECK NOT ALLOWED FOR DBNAME: *dbdname* REASON: *text*

Explanation

The index key checking option is not effective for the indicated database *dbdname*. *text* shows the reason:

- /CK FIELD IS SPECIFIED
- MISSING PRIME DB STATEMENT
- "SPIXCHK=NO" IS SPECIFIED
- "EPSCHK=NO" IS SPECIFIED
- "IXKEYCKCHK=YES" IS NOT SPECIFIED

System action

Processing continues as if IXKEYCHK=NO is specified for the indicated database *dbdname*.

User response

If you did not specify the DATABASE statement for the primary database, correct the error and rerun the HD Pointer Checker job.

If you want to run the Index Key Check function for the databases that have /CK fields, run the HD Pointer Checker job with the HASH=NO, IXKEYCHK=YES, and IXKEYCKCHK=YES options. If you did not specify the SPIXCHK=YES, EPSCHK=YES, or IXKEYCKCHK=YES option, rerun the HD Pointer Checker job by specifying one or more of these options.

FABP2073E MISSING "DATABASE" STATEMENT

Explanation

An incorrect control statement was detected by the control statement syntax checking. The data set associated with the PROCCTL DD statement had no DATABASE statement, or there was no DATABASE statement that preceded an END statement.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

You must specify the DATABASE statement, unless TYPE=CHECK or TYPE=BLKMAP is specified on the PROC statement.

FABP2074E MISSING CONTROL STATEMENT

Explanation

An incorrect control statement was detected by the control statement syntax checking. The data set associated with the PROCCTL DD statement was empty or a DUMMY data set.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP2075E MORE THAN ONE "[OPTION | REPORT]" STATEMENT SPECIFIED AFTER "PROC" OR "DATABASE" STATEMENT

Explanation

An incorrect control statement was detected by the control statement syntax checking. More than one OPTION/REPORT statement was specified for a DATABASE statement or a PROC statement.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP2076E SPECIFIED PRIMARY DATABASE IS NOT HIDAM OR HDAM

Explanation

The specified dbdname on the PRIMEDB parameter of DATABASE statement is not the name of a valid HIDAM or HDAM DBD.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct dbdname is specified on the PRIMEDB parameter. Also, ensure that the correct DBD library is specified.

FABP2077W "*parm-name*" PARAMETER IS INVALID FOR SPECIFIED "TYPE" PARAMETER

Explanation

The indicated parameter *parm-name* is not effective for specified TYPE parameter.

System action

Processing continues.

User response

None.

FABP2078E **SPECIFIED OPTION OF "*parm-name*" PARAMETER IS INVALID FOR "HISTORY=YES"**

Explanation

An incorrect control statement is detected by the control statement syntax checking. The indicated parameter (*parm-name*) cannot be specified with the HISTORY=YES option in the same run. This message is issued when:

- HASH=YES or HASH=FORCE option of the PROC statement is effective at run time.
- BLOCKDUMP keyword of the DATABASE statement is specified.
- HOMECHK=NO or HOMECHK=NOCHKP option of the OPTION statement is specified.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the combination error of the control statement.

FABP2079E **DD STATEMENT MISSING FOR DDNAME:*ddname***

Explanation

Required DD statement of work data set is not specified for the DD.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Make sure that a DD statement is present for the ddname indicated and that the correct data set is identified.

FABP2081E **MEMBER "*xxxxxxxx*" SPECIFIED IN "DBDEFCTL=" IS INVALID**

Explanation

The member name specified by the DBDEFCTL keyword on the PROC statement is incorrect.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP2082E **"*xxxxxxxx*" CANNOT BE USED AS DBDEFCTL MEMBER NAME**

Explanation

The control information member name specified by the DBDEFCTL keyword is the same as the database name.

System action

Processing stops.

User response

Specify another member name for the control information member, and rerun the HD Pointer Checker job.

FABP2084I **I/O BUFFER OF DD: *ddname* (CI/BLOCK SIZE: *xxxxx*) IS *yyyy* KBYTE.**

Explanation

xxxxx is the CI or block size of the input data set. *yyyy* is the actual size of I/O buffer.

System action

Processing continues.

User response

None. This message is informational.

FABP2085E **"*parm-name*" PARAMETER IS INVALID FOR SPECIFIED "TYPE" PARAMETER**

Explanation

The indicated parameter (*parm-name*) is not effective for the TYPE parameter specified.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check the combination error of the control statement.

FABP2086I SHARED INDEX DATABASE DB: *dbdname* DD: *ddname* IS SCANNED IN SCANGROUP: *n*

Explanation

More than two shared index databases share one data set. Different scan group numbers, however, were assigned to the same data set. The parameter of SCANGROUP= is ignored, and the second or later *dbdname ddname* of the shared index will be used in the first scan group *n*.

System action

Processing continues.

User response

None. This message is informational.

FABP2087W PARAMETER "*old-statement*" IS OBSOLETE AND IGNORED

Explanation

The specification is ignored, and *old-statement* is not used.

System action

Processing continues.

User response

None.

FABP2088W PARAMETER "*old-statement*" IS OBSOLETE AND TREATED AS "*new-statement*"

Explanation

The parameter *old-statement* will not be used. It is treated as *new-statement*.

System action

Processing continues.

User response

None.

FABP2089E PARAMETER 'KEYSIN=YES' MUST BE SCANNED IN THE SAME SCAN TASK

Explanation

More than two data sets have root segments with KEYSIN=YES specified, however, different scan group numbers are assigned to them.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

All data sets having root segments with KEYSIN=YES specified must be assigned to the same group.

FABP2090E 'EPSCHK' PARAMETER MUST BE SAME BETWEEN SCAN PROCESSES

Explanation

EPSCHK parameter is different for different SCAN processes.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

EPSCHK parameter must be the same in every SCAN process.

FABP2091E PARTITION NAME SPECIFIED IN 'PART' PARAMETER NOT FOUND IN PTE

Explanation

The partition name in the PART parameter of the control statement is not present in the IMS PTE control block. Either the partition is not defined in the RECON data sets or the partition is marked as disabled in the RECON data sets. Such partitions cannot be specified on the PART parameter.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Ensure that the partition name is correctly specified on the control statement and that the specified partition is not disabled.

FABP2092E PARTITION NUMBER SPECIFIED IN 'NUM' PARAMETER IS OVER MAX VALUE

Explanation

The partition number in the NUM parameter on the control statement exceeds the maximum value.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the partition number specified in the NUM parameter of DATABASE statement.

FABP2093E DDNAME SPECIFIED IN 'DD' PARAMETER IS INVALID

Explanation

The ddname in the DD parameter on the control statement is incorrect.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the length specified in the DD parameter of the DATABASE statement. The ddname must be a 1-digit value, and the data set group ID, A,B,C,...J,L,X, must be specified.

FABP2095E ONLINE REORG IS ACTIVE FOR DB: *dbname* PART: *partname*

Explanation

The partition (*partname*) of HALDB (*dbname*) cannot be processed because an online reorganization has not completed.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP2098E DBRC IS REQUIRED TO PROCESS HALDB DB: *dbdname*

Explanation

If the database that is being processed is a HALDB or an IMS catalog database that is registered in the RECON data set, DBRC must be activated. This message indicates that the DBRC was not active under such conditions.

This error message also appears if the database that is being processed is an unregistered IMS catalog database and if the Catalog Definition exit routine (DFS3CDX0) is not found in the STEPLIB DD or DFSDF=*xxx* is not specified on the EXEC statement.

System action

Processing stops.

User response

If the database that is being processed is a HALDB or an IMS catalog database that is registered in the RECON data set, specify Y for the 14th parameter on

the EXEC statement of the HD Pointer job step. For example,

```
//HDPCPRO EXEC PGM=DFSRRC00,
//        PARM=(ULU,FABPMAIN,,,,,,,,,,,Y,N)
```

If the processing database is an unregistered IMS catalog database, specify the library that contains the Catalog Definition exit routine (DFS3CDX0), which unregistered IMS catalog database names are defined in, to the STEPLIB DD statement. Alternatively, specify DFSDF=*xxx* for the 27th parameter on the EXEC statement of the HD Pointer job step. DFSDF specifies the 3-character suffix *xxx* of the DFSDF*xxx* member that specifies the unregistered IMS catalog database names. For example:

```
//HDPCPRO EXEC PGM=DFSRRC00,
//        PARM=(DLI,FABPMAIN,psbname,,,,,,,,,,N,N,
//        ,,,,,,,,,,'DFSDF=xxx')
```

FABP2099I RETURN CODE *nn* WILL BE RETURNED IF *parm-name* IS DETECTED

Explanation

The return code is changed when the *parm-name* event is detected. *parm-name* is T2ERROR, DBERROR, or PROCERROR. This message is shown in the HPSRETCD Statement report.

System action

Processing continues.

User response

None. This message is informational.

FABP2100E ILK IN EPS NOT FOUND IN ILDS

Explanation

Indirect list entry key (ILK) in extended pointer set (EPS) was not found in the indirect list data set (ILDS).

System action

Processing continues.

User response

Repair the databases, and rerun the HD Pointer Checker job.

Problem determination

ILK in EPS must be in ILDS as the key of ILE in ILDS.

FABP2101E ILK IN EPS IS DIFFERENT FROM ILK OF TARGET SEGMENT

Explanation

Indirect list entry key (ILK) in the extended pointer set (EPS) is different from the ILK of the TARGET segment.

System action

Processing continues.

User response

Repair the databases, and rerun the HD Pointer Checker job.

Problem determination

ILK in EPS must be the same as the ILK of the TARGET segment.

FABP2103W EPS CANNOT BE CHECKED WITHOUT SCANNING DSG 'A' OF TARGET

Explanation

The EPS cannot be checked because the data set group A of the target partition for the pointers, which reside in the EPS, is not scanned. The reorganization number in the bitmap block is required for EPS check process. The data set group must be included in the processed data sets with 'EPSCHK=YES' is specified.

System action

Processing continues.

User response

If you want to run HD Pointer Checker with 'EPSCHK=YES', specify data set group A of the target partition on DATABASE statement.

FABP2104E THE SEQUENCE OF DATABASE STATEMENTS AMONG MULTIPLE SCAN STEP JOBS CONFLICT WITH EACH OTHER

Explanation

Databases with neither logical nor index relation were processed while the scan steps (TYPE=SCAN steps), which are composed of multiple jobs, were running in a ULU region. The order of DBLG (Data Base Logical Group), that is, databases with either logical or index relations, among the scan step jobs is not correct.

System action

Processing stops.

User response

Do one of the following three actions:

- Run with TYPE=ALL.
- Run the scan step in a single job.
- Specify databases with either logical or index relations (DBLG) in the same order within multiple scan step jobs.

  Having multiple independent databases means there are multiple DBLGs. When specifying the multiple DBLGs in multiple scan-step jobs, the DBLGs must be specified in the same order for the DATABASE statements in the PROCCTL statement.

  Example:

  There are two DBLGs X and Y: X contains DB1, DB2 and Y contains DBA, DBB. If you want to process the DBLGs in two scan-step jobs, you must specify in the order DBLG X,Y, such as DB1,DBA for one job, and DB2,DBB for another. In this way, for both jobs, the DBLG is specified in the same order, that is for both job, the first DBLG specified is in X and the next one is in Y. But if, for example, you specify DB1,DB2 for one job and DBA,DBB for the other, this will cause an error because the order of the DBLG in the first job begins with X, but in the second job it begins with Y.

FABP2105E "*XXXXXXXX*" PARAMETER IS INCORRECT

Explanation

An operand is missing in the USER keyword parameter.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP2106E DUPLICATE OPERANDS FOR "*xxxxxxxx*" PARAMETER

Explanation

Two or more same user IDs are specified for USER=.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP2107E "*NO" CANNOT BE SPECIFIED WITH USERID

Explanation

Both "*NO" and USERID are specified.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP2108I T2 OR POINTER ERRORS NOTIFICATIONS WERE SENT TO TSO USERS:
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*, *xxxxxxx*,**
***xxxxxxx*, *xxxxxxx*,**

Explanation

Notification messages of T2 (unknown data) or pointer errors have been sent to the TSO user IDs.

System action

Processing continues.

User response

None. This message is informational.

FABP2109I ***mm/dd/yyyy hh:mm:ss xxxxxxx* ERROR DB: *dbname* DD: *ddname* JOBNAME: *jobname***

Explanation

HD Pointer Checker job (*jobname*) detected pointer errors or unknown data and sent this message to TSO users.

System action

Processing continues.

User response

Repair the database.

Problem determination

Check the errors in the HD Pointer Checker reports.

FABP2110E **LIU IS NOT INSTALLED OR NOT IN REQUIRED LEVEL**

Explanation

IMS Library Integrity Utilities is not found in any library concatenated to the STEPLIB DD, or the maintenance level of IMS Library Integrity Utilities is not supporting the requested IMS Library Integrity Utilities service. For more information, see "Software requirements" on page 17.

System action

Processing stops.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

If you want to use the requested IMS Library Integrity Utilities service, install IMS Library Integrity Utilities and apply the required maintenance. Otherwise remove the control statement that requests the IMS Library Integrity Utilities service.

FABP2111E **[DECODE DBD | MAP DBD] PROCESSING FAILED WITH RC=*cc***

Explanation

IMS Library Integrity Utilities returned a nonzero return code.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

If RC=8, check the Messages report of DBSRCPRT or DBMAPPRT data set. If RC=16, check message FABL*nnnn*E, issued to the console.

FABP2112E **SPMN PROCESS IS BYPASSED. BECAUSE HPIC MAINTENANCE LEVEL IS LOW.**

Explanation

Space Monitor cannot run because IMS HP Image Copy is not in the required maintenance level.

System action

Image Copy process by IMS HP Image Copy ends with an error.

User response

None.

Problem determination

Apply the required maintenance to IMS HP Image Copy.

FABP2113E **INCORRECT DATA SET: *dsname* IS SPECIFIED IN DD: *ddname***

Explanation

A real database data set is allocated in the DD *ddname* when DATASET=IMAGECOPY is specified in the PROCCTL data set.

System action

Processing stops.

User response

Specify a correct image copy data set name to HD Pointer Checker JCL. Or, if you want to use the latest image copy data set, the *ddname* DD is not required. Remove the *ddname* DD and specify the RECON data sets to the HD Pointer Checker JCL, and rerun the HD Pointer Checker job.

Problem determination

Check the *ddname* DD statement in the HD Pointer Checker JCL and the DATABASE statement in the PROCCTL data set.

FABP2114I ***mm/dd/yyyy hh:mm:ss* THE REST OF THE MESSAGES ARE SUPPRESSED JOBNAME: *jobname***

Explanation

The number of exception notification messages (FABP2109I) reached the limit of 50. The rest of the messages are not sent to TSO users.

System action

Processing continues.

User response

None. This message is informational.

FABP2115W **THE ITKBLOAD PARAMETER WAS IGNORED BECAUSE NO SERVER NAME WAS SPECIFIED**

Explanation

The IMS Tools KB load module library is specified on the ITKBLOAD parameter, but the specification was ignored because no server XCF group name is specified on the ITKBSRVR parameter.

System action

Processing continues, but HD Pointer Checker does not store any reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, supply the IMS Tools KB server XCF group name with the ITKBSRVR parameter.

FABP2117W **THE ITKBLOAD PARAMETER IS NOT USED UNTIL A SERVER NAME IS SPECIFIED**

Explanation

In the Site Default Generation utility, the data set name of IMS Tools KB load module was specified on the ITKBLOAD parameter, but server XCF group name was not specified. HD Pointer Checker will not use this value until a server XCF group name is specified.

System action

Processing continues.

User response

If you want to store the reports in the IMS Tools KB Output repository, specify the server XCF group name on the ITKBSRVR parameter by using the Site Default Generation utility or at run time.

FABP2119E **THE LATEST IMAGE COPY RECORD FOR DD: *ddname* WAS USER IC RECORD**

Explanation

HD Pointer Checker attempted to get the image copy data set name for the *ddname* from the latest image copy record in RECON data set, but the image copy record was a user IC record. HD Pointer Checker supports only the standard IC records.

System action

Processing stops.

User response

Specify the DD statement for the image copy data set and rerun the HD Pointer Checker job.

FABP2120W **RETURN CODE 04 IS RETURNED FROM VSAM OPEN DB: *dbdname* DD: *ddname***

Explanation

When opening the database data set specified by *dbdname* and *ddname*, the VSAM data set was opened successfully, but an attention message was issued from the OPEN macro.

System action

Processing continues.

User response

To avoid getting this message, resolve the attention of VSAM OPEN. If the attention is not a problem to your system, you can ignore it.

Problem determination

The reason code and data set name is shown in IEC161I. For the details of the reason code, see *z/OS DFSMS Macro Instructions for Data Sets*.

FABP2121I T2 OR POINTER ERRORS NOTIFICATIONS WERE CANCELED, BECAUSE USERS WERE NOT LOGGED ON OR TERMINAL DISCONNECTED

Explanation

HD Pointer Checker detected pointer errors or T2 errors (unknown data), and attempted to send the notification message to TSO user IDs, but failed to send the message. The TSO users were not logged on or were disconnected. The notification messages were discarded.

System action

Processing continues.

User response

None. This message is informational.

FABP2122I MARKED AS RECOVERY NEEDED FOR DB: *dbdname* PART: *partname*

Explanation

The database *dbdname* or the partition *partname* of the database *dbdname* is marked as recovery needed in the RECON data set.

System action

Processing continues.

User response

None. This message is informational.

FABP2123I FURTHER MESSAGES CANNOT BE REPORTED. *nnnnnn* MESSAGES ARE SUPPRESSED

Explanation

Not all error or warning messages were reported. *nnn,nnn* messages were suppressed.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

FABP2124E SCAN OF DB: *dbdname* PID: *partition-id* DSG: *data-set-group* WAS CANCELED

Explanation

Pointer Checking was scheduled in the IMS HP Image Copy job, the IMS Online Reorganization Facility job, or the IMS Database Reorganization Expert job, but the pointer checking process for the indicated database data set did not complete because a failure occurred in the IMS HP Image Copy process or the IMS Database Reorganization Expert process.

System action

Processing continues.

User response

Locate the error messages issued by IMS HP Image Copy or IMS Database Reorganization Expert and identify the cause of the failure. Then, correct the cause of the failure and rerun the job.

FABP2125E APF AUTHORIZATION IS REQUIRED

Explanation

One or more libraries that are specified on the STEPLIB DD statement are not APF-authorized.

System action

HD Pointer Checker ends the job with return code 8.

User response

APF-authorize all the libraries that are specified on the STEPLIB DD statement and rerun the job.

FABP2126E SENSOR=YES CANNOT BE SPECIFIED BECAUSE *reason*

Explanation

SENSOR=YES is specified in the PROC statement, but SENSOR=YES could not be processed. *reason* shows the cause of this error condition:

reason
Meaning

PGM=FABPPC00 IS NOT SPECIFIED IN THE EXEC STATEMENT
The FABPMAIN program is specified for the IMS region controller program (DFSRRC00) on the HD Pointer Checker EXEC statement. When you specify SENSOR=YES, you must specify PGM=FABPPC00 on the EXEC statement.

ITKB SERVER NAME IS NOT SPECIFIED
The IMS Tools KB server XCF group name is not specified on the ITKBSRVR parameter in the PROC statement. When you specify SENSOR=YES, you must specify the IMS Tools KB server XCF group name on the ITKBSRVR parameter.

THE ITKBLOAD PARAMETER IS SPECIFIED
The ITKBLOAD parameter is specified on the PROC statement. When you specify SENSOR=YES, the IMS Tools KB load module library must reside on the STEPLIB DD.

HDPC IS RUN IN THE DBB REGION
HD Pointer Checker ran in the DBB region when the IMS management of ACBs is not enabled. When the IMS management of ACBs is not enabled and you specify SENSOR=YES, you must specify either the ULU or DLI region.

IMS VERSION 9 IS UNSUPPORTED BY DB SENSOR
DB Sensor does not support IMS 9.1.

THE INPUT DATABASE IS AN IMAGE COPY
The input database is an image copy. When you specify SENSOR=YES, you must not specify an image copy data set as the input.

ALL OF DATA SET GROUPS OF DATABASES ARE NOT SPECIFIED
Only some of the database data sets were specified as input database data sets. When you specify SENSOR=YES, you must specify all data sets of the database as the input.

System action

Processing stops.

User response

Correct the error and rerun the job.

FABP2127E **THE TOSIXCFGRP PARAMETER CANNOT BE SPECIFIED BECAUSE PGM=FABPPC00 IS NOT SPECIFIED IN THE EXEC STATEMENT**

Explanation

The XCF group name for IMS Tools Online System Interface is specified on the TOSIXCFGRP parameter in the PROC statement. However, the XCF group name for IMS Tools Online System Interface cannot be specified on the TOSIXCFGRP parameter when you run the FABPMAIN program in the IMS region controller program (DFSRRC00). If you specify the XCF group name for IMS Tools Online System Interface on the TOSIXCFGRP parameter, you must specify PGM=FABPPC00 on the JCL EXEC statement.

System action

Processing stops.

User response

Correct the error and rerun the job.

FABP2129W **DB SENSOR API MODULE COULD NOT BE LOADED**

Explanation

The DB Sensor API module could not be loaded for one of the following reasons:

- The DB Sensor library is not specified on the STEPLIB statements.
- The level of DB Sensor is not supported by HD Pointer Checker.

System action

Processing continues without the DB Sensor process.

User response

Ensure that the correct load libraries are specified on the STEPLIB statements, and that DB Sensor is in the required version.

FABP2130I **PSINDEX DATABASES CANNOT BE CHECKED WITH THE HASH CHECK FUNCTION**

Explanation

PSINDEX databases cannot be checked with the HASH Check function because the function does not support PSINDEX databases. Databases other than PSINDEX databases are processed. The PSINDEX databases that are identified in the job are indicated

by FABP4016W messages in the PROCCTL Statements report.

System action

HD Pointer Checker ignores the PSINDEX databases and continues processing.

User response

If you want to check the PSINDEX databases, use the Standard Check function in an HD Pointer Checker stand-alone job.

FABP2131E APF AUTHORIZATION IS REQUIRED FOR DDNAME: *ddname*

Explanation

One or more libraries that are specified on the indicated DD statement are not APF-authorized.

System action

HD Pointer Checker ends the job with return code 8.

User response

APF-authorize all the libraries that are specified on the indicated DD statement and rerun the job.

FABP2132I POINTER CHECKING PROCESS IS NOT PERFORMED FOR DISABLED HALDB PARTITIONS

Explanation

HD Pointer Checker detected some disabled partitions in the HALDB. Pointer checking is not performed for disabled HALDB partitions.

System action

Processing continues without processing the disabled HALDB partitions.

User response

To identify the HALDB partitions that are disabled, locate message FABP2133W in the PROCCTL Statement report.

FABP2133W HALDB: *dbdname* PART: *partition_name* IS NOT PROCESSED BECAUSE THE HALDB PARTITION IS DISABLED

Explanation

Pointer checking is not performed for the indicated HALDB partition because the HALDB partition is disabled.

System action

Processing continues without processing the disabled HALDB partition.

User response

None.

FABP2140I SITE DEFAULT TABLE SOURCE CODE IS GENERATED

Explanation

The site default table source code was generated successfully.

System action

This message reports that the Site Default Generation utility job ended normally with RC=00.

User response

None. This message is informational.

FABP2141E PROCCTL CONTROL STATEMENT ERROR

Explanation

The site default table source code was not generated because errors are found in the PROCCTL data set.

System action

The Site Default Generation utility ended the job with RC=8.

User response

Correct the control statements and rerun the job.

Problem determination

Check the errors for the PROCCTL Statements report.

FABP2142I THE FOLLOWING STATEMENTS ARE IGNORED

Explanation

The Site Default Generation utility ignored the control statements that follow this message when it set the site defaults.

System action

The Site Default Generation utility sets the site default values from the statements preceding this message, and ignores the statements that follow this message.

User response

None. This message is informational.

FABP2143I KEYWORD: *keyword* IS IGNORED

Explanation

A site default value cannot be specified for the indicated keyword. It is ignored.

System action

The Site Default Generation utility skips the keyword, and it sets the site default values for other keywords.

User response

None. This message is informational.

FABP2144E NO KEYWORD TO GENERATE THE SITE DEFAULT TABLE

Explanation

The site default table source code was not generated because there is no valid specification in the PROCCTL data set.

System action

The Site Default Generation utility ends the job with RC=08.

User response

Specify the keywords that are valid to set the site default values in the PROCCTL data set. For available keywords for site defaults, see "FABPTGEN PROCCTL data set" on page 275.

FABP2145E TYPE=CHECK, BLKMAP, OR ESTIMATE_WK CANNOT BE SPECIFIED IN THE SITE DEFAULT TABLE

Explanation

The site default table source code was not generated because TYPE=CHECK, TYPE=BLKMAP, or TYPE=ESTIMATE_WK is specified in the PROC statement in the PROCCTL data set. These options cannot be specified for the Site Default Generation utility.

System action

Site Default Generation utility ends with RC=08.

User response

Specify TYPE=ALL or TYPE=SCAN in the PROC statement in the PROCCTL data set.

Problem determination

Check the error in the PROCCTL data set.

FABP2146E *parm-values* IS INCORRECT FOR PARM PARAMETER OF EXEC STATEMENT

Explanation

An incorrect value was specified for the EXEC parameter in the Site Default Generation utility JCL.

System action

The Site Default Generation utility ends with RC=08.

User response

Specify PARM='GEN' or PARM='REPORT' for the EXEC statement.

FABP2147E DUPLICATE ILKS WERE FOUND IN THE DATABASE

Explanation

The database is damaged. Duplicate ILKs were found in this database. An ILK must be unique for a segment type across an entire database.

System action

Processing continues.

User response

For more information about duplicate ILKs, see the description of the DUPILKCHK keyword in "PROC statement" on page 108. To repair the database, see

"Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.

FABP2148E POTENTIAL DUPLICATE ILK WAS FOUND IN THE DATABASE

Explanation

A potentially duplicate ILK was found in this database. This message is issued with message FABP2149E. Also see the explanation of message FABP2149E.

System action

Processing continues.

User response

For more information about duplicate ILKs, see the description of the DUPILKCHK keyword in "PROC statement" on page 108. To repair the database, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.

Problem determination

See the explanation of message FABP2149E.

FABP2149E MAX REORG# OF ILK >= REORG# OF PARTITION

Explanation

The maximum partition reorganization number of all the ILKs that contain the partition ID of this partition is equal to or greater than the partition reorganization number that is stored in data set group A of the partition. The partition reorganization number in data set group A of the partition is corrupted. For more information, see the attention note in the topic "HALDB partition reorganization numbers" in *IMS Database Administration*.

System action

Processing continues.

User response

To identify the partitions whose reorganization numbers are corrupted, see the Reorganization Number Information part in the Evaluation of ILKS report. To repair the database, see "Repairing HALDB partition reorganization numbers and duplicate ILKs" on page 304.

FABP2150I SITE DEFAULT TABLE FABPCTL0 IS USED

Explanation

HD Pointer Checker used the site default table module (FABPCTL0).

System action

HD Pointer Checker loads the site default table module (FABPCTL0) and sets the site default values that are specified in it.

User response

None. This message is informational.

FABP2151E SITE DEFAULT TABLE FABPCTL0 IS NOT FOUND

Explanation

The site default values are not reported because the site default table module (FABPCTL0) is not in the STEPLIB data sets.

System action

The Site Default Generation utility ends with RC=08.

User response

Specify the data set that includes the site default table module (FABPCTL0) member to the STEPLIB statement.

FABP2152E SITE DEFAULT TABLE FABPCTL0 IS CORRUPTED

Explanation

The site default table module (FABPCTL0) is corrupted.

If you received this message while running a Site Default Generation utility job, the Site Default Values report is not generated. If you received this message while running an HD Pointer Checker job, site default values are not used.

System action

The Site Default Generation utility or HD Pointer Checker ends with RC=08.

User response

Specify the correct FABPCTL0 module. If it is damaged, re-create another site default table module and store it in the STEPLIB data set.

Problem determination

Check the FABPCTL0 member in the STEPLIB data set.

FABP2160E REPAIRILK=YES CAN BE SPECIFIED ONLY IF EPSCHK=YES AND DUPILKCHK=YES ARE SPECIFIED

Explanation

The REPAIRILK=YES option is specified on the PROC statement, but the DUPILKCHK=NO option was applied for this run. When you specify REPAIRILK=YES, both EPSCHK=YES and DUPILKCHK=YES must also be specified.

System action

Processing stops.

User response

Correct the control statements and rerun the job.

FABP2161E DD STATEMENT WAS NOT FOUND FOR DDNAME: FABPILK

Explanation

When the REPAIRILK=YES option is specified, you must also specify the FABPILK DD statement. However, the DD statement was not specified in the JCL stream.

System action

Processing stops.

User response

Specify the FABPILK DD statement in the JCL stream and rerun the job.

FABP2162E REPAIRILK=YES CANNOT BE SPECIFIED BECAUSE NOT ALL OF LOGICALLY RELATED DATABASES ARE SPECIFIED

Explanation

One or more logically related HALDB databases or PSINDEX databases are not specified by DATABASE statements. When you specify the REPAIRILK=YES option, supply the names of all the related HALDB databases and PSINDEX databases with DATABASE statements.

System action

Processing stops.

User response

Specify all the HALDB databases that are related to the HALDB database that you want to repair by coding DATABASE statements. Such databases include logically related HALDB databases and PSINDEX databases. Then rerun the job.

FABP2163E REPAIRILK=YES IS NOT EFFECTIVE FOR NON-HALDB OR HALDB WITH NO LOGICAL RELATIONSHIP

Explanation

The REPAIRILK=YES option was specified in the JCL stream, but no HALDB databases that have logically related databases or PSINDEX databases are supplied through the DATABASE statements. The REPAIRILK=YES option is effective only for HALDB databases that have logically related databases or PSINDEX databases.

System action

Processing stops.

User response

Correct the error, and then rerun the HD Pointer Checker job.

FABP2164E DATASET=IMAGECOPY CANNOT BE SPECIFIED WHEN REPAIRILK=YES IS SPECIFIED

Explanation

An image copy data set cannot be used as the input database data set when the REPAIRILK=YES option is specified.

System action

Processing stops.

User response

Specify, for the input database data sets, real database data sets that are not image copy data sets, and then rerun the job.

FABP2165W '*OVERFLOW' INDICATES THAT THE VALUE EXCEEDED THE

MAXIMUM VALUE THAT CAN BE DISPLAYED.

Explanation

One or more numeric values in HD Pointer Checker reports exceeded the maximum value that can be displayed in the report fields. Those values are not printed in the report but instead printed as "*OVERFLOW" in the corresponding report fields.

System action

Processing continues.

User response

To print large values, specify GROUPDIGITS=(NO,DBSTAT) for the PROC statement in the PROCCTL data set and rerun the job. This option disables digit grouping and allows to print values that are greater than the maximum value a report field can display when digit grouping is enabled.

FABP2166W **AN ESDS DATA SET IS USED FOR THE OSAM ENCRYPTED DATABASE**

Explanation

HD Pointer Checker detected that an ESDS data set is used for this encrypted OSAM database. VSAM linear data sets must be used for encrypted OSAM databases.

System action

Processing continues.

User response

None. This message is informational.

FABP2601E **LOAD FAILED FOR DDNAME: *ddname* MODULE: *module-name***

Explanation

After issuing the LOAD macro to load module *module-name* from the *ddname* data set, register 15 contained a nonzero return code.

System action

The Site Default Generation utility ends with RC=08.

User response

Correct the error and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Make sure that the DD statement specifies the correct data set.

FABP2602W **THE ACCESS TO OUTPUT REPOSITORY WAS CANCELED REASON: *reason***

Explanation

HD Pointer Checker canceled its access to the IMS Tools KB Output repository because the initialization process failed. The reason is one of the following:

- Dynamic allocation for the library in the ITKBLOAD parameter failed
- Failed to open the library specified in the ITKBLOAD parameter
- Failed to load the HKTXXLI module

System action

Processing continues, but HD Pointer Checker does not store any reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, specify the correct load module library of the IMS Tools KB product.

Problem determination

Check the following to see if the IMS Tools KB product load module library name is correct:

- The specification of the ITKBLOAD parameter on the PROC statement in the PROCCTL data set
- STEPLIB, JOBLIB, or LINKLIST concatenations

FABP2603E **GETMAIN FAILED. SIZE: *nn* K ITEM-ID: *xx***

Explanation

After issuing a GETMAIN macro to get the size *nn* K bytes of storage, register 15 contained a nonzero return code. The ITEM-ID *xx* represents the internal location where the GETMAIN macro was issued.

System action

The Site Default Generation utility ends with RC=08.

User response

Increase the region size parameter in the JCL and rerun the job.

FABP2604E FREEMAIN FAILED. ITEM-ID: *xx*

Explanation

An internal error occurred during the FREEMAIN process for internal storage.

System action

The Site Default Generation utility ends with RC=08.

User response

Save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP2605E OPEN FAILED FOR DDNAME: *ddname*

Explanation

The OPEN macro failed when opening the data set that is associated with *ddname* DD.

System action

The Site Default Generation utility ends with RC=08.

User response

Correct the error and rerun the job.

Problem determination

Check that the *ddname* indicated in the DD statement is specifying the correct data set.

FABP2606E CLOSE FAILED FOR DDNAME: *ddname*

Explanation

An internal error occurred. The CLOSE macro failed when closing the data set that is associated with *ddname* DD.

System action

The Site Default Generation utility ends with RC=08.

User response

Correct the error and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP2607E DATA SET: *dsname* IS NOT FOUND

Explanation

The *dsname* data set was not found. The data set name is specified on the RETCDDSN keyword in the PROCCTL data set or the site defined as the site default.

System action

Processing stops.

User response

If the data set name is stored in the site default table module (FABPCTL0), correct the data set name and run the Site Default Generation utility. If the data set name is specified in the PROCCTL data set in the HD Pointer Checker JCL, specify the correct data set name. Then, rerun the HD Pointer Checker job.

Problem determination

Check that the data set name is correct. If it is correct, check that the data set name is cataloged correctly, because the data set name must be cataloged.

FABP2608W ERROR OCCURRED IN ACCESSING OUTPUT REPOSITORY FUNC: *function* RC: *rc* RSN: *rsn*

Explanation

An error occurred while getting access to the IMS Tools KB Output repository.

System action

Processing continues. If the return code is equal to or greater than 08, HD Pointer Checker does not store its reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, correct the error.

Problem determination

If any of the messages, FABP2611W, FABP2612W, FABP2613W, or FABP2614W, which describes the cause of the error, are issued following this message, see the explanation for those messages. If the above messages are not issued, check the return code and the reason code specified in this message. The codes are in hexadecimal. For the description of the return code and reason code, see the *Tools Base IMS Tools Knowledge Base User's Guide*.

FABP2609W **DB: *dbdname* PART: *partname* DD: *ddname* REPORT: *report name***

Explanation

This message follows the FABP2608W message.

System action

Processing continues. If the return code in the FABP2608W message is equal to or greater than 08, HD Pointer Checker does not store the *report name* report for the database name, partition name, and DD name that are shown in this message.

User response

See the description for message FABP2608W.

Problem determination

See the description for message FABP2608W.

FABP2611W **RECON ENTRY WAS NOT FOUND IN ITKB**

Explanation

The RECON entry was not defined in your IMS Tools Knowledge Base information management environment.

System action

Processing continues, but HD Pointer Checker does not store any reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, add a RECON environment. For more information about adding the RECON environment, see the *Tools Base Configuration Guide for IMS*.

Problem determination

Check the RECON information in the IMS Tools Knowledge Base panel of the ISPF dialogue. For more information about the IMS Tools Knowledge Base panel, see the *Tools Base IMS Tools Knowledge Base User's Guide*.

FABP2612W **ITKB SERVER NAME WAS INCORRECT**

Explanation

The connection to the IMS Tools KB server failed because the server XCF group name specified by the ITKBSRVR parameter in the PROC statement was incorrect.

System action

Processing continues, but HD Pointer Checker does not store any reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, specify the correct IMS Tools KB server XCF group name.

Problem determination

Check the IMS Tools KB server XCF group name on the ITKBSRVR parameter.

FABP2613W **HPPC WAS NOT DEFINED IN ITKB**

Explanation

IMS HP Pointer Checker was not defined in the IMS Tools Knowledge Base information management environment as a product that can store reports in the IMS Tools KB Output repository.

System action

Processing continues, but HD Pointer Checker does not store any reports in the IMS Tools KB Output repository.

User response

If you want to store the reports in the IMS Tools KB Output repository, register the IMS HP Pointer Checker product by using the IMS Tools KB product administration utility (HKTAPRA0).

Problem determination

Check the listing of registered products by using the LIST command of the IMS Tools KB HKTAPRA0 utility. For more information about HKTAPRA0, see the *Tools Base IMS Tools Knowledge Base User's Guide*.

FABP2614W REPORT WAS NOT DEFINED IN ITKB

Explanation

The report was not defined in the IMS Tools Knowledge Base information management environment.

System action

Processing continues, but HD Pointer Checker does not store the report to the IMS Tools KB Output repository.

User response

If you want to store the report to the IMS Tools KB Output repository, register the report by running the FABPITKB JCL, which is provided as a member in the SHPSSAMP data set. For more information about registering the HDPC reports with IMS Tools Knowledge Base, see "Configuring the environment to store reports in IMS Tools KB" on page 23.

Problem determination

Check the listing of registered products and reports by using the LIST command of the IMS Tools KB HKTAPRA0 utility. For more information about HKTAPRA0, see the *Tools Base IMS Tools Knowledge Base User's Guide*.

FABP2615W SOME REPORTS CANNOT BE STORED IN ITKB BECAUSE DRF IS NOT AT THE REQUIRED MAINTENANCE LEVEL

Explanation

HD Pointer Checker could not store the following reports in the IMS Tools KB Output repository because IMS Database Recovery Facility is not at the required maintenance level:

- Environment report (for HIDAM primary and non-HALDB secondary indexes)
- Run time Option report (for HIDAM primary and non-HALDB secondary indexes)
- Scan of HISAM Database report
- Scan of Index Database report
- Validation of a Pointer to a Target at SCAN report
- HASH Evaluation report
- Block Map and Block Dump report
- HD Pointer Checker Summary report (for HIDAM primary and non-HALDB secondary indexes)

System action

Processing continues.

User response

If you want to store the reports in the IMS Tools KB Output repository, apply the required maintenance to IMS Database Recovery Facility.

FABP2621E DB SENSOR IS NOT AT THE REQUIRED MAINTENANCE LEVEL: *reason_code*

Explanation

DB Sensor is not at the required maintenance level to run under HD Pointer Checker. *reason_code* has the following meaning:

Reason code	Meaning
0001	DB Sensor is not at the required maintenance level to run under HD Pointer Checker when the IMS management of ACBs is enabled. The PTF for APAR PH14031 must be applied to IMS Database Reorganization Expert.
0002	DB Sensor is not at the required maintenance level to run against IMS OSAM encrypted database data sets. The PTF for APAR PH29916 must be applied to IMS Database Reorganization Expert.

System action

HD Pointer Checker ends the job with RC=8.

User response

If you want to use the Integrated DB Sensor function in HD Pointer Checker jobs, ensure that the DB Sensor load libraries are specified on the STEPLIB statements and that DB Sensor is at the required maintenance level. Otherwise remove SENSOR=Y from the control statement.

FABP3504E MESSAGE TEXT NOT FOUND

Explanation

HD Pointer Checker attempted to print an error message that could not be found in the message table in module FABUMSGS.

System action

HD Pointer Checker issues a USER 3504 abend.

User response

Verify that IMS HP Pointer Checker, including all current maintenance, was installed correctly. Reinstall IMS HP Pointer Checker, including all maintenance, if necessary. Then rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Either IMS HP Pointer Checker or its maintenance is installed incorrectly.

FABP3505E INVALID MESSAGE FLAG

Explanation

HD Pointer Checker attempted to print an error message, and an incorrect flag was supplied to module FABUMSGS.

System action

HD Pointer Checker issues a USER 3505 abend.

User response

Verify that IMS HP Pointer Checker, including all current maintenance, was installed correctly. Reinstall IMS HP Pointer Checker, including all maintenance, if necessary. Then rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Either IMS HP Pointer Checker or its maintenance is installed incorrectly.

FABP3509E NUMBER OF ENTRIES FOR BLOCK MAP EXCEED SIZE OF GETMAIN AREA

Explanation

A database block (or control interval) contains more segments and free space elements than module's internal tables allow.

System action

HD Pointer Checker issues a USER 3509 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Verify if there are too many segments in the block. Otherwise, check for runtime errors.

FABP3510E MORE THAN *nnnn* DATABASES ARE REFERRED IN PSB: *psbname*

Explanation

The number of databases entered in the PSB *psbname* exceeds the limit *nnnn*. The limit is 2500.

User response

Redefine the PSB not to exceed the limit number of referred database data set, and rerun the HD Pointer Checker job.

FABP3513E INVALID USER STATISTICS INTERVAL SPECIFIED

Explanation

An internal error occurred.

System action

HD Pointer Checker issues a USER 3513 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3565E UNSUCCESSFUL GENCB FOR VSAM EXLST

Explanation

After issuing a GENCB macro to create an EXLST control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3565 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3566E UNSUCCESSFUL GENCB FOR VSAM ACB

Explanation

After issuing a GENCB macro to create an ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3566 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3567E UNSUCCESSFUL GENCB FOR VSAM RPL

Explanation

After issuing a GENCB macro to create an RPL control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3567 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3568E DATABASE NAME SPECIFIED IN CONTROL STATEMENT NOT FOUND IN DMB

Explanation

The *dbdname* in column 1 on your HD Pointer Checker control statement is not present in the IMS DMB control block.

System action

HD Pointer Checker issues a USER 3568 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

It is possible that you entered the DBD name incorrectly on your control statement. It is also possible that you used the wrong PSB name on the EXEC statement PARM. (You can also get this error by running HD Pointer Checker under a release of IMS different from the one used to install IMS HP Pointer Checker.)

FABP3569E DDNAME IN CTL STMT NOT FOUND IN DMB

Explanation

The ddname in column 11 on your HD Pointer Checker control statement is not present in the IMS DMB control block.

System action

HD Pointer Checker issues a USER 3569 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Ensure that the ddname is specified correctly on the control statement. It is also possible to get this error by running HD Pointer Checker under a release of IMS different from the one used to install IMS HP Pointer Checker.

FABP3570E FIND FAILED FOR DBD IN DBDLIB

Explanation

A FIND macro was issued for the *dbdname*, and no module with that name was in the library on your IMS DD statement.

System action

HD Pointer Checker issues a USER 3570 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

This problem is probably due to a JCL error. Make sure your DBD library is part of the IMS DD statement. Check your control statement for spelling errors.

FABP3571E SEGMENT CODE NOT FOUND IN DBD SEGMENT TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3571 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker) and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure the DBD and PSB are valid.

FABP3572E EXPECTED PHYSICAL PARENT NOT IN SEGMENT INFORMATION TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3572 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker) and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3573E MORE THAN 1 LOGICAL PARENT

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3573 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker) and contact IBM Software Support.

Problem determination

Check for obvious runtime errors. Make sure that the DBD and PSB are valid.

FABP3574E PHYSICAL PARENT NOT FOUND IN SEGMENT INFORMATION TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3574 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3575E DATABASE NAME SPECIFIED IN CONTROL STATEMENT NOT FOUND IN IMAGE COPY HEADER

Explanation

The *dbdname* on your control statement is not contained in the first record of your image copy data set.

System action

HD Pointer Checker issues a USER 3575 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct dbdname is specified on the control statement. Also, ensure that the correct image copy data set is used and that the image copy data set is not damaged.

FABP3576E ERROR IN DETERMINING END OF BLOCK IN BUFFER OR BAD FSE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3576 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3577E INVALID POINTER TYPE OBTAINED FROM POINTER PROFILE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3577 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3578E POINTER TO LOGICAL CHILD TABLE = 0

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3578 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3579E ERROR IN CALCULATING NUMBER OF LC POINTERS OR SEGMENT CODES DO NOT MATCH

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3579 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3580E LOGICAL PARENT NOT IN LOGICAL CHILD TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3580 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3581E PHYSICAL PARENT NOT IN PHYSICAL CHILD TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3581 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3582E ERROR IN CALCULATING NUMBER OF PC POINTERS, UNABLE TO MATCH PC TO PP IN PC TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3582 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3583E INVALID POINTER TYPE OBTAINED FROM SEGMENT INFORMATION TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3583 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3586E OPEN FAILED FOR PRINT FILE

Explanation

After issuing an OPEN macro for a printer file, DCBOFLGS is not zero.

System action

HD Pointer Checker issues a USER 3586 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check for any runtime errors.

FABP3587E INPUT RECORDS OUT OF SEQUENCE

Explanation

The data set defined by the CHECKREC DD statement is not in the proper sequence.

System action

HD Pointer Checker issues a USER 3587 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check for JCL errors. Make sure that MERGE process was run properly.

FABP3588E INPUT RECORD TYPE NOT HEADER, 0, 1, 2, 3, 6, 7, 8, OR 9

Explanation

The data set defined by the CHECKREC DD statement contains incorrect records.

System action

HD Pointer Checker issues a USER 3588 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check for JCL errors. Make sure that MERGE process was run properly.

FABP3589E OPEN FAILED FOR CONTROL FILE

Explanation

After issuing an OPEN macro for a control statement file, DCBOFLGS is not zero.

System action

HD Pointer Checker issues a USER 3589 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check for any runtime errors.

FABP3590E INVALID POINTER OR SEGMENT CODE IN SEGMENT STATISTICS TABLE

Explanation

An internal error occurred in the HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3590 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker) and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure the DBD and PSB are valid.

FABP3591E DATA SET TYPE MISMATCH FOR DB: *dbdname* DD: *ddname*

Explanation

The data set type of the database data set does not match the DATASET=REAL|IMAGECOPY parameter of the DATABASE statement in the PROCCTL data set.

System action

HD Pointer Checker issues a USER 3591 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Check for any obvious runtime errors. This error can also be caused by running HD Pointer Checker with an empty OSAM data set which has been allocated by specifying DCB parameters. Such data sets have record format 'U'. HD Pointer Checker recognizes the data sets as image copies created with IMS Image Copy 2 Utility.

FABP3600E NO DMB FOUND IN DMB DIRECTORY

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3600 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3601E LOAD FAILED FOR DDNAME: *ddname* MODULE: *module-name*

Explanation

After issuing a LOAD macro to load the indicated module *module-name* from the library specified by the indicated *ddname* on the DD statement, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3601 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Make sure that the DD statement is specifying the proper data set.

FABP3602E DELETE FAILED FOR MODULE: *module-name*

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3602 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3603E GETMAIN FAILED. SIZE: *nn* K ITEM-ID: *xx*

Explanation

After issuing a GETMAIN macro to acquire the indicated size *nn* K bytes of storage, register 15 contained a nonzero return code. The ITEM-ID *xx* represents the internal location of issuing a GETMAIN macro.

System action

HD Pointer Checker issues a USER 3603 abend.

User response

Increase the region size parameter on the JOB statement and rerun the HD Pointer Checker job.

FABP3604E FREEMAIN FAILED. ITEM-ID: *xx*

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3604 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3605E OPEN FAILED FOR DDNAME: *ddname*

Explanation

In issuing an OPEN macro to open the data set associated with the specified ddname, the ABEND exit routine was called.

The following causes are possible for a tape data set:

- Tape BLKSIZE is over 32760. There is a restriction that you have to make the block size of the image copy data set to be equal to or less than 32760.

- DCB is not specified on the DD statement of a non-label (NL) tape. DCB is required for an NL tape.

System action

The HD Pointer Checker issues a USER 3605 abend.

User response

If a DBALLABOVE statement is specified in the DFSVSAMP DD, and if message IEC133I appears in the job log, remove the DBALLABOVE statement from the DFSVSAMP DD. A DBALLABOVE statement cannot be specified for OSAM data sets.

Ensure that the indicated ddname specifies the correct data set. Correct the error and rerun the HD Pointer Checker job.

FABP3606E CLOSE FAILED FOR DDNAME: *ddname*

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3606 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3607E DEVTYPE FAILED FOR DDNAME: *ddname* (RC = *xx*)

Explanation

After issuing a DEVTYPE macro to get information about the device associated with the ddname, the return code indicated that the attempt to do so was unsuccessful.

System action

The HD Pointer Checker issues a USER 3607 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Make sure that the ddname in the DD statement is specifying the correct data set.

FABP3609E SORT FOR *process* FAILED

Explanation

DFSORT ended abnormally or returned a non-zero return code. An internal sort error occurred in the process indicated in the message. *process* shows one of the following processes:

- VALIDATION/ EVALUATION
- INDEX KEY CHECK
- BLKMAP PROCESS
- EPS HEALING
- SYMBOLIC POINTER CHECK
- DUPLICATE ILK CHECK
- FABPILK RECORD GENERATION PROCESS
- CHECKING THE CK OF THE INDEX KEY

System action

HD Pointer Checker issues a USER 3609 abend.

User response

Check the message in the SYSOUT*nn* data set generated by DFSORT, take necessary actions, and rerun HD Pointer Checker.

Problem determination

Check the SYSOUT*nn* for any runtime errors. Register 15, at an abend, contains the abend code or return code of DFSORT.

FABP3610E DUPLICATE HEADER RECORD FOUND FOR DB: *dbdname* PID: *xxxxx* DSG#: *xx*

Explanation

Two or more header records were found for the specified data set group *xx* of partition ID *xxxxx* of database *dbdname*.

System action

HD Pointer Checker issues a USER 3610 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

This problem is probably due to a JCL error. Check the data set that contains the header records.

FABP3611E **SOME HEADER RECORD(S) NOT FOUND FOR DB: *dbdname* PID: *xxxxx* DSG#: *xx***

Explanation

Some of the five types of header records (H1, H2, h3, H4, and H5) were not found in the CHECKREC data set for the specified data set group *xx* of partition ID *xxxxx* of database *dbdname*.

System action

HD Pointer Checker issues a USER 3611 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

This problem is probably due to a JCL error. Check the data set that contains the header records.

FABP3612E **INVALID TYPE OF HEADER RECORD FOUND FOR DB: *dbdname* PID: *xxxxx* DSG#: *xx***

Explanation

A type of the header record read from the CHECKREC data set for the specified data set group *xx* of partition ID *xxxxx* of database *dbdname* is not correct.

System action

HD Pointer Checker issues a USER 3612 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the error persists, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3613E **DATA OF HEADER RECORD FOR DB#: *nnn* PID: *xxxxx* DSG#: *xx* IS DIFFERENT FROM DMB**

Explanation

Data of the header records read by the CHECKREC data set is different from that of the DMB read by the IMS for the data set group *xx* of partition ID *xxxxx* (database number: *nnn*) when checking one of the following:

- DB name
- DD name
- DB logical group number (DBLG#)
- block size (BLKSIZE)
- logical record length (LRECL)

System action

HD Pointer Checker issues a USER 3613 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct PSB is specified on the EXEC statement PARM. Also, ensure that the correct PSB/DBD library is specified.

FABP3614E **HEADER RECORD FOR DB#: *nn* PID: *xxxxx* DSG#: *xx* WAS READ BUT CORRESPONDING DMB NOT FOUND**

Explanation

A header record for the specified database data set group *xx* of partition ID *xxxxx* of database (database number: *nn*) was read from the CHECKREC data set, but a DMB for the data set group was not found.

System action

HD Pointer Checker issues a USER 3614 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct PSB is specified on the EXEC statement PARM. Also, ensure that the correct PSB/DBD library is specified.

FABP3615E **MEMBER: *member-name* NOT FOUND IN *ddname* DATA SET**

Explanation

A FIND macro was issued for the indicated *member-name*, and no module with that name was in the specified *ddname* library.

System action

HD Pointer Checker issues a USER 3615 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Make sure that the indicated *member-name* is in the correct library.

FABP3617E DIFFERENT HASH OPTIONS WERE SPECIFIED TO DATA SET GROUPS FOR DB: *dbdname* DB#: *nnn*

Explanation

For database *dbdname* (database number: *nnn*), some data set groups were scanned by the HASH Check function and some by the regular check function.

System action

HD Pointer Checker issues a USER 3617 abend.

User response

Rerun the HD Pointer Checker run with the same HASH option (YES or NO) for all data set groups of the database.

Problem determination

You probably ran HD Pointer Checker by different job steps with the TYPE=SCAN option specified on the PROC statement, with HASH=YES option for some data set groups, and with HASH=NO option for other data set groups.

FABP3618E HD POINTER CHECKER FAILED IN A SCAN PROCESS (SCANGROUP: *xx*)

Explanation

The scan task ended abnormally.

System action

HD Pointer Checker issues a USER 3618 abend.

User response

Correct the error and rerun the job.

FABP3619E HD POINTER CHECKER FAILED IN AN EPS CHECK PROCESS (TASK#: *nn*)

Explanation

Subtask for EPS Check has ended abnormally.

System action

HD Pointer Checker issues a USER 3619 abend.

User response

Correct the error and rerun the job.

FABP3630E HASH RECORD NOT FOUND IN HASH CHECK PROCESS.

Explanation

No HASH record was passed to the evaluation process, while some data sets were scanned by the HASH Check function.

System action

HD Pointer Checker issues a USER 3630 abend.

User response

Save the entire run listing (including the dump, JCL, and reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3631E TOTAL NUMBER OF HASH RECORDS NOT EQUAL TO HEADER INFORMATION

Explanation

Number of HASH records is different from SCAN process and CHECK process.

System action

HD Pointer Checker issues a USER 3631 abend.

User response

Correct the error, and rerun the HD Pointer Checker job with "PROC TYPE= ALL."

Problem determination

It is possible that you have a JCL error. It could be either an old CHECKREC data set or a corrupted CHECKREC data set.

FABP3633E DBD: *dbdname* DB#: *nnn* CANNOT BE CHECKED WITH HASH OPTION

Explanation

Database *dbdname* (database number: *nnn*), which is a secondary index database, cannot be checked with the HASH option.

System action

HD Pointer Checker issues a USER 3633 abend.

User response

Correct the error, and rerun the HD Pointer Checker job with "PROC TYPE=ALL."

Problem determination

DBD can be changed between the SCAN process and the CHECK process.

FABP3640E HISTORY DATA SET CONTROL RECORD NOT FOUND

Explanation

There is no HISTORY data set control record in the HISTORY data set.

System action

HD Pointer Checker issues a USER 3640 abend.

User response

Correct the error, and rerun the HD Pointer Checker job. If you used newly allocated HISTORY data set and got the error, run the DB Historical Data Analyzer and initialize the HISTORY data set first; then rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct data set is specified on the HISTORY DD statement. Also, ensure that the HISTORY DD statement specifies a data set that was initialized by DB Historical Data Analyzer.

FABP3641E HISTORY DATA SET NO MORE SPACE FOR RECORD: *record type* KEY: *key-value*

Explanation

The HISTORY data set record specified by *record type* and *key-value* has no more space to add information gathered by HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3641 abend.

User response

Delete the old and unnecessary database data set records on the HISTORY data set (as many as possible) and reorganize the data set by using the DB Historical Data Analyzer; then rerun the HD Pointer Checker job.

FABP3642E DATA OF DBDS TABLE FOR DB#: *nnn* PART: NNNNN DSG#: *xx* IS DIFFERENT FROM DMB

Explanation

Data of the DBDS table record read by the HISTORY data set is different from that of the DMB read by the IMS data set for the specified data set group *xx* of database (database number: *nnn*) when checking one of the following:

- Primary DD name
- Overflow DD name
- Database organization
- Database access method

System action

HD Pointer Checker issues a USER 3642 abend.

User response

Correct the error, and rerun the HD Pointer Checker job. If you regenerated the DBD for the database data set, first delete all DBCS records for the database data set from the HISTORY data set by using DB Historical Data Analyzer; then rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct data set is specified on the HISTORY DD statement. Also, ensure that the DBD for the database data set was not regenerated with attributes that are different from the previous DBD.

FABP3643E MORE THAN 15 IMSIDS CANNOT BE CREATED TO HISTORY DATA SET

Explanation

More than 15 IMSIDs cannot be created in the HISTORY data set that is Multiple-IMSID option enabled.

System action

HD Pointer Checker issues a USER 3643 abend.

User response

Do not create more than 15 IMSIDs.

FABP3650E INVALID CALL TO U1212AV

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3650 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3651E INVALID CALL TO U1214AV

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3651 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3660E INVALID RECORD TYPE DETECTED IN IXKEY FILE

Explanation

Other than T1, T6, T7, or TA type of record was detected in the IXKEY data set.

System action

HD Pointer Checker issues a USER 3660 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors.

FABP3661E DB#: *nnn* PID: *xxxxx* DSG#: *xx* OF *rec-type* RECORD IS DIFFERENT FROM DBD

Explanation

The information on the indicated database (database number: *nnn* or partition ID: *xxxxx* or data set group number: *xx*) which is contained in the indicated *rec-type* (such as T1, T6, T7, and TA) record of the IXKEY file and the information in DBD is different.

System action

HD Pointer Checker issues a USER 3661 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

It is also possible that you regenerated the DBD for the database data set with an attribute different from the previous DBD.

FABP3662E NO RECORD CAN BE WRITTEN TO FABPILK DATA SET BECAUSE POINTER ERROR WAS DETECTED

Explanation

The HD Pointer Checker utility stopped generating repair information records because it detected pointer errors or T2 errors that are not corrupted HALDB partition reorganization numbers, duplicate ILKs, or potentially duplicate ILKs. No repair information records were generated in the data set that is specified by the FABPILK DD statement.

System action

The HD Pointer Checker utility issues a USER 3662 abend.

User response

To generate repair information records, correct the pointer and T2 errors, and then rerun the job.

FABP3663E ERROR IN CALCULATING ADDRESS OF POINTER

Explanation

An internal error occurred in calculating the actual direct access address of the record that contains the pointer.

System action

HD Pointer Checker issues a USER 3663 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Make sure that the input data set specified in DD statement is a real database data set. Do not provide a DD statement for any image copy data sets.

FABP3664E INCOMPATIBLE BLOCK NUMBER DB: *dbname* PID: *xxxxx* DSG: *xx* SCANNED: *mmmmmmmm* BITMAP: *nnnnnnn*

Explanation

The database or the image copy data set might be damaged. The number of physical blocks in the database data set conflicts with the information obtained from the bitmap block. The indicated number of physical blocks scanned (*mmmmmmmm*) is smaller than the indicated number of insufficient free space blocks (*nnnnnnn*) obtained from the bitmap block of the indicated database data set. The number of physical blocks scanned must be equal to the sum of insufficient free space blocks and sufficient free space blocks obtained from the bitmap blocks.

The following reasons can be considered as the cause of the bitmap error:

- The bitmap block is damaged.
- Some physical blocks are lost from the database data set or the image copy data set.
- Incorrect EOF is found in the database data set or the image copy data set.

System action

Processing continues.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP3665E DATABASE CREATION DATE '*xxxxxx*' IS INVALID FOR DB: *dbdname* PID: *xxxxx* DSG#: *xx*

Explanation

The database is damaged. HD Pointer Checker cannot accept the database creation date obtained from the database (DB: *dbdname*, PID: *xxxxx*, DSG#: *xx*) because of the incorrect data format.

System action

HD Pointer Checker issues a USER 3665 abend.

User response

Repair the database, and rerun the HD Pointer Checker job.

Problem determination

See Chapter 11, “Database repair guidelines,” on page 293.

FABP3666E FAILED IN PARTITION SELECTION; REQUEST=*xxxxxx*, RC=*yy*, RSN=*zzzz*

Explanation

During the Partition Selection Process by the IMS DFSPSEL macro, HD Pointer Checker received an error return code. *xxxxxx* is the request function for DFSPSEL macro, *yy* is RC from DFSPSEL, and *zzzz* is RSN from DFSPSEL (If RC=16, *zzzz* is ABEND code from DFSPSEL).

System action

HD Pointer Checker issues a USER 3666 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Ensure that the correct partition selection exit routine is specified and that the database is not broken. Also, ensure that the STEPLIB, LOADLIB, or LINKLIST library contains the correct HALDB Partition Selection exit routine.

FABP3667E DBRC IS REQUIRED TO PROCESS HALDB

Explanation

To process a HALDB or an IMS catalog database that is registered in the RECON data set, DBRC must be activated.

System action

HD Pointer Checker issues a USER 3667 abend.

User response

Specify Y for the 14th parameter of the EXEC statement and rerun the job.

FABP3671E OFFSET OF KEY IN VLS ROOT SEGMENT CANNOT BE ZERO

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3671 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3672E LOGICAL CHILD NOT FOUND IN SEGMENT INFORMATION TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3672 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3673E LOGICAL PARENT NOT FOUND IN SEGMENT INFORMATION TABLE

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3673 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3674E SEGMENT CODE OF INDEX TARGET NOT FOUND IN DMB DIRECTORY

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3674 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing

(including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3676E ERROR LOCATING PHYSICAL PARENT OF SOURCE SEGMENT

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3676 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3677E PHYSICAL PARENT OF THE SOURCE SEGMENT CANNOT BE LOCATED

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3677 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3678E INVALID POINTER TYPE WAS DETECTED

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3678 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Check for any runtime errors. Make sure that the DBD and PSB are valid.

FABP3679E INVALID POINTER TYPE PASSED TO CHECK PROCESS

Explanation

The work file passed to CHECK processor contains a record with an incorrect pointer type.

System action

HD Pointer Checker issues a USER 3679 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

This problem might be due to a JCL error. Ensure that you are not using an old CHECKREC data set and that the data set is not corrupted.

FABP3680E NO SEQUENCE FIELD IS SPECIFIED IN *dbdname* WITH KEYSIN=YES OPTION

Explanation

The KEYSIN=YES option is not effective for the indicated database *dbdname* because no sequence field is defined in the DBD.

System action

HD Pointer Checker issues a USER 3680 abend.

User response

Check the error, and rerun the HD Pointer Checker job with the "KEYSIN=NO" option.

FABP3690E ATTACH FAILED FOR MODULE: *module-name* (RC=*xx*)

Explanation

A nonzero return code was returned from an ATTACH macro for the module *module-name*. *xx* is the return code returned from the ATTACH macro in a decimal format.

System action

HD Pointer Checker issues a USER 3690 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

For each return code, see *Assembler Service Reference* for the operating system.

FABP3751E UNSUCCESSFUL VSAM MODCB (FOR ACB)

Explanation

After issuing a MODCB macro to modify an ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3751 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. The code returned by VSAM is at label ERROR in the HD Pointer Checker module that issued the MODCB macro.

FABP3752E UNSUCCESSFUL VSAM OPEN

Explanation

After issuing an OPEN macro for an ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3752 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. The code returned by VSAM is at label ERROR in the HD Pointer Checker module that issued the OPEN macro.

FABP3753E UNSUCCESSFUL VSAM SHOWCB (FOR ACB)

Explanation

After issuing a SHOWCB macro for an ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3753 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3754E UNSUCCESSFUL VSAM GET

Explanation

After issuing a GET macro for an ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3754 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. The feedback field into which VSAM puts a return code is at label FDBK in the HD Pointer Checker module that issued the GET macro.

FABP3755E UNSUCCESSFUL VSAM SHOWCB (FOR RPL)

Explanation

After issuing a SHOWCB macro for an RPL control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3755 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. The feedback field into which VSAM puts a return code is at label FDBK in the HD Pointer Checker module that issued the GET macro.

FABP3756E UNSUCCESSFUL VSAM MODCB (FOR EXLST)

Explanation

After issuing a MODCB for an EXLST control block, register 15 contains a nonzero return code.

System action

The HD Pointer Checker issues a USER 3756 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3757E UNSUCCESSFUL VSAM MODCB (FOR RPL)

Explanation

After issuing a MODCB for an RPL control block, register 15 contains a nonzero return code.

System action

The HD Pointer Checker issues a USER 3757 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3758E UNSUCCESSFUL VSAM CLOSE DDNAME: *ddname*

Explanation

After issuing a CLOSE macro for ACB control block, register 15 contained a nonzero return code.

System action

HD Pointer Checker issues a USER 3758 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques.

FABP3759E UNSUCCESSFUL VSAM *macro-name*. VSAM ERROR DATA: RETURN CODE: *xx* RPL "FDBK": *aaa (bb)*

Explanation

After issuing the indicated *macro-name* (GET, PUT, MODCB or DELETE macro) for ACB control block, register 15 contained an *xx* (nonzero) return code.

System action

HD Pointer Checker issues a USER 3759 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. VSAM return code and FDBK code are shown in a decimal (*xx, aaa*) and hexadecimal (*bb*) format.

FABP3760E VSAM KSDS WITH EXTENDED ADDRESSABILITY ATTRIBUTE IS NOT SUPPORTED

Explanation

It was determined that the KSDS is an SMS data set with the extended addressability attribute, which IMS does not support.

System action

HD Pointer Checker issues a USER 3760 abend.

User response

Allocate the data set with a data class that does not specify extended addressability, and rerun the job.

FABP3761E UNSUCCESSFUL VSAM VERIFY

Explanation

After issuing a VERIFY for an RPL control block, register 15 contains a nonzero return code.

System action

The HD Pointer Checker issues a USER 3761 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. For details of VERIFY error reason, see *z/OS DFSMS Macro Instructions for Data Sets*.

FABP3762E UNSUCCESSFUL VSAM POINT

Explanation

After issuing a POINT for an RPL control block, register 15 contains a nonzero return code.

System action

The HD Pointer Checker issues a USER 3762 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard VSAM debugging techniques. For details of POINT error reason, see *z/OS DFSMS Macro Instructions for Data Sets*.

FABP3770E BLANK DDNAME ON CONTROL CARD

Explanation

The FABPCHRO control statement contains blanks in the ddname field (column 1).

System action

Processing continues.

User response

Correct or remove the bad control statement. Rerun the HD Pointer Checker job, if necessary.

Problem determination

Control statement error.

FABP3775E NO DD STATEMENT = *ddname*

Explanation

There is no DD statement in your JCL that corresponds to the *ddname*.

System action

Processing continues.

User response

Correct your JCL by adding the missing DD statement, and rerun the HD Pointer Checker job.

Problem determination

This problem is probably due to a JCL error. Check for mistakes in spelling.

FABP3780E FABPDADR RDJFCB RC = *xxx*

Explanation

A return code of *xxx* resulted from a RDJFCB macro issued by module FABPDADR.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3785E FABPDADR LOCATE RC = *xxx*

Explanation

A return code of *xxx* resulted from a LOCATE macro issued by module FABPDADR.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3790E NOT DIRECT ACCESS DEVICE

Explanation

Module FABPDADR attempted to process a data set that is not on a direct-access device.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3795E FABPDADR OBTAIN RC = *xxx*

Explanation

A return code of *xxx* resulted from an OBTAIN macro issued by FABPDADR.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3800E NUMBER OF EXTENTS = 0

Explanation

Module FABPDADR attempted to process a data set that has no extents.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3805E BLKSIZE = 0

Explanation

Module FABPDADR attempted to process a data set for which the block size (DS1BLKL) in the DSCB is zero.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3810E RBA LESS THAN BLKSIZE

Explanation

The deleted RBA is less than BLKSIZE. If you are running FABPCHRO, the control statement contains an RBA (in column 11) that is smaller than your data set block size.

System action

Processing continues.

User response

Correct or remove the bad control statement. Rerun the HD Pointer Checker job, if necessary.

Problem determination

Control statement error. This message can also occur if you code blanks in column 31 for a VSAM data set.

FABP3815E RBA BEYOND EXTENTS

Explanation

The FABPCHRO control statement contains an RBA that points beyond the extents of your data set.

System action

Processing continues.

User response

Correct or remove the bad control statement. Rerun the HD Pointer Checker job, if necessary.

Problem determination

Control statement error.

FABP3820E VSAM CATALOG I/O ERROR

Explanation

Module FABPDADR attempted to LINK to IDCAMS, and the resulting return code was greater than 4.

System action

Processing continues.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging techniques.

FABP3840E UNSUPPORTED LEVEL OF IMS IS BEING USED: *level* IMS LEVEL OF THIS RUN

Explanation

The version of the IMS RESLIB that is found in the STEPLIB or JOBLIB concatenation is not supported. *level* represents the IMS level.

System action

HD Pointer Checker issues a USER 3840 abend.

User response

You must run HD Pointer Checker with the correct version of IMS.

FABP3850W TIMESTAMP MISMATCH. FROM *exitname* (*mm/dd/yy hh:mm*) HDR TIME (*mm/dd/yy hh:mm*)

Explanation

Assemble timestamp in Image Copy compression exit is different from timestamp in image copy header.

System action

Processing continues.

User response

None.

FABP3851E LENGTH FROM EXIT RTN DOES NOT MATCH ORIGINAL. AT DB <RBA|RBN>=X'*xxxxxxxx*'

Explanation

Record length returned by Image Copy compression exit in decompress process is different from original record length.

System action

The HD Pointer Checker issues a USER 3851 abend.

User response

Correct the user exit routine and rerun the job.

FABP3852E TERMINATION REQUESTED BY *exitname* IN [INITIALIZATION | BLOCK READ | TERMINATION] CALL RC=X'*xx*'

Explanation

SCAN process termination is requested by Image Copy compression exit.

System action

The HD Pointer Checker issues a USER 3852 abend.

User response

If user exit routine has an error, correct the error and rerun the job.

FABP3859E LOCATE MACRO FAILED. DATA SET: *dsname*

Explanation

The LOCATE macro failed to retrieve information about the indicated data set from the VSAM catalog. Register 15 contained a non-zero return code after issuing the LOCATE macro for the data set.

System action

HD Pointer Checker ends with an abend code of 3859.

User response

Correct the error and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3860E RDJFCB MACRO FAILED FOR DDNAME: *ddname*

Explanation

Register 15 contained a non-zero return code, after issuing a RDJFCB macro for *ddname*.

System action

HD Pointer Checker issues a USER 3860 abend.

User response

Correct the error and rerun the HD Pointer job.

Problem determination

Use standard debugging methods.

FABP3861E OBTAIN MACRO FAILED FOR DSNAME: *dsname*

Explanation

Register 15 contained a non-zero return code, after issuing an OBTAIN macro for *dsname*.

System action

HD Pointer Checker issues a USER 3861 abend.

User response

Correct the error and rerun the HD Pointer job.

Problem determination

Use standard debugging methods.

FABP3862E IDCAMS LISTCAT FAILED FOR DSNAME: *dsname*

Explanation

After internally linking IDCAMS LISTCAT routine for *dsname*, register 15 contained a non-zero return code.

System action

HD Pointer Checker issues a USER 3862 abend.

User response

Correct the error and rerun the HD Pointer job.

Problem determination

Use standard debugging methods.

FABP3863E OBTAIN MACRO FAILED FOR VOLUME: *volume*

Explanation

Register 15 contained a nonzero return code, after an OBTAIN macro for the volume was issued.

System action

HD Pointer Checker issues a USER 3863 abend.

User response

Correct the error and rerun the HD Pointer Checker job.

Problem determination

Use standard debugging methods.

FABP3864E IDENTIFY MACRO FAILED FOR ENTRY NAME: *module-name* RC=X'*xx*'

Explanation

An internal error occurred in HD Pointer Checker.

System action

HD Pointer Checker issues a USER 3864 abend.

User response

Correct the error and rerun the HD Pointer Checker job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

The HD Pointer Checker product library might be broken or specified incorrectly to STEPLIB, JOBLIB or LINKLIST. Make sure the module name is in the library.

FABP3865E AN IMS CATALOG PSB IS REQUIRED TO PROCESS IMS CATALOG: *dbdname*

Explanation

HD Pointer Checker tried to process the IMS catalog database in the DLI or DBB region. However, an IMS catalog PSB was not specified in parentheses of the PARM parameter on the EXEC statement.

System action

HD Pointer Checker issues a USER 3865 abend.

User response

Specify an IMS catalog PSB (DFSCP000, DFSCP001, or DFSCP002) that is provided by IMS and rerun the job.

FABP3866E CSVAPF MACRO FAILED FOR DDNAME *ddname* RC=*rc* RSN=*rsn*

Explanation

The CSVAPF macro failed for DD name *ddname*. RC and RSN are the return and reason codes that are set in register 15 and 0 by the CSVAPF macro. For the return code and reason code of the CSVAPF macro, see *z/OS MVS Programming Authorized Assembler Services Reference Volume 1 (ALESERV-DYNALLOC)*.

System action

HD Pointer Checker issues a USER 3866 abend.

User response

Save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3867E GETDSAB MACRO FAILED FOR DDNAME *ddname* RC=*rc* RSN=*rsn*

Explanation

The GETDSAB macro failed for DD name *ddname*. RC and RSN are the return and reason codes that are set by the GETDSAB macro. For the return code and reason code of the GETDSAB macro, see *z/OS MVS Programming Authorized Assembler Services Reference Volume 2 (EDTINFO-IXGWRITE)*.

System action

HD Pointer Checker issues a USER 3867 abend.

User response

Save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3868E DD NOT FOUND FOR DB *dbname* DD *ddname*

Explanation

The indicated DD statement is not found in the JCL stream, the DFSMDA member, or the RECON data set. The DD statement for the indicated database must be provided.

System action

HD Pointer Checker issues a USER 3868 abend.

User response

Add the missing DD statement to the JCL and rerun the job. If you want to dynamically allocate the database data set, make sure that a valid DFSMDA member exists and then rerun the job. If no valid DFSMDA member exists, create a DFSMDA member for the database data set and rerun the job.

FABP3869E FIND FAILED FOR DDNAME *ddname* MEMBER *member*. RC=*rc* RSN=*rsn*

Explanation

The FIND macro failed for the indicated member. This message contains the member name and the DD statement that points to the data set that contains this member. RC and RSN are the return and reason codes from the FIND macro.

System action

HD Pointer Checker issues a USER 3869 abend.

User response

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return and reason codes. Correct all errors and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3870E READ ERROR FOR DDNAME *ddname* MEMBER *member*

Explanation

The READ macro failed to read a member. This message contains the member name and the DD statement that points to the data set that contains this member.

System action

HD Pointer Checker issues a USER 3870 abend.

User response

Locate the MVS system message that describes the I/O error and correct the error. Then rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3871E **MEMBER *member* WAS NOT FOUND IN *ddname* DD**

Explanation

The indicated member does not exist in the data set that is pointed to from the indicated DD statement.

System action

HD Pointer Checker issues a USER 3871 abend.

User response

Specify the correct data set and rerun the job.

FABP3872E **FAILED IN PARTITION SELECTION; REQUEST=*function*, RC=*rc***

Explanation

HD Pointer Checker received an error return code from the HALDB Partition Selection exit routine. *function* is the requested function and *rc* is the return code from the HALDB Partition Selection exit routine.

System action

HD Pointer Checker issues a USER 3872 abend.

User response

Specify the correct HALDB Partition Selection exit routine in the library that is concatenated to the STEPLIB DD statement and rerun the job.

FABP3873E **DB *dbdname* IS NOT REGISTERED IN RECON**

Explanation

The indicated database is not registered in RECON.

System action

HD Pointer Checker issues a USER 3873 abend.

User response

Ensure that the following resources are correctly specified in the JCL. Then rerun the job.

- The name of the database is specified on the DB parameter of the DATABASE statement.
- The DBDLIB data set is specified on the IMS DD statement or the ACBLIB data set is specified on the IMSACB DD statement.
- The correct RECON data sets are specified.

FABP3874E **NO PARTITIONS ARE REGISTERED IN RECON FOR HALDB *dbdname***

Explanation

The partitions of the indicated HALDB are not registered in RECON.

System action

HD Pointer Checker issues a USER 3874 abend.

User response

Ensure that the following resources are correctly specified in the JCL. Then rerun the job.

- The name of the database is specified on the DB parameter of the DATABASE statement.
- The DBDLIB data set is specified on the IMS DD statement or the ACBLIB data set is specified on the IMSACB DD statement.
- The correct RECON data sets are specified.

FABP3875E **DB *dbdname* PART *partname* IS NOT REGISTERED IN RECON**

Explanation

In the RECON data set, the indicated partition is not registered as a partition of the indicated database.

System action

HD Pointer Checker issues a USER 3875 abend.

User response

Specify the correct partition name on the PART parameter of the DATABASE statement and the correct RECON data sets. Then rerun the job.

FABP3876E **ERROR RETURNED FROM IMS TOOLS CATALOG INTERFACE (*text*)**

Explanation

HD Pointer Checker received an error return code from IMS Tools Catalog Interface. *text* provides additional information:

- FUNC=OPEN RC=*return_code* RSN=*reason_code*
- FUNC=CLOSE RC=*return_code* RSN=*reason_code*
- FUNC=LIST DBD=*dbdname* RC=*return_code* RSN=*reason_code*
- FUNC=GET DBD=*dbdname* RC=*return_code* RSN=*reason_code*

The return code and reason code from IMS Tools Catalog Interface are shown in *return_code* and *reason_code*, respectively.

System action

HD Pointer Checker ends with an abend code of 3876.

User response

See IMS Tools Catalog Interface messages (GEX3*xxxx*) to determine the cause of the error.

The following list provides possible causes and recommended actions:

- If the function is OPEN, ensure that the SGLXLOAD library of IMS Tools Base 1.6 or later is specified on the STEPLIB DD statements.
- If the function is GET or LIST, ensure that the correct DBD name is specified in the PROCCTL data set and the DBD exists in the IMS directory data sets.
- Otherwise, contact IBM Software Support.

FABP3877E DBD *dbdname* IS NOT FOUND IN THE IMS DIRECTORY DATA SETS

Explanation

HD Pointer Checker could not obtain the indicated DBD from the IMS directory data sets.

System action

HD Pointer Checker ends with an abend code of 3877.

User response

Ensure that the high-level qualifier of the bootstrap data set indicated by message FABP1570I is correct and that the DBD identified by *dbdname* exists in the IMS directory data sets. Then correct the error and rerun the job.

FABP3878E AN UNREGISTERED IMS CATALOG IS NOT SUPPORTED IN AN IMS-MANAGED ACBS ENVIRONMENT

Explanation

The IMS management of ACBs is enabled but the IMS catalog database is not registered to the DBRC RECON data sets. HD Pointer Checker does not support IMS catalogs that are not registered to the DBRC RECON data sets when running HD Pointer Checker with PGM=FABPPC00 specified in the EXEC statement.

System action

HD Pointer Checker ends with an abend code of 3878.

User response

Specify PGM=DFSRRC00 on the EXEC statement and rerun the job, or run the HD Pointer Checker job in an IMS environment where the IMS management of ACBs is not enabled using DBD, PSB, or ACB libraries as input.

FABP3879E INCORRECT IMS [DIRECTORY | CATALOG ALIAS] IS DETECTED. [HLQ=*hlq*]

Explanation

Either of the following internal errors occurred in the HD Pointer Checker job:

- The IMS directory data set allocated by the IMS control region is not the same data set allocated by IMS Catalog API (DFS3CATQ).
- The IMS catalog alias name used by the IMS control region is not the same as the alias name used by IMS Catalog API (DFS3CATQ).

System action

HD Pointer Checker ends with an abend code of 3879.

User response

Contact IBM Software Support.

FABP3880E CATALOG SEARCH PROCESS FOR *ddname* DD FAILED BECAUSE *reason*

Explanation

HD Pointer Checker failed to obtain the space utilization information from the catalog of the *ddname* DD data set. *reason* shows one of the following texts:

- CSI FAILED WITH RC=*return_code*, RSN=*reason_code*
- CATALOG HAS NO DATA COMPONENT

For the return code and the reason code, see the *Catalog Search Interface User's Guide* in *z/OS DFSMS Managing Catalogs*.

System action

HD Pointer Checker ends with an abend code of 3880.

User response

Catalog the data set information correctly and rerun the job. If the problem persists, contact IBM Software Support.

FABP3901E UNKNOWN FUNCTION REQUESTED

Explanation

The module FABPIC20 was called with an unknown function code.

System action

The HD Pointer Checker issues a USER 3901 abend.

User response

Correct all errors and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3902E "GET" FAILED FOR DDNAME *ddname*

Explanation

HD Pointer Checker tried to issue a GET macro for the file associated with the DD statement. The SYNAD exit routine was called during the GET processing.

System action

HD Pointer Checker ends with the abend code 3902.

User response

Make sure that the DD statement specifies the correct data set. Correct the error and rerun the job.

FABP3903E "GETMAIN" FAILURE OCCURRED (RC = *xx*) FOR IMAGE COPY 2 BUFFER

Explanation

HD Pointer Checker issued a GETMAIN macro to get storage for the buffer. The return code indicates that the attempt to do so was unsuccessful.

System action

HD Pointer Checker issues a USER 3903 abend.

User response

Increase the region size parameter value in the EXEC statement and rerun the job.

FABP3904E "FREEMAIN" FAILURE OCCURRED (RC = *xx*) FOR IMAGE COPY 2 BUFFER

Explanation

HD Pointer Checker issued a FREEMAIN macro. The return code indicates that the attempt to do so was unsuccessful.

System action

HD Pointer Checker ends with the abend code 3904.

User response

Correct all errors and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP3911E FIRST RECORD IS NOT A TAPE HEADER RECORD

Explanation

The first record of the image copy taken with the Database Image Copy 2 utility is not a tape header record. The HD Pointer Checker expected the first record of the image copy taken with the Database Image Copy 2 utility to be a tape header record, but it was not.

System action

HD Pointer Checker issues a USER 3911 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement identifies the correct data set. Correct the errors and rerun the job.

FABP3912E **INITIALIZATION FOR IMAGE COPY 2 READING INCOMPLETE *- text***

Explanation

HD Pointer Checker could not find the record indicated. HD Pointer Checker collects the information which is required to analyze the data set while initialization processing, but the processing was incomplete. *text* shows one of the following reasons:

- DATA SET HEADER RECORD NOT FOUND
- VOLUME DEFINITION RECORD NOT FOUND

System action

HD Pointer Checker issues a USER 3912 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement identifies the correct data set. Correct the errors and rerun the job.

FABP3913E **UNEXPECTED LOGICAL END OF FILE ON IMAGE COPY 2 DATA SET**

Explanation

An unexpected trailer record was encountered while the HD Pointer Checker was reconstructing the logical record image from the image copy taken with the Database Image Copy 2 utility. The image copy taken with the Database Image Copy 2 utility has two trailer records and HD Pointer Checker regards them as the end-of-data.

System action

HD Pointer Checker issues a USER 3913 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3914E **INTERNAL RECORD LENGTH ERROR ON IMAGE COPY 2 DATA SET**

Explanation

HD Pointer Checker checked the logical record length of the dumped data set in the image copy and found incorrect length.

System action

HD Pointer Checker issues a USER 3914 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3915E **SPECIFIED IMAGE COPY 2 DATA SET IS EMPTY**

Explanation

HD Pointer Checker attempted to get a record from the specified image copy taken with the Database Image Copy 2 utility, but the data set was empty.

System action

HD Pointer Checker issues a USER 3915 abend.

User response

Make sure that the DD statement specifies the correct data set. Correct the error and rerun the job.

FABP3916E **UNEXPECTED PHYSICAL END OF FILE ON IMAGE COPY 2 DATA SET**

Explanation

HD Pointer Checker attempted to get a record from the specified image copy taken with the Database Image Copy 2 utility, but an unexpected physical end-of-file was encountered.

Note: The image copy taken with the Database Image Copy 2 utility has two trailer records. Usually HD Pointer Checker ends image copy reading on the first trailer record instead of the physical end-of-file.

System action

HD Pointer Checker issues a USER 3916 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3921E **UNSUPPORTED DUMP FORMAT. LOGICAL DUMP REQUIRED**

Explanation

The image copy taken with the Database Image Copy 2 utility must be a DFSMSdss logical dump format, but it was not.

System action

HD Pointer Checker issues a USER 3921 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3922E MORE THAN ONE DATA SET IS DUMPED IN THE IMAGE COPY

Explanation

Input data set contained more than one database data set. This results in an error because the image copy taken with the Database Image Copy 2 utility contains only one database data set.

System action

HD Pointer Checker issues a USER 3922 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3923E DATA SET ORGANIZATION CONFLICT
- EXPECTED: *xxxx*
- DUMPED DATA SET: *yyyy*

Explanation

The dumped data set organization conflicted with the access method that is defined in the DBD of the database. *xxxx* and *yyyy* show the data set organization, which can be VSAM, OSAM, ESDS, or KSDS.

System action

HD Pointer Checker issues a USER 3923 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

If the image copy of an encrypted OSAM database is SMSNOCIC or SMSCIC type image copy, remove the database. HD Pointer Checker does not support SMSNOCIC and SMSCIC type image copies of encrypted database data sets.

FABP3924E VSAM KSDS DATA SET WAS DUMPED WITHOUT VALIDATION

Explanation

VSAM KSDS must be dumped with validation by IMS Database Image Copy 2 utility, but the input data set was not.

System action

HD Pointer Checker issues a USER 3924 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3925E DUMPED DATA SET IS UNSUPPORTED FORMAT
- *text*

Explanation

The dumped database data set organization is not supported. *text* provides additional information:

- FOR OSAM DATA SET, BLOCKED RECORD
- FOR VSAM DATA SET, NOT ESDS/KSDS
- FOR VSAM DATA SET, SPANNED RECORD
- FOR DEDB/HDAM/HIDAM DATA, BLOCKED RECORD

System action

HD Pointer Checker issues a USER 3925 abend.

User response

Ensure that the correct data set is specified and that the data set is not broken. Also, ensure that the DD statement specifies the correct data set. Correct the errors and rerun the job.

FABP3986E UNSUCCESSFUL DYNALLOC REQUEST (SVC 99: RC= *return_code*, CC = *reason_code*, SMS RSN = *sms_reason_code*)

Explanation

After issuing the DYNALLOC request for the work data set, SVC 99 routines returned a nonzero return code, hexadecimal reason code, and hexadecimal SMS reason code.

System action

HD Pointer Checker issues a USER 3986 abend.

User response

Correct the error and rerun the job.

Problem determination

For the return code, reason code, and SMS reason code of SVC 99, see the *z/OS MVS Programming: Authorized Assembler Services Guide*.

FABP3987E **DATACLASS: *data_class* STORCLASS: *storage_class* DSN: *dsname***

Explanation

When the dynamic allocation of the work data set fails, this message follows message FABP3986E. This message shows the parameters that were passed to the dynamic allocation macro.

If WKDATACLASS=*NO or WKSTORCLASS=*NO was applied to the job, ******** is shown for data class or storage class.

A possible cause of this problem is the resources defined in the data class, storage group, or both are insufficient.

System action

HD Pointer Checker issues a USER 3986 abend.

User response

Ensure that the data class has sufficient space and volume count. If the resources defined in the data class are insufficient, specify the appropriate data class.

FABP3988E **UNIT: *unitname* VOL-COUNT: *volcount* DISP: (*disp1*,*disp2*,*disp3*) DSN: *dsname***

Explanation

When dynamic allocation of the work data set fails, this message follows message FABP3998E. This message shows the parameters passed to the dynamic allocation macro. Because some of the resources shown in the parameters are insufficient, the dynamic allocation might be failed.

System action

HD Pointer Checker issues a USER 3998 abend.

User response

Provide either of the following information in the JCL job and rerun the job.

- Specify the data class by coding the WKDATACLASS keyword on the PROC statement. The data class must be capable of allocating the work data sets. For more information about the WKDATACLASS keyword, see "PROC statement" on page 108.
- Specify the DD statement explicitly in the HD Pointer Checker JCL, with the appropriate unit name and volume count of your system.

FABP3989E **SYSIN, SYSOUT, OR SUBSYSTEM (SUBSYS=) IS UNSUPPORTED DATA SET TYPE. DD: *ddname***

Explanation

Data sets with the specified SYSIN, SYSOUT, or SUBSYS DD are not supported.

System action

HD Pointer Checker issues a USER 3989 abend.

User response

Ensure that the DD statement of ddname that is shown in the message is specified correctly. Correct the error and rerun the HD Pointer Checker job.

FABP3990E **INVALID IMS RELEASE LEVEL IN RECON DATA SET: *ddname***

Explanation

The data set used for the DD name *ddname* was not the correct IMS release level of the RECON data set.

System action

HD Pointer Checker issues a USER 3990 abend.

User response

Specify the correct IMS release level of the RECON data set, and rerun the job.

FABP3991E HEADER RECORD NOT FOUND IN RECON DATA SET: *ddname*

Explanation

The data set used for the DD name was not the RECON data set.

System action

HD Pointer Checker issues a USER 3991 abend.

User response

Specify the correct RECON data set, and rerun the job.

FABP3992E RECON HEADER EXTENSION RECORD NOT FOUND IN RECON DATA SET: *ddname*

Explanation

The data set used for the DD name was not the RECON data set or the correct IMS release level of the RECON data set.

System action

HD Pointer Checker issues a USER 3992 abend.

User response

Specify the correct IMS release level of the RECON data set, and rerun the job.

FABP3993E TWO VALID RECON DATA SETS NOT PROVIDED

Explanation

The two IMS release levels of RECON data sets are not correct.

System action

HD Pointer Checker issues a USER 3993 abend.

User response

Specify two correct IMS release levels of the RECON data sets, and rerun the job.

FABP3994E *xxxxxxxx* DEFINED INCORRECTLY IN RECON DATA SET: *ddname*

Explanation

The RECON data set had incorrect information. *xxxxxxxx* is "COEX" or "MINVERS".

System action

HD Pointer Checker issues a USER 3993 abend.

User response

Specify the correct COEX/MINVERS for the RECON data set when initializing RECON, and rerun the job.

FABP3995E DSN: *dsname* VOL: *vol-ser*

Explanation

If the dynamic allocation of the input database data set or the image copy data set fails, this message is issued along with message FABP3998E. Here, *dsname* and *vol-ser* are the name and volume serial of the data set that caused the error. If the data set is a cataloged data set, '******' is shown for *vol-ser*.

System action

HD Pointer Checker issues a USER 3998 abend.

User response

Check message FABP3998E.

FABP3996E UNABLE TO BUILD CONTROL BLOCKS FOR DBD: *dbdname*

Explanation

HD Pointer Checker requested construction of control blocks for the full-function database. The request was not successfully completed.

System action

HD Pointer Checker issues a USER 3996 abend.

User response

Make sure that a valid DBD or RECON data set exists for the named database.

If the processing database is an IMS catalog database that is registered in the RECON data set, specify Y for the 14th parameter on the EXEC statement of the HD Pointer job step. For example:

```
//HDPCPRO EXEC PGM=DFSRRC00,
//        PARM=(ULU,FABPMAIN,,,,,,,,,,,Y,N)
```

If the processing database is an IMS catalog database that is not registered in the RECON data set, specify the library that contains the Catalog Definition exit routine (DFS3CDX0), which the unregistered IMS catalog database names are defined in, to the STEPLIB DD statement, or specify DFSDF=*xxx* for the 27th

parameter on the EXEC statement of the HD Pointer job step. DFSDF specifies the 3-character suffix *xxx* of the DFSDF*xxx* member that specifies the unregistered IMS catalog database names. For example:

```
//HDPCPRO EXEC PGM=DFSRRC00,
//        PARM=(ULU,FABPMAIN,DFSCD000,,,,,,,,,,N,N,
//        ,,,,,,,,,,'DFSDF=xxx')
```

Correct the error and rerun the job.

FABP3997E DATA SET FOR DB: *dbdname* DD: *ddname* NOT ALLOCATED

Explanation

Either a DD statement of the required data set is not specified, or the data set cannot be allocated dynamically.

System action

Processing stops.

User response

Ensure that a valid DBD or data set name is defined in DFSMDA or RECON. Correct the error, and rerun the HD Pointer Checker job.

FABP3998E UNSUCCESSFUL DYNALLOC REQUEST (SVC 99: RC= *nn*, CC = *xxxx*)

Explanation

After issuing the DYNALLOC request for database data set, image copy data set, or work data sets, SVC 99 routines return a nonzero (*nn*) return code in register 15 and hexadecimal (*xxxx*) reason code.

System action

HD Pointer Checker issues a USER 3998 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

For the return code and reason code of SVC 99, see the *z/OS MVS Programming: Authorized Assembler Services Guide*.

If you allocate an uncataloged image copy data set on tapes dynamically, make sure you specify the correct unit name in the ICUNIT parameter in the PROCCTL statement. If you use image copy data sets that are stacked in a tape, you cannot specify both dynamic and explicit allocation.

FABP3999E UNKNOWN ERROR OCCURRED IN *module-name* MODULE (CC = *nnn*)

Explanation

An internal error occurred in the indicated module HD Pointer Checker *module-name*.

System action

HD Pointer Checker issues a USER 3999 abend.

User response

Save the entire run listing (including the dump, JCL, and reports from IMS HP Pointer Checker), and contact IBM Software Support.

FABP4001E DEVTYPE MACRO FAILURE OCCURRED FOR *ddname* DATA SET

Explanation

No data set is specified on the DD statement of ddname. This data set is required as output.

System action

HD Pointer Checker issues a USER 4001 abend.

User response

Specify the correct ddname data set. Rerun the job.

FABP4002E I/O FAILURE OCCURRED DURING *xxxxx* FOR DBDEFCTL DATA SET *(member)*

Explanation

An attempt to receive input from or send output to the DBDEFCTL data set failed. *xxxxx* is one of I/O, BLDL, WRITE, or STOW. R15 shows the return code from the macro.

System action

A user 4002 abend is issued.

User response

Correct the error and rerun the job.

Problem determination

Check system messages in the JOBLOG.

FABP4003W DATABASE STRUCTURE MAY HAVE BEEN CHANGED: *dbdname*

Explanation

The creation date of the DBDEFCTL data set is older than the assemble date of the specified DBD. If the database structure has been changed, the result of the HASH Check is unpredictable.

System action

Processing continues.

User response

Make sure that the database structure has not been changed. If it has been changed, rerun the DBD Analysis Program and then rerun the job.

FABP4004W HISAM DB: *dbdname* DB#: *nnn* DD: *ddname* WAS NOT SCANNED

Explanation

The HISAM database that has overflow DD was not scanned in the same step as the primary and overflow data sets.

System action

Processing continues.

User response

If the indicated DD was already scanned in another step, no action is required. If it has not yet been scanned, run the IMS HP Image Copy job with the HASH Check function for the HISAM database data set.

FABP4005W DB: *dbdname* DB#: *nnn* DD: *ddname* WAS NOT SCANNED FOR MULTIPLE DATA SET GROUP

Explanation

Multiple data set groups were scanned in the IMS HP Image Copy job or the IMS Database Reorganization Expert job, but the indicated data set group was not scanned.

System action

Processing continues.

User response

If you receive this message as a result of running an IMS HP Image Copy job, make sure that all database data sets in the multiple data set groups are processed in the HASH evaluation process. If you omit any of database data sets, pointer errors might not be detected.

FABP4006W DB: *dbdname* DB#: *nnn* WAS NOT SCANNED FOR LOGICALLY RELATED DB DBLG#: *mmm*

Explanation

Multiple databases have logical relationships with the database, but the indicated database was not scanned.

System action

Processing continues.

User response

Make sure that all databases in the logical relationship are processed in your HASH evaluation process. If you omit any of databases, errors might not be detected.

FABP4007E INVALID PROCESS OPTION SPECIFIED FOR "TYPE=" PARAMETER

Explanation

An incorrect TYPE operand for HASH Check function was specified. The operand that can be used for the TYPE parameter for the HASH Check function is SCAN or ALL.

System action

Processing stops.

User response

Specify TYPE=SCAN or TYPE=ALL. Rerun the job.

FABP4008E DB: *database* CANNOT BE SCANNED WHEN HD POINTER CHECKER IS INVOKED FROM OTHER PRODUCTS

Explanation

The indicated database is not supported when HD Pointer Checker is called from IMS Database Recovery Facility.

System action

Processing continues.

User response

Remove the database data set from the control statement of IMS Database Recovery Facility, and rerun the job. If the problem remains, save the entire run listing (including the dump, JCL, and all reports from IMS Database Recovery Facility and HD Pointer Checker), and contact IBM Software Support.

Problem determination

Check the control statement of IMS Database Recovery Facility.

FABP4009E "HASH=YES/FORCE" WAS NOT SPECIFIED IN PROC STATEMENT

Explanation

The parameter HASH=YES or HASH=FORCE is required for the DBD Analysis Program. The DBDEFCTL members must not be created.

System action

Processing stops.

User response

Specify HASH=YES or HASH=FORCE. Rerun the job.

FABP4010E "HASH=FORCE" WAS SPECIFIED IN PROC STATEMENT, BUT THERE IS NO DATABASE DATA SET FOR APPLYING HASH CHECK OPTION

Explanation

Self-explanatory. The DBDEFCTL members are not created.

System action

Processing stops.

User response

Make sure that you specified the correct PSB name and DATABASE statements.

FABP4011I HASH RECORDS WRITTEN TO *dsname*

Explanation

This message is informational. The HASH total records are written into the indicated data set.

System action

Processing continues.

User response

None. This message is informational.

FABP4012W NO DATABASE DATA SET PROCESSED BY HASH CHECKING

Explanation

The DBDEFCTL DD statement is specified in JCL of IMS HP Image Copy with HASH Check function job, but no database data set was processed by the HASH Check function.

System action

Processing continues.

User response

Check if the DBDEFCTL members you want to perform hash checking on exist. If not, run the DBD Analysis Program for the database specified.

FABP4013W DATA SET INFORMATION NOT FOUND IN DBDEFCTL

Explanation

The database information was found in the DBDEFCTL data set, but the data set information belonging to the database was not found in the DBDEFCTL data set.

System action

Processing continues.

User response

Check the DATABASE statement in the preceding DBD Analysis Program job. If it is incorrect, rerun the job with the correct database specification.

FABP4014I THE ABOVE DATABASE DATA SET IS PROCESSED WITH HASH CHECK FUNCTION

Explanation

This is an informational message. The HASH Check function is invoked for this database. HASH total records are written for the database.

System action

Processing continues.

User response

None. This message is informational.

FABP4015E RESERVED NAME WAS USED FOR DBD

Explanation

The reserved name PROCTL01 is specified as an input database name.

System action

Processing stops.

User response

Specify the correct process control information member name on DBDEFCTL DD card. If both the name of control information member and DBD is "PROCTL01", rerun DBD analysis program and re-create the control information member by using another name.

FABP4016W "HASH=NO" IS APPLIED TO THE ABOVE DATABASE DATA SET

Explanation

The HASH Check function is not applied to the database data set. The HASH checking is processed for other databases and not for this database.

System action

Processing continues.

User response

None.

FABP4017W REPORT CONTAINS STATISTICS FOR ONLY DDNAME: *ddname* PART OF HISAM DB: *dbdname*

Explanation

The HISAM Statistics report contains partial DB information only (either primary DB information or overflow DB information), because of a restriction of image copy hash. For complete DB statistics, refer to another HISAM Statistics report in a pair of primary and overflow DDs.

System action

Processing continues.

User response

For complete database statistics, refer to another HISAM statistics report in a pair, too.

FABP4018W PARTITION DD: *ddname dbdname* DB#: *nnn* WAS NOT SCANNED FOR LOGICALLY RELATED DB DBLG#: *nnn*

Explanation

Multiple partitions that have direct logical parent pointer were scanned in the Enhanced Image Copy utility job, but the indicated partition was not scanned.

System action

Processing continues.

User response

Make sure that all partitions of a database that has direct logical parent pointers are processed in your HASH evaluation. If you omit any partitions, errors might not be detected.

FABP4019E MEMBER "*xxxxxxxx*" FROM DDNAME DBDEFCTL NOT FOUND

Explanation

The member *xxxxxxxx* does not exist in the data set defined by the DBDFECTL DD statement.

System action

HD Pointer Checker issues a user 4019 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP4020E MEMBER "*xxxxxxxx*" FROM DDNAME DBDEFCTL IS NOT A CONTROL BLOCK

Explanation

The data format of the member *xxxxxxxx* in the data set specified by DBDEFCTL is incorrect control information.

System action

HD Pointer Checker issues a user 4020 abend.

User response

Correct the error, and rerun the HD Pointer Checker job.

FABP4021W PHIDAM PRIMARY INDEX DATABASE DB: *dbdname* CANNOT BE SCANNED WITH "HASH=YES"

Explanation

The PHIDAM primary index database *dbdname* was not processed with the HASH=YES process option.

System action

Processing continues.

User response

None.

FABP4022E DLI BATCH REGION IS NEEDED FOR THIS EXECUTION

Explanation

The program FABPHCTL was invoked as an MVS batch program, and High Availability Large Database was included to be processed. However, the DLI region is needed for processing High Availability Large Databases.

System action

HD Pointer Checker issues a USER 4022 abend.

User response

Modify JCL to use the DLI region, and rerun the job.

FABP4024W PROCCTL DD STATEMENT IS IGNORED

Explanation

HD Pointer Checker does not accept PROCCTL statements during a single-step HASH checking with IMS HP Image Copy.

System action

HD Pointer Checker ignores the specifications in the PROCCTL statements and continues processing.

User response

Specify the processing options on the ICEIN statements and, if necessary, remove the PROCCTL statement.

Problem determination

Check the PROCCTL DD in the control statement.

FABP4025W SECONDARY INDEX DB: *dbdname* CANNOT BE CHECKED WITH HASH=YES

Explanation

The pointer of the secondary index database cannot be checked for one of the following reasons:

- A secondary index database maintenance exit routine is defined in the source segment, but no load module is in the IMS2 DD data set or in the STEPLIB, LOADLIB, or LINKLIST library.
- A segment edit/compression exit routine and a sparse index are defined in the source segment.
- The source segment is a variable length and a segment edit/compression exit routine is defined in it.
- Some of the source segments are suppressed, split to prefix and data portions, and physically deleted.

The secondary index database is scanned, but the index pointer is not checked. Only statistics data is written in a report.

System action

Processing continues.

User response

If you do not need to check the secondary index nor the statistics data, this message can be ignored.

FABP4026E PARTITION DB CANNOT BE PROCESSED

Explanation

HD Pointer Checker does not support IMS Partition DB (5697-A06, 5697-D85) or any other products with an equivalent function.

System action

Pointer validation is taken for the Partition DB. Return Code 08 is returned.

User response

Change the PROCCTL or the ICEIN statement not to invoke the HASH Check option.

- For the single-step HASH Check option, specify HDPC=N for the Partition DB on the ICEIN control statement.
- For the multiple-step HASH Check option, remove the DATABASE statement for the Partition DB from the PROCCTL data set.

FABP4027W **INDEX DB: *dbdname* CANNOT BE CHECKED WITH IXKEYCHK=YES**

Explanation

Index key in index database cannot be checked for one of the following reasons:

- Some of the source segments are split to prefix and data portions and some are physically deleted.
- When a segment edit/compression routine is defined in the index source segment, IXKEYCHK cannot be done when one of the following conditions is met:
  - When HD Pointer Checker runs in an IMS Database Reorganization Expert job or Online Reorganization Facility job, IXKEYCHK cannot be done if the source segment is compressed.
  - When HD Pointer Checker runs as a stand-alone job or runs in an IMS HP Image Copy job, the segment/edit compression routine must be stored in the IMS2 DD data set or in the STEPLIB, LOADLIB, or the LINKLIST library. However, the routine did not exist in the data sets.

System action

Processing continues.

User response

If you do not need to check the index key, this message can be ignored.

FABP4028I **IMSDALIB DD STATEMENT IS IGNORED**

Explanation

HD Pointer Checker ignored the IMSDALIB DD statement because PGM=DFSRRC00 is specified on the EXEC statement.

System action

Processing continues.

User response

If you want to allocate the database data sets of the non-HALDB dynamically, specify the MDA library in either of the following ways:

- Specify the MDA library on the STEPLIB DD statement.
- Change the PGM parameter of the EXEC statement to FABPPC00.

FABP4030E **DSPSERV CREATE FAILED. DSPNAME: *dspname* RC=*nn* RSN=*nnnnnnnn***

Explanation

Failed to create data space. RC is the return code set in register 15 and RSN is the reason code set in register 0 by the DSPSERV macro.

System action

HD Pointer Checker issues a USER 4030 abend.

User response

Correct the error, and rerun the job.

FABP4031E **ALESERV *funcname* FAILED. DSPNAME: *dspname* RC=*nn***

Explanation

Failed in getting ALET. RC is the return code set in register 15 by the ALESERV macro. *funcname* is ADD or SEARCH.

System action

HD Pointer Checker issues a USER 4031 abend.

User response

Correct the error, and rerun the job.

FABP4032E **NAME/TOKEN *service* FAILED. NAME: *nametoken* RC=*nn***

Explanation

Failed in the NAME/TOKEN service. The service is in one of 'IEANTRC', 'IEANTRT', or 'IEANTDL'. RC is the return code of the NAME/TOKEN service.

System action

HD Pointer Checker issues a USER 4032 abend.

User response

Correct the error, and rerun the job.

FABP4033E **ASCRE FAILED. PROCNAME: *procname* RC=*rtncd* RSN=*rsncd***

Explanation

ASCRE macro failed. RC and RSN are the return and reason code that are set in register 15 and 0 by the ASCRE macro.

System action

HD Pointer Checker issues a USER 4033 abend.

User response

Correct the error, and rerun the job.

Problem determination

For the return code and reason code of the ASCRE macro, see *z/OS MVS Programming Authorized Assembler Services Reference Volume 1 (ALESERV-DYNALLOC)*.

FABP4034E **FABAPTH0 ENDED ABNORMALLY. PROCNAME: *procname* ERROR-ID: *error-id***

Explanation

HD Pointer Checker created a FABPATH0 address space by using the PROCNAME procedure, but the address space ended abnormally.

System action

HD Pointer Checker issues a USER 4034 abend.

User response

Check the FABPATH0 job log, correct the error and rerun the job.

FABP4035E **ASEXT FAILED. RC=*rtncd* RSN=*rsncd***

Explanation

The ASEXT macro failed. RC and RSN are the return and reason code that are set in register 15 and 0 by the ASEXT macro.

System action

HD Pointer Checker issues a USER 4035 abend.

User response

Correct the error, and rerun the job.

Problem determination

For the return code and reason code of the ASEXT macro, see *z/OS MVS Programming Authorized Assembler Services Reference Volume 1 (ALESERV-DYNALLOC)*.

FABP4036E **INCORRECT LIBRARY IS USED IN FABPATH0**

Explanation

The level of the STEPLIB library in the FABPATH0 procedure is different from the master address space.

System action

HD Pointer Checker issues a USER 4036 abend.

User response

Specify the same IMS HP Pointer Checker load module library as the MASTER JCL in the FABPATH0 STEPLIB.

Problem determination

Check the STEPLIB data set in the FABPATH0 procedure.

FABP4037E **ATTACH FAILED FOR DFSRRC00 IN FABPATH0**

Explanation

A nonzero return code was returned from the ATTACH macro when DFSRRC00 was attached in the FABPATH0 address space, which is an IMS HP Pointer Checker subordinate address space. See message in the FABPATH0 job.

System action

HD Pointer Checker issues a USER 4037 abend.

User response

Correct the error, and rerun the job.

Problem determination

For the reason the ATTACH macro failed, see the return code shown in message FABP3690E, which is issued in the FABPATH0 address space.

FABP4038E DBRC SIGNON FAILED. PROCNAME: *procname* JOBNAME: *jobname*

Explanation

HD Pointer Checker created the HPPC DMB Analyzer subordinate address space job (DMB Analyzer job). However, the DMB Analyzer job ended abnormally because of DBRC signon failure. *procname* is the procedure name and *jobname* is the job name of the address space.

System action

HD Pointer Checker issues a USER 4038 abend.

User response

DBRC sign-on failure can occur if multiple DMB Analyzer jobs attempt to sign-on to DBRC with the same job name. To avoid this, specify a different job name to each DMB Analyzer job. The job name can be specified by the DRF control statement PCJOBNM or PCPREF. For more information about DRF control statements, see the *IMS Recovery Solution Pack IMS Database Recovery Facility User's Guide and Reference*.

Problem determination

For details of DBRC signon failure, check the DFS041I message in the subordinate address space job log, and follow the description in *IMS Messages and Codes*.

FABP4095E RECON ACCESS FAILED. *reason*

Explanation

An error was detected in the RECON access processing. *reason* shows one of the following reasons:

- DBRC LIST COMMAND IS NOT COMPLETED. RC=*xxxxxxxx*
- SYSPRINT DD FOR DBRC LIST COMMAND IS SPECIFIED AS DUMMY
- INTERNAL ERROR OCCURED
- FUNC=*ffffffff* RETURN CODE=*xxxxxxxx* REASON CODE=*xxxxxxxx* KEYS: DBD=*dbdname* DDN=*ddname* KEYTYPE=*xx xxxxxxxxxx*

System action

HD Pointer Checker issues a USER 4095 abend.

User response

Correct the error, and rerun the job.

FABP8001E STATEMENT FORMAT ERROR

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8002E *parm-name* IS INVALID AS STATEMENT PARAMETER

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8003E *parm-name* PARAMETER IS INVALID FOR *ctl-stmt-name* STATEMENT

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8004E **THE NUMBER OF *parm-name* PARAMETERS EXCEEDS THE LIMIT, MAX IS *nnn***

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8005E ***parm-name* PARAMETER IS REQUIRED FOR *ctl-stmt-name* STATEMENT**

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8006E **THE NUMBER OF OPERANDS FOR *parm-name* PARAMETER EXCEEDS THE LIMIT, MAX IS *nnn***

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8007E **LENGTH ERROR IN *n-th* OPERAND OF PARAMETER: *parm-name***

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8008E ***n-th* OPERAND IS REQUIRED FOR PARAMETER: *parm-name***

Explanation

An incorrect control statement was detected by the control statement syntax checking.

System action

Processing stops.

User response

Correct the error, and rerun the HD Pointer Checker job.

Problem determination

Check the control statement.

FABP8009I (HPIC) AND SUBSEQUENT PARAMETERS ARE IGNORED

Explanation

Only "(HDPC)" statement is valid for HD Pointer Checker. "(HPIC)" and subsequent parameters are ignored because they are for IMS HP Image Copy.

System action

Processing continues. HD Pointer Checker does not check the syntax of the "(HPIC)" and subsequent parameters.

User response

None. This message is informational.

HD Tuning Aid messages and codes

The following reference topics provide information about the abend codes, return codes, and messages issued by HD Tuning Aid.

HD Tuning Aid abend codes

Every 3*nnn* abend code is accompanied by a FABT3*nnn*E message. (3*nnn* is a four-digit identification number of the abend code and message.) See the associating FABT3*nnn*E message description for the *3nnn* abend code.

HD Tuning Aid return codes

HD Tuning Aid generates return codes to indicate the success or failure of a job.

The following return codes are set by HD Tuning Aid:

Code
Meaning

0
HD Tuning Aid has been successfully run. No severe errors have been detected.

8
HD Tuning Aid has experienced severe errors and the processing stops. Check the JES log and reports for messages to correct the error and rerun the job.

HD Tuning Aid messages

Use the information in these messages to help you diagnose and solve HD Tuning Aid problems.

Message format

HD Tuning Aid messages adhere to the following format:

```
FABTnnnnx
```

Where:

FABT
Indicates that the message was issued by HD Tuning Aid

nnnn
Indicates the four-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred, which might or might not require operator intervention.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

In the message text, you will see lowercase variable names (such as *xxx...*). The variable names take on values when the message appears and might represent such things as:

- The name of a data set
- The number of data records
- A name or value provided by the user
- The name of a partition
- The name of a DBD

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABT3504E MESSAGE TEXT NOT FOUND

Explanation

HD Tuning Aid attempted to print an error message that could not be found in the message table in module FABTMSGS.

System action

HD Tuning Aid ended with the USER 3504 abend.

User response

Verify that IMS HP Pointer Checker, including all current maintenance, was installed correctly. Reinstall IMS HP Pointer Checker, including all maintenance, if necessary. Then rerun the job. If the problem persists, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Either IMS HP Pointer Checker or its maintenance might have been installed incorrectly.

FABT3505E INVALID MESSAGE FLAG

Explanation

HD Tuning Aid attempted to print an error message, and an incorrect flag was supplied to module FABTMSGS.

System action

HD Tuning Aid ended with the USER 3505 abend.

User response

Verify that IMS HP Pointer Checker, including all current maintenance, was installed correctly. Reinstall IMS HP Pointer Checker, including all maintenance, if necessary. Then rerun the job. If the problem persists, save the entire run listing (including the dump, JCL, and all reports from IMS HP Pointer Checker), and contact IBM Software Support.

Problem determination

Either IMS HP Pointer Checker or its maintenance might have been installed incorrectly.

FABT3521E OPEN FAILED FOR KEYS*xxx* FILE

Explanation

The indicated data set was not opened successfully. KEYS*xxx* is:

KEYSIN
Contains root segment keys (created by HD Pointer Checker).

KEYSOUT
Contains block/RAP assignments (created by FABTROOT).

System action

Processing stops.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors. Otherwise, rerun the HD Pointer Checker job to re-create the indicated data set.

FABT3522E EMPTY KEYSIN DATA SET

Explanation

The data set that contains the root segment keys (created by HD Pointer Checker) is empty.

The change of severity can be requested by the %OPTION statement in the CTL data set.

System action

Processing stops.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors.

FABT3522I EMPTY KEYSIN DATA SET

Explanation

The data set that contains the root segment keys (created by HD Pointer Checker) is empty.

The change of severity can be requested by the %OPTION statement in the CTL data set.

System action

Processing stops.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors.

FABT3522W EMPTY KEYSIN DATA SET

Explanation

The data set that contains the root segment keys (created by HD Pointer Checker) is empty.

The change of severity can be requested by the %OPTION statement in the CTL data set.

System action

Processing stops.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors.

FABT3523E NO TYPE R RECORD CREATED FOR ALL OF CONTROL STATEMENTS

Explanation

FABTROOT processed for all input control statements. But, none of the DB names specified in the control statements could be found in the KEYSIN data set.

System action

Processing stops.

User response

Correct the error and return the job.

FABT3525I PROCESSING COMPLETED FOR THIS DATABASE

Explanation

FABTROOT completed processing of all KEYSIN records for the database.

System action

If there are more databases to be processed, then processing continues. Otherwise, processing stops.

User response

None. This message is informational.

FABT3530E ERROR FOUND IN COLUMN *nn* OF %OPTION STATEMENT

Explanation

Incorrect value was found in column *nn* in the %OPTION statement.

System action

Processing stops.

User response

Correct the error and rerun the job.

FABT3531E MORE THAN ONE %OPTION STATEMENT SPECIFIED

Explanation

More than one %OPTION statements were specified. Only one %OPTION statement can be specified in the CTL data set.

System action

Processing stops.

User response

Correct the error and rerun the job.

FABT3532E %OPTION STATEMENT SPECIFIED AFTER DB OR PART STATEMENT

Explanation

The %OPTION statement was specified after one or more DB or PART statements. The %OPTION statement must be the first statement in the CTL data set.

System action

Processing stops.

User response

Correct the error and rerun the job.

FABT3535I END-OF-FILE ON CONTROL FILE OR STOP REQUEST

Explanation

Either FABTROOT processed all input control statements, or it processed a control statement with a **1** in column 10.

System action

Processing stops.

User response

None. This message is informational.

FABT3537E MAXIMUM NUMBER OF CONTROL STATEMENTS (DB STATEMENTS) EXCEEDED KEYSIN FILE

Explanation

More than 100 DB statements are specified.

System action

HD Tuning Aid ends with USER 3537 abend.

User response

Correct the error and rerun the job.

Problem determination

The maximum number of DB statements is 100.

FABT3538E DUPLICATE HEADER RECORD FOUND IN KEYSIN DATA SET FOR DB: *dbdname*

Explanation

HD Tuning Aid found a duplicate header record in the data set containing the root segment keys (created by HD Pointer Checker) for the database *dbdname* requested on the control statement.

System action

HD Tuning Aid issues a USER 3538 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors. Rerun the HD Pointer Checker job to re-create the KEYSIN data set.

FABT3545I ACTUAL ROOTS/BLOCK MAP WILL NOT BE REPRINTED

Explanation

FABTROOT is being run with control statement input.

System action

The Actual Roots per Block report is not printed. It is assumed that this report was printed by an earlier

HD Tuning Aid run that did not use control statement input.

User response

None. This message is informational.

FABT3568E NO DMB FOUND FOR THE DB NAME IN CONTROL STATEMENT

Explanation

FABTROOT could not find the name specified in column 1 of your control statement in the DMB.

System action

FABTROOT issues a USER 3568 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the FABTROOT control statement for spelling errors. Make sure the correct PSB name is used in the EXEC statement. The PSB must contain a PCB for that database.

FABT3570E FIND FAILED FOR DBD IN DBDLIB

Explanation

A FIND macro was issued for the dbdname. But no module with that name could be found in the library on the IMS DD statement.

System action

FABTROOT issues a USER 3570 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the FABTROOT control statement for spelling errors. Make sure the DBD library is part of the IMS DD statement.

FABT3580E ERROR RETURNED FROM IMS TOOLS CATALOG INTERFACE (*text*)

Explanation

HD Tuning Aid received an error return code from the IMS Tools Catalog Interface. *text* provides additional information:

- FUNC=OPEN RC=*return_code* RSN=*reason_code*
- FUNC=CLOSE RC=*return_code* RSN=*reason_code*
- FUNC=GET DBD=*dbdname* RC=*return_code* RSN=*reason_code*

return_code and *reason_codes* are the codes returned from the IMS Tools Catalog Interface.

System action

HD Tuning Aid ends with an abend code of 3580.

User response

See IMS Tools Catalog Interface messages (GEX3*xxxx*) to determine the cause of the error.

If the function is OPEN, ensure that the SGLXLOAD library of IMS Tools Base 1.6 or later is specified on the STEPLIB DD statements. Otherwise, contact IBM Software Support.

FABT3581E DBD *dbdname* IS NOT FOUND IN THE IMS DIRECTORY DATA SETS

Explanation

HD Tuning Aid could not obtain the indicated DBD from the IMS directory data sets.

System action

HD Tuning Aid ends with an abend code of 3581.

User response

Ensure that the high-level qualifier of the bootstrap data set indicated by message FABT3582I is correct and that the DBD identified by *dbdname* exists in the IMS directory data sets. Then correct the error and rerun the job.

FABT3582I HD TUNING AID IS RUNNING IN AN IMS-MANAGED ACBS ENVIRONMENT. BSDS HLQ=*bsds_hlq*

Explanation

HD Tuning Aid is running in an IMS managed ACBs environment and is referring to the database definitions in the IMS catalog directory data set instead of the DBD library. *bsds_hlq* is the high-level

qualifier of the bootstrap data set (BSDS) that is used for this run.

System action

Processing continues.

User response

None. This message is informational.

FABT3590E HEADER RECORD IS MISSING IN KEYS*xxx* FILE

Explanation

The first record in the indicated data set containing the root segment keys (created by HD Pointer Checker) is not in the correct format. Its second half word is not XX'0000'. Where KEYS*xxx* is:

KEYSIN
Contains root segment keys (created by HD Pointer Checker).

KEYSOUT
Contains block/RAP assignments (created by FABTROOT).

System action

HD Tuning Aid issues a USER 3590 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors. If necessary, rerun the HD Pointer Checker job to re-create the indicated data set.

FABT3601I *nnnnnnnnnn* TYPE K RECORDS PROCESSED

Explanation

nnnnnnnnnn data records from the data set containing the root segment keys (created by HD Pointer Checker) were processed for this data set. *nnnnnnnnnn* indicates the number of data records.

System action

Processing continues.

User response

None. This message is informational.

FABT3602I *nnnnnnnnnn* TYPE R RECORDS [CREATED | PROCESSED]

Explanation

nnnnnnnnnn data records from the work data set containing the block/RAP assignments were created by FABTROOT or processed by FABTRAPS. *nnnnnnnnnn* indicates the number of data records.

System action

Processing continues.

User response

None. This message is informational.

FABT3603I *dbdname* DBD NOT EITHER HDAM OR PHDAM, SKIPPING FOR NEXT FILE

Explanation

The indicated HIDAM or PHIDAM database dbdname is processed with no control statement. No reports describing HDAM randomization are produced.

System action

Processing continues.

User response

None. This message is informational.

FABT3610E RBA OF KEY BLOCK LESS THAN CURRENT BEGINNING BLOCK

Explanation

The data records from the data set containing the root segment keys (created by HD Pointer Checker) are not in the correct sequence.

System action

HD Tuning Aid issues a USER 3610 abend.

User response

Correct the error and rerun the job.

Problem determination

Rerun HD Pointer Checker to recreate the bad data set.

FABT3611E KEYSOUT BLOCK NUMBERS ARE OUT OF SEQUENCE

Explanation

The data records from the work data set containing the block/RAP assignments (created by FABTROOT and sorted by DFSORT) are not in the correct sequence.

System action

HD Tuning Aid issues a USER 3611 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the DFSORT step (between the FABTROOT and FABTRAPS steps) for errors.

FABT3615E DBD SUPPLIED NOT HDAM TYPE, AND NO HDAM OR PHDAM OVERRIDE SPECIFIED IN CONTROL STATEMENT

Explanation

The input DBD is not type HDAM, but you did not override the control statement by specifying HDAM in columns 58-61 or PHDAM in columns 58-62.

System action

HD Tuning Aid ends with a USER 3615 abend.

User response

Correct the error and rerun the job.

Problem determination

Check errors in the control statement.

FABT3616E DATABASE ORGANIZATION NOT EITHER HDAM OR PHDAM

Explanation

The input DBD is not either HDAM or PHDAM, but you did not override this with the control statement by specifying "HDAM" or "PHDAM" in columns 58-61.

System action

HD Tuning Aid issues a USER 3616 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for control statement errors.

FABT3620E RAP VALUE GREATER THAN NUMBER OF RAP'S PER BLOCK

Explanation

One of the data records from the work data set containing the block/RAP assignments (created by FABTROOT) contains a RAP assignment that is larger than allowed by the DBD.

System action

HD Tuning Aid issues a USER 3620 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors. An old version of the work data set might have been used.

FABT3625E KEYSOUT FILE DD STATEMENT MISSING

Explanation

The DD statement for the work data set containing the block/RAP assignments (created by FABTROOT) is missing.

System action

HD Tuning Aid issues a USER 3625 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors.

FABT3627E DUMMY SPECIFIED FOR KEYS*xxx* FILE

Explanation

The DD statement for the indicated data set was coded as DUMMY. Where KEYS*xxx* is:

KEYSIN
Contains root segment keys (created by HD Pointer Checker)

KEYSOUT
Contains block/RAP assignments (created by FABTROOT).

System action

The HD Tuning Aid issues a USER 3627 abend.

User response

Correct the error and rerun the job.

Problem determination

Check for JCL errors.

FABT3630E ROOT SEGMENT NOT FOUND IN DBD SEGTAB

Explanation

The DBD control block in memory was damaged.

System action

HD Tuning Aid issues a USER 3630 abend.

User response

Correct the error and rerun the job.

Problem determination

Ensure that the DBD load module is valid.

FABT3640E DATABASE ORGANIZATION IS NOT EITHER HDAM OR PHDAM AND SOME CTL STATEMENT FIELDS ARE ZERO/BLANK

Explanation

HD Tuning Aid control statement is coded incorrectly. A required field is blank.

System action

HD Tuning Aid ends with a USER 3640 abend.

User response

Correct the error and rerun the job.

Problem determination

If the DBD is not either HDAM or PHDAM, all DBD override fields on the control statement must not be blanks.

FABT3642E PSB MUST BE GENERATED WITH LANG=ASSEM, LANG=COBOL, OR LANG=PL/I

Explanation

The specified PSB is not generated with LANG=ASSEM, LANG=COBOL, or LANG=PL/I.

System action

HD Tuning Aid ends with a USER 3642 abend.

User response

Specify the correct PSB and rerun the job.

Problem determination

Check the PSB source of the PSB and make sure that the PSBGEN statement has LANG=ASSEM, LANG=COBOL, or LANG=PL/I.

FABT3650E UNSUPPORTED IMS LEVEL OF IMS IS BEING USED: *vv* IMS LEVEL OF THIS RUN

Explanation

Self-explanatory.

System action

HD Tuning Aid ends with a USER 3560 abend.

User response

Correct the error and rerun the job.

Problem determination

Check IMS level coded on JCL.

FABT3660E KEY START POSITION OR KEY LENGTH ON CONTROL STATEMENT IS NOT WITHIN KEY FIELD

Explanation

A key start position or key length is not specified within the root segment key field.

System action

HD Tuning Aid issued a USER 3660 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the DBD for location and length of the root segment key field.

FABT3665W CALCULATED KEY LENGTH=*nnn*

Explanation

A key start position other than the beginning of the root segment key field had been specified, but HD Tuning Aid adjusted the key length to be *nnn* which is the new start and end of the key field.

System action

Processing continues.

User response

None.

FABT3670E FIND FAILED FOR HDAM RANDOMIZING MODULE IN RESLIB

Explanation

A FIND macro was issued for the HDAM randomizing routine that was specified either on the control statement or in the DBD load module. No module with that name could be found in the library on the IMS2 DD statement.

System action

HD Tuning Aid issues a USER 3670 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the control statement for spelling errors in the mod (column 11) field. Make sure that the correct partitioned data set is specified on the IMS2 DD statement.

FABT3680W KEY FILE SEARCH FOR DBD= *dbdname* FAILED THAT WAS SPECIFIED BY CONTROL STATEMENT

Explanation

The data set containing the root segment keys (created by HD Pointer Checker) does not contain any records for the database *dbdname* requested on the control statement.

System action

Processing continues.

User response

Correct the error and rerun the job.

Problem determination

Check the control statement for spelling errors in the dbdname (column 1) field. Make sure that the correct input KEYSIN data set is used.

FABT3685I KEY FILE FOR *dbdname* DBD SKIPPED AS REQUESTED

Explanation

The records on the data set containing the root segment keys (created by HD Pointer Checker) that refer to the database *dbdname* requested on the control statement were not processed by HD Tuning Aid.

System action

Processing continues.

User response

None. This message is informational.

FABT3697W SPECIFIED ALGORITHM RANDOMIZED; RC4= *nnnnnnnn* RC8= *mmmmmmmm*

Explanation

HD Tuning Aid received the indicated number of return code 4/8 from the randomizer routine for the root segments.

System action

Processing continues.

User response

An application program will receive the FM status code and/or abend U812 for the root segment keys by using the specified randomizer routine.

FABT3699E 'BLKSZIN' OR 'NBLKSIN' (ON CONTROL STATEMENT) IS TOO LARGE

Explanation

An incorrect value or combination of values were found in the rbn (column 20) or blksz (column 34) field of control statement.

System action

HD Tuning Aid issues a USER 3699 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify that the fields in question are numeric (including leading zeros), and the combination of the 'BLKSZ' multiplied by the 'RBN' does not exceed 4 GB for a VSAM data set, or an even number and 8 GB for an OSAM data set.

FABT3700I NO MORE RECORDS FOR THIS FILE

Explanation

No more data records containing the block/RAP assignments (created by FABTROOT and sorted by DFSORT) remains for this data set.

System action

Processing continues.

User response

None. This message is informational.

FABT3710E INVALID PARTITION NUMBER '*xxxxxxxx*' RETURNED FROM RANDOMIZER: DBF*yyyyy*

Explanation

Fast Path randomizer DBF*yyyyy* returned an incorrect partition number.

System action

HD Tuning Aid ended with the USER 3710 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the correct randomizer is used for the run.

FABT3711E INVALID RAP NUMBER '*xxxxxxxx*' FOR PART#: *nnn* RETURNED FROM RANDOMIZER: DBF*yyyyy*

Explanation

Fast Path randomizer DBF*yyyyy* returned an incorrect relative RAP number for the indicated partition (*nnn*).

System action

HD Tuning Aid ended with the USER 3711 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the correct randomizer is used for the run.

FABT3801E MAXIMUM NUMBER OF CONTROL STATEMENTS (PART STATEMENTS) EXCEEDED FOR DBD *dbdname*

Explanation

More than 32 PART statements are specified for a database.

System action

HD Tuning Aid ended with the USER 3801 abend.

User response

Correct the error and rerun the job.

Problem determination

The maximum number of the PART statements is 32.

FABT3802E 'PARTINI' ON DB STATEMENT REQUIRES PART STATEMENT(S)

Explanation

No PART statement was specified when the PARTINI keyword was specified on the DB statement.

System action

HD Tuning Aid ended with the USER 3802 abend.

User response

Correct the error and rerun the job.

Problem determination

PARTINI requires a complete set of PART statements for a PHDAM database.

FABT3803E ’PARTDEL’ ON DB STATEMENT DOES NOT ALLOW PART STATEMENT(S)

Explanation

The PART statement was specified when the PARTDEL keyword was specified on the DB statement.

System action

HD Tuning Aid ended with the USER 3803 abend.

User response

Correct the error and rerun the job.

Problem determination

PARTDEL allows no PART statement to be specified.

FABT3804E PART STATEMENT(S) FOR NON-PARTITIONED DB ’PARTINI’ ON DB STATEMENT REQUIRED

Explanation

Self-explanatory.

System action

HD Tuning Aid ended with the USER 3804 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration to a PHDAM database from the other database, 'PARTINI' and a complete set of PART statements are required.

FABT3807E ’PARTDEL’ ON DB STATEMENT IS SPECIFIED FOR HALDB

Explanation

Self-explanatory.

System action

HD Tuning Aid ends with a USER 3807 abend.

User response

Correct the error and rerun the job.

Problem determination

The PARTDEL parameter is used only for migration from HALDB to an HDAM database.

FABT3810E INVALID STATEMENT SPECIFIED ON CONTROL STATEMENT

Explanation

The statement is not recognized as a DB statement, a PART statement, or a comment statement.

System action

Processing continues. The incorrect statement is skipped.

User response

None.

Problem determination

See the FABTROOT CTL data set format.

FABT3811E DDNAME: *ddname* IS NOT FOUND IN DBD

Explanation

DDNAME *ddname* specified on the PART statement is not found in the DBD of the partitioned database. *ddname* must match the ddname on the DBD when overriding parameters without changing the number of partitions.

System action

HD Tuning Aid ends with a USER 3811 abend.

User response

Correct the error and rerun the job.

FABT3812E ’SIZE1’ ON PART STATEMENT IS NOT AN EVEN NUMBER

Explanation

The *size1* value specified on the PART statement is an odd number. It must be an even number.

System action

HD Tuning Aid ends with a USER 3812 abend.

User response

Correct the error and rerun the job.

FABT3813E MIGRATION FROM HIDAM TO PARTITIONED HDAM. 'PARTINI' ON DB STATEMENT REQUIRED

Explanation

Self-explanatory. This type of migration requires 'PARTINIT' on the DB statement.

System action

HD Tuning Aid ends with a USER 3813 abend.

User response

Correct the error and rerun the job.

Problem determination

'PARTINI' is required in this case.

FABT3814E PART RECORD FOR PART#: *nn* IS OUT OF SEQUENCE IN KEYSIN FILE

Explanation

The PART record in the KEYSIN data set is out of partition number sequence. *nn* indicates the partition number of the PART record in error.

System action

HD Tuning Aid ends with a USER 3814 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the KEYSIN files are concatenated in ascending order of the partition number.

FABT3850E FIND FAILED FOR PARTITION SELECTION MODULE *modname* IN IMS2

Explanation

A FIND macro was issued for the partition selection exit specified in the control statement, but no module with that name could be found in the library on the IMS2 DD statement.

System action

HD Tuning Aid ends with a USER 3850 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the control statement for any spelling errors in the name of the partition selection exit module. Make sure that the correct partitioned data set is specified on the IMS2 DD statement.

FABT3851E 'AUTOINI' ON DB STATEMENT DOES NOT ALLOW PART STATEMENT(S)

Explanation

The PART statement was specified when the AUTOINI keyword was specified on the DB statement.

System action

HD Tuning Aid ends with a USER 3851 abend.

User response

Correct the error and rerun the job.

Problem determination

AUTOINI allows only partition high key or partition selection strings after the DB statement.

FABT3852E 'PARTINI' REQUIRES PARTITION SELECTION EXIT OR PARTITION HIGH KEY

Explanation

The PARTINI keyword was specified in the DB statement, but neither S nor H was specified in column 72.

System action

HD Tuning Aid ends with a USER 3852 abend.

User response

Correct the error and rerun the job.

Problem determination

PARTINI requires a complete set of PART statements for PHDAM.

FABT3853E 'AUTOINI' REQUIRES PARTITION SELECTION EXIT OR PARTITION HIGH KEY

Explanation

The PARTINI keyword was specified on the DB statement, but neither S nor H was specified in column 72.

System action

HD Tuning Aid ends with a USER 3853 abend.

User response

Correct the error and rerun the job.

Problem determination

AUTOINI requires complete information about the partition selection.

FABT3854E PARTITION SELECTION EXIT NAME IS REQUIRED ON DB STATEMENT

Explanation

'S' is specified in column 72 on the DB statement, but the exit module name of the partition selection is not specified.

System action

HD Tuning Aid ends with a USER 3854 abend.

User response

Correct the error and rerun the job.

Problem determination

The partition selection exit name is required in column 2-9 on the continuous line of the DB statement.

FABT3855E PARTITION SELECTION STRING OR HIGH KEY WAS NOT SPECIFIED ON PART STATEMENT

Explanation

'+' was specified in column 72 on the PART statement line 1, but the partition selection string or high key is not specified correctly.

System action

HD Tuning Aid ends with a USER 3855 abend.

User response

Correct the error and rerun the job.

Problem determination

The partition selection string or high key is required on the continuous line of the PART statement.

FABT3856E 'AUTOINI' ON DB STATEMENT REQUIRES PARTITION HIGH KEY OR PARTITION SELECTION STRING

Explanation

The AUTOINI keyword is specified on the DB statement, but neither the partition high key nor the partition selection string is specified on the continuous line of the PART statement.

System action

HD Tuning Aid ends with a USER 3856 abend.

User response

Correct the error and rerun the job.

Problem determination

AUTOINI requires complete information about the partition selection.

FABT3857E GETMAIN FAILED. RETURN CODE: *xx* SIZE: *nnnn* K

Explanation

A GETMAIN macro was issued, but failed.

System action

HD Tuning Aid ends with a USER 3857 abend.

User response

Correct the error and rerun the job.

Problem determination

Analyze the return code. If the reason is that there is not enough storage available to GETMAIN, increase the region size of the job or decrease the number of databases specified by CTL statement.

FABT3858E **LOAD FAILED FOR DDNAME *ddname* MODULE *modname***

Explanation

A LOAD macro was issued for the specified module, but no module could be loaded.

System action

HD Tuning Aid ends with a USER 3858 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the member specified exists in the data set specified for the specified ddname.

FABT3859E **PARTITION SELECTION FAILED FOR HALDB. FUNCTION: *xxxxx* RETURN CODE: *nn* REASON CODE: *mmmmm***

Explanation

HD Tuning Aid received the specified return code from partition selection. The return code and reason code are specified in hexadecimal.

System action

HD Tuning Aid ends with a USER 3859 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify that the partition selection exit name and the partition selection strings, or the partition high keys, are correct.

FABT3860E **MAXIMUM NUMBER OF PARTITIONS EXCEEDED FOR DBD *dbdname***

Explanation

The specifications in the CTL statement have caused the total number of partitions for the specified DBD to exceed 1001.

System action

HD Tuning Aid ends with a USER 3860 abend.

User response

Correct the error and rerun the job.

Problem determination

The maximum number of partitions for HALDB is 1001. Verify the total number of partitions defined in DBD and specified by ADD/DEL parameters in the PART statements.

FABT3861E **SPECIFIED PARTITION NAME *partname* DOES NOT EXIST IN DBD *dbdname*.**

Explanation

The partition name specified to be deleted by the DEL parameter in PART statement is not defined in the DBD.

System action

HD Tuning Aid ends with a USER 3861 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify the partition name.

FABT3862I **NO TYPE R RECORD CREATED FOR DBD *dbdname* PARTITION *partname***

Explanation

HD Tuning Aid processed all KEY records of the DBD specified, but no data record containing the block/RAP assignments was created for the specified partition.

System action

Processing continues.

User response

None. This message is informational.

FABT3864I **PARTITION *partname* WAS DELETED AS REQUEST**

Explanation

The partition specified was deleted as requested by the DEL parameter on the PART statement.

System action

Processing continues.

User response

None. This message is informational.

FABT3865E PARTITION NAME REQUIRES FOR PART STATEMENT FOR DBD: *dbdname*

Explanation

The HD Tuning Aid control statement is coded incorrectly. The 'partname' parameter is required for the PART statement.

System action

HD Tuning Aid ends with a USER 3865 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify columns 2 through 8 in the PART statement.

FABT3866E 'ADD' SPECIFIED BUT SOME CTL STATEMENT FIELDS ARE ZERO/ BLANK

Explanation

The HD Tuning Aid control statement is coded incorrectly. The ADD parameter is specified in the PART statement, but some required fields are not specified.

System action

HD Tuning Aid ends with a USER 3866 abend.

User response

Correct the error and rerun the job.

Problem determination

For each additional partition, a complete set of parameters is required in the DB statement or the PART statement.

FABT3867E RANDOMIZER NAME IS NOT SPECIFIED FOR MIGRATION TO PHDAM

Explanation

The HD Tuning Aid control statement is coded incorrectly. No randomizer name is specified on the DB statement or the PART statement.

System action

HD Tuning Aid ends with a USER 3867 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from non-PHDAM to PHDAM, the randomizer name is required in the DB statement or the PART statement.

FABT3868E RAA BLOCK NUMBER IS NOT SPECIFIED FOR MIGRATION TO PHDAM

Explanation

The HD Tuning Aid control statement is coded incorrectly. No RAA block number is specified in the DB statement or the PART statement.

System action

HD Tuning Aid ends with a USER 3868 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from non-PHDAM to PHDAM, the RAA block number parameter is required in the DB statement or the PART statement.

FABT3869E RAP NUMBER PER BLOCK IS NOT SPECIFIED FOR MIGRATION TO PHDAM

Explanation

The HD Tuning Aid control statement is coded incorrectly. The RAP number per block is not specified in the DB statement or the PART statement.

System action

HD Tuning Aid ends with a USER 3869 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from non-PHDAM to PHDAM, the RAP number per block parameter is required in the DB statement or the PART statement.

FABT3870E 'AUTOINI' BUT SOME DB STATEMENT FIELDS ARE ZERO/ BLANK

Explanation

The HD Tuning Aid control statement is coded incorrectly. The AUTOINI parameter is specified, but some required fields are not specified in the DB statement.

System action

HD Tuning Aid ends with a USER 3870 abend.

User response

Correct the error and rerun the job.

Problem determination

The AUTOINI parameter requires a complete set in the DB statement.

FABT3871E EITHER 'PARTINI' OR 'AUTOINI' IS NOT SPECIFIED FOR MIGRATION TO PHDAM

Explanation

The HD Tuning Aid control statement is coded incorrectly. The PHDAM parameter is specified without either PARTINI or AUTOINI parameter in the DB statement.

System action

HD Tuning Aid ends with a USER 3871 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from non-PHDAM database to a PHDAM database, the 'PARTINI' or the 'AUTOINI' parameter is required in the DB statement.

FABT3872E PARTDEL SPECIFIED FOR MIGRATION FROM PHIDAM TO PHDAM

Explanation

The HD Tuning Aid control statement is coded incorrectly. The PHDAM parameter is specified with PARTDEL in the DB statement for migration from a PHIDAM database to a PHDAM database.

System action

HD Tuning Aid ends with a USER 3872 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a PHIDAM database to a PHDAM database, PARTDEL is not allowed in the DB statement.

FABT3873E 'PARTDEL' IS NOT SPECIFIED FOR MIGRATION FROM HALDB TO NON-HALDB

Explanation

The HD Tuning Aid control statement is coded incorrectly. The HDAM parameter is specified without PARTDEL in the DB statement for migration from a HALDB to an HDAM database.

System action

HD Tuning Aid ends with a USER 3873 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a HALDB database to an HDAM database, 'PARDEL' is required in the DB statement.

FABT3874E COLUMN 72 ON DB STATEMENT IS NOT BLANK FOR MIGRATION FROM HALDB TO NON-HALDB

Explanation

The HD Tuning Aid control statement is coded incorrectly. The HDAM parameter is specified with a character in column 72 on the DB statement for migration from a HALDB to an HDAM database.

System action

HD Tuning Aid ends with a USER 3874 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a HALDB database to an HDAM database, only a blank is allowed in column 72 on the DB statement.

FABT3875E **PART STATEMENT EXISTS FOR MIGRATION FROM HALDB TO NON-HALDB**

Explanation

The HD Tuning Aid control statement is coded incorrectly. HDAM parameter is specified with a PART statement for migration from a HALDB to an HDAM database.

System action

HD Tuning Aid ends with a USER 3875 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a HALDB database to an HDAM database, a PART statement is not allowed.

FABT3876E **SOME DB STATEMENT FIELDS ARE ZERO/BLANK FOR MIGRATION FROM HALDB TO NON-HALDB**

Explanation

The HD Tuning Aid control statement is coded incorrectly. The HDAM parameter is specified, but some required fields are not specified in the DB statement for migration from a HALDB to an HDAM database.

System action

HD Tuning Aid ends with a USER 3876 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a HALDB database to an HDAM database, a complete set is required in the DB statement.

FABT3877E **PARTITION *partname* ADD SPECIFIED AGAINST ALREADY EXIST PARTITION FOR DBD *dbdname***

Explanation

The HD Tuning Aid control statement is coded incorrectly. The ADD parameter is specified, but the partition name is already defined for the specified database.

System action

HD Tuning Aid ends with a USER 3876 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify the partition name in the PART statement. Duplicate partition names are not allowed in a HALDB.

FABT3878E **PARTITION ID EXCEEDED 32767 FOR HALDB. DBD: *dbdname***

Explanation

An attempt to add partitions to the database failed because the maximum partition ID for HALDB is 32767.

System action

HD Tuning Aid ends with a USER 3878 abend.

User response

Correct the error and rerun the job.

Problem determination

Reorganize the whole partitions and reassign the partition IDs by the ISPF/PDF partition definition utility.

FABT3879E **PARTITION HIGH KEY OR SELECTION STRING EXCEEDED 1001 FOR HALDB. DBD: *dbdname***

Explanation

The HD Tuning Aid control statements are coded incorrectly. The maximum number of partition high keys or partition selection strings is 1001 for HALDB.

System action

HD Tuning Aid ends with a USER 3879 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify the specified number of partition high keys or partition selection strings.

FABT3880E INVALID IMS RELEASE LEVEL OR NON IMS ENVIRONMENT FOR HALDB KEYSIN

Explanation

The input KEYSIN file contained some key data for HALDB, but HD Tuning Aid was run under the MVS batch environment.

System action

HD Tuning Aid ends with a USER 3880 abend.

User response

Correct the error and rerun the job.

Problem determination

For HALDB key data processing, HD Tuning Aid must be run under the IMS batch environment.

FABT3881E KEYSIN HEADER RECORD INDICATE INVALID DB ORGANIZATION

Explanation

The input KEYSIN file contained incorrect database organization information in a header record.

System action

HD Tuning Aid ends with a USER 3880 abend.

User response

Correct the error and rerun the job.

Problem determination

Use the KEYSIN file that is created by HD Pointer Checker 1.1 or later.

FABT3882E PART RECORD FOR PARTITION ID: *nn* IS OUT OF SEQUENCE IN KEYSIN FILE

Explanation

The PART record in the KEYSIN data set is out of partition ID sequence. *nn* indicates the partition ID of the PART record in error.

System action

HD Tuning Aid ends with a USER 3882 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the KEYSIN files are concatenated in the ascending order of the partition IDs.

FABT3883E KEYSIN HEADER RECORD INDICATE *xxxxxx* BUT DBD WAS *yyyyyy*

Explanation

The database organization defined in DBD is not the same as that of the KEYSIN file.

System action

HD Tuning Aid ends with a USER 3883 abend.

User response

Correct the error and rerun the job.

Problem determination

Make sure that the KEYSIN files and the DBD are correct. These two definitions must match.

FABT3884E PHDAM 'SPECIFIED' BUT SOME CTL STATEMENT *xxxxxxxx* FIELDS ARE ZERO/BLANK

Explanation

The HD Tuning Aid control statement is coded incorrectly. PHDAM parameter is specified, but the indicated required field is not specified on a DB statement or a PART statement.

System action

HD Tuning Aid ends with a USER 3884 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration to a PHDAM, a complete DB statement or a PART statement is required.

FABT3885E 'HDAM' SPECIFIED AGAINST 'AUTOINI' ON DB STATEMENT

Explanation

The HD Tuning Aid control statement is coded incorrectly. The HDAM parameter is specified with AUTOINI on the DB statement.

System action

HD Tuning Aid ends with a USER 3885 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration to an HDAM, AUTOINI is not allowed in the DB statement.

FABT3886E PHDAM IS NOT SPECIFIED FOR MIGRATION FROM NON-HALDB TO HALDB BY 'AUTOINI'

Explanation

The HD Tuning Aid control statement is coded incorrectly. The input database organization is non-HALDB and AUTOINI parameter is specified, but PHDAM is not specified in the DB statement.

System action

HD Tuning Aid ends with a USER 3886 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from non-HALDB to a PHDAM, PHDAM is required in the DB statement.

FABT3887E NON ZERO RETURN CODE FROM CSVQUERY FOR PARTITION SELECTION EXIT *modname*. RC=*nn*

Explanation

CSVQUERY macro failed. The return code was returned from CSVQUERY.

System action

HD Tuning Aid ends with a USER 3887 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the HD Tuning Aid control statement for spelling errors. Make sure that the IMS2 data set contains the module specified by *modname*.

FABT3888E PARTITION SELECTION EXIT *modname* IS NOT REENTRANT

Explanation

The partition selection exit module specified was not reentrant.

System action

HD Tuning Aid ends with a USER 3888 abend.

User response

Correct the error and rerun the job.

Problem determination

The partition selection exit for HALDB must be a reentrant module.

FABT3890E LINK FAILED FOR IDCAMS

Explanation

HD Tuning Aid issued a LINK macro for an IDCAMS program, but failed.

System action

HD Tuning Aid issues a USER 3890 abend.

User response

Correct the error and rerun the job.

Problem determination

Check that the input database data set actually exists, or make sure the IDCAMS module is in the system library correctly.

FABT3891E PR10 DD DATA SET OPEN FAILED

Explanation

PR10 DD data set was not opened successfully. OPEN macro failed for PR10 data set.

System action

HD Tuning Aid issues a USER 3891 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the PR10 data set.

FABT3893E 'PARTINI' IS SPECIFIED FOR MIGRATION FROM HALDB TO NON-HALDB

Explanation

The HD Tuning Aid control statement is coded incorrectly. The HDAM parameter is specified with PARTINI in the DB statement for migration from a HALDB to an HDAM database.

System action

HD Tuning Aid ends with a USER 3893 abend.

User response

Correct the error and rerun the job.

Problem determination

For migration from a HALDB database to an HDAM database, PARTINI is not allowed in the DB statement.

FABT3895E DUPLICATE VALUE SPECIFIED FOR PARTITION HIGH KEY

Explanation

The same value is specified for the partition high key of two partitions.

System action

HD Tuning Aid issues a USER 3587 abend.

User response

Correct the error and rerun the job.

Problem determination

Check the PART statement (in the CTL DD statement) and the actual HALDB definitions for the partition high key.

FABT3896E INVALID LENGTH OF PARTITION SELECTION STRING OR HIGH KEY

Explanation

The partition string length or high key length specified on the PART statement is incorrect.

System action

HD Tuning Aid issues a USER 3896 abend.

User response

Correct the error and rerun the job.

Problem determination

The partition string or high key must contain no more than 255 characters. The partition high key length must be equal to the root key length.

FABT3897E INVALID VALUE SPECIFIED FOR PARTITION SELECTION STRING OR HIGH KEY

Explanation

The partition string or high key characters specified on the PART statement is incorrect.

System action

HD Tuning Aid issues a USER 3897 abend.

User response

Correct the error and rerun the job.

Problem determination

Verify the PART statement line 2 and after.

FABT3899E DUPLICATE PARTITION NAME *xxxxxxx* ON PART STATEMENT

Explanation

The same partition name is specified in more than two PART statements.

System action

HD Tuning Aid issues a USER 3899 abend.

Problem determination

Verify PART statements.

User response

Correct the error and rerun the job.

DB Historical Data Analyzer messages and codes

The following reference topics provide information about the abend codes, return codes, and messages issued by DB Historical Data Analyzer.

DB Historical Data Analyzer abend codes

The abend codes of DB Historical Data Analyzer differ by the environment in which the job ran.

MVS Batch environment
Every 3*nnn* abend code is accompanied by a FABG3*nnn*E messages. (3*nnn* is a four-digit identification number of the abend code and message.) See the associated FABG3*nnn*E message description for the 3*nnn* abend code.

The abend code 3999 is accompanied by the FABG3999E or FABG8999E message.

TSO/ISPF environment
The abend code 3999 is accompanied by the FABG399E message.

DB Historical Data Analyzer return codes

Return codes are provided only when DB Historical Data Analyzer is run in MVS batch environment.

FABGHIST

The following list shows the return codes set by FABGHIST.

Code
Meaning

0
The requested operation has completed successfully.

4
Warning message is issued, but the requested operation has completed.

8
Severe errors occurred. The job was ended.

FABGXEXP

The following list shows the return codes set by FABGXEXP.

Code
Meaning

0
The requested operation has completed successfully.

2
In the FABGRECI syntax checking process, Export Utility found that some field's length is not enough for storing the field. Warning message is issued, but the syntax checking is completed.

4
Warning message is issued, but the requested operation is completed. The reason of the warning is one or more than one of the following:

- There is a minor syntax error in the HISTIN control statement or the FABGRECI statement. Export Utility ignores the error.
- Overflow occurred in one or more fields.
- Some of the flat records are not created because the specified database, IMS ID, and date entry was not found in the HISTORY data set.

8
Severe errors occurred and the job ended. The reason of the error is one of the following:

- There is a syntax error in the HISTIN control statement or the FABGRECI statement.
- No flat record was created.

DB Historical Data Analyzer messages: TSO/ISPF environment

Use the information in these messages to help you diagnose and solve DB Historical Data Analyzer problems that occur in the TSO/ISPF environment.

DB Historical Data Analyzer issues different messages in the TSO/ISPF environment and the MVS Batch environment.

- Messages from FABG001E to FABG399E are messages in the TSO/ISPF environment.
- Messages from FABG1000I to FABG8999E are messages in the MVS Batch environment.

Message format

DB Historical Data Analyzer messages that might be issued in the TSO/ISPF environment adhere to the following format:

```
FABGnnnx
```

Where:

FABG
Indicates that the message was issued by DB Historical Data Analyzer

nnn
Indicates the three-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred, which might or might not require operator intervention.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABG001E Invalid group number entered.

Explanation

The group number entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter the correct input.

FABG002E Member name is required.

Explanation

The group number 1 was selected, but the member name has not been entered yet.

System action

The system waits for the next input.

User response

Enter the correct member name.

FABG004E Date is required.

Explanation

The group number 3 was selected, but date has not been entered yet.

System action

The system waits for the next input.

User response

Enter the correct date.

FABG005E Specified member is not found in SPMNMBR data set.

Explanation

The member entered on the "Group Selection Menu" panel was not found in the SPMNMBR data set.

System action

The system ignores the input and waits for the next input.

User response

Terminate the dialog and make sure that you allocate the SPMNMBR data set correctly in your TSO command list FABGCMD0. Correct the error and restart the dialog.

FABG006E Invalid date entered.

Explanation

The date entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter the correct input.

FABG007I No DBDS record found on History data set.

Explanation

The system searched the HISTORY data set based on the group information but no database data set record was found for the group.

System action

The system waits for the next attempt.

User response

Try a next attempt.

FABG008E Only S command is valid to select a data set.

Explanation

An input on the CMD field was not S (select) command.

System action

The system waits for the next input.

User response

Enter the S command.

FABG009E More than one data set were selected.

Explanation

More than one data set was selected at a time.

System action

The system waits for the next input.

User response

Select only one data set.

FABG010E Invalid item number entered.

Explanation

The item number entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter the correct input.

FABG011E Invalid item group number entered.

Explanation

The item group number entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter the correct input.

FABG012E Member has no control statement.

Explanation

The user-specified member in SPMNMBR data set contains no effective control statement.

System action

The system ignores the input and waits for the next input.

User response

Ensure that the SPMNMBR data set is specified correctly in the FABGCMD0 CLIST. Also ensure that you specified the correct member name.

FABG013E DD name is entered but DB name is not entered.

Explanation

The user selected group 2 on the "Group Selection Menu" panel, and specified only the DD name field without specifying the DB name.

System action

The system ignores the input and waits for the next input.

User response

Enter the DB name.

FABG014E One database data set must be selected.

Explanation

A database data set was not selected on one of the "Data Set Selection Menu" panels.

System action

The system waits for the next input.

User response

Select one database data set to be processed.

FABG015E One or more items must be selected.

Explanation

A group that has two or more items to be processed was selected, but no items to be processed were specified.

System action

The system waits for the next input.

User response

Enter S in front of items to be processed (at least one item must be specified).

FABG016E Invalid ISPF command is entered.

Explanation

The command entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter a correct ISPF command.

FABG017E **The option that was entered was not valid.**

Explanation

The option entered is not correct.

System action

The system ignores the input and waits for the next input.

User response

Enter a correct option.

FABG020E **Selected item not supported for the database.**

Explanation

The item selected is not supported for the specified database. See the table in "Step 3: Selecting a major database analysis item" on page 456 for the database analysis items and supported database types.

System action

The system ignores the input and waits for the next input.

User response

Enter the correct input.

FABG021E **Selected item not supported for the data set group.**

Explanation

The item selected is not supported for the data set group requested. See the table in "Step 3: Selecting a major database analysis item" on page 456 for the database analysis items and supported database types.

System action

The system ignores the input and waits for the next input.

User response

Enter a correct input.

FABG022E **No space allocation information available for the data set.**

Explanation

The system found that there was no space allocation information in the SPMNSPDT data set for the database data set specified.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Return to the previous panel (Group Selection Menu) and continue the dialog.

FABG023E **More than 999 entries are selected between specified dates.**

Explanation

More than 999 key date entries were selected from the range between the date specified on "From Date" field and the date specified on "To Date" field. DB Historical Data Analyzer passes a maximum of 999 key date entries and control to GDDM ICU.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Reduce the range between the date specified on "From Date" field and the date specified on "To Date" field by changing the specified date.

FABG024E **Specified date on "To Date" is older than "From Date".**

Explanation

The specified date on "To Date" field is older than the date specified on "From Date" field.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Enter the correct date in which "To Date" is not older than "From Date".

FABG025E **Invalid date entered on the date field.**

Explanation

The date entered on "To Date" field and/or "From Date" field is not correct.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Enter the correct date.

FABG026E **No DBDS record found between specified dates.**

Explanation

The system searched the history date set based on the range between the specified dates but no key date entry of DBDS record was found.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Enter the appropriate date according to the dates on "1st Entry" and "Last Entry" fields on the same panel.

FABG027E **No bucket found between specified dates.**

Explanation

The system searched the SPMNSPDT data set based on the range between the specified dates but no key date entry of bucket was found.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Enter the appropriate date according to the dates on "1st Entry" and "Last Entry" fields on the same panel.

FABG100E **HISTORY data set OPEN failed (RC = *xx*).**

Explanation

OPEN processing failed for the HISTORY data set. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code *xx*.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Terminate the dialog and make sure that you allocate the HISTORY data set correctly. Correct the error and restart the dialog.

FABG102E **SPMNMBR data set OPEN error (RC = *xx*).**

Explanation

OPEN processing failed for the SPMNMBR data set. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code *xx*.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Terminate the dialog and make sure that you allocate the SPMNMBR data set correctly. Correct the error and restart the dialog.

FABG103E **SPMNSPDT data set OPEN error (RC = *xx*).**

Explanation

OPEN processing failed for the SPMNSPDT data set. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code *xx*.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Terminate the dialog and make sure that you allocate the SPMNSPDT data set correctly. Correct the error and restart the dialog.

FABG104E **POINT macro failed for HISTORY data set, RC=*xx* RPL FDBK=*aaa* (*bb*).**

Explanation

An error was encountered with the VSAM POINT macro while attempting to access a record on the HISTORY data set.

The return code is shown in hexadecimal (*xx*), and the RPL FDBK code value is shown in both decimal (*aaa*) and hexadecimal (*bb*) format.

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the further explanation of the error.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Terminate the dialog, determine the cause of the error indicated by the VSAM status code, and correct it. Perform a VSAM VERIFY on the KSDS, and rerun the job. If this situation persists, report it to the systems operations personnel.

FABG105E **GET macro failed for HISTORY data set, RC=*xx* RPL FDBK=*aaa* (*bb*).**

Explanation

An error was encountered with the VSAM GET macro while attempting to access a record on the HISTORY data set.

The return code is shown in hexadecimal (*xx*), and the RPL FDBK code value is shown in both decimal (*aaa*) and hexadecimal (*bb*) format.

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the further explanation of the error.

System action

The system ignores the input and waits for the next input on the same panel.

User response

Terminate the dialog, determine the cause of the error indicated by the VSAM status code, and correct it. Perform a VSAM VERIFY on the KSDS, and rerun the job. If this situation persists, report it to the systems operations personnel.

FABG106E **DBDS SEQ=1 record not found for DB: *dbname* DD: *ddname*.**

Explanation

A history record for the database data set (*dbname*, *ddname*) that has a sequence number 1 was not found in the HISTORY data set.

System action

The system stops processing the database data set and returns to the last menu panel.

User response

Terminate the dialog, reorganize the HISTORY data set by running a DB Historical Data Analyzer batch job, and rerun the dialog. If this situation persists, contact IBM Software Support.

FABG107E **DBDS SEQ=2 record not found for DB: *dbname* DD: *ddname*.**

Explanation

A history record for the database data set (*dbname*, *ddname*) that has a sequence number 2 was not found in the HISTORY data set.

System action

The system stops processing the database data set and returns to the last menu panel.

User response

Terminate the dialog, reorganize the HISTORY data set by running a DB Historical Data Analyzer batch job, and rerun the dialog. If this situation persists, contact IBM Software Support.

FABG108E **Invalid history data set entry found for DB: *dbname*.**

Explanation

The system found an incorrect HISTORY data set entry while processing HISTORY data set records for the database (*dbname*). An incorrect HISTORY data set entry might be created when HD Pointer Checker run fails during processing a database data set group associated with the database.

System action

The system stops processing the database data set and returns to the last menu panel.

User response

Terminate the dialog. Run DB Historical Data Analyzer, and generate the HISTORY Data Set by Key Date report and the HISTORY Data Set by DB-DS report with the PROC TYPE=LIST option.

Collect database data set and key date information of the incorrect HISTORY data set entries, prepare necessary DB Historical Data Analyzer control statements, then delete these incorrect entries by running DB Historical Data Analyzer with the PROC TYPE=DELETE option. Rerun the dialog.

FABG109E IMSID CONTROL STATEMENT IS INCORRECT

Explanation

The IMSID control statement was specified while Multiple-IMSID is disabled, or was not specified while Multiple-IMSID is enabled.

System action

The system waits for the next input.

User response

Correct the IMSID control statement.

FABG399E Unknown error occurred in *modulename* module (RC = *nn*).

Explanation

The system found that an unknown error occurred in the internal module (*modulename*). This kind of error should not occur. The return code (*nn*) is the internal reason code.

System action

The dialog ends with an abend code of 3999.

User response

Contact IBM Software Support.

DB Historical Data Analyzer messages: MVS Batch environment

Use the information in these messages to help you diagnose and solve DB Historical Data Analyzer problems that occur in the MVS Batch environment.

DB Historical Data Analyzer issues different messages in the TSO/ISPF environment and the MVS Batch environment.

- Messages from FABG001E to FABG399E are messages in the TSO/ISPF environment.
- Messages from FABG1000I to FABG8999E are messages in the MVS Batch environment.

Message format

DB Historical Data Analyzer messages that might be issued in the MVS Batch environment adhere to the following format:

```
FABGnnnnx
```

Where:

FABG
Indicates that the message was issued by DB Historical Data Analyzer

nnnn
Indicates the four-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred, which might or might not require operator intervention.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABG1000I FABGHIST ENDED NORMALLY

Explanation

The job is completed successfully.

System action

The system completes the job normally with a return code of 0.

User response

None. This message is informational.

FABG1001W FABGHIST ENDED WITH WARNINGS

Explanation

Minor error conditions were detected by the system.

System action

The system ends with a return code of 4.

User response

Refer to the other message generated by the system to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABG1002E FABGHIST ENDED WITH ERRORS

Explanation

Major error conditions were detected by the system.

System action

Program FABGHIST ends with a return code of 8.

User response

Refer to the other message generated by the system to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABG1010I REQUESTED PROCESS ENDED NORMALLY (TYPE = *type*)

Explanation

The requested process (*type*) ended normally.

System action

The system sets a return code of 0 and continues processing.

User response

None. This message is informational.

FABG1011W REQUESTED PROCESS ENDED WITH WARNINGS (TYPE = *type*)

Explanation

Minor error conditions were detected during the requested process (*type*).

System action

The system sets a return code of 4 and continues processing.

User response

Refer to the other message generated by the system to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABG1012E REQUESTED PROCESS ENDED WITH ERROR (TYPE = *type*)

Explanation

Major error conditions were detected during the requested process (*type*).

System action

The system sets a return code of 8 and continues processing.

User response

Refer to the other message generated by the system to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABG1101E VALID STATEMENT NOT FOUND

Explanation

No valid statement (that is, statement that is not a comment) was found in the HISTIN DD data set or the FABGRECI member.

System action

The system ends with a return code of 8.

User response

Specify the necessary statements and rerun the job.

FABG1102W "DATABASE" STATEMENT IS IGNORED

Explanation

A DATABASE statement is coded following the PROC statement with TYPE=LIST, REORG, CREATE, or UPDATE. A DATABASE statement is not required when the associated PROC statement has the TYPE=LIST, REORG, CREATE, or UPDATE option.

System action

The system sets a return code of 4, ignores this DATABASE statement, and continues processing.

User response

Correct the sequence of the control statements and rerun the job, if necessary.

FABG1104W "PROC TYPE=CREATE" STATEMENT IGNORED

Explanation

After processing one or more PROC statements (except TYPE=CREATE), a PROC TYPE=CREATE statement was read. A PROC TYPE=CREATE statement must be specified at first.

System action

The system sets a return code of 4, ignores this PROC statement, and continues processing.

User response

Correct the sequence of the control statements and rerun the job, if necessary.

FABG1105E NEITHER "DB" PARAMETER NOR "MEMBER" PARAMETER IS SPECIFIED ON "DATABASE" STATEMENT

Explanation

On the DATABASE statement, neither a DB parameter nor MEMBER parameter was specified. A DB parameter or MEMBER parameter must be specified on a DATABASE statement.

System action

The system ends with a return code of 8.

User response

Correct the DATABASE statement and rerun the job.

FABG1106E "DD" PARAMETER IS NOT SPECIFIED ON "DATABASE" STATEMENT

Explanation

On the DATABASE statement, the DD keyword parameter was not specified.

System action

The system ends with a return code of 8.

User response

Correct the DATABASE statement and rerun the job.

FABG1107E BOTH "DB" AND "MEMBER" PARAMETERS SPECIFIED ON "DATABASE" STATEMENT

Explanation

On the DATABASE statement, both the DB and MEMBER keyword parameters were specified. These two keyword parameters are mutually exclusive.

System action

The system ends with a return code of 8.

User response

Correct the DATABASE statement and rerun the job.

FABG1108E **INVALID DATE IS SPECIFIED FOR "FROM"/"TO" PARAMETER ON "DATABASE" STATEMENT**

Explanation

On the DATABASE statement, the date specified by the FROM or TO keyword parameter is not correct.

System action

The system ends with a return code of 8.

User response

Correct the DATABASE statement and rerun the job.

FABG1109E **"DATABASE" STATEMENT NOT SPECIFIED FOR "PROC TYPE=DELETE" STATEMENT**

Explanation

The last statement is a PROC TYPE=DELETE statement, but no DATABASE statement follows it. At least one DATABASE statement must follow a PROC statement with TYPE=DELETE option.

System action

The system ends with a return code of 8.

User response

Add necessary DATABASE statements and rerun the job.

FABG1110E **"DB" PARAMETER IS NOT SPECIFIED ON "DATABASE" STATEMENT**

Explanation

On the DATABASE statement, DB keyword parameter was not specified.

System action

The system ends with a return code of 8.

User response

Correct the DATABASE statement and rerun the job.

FABG1111W **DATABASE DATA SET WAS ALREADY SPECIFIED BY PREVIOUS "DATABASE" STATEMENT**

Explanation

The database data set specified on the DATABASE statement was already specified by the previous DATABASE statement.

System action

The system ignores the statement and continues processing. The return code is set to 4.

User response

Correct the DATABASE statement and rerun the job, if necessary.

FABG1112W **DATABASE DATA SET WAS ALREADY SPECIFIED BY PREVIOUS CONTROL STATEMENT**

Explanation

The database data set specified on the Space Monitor control statement in the control member data set was already specified by the previous Space Monitor control statement.

System action

The system ignores the statement and continues processing. The return code is set to 4.

User response

Correct the DATABASE statement and rerun the job, if necessary.

FABG1113I ***80-byte Space Monitor control statement image***

Explanation

The message text shows the 80-byte Space Monitor control statement image read from the member of the SPMNMBR data set.

System action

None.

User response

None. This message is informational.

FABG1114E **"ENDPROC" STATEMENT NOT FOUND**

Explanation

The system encountered EOF status of HISTIN data set, or read another PROC control statement before the ENDPROC control statement. Every PROC control statement must have a matching ENDPROC control statement.

System action

The system ends with a return code of 8.

User response

Specify ENDPROC control statement where missing, and rerun the job.

FABG1115E INVALID TYPE IS SPECIFIED FOR "TYPE" PARAMETER ON "PROC" STATEMENT

Explanation

On the PROC statement, the type specified by the TYPE keyword parameter is not correct.

System action

The system ends with a return code of 8.

User response

Correct the PROC statement and rerun the job.

FABG1116E DBNAME FIELD (COLUMN 1-8) IS INVALID

Explanation

The system found that the DB name specified in columns 1-8 of the control statement is not correct.

System action

The system ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABG1117E DDNAME FIELD (COLUMN 10-17) IS INVALID

Explanation

The system found that the DD name specified in columns 10-17 of the control statement is not correct.

System action

The system ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABG1118E MEMBER HAS NO VALID CONTROL STATEMENT WHICH SPECIFIES DBNAME AND DDNAME

Explanation

The member specified by DATABASE statement has no valid control statement that specifies a database name and ddname.

System action

The system ends with a return code of 8.

User response

Specify the correct member name of the control member data set (SPMNMBR) that contains valid control statements, and rerun the job.

FABG1119E INTERNAL WORK SPACE FOR CONTROL STATEMENTS FULL

Explanation

The system found that the internal work space for stacking DATABASE control statements and the Space Monitor control statements in the member of SPMNMBR data set was full. Total number of valid DATABASE control statements and valid Space Monitor control statements that the system can process per one PROC control statement is 1000.

System action

The system ends with a return code of 8.

User response

Do not exceed a total of 1000 DATABASE control statements and/or Space Monitor control statements (specified by the DATABASE control statement with MEMBER= parameter). Rerun the job.

FABG1120E INVALID COMBINATION IS SPECIFIED FOR "FROM=" AND "TO=" PARAMETERS

Explanation

The date specified on the FROM parameter must be older than the date specified on the TO parameters of the DATABASE control statement.

System action

The system ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABG1121W **DBDS RECORD OF DB: *dbname* DD: *ddname* NOT FOUND FOR SPECIFIED FROM=*mmddyy*, TO=*mmddyy***

Explanation

The DBDS record of indicated database data set was not found in the range between the specified dates on FROM and TO parameters of the DATABASE control statement.

System action

The system sets a return code of 4 and continues processing.

User response

Correct the control statement and rerun the job, if necessary.

FABG1122W **"*statement*" STATEMENT IS IGNORED**

Explanation

The specified control statement "*statement*" cannot be specified with the preceding PROC control statement.

System action

The system sets a return code of 4, ignores this statement, and continues processing.

User response

Correct the sequence of the control statements and, if necessary, rerun the job.

FABG1123E **"*statement*" STATEMENT NOT SPECIFIED FOR "PROC TYPE=*function*" STATEMENT**

Explanation

"*statement*" control statement is required, because "PROC TYPE=*function*" is specified previously. But, it is not specified.

System action

The system ends with a return code of 8.

User response

Add the necessary DATABASE statements and rerun the job.

FABG1124E **"*parameter*" PARAMETER IS INCORRECT**

Explanation

Incorrect operand is specified for the "*parameter*" parameter, or the specified "*parameter*" parameter is incorrect for the record type that is specified in the TYPE parameter.

System action

The system ends with a return code of 8.

User response

Specify the correct parameter or operand, and rerun the job

FABG1125E **"*statement*" STATEMENT DUPLICATED**

Explanation

More than one "*statement*" control statements are specified. Only one "*statement*" is allowed.

System action

The system ends with a return code of 8.

User response

Correct the statement and rerun the job.

FABG1126E **"*statement*" STATEMENT IS INCORRECT**

Explanation

The "*statement*" statement is missing, specified incorrectly, or a required parameter is not specified for the "*statement*" control statement.

System action

The system ends with a return code of 8.

User response

Correct the statement, parameters, or both, and rerun the job.

FABG1127E THE NUMBER OF STATEMENTS SPECIFIED IS NOT CORRECT

Explanation

The number of the statements specified in a FABGRECI member is either 0 or is over 255.

System action

The system ends with a return code of 8.

User response

Correct the statements.

Problem determination

Check the flat record definitions in the FABGRECI member.

FABG1128W DBDS RECORD OF DB: *dbname* DD: *ddname* NOT FOUND FOR VALUE SPECIFIED BY KEEP=*nnn*

Explanation

The DBDS record of the specified database data set was not found of which retention period exceeds value specified by the KEEP parameter of the DATABASE control statement.

System action

The system sets a return code of 4 and continues processing.

User response

Correct the control statement and, if necessary, rerun the job.

FABG1129W "*XXXXXXXXXXXX*" PARAMETER IS IGNORED

Explanation

Parameter shown in the message cannot be specified.

System action

System ignores the specified parameter.

User response

None.

FABG1130E DBDS RECORD NOT FOUND ON HISTORY DATA SET FOR DBDNAME: *dbname* (DDNAME: *ddname*)

Explanation

On the HISTORY data set, there is no database data set record for the database *dbname*, or the database data set specified by the *dbname* and *ddname*.

System action

The system ignores processing the database or the database data set and continues processing. The return code is set to 8.

User response

Run HD Pointer Checker for the database data set at least once, specifying HISTORY=YES on the OPTION statement, and rerun the job.

FABG1131E DATA SET NOT EMPTY FOR DDNAME: HISTORY

Explanation

An attempt was made to format a HISTORY data set which was not empty.

System action

The system ends with a return code of 8.

User response

Use the appropriate VSAM options to scratch, delete, allocate, and define the HISTORY data set, and rerun the job.

FABG1132E NO DBDS RECORD ON HISTORY DATA SET

Explanation

There is no database data set record in the HISTORY data set.

System action

The system ignores the processing for the current request type and continues processing.

User response

Ensure that the HISTORY DD statement specifies the correct data set. Correct any errors and rerun the job, if necessary.

FABG1133E HISTORY DATA SET CONTROL RECORD NOT FOUND

Explanation

There is no control record in the HISTORY data set.

System action

The system ignores the current request type and continues processing. The return code is set to 8.

User response

Make sure that the HISTORY DD statement specifies the correct data set. Correct any errors and, if necessary, and rerun the job.

FABG1134E DBDS RECORD NOT FOUND ON HISTORY DATA SET FOR IMSID: *imsid*

Explanation

There is no record in the HISTORY data set that matches the specified IMSID.

System action

Processing stops.

User response

Specify any of the IMSIDs of records that are in the HISTORY data set.

FABG1135E DUPLICATE OPERANDS FOR "*XXXXXXXX*" PARAMETER

Explanation

You cannot specify duplicate operands for the parameter shown in the message.

System action

Processing stops.

User response

Remove the duplicate operands.

FABG1136E IMSID PARAMETER CANNOT BE SPECIFIED WITH HISTORY DATA SET OF MULTIIMSID=NO

Explanation

You cannot use the IMSID parameter while the Multiple-IMSID option is disabled.

System action

Processing stops.

User response

Enable the Multiple-IMSID option when you use the IMSID parameter.

FABG1140E MEMBER: *membername* NOT FOUND ON SPMNMBR DATA SET

Explanation

The member (*membername*) specified by the EXEC parameter was not found in the SPMNMBR data set.

System action

The system ends with a return code of 8.

User response

Ensure that the SPMNMBR DD statement specifies the correct data set. Correct any errors and rerun the job.

FABG1150W NO RECORD IS EXPORTED FOR DB: *dbdname* IMSID: *imsid* FROM: *mmddyyyy* TO: *mmddyyyy* DAYS: *nnn*

Explanation

Flat record cannot be generated, because there is no history record entry for the database *dbdname* to meet the conditions specified in the HISTIN control statements and the FABGRECI members.

System action

Completes the process, and ends with a return code of 4.

User response

Correct the control statements or the flat record definition, and, if necessary, rerun the job.

Problem determination

Check the HISTIN control statements and the flat record definitions in the FABGRECI members.

FABG1151E MEMBER: *member* NOT FOUND

Explanation

member specified in the MEMBER= parameter in the HISTIN data set cannot be found in the FABGRECI data set.

System action

The system ends with a return code of 8.

User response

Correct the HISTIN control statement and rerun the job.

Problem determination

Check the HISTIN control statement and the FABGRECI data set.

FABG1152E HISTORY DATA SET IS NOT EXPORTABLE=YES OPTION

Explanation

The attribute of the HISTORY data set is EXPORTABLE=NO.

System action

The system ends with a return code of 8.

User response

Specify a correct data set name for the HISTORY DD statement, or change the EXPORTABLE attribute to YES by the FABGHIST program PROC TYPE=UPDATE and OPTION EXPORTABLE=YES.

Problem determination

You might have specified an incorrect data set on your HISTORY DD statement. It is also possible that you specified a data set on your HISTORY DD statement of which attribute is EXPORTABLE=NO. To check the attribute of the HISTORY data set, run the FABGHIST program with PROC TYPE=ATTRLIST and see the History Attribute report.

FABG1153E *parm01* AND *parm02* ARE MUTUALLY EXCLUSIVE

Explanation

You cannot specify *parm01* and *parm02* together.

System action

The system ends with a return code of 8.

User response

Correct the control statements in HISTIN or the flat record definitions in the FABGRECI member, and rerun the job.

Problem determination

Check the control statements in HISTIN or the flat record definitions in the FABGRECI member.

FABG2020E *parameter*: *operand* IS UNAVAILABLE

Explanation

The *operand* specified for the *parameter* is incorrect.

System action

The system ends with a return code of 8.

User response

Correct the flat record definitions in the FABGRECI member by referring to the tables in the Field names subsection of “FABGRECI data set” on page 420.

Problem determination

Check the flat record definitions in the FABGRECI member.

FABG2021E FIELD: *fieldname* IS UNSUITABLE FOR TYPE: *record type*

Explanation

The *field name* cannot be specified for FIELD, when TYPE is *record type*.

System action

The system ends with a return code of 8.

User response

Correct the flat record definitions in the FABGRECI member by referring to the tables in the Field names subsection of “FABGRECI data set” on page 420.

Problem determination

Check the flat record definitions in the FABGRECI member.

FABG2024E THE LENGTH OF FLAT RECORD IS TOO LONG

Explanation

The result of analyzing the flat record definitions in the FABGRECI members shows that the maximum length of flat record is greater than 32752.

System action

The system ends with a return code of 8.

User response

Correct the flat record definitions in the FABGRECI member by referring to the tables in the Field names subsection of "FABGRECI data set" on page 420.

Problem determination

Check the flat record definitions in the FABGRECI member.

FABG2026W LEN=*XXX* SPECIFIED HAS NOT ENOUGH LENGTH FOR FIELD: *XXXX*

Explanation

LEN=*xxx* has not enough length for field *xxxx*. It is possible to cause an overflow in the field. It is recommended that you increase the length of this field.

System action

Completes processing, and ends with a return code of 2.

User response

Correct the flat record definitions in the FABGRECI member by referring to the tables in the Field names subsection of "FABGRECI data set" on page 420.

Problem determination

Check the flat record definitions in the FABGRECI member.

FABG2027W DB: *zzzzzzzz* MEMBER: *yyyyyyyy* FIELD: *xxxxxxxxxxxxxxxx* CAUSED AN OVERFLOW

Explanation

Field *xxxx* that was specified caused an overflow. The flat record was created, but some data was truncated.

System action

Completes processing, and ends with a return code of 4.

User response

By referring to the tables in the Field names subsection of "FABGRECI data set" on page 420, specify for LEN= a number with enough digits to store the field.

Problem determination

The LEN= specification is too small for the overflowed field. Check the LEN= in the FIELD statement in the FABGRECI member.

FABG2028E NO RECORD IS EXPORTED

Explanation

No flat record is exported, because there is no history record entry to meet the conditions specified in the HISTIN control statements and the FABGRECI members.

System action

The system ends with a return code of 8.

User response

Correct the control statements or the flat record definitions, and if necessary, rerun the job.

Problem determination

Check the HISTIN control statements and the flat record definitions in the FABGRECI members.

FABG3501E "OPEN" FAILED FOR DDNAME *ddname* (RC = *nn*)

Explanation

OPEN processing failed for the data set associated with the DD statement (*ddname*). Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code (*nn*). If the message that the IEC130I DD statement is missing message is issued before this message, the required DD statement is not specified in the JCL.

System action

The system ends with an abend code of 3501.

User response

Ensure that a DD statement is present for the ddname indicated, and that it is correctly specified. Correct any errors and rerun the job.

FABG3502E "CLOSE" FAILED FOR DDNAME *ddname*

Explanation

CLOSE processing failed for the data set associated with the DD statement (*ddname*).

System action

The system ends with an abend code of 3502.

User response

Rerun the job. If the data set indicated is a VSAM data set, perform a VSAM VERIFY on it, and rerun the job. If this situation persists, report it to systems operations personnel.

FABG3503E "FIND" FAILED FOR DDNAME SPMNMBR MEMBER: *membername* (RC = *nn*)

Explanation

The system issued an OS FIND macro to find the member (*membername*) on the data set specified by the SPMNMBR DD statement. The return code (*nn*) indicated that the attempt was unsuccessful. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code.

System action

The system ends with an abend code of 3503.

User response

Ensure that the SPMNMBR DD statement specifies the correct data set. Correct any errors and rerun the job. If this situation persists, report it to the systems operations personnel.

FABG3504E VSAM "MODCB"/"SHOWCB" ERROR FOR HISTORY DATA SET - REG 15: *xx* REG 0: *yy*

Explanation

The system issued a MODCB or SHOWCB macro to modify or get information on the HISTORY data set. The return code indicates that the attempt was unsuccessful. The values returned in register 15 (*xx*) and 0 (*yy*) are shown in hexadecimal format. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for further explanation.

System action

The system ends with an abend code of 3504.

User response

Ensure that the HISTORY DD statement properly specifies the correct data set. Correct any errors and rerun the job. If this situation persists, report it to the systems operations personnel.

FABG3505E VSAM I/O ERROR ACCESSING HISTORY DATA SET FOR "*yyyyy*" VSAM ERROR DATA: RETURN CODE: *xx* RPL "FDBK": *aaa* (*bb*)

Explanation

The system encountered an error while attempting to access a record in the HISTORY data set. *yyyyy* is either POINT, GET, or PUT.

The return code is shown in hexadecimal (*xx*), and the RPL FDBK code value is shown in both decimal (*aaa*) and hexadecimal (*bb*) format.

System action

The system ends with an abend code of 3505.

User response

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the error. Determine the cause of the error indicated by the VSAM status code, and correct it. Perform a VSAM VERIFY on the KSDS, and rerun the job. If this situation persists, report it to the systems operations personnel.

FABG3506E INVALID HISTORY DATA SET ENTRY WAS FOUND FOR DBNAME: *dbname*

Explanation

The system found an incorrect HISTORY data set entry while processing HISTORY data set records for the database (*dbname*). An incorrect HISTORY data set entry might be created when HD Pointer Checker run

fails during processing a database data set group associated with the database.

System action

The system ends with an abend code of 3506.

User response

Run DB Historical Data Analyzer with the TYPE=LIST option, and generate the HISTORY Data Set by Key Date report and HISTORY Data Set by DB-DS report.

Collect database data sets and key date information of the incorrect HISTORY data set entries, prepare necessary DB Historical Data Analyzer control statements, then delete these incorrect entries by running DB Historical Data Analyzer with the TYPE=DELETE option. Rerun the job.

FABG3507E DD DUMMY WAS SPECIFIED FOR DDNAME *ddname*

Explanation

The system found that DUMMY was specified for the data set associated with the DD statement (*ddname*).

System action

The system ends with an abend code of 3507.

User response

Specify a correct data set name for the ddname. Rerun the job.

FABG3509E GETMAIN FAILED. SIZE: *nnnn* K ITEM-ID: *xxx*

Explanation

GETMAIN failed.

System action

DB Historical Data Analyzer ends with an abend code of 3509.

User response

Specify more region size for your Export Utility job.

Problem determination

The region size might be insufficient. Specify more region size for your Export Utility job.

FABG3510E HISTORY DATA SET CONTROL RECORD NOT FOUND DURING REORGANIZATION

Explanation

No HISTORY data set control record was found in the HISTORY data set during its reorganization.

System action

The system ends with an abend code of 3510.

User response

Ensure that the HISTORY DD statement properly specifies the correct data set. Correct any errors. Rerun the job.

FABG3511E HISTORY DATA SET RUN TIME RECORD NOT FOUND DURING REORGANIZATION

Explanation

During the reorganization of the HISTORY data set, the system detected a HISTORY data set control record that has one or more run date entries, but HISTORY data set run time record was not found in the data set.

System action

The system ends with an abend code of 3511.

User response

Ensure that the HISTORY DD statement properly specifies the correct data set. Correct any errors. Rerun the job.

FABG3512E NUMBER OF DBDS RECORDS (SEQ=1) UNMATCHED WITH CONTROL RECORD DATA

Explanation

The number of database data set records with sequence number 1 does not match the number that the HISTORY data set control record contains.

System action

The system ends with an abend code of 3512.

User response

Ensure that the HISTORY DD statement properly specifies the correct data set. Correct any errors. Rerun the job.

FABG3513E **VSAM I/O ERROR ACCESSING DDNAME ddname FOR *yyyyy* VSAM ERROR DATA: RETURN CODE: *xx* RPL "FDBK": *aaa* (*bb*); *zzzzzzzz***

Explanation

The system encountered an error while attempting to access a record in the data set (ddname). *yyyyy* is either POINT, GET, or PUT. *zzzzzzzz* is either CUTLERY, DBDSTBL, DBDSREC, or RUNTIME. The return code is shown in hexadecimal (*xx*), and the RPL FDBK code value is shown in both decimal (*aaa*) and hexadecimal (*bb*) format.

System action

The system ends with an abend code of 3513.

User response

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the error. Determine the cause of the error indicated by the VSAM status code, and correct it. Perform a VSAM VERIFY on the KSDS, and rerun the job. If this situation persists, report it to the system operations personnel.

FABG3514E **DDNAME: *ddname* NOT FOUND**

Explanation

DD name *ddname* is not specified.

System action

DB Historical Data Analyzer ends with an abend code of 3514.

User response

Correct any errors and rerun the job.

Problem determination

Check the DD statements of your JCL.

FABG3515E **RDJFCB FAILED FOR DDNAME: *ddname* RC = *xxx***

Explanation

RDJFCB was attempted for DD name *ddname,* but failed.

System action

DB Historical Data Analyzer ends with an abend code of 3515.

User response

Correct any errors and rerun the job.

Problem determination

Look up the return code from RDJFCB in *z/OS DFSMSdfp Advanced Services*.

FABG3999E **UNKNOWN ERROR OCCURRED IN *modulename* MODULE (RC = *nn*)**

Explanation

An unknown error occurred in the system internal module (*modulename*). This kind of error should not occur. Return code (*nn*) indicates the internal status code.

System action

The system ends with an abend code of 3999.

User response

Contact IBM Software Support.

FABG8001E **STATEMENT FORMAT ERROR**

Explanation

An error was detected in the specifications of statements.

System action

The system ends with a return code of 8.

User response

Correct the error. Rerun the job.

FABG8002E ***parm-name* PARAMETER IS INVALID FOR STATEMENT NAME**

Explanation

An incorrect word *parm-name* was specified for the statement in the HISTIN data set or the FABGRECI member.

System action

The system ends with a return code of 8.

User response

Correct the error. Rerun the job.

FABG8003E ***parm-name*** **PARAMETER IS INVALID FOR** ***stmt-name*** **STATEMENT**

Explanation

An incorrect parameter (*parm-name*) was specified for the statement (*stmt-name*).

System action

The system ends with a return code of 8.

User response

Correct the error. Rerun the job.

FABG8004E **THE NUMBER OF** ***parm-name*** **PARAMETERS EXCEEDS THE LIMIT, MAX IS** ***nnn***

Explanation

Too many parameters (*parm-name*) were specified. The parameter in error is shown on the message. The maximum number of specifications for the parameter is *nn*.

System action

The system ends with a return code of 8.

User response

Correct the error and rerun the job.

FABG8005E ***parm-name*** **PARAMETER IS REQUIRED FOR** ***stmt-name*** **STATEMENT**

Explanation

A required parameter (*parm-name*) is missing for the control statement (*stmt-name*).

System action

The system ends with a return code of 8.

User response

Specify the required parameter for the control statement, and rerun the job.

FABG8006E **THE NUMBER OF OPERANDS FOR** ***parm-name*** **PARAMETER EXCEEDS THE LIMIT, MAX IS** ***nnn***

Explanation

Too many parameter values were specified for the parameter (*parm-name*). The maximum number of parameter values is *nn*.

System action

The system ends with a return code of 8.

User response

Correct the error. Rerun the job.

FABG8007E **LENGTH ERROR IN** ***n-th*** **OPERAND OF PARAMETER:** ***parm-name***

Explanation

The length of the *n-th* parameter value for the parameter (*parm-name*) is not correct.

System action

The system ends with a return code of 8.

User response

Correct the error and rerun the job.

FABG8008E ***n-th*** **OPERAND IS REQUIRED FOR PARAMETER:** ***parm-name***

Explanation

The *n-th* operand was not specified for the parameter (*parm-name*).

System action

The system ends with a return code of 8.

User response

Specify the missing parameter value. Rerun the job.

FABG8999E **UNKNOWN ERROR OCCURRED IN** ***module-name*** **MODULE (RC =** ***nn*****)**

Explanation

The system found that an unknown error occurred in the internal module (*module-name*). This kind of error should not occur. The return code (*nn*) is the internal status code.

System action

The system ends with an abend code of 3999.

User response

Contact IBM Software Support.

Space Monitor messages and codes

The following reference topics provide information about the abend codes, return codes, and messages issued by Space Monitor.

Space Monitor abend codes

Every 3*nnn* abend code is accompanied by a FABK3*nnn*E messages. (3*nnn* is a four-digit identification number of the abend code and message.) See the associated FABK3*nnn*E message description for the 3*nnn* abend code.

Space Monitor return codes

Space Monitor modules generate return codes to indicate the success or failure of a job.

FABKSPMN

The following list shows the return codes set by FABKSPMN.

Code
Meaning

0
The requested operation has completed successfully.

4
Represents either of the following conditions:

- Warning message is written in the SPMNMSG data set, and the requested operation has completed.
- Warning message is written in the Space Monitor Exception report.

8
Represents either of the following conditions:

- Severe errors; job terminated. Warning message is written in the SPMNMSG data set.
- Error message is written in the Space Analysis by Data Set report.

FABKTGEN

The following list shows the return codes that are set by FABKTGEN.

Code
Meaning

0
Successfully completed. A report or the default table source is generated.

8
Did not complete successfully. Control statement errors or other errors were detected. For more information, see the error messages.

Space Monitor messages

Use the information in these messages to help you diagnose and solve Space Monitor problems.

Message format

Space Monitor messages adhere to the following format:

```
FABKnnnnx
```

Where:

FABK
Indicates that the message was issued by Space Monitor

nnnn
Indicates the four-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred, which might or might not require operator intervention.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABK0001I FABKSPMN ENDED NORMALLY

Explanation

This message is generated when FABKSPMN has been completed successfully.

System action

Program FABKSPMN completes the job normally with a return code of zero.

User response

None. This message is informational.

FABK0002W FABKSPMN ENDED WITH WARNINGS

Explanation

Program FABKSPMN encountered minor error conditions, or, one or more threshold warning messages were generated in the Space Monitor Exception report.

System action

FABKSPMN completes the job with a return code of 4.

User response

Refer to the other message generated by FABKSPMN to determine the nature and causes of the errors detected. Correct the problem and rerun the job, if necessary.

FABK0003E FABKSPMN ENDED WITH ERRORS

Explanation

Program FABKSPMN encountered major error conditions, or, one or more error messages were generated in the Space Analysis by Data Set report.

System action

FABKSPMN completes the job with a return code of 8.

User response

Refer to the other message generated by FABKSPMN to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABK0005E NO CONTROL STATEMENT FOUND IN SPMNMBR/SPMNIN/FABKCTL DATA SET

Explanation

Space Monitor found that there was no valid control statement in the member of the SPMNMBR data set, the SPMNIN data set, or the FABKCTL data set. Valid control statement here means a control statement that is not a comment.

System action

Space Monitor ends with a return code of 8.

User response

Ensure that the member you specified by the EXEC parameter contains correct control statements, or that you specified the correct data set on the SPMNMBR DD statement, or that correct control statements are specified in the SPMNIN data set or the FABKCTL data set. Correct the error and rerun the job.

FABK0006E WARNING THRESHOLD VALUE FOR NUMBER OF EXTENTS (COLUMN 64-65) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the number of extents specified in the columns 64-65 of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0007E WARNING THRESHOLD VALUE FOR % FREE SPACE (COLUMN 66-68) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the percentage of free space specified in the columns 66-68 of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0008E WARNING THRESHOLD VALUE FOR DAYS WITHOUT HDPC RUN (COLUMN 70-71) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the days without HD Pointer Checker run specified in the columns 70-71 of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0009E THE DATA SET *dsname* IS NOT AVAILABLE

Explanation

Program FABKSPMN cannot process the data set (identified by *dsname*).

System action

FABKSPMN ends with a return code of 8.

User response

See the error message written on the Space Analysis by Data Set report, correct the error and rerun the job.

FABK0010W HISTORY RECORD NOT FOUND FOR DBNAME: *dbname* DDNAME: *ddname*

Explanation

In the HISTORY data set specified by the HISTORY DD statement, program FABKSPMN found no history record for the database data set (identified by the *dbname* and *ddname*), specified by the control statement. Or, the HISTORY DD statement was not specified.

System action

FABKSPMN treats the database data set as an OS data set; that is, it does not collect the IMS information for it, and continues processing. The return code is set to 4.

User response

None.

FABK0011E DBNAME FIELD (COLUMN 1 - 8) IS INCORRECT

Explanation

Program FABKSPMN found that the database name specified in columns 1-8 of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0012E DDNAME FIELD (COLUMN 10 - 17) IS INCORRECT

Explanation

Program FABKSPMN found that the ddname specified in columns 10-17 of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0013E DSNAME FIELD (COLUMN 19 - 62) IS INCORRECT

Explanation

Program FABKSPMN found that the data set name specified in columns of the control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0014E DUPLICATE CONTROL STATEMENTS WERE FOUND FOR DBNAME *dbname* DDNAME *ddname*

Explanation

Program FABKSPMN found that more than one control statement specified the same database data sets *dbname* and *ddname*.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0015E DUPLICATE CONTROL STATEMENTS WERE FOUND FOR DSNAME *dsname*

Explanation

Program FABKSPMN found that more than one control statement specified the same data set (*dsname*).

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0016E WARNING THRESHOLD VALUES ARE SPECIFIED WITHOUT DBNAME

Explanation

Program FABKSPMN found that the secondary control statement is specified but no first control statement was specified.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0017E WARNING THRESHOLD VALUE FOR NUMBER OF AVAILABLE EXTENTS (COLUMN 10 - 11) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the number of available extents specified in columns 10-11 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0018E WARNING THRESHOLD VALUE FOR % CA SPLIT (COLUMN 21 - 23) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the percentage of CA split specified in columns 21-23 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0019E WARNING THRESHOLD VALUE FOR % CI SPLIT (COLUMN 25 - 27) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the percentage of CI split specified in columns 25-27 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0020E LAST EXTENT FIELD (COLUMN 13) IS INCORRECT

Explanation

Program FABKSPMN found that the last extent field specified in column 13 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0021E WARNING THRESHOLD VALUE FOR % USED SPACE (COLUMN 15 - 17) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the percentage of used space specified in columns 15-17 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0022E WARNING THRESHOLD VALUE FOR DAYS SINCE LAST REORGANIZATION (COLUMN 29 - 31) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the days since the last reorganization, specified in columns 29-31 of the second control statement, is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0023E LAST SPACE FIELD (COLUMN 19) IS INCORRECT

Explanation

Program FABKSPMN found that the last space field specified in column 19 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0024E WARNING THRESHOLD VALUE FOR % DATASET SIZE (COLUMN 33-35) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the percentage of data set size that is specified in columns 33-35 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0025E WARNING THRESHOLD VALUE FOR DATASET SIZE (COLUMN 37-40) IS INCORRECT

Explanation

Program FABKSPMN found that the warning threshold value for the data set size that is specified in columns 37-40 of the second control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0026E WARNING THRESHOLD VALUE FOR THE UNIT OF DATA SET SIZE (COLUMN 41) IS INCORRECT

Explanation

Program FABKSPMN or FABKTGEN found that the unit of the data set size that is specified in column 41 of the second control statement is incorrect.

System action

FABKSPMN or FABKTGEN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0030E TSO USER ID (COLUMN *xx-xx*) IS INCORRECT

Explanation

FABKSPMN found that the TSO user ID specified in columns *xx-xx* of the USER ID control statement is not correct.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0031E MORE THAN 20 TSO USER IDS ARE SPECIFIED

Explanation

FABKSPMN found that there are more than 20 TSO user IDs specified.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0032E IMSID IS NOT SPECIFIED WITH HISTORY DATA SET OF MULTIIMSID=YES

Explanation

You must specify an IMSID when the Multiple-IMSID option is enabled for the HISTORY data set.

System action

Processing stops.

User response

Specify an IMSID of database data sets when the Multiple-IMSID option is enabled for the HISTORY data set.

FABK0033E IMSID CANNOT BE SPECIFIED WITH HISTORY DATA SET OF MULTIIMSID=NO

Explanation

You cannot specify an IMSID when Multiple-IMSID is disabled for the HISTORY data set.

System action

Processing stops.

User response

Do not specify an IMSID when Multiple-IMSID is disabled for the HISTORY data set.

FABK0034E IMSID (COLUMN *XX-XX*) IS INCORRECT

Explanation

The position of the IMSID control statement is incorrect.

System action

Processing stops.

User response

Specify the IMSID control statement in the correct position.

FABK0036I SOME INFORMATION IS NOT REPORTED BECAUSE THE DATA SET IS A STRIPED DATA SET: *dsname*

Explanation

Space Monitor found that the data set identified by *dsname* is a striped data set. Some fields of the reports cannot be printed because striped data sets are not supported.

System action

Processing continues.

User response

None. This message is informational.

FABK0037I NUMBER SIGNS # ARE PRINTED IN THE FIELDS WHERE INFORMATION IS NOT REPORTED

Explanation

This message is preceded by one or more FABK0036I messages. For the striped data set that is identified by the FABK0036I message, some fields of the reports cannot be printed. For these fields, number signs (#) are printed.

System action

Processing continues.

User response

None. This message is informational.

FABK0040I EXCEPTION NOTIFICATIONS WERE SENT TO TSO USERS: *user001, user002, user003, user004, user005, user006, user007, user008, user009, user010, user011, user012, user013, user014, user015, user016, user017, user018, user019, user020*

Explanation

FABKSPMN sent exception notifications to TSO users successfully.

System action

None.

User response

None. This message is informational.

FABK0041I EXCEPTION NOTIFICATIONS WERE CANCELED, BECAUSE USERS WERE NOT LOGGED ON OR TERMINALS DISCONNECTED.

Explanation

FABKSPMN attempted to send exception notification messages to TSO USER IDs specified in the %USER control statement, however, the TSO user IDs were not logged on or the terminal sessions were disconnected. The messages were discarded.

System action

None.

User response

None. This message is informational.

FABK0042I ***mm/dd/yyyy hh:mm:ss*** **THRESHOLD EXCEPTION DB:** ***dbname__*** **DD:** ***ddname__*** **JOBNAME:** ***jobname_***

Explanation

FABKSPMN detected one or more threshold exceptions for the database data set (shown by the *dbname* and *ddname*) in the Space Monitor job (*jobname*).

System action

FABKSPMN sent this message to TSO user IDs.

User response

None. This message is informational.

FABK0043I ***mm/dd/yyyy hh:mm:ss*** **THRESHOLD EXCEPTION DS:** ***dsname***

_____
JOBNAME: ***jobname_***

Explanation

FABKSPMN detected one or more threshold exceptions for the data set shown by *dsname* on the Space Monitor job *jobname*.

System action

None.

User response

None. This message is informational.

FABK0044I ***mm/dd/yyyy hh:mm:ss*** **THE REST OF THE MESSAGES ARE SUPPRESSED JOBNAME:** ***jobname***

Explanation

The number of exception notification messages (FABK0042I or FABK0043I) reached the limit of 50. The rest of the messages are not sent to TSO users.

System action

Program FABKSPMN sent this message to TSO user IDs.

User response

None. This message is informational.

FABK0051I **FABKTGEN ENDED NORMALLY**

Explanation

This message is generated when FABKTGEN is completed successfully.

System action

FABKTGEN completes the job normally with a return code of zero.

User response

None. This message is informational.

FABK0053E **FABKTGEN ENDED WITH ERRORS**

Explanation

FABKTGEN encountered major error conditions.

System action

FABKTGEN completes the job with a return code of 8.

User response

See the other message generated by FABKTGEN to determine the nature and causes of the errors detected. Correct the problem and rerun the job.

FABK0055I **SITE DEFAULT TABLE SOURCE CODE IS GENERATED**

Explanation

FABKTGEN generated the site default table source code successfully.

System action

FABKTGEN completes the job normally with a return code of zero.

User response

None. This message is informational.

FABK0056I ***xxxxxxxxxxxx*** **[STATEMENT | PARAMETER] IS IGNORED**

Explanation

The indicated statement or parameter cannot be used for FABKTGEN. FABKTGEN ignores the statement or the parameter.

System action

Processing continues.

User response

None. This message is informational.

FABK0057I SITE DEFAULT TABLE FABKCTL0 IS PRINTED

Explanation

FABKTGEN prints the site default values that are stored in the site default table module FABKCTL0.

System action

FABKTGEN completes the job normally with a return code of zero.

User response

None. This message is informational.

FABK0059I SITE DEFAULT TABLE FABKCTL0 IS USED

Explanation

FABKSPMN uses the site default table FABKCTL0.

System action

FABKSPMN uses the site default values that are stored in module FABKCTL0.

User response

None. This message is informational.

FABK0061E SITE DEFAULT TABLE FABKCTL0 IS NOT FOUND

Explanation

The site default table module FABKCTL0 was not found in the data set concatenated to the STEPLIB DD.

System action

FABKTGEN ends with a return code of 8.

User response

Make sure that the site default table FABKCTL0 is in the STEPLIB DD. Correct any errors and rerun the job.

FABK0063E SITE DEFAULT TABLE FABKCTL0 IS CORRUPTED

Explanation

The site default table module FABKCTL0 is corrupted.

System action

FABKTGEN or FABKSPMN ends with a return code of 8.

User response

Make sure that the site default table FABKCTL0 was link-edited correctly in the STEPLIB DD. Correct any errors and rerun the job.

FABK0065E *parm-values* IS INCORRECT FOR THE PARM PARAMETER OF THE EXEC STATEMENT

Explanation

FABKTGEN found that the value for the process type specified in the *parm-values* parameter of the EXEC statement is not correct.

System action

FABKTGEN ends with a return code of 8.

User response

Specify PARM='GEN' or PARM='REPORT' to the EXEC statement and rerun the job.

FABK0071E "OPEN" FAILED FOR DDNAME *ddname__*

Explanation

The OPEN processing failed for the data set associated with *ddname*.

System action

FABKTGEN ends with a return code of 8.

User response

Make sure that a DD statement is present for the *ddname*, and that it is correctly specified. Correct any errors and rerun the job.

FABK0073E "LOAD" FAILED FOR DDNAME *ddname__* MODULE *module__*

Explanation

After issuing a LOAD macro to load module *module* from the library specified by *ddname* DD statement, register 15 contained a nonzero return code.

System action

FABKTGEN or FABKSPMN ends with a return code of 8.

User response

Make sure that the module was link-edited correctly in the library. Correct any errors and rerun the job.

FABK0100E APF AUTHORIZATION IS REQUIRED

Explanation

An APF authorization is needed to use IMS Tools Online System Interface. However, the libraries that were specified on the STEPLIB DD statement were not APF-authorized.

System action

Program FABKSPMN ends with a return code of 8.

User response

Correct the error, and rerun the job.

FABK0101E THE TOSI CONTROL STATEMENT CANNOT BE SPECIFIED

Explanation

TOSI control statement cannot be specified when Space Monitor is run under in an HD Pointer Checker job or other products. You can specify a TOSI control statement only when you run Space Monitor as a stand-alone utility.

System action

Program FABKSPMN ends with a return code of 8.

User response

Correct the control statement and rerun the job.

FABK0102E THE XCF GROUP NAME IS NOT SPECIFIED

Explanation

The XCF group name is not specified in the TOSI control statement or in the site default table module FABKCTL0.

System action

Program FABKSPMN ends with a return code of 8.

User response

Specify the XCF group name in the TOSI control statement or in the site default table module FABKCTL0, and rerun the job.

FABK0103E THE XCF GROUP NAME (COLUMN 10 - 17) IS INCORRECT

Explanation

Program FABKSPMN found that the XCF group name that is specified in columns 10 - 17 of the TOSI control statement is incorrect.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the XCF group name and rerun the job.

FABK0104E THE VSAMSTAT FIELD (COLUMN 19) IS INCORRECT

Explanation

Program FABKSPMN found that the VSAMSTAT field that is specified in column 19 of the TOSI control statement is incorrect.

System action

FABKSPMN ends with a return code of 8.

User response

Correct the VSAMSTAT field and rerun the job.

FABK0110W TOSI API FUNC=INIT ERROR RC=*return_code* RSN=*reason_code*

Explanation

An attempt to start the IMS Tools Online System Interface client API environment has failed.

System action

Because program FABKSPMN could not obtain the latest VSAM statistics about the data sets from the IMS Tools Online System Interface servers, FABKSPMN collected the space utilization from VSAM catalogs and generated reports. Therefore, some of the space utilization values in the reports might not reflect the latest data. The return code for this job is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0111W **TOSI API FUNC=CONNECT ERROR RC=*return_code* RSN=*reason_code***

Explanation

The IMS Tools Online System Interface client was unable to connect to the XCF group. This failure might be caused by either of the following reasons:

- An invalid XCF group name, which was used by IMS Tools Online System Interface, was specified.
- IMS Tools Online System Interface is not active in the IMS control regions.

System action

Because program FABKSPMN could not obtain the latest VSAM statistics about the data sets from the IMS Tools Online System Interface servers, FABKSPMN collected the space utilization from VSAM catalogs and generated reports. Therefore, some of the space utilization values in the reports might not reflect the latest data. The return code for this job is set to 4.

User response

Ensure that the XCF group name that is used by IMS Tools Online System Interface is valid. If the values are valid, ensure that IMS Tools Online System Interface is active in the IMS control regions. If both values are correct, see the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0112W **TOSI API FUNC=REQUEST FAILED FOR DBD/PART=*name* DD=*ddname* RC=*return_code* RSN=*reason_code***

Explanation

An attempt to send a request to the IMS Tools Online System Interface server has failed.

System action

Because program FABKSPMN could not obtain the latest VSAM statistics about the data set from the IMS Tools Online System Interface servers, FABKSPMN collected the space utilization from the VSAM catalog and generated reports. Therefore, some of the space utilization values in the reports might not reflect the latest data. The return code for this job is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0113W **TOSI API FUNC=RESPONSE FAILED FOR DBD/PART=*name* DD=*ddname* RC=*return_code* RSN=*reason_code***

Explanation

An attempt to receive a response from the IMS Tools Online System Interface server has failed.

System action

Because program FABKSPMN could not obtain the latest VSAM statistics about the data set from the IMS Tools Online System Interface servers, FABKSPMN collected the space utilization from the VSAM catalog and generated reports. Therefore, some of the space utilization values in the reports might not reflect the latest data. The return code for this job is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0114W **TOSI API FUNC=RETURNBUF ERROR RC=*return_code* RSN=*reason_code***

Explanation

The IMS Tools Online System Interface client was unable to release the buffer.

System action

Program FABKSPMN continues processing. The return code is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0115W **TOSI API FUNC=DISCONNECT ERROR RC=*return_code* RSN=*reason_code***

Explanation

The IMS Tools Online System Interface client was unable to disconnect from the XCF group.

System action

Program FABKSPMN continues processing. The return code is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0116W **TOSI API FUNC=TERM ERROR RC=*return_code* RSN=*reason_code***

Explanation

An attempt to end the IMS Tools Online System Interface client API environment has failed.

System action

Program FABKSPMN continues processing. The return code is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*).

FABK0117W **THE TOSI SERVER IS NOT ACTIVE**

Explanation

The IMS Tools Online System Interface server is not active in any of the IMS control regions.

System action

Because program FABKSPMN could not obtain the latest VSAM statistics about the data sets from the IMS Tools Online System Interface servers, FABKSPMN collected the space utilization from the VSAM catalogs and generated reports. Therefore, some of the space utilization values in the reports might not reflect the latest data. The return code for this job is set to 4.

User response

Ensure that IMS Tools Online System Interface is active on all IMS control regions.

FABK0118W **THE TOSI MAINTENANCE LEVEL IS LOW: *reason_code***

Explanation

The version of IMS Tools Online System Interface that is used in the IMS control regions is not at the required maintenance level. *reason_code* has the following meaning:

Reason code	Meaning
0001	The version of IMS Tools Online System Interface is not at the required maintenance level to support the VSAMSTAT command. One of the currently supported versions of IMS Tools Base is required. For more information, see "Software requirements" on page 17.
0002	The version of IMS Tools Online System Interface is not at the required maintenance level to run the VSAMSTAT command against VSAM linear data sets. IMS Tools Base 1.6 with APAR PH23664 or later is required.

System action

FABKSPMN collected the space utilization from the VSAM catalogs and generated reports.

- Reason code 0001: FABKSPMN could not obtain the latest VSAM statistics about VSAM data sets from the IMS Tools Online System Interface servers. Therefore, some of the space utilization values in the reports might not reflect the latest data for VSAM data sets.
- Reason code 0002: FABKSPMN could not obtain the latest VSAM statistics about VSAM linear data sets from the IMS Tools Online System Interface servers. Therefore, some of the space utilization values in the reports might not reflect the latest data for VSAM linear data sets.

The return code for this job is set to 4.

User response

Apply the required maintenance to the IMS Tools Online System Interface and restart the IMS online subsystems.

FABK0119W **THE VSAMSTAT COMMAND FAILED FOR DBD/PART=*name* DD=*ddname* RC=*return_code* RSN=*reason_code***

Explanation

Space Monitor issued the VSAMSTAT command to collect the latest VSAM statistics about the IMS full-function database data set by using IMS Tools Online System Interface. However, the processing did not end successfully in one or more IMS control regions.

System action

Program FABKSPMN collects space utilization statistics about the database data set from the VSAM catalog, and also from the IMS Tools Online System Interface servers of IMS control regions in which the VSAMSTAT command was successfully processed. Then, FABKSPMN generates reports based on these statistics. Some of the space utilization values in the reports might not reflect the latest data because Space Monitor could not collect the latest VSAM statistics about the data set from IMS control regions in which the process failed. In the reports, an asterisk (*) is printed on the right side of incorrect data of the data set to indicate that the value might not be the latest. The return code for this job is set to 4.

User response

See the IMS Tools Online System Interface messages (FOI*xxxxx*) that were issued in IMS control regions where the IMS Tools Online System Interface server is active.

FABK0120W **THE STATISTICS IN THE VSAM CATALOG IS INCORRECT: DSNAME *dsname***

Explanation

Space Monitor collected space statistics about the data set from the VSAM catalog by using the IDCAMS LISTCAT routine. However, the number of CI splits, CA splits, or both, which were obtained from the VSAM catalog, are incorrect.

The statistics in the VSAM catalog are updated when the data set is closed. If an error occurs when the data set is closed, statistics such as the number of CI splits and CA splits in the VSAM catalog become incorrect. If you run Space Monitor after such a close failure, the statistics obtained are likely to be incorrect.

System action

Program FABKSPMN continues processing and generates reports. In the reports, an asterisk (*) is printed on the right side of the incorrect data of the data set to indicate that the value is not accurate. The return code is set to 4.

User response

You can ignore this message if you do not want to monitor the number of CI splits and CA splits of the data set.

To correct this warning condition, correct the incorrect statistics in the VSAM catalog by copying the data set to a new data set. For more information about correcting the statistics in the VSAM catalog, see the topic about the Statistics Group in the *z/OS DFSMS Access Method Services for Catalogs*.

FABK0121E **MEMBER *member* IS NOT FOUND IN THE STEPLIB CONCATENATION**

Explanation

The indicated IMS load module member does not exist in the data sets that are concatenated to the STEPLIB DD.

System action

Space Monitor ends with a return code of 8.

User response

Add the IMS RESLIB to the STEPLIB DD concatenation and rerun the job.

FABK0122E ***ddname* DD IS NOT FOUND IN MDA MEMBER *member***

Explanation

The indicated *ddname* DD is not defined in the MDA member.

System action

Space Monitor ends with a return code of 8.

User response

Ensure that the MDA member contains the data set definition for the indicated *ddname* DD. Specify the MDA member to the IMSDALIB or STEPLIB and rerun the job.

FABK0123E **THE *dbdname* DATABASE IS DEFINED DIFFERENTLY IN DBDLIB AND RECON**

Explanation

The database definitions for the indicated database do not match between the DBDLIB and the RECON data sets.

System action

Space Monitor ends with a return code of 8.

User response

Specify the DBDLIB data set to IMS DD, and RECON data sets to RECON1, RECON2, and RECON3 DD statements. Review the contents of DBDLIB and RECON, and ensure that the database definitions are consistent between the DBDLIB and the RECON data sets.

FABK0124E **UNSUPPORTED IMS VERSION DETECTED IN IMS RESLIB. VERSION: *version***

Explanation

The IMS version of IMS RESLIB that is specified in the STEPLIB DD is not supported.

System action

Space Monitor ends with a return code of 8.

User response

To use FABKCTL control statements, IMS version must be 10 or later. Specify a valid version of IMS RESLIB to the STEPLIB DD, and rerun the job.

FABK0125E **SPMNIN OR SPMNMBR CANNOT BE SPECIFIED WHEN FABKCTL IS SPECIFIED**

Explanation

You cannot specify SPMNMBR or SPMNIN when you specify the FABKCTL DD statement.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK0126E **THE NUMBER OF DATABASE DATA SETS EXCEEDED THE MAXIMUM NUMBER ALLOWED**

Explanation

The number of database data sets has exceeded the maximum allowed number of 15,000.

System action

Space Monitor ends with a return code of 8.

User response

Decrease the number of data sets and rerun the job.

FABK0130E ***parameter=operand* SPECIFICATION IS INCORRECT**

Explanation

The indicated *parameter=operand* specification contains a syntax error.

System action

Space Monitor ends with a return code of 8.

User response

See "FABKCTL data set" on page 506 and correct the syntax error. Rerun the job.

FABK0131E ***operand* IS ALREADY SPECIFIED FOR THE *parameter* PARAMETER**

Explanation

The indicated operand is specified more than once for the indicated parameter.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK0132E **THE *parameter* PARAMETER CANNOT BE SPECIFIED BECAUSE THE DATABASE ORGANIZATION OF *dbdname* IS *dborg***

Explanation

The indicated parameter cannot be specified for the indicated database organization.

System action

Space Monitor ends with a return code of 8.

User response

See "FABKCTL data set" on page 506. Correct the error and rerun the job.

FABK0133E **THE *statement* STATEMENT IS INCORRECT**

Explanation

The indicated FABKCTL control statement, which is printed immediately before this message, is incorrect.

System action

Space Monitor ends with a return code of 8.

User response

See "FABKCTL data set" on page 506. Correct the error and rerun the job.

FABK0134E ***resource* IS NOT FOUND IN [DBDLIB | RECON]**

Explanation

The indicated resource is not defined in the DBDLIB or the RECON data sets.

System action

Space Monitor ends with a return code of 8.

User response

Ensure that the resource is defined correctly in the DBDLIB data set on IMS DD or in RECON data sets on RECON1, RECON2, and RECON3 DD statements. Specify the correct DBDLIB or RECON data sets, and rerun the job.

FABK0135E **THE DATABASE ORGANIZATION OF *dbdname* IS NOT SUPPORTED**

Explanation

The database organization type of the indicated database is not supported by Space Monitor when the FABKCTL data set is used. When the FABKCTL data set is used, Space Monitor supports the following database organization types:

- HISAM, SHISAM, HDAM, HIDAM
- HIDAM primary index
- Secondary index
- PHDAM, PHIDAM
- Partitioned secondary index (PSINDEX)

System action

Space Monitor ends with a return code of 8.

User response

If you specified multiple DB keywords on the DATABASE statement in the FABKCTL data set, remove the DB keyword that specifies the indicated database and rerun the job.

To run Space Monitor for the indicated database, use the SPMNMBR or the SPMNIN data set instead of the FABKCTL data set.

FABK0136E **NO PARTITIONS ARE FOUND FOR *dbdname* IN RECON**

Explanation

Space Monitor found no information about the partitions of the indicated HALDB database in the RECON data sets.

System action

Space Monitor ends with a return code of 8.

User response

Ensure that the correct RECON data sets are used. Correct the error, and rerun the job.

FABK0137E ***partition* IS A DISABLED PARTITION**

Explanation

The indicated partition is defined as disabled in the RECON data sets. Disabled partitions are not processed.

System action

Space Monitor ends with a return code of 8.

User response

Remove the DATABASE statement for the partition from the FABKCTL control statement, and rerun the job.

FABK0138E **ALL PARTITIONS OF *database* ARE DEFINED AS DISABLED IN RECON**

Explanation

All partitions of the indicated HALDB database are defined as disabled in the RECON data sets. The database is not processed.

System action

Space Monitor ends with a return code of 8.

User response

Remove the DATABASE statement for the database from the FABKCTL control statement, and rerun the job.

FABK0139I THE IMSCATHLQ= PARAMETER IS IGNORED BECAUSE UNSUPPORTED IMS VERSION IS USED

Explanation

Space Monitor found the IMSCATHLQ=*bsdshlq* keyword parameter in the PROC statement of the FABKCTL data set or the SPMN site default table (FABKCTL0). However, Space Monitor ignored the IMSCATHLQ keyword parameter because the version of IMS RESLIB that is identified by the STEPLIB DD statement is IMS 13 or earlier. The IMSCATHLQ keyword is supported for IMS 14 and later.

System action

Space Monitor ignores the IMSCATHLQ keyword parameter and continues processing.

User response

None. This message is informational.

FABK3501E "OPEN" FAILED FOR DDNAME *ddname* (RC=*nn*)

Explanation

OPEN processing failed for the data set associated with the *ddname*. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code (*nn*).

System action

Space Monitor ends with an abend code of 3501.

User response

Ensure that a DD statement is present for the ddname, and that it is correctly specified. Correct any errors. Rerun the job.

FABK3502E "CLOSE" FAILED FOR DDNAME *ddname*

Explanation

CLOSE processing failed for the data set associated with the *ddname*.

System action

Program FABKSPMN ends with an abend code of 3502.

User response

Rerun the job. If the data set indicated is the HISTORY data set, perform a VSAM VERIFY on it, and rerun the job. If this situation persists, report it to systems operations personnel.

FABK3503E "FIND" FAILED FOR DDNAME SPMNMBR MEMBER: *membername* (RC = *nn*)

Explanation

Program FABKSPMN issued an OS FIND macro to find the member (*membername*) on the data set specified in the SPMNMBR DD statement. The return code *nn* indicates that the attempt was unsuccessful. Refer to *z/OS DFSMS Macro Instructions for Data Sets* for the explanation of the return code.

System action

FABKSPMN ends with an abend code of 3503.

User response

Ensure that the SPMNMBR DD statement properly specifies the correct data set, and the specified member exists in the data set. Correct any errors. Rerun the job. If this situation persists, report it to systems operations personnel.

FABK3504E VSAM "*aaaaa*" ERROR FOR HISTORY DATA SET - REG 15: *xx* REG 0: *yy*

Explanation

Program FABKSPMN issued a MODCB or SHOWCB macro to modify or get information of the HISTORY data set. *aaaaa* is either MODCB or SHOWCB. The return code indicates that the attempt was unsuccessful. The values returned in register 15 (*xx*) and 0 (*yy*) are shown (in hexadecimal format).

System action

FABKSPMN ends with an abend code of 3504.

User response

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for a further explanation of the error. Ensure that the data set associated with the HISTORY DD statement is

correctly specified. Correct any errors. Rerun the job. If this situation persists, report it to systems operations personnel.

FABK3505E **VSAM I/O ERROR ACCESSING HISTORY DATA SET FOR "*yyyyy*" VSAM ERROR DATA: RETURN CODE: *xx* RPL "FDBK": *aaa* (*bb*)**

Explanation

Program FABKSPMN encountered an error while attempting to access a record in the HISTORY data set. *yyyyy* is either POINT, GET, or PUT.

The return code is shown in hexadecimal (*xx*), and the RPL FDBK code value is shown in both decimal (*aaa*) and hexadecimal (*bb*) format.

System action

FABKSPMN ends with an abend code of 3505.

User response

Refer to *z/OS DFSMS Macro Instructions for Data Sets* for a further explanation of the error. Correct any errors. Perform a VSAM VERIFY on the KSDS, and rerun the job. If this situation persists, report it to systems operations personnel.

FABK3506E **INCORRECT HISTORY DATA SET ENTRY WAS FOUND FOR DBNAME: *dbname***

Explanation

Program FABKSPMN found an incorrect HISTORY data set entry while processing the HISTORY data set records for the database (*dbname*). An incorrect HISTORY data set entry might be created when the HD Pointer Checker run fails while processing a database data set group associated with the database (*dbname*), and the rerun is not done for the database data set group on the same day.

System action

FABKSPMN ends with an abend code of 3506.

User response

Run DB Historical Data Analyzer, and generate the HISTORY Data Set by Key Date report and HISTORY Data Set by DB-DS report with the "PROC TYPE=LIST" option. Collect database data set and key date information of the incorrect HISTORY data set entries, prepare necessary DB Historical Data Analyzer control statements, then delete these incorrect entries by running DB Historical Data Analyzer with the "PROC TYPE=DELETE" option. Rerun the job.

FABK3507E **DD DUMMY WAS SPECIFIED FOR DDNAME *ddname***

Explanation

Program FABKSPMN found that DUMMY was specified for the data set associated with the DD statement (*ddname*).

System action

FABKSPMN ends with an abend code of 3507.

User response

Specify a correct data set name for the *ddname*. Then rerun the job.

FABK3508I **NO DD STATEMENT AVAILABLE FOR SPMN REPORT**

Explanation

No effective DD statements are specified for either of the Space Monitor reports. Possible cause can be that no DD statement is specified, or DUMMY is set for all specified DD statements.

System action

Processing continues.

User response

If you did not intend to, specify DD statements you want, rerun the job.

FABK3510E **MORE THAN 2000 CONTROL STATEMENTS SPECIFIED**

Explanation

Program FABKSPMN found that more than 2000 control statements were specified in the member of the data set specified by the SPMNMBR DD statement, or in the data set specified by the SPMNIN DD statement.

System action

FABKSPMN ends with an abend code of 3510.

User response

Divide the specified control statements into two or more groups so that each group contains no more than

2000 control statements. Run a separate job for each control statement group.

FABK3511E SORT FAILED FOR DDNAME SORTIN (RC=*nn*)

Explanation

Program FABKSPMN internally linked DFSORT module to sort a data set specified on the SORTIN DD statement. The return code *nn* indicates that the attempt was unsuccessful. Refer to *z/OS DFSORT Application Programming Guide* for the explanation of the return code.

System action

FABKSPMN ends with an abend code of 3511.

User response

Ensure that the DD statements required for DFSORT are properly specified and the sort work data sets have enough space. Correct any errors. Rerun the job. If this situation persists, report it to systems operations personnel.

FABK3520E IDCAMS LISTCAT FAILED FOR DDNAME *ddname* (RC = *nn*)

Explanation

Program FABKSPMN internally linked IDCAMS LISTCAT routine to obtain the data set space information for the data set specified by the ddname (*ddname*). The return code *nn* indicates that the attempt was unsuccessful. Refer to *z/OS DFSMS Access Method Services for Catalogs* for the explanation of the return code.

System action

FABKSPMN ends with an abend code of 3520.

User response

Rerun the job. If this situation persists, report it to systems operations personnel.

FABK3530E UNABLE TO OBTAIN DSCB (RC=*nn* CCHHR=*ccccchhhhrr* ID=*xxx*) FOR DSNAME: *dsname*

Explanation

Program FABKSPMN could not obtain the DSCB for the data set (*dsname*).

See the *z/OS DFSMSdfp Advanced Services* for the explanation of the return code *nn*.

ccccchhhhrr shows the address of the DSCB or shows "N/A". *xxx* shows the identifier for debugging purposes.

System action

FABKSPMN ends with an abend code of 3530.

User response

Ensure that the volume that contains the data set indicated is mounted. Mount it or catalog the data set and rerun the job. If this situation persists, report it to system operations personnel.

FABK3531E UNABLE TO OBTAIN EXTENT INFORMATION FROM DSCB FOR DSNAME: *dsname*

Explanation

Program FABKSPMN could not obtain extent information from a DSCB for the data set (*dsname*).

System action

FABKSPMN ends with an abend code of 3531.

User response

Ensure that the volume that contains the data set indicated is mounted. Mount it or catalog the data set and rerun the job. If this situation persists, report it to systems operations personnel.

FABK3533E RDJFCB FAILED FOR DDNAME: *ddname* (RC=*rc*)

Explanation

Program FABKSPMN issued a RDJFCB macro and received the non-zero return code *rc*.

System action

FABKSPMN ends with an abend code of 3533.

User response

Contact IBM Software Support.

FABK3540E WRONG FORMAT OF SPMNSPDT DATA SET RECORD FOUND FOR DSNAME: *dsname*

Explanation

Program FABKSPMN found that the SPMNSPDT data set record for the data set (*dsname*) has a wrong format.

System action

FABKSPMN ends with an abend code of 3540.

User response

Ensure that the data set associated with the SPMNSPDT DD statement is correctly specified. You might have copied the correct SPMNSPDT data set to a data set which has a smaller LRECL. Correct any errors and rerun the job.

FABK3541E **INCORRECT LRECL OF SPMNSPDT DATA SET**

Explanation

Program FABKSPMN found that the SPMNSPDT data set has an incorrect logical record length.

System action

FABKSPMN ends with an abend code of 3541.

User response

Ensure that the data set associated with the SPMNSPDT DD statement is correctly specified. The logical record length of the SPMNSPDT data set must be determined by following guidelines in "Output" on page 512 and the Format subsection in "Space Monitor Graph Record data set (SPMNSPDT)" on page 512. Correct any error. Rerun the job.

FABK3542E **"GET" FAILED FOR DDNAME *ddname*: *error description***

Explanation

Program FABKSPMN issued a GET macro to get access to the data set associated with the DD statement (*ddname*). The SYNAD exit routine was called during the GET processing. The error condition is shown in the *error description*.

System action

FABKSPMN ends with an abend code of 3542.

User response

Check the error description and make sure that a DD statement is specifying the correct data set. Correct the error and rerun the job.

FABK3550E **INSUFFICIENT STORAGE: INCREASE REGION SIZE**

Explanation

Space Monitor issued a GETMAIN to acquire storage for internal control blocks. The return code indicated that the attempt was unsuccessful.

System action

Space Monitor ends with an abend code of 3550.

User response

Increase the region parameter on the EXEC statement for Space Monitor. Rerun the job.

FABK3560E ***mmmmmmmm*** **MACRO ERROR (RC =** ***nn*****) FOR VOLUME** ***vvvvvv***

Explanation

Program FABKSPMN issued a UCBSCAN or LSPACE macro to get information about the VOLUME (*vvvvvv*). *mmmmmm* is either UCBSCAN or LSPACE. The return code indicates that the attempt was unsuccessful.

System action

FABKSPMN ends with an abend code of 3560.

User response

Make sure that the volume is mounted, and rerun the job. If this situation persists, report it to systems operations personnel.

FABK3561E **IGWASYS FAILED (RC =** ***nn*****)**

Explanation

Program FABKSPMN calls the IGWASYS routine internally to obtain the DFSMS level.

System action

FABKSPMN ends with an abend code of 3561.

User response

The return code *nn* indicates that the attempt was unsuccessful. For the explanation of the return code, refer to *DFSMS/MVS Advanced Services*.

FABK3562E **DYNAMIC ALLOCATION(/ DEALLOCATION) FAILED FOR** ***ddname*** **RC=*xx* CC=*yyyy***

Explanation

An attempt to dynamically allocate or deallocate the *ddname* data set failed. *xx* is the hexadecimal return code, and *yyyy* is the hexadecimal error reason code.

System action

Space Monitor ends with an abend code of 3562.

User response

None.

Problem determination

For the return code and reason code of SVC 99, see *z/OS MVS Programming: Authorized Assembler Services Guide*, or its higher version.

FABK3563E ERROR RETURNED FROM IMS TOOLS CATALOG INTERFACE (*text*)

Explanation

Space Monitor received an error return code from IMS Tools Catalog Interface. *text* provides one of the following additional information:

- FUNC=OPEN RC=*return_code* RSN=*reason_code*
- FUNC=CLOSE RC=*return_code* RSN=*reason_code*
- FUNC=GET DBD=*dbdname* RC=*return_code* RSN=*reason_code*

The return code and reason code from IMS Tools Catalog Interface are shown in *return_code* and *reason_code*, respectively.

System action

Space Monitor ends with an abend code of 3563.

User response

See IMS Tools Catalog Interface messages (GEX3*xxxx*) to determine the cause of the error.

The following list provides possible causes and recommended actions:

- If the function is OPEN, ensure that the SGLXLOAD library of IMS Tools Base 1.6 or later is specified on the STEPLIB DD statements and the correct high-level qualifier of the bootstrap data set is specified on the IMSCATHLQ keyword. Then rerun the job.
- If the function is GET, ensure that the correct DBD name is specified on the DB keyword and the correct high-level qualifier of the bootstrap data set is specified on the IMSCATHLQ keyword. Then rerun the job.
- If the function is CLOSE or if the problem persists, contact IBM Software Support.

FABK3564E DBD *dbdname* IS NOT FOUND IN THE IMS DIRECTORY DATA SETS

Explanation

Space Monitor could not obtain the indicated DBD from the IMS directory data sets.

System action

Space Monitor ends with an abend code of 3564.

User response

Ensure that the correct high-level qualifier of the bootstrap data set is specified on the IMSCATHLQ keyword, the correct DBD name is specified on the DB keyword, and that the DBD identified by *dbdname* exists in the IMS directory data sets. Then rerun the job.

FABK3991E THE FORMAT OF THE RECON DATA SET DOES NOT MATCH THE IMS RESLIB VERSION (*version*)

Explanation

The version of RECON is not the same as the IMS version of IMS RESLIB that is specified in the STEPLIB DD.

System action

Space Monitor ends with an abend code of 3991.

User response

Specify the correct RECON data set, and rerun the job.

FABK3992E MINVERS IN THE RECON DATA SET IS GREATER THAN THE IMS RESLIB VERSION (*version*)

Explanation

The MINVERS value in the RECON data set does not match the IMS version of IMS RESLIB that is specified in the STEPLIB DD.

System action

Space Monitor ends with an abend code of 3992.

User response

Specify the correct RECON data set, and rerun the job.

FABK3999E **UNKNOWN ERROR OCCURRED IN *modulename* MODULE (RC = *nn*)**

Explanation

Program FABKSPMN found that an unknown error occurred in the FABKSPMN internal module (*modulename*). This kind of error should not occur. The return code *nn* is the internal reason code.

System action

FABKSPMN ends with an abend code of 3999.

User response

Contact IBM Software Support.

FABK4095E **RECON ACCESS FAILED. *reason***

Explanation

An error was detected in the RECON access processing. *reason* shows one of the following reasons:

- DBRC LIST COMMAND IS NOT COMPLETED. RC=*xxxxxxxx*
- SYSPRINT DD FOR DBRC LIST COMMAND IS SPECIFIED AS DUMMY
- INTERNAL ERROR OCCURRED
- FUNC=*ffffffff* RETURN CODE=*xxxxxxxx* REASON CODE=*xxxxxxxx* KEYS: DBD=*dbdname* DDN=*ddname* KEYTYPE=*xx xxxxxxxxxx*

System action

Space Monitor ends with an abend code of 4095.

User response

Correct the error, and rerun the job.

FABK8001E **STATEMENT FORMAT ERROR**

Explanation

An error is detected in the specification of statements.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8002E ***parm-name* IS INVALID AS STATEMENT PARAMETER**

Explanation

An incorrect string *parm-name* is specified for the statement in the FABKCTL data set.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8003E ***parm-name* PARAMETER IS INVALID FOR *ctl-stmt-name* STATEMENT**

Explanation

An incorrect parameter (*parm-name*) is specified for the statement (*ctl-stmt-name*).

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8004E **THE NUMBER OF *parm-name* PARAMETERS EXCEEDS THE LIMIT, MAX IS *nnn***

Explanation

Too many parameters (*parm-name*) are specified. The parameter in error is shown on the message. The maximum number of specifications for the parameter is *nnn*.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8005E ***parm-name* PARAMETER IS REQUIRED FOR *ctl-stmt-name* STATEMENT**

Explanation

A required parameter (*parm-name*) for the control statement (*ctl-stmt-name*) is missing.

System action

Space Monitor ends with a return code of 8.

User response

Specify the required parameter for the control statement, and rerun the job.

FABK8006E **THE NUMBER OF OPERANDS FOR *parm-name* PARAMETER EXCEEDS THE LIMIT, MAX IS *nnn***

Explanation

Too many parameter values are specified for the parameter (*parm-name*). The maximum number of parameter values is *nnn*.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8007E **LENGTH ERROR IN *n-th* OPERAND OF PARAMETER: *parm-name***

Explanation

The length of the *n-th* parameter value for the parameter (*parm-name*) is not correct.

System action

Space Monitor ends with a return code of 8.

User response

Correct the error and rerun the job.

FABK8008E ***n-th* OPERAND IS REQUIRED FOR PARAMETER: *parm-name***

Explanation

The *n-th* operand is not specified for the parameter (*parm-name*).

System action

Space Monitor ends with a return code of 8.

User response

Specify the missing parameter value. Rerun the job.

DB Segment Restructure messages and codes

The following reference topics provide information about the abend codes, return codes, and messages issued by DB Segment Restructure.

DB Segment Restructure abend codes

Every 3*nnn* abend code is accompanied by a FABR3*nnn*E message. (3*nnn* is a four-digit identification number of the abend code and message.) See the associated FABR3*nnn*E message description for the 3*nnn* abend code.

DB Segment Restructure return codes

The modules of DB Segment Restructure, FABRUNLD and FABRRELD, generate return codes to indicate the success or failure of a job.

Code
Meaning

0
The DB Segment Restructure utility has been successfully run with no errors of any kind. This is the normal return code for all DB Segment Restructure runs.

4
Potential errors have been detected, but execution was able to continue. *This return code is abnormal and indicates that some of the processing you wanted has not been done*. Warning messages that explain the errors are issued. They are printed in the run listing, either in the JES log or in one of the SYSPRINT data sets.

DB Segment Restructure messages

Use the information in these messages to help you diagnose and solve DB Segment Restructure problems.

Message format

DB Segment Restructure messages adhere to the following format:

```
FABRnnnnx
```

Where:

FABR
Indicates that the message was issued by DB Segment Restructure

nnnn
Indicates the four-digit message identification number

x
Indicates the severity of the message:

E
Indicates that an error occurred, which might or might not require operator intervention.

I
Indicates that the message is informational only.

W
Indicates that the message is a warning to alert you to a possible error condition.

Each message also includes the following information:

Explanation:
The Explanation section explains what the message text means, why it occurred, and what its variables represent.

System action:
The System action section explains what the system will do in response to the event that triggered this message.

User response:
The User response section describes whether a response is necessary, what the appropriate response is, and how the response will affect the system or program.

FABR3501W DB RECORD MUST PRECEDE OTHER REC TYPES

Explanation

The first control statement in the FABRRELD SYSIN data set was not a DB record.

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD SYSIN data set to ensure that the control statements are in the proper sequence.

FABR3502W DBD NOT REFERENCED BY PSB.

Explanation

The dbdname specified on a FABRUNLD primary request control statement or a FABRRELD DB control statement was not referenced by the PSB whose name was specified on the EXEC statement.

System action

Program FABRUNLD or FABRRELD ignores the input control statement and continues processing. The return code is set to 4.

User response

Correct the input SYSIN data set or JCL, and rerun the job.

Problem determination

Check the spelling of the dbdname on the input control statement. If that is correct, then check if the correct PSB was used.

FABR3503W EXCEEDED MAXIMUM OF 1500 LITERAL BYTES PER DB

Explanation

A FABRRELD DB control statement was followed by CHG control statements that contain literals whose total number of bytes is greater than 1500.

System action

Program FABRRELD ignores the incorrect control statements and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD SYSIN data set for errors. A single DB control statement can have a total of at most 1500 bytes of literals on its related CHG control statements.

FABR3504E FABRRELD ABENDS DUE TO *xx* STATUS CODE

Explanation

A DL/1 insert (ISRT) call returned a non-blank status code *xx*.

System action

The program ends with a USER 3504 abend. If a SYSUDUMP DD statement is provided, a dump is produced.

User response

Determine the cause of the bad status code and correct the problem. Then rerun the FABRRELD job.

Problem determination

Use standard IMS application program debugging procedures.

FABR3505E FABRUNLD ABENDS DUE TO *xx* STATUS CODE

Explanation

A DL/1 get next (GN) call returned a status code (*xx*) other than GA, GB, GK, or blank.

System action

The program ends with a USER 3505 abend. If a SYSUDUMP DD statement is provided, a dump is produced.

User response

Determine the cause of the bad status code and correct the problem. Then rerun the FABRUNLD job.

Problem determination

Use standard IMS application program debugging procedures.

FABR3506W GU STATUS CODE=*xx*

Explanation

The DL/1 GU call, using the SSA provided on a FABRUNLD primary request control statement, resulted in an unacceptable DL/1 status code (*xx*).

System action

Program FABRUNLD ignores the primary request control statement and continues processing. The return code is set to 4.

User response

Determine the cause of the bad status code and correct the problem. Then rerun the FABRUNLD job.

Problem determination

Check the SSA on the primary request control statement. If that is correct, then use standard IMS application program debugging procedures.

FABR3507I *xxxxxxxxx* INPUT SEGMENTS *yyyyyyyyy* SEGMENTS CANCELED

Explanation

This is an informational message. The system is reporting the total number of input segments (*xxxxxxxxx*) and the total number of segments (*yyyyyyyyy*) that were canceled by exit routines for that database.

System action

None.

User response

None. This message is informational.

FABR3508W INVALID HEX DIGIT

Explanation

An incorrect hexadecimal digit was encountered in a hexadecimal literal on a FABRRELD CHG control statement.

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD CHG control statement for errors. A hexadecimal literal must contain only the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, or F.

FABR3509W I/O ERROR IN USEREXIT PDS DIRECTORY SRCH

Explanation

A BLDL macro using the partitioned data set on the USEREXIT DD statement resulted in a return code of 08.

System action

Program FABRUNLD or FABRRELD ignores the control statement and continues processing. The return code is set to 4.

User response

Correct the problem, and rerun the job.

Problem determination

Use standard debugging procedures.

FABR3510W I/P POS MUST BE 0 < 5 DIGITS <= '*xxxxx*'

Explanation

The inpos field on a FABRRELD CHG control statement contains an incorrect number (*xxxxx*).

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

See “CHG control statement” on page 565. Correct the FABRRELD SYSIN data set control statement, and rerun the FABRRELD job.

Problem determination

Check the format of the FABRRELD CHG control statement. All FABRRELD CHG control statements that do not contain a literal must contain a valid inpos field in column 21.

FABR3511W KFB STRING NOT IN QUOTES OR MISSING

Explanation

A key feedback string is expected to be on a FABRUNLD primary request control statement or continuation request record. Program FABRUNLD was unable to find the key feedback string (which must be enclosed in single quotes).

System action

FABRUNLD ignores the primary request control statement (and continuation request control statement, if any) and continues processing. The return code is set to 4.

User response

Correct the input SYSIN data set, and rerun the FABRUNLD job.

Problem determination

Check the format of the FABRUNLD primary request control statement or continuation request control statement. If the quotes are present, the key feedback string might start in the wrong column.

FABR3512W LENGTH MUST BE 0 < 5 DIGITS <= '*xxxxx*'

Explanation

The length field on a FABRRELD CHG control statement contains an incorrect number (*xxxxx*).

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set control statement, and rerun the FABRRELD job.

Problem determination

Check the format of the FABRRELD CHG control statement. All FABRRELD CHG control statements that do not contain a literal must contain a valid length field in column 31.

FABR3513W LITERAL MUST BE ENCLOSED IN QUOTES

Explanation

A literal on a FABRRELD CHG control statement did not contain the correct number of single quotes.

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD CHG control statement for errors. The literal must begin in column 21 of the CHG control statement.

FABR3514E *xxxxxxxx* DATA SET LRECL IS TOO SMALL

Explanation

The maximum LRECL of the sequential data set (*xxxxxxxx*) that will contain the unloaded database is too small to contain the last retrieved segment.

System action

Program FABRUNLD issues a User 3514 abend.

User response

Increase the LRECL of the *xxxxxxxx* data set, and rerun the FABRUNLD job.

Problem determination

Check the JCL of the *xxxxxxxx* DD statement.

FABR3515W MEMBER NOT FOUND IN 'USEREXIT' DATA SET

Explanation

The userexit field on a FABRRELD SEG control statement contains a name that is not a member name in the USEREXIT partitioned data set. A BLDL macro using this data set resulted in a return code of 04.

System action

Program FABRUNLD or FABRRELD ignores the control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD SYSIN data set for errors.

FABR3516W MORE THAN 150 'CHG' CARDS PER DB

Explanation

A FABRRELD DB control statement was followed by more than 150 CHG records.

System action

Program FABRRELD ignores the incorrect control statements and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD SYSIN data set for errors. A single DB control statement can have at most 150 related CHG control statements.

FABR3517W MORE THAN 50 'SEG' CARDS PER DB

Explanation

A FABRRELD DB control statement was followed by more than 50 SEG control statements.

System action

Program FABRRELD ignores the incorrect control statements and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD SYSIN data set for errors. A single DB control statement can have at most 50 related SEG control statements.

FABR3518W NO SYSIN CONTROL STATEMENTS SUPPLIED

Explanation

An empty FABRRELD SYSIN data set was used.

System action

Program FABRRELD ends without reloading any databases. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set or JCL, and rerun the FABRRELD job.

Problem determination

FABRRELD requires a nonempty SYSIN data set.

FABR3519W NULL LITERAL INVALID

Explanation

A literal of length 0 was encountered on a FABRRELD CHG control statement.

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set, and rerun the FABRRELD job.

Problem determination

Check the FABRRELD CHG control statement for errors. The literal must begin in column 21 of the CHG control statement.

FABR3520W O/P POS MUST BE 0 < 5 DIGITS <= '*xxxxx*'

Explanation

The outpos field on a FABRRELD CHG control statement contains an incorrect number (*xxxxx*).

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set control statement, and rerun the FABRRELD job.

Problem determination

Check the format of the FABRRELD CHG control statement. It must contain a valid outpos field in column 11.

FABR3521W OPEN FAILED FOR *xxxxxxx* DD

Explanation

The sequential data set whose ddname (*xxxxxxx*) was specified on a FABRUNLD primary request control

statement (OUTPUT), or a FABRRELD DB control statement (INPUT) could not be opened successfully.

System action

Program FABRUNLD or FABRRELD ignores the input control statement and continues processing. The return code is set to 4.

User response

Correct the input SYSIN data set or JCL, and rerun the job.

Problem determination

Check the spelling of the ddname on the input control statement. If that is correct, then use standard IMS application program debugging procedures.

FABR3522W OPEN FAILED FOR 'USEREXIT' DD

Explanation

The partitioned data set on the USEREXIT DD statement could not be opened successfully.

System action

Program FABRUNLD or FABRRELD ignores the control statement and continues processing. The return code is set to 4.

User response

Correct the problem, and rerun the job.

Problem determination

Use standard debugging procedures.

FABR3523I *xxxxxxxxx* SEGMENTS RELOADED

Explanation

This is an informational message. It reports the total number of database segments (*xxxxxxxxx*) that were reloaded for that database.

System action

None.

User response

None. This message is informational.

FABR3524I *xxxxxxxx* SEGMENTS UNLOADED

Explanation

This is an informational message. It reports the total number of database segments (*xxxxxxx*) that were unloaded.

System action

None.

User response

None. This message is informational.

FABR3525W TYPE MUST BE ’DB’, ’SEG’, OR ’CHG’

Explanation

A control statement in the FABRRELD SYSIN data set contained an incorrect character string in its first three columns.

System action

Program FABRRELD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRRELD SYSIN data set control statement, and rerun the FABRRELD job.

Problem determination

All FABRRELD input control statements must contain 'DB', 'SEG', or 'CHG' in column 1.

FABR3526W USER EXIT MARKED 'NOT EXECUTABLE'

Explanation

The userexit field on a FABRRELD SEG control statement contains a name that is a member name in the USEREXIT partitioned data set. A BLDL macro using this data set found that member to be marked not executable.

System action

Program FABRUNLD or FABRRELD ignores the control statement and continues processing. The return code is set to 4.

User response

Correct the problem, and rerun the job.

Problem determination

Use standard debugging procedures.

FABR3527W **STATUS CODE FM RECEIVED, *nnnnnnnnnn* SEGMENTS NOT RELOADED**

Explanation

A FABRRELD received a status code FM for DL/I insert call. A FABRRELD did not reload the root segment and all of its dependent segments. Indicated number of segments have been discarded.

System action

Processing continues.

User response

None.

FABR3528W **[ISRT | ASRT] STATUS CODE=FM**

Explanation

A DL/I insert (ISRT) or assert (ASRT) call returns status code FM. A FABRRELD did not reload the root segment and all of its dependent segments.

System action

Processing continues.

User response

None.

FABR3625E ***xxxxxxxx*** **DD STATEMENT IS MISSING**

Explanation

A required DD statement, *xxxxxxxx*, is not present in the FABRUNLD JCL.

System action

The program ends with a USER 3625 abend. If a SYSUDUMP DD statement is provided, a dump is produced.

User response

Correct the problem, and rerun the job.

Problem determination

JCL error or control statement error. Either the DD statement has been omitted, or the ddname has been spelled incorrectly on either your primary request control statement or your DD statement.

FABR3626E **FAILURE IN DEVTYPE MACRO FOR THE *xxxxxxxx* FILE**

Explanation

Program FABRUNLD issued a DEVTYPE macro for the *xxxxxxxx* ddname. The resulting return code was 8.

System action

The program ends with a USER 3626 abend. If a SYSUDUMP DD statement is provided, a dump is produced.

User response

Correct the problem, and rerun the job.

Problem determination

Use standard debugging procedures.

FABR3627E **DUMMY SPECIFIED FOR *xxxxxxxx* FILE**

Explanation

A required DD statement, *xxxxxxxx*, was coded as DUMMY in the FABRUNLD JCL.

System action

The program ends with a USER 3627 abend. If a SYSUDUMP DD statement is provided, a dump is produced.

User response

Correct the problem, and rerun the job.

Problem determination

JCL error.

FABR3628W **BLKSIZE OR LRECL OF *xxxxxxxx* FILE IS '0'; MAX ALLOWABLE SIZE FOR DEVICE IS USED**

Explanation

BLKSIZE or LRECL is not coded on the *xxxxxxxx* DD statement.

System action

FABRUNLD internally determines the BLKSIZE (block size) for the device assigned to the *xxxxxxxx* DD statement. For more information about the default block size, see the description of *dataout* DD in “FABRUNLD JCL ” on page 559. It uses BLKSIZE-4 as the LRECL. The return code is set to 4.

User response

None, unless the program ends due to an IMS or MVS error. In that case, code both LRECL and BLKSIZE on your DD statement.

When using DISP=MOD (as in Figure 260 on page 571), you might get a system 013 abend if you code BLKSIZE on the DD statement without coding LRECL.

Problem determination

For some DASD devices (such as 3375 or 3380), the default block size and record length result in wasted space. When the maximum record size for the device is considerably smaller than the maximum track length, it is desirable to code BLKSIZE and LRECL on your DD statement. For more information about the default block size, see the description of *dataout* DD in “FABRUNLD JCL ” on page 559.

FABR3629W THE VALUE IN COLUMN 19 IS INVALID

Explanation

A control statement in the FABRUNLD SYSIN data set contained an incorrect character string in column 19.

System action

Program FABRUNLD ignores the incorrect control statement and continues processing. The return code is set to 4.

User response

Correct the FABRUNLD SYSIN data set control statement, and rerun the FABRUNLD job.

Problem determination

All FABRUNLD input control statements must contain 'H' or ' ' in column 19.

FABR3630E LOGICAL DBD *xxxxxxxx* CANNOT BE SPECIFIED WITH 'H' FORMAT OPTION

Explanation

The HD unload record format option is not effective for the indicated database.

System action

The program ends with a USER 3630 abend.

User response

Specify the physical DBD with the HD unload record format option, and rerun the job.

FABR3640E UNSUPPORTED LEVEL OF IMS IS BEING USED: *mmm* IMS LEVEL OF THIS RUN

Explanation

Program FABRUNLD or FABRRELD was run with the version of IMS that is not supported by FABRUNLD or FABRRELD. *mmm* is the version and release of IMS that was run.

System action

The program ends with a USER 3640 abend.

FABR3641E UNSUPPORTED RELEASE OF DFP

Explanation

The FABRUNLD or FABRRELD job is running under an unsupported release of MVS/DFP. The DFSMSdfp of DFSMS/MVS 1.1 or later is necessary to run an FABRUNLD or FABRRELD job.

System action

The program terminates with a USER 3641 abend.

User response

None.

FABR3642E PSB MUST BE GENERATED WITH LANG=ASSEM, LANG=COBOL, OR LANG=PL/I

Explanation

The specified PSB is not generated with LANG=ASSEM, LANG=COBOL, or LANG=PL/I.

System action

The program ends with a USER 3642 abend.

User response

Specify the correct PSB and rerun the job.

Problem determination

Check the PSB source of the PSB and make sure that the PSBGEN statement has LANG=ASSEM, LANG=COBOL, or LANG=PL/I.

Chapter 38. Gathering diagnostic information

Before you report a problem with IMS HP Pointer Checker to IBM Software Support, you need to gather the appropriate diagnostic information.

Provide the following information for all IMS HP Pointer Checker problems:

- A clear description of the problem and the steps that are required to re-create the problem
- The version of IMS that you are using and the version of the operating system that you are using
- A complete log of the job
- A Load Module/Macro APAR Status report

  For information about creating a Load Module/Macro APAR Status report, see Chapter 39, “Diagnostics Aid,” on page 805.

© Copyright IBM Corp. 2000, 2021

Chapter 39. Diagnostics Aid

If you have a problem that you think is not a user error, run the Diagnostics Aid (FABPDIAG), obtain the Load Module/Macro APAR Status report, attach it to the other diagnostic documents (such as job dump list or I/O of the utility), and report the error to IBM.

The Diagnostics Aid generates a Load Module/Macro APAR Status report. This report shows the latest APAR fixes applied to each module and macro.

The Diagnostics Aid is not applicable for any other versions or releases.

Topics:

- "How to run Diagnostics Aid with JCL" on page 805
- "Load Module/Macro APAR Status report" on page 806
- "Diagnostics Aid messages and codes" on page 807

How to run Diagnostics Aid with JCL

To run the Diagnostics Aid (FABPDIAG), supply an EXEC statement and a DD statement that defines the output data set.

EXEC
This statement must be in the following form:

```
//stepname  EXEC PGM=FABPDIAG
```

STEPLIB DD
This statement defines the library that contains the load modules (usually HPS.SHPSLMD0).

SHPSLMD DD
This statement defines the library that contains the load modules (usually HPS.SHPSLMD0) for which you have a problem.

The Load Module APAR Status report is not generated if this DD statement is not provided or if DD DUMMY is specified.

It is always recommended that you specify this DD statement.

SHPSMAC DD
This statement defines the library that contains the provided macros (usually HPS.SHPSMAC0) for which you have a problem.

The Macro APAR Status report is not generated if this DD statement is not provided or if DD DUMMY is specified.

SYSPRINT DD
This output data set contains the Load Module/Macro APAR Status report. The data set contains 133-byte, fixed-length records. It can reside on a tape, direct-access device, or printer; or it can be routed through the output stream. If BLKSIZE is coded in the DD statement, it must be a multiple of 133. However, it is recommended that you use:

```
//SYSPRINT  DD SYSOUT=A
```

© Copyright IBM Corp. 2000, 2021

Load Module/Macro APAR Status report

The Diagnostics Aid generates the following two reports for the maintenance by IBM: Load Module APAR Status report and Macro APAR Status report.

Load Module APAR Status report

The Load Module APAR Status report contains information about the modules and their applied APARs.

This report contains the following information:

MODULE LIBRARY
This includes the data set names specified in the SHPSLMD DD statement. If more than 30 data sets are concatenated, only the first 30 data sets are listed.

MODULE NAME
This is the name of the load module member or the alias.

ALIAS-OF
This is the name of the original member of the alias. If the module name is not an alias, this field is left blank.

CSECT NAME
This is the name of the included CSECT in the module. The CSECT names are reported in the included order in the module.

APAR NUMBER
This is the latest APAR number applied to the module represented by the CSECT name. If no APAR is applied, NONE is shown.

APAR FIX-DATE
This is the date when the modification was prepared for the module represented by the CSECT name. If no APAR is applied, N/A is shown.

Notes:

1. If the CSECT name does not start with *FAB, HPS,* or the program structure of the CSECT does not conform to the IMS HP Pointer Checker module standard to identify the APAR number and the APAR fixed date, the fields APAR NUMBER and APAR FIX-DATE are filled with asterisks (*).
2. If the load module is a member of the PDSE library, the following statement is shown on the report line and the job completes with a return code of 4.

```
** IT CAN NOT BE ANALYZED DUE TO PDSE LIBRARY MEMBER **
```

3. If the load macro fails for a utility member, the following statement is shown on the report line and the job completes with a return code of 8.

```
** IT CAN NOT BE ANALYZED DUE TO LOAD FAILED MEMBER  **
```

Macro APAR Status report

The Macro APAR Status report contains information about macros and their applied APARs.

This report contains the following information:

MACRO LIBRARY
This includes the data set names specified in the SHPSMAC DD statement. If more than 30 data sets are concatenated, only the first 30 data sets are listed.

MACRO NAME
This is the name of the macro member or the alias.

ALIAS-OF
This is the name of the original member of the alias. If the macro name is not an alias, this field is left blank.

APAR NUMBER
This is the latest APAR number applied to the macro. If no APAR is applied, NONE is shown.

APAR FIX-DATE
This is the date when the modification was prepared for the macro. If no APAR is applied, N/A is shown.

Note: If the macro source statement structure does not conform to the IMS HP Pointer Checker macro standard to identify the APAR number and the APAR fixed date, the fields APAR NUMBER and APAR FIX-DATE are filled with asterisks (*).

Diagnostics Aid messages and codes

The following topics describe the messages and codes of FABPDIAG.

Diagnostics Aid return codes

FABPDIAG contains the following return codes:

0
Successful completion of the program.

4
Warning messages were issued, but the requested operation was completed.

8
Error messages were issued, but the request operation was completed.

Diagnostics Aid abend codes

All 36*xx* abend codes are accompanied by an FABU36*xx* message. Refer to the appropriate message for problem determination.

Diagnostics Aid messages

Use the information in these messages to diagnose and solve FABPDIAG problems.

FABU1001I DIAG ENDED NORMALLY

Explanation

This message is generated when Diagnostic Aid has been completed successfully.

System action

Diagnostic Aid completes the job successfully with a return code of 0.

User response

None. This message is informational.

FABU1002W DIAG ENDED WITH WARNINGS

Explanation

This message is generated when trivial error conditions are encountered by Diagnostic Aid.

System action

Diagnostic Aid ends with a return code of 4.

User response

Refer to other messages generated by Diagnostic Aid to determine the nature and the cause of the detected errors. Correct the problem and rerun the job.

FABU1003E DIAG ENDED WITH ERRORS

Explanation

This message is generated when severe error conditions are encountered by Diagnostic Aid.

System action

Diagnostic Aid ends with a return code of 8.

User response

Refer to other messages generated by Diagnostic Aid to determine the nature and the cause of the detected errors. Correct the problem and rerun the job.

FABU1005W [SHPSLMD | SHPSMAC] DD STATEMENT NOT FOUND

Explanation

Diagnostic Aid could not find the SHPSLMD/SHPSMAC DD statement.

System action

Diagnostic Aid sets an end-of-job return code of 4 and continues processing. Diagnostic Aid does not generate a report for the load module or the macro.

User response

If you intended to specify the indicated DD statement, correct the error and rerun the job.

FABU1006W DUPLICATE *member name* IN LIBRARY DDNAME *ddname*

Explanation

Diagnostic Aid found a duplicated member in the concatenated libraries.

System action

Diagnostic Aid uses the member which is first found in the concatenated libraries. Diagnostic Aid sets an end-of-job return code of 4 and continues processing.

User response

Ensure which libraries have correct module/macro libraries. Correct the error and rerun the job if necessary.

FABU1007W DUMMY SPECIFIED FOR [SHPSLMD | SHPSMAC] DD STATEMENT

Explanation

DUMMY was specified for the SHPSLMD/SHPSMAC DD statement.

System action

Diagnostic Aid sets an end-of-job return code of 4 and continues processing. Diagnostic Aid does not generate a report for the load module or the macro.

User response

If you did not intend to specify the dummy DD statement, correct the error and rerun the job.

FABU1008W NO [MODULE | MACRO] MEMBERS FOUND IN DDNAME [SHPSLMD | SHPSMAC]

Explanation

Diagnostic Aid could not find any utility modules or macros members from the DD ddname data set.

System action

Diagnostic Aid sets an end-of-job return code of 4 and continues processing.

User response

Ensure that the libraries have correct utility module or macro libraries. Correct the error and rerun the job.

FABU2001E LOAD FAILED FOR DDNAME *ddname* MODULE *member*

Explanation

Diagnostic Aid could not load a *member name* from *ddname*.

System action

Diagnostic Aid sets an end-of-job return code of 8 and continues processing.

User response

Ensure that the member indicated exists in the data set specified for the indicated *ddname*. Correct the error and rerun the job.

FABU3600E OPEN FAILED FOR DDNAME *ddname*

Explanation

The named DCB could not be opened.

System action

Diagnostic Aid ends with an abend code of U3600.

User response

Ensure that a *ddname* DD statement exists, and that it specifies the correct DD parameter. Correct any errors, and rerun the job.

FABU3601E GET FAILED FOR DDNAME *ddname*

Explanation

The GET failed for a directory from the DD *ddname* data set.

System action

Diagnostic Aid ends with an abend code of U3601.

User response

Refer to the MVS system message and its programmer response. Correct the error and rerun Diagnostic Aid. If the error persists, contact IBM Software Support.

FABU3602E READ FAILED FOR DDNAME *ddname* MEMBER *member*

Explanation

The READ failed for a *member* from the DD *ddname* data set.

System action

Diagnostic Aid ends with an abend code of U3602.

User response

Refer to the MVS system message and its programmer response. Correct the error and rerun Diagnostic Aid. If the error persists, contact IBM Software Support.

FABU3603E BLDL FAILED FOR DDNAME *ddname* MEMBER *member*

Explanation

The *member* was not found when the BLDL macro searched the PDS directory for the *ddname*.

System action

Diagnostic Aid ends with an abend code of U3603.

User response

Ensure that the member indicated exists in the data set specified for the indicated ddname. Correct the error and rerun the job. If the error persists, contact IBM Software Support.

FABU3604E LOAD FAILED FOR DDNAME *ddname* MODULE *member*

Explanation

Diagnostic Aid could not load the *member name* from the *ddname*.

System action

Diagnostic Aid ends with an abend code of U3604.

User response

Refer to the MVS system message and its programmer response. Correct the error and rerun Diagnostic Aid. If the error persists, contact IBM Software Support.

FABU3605E DELETE FAILED FOR MODULE *member*

Explanation

Diagnostic Aid could not delete a *member name*.

System action

Diagnostic Aid ends with an abend code of U3605.

User response

Contact IBM Software Support.

FABU3606E PUT FAILED FOR SYSPRINT

Explanation

Diagnostic Aid could not put report data in SYSPRINT.

System action

Diagnostic Aid ends with an abend code of U3606.

User response

Refer to the MVS system message and its programmer response. Correct the error and rerun Diagnostic Aid. If the error persists, contact IBM Software Support.

FABU3607E OPEN FAILED FOR SYSPRINT

Explanation

SYSPRINT DCB could not be opened.

System action

Diagnostic Aid ends with an abend code of U3607.

User response

Ensure that a *ddname* SYSPRINT DD statement exists, and that it specifies the correct DD parameter. Correct any errors, and rerun the job.

FABU3608E FIND FAILED FOR DDNAME *ddname* MEMBER *member*

Explanation

The FIND failed for a *member* from DDNAME *ddname* data set.

System action

Diagnostic Aid ends with an abend code of U3608.

User response

Ensure that the member indicated exists in the data set specified for the indicated ddname. Correct the error and rerun the job. If the error persists, contact IBM Software Support.

FABU3609E DEVTYPE FAILED FOR DDNAME *ddname*

Explanation

The DEVTYPE failed for a DDNAME *ddname* data set.

System action

Diagnostic Aid ends with an abend code of U3609.

User response

Contact IBM Software Support.

FABU3610E RDJFCB FAILED FOR DDNAME *ddname*

Explanation

The READJFCB failed for a DDNAME *ddname* data set.

System action

Diagnostic Aid ends with an abend code of U3610.

User response

Contact IBM Software Support.

FABU3611E GETMAIN FAILED. INSUFFICIENT STORAGE TO RUN THE JOB

Explanation

Work space for Diagnostic Aid could not be obtained.

System action

Diagnostic Aid ends with an abend code of U3611.

User response

Increase the region size and rerun the job.

FABU3612E TOO MANY [MODULE | MACRO] MEMBERS DETECTED IN DDNAME [SFABMOD | SHPSMAC]

Explanation

There are too many utility members in the SFABMOD/SHPSMAC DD data set.

System action

Diagnostic Aid ends with an abend code of U3612.

User response

Specify the correct data set for the indicated DD statement and rerun the job.

Notices

This information was developed for products and services offered in the U.S.A.

This material may be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Director of Licensing
IBM Corporation
North Castle Drive

© Copyright IBM Corp. 2000, 2021

Armonk, NY 10504-1785
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Programming interface information

This publication primarily documents intended Programming Interfaces that allow the customer to write programs to obtain the services of IMS HP Pointer Checker.

This publication also documents information that is NOT intended to be used as Programming Interfaces of IMS HP Pointer Checker. This information is identified where it occurs by an introductory statement to a topic or section.

Product-Sensitive programming interfaces are provided to allow the customer installation to perform tasks such as tailoring, monitoring, modification, or diagnosis of this IBM product. Use of such interfaces creates dependencies on the detailed design or implementation of the IBM product. Product-Sensitive interfaces should be used only for these specialized purposes. Because of their dependencies on detailed design and implementation, it is to be expected that programs written to such interfaces may need to be changed in order to run with new product releases or versions, or as a result of service.

Product-Sensitive Programming Interface and Associated Guidance Information is identified where it occurs, either as an introductory statement to a chapter or section or by the following marking:

Product-sensitive programming interface and associated guidance information...

This guide also documents Diagnosis, Modification, and Tuning information, which is provided to help the customer to administer IMS databases.

Warning: Do not use this Diagnosis, Modification, and Tuning Information as a programming interface.

Diagnosis, Modification, and Tuning Information is identified where it occurs, either by an introductory statement to a chapter or section or by the following marking:

Diagnosis, modification, or tuning information...

Trademarks

IBM, the IBM logo, and ibm.com® are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at http://www.ibm.com/legal/copytrade.shtml.

Other company, product, and service names may be trademarks or service marks of others.

Terms and conditions for product documentation

Permissions for the use of these publications are granted subject to the following terms and conditions:

Applicability: These terms and conditions are in addition to any terms of use for the IBM website.

Personal use: You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative work of these publications, or any portion thereof, without the express consent of IBM.

Commercial use: You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights: Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

Privacy policy considerations

IBM Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM's Privacy Policy at http://www.ibm.com/privacy and the section titled "Cookies, Web Beacons,

and Other Technologies" in IBM’s Online Privacy Statement at http://www.ibm.com/privacy/details. Also, see the "IBM Software Products and Software-as-a-Service Privacy Statement" at http://www.ibm.com/software/info/product-privacy.

Index

Special Characters

(HDPC) statement 149
*JOBUSR 121, 500
*LC 409
*LP 409
=X 458

A

abend codes
  DB Historical Data Analyzer 751
  DB Segment Restructure 793
  HD Pointer Checker 605
  HD Tuning Aid 731
  Space Monitor 772
ACB
  conversion to DEDB 591
ACBGEN
  conversion to DEDB 591
access method 394, 515, 520
accessibility
  disability 16
  keyboard shortcuts 16
  overview 16
  screen readers and magnifiers 16
ACCM 394, 515, 520
Actual Roots per Block report 327, 331, 350
allocation of work data sets 133
AMASPZAP 298
Assigned Roots per Block report 327, 331, 353
Assigned Roots per RAP report 327, 331, 351

B

bar chart 451
bidirectional physically paired logical relationship 410
bidirectional virtually paired logical relationship 410
bitmap 516
BLKMAPIN data set 62, 111, 147
BLKMAPIN statement 147
BLKSIZE
  database DD
    FABRUNLD 560
  dataout DD
    FABRUNLD 560
  FABRRELD SYSIN data set 564
  FABRRELD SYSPRINT data set 567
  FABRUNLD example 571
  FABRUNLD SYSIN data set 562
  FABRUNLD SYSPRINT data set 566
  SYSIN DD
    FABRRELD 561
    FABRUNLD 559
  SYSPRINT DD
    FABRRELD 561
    FABRUNLD 559
BLOCKMAP process 36, 62, 110, 111
bucket
  calculating the number of 512
  definition 512
  increasing the number of 533

C

CA (control area) split 404, 517, 525
calls
  FABRRELD 585
  GSCD 336
catalog databases 44
cataloged procedure
  HD Pointer Checker 19, 69
  HD Tuning Aid 337
  Space Monitor (FABKSPMP) 497
CHAINDIST= 318
chart
  HD Analysis graph 369, 472
CHECK process 34, 110, 111
CHECKREC data set 66, 111, 316
CI (control interval) split 404, 517, 525
CLIST, TSO 454
compatibility
  HD Pointer Checker 19
  IMS HP Pointer Checker 1.1 19
configuring 22
considerations
  DB Historical Data Analyzer 375, 413, 451
  DB Segment Restructure 553
  Export Utility 413
  HD Pointer Checker 39
  HD Tuning Aid 331
  MVS batch environment 375
  Space Monitor
    HALDB Online Reorganization (OLR) 490
    HISTORY data set 489
    IMS online full-function databases 490
  TSO/ISPF environment 451
continuation request control statement 563
Control Card Format report
  DB Segment Restructure (Reload) 567
  HD Tuning Aid 348
Control Card report 349
Control Cards and Messages report
  DB Segment Restructure (Reload) 567
  DB Segment Restructure (Unload) 567
control member data set 389, 453
control member data set (SPMNMBR)
  DB Historical Data Analyzer 498
control statements ()
  FABPCHRO 268
control statements (DB Historical Data Analyzer)
  DATABASE 384
  ENDPROC 389
  OPTION 386

control statements (DB Historical Data Analyzer) *(continued)*
PROC 382
syntax of 381
control statements (DB Segment Restructure)
CHG 565
continuation request 563
DB 564
FABRRELD 564
FABRUNLD 562
primary request 562
SEG 564
control statements (Export Utility)
DATABASE 418
OPTION 418
PROC 416
control statements (HD Tuning Aid)
END 347
SORT 347
control statements (Space Monitor)
%IMSID 501
%TOSI 499
%USER 500
data set 501
DATABASE 510
END 512
OPTION 508
PROC 506
record format of 498
conversion to DEDB 591
cookie policy 811
CTL data set
FABTROOT 340
CTR (counter) 409
customization of DB Historical Data Analyzer (under TSO/ISPF) 26, 454
customizing a graph chart through ICU 458, 473

D

DASD VTOC
Space Monitor 485
data flow
DB Historical Data Analyzer 370
DB Segment Restructure 552
Export Utility 370
HD Pointer Checker 34
HD Tuning Aid 328
Space Monitor 487
data set group number 376
Data Set Selection Menu by Date panel 463
Data Set Selection Menu by DB Name panel 462
Data Set Selection Menu by Member panel 461
data sets (DB Historical Data Analyzer)
ADMCDATA 453
ADMCFORM 453
ADMGDF 453
ADMSYMBL 453
HISTIN 380, 381
HISTMSG 381
HISTORY 380, 453
HISTPRT 380
SPMNMBR 380, 453
SPMNSPDT 453
SYSUDUMP 381
data sets (DB Segment Restructure)
FABRRELD database 561
FABRRELD datain 561
FABRRELD DFSVSAMP 561
FABRRELD IEFRDER 561
FABRRELD IEFRDER2 561
FABRRELD RECON1 562
FABRRELD RECON2 562
FABRRELD RECON3 562
FABRRELD SYSIN 561, 564, 592
FABRRELD SYSPRINT 561
FABRRELD USEREXIT 561
FABRUNLD database 560
FABRUNLD dataout 560
FABRUNLD DFSVSAMP 559
FABRUNLD IEFRDER 559
FABRUNLD IEFRDER2 559
FABRUNLD RECON1 560
FABRUNLD RECON2 560
FABRUNLD RECON3 560
FABRUNLD SYSIN 559, 562
FABRUNLD SYSPRINT 559
data sets (Export Utility)
FABGEXPF 415, 445
FABGRECI 415, 420
HISTIN 415, 416
HISTMSG 415, 442
HISTORY 415
HISTPRT 415, 443
data sets (HD Pointer Checker)
BLKMAPIN 62, 111, 147
CHECKREC 66, 111, 316
DBMAPPRT 65, 265
DBSRCPRT 65, 264
ddname 63
DFSHDBSC 63
DFSRESLB 61
DFSVSAMP 61
EVALIPRT 64
EVALUPR2 64, 246
EVALUPRT 64, 230
FABPCHRO CTL 267, 268
FABPCHRO PRT 267, 269
FABPCHRO SYSUDUMP 268
FSESTAT 66
HDRECS 19
HISTORY 63
IEFRDER 62, 64
IMS 62
IMS2 62
IMSACB 62
IMSDALIB 62
IXKEY 66, 315
JRM 66, 110, 111
KEYSIN 63
MERGI2nn 65, 286, 315
MERGINnn 65, 129, 286, 313
PRIMAPRT 64, 169
PROCCTL 62, 107
PROCLIB 63
RECON 63
RECOUT 19
SNAPPIT 64, 255
SORTE2nn 66, 286, 315

data sets (HD Pointer Checker) *(continued)*
SORTEX 19
SORTEX01 66, 314
SORTEXnn 66, 286
SORTILnn 66, 286, 316
SORTIN 19
SORTWKnn 65
SPMNIN 65
SPMNSPDT 65
SRTCWKnn 65
SRTEWKnn 65
SRTKWKnn 65
SRTXWKnn 65
STATIPRT 64, 174
SUMMARY 64, 261
SYSOUT 65
SYSUDUMP 65
VALIDPRT 64, 214
data sets (HD Tuning Aid)
DFSORT SORTIN 336
DFSORT SORTOUT 336
DFSORT SORTWKnn 337
DFSORT SYSABEND 336
DFSORT SYSIN 336, 347
DFSORT SYSOUT 336
DFSORT SYSUDUMP 336
FABTRAPS KEYSOUT 337
FABTRAPS PR9 337, 351
FABTRAPS PR9X 337, 353
FABTRAPS SYSUDUMP 337
FABTROOT CTL 335, 340
FABTROOT DFSHDBSC 335
FABTROOT DFSRESLB 335
FABTROOT DFSVSAMP 335
FABTROOT IEFRDER 336
FABTROOT IMS 335
FABTROOT IMS2 335
FABTROOT KEYSIN 335
FABTROOT PR10 336, 354
FABTROOT PR8 335, 348
FABTROOT PROCLIB 335
FABTROOT RAPSIN 335, 354
FABTROOT RECON 335
FABTROOT STEPLIB 334
FABTROOT SYSPRINT 336
FABTROOT SYSUDUMP 335
data sets (Space Monitor)
FABKCTL 506
HISTORY 494
SORTIN 496
SORTWK01/02/03 496
SPMININ 505
SPMNANAL 494
SPMNCREC 495
SPMNCVOL 496
SPMNDASD 494
SPMNGRAF 494
SPMNLGND 494
SPMNMBR 494, 498
SPMNMIN 494
SPMNMSG 495
SPMNPRT 494
SPMNPRTW 495
SPMNSPDT 495
data sets (Space Monitor) *(continued)*
SPMNSUMM 494
SYSOUT 496
SYSUDUMP 496
database analysis item
detailed item 457, 474
major item 456, 457
DATABASE control statement 384, 418, 479
database data set
access method of 394, 402
block (CI) size of 394, 403
device type of 394
key length of 403
logical record length of 394, 403
organization of 402
database data set (FABRRELD) 561, 592
database data set (FABRUNLD) 560
Database Image Copy utility
DB Segment Restructure 555
database number 410
database organization
DB Historical Data Analyzer 375, 451
Export Utility 413
HDAM 375, 451, 515, 520, 524
HIDAM 375, 451, 515, 520, 524
HISAM 375, 451, 515, 520, 524
PHDAM 375, 451, 515, 520, 524
PHIDAM 375, 451, 515, 520, 524
PHINDX 515, 520, 524
PINDX (HIDAM index) 515, 520, 524
PSINDEX 375, 451
PSINDX 515, 520
Secondary Index 375, 451
SINDX (secondary index) 515, 520, 524
Space Monitor 515, 524
Database Prefix Resolution utility
DB Segment Restructure 555
JCL example 573
Database Prefix Update utility
DB Segment Restructure 555
JCL example 573
Database Prereorganization utility
DB Segment Restructure 555, 557
JCL example 573
database repair guidelines 293
Database Scan utility
DB Segment Restructure 555
DATABASE statement
Space Monitor 510
datain data set (FABRRELD) 561, 592
dataout data set (FABRUNLD) 560
DB Historical Data Analyzer
HD Pointer Checker 370
MVS batch environment 370
running 375, 379
TSO/ISPF environment 370
DB Segment Restructure
DEDB 551
running 558
DB Segment Restructure (Unload) 566
DB Sensor 31
DB statement
HD Pointer Checker 125
HD Tuning Aid 341

DBD
conversion to DEDB 591
regeneration 375, 413, 451
DBD Parameters and Overrides report 349
DBDGEN
conversion to DEDB 591
DB Segment Restructure 555, 557
DBMAPPRT data set 65
DBRC 291
DBSRCPRT data set 65
DCB information
FABRUNLD 560
DD statements
DB Historical Data Analyzer 380
DB Segment Restructure 559, 560
Export Utility 414
HD Pointer Checker 47
HD Tuning Aid 332, 337
Space Monitor 491
ddname data set
HD Pointer Checker 63
debugging options 321
DEDB
converting to 553, 591
DB Segment Restructure 553
DEDB data set
Space Monitor 485
DEDB Initialization utility
conversion to DEDB 591
definition statements (Export Utility)
FIELD 423
RECORD 421
DFSHDBSC data set
HD Pointer Checker 63
DFSORT
Data Facility Sort 496
JCL 336
SORTIN data set 336
SORTOUT data set 336
SORTWKnn data set 337
SYSABEND data set 336
SYSIN data set 336, 347
SYSOUT data set 336
SYSUDUMP data set 336
DFSRESLB data set
HD Pointer Checker 61
HD Tuning Aid 335
DFSVSAMP data set
FABRRELD 561
FABRUNLD 559
HD Pointer Checker 61
HD Tuning Aid 335
diagnostics aid 805
disability 16
DL/I buffer handler
FABRRELD 561
FABRUNLD 559
DLIBATCH procedure
FABRRELD 560
FABRRELD example 573
FABRUNLD example 575
documentation
accessing 14
sending feedback 14
DOWN command 458
duplicate ILKs 115
dynamic allocation of database data set and image copy data sets 67, 136
dynamic allocation of work data sets 133, 312
dynamic PSB generation 44, 69, 72, 82

E

END command 458
END statement
HD Pointer Checker 143
Space Monitor 512
ENDPROC control statement 389
EPS (extended pointer set) 409
EPS check 115
EPS healing 115
EPSCHK 404
error
HASH Check 393
index key check 393
ESTIMATE_WK 311
estimating work data set sizes 312
estimating work data set sizes automatically 311
EVALIPRT data set 64, 248
evaluation error 405
EVALUPR2 data set 64, 246
EVALUPRT data set 64, 230
examples
DB Historical Data Analyzer
deleting HISTORY data set entries 478
producing HD Analysis report 479
producing HD Pointer Checker Summary report 479
reorganizing HISTORY data set 477
DB Segment Restructure 569
Export Utility 480, 481
HD Pointer Checker
runtime options 404
statistics information of 376, 451
HD Tuning Aid 359
Space Monitor
increasing buckets on Space Monitor graph record 533
monitoring space using FABKCTL data set 533
EXEC parameters
DB Historical Data Analyzer 380, 414
DB Segment Restructure 559, 561
HD Pointer Checker 44, 267
HD Tuning Aid 333, 336, 337
Space Monitor 491
Export Utility 369
exportable 387
extent
number of 502

F

FABGCMD0 454
FABGEXPF 445
FABGGRAF 370
FABGHIST 370
FABGP000 370
FABGPANL 370

FABGRECI 420, 445
FABGRECI data set 372
FABGRECI Statement report 443
FABGXEXP 414
FABKCTL data set 506
FABKTGEN
  FABKCTL control statements 547
  how to use 541
  JCL 544
  SPMNIN control statements 545
FABPATH0 procedure 25
FABPATHZ procedure 25
FABPC procedure 89
FABPCD procedure 91
FABPCHRO
  control statement 268
  how to use 267
  input 268
  JCL 267
  output 269
FABPCHRO CTL data set 267, 268
FABPCHRO PRT data set 267, 269
FABPCHRO SYSUDUMP data set 268
FABPCM procedure 96
FABPCMD procedure 99
FABPCTA procedure 93
FABPCTAM procedure 102
FABPMAIN
  DD statements 47, 60
  EXEC statement 44
  how to use 39
  input 107
  JCL 47
  output 151
  running 43
FABPP procedure 71
FABPPA procedure 74
FABPPD procedure 72
FABPPM procedure 79
FABPPMD procedure 82
FABPPTA procedure 76
FABPPTAM procedure 85
FABPTGEN
  control statements 275
  how to use 271
  JCL 274
FABRRELD
  Control Card Format report 567
  Control Cards and Messages report 567
  conversion to DEDB 591
  database data set 561, 592
  datain data set 561, 592
  DBD 552
  DEDB 551
  DFSVSAMP data set 561
  DLIBATCH procedure 558
  IEFRDER data set 561
  IEFRDER2 data set 561
  JCL 560
  JCL (DEDB) 592
  JCL example 569, 572, 573, 578
  job control language 558
  PSB 552, 558
  running 555, 557
FABRRELD *(continued)*
  SYSIN data set 561, 564, 592
  SYSPRINT data set 561, 567, 592
  USEREXIT data set 561, 592
FABRUNLD
  Control Card and Messages report 567
  Control Card Format report 566
  conversion to DEDB 591
  database data set 560
  dataout data set 560
  DBD 552
  DFSVSAMP data set 559
  DLIBATCH procedure 558
  IEFRDER data set 559
  IEFRDER2 data set 559
  JCL 559
  JCL example 569, 573, 578
  job control language 558
  PSB 552, 558
  running 555, 557
  SYSIN data set 559, 562
  SYSPRINT data set 559, 566
FABTIMS 337
FABTMVS 337
FABTRAPS
  JCL 337
  KEYSOUT data set 337
  PR9 data set 337, 351
  PR9X data set 337, 353
  SYSUDUMP data set 337
FABTROOT
  CTL data set 335, 340
  DFSHDBSC data set 335
  DFSRESLB data set 335
  DFSVSAMP data set 335
  IEFRDER data set 336
  IMS data set 335
  IMS2 data set 335
  JCL 332
  KEYSIN data set 335
  PR10 data Set 354
  PR8 data set 335, 348
  PROCLIB data set 335
  RAPSIN data set 335, 354
  SYSPRINT data set 336
  SYSUDUMP data set 335
Fast Reorganization Reload utility 554
field names 425
FIELD statement 423
flat file 372, 445
flat record 372, 420
flat record definition 372, 420
free space
  percentage 502
FSESTAT 66

G

GDDM (Graphical Data Display Manager)
  chart data data set 453
  chart format data set 453
  GDF (graphic data format) data set 453
  Presentation Graphic Feature
    ICU panel 473

GDDM (Graphical Data Display Manager) *(continued)*
symbol data set 453
Graph Selection Menu panel 464
Group Selection Menu panel 459
GSCD call 336

H

HALDB
DB Historical Data Analyzer 375, 413, 451
DB Segment Restructure 557
Space Monitor 489
HALDB Online Reorganization (OLR)
DB Historical Data Analyzer 375
Space Monitor 490
HALDB Process Summary report 354
HALDB Reorganization Number Verification 117
hardware requirements
DB Historical Data Analyzer 17
DB Segment Restructure 17
HD Pointer Checker 17
HD Tuning Aid 17
Space Monitor 17
HASH 404
HASH Check 31, 35, 112, 319
HD Analysis graph 369, 472
HD Analysis Graph Chart
bar chart 451
histogram 451
line graph 451
pie chart 451
polar chart 451
surface chart 451
table chart 451
tower chart 451
venn diagram 451
HD Analysis report 383, 394, 479
HD Pointer Checker 31
HD Pointer Checker processor 34
HD Pointer Checker Summary report 383, 392, 479
HD record format option 553, 554, 562, 568
HD Reorganization Reload utility 553, 554
HD Reorganization Unload utility 551, 554
HD Tuning Aid
running 331
HDAM 413, 515, 520, 524
HDAM Physical Sequence Sort/Reload utility 554
HDPC Site Default Generation utility
running 271
HDRECS data set 19
HELP command 458
HIDAM 413, 515, 520, 524
High Availability Large Database (HALDB)
HD Pointer Checker 63, 115
HD Tuning Aid 327, 328, 333
High Speed Sequential Retrieval 554
HISAM 413, 515, 520, 524
HISAM Reorganization Reload utility
DB Segment Restructure 555
HISAM Reorganization Unload utility
DB Segment Restructure 555
HISTIN data set
Export Utility 372, 416
HISTLOCK option 135
HISTMSG 442
histogram 451
historical analysis
by DB blocks 466
by DB free space 467
by DB records 471
by DB roots and dependent segments 469
by DB segments 467
by root segments 468
by space allocation 471
Historical Analysis by DB Blocks panel 466
Historical Analysis by DB Free Space panel 467
Historical Analysis by DB Records panel 471
Historical Analysis by DB Roots and Dependent Segments panel 469
Historical Analysis by DB Segments panel 467
Historical Analysis by Root Segments panel 468
Historical Analysis by Space Allocation panel 471
Historical Analysis Primary Menu 459
HISTORY Attribute report 444
HISTORY data set
change attributes of 379
deleting an entry of 376, 383, 478
estimating size of 377
initialization of 376, 378, 383
key field of 376
record layout 599
reorganization of 376, 383, 477
Space Monitor 490
using under TSO/ISPF 453
HISTORY Data Set by DB-DS report 383, 391
HISTORY Data Set by Key Date report 383, 390
HISTORY Data Set Message report
Export Utility 443
HISTORY Export Summary report 444
HISTORY option
DB Historical Data Analyzer 63
Space Monitor 63
HISTPRT 390, 443
home block 408
HOMECHK 404
how to use
DB Historical Data Analyzer (Export Utility) 413
DB Historical Data Analyzer (MVS batch environment) 375
DB Historical Data Analyzer (TSO/ISPF environment) 451
DB Segment Restructure 553
Disk Address Analyzer 267
HD Pointer Checker 39
HD Tuning Aid 331
Space Monitor 489
HPSRETCD data set 148

I

ICU (Interactive Chart Utility)
see GDDM 369
IDCAMS
conversion to DEDB 591
DB Segment Restructure 557
IEBISAM 297
IEBUPDTE utility 532
IEFRDER data set 64

IEFRDER data set (FABRRELD) 561
IEFRDER data set (FABRUNLD) 559
IEFRDER2 data set (FABRRELD) 561
IEFRDER2 data set (FABRUNLD) 559
ILK checking 115
image copy data set 390, 391, 393, 394, 402
IMS catalog databases 44
IMS data 472
IMS data set
    HD Pointer Checker 62
    HD Tuning Aid 336
IMS Database Image Copy utility
    conversion to DEDB 591
    DB Segment Restructure 555
IMS Database Prefix Resolution utility
    DB Segment Restructure 555
    JCL example 573
IMS Database Prefix Update utility
    DB Segment Restructure 555
    JCL example 573
IMS Database Prereorganization utility
    DB Segment Restructure 555, 557
    JCL example 573
IMS Database Recovery Facility 24
IMS Database Scan utility
    DB Segment Restructure 555
IMS DEDB Initialization utility
    conversion to DEDB 591
IMS HD Reorganization Reload utility 553, 554
IMS HD Reorganization Unload utility 551, 554
IMS High Performance Image Copy
    DB Segment Restructure 555, 557
IMS High Performance Prefix Resolution
    DB Segment Restructure 555
IMS HISAM Reorganization Reload utility
    DB Segment Restructure 555
IMS HISAM Reorganization Unload utility
    DB Segment Restructure 555
IMS HP Pointer Checker 1.1
    compatibility 19
IMS Index Builder
    DB Segment Restructure 555
IMS Library Integrity Utilities 142, 143
IMS Online Database Image Copy utility 557
IMS Tools Knowledge Base 14, 23
IMS Tools Online System Interface
    configuration 28
    monitoring IMS online full-function database data sets 485
IMS2 data set
    HD Pointer Checker 62
    HD Tuning Aid 335
IMSACB data set
    HD Pointer Checker 62
IMSDALIB data set
    HD Pointer Checker 62
in-core pointer check 136, 319
INCORE 404
Index Key check 31, 34, 35, 113
indirect list data set (ILDS)
    DB Historical Data Analyzer 375, 451
    Space Monitor 489
Indirect List Data Set (ILDS) 413
initial load program
initial load program *(continued)*
    DB Segment Restructure 553, 561
input (DB Historical Data Analyzer)
    FABGHIST 381
    FABGXEXP 415
input (DB Segment Restructure)
    FABRRELD 564
    FABRUNLD 562
input (HD Pointer Checker)
    FABPCHRO 268
    FABPMAIN 107
input (HD Tuning Aid)
    DFSORT 347
    FABTROOT CTL 340
input (Space Monitor)
    FABKCTL 506
    SPMININ 505
    SPMNMBR 498
Integrated DB Sensor 31
Interactive Chart Utility (ICU) 369, 451, 472
introduction
    DB Historical Data Analyzer 7, 369
    DB Segment Restructure 7, 551
    HD Pointer Checker 7, 31
    HD Tuning Aid 7, 327
    Space Monitor 7, 485
ISPEXEC command 453
ISPF command 458
ISPF interface
    DB Historical Data Analyzer 26
ISPF panel module 370
ISPSTART command 370, 453
IXKEY data set 66, 315
IXKEYCHK 404

J

JCL procedure
    HD Pointer Checker 69
    HD Tuning Aid 337
    Space Monitor 497
job control language (JCL) (DB Historical Data Analyzer)
    FABGHIST 380
    FABGXEXP 414
job control language (JCL) (DB Segment Restructure)
    FABRRELD 560
    FABRUNLD 559
job control language (JCL) (HD Pointer Checker)
    FABPCHRO 267
    FABPMAIN 47
    FABPTGEN 274
job control language (JCL) (HD Tuning Aid)
    DFSORT 336
    FABTRAPS 337
    FABTROOT 332
job control language (JCL) (Space Monitor)
    FABKSPMN 491
    FABKTGEN 544
JRM data set 66, 110, 111
jump function (=X) 458

K

key date 472
keyboard shortcuts 16
KEYS command 458
KEYSIN data set
  HD Pointer Checker 63
  HD Tuning Aid 335
KEYSIN data set record layout 597
keywords
  compatibility
    EXPORTABLE= 22
    HISTLOCK= 22
    MULTIENT= 22
    MULTIIMSID= 22
keywords (DB Historical Data Analyzer)
  ATTR= 423
  DAYS= 418
  DB= 384, 418
  DBORG 416
  DD= 384
  DSGID 421
  EXPORTABLE= 386
  FROM= 384, 418
  HISTLOCK= 386
  IMSID= 382, 418
  KEEP= 384
  KEYDATAFORM= 382
  LEN= 423
  MEMBER 416
  MEMBER= 384
  MULTIENT= 386
  MULTIIMSID= 386
  NAME= 423
  RECID 421
  TO= 384, 418
  TYPE 416, 421
  TYPE= 382
  VALUE= 423
keywords (HD Pointer Checker)
  ADXCFGRP= 119
  BITMAP= 141
  BLOCKDUMP= 129
  CHAINDIST= 142, 318, 319
  CHECK= 120
  CHECKREC= 66, 122, 319
  COMPFACT= 142
  DATASET= 127
  DB= 126
  DBALL= 128
  DBDIST= 141
  DBERROR= 150
  DBORG= 111
  DD= 126
  DECODEDBD= 65, 142
  DIAG= 321
  DIAGDUMP= 133
  DSSIZE= 133
  DUMPFORM= 133
  DUPILKCHK= 115
  EMPTYKEYSIN= 150
  EPSCHK= 115, 319
  ERRLIMIT= 132
  FSEMAP= 141
keywords (HD Pointer Checker) *(continued)*
  GROUPDIGITS= 122
  HASH= 112, 318
  HISTORY= 63, 135
  HOMECHK= 135, 319
  IBUFF= 137, 319
  ICRG#CHK= 117
  ICUNIT= 68, 136
  INCORE= 136
  INTERVAL= 136
  INTFS= 141
  INTST= 140
  ITKBLOAD= 119
  ITKBSRVR= 118
  IXKEYCHK= 113, 318, 319
  IXKEYCKCHK= 113
  KEYSIN= 63, 135, 319
  MAPDBD= 65, 143
  MAXFSD= 141
  NOCHKP= 321
  NUM= 126
  OVERFLOW= 127
  PART= 126
  PRIMEDB= 127
  PRINTDATA= 321
  PROCERROR= 150
  PTRCHK= 138, 312, 313
  RECOVNEEDED= 150
  RETCDDSN= 121
  RUNTM= 140
  SCANGROUP= 128, 319
  SEGIO= 142
  SENSOR_HOME= 118
  SENSOR= 118
  SEP= 122
  SPIXCHK= 138, 319
  SPMN= 138
  SPMNERROR= 150
  SPMNWARN= 150
  SYMIXCHK= 114
  SYMLPCHK= 115
  T2CHK= 137
  T2ERROR= 150
  THRESHOLDS= 138
  TOSIXCFGRP= 119
  TYPE= 110
  USER= 121
  VLSSUMM= 122, 319
  VSAMBF= 137
  WKDATACLASS= 122
  WKHLQ= 124
  WKSTORCLASS= 123
  ZEROCTR= 137
keywords (Space Monitor)
  AREA= 510
  DB= 510
  DD= 510
  IMSID= 506
  PART= 510
  THRESHOLDS= 508
  TOSIXCFGRP= 506
  USER= 506

L

LANG
  DB Segment Restructure 559, 560
LCF (logical child first) 409
LCL (logical child last) 409
legal notices
  cookie policy 811
  notices 811
  programming interface information 811
  trademarks 811
legend 473
Legend report 494, 522
line graph 451, 472
logical relationships
  DB Segment Restructure 555
  DB Segment Restructure example 569, 573
Logo panel 459
LP (logical parent) 409
LRECL
  dataout DD
    FABRUNLD 560
LTB (logical twin backward) 409
LTF (logical twin forward) 409

M

MERGI2nn data set 65, 286, 315
MERGIN data set 51, 54, 57
MERGIN2 data set 51, 55, 58
MERGINnn data set 65, 129, 286, 313
message module 370
messages
  Space Analysis by Data Set report 519
  Space Monitor Exception report 526
messages and codes
  DB Historical Data Analyzer 751
  DB Segment Restructure 793
  HD Pointer Checker 605
  HD Tuning Aid 731
  Space Monitor 772
messages to operator 168
monitoring space
  using FABKCTL data set 533
  using SPMNIN data set 531
  using SPMNMBR data set 532
multiple database data set entries 386

N

non-HALDBs
  DB Segment Restructure 555
non-IMS data set 386
non-reusable free space 466
nonreusable free space 406, 516
notices 811

O

online considerations 289
Online Database Image Copy utility 557
OPTION control statement 418
OPTION statement
OPTION statement *(continued)*
  HD Pointer Checker 131
  Space Monitor 508
OS data set
  Space Monitor 490
output (DB Historical Data Analyzer)
  FABGHIST 389
  FABGXEXP 442
output (DB Segment Restructure)
  FABRRELD 567
  FABRUNLD 566
output (HD Pointer Checker)
  FABPCHRO 269
  FABPMAIN 151
output (HD Tuning Aid)
  FABTRAPS 351
  FABTROOT 348, 354
output (Space Monitor)
  FABKSPMN 512
overflow area 394

P

panels
  structure 455
parallel scan 128, 319
PART statement
  HD Tuning Aid 344
partition high key 346
partition name 376
partition selection
  HD Pointer Checker 126
  HD Tuning Aid 334, 335, 344
partition selection exit 334, 335
partition selection string 346
partitioned secondary index (PSINDEX) 413
PCF (physical child first) 409
PCL (physical child last) 409
performance tips for HD Pointer Checker 319
PF (program function) key 458
PFSHOW command 458
PHDAM 413
PHIDAM 413
physical data set 499
pie chart 451
PINDX (HIDAM index) 515, 520, 524
pointer types
  *LC 409
  *LP 409
  CTR (counter) 409
  EPS 409
  LCF (logical child first) 409
  LCL (logical child last) 409
  LP (logical parent) 409
  LTB (logical twin backward) 409
  LTF (logical twin forward) 409
  PCF (physical child first) 409
  PCL (physical child last) 409
  PP (physical parent) 409
  PTB (physical twin backward) 409
  PTF (physical twin forward) 409
pointer validation 405
polar chart 451
PP (physical parent) 409

PR10 data set 336, 354
PR8 data set 335, 348
PR9 data set 337, 351
PR9X data set 337, 353
predefined flat record
    FABGRECI 445
PRIMAPRT data set 64, 169
primary request control statement 562
PROC 337
PROC control statement 416
PROC statement
    DB Historical Data Analyzer 382
    HD Pointer Checker 108
    Space Monitor 506
PROCCTL data set 62, 107
process flow
    HDPC Site Default utility 271
    SPMN Site Default utility 541
processing environment
    DB Historical Data Analyzer 17
    DB Segment Restructure 17
    HD Pointer Checker 17
    HD Tuning Aid 17
    Space Monitor 17
PROCLIB data set
    HD Pointer Checker 63
PROCOPT 559, 561, 580, 581
program functions
    DB Historical Data Analyzer 369
    DB Segment Restructure 551
    HD Pointer Checker 31
    HD Tuning Aid 327
    Space Monitor 485
program structure
    DB Historical Data Analyzer 370
    DB Segment Restructure 551
    HD Pointer Checker 34
    HD Tuning Aid 328
    Space Monitor 487
programming interface information 811
PSB
    conversion to DEDB 591
    creating a new
        FABRRELD example 572
        FABRUNLD example 572
    DB Segment Restructure 559, 560
PSB (HD Pointer Checker)
    library 62
PSB (HD Tuning Aid) 335
PSBGEN
    conversion to DEDB 591
PTB (physical twin backward) 409
PTF (physical twin forward) 409
Public format flag 377

R

randomizing module 407
RAPSIN data set 335, 354
reader comment form 14
recommended operational strategy 287
RECON data set
    HD Pointer Checker 63
    HD Tuning Aid 335
record sequence number 377
RECORD statement 421
RECOUT data set 19
report (DB Historical Data Analyzer)
    HD Analysis report 394
    HD Pointer Checker Summary report 392
    HISTORY Attribute report 410
    HISTORY Data Set by DB-DS report 391
    HISTORY Data Set by Key Date report 390
    HISTORY Data Set Message report 389
report (DB Segment Restructure)
    Control Card Format (Reload) 567
    Control Card Format (Unload) 566
    Control Cards and Messages (Reload) 567
    Control Cards and Messages (Unload) 567
report (HD Pointer Checker)
    Bit Map Display 185
    Block Map and Block Dump 255
    Check Process Total 236
    Control Card and Pointer Information 269
    Control Card Format 269
    Database Repair Guidelines 242
    Database Statistics report 203
    DB Record Distribution Statistics 197
    DBD MAP 265
    DBD Source 264
    DBSRCPRT DBD Map 265
    DBSRCPRT DBD Source 264
    DBSRCPRT Messages 264, 265
    Description of All Scanned Database 226
    DMB Directory 170
    DMB Directory and Control Card Format 243
    EPS Healing 249
    Evaluation of All Pointers to the Same Target 231
    Evaluation of ILKS 251
    Evaluation of Index Pointers and Keys 238
    Evaluation of Symbolic Pointers 246
    Free Space Map 186
    HASH Evaluation 237
    HD Data Set Statistics 191
    HD Pointer Checker Message Summary report 264
    HD Pointer Checker Summary report 261
    HISAM Data Set Statistics 177
    HISAM Segment Level Statistics 182
    HPSRETCD Statements report 174
    Interval Free Space Summary 189
    Interval Statistics 184
    Legend for Check Process Evaluation 235
    Legend for Check Process Validation 230
    Legend for Reconstruction 246
    Legend for Scan and Validation 225
    Maximum Free Space Distribution 188
    Partition Statistics report 203
    Pointer Chain Reconstruction 244
    PROCCTL statements 172
    Scan of HISAM Database 214
    Scan of Index Database 218
    separator page
        for Block Map and Dumps reports 255
        for Database Statistics reports 203
        for DB/DSG reports 175
        for evaluation reports 231
        for HD Pointer Checker Summary reports 261
        for Partition Statistics reports 202

report (HD Pointer Checker) *(continued)*
separator page *(continued)*
for reconstruction reports 242
for statistics reports 174
for the start of HD Pointer Checker reports 169
for validation reports 214
Validation of a Pointer to a Target at CHECK 228
Validation of a Pointer to a Target at SCAN (HDAM/HIDAM/PHDAM/PHIDAM) 222
report (HD Tuning Aid)
Actual Roots per Block 327, 331, 350
Assigned Roots per Block 327, 331, 353
Assigned Roots per RAP 327, 331, 351
Control Card 349
Control Card Format 348
DBD Parameters and Overrides 349
HALDB Process Summary 354
report (Space Monitor)
Legend report 522
Space Analysis by Data Set report 513
Space Monitor Exception report 526
Space Monitor Graph report 523
Summary of Data Sets by Volume report 519
Total DASD Utilization by Volume/Device-Type report 521
REPORT statement 139
restrictions and considerations
DB Historical Data Analyzer
MVS batch environment 375
TSO/ISPF environment 451
DB Segment Restructure 553
Export Utility 413
HD Pointer Checker
calling Space Monitor 41
HALDBs 39
HASH Check 41
HISAM 39
image copy data set 40
secondary index databases 39
SHISAM 39
HD Tuning Aid 331
Space Monitor 489
return codes
DB Historical Data Analyzer 751
DB Segment Restructure 793
HD Pointer Checker 605
HD Tuning Aid 731
Space Monitor 772
RETURN command 458
reusable free space 406, 466

S

scan group 129, 317, 319
SCAN process
for HDAM/HIDAM/PHDAM/PHIDAM 34
for HISAM 34
for INDEX/PSINDEX 34
scan task 129
scatter plot 488, 523
screen readers and magnifiers 16
secondary index 413
segment
average number of occurrences 410
segment *(continued)*
code 409
length of 410
maximum length of 410
name 409
prefix length of 410
total number of occurrences 410
segment code 410
service information 14
SHISAM 413
SINDX (secondary index) 515, 520, 524
slack bytes 307
SNAPPIT data set 64, 255
software requirements
DB Historical Data Analyzer 17
DB Segment Restructure 17
HD Pointer Checker 17
HD Tuning Aid 17
Space Monitor 17
Sort process 34
SORTE2nn data set 66, 286, 315
SORTEX data set 19, 55, 58
SORTEX01 data set 66, 314
SORTEX2 data set 51, 55, 58
SORTEXnn data set 66, 286
SORTIL data set 58
SORTILnn data set 66, 286, 316
SORTIN data set 19, 336, 491, 496
SORTOUT data set 336
SORTWK01/02/03 data set 491, 496
SORTWKnn data set 65, 337
space allocation 133
space allocation information 471
Space Analysis by Data Set report 494, 513
Space Monitor
Exception report 495, 526
graph record data set (SPMNSPDT) 488, 512
Graph report 494, 523
monitoring space using FABKCTL data set 533
monitoring space using SPMNIN data set 531
monitoring space using SPMNMBR data set 532
record 495
running 490
space requirement
Space Monitor 491
Spare index 138
SPMN Site Default utility
running 541
SPMNCREC data set 491, 495
SPMNCVOL data set 491, 496
SPMNIN data set
HD Pointer Checker 65
SPMNMBR data set 389, 487, 490, 494, 498
SPMNMSG data set 495
SPMNPRT data set 494, 513
SPMNPRTW data set 495, 526
SPMNSPDT data set
HD Pointer Checker 65
SPMNSPDT data set (Space Monitor graph record data set) 451, 453
SRTCWKnn data set 65
SRTEWKnn data set 65
SRTKWKnn data set 65
SRTXWKnn data set 65

statements (HD Pointer Checker)
BLKMAPIN 147
DATABASE 125
END 143
OPTION 131
PROC 108
REPORT 139
syntax of 107
STATIPRT data set 64, 174
STEPLIB data set 334
storage size 318
SUMMARY data set 64, 261
Summary of Data Sets by Volume report 494, 519
support information 14
surface chart 451
syntax diagrams
how to read 601
SYSABEND data set 268, 336
SYSIN data set
DB Segment Restructure (FABRRELD) 561, 564, 592
DB Segment Restructure (FABRUNLD) 559, 562
HD Tuning Aid 336, 347
SYSOUT data set
HD Pointer Checker 65
HD Tuning Aid 336
SYSPRINT data set
DB Segment Restructure (FABRRELD) 561, 567
DB Segment Restructure (FABRUNLD) 559, 566
FABRRELD JCL (DEDB) 592
HD Tuning Aid 336
system log data set
FABRRELD 561
FABRUNLD 559
SYSUDUMP data set
HD Pointer Checker 65
HD Tuning Aid 335, 337
Space Monitor 496

T

T2 errors 307
T2 record 393
T2CHK 404
table chart 451
technotes 14
threshold value
warning 531
THRESHOLDS keyword
AVAILEXT= 139, 509
CASPLIT%= 139, 509
CISPLIT%= 139, 509
DSSIZE%= 139, 509
DSSIZE= 139, 509
EXTENTS= 139, 509
FREESPC%= 139, 509
HDPCDAYS= 509
LASTEXT= 139, 509
REORGINTVL= 139, 509
USEDSPC%= 139, 509
VOLEXT= 139, 509
Total DASD Utilization by Volume/Device-Type report 494, 521
tower chart 451
trademarks 811
TSO CLIST (command list) 454
TYPE keyword
ANALYSIS 383, 394
CREATE 380, 383
DELETE 380, 383, 391, 392
LIST 383, 390, 391
REORG 380, 383
SUMMARY 383, 392
type of record 229, 232
types of pointer 409

U

ULU 45
unidirectional logical relationship 410
unknown data 307
unloaded database 568
UP command 458
update program
FABRRELD 578
PROCOPT 578
PSB
creating a new 578
update program 578
usable free space 515
user exit routines
DB Segment Restructure
example 569
example 573
FABRRELD 565
user-defined flat record
FABGRECI 445
USEREXIT data set (FABRRELD) 561, 592

V

validate/evaluate 35
validation error 405
VALIDPRT data set 64, 214
venn diagram 451
VSAM Zapper utility 295, 298

W

warning threshold
for days without HD Pointer Checker run 503, 516, 531
for the data set size 505, 529
for the last available space 529
for the last extent 503, 528
for the number of available extents 503, 528
for the number of days without a database reorganization 504, 528
for the number of extents 502, 531
for the percentage of CA split 504, 528
for the percentage of CI split 504, 528
for the percentage of free space 502, 531
for the percentage of space 528
for the percentage of space used 503
for the percentage of the data set used space 505, 529
not enough space for the last space 504
work data set
DSSIZE parameter 133
dynamic allocation 69, 72, 133

Z

ZEROCTR 404

Product Number: 5655-U09

SC19-2401-06