

IBM Db2 Analytics Accelerator for z/OS
Version 5.1.7

Installation Guide



Note

Before you use this information and the product it supports, read the information in “Notices” on page 183.

Eighth Edition, January 2019

This edition applies to version 5.1.7 of IBM Db2 Analytics Accelerator for z/OS (product number 5697-DA5), and to all subsequent releases and modifications until otherwise indicated in new editions. This edition replaces SH12-7062-06. Changes to this edition are marked with a vertical bar.

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Contents

Figures	vii
----------------	------------

About this book	ix
------------------------	-----------

Who should read this book	xi
----------------------------------	-----------

What's new in version 5?	xiii
---------------------------------	-------------

Chapter 1. Migrating from earlier versions	1
Migrating HPSS partitions	2
Fixing HPSS issues after the migration	3

Chapter 2. Configuring TCP/IP for connections between IBM System z and the IBM PureData System for Analytics	5
---	----------

Chapter 3. Security considerations	7
---	----------

Chapter 4. Installing IBM Db2 Analytics Accelerator Studio	11
---	-----------

Chapter 5. Enabling an existing Db2 subsystem for IBM Db2 Analytics Accelerator for z/OS	13
Software prerequisites for the Db2 data server	13
Installing libraries with IBM Db2 Analytics Accelerator for z/OS support	13
Creating the IBM Db2 Analytics Accelerator database	14
Setting ZPARMs for IBM Db2 Analytics Accelerator for z/OS	14
Setting ZPARMs for IBM Db2 Analytics Accelerator in Db2 11 for z/OS	14
Using a sample job to set ZPARMs for IBM Db2 Analytics Accelerator for z/OS	18
Configuring the incremental update function	22

Chapter 6. Setting up IBM Db2 Analytics Accelerator for z/OS	23
Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored procedures	23
Verifying the correct setup of Db2-supplied stored procedures	27
Defining WLM performance goals for IBM Db2 Analytics Accelerator for z/OS stored procedures	27
Adjusting WLM performance goals for SYSPROC.ACCEL_LOAD_TABLES	28
Setting access rights for the user who runs AQTTIJSP	30
Customizing and running AQTTIJSP	30

Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures	31
Customizing and running AQTSJI00	32
Customizing and running AQTSJI01	32

Chapter 7. Connecting IBM Db2 Analytics Accelerator for z/OS and Db2	35
Access rights	35
Access rights for power users	35
Minimum access rights	37
Binding Db2 packages and granting user privileges	38
Creating EXPLAIN tables	38
Creating a database connection profile	39
Testing the connection from IBM Db2 Analytics Accelerator Studio	41
Adding accelerators	42
Obtaining the pairing code for authentication	42
Completing the authentication using the Add Accelerator wizard	44
Testing the stored procedures	45
Customizing AQTSJI02	46
Customizing AQTSXTCO	47
Customizing AQTSCI02	47
Running AQTSJI02	48

Chapter 8. Testing query acceleration	49
Selecting a test query	49
Defining accelerator-shadow tables	49
Loading and enabling tables	49
Running a test query	50

Chapter 9. Incremental updates	53
Concepts and architecture	54
Integration	55
Completing the installation and configuring CDC	56
Configuration settings for IBM InfoSphere Data Replication for z/OS	57
Configuring staging space resources on z/OS	61
Enabling DATA CAPTURE CHANGES	62
Enabling log caching	63
Performance tuning	63
Starting CDC	64
Installing and activating the Access Server and the replication engine	64
Transferring packages for the Access Server or the replication engine	65
Activating the Access Server and the replication engine	65
Enabling or disabling Db2 subsystems	67
Enabling incremental updates for a Db2 subsystem	67
Disabling incremental updates for a Db2 subsystem	70
Starting or stopping incremental updates	71
Applying incremental updates in parallel	73

Defining keys automatically	75
Enabling continuous incremental updates	78
Suspending faulty tables	81
Excluding suspended tables from accelerated queries	82
Changing the group IP or the DRDA port	85
Changing the IP address of the CDC Capture Agent	86
Configuring the expiration behavior of WAITFORDATA queries	88
Including or excluding loaded tables from WAITFORDATA queries	90
Removing unused table metadata	92

Chapter 10. Encryption of data in motion 95

Chapter 11. Installing the IBM Netezza Analytics stored procedure package . . . 97

Installing the IBM Netezza Analytics stored procedure package	97
Creating the wrapper stored procedures	98
Using a separate database	98
Authorizations for remote stored procedures	99
Enabling the IBM Netezza Analytics stored procedures on an accelerator	99

Chapter 12. Beyond the basics 101

Logging on to the IBM Db2 Analytics Accelerator Console	101
Setting a system-wide resource limit	101
Setting resource limits for Db2 subsystems	103
Mapping of WLM importance levels to Netezza priorities	106
Setting the priority of data maintenance tasks	106
Converting 24:00:00 h time values	109
Disabling the conversion of 24:00:00 time values	110
Using the call-home function	111
Preparing your System Z for the call-home function	112
Configuring the call-home function on the accelerator	114
Providing contact information	116
Enabling the call-home function	118
Disabling the call-home function	119
Updating FTP credentials	119
Changing the maximum trace file size	121
Displaying call-home settings	122
Sending a test email	123
Changing data-encryption settings	124
Changing the keystore password	125
Manually changing the AEK	126
Using a system-generated AEK	127
Enabling queries against system-temporal and bi-temporal tables	128
Enabling the truncation of high-precision timestamps	130

Chapter 13. Installing updates 131

Updating the z/OS base package	132
--	-----

Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS	132
Updating IBM Db2 Analytics Accelerator Studio	133
Differences to earlier versions and customization	134
Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine	135
Updating accelerator components	135
Updating other Netezza software	140
Removing obsolete software packages from an accelerator	143
Updating the IBM Db2 Analytics Accelerator stored procedures	144
Updating the CDC Capture Agent	145
Running different versions of IBM Db2 Analytics Accelerator for z/OS at the same time	146

Chapter 14. Removing accelerators from your Db2 for z/OS configuration . 149

Cleaning up the communications database manually	149
Removing the remaining database objects	149

Chapter 15. Troubleshooting 151

Redundant CDC metadata	151
Firewall blocks operations because crucial ports are closed	151
Message AQT10200E and SQL code -206 when running stored procedures after migration	152
Message DSNUTILU NOT INVOKED APF AUTHORIZED	153
Error during bind step for stored procedure or function	153
No CEEDUMPs	153
PRIQ value too high when creating table spaces	154
The Db2 command -DIS ACCEL does not work	154
Connection authorization failure (error -4214)	154
Errors during ZPARM compilation	155
DRDA connection does not work	155
Removing orphaned system-table entries and catalog-table entries	156
Package not found when running a stored procedure from IBM Db2 Analytics Accelerator Studio	156
Packet delivery failure	157
SQL code -430 from IBM Db2 Analytics Accelerator for z/OS stored procedures	158
SQL code -471 referring to a function in the DSNAAQT schema	159
SYSPROC.ACCEL_LOAD_TABLES returns SQL error -471 and reason code E790002 for DSNUTILU	159
Load of partitioned tables freezes during unload phase	160
Message SYSACCELERATORS DOES NOT HAVE PROPER COLUMN DEFINITIONS	160
Repeated IBM InfoSphere Data Replication for z/OS errors after abnormal end of Db2 for z/OS	161
SQL error as you try to enable tables for incremental updates	161
Ultralite host outage after network reconfiguration	162

Appendix A. Sample TCP/IP configuration	163	Product Configuration for GDPR	188
		How to configure the offering so that it can be	
		used in a GDPR environment	188
Appendix B. Members of SAQTSAMP	165	Data Life Cycle.	189
		What types of data?	189
Appendix C. Environment variables	169	Where in the process?	189
		For what purpose?	189
		Personal data used for online contact with IBM	189
Appendix D. Using the Db2 command line processor from UNIX System Services	175	Data Collection.	190
		Data Storage	190
		Data Access	191
		Data Processing	191
Appendix E. Disabling accelerators in a Db2 subsystem.	177	Data Deletion	192
		Data Monitoring	192
Appendix F. Enabling accelerators in a Db2 subsystem	179	Responding to Data Subject Rights	192
		Does the offering facilitate being able to meet	
		data subject rights?	192
Appendix G. Restoring old-style package management.	181		
Notices	183	Glossary	195
Trademarks	185	A	195
Terms and conditions for product documentation	185	D	195
		L	195
GDPR considerations	187	M	195
GDPR	187	P	195
Why is GDPR important?	187	S	196
		T	196
		V	196
		W	196
		Index	199

Figures

- | | | |
|----|--|-----|
| 1. | Possible upgrades and downgrades | 1 |
| 2. | Assigning a medium-to-high priority service class to the SYSPROC.ACCEL_LOAD_TABLES stored procedure in the WLM ISPF application. | 29 |
| 3. | Interaction diagram of the components that are involved in the incremental update process.. | 55 |
| 4. | Replication status and functional link in the header of the accelerator view | 72 |
| 5. | SQL code -430 message window | 158 |
| 6. | Recommended connections between IBM zEnterprise server and IBM PureData System for Analytics (including switches). | 163 |

About this book

This book provides information about the following subjects:

- Installation of the software package for this product on a z/OS® data server and subsequent transfer of operating system and other software to an IBM® PureData® System for Analytics.
- Installation of a DB2® for z/OS Program Temporary Fix (PTF), which includes the Db2 software that is required to integrate this product into your Db2 environment.
- Configuration of the product from Db2 (invocation of stored procedures).
- Installation of the IBM Db2 Analytics Accelerator for z/OS client software.

Who should read this book

This book is intended for the following audiences:

- IBM Customer Service Centers (support personnel) that need to install this product at the client site.
- z/OS administrators who need to install the software for this product using SMP/E.
- Db2 for z/OS administrators who need to set up and configure this product for use with a Db2 for z/OS data server.
- Other system administrators who need to install and maintain the client software for this product on Linux or Microsoft Windows computers.

What's new in version 5?

This version of IBM Db2 Analytics Accelerator for z/OS, when used with the latest Db2 for z/OS support, includes the following new features:

- Support for temporal Db2® tables (tables with system or business period definitions)
- Encryption of data in motion
- Option to integrate *IBM Netezza® Analytics* modeling and prediction algorithms
- Installation enhancements
- Improved backward compatibility. Stored procedures can now be at a higher level than accelerator software.

Enhancements in version 5.1.7

See the release notes.

Enhancements in version 5.1.6

- Hybrid Transactional Analytical Processing (HTAP). Incrementally updated tables always contain the latest committed Db2 changes before a query is executed.
- Add-column support also for incrementally updated tables.
- FTP-S support for the call-home function (SSL-encrypted mail transfer of call-home notifications).

Enhancements in version 5.1.5

- Columns can be added to existing accelerator-shadow tables (no need to remove, redefine, and reload a table after adding columns to a Db2 table)
- Faster loading of accelerator-only tables: (Many) more than just one row are now inserted in a single transaction (multi-row inserts)
- Federated access: Queries can now reference tables of a remote Db2 subsystem (the Db2 subsystem that passes the query to the accelerator does not have to own the referenced tables).

Enhancements in version 5.1.4

- Archived partitions can be restored more than once from different accelerators.
- Support for multi-row inserts (beta).
- IP address and port of Capture Agent can be changed without stopping incremental updates.
- Numerous fixes (see release notes)

IBM Knowledge Center and book revision July 2016:

The suffixes of stored-procedure messages have been corrected. They now show the proper letters E, I, or W.

Enhancements in version 5.1.3

- Improved load performance for small tables
- Numerous fixes (see release notes)

Enhancements in version 5.1.2

- Code stabilization
- Reduction of functional limitations

Enhancements in version 5.1.1

- Maintenance release with numerous internal fixes and improvements

Chapter 1. Migrating from earlier versions

For a migration from version 3.1.0 or 4.1.0 to 5.1.0, update the individual components of IBM Db2 Analytics Accelerator for z/OS in the order that is suggested here.

You can only migrate from version 3.1.0 or 4.1.0 to 5.1.0. To upgrade version 2.1.x to 5.1.0, you must first migrate to version 3.1.0. The following diagram shows the upgrading and downgrading possibilities from the version 3.1.0, 4.1.0, and 5.1.0:

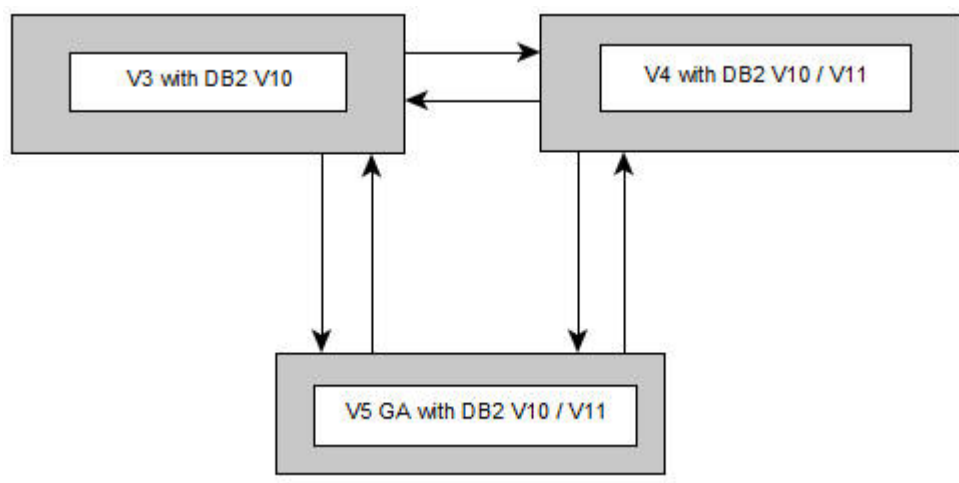


Figure 1. Possible upgrades and downgrades

Backward migration or downgrade

As a general rule, a backward migration between product releases is supported unless you have used persistent features of the newer release.

Restrictions:

- The accelerator software can only be downgraded from version 5 to version 4 if the IBM Netezza Analytics stored procedures package has not been installed.
- Access server, replication engine, and Netezza Platform Software (NPS®) can only be downgraded by IBM support.
- After migrating or updating IBM Db2 Analytics Accelerator for z/OS, do not attempt a backward migration or downgrade if any of the conditions in Table 1 applies.

Table 1. Reasons against a backward migration or downgrade

Reasons against a backward migration from version 5.1.0 to 4.1.0 PTF- <i>x</i> or 3.1.0 PTF- <i>x</i>	Reasons against a downgrade from version 5.1.0 to 4.1.0 PTF- <i>x</i> or 3.1.0 PTF- <i>x</i>
You have used the High Performance Storage Saver (HPSS) to archive partitions of the same Db2 table on different accelerators.	The Netezza Platform Software (NPS) (NPS) has already been updated to version 7.2.1 or higher (requirement for a successful update to product version 5.1.0 or higher).

Table 1. Reasons against a backward migration or downgrade (continued)

Reasons against a backward migration from version 5.1.0 to 4.1.0 PTF- <i>x</i> or 3.1.0 PTF- <i>x</i>	Reasons against a downgrade from version 5.1.0 to 4.1.0 PTF- <i>x</i> or 3.1.0 PTF- <i>x</i>
You have defined tables with columns encoded in UNICODE and EBCDIC on the same accelerator with the help of the AQT_ENABLE_MULTIPLE_ENCODING environment variable.	
The Netezza Platform Software (NPS) (NPS) has already been updated to version 7.2.1 or higher (requirement for a successful migration to product version 5.1.0 or higher).	

- In addition, if partitions have been unsuccessfully archived or restored in version 5.1.0, a backward migration is blocked. You must first solve the associated problems and then complete the archiving or restore operations to bring your installation into a state that allows a backward migration.
To manually restore partitions that were archived with version 5.1.0, see the *Restore without active accelerator* section in the description of the SYSPROC.ACCEL_RESTORE_TABLES stored procedure. You find it in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*.
- If you have used the High Performance Storage Saver (HPSS) of version 3.1.0, make sure to read the following topics before the migration:
 1. “Migrating HPSS partitions”
 2. “Fixing HPSS issues after the migration” on page 3

Migrating

For instructions on how to migrate, see Chapter 13, “Installing updates,” on page 131. Information that is specific to the migration from version 3.1.0 or from 4.1.0 to 5.1.0 has been added to the *Before you begin* and *About this task* sections of the relevant topics.

Related information:



IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference

Migrating HPSS partitions

If you have archived the data of partitions or entire tables with the High Performance Storage Saver (HPSS) that was introduced with version 3.1.0 of IBM Db2 Analytics Accelerator for z/OS, you must take a few preparatory steps before migrating to version 5.1.0.

Before you begin

If you have archived tables or partitions on an accelerator with the High Performance Storage Saver (HPSS) of IBM Db2 Analytics Accelerator for z/OS Version 3.1.0, make sure that the archiving operations have been completed successfully and that none of the affected table spaces are in a state that prevents a successful migration to version 5.1.0, such as RECOVER PENDING.

Procedure

1. Identify tables that have been archived on an accelerator, either fully or partially. Use one of the following methods:
 - Open the appropriate Accelerator views in IBM Db2 Analytics Accelerator Studio. These views list all tables on an accelerator. The **Storage Saver Partitions** column in the **Tables** section indicates whether partitions of a table have been archived.
 - Run the SYSPROC.ACCEL_GET_TABLES_INFO stored procedure with the value NULL for the *table_set* parameter (this selects all tables) and check the <tableInformation> elements in the output for tables with an attribute setting of archiveStatus=true; this indicates that tables or partitions of the tables have been archived.
2. Find out which partitions have been archived. Use one of the following methods:
 - In a relevant Accelerator view, in the **Tables** section, click **Storage Saver** on the toolbar and select **Move Partitions to Accelerator** or **Restore Partitions to Db2**. The window that opens in either case gives you the required information.
 - Run the SYSPROC.ACCEL_GET_TABLES_DETAILS stored procedure against all tables with archived partitions to find out which partitions have been archived.
3. Run the Db2 command DISPLAY DB(dbname) SP(tsname) RESTRICT on the identified tables, where dbname is the database name and tsname is the table space name. This gives you the tables that are in an adverse state.
4. Take appropriate action to remove the adverse states.
5. Set the affected table spaces to the persistent read-only (PRO) state that was introduced with Db2 10 for z/OS. This state protects the partitions in Db2 against accidental changes after archiving. The state was not automatically applied by the HPSS of IBM Db2 Analytics Accelerator for z/OS 3.1.0, so you must now set it manually before the migration.
6. Migrate to version 5.1.0.

Fixing HPSS issues after the migration

Follow the steps here to fix High Performance Storage Saver (HPSS) issues that resulted from or existed before a migration to IBM Db2 Analytics Accelerator for z/OS Version 5.1.0.

Procedure

1. Identify the HPSS partitions that are in an error state. Use one of the following methods:
 - In a relevant Accelerator view, in the **Tables** section, click **Storage Saver** on the toolbar and select **Move Partitions to Accelerator** or **Restore Partitions to Db2**. In the upcoming window, the partitions in an error state are marked with a warning icon.
 - Run the SYSPROC.ACCEL_GET_TABLES_INFO stored procedure with the value NULL for the *table_set* parameter (this selects all tables) and check the <tableInformation> elements in the output for tables with an attribute setting of archiveErrorStatus=DataInArchivedPartition or archiveErrorStatus=ArchivedPartitionNotReadonly; these are Db2 partitions that were accidentally updated after archiving or that are not protected by the partition read-only (PRO) state.

2. Take appropriate action to resolve the conflicts:
 - In Db2 for z/OS, remove the data from each archived partition by calling the LOAD REPLACE utility with an empty data set as input.
 - For each archived partition not in the PRO state (not read-only), set the PRO state by running the REPAIR utility.

Chapter 2. Configuring TCP/IP for connections between IBM System z and the IBM PureData System for Analytics

To transfer data between your database management system and IBM Db2 Analytics Accelerator for z/OS, TCP/IP connections must exist between your IBM System z® and your IBM PureData® System for Analytics.

Before you begin

- Appropriate cable connections must exist between the OSA-Express ports of your IBM System Z and your IBM PureData System for Analytics.
- IBM System Z and z/OS must be operational.
- The IBM PureData System for Analytics must be operational.

About this task

A private network must exist between System Z and IBM Db2 Analytics Accelerator for z/OS. This means that you cannot reuse existing subnets that are already defined on other interfaces. The number of required TCP/IP addresses depends on the configuration. For the minimum configuration, provide at least four TCP/IP addresses in the same subnet. For the recommended configuration, provide six IP addresses.

- One IP address for the 10 GbE interface of Netezza host 1
- One IP address for the 10 GbE interface of Netezza host 2
- One IP address (also called wall IP address) for DRDA connectivity. This is a floating IP address, which is provided by the active Netezza host.
- One IP address for the OSA-Express card facing the IBM PureData System for Analytics.

The recommended configuration uses two OSA-Express cards, each of which using its own IP address in combination with a virtual IP address (VIPA).

To view a sample configuration, click the **Related reference** link at the end.

Related reference:

Appendix A, “Sample TCP/IP configuration,” on page 163

Chapter 3. Security considerations

The accelerator contains a copy of Db2 data for selected tables. It is important to protect that data against unauthorized access. A properly configured system environment makes it very hard for attackers from the outside to get into the system and manipulate, damage, or steal data. See which security measures are in place and which measures you can take to increase the system security.

Product security

The system environment of IBM Db2 Analytics Accelerator for z/OS can be considered safe for the following reasons:

- If properly configured, the System Z data server and the IBM PureData System for Analytics (accelerator) are connected over a private data network (PDN), which does not allow access from the internet or your organization's intranet.
- Only TSO users with sufficient access rights for the relevant logical partition (LPAR) in z/OS can establish a TCP/IP connection from the LPAR to the accelerator over the PDN. A system authorization facility (SAF) like RACF® allows you to restrict this right to just a few selected users.
- The transfer, manipulation or extraction of data from the accelerator is carried out by the stored procedures that come with the product. The authorizations required to execute these tasks lie, to a large extent, with the stored procedures, so that the rights of the user executing the stored procedures can be restricted.
- The pairing mechanism exclusively links a Db2 subsystem to an accelerator. A user with access to one subsystem cannot view or otherwise access data from another subsystem just because the other subsystem is linked to the same accelerator.
- The Linux system on the accelerator machine does not allow a direct remote connection to the machine. The built-in private authentication module (PAM) is configured to prevent this. On-site access is possible, but limited through the use of service passwords with temporary validity. In addition, the service passwords can only be used for a single machine, as they are bound to the serial number. Service passwords are generated and entered by service personnel, which is why you must contact IBM support to access the machine. The facility to request a password is not publicly available on the internet. IBM support checks if the requesting party is a registered customer or licensee of the product.

What you can do to guarantee maximum system security

Security-related fixes and APAR information are published in the z Systems® Security Portal. To guarantee maximum system security, IBM issues the z Systems Security Portal Security Vulnerability Bulletins. Apply the fixes recommended there. The z Systems Security Portal is intended to help you stay current with security and system integrity fixes by providing current patch data and also provides Associated Common Vulnerability Scoring System (CVSS) V2 ratings for new APARs. For instructions on how to access the z Systems Security Portal, see **Enterprise security > Integrity**. You find a link to the website at the end of this topic.

Many security features are provided by the product, by the hardware, by Db2 for z/OS, by z/OS, or by your system authorization facility (SAF). Often, these features cannot be enabled automatically, but require an intervention on your part.

Check the following list carefully, especially for production systems, and take appropriate action if one of the items reveals a security gap:

- Because TSO users, Db2 users, and users of IBM Db2 Analytics Accelerator Studio can be seen as the highest security risks, select these users carefully. Grant users access rights as required by the roles that they play. Do not give them more rights than needed. Where advantageous, combine access rights with user groups and grant access rights to users via group membership.

For example, restrict the rights of the installer. This is the user who runs the AQTTIJSP job to create and bind stored procedures. The access rights that this user needs are listed in a separate section.

Grant users of IBM Db2 Analytics Accelerator Studio just the minimum set of access rights.

Rights for the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure can be granted for each XML input element of the **command** parameter because each element invokes a user-defined function. Make use of this feature.

A power user is helpful for first-time installations and system verification tests, but not necessarily required after that. Consider removing power users or revoking some of their access rights.

- Change the password for the IBM Db2 Analytics Accelerator Console at the first logon.
- Make sure that the hardware is located in an access-controlled area. Although direct remote connections to the accelerator are not possible, someone who knows the machine details might enter the premises and use a false identity to open a service session with IBM support.
- If available, use an access auditing solution that records accesses to the z/OS system. Access auditing can be enabled in RACF.
- Protect the PDN against unauthorized access. Follow the **Related information** link at the end of this topic for instructions.
- Make sure that regular Db2 users do not have SELECT authorization for the SYSIBM.USERNAMES catalog table in Db2 for z/OS because this would allow them to read the authentication tokens, which are created as a result of the pairing process.
- The data on damaged hard drives of the IBM PureData System for Analytics is unencrypted. If you must replace a disk, degauss the damaged disk or destroy it physically.
- IBM recommends two redundant PDN cable connections to support failover scenarios. For these connections, two network switches are required. Usually, such switches are configured from a web-browser interface. Make sure that access to this interface is limited, that the switches restrict routing to the confines of the PDN, and that the initial password has been changed. Someone with access to the interface can change the configuration of the network and might, for example, open the PDN to the intranet or internet.
- The trace function of the product allows you to select components for tracing that might disclose sensitive information in the trace file or result set. Carefully decide whether this type of information is really required. If so, avoid to send this data to parties that have no need to know.
- To be able to trace a manipulation of accelerator-shadow tables, enable auditing for the SYSIBM.SYSACCELERATEDTABLES table by adding a corresponding row to the SYSIBM.SYSAUDITPOLICIES table. This way, the Db2 transaction log will tell you which accelerator-shadow tables have been modified. Consider adding SYSIBM.USERNAMES as well.

Related reference:

“Setting access rights for the user who runs AQTTIJSP” on page 30

“Access rights for power users” on page 35

Related information:



Protecting the private data network against unauthorized access



Enterprise security > Integrity > Subscription Process

Chapter 4. Installing IBM Db2 Analytics Accelerator Studio

You must install the administration client, IBM Db2 Analytics Accelerator Studio, because the installation wizard contains all product license texts for IBM Db2 Analytics Accelerator for z/OS. You must accept these licenses before you can continue with the installation. Starting with version 3.2 of IBM Data Studio, which is the required framework for the IBM Db2 Analytics Accelerator Studio plugin, you must use IBM Installation Manager for the installation.

About this task

You can no longer use IBM Db2 Analytics Accelerator Studio 3.2 for the administration of this product. You must upgrade to version 4.1.0 or a later version. For instructions on how to upgrade, follow the link at the end of this topic.

The procedure described here will download a package that contains all required software components. It does not matter whether one or more of these components are already installed on a target system. If one or more components are already present, only the remaining components will be installed. Sometimes, an update is offered for already installed components. Currently, the installation requires 1.5 GB of free disk space.

Attention: If possible, let users install the components on a local disk. Installing these on a shared network drive bears the potential risk of damaging or even destroying the Eclipse workspace.

A damage is likely to occur if you update or uninstall components while instances of the program are still running on connected computers. So if an installation on a shared network drive cannot be avoided, make sure that users close all running instances of IBM Installation Manager, IBM Data Studio, or IBM Db2 Analytics Accelerator Studio before they update or uninstall components.

Your operating system might issue several security warnings while you are following the steps in this procedure. Always grant permission, that is, click **Accept**, **OK**, or **Run** when asked whether you want to allow programs or processes to make changes to your system or to access the internet.

Procedure

1. From a workstation with a direct internet connection, download the installation package, which is found at:
<https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=swg-db2aas>
2. Type your IBM ID and password in the appropriate fields and click **Sign in**. If you do not have an IBM ID, click **Get an IBM ID** and follow the registration instructions on the form. After finishing this task, you return to this page where you can sign in using your new IBM ID and password.

Note: Sometimes, you are asked to provide information such as your first name, last name, email address and your preferred business contact method although you have already signed in with your IBM ID. In that case, just provide the requested information again to proceed.

3. On the following page, under **License**, select **I agree** to agree to the terms and conditions.
4. Click **I Confirm**.
5. Download the installation package using one of these methods:
 - **Download using Download Director**
 - **Download using http**
6. Depending on how you want to proceed, follow one of these methods.
 - If you want users to start the installation from a remote machine, extract the downloaded, compressed archive.
 - If you want users to copy the package so that they can start a local installation, provide them with information on the package location, how to access it, how to extract the package, and how to start the installation.
7. Depending on your choice in step 6, extract the package on the download machine, or let your users extract it on their local machines.
8. Let your users start one of the installation programs, that is, **launchpad.exe** or **launchpad_win_noadmin64.exe**. The **launchpad.exe** program allows you to launch an administrative installation and a restricted installation. The **launchpad_win_noadmin64.exe** program only allows you to launch a restricted installation and only works on 64-bit Windows operating systems. Description of these installation types:

Administrative installation

Selecting this installation, users can install the product for all users of their local workstation, and in any folder they prefer. This installation requires administrative rights on the workstation.

Restricted installation

Selecting this installation, users can install the product only for a single user of their local workstation (the user who is logged in and starts the installation program). The choice of an installation folder is restricted to the folders that this user has write access to. This installation does not require administrative rights on the workstation.

9. After selecting an installation method, IBM Installation Manager starts and lists the installable packages. Your users must select the following packages:
 - IBM Data Studio client
 - IBM Db2 Analytics Accelerator Studio

If any of these are already installed, they will be greyed out or not be listed. Sometimes, IBM Installation Manager will offer to install a newer version.

10. Let your users complete the IBM Installation Manager wizard.

Related tasks:

“Updating IBM Db2 Analytics Accelerator Studio” on page 133

Chapter 5. Enabling an existing Db2 subsystem for IBM Db2 Analytics Accelerator for z/OS

To add IBM Db2 Analytics Accelerator for z/OS to your Db2 for z/OS environment, you must update the Db2 libraries supporting IBM Db2 Analytics Accelerator for z/OS as well as create and bind several stored procedures.

Software prerequisites for the Db2 data server

Before you begin with the installation, make sure that you meet the software requirements for the Db2 data server.

The prerequisites are listed at:

<http://www.ibm.com/support/docview.wss?uid=swg27046305>

Installing libraries with IBM Db2 Analytics Accelerator for z/OS support

Use SMP/E to install the product packages. Follow the installation steps in the package description.

Before you begin

1. Identify a set of queries to be used for installation verification.
2. Run these queries. The queries must return the same results before and after the installation of the Db2 libraries.
3. Save or print the results so that you can compare them with the results obtained after the installation.
4. Compared with earlier product versions, the installation procedure has changed. By default, older packages for the installation of the accelerator software, the Netezza Platform Software (NPS), the Access Server, and the replication engine are now removed from the z/OS UNIX file system (zFS). Only the most recent package, that is, the one that is created by running SMP/E with the *Apply* function, is kept. If you prefer to stick with the old behavior, you must change the AQT5JI05 customization job accordingly. Naturally, you must do this before completing the steps in this topic. For more information, follow the link to *Restoring old-style package management* at the end of this topic.

About this task

In the following text, <HLQBASE> is used as a placeholder for the high-level qualifier (HLQ) of your Db2 libraries. Replace it with the actual HLQ that is used in your system.

Procedure

1. Use the SMP/E *Apply* function to install the following packages:
FMID HAQT510
Includes the base product (Db2 for z/OS libraries)
FMID HCHCA21
Includes IBM InfoSphere® Data Replication for z/OS components

2. Use the SMP/E *Apply* function to install the IBM Db2 Analytics Accelerator for z/OS program temporary fixes (PTFs) that came with the product package.
3. If you want to use the incremental update function, follow these steps:
 - a. Complete the installation of IBM InfoSphere Data Replication for z/OS.
 - b. Configure IBM InfoSphere Data Replication for z/OS for use with IBM Db2 Analytics Accelerator for z/OS.

For instructions, follow the links at the end of this topic.

Related tasks:

Appendix G, “Restoring old-style package management,” on page 181

Related information:

Installing or upgrading InfoSphere CDC

“Configuring the incremental update function” on page 22

Creating the IBM Db2 Analytics Accelerator database

Customize and submit the DSNTIJAS job to create the database and tables for IBM Db2 Analytics Accelerator for z/OS in Db2 for z/OS.

About this task

Complete this task before you create the IBM Db2 Analytics Accelerator stored procedures by following the steps in “Customizing and running AQTTIJSP” on page 30.

Procedure

1. Copy and customize the DSNTIJAS sample job member in the <HLQBASE>.<SDSNSAMP> library according to your needs.
2. Submit DSNTIJAS.

Setting ZPARMs for IBM Db2 Analytics Accelerator for z/OS

Set the ZPARMs for IBM Db2 Analytics Accelerator for z/OS according to your needs.

Note: You can also set, change, or override most of the ZPARMS that are discussed here in one of the following ways:

- Online, during a query session
- In the BIND options for packages (static SQL)
- As part of connection properties

Setting ZPARMs for IBM Db2 Analytics Accelerator in Db2 11 for z/OS

In Db2 11 for z/OS, you can set the ZPARMs for query acceleration on the DSNTIP82 and DSNTIP8A installation panels.

About this task

The following ZPARMs are available:

ACCEL=COMMAND | AUTO | NO

COMMAND

To start the accelerator by manually invoking the **-start ACCEL <name>** command, where **<name>** is the name of the accelerator.

AUTO To automatically start the accelerator when the Db2 for z/OS subsystem starts.

NO To specify that the accelerator cannot be used with this Db2 subsystem.

GET_ACCEL_ARCHIVE NO | YES

Specifies whether data that has been archived by the High-Performance Storage Saver (HPSS) is searched when a query is executed.

YES Archived data is searched.

NO Archived data is not searched.

QUERY_ACCELERATION

The treatment of incoming queries depends, among other factors, on the setting of the CURRENT QUERY ACCELERATION special register, which is a Db2 for z/OS special register that was introduced for IBM Db2 Analytics Accelerator for z/OS.

The value of the QUERY_ACCELERATION ZPARM provides the default setting for the CURRENT QUERY ACCELERATION special register. Both, the ZPARM and the special register accept the following values:

1 (NONE)

No routing of dynamic SQL queries to an accelerator. Queries will be processed by Db2 for z/OS only (inhouse query processing).

2 (ENABLE)

A dynamic SQL query will be routed to an accelerator if it fulfills all required conditions. An incoming query is tested against a set of heuristics, which include the table size and a response time estimate based on cost information from the SYSIBM.DSN_PROFILE_ATTRIBUTES table. Both tests ensure that a query will only be routed to an accelerator if the query can be expected to run faster than in Db2 for z/OS. However, if an error occurs while the query is being processed by the accelerator, Db2 for z/OS will return a negative SQLCODE to the application and query processing will stop.

3 (ENABLE WITH FAILBACK)

Dynamic queries are accelerated only if Db2 for z/OS determines that it is advantageous to do so. If an accelerator returns an error during the PREPARE phase or when first opening (OPEN) the query, the query is processed by Db2 for z/OS rather than sent to the accelerator. If the accelerator returns an error during a FETCH operation or a subsequent OPEN operation, Db2 for z/OS returns an error to the user and the query ends abnormally.

4 (ELIGIBLE)

Dynamic queries are accelerated if they are eligible for acceleration. Db2 for z/OS does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by Db2 for z/OS. If an accelerator fails while a query is running, or if the accelerator returns an error, Db2 for z/OS returns a negative SQL code to the application.

5 (ALL)

A dynamic query will always be routed to an accelerator, no matter if it fulfills the conditions or not. If processing cannot start or continue because an incoming query fails to fulfill all the conditions for accelerated query processing, Db2 for z/OS returns a negative SQLCODE to the application and query processing ends abruptly. That is, the query will not be processed at all.

QUERY_ACCEL_OPTIONS = NONE | 1 | 2 | 3 | 4 | 5 | 6 | 7

Generally, you can use any combination of the values from 1 to 7. However, option 4 and 7 are mutually exclusive. To specify options, enclose the values in parentheses and separate them by a comma, for example (1,3). Meaning of the values:

NONE (default)

Options 1 to 7 are disabled (no query acceleration at all).

- 1** Queries that include data encoded in multibyte EBCDIC are not blocked from processing by IBM Db2 Analytics Accelerator for z/OS, although IBM Db2 Analytics Accelerator for z/OS uses a different encoding scheme (Unicode, UTF-8) for the same data. Consequently, a query processed by Db2 might return a result set that is different from the result set that IBM Db2 Analytics Accelerator for z/OS returns for the same query.
- 2** For an INSERT operation that includes a SELECT statement, this option causes the SELECT portion of the statement to be routed to IBM Db2 Analytics Accelerator for z/OS and the INSERT operation to be performed by Db2 for z/OS.

Notes:

- It is not necessary to set QUERY_ACCEL_OPTIONS= 2 for in-database transformation with accelerator-only tables because transactions on this type of table can only be executed on an accelerator. The processing location is automatically determined by the type of the table.
- The referenced tables on the accelerator might not be in sync with the tables in Db2 for z/OS.
- Db2 for z/OS does not route the SELECT portion of the statement if the target table in the INSERT statement uses an encoding scheme that is different from the scheme of the tables in the SELECT statement.

- 3** Allows query routing to IBM Db2 Analytics Accelerator for z/OS for queries that include byte-based string functions on data encoded by multibyte character set (MBCS) encoding schemes (like Unicode), although IBM Db2 Analytics Accelerator for z/OS supports only character-based string functions. If the string function operates on data that contains only single-byte characters, the query results returned by Db2 and IBM Db2 Analytics Accelerator for z/OS will be the same, irrespective of the encoding scheme that is used for the data. However, if the data contains multibyte characters, the results might be different.
- 4** Allows the acceleration of queries that use an expression with a DATE data type in a LOCAL format.

IBM Db2 Analytics Accelerator for z/OS uses the dd/mm/yyyy format to interpret the input and the output date values.

Use this option only if the DATE FORMAT field of install panel DSNTIP4 specifies LOCAL or if application programs that process SQL on Db2 have been precompiled with the DATE(LOCAL) option. In either case, the LOCAL date exit routine must also define the specific dd/mm/yyyy date format. If the LOCAL format is not defined as dd/mm/yyyy, queries might return unpredictable results.

Option 4 cannot be used if option 7 is specified because these options are mutually exclusive.

Recommendation: If you want to use this option in connection with a Db2 data sharing group, specify it on all members of the group.

5 Allows you to run accelerated queries against system-temporal and bi-temporal tables. When this value is set, timestamp columns with a precision of 12, which are used in the PERIOD definition of system-temporal intervals, are included when such a table is defined on an accelerator. The inclusion entails the truncation of the timestamp 12 values in these columns to values with precision 6. As a result, these columns can be referenced by an accelerated query.

6 Allows the truncation of timestamp values with precision 12 to a precision of 6. The Netezza database that is used by the product can only handle timestamps with a precision up to 6. Base tables in Db2 10 for z/OS or higher might contain values with a precision up to 12. Hence an upfront conversion (truncation) of such values is required before these are loaded into an accelerator-shadow table. An accelerated query would fail if longer values were encountered.

You need not set this value for queries against system-temporal or bi-temporal tables because the use of option 5 already includes a truncation of timestamp values in these tables. However, option 6 must be set if you want to run accelerated queries against timestamp columns with precision 12 in other tables, including business-temporal tables that use such columns.

7 Same as option 4, but for LOCAL Db2 DATE values in the yyymmdd format (with two space characters at the end).

Option 7 cannot be used if option 4 is specified because these options are mutually exclusive.

Important:

- You can change the value of QUERY_ACCEL_OPTIONS online.
- If you use IBM Db2 Analytics Accelerator for z/OS with a Db2 for z/OS data sharing group, make sure that all members of the data sharing group use the same setting for QUERY_ACCEL_OPTIONS.
- For restrictions and other information regarding option 1 of QUERY_ACCEL_OPTIONS (support for mixed and double-byte EBCDIC), see *Conditions that prevent query routing to an accelerator* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*.

Procedure

1. Set the ZPARMs for query acceleration on the DSNTIP82 and DSNTIP8A panels. The DSNTIP82 panel looks like this:

```
DSNTIP82 INSTALL Db2 - QUERY ACCELERATOR PREFERENCES
===>
Enter query accelerator options below:
1 ACCELERATOR STARTUP ===> NO      NO, COMMAND, or AUTO
2 GET ACCEL ARCHIVE   ===> NO      NO or YES
3 ACCELERATION OPTIONS ===> NONE   NONE or YES

Enter CURRENT QUERY ACCELERATION special register option:
4 CURRENT QUERY ACCEL ===> 1      1 = NONE
                                   2 = ENABLE
                                   3 = ENABLE_WITH_FAILBACK
                                   4 = ELIGIBLE
                                   5 = ALL

PRESS: ENTER to continue   RETURN to exit   HELP for more information
```

DSNTIP8A is a pop-up panel that opens on top of DSNTIP82 and allows you to select values for the QUERY_ACCEL_OPTIONS parameter. It is not available if NONE is specified for 3 ACCELERATION OPTIONS.

2. Stop Db2.
3. Restart Db2 so that the changes can take effect.
4. Run sample queries or a test load to verify the proper functioning of Db2.

Related tasks:

“Enabling queries against system-temporal and bi-temporal tables” on page 128

“Enabling the truncation of high-precision timestamps” on page 130

Related information:



CURRENT QUERY ACCELERATION in DB2 10 for z/OS information center



Subsystem parameters that are not on installation panels

Using a sample job to set ZPARMs for IBM Db2 Analytics Accelerator for z/OS

If you do not use Db2 11 for z/OS or prefer a different method, you can customize and run a sample job to modify the ZPARM settings for IBM Db2 Analytics Accelerator for z/OS.

About this task

The following ZPARMs are available:

ACCEL=COMMAND | AUTO | NO

COMMAND

To start the accelerator by manually invoking the **-start ACCEL <name>** command, where **<name>** is the name of the accelerator.

AUTO

To automatically start the accelerator when the Db2 for z/OS subsystem starts.

NO

To specify that the accelerator cannot be used with this Db2 subsystem.

GET_ACCEL_ARCHIVE NO | YES

Specifies whether data that has been archived by the High-Performance Storage Saver (HPSS) is searched when a query is executed.

YES Archived data is searched.

NO Archived data is not searched.

QUERY_ACCELERATION

The treatment of incoming queries depends, among other factors, on the setting of the CURRENT QUERY ACCELERATION special register, which is a Db2 for z/OS special register that was introduced for IBM Db2 Analytics Accelerator for z/OS.

The value of the QUERY_ACCELERATION ZPARM provides the default setting for the CURRENT QUERY ACCELERATION special register. Both, the ZPARM and the special register accept the following values:

1 (NONE)

No routing of dynamic SQL queries to an accelerator. Queries will be processed by Db2 for z/OS only (inhouse query processing).

2 (ENABLE)

A dynamic SQL query will be routed to an accelerator if it fulfills all required conditions. An incoming query is tested against a set of heuristics, which include the table size and a response time estimate based on cost information from the SYSIBM.DSN_PROFILE_ATTRIBUTES table. Both tests ensure that a query will only be routed to an accelerator if the query can be expected to run faster than in Db2 for z/OS. However, if an error occurs while the query is being processed by the accelerator, Db2 for z/OS will return a negative SQLCODE to the application and query processing will stop.

3 (ENABLE WITH FAILBACK)

Dynamic queries are accelerated only if Db2 for z/OS determines that it is advantageous to do so. If an accelerator returns an error during the PREPARE phase or when first opening (OPEN) the query, the query is processed by Db2 for z/OS rather than sent to the accelerator. If the accelerator returns an error during a FETCH operation or a subsequent OPEN operation, Db2 for z/OS returns an error to the user and the query ends abnormally.

4 (ELIGIBLE)

Dynamic queries are accelerated if they are eligible for acceleration. Db2 for z/OS does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by Db2 for z/OS. If an accelerator fails while a query is running, or if the accelerator returns an error, Db2 for z/OS returns a negative SQL code to the application.

5 (ALL)

A dynamic query will always be routed to an accelerator, no matter if it fulfills the conditions or not. If processing cannot start or continue because an incoming query fails to fulfill all the conditions for accelerated query processing, Db2 for z/OS returns a negative SQLCODE to the application and query processing ends abruptly. That is, the query will not be processed at all.

QUERY_ACCEL_OPTIONS = NONE | 1 | 2 | 3 | 4 | 5 | 6 | 7

Generally, you can use any combination of the values from 1 to 7.

However, option 4 and 7 are mutually exclusive. To specify options, enclose the values in parentheses and separate them by a comma, for example (1,3). Meaning of the values:

NONE (default)

Options 1 to 7 are disabled (no query acceleration at all).

- 1** Queries that include data encoded in multibyte EBCDIC are not blocked from processing by IBM Db2 Analytics Accelerator for z/OS, although IBM Db2 Analytics Accelerator for z/OS uses a different encoding scheme (Unicode, UTF-8) for the same data. Consequently, a query processed by Db2 might return a result set that is different from the result set that IBM Db2 Analytics Accelerator for z/OS returns for the same query.
- 2** For an INSERT operation that includes a SELECT statement, this option causes the SELECT portion of the statement to be routed to IBM Db2 Analytics Accelerator for z/OS and the INSERT operation to be performed by Db2 for z/OS.

Notes:

- It is not necessary to set QUERY_ACCEL_OPTIONS= 2 for in-database transformation with accelerator-only tables because transactions on this type of table can only be executed on an accelerator. The processing location is automatically determined by the type of the table.
- The referenced tables on the accelerator might not be in sync with the tables in Db2 for z/OS.
- Db2 for z/OS does not route the SELECT portion of the statement if the target table in the INSERT statement uses an encoding scheme that is different from the scheme of the tables in the SELECT statement.

- 3** Allows query routing to IBM Db2 Analytics Accelerator for z/OS for queries that include byte-based string functions on data encoded by multibyte character set (MBCS) encoding schemes (like Unicode), although IBM Db2 Analytics Accelerator for z/OS supports only character-based string functions. If the string function operates on data that contains only single-byte characters, the query results returned by Db2 and IBM Db2 Analytics Accelerator for z/OS will be the same, irrespective of the encoding scheme that is used for the data. However, if the data contains multibyte characters, the results might be different.

- 4** Allows the acceleration of queries that use an expression with a DATE data type in a LOCAL format.

IBM Db2 Analytics Accelerator for z/OS uses the dd/mm/yyyy format to interpret the input and the output date values.

Use this option only if the DATE FORMAT field of install panel DSN TIP4 specifies LOCAL or if application programs that process SQL on Db2 have been precompiled with the DATE(LOCAL) option. In either case, the LOCAL date exit routine must also define the specific dd/mm/yyyy date format. If the LOCAL format is not defined as dd/mm/yyyy, queries might return unpredictable results.

Option 4 cannot be used if option 7 is specified because these options are mutually exclusive.

Recommendation: If you want to use this option in connection with a Db2 data sharing group, specify it on all members of the group.

- 5 Allows you to run accelerated queries against system-temporal and bi-temporal tables. When this value is set, timestamp columns with a precision of 12, which are used in the PERIOD definition of system-temporal intervals, are included when such a table is defined on an accelerator. The inclusion entails the truncation of the timestamp 12 values in these columns to values with precision 6. As a result, these columns can be referenced by an accelerated query.
- 6 Allows the truncation of timestamp values with precision 12 to a precision of 6. The Netezza database that is used by the product can only handle timestamps with a precision up to 6. Base tables in Db2 10 for z/OS or higher might contain values with a precision up to 12. Hence an upfront conversion (truncation) of such values is required before these are loaded into an accelerator-shadow table. An accelerated query would fail if longer values were encountered.

You need not set this value for queries against system-temporal or bi-temporal tables because the use of option 5 already includes a truncation of timestamp values in these tables. However, option 6 must be set if you want to run accelerated queries against timestamp columns with precision 12 in other tables, including business-temporal tables that use such columns.

- 7 Same as option 4, but for LOCAL Db2 DATE values in the `yyyymmdd` format (with two space characters at the end).

Option 7 cannot be used if option 4 is specified because these options are mutually exclusive.

Important:

- You can change the value of QUERY_ACCEL_OPTIONS online.
- If you use IBM Db2 Analytics Accelerator for z/OS with a Db2 for z/OS data sharing group, make sure that all members of the data sharing group use the same setting for QUERY_ACCEL_OPTIONS.
- For restrictions and other information regarding option 1 of QUERY_ACCEL_OPTIONS (support for mixed and double-byte EBCDIC), see *Conditions that prevent query routing to an accelerator* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*.

Procedure

1. Add or change the listed parameters on the DSN6SPRM panel of the DSNTIJUZ sample job in your working libraries.
2. Stop Db2.
3. Submit DSNTIJUZ to assemble the new ZPARM load member.
4. Restart Db2 so that the changes can take effect.
5. Run sample queries or a test load to verify the proper functioning of Db2.

Related tasks:

[“Enabling queries against system-temporal and bi-temporal tables” on page 128](#)

[“Enabling the truncation of high-precision timestamps” on page 130](#)

Related information:



[CURRENT QUERY ACCELERATION in DB2 10 for z/OS information center](#)



[Subsystem parameters that are not on installation panels](#)

Configuring the incremental update function

The incremental update function of IBM Db2 Analytics Accelerator for z/OS requires components of IBM InfoSphere Data Replication for z/OS (CDC) and additional components on the accelerator, called the Access Server and the replication engine. If you want to use this feature, you are advised to configure at least the CDC components at this point. To read an introduction to the incremental update function or go straight away to the CDC configuration section, follow the appropriate link at the end of this topic.

Related tasks:

[“Completing the installation and configuring CDC” on page 56](#)

Related information:

[Chapter 9, “Incremental updates,” on page 53](#)

Chapter 6. Setting up IBM Db2 Analytics Accelerator for z/OS

Set up the IBM Db2 Analytics Accelerator for z/OS by completing the following tasks.

Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored procedures

Follow the steps in this section to set up a suitable Workload Manager (WLM) application environment.

Before you begin

Make sure that the following components have been installed:

- Db2 with the required Db2 program temporary fix (PTF) for IBM Db2 Analytics Accelerator for z/OS support
- Db2 command line processor for calling and verifying the IBM Db2 Analytics Accelerator for z/OS from the local environment

Note: The Db2 command line processor is a Java™ application that requires IBM Data Server drivers for JDBC.

If you have not installed all of these components yet, follow the **Related tasks** link at the end of this section for instructions.

About this task

The following placeholders are used for specific high-level qualifiers in the steps and examples that follow. Replace these with the actual high-level qualifiers used in your system.

<HLQBASE>

HLQ for your Db2 libraries

<HLQSP>

HLQ for the IBM Db2 Analytics Accelerator for z/OS stored-procedure libraries

<HLQDb2SSN>

HLQ for Db2 subsystem-specific libraries

<HLQXML4C1>

HLQ for the XML toolkit

<HLQACTIVE>

A suggested HLQ for a copies that are independent of the original libraries under SMP/E control

Having completed the SMP/E *Apply* steps, the parts for the stored procedures can be found in the following libraries:

<HLQSP>.SAQTSAMP

Contains a job for the installation of the stored procedures, installation verification jobs, sample jobs for calling stored procedures, and XML samples as input for the stored procedures.

<HLQSP>.SAQTDBRM

Contains database request modules (DBRMs) that must be bound to Db2.

<HLQSP>.SAQTMOD

Contains shared libraries and load modules for the stored procedures.

Procedure

1. Copy the <HLQSP>.SAQTMOD load-module data-set as <HLQACTIVE>.SAQTMOD for reference in your WLM procedure. Also copy the <HLQSP>.SAQTSAMP(AQTENV) member as <HLQACTIVE>.SAQTSAMP(AQTENV). This way, you can install updates on the data sets that are controlled by SMP/E under <HLQSP> without affecting your running database environment.
2. Create a separate Workload Manager (WLM) environment for the IBM Db2 Analytics Accelerator for z/OS stored procedures. Use the following properties:

```
Appl Environment Name . . DSNWLMV9
Description . . . . . Db2 V10 default Stored Procedures for IDAA
Subsystem type . . . . . Db2
Procedure name . . . . . DSNWLM
Start parameters . . . . Db2SSN=&IWMSSNM,APPLENV=DSN
. . . . . WLMV9
```

Important:

- DSNWLMV9 is an example. The value that you must enter here is the one used for the !WLMENV! placeholder in the AQTTIJSP job.
- The procedure name (in this example: DSNWLM) must match the name of the defined procedure that you use to start the WLM-managed address space.
- The task that is started by the WLM-managed address space is run under a certain user ID. An OMVS segment must be defined for this user ID.
- Do not specify a value for NUMTCB in the Start parameters section of the definition because this value takes precedence, and thus makes it impossible to set the value by running the JCL that is discussed in the next paragraph.

You might want to modify the following template, which contains a procedure for the WLM-managed address space started task. The template includes the required STEPLIB and DD names.

```
//*****
//* PROCEDURE NAME = DSNWLM
//*
//* JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES
//* ADDRESS SPACE
//* RGN -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.
//* Db2SSN -- THE Db2 SUBSYSTEM NAME.
//* NUMTCB -- THE NUMBER OF TCBS USED TO PROCESS
//* END USER REQUESTS.
//* APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT
//* SUPPORTED BY THIS JCL PROCEDURE.
//*
//* <HLQXML4C1.10> is the HLQ where you have installed the
//* XML Toolkit for z/OS//*
//* Db2VERS -- Db2-VERSION (I.E. V910)
//* SET BY APPLICATION ENVIRONMENT
//* DSNWLMV9 ==> V910
//*
//* The user ID that is used to start the task must have
//* read access to the <HLQs> in the STEPLIB statement
//*
//*****
//DSNWLMV9 PROC RGN=0K,APPLENV=DSNWLMV9,NUMTCB=15
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
```

```
//          PARM='&Db2SSN,&NUMTCB,&APPLENV'
//STEPLIB DD  DISP=SHR,DSN=<HLQDb2SSN> .SDSNEXIT
//          DD  DISP=SHR,DSN=<HLQBASE> .SDSNLOAD
//          DD  DISP=SHR,DSN=<HLQBASE> .SDSNLOAD2
//          DD  DISP=SHR,DSN=<HLQACTIVE> .SAQTMOD
//          DD  DISP=SHR,DSN=<HLQXML4C1.10> .SIXMLOD1
//SYSTSPRT DD  SYSOUT=A
//CEEDUMP DD  SYSOUT=H
//OUT1     DD  SYSOUT=A
//UTPRINT  DD  SYSOUT=A
//DSSPRINT DD  SYSOUT=A
//SYSPRINT DD  SYSOUT=A
//AQTEENV  DD  DSN=<HLQACTIVE> .SAQTSAMP(AQTEENV),DISP=SHR
//AQTDEFTR DD  DSN=<HLQACTIVE> .SAQTSAMP(AQTDEFTR),DISP=SHR
```

Important:

- If you are migrating from version 4 of IBM Db2 Analytics Accelerator (or an even earlier version), make sure to delete the reference to the AQTOSR data set from this template or procedure. The AQTOSR data set is no longer used.
- To avoid conflicts with environment variables that are set for stored procedures of other applications, create a WLM application environment that is exclusively used by the IBM Db2 Analytics Accelerator for z/OS stored procedures.

The stored procedures occasionally use the SYSPRINT output for diagnostic messages. For example, restart attempts for DSNUTILU, which might indicate inappropriately configured workload classes, are recorded here. Make sure to define a valid destination for SYSPRINT that grants write access to all users of the stored procedures. Otherwise, authorization failures will be recorded even if SYSPRINT was not used at all.

- The IBM Db2 Analytics Accelerator for z/OS stored procedures call the following Db2 for z/OS stored procedures:
 - SYSPROC.ADMIN_INFO_SYSPARM
 - SYSPROC.DSNUTILU

In addition, the Db2 stored procedure SYSPROC.ADMIN_COMMAND_Db2 is called by the AQTTIJSP installation job and by IBM Data Studio. Run these Db2-supplied stored procedures in a separate WLM application environments that is not shared with the IBM Db2 Analytics Accelerator stored procedures. For more information, follow the appropriate links under **Related information**.

- If your system has more than one IP stack, you must unequivocally identify the stack that IBM Db2 Analytics Accelerator for z/OS is supposed to use. To do so, add the following statement to the procedure that starts the address space:

```
//SYSTCPD DD  DISP=SHR,DSN=<TCPIP.DATA file>
```

For more information about the TCPIP.DATA data set, follow the **Related information** link at the end of this section.

Make sure that the z/OS UNIX System Services are configured to use the same IP stack. Connectivity from UNIX System Services to the accelerator is required for diagnostic and service purposes.

- You might want to change the default settings for IBM Db2 Analytics Accelerator for z/OS stored procedures, especially if you want to use parallel processing for loading tables. To do so, you must set the environment variables in the AQTEENV data set accordingly.

Notes:

- If you must set environment variables, use the same AQTENV data set that came with IBM Db2 Analytics Accelerator for z/OS Version 5.1.0. Do not re-customize an older version of AQTENV because fundamental settings have changed and using an old configuration might lead to problems.
- The value of NUMTCB must be in the range between 15 and 30 (inclusively), so as not to exceed the 31-bit memory limits of the stored procedures.
- To use the High Performance Storage Saver, you must set at least one of the following environment variables:
 - AQT_ARCHIVE_COPY1
 - AQT_ARCHIVE_COPY2
 - AQT_ARCHIVE_RECOVERYCOPY1
 - AQT_ARCHIVE_RECOVERYCOPY2
- The update transfer function of IBM Db2 Analytics Accelerator Studio only works if the value of AQT_HOST_PACKAGE_DIRECTORY has been set correctly.

For more information, in particular about the relationship between NUMTCB and AQT_MAX_UNLOAD_IN_PARALLEL, follow the **Related reference** link at the end.

Note: Do not use the NUM ON option in the ISPF editor when modifying the AQTENV data set because this makes the line numbers in the columns from 72 to 80 part of the variable value. If this has happened, an error message similar to the following one is displayed when you run the **Transfer new** function in IBM Db2 Analytics Accelerator Studio:

The ACCEL_UPDATE_SOFTWARE procedure invoked by the "Transfer new software" function in the GUI returns a file open error, because a line number (here: 00360003) was considered part of the file path name:

```
AQT10206I - The OPEN operation on the
"/SYSTEM/local/dwatest/swupdate_smpe 00360003/usr/lpp/aqt/packages" file,
data set or pipe failed . Diagnostic information: Errno is 129
```

Related tasks:

"Installing libraries with IBM Db2 Analytics Accelerator for z/OS support" on page 13

Chapter 4, "Installing IBM Db2 Analytics Accelerator Studio," on page 11

Related reference:

Appendix C, "Environment variables," on page 169

Related information:



Creating TCPIP.DATA



Using the DB2 command line processor



Java packages for JDBC support



DB2 10 for z/OS: DB2-supplied stored procedures and user-defined functions

Verifying the correct setup of Db2-supplied stored procedures

The Db2 for z/OS stored procedures SYSPROC.ADMIN_INFO_SYSPARM, SYSPROC.DSNUTILU, and SYSPROC.ADMIN_COMMAND_Db2 must run in different Workload Manager (WLM) environments that are separate from the one used by the IBM Db2 Analytics Accelerator for z/OS stored procedures. Verify that this and a few other requirements are met by following the steps here.

Procedure

1. Verify that each Db2-supplied stored procedure, SYSPROC.ADMIN_INFO_SYSPARM, SYSPROC.DSNUTILU and SYSPROC.ADMIN_COMMAND_Db2, runs in a different WLM environment.
2. Make sure that NUMTCB is set to 1 (NUMTCB=1) for the SYSPROC.ADMIN_INFO_SYSPARM and SYSPROC.DSNUTILU WLM environments.
3. In the start-up JCL job for the WLM environment for SYSPROC.DSNUTILU, use the MNSPAS parameter. Set the parameter to a value that matches the maximum number of table partitions that are to be loaded or moved in parallel. Set the value at least to 10, but to no more than 50. Mind that the number of parallel load operations (simultaneous runs of the SYSPROC.ACCEL_LOAD_TABLES stored procedure) and the maximum number of simultaneous unload operations per stored procedure call (determined by the AQT_MAX_UNLOAD_PARALLEL environment variable) influence the total number of parallel DSNUTILU calls.
4. Verify that all WLM environments include the following libraries in their STEPLIB statements:

```
//STEPLIB DD DISP=SHR,DSN=<HLQDb2SSN>.SDSNEXIT  
// DD DISP=SHR,DSN=<HLQBASE>.SDSNLOAD  
// DD DISP=SHR,DSN=<HLQBASE>.SDSNLOAD2
```

Related information:



DB2 10 for z/OS: DB2-supplied stored procedures and user-defined functions

Defining WLM performance goals for IBM Db2 Analytics Accelerator for z/OS stored procedures

It is important to define Workload Manager (WLM) performance goals in such a way that the WLM service class for the IBM Db2 Analytics Accelerator for z/OS stored procedures can provide a sufficient number of additional WLM address spaces in a timely manner when needed.

About this task

IBM Db2 Analytics Accelerator for z/OS stored procedures are called from a remote graphical user interface. This requires that a sufficient number of address spaces is available or can be started with minimum delay. To ensure such conditions, the goals of the service class for DDF transactions must be defined accordingly. Under favorable conditions, the starting of an address space takes two seconds. Under good conditions, this action takes about 10 seconds. However, if the workload is very high, the time needed to start an address space can be considerably longer.

Procedure

1. Classify your DDF transactions explicitly.
2. Assign the DDF transactions to a WLM service class.
3. Make sure that the performance objectives of this service class are in accordance with the objectives for the rest of the workload on your system. The service class for IBM Db2 Analytics Accelerator for z/OS stored procedures must have at least medium priority.

Important: If classification rules do not exist to classify some or all of your DDF transactions into service classes, the unclassified transactions are assigned the SYSOTHER service class. This service class has no performance goal and is even lower in priority than a service class with a discretionary goal.

4. Assign the address spaces for the stored procedures to a separate service class for started tasks (STC). This ensures that the address spaces can be started before DDF transactions (stored procedures) start running. For more information, read the following articles:
 - **Setting performance objectives for distributed workloads by using z/OS Workload Manager** in the IBM Knowledge Center.
 - Page 414 in Db2 9 for z/OS Stored Procedures: Through the CALL and Beyond
 - Chapter 20, server address space management (pages 423-434) in Db2 9 for z/OS Stored Procedures: Through the CALL and Beyond

Adjusting WLM performance goals for SYSPROC.ACCEL_LOAD_TABLES

The SYSPROC.ACCEL_LOAD_TABLES stored procedure is a special case because it starts one or more instances of the SYSPROC.DSNUTILU stored procedure (the Db2 Unload Utility) in turn. To start these procedures without delay, you must classify their workload accordingly.

About this task

By default, all DDF transactions are assigned to the SYSOTHER service class. The priority of this service class is too low. The WLM would delay or even prevent the parallel start of nested calls of the Db2 Unload Utility.

In addition, special attention is required if one or all of the following conditions apply:

- Logical Partition (LPAR) CPU capping is active
- Million-of-service-units (MSU) capping is active

In all of these cases, you will see a performance degradation with regard to the SYSPROC.ACCEL_LOAD_TABLES stored procedure and possibly other IBM Db2 Analytics Accelerator for z/OS stored procedures. With SYSPROC.ACCEL_LOAD_TABLES, you might also run into SQLCODE = -471 E790002 errors. This indicates that the time limit defined at installation time expired before the WLM could assign the request to a TCB in the address space for SYSPROC.DSNUTILU.

To avoid load processes that do not run to completion, adjust the WLM service class definitions or adjust the values of the following IBM Db2 Analytics Accelerator for z/OS environment variables:

AQT_MAX_UNLOAD_IN_PARALLEL

Decrease the value of this variable to reduce performance requirements

AQT_MAX_RETRIES_DSNUTILU

Increase the value of this variable to reduce performance requirements

AQT_SECONDS_BEFORE_RETRY_DSNUTILU

Increase the value of this variable to reduce performance requirements

Classifying the DDF workload for remote invocations of SYSPROC.ACCEL_LOAD_TABLES

To call the SYSPROC.ACCEL_LOAD_TABLES stored procedure from a remote environment, such as IBM Db2 Analytics Accelerator Studio, you must explicitly classify your DDF workload.

Procedure

1. Create an additional classification rule with the PR attribute, for example by creating a sub-rule to an already existing default rule.
2. To this classification rule, assign a service class with *medium-to-high* priority.

Example

In the following example, a sub-rule is assigned to an existing rule with the name DDFLOAD. The DDFLOAD service class already has medium-to-high priority. The name of the sub-rule is ACCEL_L*, which ensures that the sub-rule is applied when a stored procedure is invoked whose name starts with ACCEL_L, just like SYSPROC.ACCEL_LOAD_TABLES.

```
Subsystem-Type  Xref  Notes  Options  Help
-----
of 1
Command ==>
PAGE
Subsystem Type . : DDF      Fold qualifier names?  Y  (Y or N)
Description . . . Distributed requests

Action codes:  A=After      C=Copy      M=Move      I=Insert rule
                B=Before    D=Delete row R=Repeat  IS=Insert Sub-rule
                                   More ==>

Action  -----Qualifier-----
Type    Name      Start
-----
1  UI      *
2  PR      ACCEL_L*

Service  Report
-----
DEFAULTS: DDF
          DDF
          DDFLOAD_
```

Figure 2. Assigning a medium-to-high priority service class to the SYSPROC.ACCEL_LOAD_TABLES stored procedure in the WLM ISPF application

Classifying the workload for local invocations of SYSPROC.ACCEL_LOAD_TABLES

If the SYSPROC.ACCEL_LOAD_TABLES stored procedure is called from a local z/OS environment, you must also ensure that a service class with medium-to-high priority is assigned to this stored procedure.

Example

If you call the SYSPROC.ACCEL_LOAD_TABLES stored procedure from an application that is part of a batch process, and your TSO batch (JES) workload is assigned a service class with medium priority, you must create an additional classification rule that assigns a service class with medium-to-high priority to the batch jobs. (The batch jobs invoke the application that calls the SYSPROC.ACCEL_LOAD_TABLES stored procedure.)

Setting access rights for the user who runs AQTTIJSP

The AQTTIJSP installation job, which you need to run in a later step, works best if the user who submits the job has SYSADM authority. So make sure that the ID used for running the job has indeed SYSADM authority.

If the user who is supposed to run the job is denied SYSADM authority for some reason, the user can try to run the job with the following privileges:

- Privilege to create and drop global temporary tables with the qualifier DSNAAQT, for example, CREATETMTAB
- Privilege to create views on the SYSACCEL.SYSACCELERATORS table, for example, DBADM on the DSNACCEL database
- CREATEIN and DROPIN on the SYSPROC schema. The CREATEIN privilege is required for the creation of IBM Db2 Analytics Accelerator for z/OS stored procedures. DROPIN is required for dropping previously installed stored procedures.
- CREATEIN and DROPIN on the DSNAAQT schema or an equivalent authorization to create or drop a sequence in the DSNAAQT schema.
- SELECT, INSERT, UPDATE, and DELETE on the following tables:
 - SYSACCEL.SYSACCELERATEDPACKAGES
 - SYSACCEL.SYSACCELERATEDTABLES
 - SYSACCEL.SYSACCELERATORS
 - SYSIBM.IPNAMES
 - SYSIBM.LOCATIONS
 - SYSIBM.USERNAMES
- SELECT on all SYSIBM catalog tables (SYSIBM.*):
- UPDATE on the following table:
 - SYSIBM.SYSTABLESPACESTATS
- Privileges to call the following Db2 stored procedures (for example, EXECUTE on the DSNUTILU package):
 - SYSPROC.ADMIN_COMMAND_Db2
 - SYSPROC.DSNUTILU
 - SYSPROC.ADMIN_INFO_SYSPARM

Customizing and running AQTTIJSP

Customize the AQTTIJSP job member (JCL) for the installation of IBM Db2 Analytics Accelerator stored procedures before you run the job.

Before you begin

Make sure that you have already created the IBM Db2 Analytics Accelerator database and tables by running the DSNTIJAS job.

Procedure

1. Replace the Db2 subsystem name and the other placeholders with the actual names as described in the customization notes within the AQTTIJSP job member.

Important: The hyphen (-) is not a placeholder. Therefore, do not replace it with the name of a WLM environment in clauses like 'WLMENV(-)'. Replacing a hyphen in this way leads to SQL error -628 during the execution of the AQTTTRIN job step. The actual placeholders are strings that start and end with an exclamation mark (!).

2. Review and optionally update the GRANT statements to conform to the authorization policy at your site.
3. Recommendation: Copy the AQTTIJSP job to complete the following steps on the copy.
4. Modify AQTTIJSP according to the instructions in the job.
 - If you want install new versions of the database objects, keep the value INSTALL for the MODE parameter in job step AQTTTRIN.
 - If you want to drop the former database objects, change the value of the MODE parameter to REINSTALL.
 - If you just want to see the SQL statements that would be executed, but do not want to run these statements, change the value of the MODE parameter to INSTALL-PREVIEW or REINSTALL-PREVIEW. The JCL is then copied to the data set that is specified in the JCLOUT DD statement, but not executed.
 - If IBM support requests a trace file of the installation program, uncomment the following lines or blocks of code in the JCL:

AQTTTRACE

Uncomment this step to allocate a trace data set.

AQTTTRACE DD

Uncomment this statement in the AQTTTRIN step to activate tracing.

5. Verify that you have created all required IBM Db2 Analytics Accelerator databases and tables before you submit the job. That is, check whether the DSNTIJAS job has been run successfully.
6. Submit the customized AQTTIJSP job.

Related tasks:

“Creating the IBM Db2 Analytics Accelerator database” on page 14

Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures

Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures does not require a connection to IBM Db2 Analytics Accelerator for z/OS on an IBM PureData System for Analytics.

About this task

The verification consists of the following steps:

- Collecting information about the environment and the setup
- Verifying that required Db2 stored procedures can be called
- Verifying that IBM Db2 Analytics Accelerator for z/OS stored procedures can be called in *versionOnly* mode.

To this end, you must customize the AQTJSJI00 and AQTJSJI01 job members (JCLs) and run these job members.

Related reference:

Appendix B, “Members of SAQTSAMP,” on page 165

Customizing and running AQTJSJI00

Customize the AQTJSJI00 job member (JCL) as described in the job notes before running SAQTSAMP(AQTJSJI00).

Before you begin

Make sure that the user running AQTJSJI00 has the privileges to read the following tables:

- Db2 catalog tables
- SYSACCEL.SYSACCELERATORS
- SYSACCEL.SYSACCELERATEDTABLES

Procedure

1. In the AQTJSJI00 JCL, replace all instances of DSN!!0 with the name of the library that contains SDSNLOAD.
2. Replace all instances of DSNTEP!! with the name of the plan of the DSNTEPx sample program.
3. Replace all instances of !DSN! with the name of the Db2 subsystem in which to run the IBM Db2 Analytics Accelerator for z/OS stored procedures.
4. Submit the AQTJSJI00 JCL by running SAQTSAMP(AQTJSJI00).

Results

The job returns the following information:

- The contents of the SYSACCEL.SYSACCELERATORS table.
If the job was run immediately after the installation, the SYSACCEL.SYSACCELERATORS table is shown, but it does not contain entries for accelerators.
If the job was run later to collect diagnostic information, the SYSACCEL.SYSACCELERATORS table lists all defined accelerators.
- Does the Db2 Communication Database (CDB) exist?
- Do the following tables exist?
 - ACCEL_NAMES
 - ACCEL_QUERY_INFO
 - ACCEL_TRACE_ACCELERATOR
- Have all stored procedures been defined that are used or provided by IBM Db2 Analytics Accelerator for z/OS, and if so, what are their run options (RUNOPTS) and Workload Manager (WLM) settings?

What to do next

Save the job output. It contains important information that might be required to solve installation problems.

Customizing and running AQTJSJI01

Customize the AQTJSJI01 job member (JCL) as described in the job notes before running SAQTSAMP(AQTJSJI01).

Before you begin

- Make sure that the Db2 command line processor is installed.
- Make sure that the user who runs AQTSJI01 has the privileges to call the following stored procedures:
 - SYSPROC.DSNUTILU
 - SYSPROC.ADMIN_INFO_SYSPARM
 - SYSPROC.ADMIN_COMMAND_Db2
 - SYSPROC.ACCEL*

Procedure

1. In the AQTSJI01 JCL, replace all instances of !SAQTSAMP! with the location of the SAQTSAMP data set.
2. In the AQTSJI01 member (Db2 command script), replace all instances of !Db2ALIAS! with the connection alias as defined in the properties file of the Db2 command line processor.
3. Submit the AQTSJI01 JCL by running SAQTSAMP(AQTSJI01).

Chapter 7. Connecting IBM Db2 Analytics Accelerator for z/OS and Db2

For security reasons, communication between a Db2 subsystem and an accelerator requires an authentication of the Db2 subsystem. Follow the steps here to enable communication between these components.

Access rights

The various IBM Db2 Analytics Accelerator for z/OS components require different authorizations. Which authorizations a user requires depends on the role that this user has to play. However, in nearly all cases, the rights that users need go beyond the obvious. Unfortunately, this information unit cannot list the required authorizations for all conceivable roles. It therefore restricts itself to two sets of authorizations, one that restricts access to the absolute minimum, and one that gives a user total access to all components (power user).

Access rights for power users

The various IBM Db2 Analytics Accelerator for z/OS components require different authorizations. It is useful to create at least one power user with extensive authorizations, that is, a user who can run all IBM Db2 Analytics Accelerator for z/OS functions and thus control all components. This section lists the required Db2, RACF, and file-system authorizations for such a power user. In subsequent chapters of this manual, it is expected that the required authorizations have already been granted.

If you want to create users who are permitted to run particular stored procedures only, look up the stored procedures in question in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures and Reference*.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

Required power-user authorizations in Db2 for z/OS

A power user requires the following authorizations in Db2 for z/OS:

- EXECUTE on the SYSPROC.* stored procedures
- EXECUTE on the DSNACQT.* functions
- EXECUTE on the SYSACCEL.* packages
- MONITOR1 privilege (needed to call the ADMIN_INFO_SYSPARM stored procedure internally)
- TRACE privilege
- DISPLAY privilege
- SYSOPR authorization to start and stop accelerators
- Authorization to run the ACCESS DB command on the databases that the tables reside in (needed to refresh Db2 real-time statistics)

Required z/OS power-user access rights

A power user requires the following access rights in RACF and in the z/OS UNIX file system (zFS):

- An OMVS segment is required for the user ID.
- Write access to the /tmp directory (UNIX System Services pipes are created in this directory).
- Write access to the directory that the AQT_HOST_PACKAGE_DIRECTORY environment variable points to (default: /usr/lpp/IBM/aqt/<version>/packages, where <version> is a directory name that identifies the product version, for example /v5r1m0/). Write access is only needed if the z/OS power user installs IBM Db2 Analytics Accelerator for z/OS update packages using SMP/E, such as ++APARs and PTFs. Otherwise, read access is sufficient). You set this variable in the data set that the AQTENV DD statement for the WLM environment refers to. See the template in step 2 on page 24. You can adjust the value of the environment variable at installation time.

Note: Do not use the NUM ON option in the ISPF editor when modifying the AQTENV data set because this makes the line numbers in the columns from 72 to 80 part of the variable value. If this has happened, an error message similar to the following one is displayed when you run the **Transfer new** function in IBM Db2 Analytics Accelerator Studio:

The ACCEL_UPDATE_SOFTWARE procedure invoked by the "Transfer new software" function in the GUI returns a file open error, because a line number (here: 00360003) was considered part of the file path name:

AQT10206I - The OPEN operation on the
"/SYSTEM/local/dwatest/swupdate_smpe 00360003/usr/lpp/aqt/packages" file,
data set or pipe failed . Diagnostic information: Errno is 129

- Read access to all subdirectories of <prefix>/usr/lpp/aqt/packages directory.

Db2 for z/OS power-user authorizations for IBM Db2 Analytics Accelerator Studio

You might want to enable your power user to run IBM Db2 Analytics Accelerator Studio. If so, give the power user the following authorizations in Db2 for z/OS:

- SELECT on the DSNAPT.ACCEL_NAMES view. This privilege is required for the enumeration of accelerators.
- SELECT on the SYSACCEL* tables. This privilege is required to associate the tables with an accelerator pairing code.
- SELECT on the following catalog tables of the database management system:
 - SYSIBM.SYSCOLUMNS
 - SYSIBM.SYSCONTROLS
 - SYSIBM.SYSDATABASE
 - SYSIBM.SYSDUMMY1
 - SYSIBM.SYSINDEXES
 - SYSIBM.SYSRELS
 - SYSIBM.SYSTABLEPART
 - SYSIBM.SYSTABLES
 - SYSIBM.SYSVIEWS

Read access to these tables is required for the creation of accelerator-shadow tables and the calculation of the overall table size.

Minimum access rights

A user might only be required to view information about an accelerator, the accelerator-shadow tables on the accelerator and their status, or the query history. Such a user needs only minimal access rights. See which access rights such a user requires.

If you want to create users who are permitted to run particular stored procedures only, look up the stored procedures in question in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures and Reference*.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

Required minimum authorizations in Db2 for z/OS

A read-only user requires the following authorizations in Db2 for z/OS:

- EXECUTE on the SYSACCEL.* packages
- EXECUTE on the following functions:
 - DSNAQT.ACCEL_READFILE2
 - DSNAQT.ACCEL_GETVERSION
 - DSNAQT.ACCEL_CONTROL_GETTRACECONFIG
 - DSNAQT.ACCEL_CONTROL_GETACCELERATORINFO
 - DSNAQT.ACCEL_CONTROL_GETACCELERATORTASKS
 - DSNAQT.ACCEL_CONTROL_GETREPLICATIONEVENTS
- EXECUTE on the SYSPROC.ADMIN_INFO_SYSPARM stored procedure
- MONITOR1 privilege (needed to call the SYSPROC.ADMIN_INFO_SYSPARM stored procedure internally)
- DISPLAY privilege

Minimum Db2 for z/OS authorizations for IBM Db2 Analytics Accelerator Studio

The recommended minimum set of authorizations for IBM Db2 Analytics Accelerator Studio is:

- EXECUTE on the following IBM Db2 Analytics Accelerator stored procedures:
 - SYSPROC.ACCEL_TEST_CONNECTION
 - SYSPROC.ACCEL_CONTROL_ACCELERATOR
 - SYSPROC.ACCEL_GET_QUERY_DETAILS
 - SYSPROC.ACCEL_GET_QUERY_EXPLAIN
 - SYSPROC.ACCEL_GET_QUERIES
 - SYSPROC.ACCEL_GET_TABLES_INFO
 - SYSPROC.ACCEL_GET_TABLES_DETAILS
- SELECT on the DSNAQT.ACCEL_NAMES view. This privilege is required for the enumeration of accelerators.
- SELECT on the SYSACCEL.SYSACCELERATEDTABLES table.
- SELECT on the following catalog tables of the database management system:
 - SYSIBM.SYSCOLUMNS
 - SYSIBM.SYSCONTROLS
 - SYSIBM.SYSDATABASE
 - SYSIBM.SYSDUMMY1
 - SYSIBM.SYSRELS
 - SYSIBM.SYSTABLEPART

- SYSIBM.SYSTABLES
- SYSIBM.SYSVIEWS

Read access to these tables is required for the calculation of the overall table size.

Binding Db2 packages and granting user privileges

To enable access to Db2 for z/OS from IBM Db2 Analytics Accelerator for z/OS, IBM Data Studio, or IBM Optim™ Query Tuner, you must create and bind certain Db2 packages and grant the EXECUTE privilege to the users of these applications.

About this task

The user ID under which the bind task is carried out automatically gains the EXECUTE privilege on the packages. However, at this stage, this is the only user having this privilege. Other users who run IBM Db2 Analytics Accelerator Studio or IBM Optim Query Tuner require the EXECUTE privilege as well. The creator or binder must therefore grant the EXECUTE privilege to the others users.

Note: The IBM Optim Query Tuner functions for single query tuning and Visual Explain (access plan graph) have been integrated into the IBM Data Studio, which serves as the basis for IBM Db2 Analytics Accelerator Studio. These modules can be used to compare the Db2 access plans with and without an accelerator, a functionality which allows you to see whether a query can be accelerated.

Procedure

1. To create and bind the Db2 packages, follow the instructions on this website:
https://www.ibm.com/support/knowledgecenter/SS62YD_3.1.1/com.ibm.datatools.qrytune.configothers.doc/topics/enabledb2zfromclient_ds.html
2. To grant the EXECUTE privilege to other users, proceed as follows:
 - a. Select **Analyze and Tune > Configure for Tuning > Advanced Configuration and Privilege Management** as described on the following website:
https://www.ibm.com/support/knowledgecenter/SS7L9Q_4.1.0/com.ibm.datatools.qrytune.workloadtune.doc/topics/verify.html
 - b. Click **Manage Package Privileges** to display and modify the authorization IDs that can execute the tuning packages.

Creating EXPLAIN tables

To be able to display an access plan graph of your queries (accelerated or not) in IBM Db2 Analytics Accelerator Studio, you must create certain EXPLAIN tables in the Db2 subsystems that you use.

About this task

The instructions on the following web pages were originally written for IBM Query Tuner. However, the steps can be applied to IBM Db2 Analytics Accelerator Studio likewise.

Procedure

1. To create the basic EXPLAIN tables, follow these the instructions on this web page:

http://www.ibm.com/support/knowledgecenter/SS62YD_4.1.1/com.ibm.datatools.qrytune.configothers.doc/topics/db2z_configure_ds.html
In addition to these, you need an EXPLAIN table called DSN_QUERYINFO_TABLE. This table is described here:

https://www.ibm.com/support/knowledgecenter/SSEPEK_11.0.0/usrtab/src/tpc/db2z_dsnqueryinfotable.html

2. To create it, you find a suitable CREATE TABLE statement in the DSNTEESC member of the SDSNSAMP library..

Creating a database connection profile

Create a database connection profile to gain access to a Db2 subsystem on a database server. A Db2 subsystem houses one or more databases, in which the source data for query acceleration (schemas and tables) is kept. To authenticate the Db2 subsystem to IBM Db2 Analytics Accelerator for z/OS, you must start the Add New Accelerator wizard. However, you can only start this wizard after connecting to a Db2 subsystem.

About this task

In IBM Db2 Analytics Accelerator Studio, the connection information is stored in profiles for reuse. Having created a profile, you can reconnect to a database by double-clicking the icon representing the profile in the Administration Explorer.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. If the Welcome screen is displayed, close it.
3. On the header of the Administration Explorer on the left, click the downward-pointing arrow next to **New** and select **New Connection to a Database**.
4. In the New Connection window, decide how to name the database connection profile:
 - To use the name of the database server that you want to connect to, leave **Use default naming convention** selected.
 - To choose a different name, clear **Use default naming convention**, and type the name in the **Connection Name** field.
5. From the **Select a database manager** list, select **Db2 for z/OS**.
6. Make sure that in the **JDBC driver** drop-down list, **IBM Data Server Driver for JDBC and SQLJ (JDBC 4.0) Default** is selected.
7. In the **Location** field, type the name of the database server that you want to connect to.

Tip: To determine the **Location**, **Host** name, and **Port number**, a Db2 for z/OS systems programmer or database administrator can issue a DIS DDF command.

8. In the **Host** field, type the host name or IP address of the data server on which the database server is located.
9. In the **Port number** field, you see that port number 446 is selected by default. Leave this setting unless the database server uses another port.
10. Select **Retrieve objects created by this user only** if you want to restrict database access to the databases, schemas, tables, and other objects that were created by the logon user. If you do not select this option (default), IBM Db2

Analytics Accelerator Studio will show and make selectable all databases, schemas, and tables that the logon user has access to, including those to which this user might have only read access.

11. In the **User name** field, type the user ID that you want to use to log on to the database server. Note that you can only use IBM Db2 Analytics Accelerator Studio successfully if this user has sufficient rights to run the stored procedures behind the IBM Db2 Analytics Accelerator Studio functions. The section *Appendix C. Required access rights* in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference* lists the privileges that are required to run a particular stored procedure. If you are uncertain, use an ID with SYSADMIN authority.

In many organizations, it is a common practice to have personal user IDs with restricted authority and special-purpose user IDs (groups in most cases) with extensive privileges in a certain field. IBM Db2 Analytics Accelerator Studio supports this practice in that you can specify a secondary user ID, which might have the privileges that your logon user ID lacks, such as the privilege to run stored procedures. If the secondary ID is a group user ID, the logon user must of course be a member of that group. To specify a secondary user ID, follow these steps:

- a. On the Connection Parameters page, click the **Optional** tab.
 - b. In the **Property** field, type the following statement:
`currentSQLID`
 - c. In the **Value** field, type the secondary user ID.
 - d. Click **Add**.
 - e. Click the **General** tab to return to that page and complete the logon.
12. In the **Password** field, type the password belonging to the logon user ID.
 13. Leave the **Save password** check box deselected.
Attention: You can select **Save password** to avoid having to enter the password each time that you want to work with the database server. This, however, is not recommended because only a lightweight encryption is applied when the password is stored on your local hard disk.
 14. Leave the **Default schema** field blank.
 15. Click **Test Connection** to check if you can log on to the database server.
 16. Click **Finish**.

Results

After creating the profile, IBM Db2 Analytics Accelerator Studio automatically connects to the Db2 subsystem.

What to do next

If it takes too long to load all objects of the Db2 subsystem into the Administration Explorer (more than one minute), you can set a filter to limit the number of schemas to be loaded:

1. In the Administration Explorer, right-click the icon representing the Db2 subsystem (database symbol).
2. Select **Properties** from the menu.
3. In the Properties for ... window, select **Default Schema Filter**.
4. Clear the **Disable filter** check box. This activates the filter controls.

5. From the **Name** drop-down list, select a suitable filter mask. In the adjacent text field, type the filter string. For example, to exclude all schemas whose names starts with the characters BLU:
 - a. From the **Name** drop-down list, select **Does not start with the characters**.
 - b. In the text field, type BLU.
6. Click **Apply**.

Related reference:

“Access rights for power users” on page 35

Testing the connection from IBM Db2 Analytics Accelerator Studio

Follow the steps in this section to see if you can connect to a Db2 subsystem from IBM Db2 Analytics Accelerator Studio.

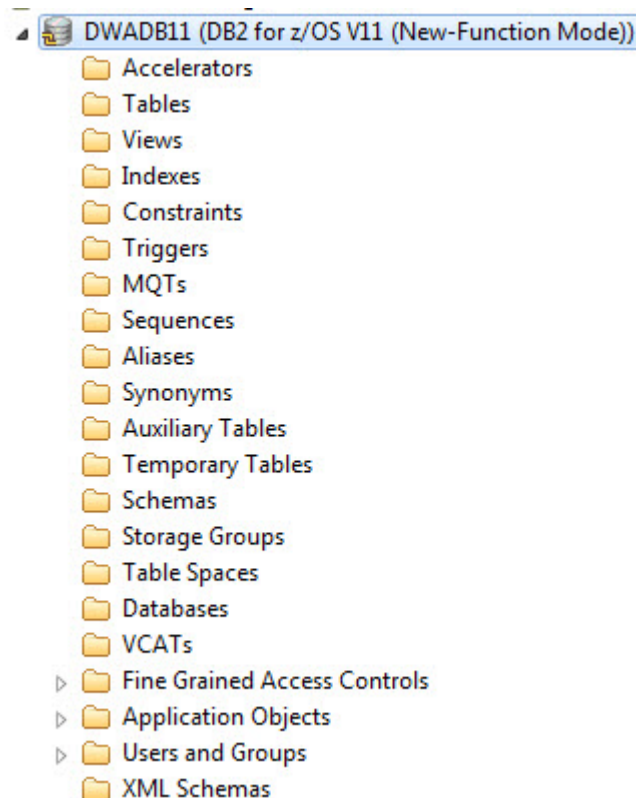
Procedure

Double-click the icon representing the database connection profile in the Administration Explorer of IBM Db2 Analytics Accelerator Studio. You find the Administration Explorer on the left.

Results

When the connection was successful, the icon representing the subsystem changes and the database object types, such as table spaces or tables, are displayed in a folder hierarchy in the Administration Explorer.

Example



What to do next

If you can connect to the database, check if you can navigate between the objects in the database. To do so, explore the folder structure in the Administration Explorer. For example, select the **Schemas** folder and check whether the schemas are displayed in the Object List Editor on the right.

Adding accelerators

Adding an accelerator to your configuration is a two-step process. First, you must obtain a pairing code from the IBM Db2 Analytics Accelerator Console. Second, you enter this pairing code along with the IP address and the name of the accelerator in the Add Accelerator wizard of IBM Db2 Analytics Accelerator Studio.

Obtaining the pairing code for authentication

Communication between an accelerator and a Db2 subsystem requires both components to share credentials. These credentials are generated after you submit a temporarily valid pairing code. This step is required each time you add a new accelerator. The following steps describe how to obtain the pairing code.

About this task

Note: You can renew the authentication for an existing accelerator without having to use a new pairing code. To do so, click the **Update** link in the Accelerator view.

The steps *Obtaining the pairing code for accelerator authentication* and *Completing the authentication using the Add New Accelerator wizard* (next topic) belong together, but are seldom carried out by the same person. Since the pairing code obtained from the IBM Db2 Analytics Accelerator Console is only valid for a limited time (30 minutes by default), the persons operating the console and IBM Db2 Analytics Accelerator Studio must coordinate the steps.

Procedure

1. Ask the network administrator or the person who did the TCP/IP setup for the IP address (virtual IP or wall IP address) of the accelerator. Make a note of this information. You need to enter it as you complete the steps that follow.
2. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
3. Log on to TSO/ISPF.
4. Enter the following command:

```
tso telnet <hostname> 1600
```

where

<hostname>

Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

1600

Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

For example:


```
tso telnet 10.101.8.8 1600
```

5. When prompted, enter the console password. The initial password is dwa-1234. You must change this password at the first login.
6. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

7. Type 3 and press Enter to display the submenu:

```
main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit
```

8. Type 1 and press Enter:
9. When the message Specify for how long you want the pairing code to be valid. is displayed, enter an appropriate integer to specify the validity period in minutes. The time that you choose must be sufficient for you or a coworker to go to the workstation that runs IBM Db2 Analytics Accelerator Studio, start the Add New Accelerator wizard, and enter the information that is returned by the console. Values from 5 to 1440 are allowed. If you just press Enter, you accept the default of 30 minutes.

```
Press <return> to accept the default of 30 minutes.
Cancel the process by entering 0.
```

```
Accelerator pairing information:
Pairing code   : 6048
IP address     : 9.152.85.192
Port           : 1400
Valid for      : 30 minutes

Press <return> to continue
```

Important: A pairing code is valid for a single try only. Furthermore, the code is bound to the IP address that is displayed on the console.

10. Make a note of the following information on the console:

- Pairing code
 - IP address
 - Port
11. Press Enter to return to the main menu of the console.
 12. Type x and press Enter to exit the console and close the telnet session.

Completing the authentication using the Add Accelerator wizard

To complete the authentication, you specify the IP address, the port number, and the pairing code in the Add Accelerator wizard.

Before you begin

Make sure that the following conditions apply:

- You need privileges to run Db2 administration commands and stored procedures on z/OS. If you created a power user as suggested, the power user will have the required privileges. For more information, follow the **Related information** link at the end of this topic.
- You have a valid pairing code. The pairing code, which is of temporary validity, can be obtained by using the IBM Db2 Analytics Accelerator Console. For more information see the **Related tasks** section at the end of this topic.

Attention: Do not give ordinary users SELECT authorization on the SYSIBM.USERNAMES table because this allows the users to see the authentication information in the SYSIBM.USERNAMES.NEWAUTHID column.

About this task

You can renew the authentication for an existing accelerator without having to use a new pairing code. To do so, click the **Update** link in the Accelerator view.

Attention: Making a new backup of your Db2 catalog tables is strongly recommended after each authentication update because restoration processes in your Db2 subsystem can make an accelerator unusable. This happens if you must restore your Db2 catalog and the backup of the catalog was made before the last update of the accelerator credentials. In this case, the latest authentication information will not be in the catalog tables of the backup, and so the accelerator can no longer be used.

For the completion of this task, the following stored procedures are run on your data server:

- SYSPROC.ACCEL_TEST_CONNECTION
- SYSPROC.ACCEL_ADD_ACCELERATOR

For information about the privileges that are required to run these procedures and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related information** at the end of this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. Select the **Accelerators** folder in the Administration Explorer.

3. On the menu bar of the Object List Editor, click the downward-pointing arrow next to the green plus sign.
4. From the drop-down menu, select **Add Accelerator**.
5. In the **Name** field, type a name for the accelerator. This name is automatically copied to the **Location** field.

The location name is the unique name of the accelerator in the SYSIBM.LOCATIONS table. Mostly, this is the same name as the accelerator name.

Restriction: An accelerator cannot be shared between two or more Db2 subsystems if the subsystems use the same location name. If you copy an entire subsystem, make sure to change the location name of the copy afterwards.

6. In the **Pairing code** field, type the pairing code.
7. In the **IP address** field, type the IP address of the accelerator.
8. In the **Port** field, type 1400. This is the fixed port for network communication between the z/OS data server and the accelerator.
9. Click **Test Connection** to check whether the accelerator with the given address can be connected to.

Note: If the network connection between the z/OS data server and the accelerator is encrypted, an MTU (maximum transmission unit or frame size) error is reported. The message says that the maximum frame sizes on the z/OS data server and on the accelerator differ. Although the difference is real (is has to do with the IPsec implementation), you can ignore this message because the difference has no impact.

10. Click **OK**. A connection test is carried out. See the note in step 9. It also applies here because it is the same test.

Related tasks:

“Obtaining the pairing code for authentication” on page 42

Related reference:

“Access rights for power users” on page 35

Related information:

“DRDA connection does not work” on page 155

Testing the stored procedures

Run a few more tests to check whether the stored procedures behave as expected.

Before you begin

Make sure that the following conditions apply:

- The Db2 libraries for IBM Db2 Analytics Accelerator for z/OS have been installed.
- The IBM Db2 Analytics Accelerator for z/OS stored procedures have been installed.
- The Db2 command line processor has been installed.

Note: The Db2 command line processor is a Java application that requires IBM Data Server drivers for JDBC.

- The accelerator has been successfully added to the Db2 subsystem from IBM Db2 Analytics Accelerator Studio.

Tips:

- Create a separate Db2 command line processor properties-file for the user who will run the tests. Remove read access to this file for everybody else. This way, you can safely add a connection alias for the accelerator network connection to the properties file, including the password. Use the following syntax to add this information to the properties file:

```
<connection_alias>=<db2host>:<db2port>/<db2location>,<uid>,<password>
```

where

<db2host>

Is the host name or IP address of the IBM Z server on which Db2 runs

<db2port>

Is the port for network connections between the Db2 command-line client and the Db2 host. To identify the Db2 port, run the following Db2 command:

```
- <ssid> DIS DDF
```

where <ssid> is the Db2 subsystem ID.

<db2location>

Is the location of the Db2 subsystem that is supposed to interact with an accelerator.

<uid>

Is the Db2 ID of the user running the tests

<password>

Is the password of the user running the tests

- It is easiest to give the testing user SYSADM authority in Db2. If this should violate a security policy of your organization, grant the testing user the required minimum access rights for each stored procedure. For more information, see *Required access rights in the IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*.

About this task

The AQTJSJ02 JCL executes the test and calls a Db2 command script named AQTSCI02, which cleans up the SYSACCEL* Db2 tables after running the test. You must customize both, the JCL and the Db2 command script before you can submit the AQTJSJ02 JCL.

Related reference:

Appendix B, “Members of SAQTSAMP,” on page 165

Related information:



Using the DB2 command line processor

Customizing AQTJSJ02

Customize the AQTJSJ02 job member (JCL) as described in the job notes before submitting this JCL.

Procedure

1. In the AQTJSJI02 JCL, replace all instances of !SAQTSAMP! with the location of the SAQTSAMP data set on your system.
2. If you change the number of IBM Db2 Analytics Accelerator for z/OS stored procedure calls in the SAQTSAMP(AQTSCI02) input data set for the Db2 command line processor, you must set the expected number of successful IBM Db2 Analytics Accelerator for z/OS stored procedure calls accordingly in the CHKCALL job step. See the following example, in which 15 stored procedure calls are expected:

```
//CHKCALL EXEC PGM=BPXBATCH,REGION=0M,  
// PARM='SH /tmp/ivp/AQTSSCHK /tmp/ivp/out 15'
```

Customizing AQTSTXTCO

Customize the AQTSTXTCO job member (XML input parameter for SYSPROC.ACCEL_TEST_CONNECTION) as described in the notes in XML comments before submitting the JCL SAQTSAMP(AQTJSJI02).

About this task

The AQTSTXTCO member contains XML code in UTF-8 encoding that is used to test the connection to an accelerator.

Procedure

In the AQTSTXTCO member, replace all instances of !IDAAA! with a valid accelerator name.

Customizing AQTSCI02

Customize the Db2 command script AQTSCI02 as described before running SAQTSAMP(AQTJSJI02).

Procedure

1. In the AQTSCI02 script, replace all instances of !Db2ALIAS! with the connection alias that is defined in the Db2 command line processor properties-file.
2. To test adding and removing an accelerator, uncomment (remove leading dashes) before the SYSPROC.ACCEL_ADD_ACCELERATOR and SYSPROC.ACCEL_REMOVE_ACCELERATOR calls and adjust the CHKCALL job step in AQTJSJI02 accordingly. To test an accelerator that was recently added, additionally complete these steps:
 - a. Replace all instances of !IDAAIP! with the IP address of the accelerator.
 - b. Replace all instances of !IDAAPORT! with the listening port number of the accelerator (by default, this is 1400).
 - c. Replace all instances of !IDAAPIN! with a valid pairing code that was created by the IBM Db2 Analytics Accelerator Console. Bear in mind that this code is valid for a limited period of time only. For more information on how to obtain a pairing code, follow the **Related tasks** link at the end of this topic.
 - d. Replace all instances of !IDAAA! with a valid accelerator name.

Related tasks:

“Transferring update packages for the accelerator” on page 136

“Obtaining the pairing code for authentication” on page 42

Running AQTSJI02

To complete the test, submit the AQTSJI02 JCL after customizing the JCL itself and the AQTSCI02 Db2 command script.

Procedure

Submit the AQTSJI02 JCL by running SAQTSAMP(AQTSJI02).

Results

If all steps in AQTSJI02 end with return code 0, the IBM Db2 Analytics Accelerator for z/OS stored procedures are set up correctly and network communication with the accelerator works.

Chapter 8. Testing query acceleration

Run a test query to verify that all required installation and configuration steps have been completed successfully and that the entire system is in an operable state.

Related information:

Running an SQL script from IBM Db2 Analytics Accelerator Studio

Loading tables

Selecting a test query

For a simple test, select a query that runs against a single table and uses an aggregation function, such as `SELECT COUNT(*) FROM <table>`. To qualify for query acceleration, the table must occupy at least 500 pages in Db2 for z/OS.

Defining accelerator-shadow tables

Define the tables that are referenced in your test query on the accelerator.

Procedure

1. In the Administration Explorer (upper left) of IBM Db2 Analytics Accelerator Studio, select the Accelerators folder.
2. In the list of the Object List Editor on the right, double-click the name of the accelerator. This opens the Accelerator view. It is empty by default, that is, it does not contain any tables.
3. Click the **Add** button.
4. In the Add Tables wizard, select the tables that are referenced in your test query.
5. Click **OK**.

Results

The newly created accelerator-shadow tables are shown in the Accelerator view.

Loading and enabling tables

Before you can run your test query, you must load the currently empty accelerator-shadow tables with data and enable these for query acceleration.

About this task

Loading or updating the data in accelerator-shadow tables for query acceleration requires IBM Db2 Analytics Accelerator Studio to hold the network connection until the process has finished.

An option that circumvents this problem is to invoke IBM Db2 Analytics Accelerator for z/OS stored procedures directly from JCL batch jobs. Such jobs can even be scheduled by using a third-party tool.

Procedure

1. In the Accelerator view, select the tables that are referenced in your test query and click **Load**.
2. Do not change value of the **Lock original database tables while loading** drop-down list. Leave the setting **None**.
3. Leave **After the load, enable acceleration for disabled tables** selected.
4. Click **OK**.

Note: The processes can take a couple of minutes to complete. If the load fails, first check whether DSNUTIL was started in Db2 for z/OS.

Running a test query

Run a simple test query against the selected tables to see whether the setup works.

Before you begin

1. Make sure that the tables referenced by the query exist on the accelerator, are loaded, and enabled for query acceleration.
2. Make sure that the accelerator has been started and is online. The status of the accelerator is shown on top of the Accelerator view.

About this task

If you followed the instructions in the previous sections, the query should run successfully, that is, it should not fail and return the intended result.

Procedure

1. On the toolbar of the Administration Explorer, click the downward-pointing arrow next to the **New** button.
2. Select **New SQL Script** from the menu.
3. In the blank space of the Script<x>.sql workspace that opens on the upper right, type the following statement on the first line:
 - SET CURRENT QUERY ACCELERATION = ENABLE;

Note: <x> stands for a counting number (integer). This means that your first SQL script is named Script1.sql, the second Script2.sql, and so on.

4. Type your query. Use a simple query, such as `SELECT SUM(QUANTITY) FROM SALES.FIGURES_FACT.`
5. Select **Script > Run SQL** from the main menu. The SQL Results pane in the lower left shows you whether the query ran successfully.
6. To check whether the accelerator was used, follow these steps:
 - a. Return to the accelerator view by clicking the tab with the name of the accelerator.
 - b. Click the twistie next to the heading **Query Monitoring**.

The section that unfolds shows a table that lists the most recent queries. These are only the queries that were run on the accelerator. Inhouse Db2 queries are not listed. Your test query should appear at the top of the table. Your query might not be listed there for various reasons, for example:

- The installation of IBM Db2 Analytics Accelerator for z/OS is incomplete.
- The Db2 optimizer did not route the query to the accelerator because the query does not qualify.

- One of the tables in the query is not defined on the accelerator.

To determine the cause for the failure, use the Db2 EXPLAIN function and look up the reason code in DSN_QUERYINFO_TABLE. For more information, read the section *EXPLAIN information* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*. You find a link under **Related information** at the end of this topic.

Chapter 9. Incremental updates

The incremental update function of IBM Db2 Analytics Accelerator for z/OS allows you to update accelerator-shadow tables continually. Changes to the data in original Db2 for z/OS tables are thus propagated to the corresponding target tables with a high frequency and just a brief delay. This way, query results from an accelerator are always extracted from recent, close-to-realtime data.

If you followed the instructions in this guide, you already installed the necessary IBM InfoSphere Data Replication for z/OS (CDC) components by completing the steps in “Installing libraries with IBM Db2 Analytics Accelerator for z/OS support” on page 13. However, for updates or more detailed information, follow the link to the installation instructions in the IBM InfoSphere Data Replication for z/OS information center at the end of this topic.

Attention:

- It is not possible to integrate and use an existing CDC installation. You must use a dedicated CDC that was installed from the SMP/E installation package delivered with IBM Db2 Analytics Accelerator for z/OS.
- A risk of data loss exists if you include tables without a unique constraint, such as a primary key or a unique index. To identify rows in such a table, the values of all table columns are used. It is possible that rows with exactly the same values exist, in which case it is impossible to identify a row unambiguously. Hence a deletion of a single row from a table in Db2 for z/OS results in the deletion of this row and all its duplicates from the corresponding accelerator-shadow table. This, in turn, leads to incorrect results for accelerated queries.
- If you update Db2 for z/OS tables by running the LOAD utility rather than an INSERT, UPDATE, or DELETE operation, you must set the following parameters (for the LOAD utility):
 - SHRLEVEL CHANGE
 - LOG YES

Otherwise, the changes that were made by the LOAD utility are not detected by the incremental update function, and will thus not be reflected in your accelerator-shadow tables.

- With the introduction of IBM Db2 Analytics Accelerator for z/OS Version 3.1, the Db2 attribute DATA CAPTURE is added to the tables on an accelerator. The attribute can carry the value Y or N (default), for *yes* or *no*. When incremental updates are enabled for a table, the DATA CAPTURE attribute of the table is set to the value Y. Once set, this attribute value persists, even if the table is disabled at a later time. Bear this in mind, especially if you run applications that use the DATA CAPTURE attribute.
- You might have to reload or even remove tables from an accelerator after the execution of an ALTER TABLE or ALTER TABLESPACE statement in Db2 for z/OS. For more information, see *What to do after changing a table or table space in Db2 for z/OS*. You find a **Related reference** link at the end of this topic.

Restriction: It is not possible to enable tables if the table name or the schema name contains GB18030 characters (Simplified Chinese) of Unicode plane 2 (U+20000-U+2FFFF: Supplementary Ideographic Plane). Trying to do so results in an error.

Concepts and architecture

The incremental update function is deeply integrated into the IBM Db2 Analytics Accelerator for z/OS solution.

You administer incremental updates from IBM Db2 Analytics Accelerator Studio or call the corresponding IBM Db2 Analytics Accelerator for z/OS stored procedures directly.

Components

IBM InfoSphere Change Data Capture for Db2 for z/OS is required for an implementation of the incremental update function. For further details, refer to the list of IBM Db2 Analytics Accelerator for z/OS prerequisites on the web.

System architecture

IBM Db2 Analytics Accelerator Studio communicates with the IBM Db2 Analytics Accelerator for z/OS server process on the Netezza host by means of the `SYSPROC.ACCEL_SET_TABLES_REPLICATION` and `SYSPROC.ACCEL_CONTROL_ACCELERATOR` stored procedures. Requests for incremental updates are forwarded to an automation program that interfaces with the application programming interface (API) of the IBM Db2 Analytics Accelerator Access Server. The Access Server executes the requested action, such as adding or removing an accelerator-shadow table from the selection list for incremental updates (called subscription).

Note: IBM Db2 Analytics Accelerator for z/OS automates the setup, but is not involved when data is transferred from the source to the target tables. Data flows directly from the CDC for Db2 for z/OS Agent to the IBM Db2 Analytics Accelerator Access Server, without IBM Db2 Analytics Accelerator for z/OS components in between (see the blue arrows in Figure 3 on page 55). In addition, the table setup is a simple 1:1 column mapping. Tables or data are neither converted nor transformed in the process, and user-exit programs are not employed.

The process flow is illustrated in the following diagram:

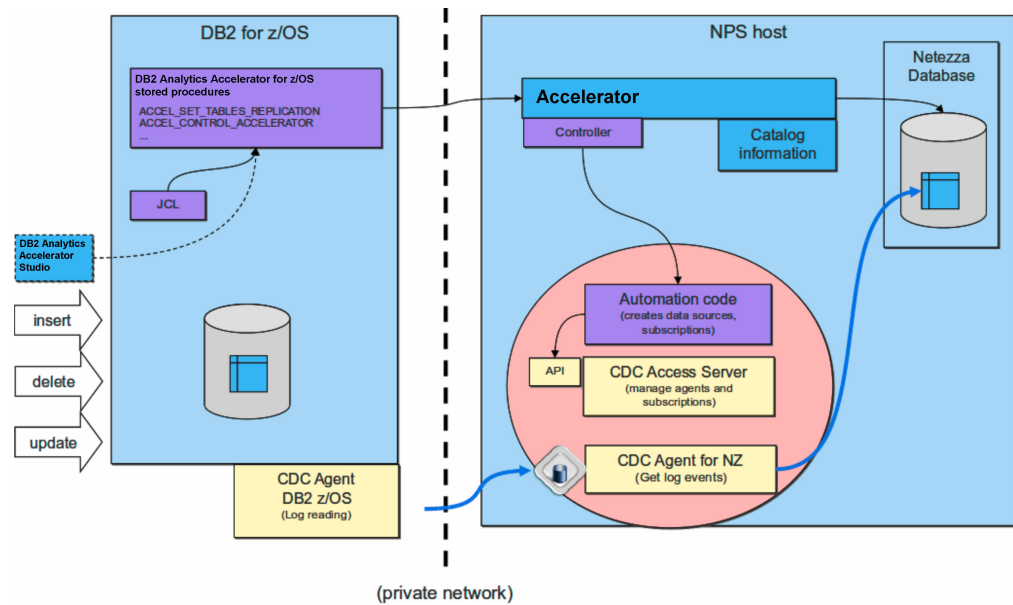


Figure 3. Interaction diagram of the components that are involved in the incremental update process.

Integration

The deep integration of the incremental update function into the IBM Db2 Analytics Accelerator for z/OS framework ensures data integrity, system stability, and uniform monitoring and recovery processes.

IBM Db2 Analytics Accelerator for z/OS is always aware of ongoing incremental update processes and can thus prevent actions that would otherwise harm the consistency of table data. For example, it is not possible to change a distribution key or organizing keys or load or update an accelerator-shadow table while an incremental update process is running.

The failover mechanism for the Netezza hosts remains in place. If a host fails during an incremental update, the inactive host will take over, and incremental updates will continue.

Furthermore, you can use the existing IBM Db2 Analytics Accelerator for z/OS functions for logging, tracing, monitoring, and software updates.

Tracing

Incremental update information is included in the collection of trace data.

Logging

Warning or errors related to the incremental update function are reported on the z/OS operator console using the uniform message ID DSNX881I.

Event monitoring

Incremental update events can be viewed in the event history view provided by IBM Db2 Analytics Accelerator Studio.

Software updates

Software updates for the incremental update function are delivered as part of regular product updates, and are uploaded, transferred, and applied through the same channels.

Completing the installation and configuring CDC

Read how to complete the installation and configure IBM InfoSphere Data Replication for z/OS (CDC) for an optimal performance of the incremental update function.

Procedure

1. Check and make sure that you meet the system requirements for CDC at: System requirements for InfoSphere CDC for z/OS. This includes the following steps (among others):
 - a. Creating a z/OS user ID for running the CDC started task. Because it makes the maintenance process easier, it is recommended that you use the same ID as the security identifier `<CHCMetaID>`, which is the owner of the CDC metadata tables (see steps 4b on page 57 and 4c on page 57). However, if your organization's security policy demands that you use different IDs, you can do so.

Important:

- If the ID for running the CDC started task and the security identifier `<CHCMetaID>` are the same, make sure that the password of this user ID is at least 4 characters long. It is possible to define a shorter password, but that will cause problems when you try to update IBM Db2 Analytics Accelerator in the future. If the IDs are different, the one for the CDC started task does not require a password, but the security identifier does.
 - Set the password of this user ID so that it never expires. This prevents unwanted interruptions of the incremental update process.
- b. Defining an OMVS segment for this user ID because the ID needs to access TCP/IP services.

This user ID requires SYSCTRL authorization in addition to other authorizations, including SELECT authorization for all tables to be processed by the incremental update function.

2. Complete the necessary preinstallation steps as described in Before you install InfoSphere CDC for z/OS. In one of the steps, you define a port number for the CDC address space used for communication between the CDC agents on z/OS and the accelerator. The default port is 5999.
3. Using the SMP/E Apply function, add required program temporary fixes (PTFs) to your base installation. (You installed the CDC base as you completed step 1 on page 13). The required PTFs are listed in:
<http://www.ibm.com/support/docview.wss?uid=swg27039487Prerequisites> and Maintenance for IBM Db2 Analytics Accelerator for z/OS Version 5.1.
4. Complete the steps in section Completing the installation using the distributed sample jobs of the CDC information center. Basically, this task comprises the following steps:
 - a. Creating the configuration control data set and copying members into this data set. The settings in this control data set are read and processed during the initialization of the CDC address space.

- b. Defining a security identifier for use of the CDC address space to ensure a controlled access to the relevant Db2 subsystems and the CDC metadata tables.
- c. Customizing and running a number of jobs to prepare your Db2 subsystems for CDC. For example, the CHCMDMUT job creates the metadata tables for CDC. You must customize this job and specify the security identifier (<CHCMMetaID>) as the owner of these tables. The security identifier becomes the schema name of the metadata tables.

What to do next

Follow the instructions in the following topics, in the order indicated:

Configuration settings for IBM InfoSphere Data Replication for z/OS

As you enable incremental updates, IBM Db2 Analytics Accelerator for z/OS uses the default values in the various configuration control data set members of IBM InfoSphere Data Replication for z/OS (CDC). Not all of these default values are suitable for the configuration of incremental updates with IBM Db2 Analytics Accelerator for z/OS. Therefore, you must change a few of these values.

1. Change values of the following keywords in the TCP/IP statement of the CHCCMMxx member as follows:

```
TCP/IP SERVICENAME=<port_no>
AUTODISCEXCLUDE=*
```

where <port_no> matches the port number or assigned service name that you have defined in step 2 on page 56. By default, this statement is set to the value 5999.

2. Change the values of the following keywords in the CONFIG statement of the CHCCFGxx member as follows:

```
PALCLEANUPTIME=23:59,
TIMEZONE=<value>,
ADMININACTTIMEOUT=15,
REPSTATSINTERVAL=5,
AUTORESTARTINTERVAL=2
```

3. Change the values of the following keywords in the Db2 statement of the CHCDBMxx member as shown:

```
Db2 SSID=<value>,
PLANSUFFIX=<value>,
ONUTILITYACTION=IDLE,
ONDECOMPRESSIONERROR=(300,IDLE),
ONSCHEMACHANGE=IDLE,
ONTABLEERROR=IDLE,
ADDCOLUMNISSCHEMACHANGE=NO,
LOGPOLLINTERVAL=(3,ALWAYS),
LOGCACHEDELAY=5,
REPLTEMPORALTABLES=DECOUPLE,
LOGREADCOMMITINTERVAL=15,
CACHEBLOCKSIZE=2,
CACHELEVEL1RESERVED=160,
CACHELEVEL1SIZE=200
```

Important:

- Note the change from ONSCHEMACHANGE=STOP to ONSCHEMACHANGE=IDLE. This is the recommended setting if your CDC installation is at fix level APAR PI65350/UI39653 or an even newer fix level. STOP was the recommended setting for earlier product releases or fix levels. Continue to use STOP if you

are at a fix level earlier than APAR PI65350/UI39653. The setting STOP causes the incremental update process to stop in case of the schema of the base tables changes, so that you can redefine and reload the corresponding accelerator-shadow table before you restart the process. With APAR PI65350/UI39653 or later, this is no longer necessary.

- The setting ONUTILITYACTION=IDLE leads to a conflict if you intend to use the High Performance Storage Saver (HPSS) on the same tables because IDLE suspends the propagation of data changes for an entire table, and not just the partitions that have been moved by the HPSS. Hence the parts that have not been archived will not be synchronized anymore. To avoid this conflict, temporarily change the setting to ONUTILITYACTION=IGNORE, that is, before you archive or restore partitions with the HPSS. Note that you must restart the CDC capture agent for the change to take effect.

Alternatively, you can also use ONUTILITYACTION=IGNORE as a permanent setting and handle the data changes that escaped the capturing process with the help of Db2 utilities.

- In addition, the setting ONUTILITYACTION=IDLE might lead to wrong or unintended results if it is used in combination with a setup for Hybrid Transactional Analytical Processing (HTAP). Generally, if a Db2 utility action is detected for an incrementally updated table in an HTAP environment (for example, LOAD or RECOVER), the table is suspended from the ongoing incremental update process. However, if more than one table must be suspended, and queries running at the same time or shortly after the suspension reference these tables, incorrect results might be computed until the suspension has been fully completed.

If this is unacceptable, you can use the setting ONUTILITYACTION=STOP instead. Mind, however, that this setting stops the entire incremental update process when a utility action is discovered. If that happens, table changes are not propagated to the accelerator anymore.

A less drastic counter-measure is the suspend-faulty-tables function. This function does not eliminate the risk of incorrect results, but minimizes it considerably.

For more information about HTAP, see *Making queries wait for incremental updates* in the *IBM Db2 Analytics Accelerator for z/OS: User's Guide*.

- The example above uses log caching. In the past, log caching was recommended for setups in which data changes were propagated to multiple connected accelerators. However, experience has shown that log caching eliminates many issues connected with the incremental update function. Therefore, always enable it.
- ONTABLEERROR=IDLE was introduced with IBM Db2 Analytics Accelerator for z/OS Version 4.1.0, maintenance level PTF-5 (it requires the installation of the fix for CDC APAR PI26807, UI27018 or higher). Do not use this setting with earlier maintenance levels or versions.
- REPLTEMPORALTABLES = DECOUPLE was introduced with IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 (it requires the installation of the fix for CDC APAR PI49337, UI31507 or higher). Do not use this setting with earlier versions. However, the setting is mandatory in Version 5.1.0.
- With this configuration, the CDC STC might allocate up to 2.2 GB (2GB staging space + 200 MB level 1 cache) of z/OS storage resources (above-the-bar storage), which might be paged to auxiliary storage. Make sure that there are sufficient system resources for this configuration. The paging might reduce the incremental update throughput significantly.

Description

Here is a brief description of the keywords (in the order of appearance):

SERVICENAME

Specifies the name of the TCP/IP service that the InfoSphere CDC address space provides to the Management Console and to other InfoSphere CDC servers that require replication services.

PALCLEANUPTIME

Specifies the time at which IBM InfoSphere Data Replication for z/OS will initiate a daily cleanup of the event log.

TIMEZONE

Specifies the local time zone of the system on which IBM InfoSphere Data Replication for z/OS is executing, for example Europe/Berlin. You can find the correct time zone for your system in the CHCTMZON member.

ADMININACTTIMEOUT

Specifies for how long (in minutes) a Management Console user connection can be inactive before the connection is severed.

REPSTATSINTERVAL

Specifies the period of time, in minutes, between consecutive messages that provide status information about Db2 log scraping activities on the source server.

AUTORESTARTINTERVAL

Sets a period in minutes after which an incremental update process is restarted in case of a normal or abnormal termination.

SSID

Specifies the name of the Db2 subsystem that CDC is supposed to work on.

PLANSUFFIX

Specifies two characters to associate a set of Db2 Plans unequivocally to CDC metadata tables. This is required because more than one instance of CDC might access the same Db2 subsystem.

ONUTILITYACTION

Specifies the behavior of IBM InfoSphere Data Replication for z/OS after detecting that a Db2 utility (such as LOAD or RECOVER) has run on a table space containing source tables that are being mirrored. Make sure to read the related bullets in the previous Important note.

ONDECOMPRESSIONERROR

Specifies how source data compression errors are to be handled. Decompression errors can be either soft (temporary and potentially recoverable) or hard (permanent and unrecoverable). This keyword has two positional sub-parameters that provide a recovery retry time limit for soft decompression errors and a resolution action for mitigating hard decompression errors.

Soft errors will be retried a number of times in an increasing series of intervening time intervals, with the sum of these interval not to exceed the specified retry time limit. When retrying to recover from a soft error starts, a message will be issued noting the location in the log and type of error. If the retrying attempts exceed the retry time limit, then the error will be deemed to be a hard error.

The recommended setting of ONDECOMPRESSIONERROR=(300,IDLE) means that the recovery interval for soft errors is set to 300 seconds or five minutes. If a

recovery does not occur within this interval, the error is escalated to a hard error. The second sub-parameter specifies how to handle hard errors. The value IDLE suspends the incremental update process, sets the status of the affected accelerator-shadow table to *inactive*, meaning that no more updates are applied to that table, and then resumes the process for the remaining tables.

ONSCHEMACHANGE

Specifies which action to take if the schema of a table to be updated incrementally has changed such that changes to the table can no longer be propagated correctly. For IBM Db2 Analytics Accelerator for z/OS, this keyword must be set to the value IDLE, which means that the change propagation continues for all but the altered tables.

ONTABLEERROR

Specifies which action to take on tables that have caused an error. The setting ONTABLEERROR=IDLE effects the stopping of incremental update activities on those tables, so that the process can continue on unaffected tables.

ADDCOLUMNISSCHEMACHANGE

Specifies whether the adding of a column is treated like any other schema change or as a special case. IBM Db2 Analytics Accelerator for z/OS requires this value to be set to NO, which means that adding a column is treated as a special case.

LOGPOLLINTERVAL

Specifies how frequently the log profiling task performs unprompted reads in a Db2 data sharing group when the local Db2 log is idle (that is, it is not actively being extended by Db2 activity). The value for this keyword is the number of seconds the local Db2 log must have been idle before the log profiling task autonomously requests additional Db2 log data.

REPLTEMPORALTABLES

Specifies which action to take on system-temporal and bi-temporal tables. Setting REPLTEMPORALTABLES=DECOUPLE makes CDC work on the regular tables as well as on the history tables.

LOGCACHEDELAY

Specifies the delay in seconds that is imposed before newly scraped Db2® log data is added to the InfoSphere CDC log cache, unless the newly scraped Db2 log data fills a complete InfoSphere CDC log cache buffer (whose size is determined by the CACHEBLOCKSIZE keyword).

Important: The example above uses log caching. In the past, log caching was recommended for setups in which data changes were propagated to multiple connected accelerators. However, experience has shown that log caching eliminates many issues connected with the incremental update function. Therefore, always enable it.

LOGREADCOMMITINTERVAL

Specifies how frequently the InfoSphere CDC for z/OS® threads that read the Db2 log will issue a Db2 COMMIT. In this case: every ten seconds. See the previous Important note under LOGCACHEDELAY.

CACHEBLOCKSIZE

Specifies the maximum size, in MB, of each buffer in the level 1 and level 2 Db2 log caches. See the previous Important note under LOGCACHEDELAY.

CACHELEVEL1RESERVED

Specifies the size, in MB, of the reserved portion of the level 1 Db2 log cache.

The reserved portion maintains records that were recently placed in the Db2 log. See the previous Important note under LOGCACHEDELAY.

CACHELEVEL1SIZE

Specifies the size, in MB, of the level 1 Db2 log cache. See the previous Important note under LOGCACHEDELAY.

Important: These settings are different from those of IBM InfoSphere Data Replication for z/OS. For example, IBM InfoSphere Data Replication for z/OS sets the ADMININACTTIMEOUT and the AUTORESTARTINTERVAL values to 0, which means that Management Console connections are allowed to run endlessly, and mirroring processes are never restarted automatically. For more information, especially in case that you want to change these values, follow the links under **Related information**.

Related tasks:

“Suspending faulty tables” on page 81

Related information:



CONFIG statement



DB2 statement in CHCDBMxx

Configuring staging space resources on z/OS

The incremental update function tracks and stages all transactions in the system memory until they are committed (and subsequently transferred to the accelerator) or rolled back. The component responsible for this task is the CDC Capture Agent on z/OS. Sufficient memory must be allocated to this component. If the memory does not suffice, a staged transaction might stop incremental updates for all connected accelerators. The error message CHC0330E is issued in such cases.

Configuration settings relevant to the staging space

The CDC configuration parameter MAXSUBSCRSTAGESIZE defines the amount of memory for the staging of incremental update transactions to be processed by an accelerator. So the total amount of memory that must be available to the CDC Capture Agent is roughly this amount multiplied by the number of accelerators. The total amount is configured by the configuration parameter **STG64LIMIT**. However, the required memory also depends on the actual workload. The default values are therefore only starting points for an evaluation. The website *Calculating staging resources* (see link at end of this topic) provides heuristics, which might serve as a computational basis.

Testing your settings

Because the staging space size depends on the workload, it is crucial that you test the configuration settings with the anticipated workload. To make sure that sufficient staging space is allocated, monitor the following events in the log of the CDC Capture Agent:

Table 2. Staging-space-related events in the log of the CDC Capture Agent

Event	Description
CHC0051W	The oldest open commit group in the staging space has exceeded a certain threshold. Long running transactions can occupy a significant amount of the staging space for a longer period of time and thus may lead to the space reaching its overall limits.
CHC9618W	Indicates that the overall memory consumption has reached a defined limit.
CHC1532W	A subscription has occupied more than 90% of the available staging space.
CHC1524E	A subscription has used up all of the available staging space (100%).
CHC0330E	Indicates that the staging space is full and that the system has to abort.

For high workloads, it might prove useful to create staging space reports. These reports show the content of the staging space and other details, which might help you understand where the problems are.

Example

```
F <cdcjob>,REPORT,TYPE=STGSP,NAME=<subname>
```

As always when monitoring the memory consumption, it is helpful to monitor the storage manager.




Example

```
F<cdcjob>,STGMGR,STATUS
```

Impact of configuration settings on the CDC Capture Agent

The CDC Capture Agent uses a configurable amount of above-the-bar storage (STG64LIMIT) for the staging of transactions and for the so-called retry cache. If this additional space is not configured, the agent uses its regular amount of storage, which is no more than 2GB because the product is a 31-bit application. If the above-the-bar storage is exhausted, the component will try to keep going with the regular storage. If the regular storage is also exhausted, memory allocation (malloc) failures occur. These memory allocation failures have a varying impact depending on the part of the product in which they occur.

Related information:


-  Calculating staging resources
-  Staging-space reports
-  CDC Storage Manager

Enabling DATA CAPTURE CHANGES

Enabling DATA CAPTURE CHANGES for the SYSIBM.SYSTABLES table has the effect that data definition (DDL) changes to source tables are recorded in the Db2 for z/OS log and hence do not go unnoticed in cases where they affect incremental

updates. In some cases, the enablement of DATA CAPTURE CHANGES even allows incremental updates to continue. Therefore, enabling DATA CAPTURE CHANGES is highly recommended. Follow the link to the CDC documentation for further information and instructions.

Related information:

 http://www.ibm.com/support/knowledgecenter/SSTRGZ_10.2.1/com.ibm.cdcdoc.cdcdforzos.doc/concepts/infospherechangedatacaptureoverview.html

Enabling log caching

Experience has shown that it is always advisable to enable log caching for the capturing agent because it helps to overcome many issues related to the incremental update function.

About this task

When the incremental update process is restarted after a stop, the Db2 log reader must resume reading from the point of interruption. The size of the Db2 active log and the incremental update log cache determine for how long incremental updates can be stopped before archived log records must be requested to locate the correct position for a resumption. To request and search archived logs takes longer, and the log reader might be unable to find the correct position within the allotted time. If the correct position can not be determined, a resumption is not possible. In this case, the only way to restart an incremental update process is to set it up anew, which involves a reload of all the tables that take part in the process.

Additionally, a log cache has two advantages, and is generally recommended for all installations of IBM Db2 Analytics Accelerator for z/OS. If a log cache is in place, the log must not be read multiple times if data must be updated on more than one accelerator. A log cache also significantly increases the ability of the log reader to catch up after an interruption of the incremental update process.

Recommendation: Make the Db2 active log so large that it can hold about one day of Db2 log activity. This means that the log reader can be stopped for one day if necessary.

Performance tuning

The speed at which IBM InfoSphere Change Data Capture for Db2 for z/OS reads from the Db2 for z/OS log affects the overall performance of the incremental update function. The Db2 log buffer and the buffer threshold are parameters that you can tweak to optimize the log reading speed.

IBM InfoSphere Change Data Capture for Db2 for z/OS (the capturing agent) uses the instrumentation facility interface (IFI) of Db2 for z/OS to access the Db2 log. Through the IFI, the agent reads the log entries for all tables for which DATA CAPTURE CHANGES have been enabled. This includes log entries for tables that have been enabled for use with other replication products. In a second step, the agent filters all the entries it has read, and keeps only those that are relevant. The filtering can be quite resource-intensive. It is therefore recommended that you use the following options for optimizing the log reading speed.


Db2 log buffer

The size of the Db2 log buffer determines how often the capturing agent can read records directly from the system memory within a fixed timeframe. Increasing the

size of the log buffer increases the log reading speed because reading from memory is much faster than reading from a data set on a hard disk.

For information on how to increase the size of the Db2 log buffer, follow this link to the CDC documentation:

Related information:


 http://www.ibm.com/support/knowledgecenter/SSEPEK_11.0.0/inst/src/tpc/db2z_ipf_outbuff.html


Db2 log buffer threshold

The BUFTHRESHOLD keyword specifies a minimum amount of data that must be stored in the Db2 log buffer before the capturing agent reads from the buffer. Setting the threshold higher thus prolongs the interval between the read operations and causes less processing resources to be spent on log reading.

The following links lead to sections in the CDC documentation that describe the BUFTHRESHOLD keyword and explain in more detail how the setting of this keyword can reduce the CPU workload with regard to the capturing process.

Related information:

 http://www.ibm.com/support/knowledgecenter/SSTRGZ_10.2.1/com.ibm.cdcdoc.cdcforszos.doc/concepts/bufthresholdvalueconsiderations.html

 http://www.ibm.com/support/knowledgecenter/SSTRGZ_10.2.1/com.ibm.cdcdoc.cdcforszos.doc/concepts/cpuresourcesconsiderations.html

Starting CDC

Having finished the configuration, start IBM InfoSphere Data Replication for z/OS as a z/OS started task.

Procedure

Start CDC as a z/OS started task. For more information, see Executing InfoSphere CDC

If you run into RACF errors that report insufficient access rights for the SO_BROADCAST socket option, proceed as follows:

1. Stop the CDC started task.
2. Add the following keyword to the TCP/IP statement in the CHCCMMxx member of the configuration control data set:
AUTODISCEXCLUDE=<value>

where <value> is a configured IP interface name or an IP address.

Using this keyword, you can exclude certain IP interfaces from auto-discovery broadcasting, which is the reason for the error messages.

3. Restart the CDC started task.

Installing and activating the Access Server and the replication engine

Transfer (install) and apply the Access Server and the replication engine for incremental updates like any other accelerator software package.

Transferring packages for the Access Server or the replication engine

Software packages for the Access Server and the replication engine are extra components, which are not automatically installed on the accelerator. Hence you must first transfer these packages from the z/OS UNIX file system (zFS) of your System z data server to the accelerator and apply these in a later step.

About this task

The update packages are copied from the z/OS UNIX file system (zFS) to the accelerator, but are not yet activated. However, to actually use a new version, you must activate it. How to do this is described in a later topic. See the hint at the end of this one.

Installing a software update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.


Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Transfer updates** link.
6. In the Transfer Updates window, you can see all software packages that are available in the zFS of your z/OS data server. Select the appropriate check boxes in the first column of the table to mark the packages that you want to transfer.

Attention: Make sure that you select the proper packages, that is, packages belonging to the release level that you want to upgrade to. The list in the Transfer Updates window might be confusing, especially if it also contains older packages. To find the correct package numbers, see the closing information or the release notes for the latest program temporary fix (PTF). You find the closing information or the release notes for a PTF on the support home page, in the category *Plan and install documentation* (see link under **Related information** at the end of this topic). If a PTF was shipped with a major product release, then, in general, you must transfer the packages included in the PTF rather than the packages in the base version.

7. Click **Transfer** to complete the installation.

Related information:

 http://www.ibm.com/support/entry/portal/plan_install/information_management/db2_analytics_accelerator_for_z~os?productContext=261865807



IBM DB2 Analytics Accelerator for z/OS: Stored Procedures Reference

Activating the Access Server and the replication engine

To use the recently transferred packages for the Access Server and the replication engine, you must first activate these packages.

About this task

- The application of an update affects all Db2 subsystems that are connected to an accelerator.
- You must activate the packages for Access Server and the replication engine separately.
- You cannot activate earlier versions of the Access Server or the replication engine. Just upgrades are possible here.

Activating a software update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

Attention: The sequence in which you activate the different software components is important. The sequence depends on the source and on the target version. To find the proper sequence for your particular update, see Table 6 on page 131.

Procedure

1. In the Administration Explorer, select the **Accelerators** folder.
2. In the Object List Editor on the right, double-click the accelerator.
3. In the Accelerator view, from the **Refresh** drop-down list in the upper right, select **Automatic off**. Otherwise, you might see warnings during the activation of the new software saying that the accelerator cannot be contacted.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Apply other software version** link.
6. On the first page of the Apply Software Version wizard, select one of the component that you want to activate:
 - **Access Server**
 - **Replication engine**
7. Click **Next**.
8. On the second page of the Apply Software Version wizard, you can see all software packages on the accelerator that are currently available for the selected component. To read information about a particular version before you activate it, select the appropriate entry in the list. The information is provided in the **Details of selected version** text box at the bottom.
9. Activate a version by selecting the appropriate radio button in the **Switch To** column.
10. Click **Finish**.
11. Repeat steps 4 through 10 for the other component.

Results

When you have successfully activated a package, this or a similar message is displayed:

New software version was successfully activated.

Related information:



IBM DB2 Analytics Accelerator for z/OS: Stored Procedures Reference

Enabling or disabling Db2 subsystems

After installing the capturing agent on your Db2 for z/OS data server, you must still enable incremental updates for all the Db2 subsystems that you want to use the function for. This gives you additional control and security because the enablement process requires a distinct user ID to be specified for running incremental update processes. Furthermore, if the function must be enabled, this also means that it can be disabled, which has the advantage that the capturing agent does not have to be uninstalled for maintenance, error analysis, or error recovery.

Enabling incremental updates for a Db2 subsystem

Follow the steps in this topic to enable incremental updates for a single Db2 subsystem from the IBM Db2 Analytics Accelerator Console. Repeat the process for other subsystems if required.

Before you begin

1. Make sure that the authentication process (pairing) between the accelerator and the Db2 subsystem that you want to enable has been completed successfully.
2. If you had two Db2 subsystems enabled in product version 3.1 (the maximum that is allowed in that version), and now want to enable more subsystems in version 4.1, you must first disable *one* of the Db2 subsystems that were enabled in version 3.1. Otherwise, the enabling process will fail.

About this task

Restriction: You can enable incremental updates for a maximum of ten Db2 subsystems that are connected to one IBM PureData System for Analytics.

Procedure

1. Ask the network administrator or the person who did the TCP/IP setup for the IP address (virtual IP or wall IP address) of the accelerator. Make a note of this information. You need to enter it as you complete the steps that follow.
2. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
3. Log on to TSO/ISPF.
4. Enter the following command:

```
tso telnet <hostname> 1600
```

where

<hostname>

Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

1600

Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

For example:

```
tso telnet 10.101.8.8 1600
```

5. When prompted, enter the console password. The initial password is dwa-1234. You must change this password at the first logon.
6. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

7. Type 5 and press Enter to display the submenu:

```
main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >
```

8. Type 1 and press Enter.
9. The enablement setup process asks you for information. Type the requested information at each prompt and press the Enter.
 - a. Select the Db2 subsystem to be enabled for replication: Type the number of the Db2 subsystem that you want to enable and press Enter.
 - b. Enter the Capture Agent IP address on z/OS ('' or '0' to exit): Enter the virtual IP address of the logical partition (LPAR) on which the CDC Capture Agent is running. Just pressing the Enter key or entering 0 ends the process and you return to the IBM Db2 Analytics Accelerator Console.
 - c. Enter the Capture Agent TCP port ('' or '0' to exit): Enter the port number of the CDC Capture Agent that you specified in step 2 on page 56. By default, this is 5999. The port must be open and must not be blocked by a firewall. Just pressing the Enter key selects the default. Entering 0 ends the process and you return to the IBM Db2 Analytics Accelerator Console.

- d. Enter the Db2 UserID for replication: Incremental update processes are run under a certain user ID. This user ID must exist in z/OS and requires access to the CDC metadata tables and to all the tables that you want to enable. It is recommended that you use the same user ID as for the started task that runs the CDC Capture Agent because this ID already has the required authorizations on the metadata tables if the CDC installation process was followed properly. If you decided to use a different user ID and want to enable *continuous incremental updates*, you must grant this user ID the following authorizations on the <CHCMetaID>.DMMD_SIGNALS table:
- SELECT
 - INSERT
 - UPDATE
 - DELETE

where <CHCMetaID> stands for the ID of the owner or the schema name of the CDC metadata tables (security identifier). You provided this ID when you ran the CDCMDMUT customization job.

In addition, mind that this ID must also have SELECT authorization on all tables that you want to enable.

Important:

- Make sure that the password of this user ID is at least 4 characters long. It is possible to define a shorter password, but that will cause problems when you try to update IBM Db2 Analytics Accelerator in the future.
- Set the password for this user ID so that it never expires. This has the advantage that you need not worry about expired CDC passwords when running incremental update jobs; you will not have to use options (5) - Manage Incremental Updates and (3) - Update Db2 subsystem credentials on the IBM Db2 Analytics Accelerator Console to correct an error that is due to an expired CDC password.

For details, follow the **Related information** link at the end of this topic.

- e. Enter the password: Enter the password of the user entered in the previous step.

Important: If you enter a wrong user ID and password combination, you receive a CHC0025W error. In such a case, proceed as follows:

- 1) Quit the enablement process.
- 2) Disable incremental updates for the selected subsystem. This is option 9 on the IBM Db2 Analytics Accelerator Console. The entire process is described in a later topic.
- 3) Reenter the enablement setup (option 8 on the console).

- f. Enter the new password again to confirm: Repeat the password and press Enter to confirm it.

- g. Press 'y' to register Db2 subsystem 'XYZ' for replication: Type y, then Enter. When this step has been completed successfully, the word done. is displayed on the screen.

If the enablement fails, proceed as described in the **Important** note to step 9e.

- h. Press the Enter key repeatedly until you reach the main menu of the IBM Db2 Analytics Accelerator Console.

10. Type x and press Enter to exit the console.

What to do next

Having configured a Db2 subsystem for incremental updates, you can start or stop incremental updates for the accelerators that are attached to the Db2 subsystem. You can also include or exclude certain tables from the process. You can complete these tasks from IBM Db2 Analytics Accelerator Studio.

Related information:



http://www.ibm.com/support/knowledgecenter/SSTRGZ_10.2.1/com.ibm.cdcdoc.cdcdforzos.doc/concepts/infospherecdcauthorizationrequirements.html

Disabling incremental updates for a Db2 subsystem

The disablement of incremental updates might be required for maintenance or error recovery tasks. It also a best practice in case of an enablement failure.

About this task

Attention: If you disable incremental updates for a Db2 subsystem, you cancel all subscriptions at the same time. That is, tables on the corresponding accelerator that are currently enabled for incremental updates will be disabled. Therefore, after re-enabling the Db2 subsystem, you must also re-enable the tables by using the **Enable replication** function in IBM Db2 Analytics Accelerator Studio.

Procedure

1. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
2. Log on to TSO/ISPF.
3. Enter the following command:

```
tso telnet <hostname> 1600
```

where

<hostname>

Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

1600

Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

For example:

```
tso telnet 10.101.8.8 1600
```

4. When prompted, enter the console password. The initial password is dwa-1234. You must change this password at the first logon.
5. Press the Pause key, then Enter to display the following screen:

```

*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

6. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

7. Type 2 and press Enter.

8. Provide the requested information:

- a. Select the Db2 subsystem where replication should be disabled: Type the name of the Db2 subsystem that you want to disable and press Enter.
- b. Press 'y' to disable replication on Db2 system 'XYZ': Type y, then Enter. When this step has been completed successfully, the phrase done. is displayed on the screen.
- c. Press the Enter key repeatedly until you reach the main menu of the IBM Db2 Analytics Accelerator Console.

9. Type x and press Enter to exit the console.

Starting or stopping incremental updates

When a Db2 subsystem has been configured for incremental updates, you can start or stop incremental updates for attached accelerators from the corresponding accelerator views in IBM Db2 Analytics Accelerator Studio. Using the functional links in the header starts or stops incremental updates for an entire accelerator.

About this task

When a subsystem has been configured for incremental updates, the header of accelerator view for regular accelerators shows an additional entry, which is labeled **Replication**. Next to this label, you find a status indicator and a functional link. Status indicator and link vary according to the current status of the accelerator. For example, if incremental updates have been stopped, the status indicator shows *Stopped* and a functional link labeled **Start**. This is reversed to *Started* and **Stop** when incremental updates have been started. The following statuses are possible:

Disabled

The incremental update function has not been configured for this accelerator and is therefore not available.

Configured

The incremental update function is available for this accelerator, but accelerator-shadow tables have not yet been added to the process.

Error The incremental update function has been configured, but cannot be started due to an error.

Started

The incremental update function is running and updates are applied to accelerator-shadow tables that have been included in the process.

Stopped

The incremental update function is available and accelerator-shadow tables have been included in the process. However, the function is not running right now.

See Figure 4.

Accelerator: VMNPS04 @ DWEDA11

Acceleration: Unknown [Start](#) [Stop](#) Credentials valid since: 11/13/12 6:56 PM [Update](#)
Status: Unknown Trace: DEFAULT / OFF [Configure](#) [Save](#) [Clear](#)
Used space: N/A Active queries: N/A
Replication: Stopped [Start](#) Replication latency: Stopped [Show events](#)

► Query Statistics

► About

▼ Tables (3 of 3 loaded / 3 of 3 enabled for acceleration)

Add...	Alter Keys...	Remove	Load...	Acceleration ▼	Storage Saver ▼	Replication ▼	
<input type="text"/> Name like: type filter text							
Name	Size	Rows	Acceleration	Last Load	Replication Since		
IUTEST	-	-	3 of 3	3 of 3 tables	3 of 3		
CUSTOMERA	-	-	Enabled	11/16/12 1:21 PM	11/16/12 1:21 PM		
CUSTOMERA2	-	-	Enabled	11/16/12 1:21 PM	11/16/12 1:21 PM		
CUSTOMERA3	-	-	Enabled	11/16/12 1:21 PM	11/16/12 1:21 PM		

Figure 4. Replication status and functional link in the header of the accelerator view

Important: Using the functional links starts or stops the incremental update process for all tables that have been enabled for incremental updates on the selected accelerator.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio and connect to a Db2 subsystem.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator that you want to include in the incremental update process.
4. Start or stop incremental updates by taking one of the following actions:
 - To start incremental updates, click **Start** in the header of the accelerator view. The **Replication status** in the header of the accelerator view changes to *Started*.
 - To stop incremental updates, click **Stop** in the header of the accelerator view. This opens the Stop Replication window, in which you can select between the following options for stopping the incremental update process:

Controlled

Completes all work in progress before stopping the process.

Immediate

Stops the process without completing work in progress. Compared with the **Controlled** option, using this option causes a restart of the process to take longer.

Click **OK** after selecting an option. You return to the accelerator view, which now shows a **Replication status** of *Stopped*.

Applying incremental updates in parallel

To speed up table synchronization, especially when the latency is high, you can apply incremental update changes in parallel. The workload is then distributed to four threads that are running at the same time.

Before you begin

Use this feature in conjunction with *continuous incremental updates*. For instructions on how to activate the latter feature, follow the **Related task** link at the end of this topic.

About this task

The use of this function, however, has a disadvantage: The referential integrity of the database cannot be guaranteed in all cases because the changes that are effected by the different threads must be committed, and that cannot be done at the same time for all threads. Serialization is the underlying principle of committing changes. It can therefore happen that a query "hits" an accelerator-shadow table at a stage where the changes brought about by one or more threads have been committed, but not yet all of these. This might lead to situations in which, for example:

- One and the same query, when run twice within a short time span, gives you different results because not all threads have committed their changes when the query hits the accelerator-shadow table for the first time.
- Different queries that read the same accelerator-shadow table "find" different values in the same row depending on the time when the queries hit the table.

The Netezza database uses multi-version concurrency control. That is, a table row is not locked for reads when it is being modified by another process (thread), so the older, unchanged values are read by a query until a change has been committed. In practice, the problem will rarely concern you because the Netezza

database gives each change thread a unique transaction ID. In most cases, these IDs contain consecutive numbers. Threads with consecutive numbers are processed in one block, and nothing can happen in between that would lead to one of the problems indicated earlier.

Important: The function that applies incremental updates in parallel was improved in product version 5.1.0. However, if this function was enabled in version 4.1.0, the old function code is still executed. To use the new code after an upgrade to product version 5.1.0 or an even newer version, stop and then restart incremental updates on the updated accelerators. For instructions, follow the appropriate link at the end of this topic.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*       Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```
main -> 5
-----

You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
       in WAITFORDATA queries

(Default 0) >
```

4. Type 6 and press Enter. A screen similar to the following is displayed:


```
Database system DWADA11(state=NOT_ENABLED) is not enabled for replication
Database system DWADA12(state=NOT_ENABLED) is not enabled for replication
Database system DWBDA11(state=NOT_ENABLED) is not enabled for replication
Database system DWBDA12(state=NOT_ENABLED) is not enabled for replication
Database system DWEDA11(state=NOT_ENABLED) is not enabled for replication
Database system DWEDA12(state=NOT_ENABLED) is not enabled for replication
```

```
Select a database system:
 1 : DWEDA14 state=STOPPED
 2 : DWEDB14 state=STARTED
```

```
Select database system by ID (0 to go back): 0
```

5. Under Select a database system, you find the Db2 subsystems that have been enabled for incremental updates. Only these are selectable for parallel processing. Type the number of the Db2 subsystem that you want to enable and press Enter. The previous example screen allows you to select two Db2 subsystems, DWEDA14 and DWEDB14. To select DWEDA14, you would type 1 and press Enter. The following message is displayed on the screen:

```
Parallel Apply is DISABLED on location DWEDA14
Do you want to enable the feature (y/n):
```

6. Type y and press Enter. The following message is displayed:
done!

```
Press <return> to continue
```

7. Press Enter to return to the submenu.

What to do next

To reverse this setting:

1. Repeat steps 2 on page 74 or 3 on page 74 through 5.
2. Enter n in step 6
3. Press Enter to return to the submenu.

Related tasks:

“Starting or stopping incremental updates” on page 71

“Enabling continuous incremental updates” on page 78

Defining keys automatically

Distribution keys and organizing keys can improve the performance of incremental update processes considerably. You can configure the product so that a distribution key, an organizing key, or both are defined automatically for tables that you enable for incremental updates.

Before you begin

Make sure that the RUNSTATS utility has been run on eligible Db2 tables before corresponding accelerator-shadow tables were defined. Otherwise, you cannot enable the automatic key definition for these tables.

About this task

For a general understanding of distribution keys and organizing keys, read the following articles in the *IBM Db2 Analytics Accelerator for z/OS: User's Guide*, SH12-7040:

- *Choosing a distribution key*

- *Choosing an organizing key*
- *Distribution keys*
- *Organizing keys*
- *Zone maps*
- *How to select tables for query acceleration*
- *Specifying or changing a distribution key or organizing keys*

When you enable incremental updates for a table, the accelerator can automatically define a distribution key, an organizing key, or both, for that table. As a result, DELETE and UPDATE operations on the original Db2 table are propagated faster to the corresponding accelerator-shadow table.

Important:

- Keys will only be defined for accelerator-shadow tables that are not yet enabled for incremental updates. Already enabled tables will not be affected by the setting.
- If you define distribution keys or organizing keys manually, you can select one distribution key with a maximum of four columns, and a maximum of four organizing keys with one column each. The automatic key definition function, however, will create a single distribution key, or a single distribution key and a single organizing key only. The maximum for an automatically defined distribution key is also four columns. However, the program determines how many (and which) columns the key actually uses.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 5 and press Enter. A screen similar to the following is displayed:

```

Database system DWADA11(state=NOT_ENABLED) is not enabled for replication
Database system DWADA12(state=NOT_ENABLED) is not enabled for replication
Database system DWBDA11(state=NOT_ENABLED) is not enabled for replication
Database system DWBDA12(state=NOT_ENABLED) is not enabled for replication
Database system DWEDA11(state=NOT_ENABLED) is not enabled for replication
Database system DWEDA12(state=NOT_ENABLED) is not enabled for replication

Select a database system:
  1 : DWEDA14 state=STOPPED
  2 : DWEDB14 state=STARTED

Select database system by ID (0 to go back): 0

```

5. The screen first lists existing Db2 subsystems that cannot be selected because they have not been enabled for incremental updates. Below, under Select a database system, you find the Db2 subsystems that you can select. Type the number of the Db2 subsystem that you want to enable and press Enter (what you actually do is enable the automatic creation of keys for accelerator-shadow tables originating from that subsystem, but only for those tables that are currently not enabled for incremental updates). The previous example screen allows you to select two Db2 subsystems, DWEDA14 and DWEDB14. To select DWEDA14, you would type 1 and press Enter. You see a screen that is similar to the following:

```

Select database system by id (0 to go back): 1

The current automatic key setting for database system 'DWEDA14'
is 'DISTRIBUTION AND ORGANIZING KEYS'

(0) - Cancel
(1) - Enable the automatic definition of a 'DISTRIBUTION KEY'
(2) - Enable the automatic definition of 'DISTRIBUTION AND ORGANIZING KEYS'
(3) N/A: - Disable the automatic definition of keys ('NO KEYS')

(Default 0) > 0

```

6. Type 1 or 3 to select the corresponding option, that is, a distribution key only, or the disablement of automatic keys. Then press Enter. You cannot select option (2) because it reflects the current setting of the Db2 subsystem. Option

(2) is also the default. That is, this option is enabled when you open the console menu for the first time. Suppose that you want the system to generate just a distribution key automatically. In this case, you would type 1 and press Enter. The following message would be displayed on the screen:

```
(Default 0) > 1
```

```
This enables the automatic definition of 'DISTRIBUTION KEY'
Do you want to continue? (y/n):
```

7. Type y and press Enter. You see the following message on the screen:

```
Automatic definition of 'DISTRIBUTION KEY'
enabled successfully.
```

```
The new setting will take effect for tables in database system 'DWEDA14',
when incremental updates are enabled for these tables on connected
accelerators.
```

```
Press <return> to continue
```

8. Press Enter to return to the submenu in step 3 on page 76.

What to do next

To reverse the setting, follow these steps:

1. Repeat steps 2 on page 76 or 3 on page 76 through 6 on page 77.
2. Enter n in step 7
3. Press Enter to return to the submenu.

Enabling continuous incremental updates

Incremental updates cannot be applied to a table while the table is being loaded. Without intervention, this would result in a loss of pending updates because the regular update process stops abruptly when the load process begins. The pending updates are not stored anywhere. The incremental update process must pick these up anew.

About this task

This would be acceptable if just one table were affected, but the start of a load process for a single table stops incremental updates for all tables in the same Db2 subsystem.

When continuous incremental updates are enabled, a marker is set when the load process sets in and also when it ends. All incremental updates that fall into the interval thus defined are written to a temporary file on the Netezza host (called spill queue). When the load process has finished, the suspended updates are read from the spill queue and are applied to the loaded table. This is called draining. Incremental updates are not stopped for other tables in the Db2 subsystem.

This feature also allows INSERT, UPDATE, and DELETE operations against the original Db2 table during a load. Because the spill queue ensures that all updates are preserved, it is not necessary to set a lock on the table. This gives you an additional performance benefit. However, to avoid conflicts, the lock mode **Row** is recommended. Such a conflict could arise when, for example, a row is being inserted in the original Db2 table, and that very same row is captured by an ongoing load process although the insertion has not yet been completed.

Lock mode **Table**, on the contrary, blocks access to the entire Db2 table until the load is finished. Hence no incremental updates can be captured and written to the spill queue during the load. The spill queue will always be empty. The pending changes to the Db2 tables are deferred until the lock is released.

Restrictions:

- You can enable incremental updates for up to ten Db2 subsystems or data sharing groups that are connected to one IBM PureData System for Analytics. Out of these ten, up to five can be enabled for *continuous* incremental updates.
- Draining processes have no effect on the execution time of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure. That is, a <waitForReplication> element as part of the **command** parameter does not postpone the execution of the stored procedure until draining has finished.

You can enable or enable continuous incremental updates from the IBM Db2 Analytics Accelerator Console.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```
main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >
```

4. Type 7 and press Enter. A screen similar to the following is displayed:

```
Database system DWCD11(state=NOT_ENABLED) is not enabled for replication
Database system DWDD12(state=NOT_ENABLED) is not enabled for replication

Continuous replication is DISABLED on location DWBDA13
Continuous replication is enabled on location DWBDB13

Select a database system:
  1 : DWBDA13 state=STOPPED
  2 : DWBDB13 state=STOPPED

Select database system by ID (0 to go back): 0
```

5. The screen firsts lists existing Db2 subsystems that cannot be selected because they have not been enabled for incremental updates. Below, under Select a database system, you find the Db2 subsystems that you can select. Type the number of the Db2 subsystem that you want to enable and press Enter: The previous example screen allows you to select two Db2 subsystems, DWBDA13 and DWBDB13. To select DWBDA13, you would type 1 and press Enter. Answer the following questions:

- a. Do you want to enable the feature (y/n):

Type y and press Enter.

- b. Enter the Db2 group IP for client connections:

Type the *private network IP address* of the selected Db2 subsystem. If the target system is a Db2 data sharing group, type the IP address that is used to reach the data sharing group over the private network from the accelerator (usually, this is a shared DVIPA address). Then press Enter.

- c. Enter the Db2 DRDA port for client connections: (Default 446) >

This is actually the listening port belonging to the IP address in step 5b. Press Enter if you use the default port. If you use a different port, type the port number and press Enter.

- d. Enter the schema name of the CDC capture task metadata tables:

Type the schema name and press Enter. The CDC metadata tables were created by the CHCMDMUT sample job at the time when IBM InfoSphere Data Replication for z/OS was installed and prepared for use with Db2.

The schema name is the ID of the owner of the CDC metadata tables (security identifier). Make sure that the user ID under which your incremental update processes are run has the required authorizations on the CDC metadata tables. See sub-step 9d on page 69.

- e. Type 'y' to enable continuous replication on location <Db2 subsystem>:

Type y and press Enter.

The following message is displayed:

Continuous replication enabled successfully for location <Db2 subsystem>

Press <return> to continue

6. Press Enter to return to the submenu.

What to do next

To reverse the setting, follow these steps:

1. Repeat steps 2 on page 79 through 5.
2. When asked Do you want to disable the feature (y/n): in step 5a, enter y.
3. A confirmation message is displayed. Press Enter to return to the submenu.

Related information:



Running the CHCMDMUT job

Suspending faulty tables

A table that causes errors during an incremental update process ends the entire process (unless *continuous incremental updates* are enabled). That is, other accelerator-shadow tables that would have been updated after this table will not be updated. Therefore, a new function has been introduced that suspends faulty tables so that these are skipped and processing for the other tables can continue. To enable this function, follow the steps in this section.

Before you begin

Make sure that you have found and eliminated the cause of the error, so that the tables will not interrupt the process again when they are made available again for incremental updates. You might have to reload the faulty tables to do this.

About this task

To get a suspended accelerator-shadow table back into the incremental update process (after eliminating the cause of the error), it is sufficient to reload the data in the table. It is not necessary to re-enable incremental updates.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 8 and press Enter. The following screen is displayed:

```

Current value of park tables on error property is: false

This will change the handling of tables in error. If this property
is set to true a table for which applying changes fails will be
parked and replication for all other tables continues.
If the property is set to false replication will end.
Do you want to change the value to 'true'? (y/n): y

```

5. Type y and press Enter. The following message is displayed on the screen:
- Changing of temporary parking tables on error completed successfully.
- Press <return> to continue
6. Press Enter to return to the submenu.

What to do next

To reverse the setting, follow these steps:

1. Repeat steps 2 on page 81 or 3 on page 81 through 4.
2. Enter n in step 5
3. Press Enter to return to the submenu.

Excluding suspended tables from accelerated queries

If a table has been suspended to prevent it from disrupting incremental updates, the latest updates to this table have not been applied. This means that the data in the accelerator-shadow table is not up-to-date. An accelerated query thus returns results that are based on obsolete data. If it is essential that your query results are always based on the very latest data, you can configure the system so that suspended tables are automatically excluded from accelerated queries.

Before you begin

Make sure that the Db2 user ID that runs the incremental update processes has the following authorizations on the SYSACCEL.SYSACCELERATEDTABLES catalog table:

- SELECT
- UPDATE

Note: This is the user ID that you specified as the Db2 UserID for replication in step 9d on page 69.

About this task

Suspension (disablement of query acceleration) only works when incremental updates are active for the tables in question. If, by contrast, a table is being reloaded, query acceleration is disabled anyway during that time. That means that query acceleration remains enabled if it had been enabled before.

If the system excludes a suspended table from query acceleration, a DSNX881I message is issued to log this event. The message content is:

Query acceleration was disabled for the <myschema.mytable> table on the <ACCELERATORNAME> accelerator. The origin of the table is the Db2 subsystem or data sharing group <Db2LOCATIONNAME>. Query acceleration was disabled because the table was previously suspended from the incremental update process. This action was taken to prevent queries against obsolete data.

where:

<myschema.mytable>

Schema name followed by the table name

<ACCELERATORNAME>

Name of the accelerator

<Db2LOCATIONNAME>

Db2 location name of the Db2 subsystem or data sharing group

If the attempt to exclude a table from query acceleration was unsuccessful, a DSNX881I message with the following content is issued:

Query acceleration could not be disabled for the <myschema.mytable> table on the <ACCELERATORNAME> accelerator (origin of the table: <Db2LOCATIONNAME>). The attempt was made to prevent queries against obsolete data because the table was previously suspended from the incremental update process.

In either case, proceed as follows:

1. Find and eliminate the error that led to the suspension of the table.
2. Reload the accelerator-shadow table.
3. Re-enable query acceleration for the accelerator-shadow table.

In rare cases, the system wrongly excludes a table from query acceleration, and the suspension of the table is lifted automatically after the detection of the error. If you come across such a case, proceed as follows:

1. Check whether the table is still suspended.
2. If the table is not suspended anymore, re-enable query acceleration for the accelerator-shadow table.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*       Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 10 and press Enter. A screen similar to the following is displayed:

```

Using the only available Db2 subsystem or data sharing group AQPGB10.

Currently, suspended tables can only be excluded from accelerated
queries if you manually disable query acceleration for these tables.

Do you want that accelerated queries are automatically disabled for
suspended tables? (y/n):

```

5. Type y and press Enter. The text continues:
Db2 group IP address to be used for client connections: 10.104.13.10
6. Press Enter to accept the group IP address. To change it, type the new address and press Enter. The text continues:
Db2 DRDA port for client connections (Default 446): 10511
7. Press Enter to accept the DRDA port. To change it, type the new port number and press Enter. The text continues:
Do you want to enable this feature? (y/n):
8. Type y and press Enter. A confirmation message is displayed:
Done.
9. Press Enter to return to the submenu.

What to do next

To reverse the setting, follow these steps:

1. Repeat steps 1 on page 104 or 2 on page 83 through 3 on page 84.
2. Enter n in step 4 on page 84.
3. Press Enter in step 6 on page 84.
4. Press Enter in step 7 on page 84.
5. Enter n in step 8 on page 84.
6. Press Enter to return to the submenu.

Changing the group IP or the DRDA port

You might have changed the external IP address or the port of the z/OS data server that is used by an accelerator to communicate with a Db2 subsystem or data sharing group. You can make such a configuration change known to the accelerator without a restart of the same by using the IBM Db2 Analytics Accelerator Console.

About this task

This console function is available only if one of the following other console functions is enabled:

- Continuous incremental updates (console option Configure continuous replication)
- Suspension of faulty tables (console option Suspend faulty tables)

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 11 and press Enter. A screen similar to the following is displayed:

```

Using the only available Db2 subsystem or data sharing group AQPGB10.

Current Db2 group IP address for client connections: 10.104.13.10
Current Db2 DRDA port for client connections: 10268
Do you want to change the the Db2 group IP and DRDA port (y/n): y

```

5. Type y and press Enter. The text continues:
Enter the new Db2 group IP address for client connections: 10.101.11.10
6. Type the new IP address and press Enter or just press Enter to leave the old address. The text continues:
Enter the new Db2 DRDA port for client connections (Default 446): 10268
7. Type the new DRDA port and press Enter or just press Enter to leave the old port. The text continues:
Type 'y' to change the Db2 group IP and DRDA port for location AQPGB10: y
8. Type y and press Enter. A confirmation message is displayed:
Done.
9. Press Enter to return to the submenu.

What to do next

To change your settings, specify a different group IP address or DRDA port while repeating steps 1 on page 104 or 2 on page 85 through 9.

Changing the IP address of the CDC Capture Agent

Changing the IP address or the port of the CDC Capture Agent was a time-consuming task in the past. Before restarting the process, accelerator-shadow tables had to be reloaded to close the replication gap that developed during the interruption. This is not necessary anymore if continuous incremental updates are enabled.

Before you begin

- Make sure that *continuous incremental updates* are enabled.

- Stop incremental updates for all accelerators paired with the Db2 subsystems that the CDC Capture Agent is configured to work on.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 5 and press Enter to display the submenu:

```
main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >
```

4. Type 12 and press Enter. A screen similar to the following is displayed:

```
Using the only applicable database system AGQBB13
Current Capture Agent IP address on z/OS: 10.104.13.11
Current TCP port of the Capture Agent on z/OS: 5999
Do you want to change the Capture Agent IP address and TCP port: (y/n):
```

5. Type y and press Enter. The text continues:
Enter the new Capture Agent IP address on z/OS:
6. Type the new IP address and press Enter or just press Enter to leave the old address. The text continues:
Enter the new Capture Agent TCP port: (Default 5999):
7. Type the new port number and press Enter or just press Enter to leave the old port. The text continues:

Type 'y' to change the Capture Agent IP address and the TCP port for location AGQBB13:

8. Type y and press Enter. A confirmation message is displayed:
Done.
9. Press Enter to return to the submenu.

What to do next

- To change your settings, specify a different IP address or port while repeating steps 4 on page 87 through 9.
- When finished, restart incremental updates on the paired accelerators.

Configuring the expiration behavior of WAITFORDATA queries

In the context of Hybrid Transactional Analytical Processing (HTAP), you can determine whether WAITFORDATA queries are aborted or executed despite the fact that not all incremental updates could be applied within the specified period.

About this task

WAITFORDATA is an option (specified as a special register, ZPARM, or bind option) that can be used for queries against incrementally updated tables. It effects a hold on the query execution until the most recent updates (changes committed in Db2 for z/OS) have been applied to the tables referenced by the query. For a more detailed description, see *Making queries wait for incremental updates* in the *IBM Db2 Analytics Accelerator for z/OS: User's Guide*.

Query execution will be stopped for the period specified by the WAITFORDATA option. During that time, it is expected that all pending incremental updates can be applied. You can specify how to proceed with a query in case the updates cannot be applied within the time allotted for this task:

FAIL

This setting leads to the failure and the subsequent abortion of the query. It is the default.

CONTINUE

This setting effects the execution of a query despite the fact that the updates could not be applied within the specified time. It bears the risk that the query is run on obsolete data and hence delivers results that are not up-to-date.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 13 and press Enter. The following screen is displayed:

```

Specify which action to take after the passing of the delay for queries
that were run with the WAITFORDATA option.

FAIL
means that the query will abort with SQLCODE -904 if the delay expired
before the table data on the accelerator could be updated.

CONTINUE
means that the query will run on the accelerator after the passing of
the delay despite the absence of current data. The query might thus run
on obsolete data. Passing of the delay is indicated by SQLCODE +904. This SQL
warning will only show if your application program fetches the entire
result set and propagates warnings to end users.

The current setting is: FAIL

Enter your choice ('fail', 'continue', or <return> to cancel): <cursor>

```

5. To change the value from FAIL to CONTINUE or vice versa, type c or f at the prompt (position of <cursor> in the screen extract). Then press Enter. To exit the dialog without changes, just press Enter. After a change or confirmation of the present value, you see the following message:

Done. The new setting is now active and will be used with the next query that is offloaded to the accelerator.

6. Press Enter again to return to the submenu.

What to do next

To change your settings, repeat steps 4 on page 89 through 6. Specify a different value in step 5 on page 89.

Related information:



IBM DB2 Analytics Accelerator for z/OS: User's Guide

Including or excluding loaded tables from WAITFORDATA queries

The WAITFORDATA option has been designed to add Hybrid Transactional Analytical Processing (HTAP) capabilities to the product. It minimizes the problem of replication latency for incrementally updated tables. However, a query might reference incrementally updated tables as well as tables that have not been enabled for incremental updates (loaded tables that can be referenced by accelerated queries).

About this task

If the WAITFORDATA option has been set to a value greater than 0.0, the loaded tables would, without further intervention, be waiting for incremental updates that never happen. The expiration period would always expire. Depending on the configured expiration behavior, the queries would fail (expiration behavior FAIL) or leave the submitter in a state of uncertainty (expiration behavior CONTINUE) because this person would always ask herself or himself whether the incrementally updated tables could be updated in time, knowing that the loaded tables alone would always cause the expiration of the update period. For that reason, an option has been designed that allows you to include loaded tables in queries with a WAITFORDATA setting. That is, after the passing of the specified WAITFORDATA delay, queries can go against a set of incrementally updated tables, a mixed set of tables, and even against a set of loaded tables only.

By default, loaded tables are excluded because there is a greater probability of data inconsistency. You can change this behavior and include loaded tables. This is recommended if you know that queries go against a mixed set of tables.

For a more detailed description of the WAITFORDATA option, see *Making queries wait for incremental updates* in the *IBM Db2 Analytics Accelerator for z/OS*

: *User's Guide*.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:


```

*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 14 and press Enter. The following screen is displayed:

```

Specify if tables that were loaded, but not enabled for
incremental updates, are to be included in delayed queries.
(queries running with a setting of WAITFORDATA > 0.0)

It cannot be guaranteed that the data in these accelerator-shadow
tables is up-to-date. If changes have been made to a Db2 source table,
a new load process must be started to propagate these changes to the
accelerator. Only then will these changes be reflected in accelerated
queries.

The current setting is: 'Included'

Do you want to include loaded tables in WAITFORDATA queries?
('yes', 'no', or <return> to cancel): <cursor>

```

5. To change the value from no to yes or vice versa, type n or y at the prompt (position of <cursor> in the screen extract). Then press Enter. To exit the dialog without changes, just press Enter. After a change or confirmation of the present value, you see the following message:

Done. The new setting is now active and will be used with the next query that is offloaded to the accelerator.

6. Press Enter again to return to the submenu.

What to do next

To change your settings, repeat steps 4 on page 91 through 6 on page 91. Specify a different value in step 5 on page 91.

Related information:



IBM DB2 Analytics Accelerator for z/OS: User's Guide

Removing unused table metadata

If you have disabled incremental updates for one or more accelerator-shadow tables, the metadata describing these tables remains although it is no longer used. This fact manifests itself in messages that are written to the CHCRPRT report data set. To get rid of these messages, you can run a function that removes the redundant metadata tables.

About this task

The function only removes CDC metadata of tables that are not incrementally updated anymore because these tables have been excluded from the process (incremental updates have been disabled). The metadata of tables that are still incrementally updated remains as it is because it is required.

Attention: Do not disable incremental updates for an entire Db2 subsystem with the intention to remove redundant table metadata with the help of this function in a second step. This would exclude all tables of the subsystem from the incremental update process, and the removal function would therefore delete all table metadata. As long as you want a table to be updated (or replicated) incrementally, this metadata is absolutely necessary, and must not be removed.

Also consider the following scenario:

1. You disable incremental updates for an accelerator-shadow table (**Disable replication** function in Accelerator view of IBM Db2 Analytics Accelerator Studio)
2. You run this function to remove this table's metadata.
3. You want to re-enable incremental updates for this table.

Because the metadata of the table has been deleted, new metadata must be created. However, if the original Db2 table was changed in the meantime by an ALTER TABLE statement, you must run the Db2 REORG utility before re-enabling the accelerator-shadow table, so that correct metadata can be created.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 5 and press Enter to display the submenu:

```

main -> 5
-----
You have the following options:

(0) - Go back one level
(1) - Enable incremental updates
(2) - Disable incremental updates
(3) - Update Db2 subsystem credentials
(4) - Restart replication processes
(5) - (Menu) Define keys automatically
(6) - Configure parallel apply
(7) - Configure continuous replication
(8) - Suspend faulty tables
(9) - Clean up capture agent catalog
(10) - Disable query acceleration for suspended tables
(11) - Change Db2 group IP and DRDA port
(12) - Change Capture Agent IP address and TCP port on z/OS
(13) - Change the delay expiration behavior for WAITFORDATA queries
(14) - Include or exclude tables not enabled for incremental updates
      in WAITFORDATA queries

(Default 0) >

```

4. Type 9 and press Enter. The following screen is displayed:

```

This option removes all unused table metadata as shown in the
"Configuration Review Report" for the selected Db2 subsystem
(CHCRPRT member) from the catalog of the CDC Capture Agent.

Important: If you want to re-enable incremental updates
(replication) for these tables later, but their schema was
changed, you must run the REORG utility.

Are you sure that you want to continue? (y/n):

```

5. Type y and press Enter. A message similar to the following is displayed on the screen:

```

Using the only applicable database system DWXDC16

Cleanup complete.
Press <return> to continue

```

6. Press Enter to return to the submenu.

Chapter 10. Encryption of data in motion

This version of IBM Db2 Analytics Accelerator for z/OS allows you to encrypt all network traffic between your z/OS systems and your accelerators, and thus increase the security of the setup profoundly.

For information on how to configure and enable encrypted network traffic, see the following web document:

Configuring Encryption of Data in Motion

Chapter 11. Installing the IBM Netezza Analytics stored procedure package

This version of IBM Db2 Analytics Accelerator for z/OS allows you to run remote stored procedures on an accelerator, which makes it possible, for example, to let data mining or other analytical tools scrutinize and process data on the accelerator. This does not only offer new ways of gaining insight, but also leads to remarkably short execution times for these programs or procedures.

Remote stored procedures are called indirectly from a Db2 for z/OS system by means of wrapper stored procedures.

With the release of IBM Db2 Analytics Accelerator for z/OS Version 5.1.0, the IBM Netezza Analytics suite of analytic tools is available as an installable stored procedures package.

Installing the IBM Netezza Analytics stored procedure package

Download and install the IBM Netezza Analytics stored procedure package as described here.

Procedure

1. Go to the following page on IBM Fix Central or locate the package by following these steps from the IBM Fix Central home page (the package name is disclosed in the release notes):
 - a. Click **Find product**.
 - b. In the **Product selector** field, start typing IBM Netezza.
 - c. Select **IBM Netezza Applications (Information Management)** from the list of choices.
 - d. From the **Installed Version** drop-down list, select **ANALYTICS_IDAA_3.3**.
 - e. Leave the **Platform** preselected at **z/OS**.
 - f. Click **Continue**.
 - g. Leave **Individual fix IDs** selected and click **Continue**.
2. Click **Continue**.
3. Sign in with your IBMid, or first create an IBMid and then sign in. As an enterprise user, you can also **Sign in with your organization's ID**.
4. Download (save) the latest fix pack to a workstation with access to the z/OS UNIX file system (zFS) of the data server that is connected to the accelerator on which you want to run the program or procedure in the package. The package consists of the following files:

tar archive

The actual procedure package that must be transferred to and installed on the accelerator

jcl files

The package includes the following jcl files:

- A file that contains the JCL for creating the wrapper stored procedures on z/OS

- A file that ends in `-for-inzar.jcl`, and which contains the definitions of SQL stored procedures for the support of the programming language R in IBM Netezza Analytics for z/OS.

txt file

A file that contains a brief package description

zip archive

A compressed archive that contains the license information in various languages.

5. Use an FTP client to transfer the downloaded package in binary format to the zFS of the z/OS data server. Transfer the package to the directory that the `AQT_HOST_PACKAGE_DIRECTORY` environment variable in the `AQTENV` data-set member points to.
6. Start IBM Db2 Analytics Accelerator Studio and transfer and apply the package.

What to do next

If you also want to use statistical functions of the R programming language in connection with this package, you can download the `ibmdbR` package from here:

<https://cran.r-project.org/package=ibmdbR>

Creating the wrapper stored procedures

The next step is to run the data-definition (DDL) statements in the package to create the wrapper stored procedures for IBM Netezza Analytics.

Procedure

1. Extract the (data set containing the) DDL from the downloaded package to a location from where you can run it. The DDL is included in a file with an extension of `jcl`.
2. Customize the DDL as indicated in the header.
3. Submit the job.
4. Check the job output to verify that the wrapper stored procedures were created successfully.

Using a separate database

It is recommended that you keep the objects that the IBM Netezza Analytics stored procedures produce in a separate Db2 for z/OS database.

Before you begin

IBM Netezza Analytics stored procedures create database objects on the selected accelerator and in Db2 for z/OS. It is recommended that the Db2 for z/OS objects (mainly definitions of accelerator-only tables) reside in a separate Db2 for z/OS database. Therefore, create or choose a suitable database first.

About this task

When the database has been created, you must set an environment variable so that the wrapper stored procedures create the accelerator-only tables in this database.

Procedure

1. Open the AQTENV data set in a suitable editor, such as ISPF.
2. Add a line that reads
`AQT_ANALYTICS_DATABASE = <db-name>`
where <db-name> is the name of the database that you want to use.
3. Save the data set and restart the WLM environment.

Authorizations for remote stored procedures

The wrapper stored procedures that are called to run remote stored procedures or external programs on an accelerator require the following authorizations:

- EXECUTE on the wrapper stored procedure
- EXECUTE on the SYSACCEL.* packages
- Authorization to read the accelerator tables specified in the *parameters* string as input tables.
- DISPLAY authorization for calling the `SYSPROC.ADMIN_COMMAND_Db2(-DIS GROUP)` command
- Authorization to create accelerator-only tables in the Db2 for z/OS database that is specified by the AQT_ANALYTICS_DATABASE environment variable or in the default database (in general, these are the specified output tables).
- Write access to the /tmp directory for the user who calls the stored procedure (for tracing)
- RACF ACCESS(READ) on the data set that contains the AQTENV file in the started task procedure of the Workload Manager (WLM) environment.

Enabling the IBM Netezza Analytics stored procedures on an accelerator

Before you can execute an IBM Netezza Analytics remote stored procedure, you must enable the package on the accelerator on which the procedures are supposed to run.

Before you begin

Make sure that at least one table has been defined on the accelerator.

About this task

The enablement process creates the required objects for the execution of the remote stored procedures in the Netezza database. You can enable the IBM Netezza Analytics remote stored procedures in the following ways (each bullet describes a different approach):

Procedure

- Run the `SYSPROC.ACCEL_CONTROL_ACCELERATOR` stored procedure with a suitable XML input string as part of the **command** parameter. Example:

```
<?xml version="1.0" encoding="UTF-8"?> <dwa:controlCommand
  xmlns:dwa="http://www.ibm.com/xmlns/prod/dwa/2011" version="1.4">
  <enableProcedurePackage name="INZA" />
</dwa:controlCommand>
```
- Complete the following steps in IBM Db2 Analytics Accelerator Studio:
 1. Open the accelerator view of the accelerator in question.
 2. Scroll down to the **About** section below the header.

3. Locate the label **Optional Server Packages**.
4. Click the **Enable** link next to the package name.

What to do next

To disable the external program or remote stored procedure, choose one of the following alternatives:

- Run the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure with an XML input string as part of the **command** parameter that is similar to this example:

```
<?xml version="1.0" encoding="UTF-8"?> <dwa:controlCommand
  xmlns:dwa="http://www.ibm.com/xmlns/prod/dwa/2011" version="1.4">
  <disableProcedurePackage name="INZA" />
</dwa:controlCommand>
```
- In IBM Db2 Analytics Accelerator Studio, follow the previous steps for enabling, but click **Disable** in step 4 instead.

Chapter 12. Beyond the basics

This chapter contains information about resource allocation and job prioritization, including tips on how to fine-tune IBM Db2 Analytics Accelerator for z/OS with regard to these issues.

Logging on to the IBM Db2 Analytics Accelerator Console

All functions or features discussed in this section are accessed from the IBM Db2 Analytics Accelerator Console, so that a console log-on is required.

Procedure

1. Ask the network administrator or the person who did the TCP/IP setup for the IP address (virtual IP or wall IP address) of the accelerator. Make a note of this information. You need to enter it as you complete the steps that follow.
2. Start a client or emulator session (using, for example, IBM Personal Communications) to communicate with the z/OS system on which your Db2 subsystem is located.
3. Log on to TSO/ISPF.
4. Enter the following command:

```
tso telnet <hostname> 1600
```

where

<hostname>

Is the IP address of the accelerator that is connected to the Db2 for z/OS data server.

1600

Is the number of the port configured for accessing the IBM Db2 Analytics Accelerator Console using a telnet connection between the Db2 for z/OS data server and the accelerator.

For example:

```
tso telnet 10.101.8.8 1600
```

5. When prompted, enter the console password. The initial password is dwa-1234. You must change this password at the first logon.

Setting a system-wide resource limit

To adapt the system utilization to your actual workload, you can set a limit on the use of an accelerator's processing resources. This allows you to save utilization fees if your workload does not require 100 percent of the available resources, but also leaves you flexible in case the workload increases again. Mind that you must first negotiate your quota with IBM before you set the limit.

Before you begin

- A limit has an effect on your bill only if you first negotiate your quota with IBM. So get in contact with IBM support and tell them how many percent of the available processing resources you want to use.
- The authentication process (pairing) must have been completed for the accelerator that you want to set a limit on.

About this task

Although the limit affects the number of snippet-processing units (SPUs) that are used for processing, it does not exclude existing hard disks, so that the data on the disks remains available. Odd hard disks are simply reassigned to the remaining SPUs.

Load jobs are exempt from a system-wide limit. That is, load jobs can always use the full capacity of the system, no matter if a limit has been set. In addition, there will be no extra charges if a load job uses more resources than specified by the limit. The limit will be valid for other workloads only.

You set the limit on the IBM Db2 Analytics Accelerator Configuration Console.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 3 and press Enter to display the submenu:

```
main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit
```

4. Type 10 and press Enter. You see a screen similar to the following:

```
The current resource limit is: 100%

Note: Valid values are between 50 and 100.
Specify a system wide resource limitation (in percent):
```

5. Type the percentage (integer) that you want to use and press Enter. In the following example, the value 80 is used:

This will set the global resource limit to: 80

To apply this change, the Netezza backend will be restarted.
Therefore the accelerator will be offline until the restart has been completed.

Do you want to continue? (y/n):

6. Type y and press Enter. A confirmation message is displayed:

Successfully updated the system wide resource limitation to: 80
Press <return> to continue

7. When finished, press just the Enter key repeatedly until you reach the main menu of the console.
8. Type x and press Enter to exit the console.

What to do next

To change or reset the limit, repeat steps 3 on page 102 through 6 on the console. Enter the appropriate value in step 5 on page 102.

Related tasks:

“Setting resource limits for Db2 subsystems”

Setting resource limits for Db2 subsystems

If an accelerator is shared by multiple Db2 subsystems, you can limit the processing resources that can be claimed by individual Db2 subsystems. This allows you to adapt the processing resources to the size of the query workloads generated by each subsystem.

Before you begin

The authentication process (pairing) must have been completed for the accelerators whose resources you want to rebalance.

About this task

By default, all of an accelerator's the processing resources are shared by the connected Db2 subsystems. If only one subsystem passes a workload to the accelerator, this subsystem can use all of the resources. If more subsystems generate workloads, the resources are distributed dynamically among these subsystems. This prevents a resource drain, that is, a situation in which a single Db2 subsystem occupies all available resources and blocks resource access for other subsystems.

You can assign a minimum portion of the available resources to particular Db2 subsystems (the absolute maximum that a subsystem can use is 100 percent of the available resources). If you set a minimum for a Db2 subsystem, that limit is a valid for the resource group associated with that Db2 subsystem on the accelerator.

The limit becomes effective only if a workload is assigned to the resource group. Otherwise, the limit is ignored, and all of the available resources can be used by other processes.

However, if the Db2 subsystem passes a workload to the accelerator, the workload is assigned to the resource group and the limit becomes active. As a result, the

minimum share is reserved for the Db2 subsystem to which it has been assigned. An example: Suppose you have two Db2 subsystems paired with the same accelerator. For each of these subsystems, a resource group exists on the accelerator. The first is named *public*, the second *analysts*. A minimum of 20 has been set for the *public* group, and a minimum of 50 for the *analysts* group:

	min	resource percentage
public	20	$20 / (20 + 50) = 29$
analysts	50	$50 / (20 + 50) = 71$

If the *analysts* and *public* resource groups are the only active groups, their resource minimums total 70 percent. The system determines the actual resource percentage that can be used by each group based on their relative resource minimums. To this end, each set minimum is divided by the total of minimums. The result is that in the present example, the public resource group can use 29 shares of the available resources (20 are the configured and guaranteed minimum plus 9 shares extra as a fraction of the 30 shares that have not been assigned). Accordingly, the *analysts* group, which has been assigned 50 shares as a guaranteed minimum, can use up to 71 shares of the available resources.

The value that you set as the minimum cannot be higher than 100 for a single Db2 subsystem. If you try to set a higher value, the following message is displayed:

Value too high! Maximum is 100

If you allocate more than 100 shares in sum, the quotas are reduced proportionally. For example, if two Db2 subsystems are attached to one accelerator, and you assign 80 shares to subsystem A and 30 shares to subsystem B, the result will be that 73 shares of the overall resources are reserved for subsystem A, and the remaining 27 shares for subsystem B.

If a system-wide resource limit has been set, then this limit will be 100 percent of the total to be dealt with in the steps that follow. That is, if a system-wide limit of 80 percent has been set, and you distribute the available resources equally between two Db2 subsystems by setting these to 50 shares, then each subsystem actually gets a share of 40 percent of the resources.

Important: Load jobs are exempt from a system-wide limit. That is, load jobs bypass the resource allocation of the system. Hence load jobs might take resources away, to the effect that other processes actually "get" fewer resources than guaranteed by a set minimum share.

You assign accelerator processing resources on the IBM Db2 Analytics Accelerator Configuration Console. The values that you enter are then mapped to guaranteed resource allocation (GRA) definitions for the IBM PureData System for Analytics.

A resource allocation is valid only for a single accelerator and the Db2 subsystems that it is connected to. That is, if you have more than one accelerator attached to the same Db2 subsystem, you must allocate resources for each accelerator separately.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*       Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 3 and press Enter to display the submenu:

```
main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit
```

4. Type 3 and press Enter. You see a screen similar to the following:

Index	Location Name	Minimum Resources	Minimum Relative
1	TEST	100	50%
2	PROD	100	50%

5. Type the number of the subsystem whose share of the processing resources you want to limit (one of the numbers in the Index column) and press Enter.

```
Minimum resource allocation for system with location name 'TEST' (1-100, 0 or
empty to abort):
```

6. Type an appropriate percentage value and press Enter. For example: 30. The following message is displayed:

```
Successfully updated minimum resource allocation for system with location name
'TEST' to 30.

Press <return>
```

7. Press Enter. You see a screen similar to the following:

Index	Location Name	Minimum Resources	Minimum Relative
1	TEST	30	23.08%
2	PROD	100	76.92%

8. Repeat steps 4 on page 105 through 7 on page 105 for other Db2 subsystems as often as required.
9. When finished, press just the Enter key repeatedly until you reach the main menu of the console.
10. Type x and press Enter to exit the console.

Related tasks:

“Logging on to the IBM Db2 Analytics Accelerator Console” on page 101

“Setting a system-wide resource limit” on page 101

Mapping of WLM importance levels to Netezza priorities

During query execution, z/OS importance levels are automatically converted. Queries thus run with the corresponding Netezza priority on an accelerator.

The priority of Db2 for z/OS queries is handled by WLM service classes of the DDF Classification Rule. The importance levels that are used map to Netezza priorities as shown in Table 3.

Table 3. Mapping of WLM importance levels to Netezza priorities

WLM importance level	Netezza priority
System	Critical
Importance 1	Critical
Importance 2	Critical
Importance 3	High
Importance 4	Normal
Importance 5	Low
Discretionary	Low

Important:

- The allocated accelerator resources set the boundaries for the validity of job priorities. If, for example, two subsystems share an accelerator, and subsystem A is allowed to use 90 percent of the resources, while subsystem B gets only ten percent, priority settings for queries from subsystem B will be considered only within the ten-percent-share. This means that a query with a low priority from subsystem A might still be processed faster than a query from subsystem B with a high priority. The actual outcome, however, depends on the workload that is assigned to the shares.
- The *period duration* feature of the WLM service classes, that is, the change of importance levels over time, is not supported by Netezza.

Related tasks:

“Setting resource limits for Db2 subsystems” on page 103

Setting the priority of data maintenance tasks

You can set the priority of maintenance tasks, such as the loading of accelerator-shadow tables, or groom or genstats operations on the IBM Db2 Analytics Accelerator Configuration Console. (The groom and genstats commands are comparable to REORG and RUNSTATS in Db2 for z/OS.)

About this task

The task priorities of IBM Db2 Analytics Accelerator for z/OS are similar to the importance levels of Workload Manager (WLM) service classes. They map to Netezza priorities in the same way. When data maintenance jobs are run on the accelerator, the corresponding Netezza priorities are applied.

Table 4. Mapping of IBM Db2 Analytics Accelerator priorities for maintenance tasks to Netezza priorities

IBM Db2 Analytics Accelerator	Netezza priority
SYSTEM	Critical
HIGHEST	Critical
HIGH	High
NORMAL	Normal
LOW	Normal
LOWEST	Normal
DISCRETIONARY	Low

A default setting exists as well (DEFAULT). It translates as follows:

Table 5. Default priorities of maintenance tasks

Maintenance job type	Priority
Loading of accelerator-shadow tables	NORMAL
genstats (equivalent to RUNSTATS in Db2 for z/OS)	LOW
groom (equivalent to REORG in Db2 for z/OS)	LOW

To change the default priority of maintenance tasks, follow these steps:

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 3 and press Enter to display the submenu:

```

main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit

```

4. Type 5 and press Enter.
5. On the following screen, type one of the numbers in front of the listed Db2 subsystems and press Enter. Example:

```

Select a database system:
 1 : DZBD912
 2 : DZBD913
 3 : DZBD924

Select database system by name or id (0 to go back):

```

In this example, you would type 3 and press Enter to change the priority of maintenance tasks for the accelerator in relation to the query workload that is received from the DZBD924 subsystem.

6. Set the priority by typing the appropriate number. Then press Enter.

```

Queries are run with the priority that is set in the corresponding
System Z Workload Manager (WLM) environment. You can set the priority
of maintenance operations, such as loading data, analogously for
the 'DWBDA21' subsystem:
* 1: DEFAULT
  2: SYSTEM
  3: HIGHEST
  4: HIGH
  5: NORMAL
  6: LOW
  7: LOWEST
  8: DISCRETIONARY

Enter the appropriate number to set the priority level.

```

For example, type 4 and press Enter to run maintenance tasks with a priority of HIGH. Note that this setting assigns a priority to data maintenance tasks that might be as high or even exceed the priority of incoming queries. If this is the case, query processing can be slower than before.

7. Repeat steps 4 through 6 for another Db2 subsystem if necessary.
8. When finished, press just the Enter key repeatedly until you reach the main menu of the console.
9. Type x and press Enter to exit the console.

Related tasks:

“Logging on to the IBM Db2 Analytics Accelerator Console” on page 101

“Setting resource limits for Db2 subsystems” on page 103

Converting 24:00:00 h time values

It is still possible to convert 24:00:00 values in TIME or TIMESTAMP columns to 23:59:59 if your version of the Netezza Platform Software (NPS) does not yet support 24:00:00 values or if the conversion leads to unwanted effects.

Before you begin

Netezza Platform Software (NPS) 7.0.2 P11, 7.0.4 P3, 7.1, or a later version of one of these series supports 24:00:00 time values. Check your version and decide whether a conversion is necessary.

Important: After you have switched the conversion on, the Netezza Platform Software (NPS) is restarted. This might take a couple of minutes. During this time, the accelerator is offline, and cannot process requests.

About this task

In the past, this option was enabled by setting the `LOAD_ENABLE_HOUR24_CONVERSION` environment variable in the `/nz/dwa/etc/dwa.server.conf` file on the Netezza host. Now, you can enable this option on the IBM Db2 Analytics Accelerator Console.

Note: If the menu entry for this option shows N/A in front, it means that the option cannot be selected because it is already enabled. If so, then you might want to check whether `LOAD_ENABLE_HOUR24_CONVERSION` is set.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 3 and press Enter to display the submenu:

```

main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit

```

4. Type 8 and press Enter.
5. When finished, press just the Enter key repeatedly until you reach the main menu of the console.
6. Type x and press Enter to exit the console.

Disabling the conversion of 24:00:00 time values

In the past, it was sometimes necessary to convert 24:00:00 values in TIME or TIMESTAMP columns to 23:59:59 by setting the environment variable `LOAD_ENABLE_HOUR24_CONVERSION` in the `/nz/dwa/etc/dwa.server.conf` file on the Netezza host. With Netezza Platform Software (NPS) 7.0.2 P11, 7.0.4 P3, 7.1, and later versions of the 7.0.2, 7.0.4, and 7.1 series, the Netezza database supports the 24:00:00 representation. Because this makes the conversion superfluous, a function has been added to the IBM Db2 Analytics Accelerator Console so that you can switch the conversion off.

Before you begin

Make sure that Netezza Platform Software (NPS) 7.0.2 P11, 7.0.4 P3, 7.1, or a later version of one of these series is installed on your IBM PureData System for Analytics.

Important: After you have switched the conversion off, the Netezza Platform Software (NPS) is restarted. This might take a couple of minutes. During this time, the accelerator is offline, and cannot process requests.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 3 and press Enter to display the submenu:

```

main -> 3
-----
You have the following options:

(0) - Go back one level
(1) - Obtain pairing code, IP address, and port
(2) - List paired Db2 subsystems
(3) - Set resource limits for Db2 subsystems
(4) - Clear query history
(5) - Specify the priority of maintenance tasks
(6) - Set the Db2 subsystem for time synchronization
(7) - Restart accelerator process
(8) - Enable the conversion mode for 24:00:00 h values to 23:59:59 h
(9) N/A: - Disable the conversion mode for 24:00:00 h values to 23:59:59 h
(10) - Set a system-wide resource limit

```

4. Type 9 and press Enter.

5. When finished, press just the Enter key repeatedly until you reach the main menu of the console.

6. Type x and press Enter to exit the console.

Related tasks:

“Logging on to the IBM Db2 Analytics Accelerator Console” on page 101

Using the call-home function

A connected Db2 subsystem or data sharing group regularly polls the accelerator server for system health information. In turn, corresponding event messages (DSNX881I messages) are returned to the subsystem or group. These messages are written to the z/OS system log (SYSLOG) of the LPAR in which the subsystem or group is located. You can enable an automatic event notification service for the most critical DSNX881I events (call-home function). When one of these events occurs, two contact addresses are notified by email, and a problem management record (PMR) is opened automatically in the correct RETAIN problem queue.

To see the events that the call-home function is able to process, follow the link under **Related information** at the end of this topic.

Event notifications are converted to JCL jobs before they are sent as files to your System Z by using the file transfer protocol (FTP). The JCL jobs are then processed by z/OS, which generates email notifications that it forwards to the IBM PMR gateway. For that reason, you must set up an FTP server and the CSSMTP message transfer agent (MTA) on your System Z. On the MTA, FTP-2-JES must be enabled.

The call-home service does not compromise the security of the accelerator because it uses the same private network between System z and the accelerator to forward the call-home notifications. No additional cabling or network is needed. Moreover, no routing takes place between the private network and any other public network. However, make sure to set up the FTP server and the CSSMTP server correctly on your System z, so that no additional security gaps are introduced. To do so, follow the instructions in “Preparing your System Z for the call-home function.”

Related information:



Structure of DSNX881I Messages

Preparing your System Z for the call-home function

You must set up and configure an FTP server (FTP-to-JES enabled) and an SMTP server to enable your System Z for the call-home function of IBM Db2 Analytics Accelerator for z/OS.

Before you begin

Be sure that you meet the prerequisites before you prepare your System Z for the call-home function:

- Your version of the Netezza Platform Software (NPS) must be 7.1 or higher.
- The product version must be V4 PTF-4 or higher.

If you use the call-home function in a high-availability or disaster recovery environment, the IP address of the z/OS FTP server that receives the JCL jobs might become unavailable, so that the call-home function does not work anymore. The following reasons might lead to the unavailability of the FTP server:

- A system crash
- Planned maintenance on the LPAR

To prevent such situations and ensure a proper functioning of the call-function, set up dynamic virtual IP addressing (DVIPA) and enter the DVIPA IP address as the FTP server address when you activate the call-home function from the IBM Db2 Analytics Accelerator Console. If the active LPAR shuts down, the DVIPA picks another LPAR, so that call-home event notifications can still be sent to your System z.

If you use the incremental update function, and DVIPA is used to ensure the constant availability of the function, you can use the same DVIPA setup for the call-home function, provided that sharing the DVIPA setup is not prohibited by other limitations.

About this task

To configure FTP and SMTP on z/OS, you must be a registered z/OS user with sufficient privileges to complete the steps in the following list, preferably a z/OS system programmer:

Procedure

1. Set up and configure FTP on z/OS. See FTP configuration statements in FTP.DATA for more information.
2. Configure the SMTP server on z/OS (CSSMTP). See Configuring the CSSMTP application for more information.

The CSSMTP application must be able to send emails to the internet (for example via corporate mail relays), so that emails created by IBM Db2 Analytics Accelerator can be passed to the IBM PMR gateway. A sample CSSMTP configuration might look like this:

```
+ copy proc from SEZAINST(CSSMTP) to SYS4.PROCLIB
  LOGFILE DD PATH='/tmp/cssmtp.log',
  CONFIG DD DSN=SYS1.&SYSNAME..TCPIP.CSSMTP(CSSMTPCF)
  STDENV DD DSN=SYS1.&SYSNAME..TCPIP.CSSMTP(CSSMTPDEV)

+ copy member SYS1.SEZAINST(CSSMTPCF) to SYS1.DWB1.TCPIP.CSSMTP(cssmtpcf)
  TargetIp      9.116.48.327
  TargetName    xy.ibm.com
  External Writer - using the default name CSSMTP
  DeadLetterDirectory /tmp/cssmtpdeadletter
  MailAdministrator billyw@xy.ibm.com
  UserExit      None

+ allocate a STDENV member SYS1.DWB1.TCPIP.CSSMTP(cssmtpdev) to get the local time.
  TZ=EST-1EDT          # GERMAN WINTER TIME

+ copy the SMTPNOTE REXX from SEZAINST(SMTPNOTE) to our proclib
  (w/o any changes)
+ and some RACF . . .
ADDUSER CSSMTP DFLTGRP(STCGROUP) OMVS(UID(17) SHARED HOME('/')) -
  NAME(STARTED TASK) NOPASSWORD
RDEF STARTED CSSMTP.** STDATA(USER(CSSMTP) GROUP(STCGROUP))
PE ** CL(JESSPOOL) ID(CSSMTP) ACCESS(ALTER)

RDEF SERVAUTH EZB.CSSMTP.** UACC(NONE)
PE EZB.CSSMTP.** CL(SERVAUTH) ID(CSSMTP ) ACC(READ)
```

```
==> F CSSMTP,REFRESH
EZD1834I CSSMTP MODIFY COMMAND ACCEPTED
EZD1840I CSSMTP UPDATED CONFIGURATION
EZD1847I CSSMTP UPDATED TARGET SERVERS WITH WARNINGS
EZD1848I CSSMTP MODIFY REFRESH COMMAND COMPLETED
EZD1821I CSSMTP ABLE TO USE TARGET SERVER 9.116.48.312
EZD1821I CSSMTP ABLE TO USE TARGET SERVER 9.116.48.327
EZD1821I CSSMTP ABLE TO USE TARGET SERVER 9.116.48.328
EZD1821I CSSMTP ABLE TO USE TARGET SERVER 9.116.48.313
WARNING:022:mIResBuildTargets:More than 4 IP addresses from all target servers
```

3. Create a user ID with the following privileges:
 - Log on to the FTP server on z/OS.
 - Submit jobs by using the FTP-to-JES interface.
 - Send emails from the z/OS SMTP server.
4. Set the password of the new user ID.
5. FTP and SMTP are unencrypted protocols. It is therefore recommended that you prevent other users from accessing the FTP and SMTP servers by using a System Authorization Facility (SAF), such as RACF. For information on security with regard to the CSSMTP application, see Security for CSSMTP.
6. A check of the FTP and CSSMTP configuration is recommended.
 - a. Create a file called smtp.txt. It is supposed to contain the test mail and look similar to the following example:

```
//SMTPSEND JOB , 'SMTP SEND MAIL' , REGION =6M , NOTIFY =& SYSUID ,
// MSGCLASS=H , CLASS =A , MSGLEVEL = ( 1 , 1 )
//SMTPBAT EXEC PGM =IEBGENER
//SYSIN DD DUMMY
//SYSPRINT DD SYSOUT =*
//SYSOUT DD SYSOUT =*
//SYSUT2 DD SYSOUT = (B ,CSSMTP )
//SYSUT1 DD *
```

```

HELLO YOURMVS
MAIL FROM: <billyw@xy.ibm.com >
RCPT TO: <jane.doe@example.com >
DATA
From: billyw@xy.ibm.com
To: jane.doe@example.com
Subject: Test Mail
MIME-Version: 1.0
Content-Type: multipart/mixed; boundary = "_frontier"

-- _frontier
Content-Type: text/plain;

This is a test mail.

-- _frontier--
.
QUIT
/*

```

- b. If you copied the example, replace the MAIL FROM, RCPT TO, From, and To addresses. Keep the angled brackets around the MAIL FROM and RCPT TO addresses.
- c. ftp <System Z IP address>
where <System Z IP address> is the IP address of the FTP target server on z/OS. In accordance with the sample in step 2 on page 112, this would be 9.116.48.327.
- d. quote site file=jes
- e. put smtp.txt
- f. quit

Configuring the call-home function on the accelerator

Before you begin

Be sure that you meet the prerequisites before you turn the call-home function on from the IBM Db2 Analytics Accelerator Console:

- Your version of the Netezza Platform Software (NPS) must be 7.1 or higher.
- The product version must be V4 PTF-4 or higher.
- A systems programmer has set up and configured an FTP server (with FTP-JES enabled) and an SMTP server (CSSMTP) on your System Z.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:


```

*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 6 and press Enter to display the submenu:

```

main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail

```

4. Type 1 and press Enter.

5. Enter the answers to the following questions:

- a. Enter the IP address of the FTP server on z/OS: Enter the IP address, for example 10.101.8.10.
- a. Enter the port of the FTP server on z/OS (default 21): Press Enter to accept the default or type the correct port number and press Enter.
- a. Do you want to secure the data transfer with SSL(y/n)? [y]: y Press Enter to accept the default (use SSL-encrypted mail transfer) or type n and press Enter to use unencrypted mail transfer.
- a. Enter the FTP user ID (or '0' to exit): Enter the ID of a user who is authorized to log in and transfer files to the FTP server.
- a. Enter the password for this user ID: Enter the password.
- a. Enter the password again to confirm: Re-enter the password.
- a. Enter the name of the SMTP application on z/OS: Enter CSSMTP.
- a. Enter the JCL job card (finish with '.' or empty input): Copy the job card to be used for the email conversion jobs or press Enter to use the default job card. Example of a custom job card:


```

//BILLKM JOB (DE#03606), 'IDAA CALL HOME',
//  REGION=0M,NOTIFY=&SYSUID,MSGCLASS=X,CLASS=S,TIME=1440

```
- b. Press Enter, if necessary twice. You see a screen output similar to this:

The following default JCL job will be used to send call home mails ('\$MESSAGE' will be replaced with the e-mail):

```
//SMTPBAT EXEC PGM=IEBGENER
//SYSIN DD DUMMY
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
//SYSUT2 DD SYSOUT=(B,CSSMTP)
//SYSUT1 DD *,DLM='$$'
$MESSAGE
$$
/*
```

- c. Press 'y' to enter a custom JCL job, any other key to use the default JCL job: Type y to change your settings and copy a custom job card or press Enter to accept what you entered before.
- d. Maximum size of trace files that can be attached: -1 (No Limit). Do you want to change it? [n]: Press Enter to accept the default. If you type y and press Enter to change the maximum size of a trace file that can be attached to a call-home email, you are prompted to enter a new size in MB:
Enter a new value for the maximum trace file size (in MB).
A negative value means there is no limitation:

Important: In the past, no call-home email was sent if the attachment size exceeded the system limit. Now, a notification is sent if a trace file exceeds the maximum attachment size that is set for the call-function. This notification email will not contain an attachment (trace file), but ensures that problems will not go unnoticed. A problem-management record (PMR) will also be opened if the product is configured accordingly.

- e. Press 'y' to save your settings: Type y and press Enter. You see the following message:
Done.
Press <return> to continue
- f. Press Enter.

Providing contact information

Use this submenu of the IBM Db2 Analytics Accelerator Console to provide, among other information, the address of your organization and the email address of the person who is supposed to receive call-home notifications.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 6 and press Enter to display the submenu:

```

main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail

```

4. Type 2 and press Enter.

Provide the following information:

5. Enter the company name ('' or '0' to exit):. Type the name of your organization and press Enter.
6. Enter the company address, line 1/3 ('' or '0' to exit):. Start to type your organization's address here (you have three lines for this information). Press Enter at the end of the first line.
7. Enter the company address, line 2/3 ('' or '0' to exit):. Continue with your organization's address. Press enter at the end of the second line.
8. Enter the company address, line 3/3, optional ('0' to exit):. Complete your organization's address on this line if needed and press Enter when finished. Otherwise, just press Enter.
9. Enter the IBM Customer Number ('' or '0' to exit):. Type your IBM customer number and press Enter.
10. Enter the name of the primary contact for PMRs ('' or '0' to exit):. Type the name of the person in your organization who is supposed to receive the call-home notification emails, for example Bill Murkham. Then press Enter.
11. Enter the phone number of the primary contact for PMRs ('' or '0' to exit):. Type the phone number of the person you entered in step 10, for example 001-487-185-6123, and press Enter.
12. Enter the email address of the primary contact for PMRs ('' or '0' to exit):. Type the email address of the person you entered in step 10, for example billym@xyz.com, and press Enter.

Important: Starting with product version 5.1, attachments in call-home notifications tend to be much larger than before because more information is

collected. Hence there is a greater chance that you will exceed the attachment size limit of your mail servers. If you have reason to believe that notifications are not delivered, check the postmaster's inbox for messages that hint at the attachment size problem. Mail servers usually generate error messages if attachments are too big. If you find such emails in the postmaster's inbox, increase the attachment size limit and ask IBM support to manually open the problem records (PMRs) that were not created automatically.

13. Enter the cell phone number of the primary contact for PMRs, optional ('0' to exit):. Type the cell-phone number of the person you entered in step 10 on page 117, for example 001-414-767-6741, and press Enter.
14. Press 'y' to update the call home contact information:. Type y and press Enter to confirm and save your information.
15. Press Enter to return to the submenu.

Enabling the call-home function

You must enable the call-home function on the IBM PureData System for Analytics before you can use it.

Before you begin

Make sure that you have completed the previous step, *Configuring the call-home function on the accelerator* successfully.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 6 and press Enter to display the submenu:

```
main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail
```

4. Type 3 and press Enter.

5. At the prompt next to the question Press 'y' to enable call home:, type y and press Enter. You see the following message:
Done.
Press <return> to continue
6. Press Enter to return to the submenu.

Disabling the call-home function

To disable the call-home function on an IBM PureData System for Analytics, complete the steps in this topic.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 6 and press Enter to display the submenu:

```
main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail
```

4. Type 4 and press Enter.
5. At the prompt next to the question Press 'y' to disable call home:, type y and press Enter. You see the following message:
Done.
Press <return> to continue
6. Press Enter to return to the submenu.

Updating FTP credentials

You can replace the FTP user ID or update the password of the current FTP user without having to go through the entire contact-information submenu again.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 6 and press Enter to display the submenu:

```
main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail
```

4. Type 5 and press Enter. You see a screen similar to this one:

```
Current call home FTP user: 'grubo'
This will overwrite the current user ID and password!

Enter the FTP user ID ('' or '0' to exit):
```

You are asked to submit the following information:

5. Enter the FTP user ID ('' or '0' to exit):. Type a new user ID or, if you want to change the password of the current user, the current FTP user ID. Then press Enter.

```
Current call home FTP user: 'grubo'
This will overwrite the current user id and password!

Enter the FTP user ID ('' or '0' to exit): grubo
Enter the password for User ID grubo (in TSO, use PF3 to hide input):
Enter the password again to confirm (in TSO, use PF3 to hide input):
Press 'y' to update the FTP credentials: y

Call home FTP credentials for user 'grubo' updated successfully.

Press <return> to continue
```

6. Enter the password for user ID grubo (in TSO, use PF3 to hide input). Type the existing password or the new password for the user ID that you entered in step 5. Then press Enter.

7. Enter the password again to confirm (in TS0, use PF3 to hide input):.
Type the password again and press Enter to confirm it.
8. Press 'y' to update the FTP credentials:.. Type y and press Enter. You see a message similar to this one:
Call home FTP credentials for user 'grubo' updated successfully.
9. Press Enter to return to the submenu.

Changing the maximum trace file size

Trace files to be attached to a call-home email can easily have a size of several hundred MB. Often, a system-wide size limit is set in z/OS, which in the past prevented the sending of the email if its attachment exceeded the size limit. The receiver did not get a notification at all. To prevent a situation like this, you can now set a maximum trace file size for call-home emails.

About this task

The new product-internal limit has the advantage that it does not suppress the sending of the email. If a trace file exceeds the maximum attachment size that has been set, the email notification is sent without an attachment. This ensures that problems will not go unnoticed. A problem-management record (PMR) will also be opened if the product is configured accordingly.

You are also prompted for the maximum trace file size during the initial configuration of the call-home function. See sub-step 1d on page 116 in section “Configuring the call-home function on the accelerator” on page 114. It has been added as a separate option so that you can change the value without having to go through the entire configuration dialog.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 6 and press Enter to display the submenu:

```

main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail

```

4. Type 6 and press Enter. The following screen is displayed:

```

Current maximum trace file size: 1 MB

Enter a new value for the maximum trace file size (in MB).
A negative value means there is no limitation ('.' to exit): 1

```

5. Enter an integer value to be used as the limit, for example 20 for a maximum attachment size of 20 MB. The following message is displayed:
Press 'y' to update the maximum trace file size to 1 MB:
6. To change the value, type y and press Enter. To cancel the process, type n and press Enter. A confirmation message is displayed on the screen. If you changed the value, it looks like this:
Call home maximum trace file size updated successfully.

Press <return> to continue
7. Press Enter to return to the call-home submenu.

Displaying call-home settings

To display or verify your settings for the call-home function, you can use another option on the call-home submenu of the IBM Db2 Analytics Accelerator Console.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 6 and press Enter to display the submenu:


```
main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail
```

4. Type 7 and press Enter.
5. Check the output on the screen.

Example

```
Call Home Status           : Enabled
Call Home FTP Server       : 10.104.7.10
Call Home FTP Port        : 21
Call Home FTP User         : billk
Call Home SMTP Application Name : CSSMTP
Call Home JCL Job Card     :
//BILLKM JOB (DE#03606), 'IDAA CALL HOME',
//  REGION=0M,NOTIFY=&SYSUID,MSGCLASS=X,CLASS=S,TIME=1440
Call Home JCL Job         :
//BILLKM JOB (DE#03606), 'IDAA CALL HOME',
//  REGION=0M,NOTIFY=&SYSUID,MSGCLASS=X,CLASS=S,TIME=1440

Maximum Trace File Size    : 20 MB

Press <return> to continue
```

Sending a test email

To check whether your call-home set up works properly, you can send a test email from the IBM Db2 Analytics Accelerator Console.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*               Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 6 and press Enter to display the submenu:

```

main -> 6
-----
You have the following options:

(0) - Go back one level
(1) - Configure call home
(2) - Provide contact information
(3) - Enable call home
(4) - Disable call home
(5) - Update FTP credentials
(6) - Update maximum trace file size
(7) - Display settings
(8) - Send test mail

```

4. Type 8 and press Enter.

Provide the following information:

5. Enter mail sender ('' or '0' to exit):. Type an email address and press Enter. This email address will appear as the sender's address in the test email.

6. Enter mail recipient ('' or '0' to exit):. Type the email address of the notification contact point that you provided as part of the contact information (see step 12 on page 117 for more information). Then press Enter. You see a message on the screen that is similar to this one:

```

Test mail with subject
'NzCallHome IBM Db2 Analytics Accelerator Call Home Test Mail' has been sent.

```

Done.

Press <return> to continue.

7. Press Enter to return to the submenu.

Changing data-encryption settings

In most cases, the IBM PureData System for Analytics N3001 and later models are delivered with self-encrypting disks. That is, all data on the hard drives of your hosts and snippet processing units (SPUs) is automatically encrypted. This includes temporary data that is stored on the host disks, such as spill-over data from queued queries or queued incremental updates. To guarantee maximum security, replace the keystore password and encryption authentication keys.

- Encryption is only available on the IBM PureData System for Analytics N3001 and newer systems.
- Encryption might be unavailable on a IBM PureData System for Analytics N3001 and newer models if exports or imports of encryption technology into a certain country are prohibited.

Encryption on your IBM PureData System for Analytics must be activated by an IBM support engineer. When an encrypted disk is inserted and powered on, it asks for a valid authentication encryption key (AEK). Without this key, the disk cannot be accessed.

The AEK is stored in a tamper-proof keystore on the Netezza host. A copy of the keystore exists in case the primary keystore gets damaged or lost.

A system with self-encrypting disks is delivered with a keystore password and encryption keys that were set by the manufacturer. To take data security to the highest possible level, replace these keys with your own as soon as possible. You can complete this task from the IBM Db2 Analytics Accelerator Console.

The encryption mechanism protects the data when the disk is pulled out. If a hard disk must be replaced, and is pulled out of its enclosure, the data on the disk cannot be accessed again if the AEK cannot be retrieved from the keystore. Hence a high level of data security can be guaranteed even if the disk is not destroyed physically.

Important: Bear in mind that an IBM PureData System for Analytics is equipped with a hot-swap recovery mechanism that is indifferent to encryption settings. If you remove a disk from the system, a spare disk will take over the data of the removed disk. If a new disk is added to the system, all existing data on the disk is ignored and the disk is formatted and configured as a spare disk for future use. Therefore, do not remove a disk as long as it is working properly. Remember that the disk is formatted if you insert it again into the same system or into another IBM PureData System for Analytics.

Changing the keystore password

The authentication encryption key (AEK) that you need to access data on a locked disk in an IBM PureData System for Analytics N3001 (or later model) is stored in a tamper-proof keystore. The keystore is secured by a master password. For maximum security, replace this password as soon as possible after the initial setup by the IBM support engineer, and after that change it at regular intervals.

About this task

It almost goes without saying that the keystore password should only be known to a few selected users who are responsible for the system security, such as system administrators.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 7 and press Enter to display the submenu:

```
main -> 7
-----

You have the following options:

(0) - Go back one level
(1) - Change password to manage encryption keys
(2) - Set user-specified authentication encryption keys (AEK)
(3) - Set system-generated authentication encryption keys
```

4. Type 1 and press Enter.

5. At the prompt, type the old keystore password and press Enter.
6. Type the new password. Choose a strong password. Then press Enter.
Password rules:
 - Maximum of 32 characters
 - At least one number
 - At least one lowercase character
 - At least one uppercase character
 - At least one non-alphanumeric character, such as the lower than sign (<), the greater than sign (>), the at-sign (@), or the plus sign (+).Not allowed are the space character (), the equals character (=), double quotes ("), and single quotes (').
7. Re-type the new password to confirm it and press Enter.
8. You see the message The password has been changed successfully. Press Enter to return to main menu of the console.

Manually changing the AEK

You can change the authentication encryption key (AEK) for disk access after the initial setup by the IBM support engineer. The key is required to access the disks of your snippet processing units (SPUs) and Netezza hosts. It is stored in the keystore.

Before you begin

During the completion of the steps in this section, your Netezza system is put in the *Stopped* state, and connected snippet-processing units (SPUs) are put in the *Paused* state. Hence accelerated query processing and the loading of accelerator-shadow tables are not possible during this time.

About this task

Define a key by yourself if your organization has fixed rules for passwords that must be complied with or employs an external tool for the generation of (all) passwords.

Also, a self-chosen key is generally easier to remember and can be noted down, which leaves you more flexible in the highly unlikely case that both copies of the keystore are lost or damaged. If this happens, an IBM support engineer will install a new keystore. If you are able to set the AEK to its former value after that (because you can remember it or have kept it somewhere), you can regain access to the data on your disks.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```

*****
*      Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console

```

3. Type 7 and press Enter to display the submenu:

```

main -> 7
-----
You have the following options:

(0) - Go back one level
(1) - Change password to manage encryption keys
(2) - Set user-specified authentication encryption keys (AEK)
(3) - Set system-generated authentication encryption keys

```

4. Type 2 and press Enter.
5. The following message is displayed:
Netezza is stopped to execute this command.
The system will be unavailable for queries or loads.
Do you want to continue? (Enter Y/N)
6. At the prompt, type the keystore password and press Enter.
7. Type the new encryption key for the SPU disks. Choose a strong key. Then press Enter. Password rules:
 - Maximum of 32 characters
 - At least one number
 - At least one lowercase character
 - At least one uppercase character
 - At least one non-alphanumeric character, such as the lower than sign (<), the greater than sign (>), the at-sign (@), or the plus sign (+).
Not allowed are the space character (), the equals character (=), double quotes ("), and single quotes (').
8. You see the message The encryption keys have been changed successfully. Press Enter to return to main menu of the console.

Using a system-generated AEK

As an alternative to a self-defined authentication encryption key (AEK), you can replace the existing authentication key for the disks of your Netezza hosts and snippet processing units (SPUs) with a key that is automatically generated by the system. Like a self-defined key, such a key is also stored automatically in the keystore.

Before you begin

During the completion of the steps in this section, your Netezza system is put in the *Stopped* state, and connected snippet-processing units (SPUs) are put in the *Paused* state. Hence accelerated query processing and the loading of

accelerator-shadow tables are not possible during this time.

About this task

An automatically generated key is always a very strong key, but has the disadvantage that it cannot be noted down (you will never see it). In the highly unlikely case that both copies of the keystore are lost or damaged, a system-generated key might leave you unable to access the data on your disks.

Procedure

1. Log on to the IBM Db2 Analytics Accelerator Console.
2. Press the Pause key, then Enter to display the following screen:

```
*****
*           Welcome to the IBM Db2 Analytics Accelerator Console
*****

You have the following options:

(1) - Change the Configuration Console Password
(2) - (Menu) Run Netezza Commands
(3) - (Menu) Run Accelerator Functions
(4) - (Menu) Manage Hardware
(5) - (Menu) Manage Incremental Updates
(6) - (Menu) Manage 'Call Home'
(7) - (Menu) Manage Encryption

-----
(x) - Exit the Configuration Console
```

3. Type 7 and press Enter to display the submenu:

```
main -> 7
-----

You have the following options:

(0) - Go back one level
(1) - Change password to manage encryption keys
(2) - Set user-specified authentication encryption keys (AEK)
(3) - Set system-generated authentication encryption keys
```

4. Type 3 and press Enter.
5. The following message is displayed:
Netezza is stopped to execute this command.
The system will be unavailable for queries or loads.
Do you want to continue? (Enter Y/N)
6. To continue with the key generation, type y and press Enter.
7. The message Authentication encryption keys generated successfully is displayed. Press Enter to return to the main menu of the console.

Enabling queries against system-temporal and bi-temporal tables

Temporal tables, introduced with Db2 10 for z/OS, are fully supported, which means that you can run accelerated queries against all columns of these tables, including the timestamp columns that define the time interval. System-temporal and bi-temporal tables are special because they create history tables. Accelerated queries can succeed only if both, the base and the history tables are defined and loaded on the accelerator. IBM Db2 Analytics Accelerator therefore checks for their presence. This is why queries against these two types of temporal tables must be enabled explicitly.

Before you begin

Make sure that the accelerators on which you want to define the temporal tables run Netezza Platform Software (NPS) 7.2.1 or later.

About this task

- To enable accelerated queries, you must define the base tables and the related history tables separately as accelerator-shadow tables and also load both types of tables.

Business-temporal tables need not be enabled. However, you must enable the truncation of the timestamp values that they contain because these always have a precision of 12. How to enable the truncation of such values is described in a separate topic.

On the contrary, it is not required to enable the truncation of such values in system-temporal and bi-temporal accelerator-shadow tables because this is done automatically if you enable these table types by following the steps here.

- Keep the base table and the related history table in sync on the accelerator. You might get confusing results if the load times of these tables do not match.
- A history table can be archived with the High Performance Storage Saver (HPSS), provided that it is partitioned by range. However, the base table of a system-temporal or bi-temporal table that is partitioned in the same manner cannot be archived by the HPSS.
- The precision of the fractional seconds portion in timestamp values is reduced to `TIMESTAMP(6)` if the precision is greater in the original Db2 table. This has the following implications:
 - The truncation leads to a loss of precision. Bear this in mind if timestamp precision is critical.
 - A timestamp column might have been chosen as the primary key of a Db2 table because the high precision of the fractional seconds guarantees the uniqueness of the values. After a truncation, the values might not be unique anymore. Therefore, the very same column might be unsuitable as the primary key of an accelerator-shadow table.

Procedure

- To enable accelerated queries against system-temporal or bi-temporal accelerator-shadow tables, set or include option 5 in the value of the `QUERY_ACCEL_OPTIONS` parameter or `ZPARAM`. For more information, follow the appropriate link at the end of this topic.
- If you want to enable incremental updates for system-temporal and bi-temporal tables, you must "tell" IBM InfoSphere Data Replication for z/OS that it needs to work on the regular tables as well as on the history tables. This is done by adding the following line to the `CHCDBMxx` configuration member:

```
REPLTEMPORALTABLES = DECOUPLE
```

Related tasks:

"Setting ZPARMs for IBM Db2 Analytics Accelerator in Db2 11 for z/OS" on page 14

"Using a sample job to set ZPARMs for IBM Db2 Analytics Accelerator for z/OS" on page 18

Enabling the truncation of high-precision timestamps

By default, IBM Db2 Analytics Accelerator for z/OS does not support timestamps if the precision of the fractional seconds portion is higher than six digits (microseconds). This behavior reflects a limitation of the underlying Netezza database. To be able to run accelerated queries against tables containing such values, you must allow the truncation of these values.

About this task

- A truncation is mandatory if you want to run accelerated queries against the interval-defining timestamp columns in business-temporal tables because these always have a precision of 12.
- The truncation of the fractional seconds portion has the following implications:
 - The truncation leads to a loss of precision. Bear this in mind if timestamp precision is critical.
 - A timestamp column might have been chosen as the primary key of a Db2 table because the high precision of the fractional seconds guarantees the uniqueness of the values. After a truncation, the values might not be unique anymore. Therefore, the very same column might be unsuitable as the primary key of an accelerator-shadow table.

Restrictions: The following constructs are not supported, no matter if truncation is enabled or not:

- Timestamps with timezone specifications, to the effect that:
 - SQL queries that require `TIMESTAMP` with a timezone specification as the result data type are not routed to an accelerator.
 - Timestamps with timezone constants are not accepted.
 - Functions and special registers that are related to timestamps with timezone specifications are not accepted.
- Fractional seconds with a precision greater than 6 in values of parameter markers
- Fractional seconds with a precision greater than 6 in `CHAR` columns that are referenced as part of an `AS OF` clause

Procedure

To make Db2 for z/OS truncate the fractional seconds portion of timestamp values to a precision of 6 before loading these values into an accelerator table, set or include option 6 in the value of the `QUERY_ACCEL_OPTIONS` parameter or `ZPARM`. For more information, follow the appropriate link at the end of this topic.

Related tasks:

[“Setting ZPARMs for IBM Db2 Analytics Accelerator in Db2 11 for z/OS”](#) on page 14

[“Using a sample job to set ZPARMs for IBM Db2 Analytics Accelerator for z/OS”](#) on page 18

Chapter 13. Installing updates

Refer to the appropriate sections to update individual components or migrate from one version to another.

It is rarely necessary to update all listed components. However, if you must update more than one component, follow the suggested order. The order for the individual components depends on the product version or the program temporary fix (PTF) level.

Order in which to update components

Table 6. Order in which to update components

Migration from 3.1.0 PTF- <i>x</i> to 5.1.0 PTF- <i>x</i>	Migration from 4.1.0 PTF- <i>x</i> to 5.1.0 PTF- <i>x</i> or Migration from 5.1.0 PTF- <i>x</i> to 5.1.0 PTF- <i>y</i>
<ol style="list-style-type: none">1. IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 FMIDs and program temporary fixes (PTFs) via SMP/E. See “Updating the z/OS base package” on page 132.2. Prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS. See Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS.3. IBM Db2 Analytics Accelerator Studio. See “Updating IBM Db2 Analytics Accelerator Studio” on page 1334. Access Server. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1355. Replication engine. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1356. IBM Db2 Analytics Accelerator software. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1357. Stored procedures. See “Updating the IBM Db2 Analytics Accelerator stored procedures” on page 1448. Netezza Firmware (FDT) (requires assistance from IBM support). See “Updating other Netezza software” on page 140.9. Netezza Host Platform (HPF) (requires assistance from IBM support). See “Updating other Netezza software” on page 140.10. Netezza Platform Software (NPS). See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 135.11. CDC Capture Agent. See “Updating the CDC Capture Agent” on page 145.	<ol style="list-style-type: none">1. IBM Db2 Analytics Accelerator for z/OS Version 5.1.0 FMIDs and program temporary fixes (PTFs) via SMP/E. See “Updating the z/OS base package” on page 132.2. Prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS. See Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS.3. IBM Db2 Analytics Accelerator Studio. See “Updating IBM Db2 Analytics Accelerator Studio” on page 1334. Access Server. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1355. Replication engine. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1356. IBM Db2 Analytics Accelerator software. See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 1357. Netezza Platform Software (NPS). See “Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine” on page 135.8. Stored procedures. See “Updating the IBM Db2 Analytics Accelerator stored procedures” on page 1449. CDC Capture Agent. See “Updating the CDC Capture Agent” on page 145.

Updating the z/OS base package

Read how to update the base package on your z/OS data server, which contains all IBM Db2 Analytics Accelerator for z/OS components.

Before you begin

You can migrate to version 5.1.0 from the versions 3.1.0 and 4.1.0. If you need to upgrade from version 2.1.x to 3.1.0 first, consider the following prerequisites:

- The version of the accelerator software and the stored procedures must be version 2.1.3 or later. If this is not the case, first update the accelerator software and then the stored procedures by applying PTF UK82772.
- Versions from 3.1.0 onwards require more extensive authorizations for users who load accelerator-shadow tables or archive table partitions with the High Performance Storage Saver (HPSS). In addition to the authority to run the UNLOAD utility, these users must be authorized to run the RUNSTATS, REORG, and LOAD utilities.
- The authority of the user who runs the AQTTIJSP installation job for version 3.1.0 must be extended so that it includes SELECT authority for the SYSIBM.SYSTABLESPACESTATS table.

Important: If you use the incremental update function, make sure that the password of the user ID for the CDC started task is at least 4 characters long. If the password is shorter, you will run into problems during the update. If necessary, change the password before you proceed.

About this task

During an update, IBM Db2 Analytics Accelerator for z/OS remains operational for most of the time.

It is possible to run a version 3.1.0 or 4.1.0 accelerator if the stored procedures on a connected Db2 system are still at level 2.1.x (but not the other way around!). The same goes for version 5.1.0, with the exception that version 5.1.0 also allows the reverse case, that is, the accelerator software can be older than the stored procedures. A mixed environment, where you have, for example, version 2.1.x stored procedures on one Db2 subsystem or member of a data sharing group and version 3.1.0, 4.1.0, or 5.1.0 stored procedures on another, is also supported.

Important: If you first have to migrate from version 2.1.x to 3.1.0, do not activate (change the configuration to use) the updated stored procedures before updating the accelerator software to level 3.1.0. Otherwise, IBM Db2 Analytics Accelerator Studio will hang as it tries to recognize the new features in version 3.1.0.

Procedure

To update the libraries with IBM Db2 Analytics Accelerator for z/OS support in Db2 for z/OS (including the stored procedures), use the apply function in SMP/E and follow the ++HOLD actions in the program temporary fixes (PTFs).

Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS

When you update your existing installation, first apply the prerequisite program temporary fixes (PTFs) for Db2 10 for z/OS or Db2 11 for z/OS.

Before you begin

Before you migrate from IBM Db2 Analytics Accelerator for z/OS Version 3.1.0 or 4.1.0 to Version 5.1.0:

- Make sure that the database management system is Db2 10 for z/OS or Db2 11 for z/OS.
- Make sure that you meet the software requirements of Db2 for IBM Db2 Analytics Accelerator for z/OS Version 5.1.0. For more information, click the link at the end of this topic.

Note: IBM Db2 Analytics Accelerator for z/OS Version 3.1.0 and 4.1.0 continue to work after installing the required Db2 for z/OS PTFs, meaning that you can migrate or update and work with the new accelerator version without also having to update the IBM Db2 Analytics Accelerator for z/OS stored procedures.

Procedure

Install the latest prerequisite Db2 for z/OS PTFs for IBM Db2 Analytics Accelerator for z/OS Version 5.1.0.

Related information:



<http://www.ibm.com/support/docview.wss?uid=swg27046305>

Updating IBM Db2 Analytics Accelerator Studio

Follow the instructions here to download and install an upgrade of IBM Db2 Analytics Accelerator Studio.

About this task

You can no longer use IBM Db2 Analytics Accelerator Studio 3.2 for the administration of this product. You must upgrade to version 4.1.0 or a later version.

To download a refresh pack for IBM Db2 Analytics Accelerator Studio, a workstation with an internet connection is required.

If IBM Installation Manager is installed on a workstation without an internet connection, the program cannot automatically locate the repositories for updates of already installed products or additional plugins. Therefore, an administrator has to download the update repository to a central location that users without an internet connection have access to.

Workstation users without an internet connections can then let their local IBM Installation Manager installations point to the repository in the central location or copy the entire installation package from the central location to their workstations and go on from there.

You can use the newer versions of IBM Db2 Analytics Accelerator Studio with older versions of accelerators and stored procedures. Version 2.1.x and 3.1.x of IBM Db2 Analytics Accelerator for z/OS continue to work even if you have installed IBM Db2 Analytics Accelerator Studio Version 4.1.x or higher. However, the user interface might not show new functions until you update the stored procedures to the next higher or newest version (4.1.0 for version 4 functions or 5.1.0 for version 5 functions).

Procedure

- To download a refresh pack for yourself or for others from a computer with an internet connection:
 1. Click the following link:

Select fixes: IBM Db2 Analytics Accelerator Studio (All releases, All platforms)

2. Select the proper refresh pack and click the **Continue** button above the list.

3. Sign in with your IBM ID or click **Create IBM id** and follow the instructions to create an IBM ID first.
 4. Select your preferred download method:
 - **Download using Download Director** (requires Java enabled browser)
 - **Download using bulk FTP**
 - **Download using your browser (HTTPS)**
 5. Leave the check box **Include prerequisites and co-requisite fixes (you can select the ones you need later)** selected.
 6. In the View and accept terms window, click **I agree** to agree to the terms and conditions.
 7. Click **Download now** and follow the instructions.
 8. Extract the content of the downloaded archive to a directory on your local workstation or to the central location (for access or download by other users).
- To update an IBM Db2 Analytics Accelerator Studio installation:
 1. Start IBM Installation Manager.
 2. Update IBM Db2 Analytics Accelerator Studio by using one of the following procedures:
 - The following approach works if you can still connect to a previously accessed IBM Installation Manager repository, and if that repository has been updated (contains the update):
 - a. Click **Update**.
 - b. Follow the instructions in the wizard. Deselect components that you do not want to update.
 - If the first method did not work, but you can access the repository file on your company's network or on your local workstation:
 - a. From the main menu of IBM Installation Manager, select **File > Preferences > Repositories**.
 - b. Click **Add Repository**.
 - c. Click **Browse** and navigate to the directory that contains the extracted update package, either in the central location, or on your local workstation.
 - d. Select the repository.config file and click **Open**.
 - e. Click **OK** twice to return the main window of IBM Installation Manager.
 - f. Click **Install**.
 - g. Follow the instructions in the installation wizard.

Differences to earlier versions and customization

IBM Db2 Analytics Accelerator Studio 4.1 differs in some respects from its predecessors. You might want to customize your installation so that it uses the workspace directory, default perspective, and language settings of earlier versions.

If you follow the steps in “Updating IBM Db2 Analytics Accelerator Studio” on page 133, IBM Data Studio Client 4.1 and IBM Db2 Analytics Accelerator Studio 4.1 are installed.

Earlier versions of IBM Db2 Analytics Accelerator Studio, for example version 3.1, used the InstallAnywhere program for the installation. In contrast, version 4.1 installs IBM Data Studio Client 4.1 by using IBM Installation Manager and adds the IBM Db2 Analytics Accelerator functionality as a third-party extension.

When comparing IBM Db2 Analytics Accelerator Studio 4.1 with version 3.1, you will notice the following differences:

- On Windows, the default folder in the start menu is named \IBM Data Studio\ instead of \IBM Db2 Analytics Accelerator Studio\.

- The name of the default workspace is different. If you want to reuse your existing workspace for IBM Db2 Analytics Accelerator Studio, select the following directory path in the workspace launcher that is displayed when you start IBM Data Studio:

```
C:\Documents and Settings\<username>\IBM\
Db2 Analytics Accelerator Studio 3.1\workspace
```

where <username> is the name of the log-on user. This is the default workspace directory for IBM Db2 Analytics Accelerator Studio Version 3.1. You might have used a custom directory with earlier versions of the program, in which case you must change your selection accordingly.

- When you start the IBM Data Studio Client, the Accelerator perspective is not the default perspective. To activate the Accelerator perspective, select **Window > Open Perspective > Other > Accelerator** from the menu bar.
- IBM Db2 Analytics Accelerator Studio Version 4.1 is available in English only. However, your version of IBM Data Studio might display some interface elements in the language that you specified in the regional settings of your operating system. To avoid a mixture of elements in English and another language, configure the IBM Data Studio version that you use for IBM Db2 Analytics Accelerator for z/OS to display all interface elements in English only. To do that, follow these steps:

1. Locate the `eclipse.exe` file in the file path of your IBM Data Studio installation.
2. Start IBM Data Studio by running the following command:

```
eclipse.exe "-nl en_US"
```

On Windows, you can also complete these steps to the same end:

1. Right-click the **Data Studio 4.1 Client** shortcut and select **Properties** from the menu.
2. In the Properties Wizard, on the **Shortcut** tab, edit the **Target** field: At the end of the target entry, add a space character followed by `"-nl en_US"`.
3. Click **OK**.

Updating the IBM Db2 Analytics Accelerator software, the Netezza Platform Software (NPS), the Access Server, or the replication engine

These are software components that run on the accelerator hardware, that is, the IBM PureData System for Analytics.

Related information:



<http://www.ibm.com/support/docview.wss?uid=swg27046305>

Updating accelerator components

The following software components run on the accelerator server: IBM Db2 Analytics Accelerator software (accelerator software), Access Server and replication engine (for the incremental update function), and the Netezza Platform Software (NPS) (NPS). Refer to the appropriate topic in this section to update any of these.

Important: An update of the Netezza Platform Software (NPS) might require you to first update the Netezza Firmware (FDT), the Netezza Host Platform (HPF), or both. Check if this is the case by referring to the prerequisites website. The procedure to update the FDT or the HPS is also described here, under *Updating other Netezza software*.

Installing update packages for the accelerator

IBM Db2 Analytics Accelerator for z/OS software includes specific libraries and other code to be installed on the IBM PureData System for Analytics. Updates for the Access Server, the replication engine, and the Netezza Platform Software (NPS) are delivered in separate packages.

Before you begin

Make sure that the following conditions apply:

- Make sure that IBM Db2 Analytics Accelerator for z/OS has been successfully connected to Db2 for z/OS.
- IBM UNIX System Services is installed on your z/OS data server.
- You have a user ID and a password to log on to your z/OS data server. The user ID has read access to the z/OS UNIX file system (zFS).
- The user ID is authorized to run the SYSPROC.ACCEL_UPDATE_SOFTWARE stored procedure.

About this task

The entire installation or update procedure consists of several steps:

1. Installing the update packages on your z/OS data server.
2. Transferring the update packages to the accelerator. You start this process from IBM Db2 Analytics Accelerator Studio, the remote client application of IBM Db2 Analytics Accelerator for z/OS.
3. Activating the newly installed software. This step is also executed from IBM Db2 Analytics Accelerator Studio.

This topic covers step 1 only.

Procedure

1. Log on to your z/OS data server using a remote client, such as IBM Personal Communications.
2. Set the AQT_HOST_PACKAGE_DIRECTORY environment variable to the path in which the installation packages reside. By default, this is *<your_prefix>/usr/lpp/IBM/aqt/<version>/packages*, where

<your_prefix>

Is your customized path for SMP/E installations, starting from the root directory.

<version>

Is a directory name that identifies the product version, for example */v5r1m0/*.

Important: The directory that AQT_HOST_PACKAGE_DIRECTORY points to requires multiple gigabytes (GB) of disk space. For example, if you work with multiple accelerators in a rolling upgrade scenario, you must have multiple instances of the installation packages in the file system. So make sure that the directory can accommodate all the files. The *IBM Db2 Analytics Accelerator for z/OS: Program Directory* lists the exact disk space requirements.

3. If the stored procedures are still at a previous level (version 4 or earlier), make sure that you keep your setting of AQT_INSTALL_PREFIX in the AQTENV data set. It is still needed by the back-level stored procedures.

Results

Your local update directory now contains the accelerator update package *version.tar.z*.

Transferring update packages for the accelerator

Transfer update packages for IBM Db2 Analytics Accelerator for z/OS, the Access Server, the replication engine, or the Netezza Platform Software (NPS) by completing the steps in this section.

Before you begin

Make sure that the following conditions apply:

- Suitable accelerator installation packages exist in the `usr/lpp/IBM/aqt/<version>/packages` directory on your z/OS data server, where `<version>` is a placeholder for a directory whose name indicates the product version. Update packages for the IBM Db2 Analytics Accelerator for z/OS software are named `version.tar.z`, where `version` is the first part of the package name, which indicates the version of the software. Update packages for the Access Server, the replication engine, or the Netezza Platform Software (NPS) are named differently.
- The value of the `AQT_HOST_PACKAGE_DIRECTORY` environment variable determines where IBM Db2 Analytics Accelerator Studio looks for software updates. If it is not set correctly, the packages cannot be located and thus cannot be transferred or installed.
- The user ID has read and write access to the directory that the `AQT_HOST_PACKAGE_DIRECTORY` environment variable points to and to all its subdirectories. You specify this variable in the `AQTENV` data set. The `AQTENV` data set must be referenced by the Workload Manager (WLM) environment that was set up for the IBM Db2 Analytics Accelerator for z/OS stored procedures. To avoid a setup with obsolete or wrong entries, use the sample `AQTENV` data set that comes with IBM Db2 Analytics Accelerator for z/OS Version 5.1.0.

However, if the stored procedures are still at a previous level (version 4 or earlier), make sure that you copy the previous setting of `AQT_INSTALL_PREFIX` to your new `AQTENV` data set. It is still needed by the back-level stored procedures.

- When you transfer an NPS update package, it is checked whether the NPS version is compatible with the installed Netezza Firmware (FDT) and Netezza Host Platform (HPF) versions. If the NPS is incompatible, you must first update the FDT, the HPF, or both. These tasks, however, can only be completed with the help of IBM support and require a downtime of about one day. So, if the NPS update is really necessary, make sure that you plan it thoroughly in advance. For more information, follow the **Related information** link at the end of this topic.

Another caveat exists in connection with an NPS transfer: If the NPS package fails the compatibility check, the process ends prematurely without transferring any packages, no matter how many other packages were selected. It is therefore recommended that you first transfer packages for IBM Db2 Analytics Accelerator, the Access Server, or the replication engine, then activate these, and transfer and activate the NPS update in a later step.

About this task

The update packages are copied from the z/OS UNIX file system (zFS) to the accelerator, but are not yet activated. However, to actually use a new version, you must activate it. How to do this is described in a later topic. See the hint at the end of this one.

Installing a software update invokes the `SYSPROC.ACCEL_UPDATE_SOFTWARE` stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Transfer updates** link.
6. In the Transfer Updates window, you can see all software packages that are available in the zFS of your z/OS data server. Select the appropriate check boxes in the first column of the table to mark the packages that you want to transfer.

Attention: Make sure that you select the proper packages, that is, packages belonging to the release level that you want to upgrade to. The list in the Transfer Updates window might be confusing, especially if it also contains older packages. To find the correct package numbers, see the closing information or the release notes for the latest program temporary fix (PTF). You find the closing information or the release notes for a PTF on the support home page, in the category *Plan and install documentation* (see link under **Related information** at the end of this topic). If a PTF was shipped with a major product release, then, in general, you must transfer the packages included in the PTF rather than the packages in the base version.

7. Click **Transfer** to complete the installation.

Related information:

“Updating other Netezza software” on page 140



Plan and install documentation for DB2 Analytics Accelerator for z/OS

Switching between available versions of accelerator software components

To use a recently transferred software package, you must first activate that package by selecting the version that the package contains. In the case of IBM Db2 Analytics Accelerator for z/OS software, you can also switch to an older version if one of your accelerators has problems with the newest version.

Before you begin

- You cannot activate a software version as long as a IBM Db2 Analytics Accelerator Console window is open. Therefore, close all console windows. If you are not sure whether there are any open console windows, click **List Tasks** in the relevant Accelerator view of IBM Db2 Analytics Accelerator Studio and cancel all active console tasks from the List Tasks window.
- Consider the following points if you want to activate new versions of the Access Server, the replication engine, or both:
 - You cannot activate earlier versions of the Access Server or the replication engine. Just upgrades are possible here.
 - Stop incremental updates for each Db2 subsystem connected to the accelerator. To do this from IBM Db2 Analytics Accelerator Studio:
 1. In the Administration Explorer window, open the **Accelerators** folder.
 2. Select a relevant connection and open its Accelerator view.
 3. In the header section of the Accelerator view, look for **Replication:** and click **Stop**.
 4. Repeat the preceding steps for each Db2 subsystem connection to the same accelerator.

Note: If you have connections to Db2 data sharing groups (DSGs) and prefer to run the `SYSPROC.ACCEL_SET_REPLICATION` stored procedure from a client command line: It is not necessary to stop incremental updates for each individual member. A DSG is treated like a single connection and stopping incremental updates for the primary member will also stop these for the other members.

About this task

- The application of an update affects all Db2 subsystems that are connected to an accelerator.
- An update of the accelerator software does not automatically include the components for the incremental update function or the Netezza Platform Software (NPS). You must activate updates of the Access Server, the replication engine, and the Netezza Platform Software (NPS) separately.
- The activation of a different accelerator software version causes a restart of the accelerator.

Activating a software update invokes the `SYSPROC.ACCEL_UPDATE_SOFTWARE` stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

Attention:

- The activation of a new version of IBM Db2 Analytics Accelerator for z/OS software components might delete the query history from the accelerator if the new version introduces changes to the query history function.
- The sequence in which you activate the different software components is important. The sequence depends on the source and on the target version. To find the proper sequence for your particular update, see Table 6 on page 131.
- When the accelerator is restarted with a new accelerator software version, accelerated queries cannot be processed on that accelerator before it reaches the *online* state. The only way to avoid a delay is to use a second accelerator in a workload balancing setup. That is, a second accelerator which is connected to the same Db2 subsystem, and which contains the same set of tables. Note that the tables must be loaded and enabled.

Procedure

1. In the Administration Explorer, select the **Accelerators** folder.
2. In the Object List Editor on the right, double-click the accelerator.
3. In the Accelerator view, from the **Refresh** drop-down list in the upper right, select **Automatic off**. Otherwise, you might see warnings during the activation of the new software saying that the accelerator cannot be contacted.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Apply other software version** link.
6. On the first page of the Apply Software Version wizard, select the component whose active version you want to change:
 - **Accelerator** (IBM Db2 Analytics Accelerator for z/OS software)
 - **Netezza Platform Software (NPS)** (software for the Netezza hosts)
 - **Access Server** (Access Server component for incremental updates)
 - **Replication engine** (replication engine or Apply Agent for incremental updates)

Important: The order in which the wizard presents the components is not necessarily the order in which you must activate these. Use the same sequence for activating software components as for updating these. To find the proper sequence, see Chapter 13, “Installing updates,” on page 131.

7. Click **Next**.
8. On the second page of the Apply Software Version wizard, you can see all software packages on the accelerator that are currently available for the selected component. To read information about a particular version before you activate it, select the appropriate entry in the list. The information is provided in the **Details of selected version** text box at the bottom.
9. Activate a version by selecting the appropriate radio button in the **Switch To** column.
10. Click **Finish**.

Results

When the process has been completed successfully, a message similar to the following is displayed:
New software version was successfully activated.

Note: In some cases, migration processes are still ongoing even though the success message was displayed, for example after a restart of the Netezza database server. In a situation like this, it might take additional time until the accelerator is ready to process queries. You can check the status of an accelerator at the top of the corresponding Accelerator view. The status must be *online* for an accelerator to process queries.

What to do next

- **Important:** The function that applies incremental updates in parallel was improved in product version 5.1.0. However, if this function was enabled in version 4.1.0, the old function code is still executed. To use the new code after an upgrade to product version 5.1.0 or an even newer version, stop and then restart incremental updates on the updated accelerators. For instructions, follow the appropriate link at the end of this topic.
- To avoid a cluttered Apply Software Version window, you can remove packages from the accelerator that you no longer need.

For instructions on how to complete either task, follow the appropriate link under **Related tasks**.

Related tasks:

“Removing obsolete software packages from an accelerator” on page 143

“Starting or stopping incremental updates” on page 71

Related information:



IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference

Updating other Netezza software

Updates of the Netezza Firmware (FDT) and the Netezza Host Platform (HPF) cannot be installed with SMP/E and are therefore carried out by an IBM service engineer. Follow the steps here to open a service request (formerly called problem management record or PMR) and provide IBM support with the necessary information.

1. In IBM Db2 Analytics Accelerator Studio, enable tracing for the accelerator that you want to update. A trace level of DEFAULT is sufficient.
For more information, see *Tracing* in the *IBM Db2 Analytics Accelerator Studio: User's Guide*.
2. Save the trace information to a file.
3. Open a service request at <https://www.ibm.com/support/servicerequest/Home.action>, preferably two weeks before the planned migration date. This gives IBM support enough time to analyze your system, coordinate maintenance actions, and update components as required.
4. If you plan to update the NPS, and the HPF or FDT updates are required for the NPS update, state this in the body of the PMR. Also state the target NPS version.
5. Attach the trace file to the service request.

Transferring Netezza Firmware (FDT) updates or Netezza Host Platform (HPF) updates

When you have submitted the service request for the update, IBM support will tell you the proper download location and the names of the packages that you have to download. After finishing the download, transfer the update packages as a preparation for the IBM service personnel, who will help you install the updates on your IBM PureData System for Analytics.

Before you begin

Netezza update packages must exist in the download directory for packages of this type in the z/OS UNIX file system (zFS). Update packages for the Netezza host consist of single files only. The target system must be able to access this directory.

Important: The AQT_HOST_PACKAGE_DIRECTORY environment variable points to this download directory. It specifies an absolute path (starting from the root directory). The AQT_HOST_PACKAGE_DIRECTORY environment is set in the <HLQSP>.SAQTSAMP(AQTENV) data set, where <HLQSP> is the chosen high-level qualifier for stored-procedure libraries. The value of this environment variable determines where IBM Db2 Analytics Accelerator Studio looks for Netezza updates. If it is not set correctly, the packages cannot be located and thus cannot be transferred to the IBM

PureData System for Analytics. To avoid a setup with obsolete or wrong entries, use the sample AQTENV data set that comes with IBM Db2 Analytics Accelerator for z/OS Version 5.1.0.

About this task

Netezza update packages are not installed automatically. They are just transferred to a directory on the IBM PureData System for Analytics, from where you must install them manually with the help of IBM support.

Transferring a Netezza update invokes the **SYSPROC.ACCEL_UPDATE_SOFTWARE** stored procedure on your data server. For information about the privileges that are required to run this procedure and further details, see the appropriate section in the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference*. A link to this document is provided under **Related reference** at the end of this section.

To start an update transfer process, follow the steps in this section.

Procedure

1. Start IBM Db2 Analytics Accelerator Studio.
2. In the Administration Explorer, select the **Accelerators** folder.
3. In the Object List Editor on the right, double-click the accelerator.
4. If necessary, expand the **About** section.
5. In the **About** section, click the **Transfer updates** link.
6. In the Transfer Updates window, you can see all Netezza Firmware (FDT) and Netezza Host Platform (HPF) files that are available in the zFS of your z/OS data server. Select the appropriate check boxes in the first column of the table to mark the files that you want to transfer.
7. Click **Transfer** to complete the process.

Installing updates of the Netezza Firmware (FDT) or the Netezza Host Platform (HPF) software

While updates for IBM Db2 Analytics Accelerator for z/OS, the Access Server, or the replication engine are installed automatically at the end of the transfer process or by using the apply function, updates for the Netezza host are not. Therefore, you must install these updates manually.

Before you begin

Make sure that the following conditions apply:

- You have opened a service request as described in “Updating other Netezza software” on page 140.
- The IBM PureData System for Analytics must be fully operational. Hardware problems must not exist. This also means the use of spare disks is not allowed. Replace defective hard disks before installing the update.
- Remote access from z/OS OMVS to the Netezza host via secure shell (ssh) must be enabled.
- IBM support will ask you to open or allow a screen-sharing session on your workstation. Make sure that this complies with the security guidelines of your organization or ask the responsible staff for a special permit.

About this task

An update installation requires you to stop the Netezza database for approximately 30 minutes. The accelerator cannot be used during this time.

Procedure

1. Contact IBM support. IBM support will ask you for remote screen-sharing access to the client machine.

2. With IBM assistance, open a login shell to the Netezza host. There are several ways to do that:
- If a telnet server and a secure-shell (ssh) client are installed in the UNIX System Services file system of your System Z, you can connect with a network client application, such as PuTTY, from your client workstation to the Netezza host by opening the following connections:
 - a. From your workstation to the System z server by telnet. Use your user ID and password to log in. See an example of a telnet login from a PuTTY window:

```
EZKTE14I login: willy
EZKTE14I willy Password:
IBM
Licensed Material - Property of IBM
5694-A01 Copyright IBM Corp. 1993, 2011
(C) Copyright Mortice Kern Systems, Inc., 1985, 1996.
(C) Copyright Software Development Group, University of Waterloo, 1989.

All Rights Reserved.

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Use, duplication or disclosure restricted by
GSA ADP Schedule Contract with IBM Corp.

IBM is a registered trademark of the IBM Corp.
```

Note: The telnet connection from the workstation to the UNIX System Services telnet server will be unencrypted.

- b. From the System Z to the Netezza host by ssh. To open this connection, enter the **ssh** command followed by `root<ip>` from the login window, where `root` is the root user ID and `<ip>` the IP address of the Netezza host. See the following example:

```
DCA1:WILLY:/u/willy>ssh root@10.104.9.3
Enter Service Password (Date: '20140506' Serial#: '1234' Rev: '2'):
```

In this example, the IP address of the Netezza host is 10.104.9.3. IBM support will enter the service password for you.

- If an ssh server and an ssh client are installed in the UNIX System Services file system of your System Z, and if server and client have been activated, you can connect with a network client application, such as PuTTY, from your client workstation to the Netezza system by opening the following connections:
 - a. From your workstation to the System Z server by ssh. Use your user ID and password to log in. See an example of an ssh login from a PuTTY window:

```
login as: willy
willy@boedcal's password:
```

Important: If your z/OS version is V2R2 or higher, make sure that the address space for the Cryptographic Service Facility (CSF) has been started. Otherwise, the ssh connection to z/OS will fail.

- b. From the System Z to the Netezza host by ssh. To open this connection, enter the **ssh** command followed by `root<ip>` from the login window, where `root` is the root user ID and `<ip>` the IP address of the Netezza host. See the following example:

```
DCA1:WILLY:/u/willy>ssh root@10.104.9.3
Enter Service Password (Date: '20140506' Serial#: '1234' Rev: '2'):
```

In this example, the IP address of the Netezza host is 10.104.9.3. IBM support will enter the service password for you.

Note: IBM prefers this method over the telnet method because the connection to the System Z server is encrypted.

- If an ssh server is installed and active on your System Z, and if port-forwarding is enabled for that server, you can connect to the Netezza system by an ssh tunnel, which looks like a single connection from your client workstation to the Netezza system. To enable port-forwarding, set `AllowTcpForwarding yes` in the `/etc/ssh/sshd_config` file of your UNIX System Services file system and restart the ssh server for the change to take effect.

Example: The commands for a tunnel connection would look similar to these:

a. `ssh -L 10022:10.0.0.1:22 user@systemz`

where:

-L 10022

is the local port on the client workstation

10.0.0.1

is the IP address of the Netezza host

22 is the remote port or listening port on the Netezza host

user@systemz

user is ID with which you log on to the UNIX System Services ssh server and systemz is the host name of that server.

b. `ssh -p 10022 root@localhost`

where:

-p 10022

is the local port on the client workstation

root@localhost

root is the user ID on the Netezza host and localhost is the host name of the client workstation

After the login, IBM support will enter the service password for you.

Tip: IBM provides a tool package called IBM Ported Tools for z/OS, which is free of charge. One of the programs in this package is called OpenSSH, which contains an ssh client component that you can use to connect from the UNIX System Services file system to the Netezza host. Note that you only need the client component of OpenSSH for Netezza host updates (called **ssh**). For more information, see:

<http://www.ibm.com/systems/z/os/zos/features/unix/ported>

3. IBM Support will provide you with a temporary password that is valid for your Netezza host and the current date only.
4. Navigate to the directory on the Netezza host in which the transferred update files are stored. To do so, enter `cd /nz/dwa/transfer/accelerator` at the command prompt of your ssh client.
5. To proceed, follow the instructions of IBM support.
6. Having installed the updates, delete the files that are not needed anymore.
7. Terminate the ssh session by entering `exit` at the command prompt.

Removing obsolete software packages from an accelerator

To free up space on an accelerator and reduce the number of versions that are displayed in the Apply Software Version window, you can remove packages that you no longer need.

About this task

The removal wizard can remove all packages that have been deployed with the help of the transfer wizard, that is:

- Accelerator software packages
- Access Server packages
- Replication engine packages
- Netezza Platform Software (NPS)
- Netezza Firmware (FDT)
- Netezza Host Platform (HPF)

Note: You can only remove software packages from regular accelerators.

Procedure

1. Open the appropriate Accelerator view.
2. If necessary, expand the **About** section.
3. Click the **Remove** link in the server subsection.
4. In the Remove Software Versions window, select the software packages that you want to remove. To do so, select the appropriate check boxes in the first column. As a decision aid, you might want to read the information under **Details of selected version**, which is displayed for each package.
5. Click **Remove**.

What to do next

The removal wizard that is described in this topic can only remove packages from an accelerator. To free up space in the z/OS UNIX file system (zFS) of your data server, manually delete no longer needed IBM Db2 Analytics Accelerator for z/OS or Netezza update packages from the zFS. To do so, open a UNIX System Services shell and delete the files by using the **rm** command.

Updating the IBM Db2 Analytics Accelerator stored procedures

Read how to update the Db2 for z/OS components of IBM Db2 Analytics Accelerator for z/OS.

Before you begin

Make sure that you have already updated the base package, which includes the stored procedures. For more information, see “Updating the z/OS base package” on page 132.

Procedure

1. If you intend to accelerate static SQL queries, verify that the table SYSACCEL.SYSACCELERATEDPACKAGES and related indexes exist in the relevant Db2 subsystems. If not, create this table and the related indexes in each connected subsystem by running the Db2 for z/OS job DSNTIJAS. You find instructions in the section *Creating the IBM Db2 Analytics Accelerator for z/OS database*. Follow the link under **Related tasks** tasks at the end of this topic.
2. For the configuration, revisit the sections that are listed at the end of this topic. Consider the following:
 - a. When you set up the WLM application environment:
 - 1) Reuse the existing WLM JCL procedure for the version 3.1.x stored procedures.
 - 2) Edit the JCL and change the high-level qualifier (HLQ) in the following statements so that the production HLQ for version 5.1.0 data sets is used:
 - DD <HLQACTIVE>.SAQTMOD
 - AQTENV DD <HLQACTIVE>.SAQTSAMP(AQTENV)
 - AQTDEFTR DD <HLQACTIVE>.SAQTSAMP(AQTDEFTR)

- b. Copy the customized settings from your old version 3.1.0 or 4.1.0 AQTENV production member (the member that you previously referred to in the AQTENV DD statement of the JCL for the WLM setup) to the new AQTENV data set member for version 5.1.0. Do not refresh your WLM application environment yet.
- c. Customize the AQTTIJSP job as described in “Customizing and running AQTTIJSP” on page 30. Unless instructed otherwise, use the INSTALL parameter for AQTTIRIN in AQTTIJSP. Do not use REINSTALL because this parameter invalidates other installations in the same Db2 subsystem. If another version exists, such as IBM Db2 Analytics Accelerator for z/OS Version 7.1.0, and REINSTALL is used, the other version must be installed again.
- d. Refresh the WLM application environment for the stored procedures. This activates stored procedure code for version 5.1.0. You might want to verify this by starting IBM Db2 Analytics Accelerator Studio. If the stored procedure code was updated successfully, the graphical user interface shows the new version 5.1.0 features.
- e. You might want to free the version 3.1.0 or 4.1.0 packages unless you want to run old and new versions in parallel for some time in a data sharing environment. The names of version 4.1.0 packages start with SYSACCEL.AQTDB and contain the version string IDAA4. Version 3.1.0 packages start with SYSACCEL.AQT03.

Related tasks:

“Creating the IBM Db2 Analytics Accelerator database” on page 14

“Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored procedures” on page 23

“Verifying the correct setup of Db2-supplied stored procedures” on page 27

“Customizing and running AQTTIJSP” on page 30

“Verifying the installation of IBM Db2 Analytics Accelerator for z/OS stored procedures” on page 31

Related reference:

“Setting access rights for the user who runs AQTTIJSP” on page 30

Updating the CDC Capture Agent

To update the CDC Capture Agent, you must update your installation of IBM InfoSphere Data Replication for z/OS (CDC).

Before you begin

To fully benefit from the latest improvements to the incremental update function, you might have to update the CDC Capture Agent even if a supported version is already installed.

About this task

For an update of CDC, you basically complete the same steps as for the initial installation.

Procedure

1. Stop incremental updates on all accelerators that use the instance of the CDC Capture Agent that you want to update. These are the accelerators that are paired with the Db2 subsystem or Db2 data-sharing-group-member for which the instance of the CDC Capture Agent has been configured. Incremental updates will be resumed when the updated instance of the CDC Capture Agent is started.
2. If two instances of the CDC Capture Agent are running in a Db2 data-sharing environment, make sure that both CDC started tasks have been stopped before you continue with the next steps.
3. Check and make sure that you meet the system requirements for the new CDC version at: System requirements for InfoSphere CDC for z/OS.
4. Make a note of the following information:
 - ID of the user who runs the CDC started task.

- Port number of the CDC address space (default port 5999)
- Security identifier (owner of CDC metadata tables)

You need this information for the customization of the CDC installation sample jobs. If any of the mentioned terms are unclear, refer to Before you install or upgrade InfoSphere CDC for z/OS.

5. Using the SMP/E Apply function, add required program temporary fixes (PTFs) for the new CDC version. The required PTFs are listed in:

Prerequisites and Maintenance for IBM Db2 Analytics Accelerator for z/OS Version 5.1.

6. Complete the steps in section Completing the installation using the distributed sample jobs of the CDC information center. Basically, this task comprises the following steps:
 - a. Creating a new configuration control data set and copying members into this data set. The settings in this control data set are read and processed during the initialization of the CDC address space.
 - b. Customizing and running a number of jobs to prepare your Db2 subsystems to work with the updated CDC version. For example, the CHCMDMUT job creates new metadata tables for CDC. You must customize this job and specify the security identifier as the owner of these tables.

Running different versions of IBM Db2 Analytics Accelerator for z/OS at the same time

In connection with a Db2 data sharing group, you can run IBM Db2 Analytics Accelerator for z/OS Version 2.1.x, Version 3.1.x, Version 4.1.x, Version 5.1.x, and later versions at the same time. Read how to create an environment that allows coexistence.

About this task

With large installations involving multiple accelerators, it might be unfavorable to update the software on all accelerators at the same time because this means that none of these will be available for processing during the update. If the accelerators are connected to a Db2 data sharing group, you can run different versions of IBM Db2 Analytics Accelerator for z/OS at the same time, so that you can update one accelerator after the other (rolling update).

A setup like this does not necessarily require an update of the stored procedures. Newer versions of the accelerator software generally work with older versions of the stored procedures, so this is not a problem unless you want to use functionality that the older stored procedures do not offer.

To use the new functionality, you must install the 5.1.x stored procedures and ensure that these stored procedures are used when the Db2 data sharing group communicates with the version 5.1.x accelerator. At the same, you need to ensure that the version 4.1.x stored procedures are used when the older accelerator is addressed because an error will occur if this is not the case (older accelerators do not work with newer stored procedures).

The coexistence of different stored procedure versions is also possible if the members of the data sharing group reside in the same logical partition (LPAR). This implies that the different versions share the same Workload Manager (WLM) application environment, which means that the same JCL procedure is used to define this environment. You must therefore configure this JCL procedure accordingly.

Procedure

1. Identify a Db2 member (A) that is supposed to use version 5.1.0 or later stored procedures, while at least one other member (B) of the same data sharing group continues to use IBM Db2 Analytics Accelerator for z/OS Version 2.1.x, 3.1.x, or 4.1.x stored procedures.
2. Check whether you must use the same WLM JCL procedure for the older and the later version. This is the case if member B runs in the same LPAR as member A, or if your JCL procedure library, for example USER.PROCLIB, is shared throughout the sysplex. Depending on the result of this check:
 - If you must use the same WLM JCL procedure for both versions, continue with step 3 on page 147.

- If you can use different WLM JCL procedures, create a second procedure with the same name for the newer stored procedures of member A, and follow steps 2a on page 144 through 2d on page 145 for member A. Skip step 2e on page 145 because the older stored procedure packages are still required for coexistence.

If the WLM JCL procedure is shared by the different members, use a data set and alias naming convention similar to the one described in *Special considerations for WLM-managed stored procedures in coexistence* of the Db2 11 for z/OS collection of the IBM Knowledge Center. See the link at the end of this topic.

3. In step 2a on page 144 of the section *Updating the IBM Db2 Analytics Accelerator stored procedures*, choose a string for <HLQACTIVE> that includes the **Db2SSN** JCL parameter. This allows release-specific data set names for the relevant members of the data sharing group.
4. Use aliases to redirect the data-set names of both installed versions to member-specific data-set names.

Example

If member A is named Db2A, member B is named Db2B, AQT is the high-level-qualifier, and you want member A to use the newer stored procedures, proceed as follows:

1. Update the WLM JCL procedure as shown:

```
//DSNWLMVA PROC RGN=0K,APPLENV= DSNWLMVA,NUMTCB=15,
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
// PARM='&Db2SSN,&NUMTCB,&APPLENV'
//STEPLIB DD DISP=SHR,DSN=<HLQDb2SSN>.SDSNEXIT
// DD DISP=SHR,DSN=<HLQBASE>.SDSNLOAD
// DD DISP=SHR,DSN=<HLQBASE>.SDSNLOD2
// DD DISP=SHR,DSN=AQT.&Db2SSN..SAQTMOD
// DD DISP=SHR,DSN=<HLQXML4C1.10>.SIXMLOD1
//SYSTSPRT DD SYSOUT=A
//CEEDUMP DD SYSOUT=H
//OUT1 DD SYSOUT=A
//UTPRINT DD SYSOUT=A
//DSSPRINT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//AQTEVV DD DSN=AQT.&Db2SSN..SAQTSAMP(AQTEVV),DISP=SHR
```

2. Create the following aliases for the later version and member A:

```
AQT.Db2A.SAQTMOD          *ALIAS
AQT.Db2A.SAQTSAMP         *ALIAS
```

3. Create the following aliases for the previous version and member B:

```
AQT.Db2B.SAQTMOD          *ALIAS
AQT.Db2B.SAQTSAMP         *ALIAS
```

This configuration ensures that a member of the data sharing group will always use the correct set of stored procedures.

What to do next

So far, you have modified the WLM JCL procedure or procedures to ensure that the right set of stored procedures is selected with regard to the data-sharing member that IBM Db2 Analytics Accelerator Studio connects to. However, to use the functionality that is available with the newer set of stored procedures only, you must ensure that IBM Db2 Analytics Accelerator Studio connects to a member that uses this set of procedures. If you specify the entire data-sharing group in the database connection profile, the member to connect to is selected at random. To avoid this, you must specify a suitable member in the profile (*member connect* instead of *group connect*).

Also consider creating an additional member just for update purposes. Such a member could be offline most of the time, and activated only when updates have to be installed.

Related tasks:

“Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored procedures” on page 23

Related information:

Special considerations for WLM-managed stored procedures in coexistence

Chapter 14. Removing accelerators from your Db2 for z/OS configuration

You might want to remove all accelerator-related objects and settings from a Db2 for z/OS configuration, for example after finishing a test or a proof-of-concept.

Procedure

1. Set DSNZPARM GET_ACCEL_ARCHIVE to NO or remove the parameter entirely.
2. Set DSNZPARM QUERY_ACCELERATION to NO or remove it.
3. Set DSNZPARM ACCEL to NO or remove it. This parameter change requires a Db2 restart, which can be postponed to the next scheduled maintenance window.
4. For each Db2 subsystem connected to an accelerator, run **-STOP ACCEL**.
5. Remove all tables from the connected accelerators. Use the **Remove** button in the relevant Accelerator views of IBM Db2 Analytics Accelerator Studio or the SYSPROC.ACCEL_REMOVE_TABLES stored procedure for this purpose.
6. Remove all accelerators from the connected Db2 subsystems. To this end, use the **Remove** button in the Object List Editor of IBM Db2 Analytics Accelerator Studio or the SYSPROC.ACCEL_REMOVE_ACCELERATOR stored procedure.
7. In Db2 for z/OS, drop the DSNACCEL database, including all tables and table spaces whose names start with SYSACCEL.

Cleaning up the communications database manually

If accelerators have already been disconnected physically, tables and accelerators (steps 5 and 6 in the previous section) cannot be removed by IBM Db2 Analytics Accelerator functions anymore. In that case, clean up the Db2 communications database (CDB) manually by following the steps here.

Procedure

1. Run the following SQL query to get a list of the defined accelerators:

```
SELECT ACCELERATORNAME FROM SYSACCEL.SYSACCELERATORS
```
2. Delete entries in the CDB by running the following SQL statements for each defined accelerator. Replace <accelerator name> with the names returned by the SQL query in step 1.

```
DELETE FROM SYSIBM.LOCATIONS WHERE LINKNAME = '<accelerator name>';  
DELETE FROM SYSIBM.IPNames WHERE LINKNAME = '<accelerator name>';  
DELETE FROM SYSIBM.USERNames WHERE LINKNAME = '<accelerator name>';
```
3. Drop the DSNACCEL database, including all tables and table spaces whose names start with SYSACCEL.

Removing the remaining database objects

Remove the remaining accelerator-related database objects by running the following SQL statements:

Procedure

1. DROP TABLE DSNAPT.ACCEL_*;
2. DROP VIEW DSNAPT.ACCEL_NAMES;
3. DROP SEQUENCE DSNAPT.UNLOADIDS;
4. DROP PROCEDURE SYSPROC.ACCEL_*;
5. DROP FUNCTION DSNAPT.ACCEL_*;
6. FREE PACKAGE SYSACCEL.*;

What to do next

Your contract with IBM might oblige you to physically erase all disks before an IBM PureData System for Analytics is moved outside of your data center. A procedure exists that guarantees and certifies the erasure of disks. If required, contact IBM support to request the execution of this procedure. If you want to reuse a machine after the execution, you must install and configure it from scratch.

Chapter 15. Troubleshooting

In the following sections, you find descriptions of known IBM Db2 Analytics Accelerator for z/OS problems. The author and the development team have tried to provide a solution wherever possible. However, a solution might be unavailable because the cause of a problem cannot be clearly identified. This is mostly the case if multiple causes can lead to the same symptom. It can also be that a solution has not yet been found. In such cases, contact IBM support.

Important: During a customer session with IBM support, system parameters might be changed. For the parameter changes to take effect, a restart of an accelerator is often required. In such situations, the accelerator will be unavailable for operational tasks until it has come back online.

Redundant CDC metadata

When you start the CDC Capture Agent on z/OS, a warning is written to the CHCRPRT report data set.

Symptoms

The following message is added to the report:

The following tables are defined for replication, but are not used in any subscriptions. These can cause the product to perform inefficiently and should be removed from the list of replication tables if not required.

Causes

Incremental updates were disabled for one or more accelerator-shadow tables. However, the CDC metadata describing these tables still exists.

Resolving the problem

You can ignore this message because the impact on the performance is negligible. If you want, you can remove the redundant metadata by using a function on the IBM Db2 Analytics Accelerator Console.

Mind that the removal function removes only redundant CDC metadata, but not the metadata of tables that are still actively replicated. For more information, see *Removing unused table metadata* in the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

Firewall blocks operations because crucial ports are closed

If product functions are not executed, check your firewall settings. IBM Db2 Analytics Accelerator requires certain ports to be open. See the table in this topic.

Symptoms

- You cannot accelerate queries.
- You cannot run functions from the IBM Db2 Analytics Accelerator Console.
- Incremental updates do not work or IBM InfoSphere Data Replication for z/OS cannot be configured.
- You cannot open a secure-shell (ssh) connection to an accelerator.
- Services are unavailable or switches (routers) cannot be reached because ICPM (Internet Control Message Protocol) traffic is blocked.

Causes

Required networking ports are closed.

Resolving the problem

Table 7. Required networking ports for IBM Db2 Analytics Accelerator

Function or protocol	Required port	Direction
Query execution (DRDA protocol)	1400	Both ways
IBM Db2 Analytics Accelerator Console	1600	Both ways
CDC data transfer	11301-11400	Outbound (from z/OS to accelerator)
CDC configuration	5999	Inbound (generally from accelerator to z/OS; depends on the configuration of the CDC Capture Agent)
Db2 DDF port (for continuous incremental updates)	446 (default)	Inbound (from accelerator to z/OS)
Secure shell connection (ssh)	22	Both ways
ICMP traffic	N/A	Both ways

Message AQT10200E and SQL code -206 when running stored procedures after migration

Stored procedure calls end with message AQT10200E and SQLCODE= -206 after a migration of IBM Db2 Analytics Accelerator for z/OS from version 2.1.x to a later version.

Symptoms

The following message is displayed:

AQT10200E - The OPEN CURSOR operation failed. Error information: "DSNT408I
SQLCODE = -206, ERROR: ARCHIVE IS NOT VALID IN THE CONTEXT WHERE IT IS USED"

Causes

Required program temporary fixes (PTFs) for Db2 for z/OS have not been installed or the respective ++HOLD migration actions have not been applied yet.

Resolving the problem

Follow the steps in section *Installing prerequisite PTFs for Db2 10 for z/OS* of the *IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.

Related tasks

"Installing prerequisite PTFs for Db2 10 for z/OS or Db2 11 for z/OS" on page 132

Message DSNUTILU NOT INVOKED APF AUTHORIZED

You run the DSNUTILU stored procedure and receive a reply message that says DSNUTILU NOT INVOKED APF AUTHORIZED.

Symptoms

You cannot run the DSNUTILU stored procedure successfully.

Causes

The stored procedure is not APF-authorized.

Resolving the problem

Make sure that all libraries used by the WLM application environment for Db2 stored procedures are APF-authorized in the STEPLIB statement of the startup JCL procedure.

Error during bind step for stored procedure or function

You receive an error message as you try to bind an IBM Db2 Analytics Accelerator for z/OS stored procedure or function.

Symptoms

The error message is similar to this one:

```
BIND PACKAGE(SYSACCEL) MEMBER(AQT02TRC) ACTION(REPLACE) ISO(CS)
CURRENT.....
EBIND) KEEP DYNAMIC(NO) LIBRARY('Db291.ISAO.SAQTDBRM')
```

```
DSNX100I  § BIND SQL WARNING
          USING HACA02 AUTHORITY
          PLAN=(NOT APPLICABLE)
          DBRM=AQT02TRC
          STATEMENT=154
          FUNCTION DSAQT.ACCEL_READFILE IS NOT DEFINED      <<<<
```

Causes

Mismatch between parameter lists.

This error occurs if a new version of an IBM Db2 Analytics Accelerator for z/OS stored procedure has a modified parameter list compared with the old version. In the example, the versions of the module AQT02TRC and the FUNCTION DSAQT.ACCEL_READFILE interface do not match.

Resolving the problem

Contact IBM support.

No CEEDUMPs

You cannot find a CEEDUMP although a signal was caught while you were running an IBM Db2 Analytics Accelerator for z/OS stored procedure.

Symptoms

A signal was caught while running an IBM Db2 Analytics Accelerator for z/OS stored procedure, but a CEEDUMP has apparently not been produced.

Causes

Missing configuration settings.

Resolving the problem

To analyze problems that cause the stored procedure to end abnormally or stop with a signal, a CEEDUMP is required. The JCL startup procedure for the Workload Manager (WLM) application environment of the IBM Db2 Analytics Accelerator for z/OS stored procedure allows you to specify a location for a CEEDUMP.

Important: Make sure that the JCL startup procedure for the Workload Manager (WLM) application environment of the IBM Db2 Analytics Accelerator for z/OS stored procedure contains a DD statement for CEEDUMP.

PRIQ value too high when creating table spaces

During table-space creation, you receive a message saying that the PRIQ value was exceeded.

Symptoms

The problem occurs if you want to create a table, but a table space must be created before this. The following error message might be displayed:

```
IDC3221I CONSTANT '16777216' NOT WITHIN VALUE RANGE
```

Causes

Program Temporary Fix (PTF) UK43901 is missing.

Resolving the problem

Install the PTF or use smaller sizes.

The Db2 command -DIS ACCEL does not work

You cannot run the Db2 for z/OS command -DIS ACCEL.

Symptoms

The -DIS ACCEL command does not return the expected accelerator information.

Resolving the problem

1. Verify that the Db2 ZPARMs are configured as described in the section “Installing libraries with IBM Db2 Analytics Accelerator for z/OS support” on page 13 *Installing Db2 libraries with IBM Db2 Analytics Accelerator for z/OS support of the IBM Db2 Analytics Accelerator for z/OS: Installation Guide*.
2. Verify that the IBM Db2 Analytics Accelerator for z/OS libraries are part of the STEPLIB statement.

Connection authorization failure (error -4214)

You receive a message about a connection authorization failure with error code -4214.

Symptoms

The full message is similar to this one:

```
[jcc][t4][2010][11246][4.7.89]
Connection authorization failure occurred.
Reason: Local security service non-retryable error.
ERRORCODE=-4214, SQLSTATE=28000
```

Causes

No access to the Db2 subsystem, although z/OS can be accessed.

Diagnosing the problem

The error is probably due to a missing RACF authorization.

Resolving the problem

Check the RACF security settings.

Errors during ZPARM compilation

You receive error messages during ZPARM compilation.

Symptoms

You receive the following error messages:

```
X00370097
VOLTDEVT=SYSDA,                X00370098
XLKUPDLT=NO,                   X00370099
ZOSMETRICS=NO
** ASMA017W Undefined keyword parameter; default to positional,
including keyword - DSN6S/OPTIOWGT
** ASMA017W Undefined keyword parameter; default to positional,
including keyword - DSN6S/OPTJBPR
** ASMA017W Undefined keyword parameter; default to positional,
including keyword - DSN6S/ZOSMETRICS
** ASMA435I Record 3165 in Db291.ISAO.LAB.SDSNMACS(DSN6SPRM)
on volume: TSMS08
57+*          Avoid overflow      DK153
000000      00000 00814      60+DSN6SPRM
CSECT      CSECT name      02-DSNDS
```

Causes

These errors are caused by the following parameters, which are unknown because they have been introduced by Program Temporary Fixes (PTFs) that are newer than those included in the base level of the libraries with IBM Db2 Analytics Accelerator for z/OS support:

- OPTIOWGT
- OPTJBPR
- ZOSMETRICS

Resolving the problem

Update the libraries with IBM Db2 Analytics Accelerator for z/OS support.

DRDA connection does not work

You can ping the accelerators, but you cannot establish a distributed relational database access (DRDA) connection between your database management system and the accelerator.

Symptoms

Db2 commands or IBM Db2 Analytics Accelerator for z/OS stored procedures cannot establish a TCP/IP connection with the accelerator. Running the SYSPROC.ACCEL_TEST_CONNECTION stored procedure reveals this issue.

Resolving the problem

Make sure that the distributed data facility (DDF) of Db2 for z/OS uses the same TCP/IP stack as the ping program.

Removing orphaned system-table entries and catalog-table entries

If an IBM PureData System for Analytics was physically removed, but the accelerator was not removed before by running the *Remove accelerator* function from IBM Db2 Analytics Accelerator Studio or by running the `SYSPROC.ACCEL_REMOVE_ACCELERATOR` stored procedure, you find invalid entries in a number of Db2 for z/OS catalog tables and system tables.

Symptoms

You find invalid entries in the following tables:

- `SYSIBM.IPNAMES`
- `SYSIBM.USERNAMES`
- `SYSIBM.LOCATIONS`
- `SYSACCEL.SYSACCELERATORS`
- `SYSACCEL.SYSACCELERATEDTABLES`

Resolving the problem

1. Disable the accelerator in the Db2 subsystem, by using the `-STOP ACCEL` command or the appropriate function in IBM Db2 Analytics Accelerator Studio.
2. To remove the invalid entries from the system tables, run the following SQL commands in the order indicated:
 - a.

```
DELETE FROM SYSIBM.IPNAMES
WHERE LINKNAME=(SELECT LINKNAME FROM SYSIBM.LOCATIONS
WHERE LOCATION=(SELECT LOCATION FROM SYSACCEL.SYSACCELERATORS
WHERE ACCELERATORNAME=<acceleratorName>));
```
 - b.

```
DELETE FROM SYSIBM.USERNAMES
WHERE LINKNAME=(SELECT LINKNAME FROM SYSIBM.LOCATIONS
WHERE LOCATION=(SELECT LOCATION FROM SYSACCEL.SYSACCELERATORS
WHERE ACCELERATORNAME=<acceleratorName>));
```
 - c.

```
DELETE FROM SYSIBM.LOCATIONS
WHERE LOCATION=(SELECT LOCATION FROM SYSACCEL.SYSACCELERATORS
WHERE ACCELERATORNAME=<acceleratorName>);
```
 - d.

```
DELETE FROM SYSACCEL.SYSACCELERATORS
WHERE ACCELERATORNAME=<acceleratorName>;
```
 - e.

```
DELETE FROM SYSACCEL.SYSACCELERATEDTABLES
WHERE ACCELERATORNAME=<acceleratorName>;
```

Related tasks

Appendix E, “Disabling accelerators in a Db2 subsystem,” on page 177

Package not found when running a stored procedure from IBM Db2 Analytics Accelerator Studio

You receive a message saying that a package was not found when you try to run an IBM Db2 Analytics Accelerator for z/OS stored procedure from IBM Db2 Analytics Accelerator Studio.

Symptoms

You receive a message similar to this one:

```
SQL0805N  Package "<location>.NULLID.SYSSTAT.5359534C564C3031"
was not found.  SQLSTATE=51002
```

Causes

The package has not been bound due to an IBM Db2 Analytics Accelerator Studio installation error.

Resolving the problem

Bind the package manually. The following methods can be used:

- From the Db2 command-line client:

1. `cd <Db2-client-install-folder>\bnd`
where <Db2-client-install-folder> is the fully qualified path to the installation folder of the Db2 command-line client.
2. `db2 connect to <database-name>`
where <database-name> is the database to which the stored procedure belongs.
3. `db2 bind @db2cli.lst grant public`

- Using the Db2Binder utility from a Windows command-prompt:

1. Adjust the following command as needed. Then press the Enter key.

```
cd /d <idaa-studio-install-directory>
\plugins\com.ibm.datatools.db2_2.1.403.v20120228_2105\driver
```

where <idaa-studio-install-directory> is the drive and installation directory of IBM Db2 Analytics Accelerator Studio on your local workstation, for example C:\Program Files\IBM\ IBM Db2 Analytics Accelerator Studio 2.1. The full name of the com.ibm.datatools.db2_ directory changes with each new driver. So make sure that you choose the correct directory.

2. Enter:

```
..\..\..\jre\bin\java -cp db2jcc4.jar;
db2jcc4_license_cisuz.jar;
db2jcc4_license_cu.jar com.ibm.db2.jcc.Db2Binder
-url jdbc:db2://<server>:<port>/<location>
-user <user-id> -password <password>
```

where

<server>

Is the host name of the Db2 data server

<port>

Is the port on which the Db2 data server listens to JDBC requests

<location>

Is the unique name of the database server. An application uses the location name to access a Db2 database server. A database alias can be used to override the location name when accessing a remote server.

<user-id>

Is a user ID with the privilege of running the Db2 Binder utility

<password>

Is the password belonging to <user-id>

Packet delivery failure

The stored procedures can establish a connection to the IBM PureData System for Analytics, but sometimes, the packet delivery fails, especially during loads.

Symptoms

You notice communication timeout errors between stored procedures and IBM Db2 Analytics Accelerator for z/OS. Usually, a stored procedure sends a request and does not receive an answer. The problem is prevalent in SYSPROC.ACCEL_CONTROL_ACCELERATOR calls using the **<getInfo>** parameter if a reply requires the sending of data packages bigger than 1.5 KB.

Causes

In most cases, this is caused by network components that do not support jumbo frames.

Resolving the problem

1. Make sure that all network components, especially switches, support jumbo frames. Sometimes, you must configure the switches to support jumbo frames.
2. To verify that your configuration works, click the **Test connection** button in the Add Accelerator window.

SQL code -430 from IBM Db2 Analytics Accelerator for z/OS stored procedures

A stored procedure of IBM Db2 Analytics Accelerator for z/OS ends abnormally, and you receive an error message with SQL code -430.

Symptoms

IBM Db2 Analytics Accelerator for z/OS stored procedures end abnormally. In IBM Db2 Analytics Accelerator Studio, the Administration Explorer returns a message window like this one:

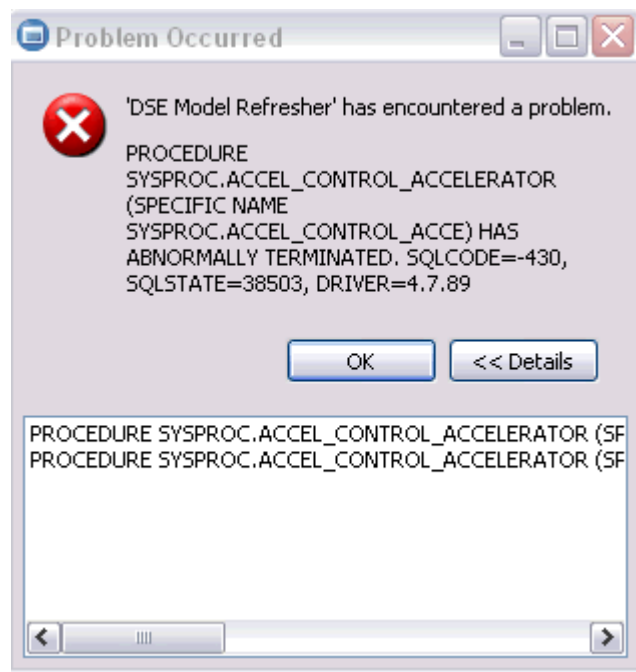


Figure 5. SQL code -430 message window

Causes

This is probably a configuration problem.

Diagnosing the problem

1. Verify that the IBM Db2 Analytics Accelerator for z/OS stored procedures run in a separate Workload Manager (WLM) environment. Each application environment must be set up according to the instructions in *Setting up a WLM application environment for IBM Db2 Analytics Accelerator for z/OS stored*

procedures. In particular, the ADMIN_INFO_SYSPARM and DSNUTILU stored procedures must run in different WLM environments and NUMTCB must be set to the correct value.

2. Rerun the AQTJSJ00 and AQTJSJ01 jobs to verify the correct installation of the IBM Db2 Analytics Accelerator for z/OS stored procedures.

SQL code -471 referring to a function in the DSNAQT schema

You receive a message with SQLCODE= -471 and reason code 00E79002 when trying to run the internal function DSNAQT.ACCEL_READFILE2.

Symptoms

You see an error message that is similar to the following:

```
DSNT408I SQLCODE = -471, ERROR: INVOCATION OF FUNCTION OR PROCEDURE
DSNAQT.ACCEL_LIST_SOFTWARE FAILED DUE TO REASON 00E79002
DSNT418I SQLSTATE = 55023 SQLSTATE RETURN CODE
DSNT415I SQLERRP = DSNX9GPL SQL PROCEDURE DETECTING ERROR
DSNT416I SQLERRD = -40 0 0 -1 0 0 SQL DIAGNOSTIC INFORMATION
DSNT416I SQLERRD = X'FFFFFFFFD8' X'00000000' X'00000000' X'FFFFFFFF'
X'00000000' X'00000000' SQL DIAGNOSTIC INFORMATION
```

Causes

In addition to externally published stored procedures in the SYSPROC schema, IBM Db2 Analytics Accelerator for z/OS employs user-defined functions internally. These functions are included in the DSNAQT schema and serve the following purposes:

- Reading temporary trace files from IBM Db2 Analytics Accelerator for z/OS stored procedures (function DSNAQT.ACCEL_READFILE2)
- Checking available software versions of IBM Db2 Analytics Accelerator Studio (function DSNAQT.ACCEL_GETVERSION)

If such a function was stopped for some reason (for example by a database administrator), the end-user who has triggered the execution of the internal function sees a Db2 error -471 00E79002.

Resolving the problem

1. From your Db2 subsystem, check the function status by using the following command:
-DIS FUNCTION SPECIFIC (DSNAQT.*)
2. If the function is not in the state STARTED, start it with the following command:
-STA FUNCTION SPECIFIC (DSNAQT.*)

The trace information that was supposed to be delivered to the caller of the stored procedure in a Db2 result set has been kept in its temporary location (/tmp by default). Thus you can still transfer this information after restarting the stopped function.

SYSPROC.ACCEL_LOAD_TABLES returns SQL error -471 and reason code E790002 for DSNUTILU

You try to load accelerator tables, but the SYSPROC.ACCEL_LOAD_TABLES stored procedure returns SQL error -471 and reason code E790002. This error is related to the Db2 stored procedure SYSPROC.DSNUTILU.

Symptoms

The load performance is poor and load processes do not run to completion.

Causes

Wrong setup of the Workload Manager (WLM) application environment for DSNUTILU

Resolving the problem

1. See “Adjusting WLM performance goals for SYSPROC.ACCEL_LOAD_TABLES” on page 28.
2. If you still see -471 errors, consider changing the value of the STORTIME ZPARM to NOLIMIT (the default is 180 seconds).

Load of partitioned tables freezes during unload phase

You can load unpartitioned tables without problems, but the process stalls when you try to load tables with more than one partition.

Symptoms

The Db2 command -DISPLAY UTIL(*) shows two or more UNLOAD utility processes that appear to be active, but only with a few unloaded rows. The number of displayed unloaded rows does not change when you run the -DISPLAY UTIL(*) command repeatedly.

Causes

The Db2 stored procedure SYSIBM.DSNUTILU has been started more than once in the same address space.

Resolving the problem

1. Make sure that NUMTCB is set to 1.

You can change the value in the JCL for the setup of the Workload Manager (WLM) application environment (part of SYSIBM.DSNUTILU) so that it is set when you run the SYSIBM.DSNUTILU stored procedure, or set it as a start parameter in the definition of the WLM application environment.

Important: A NUMTCB start parameter in the definition of the application environment overrides an equivalent setting in the JCL.

2. Make sure that the address space for DSNUTILU is managed by the WLM and not limited to a single instance per system or per sysplex.

Message SYSACCELERATORS DOES NOT HAVE PROPER COLUMN DEFINITIONS

The message SYSACCELERATORS DOES NOT HAVE PROPER COLUMN DEFINITIONS is returned by the -start ACCEL command.

Symptoms

The complete message text that is displayed is similar to the following screen output:

```
-D8Q0 START ACCEL(SAPACCEL)
DSNX892I -D8Q0 DSNX8CTG DSNACCEL TABLE 829
SYSACCELERATORS DOES NOT HAVE PROPER COLUMN DEFINITIONS, COLUMN
ACCELERATORIPNAME IS MISSING OR INCORRECTLY DEFINED
DSNX800I -D8Q0 DSNX8STA ACCELERATOR FUNCTION IS NOT AVAILABLE
DSNX810I -D8Q0 DSNX8CMD START ACCEL FOLLOWS -
DSN9022I -D8Q0 DSNX8CMD '-START ACCEL' NORMAL COMPLETION
```

Causes

You added IBM Db2 Analytics Accelerator for z/OS to a Db2 V9.1 for z/OS subsystem, but forgot to set the ACCEL_LEVEL ZPARM to the correct value. The ACCEL_LEVEL parameter specifies the version of the accelerator that Db2 for z/OS is supposed to use.

Resolving the problem

Define the ACCEL_LEVEL ZPARM in the DSN6SPRM macro. Values:

V1 (default)

Instructs Db2 for z/OS to use version 1 of IBM Db2 Analytics Accelerator for z/OS.

V2 Instructs Db2 for z/OS to use version 2 of IBM Db2 Analytics Accelerator for z/OS.

Notes:

- You cannot change the ACCEL_LEVEL ZPARM online.
- The ACCEL_LEVEL ZPARM is deprecated in Db2 Version 9.1 for z/OS.
- This information does not apply to Db2 10 for z/OS. Db2 10 for z/OS does not support version 1 of IBM Db2 Analytics Accelerator for z/OS, so the parameter does no longer exist.

Repeated IBM InfoSphere Data Replication for z/OS errors after abnormal end of Db2 for z/OS

IBM InfoSphere Data Replication for z/OS repeatedly reports errors after an abnormal end of Db2 for z/OS.

Symptoms

An error message similar to the following is displayed:

```
CHC9210E (CDCSZA1) Db2 CAF IFI-READS request has failed. ReturnCode=X'00000100',  
ReasonCode=X'00F30018'
```

Causes

If incremental updates are configured, and Db2 for z/OS ends unexpectedly, IBM InfoSphere Data Replication for z/OS is not notified of the shutdown. IBM InfoSphere Data Replication for z/OS still “expects” to find the instance of Db2 that was previously running. When Db2 for z/OS is restarted, IBM InfoSphere Data Replication for z/OS tries to renew the connection to the known Db2 instance. That is, it uses the session configuration or parameters of the previously stalled connection. These will never be correct, so the error message is displayed after each retry.

Resolving the problem

Restart the IBM InfoSphere Data Replication for z/OS address space.

SQL error as you try to enable tables for incremental updates

The incremental update function is enabled, but you cannot enable tables to be included in the process.

Symptoms

You receive an error message that is similar to this one:

```
Db2 SQL Error: SQLCODE=-551, SQLSTATE=42501,  
SQLERRMC=CDCIDAA;UPDATE;CDCUSER.DMMD_SIGNALS.SIGNAL_STATE
```

Causes

The user (ID) who starts the CDC started task for the CDC Capture Agent does not have sufficient authorizations on the CDC metadata tables.

Resolving the problem

Make sure that the user who starts the CDC started task has the following authorizations on the `<CHCMetaID>.DMMD_SIGNALS` table:

- SELECT
- INSERT
- UPDATE
- DELETE

where `<CHCMetaID>` stands for the ID of the owner or the schema name of the CDC metadata tables (security identifier). You provided this ID when you ran the CDCMDMUT customization job.

Ultralite host outage after network reconfiguration

You have adjusted the range of IP addresses for your private network, which addresses an IBM PureData System for Analytics N3001-001 (Ultralite) or changed the IP address of a host or an Intelligent Platform Management Interface (IPMI, also called Integrated Management Module or IMM for earlier models). The accelerators on the IBM PureData System for Analytics do not come online anymore after a restart.

Symptoms

Accelerators do not come online after a reconfiguration of the network or the IP addresses.

Causes

The Ultralite machine is a specialty in the IBM PureData System for Analytics family: Because it consists of the hosts only, it also has no internal switch for the communication between the IPMIs (or IMMs) and the attached hosts. Hence the communication between these two components relies on connections over the external (private) network, which also connects your accelerator with the System Z mainframe computer. If you adjust the range of IP addresses that can be used by this network and also change the IP addresses of the Netezza hosts, you might end up with a configuration that disconnects the IPMIs (or IMMs) from the hosts. The reason for that is that the IPMIs (or IMMs) must be part of the same CIDR /29 (or 255.255.255.248) subnet, which gives you only six IP addresses. If you adjust your subnet definition, or change the IP addresses of the hosts or the IPMIs (IMMs), the hosts and the IPMIs (or IMMs) might no longer be in the same subnet. The result will be that the IPMIs or IMMs cannot communicate with the hosts anymore, and this, in turn causes the outage of the accelerators.

Resolving the problem

- Try to solve the problem by giving the hosts the IP addresses that they had before the address change.
- If that fails or is not possible, analyze your private network and modify the host IP addresses as needed:
 1. Check the IP addresses of the hosts and the IPMIs (IMMs).
 2. Change the IP addresses of the hosts so that the host addresses and the IPMI (IMM) addresses lie within the range of a CIDR /29 subnet.

Appendix A. Sample TCP/IP configuration

In this section, you find a sample VTAM® definition and a sample profile for the TCP/IP setup on your System z.

Schematic overview

The following figures give a schematic overview of a working setup. A detailed description of this setup can be found in *Chapter 5: QDIO mode for z/OS of the OSA-Express Implementation Guide*. To read this guide, click the **Related information** link at the end of this topic.

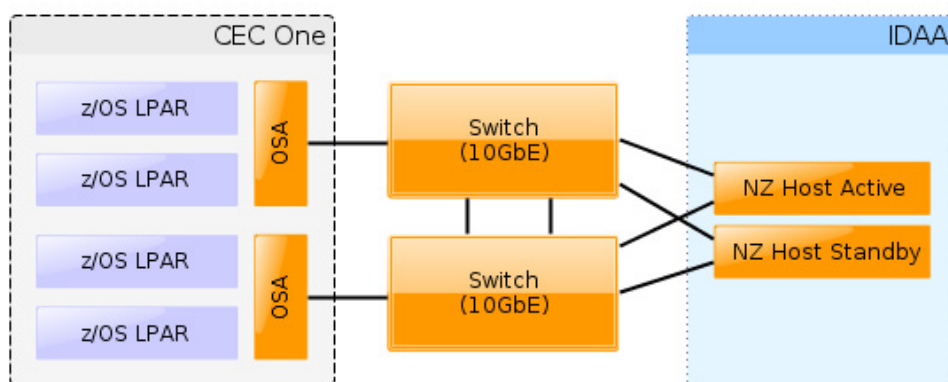


Figure 6. Recommended connections between IBM zEnterprise® server and IBM PureData System for Analytics (including switches)

Important: The switches that you use must support jumbo frames (a frame size of 8992). With some switches, you must enable support for this type of frames in the switch configuration.

Sample VTAM definition

The following sample VTAM definition is for the setup in Figure 6.

```
*-----*
* GIGABIT ETHERNET OSA EXPRESS                *
* VTAM NODE : IPAMNZA                          *
*-----*
TRLE0  VBUILD TYPE=TRL

IPANZA0 TRLE  LNCTL=MPC,READ=E100,
              WRITE=E101,DATAPATH=E102,
              PORTNAME=GBE100,MPCLEVEL=QDIO

IPANZA1 TRLE  LNCTL=MPC,READ=E300,
              WRITE=E301,DATAPATH=E302,
              PORTNAME=GBE300,MPCLEVEL=QDIO
```

The following profile uses the names introduced in the VTAM definition.

Sample TCP/IP profile (PROFILE.TCPIP data set)

The following sample TCP/IP profile also refers to the setup in Figure 6 on page 163.

```
IPCONFIG MULTIPATH PERCONNECTION
; If you do not use a switch, use NOMULTIPATH instead

; STATIC VIPA DEFINITIONS for IBM Db2 Analytics Accelerator network
DEVICE VIPA1 VIRTUAL 0
LINK VIPA1L VIRTUAL 0 VIPA1
;
; Interfaces to IBM Db2 Analytics Accelerator
;Ten Gigabit Interface Definition for Portname GBE100
INTERFACE TENGBEE1 DEFINE IPAQENET
  PORTNAME GBE100
  IPADDR 10.1.0.137/24
  MTU 8992
  INBPERF DYNAMIC PRIR
  VMAC ROUTEALL
  SOURCEVIPAINIT VIPA1L
;
;Ten Gigabit Interface Definition for Portname GBE300
INTERFACE TENGBEE3 DEFINE IPAQENET
  PORTNAME GBE300
  IPADDR 10.1.0.237/24
  MTU 8992
  INBPERF DYNAMIC PRIR
  VMAC ROUTEALL
  SOURCEVIPAINIT VIPA1L
;
;
HOME
  10.1.0.37      VIPA1L

BEGINRoutes
; Direct Routes - Routes that are directly connected to my interfaces
; Destination Subnet Mask First Hop Link Name Packet Size ;
ROUTE 10.1.0.0      255.255.255.0   = TENGBEE1 mtu 8992
ROUTE 10.1.0.0      255.255.255.0   = TENGBEE3 mtu 8992
ENDRoutes
;
;
; In case a global SOURCEVIPA or TCPSTACKSOURCEVIPA address is defined,
; the source IP address for requests targeting the accelerator network
; needs to be explicitly defined as the VIPA for the accelerator
; network on z/OS.
; Otherwise, communication and tools (such as ssh) addressing the private network
; will fail because the requestor address cannot be reached.
;
SRCIP
  DESTINATION      10.1.0.0/24    10.1.0.37
ENDSRCIP

START TENGBEE1 ; 10 GBE to Netezza
START TENGBEE3 ; 10 GBE to Netezza
;
```

Related information:



<http://www.redbooks.ibm.com/redbooks/pdfs/sg245948.pdf>



<http://www.ibm.com/support/docview.wss?uid=swg27023654>



<http://www.ibm.com/support/docview.wss?uid=swg27024236>

Appendix B. Members of SAQTSAMP

The SAQTSAMP data set contains various samples for installing, configuring or running the IBM Db2 Analytics Accelerator for z/OS stored procedures. The following table lists all these members and provides brief descriptions of their functions.

Table 8. Members of the SAQTSAMP data set

Member name	Function
AQTENV	Default environment variable settings for the IBM Db2 Analytics Accelerator for z/OS stored procedures.
AQTDEFTR	<p>Sample default trace specification for stored procedures. Default trace specifications are used when stored procedures are not called with a message input parameter that specifies the trace configuration. The sample uses a verbosity level of INFO for all stored procedure calls and specifies that the traces are to be kept in a specific directory if the procedure ends with an error.</p> <p>To use this member, you must add an appropriate DD statement (DD AQTDEFTR) to the JCL that starts the Workload Manager (WLM) environment for IBM Db2 Analytics Accelerator stored procedures.</p>
AQTHFSCL	REXX script that creates or removes a control file named keepPackages in the directory usr/lpp/IBM/aqt/v5r1m0 of the z/OS UNIX file systems (zFS).
AQTSCALL	Sample application program in the C programming language with embedded SQL CALL statements for calling IBM Db2 Analytics Accelerator for z/OS stored procedures.
AQTSCI01	<p>Db2 command line processor script that calls the following stored procedures in the order indicated:</p> <ol style="list-style-type: none">1. SYSPROC.ACCEL_REMOVE_TABLES (returns only the version of the stored procedure)2. SYSPROC.ADMIN_INFO_SYSPARM3. SYSPROC.ADMIN_COMMAND_Db2(-DIS ACCEL)4. SYSPROC.ADMIN_COMMAND_Db2(-DIS GROUP)5. SYSPROC.DSNUTILU(UNLOAD)

Table 8. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSCI02	<p>Db2 command line processor script that calls the following stored procedures and Db2 commands in the order indicated:</p> <ol style="list-style-type: none"> 1. SYSPROC.ACCEL_ADD_ACCELERATOR for the initial setup <p>Running this stored procedure requires a valid pairing code. You must therefore edit AQTSCI02 so that a valid pairing code is provided when SYSPROC.ACCEL_ADD_ACCELERATOR is invoked.</p> <p>Important: In the sample script, the call of this stored procedure has been commented out. To activate the call, you must uncomment the corresponding line.</p> <ol style="list-style-type: none"> 2. SYSPROC.ACCEL_TEST_CONNECTION 3. SYSPROC.ACCEL_ADD_TABLES 4. SYSPROC.ACCEL_GET_TABLES_INFO 5. SYSPROC.ACCEL_LOAD_TABLES <p>To enforce a reload of the accelerator-shadow tables and enable these for query acceleration:</p> <ol style="list-style-type: none"> 1. SYSPROC.ACCEL_LOAD_TABLES 2. SYSPROC.ACCEL_SET_TABLES_ACCELERATION(ON) <p>To execute the query:</p> <ol style="list-style-type: none"> 1. START -ACCEL 2. Query execution 3. SYSPROC.ACCEL_GET_QUERIES 4. STOP -ACCEL <p>To check various other functions:</p> <ol style="list-style-type: none"> 1. SYSPROC.ACCEL_ALTER_TABLES 2. SYSPROC.ACCEL_REMOVE_TALBES 3. SYSPROC.ACCEL_CONTROL_ACCELERATOR (including the various subfunctions) 4. SYSPROC.ACCEL_REMOVE_ACCELERATOR <p>Important: In the sample script, the call of this stored procedure has been commented out. To activate the call, you must uncomment the corresponding line.</p> <p>Note: This script requires customization.</p>
AQTSJI00	JCL that collects information about required IBM Db2 Analytics Accelerator for z/OS databases and tables.
AQTSJI01	JCL that calls the Db2 command line processor for verifying IBM Db2 Analytics Accelerator for z/OS stored procedures without an accelerator.
AQTSJI02	JCL that calls all verification steps one-by-one. For a successful completion, a running and connected accelerator is required.
AQTSJI03	JCL that compiles, links, and invokes the AQTSCALL sample program, which calls IBM Db2 Analytics Accelerator for z/OS stored procedures. For a successful completion of the job, a running accelerator is required.

Table 8. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSJI04	JCL for a manual recovery of a partition that was archived with the High Performance Storage Saver (HPSS). With the help of this JCL, you can recover an archived partition if the accelerator that holds the data is unavailable. No changes will be made on the accelerator. The JCL uses the image copies in Db2 for z/OS for the recovery. Important: When the accelerator returns to the <i>online</i> state at a later point-in-time, the data might not be in sync anymore with the data in Db2 for z/OS. This might result in different query results. To solve this problem, restore all archived partitions to Db2 for z/OS, and delete the corresponding accelerator-archive table when the accelerator is back online.
AQTSJI05	JCL for the management of installation packages in the z/OS UNIX file system (zFS) on your z/OS data server. You can customize this JCL to effect the keeping or the removal of older software installation packages during the installation of a new package. The JCL calls the AQTHFSCCL member.
AQTSSCHK	UNIX System Services shell script that checks the output of Db2 command line processor scripts containing IBM Db2 Analytics Accelerator for z/OS stored procedure calls. If BPXBATCH is used to call this script, as in the AQTSJI02 member, the return code of this job step is determined by the MESSAGE output parameters of the IBM Db2 Analytics Accelerator for z/OS stored procedures. Divide this return code by 256 to determine the severity of an error: 0 All stored procedures that were called returned information messages 4 Warning (return code 1024) 8 Error (return code 2048) 12 Severe (return code 3072)
AQTSSCPY	UNIX System Services shell script that copies SAQTSAMP members to the /tmp/ivp directory in the z/OS UNIX file system. Note: Db2 command line processor scripts cannot be run from a data set.
AQTSXADD	XML definition of a simple table specification (<tableSpecifications> element). This XML code can be used as input for the SYSPROC.ACCEL_ADD_TABLES stored procedure.
AQTSXALT	XML definition of a table specification as input for the SYSPROC.ACCEL_ALTER_TABLES stored procedure.
AQTSXCN0	XML code for the deletion of collected trace data. The XML code is used as the value of the COMMAND parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN1	XML code for the retrieval of accelerator status information. The XML code is used as the value of the COMMAND parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN2	XML code for the configuration of accelerator tracing. The XML code is used as the value of the COMMAND parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN3	XML code for the collection of trace data. The XML code is used as the value of the COMMAND parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.
AQTSXCN4	XML code that lists the active tasks on the accelerator. The XML code is used as the value of the COMMAND parameter of the SYSPROC.ACCEL_CONTROL_ACCELERATOR stored procedure.

Table 8. Members of the SAQTSAMP data set (continued)

Member name	Function
AQTSXIM0	XML code that returns just the version of an IBM Db2 Analytics Accelerator for z/OS stored procedure without executing its actual function. The XML code is used as the value of the MESSAGE input parameter.
AQTSXQHI	XML definition that serves as an input value for the QUERY_SELECTION parameter of the SYSPROC.ACCEL_GET_QUERIES stored procedure.
AQTSXSD1	All XML schema definitions (xsd files) for the input and output parameters of the IBM Db2 Analytics Accelerator for z/OS stored procedures.
AQTSXTCO	XML definition that serves as an input value for the DIAGNOSTIC_INPUT parameter of the SYSPROC.ACCEL_TEST_CONNECTION stored procedure.
AQTSXTS0	XML definition of a table set as input for various stored procedures.
AQTSXTSL	XML definition that serves as an input value for the TABLE_LOAD_SPECIFICATION parameter of the SYSPROC.ACCEL_LOAD_TABLES stored procedure.
AQTSXTSU	XML definition for an update of selected table partitions. The definition serves as an input value for the TABLE_LOAD_SPECIFICATION parameter of the SYSPROC.ACCEL_LOAD_TABLES stored procedure.
AQTTIJSP	JCL for the installation of the IBM Db2 Analytics Accelerator for z/OS stored procedures.

Appendix C. Environment variables

The job control language (JCL) for the configuration of the Workload Manager (WLM) environment for IBM Db2 Analytics Accelerator for z/OS stored procedures contains a data definition (DD) "AQTENV". This data definition includes a data set in which environment variables are defined. These variables control the behavior of some stored procedures.

Important:

- When editing the AQTENV data set with an ISPF editor, make sure not to use the NUM ON option. Otherwise the line numbers of the columns from 72 to 80 become part of the variable values. Also, do not insert blanks before or after the equals sign and make sure that you do not have trailing blanks at the end of the line.

The AQTENV data set is made available to the stored procedures by the RUN OPTION 'ENVAR("_CEE_ENVFILE_S=DD:AQTENV")', which is set in the CREATE PROCEDURE statement for each procedure. If a line in the AQTENV data set matches the pattern *NAME=VALUE*, the environment variable *NAME* is set to *VALUE*. For more information, follow the **Related information** link at the end.

- Make sure that the permissions for the AQTENV data set include read access for all users who execute stored procedures. Otherwise, the environment variable settings do not take effect and corresponding error messages are written to the system log.
- After modifying settings in the AQTENV data set, refresh the WLM environment so that the changes can take effect.
- Do not reuse the AQTENV data set member that was delivered with version 3.1.0 because this member is incompatible with IBM Db2 Analytics Accelerator for z/OS Version 4.1.0.

When upgrading to a new release, always use the AQTENV sample that is provided with the new version as a template for your own AQTENV data set. This ensures that you do not set obsolete environment variables and specify all mandatory new variables that were introduced with the new release.

New in version 4.1.0 PTF-2: You can set or override environment variables temporarily on a per-call basis. Settings will be valid only for the duration of a stored-procedure call. For more information, follow the link to the *IBM Db2 Analytics Accelerator for z/OS: Stored Procedures Reference* at the end of this topic.

AQT_ANALYTICS_DATABASE

Specifies the name of a Db2 for z/OS database to contain the catalog definitions of accelerator-only tables that are created as output tables by remote stored procedures. You must set this variable if you use a separate database for remote stored procedures. Otherwise, this database is not recognized and the default database is used.

The use of a separate database for external packages is recommended because you can direct all output of the remote stored procedures to that particular database, which makes it sufficient to give the users running these procedures access to this database only. The alternative is to store the output tables in a database which might contain other tables with sensitive data that:

- The users running the external program or remote stored procedure need not have access to
- Must not be put at risk by the operations of the external program or remote stored procedure

If you do not create a separate database for remote stored procedures, the resulting accelerator-only tables are defined in the default database of Db2 for z/OS.

AQT_ARCHIVE_COPY1

Specifies the name of the first image-copy data-set to be created when the SYSPROC.ACCEL_ARCHIVE_TABLES stored procedure archives partition data from Db2 for z/OS on an accelerator. For example:

```
AQT_ARCHIVE_COPY1 = &USERID..&DB..&TS..P&PART..&UNIQ.
```

where

&USERID.

ID of the user who runs SYSPROC.ACCEL_ARCHIVE_TABLES

&DB.

Name of the database that a partition resides in

&TS.

Name of the table space that the partition resides in

&PART.

Identifier of the (physical) partition. The letter P in the example is a text or string constant used as a prefix. This is required because &PART. resolves to a numeric value like 00001, and this not valid for qualifiers in a data-set name.

&UNIQ.

Causes the creation of a unique identifier

The template specification in the example could, for instance, result in the following image copy name:

```
BCKE.V4L1.BCKERTSE.CK RANGE3.P00001.D72R4KHN
```

- All template variables that are documented for the Db2 COPY utility can be used, with the exception of &SEQ (&SQ), &LIST (&LI), and &DSNUM.
- The chosen variables must ensure the uniqueness of image-copy data-set names. It is therefore recommended that you use at least the &PART. and &UNIQ. template variables.
- Templates must resolve to valid z/OS data set names.
- The template data-set names that you use must have been mapped to suitable data classes in the DFSMS.

Important: The AQT_ARCHIVE_COPY_HLQ environment variable that was used with earlier versions of the HPSS is deprecated. Remove it from the AQTENV data set.

AQT_ARCHIVE_COPY2

Specifies the name of the second image-copy data-set to be created when the SYSPROC.ACCEL_ARCHIVE_TABLES stored procedure archives partition data from Db2 for z/OS on an accelerator. For more details, see AQT_ARCHIVE_COPY1.

AQT_ARCHIVE_RECOVERYCOPY1

Specifies the name of the third image-copy data-set to be created when the SYSPROC.ACCEL_ARCHIVE_TABLES stored procedure archives partition data from Db2 for z/OS on an accelerator. For more details, see AQT_ARCHIVE_COPY1.

AQT_ARCHIVE_RECOVERYCOPY2

Specifies the name of the fourth image-copy data-set to be created when the SYSPROC.ACCEL_ARCHIVE_TABLES stored procedure archives partition data from Db2 for z/OS on an accelerator. For more details, see AQT_ARCHIVE_COPY1.

AQT_ENABLE_MULTIPLE_ENCODING

Enables the SYSPROC.ACCEL_ADD_TABLES stored procedure to add both, EBCDIC and UNICODE tables, to the same accelerator, provided that these source tables are located in the same Db2 subsystem.

The setting takes effect only if it is the first table that is added to an accelerator or if the accelerator already contains EBCDIC tables. You cannot add EBCDIC tables if the accelerator already contains UNICODE tables; in this case, you can only define tables of both types if you first remove all tables.

You cannot define ASCII tables and UNICODE or EBCDIC tables on the same accelerator.

Note: Enabling tables with UNICODE and EBCDIC encoding might result in sorting differences between Db2 for z/OS and the accelerator for certain queries against UNICODE tables. Such differences can occur if the queries contain explicit cast statements to CHAR or VARCHAR data types.

AQT_HOST_PACKAGE_DIRECTORY

Specifies the directory in the z/OS UNIX file system (zFS) that contains the update packages. Currently, upgrades for the Netezza Host Platform (HPF) and the Netezza Firmware (FDT) cannot be installed with SMP/E. Instead, packages of this type must be downloaded via FTP to the specified directory, so that you can transfer these to the Netezza host. To install these packages, you must open a service request. See *Updating other Netezza software* in the *IBM Db2 Analytics Accelerator for z/OS: User's Guide* for more information. For more information, follow the link to *Updating other Netezza software* at the end of this topic.

AQT_MAX_RETRIES_DSNUTILU

Determines how many times the SYSPROC.ACCEL_LOAD_TABLES stored procedure tries to call DSNUTILU if the attempt failed in the first place with SQL code -471 and reason code 00E79002 (timeout error). The default value is 2.

If partition or table data is being archived by the SYSPROC.ACCEL_ARCHIVE_TABLES stored procedure, AQT_MAX_RETRIES_DSNUTILU also controls the number of pruning attempts. Mostly, an attempt to prune the data fails because an exclusive lock on the data cannot be obtained during the timeout period that is set by the UTMOUT subsystem parameter. For more information, follow the appropriate link under **Related information** at the end of this topic.

AQT_MAX_UNLOAD_IN_PARALLEL

The maximum number of parallel DSNUTILU invocations used by the SYSPROC.ACCEL_LOAD_TABLES, SYSPROC.ACCEL_ARCHIVE_TABLES,

and SYSPROC.ACCEL_RESTORE_ARCHIVE_TABLES stored procedures when loading data from a partitioned Db2 table. Increasing the value leads to a better performance, provided that enough processors are available to handle additional parallel processes. Note also that increasing the value of AQT_MAX_UNLOAD_IN_PARALLEL to more than 8 might not increase the throughput any further. The default value is 4.

Important: If you increase the value of AQT_MAX_UNLOAD_IN_PARALLEL, you must, in most cases, also increase the NUMTCB value of the WLM application environment for the IBM Db2 Analytics Accelerator for z/OS stored procedures. During the initial setup, the NUMTCB value is set to 15. Increase this value according to the following formula:

$$\text{<value of NUMTCB> } > = 3 \times \text{<value of AQT_MAX_UNLOAD_IN_PARALLEL> } + 1$$

Thus, if you increase the value of AQT_MAX_UNLOAD_IN_PARALLEL to 6, you must set NUMTCB to 19 at least.

AQT_RTS_EXTERNALIZATION_AUTH_FAILURE

Determines the behavior if the Db2 command -ACCESS DATABASE (ACCESS DB) is called by a stored procedure, but cannot be invoked because the user who runs the stored procedure lacks the proper authorization. Possible values:

ERROR (default)

Processing stops and an error message is displayed.

WARNING

Processing continues, but a warning is displayed at the end of the process. There will be just one generic warning.

IGNORE

Processing continues without a warning or error message.

AQT_SECONDS_BEFORE_RETRY_DSNUTILU

Specifies the interval in seconds between DSNUTILU calls (retries). By default, this interval is set to 60 seconds.

AQT_SKIP_UNLOAD_EMPTY_PARTS

Suppresses invocations of the Db2 UNLOAD utility (DSNUTILU) when SYSPROC.ACCEL_LOAD_TABLES was called to load an accelerator-shadow table or partition, but the Db2 source table or partition is empty. This improves the performance of the load process. The detection of empty tables relies on Db2 real-time statistics.

Important: If the <externalTool> element is used as part of the *table_load_specification* parameter for SYSPROC.ACCEL_LOAD_TABLES, the Db2 UNLOAD utility is always called, irrespective of the setting of this variable.

AQT_SORTDEV

Specifies the device type to use when sorting temporary data sets dynamically. This setting is used by the sort program when an IBM Db2 Analytics Accelerator for z/OS stored procedure sends a request to a Db2 Utility that includes a sort job like this.

AQT_TCPSENDBFRSIZE

Specifies the TCP send buffer size to be used during a parallel data transfer by one of the following stored procedures:

- SYSPROC.ACCEL_LOAD_TABLES

- SYSPROC.ACCEL_ARCHIVE_TABLES
- SYSPROC.ACCEL_TEST_CONNECTION.

If AQT_TCPSENBFRSIZE=0 is set, the TCPSENBFRSIZE value in the TCPCONFIG data set will be used, which leads to a better performance compared with product version 4.1.0. You might be able to improve the performance even further by setting AQT_TCPSENBFRSIZE to a value that is higher than the value of TCPSENBFRSIZE, especially if TCPSENBFRSIZE is low. If you do not set AQT_TCPSENBFRSIZE at all, the size is computed by the system, as in earlier product versions.

AQT_UTILITY_TMP (new in version 4.1.0 PTF-2)

Specifies a template for the generation of unique temporary data-set names to be used by Db2 utilities. For example, several IBM Db2 Analytics Accelerator stored procedures invoke Db2 utilities, which in turn create temporary data sets with the user ID of the stored-procedure caller as the high-level qualifier. If you do not want this to happen, you can set AQT_UTILITY_TMP to generate a different name. The syntax is:

```
AQT_UTILITY_TMP = &USERID..AQT.&UNIQ.
```

The specification needs to resolve to valid and unique data-set names. To ensure uniqueness, always make the &UNIQ. variable part of the template value. The string AQT is a constant. For a description of the Db2 template variables, see the entry for AQT_ARCHIVE_COPY1 further up in this list.

Related information:



IBM DB2 Analytics Accelerator for z/OS: Stored Procedures Reference



z/OS V1R12.0 XL C/C++ Programming Guide (SC09-4765-11)



Specifying how long utilities wait for resources



IBM DB2 Analytics Accelerator for z/OS: User's Guide

Appendix D. Using the Db2 command line processor from UNIX System Services

To start a batch job, you can use the Db2 command line processor from UNIX System Services. In this case, the z/OS BPXBATCH utility is used to invoke the command line processor.

Before you begin

Make sure that the following conditions apply:

- The Db2 libraries for IBM Db2 Analytics Accelerator for z/OS have been installed.
- The IBM Db2 Analytics Accelerator for z/OS stored procedures have been installed.
- The Db2 command line processor has been installed.

Note: The Db2 command line processor is a Java application that requires IBM Data Server drivers for JDBC.

- The accelerator has been successfully added to the Db2 subsystem from IBM Db2 Analytics Accelerator Studio.

About this task

To create a suitable batch job with minimum effort, you can copy and customize one or more of the Db2 command-line scripts and UNIX System Services shell scripts that are included in the SAQTSAMP data set.

Procedure

1. Create a separate Db2 command line processor properties-file for the user who will run the batch job. Make sure that the user uses this properties file, for example by adding the CLPPROPERTIESFILE environment variable to the .profile of this user. Remove read access to this file for everybody else. This way, you can safely add a connection alias for the accelerator network connection to the properties file, including the password. Use the following syntax to add this information to the properties file:

```
<connection_alias>=<db2host>:<db2port>/<db2location>,<uid>,<password>
```

where

<db2host>

Is the host name or IP address of the IBM Z server on which Db2 runs

<db2port>

Is the port for network connections between the Db2 command-line client and the Db2 host. To identify the Db2 port, run the following Db2 command:

```
- <ssid> DIS DDF
```

where <ssid> is the Db2 subsystem ID.

<db2location>

Is the location of the Db2 subsystem that is supposed to interact with an accelerator.

<uid>

Is the ID of the user running the batch job

<password>

The password of the user running the batch job

2. Copy the following Db2 command-line scripts or UNIX System Services shell scripts and JCLs. The scripts are included in the SAQTSAMP data set, which is delivered with IBM Db2 Analytics Accelerator for z/OS.
 - AQTSCI02
 - AQTJSI02
 - AQTSSCHK
 - AQTSSCPY
 - Sample XML input strings depending on the stored procedures that you want to test. For example, AQTSTXCO is a sample XML input string for the SYSPROC.ACCEL_TEST_CONNECTION stored procedure. The SAQTSAMP data set contains such sample XML input strings for most IBM Db2 Analytics Accelerator for z/OS stored procedures.

For a description, follow the **Related reference** link at the end.

3. Customize the following scripts according to your needs:
 - AQTSCI02
 - AQTJSI02
 - AQTSSCHK

Note: AQTSSCHK checks the number of successful stored procedure calls. If you change the number of calls in AQTSCI02, you must also change it in AQTJSI02 because AQTJSI02 passes this number to AQTSSCHK as the number of calls to check for.

- Members containing sample XML input strings, such as AQTSTXCO.
4. Submit AQTJSI02. AQTJSI02 uses AQTSSCPY to copy AQTSCI02 and various XML files to the /tmp/ivp directory in the z/OS UNIX file system, starts the command line processor with the copied files as input, and finally runs AQTSSCHK to verify the output.

Related tasks:

“Testing the stored procedures” on page 45

Related reference:




Appendix B, “Members of SAQTSAMP,” on page 165

Appendix E. Disabling accelerators in a Db2 subsystem


It is recommended that you disable an accelerator before you activate an IBM Db2 Analytics Accelerator for z/OS software update or take actions to solve a problem.

Procedure

Use one of the following methods (Db2 command or IBM Db2 Analytics Accelerator Studio):

- In Db2 for z/OS, enter `-stop ACCEL <name>` where `<name>` is the name of the accelerator
- In IBM Db2 Analytics Accelerator Studio:
 1. Go to the Administration Explorer.
 2. Select the **Accelerators** folder.
 3. In the Object List Editor on the right, select the accelerator.
 4. Complete one of the following steps:
 - Click  on the accelerator to disable the selected accelerator without canceling running queries. The accelerator status first changes to *Stopping*, then to *Stopped*. During the *Stopping* phase, running queries are completed.
 - Click the  button on the right of the  button and select **Force** from the menu to disable the selected accelerator and cancel all running queries. The status of the accelerator changes to *Stopped* immediately.

Note: Disabling does not make an accelerator unusable or remove it from the configuration. It just deactivates it. To re-enable an accelerator, click the

 button on the toolbar.

Appendix F. Enabling accelerators in a Db2 subsystem

If you have disabled an accelerator before activating an accelerator update or solving a problem, (re-)enable the accelerator so that it becomes operational again.

Procedure

Use one of the following methods (Db2 command or IBM Db2 Analytics Accelerator Studio):

- In Db2 for z/OS, enter `-start ACCEL <name>` where `<name>` is the name of the accelerator.
- In IBM Db2 Analytics Accelerator Studio:
 1. Go to the Administration Explorer.
 2. Select the **Accelerators** folder.
 3. In the Object List Editor on the right, select the accelerator.
 4. Click **Start** on top of the Object List Editor. The status of the accelerator changes from *Stopped* to *Online*.

Appendix G. Restoring old-style package management

You can customize the installation procedure, so that older installation packages in the z/OS UNIX file system (zFS) are kept rather than removed after adding a new package with the SMP/E *Apply* function. This was the standard behavior for older product versions.

About this task

The first step in the installation procedure is to use the SMP/E *Apply* function on an FMID package. This sets off a process during which an installation package for all the software to be deployed on the accelerator hardware is created in the zFS of your z/OS data server. In earlier product versions, these packages remained in the zFS, where they took up considerable space. Therefore, the procedure was changed for product version 5. Now, only the last package is kept, and all earlier packages that are found in the zFS are removed during the installation process. The following customization steps allow you to restore the old behavior if this is preferred for some reason.

Procedure

1. Open the product-supplied AQTSJI05 sample job for customizing.
2. Add a valid job card for your system.
3. Replace the string !jcl-lib! with SAQTSAMP. This data set contains a member called AQTHFSCL, which is relevant here.
4. Replace the string !PathPrefix! with the zFS path that you use for the product installation. It is set in AQTISMKD job.
5. Replace the string !Mode! with the value KEEP to disable the removal of older installation packages.
6. Save and submit the customized AQTSJI05 job.

What to do next

To restore the default behavior (removal of old packages), follow these steps:

1. Reopen the AQTSJI05 job for customizing.
2. Replace the value KEEP (see step 5) with CLEAN to re-enable the removal of older installation packages.
3. Save and submit the customized AQTSJI05 job.

Related reference:

Appendix B, “Members of SAQTSAMP,” on page 165

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GDPR considerations

For PID(s): 5697-DA7, 5697-DA5, 5697-DAB

Notice: This document is intended to help you in your preparations for GDPR readiness. It provides information about features of IBM Db2 Analytics Accelerator for z/OS that you can configure, and aspects of the product's use, that you should consider to help your organization with GDPR readiness. This information is not an exhaustive list, due to the many ways that clients can choose and configure features, and the large variety of ways that the product can be used in itself and with third-party applications and systems.

Clients are responsible for ensuring their own compliance with various laws and regulations, including the European Union General Data Protection Regulation. Clients are solely responsible for obtaining advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulations that may affect the clients' business and any actions the clients may need to take to comply with such laws and regulations.

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1. GDPR Overview
2. "Product Configuration for GDPR" on page 188
3. "Data Life Cycle" on page 189
4. "Data Collection" on page 190
5. "Data Storage" on page 190
6. "Data Access" on page 191
7. "Data Processing" on page 191
8. "Data Deletion" on page 192
9. "Data Monitoring" on page 192
10. "Responding to Data Subject Rights" on page 192

GDPR

General Data Protection Regulation (GDPR) has been adopted by the European Union ("EU") and applies from May 25, 2018.

Why is GDPR important?

GDPR establishes a stronger data protection regulatory framework for processing of personal data of individuals. GDPR brings:

- New and enhanced rights for individuals
- Widened definition of personal data
- New obligations for processors
- Potential for significant financial penalties for non-compliance
- Compulsory data breach notification

Read more about GDPR

- EU GDPR Information Portal (<https://www.eugdpr.org/>)
- [ibm.com®/GDPR website \(http://ibm.com/GDPR\)](http://ibm.com/GDPR)

The EU General Data Protection Regulation (GDPR) regulates data privacy in the European Union (EU). For details, see: <https://www.eugdpr.org>

The regulations laid out in the GDPR apply if the data controller (an organization that collects data from EU residents), or the processor (an organization that processes data on behalf of a data controller, such as a cloud service provider), or the data subject (an individual) is based in the EU (source: Wikipedia. See: https://en.wikipedia.org/wiki/General_Data_Protection_Regulation). A violation of GDPR regulations might incur severe financial penalties (fines) and reputation damages. This documentation is intended for data controllers or processors who use Db2 for z/OS together with IBM Db2 Analytics Accelerator for z/OS with the aim of storing personal data of EU residents (individuals). As regards IBM Db2 Analytics Accelerator for z/OS, the IBM company is neither the data controller, nor the data processor. Nevertheless, the IBM company feels obliged to give such entities guidance on how to follow GDPR regulations.

Your responsibilities as a data controller or processor

If you act on behalf of a data controller or data processor, see the frequently asked questions (FAQ) on the official GDPR website to find out what your responsibilities are:

<https://www.eugdpr.org/gdpr-faqs.html>

Furthermore, refer to chapter 4 in the GDPR regulations:

<https://www.eugdpr.org/article-summaries.html>

Product Configuration for GDPR

The following sections provide considerations for configuring IBM Db2 Analytics Accelerator for z/OS to help your organization with GDPR readiness.

How to configure the offering so that it can be used in a GDPR environment

The following sections describe how personal data is stored and processed by IBM Db2 Analytics Accelerator for z/OS (called 'accelerator' in the text that follows).

If personal data is to be stored on an accelerator, the following configuration steps might help you meet your compliance objectives with regard to GDPR:

- Activate the encryption of data in motion (data that is transferred over a data network between Db2 for z/OS and the accelerator).
- Activate the encryption of data at rest (encryption of disks and other storage devices).
- Do not share passwords for the operation of the IBM Db2 Analytics Accelerator Console between multiple persons. Instead, create separate user IDs with different passwords for each console user.
- Give read access to personal data (the privilege to run queries) only to authorized Db2 for z/OS users. To this end, define appropriate Db2 authorizations (SELECT, and so on) in the Db2 for z/OS catalog.

- Restrict the right to unload data from and to create image copies in Db2 for z/OS. Give this right to authorized administrators only.
- Restrict access to the 'Save Trace' function in Db2 Analytics Accelerator for z/OS because the collected trace data might contain personal data. Access should be given to authorized administrators only.
- Restrict access to the table SYSIBM.USERNAMES in the catalog of the Db2 for z/OS communication database because this table contains authentication credentials. If these credentials are read or copied by unauthorized users, these users might obtain access to sensitive personal data.

Data Life Cycle

You can create copies of any Db2 for z/OS table on an accelerator (accelerator-shadow tables). As soon as you create a copy of a Db2 for z/OS table and load it with personal data, the GDPR regulations apply in the same way as they apply to personal data in the original Db2 for z/OS tables.

An accelerator also allows you to load and store external data outside of Db2 for z/OS, such as the data of VSAM files, in accelerator-shadow tables. Products like the Db2 Analytics Accelerator Loader can be used to this end. If the external data contains personal information, the GDPR regulations apply to the data that is transferred to the accelerator.

What types of data?

The administrative environment of an accelerator (client and configuration software) does not store personal data, except for the user IDs and authentication tokens of its administrators. However, the GDPR regulations apply to all personal data that you store in database tables on the accelerator.

Where in the process?

An accelerator is loaded with data in the course of individual load operations or by the incremental update function (automated load of table updates). Adding a table to an accelerator does not yet copy any data. It merely defines the table's structure (metadata) on the accelerator. However, if you load the table or enable it for incremental updates, the data of the source table - which might contain personal data - is copied to the accelerator.

For what purpose?

An accelerator, like Db2 for z/OS, is a general database management system for SQL queries. Such queries are run with the aim of retrieving stored information and gaining further insights (analytical queries that uncover the dependencies or connections between sets of values). An accelerator can return the results of SQL queries to authorized and authenticated users of the system. The results usually consist of subsets or aggregations of numerous data records. All these records might include personal data.

Personal data used for online contact with IBM

IBM Db2 Analytics Accelerator for z/OS clients can submit online comments/feedback/requests to contact IBM about accelerator subjects in a variety of ways, primarily:

- Public comments area on pages in the IBM Integration community on IBM developerWorks®

- Public comments area on pages of the IBM Db2 Analytics Accelerator for z/OS product documentation in the IBM Knowledge Center
- Feedback forms in the IBM Integration community

Typically, only the client name and email address are used, to enable personal replies for the subject of the contact, and the use of personal data conforms to the *IBM Online Privacy Statement* (<http://www.ibm.com/privacy/cc/>).

Data Collection

IBM Db2 Analytics Accelerator for z/OS can be used to collect personal data. When assessing your use of IBM Db2 Analytics Accelerator for z/OS and the requirements of GDPR, you should consider the types of personal data which in your circumstances are stored on an accelerator.

The use of an accelerator does not impose new requirements for the collection of personal data. It does not introduce new users or new privileges, but makes use of existing users and their privileges as defined in Db2 for z/OS. The use of an accelerator does not introduce additional obligations for the safekeeping or administration of data if you already observe the GDPR regulations for the storage of data in Db2 for z/OS.

Make sure that the process of collecting data and storing it in Db2 for z/OS is GDPR-compliant. The use of an accelerator will then be equally compliant.

Data Storage

The use of IBM Db2 Analytics Accelerator for z/OS involves the storage of data in a persistent manner.

An accelerator is a general-purpose data processing and retrieval engine. It is not aware of the meaning of data or any meaning that can be inferred from it. It is thus the responsibility of the data controller or processor to classify the data as personal data - for example account data - and make sure that the collection, access and processing of this data is in accordance with the GDPR regulations.

Storage in backups:

An accelerator has no backup function. However, image copies are created in Db2 for z/OS when the accelerator's archiving function is used (high performance storage saver). If these image copies contain personal data, the GDPR rules apply. This means, for example, that if individuals request their data to be deleted, it must also be deleted from all the image copies that may exist.

Storage in archives:

The high performance storage saver deletes table data from Db2 for z/OS and stores it exclusively on an accelerator. If this data contains personal information, the GDPR regulations might require that you delete the personal information from a number of records. The current version of the accelerator software does not allow DELETE operations on archived partitions. So in case you must delete records, first restore the archived partition to Db2 for z/OS, then delete then delete the personal data from Db2 for z/OS. Finally, archive the partition again (which now does not include the personal data anymore).

Data Access

Access to data on an accelerator requires a Db2 for z/OS user ID and a password. The accelerator recognizes the privileges defined in Db2 for z/OS and does not allow a user to run functions that she or he is not entitled to use.

As long as the Db2 for z/OS authorizations, such as SELECT, INSERT, UPDATE, or DELETE privileges, are defined in accordance with the GDPR regulations, access to data on the accelerator will likewise be in accordance with these regulations.

So it is crucial that the definition of roles and access rights in Db2 for z/OS effectuates an adequate separation of duties and responsibilities.

One accelerator-specific function might provide access to personal data on the accelerator: This is the "Save Trace" function, which collects diagnostic information for troubleshooting. The resulting trace files might contain personal data because they sometimes include the code of SQL queries to which personal information has been passed in the form of query literals. Trace files can also include memory dumps that contain personal data.

It is therefore important that access privileges to data, such as SELECT privileges or superuser privileges like SYSADM and DBADM, are granted with great care. The permission to use the "Save Trace" function should be given to selected administrators only.

The privilege to create image copies in Db2 for z/OS must also be handled with care. It is required, for example, if a user wants to archive table partitions on an accelerator.

Data Processing

Privileges defined in the Db2 for z/OS catalog control data processing on an accelerator.

In addition to that, the encryption features (encryption of data in motion and encryption of data at rest) should be activated. This prevents an unauthorized person without proper privileges from gaining direct access to personal data by interfering with the network communication or by obtaining physical access to the storage devices (hard disks or solid state disks).

Encryption features and safeguarding precautions:

Encryption of data in motion:

This feature encrypts the network traffic between an IBM Z[®] system and an accelerator.

Encryption of data at rest:

This feature encrypts the data on an accelerator's physical storage devices (hard disks and solid state disks). Depending on the model of the hardware, the feature might already be turned on by default.

Encryption key ownership:

Restrict access to the encryption keys because the keys enable a person to read or decrypt personal data on a network or storage device. Put the safekeeping and maintenance (rotation) of the encryption keys in the hands of a trusted administrator.

Data Deletion

When data is deleted from Db2 for z/OS, it might still exist in table copies on the accelerator. To delete the data on an accelerator, you have the following options:

The data in accelerator-shadow tables is deleted:

- If the data in the original Db2 for z/OS tables has been deleted, and if the affected accelerator-shadow tables have been reloaded (with the contents of the now empty Db2 tables).
- If the accelerator-shadow tables are removed from the accelerator.
- If the incremental update function is used and the function replicates empty table content to the accelerator because the original Db2 for z/OS table data has been deleted.

The data in an accelerator-only table (AOT) is deleted:

- If the AOT is removed from the accelerator.
- If an explicit DELETE statement is submitted on the Db2 for z/OS side, which references the AOT and contains a predicate that specifies the row to be deleted.

The data in partitions archived by the high-performance storage saver (HPSS) is deleted:

- If the table partitions are removed from the accelerator.
- If an archived partition is restored to Db2 for z/OS.
- If the data is deleted from Db2 for z/OS because this means that the archived partition is reloaded or that the partition is archived again after the deletion from Db2 for z/OS (empty table content will be reloaded or archived).

Data Monitoring

Db2 for z/OS provides powerful auditing and monitoring functions that allow you to track the processing of personal data. Because IBM Db2 Analytics Accelerator for z/OS is a logical component of Db2 for z/OS, and keeps only copies of Db2 for z/OS data, the monitoring functions for data processing in Db2 for z/OS are sufficient.

Responding to Data Subject Rights

To identify an individual's data that is stored on an accelerator, you can submit SQL queries from Db2 for z/OS. These queries ought to search for the name, the account number, or for other identifying information about the subject using SQL syntax. Since an accelerator works on copies of Db2 for z/OS data, the same queries can be run to retrieve the data either from Db2 for z/OS or from the accelerator. Specific advice or examples of such queries can not be provided here because the structure and the content of the database tables, as defined by the data controller or data processor, is not known.

Does the offering facilitate being able to meet data subject rights?

Right to Access

Can the client provide individuals access to their data?

Db2 for z/OS and accelerators can process SQL queries in which an individual's ID can be specified as a search criterion. This way, all data

stored about that individual can be retrieved. In Db2 for z/OS, a client's data access can be restricted, so that the client can only search and retrieve a subset of the available data records, that is, those records that belong to a specific group of individuals. To this end, a feature called label based access control (LBAC) can be employed. IBM Db2 Analytics Accelerator provides a similar functionality, which restricts access to a selected set of rows based on the CURRENT SQLID special register.

Can the client provide individuals information about what data the client has about the individual?

Yes. To identify an individual's data stored on an accelerator, the client can submit SQL queries from Db2 for z/OS. These queries ought to search for the name, the account number, or for other identifying information about the subject using SQL syntax.

Right to Modify

Can the client allow an individual to modify or correct their data?

Db2 for z/OS allows a client to update the data that is stored about an individual. Depending on the architecture of the application, it might even be possible to authorize the individuals, so that these can update their data by themselves. After an update in Db2 for z/OS, the modified data is copied to the accelerators attached to the database during the next reload operation, which can be started manually or automatically (by the incremental update function). During that process, incorrect data will be overwritten.

Can the client correct an individual's data for them?

Yes (see the previous question *Can the client allow an individual to modify or correct their data?*).

Right to Restrict Processing

Can the client stop processing an individual's data?

Yes. In Db2 for z/OS, a client can submit DELETE statements to remove data records of individuals. The removal will be reflected in the data that is stored on an attached accelerator when the next reload operation (manual or automatic) is taking place. During that process, records previously deleted from Db2 for z/OS will also be deleted from the accelerator. Furthermore, an individual's data can be excluded from SQL queries through the use of filters in query predicates. For example, a query that reads `SELECT CUSTOMER_DATA FROM CUSTOMER_TABLE where custid NOT IN (a,b,...c)` returns only data records that are not related to (do not belong to) the users in the specified group (a,b,...c).

Right to Object

Same as "Right to Restrict Processing."

Right to Be Forgotten

Can the client delete an individual's data?

Yes.

Right to Data Portability

Can the customer provide an individual with the information that they have about the individual in a user-friendly/machine readable format?

Yes.

Glossary

This glossary includes terms and definitions related to the installation of IBM Db2 Analytics Accelerator for z/OS.

The following cross-references are used in this glossary:

- *See* refers you from a term to a preferred synonym, or from an acronym or abbreviation to the defined full form.
- *See also* refers you to a related or contrasting term.

A

access plan graph

A visual representation of a query that shows the database objects that are accessed by the query and the order in which this is done.

APF See authorized program facility (APF).

authorized program facility (APF)

In a z/OS environment, a facility that permits the identification of programs that are authorized to use restricted functions.

D

DDF See distributed data facility (DDF).

distributed data facility (DDF)

A set of Db2 for z/OS components by which Db2 for z/OS communicates with another relational database management system.

L

lock A means of preventing uncommitted changes made by one application process from being perceived by another application process and for preventing one application process from updating data that is being accessed by another process. A lock ensures the integrity of data by preventing concurrent users from accessing inconsistent data.

M

manifest

An XML file that contains metadata and procedural instructions for an IBM Db2 Analytics Accelerator for z/OS update package, such as the version of the package, update information (which versions are updated to which newer version), and parameters for internal package processing.

P

plan (also execution plan)

A Netezza file with an extension of p1n that shows in which order the tables in a query are scanned.

port-forwarding

A networking mechanism that allows Secure Shell access to a host in a private network from the outside.

S**Secure Shell (SSH)**

A UNIX-based command interface and protocol for securely getting access to a remote computer.

S-FTP See SSH File Transfer Protocol.

SSH File Transfer Protocol

A network protocol that provides the ability to transfer files securely over any reliable data stream.

SSH tunnel

A secure and encrypted path through a network.

SSH See Secure Shell (SSH).

systems programmer

A programmer who plans, maintains, and controls the use of an operating system with the aim of improving the overall productivity of an installation.

T**table space**

- A logical unit of storage in a database. In Db2 for z/OS, a table space is a page set and can contain one or more tables.
- In Netezza terminology, a logical collection of extents that are assigned to a table. A table space contains all the disk space that is allocated to a given table or table fragment and includes pages allocated to data and to indexes, pages that store TEXT or BYTE data in the dbspace, and bitmap pages that track page use within the extents.

throughput

A measure of the amount of information transmitted over a network in a given period of time. Throughput is generally measured in bits per second (bps), kilobits per second (Kbps), or megabits per second (Mbps).

V**virtual IP address**

An IP address that is shared among multiple domain names or multiple servers. Virtual IP addressing enables one IP address to be used either when insufficient IP addresses are available or as a means to balance traffic to multiple servers.

W**wall IP address**

A Netezza term for the virtual IP address that is used to contact the Netezza system over the network. A floating IP address that is automatically assigned to the active Netezza host. Using the wall IP

address from the z/OS data server, the active Netezza host can always be reached. This is transparent behavior in case of a failover. See also virtual IP address.

WLM application environment

A z/OS Workload Manager attribute that is associated with one or more procedures. The WLM application environment determines the address space in which a given procedure runs.

Index

Special characters

<CHCMetaID>.DMMD_SIGNALS table 161

A

- accelerator
 - adding to configuration 42
 - defining 42
 - limit on system utilization 101
 - remove from Db2 for z/OS 149
 - shared 103
 - update 135
- accelerator-only tables 18
- accelerators
 - disabling 177
 - enabling 179
 - updating software 135
- access
 - rights
 - AQTTIJSP 30
- access rights 35
 - for Db2 for z/OS stored procedures 35, 37
 - for IBM Db2 Analytics Accelerator for z/OS stored procedures 35, 37
 - minimum 37
 - power user 35
 - RACF 35
- Access Server
 - activation 66
 - installing updates 136
 - update packages 65, 136
- access, Db2 subsystem 39
- activation of software updates
 - Access Server 66
 - replication engine 66
 - switching between software versions 138
- AEK
 - See* authentication encryption key
- allocation, processing resources 103
- analytics tools 97
- application environment 23
- AQTENV 169
- AQTSCI02 45, 47
- AQTSJ05 181
- AQTSJI00 32
- AQTSJI01
 - customization 33
 - running 33
- AQTSJI02
 - customization 47
 - running 48
 - stored procedure testing 45
- AQTSXTCO 47
- AQTTIJSP
 - access rights 30
 - running 30
- AQTTRIN 30
- archived partitions
 - after migration 3
- assigning accelerator resources to 103

- auditing 7
- authentication 42
- authentication encryption key (AEK) for hosts and SPUs
 - description 124
 - manually set 126
 - system-generated 127
- authorizations 35, 37
- automatic
 - notification of DSNX881I events 111, 114
 - PMRs 111, 114
- automatic update of table data 53

B

- batch jobs 175
- bi-temporal tables 129
- binding Db2 packages 38
- business-temporal tables 129, 130

C

- call home 114
- call-home function 111
 - activating 114, 118
 - contact information 116
 - CSSMTP 112
 - disabling 119
 - displaying settings 122
 - FTP server 112
 - FTP-to-JES 112
 - maximum trace file size 121
 - preparing System z 112
 - SMTP server 112
 - test email 123
 - updating FTP user and password 120
- Capture Agent, updating 145
- CDC
 - configuring 22, 56
 - installing 13
 - signals table, authorizations 161
 - starting as z/OS started task 64
 - troubleshooting 161
 - updating 145
 - user 56
- CDC Capture Agent
 - IP address 86
- classification of workloads
 - DDF 29
 - DSNUTILU 28
 - SYSPROC.ACCEL_LOAD_TABLES 28
 - z/OS 30
- CLPPROPERTIESFILE 175
- command line processor 175
- configuration 95, 97
- connection
 - alias 45
 - profile 39
 - testing 41
- connection alias 175

- conversion of 24:00:00 values
 - disable 110
 - enable 109
- credentials 42
- CSSMTP 112
- customization
 - AQTSCI02 47
 - AQTSJI01 33
 - AQTTIJSP 30
 - AQTTRIN 30

D

- damaged disk 7
- data loss 53
- data privacy 187
- data sharing group, different versions of IBM Db2 Analytics Accelerator for z/OS 146
- database
 - for IBM Netezza Analytics 98
 - to contain accelerator-only tables 98
- database connection profile 39
- Db2 authorizations for stored procedures 35, 37
- Db2 for z/OS
 - access from IBM Db2 Analytics Accelerator Studio 38
 - access from IBM Optim Query Tuner 38
 - command-line processor 175
 - connection to IBM Db2 Analytics Accelerator for z/OS 35
 - disabling accelerators 177
 - enabling accelerators 179
- Db2 subsystem 103
- Db2 Unload Utility 28
- Db2-supplied stored procedures
 - setup verification 27
- DDF workload classification 29
- DDL for wrapper stored procedures 98
- disabling accelerators in Db2 for z/OS 177
- distribution keys
 - automatic definition of 75
 - performance of incremental updates 75
- DMMD_SIGNALS table 67
- double-byte EBCDIC (graphic) 14, 18
- drain 103
- DSNTIJAS 14, 30
- DSNTIJUZ 18
- DSNUTILU performance goals 28
- DSNX881I 111, 114

E

- EBCDIC
 - GRAPHIC 14, 18
 - MIXED 14, 18
- enabling
 - accelerators 179
 - existing Db2 subsystem 13
 - INSERT FROM SELECT 14, 18
 - mixed and double-byte EBCDIC 14, 18
 - Optim Query Tuner 38
- encryption
 - authentication encryption key 126, 127
 - host and SPU encryption 124, 126, 127
 - IBM PureData System for Analytics N3001 124
 - keystore password 125
 - master password 125
 - of data in motion 95

- enhancements in this version xiii
- environment variables
 - AQT_HOST_PACKAGE_DIRECTORY 136, 140
 - AQTENV data set 169
- European Union (EU) 187
- external packages
 - authorizations 99
 - enabling on accelerator 99
- external programs
 - authorizations 99
 - enabling on accelerator 99

F

- firewall 151
- FTP server 112
- FTP-to-JES 112

G

- GB18030 characters 53
- GDPR 187
- General Data Protection Regulation
 - See GDPR
- glossary 195

H

- hot-swap recovery 124
- HPSS partitions after migration 3
- HTAP
 - See WAITFORDATA
- Hybrid Transactional Analytical Processing (HTAP)
 - See WAITFORDATA

I

- IBM Db2 Analytics Accelerator
 - remove from Db2 for z/OS 149
- IBM Db2 Analytics Accelerator Console, logging on 101
- IBM Db2 Analytics Accelerator for z/OS
 - connection testing 41
 - connection to Db2 for z/OS 35
 - Console 42
 - installing updates 136
 - migrating 131
 - update packages 136
 - updates
 - libraries 132
 - stored procedures 132, 144
 - updates, installing 131
 - WLM performance goals for stored procedures 27
- IBM Db2 Analytics Accelerator Studio
 - installation 11
 - language settings 134
 - perspective in IBM Data Studio 134
 - workspace directory 134
- IBM InfoSphere Data Replication for z/OS
 - See also CDC
 - configuring 22
 - installing 13
 - starting as z/OS started task 64
 - update 145
- IBM Installation Manager
 - IBM Data Studio 11

- IBM Installation Manager (*continued*)
 - IBM Db2 Analytics Accelerator Studio 11
- IBM Netezza Analytics 97
 - downloading 97
 - installing 97
- ibmddbR 97
- improvements in this version xiii
- incremental updates 53
 - applying changes in parallel 73
 - CDC Capture Agent, IP address 86
 - configuring 22
 - continuous 78
 - DRDA port 85
 - exclude 82
 - faulty tables 81
 - group IP 85
 - high latency 73
 - including tables (enabling tables for) 161
 - log cache 63
 - log cache size 63
 - performance
 - distribution keys 75
 - organizing keys 75
 - removing unused metadata 92
 - spill queue 78
 - start 72
 - stop 72
 - suspended tables 82
 - suspension of tables 81
 - WAITFORDATA 88, 90
- INSERT FROM SELECT 14, 18
- installation
 - DSNTIJAS 14
 - from Installation Manager 11
 - IBM Db2 Analytics Accelerator database 14
 - IBM Db2 Analytics Accelerator Studio 11
 - keeping old packages 181
 - testing 49
 - verification 49
- installation, updates 131
- INZA
 - See* IBM Netezza Analytics

J

- JCLs 165

K

- keystore password, encryption 125

L

- language settings, IBM Db2 Analytics Accelerator Studio 134
- latency, high for incremental updates 73
- limit
 - for Db2 subsystem 103
 - on processing resources 103
- LOAD_ENABLE_HOUR24_CONVERSION 109, 110
- loading tables
 - concurrent incremental updates 78
- location name 44
- log cache size, incremental updates 63
- logon console 101
- loss of data 53

M

- master password, encryption 125
- migrating
 - archived partitions 2
 - from version 3.1.0 to 5.1.0 1
 - from version 4.1.0 to 5.1.0 1
 - HPSS partitions 2
- migration 131
- mixed EBCDIC 14, 18
- multi-version concurrency control 73
- MVCC
 - See* multi-version concurrency control

N

- Netezza Firmware (FDT)
 - installing updates 141
 - transferring updates 140
 - updating 140
- Netezza Host Platform (HPF)
 - installing updates 141
 - transferring updates 140
 - updating 140
- Netezza host, encryption 124, 126, 127
- Netezza Platform Software (NPS)
 - installing updates 136
 - update packages 136
- Netezza priorities 106
- new features xiii
- NPS
 - See* Netezza server software

O

- of network traffic 95
- Optim Query Tuner 38
- organizing keys
 - automatic definition of 75
 - performance of incremental updates 75

P

- packages (installation), keeping old 181
- pairing code 42
- parallel, incremental updates 73
- performance goals
 - DSNUTILU 28
 - SYSPROC.ACCEL_LOAD_TABLES 28
 - WLM 27
- perspective, IBM Db2 Analytics Accelerator Studio 134
- PMR
 - See* problem management record
- port-forwarding 141
- ports 151
- power user 35
- prerequisites
 - Db2 data server 13
 - IBM Db2 Analytics Accelerator Studio 11
- priority
 - genstats 107
 - groom 107
 - Netezza 106
 - of queries 106
 - table loading 107
 - WLM 106

- privacy
 - See* data privacy
- private data network (PDN) 7
- problem management record (PMR) 111, 114

Q

- query acceleration testing
 - defining tables 49
 - loading and enabling tables 49
 - running a test query 49

R

- R programming language, support for 97
- RACF access for IBM Db2 Analytics Accelerator for z/OS
 - stored procedures 35
- remote stored procedures
 - authorizations 99
 - enabling on accelerator 99
- remove
 - IBM Db2 Analytics Accelerator from Db2 for z/OS 149
- replication engine
 - activation 66
 - installing updates 136
 - update packages 65, 136
- requirements for Db2 data server 13
- resource
 - allocation 103
 - limit
 - for Db2 subsystem 103
 - system-wide limit 101
- rolling updates 146
- running
 - AQTSJI01 33
 - AQTTIJSP 30
 - AQTTRIN 30

S

- sample job members 165
- SAQTSAMP 165
- SAQTSAMP(AQTSJI00) 32
- schema filters 39
- security 7
- sensitive information 7
- service password 7
- setting
 - ZPARMs 18
 - ZPARMs, Db2 11 for z/OS 14
- shared accelerator 103
- sharing credentials 42
- signals table 67, 161
- size of log cache, incremental updates 63
- SMP/E 23, 65, 132, 136
- SMTP server 112
- snippet processing unit (SPU), encryption 124, 126, 127
- software
 - prerequisites for Db2 data server 13
 - required PTFs
 - Db2 10 for z/OS 133
 - Db2 11 for z/OS 133
 - version
 - activation 66
 - switching 66

- software version
 - activation 138
 - switching 138
- starting
 - CDC 64
 - IBM InfoSphere Data Replication for z/OS 64
- starting incremental updates 72
- stopping incremental updates 72
- stored procedures
 - access rights 35, 37
 - clean up SYSACCEL tables after testing accelerator 48
 - Db2-supplied 27
 - installation verification 31
 - SAQTSAMP(AQTSJI00) 32
 - SAQTSAMP(AQTSJI01) 33
 - testing 45
 - AQTSJI02 47
 - AQTSXTCO 47
- switching between software versions 138
 - Access Server 66
 - replication engine 66
- SYSADM 30
- SYSPROC.ACCEL_LOAD_TABLES 28
- system monitoring
 - automatic notifications 111, 114
 - automatic PMRs 111, 114
 - call home 111, 114
- system-temporal tables 18, 129

T

- TCP/IP
 - configuration 5
 - sample configuration 163
- temporal tables 18, 129
- testing
 - query acceleration 49
 - stored procedures 45
- timestamp precision > 6 18
- timestamps
 - truncation 130
- tracing
 - sensitive information 7
- transferring update
 - Access Server 65, 136
 - IBM Db2 Analytics Accelerator for z/OS software 136
 - Netezza Firmware (FDT) 140
 - Netezza Host Platform (HPF) 140
 - replication engine 65, 136
- troubleshooting 151
- truncation of timestamp values 18, 130

U

- unified store
 - See* WAITFORDATA
- update
 - accelerator 135
 - different versions of IBM Db2 Analytics Accelerator for z/OS 146
 - required PTFs
 - Db2 10 for z/OS 133
 - Db2 11 for z/OS 133
 - rolling 146
- updating
 - Access Server 135

- updating (*continued*)
 - credentials 42
 - from version 3.1.0 to 5.1.0 1
 - from version 4.1.0 to 5.1.0 1
 - IBM Db2 Analytics Accelerator software 135
 - IBM Db2 Analytics Accelerator Studio from IBM
 - Installation Manager 133
 - Netezza Firmware (FDT) 140
 - Netezza Host Platform (HPF) 140
 - Netezza Platform Software (NPS) 135
 - replication engine 135
- updating accelerator-shadow tables continuously 53
- user IDs 39

W

- WAITFORDATA
 - expiration 88
 - include loaded tables 90
- wall IP address 5
- WLM
 - application environment 23
 - importance level 106
 - performance goals
 - for IBM Db2 Analytics Accelerator for z/OS stored
 - procedures 27
 - for SYSPROC.ACCEL_LOAD_TABLES 28
- WLM, application environment 98, 169
- workload classification
 - DDF 29
 - DSNUTILU 28
 - SYSPROC.ACCEL_LOAD_TABLES 28
 - z/OS 30
- Workload Manager
 - See* WLM
- workspace directory, IBM Db2 Analytics Accelerator
 - Studio 134
- wrapper stored procedures
 - authorizations 99
 - creating 98
 - running DDL to create 98

Z

- z/OS UNIX file system (zFS)
 - old installation packages 181
- zFS
 - old installation packages 181
- ZPARMs 14, 18



Product Number: 5697-DA5

SH12-7062-07

