z/OS

Introduction and Release Guide

Version 1 Release 4

GA22-7502-05

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Note
Before using this information and the product it supports, be sure to read the general information under “Notices” on page 39.

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This edition applies to Version 1 Release 4 of z/OS (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

About this book

This book is an introduction to z/OS™, the next generation of the OS/390® operating system. It explains the enhancements that make z/OS the premier operating system, unmatched in the industry today. It also lists and describes the functional elements and features that together make up z/OS.

This book is also a release guide. That is, it will explain the new functional content of the release of z/OS.

Who should read this book

This book is for people who are interested in using an advanced-technology, enterprise-wide server operating system environment that is completely dedicated to supporting business goals. It helps anyone who needs a quick overview of the advances that z/OS offers.

Summary of changes

Summary of changes
for GA22-7502-05
z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-04, which supports z/OS Version 1 Release 4.

New Information

This book contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

Summary of changes
for GA22-7502-04
z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-03, which supports z/OS Version 1 Release 4.

New Information

This book contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

Changed Information

The descriptions of the base elements and optional features is now listed alphabetically.

Summary of changes
for GA22-7502-03
z/OS Version 1 Release 4

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-02, which supports z/OS Version 1 Release 3.

New Information

This book contains descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 4 in Chapter 1.

Summary of changes
for GA22-7502-02
z/OS Version 1 Release 3

This book contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-01, which supports z/OS Version 1 Release 2.

New Information

This book contains descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 3 in Chapter 1.

Chapter 1. What's new in z/OS V1R4

What's new in the BCP

For z/OS V1R4, the BCP includes the following enhancements:

z990 compatibility

z990 compatibility allows your z/OS system either to run on or coexist with systems running on IBM @server zSeries 990 (z990) processor.

The z990 processor supports the following:

- Multiple logical channel subsystems (LCSS), which allow you to logically partition your physical channel resources to accommodate large-scale enterprise workload connectivity and high bandwidth demands. Each LCSS can have up to 256 CHPIDs. Physical channels can be shared, or spanned, across LCSSes, allowing you to minimize the number of physical CHPIDs, switch ports and cables required.
- More than 15 LPARs (up to 30) on the z990 processor.
- The Intelligent Resource Director on the z990 and IBM z900 processors provide flexible resource management across logical partitions according to workload goals.

z990 compatibility focuses on coexistence with z990 compatibility:

- Allows OS/390 R10, and z/OS V1R2, V1R3, and V1R4 systems to run on the z990 processor without exploiting the new z9xx functions.
- Allows z/OS V1R2, V1R3, and V1R4 systems running on pre-z990 processors to coexist in the same sysplex with systems running on a z990 processor.
- With z990 compatibility installed, HCD lets you define logical channel subsystems and up to 30 logical partitions, but you cannot activate them.

WLM-managed batch initiator enhancements

WLM is enhanced to improve the balancing of WLM-managed batch initiators between systems of a sysplex. On highly utilized systems, the number of initiators is reduced while more are started on low utilized systems. This enhancement can improve sysplex performance with better use of the processing capability of each system. WLM attempts to distribute the initiators across all members in the sysplex to balance the utilization of the systems while taking care that jobs with affinities to specific systems are not hurt by WLM decisions. Initiators are stopped on systems that are utilized over 95% when another system in the sysplex offers the required capacity for such an initiator. WLM also increases the number of initiators more aggressively, when a system is under utilized and jobs are waiting for execution.

What's new in C/C++

For z/OS V1R4, the C/C++ run-time library which is shipped with Language Environment® includes the following enhancements:

IPv6 support

The C/C++ run-time library provides enhanced functions. For descriptions of the new and changed C functions, see *z/OS C/C++ Run-Time Library Reference*, SA22-7821.

Transport Layer Security (TLS) certificate support

The __certificate() function is updated to allow authentication of digital certificates. This enables better password support for File Transfer Protocol (FTP).

iconv() support for code page IBM-5488
New support now allows conversions with code page IBM-5488.

G11N white paper currency support
New support provides additional country support by locales. For more information, see *z/OS C/C++ Programming Guide*, SC09-4765.

What's new in Communications Server

For z/OS V1R4, Communications Server includes the following enhancements:

IPv6 support
IPv6 is an evolution of the current version, IP Version 4 (IPv4), and is designed to improve upon the older protocol. The major benefits of IPv6 fall into the following categories:

- Increased scalability
- Potential to reduce administration costs
- Support for renumbering
- Application compatibility.

IPv6 support requires the use of an OSA-Express adapter running in QDIO mode and is supported only on OSA-Express features on zSeries™ at driver level 3G (GA3 code) or above. IPv6 requires a zSeries processor. For more information, see *z/OS Communications Server: IPv6 Network and Application Design Guide*, SC31-8885.

e-business networking enhancements

Simple Network Time Protocol Daemon (SNTPD)
SNTPD, a new TCP/IP daemon, enables synchronization of time between a client and a server. This function gives customers the ability to synchronize clocks between various platforms in their network.

SNA network improvements and Enterprise Extender
New enhancements help reduce operational costs, simplify configuration, and improve diagnosis capability and serviceability in SNA networks, particularly those exploiting the Enterprise Extender (EE) function.

FTP server and client updates
Updates provide:

- Improved logging of messages associated with various types of activities, such as MVS™ dataset allocation and deallocation, and connection activation and termination
- More consistent information, such as client IP address and port number, provided to all FTP security exits
- A scratchpad work area to allow for the passing of information between exit routines.
- Passive-mode FTP compatibility (″firewall-friendly″) with the Sysplex Distributor function. Passive-mode FTP compatibility enables the availability advantages of Sysplex Distributor for customers with Web-browser-based FTP.

TN3270E server
New enhancements include support for the latest TN3270E standards and improved security features.

OSA SNMP subagent support
This function provides support for the new OSA SNMP subagent and OSA-Express MIB provided by OSA (Open System Adapter). SNMP support provides SNMP management data for OSA-Express features configured in QDIO mode. Open Systems Adapter/Support

Facility (OSA/SF) is no longer required to manage SNMP data for OSA-Express features configured in QDIO mode running on a zSeries processor.

OSA-Express QDIO broadcast support
This function provides support for sending and receiving broadcast data through OSA-Express features when configured in QDIO mode. Customers can configure their OSA-Express features in QDIO mode when using applications that require broadcast support, such as DHCP and routing applications using Routing Information Protocol (RIP) Version 1.

Purge ARP cache
This function provides a new command that can be used to purge all ARP cache entries for device types that maintain ARP caches. Entries with invalid ARP information can be purged and recreated dynamically at the next usage without waiting for ARP entry timeouts. This function can also be used to purge IPv6 neighbor cache entries.

Sysplex-wide source VIPA
This function provides the ability to define a sysplex-wide dynamic VIPA for TCP/IP connections. This enables applications within a sysplex initiating outbound connections to have the same single IP address appearance as Sysplex Distributor provides for inbound connections. This capability simplifies IP address and workload management, improves security, and allows greater scalability and flexibility.

Sysplex-wide security associations
This function enables VPN (virtual private network) security associations to be dynamically re-established on a backup processor in a sysplex when a Dynamic Virtual IP Address (DVIPA) takeover occurs. It provides customers with improved availability of IPSec security associations (SAs).

What's new in Cryptographic Services™

For z/OS V1R4, ICSF includes the following enhancements:

Support for the IBM 2084 e(logo)Server zSeries 990
Support for the IBM 2084 e(logo)Server zSeries 990 has been added. Cryptographic assist instrustions are implemented on every processor. SHA-1 secure hashing is directly available to application progrmas.

CP Assist for Cryptographic Functions
CP Assist for Cryptographic Functions permits enabling clear key DES and TDES instructions on all processors.

What's new in DFS

For z/OS V1R4, SMB includes the following enhancements:

smbidmap file support
The smbidmap file supports an asterisk for the SMB user ID on a Domain basis to allow mapping of all users in a Domain to a single z/OS user ID.

What's new in DFSMS

For z/OS V1R4, DFSMS includes the following enhancements:

DFSMStvs
DFSMS Transactional VSAM Services, an optional feature, enables running batch jobs concurrently with CICS online transactions to allow updates to

the shared VSAM data sets. Multiple batch jobs and online transactions can be run against the same VSAM data sets. DFSMStvs ensures data integrity for concurrent batch updates while CICS provides it for online updates.

DFSMStvs functions include the:

- Concurrent shared update of VSAM recoverable data sets across CICS transactions and batch applications, which can reduce or eliminate your batch window
- Ability to run multiple batch jobs concurrently on the same or a different z/OS image in a parallel sysplex instead of serially on one image
- Ability to allow backup-while-open to be taken using DFSMSdss and DFSMShsm
- Ability to perform log, commit and backout or rollback functions
- Use of the same forward recovery logs as those used by CICS TS and supported by CICSVR
- Ability to enable 24x7 CICS Transaction Server (TS) applications

DFSMStvs supports the coupled systems strategy. It builds on the locking and data caching functions provided in VSAM RLS using Coupling Facility (CF) hardware to provide a shared data storage hierarchy for VSAM data. A new Transactional VSAM access mode builds on the access to shared VSAM data sets via CF locking and caching provided by VSAM RLS. It adds the logging and two-phase commit and backout protocols required for full transactional capability and sharing.

What's new in HCD

For z/OS V1R4, HCD includes the following enhancements, available as SPEs:

System-managed coupling facility duplexing

In support of system-managed coupling facility duplexing, a CF logical partition can use the CF sender to communicate with another CF logical partition. That means, you can define sender channel paths (CFS, CBS, ICS) besides the receiver channel paths (CFR, CBR, ICR) in a CF partition. CF duplexing is supported starting with the 9672 Parallel Enterprise Servers G5 and G6 models and the 2064 zSeries models.

iQDIO and FCP channel support

HCD supports two new channel types:

IQD In zSeries processors, a virtual internal queued direct I/O (iQDIO) transport layer enables memory-to-memory message delivery across logical partitions. IQD channels will be used for Fast Message Passing between z/OS logical partitions and the Linux for zSeries partition.

FCP This channel path type allows access to SCSI devices, for example, a DVD device, via the Fibre Channel Protocol from a Linux for zSeries image.

FCTC support

IBM® @server zSeries 900 exploits the FICON™ capability to provide channel-to-channel host communication between processors. FICON CTC (FCTC) provides CTC communication at a higher bandwidth and with greater connectivity than with ESCON® CTC.

To use an FCTC connection channel, an FC channel path must be defined to an FCTC control unit which is connected to FCTC devices. At least one end of an FCTC connection must be a 2064 zSeries processor, since the FCTC control unit function is only contained in an FC channel of a 2064 zSeries machine at the corresponding EC level and follow-on machines.

FICON cascade switching support

Support is provided for fabrics containing cascade switching using FICON switches. Such a fabric consists of two or more FICON switches. Within a fabric, the connection from a channel path to a control unit is dynamically established using the link address of the target control unit provided.

For addressing control units in FICON cascade switching environments, HCD supports the use of two-byte link addresses. The first byte specifies the switch address and the second byte specifies the port address of the FC switch to which the control unit is attached.

Hardware support

HCD supports zSeries 900 (Type 2084) processors. These processors support: - more than one channel subsystem within the processor complex - more than 15 partitions throughout all defined channel subsystems - more than 256 channel paths throughout all defined channel subsystems - spanning for specific channel types Each single channel subsystem has the following limitations: - 256 channel paths - 15 logical partitions - 64K devices.

Multiple channel subsystems (MCSS)

More than 256 channel paths are supported on an XMP machine. This is achieved by allowing the definition of multiple channel subsystems. The HCD dialog is enhanced in a way that for XMP processors the definition of multiple channel subsystems is supported. A new object called channel subsystem is introduced into the object hierarchy below the processor object. For such processors, partitions and channel paths now pertain to a channel subsystem. For previous processor generations , the object hierarchy remains unchanged. With XMP processors, supporting multiple channel subsystems, some types of channel paths can be shared across partitions belonging to different channel subsystems. Such a channel path is called a spanned channel path.

Physical channel support

Real I/O hardware is attached to a processor via physical channels. Physical channels have a physical channel identifier (PCHID) which determines the physical location of a channel in the processor. In IODFs that contain XMP processors, for these processors you have to specify the physical channel identifier (PCHID) to the channel path identifier (CHPID). The task of adding the physical channel path information to an IODF is eased in a way that HCD can cooperate with the CHPID Mapping Tool (CMT). Input to the CMT is the hardware configuration file (CFReport) of your machine and a valid IOCP input file. Output from the CMT is again an IOCP input file that has the PCHID values filled in. This IOCP input file can be reimported into the IODF.

Enhanced IODF prompt

Besides IODF name and the volume serial number, the IODF prompt now shows the following attributes: - the VSAM allocated blocks for the data object - the creation date of the VSAM cluster.

HCD profile changes

The default of the following keywords in the HCD profile have changed from NO to YES: - IODF_DATA_SPACE - SHOW_IO_CHANGES - BATCH_IODF_NAME_CHECK

Redesigned Switch Configuration Detail Report

The Switch Configuration Detail Report was previously too extensive and not clearly arranged. Its format is now redesigned such that via grouping the information contained in that report will be highly condensed.

Limitation of CSS Report

When limiting a Channel Subsystem Report to a single partition, the report

will show channel paths, control units and devices attached by the access list as well as those attached by the candidate list.

Default SIZE parameter of INITIODF utility

For the SIZE parameter of the Initialize IODF (INITIODF) utility, you can now specify zero (0) to get the default. HCD then tries to get the number of allocated blocks of the VSAM data set from the catalog and uses that value as the default. If you specify a size value greater than zero, HCD checks whether this value does not exceed the allocated size of the VSAM data set.

Enhanced checking

The following new checks are introduced: - When copying/merging channel paths, HCD checks whether an existing target channel path is connected to a different switch port than the source channel path. HCD also checks whether an existing dedicated channel path in the target is reconnected to a different partition during copying/merging, because the CHPID already existed in the target. Appropriate warning messages are issued if necessary. - For esoteric groups, HCD issues a warning message if: – you do not specify a token for esoterics in an EDT – you mix DASDs and TAPEs into a single esoteric group. - A warning message is issued while building the production IODF in case more than one channel path is connected to the same switch port. Also a port that is already connected to a channel path will no longer be presented in the prompt when connecting a channel path with the same ID to the switch.

What's new in HCM

Cascaded switch support

Support includes cascaded connections between FICON switches. A control unit to a FICON channel path connection can now run through two or more FICON switches. Therefore, a switch address must be specified for the single FICON switches of the fabric. A new utility provides support for explicit upgrading from one–byte link addresses to two–byte link addresses as well as down–grading of two–byte link addresses to one–byte link addresses.

FCTC (FICON channel to channel) support

Two FC channels might be connected with each other to establish an FCTC connection. At least one FC channel path must be connected to a 2064 processor type to provide a valid FCTC connection. HCM together with HCD enforces this rule.

iQDIO channel paths support

HCM allows you to specify the maximum frame size for IQD channel paths. HCM's reports have been enhanced so that they contain the maximum frame size (where appropriate).

PPRC (peer to peer remote copy) support

Support consists of the following elements:

- Document direct physical connections between serial interfaces on controllers. These connections may pass through directors and patchports.
- Maintain logical connections between subsystems, including through directors.
- Ability to share PPRC data with other tools (like GDPS™ and RCMF). HCM can export and import CESTPATH commands and GEOPARM control statements.

To create a PPRC connection, HCM provides a wizard where you create a PPRC connection step by step. You can add an SSID (Subsystem

Identifier) to control units, and selected physical description files have been updated to include SAID (System Adapter Identifier) information.

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IODFs dialog

The IODFs dialog now shows the size of the IODF and the creation date.

What's new in Language Environment

For z/OS V1R4, Language Environment includes the following enhancements:

IPv6 support

IPv6 support includes application programming interfaces (APIs) and updated headers that meet IPv6 standards.

Support of Debug Tool for DB2® stored procedures

Enhancements significantly improve debugging of DB2 stored procedures, regardless of language. Two new debugger event codes are provided for DB2 and the Debug Tool to debug the stored procedure repeatedly without having to recycle the stored procedure (SP) address.

CICS® trace of an application domain

A new CICS trace allows users to monitor and determine the activity of a CICS transaction giving users the ability to trace key events in Language Environment while running CICS transactions. Every time CICS calls Language Environment, the feature trace is activated under the Extended Run-Time Library Interface (ERTLI). The CICS trace requires AP level 2 tracing to be active. By activating the feature trace records, trace points are added at strategic points.

Enhanced pthread_quiesce_and_get_np()

Enhancements are made within pthread_quiesce_and_get_np() to improve reliability and performance.

What's new in msys for Setup

For z/OS V1R4, Managed System Infrastructure for Setup includes the following enhancements:

Multiple user support
Multiple users can now use separate workplaces to simultaneously set up software in the same system environment. A msys for Setup user administrator can control which software a particular user is allowed to set up and which administrative tasks within msys for Setup the user can carry out. With multiple user support it is also possible to monitor which user performed which task.

Finer granularity for setting up products
Updates can be committed on a product level rather than on a resource level. Updates of multiple product against the parmlib do not need to be committed at the same time anymore, but can be committed for each product selectively.

Ease-of-use
The representation of resources in the resource tree has been simplified and the steps for setting up a product have been reduced.

Job progress indicator
A job progress indicator shows how far a running host job has progressed. This is helpful during long jobs.

Japanese NLS support
msys for Setup is now available in Japanese.

Additional products offer customization through msys for Setup
Visit the msys for Setup Web site at:
http://www.ibm.com/servers/eserver/zseries/msys/exploit.html for the current list of products that provide customization through msys for Setup.

Proclib services
msys for Setup introduces its own procedure library together with services that allow products to create and maintain their startup procedures in that library in a consistent way.

What's new in Network Authentication Service

For z/OS V1R4, Network Authentication Service includes the following enhancements:

IPv6 support
IPv6 support is provided.

NDBM database support
The Kerberos NDBM database uses the Unix System Services database support instead of RACF®. For this reason, the database is stored in HFS files.

The NDBM database supports the Kerberos kadmin command for remote Kerberos administration and can be shared with non-z/OS Kerberos platforms. That is, the KDC can run on both z/OS and non-z/OS platforms. If you use RACF for the Kerberos database, then the KDC runs only on z/OS and only RACF commands can be used to administer the Kerberos information.

What's new in OSA

For z/OS V1R4, OSA includes the following enhancements:

z990 compatibility
z990 compatibility provides provides a Java based GUI that replaces the Windows based GUI interface and continues to provide support for all OSA features.

New OSA direct SNMP subagent
A new OSA SNMP subagent provides direct access to OSA management

information bases (MIBs) for use with simple network management protocol (SNMP) applications. OSA/SF is no longer required for SNMP applications to access MIBs for OSA-Express features running in QDIO mode.

IPv6 support

The OSA-Express Gigabit Ethernet and Fast Ethernet features now support IPv6. IPv6 improves network communications with enhancements such as 128-bit addressing, simplified headers, and more efficient packet handling.

What's new in RMF™

For z/OS V1R4, RMF includes the following enhancements:

FICON Switch Cascading sSupport

The FICON Director Activity report now indicates that another switch is connected to a port in case of FICON cascaded switches.

Monitor III Data Gatherer

There is no longer the need to take care that the region size for the Monitor III data gatherer (RMFGAT) has at least the value specified with the WSTOR gatherer option.

Crypto Hardware Activity report

The Crypto Hardware Activity report now includes measurements for the cryptographic coprocessor facility (CCF). New overview conditions are also available for the Postprocessor.

WLMGL Report

The reporting of state samples has been enhanced. Prior to V1R4 state samples have been reported as a percentage of average transaction response time (response time breakdown). The response time is calculated when a transaction completes. This can result in percentages greater than 100 when samples are included for long running transactions which have not completed in the gathering interval. Percentages greater than 100 in the breakdown section are now avoided by showing the state values as percentages of the total transaction samples (state samples breakdown) instead of percentages of response time.

Work Manager Delays report

The RMF Postprocessor WLMGL and Monitor III Work Manager Delays report includes includes information about additional WLM performance block (PB) states.

z999 compatibility

With z9xx compatibility, RMF adopts its device and CPU activity data gathering. Together with this support, all Device Activity reports are modified. Director Port busy delay times and Control Unit busy delay times are removed and Initial Command Response time is added. This functionality is available as SPE and needs to be installed as APAR OW54347.

What's new in Security Server

Firewall Technologies

For z/OS V1R4, Firewall Technologies includes the following enhancements:

ISAKMP server

The ISAKMP server has been enhanced to detect when a dynamic VIPA in a sysplex environment is moved to and from a Firewall stack. A dynamic VIPA (DVIPA) is a virtual IP address that can be moved from one system to another in a sysplex through a takeover/giveback scenario or through vary obey commands. When a DVIPA is moved from one Firewall stack in a sysplex to another, the security associations (SAs) associated with that

DVIPA are automatically re-established on the target stack. The ISAKMP server on the system assuming control of the DVIPA will renegotiate the new SAs to replace the ones that were on the previously owning system in the sysplex. Coprocessor management functions have been combined onto one panel.

DVIPA function support

The configuration client has been enhanced to support the DVIPA function that has been added to the ISAKMP server. This primarily consisted of several changes to dynamic connection status list panel.

LDAP

For z/OS V1R4, LDAP includes the following enhancements:

Digest-MD5 and CRAM-MD5

Both the (C/C++) client and server are updated with new authentication methods: Digest-MD5 and CRAM-MD5. These authentication methods are prescribed in IETF RFC 2829 and RFC 2831. Interoperability is improved for any applications which make use of these methods.

Transport Layer Security (TLS) support

Transport Layer Security (TLS) support allows an application to control which LDAP operations are secured with SSL/TLS. Support for TLS Version 1 is provided by the LDAP client and server's use of System SSL, including new cipher specifications introduced with TLS Version 1.

Expanded support for renaming directory entries

Expanded support for renaming directory entries allows you to rename or move any entry as long as the DN is still managed by the same TDBM backend.

Entry Universal Unique Identifier (UUID)

Entry Universal Unique Identifier (UUID) support identifies an entry uniquely within a server, even if the entry's name changes. A utility is provided to add entry UUIDs to each entry already existing in an LDAP directory (TDBM backend) that is migrated from a previous release.

ACL enhancements

ACL enhancements to allow attribute-level access control and the ability to explicitly deny access to information.

Server activity log

A new server activity log allows a system administrator to produce a log of server activity. This support is similar to logging capabilities that are provided by other popular LDAP servers.

Improved server performance

Server performance has been improved.

Removed functions

The following functions have been removed in z/OS V1R4:

- RDBM backend and its associated parts. (TDBM is the replacement.)
- IBM's JNDI implementation. (Sun's JNDI is the replacement.)

RACF

For z/OS V1R4, RACF includes the following enhancements:

Enterprise Identity Mapping (EIM)

Enterprise Identity Mapping (EIM) architecture defines a set of services and extensions to LDAP. It will be available on all Enterprise Server Group (ESG) platforms - iSeries™ (OS/400®), zSeries (z/OS), pSeries™ (AIX®), and xSeries™ (LINUX). EIM is an infrastructure that user administration applications, servers, operating systems, and audit tools can leverage to transform the user identity associated with a work request as it moves between systems through a multi-tiered application user administration in a

heterogeneous environment. The RACF Support for EIM consists of changes to the database templates, profiles, and commands to allow a system administrator to define EIM configuration information in RACF.

IRRICE reporting
A new report has been added to IRRICE.

MLS compatibility support
MLS compatibility support changes SETROPTS to disallow the activation of MLS or MLACTIVE if the SECLABEL class in not already active, or being activated by the existing command. The SETROPTS command also disallows the deactivation of the SECLABEL class if MLS or MLACTIVE is active. Additionally, RACF processing prevents the setting of the RCVT bits representing MLS and MLACTIVE if the SECLABEL class is inactive.

Unique UID/GID support
Unique UID/GID support improves usability of security management as it relates to z/OS UNIX®. This includes the SEARCH enhancement, the prevention of shared ids and the automatic assignment of ids The enhancements to the ISPF panels and R_admin (in support of the new command keywords) are only applicable to z/OS.

PKI Services III support
PKI Services III support uses 4578 to generate private keys, update the list of default CERTAUTH certificates in RACF, enable use with a Parallel Sysplex® system, notify (via e-mail) of completed certificate requests and expiration warnings, remove clear text LDAP password from the pkiserv.conf file, support MAIL, STREET, and POSTALCODE distinguished name qualifiers, and support PKSC#7 certificate chains.

Program Access to Data Sets (PADS)
Program Access to Data Sets (PADS) enhancement provides improved usability and increased security when using Program Control, Program Access to Data Sets (PADS), and optionally UNIX servers and daemons. The increased security allows implementation of a new ENHANCED mode for program security that can make systems more resistant to malicious attacks. The improved usability allows specification in the conditional access list of the program the user actually executed and makes it simpler to specify conditional access lists for PADS and to reduce administrator error.

RACROUTE REQUEST=VERIFY
RACROUTE REQUEST=VERIFY abends allows applications such as IMS™ to tell RACF to issue a return and reason code instead of an abend when certain types of situations occur. The support introduces a keyword on RACROUTE REQUEST=VERIFY(X), ″ERROROPT″.

UNIX access enhancements
UNIX access enhancements improves access checking for UNIX files and directories.

What's new in System SSL

For z/OS V1R4, System SSL includes the following enhancements:

gskkyman utility
The gskkyman utility has been restructured to allow for clearer presentation of certificate information as well as enhanced to support exporting/importing certificates in PKCS #12 Version 3 and PKCS #7 format, modification of certificate labels and creation of Digital Signature Standard certificates (FIPS 186-1).

New certificate management APIs
In addition to the APIs being provided so that applications can securely communicate over an open communication network using the SSL or TLS

protocols, a new suite of APIs has been introduced to allow application writers the ability to exploit function other than the typical SSL functions. These functions include:

- The ability to create/manage key database files in a similar function to the SSL gskkyman utility.
- Use certificates stored in the key database file or key ring for purposes other than SSL.
- Basic PKCS #7 message support has been added to provide application writers a mechanism to communicate with another application through the PKCS #7 standard. These APIs build and process the PKCS #7 messages.

External Security Manager

Key ring support has been enhanced to allow private keys to be stored in ICSF and applications to use key rings owned by other userids.

IPv6 support

IPv6 network addresses support has been added.

AES cipher support

System SSL has added AES cipher support to its SSL V3.0 and TLS V1.0 implementations. To exploit the AES ciphers, Security Level 3 Feature of System SSL is required.

Performance enhancements

An in storage caching mechanism has been added where retrieved Certificate Revocation Lists (CRLs) will be cached for a period of time. This will optimize the fetching done to retrieve CRL information from the LDAP server during certificate validation.

A sysplex session cache has been added to make SSL server session information available across the sysplex. An SSL session established with a server on one system in the sysplex can be resumed using a server on another system in the sysplex as long as the SSL client presents the session identifier obtained for the first session when initiating the second session. The sysplex session cache can be used to store SSL V3.0 and TLS V1.0 server session information.

Serviceability enhancements

Component trace and enhanced debug granularity of trace information has been added.

Messages and codes

Explanations and actions have been added for the system SSL API return codes and utility messages.

What's new in zFS

For z/OS V1R4, zFS includes the following enhancements:

Configuration changes

Configuration changes can be made to zFS without stopping and restarting zFS. The zfsadm config and zfsadm configquery commands are used when changes need to be made to the configuration of zFS.

A zFS aggregate can be dynamically extended

The aggregate must have secondary allocation specified when it is defined and space must be available on the volumes. The aggregate is extended

when an operation cannot complete because the aggregate is full. If the extension is successful, the operation will be redriven transparently to the application.

Different zFS file systems can have the same name
You can specify the allow_duplicate_filesystems option in the IOEFSPRM file and create file systems with the same name as long as they reside in different aggregates.

System symbols can be used in the IOEFSPRM file
If you want to share a single IOEFSPRM file across systems in a sysplex, you can specify system symbols in data set names in the IOEFSPRM file.

What's new UNIX System Services

Authenticating of certificates on the BPX1SEC service
You can use the BPX1SEC service to provide the certificate for the authentication of a specified user ID.

Automove system list
When mounting file systems, you can specify an automove system list to indicate where the file system should or should not be moved when a system leaves the sysplex

BPXWDYN
The BPXWDYN text interface is now available.

Distributed byte range lock manager (BRLM)
You can set up byte range lock manager (BRLM) so that every system in the sysplex is started with BRLM. By default, the lock manager is initialized on only one system in the sysplex.

FILE.GROUPOWNER.SETGID profile
You can choose how the group owner of a new HFS file is assigned. Use the FILE.GROUPOWNER.SETGID profile in the UNIXPRIV class to specify that the group owner is to come from the effective GID of the creating process.

IPv6 support
IPv6 support is provided.

Process start/end exits
Applications can use new installation exit points to monitor the creating and terminating of z/OS UNIX processes.

Sanction lists
You can compile a single list to contain the lists of pathnames and program names that are sanctioned by the installation for use by APF-authorized or program-controlled calling programs.

UID and GID enhancements
UIDs and GIDs can be automatically assigned to new users, prevented from being shared, or allowed to be shared

What's new in leadership technology

For z/OS V1R4, the following enhancements have been made in the area of leadership technology:

XES performance enhancements for coupling facility structures
Three new IXLCACHE macro invocations are provided. Their intent is to improve performance for data sharing systems by batching together high-frequency cache structure operations and thereby reduce the number of commands sent to the coupling facility.

The new IXLCACHE commands require that the cache structure to be accessed is allocated in a coupling facility of CFLEVEL 12 or higher.

CFRM performance enhancements

The Coupling Facility Resource Manager (CFRM) provides the following performance enhancements:

- Minimize the amount of data read and I/O to the CFRM couple data set for IXCQUERY commands. This is accomplished by analyzing the request first and then reading the minimum policy data required to satisfy the request.
- Optimize structure rebuild confirmation processing. This is accomplished by handling all queued event confirmations in the same function call.

Chapter 2. z/OS elements and features

z/OS base elements

z/OS provides function equivalent to the following elements. For the version and release numbers of those elements that also exist as separately orderable products, see *z/OS and z/OS.e Planning for Installation*, GA22-7504.

An additional set of integrated features is available on an optional basis, see “z/OS optional features” on page 16.

The following is a list of z/OS base elements:

- Base Control Program (BCP)
- BookManager® BookServer
- BookManager READ
- Bulk Data Transfer (BDT)
- C/C++ IBM Open Class® Library
- Communications Server
- Cryptographic Services (includes ICSF)
- DCE Application Support
- DCE Base Services
- Distributed File Service
- DFSMSdfp™
- Encina® Toolkit Executive
- EREP
- ESCON Director Support
- FFST™
- GDDM® (includes PCLK and OS/2® Link)
- HCD
- High Level Assembler (HLASM)
- IBM HTTP Server
- IBM License Manager
- ICKDSF
- ISPF
- JES2
- Language Environment
- MICR/OCR Support
- msys for Operations
- msys for Setup
- Network File System
- OSA Support Facility
- SMP/E
- Text Search
- TIOC
- TSO/E
- UNIX System Services
- 3270 PC File Transfer Program

z/OS optional features

Some optional features are not priced, but priced as well as unpriced features are included in z/OS integration-testing. All priced, host-based features are capable of being dynamically enabled or disabled. The only exception is VisualLift® for MVS, VSE, VM, which is shipped on a diskette. For the version and release levels of those features that also exist independently, see *z/OS and z/OS.e Planning for Installation*, GA22-7504.

The following is a list of z/OS optional features:

- BookManager BUILD
- Bulk Data Transfer (BDT) File-to-File
- Bulk Data Transfer (BDT) SNA NJE
- C/C++ with Debug Tool
- C/C++ without Debug Tool
- Communications Server Security Level 3
- DFSMSdss™
- DFSMShsm™
- DFSMSrmm™
- DFSMStvs
- DFSORT™
- GDDM-PGF
- GDDM-REXX
- High Level Assembler (HLASM) Toolkit
- Hardware Configuration Manager (HCM)
- IBM HTTP Server NA Secure
- Infoprint® Server
- JES3
- OCSF Security Level 3
- RMF
- SDSF
- Security Server
  - RACF
  - DCE Security Server at OSF DCE level 1.1
  - LDAP Server
  - Firewall Technologies
  - Network Authentication Service Level 3
  - and OCEP
- System Secure Sockets Layer (SSL) Security Level 3

Chapter 3. z/OS base elements descriptions

The following is a description of each base element in z/OS.

BCP (Base Control Program)

The backbone of the z/OS system is the MVS Basic Control Program with JES2 or JES3. These provide the essential services that make z/OS the system of choice when you need to process your workloads reliably, securely, with complete data integrity and without interruption.

Unicode support: The Unicode Standard is the universal character encoding standard used for representation of text for computer processing. This support also takes advantage, if present, of native z/Architecture™ Unicode HW instructions for faster processing. The Unicode Standard provides the capacity to encode all of the characters used for the written languages of the world. z/OS support for Unicode implements these Unicode Version 3.0 standards: Character codepage and case conversion and normalization. This support also takes advantage, if present, of native z/Architecture Unicode HW instructions for faster processing.

BookManager BookServer

BookManager BookServer for the World Wide Web enables customers to provide entire libraries of documents via the World Wide Web. This element is a z/OS version of the BookServer product available on OS/2. Customers are able to serve BookManager books to HTML browsers connected to either the Internet or an intranet. The information is stored in a virtual library, which is composed of books, bookshelves, and collections.

BookManager READ

BookManager READ allows you to use any online BookManager book that you can access. Using the BookManager panels, windows, and function keys, you can manage, display, and search online books quickly and easily.

BDT (Bulk Data Transfer)

Bulk Data Transfer (BDT) provides the base services that BDT File-to-File and BDT SNA NJE need to transfer data from one computer system to another.

C/C++ IBM Open Class Library

C/C++ IBM Open Class Library is a comprehensive set of C/C++ class libraries that is used to develop applications. This component of the C/C++ optional feature is licensed with the base operating system and can be used without enabling the C/C++ feature (C/C++ with Debug Tool or C/C++ without Debug Tool). Applications are not required to license the C/C++ feature of z/OS for access to the dynamic link libraries (DLLs), and you are not required to use the DLL Rename Utility to package and redistribute DLLs with the applications.

Communications Server

IP IP (formerly known as IBM TCP/IP) is a set of industry standard protocols and applications that allow you to share data and computing resources with other computers, both IBM and non-IBM. By using IP commands at your

workstation, you can perform tasks and communicate easily with a variety of other systems and workstations. IP allows you to perform tasks independent of the computer type. UNIX applications use IP. Some common uses of IP include: electronic mail, file transfer, remote logon, and the Internet.

IP CICS Sockets

IP CICS Sockets (integrated into the base TCP/IP stack) provides the ability to use the generalized Application Programming Interface (API) and socket applications in COBOL, PL/I, and assembler.

IP IMS Sockets

IMS IP support (integrated into the base TCP/IP stack) allows the development of peer-to-peer applications in which IMS and an IP-connected peer form a client/server relationship. Using this support, IMS can be either client or server.

This element consists of three parts:

- The Sockets Extended Application Programming Interface. Using this API, IMS message processing programs can communicate with remote IP-connected hosts using socket protocol.
- If IMS is acting as the server, the IMS Listener can be used to collect incoming transaction requests from remote IP-connected hosts and schedule IMS message processing programs to service these requests.
- The IBM Assist module provides support for the IMS application programmer who wishes to code IP client/server application programs using the IMS API. When used, this optional function intercepts IMS message queue calls and replaces them with socket calls.

SNA (includes AnyNet®)

Formerly known as VTAM®, SNA is a network communication access method (Systems Network Architecture) and Advanced Peer-to-Peer Networking® (APPN). It provides the interface between application programs in a host processor and other resources in an SNA network, and links peer users of the network. It establishes and terminates sessions between users of the network, forwarding session data to and from each session partner.

In addition to establishing and terminating sessions, it activates and deactivates resources under its control, including application programs, Network Control Programs (NCPs) and the devices they control, and devices to which SNA is directly attached. SNA also maintains information on the network configuration, active sessions, and network conditions.

To help users control a network, SNA receives commands from an operator to perform network services. It keeps the operator informed about those services, as well as about network conditions, through operator messages.

AnyNet

AnyNet implements the multiprotocol transport networking (MPTN) architecture. AnyNet enables application program types to communicate without change over different transport networks and across interconnected networks.

The AnyNet SNA over IP function enables SNA application programs to communicate over an IP network. SNA over IP provides support for dependent logical unit communications, such as printers and emulators, if the host is defined as a dependent LU server and dependent LU requester support is enabled at the workstation. In addition, SNA over IP supports all LU types, including LU 6.2, and supports concurrent sessions over the IP network to LUs in different SNA networks.

The AnyNet Sockets over SNA function enables application programs that use the C socket API to communicate over SNA networks with other application programs that also use the C socket interface.

AnyNet provides the UNIX application environment quick and easy access to the vast resources of the SNA/APPN network and all of the security and reliability that goes along with SNA/APPN. This support means that applications written to the sockets interface can dynamically and simultaneously communicate across either SNA/APPN, IP or both networks.

Cryptographic Services

Cryptographic Services (including ICSF) provide cryptographic functions for data secrecy, data integrity, personal identification, digital signatures, and the management of cryptographic keys. It includes ICSF. These functions are provided through the combination of secure cryptographic hardware, the ICSF cryptographic API, and the ICSF administration interface. The cryptographic services support a wide variety of applications with high performance, security, and availability. ICSF supports the Common Cryptographic Architecture (CCA), as well as the DES algorithm, RSA public key cryptography, and the Digital Signature Standard.

Additional functions are:
- Trusted Key Entry—the key entry unit for master keys has been replaced by a secure channel version implemented on a workstation known as the Trusted Key Entry Workstation. The unit is an optional cost feature.
- Commercial Data Masking Facility supports privacy functions.
- Public Key API (PKA Support) provides additional formatting or message digest standards.

DCE (Distributed Computing Environment)

The DCE Services provides the strengths of a distributed computing environment:
- Transparency of data and logic
- Distributed, consistent directory service
- Security for both clients and servers integrated in execution path
- Scalability of distributed applications
- Interoperability and portability.

DCE Services supports the following:
- Remote Procedure Call (RPC) lets calls between programs running on different platforms appear as local procedure calls to the programmer.
- Directory Services allows resources to be found anywhere in an enterprise without the need to know local names.
- Security Services solves security problems common in a distributed environment by handling identification and certification of users, clients, servers, and systems.
- Distributed Time Services synchronizes clocks running on different nodes.

All components supported are based on the Open Software Foundation (OSF) DCE level 1.2.1. The DCE Base Services support clients and servers that run on IP and SNA networks.

DCE application support

This function provides distributed application support.

- Inbound transactional RPC support allows customers to develop and run DCE-based distributed transaction processing applications, which include IMS, on the z/OS platform. This support interfaces with Encina Toolkit Executive for two-phase commit, IMS OTMA for IMS support, and RRS for z/OS recovery services. TRPC promotes use of network computing by supporting Encina clients on a variety of platforms, including the internet.
- C Data Type support provides IDL compiler support for certain C Data types, in addition to the current COBOL data type support. This item expands the Application Support capabilities of DCE to include additional data types.

DFS (Distributed File Service)

The Distributed File Service provides DFS support which is the Distributing Computing Environment (DCE) distributed file service component. As developed by the Open Group Open Systems Foundation (OSF), DCE and DFS join heterogeneous systems to provide secure read/write access to file data stored on the system or on another DCE system. DFS joins file systems on different systems into a single, global file system accessible by a large number of users. DFS file servers export file data for access by DFS clients running on the same or remote DCE system. DFS clients and servers communication uses DCE RPC protocols and DCE security. DFS provides a uniform file name space for users on heterogeneous systems; client caching for improved performance; transparent file locations to enable file data replication and movement between DCE systems which result in high availability and scalability. A DFS server on z/OS can export DCE LFS, HFS, Sequential, VSAM and PDS(/E) data for access by DFS clients. HFS, Sequential, VSAM and PDS(/E) data exported by a DFS server can be shared with local z/OS users and applications.

The Distributed File Service Server Message Block (SMB) support provides a server that makes Hierarchical File System (HFS) files and data sets available to SMB clients. (Server Message Block (SMB) is a protocol for remote file/print access used by Windows® clients. This protocol is also known as Common Internet File System.) The data sets supported include sequential data sets (on DASD), partitioned data sets (PDS), partitioned data sets extended (PDSE) and Virtual Storage Access Method (VSAM) data sets. The data set support is usually referred to as Record File System (RFS) support. The SMB protocol is supported through the use of TCP/IP on z/OS. This communication protocol allows clients to access shared directory paths and shared printers. Personal Computer (PC) clients on the network use the file and print sharing functions that are included in their operating systems. Supported SMB clients include Microsoft® Windows 98, Windows NT® 4.0 Workstation, Windows 2000 Professional. At the same time, these files can be shared with local z/OS UNIX System Services applications and with DCE DFS clients. In addition, Windows SMB clients can make remote print requests to z/OS printers that are connected to Infoprint Server for z/OS.

The Distributed File Service zSeries File System (zFS) support provides a Physical File System (PFS) that can be used in addition to the Hierarchical File System (HFS). zFS file systems contain files and directories that can be accessed with the z/OS hierarchical file system file application programming interfaces. zFS file systems can be mounted into the z/OS UNIX hierarchy along with other local (or remote) file system types (for example, HFS, TFS, AUTOMNT, NFS, etc.). zFS generally provides improved performance over HFS.

DFSMSdfp

DFSMSdfp provides the foundation for:

Storage management

DFSMSdfp includes ISMF, an interactive facility that lets you define and maintain policies to manage your storage resources. These policies help to improve the use of storage devices, and to increase levels of service for user data, with minimal effort required from users. SMS manages these policies for the operating system. You can also use the NaviQuest tool under ISMF to help you migrate to SMS, maintain your SMS configuration, and perform many testing, implementation, and reporting tasks in batch.

Tape mount management

SMS provides a means for implementing tape mount management, a methodology for improving tape usage and reducing tape costs. This methodology involves intercepting selected tape data set allocations through the SMS automatic class selection (ACS) process, and redirecting them to a DASD buffer. Once on DASD, these data sets can be migrated to a single tape or small set of tapes, thereby reducing the overhead associated with multiple tape mounts.

Data management

DFSMSdfp helps you store and catalog information on DASD, optical, and tape resources, so that it can be quickly identified and retrieved from the system. You can use the catalog search interface, now part of DFSMSdfp, to access the catalog.

Program management

DFSMSdfp combines programs into executable modules, prepares them to run on the operating system, stores them in libraries, and reads them into storage for execution.

Device management

DFSMSdfp is involved in defining your input and output devices to the system, and in controlling the operation of those devices in the MVS/ESA™ environment.

Distributed data access

Distributed data access allows all authorized systems and users in a network to exploit the powerful features of system-managed storage, or automated storage management provided by DFSMS/MVS®. DFSMSdfp uses the Distributed FileManager (DFM) to support remote access of MVS data and storage resources from workstations, personal computers, or any other system on a SNA LU 6.2 network.

The z/OS UNIX System Services (z/OS UNIX) file system works in conjunction with z/OS UNIX to provide a full UNIX environment within the MVS system. MVS becomes a full-feature UNIX client or server when coupled with the z/OS Network File System (z/OS NFS). With the z/OS UNIX file system, MVS programs can directly access UNIX data. When the z/OS NFS client and z/OS UNIX are used together, MVS can act as a client and access data from any remote system, including another MVS or UNIX system that is connected using a TCP/IP network served by a Network File System server.

Encina Toolkit Executive

Provides a set of tools for developing client components of distributed transactional applications. It also allows ephemeral (non-recoverable) client applications to be written.

EREP (Environmental Record Editing and Printing Program MVS)

EREP edits and prints reports for the records placed in the error recording data set (ERDS) by the error recovery program (ERP) of the operating system. It helps IBM service representatives maintain customer data processing installations, because the service representative can analyze information in the EREP reports to determine if a problem exists, what the problem is, and where the problem is located.

ESCON Director Support

When your installation uses ESCON directors, the ESCON Director Device Support feature enables reporting of ESCON director device errors to z/OS.

FFST/MVS (First Failure Support Technology/MVS)

FFST/MVS provides immediate notification and first failure data capture for software events. FFST/MVS also incorporates its own technology by including software probes in its own code. When one of these probes is triggered, FFST/MVS issues a symptom string that describes the event.

FFST/MVS provides the following services for IBM products:

- Customized dumps
- Symptom strings
- Symptom records
- Messages
- Network notification

GDDM (includes PCLK and OS/2 LINK)

GDDM provides presentation services and device-driving capability. GDDM has a powerful application-programming interface for creating, displaying, and storing vector graphics, images and alphanumerics. GDDM drives displays, printers and plotters, and includes several utilities for end users. GDDM's excellence as a graphics program and device driver is recognized worldwide, and as a result it is used extensively as a graphics enabler by other licensed programs, including other elements of z/OS, such as BookManager.

HCD (Hardware Configuration Definition)

HCD is used to define both the operating system configuration and the processor hardware configuration for a system. Because HCD validates data when it is defined rather than when a device is accessed, inconsistencies can be corrected right away and unplanned system outages resulting from inconsistent definitions avoided. The defined configuration can be used to POR/IPL or dynamically reconfigure your system.

HLASM (High Level Assembler)

High Level Assembler integrates almost all functions of past assemblers. It also provides extensions and improvements including:

- Many new and expanded cross reference facilities and diagnostics that enable substantial savings in time and in human and machine resources, and support integration of HLASM into tool and development environments.

- Numerous language enhancements that improve the speed and accuracy of application development and the quality and reliability of the resulting code.
- Assembly-time options extensions and enhancements that allow increased flexibility and precision in controlling the processes you use to manage application development.

HLASM helps to maximize the productivity of application programmers by relieving them of many tedious and unproductive tasks that can now be done by the assembler itself and helps organizations avoid the necessity for converting existing -- and working -- applications from Assembler Language to other languages.

IBM HTTP Server

The IBM HTTP Server provides for scaleable, high performance webserving for critical e-business applications. It is exclusive to z/OS. This element was previously known as a base element of z/OS under the names Lotus® Domino™ Go, the Internet Connection Secure Server (ICSS) and the Internet Connection Server (ICS). In order to have secure communication, one of the following optional features must be installed: IBM HTTP Server Export Secure,, IBM HTTP Server NA Secure.

ICKDSF (Device Support Facility)

ICKDSF enables you to perform functions needed for the installation and use of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance.

ISPF

ISPF provides facilities for all aspects of host-based software development.

- Programmers can use ISPF to develop and document batch and interactive programs.
- Data center administrators and system programmers can monitor and control program libraries, and communicate with MVS through TSO commands, CLISTs, or REXX EXECs.
- Terminal users can work with interactive applications called dialogs.
- Managers can prepare and print memos using ISPF Edit, BookMaster, and the Hardcopy utility.

ISPF has four major components:

Dialog Manager (DM)

The Dialog Manager (DM) provides services to dialogs and end users. These include display, variable services, input and output, user and application profiles, table management, system interface services, and dialog testing and debugging aids.

Program Development Facility (PDF)

The Program Development Facility (PDF) provides services to assist dialog or application developers. These include Edit and Browse functions, a wide range of foreground and batch compilers, data set and catalog utilities, TSO or CMS command interfaces, and data set search and compare functions.

Software Configuration and Library Manager (SCLM)

The Software Configuration and Library Manager (SCLM) is a tool that automatically controls, maintains, and tracks all of the software components of the application throughout the development cycle.

Client/Server component

The Client/Server component provides users who have a workstation running Windows, or UNIX with a Graphical User Interface to ISPF application panels.

JES2

JES2 accepts the submission of work for the BCP. Major JES2 functions and design features include:

- The interpretation of job control language (JCL) statements
- The disposition of output
- A single-system image
- The ability to run multiple copies of JES2 (poly-JES)
- JES2 WLM for Sysplex

JES2 differs from JES3 in two main processing areas:

- JES2 exercises independent control over its job processing functions. JES3 exercises centralized control. Each JES2 processor in a multi-processor environment controls its own job input, job scheduling, and job output processing.
- JES3 does pre-execution of job setup. JES2 does not do this.

Language Environment

Language Environment provides common services and language-specific routines in a single run-time environment. It ensures consistent and predictable results for your language applications, independent of the language they are written in.

Language Environment is the prerequisite run-time environment for applications generated with the following IBM compiler products:

- z/OS C/C++
- OS/390 C/C++
- C/C++ for MVS/ESA
- COBOL for OS/390 & VM
- COBOL for MVS & VM
- Enterprise COBOL for z/OS and OS/390
- AD/Cycle® C/370™
- PL/I for MVS & VM
- IBM VisualAge® for Java™, Enterprise Edition for z/OS
- VS FORTRAN and FORTRAN IV (in compatibility mode)

Language Environment supports the VS Fortran and Fortran IV compilers' object/load module compatibility, which means Fortran load modules can be run under Language Environment and object code can be link-edited with Language Environment and run under it. Language Environment also provides a set of assembler macros for running assembler language routines, and supports debugging of applications using the IBM Debug Tool stand-alone or in conjunction with the IBM VisualAge remote debugger.

Some benefits are that you can:

- Mix old code with new code.
- Handle conditions, such as program checks or abends, in your COBOL programs without having to use assembler.
- Share common run-time services.
- Run applications that conform to the POSIX 1003.1 standard or the X/Open Single UNIX Specification, also known as UNIX 95 or XPG4.2.

- Access CICS and IMS transactions and data through a C, COBOL, or PL/I server from any client in your network.
- Perform interlanguage communication more efficiently.
- Manage storage dynamically for your C/C++, COBOL, and PL/I routines with a common storage manager.
- Access a rich set of math services.

MICR/OCR

MICR/OCR provides the device support code for the following devices:
- 1287/1288 - IBM Optical reader and page reader respectively
- 3540 - IBM Disk device
- 3886 - IBM Optical Character reader
- 3890™ - IBM Magnetic Ink Reader
- 3895 - IBM Printer device

msys for Operations

Managed System Infrastructure for Operations (msys for Operations) simplifies the day-to-day operation of z/OS Parallel Sysplex clusters. Through automation of typical operator tasks and events in a Parallel Sysplex, msys for Operations reduces operations complexity and improves system recoverability, thereby enhancing the availability of Parallel Sysplex clusters. Other benefits of using msys for Operations include better overall manageability of a Parallel Sysplex cluster, reduced operations complexity, and fewer outages due to operations errors.

msys for Setup

Managed System Infrastructure for Setup (msys for Setup) is part of a major ease-of-use initiative within IBM, and is the strategic solution for product installation, configuration and function enablement. msys for Setup allows the use of consistent interfaces with wizard-like configuration dialogs that provide defaults and best-practice values whenever possible and derive low-level values from answers to high-level questions. After the configuration parameters have been specified, msys for Setup can automatically update the system configuration directly. The user can see in detail what the changes will be before they are made. This also relieves the user of the intricacies of the multitude of traditional z/OS configuration interfaces, such as parmlib members. msys for Setup stores its configuration data in the z/OS management directory that has been introduced with msys for Setup as a part of z/OS. It will become the central repository for all configuration data.

Network File System (NFS)

NFS acts as a file server to workstations, personal computers, or other authorized systems in a IP network. It also provides an MVS client. It enables client users to remotely access MVS data sets or z/OS UNIX Services files from any system on an IP network that uses client software for the SUN Network File System protocol. The remote data sets or files are mounted from the mainframe to appear as local directories and files on the client system.

Open Systems Adapter Support Facility (OSA/SF)

OSA/SF is an element that supports S/390® Open System Adapter (OSA-Express and OSA-2) hardware features to deliver connectivity via directly-attached local area clients using:
- Transmission Control Protocol/Internet Protocol (IP) network protocol

- Systems Network Architecture Application Peer-to-Peer Networking
- Internet Packet Exchange (IPX)

The OSA-2 and OSA Express features connect to Ethernet, Fast Ethernet (FENET), and Asynchronous Transfer Mode (ATM), and 1000Base-T Ethernet networks. OSA-Express also connects to Gigabit Ethernet, while OSA-2 supports Fiber Distributed Data Interface (FDDI) and token-ring connection. OSA/SF provides a user-friendly interface for monitoring and controlling the OSA features. OSA/SF Version 2 introduces support for a new Windows-based GUI interface as well as support for the new OSA-Express features. OSA/SF Version 2 continues support for the OSA-2 features and continues to provide the OS/2-based GUI.

SMP/E

SMP/E is a tool for installing and maintaining software, and for managing the inventory of software that has been installed. SMP/E provides a consistent and reliable method for installing and upgrading the software in a z/OS system.

Time Sharing Option/Extensions (TSO/E)

TSO Extensions is a base interactive interface that provides non-DP professionals, end users, system and application programmers, and administrators with an extensive set of commands, services, facilities and programming languages to do productive work on z/OS, and helps to ease systems management. TSO/E is an integral part of z/OS, and serves as a platform for other elements, such as BookManager READ/MVS, HCD, and ISPF.

Terminal Input Output Controller (TIOC)

TIOC is the interface between TSO and VTAM. It allows TSO to communicate with the terminal hardware.

Text Search

Text Search consists of two components: the IBM Text Search Engine and the NetQuestion Solution for a single Web server.

Text Search Engine

The Text Search Engine is an advanced search engine. The most important components are client/server handling, linguistic support for different languages, and queue mechanisms. Free-text searching, Boolean logic, and fuzzy searches are supported. The search results can be ranked by relevance.

NetQuestion Solution

The NetQuestion Solution is a ready-to-run text search solution based on the Text Search Engine. It provides a full-text search service for documents stored on the z/OS operating system. The search service can be accessed through TCP/IP-connected workstations using an HTML browser.

UNIX System Services (X/Open UNIX 95 functions)

UNIX System Services Application Services (Shell, Utilities, and Debugger)

Shell and Utilities provides the standard command interface familiar to interactive UNIX users. z/OS includes all of the commands and utilities specified in the X/Open Company's Single UNIX Specification, also known as UNIX 95 or XPG4.2. This feature will allow your UNIX programmers and other users to interact with z/OS as a UNIX system without necessarily

having to learn the z/OS command language or other interactive interfaces. The z/OS UNIX Services Debugger provides a set of commands that allow a C language program to be debugged interactively. The command set is familiar to many UNIX users.

UNIX System Services Kernel

These services add the world of open UNIX-based computing to the z/OS operating system. With Language Environment, they support industry standards for C programming, shell and utilities, client/server applications, and the majority of the standards for thread management and the X/Open Single UNIX Specification. Application developers and interactive users using these interfaces can exploit the capabilities of z/OS without having to understand z/OS itself. The combination of open computing and z/OS allows the transparent exchange of data, easy portability of applications, cross-network management of data and applications, and the exploitation of traditional MVS system strengths in an open environment.

3270 PC File Transfer Program

This program transfers files from the host to the workstation for off-line data manipulation or transfers local data for storage on the host.

Chapter 4. z/OS optional features descriptions

The following is a description of each optional feature in z/OS.

BookManager BUILD

BookManager BUILD lets you create your own online books from files marked up with:
- GML (Generalized Markup Language) Starter Set
- IBM Publishing Systems BookMaster®

Instead of preparing the files for a printer, BookManager BUILD takes the files and produces a single file that contains the text and artwork for an online book.

Books built with BookManager BUILD can be read with any of the BookManager READ or BookServer products, such as:
- BookManager READ/MVS, which is part of the z/OS base
- BookManager READ/VM
- BookManager READ/2
- BookManager READ/6000
- BookManager READ for Windows
- BookManager READ/DOS
- BookManager BookServer

Bulk Data Transfer (BDT) File-to-File

The BDT File-to-File element allows users at one z/OS system in a SNA network to copy data sets to or from another z/OS system in the network.

Bulk Data Transfer (BDT) SNA NJE

The BDT JES3 SNA NJE element allows users with the JES3 element to transmit jobs, output (SYSOUT), commands, and messages from one computer system to another within a SNA network.

C/C++ with/without Debug Tool

This language-centered C/C++ application development environment on the z/OS platform includes a C compiler, a C++ compiler, class libraries, and some C/C++ application development utilities. This feature exploits the C/C++ runtime environment and library of runtime services available with the Language Environment element of z/OS. There are actually two features. One includes a debug tool and one does not.

The C/C++ IBM Open Class Library component of the C/C++optional feature is licensed with the z/OS base operating system and can be used without enabling the optional feature.

Communications Server Security Level 3

This feature provides authentication and security services in an IP network environment. It provides support for packet filtering, tunnels, and network address translation (NAT), which enables secure communication over private and public networks. It uses the DES algorithm and it includes SSL triple DES (TDES), SNMPv3 56-bit, and IPSec TDES.

DFSMS Features (DFSMSdss, DFSMShsm, DFSMSrmm)

There are four DFSMS features:

DFSMSdss

DFSMSdss is a DASD data and space management tool. DFSMSdss can be used to copy and move data sets between volumes; dump and restore data sets, entire volumes, or tracks; convert data sets and volumes to and from SMS management; compress partitioned data sets; release unused space in data sets; and consolidate free space on volumes.

DFSMShsm

DFSMShsm is a DASD storage management and productivity tool for managing low-activity and inactive data. It improves DASD use by automatically managing space and data availability in a storage hierarchy. Working with SMS, DFSMShsm performs space management and availability management of data sets as directed by their management class attributes.

DFSMSrmm,

DFSMSrmm allows you to manage your removable media as one enterprise-wide library across systems that can share DASD. DFSMSrmm manages your installation's tape volumes and the data sets on those volumes. DFSMSrmm manages all tape media, such as cartridge system tapes and 3420 reels, as well as other removable media you define to it. For example, DFSMSrmm can record the shelf location for optical disks and track their vital record status; it does not manage the objects on optical disks.

DFSMStvs

DFSMS Transactional VSAM Services, an optional feature, enables running batch jobs concurrently with CICS online transactions to allow updates to the shared VSAM data sets. Multiple batch jobs and online transactions can be run against the same VSAM data sets. DFSMStvs ensures data integrity for concurrent batch updates while CICS provides it for online updates.

DFSORT

DFSORT is IBM's high performance sort, merge, copy, analysis and reporting product for z/OS. This high-speed, flexible data processing tool provides fast and efficient sorting, merging, copying, reporting and analysis of business information, as well as versatile data manipulation at the record, field and bit level.

DFSORT is designed to optimize the efficiency and speed with which operations are completed through synergy with processor, device, and system features (for example, hiperspace, data space, striping, compression, extended addressing, DASD and tape device architecture, processor memory, processor cache, and so on) and other products (for example, The SAS System**, COBOL, PL/I, IDCAMS BLDINDEX, and so on).

DFSORT includes the high-performance ICEGENER facility, the versatile ICETOOL utility, multiple output and reporting capability with the powerful OUTFIL feature, the time-saving ability to use Symbols for fields and constants in DFSORT and ICETOOL statements, and much more.

For more information on DFSORT, visit the DFSORT Website at:

`http://www.ibm.com/storage/dfsort/`

GDDM-PGF

GDDM-PGF (Presentation Graphics Facility), a set of programs for creating presentation material in a variety of styles, provides:

Interactive Chart Utility
The Interactive Chart Utility (ICU), an easy-to-use end-user program for creating business charts.

Vector Symbol Editor
The (VSE), a means of creating and modifying symbols for use with the ICU or other GDDM functions.

An application programming interface
An application programming interface that enables programs to call either the ICU or a set of presentation-graphics routines for chart creation.

Online Presentation Services (OPS)
GDDM-PGF now incorporates an enhanced presentation-producing capability, Online Presentation Services (OPS). GDDM-OPS provides a command interface, which is simple and easy to use, yet which is also powerful enough to allow the very concise creation of high-quality presentations. These can then be used from displays (perhaps using the built-in automatic scrolling feature), or can be saved for printing or plotting.

Typical applications of GDDM-OPS are:
- Public presentations using a video monitor or projector
- Educational sessions for private or public display
- Scrollable interactive presentations of business charts
- Production of high-quality foils.

GDDM-REXX

GDDM-REXX/MVS is a productivity tool that enables programmers to prototype GDDM applications and to create small routines and utility programs quickly and easily.

HCM (Hardware Configuration Manager)

HCM is a PWS-based client/server interface to z/OS Hardware Configuration Definition (HCD). It combines the logical and physical aspects of z/OS hardware configuration management. In addition to defining the logical connections (accomplished via HCD), you can also manage the physical aspects of your configuration. For example, you can effectively manage the flexibility offered by the ESCON infrastructure.

All updates are done with HCM's intuitive graphical user interface, and all changes are written into the IODF and fully validated for accuracy and completeness by HCD, avoiding unplanned system outages that are due to incorrect definitions.

High Level Assembler Toolkit

This toolkit provides a powerful set of capabilities to improve application development, debugging, and recovery.

IBM HTTP Server NA Secure

The IBM HTTP Server North American Secure feature, in conjunction with the IBM HTTP Server, uses Secure Sockets Layer (SSL) to provide secure communications over an open communications network, such as the Internet. The HTTP server uses SSL to initiate a secure connection between the client and itself. The server then uses SSL to decrypt and encrypt all of the information in the client request and the server response.

Infoprint Server

Infoprint Server consists of several components that support printing on a z/OS system:

Print Interface
: This component accepts print requests from z/OS UNIX System Services and from remote systems in your IP network. It allocates output data sets on the JES2 or JES3 spool for printing on local or remote printers.

Windows Client
: This component contains the Infoprint Port Monitor for Windows, which transmits documents and job attributes to Infoprint Server.

IP Printway
: This component transmits output data sets from the JES2 or JES3 spool to remote printers in an IP network or SNA network.

NetSpool™
: This component intercepts print output from VTAM applications and allocates output data sets on the JES2 or JES3 spool for printing on local or remote printers.

JES3

You might choose to enable JES3 as an alternative to the base JES2 element. It also accepts the submission of work for the BCP. Major JES3 functions and design features include:

- The interpretation of job control language (JCL) statements
- The disposition of output
- A single system image
- Workload balancing
- Deadline scheduling
- Dependent job control
- Control flexibility

JES3 differs from JES2 in two main processing areas:

- JES3 exercises centralized control over its job processing functions. JES2 exercises independent control. With JES3, a single, global processor controls job, device, and workflow for all processors in a multi-processor environment.
- JES3 does pre-execution of job setup. JES2 does not do this.

RMF (Resource Measurement Facility)

RMF is the window on z/OS resource usage. It gathers information at sysplex, single-system or address-space level, and provides reports at any system in a sysplex. The user can choose between reports about activities and delays, and can focus on storage, I/O or processor data. A wide range of options allows selection of the relevant information, including the attainment of Workload Manager goals.

The RMF monitors present snap-shot and short-term reports real-time in ISPF dialogs with on-line help, and you can have the results printed if you wish. The RMF Postprocessor provides long-term reports for detailed analysis of historical data gathered by RMF. These reports can be printed or displayed.

In addition to host-based reporting functions in RMF, there are other components available that offer reporting capabilities at the workstation. The RMF PM Java Edition provides an interface between the workstation and the z/OS sysplex through a TCP/IP connection that gives you the flexibility to create unique scenarios to monitor the performance of your sysplex. The Spreadsheet Reporter, running on your Windows workstation, gives you the ability to extract reports from RMF Postprocessor output to convert them into a common spreadsheet format and allows your spreadsheet application to use the RMF data. This function enables you to integrate RMF data into your business process. It also means you can easily produce presentation graphics which illustrate performance analysis results.

SDSF (System Display and Search Facility)

SDSF provides you with information to monitor, manage and control your z/OS system. SDSF provides an easy and efficient way to control job processing (hold, release, cancel and purge jobs) and to control devices (such as printers, lines and initiators). It allows you to monitor jobs while they are running and browse output without printing it. You can also browse the system log, including the sysplex-wide operations log. SDSF provides sort, filter, arrange, search, and print functions to help you locate and organize information. Single-character commands eliminate the need to learn and remember complex system commands. You can easily change characteristics of an object, such as a job or node, by typing over a displayed value. An optional action bar and pop-up windows make it easy to find and use SDSF functions. You can establish security for SDSF using SDSF's own security parameters, or with IBM's standard interface, SAF (System Authorization Facility).

SDSF provides complete online help and an interactive tutorial. In addition, ISPF users can view online documentation directly from SDSF, using the BookManager Read/MVS product.

Security Server

The Security Server includes:

DCE Security Server

DCE Security Server provides user and server authentication for applications using the client server communications technology. Through integration with RACF, DCE support allows RACF-authenticated z/OS users to access DCE-based resources and application servers without having to further authenticate themselves to DCE. In addition, DCE application servers can, if needed, convert a DCR-authenticated user identity into a RACF identity into an RACF identity and then access z/OS resources on behalf of that user, with full RACF access control.

Firewall Technologies

Firewall Technologies, implemented partly in the Security Server and partly in the Communications Server for z/OS , provide basic firewall capabilities on the z/OS platform to reduce or eliminate the need for non-z/OS platform firewalls in many customer installations. The Communications Server provides the firewall functions of IP packet filtering, IP security (VPN or tunnels), and Network Address Translation (NAT). The Security Server provides the firewall functions of FTP proxy support, SOCKS daemon support, logging, configuration, and administration.

LDAP Server

LDAP Server provides secure access for applications and systems on the network to directory information held on z/OS using the Lightweight Directory Access Protocol.

Network Authentication Service

Network Authentication Service,based on Kerberos Version 5, provides Kerberos security services without requiring that you purchase or use a middleware product such as Distributed Computing Environment (DCE). These services include native Kerberos application programming interface (API) functions, as well as the Generic Security Service Application Programming Interface (GSS-API) functions defined in Internet RFC 2078, Generic Security Service Application Program Interface, Version 2 and Internet RFC 2744, Generic Security Service API Version 2: C-bindings. Network Authentication Service performs authentication as a trusted third-party authentication service by using conventional shared secret-key cryptography. Network Authentication Service provides a means of verifying the identities of principals, without relying on authentication by the host operating system, without basing trust on host addresses, without requiring physical security of all the hosts on the network, and under the assumption that packets traveling along the network can be read, modified, and inserted at will.

Open Cryptographic Enhanced Plug-ins (OCEP)

OCEP provides an application interface for managing server certificates and help protect server private keys in a uniform and secure way. Applications complying with Common Data Security Architecture (CDSA) standard interfaces can use OCEP. OpenCryptographic Services Facility , a base z/OS element, provides these interfaces. Application developers and independent software vendors will find it easier to develop and port applications to the zSeries platform. It helps customers apply consistent security rules to e-business applications that use digital certificates and helps protect server private keys.

Public Key Infrastructure (PKI) Services

PKI Services allows you to establish a PKI infrastructure and serve as a certificate authority for your internal and external users, issuing and administering digital certificates in accordance with your own organization's policies. You can use a PKI Services application to request and obtain certificates through their own Web browsers, while your authorized PKI administrators approve, modify, or reject these requests through their own Web browsers. The Web applications provided with PKI Services are customizable, and a programming exit is also included for advanced customization. You can allow automatic approval for certificate requests from certain users and, to provide additional authentication, add host IDs, such as RACF user IDs, to certificates you issue for certain users. You can also issue your own certificates for browsers, servers, and other purposes, such as virtual private network (VPN) devices, smart cards, and secure

e-mail. PKI Services supports Public Key Infrastructure for X.509 version 3 (PKIX) and Common Data Security Architecture (CDSA) cryptographic standards.

Resource Access Control Facility (RACF)

RACF provides a strong security base that enables the Security Server element of z/OS to incorporate additional components that aid in securing your system as you make your business data and applications accessible by your intranet, extranets, or the Internet.

System Secure Sockets Layer (SSL) Security Level 3

System SSL support provides privacy between a client and a server through use of the SSL protocol and greater--than--56-bit user data cryptography. The base element Cryptographic Services alone, without this feature, provides only 56-bit user data cryptography. With limited exceptions, this feature may not be exported from the United States and Canada.

Appendix. Accessibility

Accessibility features help a user who has physical disabilities, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such a screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*,and *z/OS ISPF User's Guide Volume I*for information about accessing TSO/E and ISPF interfaces, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to handle their functions.

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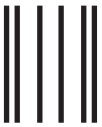

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