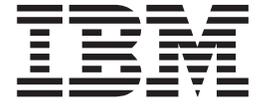


z/OS

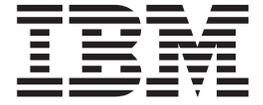


# Introduction and Release Guide

*Version 1 Release 4*



z/OS



# Introduction and Release Guide

*Version 1 Release 4*

**Note**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 37.

**Second Edition, September 2002**

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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## 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 each succeeding 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 GA22-7502-03  
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.



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# Chapter 1. z/OS Version 1 Release 4 Enhancements

---

## Enhancements for z/OS UNIX<sup>®</sup> System Services

### IPv6 support

Internet Protocol Version 6 (IPv6) support is provided, which increases the number of internet address spaces that are available.

### Process start/end exitsproce

Applications can use new installation exit points to monitor the creating and terminating of UNIX processes.

### Enhancements to the BPX1SEC service

A new function authenticates certificates for specified callers.

### Automove system list

When mounting file systems, you can compile an automove system list to indicate where the file systems should be moved when a system leaves the sysplex.

### BPXWDYN

BPXWDYN is a text interface that makes dynamic allocation and dynamic output services easily accessible to programs running either outside or inside a TSO environment.

### Distributed byte range lock manager (BRLM) enhancements

You can set up byte range lock manager (BRLM) so that every system in the sysplex is started with BRLM.

### Enhanced program security

You can set up enhanced security checking for files that have been defined to RACF<sup>®</sup> as MAIN.

### Enhanced pthread support

Individual threads can be stopped and resumed.

### REXX functions

Various REXX functions were added to z/OS UNIX

- BPXWDYN, a text interface to a subset of the SVC 99 (dynamic allocation) and SVC 109 (dynamic output) services. BPXWDYN supports data set allocation, unallocation, concatenation, and adding and deleting output descriptors.
- Support for 19 REXX functions that extend the REXX language in the z/OS UNIX environment. These functions can be used for standard REXX I/O, or to access some common file services and environment variables.
- Support for a TSO host command environment that permits a REXX program to run TSO/E commands.
- Support for "immediate commands," TSO/E REXX commands that change characteristics that control the execution of an exec or program

### **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.

### **Shared HFS enhancements**

Shared HFS has been enhanced to provide more reliable serialization. e

### **Support of /dev/fd/n files**

The `/dev/fd/n` file is supported and can be dynamically created.

### **UID and GID enhancements**

Enhancements have been made in the way that UIDs and GIDs can be assigned by RACF. They can be automatically assigned to new users, prevented from being shared, or allowed to be shared.

### **Choosing group owners of new HFS files**

You can choose how the group owner of a new HFS file is assigned. Previously, only the group owner of the parent directory could be the group owner of the new HFS file. now, the FILE.GROUPOWNER.SETGID class profile in the UNIXPRIV class can be used to specify that the group owner is to come from the effective GID of the creating process.

### **zFS enhancements**

You can display the aggregate name of zFS file systems. You can also use the ISHELL to create HFS-compatible zFS file systems.t

---

## **What's New in Language Environment<sup>®</sup> for z/OS Version 1 Release 4**

For z/OS Version 1 Release 4, Language Environment provides the following:

- **Support of Debug Tool for DB2<sup>®</sup> Stored Procedures**

Language Environment is enhanced to 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<sup>™</sup>) address.

- **CICS<sup>®</sup> trace of an application domain**

A new CICS trace allows users to monitor and determine the activity of a CICS transaction. This gives 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 C/C++ for z/OS Version 1 Release 4**

This run-time library is shipped with Language Environment. For z/OS Version 1 Release 4, the C/C++ run-time library includes the following enhancements:

- **IPv6**

Internet Protocol Version 6 (IPv6) is the base technology of the next generation Internet. z/OS provides IPv6 support in V1R4. Language Environment provides support for Communications Server through Application Programming Interfaces

(APIs) and 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*.

Language Environment headers are also updated to meet IPv6 standards. z/OS UNIX support is also provided.

- **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**

Support has been added to allow conversions with code page IBM-5488.

- **G11N White Paper Currency Support**

This support provides additional country support by locales. For more information, see *z/OS C/C++ Programming Guide*.

---

## Security enhancements

### RACF Support for z/OS V1R4

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.

Unique UID/GID support improves usability of security management as it relates to z/OS UNIX. The bulk of this function is being rolled back to OS/390 V2R10 via SPE. This includes the SEARCH enhancement, the prevention of shared IDs, and the automatic assignment of IDs. However, the enhancements to the ISPF panels and R\_admin (in support of the new command keywords) will not be rolled back and are only applicable to z/OS V1R4. The file group ownership function will not be rolled back, either. This plan results in the availability of the most sought after function, while reducing the development cost and risk of a PE.

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) 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 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".

MLS Compatibility Support changes SETROPTS to disallow the activation of MLS or MLACTIVE if the SECLABEL class is 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.

UNIX Access Enhancements improves access checking for UNIX files and directories.

IRRICE Reporting consists of a new report being added to IRRICE.

## Firewall Technologies

In Release 4, the functional enhancements that have been made to Firewall Technologies are::

- 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
- 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.

## z/OS LDAP

For Release 4, z/OS LDAP (part of the Security Server for z/OS) provides the following new capabilities:

- z/OS Managed System Infrastructure (msys) for Setup provides a configuration wizard and property sheets to be used for setting up a new LDAP server or managing an existing LDAP server.
- Both the (C/C++) client and server are updated with new authentication methods: Digest-MD5 and CRAM-MD5. These authentication methods are prescribed IETF RFC 2829 and RFC 2831. Interoperability is improved for any applications which make use of these methods.
- 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 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) 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 to allow attribute-level access control and the ability to explicitly deny access to information.
- Improved server performance.
- 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.

In addition, the following function has been removed in Release 4:

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

## **z/OS Network Authentication Service V1R4**

Release 4 of Network Authentication Service principally provides two new items: IPv6 support and support for the NDBM database. 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 advantage of using NDBM instead of RACF for the Kerberos database is that 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 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.

## **System SSL**

In Release 4, the following functional and performance enhancements have been made to System SSL

- 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).
- 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.
- 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.
- System SSL has added AES cipher support to its SSL V3.0 and TLS V1.0 implementations. In order to exploit the AES ciphers, Security Level 3 Feature of System SSL is required.
- Support for IPv6 network addresses has been added.

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

---

## File and data management

The following Distributed File Service enhancements have been made for Release 4

### zFS enhancements

zFS provides the following features and benefits:

- 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 if they are in different multi-file system aggregates. 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.

### SMB Enhancements

The smbimap 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.

---

## Support of the Cryptographic Hardware

The **Crypto Hardware Activity** report, introduced with RMF™ for z/OS 1.2, now includes measurements for the cryptographic coprocessor facility (CCF). In addition, new overview conditions are available for the Postprocessor.

---

## Support of FICON™ Switch Cascading

The **FICON Director Activity** report is enhanced to indicate that another switch is connected to a port in case of FICON cascaded switches.

---

## WLM Support

RMF reports about additional WLM performance block (PB) states in the **Work Manager Delays** report.

---

## What is New in HCD for z/OS Version 1 Release 4

This section summarizes the updates that have been introduced to HCD in z/OS Version 1 Release 4 (z/OS V1R4). The enhancements are available as SPEs:

- “Coupling Facility Duplexing”
- “iQDIO and FCP Channel Support”
- “FCTC Support”
- “Support for FICON Cascade Switching”

### Coupling Facility Duplexing

With 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

In addition, 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. So, 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 is introduced to allow access to SCSI devices, for example, a DVD device, via the Fibre Channel Protocol from a Linux for zSeries image.

### FCTC Support

IBM eServer 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.

In order to be usable as 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.

### Support for FICON Cascade Switching

HCD supports 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 2066) processors.

---

## Cascaded Switch Support

Cascaded connections between FICON switches are supported. This means that 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. HCM also supports 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 via a new utility.

---

## 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 in order to provide a valid FCTC connection. HCM together with HCD ensures that this rule is obeyed.

---

## Support for iQDIO Channel Paths

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).

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## Support for PPRC (Peer to Peer Remote Copy)

HCM's 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.

In order to create a PPRC connection, HCM offers you 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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## Managed System Infrastructure for Setup

For z/OS Version 1 Release 4, Managed System Infrastructure for Setup provides the following enhancements:

**Multiple user support:**

Multiple users can now use separate workplaces to simultaneously set up software in the same system environment. An 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:**

All setup steps can now be performed at the same granularity at which products or parts of products can be customized.

**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 particularly 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.

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## 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.

### OSA-Express for V1R4

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 on OSA-Express

- 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.

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## Chapter 2. z/OS - List of 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 Planning for Installation. An additional set of integrated features is available on an optional basis. (See Chapter 3.)

---

### System Services

- DFSMSdfp™
- EREP
- ESCON Director Support
- High Level Assembler (HLASM)
- ICKDSF
- ISPF
- JES2
- MICR/OCR Support
- Bulk Data Transfer (BDT)
- Base Control Program (BCP)
- TSO/E
- 3270 PC File Transfer Program
- FFST™
- TIOC
- ILM
- msys for Setup
- msys for Operations
- Unicode Support

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### Systems Management Services

- HCD
- Cryptographic Services (includes ICSF)
- SMP/E
- Tivoli® Management Framework

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### Application Enablement Services

- DCE Application Support
- Encina® Toolkit Executive
- GDDM® (includes PCLK and OS/2® Link)
- Language Environment
- SOMobjects® Runtime Library
- C/C++ IBM Open Class® Library
- Text Search

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## UNIX System Services (X/Open UNIX 95 functions)

- z/OS UNIX System Services Application Services (Shell, Utilities,)
- z/OS UNIX System Services (included in the BCP)

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## Distributed Computing Services

- DCE Base Services (OSF DCE level 1.1)
- Distributed File Service (OSF DCE 1.2.2 level)
- Network File System

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## Communications Server

- IP (formerly TCP/IP)
- SNA (includes AnyNet<sup>®</sup>) (formerly VTAM<sup>®</sup>)

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## LAN Services

- LAN Server
- OSA Support Facility

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## Network Computing Services

- BookManager<sup>®</sup> BookServer
- IBM HTTP Server

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## Softcopy Services

- BookManager READ

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## Chapter 3. z/OS - List of 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<sup>®</sup> for MVS<sup>™</sup>, VSE, VM, which is shipped on a diskette. For the version and release levels of those features that also exist independently, see *z/OS Planning for Installation*.

---

### System Services

- JES3
- Bulk Data Transfer (BDT) File-to-File
- Bulk Data Transfer (BDT) SNA NJE

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### SecureWay<sup>®</sup> Security Server

- SecureWay Security Server (RACF, DCE Security Server at OSF DCE level 1.1, LDAP Server, Firewall Technologies, and OCEP)
- Security Server LDAP Server DES

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### Systems Management Services

- DFSMSdss<sup>™</sup>
- DSMSrmm
- DFSMSHsm<sup>™</sup>
- HCM
- OCSF Security Level 3
- RMF
- SDSF
- System Secure Sockets Layer (SSL) Security Level 3

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### Application Enablement Services

- C/C++ with Debug Tool
- C/C++ without Debug Tool
- DFSORT<sup>™</sup>
- GDDM-PGF
- GDDM-REXX
- High Level Assembler (HLASM) Toolkit
- SOMobjects Application Development Environment

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### Distributed Computing Services

- DCE User Data Privacy (DES and CDMF) - OSF DCE 1.1 level
- DCE User Data Privacy (CDMF) - OSF DCE 1.1 level

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### Print Services

- Infoprint<sup>®</sup> Server (includes Print Interface, Windows<sup>®</sup> client, IP PrintWay<sup>™</sup>, NetSpool<sup>™</sup>)

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## **Communications Server**

- Communications Server Security Level 1
- Communications Server Security Level 2
- Communications Server Security Level 3
- Communications Server Network Print Facility (NPF)

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## **Network Computing Services**

- IBM HTTP Server NA Secure

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## **Softcopy Services**

- BookManager BUILD

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## Chapter 4. z/OS - Description of Base Elements

To help you understand the general function of an element or feature, these descriptions are categorized by functional groups.

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### System Services

#### 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.

## **Environmental Record Editing and Printing Program MVS (EREP MVS) R3.5**

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.

## **High Level Assembler (HLASM)**

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.

## **Device Support Facility (ICKDSF)**

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**

SPF consists of four major components; Dialog Manager (DM), Program Development Facility (PDF), Software Configuration Library Manager (SCLM), and Client/Server (C/S).

- DM -- Provides services to dialogs and end-users for creating and using elements, such as functions, panel definitions, message definitions, tables, file-tailoring skeletons, and dialog variables.
- DF -- Provides editing, compiling, and library management services to assist the dialog or application developer.
- SCLM -- Provides services to application developers to manage their application development libraries.

- C/S -- Allows you to run ISPF on a programmable workstation, and to display the panels using the display function of your workstation operating system.

## 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:

- ES2 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.

## MICR/OCR Support

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

## Bulk Data Transfer (BDT)

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.

## Base Control Program (BCP)

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.

## 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.

## The 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.

## First Failure Support Technology/MVS (FFST/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

## Terminal Input Output Controller (TIOC)

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

## msys for Operations

msys for Operations is a base element of z/OS 1.2 which 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.

## Support for Unicode

The Unicode Standard is the universal character encoding standard used for representation of text for computer processing. It is fully compatible with the second edition of International Standard ISO/IEC 10646-1:2000, and contains all the same characters and encoding points as ISO/IEC 10646. 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 provides the infrastructure and conversion services necessary to implement the Unicode Standard.

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## Systems Management Services

### Hardware Configuration Definition (HCD)

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.

### Cryptographic Services (includes ICSF)

Cryptographic Services 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**  
This supports privacy functions.
- **Public Key API (PKA Support)**  
This support provides additional formatting or message digest standards.

## **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 an z/OS system.

## **Tivoli Management Framework**

The Tivoli Management Framework contains the Tivoli Management Agent for z/OS, which enables z/OS to be managed by the Tivoli Framework-based applications that support z/OS, such as Tivoli User Administration for z/OS and Tivoli Security Management for z/OS.

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## **Application Enablement Services**

### **DCE Application Support**

This function of z/OS provides distributed application support.

- **Inbound transactional RPC**  
This 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**  
This 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.

### **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.

## 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.

## 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 z/OS and VM
- COBOL for MVS and VM
- AD/Cycle<sup>®</sup> C/370<sup>™</sup>
- SAA<sup>®</sup> AD/Cycle PL/I MVS and VM
- PL/I for MVS and VM
- IBM VisualAge<sup>®</sup> for Java<sup>™</sup>, 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.

And Language Environment has support for Year 2000 using a 'sliding window' approach.

## **SOMobjects Runtime Library (RTL)**

The SOMobjects runtime library is a set of functions for creating objects and invoking methods on them. SOMobjects applications can use the same object-oriented classes even when the applications are written in different programming languages. SOMobjects applications require the SOMobjects runtime library.

## **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. Retroactive to z/OS Version 1 Release 3, 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.

## **Text Search**

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

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.

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.

## **z/OS UNIX System Services (X/Open UNIX 95 functions)**

### **z/OS 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.

### **z/OS 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.

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## Distributed Computing Services

### Distributed Computing Environment (DCE) Base Services (OSF DCE Level 1.1)

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.

## 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 DFS 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 and OS/2 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 95, Windows 98, Windows NT® 4.0 Workstation, Windows 2000 Professional, Windows 3.11 (Windows for Workgroups), and OS/2 Version 4 (for file access only). 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 the Infoprint Server for z/OS (OS/390 Version 2 Release 8 or later).

## Network File System (NFS)

z/OS 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 a 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.

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## 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
- 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 a 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 a 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.

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## **LAN Services**

### **LAN Server**

LAN Server for MVS enables LAN workstation users to store and share data and applications in a central location on a System/390® which allows the large storage capacity of a System/390 to relieve the capacity constraints of workstation-based servers.

LAN Server uses host disk storage to provide file sharing services to workstation users on local area networks (LANs). The LANs can be either OS/2 LAN Server environments or IP environments using Network File System (DFSMS/MVS NFS) services.

Some benefits are:

- LAN Server provides complete workstation file system services on a host system.
- Workstation users accustomed to working with file servers do not need to learn new interfaces to use LAN Server.
- LAN Server allows file sharing across multiple LANs. Workstation users on widely scattered LANs can share files on a host.
- Workstation users on OS/2 LANs can share files with DFSMS/MVS Network File System users on IP networks, and vice versa.
- LAN Server supports multiple connectivity options (including ESCON), so it can be used in a wide variety of application environments.
- While LAN Server is running, administrators can control and monitor access to the workstation files stored on the host.
- Administrators can back up and restore workstation-format files using an ADSTAR Distributed Storage Manager (ADSM) server. Administrators can copy selected files, directories, or disks to backup storage managed by one of these servers.

## Open Systems Adapter Support Facility (OSA/SF)

OSA/SF is a base, non-exclusive element that supports S/390<sup>®</sup> 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) 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.

---

## Network Computing Services

### IBM HTTP Server

The IBM HTTP Server provides for scaleable, high performance web-serving 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<sup>®</sup> Domino<sup>™</sup> 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 France Secure, IBM HTTP Server NA Secure.

## **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 an 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.

---

## **Softcopy Services**

### **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.

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## Chapter 5. z/OS - Description of Optional Features

To help you understand the general function of an element or features, these descriptions are categorized by a functional group.

---

### System Services

#### 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.

#### 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.

---

### SecureWay Security Server

#### SecureWay Security Server (RACF, DCE Security Server at the OSF DCE level 1.1, LDAP Server, Firewall Technologies, OCEP)

The Security Server combines the traditional benefits of RACF with the Open Software Foundation DCE level 1.1. This means that you get:

- Flexible control of access to protected resources
- Protection of installation-defined resources
- Ability to store information for other products
- Choice of centralized or decentralized control of security profiles
- An ISPF panel interface
- Transparency to end users
- Exits for installation-written security routines

The DCE feature integrates the Open Software Foundation Distributed Computing Environment technologies with the base MVS/ESA operating system.

The interoperation of OSF DCE and RACF enables DCE application servers in an MVS/ESA environment to use the RACF security functions when called from DCE-based server applications. These functions include the access control and auditing mechanisms provided by RACF.

z/OS also includes Open Cryptographic Enhanced Plug-ins (OCEP). OCEP is intended to be used with the framework provided by the Open Cryptographic Services Facility (OCSF). OCEP provides two service provider modules; one for data library services and the other for a trust policy manager. These service provider modules enable applications to use z/OS Security Server (RACF), or an equivalent product, to provide security functions for digital certificates and key rings.

## Security Server LDAP Server DES

This feature provides cryptographic protection above what is provided by the LDAP Server in the Security Server. It contains DES/TDES function.

---

## Systems Management Services

### 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-40-bit user data cryptography. The base element Cryptographic Services alone, without this feature, provides only 40-bit user data cryptography. With limited exceptions, this feature may not be exported from the United States and Canada.

### Resource Measurement Facility (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.

With the RMF Spreadsheet Converter, you can download reports from the screen, or from RMF data sets in MVS, to spreadsheets at a workstation, and perform your own detailed analyses, using one of several familiar spreadsheet products.

In addition to host-based reporting functions in RMF, there are other components available that offer reporting capabilities at the workstation. Performance Monitoring of z/OS (PM of z/OS) provides an interface between the OS/2 workstation and the z/OS sysplex that gives you the flexibility to create unique scenarios to monitor the performance of your system. You can collect real-time data in graphic and text mode, combine data from different collection types, or even from different applications, and group resources together. The RMF Spreadsheet Reporter is a workstation interface based on Windows 95 or Windows NT for analyzing RMF data with Lotus 1-2-3<sup>®</sup> and Excel spreadsheets. This function enables you to integrate

RMF data into your business processes. It also means you can easily produce presentation graphics which illustrate performance analysis results.

## HCM

The z/OS Hardware Configuration Manager 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.

## DFSMS Features (DFSMSdss, DFSMShsm, DFSMSrmm™)

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 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. With DFSMSrmm, you can 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.

## 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.

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## Application Enablement Services

### 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 information on the enhancements provided with DFSORT R14, see "What's New in DFSORT R14" at:

[http://www.storage.ibm.com/software/sort/mvs/release\\_14/index.html](http://www.storage.ibm.com/software/sort/mvs/release_14/index.html)

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

<http://www.ibm.com/storage/dfsor/>

### GDDM-PGF

GDDM-PGF is an optional feature of z/OS. GDDM-PGF (Presentation Graphics Facility) is a set of programs for creating presentation material in a variety of styles. It provides:

- The Interactive Chart Utility (ICU), an easy-to-use end-user program for creating business charts
- The Vector Symbol Editor (VSE), a means of creating and modifying symbols for use with the ICU or other GDDM functions
- An application programming interface that enables programs to call either the ICU or a set of presentation-graphics routines for chart creation.
- 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.

## 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.

## High Level Assembler Toolkit

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

## SOMobjects Application Development Environment (ADE)

SOMobjects is a technology that allows applications written in different programming languages to use the same object-oriented class libraries. Installations that use SOMobjects can extend or replace those class libraries without requiring changes to, or recompiling of, existing applications. The ADE provides a SOM™ compiler and source code for the SOM kernel (root) classes, Interface Repository Framework, and Emitter Framework. Distributed SOMobjects provides the ability to distribute objects and object processing to other systems in your enterprise. SOMobjects is CORBA 2.0 compliant.

---

## Print Services

### Infoprint Server

The Infoprint Server consists of several components that support printing on an 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 Monitor for Windows 95/98, Windows NT, and Windows 2000, 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.

---

## Communications Server

### Communications Server Security Level 1, 2, and 3

The three levels of this feature provide 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. Level 1 provides the least stringent security. It provides SLL RC2/RC4, and includes function previously found in IP Security-CDMF and TCP/IP Kerberos Non-DES. Level 2 provides the next level of security, using the DES algorithm, and including SSL DES and SNMPv3 56-bit. It includes function previously provided in IP Security-DES/CDMF and TCP/IP Kerberos DES. The highest level of security is provided by Level 3. It uses the DES algorithm and it includes SSL triple DES (TDES), SNMPv3 56-bit, and IPsec TDES.

### Communications Server Network Print Facility (NPF)

The Network Print Facility (NPF) provides an enhanced printing function that reroutes print data to the IP network.

---

## Network Computing Services

### IBM HTTP Server NA Secure

Selection of any of these features gives you an integrated Web Application Server, which:

- Provides a repository of home pages
- Serves requests from Web browsers
- Stores text created with HTML
- Stores images, sound, and video clips
- Uses the z/OS Security Server for robust security, including Secure Sockets Layer (SSL) and Proxy Authentication
- Acts as a proxy server
- Provides interface to other z/OS applications
- Provides a Common Gateway Interface (CGI), allowing access to DB2, IMS, and CIC transactions and data
- Offers secure sockets layer (SSL) and secure hypertext transfer protocol (S-HTTP) functions

---

## Softcopy Services

### 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<sup>®</sup>

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



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## Appendix. Appendix A. 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 as 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

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### 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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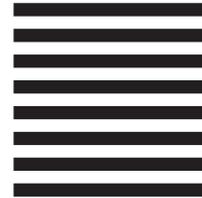
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