z/VM

Migration Guide

Version 5 Release 1.0

GC24-6103-00

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Note:
Before using this information and the product it supports, read the information under “Notices” on page 197.

First Edition (September 2004)

This edition applies to version 5, release 1, modification 0 of IBM z/VM (product number 5741-A05) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces GC24-5996-03.

Contents

About This Book

This book provides information to help you migrate to IBM® z/VM®, Version 5 Release 1.0 (z/VM V5R1), from any of the following:

- IBM z/VM Version 4
- IBM z/VM Version 3
- IBM VM/ESA® Version 2

If your current system is older than VM/ESA Version 2, see “Migrating from Older VM Products” on page 2.

This book provides three types of information:

- Descriptions of changes to the VM system that you should be aware of before migrating
- Identification of specific external interfaces that have changed, with an assessment of the compatibility of each change
- Guidance for migration tasks that you might need to perform

Who Should Read This Book

This book is intended for system programmers, system analysts, and system support personnel who are responsible for planning and completing a system migration. Parts of this book could also be helpful to application programmers who will be migrating applications to the new system.

What You Should Know before Reading This Book

This book assumes that you are familiar with VM. However, depending on what VM product you are migrating from, z/VM V5R1 might be quite different from your current system. Also, the hardware and software requirements for installing and running z/VM might have changed since your VM release. For a general description of z/VM V5R1, including information about the current hardware and software requirements, see *z/VM: General Information*.

Where to Find More Information

For more information about z/VM functions, see the books listed in the “Bibliography” on page 203.

Links to Other Online Books

If you are viewing the Adobe Portable Document Format (PDF) version of this book, it may contain links to other books. A link to another book is based on the name of the requested PDF file. The name of the PDF file for an IBM book is unique and identifies both the book and the edition. The book links provided in this book are for the editions (PDF names) that were current when the PDF file for this book was generated. However, newer editions of some books (with different PDF names) may exist. A link from this book to another book works only when a PDF file with the requested name resides in the same directory as this book.

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Chapter 1. Introduction to Migration

Migration is the transfer and adjustment of information required to upgrade from one VM release to a later VM release. Rather than starting from scratch when you upgrade from your current system, you probably want to transfer and adjust a lot of your current information to use on the new system. Information you may want to transfer includes:

- I/O configurations
- Saved segment definitions
- Spool files
- User directory entries
- SFS file pool servers
- Application programs

Note: This book assumes that you have already determined your hardware requirements for the new system, including your DASD, real storage, and performance needs.

But before you begin to transfer any information, you should determine if there are differences between your current VM release and the new release that may affect the migration. This book is intended to help you make that determination.

How Migration Information Is Presented in This Book

This book provides an overview of the changes to VM **since VM/ESA V2R1**. This information is presented two ways:

- Chapter 2, “System Changes,” provides a brief discussion of significant changes and enhancements to system functions. The chapter is organized according to the general subject areas where changes have occurred, such as product packaging, installation and service, hardware and architecture support, application development, and so on.
- Chapter 3, “Changes to External Interfaces,” identifies changes to specific external interfaces in the following VM components: CP, CMS, AVS, Dump Viewing Facility, GCS, REXX/VM, TSAF, and VMSES/E. External interfaces are commands, routines, macros, DIAGNOSE codes, directory control statements, and so on. Each change is identified as either upwardly compatible or incompatible. (For definitions of these terms, see “Compatibility Terms Used in This Book” on page 2.) The chapter is organized by component and by interface type.

For each change listed in those two chapters, the version and release in which the change occurred is indicated numerically in brackets (for example, changes for z/VM V5R1 are indicated like this, **[5.1.0]**), so you can select the items that affect you. The identified release refers to the earliest release in which the change was included in the base product; in some cases the change may have been available to earlier releases through a program temporary fix (PTF). Also included are references to other books where the changes are discussed in more detail.

Chapter 4, “Migration Tasks,” provides guidance for some migration tasks you might have to do, such as converting from using system definition macros (HCPRIO, HCPSYS, and HCPBOX) to using system configuration files, or migrating your user directory and your spool files.

Compatibility Terms Used in This Book

In Chapter 3, “Changes to External Interfaces,” certain terms are used to convey the degree of compatibility for each change. The compatibility terms are:

Upwardly compatible
The syntax, functions, or responses of the external interface have been changed, but not significantly. Invocations and applications using the external interface on the new system in the same manner as on the current system should continue to execute unchanged.

Note: New function, if not exploited, is also upwardly compatible.

Incompatible
The syntax, functions, or responses of the external interface have been changed significantly. Some invocations and applications using the external interface on the new system in the same manner as on the current system may execute incorrectly or may not execute at all.

Note: Depending on how you use the interface, a change identified as incompatible may actually be upwardly compatible for you.

Cross-References to Other Books

Many of the descriptions of system changes in this book contain cross-references to other books for more information about those functions. Over the course of product releases, the titles of some VM books have changed. In most cases, the cross-reference points to the *current* version (title) of the appropriate book.

Migrating from Older VM Products

If you are migrating from VM/ESA V1R1.5 370 Feature, VM/ESA V1R2, VM/ESA V1R2.1, or VM/ESA V1R2.2, you need to obtain the following book (not included in the z/VM V5R1 library):

- *VM/ESA V2R4: Conversion Guide and Notebook*, GC24-5839

Use that book to determine the differences between your current VM product and VM/ESA V2R4. Then use this book to determine the additional differences between VM/ESA V2R4 and z/VM V5R1.

If you are migrating from a VM product older than those listed above, you need to obtain one of the following books (not included in the z/VM library):

- *VM/ESA V2R1: Conversion Guide and Notebook for VM/SP, VM/SP HPO, and VM/ESA (370 Feature)*, SC24-5754
- *VM/ESA V2R1: Conversion Guide and Notebook for VM/XA SP and VM/ESA*, SC24-5753

Use the appropriate book to determine the differences between your current VM product and VM/ESA V2R1. Then use this book to determine the additional differences between VM/ESA V2R1 and z/VM V5R1.

Considerations for Future Automated Migration

To take advantage of any future automated migration aids supplied by IBM, you must adhere to the following:

- If you need to alter, modify, or customize any IBM supplied parts, always use the VMSES/E local modification procedures unless it is specifically documented to do otherwise. The LOCALMOD tool is supplied with VMSES/E to simplify the creation of local modifications.
- If you want to use an IBM supplied shared file system (SFS) for your data, use VMSYSU. Do not use VMSYS or VMSYSR.
- Each customizable file must reside on the disk specified for that part in the product documentation.
- Additional minidisks should not be defined on the *xxx*RES, *xxx*W01, and *xxx*W02 DASD volumes for the new release.

Chapter 2. System Changes

This chapter describes significant VM system changes since VM/ESA V2R1. The release in which each change occurred is indicated. These changes could affect your migration to the new z/VM system.

For information about changes to specific external interfaces (such as commands, routines, and macros), see Chapter 3, “Changes to External Interfaces,” on page 79.

Note: Any changes described in this chapter could be superseded by later changes described in this chapter.

This chapter contains the following major sections:

Product Packaging

This section describes changes in what facilities are included in the VM base product or offered as optional features.

CMS Utilities Feature Integrated into CMS [4.1.0]

Most of the functions formerly provided in the optional CMS Utilities Feature have been integrated into CMS.

The following functions are located on the 190 disk:

- BROWSE
- CLRSCRN
- DEPRINT
- DEVTYPE
- DIRMAP
- FILESTCK
- FINDSTAK
- FLIST
- GETFMADR
- OPTIMISE
- REPRINT
- SADT
- SETKEYX
- SHRLDR
- STAG
- USERID
- VMSIZE
- WAKEUP

- XRDR
- YDISK

The following functions, which may require privilege classes not given to general users, are located on the 193 disk:
- ACCOUNT
- AUDITOR
- DCSSBKUP
- DCSSRSAV
- QSYSOWN
- SFPURGER
- SYSWATCH

All of these functions (except OPTIMISE and SETKEYX) are documented in the *z/VM: CMS Commands and Utilities Reference*. The documentation for these functions has been substantially updated and improved.

All messages issued by these functions are contained in the CMS message repository, and documentation for the messages has been added to *z/VM: System Messages and Codes - CMS and REXX/VM*.

OPTIMISE and SETKEY have been included in CMS only for compatibility and are documented only in HELP.

The following functions have not been integrated into CMS:
- CPFMT
- SYSIDT

TCP/IP Included in the z/VM Base [4.1.0]

TCP/IP, previously offered as an optional feature of VM, is now supplied with the z/VM base. The TCP/IP Network File System (NFS) Feature has been integrated into the TCP/IP base. TCP/IP source, previously offered as a feature, is also supplied with the z/VM base.

Directory Maintenance Facility Feature [4.1.0]

Directory Maintenance Facility (DirMaint™), based on the Directory Maintenance VM/ESA licensed program, is offered as an optional feature of z/VM. For information about DirMaint restrictions, system integrity, and security, and requirements for using DirMaint in a CSE complex, see the *z/VM: General Information* book.

REXX/EXEC Migration Tool for VM/ESA Deleted [4.1.0]

The REXX/EXEC Migration Tool for VM/ESA (ESAMIGR) is no longer supplied with z/VM.

OpenEdition® Distributed Computing Environment (DCE) Feature Deleted [4.1.0]

The OpenEdition Distributed Computing Environment (DCE) Feature is not supported on z/VM V4R1 and is no longer orderable.

LANRES/VM Feature Deleted [4.1.0]

LANRES/VM is no longer offered as a feature of z/VM.

VM BookManager® Library Feature Deleted [4.1.0]

The VM BookManager Library Feature, which provided BookManager versions of VM publications on the product delivery medium, is no longer offered with z/VM. BookManager versions of VM publications are still included on the *Online Library Omnibus Edition: VM Collection* CD-ROM. The CD-ROM includes the Softcopy Receiver Tool for transferring BookManager files to the workstation or host.

Resource Access Control Facility Feature [4.3.0]

Resource Access Control Facility (RACF®) is offered as an optional feature of z/VM. RACF works with existing z/VM system functions to provide improved data security for an installation.

The RACF feature is functionally equivalent to the RACF for VM V1R10.0 licensed program (5740-XXH). However, only the RACF feature is licensed to run on z/VM in an Integrated Facility for Linux (IFL) LPAR.

Hardware Configuration Definition and Hardware Configuration Manager for z/VM [4.4.0]

Hardware Configuration Definition and Hardware Configuration Manager for z/VM is a new facility included in the z/VM base and pre-installed. For more information about this facility, see “Hardware Configuration Definition and Hardware Configuration Manager for z/VM (HCD and HCM for z/VM) [4.4.0]” on page 50.

Language Environment® Integrated as a Component [4.4.0]

Language Environment is now a component of z/VM. The C/C++, COBOL, and PL/I run-time libraries included in the Language Environment component have been upgraded to the level shipped with version 1, release 4.0 of z/OS®.

The Language Environment component is installed and serviced under the MAINT user ID and uses a set of disks that belong to MAINT. Language Environment is included in the ZVM $PPF file. In addition, files with file types of LOCALE, LOCALEX, CHARMAP, GENXLT, UCMAP, UCONVTBL and a few EDC$ ASSEMBLE files now will reside on the Language Environment 49B disk.

Attention: Do not migrate Language Environment 1.8 or earlier to z/VM V4R4. The only level of Language Environment supported on z/VM V4R4 is the new Language Environment component. The files for the z/VM Language Environment component are installed on the MAINT 19E disk. Depending on how you plan to migrate other files from your old 19E disk to the new system, you may need to remove the old Language Environment files. See “Removing the Old Level of Language Environment.”

Removing the Old Level of Language Environment

The files for the z/VM Language Environment component are installed on the MAINT 19E disk. If you are migrating files from your old 19E to the new 19E, do not copy any Language Environment files. If you intend to use your old 19E disk with the new z/VM V4R4 system, and want to copy the Language Environment component from the new 19E to the old 19E, you must first remove all Language Environment files from your old 19E.

To remove the Language Environment files from your old 19E disk:

1. Log on as MAINT.
2. Access the 19E disk in R/W mode:

```
access 19e y
```

3. Use the VMSES/E VMFERASE command to erase the Language Environment files from Y. Enter:

   ```
   vmferase prod prodid%compname from y
   ```

   where *prodid* and *compname* identify the level of Language Environment on your system. See Table 1.

Table 1. Language Environment level identifiers

Language Environment level	*prodid*	*compname*
1.5 (C run-time only), included with VM/ESA 2.1.0	5688198E	POSIX
1.5 (complete), available for VM/ESA 2.1.0	5688198E	LE370
1.6 (C run-time only), included with VM/ESA 2.2.0	5688198F	POSIX
1.6 (complete), available for VM/ESA 2.2.0	5688198F	LE370
1.8, available for VM/ESA 2.3.0 and later	5688198H	LE370

4. If the VMFERASE command returns the following message,

   ```
   VMFERA2738I No files to erase from Y for product prodid%compname
   ```

   then the files are not listed in the VMSES PARTCAT file and cannot be erased with the VMFERASE command. You must use the CMS ERASE command to manually erase all files on Y whose file names begin with the characters EDC, CEE, IBM, IGZ, or SCEE.
5. After the Y-disk is cleaned up, you must remove the Language Environment shared segments. Enter the following commands:

   ```
   cp purge nss name scee
   cp purge nss name sceex
   ```
6. Because the file status table for the Y-disk is included in the CMS saved system, and you have changed the contents of the Y-disk, you must resave CMS. Use the SAMPNSS command to create a new skeleton system data file, then IPL and save the rebuilt CMS saved system:

   ```
   sampnss cms
   ipl 190 clear parm savesys cms
   ```
7. Now that you have removed the old Language Environment files and segments from your system, you must decided what to do with the user ID to which the Language Environment files were initially loaded (P688198E, P688198F, or P688198H, depending on the level of Language Environment) You can either delete this user ID from the CP directory and reuse all the disk space assigned to it, or you can leave the user ID on your system as a means of returning to the old Language Environment level if an application requires it.

Performance Toolkit Feature [4.4.0]

The Performance Toolkit for VM™ is offered as an optional feature of z/VM. It is supplied pre-installed but disabled, and is serviced through VMSES/E. The Performance Toolkit is intended as a replacement for the RealTime Monitor (RTM) and Performance Reporting Facility (PRF) optional features, and provides enhanced functions. For more information, see “Performance Toolkit [4.4.0]” on page 53.

Product Packaging Modifications [5.1.0]

The packaging of the z/VM V5R1 product has been modified as follows:

- The 3270 PC File Transfer product (5664-281), which previously could be ordered with the z/VM V4 System Delivery Offering (SDO), is now available as part of the z/VM V5R1 product. It is shipped as a sample program on the system disk, with no support available.
- The restricted source feature, available as a no-charge feature that could be ordered with z/VM Version 4, and the PL/X source, provided with the installation media in z/VM Version 4, are not shipped with z/VM V5R1 and cannot be ordered with z/VM V5R1. Both will be available as no-charge downloads from IBM Resource Link™ at www.ibm.com/servers/resourcelink/.

  Note: If you are not registered with Resource Link, you will be required to register for a user ID and password. You must also be licensed for z/VM V5R1, and entitlement will be verified when you request the source code. After approval, you will receive instructions describing how to download the code.
- DFSMS/VM®, previously provided automatically with z/VM Version 4, will no longer be shipped automatically. It can be ordered as a no-charge feature with the z/VM V5 SDO.
- The national language features for Interactive System Productivity Facility (ISPF), program number 5684-043, have been removed from the z/VM SDO. These features can still be ordered using the standalone ordering process.
- The Tivoli Storage Manager (TSM) for VM product, which was packaged on the z/VM Version 4 system DDRs, is not provided with z/VM V5R1 and cannot be ordered with the z/VM V5 SDO. TSM for VM can still be ordered as a standalone product for standard processor engines. However, IBM recommends TSM for z/OS and z/VM, V5.2 (5698-A13), or TSM Extended Edition for z/OS and z/VM, V5.2 (5698-A11).

  If you are running in a Linux® guest environment, IBM recommends TSM, V5.2 (5698-ISX), or TSM Extended Edition, V5.2 (5698-ISM) for key data protection activities of backup, archive, recovery, space management, and disaster planning.
- The Java™ and NetRexx™ programs on z/VM, previously available as downloads from the z/VM Web site, are not supported with z/VM V5R1. Refer to www.ibm.com/eserver/zseries/zvm/java/ for additional information. Java and NetRexx functionality can be obtained from Linux running on z/VM.
- The RealTime Monitor (RTM) and Performance Reporting Facility (PRF) features cannot be ordered with z/VM V5R1, nor can they be licensed with z/VM V5R1.

Installation and Service

This section describes changes to the VM installation and service processes and tools.

Note: For information about changes to the VM installation and service procedures, see the *z/VM: Guide for Automated Installation and Service* and the *z/VM: Service Guide*.

Electronic Delivery of Service [2.2.0]

The ITNVTSTR EXEC supports the delivery of IBM service electronically by satellite. This electronic delivery is provided by the IBM Advanced Digital Delivery System product (5799-XDG).

For more information, see:

- *z/VM: VMSES/E Introduction and Reference*
- *Advanced Digital Delivery User's Guide*, SC23-3281

Local Modification of Replacement-Maintained Parts [2.2.0]

The VMFREPL EXEC supports the local modification of replacement-maintained parts. VMFREPL can be used to:

- Copy the highest level of a part
- Copy a specified part
- Update a Version Vector Table
- Update a Select Data file
- Display the highest level of a part

For more information, see the *z/VM: VMSES/E Introduction and Reference*.

S/390® Service Update Facility [2.3.0]

The S/390 Service Update Facility (SUF) is an internet-based S/390 software service tool that makes ordering and receiving OS/390®, VM, and VSE software service quick and easy. SUF allows systems programmers to order both corrective and preventive service through the internet. VM service, both corrective and preventive, can be delivered through the internet or through standard physical media. Where available, Advanced Digital Delivery (satelite delivery) is also an option.

A common GUI interface is provided by the SUF Customer Application Server. This workstation server can support multiple systems programmers supporting multiple S/390 servers. OS/390, VM, and VSE servers can be attached to a single workstation server simulaneously.

For details regarding prerequisites, entitlement, and how to obtain SUF, refer to the SUF web page at www.ibm.com/eserver/zseries/zos/suf/.

VMSES/E Enhancements [2.3.0]

The following execs have been added:

VMFENRPT
: Creates a report of the products that are enabled, disabled, and installed on your system.

VMFSUFIN
: Installs service from RSU service envelope files, COR service envelope files, or both.

VMFSUFTB
: Builds a table, sysid SYSSUF, that contains a list of all installed products and related data needed by the Service Update Facility to service each product.

VMFINS DISABLE
: Changes a product to a disabled state.

VMFINS ENABLE
: Changes a product to an enabled state.

The following Software Inventory tables have been added:

VM SYSSUF (System-Level Service Update Facility table)
Contains a list of all products that are installed on the system. For each product, it contains the data needed by the Service Update Facility to service the product.

VM SYSREST (System-level Restart table)
Contains records used to restart the VMFSUFIN EXEC, which is part of the Service Update Facility.

The following execs have been changed:

ITNVTSTR
The PROD and KEY operands have been added. The PROD operand identifies the products that were ordered for a RSU package. The KEY operand indicates that the RSU package is one of two packages that are to be installed together.

VMFINS DELETE
The DISABLE operand has been added. The DISABLE operand sets up a product as disabled and deleted.

VMFINS MIGRATE
The DISABLE and ENABLE operands have been added. The DISABLE operand sets up a product as disabled. The ENABLE operand sets up a product as enabled.

VMFINS INSTALL
The DISABLE, ENABLE, NOSETUP, and SETUP operands have been added. The DISABLE operand sets up a product as disabled. The ENABLE operand sets up a product as enabled. The NOSETUP operand indicates that a new minidisk or directory access order is not set up. The SETUP operand indicates that a new minidisk or directory access order is set up. It is set up according to entries in the :MDA section of the product parameter file.

The following Software Inventory table has been changed:

VM SYSAPPS
The :ESTAT tags has been added. The :ESTAT tag specifies the enablement status of a product on the system.

For more information about these changes, see the *z/VM: VMSES/E Introduction and Reference*.

Tool for Removing PTFs [2.4.0]

The VMFREM EXEC removes individual PTFs by “un-applying” them from all service levels (apply disks) and optionally “un-receiving” them. To “un-apply” a PTF means to undo the function previously performed for that PTF by the VMFAPPLY command. To “un-receive” a PTF means to undo the function previously performed for that PTF by the VMFREC command.

VMFREM also removes complete service levels and optionally “un-receives” PTFs that are applied only to the removed levels. In addition, commit support is provided for individual PTFs that have been applied. For more information, see the *z/VM: VMSES/E Introduction and Reference*.

$PPF Override File Name [3.1.0]

The IBM-supplied override PPF, which contains overrides to the base $PPF files for each component, has changed to ZVM $PPF. The override PPF for VM/ESA was ESA $PPF.

Installation Changes [4.1.0]

The following changes and enhancements have been made to the installation procedure:

- A new ″Express″ installation method using predefined defaults is available, making it faster and easier for you to install and service z/VM. There are some restrictions when using the Express installation method:
  - Only IBM supplied PPFs are used.
  - VM source code is not installed.
  - Customer local modifications are not allowed.
  - Products and features are installed onto minidisks only. You cannot move them to SFS.
  - Only the SMALL FILEPOOL is provided (no large VMSYS (SFS) filepool).
  - Only one DASD type and model can be used for your installation.
- The new SERVICE and PUT2PROD commands automate the application of an RSU and CORrective service. The SERVICE command installs an RSU or applies CORrective service for z/VM components, features, or products that are installed on the z/VM system DDR. The PUT2PROD command places components, features, or products that were serviced using the SERVICE command into production.

  All customers can use these commands at installation time. However, after installation is complete, they may be used only by Express cutsomers.
- DASD types 9345 and FBA are not supported.

VMSES/E Enhancements [4.1.0]

The following commands have been added:

PUT2PROD
: Places a component, feature, or product that was serviced by preventive or corrective service into production.

SERVICE
: Installs an RSU or applies CORrective service for the z/VM components, features, or products that are installed on the z/VM system DDR.

Installation Changes [4.3.0]

The following changes and enhancements have been made to the installation procedure:

- 3590 tape drive is now supported for installation.
- Non-XF 3480 tape drive is no longer supported for installation.
- 4mm DAT tape is no longer supported for installation.
- 3380 DASD is no longer supported for installation.
- Mixed DASD are no longer supported for installation. All 3390 DASD used for installation must be the same model.
- TSAF and AVS are no longer optionally installed; they are now part of the base installation.

TCP/IP Configuration Wizard [4.3.0]

A new utility automates the connection of a newly-installed z/VM system to a TCP/IP-based network. The TCP/IP configuration wizard, IPWIZARD, requires no knowledge of z/VM TCP/IP and is similar to the network configuration utilities used in Linux for zSeries distributions during Linux installation. This easy-to-use configuration wizard assists the z/VM installer in providing desired Internet Protocol (IP) configuration information such as host and domain name, IP addresses, and subnet mask. From that information, the wizard generates an initial TCP/IP configuration (creating the SYSTEM DTCPARMS, TCPIP DATA, and PROFILE TCPIP files) and verifies that connectivity to the network has been established. For more information, see the *z/VM: Guide for Automated Installation and Service*.

Service Enhancements [4.3.0]

The SERVICE tool can now detect local modifications and present that information to you. This allows you to rework your local modifications before the new service is built into executables. The new VMFUPDAT command provides a panel interface that displays which local modifications need to be reworked and allows updates to the System-Level Service Update Facility table. For more information, see the *z/VM: VMSES/E Introduction and Reference*.

New functions in the VMFUPDAT command allow you to:

- Change the INSTALL, BUILD, INCLUDE, INSPPF, BLDPPF, and P2PPF tags in the System-Level Status table
- Change the local modification rework status in the System-Level Local Modification table

Integrated 3270 Console [4.4.0]

z/VM V4R4 supports real and virtual integrated 3270 console devices. Real support enables this device, which is provided through a Hardware Management Console, to be used as a z/VM system operator console. This removes the requirement to have an external 3270 device to install and service z/VM V4R4. The z/VM Stand Alone Program Loader (SAPL) and stand-alone DASD Dump-Restore (DDR) program support the use of the integrated 3270 console as a system operator console. Virtual support enables testing of guest operating systems and utilities that support the integrated 3270 console device.

Note: There may be additional hardware requirements to use this support. See the section on server support in *z/VM: General Information*.

The following CP function has been updated:

- OPERATOR_CONSOLES system configuration file statement

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: System Operation*

Installation Enhancements [4.4.0]

The following improvements have been made to z/VM installation:

- There are fewer choices during installation, making z/VM easier to install.
- Language Environment is now a component of z/VM and has been upgraded to a new level.

Attention: Do not migrate Language Environment 1.8 or earlier to z/VM V4R4. The only level of Language Environment supported on z/VM V4R4 is the new Language Environment component. The files for the z/VM Language Environment component are installed on the MAINT 19E disk. Depending on how you plan to migrate other files from your old 19E disk to the new system, you may need to remove the old Language Environment files. See "Removing the Old Level of Language Environment" on page 7.

- A direct installation into SFS is now supported. Previously, the installation process installed all products, features, and components onto minidisks, then copied files to SFS.
- Service disks for all z/VM components (CP, CMS, VMSES/E, Dump Viewing Facility, REXX/VM, TSAF, AVS, GCS, and Language Environment) can now be either on minidisks or in SFS. Previously, only service disks for TSAF, AVS, GCS, and Language Environment could be in SFS.

  Note: The service disks for the z/VM components must be all on minidisks or all in SFS; you cannot have some components on minidisks and some in SFS.
- There are no longer separate source disks for the base components of z/VM; therefore, source code will be placed on the component's base disk.
- Source code, OSA/SF, and Tivoli® Storage Manager are no longer optionally installed; they are now part of the installation base. (Tivoli Storage Manager is installed disabled.)
- The steps to move a component or product into SFS directories are more automated.
- The new HCD and HCM for z/VM facility is pre-installed.
- The new Performance Toolkit feature is pre-installed (disabled).
- A new level of OSA/SF, 440, is pre-installed.
- A new release of ICKDSF, 1.17.0, is pre-installed.

For more information, see the *z/VM: Guide for Automated Installation and Service*.

Service Enhancements [4.4.0]

New service enhancements are as follows:

- Service processes and EXECs now support z/VM base component service disks either on minidisks or in SFS directories.
- TSAF and AVS now share SFS directories.
- Changes to the VMFREM command allow you to remove local modifications.
- New message log support for the SERVICE and PUT2PROD EXECs places all console messages into VMSES/E-formatted $MSGLOG files. This allows you to use VMFVIEW to view error and warning messages quicker and easier than in a console log.
- New functions in the VMFUPDAT command allow you to:
  - Change the manual status in the Service-Level Build Status table
  - Delete restart records in the System-Level Restart table or SERVICE $RESTART (from SERVICE EXEC) file.
- The VMFBDPMD part handler has been updated to allow building modules using **c89** and the CMS binder.

For more information, see the the *z/VM: VMSES/E Introduction and Reference* and the *z/VM: Service Guide*.

Product Parameter File ($PPF) Changes [4.4.0]

The shipped ZVM $PPF file now includes the Language Environment component.

The ZVM $PPF file and all base component product parameter files ($PPFs) now have an SFS component name for each component.

TSAF and AVS now share SFS directories.

There are no longer separate source disks for the base components of z/VM; therefore, source code will be placed on the component's base disk.

Installation of z/VM from DVD [5.1.0]

z/VM V5R1 includes the capability to install z/VM from a DVD to an ESS SCSI disk emulated as an FBA device or to a 3390 DASD. Installing from a DVD can significantly reduce the required installation media and allows you to install to a zSeries® server using only SCSI disks. This capability requires the Hardware Management Console, Version 1.8 or later.

The following CP functions have been added for this support:
- DVDPRIME utility
- INSTDVD utility

The following CP functions have been updated:
- INSTPLAN utility
- INSTVM utility

For more information, see:
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: Guide for Automated Installation and Service*

CP Is Now 64-Bit Only [5.1.0]

z/VM V5R1 includes only a 64-bit CP module. The 32-bit and dual-mode CP modules included with previous releases are no longer provided. VMSES/E commands and files are affected as follows:

- The VMFHLASM and GENCPBLS commands now have NODUAL as the default.
- In the CP product parameter file, 5VMCPR10 $PPF:
  - The ALTCNTRL tag has been removed from the CNTRLOP section.
  - The HCPESAME, CPLOAD32, CPLOAD64, and HCPBLNUC build lists have been removed from the BLD section.
  - The CPLOAD build list has been added to the BLD section. This build list builds one CP nucleus, which is the 64-bit version.

    Note that the parts included in the build for the single 64-bit CP nucleus have the file type TEXT, not TXTESAME. Also, there is now only one CP control file, HCPVM CNTRL.

Installation and Service Enhancements [5.1.0]

The automated service process has been updated to include:

- A new MAINT 500 minidisk, which may be used for loading certain service envelopes
- An easier query of RSU levels and individual PTF levels for a component

- Cataloging service memo files online and easily displaying them using the VMFUPDAT command
- An easier way to browse server restart records using VMFUPDAT SYSREST
- A new command, LOCALMOD, to automate the local modifications procedure

To help improve the ease-of-use for installing Linux with your z/VM system, spool and page space has been removed from the System Residence volume, and separate installation volumes for spooling and paging are now assigned by the user.

Installation of z/VM to 3390-1 or 3390-2 DASD is no longer supported and has been removed from the INSTPLAN utility.

For more information, see:

- *z/VM: Guide for Automated Installation and Service*
- *z/VM: VMSES/E Introduction and Reference*

Relocation of BFS /etc Directory [5.1.0]

The BFS /etc directory, which contains the configuration files for the OpenExtensions™ Shell and Utilities, has been moved from the VMSYS file pool to the VMSYSU file pool. For more information, see *z/VM: CMS File Pool Planning, Administration, and Operation*.

Product Parameter File ($PPF) Names [5.1.0]

The file name of the base $PPF file for each component and feature has changed:

Component/Feature	File name and file type
AVS	5VMAVS10 $PPF
CMS	5VMCMS10 $PPF
CP	5VMCPR10 $PPF
DirMaint	5VMDIR10 $PPF
Dump Viewing Facility	5VMDVF10 $PPF
GCS	5VMGCS10 $PPF
Performance Toolkit	5VMPTK10 $PPF
REXX	5VMREX10 $PPF
TCP/IP	5VMTCP10 $PPF
TSAF	5VMTSA10 $PPF
VMSES/E	5VMSES10 $PPF

Note: The product parameter file for Language Environment has not changed; it is still 4VMVMQ40 $PPF.

Support for Hardware Architectures and Facilities

This section describes VM support for, or exploitation of, new or enhanced hardware architectures and facilities.

Notes:

1. Some VM hardware support or exploitation may depend on hardware level or availability. See the sections on server support and device support in *z/VM: General Information*. For detailed information on hardware capabilities and requirements, refer to the appropriate hardware announcements and other hardware documentation.

2. This section also describes the VM simulation or emulation of certain hardware architectures and facilities. Others may be described under “Connectivity and Networking” on page 30.

S/390 Open Systems Adapter Support Facility (OSA/SF) [2.2.0]

The IBM S/390 Open Systems Adapter (OSA) is an integrated hardware feature that allows the S/390 platform to provide industry-standard connectivity directly to clients on local area networks (LANs) and wide area networks (WANs). The Open Systems Adapter Support Facility (OSA/SF) is a host-based tool supplied with VM that allows you to customize an OSA’s modes of operation. You can access OSA/SF by a CMS user ID, by a REXX call to the OSA/SF application programming interface (API), or through the OSA/SF Windows® 95, Windows NT®, or OS/2® graphical user interface (GUI). For more information, see *eServer zSeries 900: Planning for the Open Systems Adapter-2 Feature*.

Multi-Path Lock Facility (MPLF) [2.2.0]

The 3990 Model 6 Multi-Path Lock Facility (MPLF) provides function to control processes and share data in a loosely coupled environment. VM now provides support to allow dedicated devices and full-pack minidisks to use this real hardware facility. The addition of this support allows Transaction Processing Facility (TPF) systems running as guests on VM to share data with native TPF systems.

MPLF controls locking through a set of channel commands implemented by the 3990 Model 6 DASD control unit. These commands result in a setting which indicates the requested operation is either compatible or incompatible with the current state of the lock. The control unit maintains the names and status of the locks in use and responds to requests to obtain or release a lock. The control unit also notifies a host when it permits lock ownership that was previously denied. A host can obtain a lock, release a lock, examine the status of active locks, and check the outcome of lock-related operations using the channel commands.

For more information, see the SET LKFACR and QUERY LKFACR commands in the *z/VM: CP Commands and Utilities Reference*.

Guest Coupling Simulation [2.3.0]

VM guest coupling simulation provides for the simulation of one or more complete parallel sysplex systems within a single VM system image. This environment allows the testing and debugging of guest operating systems while running under VM. Guest coupling simulation is supported on the following processors (at the appropriate engineering-change levels):

- IBM S/390 Parallel Enterprise Server™ - Generation 3 and later
- IBM S/390 Multiprise® 2000 and later

VM guest coupling simulation support simulates a sysplex environment by using software equivalents of the real hardware and software requirements. The hardware is simulated by the message facility support in CP. Other virtual machines, referred to as coupled guests, are set up to run the guest operating systems (that is, MVS™ or OS/390). A special virtual machine called a Coupling Facilities (CF) service machine is defined and runs the coupling facility code. The coupled guest machines and the CF service machines are coupled together by a special message facility environment that passes information back and forth between the CF service machines and the coupled guests. The CF service machines manage data movement, scheduling, and locks, and maintain the status of the entire sysplex environment.

This facility also provides a CP command set to allow you to perform operations required to control the coupled guest environment:

- DEFINE MSGPROC
- DETACH MSGPROC
- QUERY VIRTUAL MSGDEVICES
- QUERY VIRTUAL MSGPROC
- RESTART MSGPROC
- SET MSGFACIL

These commands allow you to add and remove links to the CF service machines, request status from the CF service machines, and control the message facility environment. Also, a new CP SET VTOD command has been added to allow Year 2000 testing of a parallel sysplex environment on VM.

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: Running Guest Operating Systems*
- *z/VM: Diagnosis Guide*

Integrated Cluster Bus Channels [2.4.0]

VM provides support for integrated cluster bus channels for S/390 CMOS processors that support this channel type. The existing dynamic I/O configuration support has been updated to allow VM, when running in an LPAR controlling the dynamic I/O configuration changes, to define integrated cluster bus channels for an OS/390 LPAR on the same Central Electronics Complex (CEC).

Fibre Connection Channels [2.4.0]

VM provides support for fibre connection (FICON®) channels for processors that support this channel type. FICON channel technology can improve system performance and total aggregate system bandwidth. Each FICON channel provides the equivalent of eight ESCON® channels. VM support includes:

- Dynamic I/O configuration support for the new FICON and FICON-converter channel types
- Support for the fibre-channel-to-ESCON converter function on the 9032-5 switch
- Support for the FICON 9042-1 switch
- Support for the S/390 architecture changes in the SCHIB, ORB, and IRB
- A new CP monitor record, Extended Channel Path Measurement Data

QDIO Facility and OSA-Express Gigabit Ethernet [2.4.0]

VM provides guest support for the queued direct I/O (QDIO) facility on processors that support this new I/O architecture. The QDIO Facility allows a program to directly exchange data with an I/O device without performing traditional S/390 I/O instructions. To exchange data, both the I/O device and the program reference main storage directly through a set of data queues.

VM provides guest (dedicated device) support and dynamic I/O support for the new OSA Express Gigabit Ethernet (OSA-Express GbE). A new channel path ID has been defined for this device.

The following CP commands have been updated:

- DEFINE CHPID / PATH

- QUERY VIRTUAL OSA
- SET CPTRACE

For more information, see the *z/VM: CP Commands and Utilities Reference*.

Cryptographic Support [2.4.0]

This support provides guest virtual machine access to the S/390 CMOS Cryptographic Coprocessor by extending the existing VM guest cryptographic support for Bipolar processors. The new cryptographic support is upwardly compatible with the existing Bipolar support.

This support is intended primarily for use by OS/390 Integrated Cryptographic Service Facility (ICSF) applications running in an OS/390 guest of VM. ISCF is currently the only IBM application program interface to the S/390 CMOS cryptographic hardware. The following commands and statements were updated:

- CP DEFINE CRYPTO command
- CP QUERY CRYPTO command
- CP QUERY VIRTUAL CRYPTO command
- CP SET CRYPTO command
- CPU directory control statement
- CRYPTO directory control statement

For more information, see:

- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Planning and Administration*

IEEE Floating Point [2.4.0]

New function has been added to support IEEE Floating Point hardware on servers that provide this capability. CP has been updated to allow multiple levels of guest operating systems to use basic floating point extensions, floating point support extensions, hexadecimal floating point extensions, and binary floating point.

This support includes preservation and restoration of 16 floating point registers (Additional Floating Point registers 1,3,5,7,8-15 plus existing floating point registers 0,2,4,6) and the Floating Point Control (FPC) register which is provided by the IEEE Floating Point hardware. The following were updated:

- CP DISPLAY Registers command
- CP STORE (Registers) command
- CP STORE STATUS command
- CP TRACE command
- Messages HCP6153E and HCP6154E (new)

For more information, see the *z/VM: CP Commands and Utilities Reference*.

Note: Applications that exploit the IEEE Floating Point hardware require the IBM High Level Assembler Version 1 Release 3.0.

Extended-TOD-Clock [2.4.0]

The Extended-TOD-clock facility is a hardware facility available on certain processors which provides a 128-bit Time of Day (TOD) clock. VM supports the use of the Extended-TOD-clock facility from XA, ESA, and XC virtual machines.

Enterprise Storage Server® (ESS) FlashCopy® [3.1.0]

z/VM allows a native CP user to initiate a FlashCopy function (an instant copy of a disk or data set) of a source device to a target device on an IBM Enterprise Storage Server. Customers will find this feature especially beneficial for large databases, which normally require a long time to copy. FlashCopy support includes the new CP FLASHCOPY command. For more information, see the *z/VM: CP Commands and Utilities Reference*.

ESS Parallel Access Volumes [3.1.0]

z/VM provides guest support for the ESS Parallel Access Volumes feature. This feature allows the configuration of logical volumes (known as alias Parallel Access Volumes), where each logical volume (alias) has a unique device address but is actually an exposure of the existing real device (known as the base Parallel Access Volume). This allows the host to issue concurrent I/O requests to one real device, the base volume, through the different alias volumes.

Support for Parallel Access Volumes includes:

- The new CP QUERY PAV command, which displays information about the Parallel Access Volume devices on the system.
- Enhancements to the CP QUERY DASD DETAILS command to display additional information if the queried device is a Parallel Access Volume.
- A new CP Monitor Record, which has been added to Domain 6 (I/O) to record state change interrupts that indicate a change in the Parallel Access Volumes information:
  - Record 20 – MRIODSTC – State change

  Other Parallel Access Volumes information will be recorded in the existing Device Configuration Data Record (Domain 1, Record 6) and the Vary On Device - Event Data Record (Domain 6, Record 1).

Tape Support Enhancements [3.1.0]

z/VM provides additional guest support for the IBM 3494 Virtual Tape Server (VTS):

- Peer-to-Peer VTS provides flexible component placement to meet 7x24 processing requirements and provides a solution for remote backup and recovery.
- Import/Export allows physical tapes to be removed from and inserted into the VTS logical tape library.

z/VM supports guest use of IBM 3590 A60 tape controllers attached with FICON™ channels when such guests themselves support the 3590 A60 on native FICON channels.

z/Architecture™ Support [3.1.0]

z/Architecture (64-bit) capabilities are supported for guest operating systems.

Integrated Facility for Linux (IFL) [4.1.0]

z/VM supports the IBM S/390 Integrated Facility for Linux (IFL), a hardware feature available on G5, G6 and zSeries® servers which provides additional processing capacity for Linux workloads. CMS Level 17 or later, Linux for zSeries, Linux for S/390, z/VM V4R1 or later, and stand-alone utilities supplied with z/VM V4R1 or later are supported on IFL.

IFL is managed by Processor Resource/Systems Manager™ (PR/SM™) as a logical partition with dedicated CPs. Implementation of this facility requires an LPAR definition, following normal LPAR activation procedures. As with any change in the LPAR configuration of a processor, the introduction of additional resources to manage may have an impact on the capacity of the existing partitions and workloads running on the server. The size of the impact is dependent on the quantity of added resources and the type of applications being introduced. A tool is available to aid in assessing the impact to any server; contact your IBM representative for details.

Cryptographic Support [4.2.0]

z/VM supports the IBM PCICA (PCI Cryptographic Accelerator) and the IBM PCICC (PCI Cryptographic Coprocessor) for Linux guest virtual machines. This support provides clear-key RSA support for Linux guests enabling hardware SSL acceleration on the zSeries and S/390 servers. A z/VM system can include Linux guests using the RSA-Assist support simultaneously with other VM guests using the CMOS Cryptographic support.

The following commands and statements were updated:
- CP QUERY CRYPTO command
- CP QUERY VIRTUAL CRYPTO command
- CP SET CRYPTO command
- CRYPTO directory control statement

For more information, see:
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Planning and Administration*

ESS Large Volumes [4.2.0]

z/VM supports 3390 volumes greater than 10,017 cylinders on the ESS, up to the maximum supported by the DASD. This helps relieve device address constraints and improves disk resource utilization and storage administrator productivity by providing the ability to consolidate multiple disk volumes into a single address.

The following CP functions have been updated to reflect this new capacity:
- XLINK_DEVICE_DEFAULTS system configuration statement
- XLINK_VOLUME_INCLUDE system configuration statement
- MDISK directory control statement

For more information, see *z/VM: CP Planning and Administration*.

FICON CTCA [4.2.0]

z/VM supports FICON Channel-to-Channel communications between an IBM zSeries 900 (at the appropriate service level) and another z900 or an S/390 Parallel Enterprise Server G5 or G6. This enables more reliable and higher bandwidth host-to-host communication than is available with ESCON channels.

The CP DEFINE CU/CNTLUNIT command was updated.

Additional explanation was added to dynamic I/O return codes for control units.

For more information, see:
- *z/VM: CP Commands and Utilities Reference*

- *z/VM: CP Planning and Administration*

HiperSockets™ [4.2.0]

z/VM supports the z/Architecture HiperSockets function for high-speed TCP/IP communication among virtual machines and logical partitions (LPARs) within the same zSeries server. The HiperSockets function uses an adaptation of the queued direct I/O (QDIO) high-speed I/O protocol. The HiperSockets function allows virtual machines and logical partitions to communicate internally over the memory bus using the internal-queued-direct (IQD) channel type in the z900.

Up to four IQD channels can be configured within a z900. Each IQD channel provides isolated communications among the logical partitions and virtual machines using that channel. There is no communication between different IQD channels, thereby providing communication security among separate groups of logical partitions and virtual machines connected to different IQD channels.

The z900 provides up to 1024 HiperSockets devices through which HiperSockets communication can be used, divided at your discretion among the four IQD channels.

z/VM supports HiperSockets for use by guest operating systems and by the TCP/IP server virtual machine. VM programs using traditional TCP/IP socket connections can communicate through HiperSockets with other VM programs, guest operating systems, and other logical partitions that are also using TCP/IP.

Note: z/VM support for HiperSockets requires a z900 server at EC level J10607 or J10608. For the most current information on the VM support for HiperSockets, refer to the z/VM web site at:

`www.ibm.com/eserver/zseries/zvm/`

For customers who plan to run z/OS as a guest of VM, refer to the z/OS web site for the most current information on z/OS support for HiperSockets:

`http://www.ibm.com/eserver/zseries/zos/`

OSA-Express Token Ring [4.2.0]

OSA-Express token ring support expands on previous OSA token ring support by adding 100Mb/sec (megabit/second) support to the earlier 4 Mb/sec and 16 Mb/sec support.

The OSA-Express token ring feature supports the QDIO data transfer architecture. QDIO support requires z/VM V4R2.

The OSA-Express token ring feature continues to support non-QDIO environments, the traditional TCP/IP (LAN Channel Station (LCS)) and SNA (Link Services Architecture (LSA)) traffic. VM/ESA 2.3.0 or later is required.

z/VM V4R2 supports the OSA-Express token ring feature for use by guest operating systems and by the TCP/IP server virtual machine.

z/Architecture Guest Coupling Facility [4.2.0]

VM guest coupling support has been enhanced to accommodate the z/Architecture guest coupling facility. These enhancements include the following:

- Larger Vector Support
- Coupling Facility Duplexing

- Multiple-Buffer Capability
- Message Architecture Enhancements
- New CP Commands:
  - DEFINE CFLINK
  - DETACH CFLINK
  - QUERY CFLINKS
  - QUERY VTOD
  - SET CFLINK
- Updated CP Commands and Directory Control Statements
  - DEFINE MSGPROC
  - SPECIAL Directory Control Statement

For more information, see:

- *z/VM: CP Commands and Utilities Reference*
- *z/VM: Running Guest Operating Systems*
- *z/VM: CP Planning and Administration*

Fibre Channel Protocol (FCP) Guest Support [4.3.0]

z/VM provides guest support for the new FCP hardware channel. This channel allows an IBM zSeries server to connect to a fibre-channel fabric. The z/VM support allows guest operating systems to access selected devices on Small Computer System Interface (SCSI) controllers connected to the fabric.

The programs operating in guest virtual machines on z/VM are responsible for providing the appropriate support to use and control the SCSI devices connected through the FCP channel. Your system administrator is responsible for ensuring the necessary level of access control and concurrent-access data integrity for the SCSI devices. z/VM itself neither uses any SCSI devices nor controls guest access to them. z/VM allows the dedication of zSeries subchannels on FCP channels to a guest. Each subchannel allows the guest to access any SCSI device for which access permission has been granted to the worldwide port name of the FCP channel within the fibre-channel infrastructure. Typical access controls within the infrastructure include zoning in the switches and Logical Unit Number-masking (LUN-masking) in the controllers.

When FCP-based SCSI support is available from Linux for zSeries, guest Linux operating systems can access data on the SCSI devices connected to the fibre-channel fabric. Access to SCSI devices by a Linux guest is governed by open standards for fibre-channel fabrics and controllers as well as by proprietary or commonly-available functions provided by individual vendors. Therefore, unlike the device isolation provided among virtual machines by z/VM and z/Architecture for devices connected to other types of channels, neither z/VM nor the FCP channels provide for the isolation of SCSI devices to a single virtual-machine configuration.

The following CP commands have been updated for this support:

- ATTACH
- DEFINE CHPID / PATH
- DETACH (Real Device)
- QUERY ALL
- QUERY CHPID / PATH
- QUERY (Real Device)
- QUERY VIRTUAL ALL
- QUERY (Virtual Device)

For more information, see the *z/VM: CP Commands and Utilities Reference*.

Performance Monitor Enhancement [4.3.0]

To correctly extract processor configuration data and performance data from each of the I/O processors on zSeries servers, CP has been updated to issue the new STSI (Store System Information) hardware instruction and record the appropriate monitor information. The Performance Reporting Facility (PRF) feature has been updated to process this new monitor data.

Cascaded FICON Directors [4.4.0]

z/VM supports the zSeries capability to cascade two FICON directors within a fibre-channel fabric. The z/VM support for cascaded FICON directors is embodied in support for two-byte fibre-channel link addresses when defining and configuring control units within the fabric. Previously, only single-byte link addresses were needed in a single-switch fabric. Cascaded FICON directors require the use of two bytes of the standard three-byte fibre-channel link address; the third byte, for arbitrated-loop support, is not used in FICON fabrics. When using the new cascaded-FICON-director function, your hardware-I/O definitions need to be updated accordingly.

When CP is in control of the dynamic I/O, use the DEFINE CU and MODIFY CU commands to define a cascaded FICON director topology to the system. When HCD is in control of the dynamic I/O, use the ACTIVATE command from the HCD virtual machine to define the cascaded FICON director topology.

The following CP functions have been updated:
- DEFINE CU / CNTLUNIT command
- MODIFY CU / CNTLUNIT command

For more information, see the *z/VM: CP Commands and Utilities Reference*.

Enhanced QDIO Performance [4.4.0]

The QDIO architecture, originally introduced with the OSA-Express, was later extended to HiperSockets and the FCP channels. The architecture itself was extended in HiperSockets to include a new type of high-performance I/O interruption known as an adapter interruption. The use of adapter interruptions has been extended to the OSA-Express and FCP channels on the IBM @server® zSeries 990 (z990).

In addition to the use of adapter interruptions by the OSA-Express and FCP channels, the z990 server is designed to include a performance assist for the virtualization of adapter interruptions being given to operating systems running as guests of z/VM. This hardware performance assist is available to V=V guests (pageable guests) that support QDIO on z/VM V4R4.

This new IBM virtualization technology is designed to benefit all guest operating systems in environments where they can process adapter interruptions. This includes all users of HiperSockets, and guest operating systems that add adapter-interruption support for OSA-Express and FCP channels. With the enhancement of the TCP/IP stack in z/VM V4R4 to use adapter interruptions for OSA-Express, TCP/IP can benefit from this performance assist for both HiperSockets and OSA-Express.

The following CP functions have been added for this support:

- QUERY QIOASSIST command
- SET QIOASSIST command

The following CP functions have been updated for this support:
- QUERY VIRTUAL FCP command
- QUERY VIRTUAL OSA command

For more information, see the *z/VM: CP Commands and Utilities Reference*.

ESS FlashCopy Version 2 [4.4.0]

z/VM supports the following ESS FlashCopy Version 2 enhancements:

- Data Set FlashCopy, which removes the restriction where source cylinders must be copied to the same physical target cylinders. The removal of this restriction is especially helpful when copying one VM minidisk to another. It allows a non-fullpack source minidisk to be copied to a non-fullpack target minidisk when the minidisks exist on different physical cylinder extents of the same physical volume or different physical volumes.
- Multiple Relationship FlashCopy, which allows a source to have multiple targets. This function allows one source volume to be copied to many target volumes.
- Elimination of Logical Storage System (LSS) constraint, which allows a source and target relationship to span across an LSS. This removes the restriction where both the source volume and the target volume must reside in the same logical control unit.

ESS Peer-to-Peer Remote Copy (PPRC) Enhancements [4.4.0]

z/VM supports guest use of the ESS PPRC Extended Distance (PPRC-XD) function. Guests who support PPRC-XD and have DATAMOVER authority in their user directory can copy full volumes of data in non-synchronous mode, which extends the distance between the primary and secondary ESS with a minimal effect on performance. PPRC-XD is suitable for data migration, backup, and disaster recovery procedures. Data can be copied at distances well beyond the 103 km supported for PPRC synchronous transmissions. Typically, the distance for PPRC-XD is limited only by the capabilities of the network and channel extension technologies.

Native z/VM support for PPRC-XD is provided by Device Support Facilities (ICKDSF), Version 1 Release 17, with ICKDSF running in a CMS virtual machine.

z/VM also provides guest support for PPRC Version 2, which is designed to offer an Asynchronous Cascading solution, providing a complete, consistent, and coherent copy of data at a remote site. Asynchronous Cascading provides a two-volume synchronous PPRC implementation with a non-synchronous third volume serving as a backup device that can provide a multi-site, long distance solution.

Extended Channel Measurement Data Support (ECMDS) [4.4.0]

z/VM supports the extended I/O-measurement facilities of the z990 server. This function provides an extended I/O-measurement block for each subchannel and an extended measurement word at the completion of each I/O operation. Each extended I/O-measurement block has its own 64-bit address, allowing the measurement blocks to be stored in noncontiguous real memory. The extended measurement word provides channel measurement data for each I/O operation when it completes, streamlining measurement processing in the operating system.

Guest Coupling Enhancement [4.4.0]

VM's virtual Coupling Facility (CF) support has been enhanced to allow z/VM systems to run as second-level (or higher) guests while simulating complete OS/390 and z/OS coupled sysplexes. This enhanced support loads the Coupling Facility Control Code (CFCC) from the Service Element of a zSeries or S/390 server into CF service virtual machines in a z/VM system running as a second-level (or higher) guest of z/VM V4R4. This allows you to test an OS/390 or z/OS Parallel Sysplex® environment at any guest level.

Note: Each additional level of guest virtualization incurs a performance penalty that may make running a Parallel Sysplex impractical at higher guest levels.

Logical Channel Subsystems [4.4.0]

A new logical channel subsystem (LCSS) structure is introduced with the z990 server. It is designed to allow the definition of more than one channel subsystem (CSS), providing channel-path and subchannel controls for configuring channel-subsystem images. Each channel-subsystem image can be configured with up to 256 channel paths, and each logical partition has access to one channel-subsystem image.

Support for dynamic I/O configuration on z/VM V4R4 has been extended to allow channel paths, control units, and devices to be dynamically added, changed, and deleted in multiple logical channel subsystems when z/VM V4R4 is running on a z990 server with the applicable hardware support. When z/VM V4R4 is running on a z990 server that includes the hardware support, and z/VM is the controlling logical partition for dynamic-I/O configuration, z/VM is designed to handle all of the new elements of each CSS facility for changing your hardware I/O configuration. To dynamically change the I/O configuration, one of two methods can be employed:

- CP's suite of interactive dynamic-I/O-configuration commands
- HCD and HCM configuration-managment tools

The following CP functions have been changed for this support:

- DEFINE CHPID/PATH command
- DEFINE CU/CNTLUNIT command
- DEFINE DEVICE/IODEVICE command
- MODIFY CHPID/PATH command
- MODIFY CU/CNTLUNIT command
- MODIFY DEVICE/IODEVICE command
- DELETE CHPID/PATH command
- DELETE CU/CNTLUNIT command
- DELETE DEVICE/IODEVICE command
- QUERY CHPID command
- QUERY DYNAMIC_I/O command
- QUERY LPARS command
- DIAGNOSE code X'2AC' – HCD Dynamic I/O

For more information, see:

- *z/VM: I/O Configuration*
- *z/OS and z/VM: Hardware Configuration Manager User's Guide*

Support for 30 LPARs [4.4.0]

Prior to the z990, there was an LPAR limit of 15. IBM plans to increase this limit for the z990 server. z/VM can handle I/O-configuration definition and dynamic-I/O

configuration for up to 30 LPARs. In addition, the CP Monitor has been updated to allow performance data to be collected and recorded for z/VM systems running on servers with more than 15 LPARs.

3590 Model H [4.4.0]

z/VM supports the IBM TotalStorage® Enterprise Tape Drive 3590 Model H. This 384-track tape drive is faster and of higher capacity than the previous 256-track 3590 Model E. The 3590 Model H can be configured to emulate the device characteristics of either the 3590 Model B or the 3490 Model E. z/VM supports both emulation modes. The drive performs at 384-track speeds and capacity regardless of how it is configured.

The following external interfaces have been updated for this support:
- CP DIAGNOSE code X'210'
- CMS message DMS2139I

z/VM Operates on zSeries Only [5.1.0]

z/VM V5R1 is designed to operate only on IBM zSeries (z990, z900, z890, and z800) or equivalent servers that support the IBM z/Architecture (64-bit).

z/VM V5R1 supports the enhanced z990 and the new z890, including supporting the enhanced LCSSs, spanned channels, and other server functions and features described below.

ASN-and-LX-Reuse Facility Support [5.1.0]

z/VM adds support for guest use of the ASN-and-LX Reuse Facility when available on the processor. For example, z/OS Version 1 Release 6 will take advantage of this architectural extension to improve availability by reusing linkage indices in more circumstances than can currently be done.

The following CP commands are have been updated for this support:
- DISPLAY LKS
- DUMP LKS
- TRACE *mnemonic1*

For more information, see *z/VM: CP Commands and Utilities Reference*.

Enhanced LCSS Support [5.1.0]

The scalability of LCSSs is being further expanded — you can now define up to four LCSSs on a single z990. The z890 can support up to two LCSSs. The channel subsystem structure now offers the following:

- Four LCSSs (z990), two LCSSs (z890)
  - Each LCSS can have up to 256 channels defined.
  - Each LCSS can be configured with 1 to 15 logical partitions (LPARs).
    - Cannot exceed 30 LPARs per system.

There is no change to the operating system maximums. One operating system image continues to support up to 256 Channel Path Identifiers (CHPIDs). z/VM V5R1 will support four LCSSs on a zSeries server with the capability to do dynamic-I/O configuration in any LCSS.

ESS Model 750 [5.1.0]

z/VM V5R1 supports the ESS Model 750. The Model 750 supports FlashCopy® V1 and V2, as well as Peer-to-Peer Remote Copy (PPRC) V1 and V2. The Model 750 also includes support for the zSeries performance enhancers, and Parallel Access Volumes (PAV).

ESS PPRC over FCP Connections [5.1.0]

z/VM V5R1 provides guest support for using the ESS PPRC function over FCP connections. Native support is provided by running Device Support Facilities (ICKDSF), Release 17, in a CMS virtual machine.

I/O Devices Not Supported [5.1.0]

In addition to devices not supported by previous releases of z/VM, the following I/O devices are not be supported by z/VM V5R1:

- 3370 DASD
- 3375 DASD
- 3380 DASD on 3880 DASD Control Unit

  Note: Emulated 3380 devices on 3990 Model 2 or higher controllers will continue to be supported. This includes RAMAC® emulated 3380 models and 3390 DASD running in 3380 track compatibility mode.
- Multiprise Internal Disk
- 3830 DASD Control Unit
- 3880 DASD Control Unit
- 3995 Optical Library Dataserver
- 9332 DASD
- 9335 DASD
- 9336 DASD, except simulated VDISKs and emulated SCSI LUNs
- 9340 DASD Subsystem, including all associated DASD and controllers
- 2440 Tape Unit
- 3420 Tape Unit
- 3422 Tape Unit and Control, except OMA/2 CD devices that emulate 3422s (supported for installation only)
- 3424 Tape Subsystem
- 3430 Tape Unit
- 9348 Tape Unit
- 3803 Tape Control Unit
- 9221 DASD/Tape Subsystem Control
- SDLC Integrated Communication Attachment
- BSC Integrated Communication Attachment
- CETI (9221) Integrated Communication Attachment

Omission of a device from this list does not mean that the device is supported. For a list of the devices that are supported by z/VM V5R1, see *z/VM: General Information*.

Improvements to Capacity Upgrade on Demand [5.1.0]

z/VM V5R1 supports the On/Off Capacity on Demand (On/OffCoD) and the Capacity Backup Upgrade (CBU) functions on IBM zSeries servers and includes functional enhancements that can allow z/VM to:

- Recognize changed processor configuration settings on a zSeries system to:
  - Report the change in configuration to the system operator
  - Report the change in configuration to guests that support configuration change notification
- Recognize changed processor capacity settings on zSeries systems to:
  - Report the change in capacity to guests that support capacity measurement for billing purposes
  - Report the capacity change in z/VM monitor and accounting data

The following CP functions have been added for this support:

- QUERY CAPABILITY command determines the capability values of the processors in the configuration. A processor's capability value indicates its capability relative to other CPU models.
- Type D Accounting Record records the CPU capability of the processors in the configuration. This record is generated during system initialization and whenever the CPU capability changes.

For more information, see:

- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Planning and Administration*

OSA-Express Integrated Console Controller [5.1.0]

With the new z890 and enhancements to the z990, IBM is introducing a new function for the OSA-Express 1000BASE-T Ethernet feature and a new Channel Path Identifier (CHPID) type, OSC. The new OSA-Express Integrated Console Controller (OSA-ICC) function supports TN3270E and non-SNA DFT 3270 emulation. Now, 3270 emulation for console session connections is integrated in the z990 and z890 through a port on the OSA-Express 1000BASE-T Ethernet feature. This can help eliminate the requirement for external console controllers (2074, 3174).

OSA-ICC support is available with the OSA-Express 1000BASE-T Ethernet feature, and can be configured on a port-by-port basis. A port on the 1000BASE-T Ethernet feature can be configured as an OSD, OSE, or OSC CHPID type. Use of the OSA-ICC and the OSC CHPID type is supported by z/VM V5R1.

For more information, see:

- *z/VM: CP Commands and Utilities Reference*
- *eServer zSeries: Open Systems Adapter-Express Integrated Console Controller User's Guide*

PCIX Cryptographic Coprocessor (PCIXCC) [5.1.0]

z/VM V5R1 provides z/OS and Linux guest support for the PCIXCC feature available with the IBM z990 and z890. z/VM support includes:

- Dedicated-queue support for clear-key and secure-key cryptographic functions for z/OS guests

- Shared-queue and dedicated-queue support for clear-key cryptographic functions for Linux guests with up to 256 dedicated queues

The following CP functions have been changed for this support:
- CRYPTO directory control statement
- QUERY CRYPTO command
- QUERY VIRTUAL CRYPTO command

For more information, see:
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Transparent Sharing of Additional Channel Resources Across LCSSs [5.1.0]

When LCSSs were introduced, they were designed to provide transparent sharing of Internal Coupling Channels (ICs) and HiperSockets™ between separate LCSSs. This support has now been expanded to include the ICB-3, ICB-4, ISC-3, FICON™ Express, and OSA-Express features. They are now capable of being configured as Multiple Image Facility (MIF) spanning channels, allowing sharing of channel resources across LPARs.

Spanned channels can be shared among LPARs across LCSSs. ICB-3, ICB-4, ISC-3, FICON Express, and OSA-Express can be configured to multiple channel subsystems and are intended to be shared transparently by any or all of the configured LPARs without regard to the LCSS to which the LPAR is configured.

z/VM V5R1 supports all of the spanned channel types identified, and also supports internal spanned channels.

Up to 24 Processor Engines in a Single z/VM Image [5.1.0]

z/VM supports up to 64 virtual processor engines in a single guest configuration. z/VM V5R1 allows up to 24 real processor engines in a single z/VM image on a z990. The specific workload will influence the efficiency with which a specific z/VM system can use larger numbers of engines. Generally, z/VM overhead is expected to be lower with fewer, more CPU-intensive guests than with many lightly loaded guests. Excessive overcommitment of storage could contribute to increased overhead as well.

3592 Tape Drive [5.1.0]

z/VM supports the IBM TotalStorage Enterprise Tape Drive 3592, which offers greater capacity and improved performance over previous 3590 tape drives. The 3592 supports standard read/write media as well as Write Once Read Many (WORM) media. z/VM provides both native and guest support for the 3592.

Message HCP2246E has been added for this support, and the following CP interface has been updated:
- DIAGNOSE code X'210'

Connectivity and Networking

This section describes changes that can affect how VM systems, applications, and guest operating systems communicate with each other.

Notes:

1. For information about VM support for hardware connectivity facilities, see "Support for Hardware Architectures and Facilities" on page 16.
2. This section does not include TCP/IP changes prior to z/VM V4R2. For that information, see *z/VM: TCP/IP Planning and Customization*. For TCP/IP migration considerations and other TCP/IP topics, also see the z/VM TCP/IP web site at http://www.ibm.com/eserver/zseries/zvm/related/tcpip/.

MQSeries® Client for VM/ESA [2.3.0]

MQSeries Client for VM/ESA enables applications using message queuing to communicate across different platforms using client-server technology.

MQSeries Client for VM/ESA executes in any CMS virtual machine and provides a simple user interface to the server environment. It is not a full function queue manager. Therefore it needs to be connected through TCP/IP or APPC to other queue managers.

The application Language Bindings supported are:

- IBM C for VM/ESA
- IBM VS Cobol II
- IBM PL/I Compiler
- REXX/VM
- IBM Assembler

For more information, see the *MQSeries: Application Programming Guide*, SC33-0807.

Guest LAN [4.2.0]

z/VM supports a network of virtual adapters connecting guests within a z/VM system. The CP component of z/VM has been enhanced to provide:

- Virtual HiperSockets adapters

  CP now offers a virtual network interface card (NIC) that emulates the HiperSockets adapter. A guest should be able to operate the virtual adapter using the same software that would have been used to drive the equivalent hardware.
- Connectivity for virtual adapters

  CP now provides commands that enable z/VM users to connect virtual network adapters to an emulated Local Area Network (LAN) segment, known as a Guest LAN. Guests connected by an emulated LAN should be able to communicate using the same software that would have been used to communicate over an equivalent physical LAN segment.

The following CP commands have been added:

- DEFINE LAN
- DEFINE NIC
- DETACH LAN
- DETACH NIC
- QUERY LAN
- QUERY NIC
- QUERY VMLAN
- SET LAN
- UNCOUPLE

The following CP functions have been updated:
- COUPLE command
- DEFINE (Virtual Device) command
- QUERY (Virtual Device) command
- QUERY VIRTUAL OSA command
- SPECIAL directory control statement

TCP/IP Stack Vulnerability Reduction [4.2.0]

Function has been added to improve the performance and reliablity of the TCP/IP stack by recording and reporting some Denial of Service (DOS) attacks and preventing their propagation. These attacks include:

- Smurf — ICMP Echo Request packets sent to IP broadcast or multicast addresses
- Fraggle — UDP Echo Request packets sent to IP broadcast or multicast addresses
- Ping-o-Death — ICMP Echo Request packets that are too large.

Guest LAN Enhancements [4.3.0]

The Guest LAN implementation has been extended to support multicast transmission across HiperSockets Guest LANs. Also, Guest LANs can now be defined to function as either HiperSockets transport media or OSA-Express QDIO transport media. The addition of QDIO simulation allows the virtualization of a QDIO LAN environment and provides support for the broadcast capability that is part of the QDIO architecture. As with the z/VM HiperSockets simulation, no real hardware is required to support the OSA-Express QDIO simulation.

Serviceability aids have been added in the form of an AIF trace option to trace the occurrence of Adapter Interruption Facility events, and external symbols are defined to mark key points for adding TRSOURCE traps.

The following new CP commands have been added for this support:
- SET VMLAN
- TRACE AIF

The following CP functions have been updated:
- DEFINE LAN system configuration statement
- SPECIAL directory control statement
- COUPLE command
- DEFINE LAN command
- DEFINE NIC command
- QUERY LAN command
- QUERY NIC command
- QUERY VMLAN command
- SET LAN command

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

TCP/IP Device and Stack Performance Improvements [4.3.0]

Key sections of TCP/IP routing, device driver, and other processes have been optimized. By primarily recoding these processes in Assembler Language,

improvements in performance of high-use code paths in the TCP/IP stack have been achieved. In addition to recoding, some algorithms were changed to provide equivalent functions at lower CPU costs.

When TCP/IP is configured to use the equal-cost multipath support, the routing table will maintain up to four equal-cost paths to a particular destination, providing load balance support and better performance. Refer to *z/VM: TCP/IP Planning and Customization* for further information.

Additional support has been added to the NETSTAT command. Functions of OBEYFILE such as starting and stopping devices and performing other simple control tasks can be accomplished by using the OBEY function of the NETSTAT command.

A new FTP PASSIVE subcommand has been added to control whether the client or the server establishes connections for data transfers. Refer to *TCP/IP User's Guide* for further information.

The TCP/IP stack has been enhanced to support the following:

- Multicast for HiperSockets
- Broadcast for QDIO

TCP/IP Dynamic Stack Configuration [4.3.0]

Authorized users now can define, change or display the TCP/IP configuration dynamically. These changes are temporary and are discarded when the TCP/IP stack virtual machine is restarted. This support involves the following commands:

IFCONFIG
: Added with z/VM V4R3; refer to *z/VM: TCP/IP Planning and Customization* for more information.

NETSTAT DEVLINKS
: Updated to display additional information about the devices and links defined for the TCPIP virtual machine; refer to *z/VM: TCP/IP User's Guide* for more information.

QUERY (Real Device)
: Updated with a new operand, ID, which displays the sense ID information returned by a device and its control unit; refer to *z/VM: CP Commands and Utilities Reference* for more information.

The IFCONFIG command can also be used to generate syntactically-correct configuration statements for inclusion in the PROFILE TCPIP file in order to make permanent changes to the network configuration.

TCP/IP Stack Vulnerability Reduction [4.3.0]

Function has been added to improve the performance and reliability of the TCP/IP stack by recording and reporting additional Denial-of-Service (DoS) attacks and preventing their propagation. These attacks include:

- Kiss-of-Death (KOD) — an IGMP based attack that depletes the stack's large envelopes
- KOX — a version of the KOD attack that also has source IP address spoofing
- Stream — an attack in which TCP packets are sent to the stack with no header flags set
- R4P3D — an augmented version of the Stream attack

- Blat — a version of the Land attack that also has the URG flag turned on in the TCP header and has the ability to incrementally spoof the source IP address
- SynFlood — an attack in which the initiator floods the TCP/IP stack with SYN packets that have spoofed source IP addresses, resulting in the server never receiving the final ACKs needed to complete the three-way handshake in the connection process.

The Smurf DoS attack has also been updated to address three variants of the attack. Smurf is a DoS attack in which an ICMP Echo Request is sent to a broadcast or multicast address. The three variants are:

- Smurf-IC — where ″IC″ denotes that incoming packets are using the TCP/IP stack to launch an attack
- Smurf-OB — where ″OB″ denotes that an outbound ICMP Echo Request matched the description of a Smurf attack
- Smurf-RP — where ″RP″ denotes that ICMP Echo Reply packets being received by the stack do not match any Echo Requests that were sent.

Guest LAN Support of Internet Protocol version 6 (IPv6) [4.4.0]

Guest LAN support for OSA-Express simulation in QDIO mode has been updated for IPv6. Virtual machines in the Guest LAN environment can define and use simulated OSA-Express devices that support both the IPv4 and IPv6 protocols.

IEEE Virtual Local Area Network (VLAN) Support [4.4.0]

IEEE Virtual LAN (VLAN) standard 802.1q describes a mechanism that is designed to enable groups of hosts to be logically connected into a single Local Area Network (LAN) even though they are connected to different switches in different physical locations. Network hosts can be organized into LAN segments which fit an organization's network traffic patterns, rather than being dependent on physical location. In addition, by connecting a router to multiple VLANs, savings can be realized by providing router connections to new LAN segments without having to add additional network interfaces to the routers.

To support IEEE VLANs, z/VM V4R4 provides:

- Enhancements to TCP/IP for z/VM to enable membership in a VLAN for IBM zSeries OSA-Express (QDIO) and HiperSockets adapters that support IEEE 802.1q
- Enhancements to z/VM's virtual QDIO and HiperSockets network interface simulation to support VLAN frame tagging as described by IEEE 802.1q
- Management and control of the VLAN identifiers (VIDs) that can be used by guest virtual machines

TCP/IP Broadcast Support for HiperSockets [4.4.0]

TCP/IP broadcast support is available for the HiperSockets environment when utilizing Internet Protocol version 4 (IPv4). Applications that use the broadcast function can propagate the broadcast frames to all TCP/IP applications when using either HiperSockets or OSA-Express QDIO. Broadcast support is automatically enabled for the TCP/IP stack.

TCP/IP IMAP User Authentication Exit [4.4.0]

Previously, TCP/IP Internet Message Access Protocol (IMAP) users required a VM user ID and password to access the IMAP mail store on z/VM. Through a new user-written IMAP authentication exit, a VM user ID and password, with the

accompanying limitation of eight characters, are no longer required. The authentication exit runs in a separate virtual machine (IMAPAUTH), authenticates user IDs and passwords, and maps the IMAP user's ID to an eight-character SFS ID by which the user accesses the mail store.

You have the flexibility of using whatever authentication program you want to use. The authentication exit is enabled through a new TCP/IP configuration statement, AUTHENTICATEID. If enabled, the exit is called to handle the following types of requests:

- Validating LOGIN commands
- Mapping a long name to a short name
- Pre-authorizing connections

If the exit is not enabled, the IMAP server validates IMAP clients through CP or an external security manager.

For more information about IMAP user authentication, see *z/VM: TCP/IP Planning and Customization*.

TCP/IP SSL Server Upgrade [4.4.0]

The TCP/IP Secure Sockets Layer (SSL) server is now compatible with the Linux 2.4 kernel. The upgraded SSL server provides appropriate Red Hat Package Manager (RPM) packages for the SuSE Linux 2.4.7 SLES 7 and 2.4.19 SLES 8 distributions. This upgrade helps avoid potential support issues with the backlevel 2.2.16 Linux kernel and allows the SSL server to exploit the many performance improvements in the Linux 2.4 kernel.

TCP/IP Stack Performance Improvements [4.4.0]

The performance of the TCP/IP stack has been improved by optimizing additional high-use code paths and adding virtual multiprocessing capabilities. Individual device drivers can now be associated with particular virtual processors. A new CPU option on the DEVICE configuration statement designates the CPU where the driver for a particular device will be dispatched, allowing up to seven virtual processors to be exploited. This enables the TCP/IP load to be spread across multiple real processors and, in high-activity environments, can improve responsiveness and throughput. If your TCP/IP load ordinarily uses a substantial portion of a single processor, there may be benefits to creating a multiprocessor configuration. For more information, see *z/VM: TCP/IP Planning and Customization*.

TCP/IP Stack Security Improvements [4.4.0]

The overall security and auditability of the TCP/IP stack and the integrity of the z/VM system have been improved to aid self-protection by providing better controls, monitoring, and defaults, which include:

- Logging of all TCP/IP administrative commands (including NETSTAT, OBEYFILE, and IFCONFIG) that alter, or attempt to alter, the active IP or CP configuration.
- Changing the defaults of the ASSORTEDPARMS statement within the TCP/IP configuration to:
  - **RESTRICTLOWPORTS**, to prevent impersonation ("spoofing") of well-known z/VM TCP/IP applications by CMS users or guest operating systems
  - **VARSUBNETTING**, to avoid creating unnecessary TCP/IP routing table entries

The security of the TCP/IP stack has been improved by making the RESTRICTLOWPORTS operand of the ASSORTEDPARMS statement active ***by default.*** Thus, all TCP/IP applications that listen on "well-known" ports (ports 1 through 1023) must be given permission to do so. Such permission can be granted by customizing the TCP/IP server configuration file (PROFILE TCPIP, or its equivalent) in one of three ways:

1. Use the PORT statement to reserve the specific port (or ports) required by each application (virtual machine) used on your system. **This is the preferred method.** Note that with TCP/IP Level 440, ports can reserved within a specific range, in addition to being reserved on an individual basis.
2. Modify the OBEY statement to include the affected virtual machines in the TCP/IP obey list.
3. Include the FREELOWPORTS operand as part of an ASSORTEDPARMS statement. Note that *this method removes the default protection for all well-known ports.*

Note: When the RESTRICTLOWPORTS default is in effect and appropriate port authorizations have not been provided, applications that rely upon well-known ports (for example, VM-based web servers or remote printing functions such as **lpr**) are likely to report "Unable to open port(s)" or "Permission denied" conditions.

For more information, see *z/VM: TCP/IP Planning and Customization*.

Virtual FICON CTCAs [4.4.0]

CP's virtual I/O subsystem supports the simulation of FICON Channel-to Channel Adapters (CTCAs). This support enhances previous virtual-CTCA support by adding the FICON protocol as an option for guest operating systems. Virtual CTCAs now support the 3088, ESCON, and FICON protocols. A new CTCA device subclass, FCTC, has been defined for the virtual FICON CTCA.

The following CP functions have been updated:

- SPECIAL directory statement
- DEFINE CTCA command
- QUERY VIRTUAL CTCA command

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Virtual Switch [4.4.0]

z/VM further enhances virtualization technology by introducing a virtual IP switch that is capable of bridging a Guest LAN to an associated real LAN connected by an OSA-Express adapter. The Virtual Switch is designed to help eliminate the need for virtual machines acting as routers to provide IPv4 connectivity to a physical LAN through an OSA-Express adapter. Further, it eliminates the need to define a separate routable subnet for the exclusive use of the members of a Guest LAN. Using the Virtual Switch, the convenience of a Guest LAN is maintained while allowing the guests to be assigned IP addresses in the real LAN subnet.

Virtual routers consume valuable processor cycles to process incoming and outgoing packets, requiring additional copying of the data being transported. The Virtual Switch helps alleviate this problem by moving the data directly between the real network adapter and the target or originating guest data buffers.

Centralized network configuration and control of the Virtual Switch within CP allows the Guest LAN administrator to more easily grant and revoke access to the real network and to manage the configuration of Guest LAN VLAN segments. While the z/VM system can be a member of multiple VLANs, the Guest LAN administrator can control which guests belong to which real VLAN, without requiring additional network adapters or switch port configuration. If a guest does not support IEEE 802.1q, z/VM will transparently join the virtual network interface into the desired VLAN.

The Virtual Switch employs transparent bridging to enable the switch to dynamically determine and maintain node connectivity so that the LAN administrator has less network maintenance to perform.

The following new CP functions have been added for this support:
- DEFINE VSWITCH system configuration statement
- MODIFY VSWITCH system configuration statement
- MODIFY LAN system configuration statement
- NICDEF directory control statement
- DEFINE VSWITCH command
- DETACH VSWITCH command
- QUERY CONTROLLER command
- QUERY VSWITCH command
- SET VSWITCH command

The following CP functions have been updated:
- VMLAN system configuration statement
- IUCV directory statement
- SPECIAL directory statement
- COUPLE command
- DEFINE NIC command
- QUERY NIC command
- QUERY LAN command
- QUERY VMLAN command
- UNCOUPLE command

The following new Directory Maintenance Facility functions have been added:
- NICDEF command
- SPECIAL command

The following Directory Maintenance Facility functions have been updated:
- IUCV command

For more information, see:
- *z/VM: Connectivity*
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: Directory Maintenance Facility Commands Reference*

Enhanced IPv6 Support [4.4.0]

z/VM V5R1 enhances its IPv6 support by allowing the z/VM TCP/IP stack to be configured for IPv6 networks connected through OSA-Express operating in QDIO mode. The stack can be configured to provide static routing of IPv6 packets and to send IPv6 Router Advertisements. The native z/VM TCP/IP applications that have been enhanced to support IPv6 are TRACERTE and PING. In addition, support is

being provided to help application developers to create socket applications for IPv6 communications. This support includes updates to the C-Language sockets through the Language Environment and the OpenExtensions callable services library (CSL) socket APIs.

For more information, see:

- *z/VM: TCP/IP User's Guide*
- *z/VM: OpenExtensions Callable Services Reference*
- *C/C++ for z/VM: Run-Time Library Reference*, SC09-7624

Enhanced Virtual Switch Support — Failover [5.1.0]

The Virtual Switch has been improved in z/VM V5R1 to provide enhanced failover support for less disruptive recovery for some common network failures. Enhancements include the ability to:

- Recover from the failure of a Virtual Switch's network connection by swapping from a failing OSA-Express device to a partially initialized backup device in less time, helping to reduce data loss
- Detect a stalled OSA-Express device associated with a Virtual Switch, with failover to a backup device
- Detect a nonfunctioning z/VM TCP/IP controller and failover to a backup controller
- Limit the number of SETIP requests sent to an OSA-Express to help prevent overload of the device

For more information about the Virtual Switch, see *z/VM: Connectivity*.

Enhanced Virtual Switch Support — VLAN [5.1.0]

The following changes have been made for deploying VLAN technology on z/VM:

- The VLAN ANY operand has been removed from the SET VSWITCH command and MODIFY VSWITCH statement.
- A new VLAN awareness attribute on a Virtual Switch has been defined. You can define a Virtual Switch as VLAN AWARE or VLAN UNAWARE. The awareness attribute can be specified on the DEFINE VSWITCH command and statement for IP and ETHERNET Virtual Switches.
- A new PORT attribute is defined on the DEFINE VSWITCH and SET VSWITCH commands. The supported ports are ACCESS and TRUNK.

See the following for more information:

- *z/VM: Connectivity* for information about the Virtual Switch
- *z/VM: CP Planning and Administration* for the changes to the DEFINE VSWITCH and MODIFY VSWITCH statements
- *z/VM: CP Commands and Utilities Reference* for the changes to DEFINE VSWITCH, SET VSWITCH, QUERY VSWITCH, QUERY LAN, and QUERY NIC.

Internet Protocol Version 6 (IPv6) Support [5.1.0]

z/VM V5R1 enhances its IPv6 support by allowing the z/VM TCP/IP stack to be configured for IPv6 networks connected through OSA-Express operating in QDIO mode. The stack can be configured to provide static routing of IPv6 packets and to send IPv6 Router Advertisements. The native z/VM TCP/IP applications that have been enhanced to support IPv6 are TRACERTE and PING. In addition, support is being provided to help application developers to create socket applications for IPv6

communications. This support includes updates to the C/C++ Language sockets through the Language Environment and the OpenExtensions callable services library (CSL) socket APIs.

System Administration and Operation

This section describes changes that can affect how you manage the administration and operation of VM and guest operating systems.

Note: Enhancements in TCP/IP administration are described under “Connectivity and Networking” on page 30.

Year 2000 Support [2.2.0]

VM/ESA 2.2.0 provides support for the year 2000 and beyond. CP and CMS commands that accept dates as input or display dates as output have been enhanced to support dates with 4-digit years. In addition to commands, CMS Pipelines and application program interfaces such as REXX and CSL routines have been enhanced to support dates with 4-digit years. Existing dates consisting of 2-digit years are resolved with correct 4-digit year information. A new CSL routine, DateTimeSubtract, has been added to assist users in modifying their user-written programs to work with 4-digit date support. The TOD clock support is also enhanced to aid in IPLing a VM system in the year 2000 or later.

The capability to set a default date format for CP and CMS commands is provided on a system-wide basis and also on a user (virtual machine) basis. A new system configuration file statement, SYSTEM_DATEFORMAT, sets the system-wide default date format. A new directory control statement, DATEFORMAT, sets the default date format for a user (virtual machine). Two new CP commands, SET DATEFORMAT and QUERY DATEFORMAT, set and query the default date formats for the system and individual users. Default date formats for the FILELIST and RDRLIST commands can also be set with the CMS DEFAULTS command.

Range of Dates Supported for Files

Minidisk files and SFS files support dates only in the range of 01/01/1900 to 12/31/2099.

Files on a Back Level File Pool Server

4-digit years are not supported on a file pool server from a VM release prior to VM/ESA 2.2.0. The new system will interpret all dates associated with a file on a back level server as 19*yy*, where *yy* is the 2-digit year.

Remote Systems That Are Not Year 2000 Ready

If a remote system that is not Year 2000 ready accesses minidisks on the new system, all the 4-digit years for existing files will appear to be 19*yy*, even if they have been created after 1999.

If you copy a file from a remote system to a minidisk or SFS directory on the new system using the OLDDATE option, the 4-digit year for the file may not be correct if the remote system is not Year 2000 ready. Therefore, an incorrect date might be propagated onto your system.

If you use the new system to create a file on a minidisk on a remote system that is not Year 2000 ready, the new system will see the correct 4-digit year.

Profiles for CMS Productivity Aids

If you have a pre-VM/ESA 2.2.0 XEDIT profile for FILELIST, RDRLIST, SENDFILE, or PEEK on your A-disk or in your search order accessed ahead of the system disk, some PF key functions may not work correctly with the new FULLDATE and ISODATE options. To ensure that the new date functions operate correctly, you should erase your old profiles and create new ones. The recommended method for customizing the operation of the PF keys for these commands (as well as other productivity aids that use profiles) is to build a user profile that first calls the profile from the system disk, followed by your customized changes. For more information, see Appendix A of the *z/VM: CMS Commands and Utilities Reference*.

CMS Productivity Aids Performance Enhancement [2.2.0]

The CMS productivity aids FILELIST, RDRLIST, and PEEK have been rewritten from EXEC 2 to REXX and compiled. They have also been placed into the CMSINST logical saved segment, which has been moved above the 16MB line. (See "HELPINST Saved Segment Replaced by HELPSEG and INSTSEG [2.2.0].") This will improve the performance of these commands and also aid in the servicing of these parts.

HELPINST Saved Segment Replaced by HELPSEG and INSTSEG [2.2.0]

The default CMS installation saved segment (CMSINST) and the HELP logical saved segment are no longer defined in a single physical saved segment called HELPINST. CMSINST is now defined in the INSTSEG physical saved segment, which has been moved above the 16MB line. HELP is now defined in the HELPSEG physical saved segment, which is still located below 16MB. This change provides more room for help files in the HELP saved segment.

More of the CMS productivity aids (execs and XEDIT macros that reside on the S-disk) have been added to CMSINST. For a list of the contents of CMSINST, see the CMSINST LSEG file.

To allow CMSINST to be moved above 16MB, execs included in CMSINST that were formerly written in EXEC or EXEC 2 have been rewritten in REXX. If you have user modifications to any of these rewritten execs, you must rewrite your modifications in REXX. You cannot add EXEC or EXEC 2 execs to CMSINST. If you have EXEC or EXEC 2 execs you want to provide in a logical saved segment, you must add them to a segment that is loaded below 16MB.

Removable Media Services (RMS) Free Drive Support [2.2.0]

DIAGNOSE code X'254', Access Real Subsystem, allows the RMS virtual machine to issue nondrive dependent I/O to a 3494 or 3495 tape library subsystem, without requiring the DFSMS/VM RMS machine to have a CP-attached tape drive. For more information, see *z/VM: CP Programming Services*.

SFS AUDIT Enhancement [2.2.0]

You can now specify AUDIT OFF CLOSE *fn ft* or AUDIT CLOSE *fn ft* to create a file to capture a "snapshot" of the security audit trace file. This prevents overwriting the security audit trace file and allows you to get audit information while auditing remains on. For more information, see *z/VM: CMS File Pool Planning, Administration, and Operation*.

Additional Year 2000 Support [2.3.0]

VM/ESA 2.3.0 provides extended support for year 2000 and beyond. A new CMS pipelines stage called DATECONVERT allows date conversion, validation, and windowing functions. It supports all of the REXX date formats, plus additional formats. It is a powerful front-end to the DateTimeSubtract CSL routine. There are two new data migration and testing aid commands: FIXCENT and FILESERV FIXCENT. These commands can be used to set the internal century information stored with minidisk and SFS files. Note that this is not needed as part of the general processing. There is a new conversion command that converts dates in the user's NETLOG file called NETLCNVT as well as message display enhancements to the NETDATA command. When IPLing VM, the 'SET DATE' prompt has been enhanced to accept 4-digit year dates.

For more information, see:

- *z/VM: CMS Pipelines Reference*
- *z/VM: CMS Commands and Utilities Reference*
- *z/VM: CMS File Pool Planning, Administration, and Operation*

ISO Date Used in Default CMS IPL Heading [2.3.0]

The date field in the default CMS IPL heading has been changed to ISO format (*yyyy-mm-dd*). Each time you IPL CMS, a heading is displayed to identify the VM release level and time stamp of the CMS system being IPLed. A default heading is constructed when the CMS system is generated if the VERSION= parameter in the DEFNUC macro is specified without a value (which is the default).

Logical Device Limit Relief [2.3.0]

Support has been added to CP to let you to change the maximum number of logical devices allowed on the system. The old limit of 4096 devices is now the default, but you can use the new CP SET MAXLDEV command to reset the limit up to 32768 devices. The new QUERY MAXLDEV command allows you to determine the current setting.

Allocation of Real Storage for Segment Tables [2.3.0]

To represent the virtual storage for each primary address space (virtual machine) larger than 32MB and each nonprimary address space (data space), CP creates segment tables in real storage:

- For each virtual machine larger than 32MB but less than or equal to 1024MB, one real storage frame is allocated for the segment table.
- For each data space less than or equal to 1024MB, one real storage frame is allocated for the segment table.
- For each virtual machine or data space larger than 1024MB, two consecutive real storage frames are allocated for the segment table.

CP creates the segment table at the start of the storage frame. But in previous releases, the entire storage frame was allocated for the segment table regardless of the actual size of the table. This could have resulted in constraints on real storage availability if large numbers of virtual machines had arbitrarily large storage sizes, or were allowed to create many data spaces and/or very large data spaces, or loaded saved segments or saved systems defined at very high addresses outside the virtual machines.

On the new system, although real storage frames are still nominally allocated for the segment tables as indicated above, only the actual amount of real storage necessary to contain the segment tables is used. Any storage remaining beyond the end of a segment table may be used for CP free storage.

TCP/IP Awareness [2.3.0]

Support has been added to the following CP functions to detect TCP/IP addresses and include those addresses in queries and responses:

- QUERY LDEVS command
- QUERY VIRTUAL CONSOLE command
- DIAGNOSE code X'7C' (Logical Device Support Facility)
- CP accounting records
- Access control interface (ACI)

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Programming Services*

Changes to Accounting Records for TCP/IP

The formats of the CP accounting records for journaling (Record types 04, 05, 06, and 08) have been changed to supply TCP/IP data, as indicated in Table 2.

Table 2. Changes to Accounting Records for TCP/IP Awareness

Record	Release	Columns	Contents
04	Old	57-70	Reserved
		71-78	LUNAME for SNA terminal
	New	57-62	Reserved
		63-70	Network qualifier for SNA terminal or host virtual machine name for TCP/IP terminal
		71-78	LUNAME for SNA terminal or IP address for TCP/IP terminal
05	Old	58-70	Reserved
		71-78	LUNAME for SNA terminal
	New	58-62	Reserved
		63-70	Network qualifier for SNA terminal or host virtual machine name for TCP/IP terminal
		71-78	LUNAME for SNA terminal or IP address for TCP/IP terminal
06	Old	61-70	Reserved
		71-78	LUNAME for SNA terminal
	New	61-62	Reserved
		63-70	Network qualifier for SNA terminal or host virtual machine name for TCP/IP terminal
		71-78	LUNAME for SNA terminal or IP address for TCP/IP terminal

Table 2. Changes to Accounting Records for TCP/IP Awareness (continued)

Record	Release	Columns	Contents
08	Old	29-64	Reserved
	New	29-48	Reserved
		49-56	LUNAME for SNA terminal or IP address for TCP/IP terminal
		57-64	Network qualifier for SNA terminal or host virtual machine name for TCP/IP terminal

Changes to the ACI for TCP/IP

In the access control interface (ACI) to an external security manager (ESM), the ACIPARMS control block has been changed. In the ACIPARMS parameter list for authorization checking on the LOGON command, a new ACILOGIP option can be set under ACILGOPT (if the ACILOGCL option is also set) to indicate a logical terminal with an IP address. The IP address is specified in ACITRMID.

IPLing with the NODIRECT Option [2.3.0]

When you IPL your new system with the NODIRECT option, the OPERATOR user ID is logged on in ESA mode with 2047MB of virtual storage. In releases prior to VM/ESA 2.3.0, OPERATOR was logged on in 370 mode with 32MB of virtual storage.

Product Enablement Support [2.3.0]

You can use the CP SET PRODUCT command and the PRODUCT configuration statement to define products and features to your VM system and to determine whether the product or feature can run on that system. You can then use the CP QUERY PRODUCT command to display information about the products that are defined to the system. You can also use DIAGNOSE code X'27C' to request information about the enablement status of a single product or feature.

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Programming Services*

Dynamic CP Exits [2.4.0]

You can define CP exit points dynamically using the DEFINE EXIT command or system configuration file statement. A dynamic CP exit point behaves just like a formally-defined exit point, except that its ability to influence subsequent processing in the module containing the exit point is limited, and it does not carry over an IPL. Dynamic exits provide a convenient way to collect diagnostic or other information or to handle many situations in which the flow of control of a CP module does not need to be changed extensively.

The MODIFY EXIT command or system configuration file statement allows you to change the definition of an existing dynamic CP exit point or remove it from the system. The QUERY EXITS command has been enhanced to display additional information about a dynamic exit: exit location, characteristics, and parameter definitions.

For more information, see:

- *z/VM: CP Exit Customization*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Planning and Administration*

CP Nucleus [3.1.0]

An IPLable CP nucleus is no longer supported. Only a nucleus load module may be used to hold CP nucleus code.

z/VM now provides two CP images:

- 32-bit

  You can IPL this CP image on an ESA/390 or z/Architecture server.
- 64-bit

  You can IPL this CP image only on an z/Architecture server.

A dual-image CP is also provided with z/VM. If the dual-image CP is installed, it automatically determines at IPL if the server is z/Architecture-capable. If it is, the 64-bit CP image is loaded; otherwise, the 32-bit CP image is loaded. This can be overridden on the IPL to load the 32-bit CP on a z/Architecture server.

CP Exit Modifications [3.1.0]

CP exits may need to be modified for correct operation. For more information, see *z/VM: CP Exit Customization*.

High Level Assembler V1R4.0 [3.1.0]

The IBM High Level Assembler V1R4.0 is required for:

- Installation:
  - Adding devices that cannot be sensed (updating HCPRIO ASSEMBLE)
  - Local modifications
- Servicing the CP Loader (HCPLDR)
- Creating the Stand-Alone Dump Utility (HCPSADMP EXEC)
- Assembling any CP modules
- Using CP exit routines
- Installing and servicing RTM/ESA

RIO370 [3.1.0]

RIO370 is no longer supported.

64-Bit Support [3.1.0]

z/VM provides support for 64-bit addressing in:

- Storage configuration
- Display/dump/store of storage, registers, and PSWs
- Tracing

Storage Configuration

The CP DEFINE STORAGE command allows larger extents and discontiguous storage definitions. The display of the configurations has been changed.

Two new Directory Control Statements, STORAGE and MAXSTORAGE, allow you to define a default and a maximum virtual storage size for users.

The USER statement now allows a maximum storage of 16 exabytes.

Display/Dump/Store

All commands for displaying, dumping, or storing data or registers accommodate larger registers and storage areas.

Tracing

Trace commands show new instructions, larger registers, PSWs, and storage areas. The new TRACE GG command allows you to trace changes in general-purpose registers for either a 64-bit or a 32-bit image of CP.

Graphical User Interface (GUI) Facility Changes [3.1.0]

The following changes have been made to the GUI Facility:

- The GUI workstation agents, along with their Help files, are not shipped with z/VM. They are available with limited support from the VM Download Library at:

  www.ibm.com/eserver/zseries/zvm/download/
- The CMSDESK application modules and message repository are also available as part of the GUI package from the VM Download Library.
- The CMSDESK command and nucleus routines remain in CMS. Documentation is available from the GUI download package. To use these functions, you must download the workstation agents and GUI modules and put them on a CMS minidisk or SFS directory.

VMLINK Improvements [3.1.0]

The VMLINK command has been overhauled with both code and documentation changes. Many enhancements and some additions were made to increase the usability of this command:

- Changes were made to better validate some of the values in the VMLINK CONTROL file.
- The PUSH and POP options were changed to ensure the behaviors were consistent and could be documented.
- File mode support was made more complete and the documentation lists all the supported file mode definitions.
- Previously, when multiple INVOKE commands were processed and one or more failed, it was difficult to determine which ones failed because only one message and one return code were issued. VMLINK has been updated to return an error message and return code for each failing INVOKE command.
- Previously, the parameters passed to exits were automatically uppercased before the exit was called. These parameters will now remain in the case entered by the user, allowing mixed-case strings to be passed.
- The .EX and .PX VMLINK variables have been added to complete support for all possible NAMES file tags to be retrieved.
- Messages displayed when disks and directories are detached and released were changed for consistency.
- Message DMS2062I has been improved to include the name of the nickname which is being used when the QUERY option is being processed. This can be especially useful when more than one nickname is specified.
- The documentation has been completely reorganized. Guide information has been removed from the command description in the *z/VM: CMS Commands and Utilities Reference* and moved to the *z/VM: CMS User's Guide*.

Vector Facility [4.1.0]

CMS support for the Vector Facility has been removed.

370-Mode Virtual Machines Not Supported [4.1.0]

z/VM no longer supports 370-mode virtual machines. However, the 370 Accommodation Facility allows many CMS applications written for 370 virtual machines to run in XA, ESA, or XC virtual machines. For more information about the 370 Accommodation Facility, see *z/VM: CP Programming Services*.

If a user attempts to define a 370-mode virtual machine, the following will occur:

- If a user issues the SET MACHINE 370 command, the command is rejected and message HCP1016E is issued.
- If a user with a MACHINE 370 statement in their directory logs on, the logon continues, but the virtual machine is defined as XA-mode. In addition, CP's 370 accommodation support (370ACCOM) is set ON and message HCP1512E is issued. Note that doing certain operations, such as resetting the system or defining storage, will set 370ACCOM OFF.

Fast CCW Translation [4.1.0]

A new fast channel control word (CCW) translator has been provided that targets Network Adapter channel programs. This enhancement improves performance of I/O to network adapters, allowing any guest, such as Linux for S/390, to take advantage of this new fast-CCW translation processes, which improves I/O performance by reducing CP overhead.

Enhanced Page Fault Handling for Guests [4.1.0]

Page fault handling support within CP has been enhanced to allow 31-bit or 64-bit guests to take full advantage of page fault notifications, allowing the guest to continue processing while the page fault is handled by CP.

System Default Language Set Dynamically [4.1.0]

All of the IBM-translated languages are now included in CP. You can set the system default language by specifying the CPLANGUAGE operand on the USER_DEFAULTS statement in the system configuration file. You no longer have to rebuild CP to change the system default language. You can dynamically change the default language on the running system by using the SET CPLANGUAGE command.

SET OBSERVER Support [4.2.0]

This support allows one virtual machine to observe the console activity of another without affecting the behavior of the observed machine.The following CP functions have been added or updated:

- SET OBSERVER command
- QUERY OBSERVER command
- SET SECUSER command
- CONSOLE directory control statement

DDR Compression [4.2.0]

The LZCOMPACT option has been added to the I/O Definition Control Statement for the DDR command to allow users to select an alternate compression algorithm.

Automated Shutdown Support [4.3.0]

By virtualizing a hardware interface, automated shutdown enables guests to shut themselves down when signaled to do so by a CP command. This support is exploited by z/VM when running as a guest and can also be exploited by other guest operating systems. The amount of elapsed time during which a guest is allowed to process a termination signal is limited by a timeout interval. automated shutdown can also be used to cause z/VM itself to shut down when a hardware event (for example, deactivation of the logical partition) is initiated while z/VM is active. In this situation, guest virtual machines may, at customer discretion, be given an opportunity to shut themselves down before z/VM terminates.

The following new CP functions have been added for this support:
- SET SIGNAL system configuration statement
- QUERY SHUTDOWNTIME command
- QUERY SIGNAL command
- QUERY SIGNALS command
- SET SHUTDOWNTIME command
- SET SIGNAL command
- SIGNAL command

The following CP commands have been updated:
- FORCE
- SHUTDOWN

For more information, see:
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Enhanced Timer Management [4.3.0]

The performance of CP timer management has been improved for environments where a large number of requests are scheduled, particularly for short intervals, and where timer requests are frequently canceled before they become due. A system with large numbers of Linux or z/OS guests with certain workloads would be an example of such an environment. Master-processor overhead has been reduced by allowing timer events to be handled on any processor. Also, clock comparator settings are now tracked and managed across all processors to eliminate duplicate or unnecessary timer interruptions.

Improved Utilization of Large Real Storage [4.3.0]

System performance may be improved with better utilization of large real storage when Expanded Storage is unavailable, full, or nearly full while CP is replenishing its available-page list. This is accomplished by moving pages to storage above the 2GB line when:
- Pages would otherwise go to DASD
- No Expanded Storage has been made available
- Expanded Storage is not available when requested
- Excess storage is available above the 2GB line

Shared Tape Support [4.3.0]

Shared tape support allows multiple guest operating systems to serially share the same tape device (IBM 3424, 3480, 3490, or 3590). It removes the need to manage the movement of a dedicated tape device from one guest to another, because the

tape device can now remain attached to several guests concurrently. This support is intended for z/OS, z/OS.e, and OS/390 guests that use ATS Star or IEFAUTOS for automatic tape switching. In principle, however, it will work for any guest that manages its own assignment of tape devices. Traditionally, a tape device would be attached to such a guest with the CP ATTACH command using the NOASSIGN option. This support is not intended for CMS unless some external means of managing assignments or serializing access to the tape device among the sharing users is explicitly implemented.

The MULTIUSER option has been added to the CP ATTACH command and the DEDICATE directory control statement to specify that a tape device is to be shared. The QUERY ALL, QUERY (Real Device), and QUERY TAPES commands have been enhanced to return information about which tape devices are attached MULTIUSER. Assign and Unassign CCWs are simulated for tape devices attached MULTIUSER so that guests running under the same VM image can serialize access to the tape devices they share. The ALL option has been added to the CP DETACH command to allow removal of a shared tape device from all sharing guests with one command invocation. Third party assignment and multiple system assignment (Control Access CCW) are not supported.

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Virtual Machine Accounting Improvements [4.3.0]

CP has been enhanced with additional capability to account for the use of system resources by virtual machines, including those running Linux. A new accounting record is produced that tracks a virtual machine's use of virtual network resources, including virtual channel-to-channel adapters (CTCAs), inter-user communication vehicle (IUCV) or advanced program-to-program (APPC) connections, and virtual (Guest LAN) network interface cards (NICs).

The following CP functions have been updated:

- DEFINE LAN system configuration statement
- VMLAN system configuration statement
- OPTION directory control statement
- ACNT command
- DEFINE LAN command
- QUERY LAN command
- QUERY VMLAN command
- SET LAN command
- SET VMLAN command
- DIAGNOSE code X'4C' (Generate Accounting Records)
- Accounting records — Accounting Records for Network Data Transmissions (Record Type 0C) has been added.

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CP Programming Services*

Virtual Machine Resource Manager (VMRM) [4.3.0]

VMRM provides z/VM functions to:

- Manage guest performance

  Capabilities have been added that allow z/VM to manage guest performance to meet customer-defined goals. A new service virtual machine (SVM) accepts customer-defined workload definitions, goal specifications, and associations between them. The SVM then adjusts virtual machine CPU and I/O performance controls based on actual performance measurements to attempt to achieve the goals associated with each workload.
- Exploit I/O Priority Queueing

  I/O management facilities have been added that enable z/VM to exploit the hardware I/O Priority Queueing facility to prioritize guest and host I/O operations. A virtual equivalent of the hardware facility is provided, allowing virtual machines running guest operating systems such as z/OS that exploit I/O Priority Queueing to determine the priority of their I/O operations within bounds defined by a new CP command. z/VM will automatically set a priority for I/O operations initiated by virtual machines that do not exploit this function.

The following CP functions have been added for this support:

- IOPRIORITY directory control statement
- QUERY IOPRIORITY command
- SET IOPRIORITY command

For more information, see:

- *z/VM: Performance*
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Automated SFS Shutdown [4.4.0]

Utilizing the automated shutdown support added in z/VM V4R3, SFS file pool servers now shut down automatically when CP is shut down. This function helps ease z/VM system administration and helps maintain the integrity of the SFS and its data.

The new SHUTDOWNSIGNAL start-up parameter (the default) enables an SFS file pool server to receive a shutdown signal from a CP SHUTDOWN, FORCE, or SIGNAL command. When an enabled SFS file pool server receives this shutdown signal from CP, the file pool operator STOP command (with no operands) is automatically issued to shut down the server before CP shuts down. To override this automation, the NOSHUTDOWNSIGNAL start-up parameter must be explicitly specified in the SFS file pool server's DMSPARMS file. For more information, see *z/VM: CMS File Pool Planning, Administration, and Operation*.

Message DMS3108I is issued to indicate that the SFS server is stopping as the result of a signal from CP. Message DMS3109I is issued at SFS initialization if the SFS server is not enabled to receive a shutdown signal from CP. For more information, see *z/VM: System Messages and Codes - CMS and REXX/VM*.

CP Command Response Suppression [4.4.0]

The CP SILENTLY command executes another CP command and suppresses its responses, if that command is so enabled. A command is enabled for response suppression by specifying the SILENT option on the DEFINE COMMAND / CMD or

MODIFY COMMAND / CMD command or system configuration statement. Response suppression is supported only for the ATTACH, DETACH, and GIVE commands.

The following CP function has been added for this support:
- SILENTLY command

The following CP functions have been updated:
- DEFINE COMMAND / CMD system configuration statement
- MODIFY COMMAND / CMD system configuration statement
- DEFINE COMMAND / CMD command
- MODIFY COMMAND / CMD command

For more information, see:
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Guest IPL from SCSI Disks [4.4.0]

z/VM allows IPLing from FCP-attached SCSI disks for Linux and other guest operating systems that contain support for IPLing from FCP-attached SCSI disks, when z/VM is running on a z990, z900, z800, or equivalent server equipped with the function for IPLing from FCP-attached SCSI disks. When this hardware function is available, Linux guests can be started and run completely from FCP-attached SCSI disks in your hardware configuration. z/VM continues to require ESCON-attached or FICON-attached disk or tape for its own IPL and other functions.

The following new CP functions have been added for this support:
- LOADDEV directory statement
- QUERY LOADDEV command
- SET LOADDEV command

The following CP functions have been updated:
- IPL command

The following new Directory Maintenance Facility functions have been added:
- LOADDEV command

For more information, see:
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: Directory Maintenance Facility Commands Reference*

Hardware Configuration Definition and Hardware Configuration Manager for z/VM (HCD and HCM for z/VM) [4.4.0]

HCD and HCM for z/VM provides a comprehensive I/O configuration management environment similar to that available with the z/OS operating system. The HCD and HCM programs work together to help you create and manage the hardware and software aspects of your z/VM I/O configuration.

HCM runs on a Windows-based personal computer connected to the z/VM system through TCP/IP. HCM provides a graphical user interface (GUI) as well as

commands to help you configure your system. You provide the I/O-configuration information to HCM, which processes the information and passes it to HCD.

HCD runs in a z/VM server virtual machine and performs the work of actually creating and changing the hardware and software aspects of your I/O configuration. HCM provides the primary user interface to HCD, but HCD provides a backup user interface on your z/VM host for certain I/O configuration tasks and for when HCM is not available.

HCD and HCM for z/VM can be used to create and manage the hardware aspects of the I/O configuration definition for all of the LPARs in your zSeries or S/390 server. For the software aspects, HCD and HCM for z/VM creates and manages the I/O configuration definition for only the z/VM system on which it is running. The software aspects of the I/O configuration definition for operating systems in other LPARs are handled by those operating systems.

HCD and HCM for z/VM provides an easy-to-use alternative to z/VM's existing method of I/O configuration using the I/O Configuration Program (IOCP) and CP's dynamic-I/O configuration commands. The two methods are not intended to be used together, so you should choose one method or the other for your installation.

The following new CP functions have been added for this support:
- QUERY HCD command
- DISABLE HCD command
- DIAGNOSE code X'2AC' – HCD Dynamic I/O

The following CP functions have been updated:
- IODF system configuration statement
- SET IPLPARMS command

For more information, see *z/VM: I/O Configuration*.

HELP Facility Enhancements [4.4.0]

The HELP Facility has been enhanced as follows:

- Help files are now provided for all z/VM TCP/IP commands and subcommands. The following new HELP components have been defined for TCP/IP:

BOOTPD	BOOTP server administrative (BOOTPD command) subcommands
DHCPD	DHCP server administrative (DHCPD command) subcommands
DNS	DNS server administrative commands
GDDMXD	GDDMXD/VM interface subcommands
IMAPADM	IMAP server administrative commands
LPD	LPD administrative commands
MPROUTE	MPROUTE server administrative commands
NFS	NFS server administrative commands
RTE	RouteD server administrative commands
SMTP	SMTP server administrative commands
SNMP	SNMP administrative commands
SSLADMIN	SSL server administrative commands

TCPIP	TCP/IP commands and related functions
TELNET	Telnet protocol client subcommands
TFTD	TFTP server administrative (TFTPD command) subcommands
TFTP	TFTP client (TFTP command) subcommands
UFTD	UFT server administrative (UFTD command) subcommands
X25IPI	X.25 interface administrative commands

You can access the top level of help for TCP/IP by entering one of the following commands:

```
help tcpip menu
help tcpip task
```

Menus are also provided for each of the new HELP components listed above.

Note: For two of the new TCP/IP HELP components, the menu name is different from the component name:

- The menu for the RouteD server administrative commands is ROUTED HELPMENU (not RTE HELPMENU).
- The menu for the TFTP server administrative (TFTPD command) subcommands is TFTPD HELPMENU (not TFTD HELPMENU).

- A new HELP component, LE, has been defined for the Language Environment component. Help files are provided for the following Language Environment commands:

  C370LIB
  CMOD
  CPLINK
  GENXLT
  ICONV
  LINKLOAD

  An LE HELPMENU file is also provided.
- Help for privileged CP commands (formerly HELP component CPOTHER) has been merged with the nonprivileged CP commands (HELP component CP). This can make it easier to display the help file for a CP command, because you do not need to know whether the command is privileged when you enter the HELP command. For example, to display the help file for the ATTACH command (privilege class B), previously you had to enter:

  ```
  help cpother attach
  ```

  Now, to display the help file for the ATTACH command, enter:

  ```
  help cp attach
  ```

  To display a menu of help for all CP commands, enter:

  ```
  help cp menu
  ```

Linux Guest Capacity Improvements [4.4.0]

Improvements to the CP scheduler increase the number of Linux and other guest virtual machines that can be managed concurrently. While this increase in capacity can be experienced on all zSeries hardware configurations, it may be more dramatic on larger n-way servers. The scheduler lock is used to serialize scheduler activities, timer request block management, and processor local dispatch vector

(PLDV) management. Because contention on the lock is lowered by creating a new lock for timer request block management, CP overhead can be decreased.

Performance Toolkit [4.4.0]

The Performance Toolkit is offered as an optional feature of z/VM. Derived from the FCON/ESA program (5788-LGA), the Performance Toolkit is designed to assist system operators, systems programmers, and performance analysts in the following areas:

- Operation of the system operator console in full-screen mode
- Management of multiple z/VM systems (local or remote)
- Post-processing of Performance Toolkit history files and VM monitor data captured by the MONWRITE utility
- Viewing of performance monitor data using either web browsers or PC-based 3270 emulator graphics
- TCP/IP performance reporting

In addition to analyzing VM performance data, the Performance Toolkit processes Linux performance data obtained from the Resource Management Facility (RMF™) Linux performance gatherer, **rmfpms**. The **rmfpms** application is available from the zSeries web site at http://www.ibm.com/zseries/zos/rmf/rmfhtmls/pmweb/pmlin.htm. The Linux performance data obtained from RMF can be viewed and printed in a mannner similar to the presentation of VM data.

For detailed information, refer to *z/VM: Performance Toolkit*.

Although the RealTime Monitor (RTM) and Performance Reporting Facility (PRF) optional features continue to be supported in z/VM V4R4, IBM plans to make future performance management enhancements primarily to the Performance Toolkit. IBM plans that z/VM V4R4 will be the last release in which the RTM and PRF features will be available with z/VM, and plans to withdraw both the RTM and PRF features from marketing in a future z/VM release.

VMRM Enhancements [4.4.0]

VMRM has been enhanced to provide the infrastructure necessary to support more extensive workload and systems resource management features that may be delivered in future releases of z/VM. To accomplish this objective, the following have been added:

- Extended syntax for user ID specification in the VMRM configuration file.

  In the WORKLOAD statement, a new wildcard character (*) allows matching up to seven characters of a user ID. For example, `WORKLOAD WORK1 USER` *`user1 vmrm`* `zvm*` would search for any user ID names starting with 'zvm' as the first three characters.
- Continuation of configuration file statements. Configuration file statements can be continued on multiple lines, using a comma as a continuation character at the end of the line being continued.
- Monitor Application Data Sample Records that now contain VMRM workload information.
- The ability to dynamically change the VMRM configuration file, in order to change workloads, workload characteristics, and performance goals, without manually stopping and restarting the VMRM service virtual machine.
- Improvements to debug messages, log file entries, and the format of the log file for better readability and serviceability.

- Performance improvements for searching through lists when analyzing monitor data.
- A SYNCHECK option on the IRMSERV command allows syntax checking of the configuration file.

For more information, see *z/VM: Performance*.

370 Functions Removed [5.1.0]

370 virtual machines are not supported on z/VM Version 4 or later. Obsolete operands, responses, and messages related to 370 virtual machines have been removed. The following CP functions have been modified:

- MACHINE directory control statement
- STORE PSW/CAW/CSW command
- CPFMTXA utility
- HCPLDR utility

Authorization Enhanced for Guest LANs and Virtual Switches [5.1.0]

z/VM V5R1 enhances the authorization capabilities for z/VM Guest LANs and Virtual Switches by using the Resource Access Control Facility (RACF) or any equivalent external security manager (ESM) that supports this new authorization function. It is designed to provide ESM-centralized control of authorizations and Virtual LAN (VLAN) assignment.

For more information, see:

- *z/VM: CP Planning and Administration*
- *Resource Access Control Facility: Security Administrator's Guide*

Contiguous Frame Management [5.1.0]

Various algorithms in CP frame management have been adjusted to improve system performance and reduce hang conditions.

CP Functions Removed [5.1.0]

z/VM V5R1 is designed to operate only on IBM zSeries, or equivalent servers that support the IBM 64-bit z/Architecture. As a result, certain functions are not provided by z/VM V5R1:

- IPL from a 31-bit image of the CP nucleus
- Preferred (V=R and V=F) virtual machines
- Paging of the CP nucleus

The following CP commands have been removed:

- QUERY IOASSIST
- QUERY VRFREE
- QUERY V=R
- SET CCWTRAN
- SET IOASSIST
- SET NOTRANS

The following CP functions have been modified:

- CPXLOAD configuration statement
- STORAGE configuration statement
- DEDICATE directory control statement
- OPTION directory control statement

- ATTACH command
- AUTOLOG command
- COMMIT command
- CPXLOAD command
- DEDICATE command
- DEFINE command
- DESTAGE command
- DETACH command
- DISCARD PINNED command
- DUPLEX command
- FLASHCOPY command
- INDICATE PAGING command
- INDICATE USER command
- IPL command
- LOCATE (Storage) command
- LOCATE SYMBOL command
- LOCK command
- LOGON command
- MONITOR command
- QUERY CACHE command
- QUERY CACHEFW command
- QUERY CPLEVEL command
- QUERY DASDFW command
- QUERY DUMP command
- QUERY DUPLEX command
- QUERY FENCES command
- QUERY FRAMES command
- QUERY NVS command
- QUERY PINNED command
- QUERY (Real Device) command
- QUERY RSAW command
- QUERY SET command
- QUERY VIRTUAL CTCA command
- QUERY VIRTUAL DASD command
- QUERY (Virtual Device) command
- QUERY VIRTUAL DUPLEX command
- QUERY VIRTUAL GRAF command
- QUERY VIRTUAL LINES command
- QUERY VIRTUAL OSA command
- QUERY VIRTUAL PRINTER command
- QUERY VIRTUAL PUNCH command
- QUERY VIRTUAL READER command
- QUERY VIRTUAL TAPES command
- REDEFINE command
- RESET command
- SAVESEG command
- SET CACHE command
- SET CACHEFW command
- SET DASDFW command
- SET DUMP command
- SET IPLPARMS command
- SET NVS command
- SET SCMEASURE command
- SHUTDOWN command
- SYNCMDRS command
- TRACE command

- UNDEDICATE command
- UNLOCK command
- XAUTOLOG command
- DDR utility
- HCPLDR utility
- SALIPL utility
- DIAGNOSE code X'84'
- DIAGNOSE code X'90'
- DIAGNOSE code X'98'
- MDLATENT macro
- SYSRES macro
- SYSSTORE macro
- *RPI system service
- OPTIONS directive for CPXLOAD

Deploying Linux on zSeries with z/VM [5.1.0]

A new book, *z/VM: Getting Started with Linux on zSeries*, SC24-6096, describes z/VM basics and how to configure and use z/VM functions and facilities to create and manage Linux servers running on zSeries processors. This book is designed to help systems personnel (system programmers, administrators, and operators) with limited knowledge of z/VM to deploy Linux servers on z/VM more quickly and more easily. The book provides some requirements and guidelines for z/VM installation, but for the most part assumes that you have installed z/VM and are ready to deploy Linux servers in z/VM virtual machines. Specific topics covered include:

- Configuring, administering, and servicing a z/VM system
- Configuring TCP/IP for z/VM
- Creating and cloning Linux virtual machines
- Setting up basic system automation
- Monitoring performance and capacity
- Diagnosing z/VM and Linux problems

HyperSwap Support [5.1.0]

z/VM is providing a new HyperSwap™ function so that the virtual devices associated with one real disk can be swapped transparently to another. HyperSwap can be used to switch to secondary disk storage subsystems mirrored by Peer-to-Peer Remote Copy (PPRC). It may also be helpful in data migration scenarios to allow applications to use new disk volumes.

Geographically Dispersed Parallel Sysplex™ (GDPS®) 3.1 plans to exploit the new z/VM HyperSwap function to provide a disaster recovery solution for distributed applications, such as WebSphere®, that span z/OS images running natively and Linux guests running under z/VM. This disaster recovery solution requires GDPS, IBM Tivoli System Automation for Linux, Linux for zSeries, and z/VM V5R1.

To cover planned and unplanned outages, GDPS 3.1 is planning to provide the following recovery actions:

- In-place re-IPL of failing operating system images
- Site takeover/failover of a complete production site
- Coordinated planned and unplanned HyperSwap of storage subsystems transparently to the operating system images and applications using the storage

The following CP commands have been added:

- HYPERSWAP

- QUERY HYPERSWAP

For more information, see:

- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*

Performance Toolkit Enhancements [5.1.0]

The Performance Toolkit feature available with z/VM V4R4 included functional equivalence to the RealTime Monitor (RTM) optional feature. The Performance Toolkit has been enhanced in z/VM V5R1 by providing functional equivalence to the Performance Reporting Facility (PRF) optional feature, thereby eliminating the need for separate products (PRF and RTM) to help manage your performance more efficiently. Other new function includes:

- High-level Linux reports based on Application Monitor records from Linux guests
- Report for SCSI disks

For more information, see *z/VM: Performance Toolkit*.

z/VM HELP files are now provided for all Performance Toolkit commands and messages.

SCSI FCP Disk Support [5.1.0]

z/VM V5R1 supports SCSI FCP disk logical units (SCSI disks) for both system and guest use. SCSI disks supported are those within an IBM TotalStorage Enterprise Storage Server (ESS) when it is connected to a fibre-channel (FC) fabric by zSeries FCP channels.

SCSI disks can be used directly by a guest operating system when an FCP subchannel is dedicated to the guest. Such a guest must provide its own SCSI device support. Linux for zSeries is designed to be one such guest.

SCSI disks can also be used as emulated 9336 Model 20 fixed-block-architecture (FBA) disks. z/VM CP and CMS rely almost exclusively on this emulated-FBA support for their SCSI use. Specifically, this use includes system paging, spooling, directory services, minidisks, and all other system functions and programming services that can use FBA disks. Guests that support FBA disks (such as CMS, GCS, RSCS, and VSE) also can use SCSI disks through the emulated-FBA support, without requiring their own SCSI support.

z/VM's SCSI support allows a Linux server farm to be deployed on z/VM in a configuration that includes only SCSI disks. Extended count key data (ECKD™) disks are no longer required. Installation of z/VM from DVD to a SCSI disk, IPL from a SCSI disk using Stand-Alone Program Loader (SAPL), and z/VM system dumps to a SCSI disk are supported. DASD Dump/Restore (DDR) services using SCSI disks are supported when DDR is running under CMS.

z/VM supports an individual emulated FBA disk up to 381GB in size. However, directory, paging, and spooling allocations must reside within the first 64GB of a CP-formatted volume. Other kinds of CP allocations (TDSK, PERM, and PARM) may be defined beyond the first 64GB.

The following new CP functions have been added for this support:

- EDEVICE system configuration file statement
- DELETE EDEVICE command

- QUERY EDEVICE command
- SET EDEVICE command

The following CP functions have been updated:
- MDISK directory statement
- QUERY ALLOC command
- CPFMTXA utility
- DIRECTXA utility
- DISKMAP utility

Screen layouts for the following CMS functions have been adjusted to accommodate larger file and disk sizes:
- BROWSE command
- FLIST command
- SADT command
- DIRMAP utility
- QSYSOWN utility

For more information, see:
- *z/VM: CP Planning and Administration*
- *z/VM: CP Commands and Utilities Reference*
- *z/VM: CMS Commands and Utilities Reference*

The Directory Maintenance Facility (DirMaint) feature has also been updated to support the larger disk sizes. Larger values may appear in the disk space reports generated by commands such as DIRMAP, FREEXT, and USEDEXT.

SPTAPE Command Removed [5.1.0]

The SPTAPE command has been removed. The SPXTAPE command offers superior function and speed for backup and recovery of spool files. Backup tapes made with SPTAPE cannot be restored to a z/VM V5R1 or later system.

In addition, the following CP commands have been modified:
- QUERY ALL
- QUERY READER/PRINTER/PUNCH
- QUERY (Real Device)
- QUERY TAPES

System Administration Facility [5.1.0]

IBM intends to withdraw the System Administration Facility from a future release of z/VM. Customers using the System Administration Facility to create and manage Linux server images as guests of z/VM should start using other systems management facilities of z/VM, write a client application using the systems management APIs introduced in z/VM V4R4, or acquire a system management application from an IBM solution provider. (Also see “Deploying Linux on zSeries with z/VM [5.1.0]” on page 56.) Documentation is available in the *z/VM: System Administration Facility* publication, SC24-6034, but this publication is not included in the z/VM V5R1 library.

Application Development and Deployment

This section describes changes that can affect how you develop and deploy applications on z/VM.

REXX Sockets [2.2.0]

The REXX Sockets API allows you to write socket applications in REXX for the TCP/IP environment. This allow you to use REXX to implement and test TCP/IP applications. A new REXX/VM external function, SOCKET, is provided. The SOCKET function uses the TCP/IP IUCV API to access the TCP/IP internet socket interface. The REXX socket functions are similar to socket calls in the C programming language. For more information, see the *z/VM: REXX/VM Reference*.

Querying the CMS Level [2.2.0]

The CMSPROG field of NUCON, returned in register 1 by the CMS command QUERY CMSLEVEL when the command is invoked internally by a program, has been frozen at X'0F', the value for CMS level 12 (VM/ESA 2.1.0). The CMSLEVEL assembler macro will not map CMS levels beyond CMS level 12. To determine the CMS level, use the DMSQEFL CSL routine or the DMSQEFL assembler macro.

Pseudo Timer Extended [2.2.0]

DIAGNOSE code X'270' (Pseudo Time Extended) can be used to replace DIAGNOSE code X'0C' (Pseudo Timer). DIAGNOSE code X'0C' returns the time only in SHORTDATE format. DIAGNOSE code X'270' returns the same information as DIAGNOSE code X'0C' plus two additional fields containing the time in FULLDATE format and ISODATE format.

Calling CSL Routines That Have Dates as Output [2.2.0]

The following CSL routines, which provide dates in their output, have been enhanced with a new parameter for specifying the format in which the dates are to be returned:

- DMSEXIDI
- DMSEXIFI
- DMSOPBLK
- DMSGETDA
- DMSGETDF
- DMSGETDS
- DMSGETDX

The date formats are:

Keyword	Format
SHORTDATE	*yy/mm/dd*
FULLDATE	*yyyy/mm/dd*
ISODATE	*yyyy-mm-dd*

If no keyword is specified, the default is SHORTDATE, which is the format compatible with prior VM releases. The output field in which the date is returned is either 8 or 10 characters in length, depending on the format requested.

In REXX, the date field returned is always 10 characters. If SHORTDATE is specified or allowed to default, the 8-character date is padded on the right with two blanks. An incompatibility is that old REXX programs which now get the date returned as an 8-character string will start getting the date returned as a 10-character string.

If you call one of these routines from a higher level language, the date field is not padded. For SHORTDATE, an 8-character field is returned. For FULLDATE or

ISODATE, a 10-character field is returned. Therefore, if you specify FULLDATE or ISODATE, you must be sure to also specify a 10-character output field. Otherwise, you could get storage overlays.

OS Simulation Support for Tape Library Dataserver [2.2.0]

CMS OS simulation has been enhanced to call DFSMS/VM Removable Media Services (RMS) CSL routines to mount and demount tapes on Tape Library Dataserver machines. The new LIBSRV option on the CMS FILEDEF command is used to indicate that a tape is under the control of a Tape Library Dataserver. OS simulation can also determine that a tape is under Dataserver control if the user has issued the DFSMS/VM MOUNT command to premount the tape before the CMS tape processing function is invoked.

When a tape is under Dataserver control:

- OS simulation calls the RMS FSMRMDMT (Demount) and FSMRMMNT (Mount) routines to get subsequent multivolume tapes mounted for the user through the native DMSTVS mounting service and the CMS native rewind and unload tape processing functions.
- The RUN (rewind and unload) function of the CMS TAPE and VMFPLC2 commands and the TAPECTL macro calls the RMS FSMRMDMT routine to demount the tape.

See the following books for more information:

- *z/VM: CMS Application Development Guide for Assembler*
- *z/VM: CMS Commands and Utilities Reference*
- *z/VM: DFSMS/VM Removable Media Services*

GCS Pathlength Reduced [2.2.0]

GCS processor usage has been reduced, which improves the overall performance of GCS. This can also improve the performance of applications and program products that use GCS.

Full MP Capability for VMCF [2.2.0]

The Virtual Machine Communications Facility (VMCF) has been changed so that it no longer has to run on the master processor. This can improve performance and capacity for systems that run applications (such as TCP/IP, OV/VM, and RACF) that use VMCF.

Language Environment® [2.3.0]

Language Environment is now included with VM. Language Environment provides a common run-time environment for programs generated with C for VM/ESA and other high-level languages.

Dynamic Link Libraries [2.3.0]

Dynamic link library (DLL) support is available for applications running under VM and Language Environment.

A DLL is a collection of one or more functions or variables gathered in a load module and executable or accessible from a separate application load module. The term derives from the fact that the connection or link between the application that uses the DLL and the DLL functions or variables is made dynamically while the application is executing rather than statically when the application is built.

For more information, see:

- *z/VM: CMS Application Development Guide*
- *z/VM: OpenExtensions Callable Services Reference*
- *C for VM/ESA: Library Reference*, SC23–3908

Non-Relocatable Modules Loaded between 16-20MB [2.3.0]

Non-relocatable modules that are loaded in the virtual machine between 16-20MB must be regenerated. The CMS nucleus now spans from 15-20MB, which will prevent these modules from being loaded. You must either regenerate the non-relocatable modules at a different storage location or generate the modules as relocatable modules using the RLDSAVE option on the CMS LOAD command. See the *z/VM: CMS Commands and Utilities Reference* for information on generating modules using the LOAD and GENMOD commands.

CMS Migration Utility Feature No Longer Available [2.3.0]

Beginning with VM/ESA 2.1.0, which became generally available in December 1995, CMS no longer runs in 370-mode virtual machines. To simplify the migration of older applications and to facilitate the running of 370-mode-only CMS applications in non-370-mode virtual machines (that is, in XA or XC mode) IBM provides the 370 Accommodation Facility. This function originally shipped with VM/ESA 1.2.1 (available July 1993) and has since been enhanced as the result of customer experience and input. 370 Accommodation handles the vast majority of inconsistencies between 370 mode and either XA or XC mode, eliminating the need to change these applications to exploit the new architectures.

IBM also provided the 370-capable level of CMS which shipped with VM/ESA 1.2.2 (known as CMS 11) as a no-charge feature for customers with specialized applications which 370 Accommodation could not support. Few VM customers have needed this CMS Migration Utility Feature and IBM has not updated it. Most importantly, the CMS Migration Utility Feature has not been made Year 2000 Ready. IBM recommends that customers who are using the CMS Migration Utility should modify their applications to run on a Year 2000-Ready level of CMS (VM/ESA 2.2.0 or later) and stop using the CMS Migration Utility as an application environment. Customers should not rely upon the CMS Migration Utility as a production environment. Also, IBM has announced the discontinuance of service for VM/ESA 1.2.2 (including CMS 11) and the CMS Migration Utility Feature as of April 30, 1999.

Consistent with IBM's policy of delivering only Year 2000-Ready products to customers in 1998 and beyond, the CMS Migration Utility Feature will no longer be available as part of VM. Customers who find that their applications cannot run under the current level of CMS should modify their applications if possible, or use the 370 Accommodation function. If problems persist, customers should call IBM Service for assistance.

Pipelines Code Bases Merged [2.3.0]

The code bases for CMS Pipelines and CMS/TSO Pipelines have been merged:

- All pipelines that were written using previous levels of CMS Pipelines or CMS/TSO Pipelines should operate successfully with this new code base.
- All internal EXECs, messages, and modules of CMS Pipelines have been renamed from a DMS to an FPL prefix. Message numbers and text have changed.

Notes:

1. User-written applications that are sensitive to these changes may require alterations. Published externals (such as PIPGFTXT) have **not** been changed.
2. For cross-references between the old (DMS) and new (FPL) Pipelines message numbers, see Appendix A, "CMS Pipelines Message Cross-Reference [2.3.0]," on page 181.

- All stages, commands and subcommands documented in the *CMS/TSO Pipelines Author's Edition* are now supported. Before the merge of the code bases, only the stages and subcommands documented in the *VM/ESA: CMS Pipelines Reference* were supported.
- Some new function exists as a result of the code merge. Stages that are new or changed include:
  - AHELP
  - CONFIGURE
  - DATECONVERT
  - HOSTBYADDR
  - HOSTBYNAME
  - HOSTID
  - HOSTNAME
  - IP2SOCKA
  - SOCKA2IP
  - SPILL
  - TCPCLIENT
  - TCPDATA
  - TCPLISTEN
  - GETRANGE
  - SCANRANGE
  - SCANSTRING

  Specific information about some enhancements can be found in PIPELINE NEWS, which is accessible from the internet at the following URL:

  `http://pucc.princeton.edu/%7Epipeline`
- Any CMS Pipelines stages, commands, and subcommands that are not documented in the *z/VM: CMS Pipelines Reference* can be found in the *CMS/TSO Pipelines Author's Edition*, which is now included with the VM library.

OpenEdition Enhancements [2.3.0]

Enhancements to OpenEdition include additional C library routines, new callable services and mapping macros, new OPENVM commands for fork processing, and new shell commands for data compression.

Additional C/VM Library Routines

Over 150 C library routines have been added to the C/VM™ run-time library. For more information about these routines, see the *C for VM/ESA: Library Reference*, SC23–3908.

New Callable Services and Macros

The following callable services have been added:

Service	Purpose
DLL_delete (BPX1DEL)	Delete a previously-loaded program from storage
DLL_load (BPX1LOD)	Load a program into storage
fork (BPX1FRK)	Create a new process

msgctl (BPX1QCT)	Control message queues
msgget (BPX1QGT)	Create or find a message queue
msgrcv (BPX1QRC)	Receive a message from a message queue
msgsnd (BPX1QSN)	Send a message to a message queue
semctl (BPX1SCT)	Control semaphores
semget (BPX1SGT)	Create or find a set of semaphores
semop (BPX1SOP)	Perform semaphore operations atomically
shmat (BPX1MAT)	Attach a shared memory segment
shmctl (BPX1MCT)	Control shared memory segments
shmdt (BPX1MDT)	Detach a shared memory segment
shmget (BPX1MGT)	Create or find a shared memory segment
wait-extension (BPX1WTE)	Obtain status information about child processes
w_getipc (BPX1GET)	Query interprocess communications

The following mapping macros have been added:

Macro	Purpose
BPXYIPCP	Map interprocess communications permissions
BPXYIPCQ	Map the data structure used by w_getipc (BPX1GET)
BPXYMSG	Map interprocess communications message queues
BPXYSEM	Map interprocess communications semaphores
BPXYSHM	Map interprocess communications shared memory segments
BPXYSINF	Map the Siginfo_t structure used by wait-extension (BPX1WTE)

For additional information about these routines and macros, see the *z/VM: OpenExtensions Callable Services Reference*.

OPENVM Commands for fork (BPX1FRK) Processing [2.3.0]

Because the VM implementation of the fork (BPX1FRK) service does not meet all POSIX.1 requirements, you must explicitly turn fork (BPX1FRK) processing ON with the CMS OPENVM SET FORK command before running your program. You can use the OPENVM QUERY FORK command to determine the current setting.

For information about restrictions in the VM implementation of fork (BPX1FRK), see the *z/VM: OpenExtensions Callable Services Reference*. For more information about OPENVM commands, see the *z/VM: OpenExtensions Commands Reference*.

Shell Commands for Data Compression [2.3.0]

The following shell commands have been added to the OpenEdition Shell and Utilities:

- **compress**
- **uncompress**
- **zcat**

The **compress** and **uncompress** commands use Lempel-Ziv compression techniques to compress and uncompress data in files or from the standard input. The **zcat** command calls **uncompress** to uncompress data from one or more files or from the standard input and writes it to the standard output.

For more information about these commands, see the *z/VM: OpenExtensions Commands Reference*.

OS Simulation Enhancements [2.4.0]

CMS OS Simulation support has been enhanced as follows:

- The CMS FILEDEF command has been changed to allow record length (LRECL) definitions up to 65535 bytes for variable spanned OS records and non-OS CMS files, and block size (BLOCK or BLKSIZE) definitions up to 65535 bytes for non-OS CMS files.
- The CMS LKED command has been changed to allow larger default work area sizes (SIZE option): 400K for *value1* and 100K for *value2*.
- The CMS MOVEFILE command has been changed to allow the processing of QSAM variable spanned records up to 65535 bytes in length under the Extended Logical Record Interface (XLRI). MOVEFILE can also process non-OS CMS files up to 65535 bytes.
- The CMS QUERY FILEDEF command has a new optional operand, ATTRIBUT, which allows you to display the RECFM, LRECL, and block size attributes associated with the current FILEDEF.
- OS Simulation DCB macro processing has been changed to allow it to describe and pass both LRI and XLRI conventions for QSAM variable spanned long records, up to 65535 bytes in length, for subsequent OPEN, CLOSE, GET, or PUT processing. DCB can now also describe non-OS CMS files up to 65535 bytes in length.
- The OS Simulation OPEN, CLOSE, GET, and PUT macros, and the SVC 19 and SVC 20 supervisor calls, have been changed to allow the processing of OS formatted variable spanned QSAM records and non-OS CMS files up to 65535 bytes in length.
- The OS Simulation tape processing routines, such as DMSTVS, will issue a new message, DMS2139I, if SENSE data from a tape mount indicates that the mounted tape cartridge may be incorrect for the tape device in use. These tape processing routines may be invoked by MOVEFILE processing and by the following OS Simulation macros: OPEN, CLOSE, GET, PUT, READ, WRITE, and FEOV.

For more information, see:

- *z/VM: CMS Application Development Guide for Assembler*
- *z/VM: CMS Commands and Utilities Reference*

OpenEdition Enhancements [2.4.0]

New realpath (BPX1RPH) Callable Service

The realpath (BPX1RPH) service finds the absolute path name for a specified relative path name. Any dot (.) or dot dot (..) components, symbolic links, or mount external links included in the relative path name input are resolved in the absolute path name output.

New setopen (BPX1VM6) Callable Service

The setopen (BPX1VM6) service sets certain flags specific to the OpenEdition platform without creating a new POSIX process in the virtual machine. The function codes used in the setopen service are mapped by the BPXYVM6 macro.

OpenEdition Renamed to OpenExtensions [3.1.0]

In z/VM, support for POSIX and XPG standards is called OpenExtensions. In VM/ESA, this support was called OpenEdition for VM/ESA. No modifications are necessary to run OpenEdition applications on z/VM. OpenExtensions Services and the OpenExtensions Shell and Utilities are now included in CMS.

Open Files Limit Increased [3.1.0]

Under OpenExtensions, the limit on open files has been increased from 1024 to 64K (65536).

BFS Root Not Case Sensitive [3.1.0]

The fully qualified VM byte file system root (**/../VMBFS:***filepoolid***:***filespaceid***/**) is no longer case sensitive.

Binder/Loader Support [3.1.0]

CMS hosts the OS/390 DFSMS Program Management binder and provides a native implementation of the corresponding program object loader functions. Included with this support is a new CMS command, BIND, to invoke the services of the binder to bind and store an executable file containing a program object on DASD (minidisk, SFS directory, or BFS directory). An executable file produced by the binder may be used on a CMS system containing the program object loader in exactly the same way as a conventional MODULE file generated by the CMS GENMOD command.

Also included in this support is an enhancement to the **c89** command to use the new BIND command in place of the combination of the Language Environment prelinker and the old LOAD, INCLUDE, and GENMOD commands. In addition, the complete binder API is available to application programs that need to invoke the services of the binder dynamically.

CMS support of the binder and loader allows ready transportability of executable files between z/VM and OS/390 or z/OS systems and provides the infrastructure to permit CMS to exploit new and emerging programming language technology being developed for z/OS.

For more information, see *z/VM: Program Management Binder for CMS*.

CMS OS Simulation Enhancement [3.1.0]

The new SET TAPENEVR command allows you to control CMS OS Simulation tape label date checking for 'Unexpired Files'. The new QUERY TAPENEVR command allows you to display the current setting.

For more information, see:

- *z/VM: CMS Application Development Guide for Assembler*
- *z/VM: CMS Commands and Utilities Reference*

Tape FICON and RAS Support [3.1.0]

Extended function in DIAGNOSE code X'210' allows application programs to find out the underlying real hardware that is associated with tape devices operating in emulation mode. For more information, see *z/VM: CP Programming Services*.

C Socket Application Programming Interface [4.2.0]

A new z/VM C sockets library within Language Environment provides C socket support for new or existing applications that use Language Environment services. This support includes:

- New C socket-related function calls. These calls are documented in the *z/VM: Language Environment 1.8 C Run-Time Library Reference*, SC24–6038. (This is a new book, which replaces the *C for VM/ESA: Library Reference*.)
- New OpenExtensions callable services (BPX routines), which correspond to the basic z/VM C socket calls. These services are documented in the *z/VM: OpenExtensions Callable Services Reference*.
- A version of the TCP/IP Remote Procedure Call (RPC) function library, VMRPC, to be used in conjuction with the z/VM C sockets. Information about RPC is in the *z/VM: TCP/IP Programmer's Reference*.

The z/VM C sockets are intended as replacements for the existing TCP/IP C sockets and OpenEdition sockets. Although those socket libraries are still supported for compatibility, the z/VM C socket API is preferred. Existing applications may need to recompile to use the new z/VM C socket functions, but no source code changes are required. For more information about using the z/VM C socket API, see the *z/VM: TCP/IP Programmer's Reference*.

Increased 64-bit Addressing Support for DIAGNOSE Codes [4.3.0]

The following DIAGNOSE codes now support the 64-bit addressing mode:

- DIAGNOSE code X'08' – Virtual Console Function
- DIAGNOSE code X'44' – Voluntary Time Slice End
- DIAGNOSE code X'4C' – Generate Accounting Records
- DIAGNOSE code X'DC' – Control Application Monitor Record Collection
- DIAGNOSE code X'258' – Page-Reference Services

For more information, see *z/VM: CP Programming Services*.

C/C++ Compiler Support [4.4.0]

IBM C/C++ for z/VM, Version 1 (5654-A22) Release 1.0, is a z/VM-enabled version of the C/C++ compiler for version 1 release 2.0 of z/OS. This new C/C++ compiler, which runs on CMS, allows C/C++ programs to be compiled and executed on CMS and creates portability between z/VM and z/OS C/C++ programs. The new OpenExtensions command **cxx** invokes the C/C++ for z/VM compiler. C/C++ source files can be read from a CMS minidisk, the SFS, or the byte file system (BFS), and output can be written to any of these file systems. C/C++ for z/VM runs only on z/VM V4R4 and can be licensed only for standard processor engines. However, applications compiled with this C/C++ compiler will run on standard processor engines or Integrated Facility for Linux (IFL) processor features. For more information, see:

- *z/VM: OpenExtensions Commands Reference*
- *C/C++ for z/VM: User's Guide*, SC09-7625

Language Environment Upgrade [4.4.0]

Language Environment for z/VM has been upgraded to provide C/C++, COBOL, and PL/I run-time libraries at the same level shipped with version 1 release 4.0 of z/OS. In addition, this new level of Language Environment has been integrated into z/VM as a component.

Attention: Do not migrate Language Environment 1.8 or earlier to z/VM V4R4. The only level of Language Environment supported on z/VM V4R4 is the new Language Environment component. The files for the z/VM Language Environment component are installed on the MAINT 19E disk. Depending on how you plan to migrate other files from your old 19E disk to the new system, you may need to remove the old Language Environment files. See "Removing the Old Level of Language Environment" on page 7.

Some of the new and enhanced features of the new level of Language Environment are:

XPLINK
Reduces program size and improves performance for small programs that frequently call each other.

Large File Support
Improves the porting capabilities of C/C++ applications accessing BFS and NFS files larger than 2GB.

For more information, see the *z/VM: Language Environment User's Guide*.

Systems Management APIs [4.4.0]

The systems management APIs provide a basic set of functions that can be called by applications to allocate and manage resources for guests running in z/VM virtual machines (virtual images). Although these APIs are primarily intended for managing Linux virtual images, they can be used for managing any type of virtual image running in a z/VM virtual machine. The APIs are designed so that applications can be written by customers or solution providers to help administrators, especially those who lack in-depth VM knowledge, manage large numbers of virtual images running in a single z/VM system.

Functions supported by the systems management APIs allow you to:

- Create and delete virtual images
- Add and remove resources in an image's static (directory) or dynamic (active) configuration
- Activate and deactivate virtual images (individual or lists)
- Manage connectivity between virtual images, including exploitation of the new Virtual Switch support
- Query the status of "long-running" asynchronous operations initiated through the APIs
- Create, delete, replace, and query shared storage segments

The systems management APIs require a directory manager. The IBM Directory Maintenance Facility (DirMaint) optional feature of z/VM has been enhanced with support for these APIs through a service upgrade. See *z/VM: General Information*.

Client applications invoke the systems management APIs through a set of IBM-supplied Remote Procedure Calls (RPCs) to a z/VM server machine (either remotely or from within the z/VM system). The server then calls a set of CMS Callable Services Library (CSL) routines, which perform the requested functions. The CSL routines are replaceable to allow customized solutions for the systems management API functions. For more information, see *z/VM: Systems Management Application Programming*.

Java and NetRexx™ Support Removed [5.1.0]

Java and NetRexx support has been removed from z/VM. If you want to use Java in a z/VM environment, you should consider using Java for Linux running in a Linux guest.

Enhanced Systems Management APIs [5.1.0]

All enhancements to the systems management APIs in z/VM V5R1 have been implemented using Version 2 (V2) of the RPC server. Previous APIs implemented using V1 of the RPC server can also function with the new V2 server. A new server security identification procedure is provided for special authorized clients, which can remove the need to log on with a password, simplifying the logon process. In addition to some usability enhancements, new functions include:

- DASD volume management for virtual images
- Virtual Machine Resource Manager (VMRM) configuration file management
- Query VMRM measurement data
- Query status of active images

Parameter lists for some V1 APIs have been changed to create enhanced APIs for V2. These enhancements are accessible only from a V2 client. The same RPC program number is used, but a new version number (2) is registered with the portmapper during server initialization. A client is required to log in as either a V1 or V2 client. During a client-server session, the client has access only to the functionality for the specified version.

The following V1 APIs have been enhanced:

- AUTHORIZATION_LIST_REMOVE has been enhanced to optionally remove multiple entries for a user ID from the VSMSERVE AUTHLIST file.
- LOGIN has been enhanced to recognize certain V2 clients as trusted users that are not required to supply a password when logging in to the server.
- SHARED_STORAGE_QUERY has been enhanced to optionally return information on all shared segments.
- VIRTUAL_NETWORK_LAN_CONNECT and VIRTUAL_NETWORK_VSWITCH_CONNECT have been enhanced with a new parameter to support Layer 2 LAN, which provides an alternative transport mechanism for Guest LANs and Virtual Switches.
- VLANID parameter of VIRTUAL_NETWORK_VSWITCH_SET has been enhanced to support changes to Virtual Switch operation.

For more information, see *z/VM: Systems Management Application Programming*.

The IBM z/VM Directory Maintenance Facility (DirMaint) feature, Function Level 510, has been enhanced to support the new API functions.For more information, see the *z/VM: Directory Maintenance Facility Commands Reference*.

Dynamic Virtual Machine Timeout [5.1.0]

A new programming service is provided by an emulated DIAGNOSE instruction that helps enable a guest operating system to specify an action to be taken by CP when the guest becomes unresponsive. The DIAGNOSE instruction also allows each guest to define what “unresponsive” means for itself. A time interval and action are specified by the guest. If the guest fails to reissue the DIAGNOSE instruction within the specified time interval, CP performs the action. The guest may define the action as any set of CP commands, although it is envisioned that this function will be used

to terminate the virtual machine in which the guest is running if it becomes unresponsive. This can help ensure that a malfunctioning guest would no longer have access to shared system resources and would relinquish system resources to other guests.

For more information, see *z/VM: CP Programming Services*.

Relocation of REXX Work Area for Applications [5.1.0]

In previous releases, the REXX work area that CMS used to pass parameters to applications was always allocated from below the 16MB line. Now this work area is allocated from above 16MB if the application has identified itself as either AMODE 31 or AMODE ANY.

Server-Requester Programming Interface [5.1.0]

IBM intends to withdraw the Server-Requester Programming Interface (SRPI) from a future release of z/VM. SRPI was introduced in VM in 1986 to provide a programming interface that enhances the environment of IBM workstations communicating with IBM mainframes operated with VM systems. Customers with applications using SRPI should start using TCP/IP for z/VM to provide similar function. Documentation for SRPI is available in the *VM/ESA: Programmer's Guide to the Server-Requester Programming Interface for VM*, SC24-5455, but this publication is not included in the z/VM V5R1 library. Also, documentation for SRPI-related functions, such as the CMSSERV command, has been removed from other z/VM V5R1 books.

System Diagnosis

This section describes changes that can affect how you diagnose problems on VM.

FST and ADT Macro Changes to Support 4-digit Years [2.2.0]

FST (File Status Table)

When you access a disk or SFS directory, a file directory is stored in your virtual machine. The entries in the file directory for each CMS file are called the File Status Table (FST). The FST describes the attributes of the file. One of the attributes of a file is date/time of last update. This is currently stored in 6 bytes (*yy mm dd hh mm ss*), where each byte holds two decimal digits. This is the date and time that the accessed file was last updated.

In VM/ESA 2.2.0, support was added for 4-digit years by adding a century flag FSTCNTRY (X'08') in the FST flag byte (FSTFLAGS) for both FST forms (see table below). This is bit 4, which identifies the century in which the file was last written or updated. If bit 4 is off, the year is in the 1900s. If bit 4 is on, the year is in the 2000s. Therefore, the range of years supported is from 1900 to 2099.

If you are interested in the existing flag settings for the FSTFLAGS field, see the usage notes for the FSSTATE macro in the *z/VM: CMS Macros and Functions Reference*.

If you are using the FST to retrieve the date and time of last update in your application, you can add support to use an appropriate CSL routine (for example, DMSGETDI, DMSEXIST, or DMSERP) or you can use the FSSTATE macro. For information about CSL routines, see the *z/VM: CMS Callable Services Reference*. For information about FSSTATE, see the *z/VM: CMS Macros and Functions Reference*.

Table 3. Base versus Extended FST Format. Note that not all field names are shown.

Hex Disp	Dec Disp	Size	Base	Ext	Field Name	Field Description
0	0	16	B	E	FSTDFNFT	File name File type
		8	B	E	FSTFNAME	File name
		8	B	E	FSTFTYPE	File type
10	16	2	B		FSTDATEW	Date (*mm yy*) last written
1F	31	1	B	E	FSTFLAGS	FST flag byte
		Bit 4	B	E	FSTCNTRY	X'08' Century last written (0 - 19*nn*, 1 - 20*nn*)
26	38	2	B		FSTYEARW	Year (*yy*) last written
36	54	6		E	FSTADATI	Alternate date/time (*yy mm dd hh mm ss*)
4E	78	1		E	FSTFB3	FST flag byte 3
		Bit 4		E	FSTCDOLR	X'08' Century date of last reference (0 - 19*nn*, 1 - 20*nn*)
54	84	3		E	FSTDOLR	Date of last reference
Note: FSTFB3, FSTCDOLR, and FSTDOLR apply only to an SFS FST.						

Also, for an SFS FST, a new flag FSTCDOLR (X'08') is added in the FSTFB3 flag byte 3. This is the flag that indicates the Century for Date of Last Reference (0 indicates the year is in the 1900s, 1 indicates the year is in the 2000s) that corresponds to FSTDOLR.

ADT (Active Disk Table) - Disk Label

The ADTSECT maps information in the active disk table (ADT). It also contains information about the disk label. One of the fields contained in the disk label is ADTDCRED, which is the creation date and time of the minidisk. Following the ADTDCRED field is a new flag byte for the volume label called ADTFLGL, which contains the new ADTCNTRY flag. The ADTCNTRY flag is X'01', and corresponds to the ADTDCRED field. If the value of this flag is 0, it indicates that the creation year is in the 1900s. If the value is 1, it indicates the creation year is in the 2000s.

Viewing and Printing CP and CMS Control Blocks [2.3.0]

CP and CMS control block documentation is now available on the VM Internet Library at www.ibm.com/eserver/zseries/zvm/library/.

You can view or print an entire control block or select general sections.

In addition, VM provides an unsupported tool, DACBGEN EXEC, that you can use against CP and CMS control blocks on your system to get the most current data. You can also use DACBGEN against user blocks if they follow the prescribed formula. You can tailor DACBGEN to your own environment.

Dump Viewing Facility No Longer Supports CP Dumps [3.1.0]

The Dump Viewing Facility no longer supports CP dumps; it supports only VM (virtual machine) dumps. The VM Dump Tool is the dump viewing program to use for z/VM CP dumps.

VM Dump Tool [3.1.0]

The VM Dump Tool assists in analyzing dump data from a dump file created by the DUMPLOAD utility. The VM Dump Tool provides a variety of subcommands and macros that allow you to display, locate, and format dump data interactively. This tool can process CP stand-alone dumps, CP ABEND dumps, and virtual machine dumps of a CP system. For more information, see the new *z/VM: VM Dump Tool* book.

VM Dump Tool Enhancement [4.3.0]

The structure of the VM Dump Tool has been changed to use 31–bit addressing instead of 24–bit addressing. While this did not directly affect any external interfaces, it should reduce storage requirements in the virtual machine below the 16MB line.

VM Dump Tool Enhancements [4.4.0]

The following support is added to the VM Dump Tool:

- A new EXTRACT function for easy access from a macro environment to selected information in the dump
- Support for a macro file type of VMDT.
- Improved support for non-CP dumps, including new subcommands/macros for migration from the Dump Viewing Facility environment (DVFSTACK, FINDSTRG, INIT, and READSTRG)
- You can now halt long-running commands without losing unsaved dump session information by using the existing HI IMMEDIATE command. This CMS command is now supported by the following VM Dump Tool subcommands: CHAIN, FRAMES, LOCATE, TRACE, and VMDBK.
- The new XEDITPRE option of the VM Dump Tool SET subcommand allows you to disable or change the XEDIT escape value (the function that indicates when a command should be forwarded directly to XEDIT). You can reset it to either a single character or a string. This option replaces the XEDIT subcommand. Also, the new XEDITPRE option of the VM Dump Tool QUERY subcommand allows you to query the current setting for the XEDIT escape value.
- Output from the DISPLAY subcommand, when issued from a macro, is now the same as DISPLAY subcommand output when the subcommand is issued from the command line. Any macro which depends on the output of DISPLAY will have to be modified to handle the new output.

For more information, see *z/VM: VM Dump Tool*.

VM Dump Tool Enhancements [5.1.0]

The following support is added to the VM Dump Tool:

- The VM Dump Tool can be used to look at all dumps from Version 3, Release 1.0 through Version 5, Release 1.0.
- The MAP command and related infrastructure which creates a VMDTMAP file has been rewritten. For a CP dump the externals are not changed. The new code obtains the information for the VMDTMAP file from the CP symbol table if possible, which avoids the time required to scan storage. If the CP symbol table is not available (which is the case for older dumps), then the VM Dump Tool scans storage looking for CP module headers as it has in the past.
- New MAPA and MAPN options of the EXTRACT subcommand make it easier for a macro to find out the name or address of a module. EXTRACT MAPA allows a

macro to find the name of a module or entry point from an address. EXTRACT MAPN allows a macro to find the address of a module or entry point name.

- The new sample VMDTNCPM macro helps you build a VMDTMAP file for non-CP dumps.
- The new SET DEBUG function provides new support to help you debug macros written for the VM Dump Tool. With SET DEBUG ON, non-zero return codes associated with a macro are reported to the virtual machine console. The new matching QUERY DEBUG function displays your DEBUG setting (ON or OFF).
- The preferred file type for a VM Dump Tool macro is now VMDT rather than XEDIT. In a future release all IBM-supplied VM Dump Tool macros will be renamed from their current file type of XEDIT to a file type of VMDT. Also, the default environment when a VM Dump Tool macro is entered is now VMDUMPTL.
- To be consistent with the SETVAR function, the EXTRACT DFIR/DFIZ and EXTRACT SYMPTOM functions now require a decimal length value rather than hexadecimal. If you have any customer-written VM Dump Tool macros which use these functions, you will have to change the macros to use a decimal length value. Also, the maximum size for EXTRACT DFIR has been increased to 36,864 bytes.
- The new EXTRACT DISPL function allows a macro to obtain the displacement of a specified field. Only selected fields of PFXPG and SYSCM are supported at this time.
- The INDQ is no longer supported. It now returns only a response of ″complete.″
- The CPEBK subcommand and the CALLERS macro now both take up to 17 characters of input. Both still have the restriction of allowing up to only eight significant digits in the address operand.
- The TRACE FROM and TRACE TO functions no longer check the frame type to be sure it is a trace frame. Because of this these functions can now be used when the frame table is not available. (However, these functions can cause unpredictable output when the page is not really part of the trace table.)
- The output from the RDEVBK, RSCH, VDEVBK and VSCH subcommands has been changed to produce the addresses of significant related control blocks instead of displaying the storage of the control blocks themselves.

For more information, see *z/VM: VM Dump Tool*.

Other System Changes

This section describes additional changes that can affect how you run your new VM system.

Euro Support [2.4.0]

Support has been added to the following:

- Almost 200 new translation tables have been added to VM TCP/IP.
- A new CSL routine, DTCXLATE, provides an application programming interface (API) for programs to use the translation information contained in the TCP/IP translation tables.
- OPENVM GETBFS and PUTBFS commands were updated, increasing the number of code pages that could be specified.
- The FTP server and VM/ESA 2.3.0 TCP/IP FL310 NFS feature have been updated to allow specification of particular translation tables.
- Language Environment 1.6 and 1.8

- LANRES
- LFS
- The TCP/IP LPR client and LPD server applications have been enhanced to provide users with the ability to specify alternate translation tables.
- RSCS LPR/LPD
- SMTP

For more information, see the euro link on the VM euro web page:

`http://www.ibm.com/eserver/zseries/zvm/euro/`

Product Documentation

This section describes changes to the format, location, or availability of the z/VM product documentation. For information about which z/VM books have been updated for the new release, see *z/VM: General Information*.

System Messages and Codes Book Divided [4.1.0]

The *z/VM: System Messages and Codes* book has been divided into the following three books:

- *z/VM: System Messages and Codes - CP*, GC24-6030
- *z/VM: System Messages and Codes - CMS*, GC24-6031
- *z/VM: System Messages and Codes - Other Components*, GC24-6032

Relocated Information [4.1.0]

The following table shows information that has been relocated within the z/VM library.

Table 4. Information Relocated in z/VM V4R1

Topic	Old Location (Book)	New Location (Book)
CMS utilities	*VM/ESA: CMS Utilities Feature*	• *z/VM: CMS Commands and Utilities Reference* • *z/VM: System Messages and Codes - CMS and REXX/VM*
GCS nucleus build information	*z/VM: Installation Guide*	*z/VM: Group Control System*
CMS nucleus build information	*z/VM: Installation Guide*	*z/VM: Planning and Administration*

Deleted Books [4.1.0]

The following books are not included in the z/VM V4R1 library:

- *LAN Resource Extension and Services/VM: General Information*, GC24-5618
- *LAN Resource Extension and Services/VM: Guide and Reference*, SC24-5622
- *LAN Resource Extension and Services/VM: Licensed Program Specifications*, GC24-5617
- *OpenEdition DCE for VM/ESA: Administration Guide*, SC24-5730
- *OpenEdition DCE for VM/ESA: Administration Reference*, SC24-5731
- *OpenEdition DCE for VM/ESA: Application Development Guide*, SC24-5732
- *OpenEdition DCE for VM/ESA: Application Development Reference*, SC24-5733
- *OpenEdition DCE for VM/ESA: Configuring and Getting Started*, SC24-5734

- *OpenEdition DCE for VM/ESA: Introducing the OpenEdition Distributed Computing Environment*, SC24-5735
- *OpenEdition DCE for VM/ESA: Messages and Codes*, SC24-5736
- *OpenEdition DCE for VM/ESA: Planning*, SC24-5737
- *OpenEdition DCE for VM/ESA: User's Guide*, SC24-5738
- *VM/ESA: CMS Utilities Feature*, SC24-5535
- *VM/ESA: REXX/EXEC Migration Tool for VM/ESA*, GC24-5752

Monitor Records Provided on the Web as HTML [4.2.0]

z/VM monitor records are now provided on the z/VM web site in the same HTML format as the data areas and control blocks.

Relocated Information [4.2.0]

The following table shows information that has been relocated within the z/VM library.

Table 5. Information Relocated in z/VM V4R2

Topic	Old Location (Book)	New Location (Book)
C sockets API (reference)	• *z/VM: TCP/IP Programmer's Reference* • *OpenEdition for VM/ESA: Sockets Reference*	*z/VM: Language Environment 1.8 C Run-Time Library Reference*
Test the installation or service of the DirMaint servers	*Directory Maintenance Facility Program Directory*	*z/VM: Directory Maintenance Facility Tailoring and Administration Guide*

Planning Book Divided [4.3.0]

The *z/VM: Planning and Administration* book has been divided into the following four books:

- *z/VM: CMS Planning and Administration*, SC24-6042
- *z/VM: CP Planning and Administration*, SC24-6043
- *z/VM: Dynamic I/O Configuration Planning and Administration*, SC24-6044
- *z/VM: Saved Segments Planning and Administration*, SC24-6056

Relocated Information [4.3.0]

The following table shows information that has been relocated within the z/VM library.

Table 6. Information Relocated in z/VM V4R3

Topics	Old Location (Book)	New Location (Book)
• Setting up OpenExtensions • DIRPOSIX utility	*z/VM: Planning and Administration*	*z/VM: OpenExtensions User's Guide*
• DFSMS/VM installation	*VM/ESA: DFSMS/VM Function Level 221 Installation and Customization* **Note:** This book has been renamed to *z/VM: DFSMS/VM Customization*.	*DFSMS/VM Function Level 221 Program Directory*

Table 6. Information Relocated in z/VM V4R3 (continued)

Topics	Old Location (Book)	New Location (Book)
• DirMaint control files	*Directory Maintenance VM/ESA: Diagnosis Reference* (This book has not been updated for the Directory Maintenance Facility feature for z/VM.)	*z/VM: Directory Maintenance Facility Tailoring and Administration Guide*
• Tailorable and nontailorable DirMaint system files	*Directory Maintenance Facility Program Directory*	*z/VM: Directory Maintenance Facility Tailoring and Administration Guide*

Retitled Books [4.4.0]

The following table lists z/VM books that have been retitled (and might have new form numbers).

Table 7. Books Retitled in z/VM V4R4

Old Book Title and Number	New Book Title and Number
z/VM: Dynamic I/O Configuration Planning and Administration, SC24-6044	*z/VM: I/O Configuration*, form number unchanged
z/VM: Installation Guide, GC24-5992	*z/VM: Guide for Automated Installation and Service*, GC24-6064

Relocated Information [4.4.0]

The following table shows information that has been relocated within the z/VM library.

Table 8. Information Relocated in z/VM V4R4

Topics	Old Location (Book)	New Location (Book)
• Installation-related CP utilities: INSTALL INSTDEF INSTIIS INSTPLAN INSTVM IPWIZARD MIGR51D MOVE2SFS	*z/VM: Installation Guide*	*z/VM: CP Commands and Utilities Reference*
• Messages for installation-related CP utilities	*z/VM: Installation Guide*	*z/VM: System Messages and Codes - CP*
• CP access control interface (ACI)	*z/VM: CP Planning and Administration*	*z/VM: CP Programming Services*

Deleted Books [4.4.0]

The following table lists books that are not included in the z/VM V4R4 library.

Table 9. Books Removed from the Library in z/VM V4R4

Book Title and Number	Reason for Removal
Debug Tool User's Guide and Reference, SC09-2137	This product does not support the new C/C++ compiler.
Language Environment for OS/390 & VM: Concepts Guide, GC28-1945	Replaced by *z/OS: Language Environment Concepts Guide*, SA22-7567-03

Table 9. Books Removed from the Library in z/VM V4R4 (continued)

Book Title and Number	Reason for Removal
Language Environment for OS/390 & VM: Debugging Guide and Run-Time Messages, SC28-1942	Replaced by *z/OS: Language Environment Debugging Guide*, GA22-7560-03, and *z/OS: Language Environment Run-Time Messages*, SA22-7566-03
Language Environment for OS/390 & VM: Programming Guide, SC28-1939	Replaced by *z/OS: Language Environment Programming Guide*, SA22-7561-03
Language Environment for OS/390 & VM: Programming Reference, SC28-1940	Replaced by *z/OS: Language Environment Programming Reference*, SA22-7562-03
Language Environment for OS/390 & VM: Run-Time Migration Guide, SC28-1944	Not required for z/VM
Language Environment for OS/390 & VM: Writing Interlanguage Communication Applications, SC28-1943	Replaced by *z/OS: Language Environment Writing ILC Applications*, SA22-7563-01
z/VM: Language Environment 1.8 C Run-Time Library Reference, SC24-6038	Retitled to *C/C++ for z/VM: Run-Time Library Reference*, SC09-7625, and included in the C/C++ for z/VM bookshelf on the *z/VM Collection* CD-ROM.

Retitled Books [5.1.0]

The following table lists z/VM books that have been retitled.

Table 10. Books Retitled in z/VM V5R1

Old Book Title	New Book Title
VM/ESA: Connectivity Planning, Administration, and Operation	*z/VM: Connectivity*
z/VM: System Messages and Codes – CMS	*z/VM: System Messages and Codes – CMS and REXX/VM*
z/VM: System Messages and Codes – Other Components	*z/VM: System Messages and Codes – AVS, Dump Viewing Facility, GCS, TSAF, and VMSES/E*

Relocated Information [5.1.0]

The following table shows information that has been relocated within the z/VM library.

Table 11. Information Relocated in z/VM V5R1

Topics	Old Location (Book)	New Location (Book)
• "Converting to System Configuration Files"	*z/VM: CP Planning and Administration*	*z/VM: Migration Guide*, "Converting from HCPRIO, HCPSYS, and HCPBOX to Configuration Files" on page 143
• "Linux under z/VM"	*z/VM: Running Guest Operating Systems*	*z/VM: Getting Started with Linux on zSeries*
• "Working with Virtual Networks"	*z/VM: Virtual Machine Operation*	*z/VM: Connectivity*

Deleted Books [5.1.0]

The following table lists books that are not included in the z/VM V5R1 library.

Table 12. Books Removed from the Library in z/VM V5R1

Book Title and Number	Reason for Removal
eServer zSeries: Open Systems Adapter-Express Customer's Guide and Reference, SA22-7476	Replaced by *eServer zSeries: Open Systems Adapter-Express Customer's Guide and Reference*, SA22-7935-02.
S/390: Open Systems Adapter-Express Customer's Guide and Reference, SA22-7403	This book is for S/390 servers (G5, G6), which are not supported by z/VM V5R1.
S/390: Planning for the S/390 Open Systems Adapter (OSA-1, OSA-2) Feature, GC23-3870	This book is for S/390 servers (G5, G6), which are not supported by z/VM V5R1.
VM/ESA: Open Systems Adapter Facility User's Guide for OSA-2, SC28-1992	This book is for S/390 servers (G5, G6), which are not supported by z/VM V5R1.
VM/ESA: Programmer's Guide to the Server-Requester Programming Interface for VM/ESA, SC24-5455	IBM intends to withdraw the Server-Requester Programming Interface (SRPI) from a future release of z/VM.
VM/ESA: REXX/VM Primer, SC24-5598	The same topics are covered in the *z/VM: REXX/VM User's Guide*, SC24-6114
z/VM: Performance Reporting Facility Function Level 410, SC24-6027	The Performance Reporting Facility functions have been merged into the Performance Toolkit. The Performance Reporting Facility feature is not available with or supported by z/VM V5R1.
z/VM: RealTime Monitor Function Level 410, SC24-6027	The RealTime Monitor functions have been merged into the Performance Toolkit. The RealTime Monitor feature is not available with or supported by z/VM V5R1.
z/VM: System Administration Facility, SC24-6034	IBM intends to withdraw the System Administration Facility from a future release of z/VM.

Documentation

Chapter 3. Changes to External Interfaces

This chapter identifies the specific external interfaces in VM components that have changed since VM/ESA V2R1. The release in which each change occurred is indicated, and each change is identified as either ***upwardly compatible*** or ***incompatible***. Use the information provided in this chapter to determine if you need to make any changes in the way you use these interfaces. See "Compatibility Terms Used in This Book" on page 2 for the meaning of the compatibility terms.

Notes:

1. For changes that occur every release, such as responses from commands that query the level of the system, only the latest release is indicated.
2. Changes from PTFs for post-release APARs are identified as changes in the successive release.
3. For changes to external interfaces in other parts of VM (not components), see the documentation for those facilities and features.

This chapter contains the following major sections:

CP Changes

This section identifies the changes to CP external interfaces. It contains the following subsections:

System Configuration File Statements

Table 13 lists the system configuration file statements that have changed. For additional information, see *z/VM: CP Planning and Administration*.

Table 13. Changes to System Configuration File Statements

Statement	Changes
CHARACTER_DEFAULTS	**INCOMPATIBLE:** • **[2.3.0]** Letters A-Z, numbers 0-9, and bytes X'OE' (shift out) and X'0F' (shift in) cannot be defined as the system default line edit symbols (line-delete, character-delete, escape, line-end, and tab).
CPXLOAD	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: &TEXT, &TXTLIB. The dual-mode CP is no longer supported; CP runs only in 64-bit mode. The file type of all supplied CP text files is TEXT, not TEXT64. The file type of all supplied CP text libraries is TXTLIB, not T64LIB. **Upwardly compatible:** • **[5.1.0]** LOCK and NOLOCK operands no longer have any effect. All symbols are considered resident, which means they cannot be locked or unlocked.
DEFINE COMMAND / CMD	**Upwardly compatible:** • **[4.4.0]** New operand: SILENT.
DEFINE LAN	**Upwardly compatible:** • **[4.3.0]** New operands: TYPE HIPERsockets, ACCOUNTing, GRANT *userlist*. • **[5.1.0]** New operands: IP, ETHernet.
DEFINE VSWITCH	**Upwardly compatible:** • **[5.1.0]** New operands: IP, ETHernet, VLAN, PORTType.
FEATURES	**Upwardly compatible:** • **[3.1.0]** New options for automatic start and restart, IPL message control, and forced disconnect timeout.
MODIFY COMMAND / CMD	**Upwardly compatible:** • **[4.4.0]** New operands: SILENT, NOTSILENT.
MODIFY VSWITCH	**INCOMPATIBLE:** • **[5.1.0]** 'ANY' is not supported as a value for *vlanid*. It was formerly the default. The default VLAN for the user is now the VLAN ID specified on the DEFINE VSWITCH configuration statement or command. **Upwardly compatible:** • **[5.1.0]** New operand: PORTType.

OPERATOR_CONSOLES	**INCOMPATIBLE:**
	• **[4.4.0]** New operand: SYSTEM_3270.
	This operand is not valid in the OPERATOR_CONSOLES statement for any prior VM release. If your only statement includes this operand, and you need to back out of the new release to your prior VM release, the exposure of a missing console could cause the initialization of the prior VM release to fail with a 1010 wait state. As a temporary measure during the migration to the new release, include two OPERATOR_CONSOLES statements, the first without the SYSTEM_3270 operand and the second with it. For example:
	`OPERATOR_CONSOLES 03E0 0009 001F 00078`
	`OPERATOR_CONSOLES SYSTEM_3270 03E0 0009 001F 00078`

Table 13. Changes to System Configuration File Statements (continued)

Statement	Changes
STORAGE	**INCOMPATIBLE:** • **[3.1.0]** RIO370 operand removed. • **[5.1.0]** Options removed: V=R, V=R_FREE. The V=R area and V=R recovery area are not supported.
SYSTEM_RESIDENCE	**Upwardly compatible:** • **[3.1.0]** New VOLID options: &SYSRES, &SYSPARM.
USER_DEFAULTS	**Upwardly compatible:** • **[3.1.0]** New operand: MESSAGE_LEVEL. • **[4.1.0]** New operand: CPLANGUAGE. • **[4.1.0]** Message HCP365I (new format) issued at system initialization.
VMLAN	**Upwardly compatible:** • **[4.3.0]** New operands: ACNT, ACCOUNTing. • **[4.4.0]** New operand: MACprefix *macprefix* • **[5.1.0]** New operand: MACIDRange.
XLINK_DEVICE_DEFAULTS	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: TYPE 3330, TYPE 3340, TYPE 3350, TYPE 3375, TYPE 9345. **Upwardly compatible:** • **[4.2.0]** The Class 9 description of the TYPE 3390 operand was changed. Specifying TYPE3390 Class 9 supports the maximum number of cylinders on the 3390 device (10017 or greater).
XLINK_VOLUME _INCLUDE	**Upwardly compatible:** • **[4.2.0]** The description of the CYLinder operand was changed. The CSE track can now be on a cylinder from 0 to the maximum number of cylinders that the 3390 supports.

User Directory Control Statements

Table 14 lists the user directory control statements that have changed. For additional information, see *z/VM: CP Planning and Administration*.

Table 14. Changes to User Directory Control Statements

Statement	Changes
CONSOLE	**Upwardly compatible:** • **[4.2.0]** New operand: OBSERVER.
CRYPTO	**Upwardly compatible:** • **[2.4.0]** New operand: MODIFY. • **[4.2.0]** New operand: APVIRT. • **[5.1.0]** New operand: APDED.
DEDICATE	**INCOMPATIBLE:** • **[5.1.0]** Operand removed: NOIOASSIST. I/O assist is not supported. **Upwardly compatible:** • **[4.3.0]** New operands: SINGLEUSER, MULTIUSER.
DIRECTORY	**INCOMPATIBLE:** • **[5.1.0]** Device types 3350, 3370, 3375, 9332, 9335, and 9345 are not supported. Only 3380, 3390, 9336, and FB-512 are supported.

Table 14. Changes to User Directory Control Statements (continued)

Statement	Changes
MACHINE	**Upwardly compatible:** • **[5.1.0]** 370 operand removed. If a virtual machine defined as 370 mode is IPLed, it is logged on in XA mode with 370 Accommodation turned on.
MDISK	**Upwardly compatible:** • **[3.1.0]** New volume identification option: &SYSRES. • **[4.2.0]** New maximum number of cylinders for 3390 models A98, B9C supported. • **[5.1.0]** Supports larger FBA disk size.
OPTION	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: DEDICATE, NODEDICATE, VIRT=REAL, V=R, VIRT=FIXED, V=F. V=R and V=F virtual machines are not supported. **Upwardly compatible:** • **[2.2.0]** Current LKFAC operand authorizes full-pack minidisks and devices for real MPLF use. For dedicated devices, MPLF channel commands may now succeed where they used to fail. For full-pack minidisks, the change is transparent until you issue the new SET LKFACR command. • **[2.3.0]** Specifying the TODENABLE operand allows a user to change the virtual machine TOD clock with the new CP SET VTOD command. • **[2.3.0]** New operands: CFVM, CFUSER. • **[2.4.0]** New operand: DIAG88. • **[4.3.0]** New operands: NETAccounting, NETRouter.
SPECIAL	**INCOMPATIBLE:** • **[3.1.0]** Changed message: HCP2801E. **Upwardly compatible:** • **[2.3.0]** New operand: MSGPROC. • **[4.2.0]** New operands: SCTC, BCTC, CNC, *n*, HIPER, *devs*, *ownerid*, and *lanname*. • **[4.4.0]** New operand: FCTC.
USER	**INCOMPATIBLE:** • **[2.3.0]** Letters A-Z, numbers 0-9, and bytes X'OE' (shift out) and X'0F' (shift in) cannot be defined as logical line edit symbols (line-end, line-delete, character-delete, and escape).

CP Commands

Table 15 lists the CP commands that have changed. For additional information, see the *z/VM: CP Commands and Utilities Reference*.

Table 15. Changes to CP Commands

Command	Changes
ACNT	**Upwardly compatible:** • **[4.3.0]** Entering ACNT creates all available types of accounting records for each user specified.

Table 15. Changes to CP Commands (continued)

Command	Changes
ATTACH	**INCOMPATIBLE:** • **[5.1.0]** Operand removed: NOIOASSIST. I/O assist is no longer supported, so there is no need to turn eligibility off. • **[5.1.0]** Response for preferred virtual machine removed. Preferred virtual machines are no longer supported. • **[5.1.0]** Messages removed: HCP811I, HCP1508I, HCP1511I, HCP1556I. **Upwardly compatible:** • **[3.1.0]** New messages: HCP6860E, HCP6863E, HCP6864E. • **[4.3.0]** New operands: SINGLEUSER, MULTIUSER. • **[4.3.0]** New message: HCP1128E. • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter. • **[4.4.0]** New operand: VOLid.
AUTOLOG	**Upwardly compatible:** • **[3.1.0]** New message: HCP093E.
BEGIN	**Upwardly compatible:** • **[3.1.0]** Supports hexadecimal storage locations up to 16 digits.
COMMIT	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
COUPLE	**Upwardly compatible:** • **[3.1.0]** New message: HCP6024E. • **[4.2.0]** New operands: *ownerid*, *lanname*. • **[4.2.0]** New response. • **[4.2.0]** New messages: HCP2786E, HCP2787E, HCP2788E, HCP2789E, HCP2791E. • **[4.2.0]** Changed message: HCP6011E. • **[4.3.0]** Changed message: HCP6024E. • **[4.4.0]** New operand: SYSTEM *switchnm*. • **[5.1.0]** New messages: HCP6525E and HCP6528E.
CPLISTFILE	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Responses include 4-digit years for FULLDATE and ISODATE operands.
CPXLOAD	**Upwardly compatible:** • **[5.1.0]** LOCK and NOLOCK operands no longer have any effect. All symbols are considered resident, which means they cannot be locked or unlocked.
DEDICATE	**INCOMPATIBLE:** • **[5.1.0]** Default of V=R user removed. USER operand must be specified. V=R virtual machine is not supported. • **[5.1.0]** Message removed: HCP893E.

Table 15. Changes to CP Commands (continued)

Command	Changes
DEFINE (in general)	**INCOMPATIBLE:** • **[5.1.0]** Messages removed: HCP811I, HCP1450E. • Also see DEFINE commands listed below. **Upwardly compatible:** • **[2.3.0]** New operand: MSGPROC. • **[2.3.0]** New messages: HCP045E, HCP260E, HCP1014E, HCP2800E, HCP2801E, HCP2802E, HCP2803E, HCP2804I, HCP2806E, HCP2811E. • **[2.4.0]** New operand: EXIT. • **[4.2.0]** New operands: CFLINK, LAN, NIC, SUBSTITUTE. • **[4.2.0]** New messages: HCP2781E, HCP2782E, HCP2784E, HCP2792E, HCP2794E, HCP2795E, HCP2796E • **[4.4.0]** New operand: VSWITCH. • Also see DEFINE commands listed below.
DEFINE CHPID / PATH	**Upwardly compatible:** • **[2.2.0]** New operands: INTEGRATED_SYSTEM_DEVICE, ISD. • **[2.4.0]** New operands: CLUSTER_BUS_SENDER_CHANNEL, CBS, FICON, FC, FICON_CONVERTER, FCV, OSA_DIRECT_EXPRESS, OSD, OSA_EXPRESS, OSE. • **[2.4.0]** New return codes for message HCP6806E. • **[3.1.0]** New operands: CLUSTER_BUS_PEER_CHANNEL, CBP, CLUSTER_BUS_RECEIVER_CHANNEL, CBR, COUPLING_FACILITY_RECEIVER_CHANNEL, CFR, DIRECT_SYSTEM_DEVICE, DSD, EMULATED_I/O, EIO, INTERNAL_COUPLING_PEER_CHANNEL, ICP, IOCLUSTER *iocname*, MANAGED, PEERPATH *nn*. • **[4.3.0]** New operand: FCP. • **[4.4.0]** New operands: PCHID *nnnn*, CSS *nn*, PEERCSS *nn*.
DEFINE COMMAND / CMD	**Upwardly compatible:** • **[4.4.0]** New operand: SILENT. • **[5.1.0]** The SILENT operand can be specified as SILENTLY.
DEFINE CPOWNED	**Upwardly compatible:** • **[4.2.0]** New operand: RESERVED.
DEFINE CRYPTO	**Upwardly compatible:** • **[2.4.0]** New response. • **[2.4.0]** New message: HCP1716E.
DEFINE CTCA	**Upwardly compatible:** • **[3.1.0]** New operands: SCTC, BCTC, CNC. • **[4.40]** New operand: FCTC.

Table 15. Changes to CP Commands (continued)

Command	Changes
DEFINE CU / CNTLUNIT	**Upwardly compatible:** • **[2.4.0]** CFS operand has been changed to CF because this operand now indicates that the control unit is connected to a coupling facility sender channel path or a cluster bus sender channel path, or both. However, the CFS form of the operand is still supported for compatibility. • **[2.4.0]** Range of permitted values for CU_LOGICAL_ADDRESS has been increased. • **[3.1.0]** New option for TYPE: *. • **[3.1.0]** New operand: MANAGED_PATHS *n*. • **[4.2.0]** New operand: FICON_CTC. • **[4.4.0]** Changed operand: LINK_address. • **[4.4.0]** New operand: CSS *nn*.
DEFINE DEVICE / IODEVICE	**Upwardly compatible:** • **[2.4.0]** CFS operand has been changed to CF because this operand now indicates that the control unit is connected to a coupling facility sender channel path or a cluster bus sender channel path, or both. However, the CFS form of the operand is still supported for compatibility. • **[4.4.0]** New operand: CSS *nn*.
DEFINE LAN	**Upwardly compatible:** • **[4.3.0]** New ACCOUNTING ON and ACCOUNTING OFF operands allow Class B users to control whether accounting records are to be created for the LAN being defined. • **[5.1.0]** New operands: IP, ETHernet.
DEFINE MSGPROC	**INCOMPATIBLE:** • **[3.1.0]** Changed message: HCP2801E. **Upwardly compatible:** • **[4.2.0]** New operand: DEVICES.
DEFINE NIC	**Upwardly compatible:** • **[4.4.0]** Updated information for the HIPERsockets and QDIO operands to include virtual switch information.
DEFINE STORAGE	**Upwardly compatible:** • **[3.1.0]** New operand: CONFIGURATION.
DEFINE (Temporary Disk)	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: T3350, T3375, T9345, T3370, T9332, T9335.
DEFINE VSWITCH	**Upwardly compatible:** • **[5.1.0]** New Operands: IP, ETHernet, VLAN, PORTType. • **[5.1.0]** New message: HCP2846E.
DEFSYS	**INCOMPATIBLE:** • **[5.1.0]** Value of '370' not supported with MACHMODE option. 370 virtual machines are not supported.
DELETE (in general)	**Upwardly compatible:** • See DELETE commands listed below.
DELETE CHPID / PATH	**Upwardly compatible:** • **[2.4.0]** New return codes for message HCP6806E. • **[4.4.0]** New operand: CSS *nn*.

Table 15. Changes to CP Commands (continued)

Command	Changes
DELETE CU / CNTLUNIT	**Upwardly compatible:** • **[2.4.0]** CFS operand has been changed to CF because this operand now indicates that the control unit is connected to a coupling facility sender channel path or a cluster bus sender channel path, or both. However, the CFS form of the operand is still supported for compatibility. • **[4.4.0]** New operand: CSS *nn*. • **[4.4.0]** New message: HCP1006E.
DELETE DEVICE / IODEVICE	**Upwardly compatible:** • **[2.4.0]** CFS operand has been changed to CF because this operand now indicates that the control unit is connected to a coupling facility sender channel path or a cluster bus sender channel path, or both. However, the CFS form of the operand is still supported for compatibility. • **[3.1.0]** Additional format for message HCP6818E. • **[4.4.0]** New operand: CSS *nn*. • **[4.4.0]** New message: HCP1006E.
DELETE RDEVICE	**Upwardly compatible:** • **[3.1.0]** New message: HCP6862E.
DESTAGE	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
DETACH (in general)	**INCOMPATIBLE:** • **[5.1.0]** Messages removed: HCP811I, HCP893E. **Upwardly compatible:** • **[2.3.0]** New operand: MSGPROC. • **[2.3.0]** Additional messages: HCP260E, HCP2805E, HCP2807E. • **[4.2.0]** New operands: CFLINK, LAN, NIC. • **[4.2.0]** Additional messages: HCP006E, HCP2783E, HCP2793E, HCP2795E. • **[4.3.0]** New message: HCP1119E. • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter. • **[4.4.0]** New operand: VSWITCH. • Also see DELETE commands listed below.
DETACH (Real Device)	**Upwardly compatible:** • **[4.3.0]** New operand: ALL. • **[4.4.0]**New operand: VOLid.
DIAL	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros.
DISCARD PINNED	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
DISCONNECT	**Upwardly compatible:** • **[3.1.0]** Time the system waits between disconnect and automatic logoff can be set on the FEATURES system configuration statement.

Table 15. Changes to CP Commands (continued)

Command	Changes
DISPLAY (in general)	**Upwardly compatible:** • **[3.1.0]** New operand: PSWG. • **[3.1.0]** Message HCP6150E may specify z/Architecture mode. • Also see DISPLAY commands listed below.
DISPLAY ESA/XC Storage	See DISPLAY Guest Storage (ESA/XC).
DISPLAY Guest Storage (ESA/XC)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and displaying data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.
DISPLAY Guest Storage (ESA/390)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and displaying data in ASCII format. • **[3.1.0]** Supports 64-bit addressing. • **[3.1.0]** New z/Architecture variation.
DISPLAY Host Storage	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and displaying data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.
DISPLAY Linkage Stack	**Upwardly compatible:** • **[2.2.0]** Response indicates the called-space identification (CSID) if the linkage-stack entry type is a program-call state entry with a called-space ID. • **[3.1.0]** New responses for 64-bit mode.
DISPLAY PSW	**Upwardly compatible:** • **[3.1.0]** For a z/Architecture guest, translates a z/Architecture format PSW into an ESA/390 format PSW (if the SET PSWTRANS ALL or SET PSWTRANS STORE command was previously issued).
DISPLAY Registers	**Upwardly compatible:** • **[2.4.0]** New operand: FPC. • **[2.4.0]** Yreg operands accept register numbers 0-15 if the IEEE Floating Point hardware feature is installed on the processor. • **[2.4.0]** New response when FPC operand is used. • **[2.4.0]** New messages: HCP6153E, HCP6154E. • **[3.1.0]** New operands: GG*reg1*, GH*reg1*, XG*reg1*, XH*reg1*.
DUMP (in general)	**Upwardly compatible:** • **[3.1.0]** Message HCP6150E may specify z/Architecture mode. • **[3.1.0]** New operand: PSWG. • Also see DUMP commands listed below.
DUMP ESA/XC Storage	See DUMP Guest Storage (ESA/XC)
DUMP Guest Storage (ESA/XC)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and dumping data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.

Table 15. Changes to CP Commands (continued)

Command	Changes
DUMP Guest Storage (ESA/390)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and dumping data in ASCII format. • **[3.1.0]** Supports 64-bit addressing. • **[3.1.0]** New z/Architecture version of this command.
DUMP Host Storage	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and dumping data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.
DUMP Linkage Stack	**Upwardly compatible:** • **[2.2.0]** Response indicates the called-space identification (CSID) if the linkage-stack entry type is a program-call state entry with a called-space ID. • **[3.1.0]** New responses for 64-bit mode.
DUMP Registers	**Upwardly compatible:** • **[3.1.0]** New operands: GG, GH, XG, XH.
DUMPLOAD	**Upwardly compatible:** • **[5.1.0]** New message: HCP8185I.
DUPLEX	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
FLASHCOPY	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
FORCE	**INCOMPATIBLE:** • **[4.3.0]** Message HCP6704E is now returned instead of HCP020E if FORCE is issued with no operands. **Upwardly compatible:** • **[4.3.0]** New operands for LOGoff which will send a shutdown signal to the user.
GIVE	**Upwardly compatible:** • **[4.3.0]** New message: HCP1118E.
HALT	**Upwardly compatible:** • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter.
INDICATE (in general)	**INCOMPATIBLE:** • See INDICATE commands listed below.
INDICATE PAGING	**INCOMPATIBLE:** • **[5.1.0]** Response no longer includes page residency data for the CP nucleus. All modules in the CP nucleus are now resident.
INDICATE QUEUES	**Upwardly compatible:** • **[3.1.0]** Responses changed to support 64-bit architecture.
INDICATE SPACES	**Upwardly compatible:** • **[3.1.0]** Responses changed to support 64-bit architecture.

Table 15. Changes to CP Commands (continued)

Command	Changes
INDICATE USER	**INCOMPATIBLE:** • **[5.1.0]** IO field in the response no longer includes a plus sign (+) to indicate operation with SIE assist. SIE assist is not supported. **Upwardly compatible:** • **[3.1.0]** Responses changed to support 64-bit architecture.
IPL	**INCOMPATIBLE:** • **[2.2.0]** New response is issued if tracing is active when a preferred guest is IPLed. Tracing must be turned off and the guest reIPLed. • **[2.3.0]** Previously, when you IPLed CMS with the PARM operand, CMS initialization attached a fence of 8 bytes of X'FF's to the end of the PARM data before passing it to the SYSPROF EXEC. Now, no fence is attached, and only the actual PARM data (up to 64 characters) is passed. If you have tailored your SYSPROF EXEC to use the fence to determine the end of the PARM data, you must modify your SYSPROF EXEC to use a different method. • **[5.1.0]** Text for message HCP6770E has changed. • **[5.1.0]** Messages removed: HCP203E, HCP811I. **Upwardly compatible:** • **[4.4.0]** New operand: *fcp-dev*, with STOP and ATTN options.. • **[5.1.0]** New messages: HCP260E and HCP838E.
LOCATE (in general)	**Upwardly compatible:** • See LOCATE commands listed below.
LOCATE CMDBK	**Upwardly compatible:** • **[3.1.0]** New message: HCP026E.
LOCATE DGNBK	**Upwardly compatible:** • **[3.1.0]** New message: HCP009E.
LOCATE FILID	**Upwardly compatible:** • **[3.1.0]** New message: HCP026E.
LOCATE FRAMETBL	**Upwardly compatible:** • **[3.1.0]** New message: HCP026E. • **[3.1.0]** New response formats for 64-bit addresses.
LOCATE LDEV	**Upwardly compatible:** • **[3.1.0]** New message: HCP026E.
LOCATE (Storage)	**Upwardly compatible:** • **[3.1.0]** New operand: ASCII. • **[3.1.0]** New messages: HCP002E, HCP003E, HCP004E, HCP009E, HCP6704E.
LOCATE SYMBOL	**Upwardly compatible:** • **[5.1.0]** Response specifies only one address for each symbol, as all symbols are now resident.
LOCATE VDEV	**Upwardly compatible:** • **[3.1.0]** New messages: HCP020E, HCP026E.
LOCATE VSMBK	**Upwardly compatible:** • **[3.1.0]** New message: HCP026E.

Table 15. Changes to CP Commands (continued)

Command	Changes
LOCATEVM	**Upwardly compatible:** • **[3.1.0]** New operand: ASCII. • **[3.1.0]** New messages: HCP002E, HCP003E, HCP004E, HCP009E, HCP6704E.
LOCK	**INCOMPATIBLE:** • **[5.1.0]** SYSTEM operand removed. The CP nucleus is no longer pageable. Modules in the nucleus cannot be locked or unlocked. • **[5.1.0]** Text for message HCP295E has changed. **Upwardly compatible:** • **[3.1.0]** New response variations to support 64-bit architecture. • **[5.1.0]** SYMBOL and *symbol* operands have no effect. All symbols are now considered resident (locked) and cannot be individually locked.
LOGON / LOGIN	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros. • **[4.1.0]** 370 operand no longer supported. • **[5.1.0]** Messages removed: HCP200E, HCP811I, HCP893E, HCP1106I, HCP1508I, HCP1511I, HCP1556I. **Upwardly compatible:** • **[2.3.0]** New message: HCP2808E. • **[3.1.0]** Can specify larger amount of storage on the STORAGE operand. • **[3.1.0]** The response contains a new field after the service level to identify the CP image that is running: '[32-bit]' or '[64-bit]'. • **[3.1.0]** New message: HCP093E. • **[4.3.0]** New message: HCP2094I. • **[5.1.0]** The image field in the response always contains '[64-bit]'. • **[5.1.0]** In the response, the product level has changed.
MODIFY (in general)	**Upwardly compatible:** • See MODIFY commands listed below.
MODIFY CHPID / PATH	**Upwardly compatible:** • **[2.4.0]** New return codes for message HCP6806E. • **[4.4.0]** New operands: CSS *nn*, ADD_CSS_access, RCSS *nn*, INITial_access *pname*, DELETE_CSS_access. • **[4.4.0]** New messages: HCP864E, HCP1006E.
MODIFY COMMAND / CMD	**Upwardly compatible:** • **[4.4.0]** New operands: SILENT, NOTSILENT. • **[5.1.0]** The SILENT and NOTSILENT operands can be specified as SILENTLY and NOTSILENTLY. Also, they cannot be used when modifying a specific version of a command with the IBMCLASS *version* operands.

Table 15. Changes to CP Commands (continued)

Command	Changes
MODIFY CU / CNTLUNIT	**Upwardly compatible:** • **[2.4.0]** New operands: TYPE CF. • **[2.4.0]** Range of permitted values for CU_LOGICAL_ADDRESS has been increased. • **[3.1.0]** New operand: MANAGED_PATHS *n*. • **[4.4.0]** Changed operand: LINK_address. • **[4.4.0]** New message for the LINK_address: HCP6536E. • **[4.4.0]** New operands: CSS *nn*, ADD_CSS_access, RCSS *nn*, DELETE_CSS_access. • **[4.4.0]** New message: HCP1006E.
MODIFY DEVICE / IODEVICE	**Upwardly compatible:** • **[3.1.0]** New format for message HCP6818E. • **[4.4.0]** New operand: CSS *nn*. • **[4.4.0]** New messages: HCP864E, HCP1006E.
MONITOR (in general)	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP6232E.
QUERY (in general)	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: IOASSIST, VRFREE, V=R. • Also see QUERY commands listed below. **Upwardly compatible:** • **[3.1.0]** New operands: PAV, PSWTRANS, UNDERSCORE. • **[4.2.0]** New operands: CFLINKS, LAN, NIC, SUBSTITUTE, VMLAN, VTOD • **[4.3.0]** New operand: IOPRIORITY • **[4.4.0]** New operands: CONTROLLER, LOADDEV, VSWITCH. • **[5.1.0]** New operands: EDEVICE, HYPERSWAP. • Also see QUERY commands listed below.
QUERY ALL	**INCOMPATIBLE:** • **[5.1.0]** Response indicating a tape drive is being used by SPTAPE has been removed. SPTAPE is no longer supported. **Upwardly compatible:** • **[4.3.0]** New responses to indicate tapes attached MULTIUSER, also to indicate a SCSI device adapter with a TYPE of FCP.
QUERY ALLOC	**INCOMPATIBLE:** • **[5.1.0]** Response has been changed to support large SCSI LUNs. The fields containing allocation values are expanded and reformatted to support the larger values.
QUERY CACHE	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY CACHEFW	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E. **Upwardly compatible:** • **[2.2.0]** Response indicates if the cache fast write function is suspended for the subsystem.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY CHPID	**Upwardly compatible:** • **[2.3.0]** New operand: TYPE. • **[2.3.0]** New responses if TYPE is specified. • **[2.4.0]** New responses for the TYPE operand to indicate OSA Express, OSA Direct-Express, cluster-bus-sender, and FICON channels. • **[3.1.0]** New responses for the TYPE operand to indicate coupling-facility-sender, cluster-bus-receiver, internal-coupling-sender, internal-coupling-receiver, direct-system-device, emulated-I/O, cluster-bus-peer, coupling-facility-peer, and internal-coupling-peer channels. • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter. • **[4.4.0]** New operand: PCHID *nnnn*. • **[4.4.0]** New message: HCP1006E.
QUERY CONTROLLER	**INCOMPATIBLE:** • **[5.1.0]** Format of the response has changed.
QUERY CPLANGLIST	**Upwardly compatible:** • **[4.1.0]** Responses may have new meanings.
QUERY CPLEVEL	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY CPLEVEL command, the output from QUERY CPLEVEL uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted. • **[3.1.0]** The response contains a new field after the service level to identify the CP image that is running: '[32-bit]' or '[64-bit]'. • **[5.1.0]** The image field in the response always contains '[64-bit]'. • **[5.1.0]** In the response, the product level has changed.
QUERY CPLOAD	**Upwardly compatible:** • **[3.1.0]** Responses have changed because you can no longer load CP from a nucleus, only from a module.
QUERY CRYPTO	**INCOMPATIBLE:** • **[4.2.0]** Revised responses. The keyentry information is no longer issued. **Upwardly compatible:** • **[2.4.0]** New operand: CAMQS. • **[2.4.0]** Two new responses. • **[4.2.0]** Added APqs parameter. • **[5.1.0]** Responses revised to indicate installation of Crypto Adjunct Processor.
QUERY DASD	**Upwardly compatible:** • **[3.1.0]** New operand: QUIESCED. • **[3.1.0]** Response for QUERY DASD DETAILS may contain a new line containing Parallel Access Volumes information. • **[5.1.0]** Response for QUERY DASD DETAILS changed for devices attached to a caching storage controller.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY DASDFW	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E. **Upwardly compatible:** • **[2.2.0]** Response indicates if the DASD fast write function is suspended for the subsystem.
QUERY DUPLEX	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY EXITS	**Upwardly compatible:** • **[2.4.0]** Additional response information provided for a dynamic CP exit.
QUERY FENCES	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY FRAMES	**Upwardly compatible:** • **[3.1.0]** Responses changed to support 64-bit architecture. • **[5.1.0]** The V=R field of the response will always be zero. The V=R area is not supported. • **[5.1.0]** The PGNUC field of the response indicates additional frames being used by the CP nucleus. However, the CP nucleus is no longer pageable.
QUERY GRAF	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros.
QUERY IMG	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY IMG command, the output from QUERY IMG uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted.
QUERY IOASSIST	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. I/O assist is not supported.
QUERY LAN	**INCOMPATIBLE:** • **[4.4.0]** In the response, the *ipaddr (n)* address can contain an IPv6 address. • **[5.1.0]** Format of the response has changed. **Upwardly compatible:** • **[4.3.0]** New ACCOUNTING ON and ACCOUNTING OFF responses indicate whether accounting records will be generated for this LAN. • **[4.4.0]** New operand: VLAN *vlanid*.
QUERY LDEVS	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros. **Upwardly compatible:** • **[2.3.0]** The response may include the IP address for TCP/IP.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY LPARS	**Upwardly compatible:** • **[4.4.0]** New operand: CSS *nn*. • **[4.4.0]** New responses.
QUERY NAMES	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros.
QUERY NIC	**INCOMPATIBLE:** • **[5.1.0]** The format of the response has changed. **Upwardly compatible:** • **[4.4.0]** In the response, the *ipaddr (n)* address can contain an IPv6 address. • **[4.4.0]** Updated example to include VLAN information.
QUERY NLS	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY NLS command, the output from QUERY NLS uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted.
QUERY NSS	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP1375I. **Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY NSS command, the output from QUERY NSS uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted.
QUERY NVS	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY PINNED	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY PROMPT	**INCOMPATIBLE:** • **[5.1.0]** Operand removed: AFTER_POWEROFF

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY READER / PRINTER / PUNCH	**INCOMPATIBLE:** • **[5.1.0]** Response for file being used by SPTAPE has been removed. SPTAPE is no longer supported. **Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Responses include 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** New operands DIST and NODIST, available only with operands FULLDATE and ISODATE, specify whether the distribution code is to be included in the response. The default is NODIST, so the output record fits within an 80-character buffer. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY RDR|PRT|PUN command, the output from QUERY RDR|PRT|PUN uses the new default date format. This causes the date to be expanded to include the 4-digit year, the NAME and TYPE fields to the right of the date to be shifted, and the distribution code to be omitted (by default).
QUERY (Real Device)	**INCOMPATIBLE:** • **[5.1.0]** Response for tape device being used by SPTAPE has been removed. SPTAPE is no longer supported. • **[5.1.0]** Message removed: HCP2601E. **Upwardly compatible:** • **[4.3.0]** New ID operand to display the device and control unit identifiers for a specified device address, if they are known. • **[4.3.0]** New response to indicate tapes attached MULTIUSER.
QUERY RSAW	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY SET	**Upwardly compatible:** • **[5.1.0]** Because NOTRAN, IOASSIST, and CCWTRAN can no longer be set, these fields in the response are retained only for compatibility and will always indicate NOTRAN OFF, IOASSIST OFF, and CCWTRAN ON.
QUERY SPACES	**Upwardly compatible:** • **[3.1.0]** Response may contain new values to indicate larger address space.
QUERY STORAGE	**Upwardly compatible:** • **[3.1.0]** Response may contain new values to indicate greater storage.
QUERY TAPES	**INCOMPATIBLE:** • **[5.1.0]** Response for tape drive being used by SPTAPE has been removed. SPTAPE is no longer supported. **Upwardly compatible:** • **[4.3.0]** New response to indicate tapes attached MULTIUSER.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY TIME	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY TIME command, the output from QUERY TIME uses the new default date format. This causes the date to be expanded to include the 4-digit year.
QUERY TOKEN	**Upwardly compatible:** • **[3.1.0]** New message: HCP6815E.
QUERY TRACE	**Upwardly compatible:** • **[3.1.0]** Responses may contain new values and expanded address field for 64-bit.
QUERY TRFILES	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY TRFILES command, the output from QUERY TRFILES uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted.
QUERY UCR	**Upwardly compatible:** • **[2.2.0]** New operands to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Response includes 4-digit years for FULLDATE and ISODATE operands. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the QUERY UCR command, the output from QUERY UCR uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted.
QUERY USERID	**Upwardly compatible:** • **[3.1.0]** Response may contain additional fields to indicate IP address.
QUERY USERS	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros.
QUERY VIRTUAL ALL	**Upwardly compatible:** • **[2.3.0]** Supports virtual message processors. • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter.
QUERY VIRTUAL CONSOLE	**INCOMPATIBLE:** • **[2.3.0]** Response may include a new line containing TCP/IP information.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY VIRTUAL CRYPTO	**INCOMPATIBLE:** • **[4.2.0]** One response was deleted. Other responses were revised to include Direct Attached Crypto information. **Upwardly compatible:** • **[2.4.0]** New response.
QUERY VIRTUAL CTCA	**INCOMPATIBLE:** • **[3.1.0]** Response contains new subclass field. • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported. **Upwardly compatible:** • **[4.4.0]** Response contains new subclass field: FCTC.
QUERY VIRTUAL DASD	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY (Virtual Device)	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported. **Upwardly compatible:** • **[2.3.0]** Response indicates REAL-MPLF or SIMULATED-MPLF if enabled for the device. • **[2.3.0]** Supports virtual message devices. The device type MSGD appears in the response. • **[4.2.0]** Changed response. • **[4.3.0]** New response for the TYPE operand of FCP to indicate a SCSI device adapter.
QUERY VIRTUAL DUPLEX	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
QUERY VIRTUAL GRAF	**INCOMPATIBLE:** • **[3.1.0]** The fields of an IP address included in the response no longer contain leading zeros. • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VIRTUAL FCP	**Upwardly compatible:** • **[5.1.0]** Response may include new BYTES information for QDIO devices.
QUERY VIRTUAL LINES	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VIRTUAL OSA	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported. **Upwardly compatible:** • **[2.4.0]** New lines in the response for OSA devices that use the Queued-Direct-I/O (QDIO) Facility. • **[4.2.0]** Supports virtual OSA devices. • **[5.1.0]** Response may include new BYTES information for QDIO devices.

Table 15. Changes to CP Commands (continued)

Command	Changes
QUERY VIRTUAL PRINTER	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VIRTUAL PUNCH	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VIRTUAL READER	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VIRTUAL STORAGE	**Upwardly compatible:** • **[3.1.0]** New response to support the new CONFIGURATION operand on the DEFINE STORAGE command.
QUERY VIRTUAL TAPES	**INCOMPATIBLE:** • **[5.1.0]** Response no longer indicates eligibility for I/O assist. I/O assist is not supported.
QUERY VMLAN	**INCOMPATIBLE:** • **[5.1.0]** Format of the response has changed. **Upwardly compatible:** • **[4.3.0]** New System Accounting and User Accounting responses indicate the current default setting for account record generation for VMLANs. • **[4.4.0]** Updated purpose to include virtual switch information.
QUERY VRFREE	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. The V=R recovery area is not supported.
QUERY VSWITCH	**INCOMPATIBLE:** • **[5.1.0]** Format of the response has changed.
QUERY V=R	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. The V=R area is not supported.
REDEFINE	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP811I.
RESET	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP811I.
SAVESEG	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP1350E.
SAVESYS	**INCOMPATIBLE:** • **[5.1.0]** Text of message HCP1368E has been changed.
SEND	**Upwardly compatible:** • **[3.1.0]** Class C user can send input to any virtual machine.

Table 15. Changes to CP Commands (continued)

Command	Changes
SET (in general)	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: CCWTRAN, IOASSIST, NOTRANS. • Also see SET commands listed below. **Upwardly compatible:** • **[3.1.0]** New operands: PSWTRANS, UNDERSCORE. • **[4.2.0]** New operands: CFLINK, LAN. • **[4.3.0]** New operands: IOPRIORITY, VMLAN. • **[4.4.0]** New operands: LOADDEV, VSWITCH. • **[5.1.0]** New operand: EDEVICE. • Also see SET commands listed below.
SET CACHE	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
SET CACHEFW	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
SET CCWTRAN	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. V=R virtual machine is no longer supported.
SET CPLANGUAGE	**Upwardly compatible:** • **[4.1.0]** Added new parameters to allow the user to specify whether the language is to be changed for the user or for the whole system.
SET CPTRACE	**Upwardly compatible:** • **[2.4.0]** New trace category and trace codes for QDIO instructions. • **[3.1.0]** New trace codes.
SET CRYPTO	**INCOMPATIBLE:** • **[4.2.0]** Removed KEYENTRY operand. **Upwardly compatible:** • **[2.4.0]** New operands: MODIFY, ON, OFF. • **[2.4.0]** Changed responses. • **[2.4.0]** Changed messages: HCP1706I, HCP1709E, HCP1710E, HCP1711I. • **[2.4.0]** New messages: HCP1714E, HCP1715E.
SET DASDFW	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E.
SET DUMP	**INCOMPATIBLE:** • **[5.1.0]** V=R operand and corresponding value in response removed. The V=R area is not supported. **Upwardly compatible:** • **[3.1.0]** New operand: XF. • **[3.1.0]** New message: HCP1851E. • **[4.3.0]** New message: HCP1917E.
SET IOASSIST	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. I/O assist is not supported.

Table 15. Changes to CP Commands (continued)

Command	Changes
SET IPLPARMS	**INCOMPATIBLE:** • **[5.1.0]** IPL parameter ARCH390 is ignored when IPLing a z/VM V5R1 or later CP module because there is no 32-bit version. **Upwardly compatible:** • **[4.4.0]** New operand: NOHCD.
SET LAN	**Upwardly compatible:** • **[4.3.0]** New ACCOUNTING ON and ACCOUNTING OFF operands allow Class B users to control whether accounting records are to be created for the LAN being defined.
SET LOADDEV	**Upwardly compatible:** • **[5.1.0]** New operand allows Class G users to specify the SCPDATA to be passed to the program to be loaded during a guest IPL.
SET MACHINE	**INCOMPATIBLE:** • **[4.1.0]** 370 operand no longer supported. **Upwardly compatible:** • **[3.1.0]** New message: HCP1016E.
SET MDCACHE	**Upwardly compatible:** • **[3.1.0]** Supports defining a minidisk cache larger than 2GB for z/Architecture virtual machines.
SET NOTRANS	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. V=R virtual machine is no longer supported.
SET NVS	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E. I/O assist is not supported.
SET PROMPT	**INCOMPATIBLE:** • **[5.1.0]** Operand removed: AFTER_POWEROFF.
SET RDEVICE	**Upwardly compatible:** • **[3.1.0]** New messages: HCP6580E, HCP6862E, HCP6870E.
SET RDEVICE Integrated Communication Adapters	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: TYPE ICA_BSC and TYPE ICA_SDLC
SET RDEVICE Tape Units	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: 3420 and the associated MODEL and DUAL_DENSITY
SET SECUSER	**Upwardly compatible:** • **[4.2.0]** New message: HCP017E.
SET VSWITCH	**INCOMPATIBLE:** • **[5.1.0]** 'ANY' is not supported as a value for *vlanid*. It was formerly the default. The default VLAN for the user is now the VLAN ID specified on the DEFINE VSWITCH command or configuration statement. **Upwardly compatible:** • **[5.1.0]** New operand: PORTType.

Table 15. Changes to CP Commands (continued)

Command	Changes
SHUTDOWN	**INCOMPATIBLE:** • **[5.1.0]** ORIGIN operand is accepted when loading z/VM V5R1 or later CP, but CP will relocate itself to location X'2000'. • **[5.1.0]** Messages removed: HCP6880E, HCP9403E, HCP9405E, HCP9415I, HCP9417I, HCP9418E. **Upwardly compatible:** • **[3.1.0]** New operand: WAIT. • **[3.1.0]** If REIPL is specified, an automatic warmstart is done from a CP module, not a nucleus. • **[4.3.0]** New operands to cancel a scheduled shutdown or send a shutdown signal to users.
SPTAPE	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed. SPTAPE is not supported. Tapes created with SPTAPE on an earlier VM system cannot be restored to a z/VM V5R1 or later system.
SPXTAPE (in general)	**Upwardly compatible:** • **[4.3.0]** New message: HCP1917E.
STORE (in general)	**INCOMPATIBLE:** • See STORE commands listed below. **Upwardly compatible:** • **[3.1.0]** Message HCP6150E may specify z/Architecture mode. • **[3.1.0]** New operands: PSWA, PSWG. • Also see STORE commands listed below.
STORE ESA/XC Storage	See STORE Guest Storage (ESA/XC).
STORE Guest Storage (ESA/XC)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and storing data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.
STORE Guest Storage (ESA/390)	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and storing data in ASCII format. • **[3.1.0]** Supports 64-bit addressing. • **[3.1.0]** New z/Architecture version of this command.
STORE Host Storage	**Upwardly compatible:** • **[3.1.0]** New operands for indirect addressing and storing data in ASCII format. • **[3.1.0]** Supports 64-bit addressing.
STORE PSW	**INCOMPATIBLE:** • **[4.1.0]** Operands removed: CAW, CSW. 370 virtual machines are not supported. **Upwardly compatible:** • **[3.1.0]** For a z/Architecture guest, translates an ESA/390 format PSW into a z/Architecture format PSW (if the SET PSWTRANS ALL or SET PSWTRANS STORE command was previously issued).

Table 15. Changes to CP Commands (continued)

Command	Changes
STORE (Registers)	**INCOMPATIBLE:** • **[5.1.0]** Text of message HCP6150E has changed. **Upwardly compatible:** • **[2.4.0]** New operands: FPC *hexword*. • **[2.4.0]** Yreg operands accept register numbers 0-15 if the IEEE Floating Point hardware feature is installed on the processor. • **[2.4.0]** New messages: HCP6153E, HCP6154E. • **[3.1.0]** New operands: GG*reg1*, GH*reg1*, XG*reg1*, XH*reg1*. • **[3.1.0]** Message HCP6150E may specify z/Architecture mode.
STORE STATUS	**Upwardly compatible:** • **[2.4.0]** Stores the address of the extended save area at address 212 (X'D4'). This save area contains floating-point registers 0-15 and the floating-point control register. • **[3.1.0]** Stores virtual machine data for a z/Architecture virtual machine.
SYNCMDRS	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP2601E. I/O assist is not supported.
SYSTEM	**Upwardly compatible:** • **[3.1.0]** Stores virtual machine data for a z/Architecture virtual machine.
TERMINAL (in general)	**Upwardly compatible:** • **[4.4.0]** New operands: SYS3270, SYSGRAF
TRACE (in general)	**INCOMPATIBLE:** • **[2.2.0]** New message: HCP1038E. • **[5.1.0]** Messages removed: HCP1038E, HCP1039E. **Upwardly compatible:** • **[2.3.0]** New command responses. • **[2.4.0]** New response for floating-point register information. • **[3.1.0]** Message HCP6150E may specify z/Architecture mode. • **[3.1.0]** New operand: GG. • **[3.1.0]** New option: ASCE. • **[3.1.0]** New response formats for 64-bit. • **[4.3.0]** New operand: AIF. • Also see TRACE commands listed below.
TRACE *mnemonic1*	**Upwardly compatible:** • **[2.3.0]** New mnemonic: BSA. • **[3.1.0]** New mnemonics: EPSW, LCTLG, LPSWE, STCTG, STFL, STSI.
TRACE TABLE	**Upwardly compatible:** • **[3.1.0]** New response formats for 64-bit.
TRSAVE	**Upwardly compatible:** • **[4.3.0]** New message: HCP1917E.
TRSOURCE ID	**Upwardly compatible:** • **[3.1.0]** New values can be specified on the DL operand for 64-bit registers or indirect addressing.

Table 15. Changes to CP Commands (continued)

Command	Changes
UNCOUPLE	**Upwardly compatible:** • **[4.4.0]** Updated purpose to include virtual switch information and added a new response.
UNDEDICATE	**INCOMPATIBLE:** • **[5.1.0]** Default of V=R user removed. USER operand must be specified. V=R virtual machine is no longer supported. • **[5.1.0]** Message removed: HCP893E.
UNLOCK	**INCOMPATIBLE:** • **[3.1.0]** RIO370 operand no longer supported. • **[5.1.0]** SYSTEM operand removed. The CP nucleus is no longer pageable. Modules in the nucleus cannot be locked or unlocked. • **[5.1.0]** SYMBOL and *symbol* operands have no effect. All symbols are now considered resident (locked) and cannot be unlocked. • **[5.1.0]** VIRT=REAL and V=R operands removed. The V=R area is not supported. • **[5.1.0]** Text of message HCP295E has changed. • **[5.1.0]** Messages removed: HCP200E, HCP204E, HCP205I, HCP1556I.
VARY (Real Device)	**Upwardly compatible:** • **[3.1.0]** New message: HCP6861I. • **[4.3.0]** New message: HCP1917E.
VMDUMP	**Upwardly compatible:** • **[3.1.0]** Can dump larger storage areas and discontiguous storage areas.
XAUTOLOG	**INCOMPATIBLE:** • **[4.1.0]** 370 operand no longer supported. • **[5.1.0]** Messages removed: HCP811I, HCP1508I, HCP1511I, HCP1556I. **Upwardly compatible:** • **[3.1.0]** Can specify larger amount of storage on the STORAGE operand.

CP Utilities

Table 16 lists the CP utilities that have changed. Unless otherwise indicated, for additional information see the *z/VM: CP Commands and Utilities Reference*.

Table 16. Changes to CP Utilities

Utility	Changes
CPFMTXA	**INCOMPATIBLE:** • **[5.1.0]** Message removed: HCP6203E. • **[5.1.0]** Fields in the FBA allocation map have been expanded to accommodate larger disk sizes. **Upwardly compatible:** • **[5.1.0]** Allocation specifications for FBA devices, formerly limited to 6 digits, now accept up to 9 digits. • **[5.1.0]** TDSK, PERM, and PARM allocations may reside above page 16,777,215. DRCT, PAGE, and SPOL allocations may not reside above page 16,777,215.

Table 16. Changes to CP Utilities (continued)

Utility	Changes
DDR	**INCOMPATIBLE:** • **[5.1.0]** NUCLEUS function statement removed. The CP nucleus cannot be dumped to or restored from tape. • **[5.1.0]** Messages removed: HCP722E, HCP723E, HCP724E. **Upwardly compatible:** • **[4.2.0]** New operand to compress DDR data: LZCOMPACT.
DIRECTXA	**INCOMPATIBLE:** • **[2.3.0]** If a USER statement within the directory specifies a logical line edit symbol that is not valid (a letter A-Z, number 0-9, or bytes X'OE' (shift out) or X'0F' (shift in)), DIRECTXA issues message HCP786I, uses the system default line edit symbol, and continues processing. If no error prevents the directory from being written, DIRECTXA returns to CMS with RC=9. • **[5.1.0]** A request for a V=R or V=F virtual machine in the directory file being processed will result in the user being logged on as a V=V virtual machine. V=R and V=F virtual machines are no longer supported. **Upwardly compatible:** • **[3.1.0]** New operands: &SYSRES *volid*. • **[3.1.0]** New message: HCP493E. • **[5.1.0]** Supports larger FBA disk size in directory MDISK statements. • **[5.1.0]** In the response, the release level value has changed.
HCPLDR	**INCOMPATIBLE:** • **[5.1.0]** Operands removed: 370, ESA, XA, XC. All modules created with HCPLDR will run in ESA, XA, and XC virtual machines. 370 virtual machines are not supported. • **[5.1.0]** RLDSAVE operand is accepted when generating the CP module but has no effect. The CP nucleus is no longer relocatable. CP will always relocate itself to location X'2000'. **Upwardly compatible:** • **[3.1.0]** New operands: &SYSRES *volid*. • **[3.1.0]** New message: HCP493E. • **[5.1.0]** Output report “CSECT’S WITH SIZE GREATER THAN CONDITIONAL PAGE BOUNDARY” is generated when the MAP option is specified but the PAGEB option is not specified. For CP, only @MAPSTART should be listed. Any other modules listed are in error. • **[5.1.0]** In the response, the release level value has changed.
INSTVM	**Upwardly compatible:** • **[5.1.0]** New operand: DVD.

Table 16. Changes to CP Utilities (continued)

Utility	Changes
SALIPL	**INCOMPATIBLE:** • **[2.2.0]** Message HCP039E has been deleted and replaced by new message HCP394E with the same text. • **[2.2.0]** Date field on the file list panel displays the year with 4 digits. • **[5.1.0]** ORIGIN option is accepted when loading CP for z/VM V5R1 or later, and the default address of X'1000' still applies, but CP will relocate itself to location X'2000'. • **[5.1.0]** IPLPARMS value ARCH390 is ignored when IPLing a z/VM V5R1 or later CP module because there is no 32-bit version. • **[5.1.0]** The number of blocks on FBA DASD (SCSI or not) that SALIPL uses for SAPL has increased. SALIPL now writes to blocks 5-207 on CP-formatted FBA DASD. In previous releases, SALIPL wrote to blocks 5-31. You must ensure that no other functions (such as CP directory, warmstart, checkpoint, paging, spooling, user minidisks, or CP parm disks) are using the area to which SALIPL writes. Use ICKDSF or CPFMTXA to allocate pages 4 through 25 as PERM. • **[5.1.0]** On a CMS minidisk on FBA DASD, SALIPL now writes to blocks 5-207 of the RECOMP area. In previous releases, SALIPL used blocks 5-31. To accommodate the larger size of SAPL, you may need to increase the size of the RECOMP area on the CMS minidisk.

Dynamic I/O Return Codes

Table 17 lists the dynamic I/O return codes that have changed. For additional information, see *z/VM: I/O Configuration*.

Table 17. Changes to Dynamic I/O Return Codes

Return Code	Changes
0103	**Upwardly compatible:** • **[5.1.0]** Issued if you tried to modify or delete an I/O control unit, but the control unit number specified is associated with a coupling-facility control unit. • **[5.1.0]** Issued if you tried to modify or delete a coupling-facility control unit but the control unit number specified is associated with an I/O control unit.
0105	**Upwardly compatible:** • **[4.2.0]** Issued if the specified channel path for a FICON_CTC control unit is not a FICON channel. • **[4.4.0]** Issued if you tried to define or modify the I/O or coupling-facility control unit with a mixture of shared and unshared channel paths (including channel path that might be defined in other channel-subsystem images).
0107	**Upwardly compatible:** • **[4.2.0]** Issued if more than one channel path is specified for a FICON_CTC control unit.

Table 17. Changes to Dynamic I/O Return Codes (continued)

Return Code	Changes
010D	**Upwardly compatible:** • **[4.4.0]** Issued if you tried to add, delete, or change a control unit, but one of the following occurred: – For a channel path to which the specified I/O control unit is attached, you exceeded the limit on the number of unit addresses supported for that type of channel path. – One or more of the specified channel paths for the specified I/O control unit is a coupling-facility channel path. – One or more of the specified channel paths for the specified coupling-facility control unit is one of several types of coupling-facility-receiver channel paths that is not dynamically changeable on your machine model. – Your machine model does not support the dynamic-I/O configuration change that you requested. – One or more of the specified channel paths for the specified coupling-facility control unit is an I/O channel path. – The combination of coupling-facility channel-path types that would result from the requested change for the specified coupling-facility control unit (including channel-path types defined in other channel-subsystem images for the control unit) is not supported on your machine model.
0113	**Upwardly compatible:** • **[4.4.0]** Issued if you tried to delete a coupling-facility control unit from your configuration, but the the control unit is defined in more than one channel-subsystem image.

DIAGNOSE Codes

Table 18 lists the DIAGNOSE codes that have changed. For additional information, see *z/VM: CP Programming Services*.

Table 18. Changes to DIAGNOSE Codes

Code	Changes
X'00' Storage Extended Identification Code	**Upwardly compatible:** • **[2.2.0]** In the program product bit map, bit 13 (X'0004000000000000') indicates whether Year 2000 support is present in CP. • **[3.1.0]** In the execution environment field of the extended-identification code bit map, bit 1 (formerly reserved) indicates the CP image that is running: 0=32-bit, 1=64-bit. • **[5.1.0]** Licensed program bit map field of the extended-identification code bit map contains a new value to indicate the new product level. • **[5.1.0]** Release information field of the extended-identification code bit map contains the new release level.
X'04' Examine Real Storage	**Upwardly compatible:** • **[3.1.0]** Supports 64-bit addressing.
X'08' Virtual Console Function	**Upwardly compatible:** • **[4.3.0]** Supports 64-bit addressing.
X'14' Input Spool File Manipulation	**Upwardly compatible:** • **[2.2.0]** For subcodes X'0004', X'0008', X'0FFE', and X'0FFF', a one-byte century indicator was added to the SFBLOK data area.

Table 18. Changes to DIAGNOSE Codes (continued)

Code	Changes
X'44' Voluntary Time Slice End	**Upwardly compatible:** • **[4.3.0]** Supports 64-bit addressing.
X'4C' Generate Accounting Records	**Upwardly compatible:** • **[4.3.0]** Supports 64-bit addressing. • **[4.3.0]** New accounting record identification code: C'CC' — the virtual machine network data transmission records.
X'64' Named Saved Segment Manipulation	**Upwardly compatible:** • **[4.1.0]** For exit with error, return code X'54D' is reserved (not used).
X'7C' Logical Device Support Facility	**Upwardly compatible:** • **[2.3.0]** For the INITIATE function, bit 3 of the first byte of Rx+1 indicates that Ry+1 contains the IP address associated with the logical device. • **[4.4.0]** Bit 4 of Ry+1 points to a 16-byte field containing an IPv6 address. If bit 3 is on, bit 4 is ignored.
X'84' Directory Update-in-Place	**INCOMPATIBLE:** • **[2.3.0]** For EDITCHAR operation, letters A-Z, numbers 0-9, and bytes X'OE' (shift out) and X'0F' (shift in) cannot be specified as logical line edit symbols (line-end, line-delete, character-delete, and escape). • **[5.1.0]** For MACHINE operation, 370 option is not valid. 370 virtual machines are not supported. **Upwardly compatible:** • **[2.2.0]** Can now replace the user's default date format setting. • **[2.2.0]** New operation: DATEFMT. • **[2.2.0]** New return codes due to new function (in hex): 122, 123, 124. • **[5.1.0]** For OPTIONS operation, Virt=real option is ignored. V=R virtual machine is not supported. • **[5.1.0]** Return code X'108' is reserved (not used). V=R and V=F virtual machines are not supported.
X'90' Read Symbol Table	**Upwardly compatible:** • **[5.1.0]** Condition code 1 no longer returned. All symbols are now resident.
X'98' Real I/O	**INCOMPATIBLE:** • **[5.1.0]** Cannot be used in 24-bit addressing mode. **Upwardly compatible:** • **[3.1.0]** New subfunctions: BLOCK DIAGNOSE, MULTIPLE REQUEST BLOCK. • **[5.1.0]** For the LOCK and UNLOCK subfunctions, return code 1 is reserved (not used). V=R and V=F virtual machines are not supported. • **[5.1.0]** For the LOCK subfunction, return code 3 is reserved (not used). 24-bit addressing mode guests cannot use this DIAGNOSE code, and 370 virtual machines are not supported. • **[5.1.0]** For the Block Diagnose X'98' subfunction, global return code 2 is reserved (not used). V=R and V=F virtual machines are not supported. • **[5.1.0]** For the Block Diagnose X'98' subfunction, global return codes 3 and 4 are reserved (not used). 24-bit addressing mode guests cannot use this DIAGNOSE code, and 370 virtual machines are not supported.

Table 18. Changes to DIAGNOSE Codes (continued)

Code	Changes
X'BC' Open and Query Spool File Characteristics	**Upwardly compatible:** • **[2.2.0]** Depending on the specified buffer length, following the SECLABEL field the user's buffer will include the full (4-digit-year) date and the ISO date.
X'D8' Read Spool File Blocks	**Upwardly compatible:** • **[2.2.0]** For subcode X'0000', a one-byte century indicator was added to the SFBLOK data area.
X'DC' Control Application Monitor Record Collection	**Upwardly compatible:** • **[4.3.0]** Supports 64-bit addressing.
X'210' Retrieve Device Information	**Upwardly compatible:** • **[3.1.0]** A byte code X'0C' of the VRDCBLOK control block has been added so that application programs can find out the underlying real hardware associated with tape devices operating in emulation mode. • **[3.1.0]** New messages: HCP2327I, HCP2328I, HCP2340I, HCP2341I, HCP2342I, HCP2343I, HCP2344I, HCP2345I, HCP2346I, HCP2347I, HCP2348I, HCP2349I, HCP2350I, HCP2351I, HCP2352I, HCP2353I, HCP2354I, HCP2355I, HCP2356I, HCP2357I, HCP2358I, HCP2359I, HCP2360I, HCP2361I, HCP2362I, HCP6365I. • **[4.4.0]** New VRDCUNDV values for the 3590 Model H. • **[5.1.0]** New VRDCUNDV values for the 3592 Model J.
X'254' Access Real Subsystem	**INCOMPATIBLE:** • **[4.3.0]** This DIAGNOSE code is no longer supported as a Programming Interface for customers.
X'258' Page-Reference Services	**Upwardly compatible:** • **[4.3.0]** Supports 64-bit addressing.
X'270' Pseudo Timer Extended	**Upwardly compatible:** • **[2.4.0]** Output has been expanded to include the version of DIAGNOSE code X'270', the user's default date format, and the system default date format.

CP Macros

This section identifies the CP macros that have changed. It contains the following subsections:

System Definition Macros

Table 19 lists the System Definition macros that have changed.

Table 19. Changes to System Definition Macros

Macro	Changes
SYSRES	**INCOMPATIBLE** • **[5.1.0]** SYSVOL, SYSRES, SYSTYPE, and SYSNUC parameters are ignored. CP cannot be IPLed from a nucleus, only from a module on the parms disk.
SYSSTORE	**INCOMPATIBLE** • **[3.1.0]** RIO370 parameter removed. • **[5.1.0]** Parameters removed: VRSIZE, VRFREE. The V=R area and V=R recovery area are not supported.

IUCV Functions

There are no changes to IUCV functions.

APPCVM Macro Functions

There are no changes to APPCVM macro functions.

VM Data Space Macros

Table 20 lists the VM data space macros that have changed. For additional information, see *z/VM: CP Programming Services*.

Table 20. Changes to VM Data Space Macros

Macro	Changes
ADRSPACE	**Upwardly compatible:** • **[5.1.0]** Operation exception cannot occur. 370 virtual machines are not supported.
ADRSPACE ISOLATE	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.
ADRSPACE PERMIT	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.
ADRSPACE QUERY	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.
ALSERV	**Upwardly compatible:** • **[5.1.0]** Operation exception cannot occur. 370 virtual machines are not supported.
ALSERV ADD	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.
ALSERV REMOVE	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.
MAPMDISK	**Upwardly compatible:** • **[5.1.0]** Operation exception cannot occur. 370 virtual machines are not supported.
REFPAGE	**Upwardly compatible:** • **[5.1.0]** Operation exception cannot occur. 370 virtual machines are not supported.

Table 20. Changes to VM Data Space Macros (continued)

Macro	Changes
VMUDQ	**INCOMPATIBLE:** • **[5.1.0]** MACHINE=370 parameter has no supported function. 370 virtual machines are not supported.

Other CP Macros

Table 21 lists the other CP macros that have changed. For additional information, see *z/VM: CP Exit Customization*.

Table 21. Changes to Other CP Macros

Macro	Changes
HCPCALL	**INCOMPATIBLE:** • **[5.1.0]** HCPCALL now ensures that no extra positional parameters are specified. If any are found, the following message is displayed: `MNOTE 8, 'Extra positional parameter: pppppppp'` If *pppppppp* is blank, this message could indicate that incorrect continuation was used on the HCPCALL invocation.
HCPPROLG	**INCOMPATIBLE:** • **[5.1.0]** PAGEABLE attribute is not supported. All CP modules must be resident. If PAGEABLE is specified, CP changes the attribute to RESIDENT.
HCPTKDEF Parser Token Definition	**Upwardly compatible:** • **[2.4.0]** New conversion type: INSTRUCT.
MDLATENT Exit Entry Definition	**INCOMPATIBLE:** • **[5.1.0]** PAGEABLE parameter is not supported and has been removed. All modules included in the CP nucleus are resident. • **[5.1.0]** NUCLEUS=ESA390 parameter is not supported and has been removed. The CP nucleus is 64-bit only. **Upwardly compatible:** • **[5.1.0]** RESIDENT parameter is now the default. • **[5.1.0]** FULLREG parameter is retained for compatibility and is equivalent to LONGREG. • **[5.1.0]** NUCLEUS=BOTH parameter is retained for compatibility and is still the default, but it is now equivalent to NUCLEUS=ESAME.

CP System Services

Table 22 lists the CP system services that have changed. For additional information see *z/VM: CP Programming Services*.

Table 22. Changes to CP System Services

System Service	Changes
*LOGREC Error Logging System Service	**Upwardly compatible:** • **[5.1.0]** New record added: Special VM Record (SVMR).
*RPI Access Verification System Service	**INCOMPATIBLE:** • **[5.1.0]** ACI entry points HCPRPDEP, HCPDA0RL, HCPDA0UL, and HCPDA0MC are no longer pageable.

CPXLOAD Directives

Table 23 lists the CPXLOAD directives that have changed. For additional information see *z/VM: CP Programming Services*.

Table 23. Changes to CPXLOAD Directives

Directive	Changes
OPTIONS	**Upwardly compatible:** • **[5.1.0]** LOCK and NOLOCK operands no longer have any effect. The CP nucleus, including dynamically loaded CP routines, is now completely resident.

VM Dump Tool

This section identifies the VM Dump Tool functions that have changed. It contains the following subsections:

- VM Dump Tool Command, Subcommands, and Macros
- "VM Dump Tool Messages" on page 113

VM Dump Tool Command, Subcommands, and Macros

Table 24 lists changes to the VM Dump Tool command, subcommands, and macros. For additional information, see *z/VM: VM Dump Tool*.

Table 24. Changes to VM Dump Tool Command, Subcommands, and Macros

Function	Changes
VMDUMPTL command	**INCOMPATIBLE:** • **[4.4.0]** Message HCQ031W changed to HCQ031E. **Upwardly compatible:** • **[4.3.0]** New messages: HCQ001W, HCQ006W, HCQ011W, HCQ012W, HCQ040E, HCQ049E. • **[4.4.0]** New messages: HCQ106E, HCQ107E, HCQ108E, HCQ109E, HCQ112E, HCQ113E, HCQ114E. • **[5.1.0]** New message: HCQ007E
BLOCK macro	**Upwardly compatible:** • **[4.3.0]** New options for the FIELDS operand. • **[4.4.0]** New messages: HCQ090I, HCQ111E.
CPEBK subcommand	**Upwardly compatible:** • **[5.1.0]** Now accepts up to 17 characters of input.
CALLERS macro	**Upwardly compatible:** • **[5.1.0]** Now accepts up to 17 characters of input.
DISPLAY subcommand	**INCOMPATIBLE:** • **[4.4.0]** Output from the DISPLAY subcommand, when issued from a macro, is now the same as DISPLAY subcommand output when the subcommand is issued from the command line.
EXTRACT subcommand	**INCOMPATIBLE:** • **[5.1.0]** The DFIR/DFIZ and SYMPTOM operands require a decimal value. **Upwardly compatible:** • **[5.1.0]** New options: MAPA, MAPN, and DISPL. • **[5.1.0]** New message: HCQ121E.

Table 24. Changes to VM Dump Tool Command, Subcommands, and Macros (continued)

Function	Changes
FRAMES subcommand	**Upwardly compatible:** • **[5.1.0]** New message: HCQ127I.
GREGS subcommand	**Upwardly compatible:** • **[4.3.0]** New operands: MAP, NOMAP, LONG, SHORT.
INDQ subcommand	**Upwardly compatible:** • **[5.1.0]** This subcommand is no longer supported.
LOCATE subcommand	**Upwardly compatible:** • **[4.3.0]** New message: HCQ004W.
MAP subcommand	**Upwardly compatible:** • **[4.3.0]** New messages: HCQ086E, HCQ087E, HCP088E, HCQ100I, HCQ101E, HCP102E, HCP103E, HCP104I, HCP105E. • **[5.1.0]** New messages: HCQ116W, HCQ117E, HCQ118E, HCQ123E, HCQ124E, HCQ126I.
QUERY subcommand	**Upwardly compatible:** • **[4.4.0]** New operands: DVFMACRO, IMPDVF. • **[5.1.0]** New operand: DEBUG.
RDEVBK subcommand	**Upwardly compatible:** • **[5.1.0]** The output now displays the addresses of significant related control blocks rather than the storage of the control blocks.
RSCH subcommand	**Upwardly compatible:** • **[5.1.0]** The output now displays the addresses of significant related control blocks rather than the storage of the control blocks.
SET subcommand	**Upwardly compatible:** • **[4.4.0]** New operands: DVFMACRO, IMPDVF, XEDITPRE. • **[4.4.0]** New message: HCQ110E. • **[5.1.0]** New operand: DEBUG.
SETVAR subcommand	**Upwardly compatible:** • **[4.3.0]** New operand: WORD.
TRACE subcommand	**Upwardly compatible:** • **[4.3.0]** New messages: HCP047W, HCQ074E. • **[5.1.0]** The FROM and TO operands no longer check the frame type. These operands can now be used when the frame table is not available.
VDEVBK subcommand	**Upwardly compatible:** • **[5.1.0]** The output now displays the addresses of significant related control blocks rather than the storage of the control blocks.
VIRTUAL macro	**Upwardly compatible:** • **[4.4.0]** New operand: DETAILS.
VMDBK subcommand	**INCOMPATIBLE:** • **[4.4.0]** Message HCQ018E changed to HCQ018I. **Upwardly compatible:** • **[4.3.0]** New message: HCQ018E.
VMDSCAN macro	**Upwardly compatible:** • **[4.4.0]** New operand: *userid*.

Table 24. Changes to VM Dump Tool Command, Subcommands, and Macros (continued)

Function	Changes
VSCH subcommand	**Upwardly compatible:** • **[5.1.0]** The output now displays the addresses of significant related control blocks rather than the storage of the control blocks.

VM Dump Tool Messages

The following VM Dump Tool messages have ***changed text***. For additional information, see *z/VM: System Messages and Codes - CP*.

[4.3.0] HCQ001E
[4.3.0] HCQ006E
[4.3.0] HCQ009E
[4.3.0] HCQ011E
[4.3.0] HCQ012E
[4.3.0] HCQ018E
[4.3.0] HCQ021E
[4.3.0] HCQ027E
[5.1.0] HCQ031E
[4.3.0] HCQ034E
[4.3.0] HCQ039E
[4.3.0] HCQ041E
[4.3.0] HCQ045W
[4.4.0] HCQ055E
[4.3.0] HCQ059E
[4.3.0] HCQ061E
[4.3.0] HCQ071E
[4.4.0] HCQ073E
[4.3.0] HCQ074E
[4.3.0] HCQ077W
[4.3.0] HCQ085E
[4.3.0] HCQ092E
[5.1.0] HCQ088E
[4.4.0] HCQ093E
[4.4.0] HCQ094E
[4.3.0] HCQ099E

CP Messages

The following CP messages do not exist in z/VM V5R1:

HCP198I
HCP200E
HCP202I
HCP203E
HCP204E
HCP352W
HCP353W
HCP354W
HCP407I
HCP408E
HCP412E
HCP416I
HCP543A
HCP648E
HCP722E
HCP723E
HCP724E
HCP811I
HCP813I
HCP820E
HCP825E
HCP828W
HCP893E
HCP972W
HCP1038E
HCP1039E
HCP1106I
HCP1161I
HCP1357E
HCP1365E
HCP1375I
HCP1450E
HCP1508I
HCP1511I
HCP1555E
HCP1556I
HCP1557E
HCP1602W
HCP1605W
HCP1606W
HCP1607W
HCP1609W
HCP2161I
HCP2578E
HCP2601E
HCP6055E
HCP6203E
HCP6232E
HCP6541E
HCP6748E
HCP6749E
HCP6752I
HCP6766E
HCP6767E
HCP6775E
HCP6788E
HCP6880E
HCP8039S
HCP8167E
HCP8306E
HCP8307E
HCP8308E
HCP8309E
HCP8310E
HCP8319E
HCP8320E
HCP8321E
HCP8322R
HCP8323R
HCP8346I
HCP8348I
HCP8359W
HCP8360A
HCP8363E
HCP8391I
HCP8396E
HCP8397E
HCP8406E
HCP8408E
HCP8409I
HCP8410E
HCP8413I
HCP8415W
HCP8418I
HCP8420R
HCP8444E
HCP8448E
HCP8485I
HCP8486I
HCP8487I
HCP8489I
HCP8501E
HCP8611T
HCP9010W
HCP9016W
HCP9026W
HCP9027W
HCP9028W
HCP9029W
HCP9400I
HCP9401I
HCP9402E
HCP9403E
HCP9404I
HCP9405E
HCP9406I
HCP9407I
HCP9408E
HCP9409E
HCP9410I
HCP9411I
HCP9412E
HCP9413I
HCP9414I
HCP9415I
HCP9417I
HCP9418E
HCP9419E
HCP9420E
HCP9421E
HCP9422E

The following CP messages have ***changed text***. For additional information, see *z/VM: System Messages and Codes - CP*.

Note: If a message has changed in more than one release, only the latest release is indicated.

[4.2.0] HCP006E
[4.2.0] HCP047E
[5.1.0] HCP260E
[5.1.0] HCP295E
[4.2.0] HCP296E
[4.2.0] HCP319E
[4.2.0] HCP332E
[3.1.0] HCP513I
[2.3.0] HCP580I
[4.2.0] HCP728E
[5.1.0] HCP824E
[2.4.0] HCP1003E
[5.1.0] HCP1016E
[5.1.0] HCP1350E
[5.1.0] HCP1368E
[5.1.0] HCP1512E
[2.4.0] HCP1706I
[2.4.0] HCP1709E
[2.4.0] HCP1710E
[2.4.0] HCP1711I
[4.2.0] HCP1914E
[4.3.0] HCP2090I
[4.3.0] HCP2091I
[4.3.0] HCP2092E
[2.4.0] HCP2234E
[2.2.0] HCP2252E
[4.2.0] HCP2511A
[4.2.0] HCP2515E
[4.2.0] HCP2601E
[4.3.0] HCP2768E
[4.4.0] HCP2782E
[4.4.0] HCP2783E
[4.4.0] HCP2784E
[4.4.0] HCP2788E
[4.4.0] HCP2793E
[5.1.0] HCP2797E
[4.2.0] HCP2800E
[4.2.0] HCP2801E
[4.2.0] HCP2805E
[4.2.0] HCP2806E
[5.1.0] HCP2815I
[5.1.0] HCP2817I
[3.1.0] HCP2819E
[5.1.0] HCP2830I
[5.1.0] HCP2832E
[5.1.0] HCP2838W
[3.1.0] HCP5769E
[5.1.0] HCP6011E
[4.3.0] HCP6024E
[2.4.0] HCP6111I
[5.1.0] HCP6150E
[4.4.0] HCP6706E
[5.1.0] HCP6751E
[4.2.0] HCP6768I
[4.2.0] HCP6769I
[5.1.0] HCP6770E
[2.4.0] HCP6789E
[5.1.0] HCP6844E
[4.2.0] HCP6850E
[5.1.0] HCP6855E
[5.1.0] HCP6870E
[5.1.0] HCP9037W
[5.1.0] HCP9039W
[5.1.0] HCP9254E

CMS Changes

This section identifies the changes to CMS external interfaces. It contains the following subsections:

General CMS Commands

Table 25 lists the general CMS commands that have changed. For additional information, see the *z/VM: CMS Commands and Utilities Reference*.

Table 25. Changes to General CMS Commands

Command	Changes
BROWSE	**INCOMPATIBLE:** • **[5.1.0]** Screen layout has been adjusted to accommodate larger file and disk sizes.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
CMSDESK	**INCOMPATIBLE:** • **[2.2.0]** Message DMS2302E replaced by new format of DMS622E, same return code. **Upwardly compatible:** • **[2.2.0]** Supports three date formats: short date, full date, ISO date. • **[2.2.0]** Display of the contents of the File Manager application has been changed. • **[2.2.0]** Displays a toolbar on the applications. • **[2.2.0]** New and changed menu items for some applications. • **[3.1.0]** See "Graphical User Interface (GUI) Facility Changes [3.1.0]" on page 45.
CONV2WD	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed.
COPYFILE	**INCOMPATIBLE:** • **[2.2.0]** New message: DMS516E.
CREATE DIRECTORY	**Upwardly compatible:** • **[2.2.0]** New message for authorization failure from ESM: DMS1331E.
CSLLIST	**Upwardly compatible:** • **[2.3.0]** When an = or ? is typed as the first character in the "Cmd" area of a line in the CSLLIST display screen, all characters following the = or ? are ignored.
CSLMAP	**Upwardly compatible:** • **[2.3.0]** When an = or ? is typed as the first character in the "Cmd" area of a line in the CSLMAP display screen, all characters following the = or ? are ignored.
DEFAULTS	**Upwardly compatible:** • **[2.2.0]** New options supported as parameters for FILELIST and RDRLIST: VMDATE, SHORTDATE, FULLDATE, ISODATE. • **[2.3.0]** New options supported as parameters for NETDATA: VMDATE, SHORTDATE, FULLDATE, ISODATE.
DIRLIST	**Upwardly compatible:** • **[2.3.0]** When an = or ? is typed as the first character in the "Cmd" area of a line in the DIRLIST display screen, all characters following the = or ? are ignored.
ERASE	**Upwardly compatible:** • **[2.2.0]** New message for authorization failure from ESM: DMS1332E.
FILEDEF	**Upwardly compatible:** • **[2.2.0]** New option: LIBSRV. • **[2.4.0]** Allows LRECL definitions up to 65535 bytes for OS variable spanned records (under XLRI processing) and non-OS CMS files. • **[2.4.0]** Allows BLKSIZE definitions up to 65535 bytes for non-OS CMS files.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
FILELIST	**INCOMPATIBLE:** • **[2.2.0]** When FILELIST is specified with the SHARE option, if a pre-VM/ESA 2.2.0 profile (PROFFSHR XEDIT) resides on a disk accessed ahead of the S-disk, sorts by date or size will not work. IBM recommends that you recreate all non-system FILELIST profiles. See Appendix A of the *z/VM: CMS Commands and Utilities Reference*. • **[2.2.0]** If you file the file created by FILELIST, that file might contain new and changed fields (on the far right). **Upwardly compatible:** • **[2.2.0]** New options to specify date format: VMDATE, SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** BEFORE *date* and AFTER *date* options support 4-digit years. • **[2.2.0]** Screens and responses support 4-digit years. • **[2.2.0]** If a date format option is not specified on the FILELIST command, the CMS DEFAULTS date format setting for FILELIST will be used. • **[2.3.0]** When an = or ? is typed as the first character in the "Cmd" area of a line in the FILELIST display screen, all characters following the = or ? are ignored.
FLIST	**INCOMPATIBLE:** • **[5.1.0]** Screen layout has been adjusted to accommodate larger file and disk sizes.
GENMOD	**INCOMPATIBLE:** • **[5.1.0]** 370 option removed. 370 virtual machines are not supported.
GLOBAL	**Upwardly compatible:** • **[2.2.0]** New message for duplicate library name in input list: DMS045W. The duplicates are ignored.
HELP	**INCOMPATIBLE:** • **[4.4.0]** HELP components removed: CMSUTIL, CPOTHER, CPUTIL, SOCKETS. CPOTHER (HELPCPOT) files renamed to HELPCP. • **[5.1.0]** HELP components removed: SPTAPE, SRPI, VMADMIN. **Upwardly compatible:** • **[4.4.0]** HELP components added: BOOTPD, DHCPD, DNS, FTP, GDDMXD, HELP, IMAPADM, LE, LPD, MPROUTE, MROUTINE, NFS, RTE, SMTP, SNMP, SSLADMIN, TCPIP, TELNET, TFTD, TFTP, UFTD, X25IPI. • **[5.1.0]** HELP component added: FCX.
IDENTIFY	**Upwardly compatible:** • **[2.2.0]** New options to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Responses support 4-digit years. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the IDENTIFY command, the output from IDENTIFY uses the new default date format. This causes the date to be expanded to include the 4-digit year and also causes fields to the right of the date to be shifted. • **[2.3.0]** New option for TCP/IP mail integration: TCPIP.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
LISTDS	**Upwardly compatible:** • **[2.3.0]** New options to specify date format: VMDATE, SHORTDATE, FULLDATE, ISODATE. • **[2.3.0]** Responses support 4-digit years. • **[2.3.0]** If the user's default date format is changed to FULLDATE or ISODATE, and the SHORTDATE option is not specified on the LISTDS command, any output from LISTDS with dates uses the new default date format. This causes the dates to be expanded to include the 4-digit year and also causes fields to be shifted.
LISTFILE	**INCOMPATIBLE:** • **[2.4.0]** Message DMS550E changed to DMS765E. **Upwardly compatible:** • **[2.2.0]** New options to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** BEFORE *date* and AFTER *date* options support 4-digit years. • **[2.2.0]** Responses support 4-digit years. • **[2.2.0]** If the user's default date format is changed from SHORTDATE to FULLDATE or ISODATE, and a date format option is not specified on the LISTFILE command, any output from LISTFILE with dates uses the new default date format. This causes the dates to be expanded to include the 4-digit year and also causes fields to be shifted.
LKED	**Upwardly compatible:** • **[2.4.0]** Defaults for *value1* and *value2* on the SIZE option have been increased to 400K and 100K, respectively.
LOAD	**Upwardly compatible:** • **[2.2.0]** New message for insufficient storage above 16MB: DMS891W.
LOADMOD	**INCOMPATIBLE:** • **[2.2.0]** Changed message (new text possible): DMS639E.
MACLIST	**Upwardly compatible:** • **[2.3.0]** When an = or ? is typed as the first character in the "Cmd" area of a line in the MACLIST display screen, all characters following the = or ? are ignored.
MACLMIG	**INCOMPATIBLE:** • **[5.1.0]** Command has been removed.
MOVEFILE	**Upwardly compatible:** • **[2.4.0]** Can process OS variable spanned records (under XLRI processing) and non-OS CMS files with record lengths up to 65535 bytes. • **[2.4.0]** Adjusts output file sizes for compatibility between CMS and OS. • **[2.4.0]** Allows greater FILEDEF default flexibility for file attributes (RECFM, LRECL, BLKSIZE). • **[2.4.0]** If default size values are used, fixes record truncation problems when moving data files from fixed to variable format. • **[2.4.0]** New message: DMS1116E. • **[4.4.0]** Message DMS2139I has additional text.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
NETDATA	**Upwardly compatible:** • **[2.3.0]** New options to specify date format: VMDATE, SHORTDATE, FULLDATE, ISODATE. • **[2.3.0]** Supports 4-digit-year date formats for entries in the *userid* NETLOG file. • **[2.3.0]** Responses support 4-digit years. • **[2.3.0]** If the user's default date format is changed to FULLDATE or ISODATE, and the SHORTDATE option is not specified on the NETDATA command, any output from NETDATA with dates uses the new default date format. This causes the dates to be expanded to include the 4-digit year and also causes fields to be shifted.
NOTE	**INCOMPATIBLE:** • **[4.4.0]** In the Date field of the note header, the name of the time zone has been replaced with the offset from Coordinated Universal Time (UTC), *zzzzz*. The first character is a plus (+) or minus (–), indicating whether the local time is ahead of (east of) or behind (west of) UTC. The next two characters (digits) indicate the number of hours difference from UTC. The last two characters (digits) indicate the number of additional minutes difference from UTC. **Upwardly compatible:** • **[2.2.0]** In the Date field of the note header, the year is now displayed with four digits. • **[2.3.0]** TCP/IP domain names accepted as user IDs or as the resolution of nicknames. • **[2.3.0]** Supports 4-digit-year date formats for entries in the *userid* NETLOG file.
NUCXLOAD	**INCOMPATIBLE:** • **[2.2.0]** Changed message (new text possible): DMS639E.
PEEK	**Upwardly compatible:** • **[2.3.0]** TCP/IP origin domain name address used when available and shown on PEEK message line for origin within current space and formatting limitations.
PIPE	**INCOMPATIBLE:** • **[2.3.0]** All CMS Pipelines messages have a new prefix, and many messages have new numbers and text. See Appendix A, "CMS Pipelines Message Cross-Reference [2.3.0]," on page 181. **Upwardly compatible:** • See "CMS Pipelines Stages, Subcommands, and Macros" on page 123.
QUERY (in general)	**Upwardly compatible:** • **[3.1.0]** New operand: TAPENEVR. • **[4.3.0]** New operand: TAPECSL. • **[5.1.0]** New operands: EDEVICE, HYPERSWAP. • See QUERY commands below.
QUERY CMSLEVEL	**Upwardly compatible:** • **[5.1.0]** In the response, the CMS level value has changed.
QUERY CMSREL	**Upwardly compatible:** • **[5.1.0]** In the response, the release level value has changed.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
QUERY FILEDEF	**Upwardly compatible:** • **[2.4.0]** New operand, ATTRIBUT, and its response.
RDRLIST	**INCOMPATIBLE:** • **[2.2.0]** If you file the file created by RDRLIST, that file might contain new and changed fields (on the far right). **Upwardly compatible:** • **[2.2.0]** New options to specify date format: VMDATE, SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** Screen supports 4-digit years. • **[2.2.0]** If a date format option is not specified on the RDRLIST command, the CMS DEFAULTS date format setting for RDRLIST will be used. • **[2.3.0]** When an = or ? is typed as the first character in the “Cmd” area of a line in the RDRLIST display screen, all characters following the = or ? are ignored. • **[2.3.0]** TCP/IP origin domain name address used when available and shown on the RDRLIST panel origin area within current space and formatting limitations.
RECEIVE	**Upwardly compatible:** • **[2.3.0]** Supports 4-digit-year date formats for entries in the *userid* NETLOG file.
SADT	**INCOMPATIBLE:** • **[5.1.0]** Screen layout has been adjusted to accommodate larger file and disk sizes.
SENDFILE	**Upwardly compatible:** • **[2.3.0]** TCP/IP domain names accepted as user IDs or as the resolution of nicknames. • **[2.3.0]** New options to specify the transmission method: SMTP, MIME, UFTSYNC, UFTASYNC. • **[2.3.0]** Supports 4-digit-year date formats for entries in the *userid* NETLOG file.
SET (in general)	**Upwardly compatible:** • **[3.1.0]** New operand: TAPENEVR. • **[4.3.0]** New operand: TAPECSL.
TAPE	**Upwardly compatible:** • **[2.2.0]** If the tape is under the control of a Tape Library Dataserver machine, and the DFSMS/VM Removable Media Services (RMS) FSMPPSI CSLLIB is available to CMS, the RUN (rewind and unload) function of TAPE calls the RMS FSMRMDMT (Demount) CSL routine to have the Dataserver unmount the tape. • **[2.2.0]** Added message for Tape Library Dataserver support: DMS2147W. • **[4.4.0]** Message DMS2139I has additional text.
TELL	**Upwardly compatible:** • **[2.3.0]** Accepts a TCP/IP domain name as part of the destination information.

Table 25. Changes to General CMS Commands (continued)

Command	Changes
VMFPLC2	**Upwardly compatible:** • **[2.2.0]** If the tape is under the control of a Tape Library Dataserver machine, and the DFSMS/VM Removable Media Services (RMS) FSMPPSI CSLLIB is available to CMS, the RUN (rewind and unload) function of VMFPLC2 calls the RMS FSMRMDMT (Demount) CSL routine to have the Dataserver unmount the tape. • **[2.2.0]** Added message for Tape Library Dataserver support: DMS2147W. • **[4.4.0]** Message DMS2139I has additional text.
VMLINK	**INCOMPATIBLE:** • **[3.1.0]** Previously, parameters passed to exits were automatically uppercased before the exit was called. Now they remain in the case entered by the user. • **[4.4.0]** A file mode extension specified in the *MODES record in the control file is no longer ignored. It is used unless overridden by the command line or by the :product tag in the NAMES file. **Upwardly compatible:** • **[2.3.0]** When an = or ? is typed as the first character in the “Cmd” area of a line in the VMLINK display screen, all characters following the = or ? are ignored. • **[3.1.0]** New variables: .EX, .PX. • **[3.1.0]** Error message returned for each failing INVOKE command. • **[3.1.0]** Message DMS2062I includes the name of the nickname being used when the QUERY option is processed. • **[3.1.0]** Additional changes to operation and documentation. See “VMLINK Improvements [3.1.0]” on page 45. • **[4.4.0]** An asterisk (*) or equals sign (=) can be specified in the *MODES record in the control file to indicate that the default search order, Z-A, should be used.

CMS Utilities

Table 26 lists the CMS utilities that have changed. For additional information, see the *z/VM: CMS Commands and Utilities Reference*.

Table 26. Changes to CMS Utilities

Utility	Changes
DIRMAP	**INCOMPATIBLE:** • **[5.1.0]** Screen layout has been adjusted to accommodate larger file and disk sizes.
QSYSOWN	**INCOMPATIBLE:** • **[5.1.0]** Screen layout has been adjusted to accommodate larger file and disk sizes.

CMS File Pool Administration and Operator Commands

Table 27 lists the CMS file pool administration and operator commands that have changed. For additional information, see *z/VM: CMS File Pool Planning, Administration, and Operation*.

Table 27. Changes to CMS File Pool Administration and Operator Commands

Command	Changes
AUDIT	**Upwardly compatible:** • **[2.2.0]** New operands: *fn ft*, REPLACE. • **[2.2.0]** Added messages: DMS024E, DMS1258E, DMS3253I, DMS3254E, DMS3255E. • **[2.2.0]** Changed message: DMS3470W (new text possible).
DELETE USER	**Upwardly compatible:** • **[2.2.0]** New options: DELAUTH | KEEPAUTH. • **[2.2.0]** Added message: DMS2023E.
FILEPOOL RELOAD	**Upwardly compatible:** • **[2.2.0]** New message: DMS3455I.
FILEPOOL UNLOAD	**Upwardly compatible:** • **[2.2.0]** New message: DMS3455I.

OPENVM Commands

Table 28 lists the OPENVM commands that have changed. For additional information, see the *z/VM: OpenExtensions Commands Reference*.

Table 28. Changes to OPENVM Commands

Command	Changes
OPENVM DEBUG	**Upwardly compatible:** • **[3.1.0]** New operands: ALL, NOALL, DUMP, NODUMP, FILEIO, NOFILEIO, FLOW, NOFLOW, MOUNT, NOMOUNT, NFSREQUEST, NONFSREQUEST, OTHER, NOOTHER, RPCBUFFERS, NORPCBUFFERS, RPCLIBRARY, NORPCLIBRARY, WRAPSIZE 500, WRAPSIZE *n*, FORMAT. • **[3.1.0]** Supports tracing NFS and BFS Client events.
OPENVM MOUNT	**Upwardly compatible:** • **[3.1.0]** Supports new local NFS options.
OPENVM OWNER	**Upwardly compatible:** • **[3.1.0]** New operands: *gid*, *uid*.
OPENVM QUERY MOUNT	**Upwardly compatible:** • **[3.1.0]** New options: NODETAILS, DETAILS. • **[3.1.0]** Supports mounted NFS file systems.
OPENVM RUN	**INCOMPATIBLE:** • **[2.2.0]** Changed message (new text possible): DMS639E.

XEDIT Subcommands

Table 29 lists the XEDIT subcommands that have changed. For additional information, see the *z/VM: XEDIT Commands and Macros Reference*.

Table 29. Changes to XEDIT Subcommands

Subcommand	Changes
FILE	**Upwardly compatible:** • **[3.1.0]** Updated return codes: 32, 55. • **[3.1.0]** New messages: 1019, 1020. • **[3.1.0]** Supports mounted NFS file systems.
GET	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.
LOAD	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.
PUT	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.
PUTD	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.
SAVE	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.
XEDIT	**Upwardly compatible:** • **[3.1.0]** Added message 1019 and 1020; updated return code 32 and 55. • **[3.1.0]** Supports mounted NFS file systems.

CMS Pipelines

This section identifies the CMS Pipelines functions that have changed. It contains the following subsections:

- CMS Pipelines Stages, Subcommands, and Macros
- “CMS Pipelines Messages” on page 124

CMS Pipelines Stages, Subcommands, and Macros

Table 30 lists the CMS Pipelines stages, subcommands, and macros that have changed. For additional information, see the *z/VM: CMS Pipelines Reference*.

[2.3.0]
The code bases for CMS Pipelines and CMS/TSO Pipelines have been merged. Some new function exists as a result of the code merge. See “Pipelines Code Bases Merged [2.3.0]” on page 61.

Table 30. Changes to CMS Pipelines Stages, Subcommands, and Macros

Function	Changes
BFSQUERY stage	**Upwardly compatible:** • **[5.1.0]** Output record contains the new levels of CP and CMS.
DATECONVERT stage	**Upwardly compatible:** • **[2.4.0]** Provides timestamp output.

Table 30. Changes to CMS Pipelines Stages, Subcommands, and Macros (continued)

Function	Changes
PIPEPVR macro	**Upwardly compatible:** • **[2.4.0]** New option: *label*.
QUERY stage	**Upwardly compatible:** • **[3.1.0]** Information returned for QUERY VERSION indicates the new version level. • **[5.1.0]** Information returned for QUERY LEVEL may indicate a new service level.
READER stage	**Upwardly compatible:** • **[2.4.0]** New options: HOLD, NOHOLD, KEEP, NOKEEP, PURGE.

CMS Pipelines Messages

The following CMS Pipelines messages have ***changed text***. For additional information, see *z/VM: System Messages and Codes - CMS and REXX/VM*.

[2.3.0]

All CMS Pipelines messages have been renamed and renumbered from a DMS prefix to an FPL prefix. All of the FPL message numbers are consistent with those from CMS/TSO Pipelines. For a cross-reference between DMS and FPL messages, see Appendix A, "CMS Pipelines Message Cross-Reference [2.3.0]," on page 181.

Note: If a message has changed in more than one release, only the latest release is indicated.

[4.1.0] FPL1016E
[2.4.0] FPL1170E
[2.4.0] FPL1171W
[2.4.0] FPL1182E
[2.4.0] FPL1183E
[2.4.0] FPL1184E
[2.4.0] FPL1185E
[2.4.0] FPL1186W

CMS Routines

This section identifies the CMS routines that have changed. It contains the following subsections:

General CMS Callable Services

Table 31 lists the general CMS callable services that have changed. For additional information, see the *z/VM: CMS Callable Services Reference*.

Table 31. Changes to General CMS Callable Services

Routine	Changes
DMSCLBLK	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90320, 90330, 90492, 90495.
DMSCLDBK	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90320, 90330, 90495.
DMSCLOSE	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90320, 90330, 90495.
DMSCRDIR	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSCRFIL	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* and *create_date* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSCROB	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* and *create_date* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSDEUSR	**Upwardly compatible:** • **[2.2.0]** New parameters: DELAUTH, KEEPAUTH, and *length4*. • **[2.2.0]** New reason code: 98700.
DMSENUSR	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE, *length7*. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90330, 90495.

Table 31. Changes to General CMS Callable Services (continued)

Routine	Changes
DMSERP	**Upwardly compatible:** • **[2.2.0]** New information names for Year 2000 support (FILE_DATE_CENTURY, ACT_FILE_DATE_CENTRY (note that U is omitted), and YEAR2000_SUPPORT).
DMSEXIDI	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *last_change_date* and *create_date* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90320, 90330.
DMSEXIFI	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date*, *dateref*, *create_date*, and *last_change_date* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90320, 90330.

Table 31. Changes to General CMS Callable Services (continued)

Routine	Changes
DMSEXIST	**Upwardly compatible:** • **[2.2.0]** Offsets have changed in the FILE data record (and the record length has increased to 436 bytes): **OFFSET** — **Field Name — Change Description** **339 (X'153')** — *dec_date_ext* — Previously reserved **343 (X'157')** — *date_ext* — Added **353 (X'161')** — *iso_date_ext* — Added **363 (X'16B')** — *dec_dateref_ext* — Added **367 (X'16F')** — *dateref_ext* — Added **377 (X'179')** — *iso_dateref_ext* — Added **387 (X'183')** — *dec_cr_date_ext* — Added **391 (X'187')** — *cr_date_ext* — Added **401 (X'191')** — *iso_cr_date_ext* — Added **411 (X'19B')** — *dec_last_change_date_ext* — Added **415 (X'19F')** — *last_change_date_ext* — Added **425 (X'1A9')** — *iso_last_change_date_ext* — Added **435 (X'1B3')** — Reserved — Added • **[2.2.0]** Offsets have changed in the DIRECTORY data record (and the record length has increased to 308 bytes): **OFFSET** — **Field Name — Change Description** **254 (X'FE')** — *dec_last_change_date_ext* — Previously reserved **258 (X'102')** — *last_change_date_ext* — Added **268 (X'10C')** — *iso_last_change_date_ext* — Added **278 (X'116')** — *dec_cr_date_ext* — Added **282 (X'11A')** — *cr_date_ext* — Added **292 (X'124')** — *iso_cr_date_ext* — Added **302 (X'12E')** — Reserved — Added
DMSGETDA	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE and *length2*. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90320, 90330.

Table 31. Changes to General CMS Callable Services (continued)

Routine	Changes
DMSGETDF	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE and *length2*. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90320, 90330.
DMSGETDI	**Upwardly compatible:** • **[2.2.0]** Offsets have changed in the FILE data record (and the record length has increased to 112 bytes): **OFFSET** — **Field Name — Change Description** **88 (X'58')** — *dec_date_ext* — Added **92 (X'5C')** — *date_ext* — Added **102 (X'66')** — *iso_date_ext* — Added • **[2.2.0]** Offsets have changed in the FILEEXT data record (and the record length has increased to 284 bytes): **OFFSET** — **Field Name — Change Description** **185 (X'B9')** — *dec_date_ext* — Previously reserved **189 (X'BD')** — *date_ext* — Added **199 (X'C7')** — *iso_date_ext* — Added **209 (X'D1')** — *dec_dateref_ext* — Added **213 (X'D5')** — *dateref_ext* — Added **223 (X'DF')** — *iso_dateref_ext* — Added **233 (X'E9')** — *dec_cr_date_ext* — Added **237 (X'ED')** — *cr_date_ext* — Added **247 (X'F7')** — *iso_cr_date_ext* — Added **257 (X'101')** — *dec_last_change_date_ext* — Added **261 (X'105')** — *last_change_date_ext* — Added **271 (X'10F')** — *iso_last_change_date_ext* — Added **281 (X'119')** — Reserved — Added • **[2.2.0]** Offsets have changed in the SEARCHALL and SEARCHAUTH data records (and the record length has increased to 252 bytes): **OFFSET** — **Field Name/Change Description** **226 (X'E2')** — Reserved — Added **228 (X'E4')** — *dec_date_ext* — Added **232 (X'E8')** — *date_ext* — Added **242 (X'F2')** — *iso_date_ext* — Added

Table 31. Changes to General CMS Callable Services (continued)

Routine	Changes
DMSGETDS	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE and *length2*. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90320, 90330.
DMSGETDX	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE and *length2*. • **[2.2.0]** *date*, *dateref*, *create_date*, and *update_date* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason codes: 90310, 90320, 90330.
DMSOPBLK	**INCOMPATIBLE:** • **[2.2.0]** When this routine is called from a REXX program, the date field is returned as 10 characters. Previously, it was returned as 8 characters. **Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date*, *create_date*, and *dateref* parameters support 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSOPDBK	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *create_date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSOPEN	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *create_date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.
DMSQEFL	**Upwardly compatible:** • **[5.1.0]** New values returned for the *cp_level* and *cms_level* parameters.
DMSQSFSL	**Upwardly compatible:** • **[5.1.0]** New value returned for the *server_level* parameter.

Table 31. Changes to General CMS Callable Services (continued)

Routine	Changes
DMSRDCAT	**Upwardly compatible:** • **[2.2.0]** In the OBJECTCAT record for SFS: – New bit settings in FILEFLAGS field to support 4-digit years (century setting for DATE and DATEREF fields). – Reserved CHAR(1) field preceding the LAST_CHANGE_DATE field has changed to: **Field Name** / **Field Type/Description** **CHGDATE_CENTURY** / CHAR(1) Century byte for LAST_CHANGE_DATE – Reserved CHAR(1) field preceding the CREATIONDATE field has changed to: **Field Name** / **Field Type/Description** **CREATIONDATE_CENTURY** / CHAR(1) Century byte for CREATIONDATE
DMSTRUNC	**Upwardly compatible:** • **[2.2.0]** New parameters to specify date format: SHORTDATE, FULLDATE, ISODATE. • **[2.2.0]** *date* parameter supports 4-digit years (10-character dates) when used with the FULLDATE and ISODATE parameters. • **[2.2.0]** New reason code: 90495.

CMS Multitasking Routines

Table 32 lists the CMS multitasking routines that have changed. For additional information, see *z/VM: CMS Application Multitasking*.

Table 32. Changes to CMS Multitasking Routines

Routine	Changes
DateTimeSubtract	**Upwardly compatible:** • **[2.3.0]** Supports new date and time formats.

OpenExtensions Callable Services

Table 33 lists the OpenExtensions callable services that have changed. For additional information, see the *z/VM: OpenExtensions Callable Services Reference*.

Table 33. Changes to OpenExtensions Callable Services

Routine	Changes
close (BPX1CLO)	**Upwardly compatible:** • **[3.1.0]** Supports sockets.
fcntl (BPX1FCT)	**Upwardly compatible:** • **[3.1.0]** Supports sockets.
mount (BPX1MNT)	**Upwardly compatible:** • **[3.1.0]** Mounts a local or remote file system.
openvmf (BPX1VM5)	**Upwardly compatible:** • **[2.4.0]** New function code: VM5_RESOLVE_PATH.

Table 33. Changes to OpenExtensions Callable Services (continued)

Routine	Changes
read (BPX1RED)	**Upwardly compatible:** • **[3.1.0]** Supports sockets.
wrote (BPX1WRT)	**Upwardly compatible:** • **[3.1.0]** Supports sockets.

Systems Management Routines

Table 34 lists the systems management routines that have changed. For additional information, see *z/VM: Systems Management Application Programming*.

Table 34. Changes to Systems Management Routines

Routine	Changes
VIRTUAL_NETWORK_VSWITCH_SET (RPC)	**INCOMPATIBLE:** • **[5.1.0]** For the *VLANID* parameter, the value 'ANY' is no longer supported. It was formerly the default.
Virtual_Network_Vswitch_Set (CSL)	**INCOMPATIBLE:** • **[5.1.0]** For the *vlan_id* parameter, the value 'ANY' is no longer supported. It was formerly the default.

CMS Compatibility-Interface Routines

Table 35 lists the CMS compatibility-interface routines that have changed. For additional information, see the *z/VM: CMS Application Development Guide for Assembler*.

Table 35. Changes to CMS Compatibility-Interface Routines

Routine	Changes
DMSTVS	**Upwardly compatible:** • **[2.2.0]** New LIBSRV plist parameter. • **[2.4.0]** New message DMS2139I is issued if SENSE data from the tape mount indicates that the mounted tape cartridge may be incorrect for the tape device in use.

CMS Macros

This section identifies the CMS macros that have changed. It contains the following subsections:

General CMS Macros and Subcommands

Table 36 lists the general CMS macros and subcommands that have changed. For additional information, see the *z/VM: CMS Macros and Functions Reference*.

Table 36. Changes to General CMS Macros and Subcommands

Macro or Subcommand	Changes
CMSLEVEL macro	**INCOMPATIBLE:** • **[2.2.0]** Returned CMS level has been frozen at X'0F' (Level 12) for VM/ESA 2.1.0 and later. Use the new DMSQEFL macro or the DMSQEFL CSL routine instead.
DIRBUFF macro	**Upwardly compatible:** • **[2.2.0]** FILE record contains the following new fields: DIRFDAXD, DIRFDAXC, DIRFDAXI, DIRFLV13. • **[2.2.0]** FILEEXT record contains the following new fields: DIREDAXD, DIREDAXC, DIREDAXI, DIREDRXD, DIREDRXC, DIREDRXI, DIRECDXD, DIRECDXC, DIRECDXI, DIREDCXD, DIREDCXC, DIREDCXI, DIRELV13. • **[2.2.0]** SEARCHALL and SEARCHAUTH records contain the following new fields: DIRSDAXD, DIRSDAXC, DIRSDAXI, DIRSCEND, DIRSLV13.
DMSQEFL macro	**Upwardly compatible:** • **[5.1.0]** Returns a new value for the CMS level.
EXSBUFF macro	**Upwardly compatible:** • **[2.2.0]** FILE record contains the following new fields: EXSFDAXD, EXSFDAXC, EXSFDAXI, EXSFDRXD, EXSFDRXC, EXSFDRXI, EXSFCDXD, EXSFCDXC, EXSFCDXI, EXSFDCXD, EXSFDCXC, EXSFDCXI, EXSF2000, EXSFLV13. • **[2.2.0]** In the FILE record, the following field has changed: EXSFRES. • **[2.2.0]** DIR record contains the following new fields: EXSDDCXD, EXSDDCXC, EXSDDCXI, EXSDCDXD, EXSDCDXC, EXSDCDXI, EXSD2000, EXSDLV13. • In the DIR record, the following field has changed: EXSDRES.
FSSTATE macro	**Upwardly compatible:** • **[2.2.0]** In the FST flag byte, bit 4 indicates the century (first two digits of the year) the file was last written or updated (0=19*nn*, 1=20*nn*, where *nn* is the 2-digit year). Previously, this bit was not used.
FSTD macro	**Upwardly compatible:** • **[2.2.0]** FSTFLAGS section contains the new FSTCNTRY field, which is a bit that indicates the century (first two digits of the year) the file was last written or updated (0=19*nn*, 1=20*nn*, where *nn* is the 2-digit year).
TAPECTL macro	**Upwardly compatible:** • **[2.2.0]** If the tape is under the control of a Tape Library Dataserver machine, and the DFSMS/VM Removable Media Services (RMS) FSMPPSI CSLLIB is available to CMS, the RUN (rewind and unload) function of TAPECTL calls the RMS FSMRMDMT (Demount) CSL routine to have the Dataserver unmount the tape.

OpenExtensions Macros

Table 37 lists the OpenExtensions macros that have changed. For additional information, see the *z/VM: OpenExtensions Callable Services Reference*.

Table 37. Changes to OpenExtensions Macros

Macro	Changes
BPXYERNO	**Upwardly compatible:** • **[3.1.0]** Contains equates for new return codes and reason codes.
BPXYOPNF	**Upwardly compatible:** • **[3.1.0]** New equates for new flag values for fcntl (BPX1FCT).

Table 37. Changes to OpenExtensions Macros (continued)

Macro	Changes
BPXYVM5	**Upwardly compatible:** • **[2.4.0]** New equate for new VM5_RESOLVE_PATH function code for openvmf (BPX1VM5).

CMS Compatibility-Interface Macros

Table 38 lists the CMS compatibility-interface macros that have changed.

Table 38. Changes to CMS Compatibility-Interface Macros

Macro	Changes
DEFNUC	**INCOMPATIBLE:** • **[2.3.0]** In the default CMS IPL heading (used when the VERSION= parameter is specified without a value in DEFNUC) the date is presented in ISO format (*yyyy-mm-dd*). **Upwardly compatible:** • **[5.1.0]** Default IPL heading entry has been updated with the new release level. For additional information, see *z/VM: CMS Planning and Administration*.

CMS OS Simulation Macros and Supervisor Calls

Table 39 lists the CMS OS Simulation macros that have changed. Table 40 lists the CMS OS simulation supervisor calls that have changed. For additional information, see the *z/VM: CMS Application Development Guide for Assembler*.

Table 39. Changes to CMS OS Simulation Macros

Macro	Changes
CLOSE	**Upwardly compatible:** • **[2.4.0]** Can process OS formatted variable spanned QSAM records (under XLRI) or non-OS CMS files up to 65535 bytes in length.
DCB	**Upwardly compatible:** • **[2.4.0]** Can describe and pass both LRI and XLRI conventions for QSAM variable spanned long records (up to 65535 bytes) for subsequent OPEN, CLOSE, GET, or PUT processing. Can also describe non-OS CMS files up to 65535 bytes in length.
GET	**Upwardly compatible:** • **[2.4.0]** Can process QSAM I/O to variable spanned QSAM records or non-OS CMS files up to 65535 bytes in length.
OPEN	**Upwardly compatible:** • **[2.4.0]** Can process OS formatted variable spanned QSAM records (under XLRI) or non-OS CMS files up to 65535 bytes in length.
PUT	**Upwardly compatible:** • **[2.4.0]** Can process QSAM I/O to variable spanned QSAM records or non-OS CMS files up to 65535 bytes in length.
TIME	**Upwardly compatible:** • **[2.2.0]** Second half-byte of the date format is a century indicator, where 0 indicates the 1900's, 1 indicates the 2000's, and 2 indicates the 2100's. This corresponds to the MVS implementation of the TIME macro.

Table 40. Changes to CMS OS Simulation Supervisor Calls

SVC	Changes
SVC 19 (OPEN)	**Upwardly compatible:** • **[2.4.0]** Can process OS formatted variable spanned QSAM records (under XLRI) or non-OS CMS files up to 65535 bytes in length.
SVC 20 (CLOSE)	**Upwardly compatible:** • **[2.4.0]** Can process OS formatted variable spanned QSAM records (under XLRI) or non-OS CMS files up to 65535 bytes in length.

HELP Facility

Note: This section does not include HELP changes prior to z/VM V4R4.

Table 41 lists HELP components (file types) that have been added or deleted. Table 42 lists HELP files that have been deleted or renamed (except HELP files for deleted messages). If a specific file name is not identified, the change applies to all files with the specified file type.

If you install HELP for the new VM release over HELP for your current release, both groups of changes are considered to be **INCOMPATIBLE**, because:

- HELP files with new file types may overlay local HELP files that use those same file types.
- HELP files identified as deleted or renamed are not overlaid and should be manually removed from your system because they may contain backlevel information.

New help files added to existing HELP components are not listed because they are all upwardly compatible.

Table 41. Changes to HELP Components

HELP Component (File Type)	Change
BOOTPD (HELPBOOT)	**[4.4.0] Added** for TCP/IP BOOTP server administrative (BOOTPD command) subcommands.
CPOTHER (HELPCPOT)	**[4.4.0] Deleted** and all files renamed to HELPCP.
DHCPD (HELPDHCP)	**[4.4.0] Added** for TCP/IP DHCP server administrative (DHCPD command) subcommands.
DNS (HELPDNS)	**[4.4.0] Added** for TCP/IP DNS server administrative commands.
FCX (HELPFCX)	**[4.4.0] Added** for Performance Toolkit subcommands and field descriptions.
GDDMXD (HELPGDDM)	**[4.4.0] Added** for TCP/IP GDDMXD/VM interface subcommands.
IMAPADM (HELPIMAP)	**[4.4.0] Added** for TCP/IP IMAP server administrative commands.
LPD (HELPLPD)	**[4.4.0] Added** for TCP/IP LPD administrative commands.
MPROUTE (HELPMPRO)	**[4.4.0] Added** for TCP/IP MPROUTE server administrative commands.
MROUTINE (HELPMROU)	**[4.4.0] Added** for CMS virtual systems management CSL routines.
NFS (HELPNFS)	**[4.4.0] Added** for TCP/IP NFS server administrative commands.
RTE (HELPRTE)	**[4.4.0] Added** for TCP/IP RouteD server administrative commands. **Note:** The menu file for this component is ROUTED HELPMENU.
SMTP (HELPSMTP)	**[4.4.0] Added** for TCP/IP SMTP server administrative commands.
SNMP (HELPSNMP)	**[4.4.0] Added** for TCP/IP SNMP administrative commands.

Table 41. Changes to HELP Components (continued)

HELP Component (File Type)	Change
SOCKETS (HELPSOCK)	**[4.4.0] Deleted** (functions now in C/C++ for z/VM).
SPTAPE (HELPSPTA)	**[5.1.0] Deleted** (no longer supported).
SRPI (HELPSRPI)	**[5.1.0] Deleted** (function to be withdrawn in a future release).
SSLADMIN (HELPSSLA)	**[4.4.0] Added** for TCP/IP SSL server administrative commands.
TCP (HELPTCP)	**[4.4.0] Deleted** and replaced by TCPIP.
TCPIP (HELPTCPI)	**[4.4.0] Added** for TCP/IP commands and related functions.
TELNET (HELPTELN)	**[4.4.0] Added** for TCP/IP Telnet protocol client subcommands.
TFTD (HELPTFTD)	**[4.4.0] Added** for TCP/IP TFTP server administrative (TFTPD command) subcommands. **Note:** The menu file for this component is TFTPD HELPMENU.
TFTP (HELPTFTP)	**[4.4.0] Changed** to be used only for TCP/IP TFTP client (TFTP command) subcommands.
UFTD (HELPUFTD)	**[4.4.0] Added** for TCP/IP UFT server administrative (UFTD command) subcommands.
VMADMIN (HELPVMAD)	**[5.1.0] Deleted** (function to be withdrawn in a future release).
X25IPI (HELPX25I)	**[4.4.0] Added** for TCP/IP X.25 interface administrative commands.

Table 42. Deleted or Renamed HELP Files (Arranged by File Type)

HELP File	Change
CPOTHER HELPABBR	**[4.4.0] Deleted** (data merged into CP HELPABBR).
MACRO HELPABBR	**[4.4.0] Renamed** to MACROS HELPABBR.
ROUTINE HELPABBR	**[4.4.0] Deleted** (duplicate of ROUTINES HELPABBR).
SPTAPE HELPABBR	**[5.1.0] Deleted** (no longer supported).
SRPI HELPABBR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
VMADMIN HELPABBR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
CMSSERV HELPCMS	**[5.1.0] Deleted** (function to be withdrawn in a future release).
CONV2WD HELPCMS	**[5.1.0] Deleted** (no longer supported).
FTP HELPCMS	**[4.4.0] Deleted** and replaced by FTP HELPTCPI.
LPQ HELPCMS	**[4.4.0] Deleted** and replaced by LPQ HELPTCPI.
LPR HELPCMS	**[4.4.0] Deleted** and replaced by LPR HELPTCPI.
LPRM HELPCMS	**[4.4.0] Deleted** and replaced by LPRM HELPTCPI.
LPRSET HELPCMS	**[4.4.0] Deleted** and replaced by LPRSET HELPTCPI.
MACLMIG HELPCMS	**[5.1.0] Deleted** (no longer supported).
NETSTAT HELPCMS	**[4.4.0] Deleted** and replaced by NETSTAT HELPTCPI.
PING HELPCMS	**[4.4.0] Deleted** and replaced by PING HELPTCPI.
REXEC HELPCMS	**[4.4.0] Deleted** and replaced by REXEC HELPTCPI.
TELNET HELPCMS	**[4.4.0] Deleted** and replaced by TELNET HELPTCPI.
TFTP HELPCMS	**[4.4.0] Deleted** and replaced by TFTP HELPTCPI.
USER HELPCP	**[4.4.0] Deleted** and replaced by MESSAGEU HELPCP.
fn HELPCPOT	**[4.4.0] Deleted** and replaced by *fn* HELPCP files.
CFLINK HELPCPQU	**[4.4.0] Renamed** to CFLINKS HELPCPQU.

Table 42. Deleted or Renamed HELP Files (Arranged by File Type) (continued)

HELP File	Change
IOASSIST HELPCPQU	**[5.1.0] Deleted** (no longer supported).
VR HELPCPQU	**[5.1.0] Deleted** (no longer supported).
VRFREE HELPCPQU	**[5.1.0] Deleted** (no longer supported).
CCWTRAN HELPCPSE	**[5.1.0] Deleted** (no longer supported).
IOASSIST HELPCPSE	**[5.1.0] Deleted** (no longer supported).
NOTRANS HELPCPSE	**[5.1.0] Deleted** (no longer supported).
ADDENTRY HELPMACR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
CPRB HELPMACR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
CSMRETCD HELPMACR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
DELENTRY HELPMACR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
SENDREQ HELPMACR	**[5.1.0] Deleted** (function to be withdrawn in a future release).
COMMAND HELPMENU	**[4.4.0] Deleted** (duplicate of COMMANDS HELPMENU).
CPOTHER HELPMENU	**[4.4.0] Deleted** (data merged into CP HELPMENU).
MACRO HELPMENU	**[4.4.0] Deleted** (duplicate of MACROS HELPMENU).
ROUTINE HELPMENU	**[4.4.0] Deleted** (duplicate of ROUTINES HELPMENU).
SOCKETS HELPMENU	**[4.4.0] Deleted** (functions now in C/C++ for z/VM).
SPTAPE HELPMENU	**[5.1.0] Deleted** (no longer supported).
SRPI HELPMENU	**[5.1.0] Deleted** (function to be withdrawn in a future release).
VMADMIN HELPMENU	**[5.1.0] Deleted** (function to be withdrawn in a future release).
HCQ031W HELPMSG	**[4.4.0] Renamed** to HCQ031E HELPMSG.
fn HELPSOCK	**[4.4.0] Deleted** (functions now in C/C++ for z/VM).
fn HELPSPTA	**[5.1.0] Deleted** (no longer supported).
fn HELPSRPI	**[5.1.0] Deleted** (function to be withdrawn in a future release).
AVS HELPTASK	**[4.4.0] Deleted.**
CMS HELPTASK	**[4.4.0] Deleted.**
CP HELPTASK	**[4.4.0] Deleted.**
DVF HELPTASK	**[4.4.0] Deleted.**
GCS HELPTASK	**[4.4.0] Deleted.**
MACRO HELPTASK	**[4.4.0] Renamed** to MACROS HELPTASK.
OPTIONS HELPTASK	**[4.4.0] Renamed** to QUERYSET HELPTASK.
PIPELINE HELPTASK	**[4.4.0] Deleted.**
ROUTINE HELPTASK	**[4.4.0] Renamed** to ROUTINES HELPTASK.
SOCKETS HELPTASK	**[4.4.0] Deleted** (functions now in C/C++ for z/VM).
SRPI HELPTASK	**[5.1.0] Deleted** (function to be withdrawn in a future release).
TSAF HELPTASK	**[4.4.0] Deleted.**
VMDT HELPTASK	**[4.4.0] Deleted.**
VMRM HELPTASK	**[4.4.0] Deleted.**
VMSESE HELPTASK	**[4.4.0] Deleted.**
VMSESEI HELPTASK	**[4.4.0] Deleted.**
XSPOOL HELPTASK	**[4.4.0] Deleted.**

Table 42. Deleted or Renamed HELP Files (Arranged by File Type) (continued)

HELP File	Change
IFCONFIG HELPTCP	**[4.4.0] Deleted** and replaced by IFCONFIG HELPTCPI.
OBEYFILE HELPTCP	**[4.4.0] Deleted** and replaced by OBEYFILE HELPTCPI.
fn HELPVMAD	**[5.1.0] Deleted** (function to be withdrawn in a future release).

Note: For each system message deleted from VM, the corresponding HELP file has also been deleted. For lists of the deleted messages, see the appropriate section (if any) under each component.

CMS Messages

[2.3.0]

All CMS Pipelines messages have been renamed and renumbered from a DMS prefix to an FPL prefix. All of the FPL message numbers are consistent with those from CMS/TSO Pipelines. For a cross-reference between DMS and FPL messages, see Appendix A, “CMS Pipelines Message Cross-Reference [2.3.0],” on page 181.

In the DMSMES system repository, the message texts for message numbers 2571 through 2999 have been replaced with pointers to the corresponding FPL equivalent message numbers in the FPLMES system repository. This may or may not be maintained in any future releases of VM.

Note: Changed CMS Pipelines messages are not listed here. See “CMS Pipelines Messages” on page 124.

The following CMS messages do not exist in z/VM V5R1:

DMS683E
DMS716E
DMS718E
DMS719E
DMS720E
DMS812E
DMS912I
DMS1126S
DMS1250E
DMS2048W

The following CMS messages have ***changed text***. For additional information, see *z/VM: System Messages and Codes - CMS and REXX/VM*.

Note: If a message has changed in more than one release, only the latest release is indicated.

[4.2.0] DMS050E
[3.1.0] DMS149E
[2.2.0] DMS516E
[2.2.0] DMS622E
[2.2.0] DMS639E
[5.1.0] DMS988E
[2.2.0] DMS1229E
[2.3.0] DMS1433I
[2.3.0] DMS1437I
[2.4.0] DMS2010E
[5.1.0] DMS2046E
[3.1.0] DMS2119E
[4.4.0] DMS2139I
[2.3.0] DMS3009R
[2.2.0] DMS3455I
[2.2.0] DMS3470W

AVS Changes

There are no changes to AVS external interfaces.

Dump Viewing Facility Changes

Table 43 lists the Dump Viewing Facility functions that have changed. For additional information, see *z/VM: Dump Viewing Facility*.

Table 43. Changes to Dump Viewing Facility Functions

Function	Changes
DUMPSCAN	**INCOMPATIBLE:** • **[3.1.0]** DUMPSCAN cannot be used for CP dumps. Use the VM Dump Tool. • **[3.1.0]** The following subcommands are no longer supported: CPEBK, FINDCPE, FINDUSER, FRAMETBL, INSPECT, REAL, RIOBLOK, SELECT, SNAPLIST, TRSAVE, VIOBLOK, VIRT, VMDBK, XTRACE. • **[3.1.0]** Header record indicates new product name. **Upwardly compatible:** • **[5.1.0]** Header record indicates new release level.

GCS Changes

Table 44 lists the GCS external interfaces (commands and macros) that have changed. For additional information, see *z/VM: Group Control System*.

Table 44. Changes to GCS Commands and Macros

Interface	Changes
GCSLEVEL macro	**Upwardly compatible:** • **[5.1.0]** Contains new equates for new release levels.
GETMAIN macro	**INCOMPATIBLE:** • **[2.2.0]** Previously, although LOC=RES was documented as the default, the actual default was LOC=BELOW, and all the requested virtual storage was allocated below 16MB. The actual default has been changed to LOC=RES. If the requester resides above 16MB, virtual storage may be allocated anywhere. If you have any programs that invoke GETMAIN with the default, you must make sure they can accommodate addresses above 16MB, or you must recode them to invoke GETMAIN with LOC=BELOW.
QUERY GCSLEVEL command	**Upwardly compatible:** • **[5.1.0]** Response contains new values for the new release.
QUERY MODDATE command	**INCOMPATIBLE:** • **[2.2.0]** Full 4-digit year is now returned in the date field of the response instead of a 2-digit year.
TIME macro	**Upwardly compatible:** • **[2.2.0]** Second half-byte of the date format is a century indicator, where 0 indicates the 1900's, 1 indicates the 2000's, and 2 indicates the 2100's. This corresponds to the MVS implementation of the TIME macro.

REXX/VM Changes

Table 45 lists the REXX/VM external interfaces (instructions, functions, and external functions) that have changed. For additional information, see the *z/VM: REXX/VM Reference*.

Table 45. Changes to REXX/VM External Interfaces

Interface	Changes
CMSFLAG	**Upwardly compatible:** • **[2.2.0]** New value for *flag*: YEAR2000.
DATE	**Upwardly compatible:** • **[2.2.0]** New parameters allow you to specify a date to be converted to a different format. • **[2.4.0]** New parameters: *output_separator_char*, *input_separator_char*.
DIAG / DIAGRC	**Upwardly compatible:** • **[2.2.0]** New DIAGNOSE code is supported: X'270'.
PARSE	**Upwardly compatible:** • **[5.1.0]** Information obtained by PARSE VERSION may contain new values.

TSAF Changes

There are no changes to TSAF external interfaces.

VMSES/E Changes

This section identifies the changes to VMSES/E external interfaces. It contains the following subsections:

- $PPF File Names
- "VMSES/E Commands"
- "VMSES/E Messages" on page 141

$PPF File Names

See "Product Parameter File ($PPF) Names [5.1.0]" on page 16.

VMSES/E Commands

Table 46 lists the VMSES/E commands that have changed. For additional information, see the *z/VM: VMSES/E Introduction and Reference*.

Table 46. Changes to VMSES/E Commands

Command	Changes
GENCPBLS	**INCOMPATIBLE:** • **[5.1.0]** Default has changed from DUAL to NODUAL. **Upwardly compatible:** • **[3.1.0]** New options: ALTCNTRL, DUAL, NODUAL, LOADLIST, ALTLOADLIST, PREEXIT.
ITNVTSTR	**Upwardly compatible:** • **[2.3.0]** New operands: KEY, PROD.
PUT2PROD	**Upwardly compatible:** • **[4.3.0]** New message: VMF1219E • **[4.4.0]** Console messages placed into VMSES/E-formatted $VMFP2P $MSGLOG file.

Table 46. Changes to VMSES/E Commands (continued)

Command	Changes
SERVICE	**Upwardly compatible:** • **[4.3.0]** New operands: BUILD, ENABLE, DISABLE. • **[4.3.0]** New messages: VMF1220W, VMF2308W, VMF2310I, VMF2771E, VMF2774I. • **[4.4.0]** Console messages placed into VMSES/E-formatted $VMFSRV $MSGLOG file. • **[5.1.0]** New operands: BITMAP, STATUS.
VMFAPPLY	**Upwardly compatible:** • **[3.1.0]** New option: PREEXIT.
VMFASM	**Upwardly compatible:** • **[3.1.0]** New option: PREEXIT.
VMFBLD	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT, ULOG, WILD.
VMFEXUPD	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT.
VMFHASM	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT.
VMFHLASM	**INCOMPATIBLE:** • **[5.1.0]** Default has changed from DUAL to NODUAL. **Upwardly compatible:** • **[3.1.0]** New options: ALTCNTRL, DUAL, NODUAL, LOADLIST, ALTLOADLIST, PREEXIT.
VMFINS (in general)	**Upwardly compatible:** • **[2.3.0]** New operands: DISABLE, ENABLE. • See VMFINS commands below.
VMFINS DELETE	**Upwardly compatible:** • **[2.3.0]** New operand: DISABLE.
VMFINS INSTALL	**Upwardly compatible:** • **[2.3.0]** New operands: DISABLE, ENABLE, NOSETUP, SETUP.
VMFINS MIGRATE	**Upwardly compatible:** • **[2.3.0]** New operands: DISABLE, ENABLE.
VMFMRDSK	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT.
VMFNLS	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT.
VMFREC	**Upwardly compatible:** • **[3.1.0]** New options: PREEXIT.
VMFREM	**Upwardly compatible:** • **[3.1.0]** New option: PREEXIT. • **[4.4.0]** New operand: MOD. • **[4.4.0]** New option: PREFIX. • **[4.4.0]** UNAPPLY and UNRECEIVE options can be used for local modifications.

Table 46. Changes to VMSES/E Commands (continued)

Command	Changes
VMFREPL	**Upwardly compatible:** • **[3.1.0]** New options: LOG, LOGLVL, MOD, PREEXIT, PREFIX, PTF.
VMFSETUP	**Upwardly compatible:** • **[2.3.0]** New operands: NOCONS, NOPROMPT, PROMPT.
VMFSIM (in general)	**Upwardly compatible:** • See VMFSIM commands below.
VMFSIM GETLVL	**Upwardly compatible:** • **[3.1.0]** New options: MOD, PTF.
VMFSUFIN	**Upwardly compatible:** • **[2.4.0]** New operand: ALL. • **[2.4.0]** New options: CORTAPE, RSUTAPE. • **[4.3.0]** New option: BUILD. • **[4.3.0]** New message: VMF2308W
VMFSUFTB	**Upwardly compatible:** • **[4.3.0]** New operand: SUFFN *fn*.
VMFUPDAT	**Upwardly compatible:** • **[4.3.0]** New messages: VMF2300E, VMF2301W, VMF2302E, VMF2303W, VMF2304E, VMF2306W, VMF2307W, VMF2309W. • **[4.4.0]** New operands: SRVBLDS and SYSREST. • **[4.4.0]** Changes to VMFUPDAT Function Selection Panel. • **[4.4.0]** New panels: SRVBLDS Update Panel and SYSREST Update Panel. • **[5.1.0]** New operand: SYSMEMO. • **[5.1.0]** New panel: SYSMEMO Update Panel. • **[5.1.0]** Changed panel: SYSREST Update Panel — added PF key for Browse. • **[5.1.0]** Changed panel: VMFUPDAT Function Selection Panel — added SYSMEMO.
VMFVIEW	**Upwardly compatible:** • **[2.4.0]** New operands (all have the same function): REMOVE, VMFREM, $VMFREM. • **[4.2.0]** New operands (all have the same function): *xxx*, VMF*xxx*, $VMF*xxx*.

Changed BLDDATA file

[4.4.0] CMSSEGS BLDDATA has been renamed to ZVMSEGS BLDDATA and the Language Environment component segments have been added to it.

VMSES/E Messages

The following VMSES/E messages have ***changed text***. For additional information, see *z/VM: System Messages and Codes - AVS, Dump Viewing Facility, GCS, TSAF, and VMSES/E*.

Note: If a message has changed in more than one release, only the latest release is indicated.

[5.1.0] VMF389E
[2.3.0] VMF1078I
[4.1.0] VMF1200E
[4.3.0] VMF1201E
[2.4.0] VMF1203E
[2.4.0] VMF1205E
[4.3.0] VMF1206I
[2.4.0] VMF1207I
[2.4.0] VMF1211I
[4.3.0] VMF1211I
[4.3.0] VMF1215E
[5.1.0] VMF1821E
[2.4.0] VMF2066E
[2.4.0] VMF2114R
[2.4.0] VMF2118I
[2.4.0] VMF2119I
[2.4.0] VMF2120W
[2.4.0] VMF2152E
[3.1.0] VMF2178I
[2.2.0] VMF2206E
[2.4.0] VMF2206W
[4.3.0] VMF2215E
[2.2.0] VMF2225E
[5.1.0] VMF2240E
[5.1.0] VMF2304E
[2.3.0] VMF2507I
[2.2.0] VMF2509I
[3.1.0] VMF2733E
[2.3.0] VMF2760I
[4.3.0] VMF2760I
[5.1.0] VMF2767I

Chapter 4. Migration Tasks

This chapter provides guidance for various tasks and procedures that may apply to your migration. It contains the following major sections:

Converting from HCPRIO, HCPSYS, and HCPBOX to Configuration Files

If you are still using the HCPSYS, HCPRIO, and HCPBOX ASSEMBLE files to define your current VM system, you should convert to using configuration files **before you migrate to the new z/VM system**. Configuration files:

- Provide more flexibility.

  When system definition information is moved out of the CP nucleus into configuration files, much of that information can be changed dynamically using CP commands without having to rebuild CP.
- Support the latest system functions and capabilities.

  Since configuration files were established as the recommended method for defining a VM system, only the configuration files have been enhanced to support new system functions and capabilities. The ASSEMBLE files have not been updated to support those functions.

The HCPSYS and HCPRIO definitions can be replaced by statements in the system configuration file (usually called SYSTEM CONFIG). The HCPSYS ASSEMBLE file included in the CP module on the new z/VM system contains only a SYSEND macroinstruction. The HCPRIO ASSEMBLE file included in the CP module on the new z/VM system contains only an RIOGEN CONS=DYNAMIC macroinstruction.

The system logo definitions in HCPBOX can be replaced by statements in the logo configuration file (usually called LOGO CONFIG). See "Creating a Logo Configuration File" on page 148.

z/VM: CP Planning and Administration describes how to set up and use the system configuration file and logo configuration file, including how to define the *parm disk* on which the configuration files reside.

There are three ways that you can migrate your HCPSYS and HCPRIO data to system configuration statements:

- Create the SYSTEM CONFIG file and system configuration statements manually.
- Use the HCPTSYS and HCPTRIO sample utility programs to read your current HCPSYS and HCPRIO files and create system configuration statements. See "Using the HCPTRIO and HCPTSYS Utilities" on page 146.

- Use the HCPDCON sample utility program to create system configuration statements from your current running system. You can also use the HCPRDEVS sample utility program to create real I/O device definitions from your running system. See “Using the HCPDCON Utility” on page 147 and “Using the HCPRDEV Utility” on page 148.

Note: The HCPTSYS, HCPTRIO, HCPDCON, and HCPRDEVS sample utility programs were supplied with z/VM V4R4 and earlier releases. **They are not included with the new z/VM release.**

No matter which method you choose, you will have to make some decisions and adjustments. After you create the SYSTEM CONFIG file and make your changes, re-IPL CP. Because the system configuration statements override the HCPSYS and HCPRIO macros that were used in building the CP nucleus, there is no need to rebuild CP. This allows you to migrate your definitions gradually. At any time you can change back to using the HCPSYS and HCPRIO files by renaming the SYSTEM CONFIG file on the parm disk.

“Configuration Statements that Replace HCPSYS Macroinstructions” identifies system configuration statements that provide functions equivalent to macroinstructions in HCPSYS. “Configuration Statements that Replace HCPRIO Macroinstructions” on page 146 identifies system configuration statements that provide functions equivalent to macroinstructions in HCPRIO. These are not complete lists of the supported system configuration statements. Many additional configuration statements exist that provide capabilities for which there are no corresponding HCPSYS or HCPRIO macroinstructions.

For more information about what you can specify in the system configuration file, rules for coding the system configuration file, and complete descriptions of all the supported system configuration statements, see *z/VM: CP Planning and Administration*.

Configuration Statements that Replace HCPSYS Macroinstructions

Table 47 shows the macroinstructions in the HCPSYS ASSEMBLE file that should be migrated to system configuration statements. In some cases, information from one macroinstruction must be migrated into more than one system configuration statement.

Table 47. System Configuration Statements that Replace HCPSYS Macros

HCPSYS Macro	Corresponding System Configuration Statement
CSELDEV	XLINK_DEVICE_DEFAULTS
CSELVOL	XLINK_VOLUME_INCLUDE XLINK_VOLUME_EXCLUDE
CSESYS	XLINK_SYSTEM_INCLUDE XLINK_SYSTEM_EXCLUDE XSPOOL_SYSTEM **Note:** There is a difference between using the CSESYS macroinstruction and the XSPOOL_SYSTEM statement. If you use cross system commands and spooling operations, the CSESYS macroinstruction requires you to specify each system in the list in exactly the same order on every system in the CSE complex. When you use the XSPOOL_SYSTEM statement, you do not have to list the systems in the same order as long as you use the SLOT operand to give the same slot number to each system.
CSETRACE	XSPOOL_TRACE

Table 47. System Configuration Statements that Replace HCPSYS Macros (continued)

HCPSYS Macro	Corresponding System Configuration Statement
CSEUSER	XSPOOL_XLIST_INPUT XSPOOL_XLIST_OUTPUT
SYSACNT	SYSTEM_USERIDS
SYSADDIN	CP_ADDON_INITIALIZE_ROUTINES
SYSCPVOL	CP_OWNED **Notes:** 1. The list of CP-owned volumes generated by CP_OWNED statements completely supersedes the list of CP-owned volumes generated by the SYSCPVOL macroinstruction. 2. There are two differences between using the SYSCPVOL macroinstruction and the CP_OWNED statement: a. If you use cross system spool file sharing, the SYSCPVOL macroinstruction requires you to specify each volume in the CP-owned list in exactly the same order on every system in the CSE complex. When you use the CP_OWNED statement, you do not have to list the volumes in the same order as long as you use the SLOT operand to give the same slot number to each shared volume. b. With the SYSCPVOL macroinstruction, if you need to add volumes to the CP-owned volume list on a running system, you have two choices: 1) Update the SYSCPVOL macroinstruction and IPL your system again. 2) Plan ahead — code volumes you do not have into the SYSCPVOL macroinstruction, and when you need to add a new volume, make sure the 1-character to 6-character volume identifier (*volid*) on the SYSCPVOL macroinstruction matches the volume identifier of the new volume. When you use the CP_OWNED statement, adding a new volume is easier: 1) Use the RESERVED operand to save one or more empty slots. 2) Use the CP DEFINE CPOWNED command to add the new volume. 3) If this is a permanent addition to the list, update your system configuration file so the new volume is automatically included in the CP-owned list then next time you IPL the system.
SYSDUMP	SYSTEM_USERIDS
SYSEREP	SYSTEM_USERIDS
SYSEXCL	USER_VOLUME_EXCLUDE
SYSFCN	PRIV_CLASSES
SYSFORM	USERFORM FORM_DEFAULT
SYSID	SYSTEM_IDENTIFIER
SYSINCL	USER_VOLUME_INCLUDE
SYSJRL (PSUPRS)	FEATURES
SYSJRL (other)	JOURNALING
SYSMAXU	FEATURES
SYSOPR	SYSTEM_USERIDS
SYSPCLAS	PRINTER_TITLE
SYSRES (SYSCLR)	FEATURES
SYSRES (other)	SYSTEM_RESIDENCE
SYSSYMP	SYSTEM_USERIDS

Table 47. System Configuration Statements that Replace HCPSYS Macros (continued)

HCPSYS Macro	Corresponding System Configuration Statement
SYSTIME	TIMEZONE_DEFINITION **Note:** There is one difference between the SYSTIME macroinstruction and the TIMEZONE_DEFINITION statement. Using the SYSTIME macroinstruction allows you to define only one time zone, while the TIMEZONE_DEFINITION statement allows you to define an unlimited number of time zones. However, only one time zone can be active at any one time.
SYSTORE	STORAGE **Note:** The SYSTORE macroinstruction has the RMSIZE parameter that lets you define how much real storage CP should allocate for itself. However, CP now uses the maximum amount of available storage, unless you specify a real storage amount on the RMSIZE parameter of the SYSTORE macroinstruction or you specify the STORE=*nnnn*M parameter of the Stand-Alone Program Loader (SAPL). (For more information about SAPL and the IPL parameters, see *z/VM: CP Planning and Administration*.) Because CP uses the maximum amount of available storage, there is no need for an operand on the STORAGE statement that is equivalent to the RMSIZE parameter of the SYSTORE macroinstruction.
SYSUVOL	USER_VOLUME_SET

Configuration Statements that Replace HCPRIO Macroinstructions

Table 48 shows the macroinstructions in the HCPRIO ASSEMBLE file that should be migrated to system configuration statements.

Table 48. System Configuration Statements that Replace HCPRIO Macros

HCPRIO Macro	Corresponding System Configuration Statement
RDEVICE (ICA)	RDEVICE (ICA)
RDEVICE (SHARED)	DEVICES
RDEVICE (UIRATE)	HOT_IO_RATE **Note:** There are two differences between the UIRATE parameter of the RDEVICE macroinstruction and the HOT_IO_RATE statement: 1. Both the UIRATE parameter and the HOT_IO_RATE statement let you specify the maximum unsolicited interrupt rate for a specific device, but the HOT_IO_RATE statement also lets you set the rate for: • All devices • An entire class of devices • A range of real device numbers. 2. You can use the CP QUERY HOTIO command to display hot I/O rates defined in the system configuration file, but you cannot use this command to display hot I/O rates that you defined using the UIRATE parameter of the RDEVICE macroinstruction.
RDEVICE (other)	RDEVICE **Note:** Only real I/O devices that are too old to be sensed or that require more information must be defined with RDEVICE statements.
RIOGEN	OPERATOR_CONSOLES **Note:** You can use the EMERGENCY_MESSAGE_CONSOLES statement to define a list of console addresses that CP notifies when there is a system emergency.
SYSFCN	PRIV_CLASSES

Using the HCPTRIO and HCPTSYS Utilities

The HCPTRIO and HCPTSYS sample utility programs convert HCPRIO and HCPSYS definitions to system configuration statements. HCPTRIO and HCPTSYS

are REXX programs and can run on any level of VM. The programs read your HCPRIO and HCPSYS files and create files containing statements that you can use in a SYSTEM CONFIG file.

Notes:

1. HCPTRIO and HCPTSYS do not process DMKRIO and DMKSYS files.
2. By default, HCPTRIO examines the HCPRIO ASSEMBLE file on the first accessed CMS minidisk and generates a list of statements for those real devices that do not answer sense ID requests or that do not return enough information. By default, HCPTRIO creates a file called RDEV CONFIG on the first CMS minidisk accessed in R/W mode.
3. By default, HCPTSYS examines the HCPSYS ASSEMBLE file on the first accessed CMS minidisk and generates a list of statements for your system that define its system characteristics (such as accounting, journaling, and time zone) and CSE status. By default, HCPTSYS creates a file called SYSTEM CONFIG on the first CMS minidisk accessed in R/W mode.
4. The statements created by HCPTRIO and HCPTSYS may not define a complete SYSTEM CONFIG file. Because HCPTRIO and HCPTSYS create statements from your existing HCPRIO and HCPSYS macroinstructions, they may not create some new configuration statements that are necessary for IPL. For example, HCPTRIO and HCPTSYS will not create a LOGO_CONFIG statement. You must create that statement, and perhaps others, manually in the SYSTEM CONFIG file. For detailed information about configuration file statements and the minimum contents of the SYSTEM CONFIG file, see *z/VM: CP Planning and Administration*.

In the following example, system configuration statements are created in the RIO CONFIG A file from the macros contained in the file HCPRIO ASSEMBLE D:

```
hcptrio rio config a from hcprio assemble d
```

In this example, the HCPTSYS command creates SYS CONFIG A from HCPSYS ASSEMBLE E:

```
hcptsys sys config a from hcpsys assemble e
```

For more information, see “HCPTRIO” on page 192 and “HCPTSYS” on page 194.

To use the statements created by HCPTRIO and HCPTSYS, add them to the SYSTEM CONFIG file on the parm disk. Make any other changes you desire or need and re-IPL CP.

Using the HCPDCON Utility

The HCPDCON sample utility program examines your running system and generates a file of configuration statements. By default, HCPDCON creates a file named SYSTEM CONFIG on the first CMS minidisk accessed in R/W mode. For more information, see “HCPDCON” on page 188.

Before using the SYSTEM CONFIG file created by HCPDCON, make sure that the file contain all the necessary statements and definitions. For detailed information about configuration file statements and the minimum contents of the SYSTEM CONFIG file, see *z/VM: CP Planning and Administration*. Then copy the SYSTEM CONFIG file to the parm disk and re-IPL CP.

Using the HCPRDEV Utility

The HCPRDEV sample utility program creates a system configuration-like file that contains statements for all real devices on your system that do not answer a sense ID request or do not return enough information. (These devices must be defined to the system.) When you select this function of HCPRDEV, by default it creates a file named RDEVS CONFIG on the first CMS minidisk accessed in R/W mode. For more information, see “HCPRDEVS” on page 190.

Difference with Multiple Systems Using Shared Data

When using CP configurability support, you may see DASD attached to systems other than your new system. For example, your installation can have a large set of DASD that is shared by several systems. All the systems' IOCPs could be set up for all the DASD, but each system actually uses only some of the DASD.

Because CP configuration senses all the DASD you have defined in your IOCP, you can see DASD not attached to your new system. To have your new system ignore DASD not attached to it, identify each one on a USER_VOLUME_EXCLUDE configuration statement.

Creating a Logo Configuration File

You can use the logo configuration file to override all information specified in HCPBOX ASSEMBLE. You can define an alternate source for logo picture files without changing HCPBOX. You can use statements in the logo configuration file to choose logo pictures for logical devices, SNA terminals, and locally-attached terminals. You can also use the logo configuration file to define the contents of the following fields:

- Command area
- Input area at the bottom of the logo screen
- Online message at the top of each logo screen
- Status area

You can use the DRAWLOGO sample utility program to create logo screens for your system. With this utility, you can edit the text of the logo file using XEDIT and modify the 3270 screen attributes in a logo file. DRAWLOGO creates these logo files on the first CMS minidisk accessed in R/W mode. By default, the file type is LOGO.

For more information about creating a logo configuration file and using the DRAWLOGO utility, see *z/VM: CP Planning and Administration*.

Migrating Spool Files and Saved Segments

This section provides you with some options for migrating your spool files, including saved segments, from your old system to your new system.

Notes:

1. The IPL process handles migration of spool files during IPL, but as a precaution you may want to consider doing your own spool file migration, especially for important spool files.
2. Use the SPXTAPE command to dump files from your old system and load them on the new system.

The VMFSGMAP command provides a saved segment mapping and planning interface and allows you to define saved segments to VMSES/E. You can then use the VMFBLD command to build saved segments on your system. The *z/VM: Saved Segments Planning and Administration* book provides details on saved segments, including how to use VMFSGMAP to map and manipulate saved segment layouts and how to use VMFBLD to build saved segments on your system.

Depending on how you plan to migrate to the new system, you can use various methods to migrate your old system's spool files and saved segments, as shown in Table 49.

Table 49. Methods for Migrating Spool Files

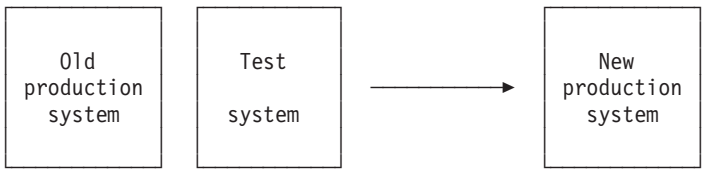
Method	When you can use this method
Using the same warm start and checkpoint areas	• When you are ready to cut over completely from your old system to your new system • When you want to migrate all your spool files and saved segments at once
Using SPXTAPE	• When you are ready to cut over completely from your old system to your new system • When you want to use your new system as a test system before cutting over completely • When you want to migrate all your spool files and saved segments at once • When you want to migrate selected spool files or saved segments
Building saved segments individually	• Anytime

Using the Same Warm Start and Checkpoint Areas to Migrate All Spool Files at Once

If you are ready to cut over completely from your old system to a new production system, you can set up your new system to use the same warm start and checkpoint areas as your old system. When you IPL your new system with the warm start option, all of the spool files, including your saved segments, are known to your new system. Be sure that no other users are on the old system.

Note: If you cold start your system, saved segments are saved and known to your system.

The steps below describe the situation where you are currently running the new z/VM release on a test system.



1. Define your new production system using the same warm start area and spool areas you defined in your old production system. Define these areas in the CP_OWNED and SYSTEM_RESIDENCE statements in SYSTEM CONFIG. List all DASD from your old system first, just as it is defined. **Make sure that the**

DASD slot numbers for the spool file volumes are identical between the old production system and the new production system. Then list any additional volumes directly after.

2. Use SPXTAPE to dump all of your spool files to tape from your old production system. This is for backup purposes.
3. On your old production system, purge any saved segments, saved systems, or other spool files that you do not want on your new production system.
4. Use SPXTAPE to dump all of the spool files and system data files from your test system to tape. You have to do this because in the next step you IPL your new production system using the same warm start and checkpoint areas as your old production system, which means that your new segments from the test system will not be available.
5. IPL your new production system using the warm start option. Consider using the NOAUTOLOG option in response to the START prompt to prevent any service machines from coming up with the wrong level of CMS.

   Note: The spool files of users not known to your new system but who had spool files in your old system are now owned by the OPERATOR user ID.
6. Use SPXTAPE to load the spool files and saved segments from your test system (that you dumped to tape in step 4) on to your new production system.
7. To see what saved segments and saved systems your new system has, enter:

   ```
   q nss
   ```

   You may see some saved segments or saved systems with the same name or some that you no longer want or need on your new system.

   Using the spool ID, purge any saved segments or saved systems that are duplicates or that you no longer want or need. Do not use the names of the saved segments or saved systems to purge them. Using the name may cause you to purge a saved segment you meant to keep.
8. Either shutdown and reIPL your new system, or enter the following command to start up all of your system's service machines:

   ```
   xautolog autolog1
   ```

   Attention: Do not IPL your old production system. Because it is defined with the same checkpoint and warm start areas as your new system, it can corrupt your new system's spool files.
9. Consider using the VMFSGMAP command to further map your system's saved segment layout and set up VMSES/E to build saved segments. See "Building Saved Segments Individually" on page 151 for a brief description of VMFSGMAP. For further details on managing saved segments see the *z/VM: Saved Segments Planning and Administration* book.

Using SPXTAPE to Migrate All or Some of Your Spool Files

Another method for migrating your spool files is to use SPXTAPE. You can use this method if you want to migrate all of your spool files or selected spool files. For example, if you want to test out particular saved segments on your new system before bringing it into production, you can migrate only the spool files that contain those segments.

1. If you need to, use QUERY commands on your old system to determine which spool files (reader, printer, punch, saved segments) you want to migrate to your new system.
2. On your old system, use SPXTAPE to dump to tape the spool files you want to migrate to your new system, including saved segments and saved systems.

3. IPL your new system. Make sure you have enough spool space allocated to contain the spool files you intend to load.
4. On your new system, use SPXTAPE to load the spool files you dumped in step 2 on page 150.
5. To see what saved segments and saved systems your new system has, enter:

   ```
   q nss
   ```

   You may see some saved segments or saved systems with the same name or some that you no longer want or need on your new system.

   Using the spool ID, purge any saved segments or saved systems that are duplicates or that you no longer want or need. Do not use the names of the saved segments or saved systems to purge them. Using the name may cause you to purge a saved segment you meant to keep.
6. Consider using the VMFSGMAP command to further map your system's saved segment layout and to set up VMSES/E to build saved segments. See "Building Saved Segments Individually" for a brief description of VMFSGMAP. For further details on managing saved segments see the *z/VM: Saved Segments Planning and Administration* book.

Building Saved Segments Individually

If you prefer, you can rebuild each individual saved segment you need on your new system. In general, to plan and map your new system's saved segment layout, you need to:

- Gather information about the saved segments you need in your system
- Use VMFSGMAP, a segment mapping and planning tool, to help you map your system's saved segments

To plan and set up your saved segment layout in the new system:

1. Identify all of the products or applications in your new system that require saved segments.
2. Collect all of the saved segment definitions (that is, default DEFSEG commands) for each of the products or applications that will use saved segments in your new system.

   For products, this information will most likely be in the installation information for each product. You need to gather this information for your system's own applications as well. The type of information you would need is shown in Table 50.

Table 50. Example of Saved Segment Information

Type of information needed	Your segment information
Product	z/VM
Segment Name	CMSBAM
Segment Type	Physical
Space Name	DOSBAM
Default Location	B10-B3F
Size (Pages)	30 hex pages (48 decimal)
Run Above 16MB?	No
Build Tool	VMFBLD

Depending on how you plan to migrate to your new system, you may gather this information in two ways:

- Gradually, as you install or move each product or application
- During your migration planning prior to installing any products

Although it may require more time to plan for your migration, you should consider mapping your entire saved segment layout at once. Otherwise, as you gradually install additional products, you may have to remap and rebuild saved segments on your system.

As you gather saved segment information for your system's products and applications, you may need to take note of additional information about each saved segment that you plan to use in your new system:

- Whether the saved segment is a CMS logical segment or a CP physical segment
- Whether the saved segment can reside above the 16MB line
- What execs or commands are used to build and save the segment

Note: There are two situations when you may not need to gather the additional information:

- Depending on how your new system and associated products were packaged, a number of saved segments may already be defined on your system. If this is true, do not collect the information for these segments manually. Later, when you use VMFSGMAP, you can pull saved segment information for these saved segments directly into the VMFSGMAP segment mapping tool using the SEGMERGE macro. You can input any additional segment information later if necessary.
- Some products may be VMSES/E-installed. In this case, these products may already have their default saved segment definitions identified for VMFSGMAP; so you do not need to collect this information manually. When you refer to each individual product's installation manual, the manual should clearly identify whether the product's saved segments are already defined for VMFSGMAP.

The information you gather will be useful to you later when you build your saved segments using VMFBLD. You provide this information to VMSES/E using the VMFSGMAP interface.

3. Use VMFSGMAP to add saved segment definitions or to plan for and out your system's saved segment layout.

   With VMFSGMAP, you provide specific information about each saved segment in your system:

   - Where it should reside in storage (the DEFSEG statement)
   - The name of the saved segment and segment space name if it applies
   - Whether it can reside above the 16MB line
   - Whether CMS logical segments reside in the saved segment
   - What disks must be accessed for the saved segment to be properly built
   - Instructions for how to build and save the saved segment

   Note: Some packaged systems and any products that are VMSES/E enabled already have this information, as well as any other applicable information, identified for you. In general, for these saved segments you update only information about the placement of a saved segment or of a segment space in which the saved segment resides.

   Using VMFSGMAP, you can map and manipulate your system's saved segment layout without affecting your running system. How to invoke VMFSGMAP, use

its panel interface, and map out and manipulate saved segment layouts is fully described in the *z/VM: Saved Segments Planning and Administration* book.

When manipulating your system's saved segment layout:

- Remember that CMS uses storage locations from 15MB to 20MB. Be sure not to place any saved segments in that area.
- Make sure that you adequately plan for saved segments that must be run below the 16MB line.
- Be careful not to overlay saved segments that require one another.

4. Build and save the saved segments you need on your system.

   Saved segments that have been completely defined to VMSES/E with the VMFSGMAP interface can be built using VMFBLD, regardless of whether the saved segment belongs to a product that is completely serviced with VMSES/E. And, for any products or applications that are serviced with VMSES/E, you will be notified whenever service to that product or application requires that a saved segment must be rebuilt. For products or applications that are not VMSES/E-enabled, you can manually provide the necessary information and use VMFBLD to build the saved segment.

   For example, to build the CMSPIPES saved segment, you would enter:

   ```
   vmfbld ppf segbld esasegs segblist cmspipes ( all
   ```

   For examples of how to use VMFBLD to build saved segments on your system, see the *z/VM: Saved Segments Planning and Administration* book.

Avoiding the Loss of Spool Files and System Data Files During Migration

Changing how you allocate SPOOL space on your new system may cause you to lose spool files, which can include system data files. For example, you may decide to remove a cylinder or extent of SPOOL space during the migration of your system and make it PERM space for a minidisk. When the minidisk owner formats that space, any spool file that was chained through a page that was changed from SPOOL space to PERM space will then be destroyed. To avoid this potential loss of data:

1. Back up your spool files and system data files using SPXTAPE DUMP before reallocating SPOOL space.
2. Reallocate the SPOOL space.
3. Purge your system data files from the old system.
4. Shutdown the old system. **Do NOT use SHUTDOWN REIPL.**
5. IPL the new system with a cold start.
6. Restore the backed up spool files and system data files using SPXTAPE LOAD.

Sharing Data between Your Old System and Your New System

If you plan to migrate users from your old system to the new system in a staged fashion, your production will be split between several systems. One major concern is how you will share data between these systems.

z/VM allows you to share information on a DASD volume in the following ways:

- Among multiple virtual machines using virtual reserve/release.
- Among one virtual machine and operating systems running on other processors using real reserve/release.

- Among multiple virtual machines and operating systems running on other processors using concurrent virtual and real reserve/release. The virtual machines and operating systems must support reserve/release CCWs.

The following sections include examples of using virtual reserve/release and concurrent virtual and real reserve/release. For a complete discussion, refer to the information about DASD sharing in the *z/VM: CP Planning and Administration* book.

Reserve/Release Considerations for VSE

z/VM supports virtual reserve/release for minidisks that are not a full pack. Therefore, the cross-system communication (also called the "lock file") volume does not have to be defined as a full pack.

MDISK statements for all DASD you want to mount to VSE as shared (in other words, you want to use the S operand of the IPL ADD statement) must include the V suffix on the link mode. That is, the link mode must be MWV. If this is not done, VSE issues MSG0I23I for the minidisks that do not have link mode MWV on their MDISK statements.

Specifying MWV does not result in any additional overhead because z/VM does not do a reserve/release to any pack unless the guest asks it to. VSE only does a reserve/release to the cross-system communication file (the "lock file") after IPL.

Note that if the cross-system communication file (the "lock file") is shared by more than one CPU, SHARED must be YES on the RDEVICE statement in the system configuration file. Also, for sharing a volume concurrently between real and virtual machines, the volume must be defined as a full-pack minidisk.

Note: z/VM supports virtual reserve/release for the virtual disks in storage function. Virtual disks in storage are temporary FBA minidisks simulated in system storage rather than mapped to real DASD. Therefore, a virtual disk in storage may be faster than other minidisks because it avoids the overhead of I/O operations. VSE guests may benefit from this function by using a virtual disk in storage instead of a permanent minidisk to store label information areas and the cross-system communication file (the "lock file"). The virtual disk in storage function may be used by a guest running any supported version or release of VSE.

What to Do if Reserve/Release Cannot Be Used

In some instances, you will not benefit from or will not be able to share DASD through reserve/release. For instance, if:

- You need to share data among multiple virtual machines on multiple systems and the operating systems running in the virtual machines do not support reserve/release CCWs. CMS is an example of a virtual machine that does not support this type of sharing.
- Your system is constrained and you cannot afford the performance degradation that results from shared DASD (particularly concurrent virtual and real reserve/release).
- You need to share databases (such as SQL/DS™ or DB2® Server for VM) between several groups of users and not all of the users can be moved to the new system.
- There are incompatibilities that prevent your old system and new system from accessing the same data.

In these cases, you might:

- Replicate the data.
- Maintain the data on only one system and give two user IDs to users who need to access the data.
- Physically attach the DASDs you want to share to the second system and allow write access from only one system. If you have RACF, you can use it to find out who has access and to limit the write access from one system. You should be aware, however, that this method of sharing is not protected by z/VM; you must set up the controls yourself.
- Use the cross system extensions (CSE) support in z/VM. See “Sharing Data among CMS Users on Multiple Systems” on page 159 for details.

Sharing Data among Multilevel Virtual Machines

If you want to share data among virtual machines running on the new system that support reserve/release CCWs, and you do not need to share this data with operating systems running on other processors, use virtual reserve/release. “Using Virtual Reserve/Release” explains how to do this. A virtual machine in which MVS is running is an example of a virtual machine that supports reserve/release CCWs.

If you want to share data among virtual machines running on the new system, and the virtual machines do not support reserve/release CCWs, you cannot use virtual reserve/release. A virtual machine in which CMS is running is an example of a virtual machine that does *not* support reserve/release CCWs. “Without Using Virtual Reserve/Release” on page 157 shows you how to share data between virtual machines that do not support virtual reserve/release.

Using Virtual Reserve/Release

If you want to share data among virtual machines running on the new system that support reserve/release CCWs, and you do not need to share this data with operating systems running on other processors, use virtual reserve/release.

Virtual reserve/release works the same way on the new system as it does on your old system. Figure 1 on page 156 depicts virtual machines containing MVS that are sharing DASD through virtual reserve/release.

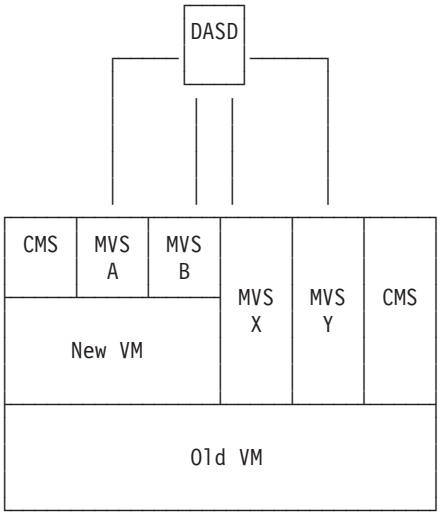


Figure 1. Sharing DASD Using Virtual Reserve/Release

To set up virtual reserve/release, it has to look like concurrent virtual and real reserve/release to the guest, which in the scenario depicted in Figure 1 is your new system.

Do the following on the new (guest) system:

1. Define the DASD as a minidisk for one of the virtual machines, perhaps MVS A, in the new system directory. Specify MWV as the access mode on the MDISK statement. To the second level guest, which is your new z/VM system, this minidisk must be viewed as a full-pack minidisk.
2. Use the SHARED YES operand on the RDEVICE statement in your SYSTEM CONFIG file on the new system guest for this minidisk. For example:

   ```
   Rdevice 0cc0 Type Dasd Shared yes
   ```

   Or use the SET SHARED command on the new system guest for this minidisk. For example:

   ```
   set shared on for 0cc0
   ```
3. Code the LINK statement for the remaining virtual machine, MVS B, in the new system directory. Specify MW as the access mode.

Do the following on the old (first-level) system:

1. Define the DASD where the minidisk resides.
2. Code the MDISK statement in your new system's directory entry in the old system's directory. You must append a V to the primary access mode (read, write, multiple write, and so on) indicating that this minidisk can be shared between virtual machines. For example:

   ```
   MDISK 197 3390 000 400 WORKPK MWV ORANGE
   ```
3. Code the LINK statement in the directory entries for MVS X and MVS Y. For example:

   ```
   LINK NEWESA 197 197 MW
   ```
4. Specify that the DASD will not be shared with another operating system. The default setting of the SHARED option of the RDEVICE macro (SHARED=NO) takes care of this for you.

Now, virtual machines running on your new system (the second-level system) may have write access to the same information as virtual machines running on your old system (the first level system).

Without Using Virtual Reserve/Release

If you want to share data among virtual machines running on the new system, and the virtual machines do not support reserve/release CCWs, such as CMS, you cannot use virtual reserve/release. You define the DASD as a minidisk, giving read/write access to only one of the CMS users running on the new system guest; the others can have only read access. This is shown in Figure 2.

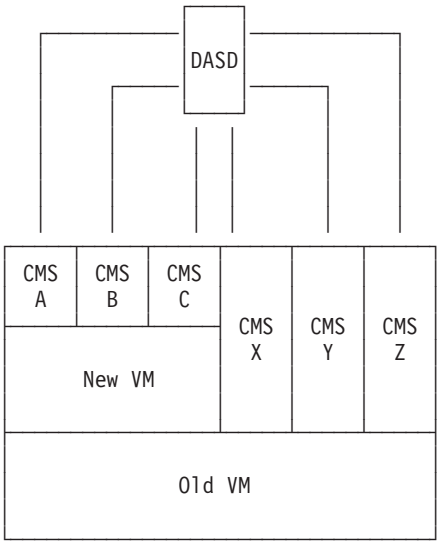


Figure 2. Sharing DASD without Using Virtual Reserve/Release

Do the following on the new (guest) system:

1. Define the DASD as a minidisk for one of the virtual machines, perhaps CMS A, in the new system directory. Specify MW as the access mode on the MDISK statement.
2. Code the LINK statement for the remaining virtual machines, CMS B and CMS C, in the new system directory. Specify RR as the access mode.

Do the following on the old (first-level) system:

1. Define the DASD where the minidisk resides.
2. Code the MDISK statement in your new system's directory entry in the old system's directory. Do not append a V to the primary access mode. For example:

   ```
   MDISK 197 3390 000 400 WORKPK MW ORANGE
   ```

3. Code the LINK statement in the directory entries for CMS X, CMS Y, and CMS Z. For example:

   ```
   LINK NEWESA 197 197 MW
   ```

4. Specify that the DASD will not be shared with another operating system. The default setting of the SHARED option of the RDEVICE macro (SHARED=NO) takes care of this for you.

Now, virtual machines running in the new system may have read access to the same information as virtual machines running on the old system.

Sharing Data among Virtual Machines and Other Systems

To share data among multiple virtual machines running on the new system and on other (older) systems, use concurrent virtual and real reserve/release support. You can do this, however, only if the virtual machines that are sharing the data support reserve/release CCWs. In the example shown in Figure 3, the virtual machines containing MVS on the new system can share DASD in this manner with the virtual machine containing MVS on the old system. The virtual machines containing CMS cannot share DASD because CMS does not support reserve/release CCWs. You have to replicate the data for the CMS users or physically attach the DASD and give write access to only one system.

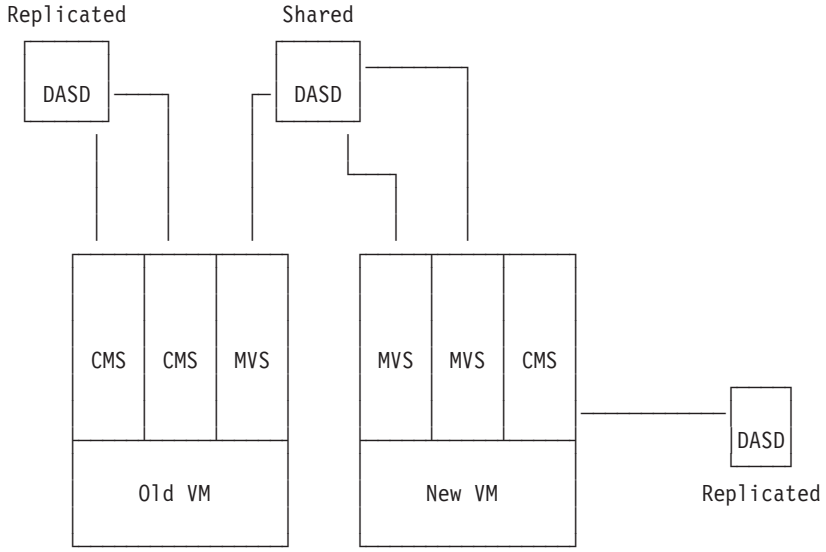


Figure 3. Sharing DASD between Virtual Machines on Multiple Systems

Concurrent virtual and real reserve/release support can be invoked either during system generation or at any time while the system is running.

Do the following to invoke concurrent virtual and real reserve/release while generating the system:

1. Ensure that the operating system running as a guest on the new system and the operating system with which you are sharing the DASD both support reserve/release CCWs.
2. Define the DASD as a shareable full-pack minidisk. To do this, use the MDISK statement in the user directory.

   To define the DASD as a full-pack minidisk, the starting cylinder or block number must be zero and the number of cylinders or blocks must equal or exceed the number of cylinders or blocks on the real device. To define the DASD as virtually shareable, include the V in the mode definition. For example:

   ```
   MDISK 327 3380 000 885 MVS003 MWV
   ```

   or

   ```
   MDISK 328 9336 0000 END MVS003 MWV
   ```
3. Define the DASD as being shareable between multiple real and virtual systems by specifying the SHARED YES option on an RDEVICE statement in SYSTEM CONFIG. For example:

   ```
   Rdevice 0327 Type Dasd Shared yes
   ```

Note: Unless SHARED YES is specified, CP assumes that the device is not shared.

Sharing Data among CMS Users on Multiple Systems

You can use cross system extensions (CSE) to share access to minidisks among CMS users on different systems as if they were on the same system. Refer to *z/VM: CP Planning and Administration* for detailed information about CSE.

Preparing for Cross-System Link

Activation of cross-system link requires that the volumes be defined in the CP_OWNED or USER_VOLUME_LIST statements in the SYSTEM CONFIG file and switched online to all systems. Also, several other system configuration statements need to be added to the SYSTEM CONFIG file:

- XLINK_SYSTEM_EXCLUDE—to specify systems that CP is to exclude from the cross-system link.
- XLINK_SYSTEM_INCLUDE—to specify systems that CP is to include in the cross-system link.
- XLINK_VOLUME_EXCLUDE—to define DASD volumes that are to be excluded from the cross-system link operation.
- XLINK_VOLUME_INCLUDE—to define the DASD volumes to be included in the cross-system link operation.

The statements are described in *z/VM: CP Planning and Administration*.

Preparing for Cross-System Spool

Activation of cross-system spool requires that the spooling volumes be defined to the control programs by the CP_OWNED statement in the SYSTEM CONFIG files of all CSE systems in the complex. The spooling volumes must be switched online to those systems. Additional configuration statements may be needed, as follows:

- XSPOOL_SYSTEM—to specify the systems that are to participate in cross-system commands and spooling operations.
- XSPOOL_TRACE—to define the number of pages of storage that CP should allocate for the cross-system spool (XSPOOL) trace tables.
- XSPOOL_XLIST_INPUT—to specify virtual machines whose input spool files will not participate in cross-system spooling and cross-system message and query commands.
- XSPOOL_XLIST_OUTPUT—to specify virtual machines whose output spool files will not participate in cross-system spooling and cross-system message and query commands.

Finally, all spooling volumes must be CP-formatted for the new system. Once these conditions are met, cross-system spooling is activated by an explicit operator command and can be started on one system at a time until the entire complex is operating with shared spool.

Any system not starting cross-system spool will continue to operate in the normal way without shared spool. However, once a complex has become operational, systems cannot be removed and then added again without consideration for the spool files that belong to different users and are now spread throughout the complex. These files are now owned by different systems and must be collected and redistributed if CSE operation is discontinued.

Migrating Your User Directory

This section helps you migrate your old user directory to the new system. Do not migrate the directory until you finish installing the new system.

Object Directory Compatibility

Object directory compatibility is supported when the object directory created with the DIRECTXA MODULE on the new system is used by **other currently supported releases of CP**. This support lets you use a single source directory in a mixed Cross System Extensions (CSE) environment, or when migrating to the new release of CP.

A copy of the new DIRECTXA MODULE should exist on each system that will share a single source directory and depend on object directory compatibility. A new copy of the DIRECTXA MODULE should be distributed to each of the systems whenever service is applied to the HCPDIR ASSEMBLE file on the new system, which is used to create the DIRECTXA MODULE.

Getting Around Directory Differences

If you want to use the same source directory for your old and new systems:

- **Migrating from an Unsupported Release:** Avoid using any directory statements or options that were introduced after your current release. MIXED directory APARs do not exist for any subsequent releases. To include statements or options that were introduced after your release, you must maintain two source directories. The statements and options that are unsupported by your old system should be included only in the source directory for the new system.
- **Migrating from a Supported Release:** You can do either of the following:
  - Use the DIRECTXA MODULE on the new system to create the object directory for both systems, as described above.
  - Avoid using any directory statements or options that were introduced after your release. MIXED directory APARs do not exist for any subsequent releases.

User Directory Control Statement Changes

For a list of control statement changes, refer to the control statements compatibility table (if any) for each of the releases since your old release.

Default Volume Label Changes

The default volume labels have changed from your old release to the new release. The new prefix is 510. For example, the label for the system residence volume is 510RES.

Preparing to Migrate Your User Directory

If you have a problem IPLing the new system, it may be because of changes you have made to the directory. If you suspect this, you can use the NODIRECT option when you bring up the new system. This brings up the system without accessing the user directory.

Before you can use NODIRECT, you need to know information about the source directory's minidisk, the CMS system disk, and the system residence volume. Enter this information now in Table 51 on page 161 to help you remember it. It may be too late to get this information if you wait until you have directory problems. The first

three entries in Table 51 are examples. Refer to *z/VM: CP Planning and Administration* for more information on loading z/VM V5R1. Refer to the *z/VM: Guide for Automated Installation and Service* for information on the IBM default location and sizes of minidisks.

Table 51. Information Needed To Use NODIRECT Option

	Minidisk or Volume Address	**Volume Identifier**	**Starting Cylinder or Block**	**Number of Cylinders or Blocks Allocated**
Minidisk containing source directory **(example)**	2CC	510RES	296	5
CMS system disk **(example)**	190	510RES	189	107
System residence volume **(example)**	123	510RES	0	END
Minidisk containing source directory				
CMS system disk				
System residence volume				

Using Two Source Directories

During your migration, you may choose to maintain either two source directories or one. If you use two directories, one on the old system and one on the new, you need to be very careful that any changes are reflected in both directories, if needed. Using two directories allows you to exploit the new functions of z/VM V5R1 without worrying about backing out.

Considerations for Using a Directory Maintenance Program

If you have already installed a directory maintenance program on your z/VM V5R1 system, or if you are using only one directory, you may have to issue additional commands while migrating the source directory.

Example Using the IBM Directory Maintence Facility (DirMaint)

For example, several additional steps are needed if DirMaint is used:

1. Before changing the source directory, enter DIRM DISABLE. This ensures that DirMaint does not try to update the directory while you are converting it.
2. Enter DIRM USER BACKUP. This creates a CMS flat file of the current source directory named USER BACKUP and found on DirMaint's 1DB minidisk (G-disk).
3. Update USER BACKUP with the new directory statements.
4. After updating, copy USER BACKUP to DirMaint's 1DF minidisk (E-disk) and rename it to USER INPUT.
5. Erase any USER DIRECT E file and start DirMaint by autologging it or by running DVHBEGIN or DIRM RLDDATA.
6. Enter DIRM ENABLE to allow DirMaint to resume making updates.

For complete information on how to make manual changes to the source directory when DirMaint is installed and running, see:

- *z/VM: Directory Maintenance Facility Tailoring and Administration Guide*
- *z/VM: Directory Maintenance Facility Commands Reference*
- *IBM Directory Maintenance Facility Program Directory*

Steps for Migrating Your Source User Directory

Whether you use two directories or one during migration, you can migrate your source directory by merging information from the old directory into the new directory. The old directory is left unchanged and can be either discarded or used on the old system. To do this:

1. Make a copy of the source user directory on the old system with a different file name. Move the copy to the new system.
2. Edit the z/VM V5R1 directory and merge pieces from the old directory into it as the old directory entries are migrated. To migrate the old directory entries:
   a. Migrate each system user ID.

      IBM supplies a sample directory with the z/VM product. In this directory, there are several system user IDs defined. For each system user ID that you used in your old system, verify that your directory entries are applicable in z/VM V5R1:

      - If applicable, make the needed changes in the new directory's entry.
      - If not applicable, leave the new directory's entry as is.

   b. For all other user IDs:

      Note: This step may be staged or done in groups as you move the users to the new system.

      1) Increase storage sizes as needed. The minimum storage size for a shared copy of CMS is 256KB. At least 20MB is needed to IPL a nonshared copy of CMS, for example to IPL the 190 minidisk.
      2) Verify that AUTOONLY, NOLOG, NOPASS, or LBYONLY is not specified in the password field of the USER statement unless the user is to take advantage of the function the operand provides.
      3) Specify the type of virtual machine you want your user IDs to have. You can specify an XA, ESA, or XC virtual machine.

         Note: 370 virtual machines are no longer supported.
      4) Look for usage of incompatible directory control statements. See the user directory control statement compatibility tables in this book for the list of incompatible statements. Note any defaults that changed since your old release.
      5) Resolve any incompatibilities by:
         - Removing directory control statements that are no longer supported.
         - Changing directory control statements with changed parameters.
         - Optionally, exploiting new directory control statements and parameters.
      6) Move all migrated user IDs to the new directory.
3. Check the syntax of your new directory using the DIRECTXA command with the EDIT option. For example:

   ```
   directxa user direct (edit
   ```
4. Fix any problems.
5. Put the new directory on-line using the DIRECTXA command, for example,

   ```
   directxa user direct
   ```

If You Cannot IPL Because of a Problem with the User Directory

If you have a problem IPLing z/VM V5R1, you can try using the NODIRECT option. Because z/VM V5R1 does not support a stand-alone directory function, you must

use the following steps to recover when you cannot IPL because of a problem with the user directory. The information recorded in Table 51 on page 161 is used in this procedure.

1. IPL and bring up the system using the NODIRECT option. This logs on the primary system operator.
2. Use the DEFINE MDISK command to obtain access to the minidisks containing the directory source file, the CMS system disk, and the CP system residence volume. You recorded the minidisks addresses, starting values, and sizes in Table 51 on page 161.

   For example, using the sample information in Table 51 on page 161:

   ```
   define mdisk as 2cc 296 5 510RES
   define mdisk as 190 189 107 510RES
   define mdisk as 123 0 END 510RES
   ```
3. IPL 190
4. Enter the ACCESS command to access the minidisk that contains the source directory.
5. Fix the problem with the directory.
6. Put the corrected directory on-line using the DIRECTXA command. For example:

   ```
   directxa user direct
   ```
7. Shutdown and re-IPL the system without using the NODIRECT option.

Refer to *z/VM: System Operation* for a complete step-by-step procedure for recovering the user directory after a problem during IPL.

Migrating Your SFS File Pool Servers

You will probably want to have the *z/VM: CMS File Pool Planning, Administration, and Operation* book available as you do this task.

Using Two System Images

For this type of migration, you have both the old system and the new system running at the same time. The new system can be installed on a separate physical processor, in a logical partition, or as a second level system on your old system.

You can do the migration in two ways:

- Move the entire user population for your SFS file pool servers all at once.
- Stage the move by grouping your users, for example, by department, by project, or whatever is appropriate.

Staging the move may be time consuming. Also, if you are not careful, aliases and authorizations may be lost in the move.

You can automate the move somewhat by using the SFSTRANS EXEC, which is documented in the *z/VM: CMS File Pool Planning, Administration, and Operation* book, as a model. Note that SFSTRANS assumes that you have access to both the old and the new servers.

Procedure

1. Use FILEPOOL BACKUP for each storage group to back up all the data on the old release.

For assistance, refer to the section on backing up the user data in the *z/VM: CMS File Pool Planning, Administration, and Operation* book. This backup can be used on your new server. It can also be used if you need to back out to your old release.

Notes:

a. **[2.1.0]** Control data backup files created on your new system are not supported on the old system.

2. Shut down the SFS file pool servers on your old system.

   Enter the STOP operator command. Do not use STOP IMMEDIATE. For example, from the server machine console, enter:

   ```
   stop
   ```

   Or, from a secondary user console, such as MAINT, enter:

   ```
   #cp send vmserv3 stop
   #cp send vmserv4 stop
   ```

3. Install the new level of z/VM.

4. Set up a file pool server machine on the new system.

   If you are moving everyone at once:

   If you can, move the entire DASD pack that contains the SFS minidisks to the new system. Use the same minidisk locations and addresses defined in the directory entry for the server on the old system. If needed, update the directory entry as described in “Directory Entry Considerations and Changes” on page 166.

   If you cannot move the entire DASD pack to the new processor, configure your directory entry for the new server so that it has identical minidisk addresses and sizes as the server on the old system. If you are moving the minidisks to a DASD of a different type, it may be impossible for the sizes to be exactly the same. In that case, make them slightly larger. Then, use the DFSMS COPY command or the DDR command to move the contents of the old server's minidisks onto the new server's minidisks. See the *z/VM: CMS File Pool Planning, Administration, and Operation* book for more information about how to prepare for and use DFSMS COPY.

   If you are staging the move by groups:

   Make sure the new file pool server machine has enough physical DASD space to hold the group of users that you want to move. See the section on generating a file pool and server in the *z/VM: CMS File Pool Planning, Administration, and Operation* book for details on how to do this.

5. **If you are staging the move by groups:**

   Move the users in the group that you want to move to the new file pool. Consider modifying the SFSTRANS EXEC, which is shown in the *z/VM: CMS File Pool Planning, Administration, and Operation* book, to automate this procedure for you. To move users to the new file pool, do the following:

   a. Enroll the users in the new file pool. Make sure the users have enough file blocks to contain their data.

   b. Re-create each user's directory structure in the new file pool.

   c. Copy or move the users' files from the old file pool to the new file pool.

   d. Remove the users' space from the old file pool.

      If you can, use the DELETE USER command to delete a user from the old file pool. However, if a user needs to write to others' files in the old file pool, you can:

- Delete the user from the old file pool, then immediately re-enroll the user, or
- Erase the copied or moved files, and reduce the user's space to 0 using the MODIFY USER command.

Notes:

1) If you specify the KEEPAUTH option on the DELETE USER command, authorizations that were granted to that user ID are not deleted.
2) Aliases that others have for the moved files are lost, and aliases that the moved user has in the old file pool are lost. If the users still need to share files, they have to access each others' directories. Aliases cannot refer to base files in other file pools.

6. Log on to the file pool server machine. Make sure it uses the new CMS code, which is typically:
   - CMS code: In the CMS segment or on the 190 minidisk, and
   - SFS code: On the 193 minidisk or in the CMSFILES segment.
7. IPL the new CMS.
8. Check the USERS startup parameter in the DMSPARMS file for your server and the MAXCONN value in the server's directory entry against the suggested values found in the *z/VM: CMS File Pool Planning, Administration, and Operation*. This can help you avoid potential virtual storage problems.
9. If BACKUP is specified in the DMSPARMS file, issue FILESERV BACKUP to back up control data. You must do this before issuing FILESERV START or you will get message DMS3440E, and FILESERV START will not continue.

   ```
   fileserv backup
   ```
10. Start the SFS file pool servers.

    If FILESERV START is not included in the PROFILE EXEC of the file pool server virtual machine, enter it from the operator's console:

    ```
    fileserv start
    ```
11. Immediately back up your server data. Use FILEPOOL BACKUP for each storage group to back up all the data on the old release.

    Note: Control data created on your old release cannot be used on the new release Storage group (user data) backup files created on your old release can be used on the new release.
12. If you encounter problems and need to back out to your old system, see "Converting an SFS File Pool Server Back to Your Old Release" on page 167.

Using the 'Cut and Go' Strategy

The 'cut and go' strategy is to move immediately off the old system and right on to the new one. This approach is recommended only if your system is a guest system or is small or very straightforward.

Procedure

1. Use FILEPOOL BACKUP for each storage group to back up all the data on the old release.

   For assistance, refer to the section on backing up the user data in the *z/VM: CMS File Pool Planning, Administration, and Operation* book. This backup can be used on your new server. It can also be used if you need to back out to your old release.

Note: Control data created on your old release cannot be used on the new release. Storage group (user data) backup files created on your old release can be used on the new release. Neither control data nor storage group backup files created on your new system are supported on the old system.

2. Review and make note of the start-up parameters, which are in the DMSPARMS file, for each server on your old system.
3. Shut down your old-system SFS file pool servers.

   Enter the STOP operator command. Do not use STOP IMMEDIATE. For example, from the server machine console, enter:

   ```
   stop
   ```

   Or, from a secondary user console, such as MAINT, enter:

   ```
   #cp send vmserv3 stop
   #cp send vmserv4 stop
   ```
4. Install the new level of z/VM.
5. Make sure the server virtual machine has access to the disks where the new CMS code resides, which is typically:
   - CMS code: In the CMS segment or on the 190 minidisk, and
   - SFS code: On the 193 minidisk or the CMSFILES segment.
6. IPL the new CMS.
7. Check the USERS startup parameter in the DMSPARMS file for your server and the MAXCONN value in the server's directory entry against the suggested values found in the *z/VM: CMS File Pool Planning, Administration, and Operation* book. This can help you avoid potential virtual storage problems.
8. If BACKUP is specified in the DMSPARMS file, issue FILESERV BACKUP to back up control data. You must do this before issuing FILESERV START or you will get message DMS3440E, and FILESERV START will not continue.

   ```
   fileserv backup
   ```
9. Start the SFS file pool servers.

   If FILESERV START is not included in the PROFILE EXEC of the file pool server virtual machine, enter it from the operator's console:

   ```
   fileserv start
   ```
10. If you encounter problems and need to back out to your old system, see "Converting an SFS File Pool Server Back to Your Old Release" on page 167.

Directory Entry Considerations and Changes

You may have to modify some of the CP directory entries for your SFS file pool servers. If you have not done so already, make the following changes:

- **USER directory control statement:**
  - Make sure the minimum and maximum virtual storage are at least 32MB.
- **OPTION directory control statement:**
  - Add the NOMDCFS operand to allow the server to use minidisk caching at a rate that is not limited by the Fair Share Limit.

    Note: This is applicable only to SFS file pool servers, not CRR recovery servers.
  - Add the QUICKDSP operand to allow the server to be added to the dispatch list immediately when it has work to do, without waiting in the eligible list.

  - Add the SVMSTAT operand to specify that the virtual machine is a service virtual machine. This causes the server's monitor statistics to be reported separately from end-user virtual machines.
  - Check your MAXCONN value in the server's directory entry against the suggested values found in *z/VM: CMS File Pool Planning, Administration, and Operation*. This can help you avoid potential virtual storage problems.
- **SHARE directory control statement:**
  - Add SHARE REL 1500 to place the server in a more favorable position in the dispatch queue.
- **MACHINE directory control statement:**
  - If not already done, replace 370 with XA or XC.

    SFS file pool servers should use XC to exploit data spaces. CRR recovery servers do not exploit data spaces and therefore should be set to XA.
- **XCONFIG directory control statement:**
  - If you designated XC in the MACHINE directory control statement, then add the following XCONFIG directory control statements:

    ```
    XCONFIG ADDRSPACE MAXNUMBER 100 TOTSIZE 8192G SHARE
    XCONFIG ACCESSLIST ALSIZE 1022
    ```

    These statements have appropriate data space values for an SFS file pool server.
- **MINIOPT directory control statement:**
  - Add MINIOPT NOMDC to inhibit expanded storage caching for the following file pool minidisks:
    - For SFS file pool servers:
      - Control minidisk
      - SFS log minidisks
    - For CRR recovery servers:
      - All file pool minidisks

Converting an SFS File Pool Server Back to Your Old Release

z/VM does not support the conversion of SFS file pools and servers back to a previous release. However, IBM does recognize that special situations exist where such a conversion may be desired. The following procedure is intended to provide some guidance. Please read this entire section before beginning the conversion.

If you do the conversion incorrectly, some of the problems you may encounter include:

- Not being able to start the file pool server in your old system
- Loss of data

Procedure

To avoid file pool server problems, you must perform the following steps, where required, in the order indicated:

1. Shut down the new SFS file pool server.

   Stop file pool server multiple user mode processing by entering the STOP operator command. **Do not use STOP IMMEDIATE.** For example, from the server machine console enter:

   ```
   stop
   ```

   Or, from a secondary user console, such as MAINT, enter:

```
#cp send vmservu stop
```

If your SFS file pool server is also a CRR recovery server, this step ensures that all CRR logging activity completes normally. There are no additional migration considerations if the SFS file pool server is also a CRR recovery server. (Your SFS file pool server is a CRR recovery server if the CRR start-up parameter exists in its *serverid* DMSPARMS file.)

Also, if possible, do not change the LU name value on the LUNAME start-up parameter. See *z/VM: CMS File Pool Planning, Administration, and Operation* for LUNAME start-up parameter considerations.

2. Convert your system back to the old release.
3. On the old system:
   a. If you are using SFS control backup, which means you used the BACKUP start-up parameter, execute the FILESERV BACKUP command to create a new control backup file. For example:

      ```
      fileserv backup
      ```

      Note: Control backup files created by one VM release cannot be processed by a different (earlier or later) release.

   b. Start the old-system SFS file pool server for multiple user mode processing.

      If FILESERV START is not included in the PROFILE EXEC of the file pool server virtual machine, enter it:

      ```
      fileserv start
      ```

Your SFS file pool conversion back to the old release is now complete.

Establishing Connectivity between Your New and Old Systems

Establishing connectivity between your new system and your old system allows you to move data files from the old system to the new system. If you have installed the new system on a separate processor or in another logical partition on the same processor as the old system, you can use real channels to establish connectivity between the two systems. If you have installed the new system as a guest of the old system, you can use virtual channels to establish connectivity between the two systems.

For example, you can set up a virtual channel between the RSCS licensed program installed on the old system and RSCS installed on the new system. A virtual channel for using PVM, VTAM®, TSAF, or AVS could be set up in a similar manner.

To set up RSCS, you make a virtual channel and add the proper definitions in the configuration and control files. RSCS relies on GCS for supervising services. The RSCS virtual machine must be defined as part of the GCS group so that it can share a common storage area for information exchange, multitasking services, and general I/O services.

Figure 4 on page 169 shows the relationship between the old (first-level) and new (second-level) RSCS machines.

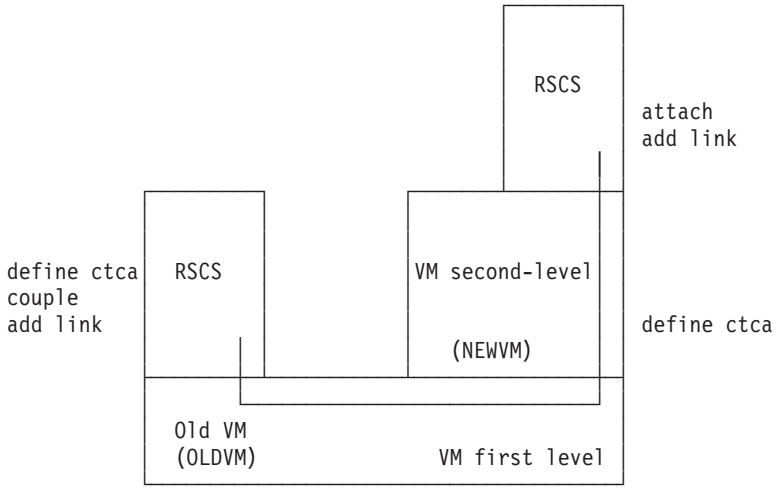


Figure 4. Connectivity between First- and Second-Level RSCS Machines

Procedures

On the First-level System

1. Define a link between the first-level RSCS virtual machine and the user ID that will be running the second-level system.

   In this example, the user ID that will be running the second-level system is NEWVM.

   The virtual address of the channel that is used for the link is 312.

   a. From **both** the first-level RSCS virtual machine and the NEWVM user ID, define the channel using the CP DEFINE command or the SPECIAL user directory control statement.

      For example, using the CP DEFINE command, you can enter:

      ```
      define ctca 312
      ```

      Or, in the user directory entries for NEWVM and the RSCS virtual machine, add the following statement:

      ```
      SPECIAL CTCA 312
      ```

   b. Ensure that the channel you specified using DEFINE CTCA is defined in the second-level system's SYSTEM CONFIG file.

      In our example, we are using 312 as the address of the channel that is used for the link.

2. From either the RSCS machine or the NEWVM user ID, couple the addressed links to enable communications over the virtual channel. For example, from the first-level RSCS virtual machine, you can enter:

   ```
   couple 312 newvmesa 312
   ```

3. Bring up the second-level system, including the second-level RSCS machine.

On the Second-level System

1. From the second-level RSCS virtual machine, attach the channel address defined by NEWVM. For example, enter:

   ```
   attach 312 rscs 312
   ```

How to Back Out of the Migration

You may have to back out of the migration because of either system problems or problems with application programs.

Note: To back out spool files, use the SPXTAPE command.

Backing Out Because of System Problems

How you back out depends on whether you are using separate residence volumes for the old system and the new system or the same residence volume for both.

Using Separate Residence Volumes

If you run into a problem with z/VM V5R1 that forces you to back out, and you have not yet exploited functions specific to z/VM V5R1 or migrated any CMS users, the backout will not affect your end users. However, if you have to back out after migrating some CMS users, you will greatly affect those users. Once users convert their applications to run on the z/VM V5R1 CMS, they may not be able to run these applications on the old CMS. Therefore, you should not migrate users to z/VM V5R1 until you are satisfied with its stability.

Throughout the migration, you should maintain your old system residence volume and CP-owned packs. Then, if you need to back out, you can easily do so.

If you must back out from z/VM V5R1 and IPL an old system, do the following:

1. Dump the spool files with the SPXTAPE DUMP command.
2. Shut down the z/VM V5R1 system.
3. Re-IML the processor to the appropriate mode, if needed.
4. IPL the old system.
5. Load the spool files with the SPXTAPE LOAD command.
6. Enable the terminals.

Using the Same Residence Volume

In preparation for a possible backout:

1. Before going to the new system, use stand-alone DDR to dump the nucleus:

   ```
   ddr dump nuc
   ```

2. When you go to the new system, use the same CP-owned volumes, warmstart area, and checkpoint area. Also, do not overwrite where the old system's nucleus was; keep that space available.

Then, if you have to back out, do the following:

1. Use the SPXTAPE DUMP command to save the spool files, if you want to.
2. IPL the stand-alone DDR program.
3. Use DDR to restore the nucleus to the system residence pack.
4. IPL the system residence pack.
5. Use the SPXTAPE LOAD command to restore any saved spool files.

Backing Out Individual Users Because of Problems with Application Programs

When the system is stable, you can begin to migrate CMS users. To prepare for a possible backout, either dual-path the code or keep copies of the old (pre-migration) versions of your applications.

User Directory Concerns

If a user or group of users has problems running applications on z/VM V5R1 CMS, you will need to backout these users to the old release. To plan for this, keep a user directory entry in an old-level system for each z/VM V5R1 user until you are satisfied that the users are running smoothly. You can use either an old-level guest or a separate old-level system as the backout system. This will be extra work for you but will have the least impact on the end users if they run into problems.

If you are using two source user directories, you must remember to reflect changes made in one user directory to the other user directory.

Installing a Backlevel CMS

Note: If z/VM is installed on an IFL engine, you cannot run a level of CMS prior to CMS Level 17.

IBM provides limited support for multiple levels of CMS on z/VM V5R1. You can continue to use your production CMS with the CP component of z/VM V5R1, and then gradually migrate users and applications to the new CMS. Previous releases of the CMS component will be supported for a limited time following the general availability of z/VM V5R1.

There is no intent to retrofit new function onto old releases of CMS. Attempts to use new function on backlevel releases of CMS are unsupported and the results are undefined. New function is defined as any device support, new CMS, or new CP functions introduced in later releases of the operating system and not retrofitted to the old CMS through the APAR service stream.

IBM will help with problem determination in these mixed environments and will take APARs for problems in older releases of CMS. However, when IBM discontinues service of an old VM release, support for the corresponding CMS under this offering also ends.

Notes:

1. Throughout this discussion, backlevel CMS refers to an older level of CMS, still in service, running on z/VM V5R1 CP.
2. z/VM V5R1 CMS does not support back levels of CP.

Before You Install a Backlevel CMS

While you are still running on your old system, there is certain information you should record that will help when you install your backlevel CMS. Record this information in Table 52 on page 173.

- Record the MDISK statement that defines the 190 minidisk on your old system. This can be used as a reference when defining the minidisk to hold the backlevel CMS on z/VM V5R1.
- Record the number of cylinders needed for your old 190 disk. You can get this information from the MDISK statement that defines your old 190 disk, or you can enter:

  ```
  q virtual 190
  ```

- Determine the type of DASD your old CMS will reside on when you install it on your z/VM V5R1 system. While installing a backlevel CMS, you will have to copy the contents of your 190 minidisk from the old system to your z/VM V5R1 system.

  - If you use the same type of DASD to hold the backlevel CMS on your z/VM V5R1 system as you used on your old system, you can use DDR to copy the files over. This is the preferred method.
  - If the DASD type is not the same, you can use the VMFPLC2 command. This method is not as easy as using DDR because you have to rebuild the CMS nucleus.

  Record the type of DASD you will use and how you will copy files over to z/VM V5R1.

- If you are using the VMFPLC2 command to copy files, you have to format the z/VM V5R1 minidisk that holds the backlevel CMS using the FORMAT command with the RECOMP option. The RECOMP option changes the number of cylinders on a disk that are available to you. By using the RECOMP option on the FORMAT command you can leave a number of cylinders on the minidisk available for the CMS nucleus. If you do not FORMAT the minidisk with RECOMP, you cannot build the CMS nucleus.

  To figure out how many cylinders to recomp, from your old system enter:

  ```
  query virtual 190
  ```

  An example of what this command returns is:

  ```
  DASD 0190 3380 SYGEMC R/O     135 CYL  ON DASD
  ```

  Now enter:

  ```
  query disk s
  ```

  An example of what this command returns is:

```
LABEL  VDEV M  STAT  CYL TYPE BLKSIZE  FILES  BLKS USED-(%) BLKS LEFT  BLK TOTAL
CMSOLD 190  S   R/O  120 3390 4096       843      17905-83       3695      21600
Ready;
```

  The difference in the number of cylinders displayed by these two commands is the amount of space needed to hold the CMS nucleus. The number of cylinders shown in the QUERY DISK response is the number of cylinders needed to hold the contents for the 190 disk and is also the number of cylinders to recomp. In this example, 120 cylinders are required on a 3390 DASD. By recomping 120 cylinders, fifteen cylinders are available for the CMS nucleus.

  If you are using the VMFPLC2 method because your DASD types are not the same, the number of cylinders you have to recomp may not be exactly the number calculated above. This is because the number of pages per cylinder varies from DASD type to DASD type. To make sure you are recomping a sufficient number of cylinders:

  1. Figure out how many pages per cylinder there are for each DASD type you are using. You can find this information in the DASD storage capacity tables in the *z/VM: CP Planning and Administration* book. For example, a 3380-E has 150 pages per cylinder and a 3390-1 has 180 pages per cylinder.
  2. Multiply the number of cylinders needed to hold the contents of your old 190 disk (120 in this example) by the pages per cylinder for each DASD.

     For 3380 model E:
     120 * 150 = 18000 pages

     For 3390-1: 120 * 180 = 21600 pages

     This shows you that you need 18000 pages of storage for the contents of the old 190 disk. If you recomp 120 cylinders of 3390-1 DASD, this gives you 21600 pages of storage. Therefore, 120 cylinders is a sufficient number of cylinders to recomp.

3. Multiply the number of cylinders needed to hold the CMS nucleus (fifteen in the previous example) by the pages per cylinder for each DASD. For example,

   For 3380 model E:
   15 * 150 = 2250 pages

   For 3390-1: 15 * 180 = 2700 pages

   If you reserve fifteen cylinders on a 3390-1 DASD, it is plenty of space to hold the CMS nucleus that you stored in fifteen cylinders on a 3380 model E.

If you calculated the number of cylinders to recomp on a 3390-1 DASD to be 120 cylinders, you would have to recomp 144 cylinders on a 3380-E DASD to store the same amount of data. This is because there are fewer pages per cylinders on a 3380-E.

Record the number of cylinders you need to recomp in Table 52.

Table 52. Information Needed Before Installing a Backlevel CMS

What	Example Information	Your Information
MDISK statement for old VM system 190 disk	MDISK 190 3380 125 135 CMSRES RR ALL	
Number of cylinders for old VM system 190 disk	135	
DASD type for old VM system CMS	3380	
DASD type for backlevel CMS on new system	3390	
Method you will use to copy files (DDR or VMFPLC2)	VMFPLC2	
If using VMFPLC2, number of cylinders to recomp	120	

Steps for Installing a Backlevel CMS

When you are done installing the old CMS, the environment will look like this:

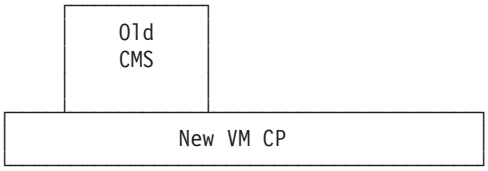


Figure 5. Backlevel CMS Running on a z/VM V5R1 CP

The steps for installing the old CMS on the z/VM V5R1 CP are as follows:

1. Log on to your z/VM V5R1 MAINT user ID.
2. Create a minidisk where the backlevel CMS will reside. You can use the MDISK directory control statement from your old system as a reference. You recorded this in Table 52.

   The MDISK directory control statement in your z/VM V5R1 user directory for the backlevel CMS may look like this:

   ```
   MDISK 590 3380 125 135 510RES MR ALL WRITE MULTIPLE
   ```

   - The 590 minidisk eventually becomes the 190 disk for the backlevel CMS. The 590 minidisk can reside on any DASD volume.

- In this example, 135 cylinders are reserved for the 590 disk starting at cylinder 125. You recorded the number of cylinders needed by your old 190 disk in Table 52 on page 173.
  - If you are using the DDR method later in the procedure, you must make your backlevel CMS minidisk on z/VM V5R1 exactly the same size as your old CMS 190 minidisk.
  - If you are using the VMFPLC2 method, the backlevel CMS minidisk can be the same size or bigger than your old CMS 190 minidisk.
- Once you know how many cylinders you need for the 590 disk, you have to figure out where to put the minidisk in your z/VM V5R1 configuration. Use the DISKMAP command to find out where to put the backlevel CMS minidisk. In the previous MDISK statement, the starting cylinder is 125. This was obtained by entering:

  ```
  diskmap user direct
  ```

  For more information on DISKMAP, see the *z/VM: CP Commands and Utilities Reference*.

  The output file from this command is USER DISKMAP. This file shows you the space you have available. If you cannot find enough contiguous space, you may have to shift other minidisk locations and data around to make room for the backlevel CMS.

  Note: If you move a minidisk location, make sure you also move the data on that minidisk. If you decide to shift locations of minidisks used for the Shared File System, there may be additional considerations. See the *z/VM: CMS File Pool Planning, Administration, and Operation* book for details on replacing the SFS and CRR file pool minidisks.

3. Put the directory with the new statement online by issuing:

   ```
   directxa user direct
   ```

4. Make sure your MAINT user ID is running an XA virtual machine. To check the virtual machine mode, you can use the QUERY SET command. You can use the SET MACHINE XA command or the MACHINE directory control statement to set MAINT's virtual machine to XA.
5. Link the minidisk where the backlevel CMS will reside by entering:

   ```
   link maint 590 590 MR
   ```

6. Format the 590 disk and access it using an unused file mode by entering:

   ```
   format 590 k
   DMSFOR603R Format will erase all files on disk k(590).
   Do you wish to continue? Enter 1 (YES) or 0 (NO).
   1
   DMSFOR605R Enter disk label:
   CMSOLD
   ```

Note to VMFPLC2 Users

If you plan to use the VMFPLC2 method to copy files to z/VM V5R1, skip to step 10 on page 175.

If you are using the DDR method, continue with step 7.

7. Copy the contents of your old 190 minidisk to the backlevel CMS minidisk on z/VM V5R1 590. The following steps show how to DDR the old 190 contents to the z/VM V5R1 590 minidisk.
   a. Log on to your old-system MAINT user ID.

b. Determine the location and size of the old 190 minidisk:

```
query mdisk 190 location
```

The response from this command would be something like this:

```
TargetID  Tdev  OwnerID   Odev  Dtype Vol-ID  Rdev     StartLoc      Size
MAINT     0190  MAINT     0190  3390  410SYS  E202        1937       130
```

c. Log on to your z/VM V5R1 MAINT user ID.

d. Define the 190 location as a minidisk on the new system. For example:

```
define mdisk f190 1937 130 410sys
```

e. Dump the old-system files:

```
ddr
sysprint cons
input f190 3390
output 590 3390
copy all
```

Now you have the old VM system 190 CMS files on your z/VM V5R1 590 minidisk.

8. Define the 190 minidisk that contains z/VM V5R1 CMS with another address; for example:

```
define 190 as 90
```

9. Define the 590 minidisk with the old-system CMS on it as your 190; for example:

```
def 590 190
```

Note to DDR Users

DDR users can now skip to step 17 on page 177.

If you are using the VMFPLC2 method, continue with step 10.

10. While you are still on your z/VM V5R1 MAINT user ID, use the FORMAT command with the RECOMP option to change the available cylinders on 590 for disk-resident files. In the previous example, 120 cylinders needed to be recomped. (See Table 52 on page 173.) Remember, this leaves fifteen cylinders for the backlevel CMS nucleus. Use the following FORMAT command:

```
format 590 k 120 (recomp
```

The response from this command would be:

```
LABEL  VDEV M  STAT  CYL TYPE BLKSIZE  FILES  BLKS USED-(%) BLKS LEFT  BLK TOTAL
CMSOLD 590  K   R/W  120 3390 4096       843      17905-83       3695      21600
Ready;
```

11. Copy the contents of the old-system CMS on your 190 minidisk to the backlevel CMS minidisk on your z/VM V5R1 590. The following steps show how to move the old-system 190 contents to the z/VM V5R1 590 minidisk using VMFPLC2.

a. Log on to your old-system MAINT user ID.

b. Create a copy of the CMS nucleus and put it in MAINT's reader by entering:

```
spool punch *
spool printer *
vmfload cmsload dmsvm
```

These commands put the load deck in MAINT's reader.

c. Receive the load deck as a CMS file on your 191 disk. Make sure you record the file name and file type. The example described here uses the file name CMSNUC FILE A.

d. Attach a tape to the MAINT user ID on your old system:

```
attach rdev to maint as 181
```

e. Access the old-system 190 disk as something other than S. If you access it as S, only files with a file mode of S2 are accessible.

```
access 190 v
```

f. Dump the old-system 190 files and the new copy of the CMS nucleus on the A-disk to tape and write two tape marks:

```
vmfplc2 dump * * v
vmfplc2 wtm
vmfplc2 dump cmsnuc file a
vmfplc2 wtm 2
detach 181
```

g. Log on to your z/VM V5R1 MAINT user ID.

h. Attach the tape to the MAINT user ID on your z/VM V5R1 system:

```
attach rdev to maint as 181
```

i. Access the z/VM V5R1 590 disk and load the old-system 190 files off the tape and onto the 590 minidisk:

```
access 590 v
vmfplc2 load * * v
```

Now you have the old-system CMS files on your 590 minidisk.

j. Load the CMSNUC FILE on to your 191 A disk:

```
vmfplc2 load cmsnuc file a
```

k. Detach the tape:

```
detach 181
```

12. Build your backlevel CMS nucleus on your z/VM V5R1 system.

a. Enter the following commands:

```
spool punch *
spool printer *
spool reader hold
```

b. Punch the file containing the CMS load deck, CMSNUC FILE, to the MAINT user ID. Make sure you use the NOHEADER option so a header is not included in the file.

```
punch cmsnuc file a (noh
```

An example of a response from the previous PUNCH command is:

```
RDR FILE 0002 SENT FROM MAINT    PUN WAS 0002 RECS 025K CPY  001 A NOHOLD NOKEEP
```

You need the file number of the CMS nucleus for the next step. The file number in this example is 0002.

c. If the CMS nucleus is not the first file in your reader, order your reader so that the CMS nucleus is the first file processed; for example:

```
order rdr 0002
```

13. Define the 190 minidisk that contains z/VM V5R1 CMS with another address; for example:

```
define 190 as 90
```

14. Define the 590 minidisk with the old-system CMS on it as your 190. For example:

```
def 590 190
```

15. IPL the load deck from MAINT's reader:

    ```
    ipl 00c cl
    ```

16. When you are sure you are done with the CMSNUC FILE, you may want to erase it; it can be rather big. Keep the tape with the old-system 190 files and the CMSNUC FILE for backup.

> **Note to Both DDR and VMFPLC2 Users**
> Use the following steps to put CMS into a named saved system.

17. Determine the DEFSYS command to use to define CMSOLD as a named saved system. You can probably just use your old system's DEFSYS command. You may want to add this DEFSYS command to an exec where you define all the other saved segments and saved systems. The sample DEFNSS EXEC shown in the following section defines various CMS named saved systems.
18. Issue the DEFSYS command or use the sample DEFNSS EXEC to define the CMSOLD named saved system; for example:

    ```
    defnss cmsold
    ```

19. Use the QUERY NSS MAP command to check that CMSOLD exists.
20. IPL the 190 minidisk with CMSOLD on it:

    ```
    ipl 190 parm savesys cmsold
    ```

Defining Various Levels of CMS

Use the following sample DEFNSS EXEC to define different levels of CMS in a named saved system.

```
/**********************************************************************/
/*                                                                    */
/* An EXEC that will define the various levels of CMS                 */
/* NSSs for our new system.                                           */
/*                                                                    */
/* You can pass in the following arguments:                           */
/* o CMSNEW - for the new CMS                                         */
/* o CMSOLD - for the old CMS                                         */
/* o ALL - for both the old CMS and the new CMS                       */
/*                                                                    */
/**********************************************************************/
  Arg parms .
/* Create a list of all NSSs to be defined */
  nssname.1 = 'CMSNEW'
  nssname.2 = 'CMSOLD'
  nssname.0 = 2
  allnss = ''
  Do i = 1 To nssname.0
     allnss = allnss nssname.i
     End

  skip_processing = 'NO'
  Select
/* Define only the new CMS */
     When parms = nssname.1 Then Do
        start = 1
        stop = 1
        End
/* Define only the backlevel CMS */
     When parms = nssname.2 Then Do
        start = 2
        stop = 2
        End
```

```
/* If DEFNSS is called with 'ALL' or blank then */
/* define both the new CMS and the backlevel CMS */
     When parms = 'ALL' | parms = '' Then Do
        start = 1
        stop = 2
        End
/* Set up error message information */
     Otherwise Do
        skip_processing = 'YES'
        badnss = allnss
        errors = 'YES'
        End
     End

  If skip_processing = 'NO' Then Do
/* DEFSYS command to define the new CMS */
     nss.1 = 'CP DEFSYS CMSNEW 0-D EW 20-23 EW F00-13FF SR MINSIZE=256K',
     'MACHMODE XA,XC,ESA PARMREGS=0-15'
/* DEFSYS command to define the backlevel CMS */
     nss.2 = 'CP DEFSYS CMSOLD 0-D EW 20-23 EW F00-12FF SR MINSIZE=256K',
     'MACHMODE XA,XC'

/* Default for no errors detected */
     errors = 'NO'
     badnss = ''

/* Define the NSSs */
     Do i = start To stop
        Address COMMAND nss.i
        If rc <> 0 Then Do
           errors = 'YES'
           badnss = badnss nssname.i
           End
        End
     End

/* If any errors were found, show error messages */
  If errors = 'YES' Then Do
     Say 'The following NSSs were not defined because a definition has'
     Say 'not been set up for the NSS:' badnss
     Say
     Say 'A list of all valid NSS follows:'
     Say '     ' allnss
     End
  Exit
```

Swapping Between the Backlevel CMS and z/VM V5R1 CMS

If you want to be able to switch between the z/VM V5R1 CMS and the backlevel CMS, consider using the following execs that link to the different system disks. You can make these execs available to your users. The users then need to do a SET MACH XA and IPL the corresponding CMS segment (IPL CMSNEW or IPL CMSOLD).

```
/* This exec swaps a backlevel CMS with a */
/* new CMS.                               */

    Address Command
    'EXECIO 0 CP (STRING DETACH 190'
    'CP LINK MAINT  190 190 RR'
```

Figure 6. SWAP2NEW EXEC

The user should then do a SET MACH XA and IPL CMSNEW.

```
/* This exec swaps a new CMS with a        */
/* backlevel CMS.                          */

    Address Command
    'EXECIO 0 CP (STRING DETACH 190'
    'CP LINK MAINT  590 190 RR'
```

Figure 7. SWAP2OLD EXEC

The user should then issue:

```
set mach xa
ipl cmsold
```

Appendix A. CMS Pipelines Message Cross-Reference [2.3.0]

All CMS Pipelines messages have been renamed and renumbered from a DMS prefix to an FPL prefix. All of the FPL message numbers are consistent with those from CMS/TSO Pipelines.

This appendix contains two message cross-references: one from DMS prefix to FPL prefix, the other from FPL prefix to DMS prefix. Many messages also have different text, but those changes are not identified here. See the descriptions of individual FPL messages in *z/VM: System Messages and Codes - CMS and REXX/VM*.

Note: FPL messages not included in these cross-references have no DMS prefix equivalent.

DMS to FPL Message Cross-Reference

The following is a cross-reference from the old DMS message numbers to the corresponding new FPL message numbers:

DMS2571E-FPL337E
DMS2572E-FPL338E
DMS2573E-FPL339E
DMS2574I-FPL340I
DMS2575I-FPL341I
DMS2576I-FPL342I
DMS2577E-FPL343E
DMS2578I-FPL344I
DMS2579E-FPL345E
DMS2580E-FPL346E
DMS2581E-FPL347E
DMS2582I-FPL348I
DMS2583E-FPL1015E
DMS2584E-FPL573E
DMS2585E-FPL575E
DMS2586I-FPL369I
DMS2587E-FPL576E
DMS2588E-FPL611E
DMS2589I-FPL612I
DMS2590E-FPL613E
DMS2591E-FPL614E
DMS2592E-FPL615E
DMS2593E-FPL616E
DMS2594E-FPL617E
DMS2595W-FPL620W
DMS2596E-FPL627E
DMS2597E-FPL635E
DMS2598E-FPL1019E
DMS2599E-FPL371E
DMS2600W-FPL564W
DMS2601E-FPL685E
DMS2602E-FPL639E
DMS2603E-FPL642E
DMS2604E-FPL307E
DMS2605E-FPL651E
DMS2606E-FPL652E
DMS2607E-FPL653E
DMS2608E-FPL654E
DMS2609E-FPL655E
DMS2610E-FPL656E
DMS2611E-FPL657E
DMS2612E-FPL660E
DMS2613E-FPL662E
DMS2614E-FPL664E
DMS2615E-FPL1032E
DMS2616E-FPL1033E
DMS2618E-FPL1036E
DMS2619E-FPL686E
DMS2620E-FPL1038E
DMS2621E-FPL1039E
DMS2622E-FPL1040E
DMS2623E-FPL1041E
DMS2624E-FPL1049E
DMS2625E-FPL680E
DMS2626E-FPL663E
DMS2627E-FPL694E
DMS2628E-FPL1124E
DMS2629E-FPL700E
DMS2630E-FPL701E
DMS2631I-FPL702I
DMS2632I-FPL703I
DMS2633E-FPL704E
DMS2634E-FPL705E
DMS2635E-FPL706E
DMS2636E-FPL707E
DMS2637E-FPL708E
DMS2638E-FPL709E
DMS2639E-FPL710E
DMS2640E-FPL711E
DMS2641E-FPL712E
DMS2642E-FPL713E
DMS2643E-FPL714E
DMS2644E-FPL715E
DMS2645E-FPL716E
DMS2646I-FPL717I
DMS2647I-FPL718I
DMS2648I-FPL719I
DMS2649I-FPL720I
DMS2650E-FPL000E
DMS2651I-FPL001I
DMS2652I-FPL002I
DMS2653I-FPL003I
DMS2654I-FPL004I
DMS2655E-FPL010E
DMS2656E-FPL011E
DMS2657E-FPL012E
DMS2658I-FPL721I
DMS2659E-FPL014E
DMS2660E-FPL015E
DMS2661E-FPL016E
DMS2662E-FPL017E
DMS2663E-FPL018E
DMS2664W-FPL019W
DMS2665I-FPL020I
DMS2666E-FPL021E
DMS2668E-FPL023E
DMS2669W-FPL024W
DMS2670E-FPL1100E
DMS2672E-FPL027E
DMS2673I-FPL028I
DMS2674E-FPL029E
DMS2675I-FPL030I
DMS2676I-FPL031I
DMS2677I-FPL1110I
DMS2678I-FPL033I
DMS2679I-FPL034I
DMS2680I-FPL035I
DMS2681I-FPL036I
DMS2682I-FPL037I
DMS2683I-FPL038I
DMS2684I-FPL039I
DMS2685E-FPL040E
DMS2686E-FPL041E
DMS2687E-FPL042E
DMS2688E-FPL043E
DMS2689E-FPL044E
DMS2690W-FPL045W
DMS2691E-FPL046E
DMS2692E-FPL047E
DMS2693E-FPL048E
DMS2694E-FPL049E
DMS2695E-FPL050E
DMS2696E-FPL051E
DMS2697E-FPL052E
DMS2698E-FPL053E
DMS2699E-FPL054E
DMS2700I-FPL1111I
DMS2701E-FPL056E
DMS2702I-FPL725I
DMS2703E-FPL058E
DMS2704E-FPL059E
DMS2705E-FPL060E
DMS2706E-FPL061E
DMS2707E-FPL062E
DMS2708E-FPL063E
DMS2709E-FPL064E
DMS2710E-FPL065E
DMS2711E-FPL066E
DMS2712E-FPL067E
DMS2713E-FPL068E
DMS2714E-FPL069E
DMS2715E-FPL070E
DMS2716E-FPL071E
DMS2717E-FPL072E
DMS2718E-FPL073E
DMS2719E-FPL074E
DMS2720E-FPL075E
DMS2721I-FPL076I

DMS2722I-FPL077I
DMS2723E-FPL078E
DMS2724E-FPL079E
DMS2725E-FPL080E
DMS2726E-FPL081E
DMS2727E-FPL082E
DMS2728E-FPL083E
DMS2729E-FPL084E
DMS2730E-FPL085E
DMS2731I-FPL086I
DMS2732E-FPL087E
DMS2733E-FPL088E
DMS2734E-FPL089E
DMS2735E-FPL090E
DMS2736E-FPL091E
DMS2737E-FPL092E
DMS2738E-FPL093E
DMS2739E-FPL094E
DMS2740E-FPL095E
DMS2741E-FPL096E
DMS2742E-FPL097E
DMS2743E-FPL098E
DMS2744E-FPL099E
DMS2745E-FPL100E
DMS2746E-FPL101E
DMS2747E-FPL102E
DMS2748E-FPL103E
DMS2749E-FPL104E
DMS2750E-FPL105E
DMS2751E-FPL107E
DMS2752E-FPL108E
DMS2753E-FPL109E
DMS2754E-FPL110E
DMS2755E-FPL111E
DMS2756E-FPL112E
DMS2757E-FPL113E
DMS2758E-FPL114E
DMS2759E-FPL115E
DMS2760E-FPL116E
DMS2761E-FPL117E
DMS2762E-FPL118E
DMS2763E-FPL119E
DMS2764E-FPL120E
DMS2765I-FPL726I
DMS2766E-FPL122E
DMS2767I-FPL727I
DMS2768E-FPL124E
DMS2769E-FPL125E
DMS2770E-FPL126E
DMS2771E-FPL127E
DMS2772E-FPL128E
DMS2773E-FPL129E
DMS2774E-FPL131E
DMS2775E-FPL132E
DMS2776E-FPL133E
DMS2777E-FPL134E
DMS2778I-FPL728I
DMS2779I-FPL729I
DMS2780E-FPL137E
DMS2781E-FPL138E
DMS2782E-FPL139E
DMS2783E-FPL140E
DMS2784E-FPL141E
DMS2785E-FPL142E
DMS2786E-FPL143E
DMS2787E-FPL144E
DMS2788I-FPL145I
DMS2789E-FPL146E
DMS2790E-FPL147E
DMS2791E-FPL148E
DMS2792E-FPL150E
DMS2793E-FPL151E
DMS2794E-FPL152E
DMS2795E-FPL154E
DMS2795E-FPL732E
DMS2796E-FPL155E
DMS2797E-FPL156E
DMS2798E-FPL157E
DMS2799E-FPL159E
DMS2800E-FPL161E
DMS2801E-FPL162E
DMS2802E-FPL163E
DMS2803E-FPL164E
DMS2804E-FPL165E
DMS2805E-FPL166E
DMS2806E-FPL733E
DMS2807E-FPL169E
DMS2808E-FPL170E
DMS2809E-FPL172E
DMS2810E-FPL173E
DMS2811E-FPL174E
DMS2812E-FPL734E
DMS2813E-FPL735E
DMS2814I-FPL177I
DMS2815E-FPL178E
DMS2816E-FPL179E
DMS2817E-FPL180E
DMS2818E-FPL181E
DMS2819W-FPL182W
DMS2820E-FPL183E
DMS2821E-FPL184E
DMS2822E-FPL185E
DMS2823I-FPL186I
DMS2824E-FPL187E
DMS2825I-FPL189I
DMS2826E-FPL190E
DMS2827E-FPL191E
DMS2828I-FPL192I
DMS2829E-FPL193E
DMS2830E-FPL194E
DMS2831E-FPL195E
DMS2832E-FPL196E
DMS2833E-FPL197E
DMS2834E-FPL198E
DMS2835E-FPL209E
DMS2836E-FPL211E
DMS2837E-FPL212E
DMS2838E-FPL214E
DMS2839E-FPL215E
DMS2840E-FPL736E
DMS2841E-FPL219E
DMS2842E-FPL220E
DMS2843E-FPL222E
DMS2844E-FPL223E
DMS2845E-FPL224E
DMS2846E-FPL225E
DMS2847E-FPL226E
DMS2848E-FPL227E
DMS2849E-FPL229E
DMS2850E-FPL230E
DMS2851E-FPL231E
DMS2852E-FPL232E
DMS2853E-FPL233E
DMS2854E-FPL234E
DMS2855E-FPL235E
DMS2856E-FPL236E
DMS2857E-FPL237E
DMS2858E-FPL238E
DMS2859E-FPL241E
DMS2860W-FPL245W
DMS2861E-FPL253E
DMS2862I-FPL256I
DMS2863E-FPL257E
DMS2864E-FPL261E
DMS2865E-FPL264E
DMS2866E-FPL279E
DMS2867E-FPL280E
DMS2868W-FPL281W
DMS2869E-FPL282E
DMS2870W-FPL283W
DMS2871E-FPL284E
DMS2871E-FPL737E
DMS2872E-FPL287E
DMS2873E-FPL738E
DMS2874E-FPL289E
DMS2875E-FPL290E
DMS2876E-FPL291E
DMS2877E-FPL292E
DMS2878I-FPL293I
DMS2879E-FPL297E
DMS2880I-FPL298I
DMS2881E-FPL740E
DMS2882E-FPL301E
DMS2883E-FPL302E
DMS2884E-FPL303E
DMS2885E-FPL304E
DMS2886E-FPL305E
DMS2887E-FPL308E
DMS2888E-FPL309E
DMS2889E-FPL310E
DMS2890E-FPL311E
DMS2891E-FPL313E
DMS2892E-FPL314E
DMS2893E-FPL315E
DMS2894E-FPL317E
DMS2895E-FPL318E
DMS2896E-FPL319E
DMS2898E-FPL333E
DMS2899E-FPL334E
DMS2900E-FPL350E
DMS2901E-FPL352E
DMS2902E-FPL354E
DMS2903I-FPL355I
DMS2904I-FPL356I
DMS2905E-FPL357E
DMS2906E-FPL358E
DMS2907E-FPL359E
DMS2908E-FPL360E
DMS2909I-FPL361I
DMS2910E-FPL362E
DMS2911E-FPL363E
DMS2912E-FPL364E
DMS2913E-FPL365E
DMS2914E-FPL366E
DMS2915E-FPL741E
DMS2916E-FPL368E
DMS2917E-FPL742E
DMS2918E-FPL370E
DMS2919I-FPL743I
DMS2920I-FPL744I
DMS2921E-FPL373E
DMS2922E-FPL380E
DMS2925E-FPL391E
DMS2926E-FPL392E
DMS2927E-FPL393E
DMS2928E-FPL745E
DMS2929E-FPL400E
DMS2930E-FPL401E
DMS2931I-FPL402I
DMS2932E-FPL746E
DMS2933E-FPL747E
DMS2934E-FPL405E
DMS2934E-FPL748E
DMS2935E-FPL406E
DMS2936E-FPL407E
DMS2937I-FPL412I
DMS2938E-FPL409E
DMS2939E-FPL410E
DMS2940I-FPL411I
DMS2941E-FPL420E
DMS2942I-FPL413I
DMS2943E-FPL749E
DMS2944E-FPL750E
DMS2946E-FPL752E
DMS2947E-FPL753E
DMS2948E-FPL780E
DMS2949E-FPL509E
DMS2950E-FPL510E
DMS2951E-FPL511E
DMS2952E-FPL512E
DMS2953E-FPL513E
DMS2954E-FPL514E
DMS2955E-FPL515E
DMS2956E-FPL516E
DMS2957E-FPL517E
DMS2958E-FPL518E
DMS2959E-FPL530E
DMS2960E-FPL531E
DMS2961E-FPL532E
DMS2962E-FPL533E

DMS2963E-FPL534E
DMS2964E-FPL535E
DMS2965E-FPL536E
DMS2966I-FPL537I
DMS2967I-FPL538I
DMS2968E-FPL539E
DMS2969E-FPL540E
DMS2970E-FPL541E
DMS2971E-FPL542E
DMS2972E-FPL543E
DMS2973I-FPL544I
DMS2974E-FPL545E
DMS2975E-FPL546E
DMS2976E-FPL547E
DMS2977I-FPL548I
DMS2979I-FPL1112I
DMS2980I-FPL552I
DMS2981I-FPL1113I
DMS2982E-FPL554E
DMS2983I-FPL555I
DMS2984E-FPL556E
DMS2986I-FPL1114I
DMS2987I-FPL1115I
DMS2988I-FPL560I
DMS2989E-FPL561E
DMS2990E-FPL562E
DMS2991E-FPL306E
DMS2992E-FPL650E
DMS2993E-FPL569E
DMS2994E-FPL571E
DMS2998E-FPL335E
DMS2999E-FPL336E

FPL to DMS Message Cross-Reference

The following is a cross-reference from the new FPL message numbers to the corresponding old DMS message numbers:

FPL000E-DMS2650E
FPL001I-DMS2651I
FPL002I-DMS2652I
FPL003I-DMS2653I
FPL004I-DMS2654I
FPL010E-DMS2655E
FPL011E-DMS2656E
FPL012E-DMS2657E
FPL014E-DMS2659E
FPL015E-DMS2660E
FPL016E-DMS2661E
FPL017E-DMS2662E
FPL018E-DMS2663E
FPL019W-DMS2664W
FPL020I-DMS2665I
FPL021E-DMS2666E
FPL023E-DMS2668E
FPL024W-DMS2669W
FPL027E-DMS2672E
FPL028I-DMS2673I
FPL029E-DMS2674E
FPL030I-DMS2675I
FPL031I-DMS2676I
FPL033I-DMS2678I
FPL034I-DMS2679I
FPL035I-DMS2680I
FPL036I-DMS2681I
FPL037I-DMS2682I
FPL038I-DMS2683I
FPL039I-DMS2684I
FPL040E-DMS2685E
FPL041E-DMS2686E
FPL042E-DMS2687E
FPL043E-DMS2688E
FPL044E-DMS2689E
FPL045W-DMS2690W
FPL046E-DMS2691E
FPL047E-DMS2692E
FPL048E-DMS2693E
FPL049E-DMS2694E
FPL050E-DMS2695E
FPL051E-DMS2696E
FPL052E-DMS2697E
FPL053E-DMS2698E
FPL054E-DMS2699E
FPL056E-DMS2701E
FPL058E-DMS2703E
FPL059E-DMS2704E
FPL060E-DMS2705E
FPL061E-DMS2706E
FPL062E-DMS2707E
FPL063E-DMS2708E
FPL064E-DMS2709E
FPL065E-DMS2710E
FPL066E-DMS2711E
FPL067E-DMS2712E
FPL068E-DMS2713E
FPL069E-DMS2714E
FPL070E-DMS2715E
FPL071E-DMS2716E
FPL072E-DMS2717E
FPL073E-DMS2718E
FPL074E-DMS2719E
FPL075E-DMS2720E
FPL076I-DMS2721I
FPL077I-DMS2722I
FPL078E-DMS2723E
FPL079E-DMS2724E
FPL080E-DMS2725E
FPL081E-DMS2726E
FPL082E-DMS2727E
FPL083E-DMS2728E
FPL084E-DMS2729E
FPL085E-DMS2730E
FPL086I-DMS2731I
FPL087E-DMS2732E
FPL088E-DMS2733E
FPL089E-DMS2734E
FPL090E-DMS2735E
FPL091E-DMS2736E
FPL092E-DMS2737E
FPL093E-DMS2738E
FPL094E-DMS2739E
FPL095E-DMS2740E
FPL096E-DMS2741E
FPL097E-DMS2742E
FPL098E-DMS2743E
FPL099E-DMS2744E
FPL100E-DMS2745E
FPL101E-DMS2746E
FPL102E-DMS2747E
FPL103E-DMS2748E
FPL104E-DMS2749E
FPL105E-DMS2750E
FPL107E-DMS2751E
FPL108E-DMS2752E
FPL109E-DMS2753E
FPL110E-DMS2754E
FPL111E-DMS2755E
FPL112E-DMS2756E
FPL113E-DMS2757E
FPL114E-DMS2758E
FPL115E-DMS2759E
FPL116E-DMS2760E
FPL117E-DMS2761E
FPL118E-DMS2762E
FPL119E-DMS2763E
FPL120E-DMS2764E
FPL122E-DMS2766E
FPL124E-DMS2768E
FPL125E-DMS2769E
FPL126E-DMS2770E
FPL127E-DMS2771E
FPL128E-DMS2772E
FPL129E-DMS2773E
FPL131E-DMS2774E
FPL132E-DMS2775E
FPL133E-DMS2776E
FPL134E-DMS2777E
FPL137E-DMS2780E
FPL138E-DMS2781E
FPL139E-DMS2782E
FPL140E-DMS2783E
FPL141E-DMS2784E
FPL142E-DMS2785E
FPL143E-DMS2786E
FPL144E-DMS2787E
FPL145I-DMS2788I
FPL146E-DMS2789E
FPL147E-DMS2790E
FPL148E-DMS2791E
FPL150E-DMS2792E
FPL151E-DMS2793E
FPL152E-DMS2794E
FPL154E-DMS2795E
FPL155E-DMS2796E
FPL156E-DMS2797E
FPL157E-DMS2798E
FPL159E-DMS2799E
FPL161E-DMS2800E
FPL162E-DMS2801E
FPL163E-DMS2802E
FPL164E-DMS2803E
FPL165E-DMS2804E
FPL166E-DMS2805E
FPL169E-DMS2807E
FPL170E-DMS2808E
FPL172E-DMS2809E
FPL173E-DMS2810E
FPL174E-DMS2811E
FPL177I-DMS2814I
FPL178E-DMS2815E
FPL179E-DMS2816E
FPL180E-DMS2817E
FPL181E-DMS2818E
FPL182W-DMS2819W
FPL183E-DMS2820E
FPL184E-DMS2821E
FPL185E-DMS2822E
FPL186I-DMS2823I
FPL187E-DMS2824E
FPL189I-DMS2825I
FPL190E-DMS2826E
FPL191E-DMS2827E
FPL192I-DMS2828I
FPL193E-DMS2829E
FPL194E-DMS2830E
FPL195E-DMS2831E

FPL196E-DMS2832E
FPL197E-DMS2833E
FPL198E-DMS2834E
FPL209E-DMS2835E
FPL211E-DMS2836E
FPL212E-DMS2837E
FPL214E-DMS2838E
FPL215E-DMS2839E
FPL219E-DMS2841E
FPL220E-DMS2842E
FPL222E-DMS2843E
FPL223E-DMS2844E
FPL224E-DMS2845E
FPL225E-DMS2846E
FPL226E-DMS2847E
FPL227E-DMS2848E
FPL229E-DMS2849E
FPL230E-DMS2850E
FPL231E-DMS2851E
FPL232E-DMS2852E
FPL233E-DMS2853E
FPL234E-DMS2854E
FPL235E-DMS2855E
FPL236E-DMS2856E
FPL237E-DMS2857E
FPL238E-DMS2858E
FPL241E-DMS2859E
FPL245W-DMS2860W
FPL253E-DMS2861E
FPL256I-DMS2862I
FPL257E-DMS2863E
FPL261E-DMS2864E
FPL264E-DMS2865E
FPL279E-DMS2866E
FPL280E-DMS2867E
FPL281W-DMS2868W
FPL282E-DMS2869E
FPL283W-DMS2870W
FPL284E-DMS2871E
FPL287E-DMS2872E
FPL289E-DMS2874E
FPL290E-DMS2875E
FPL291E-DMS2876E
FPL292E-DMS2877E
FPL293I-DMS2878I
FPL297E-DMS2879E
FPL298I-DMS2880I
FPL301E-DMS2882E
FPL302E-DMS2883E
FPL303E-DMS2884E
FPL304E-DMS2885E
FPL305E-DMS2886E
FPL306E-DMS2991E
FPL307E-DMS2604E
FPL308E-DMS2887E
FPL309E-DMS2888E
FPL310E-DMS2889E
FPL311E-DMS2890E
FPL313E-DMS2891E
FPL314E-DMS2892E
FPL315E-DMS2893E
FPL317E-DMS2894E
FPL318E-DMS2895E
FPL319E-DMS2896E
FPL333E-DMS2898E
FPL334E-DMS2899E
FPL335E-DMS2998E
FPL336E-DMS2999E
FPL337E-DMS2571E
FPL338E-DMS2572E
FPL339E-DMS2573E
FPL340I-DMS2574I
FPL341I-DMS2575I
FPL342I-DMS2576I
FPL343E-DMS2577E
FPL344I-DMS2578I
FPL345E-DMS2579E
FPL346E-DMS2580E
FPL347E-DMS2581E
FPL348I-DMS2582I
FPL350E-DMS2900E
FPL352E-DMS2901E
FPL354E-DMS2902E
FPL355I-DMS2903I
FPL356I-DMS2904I
FPL357E-DMS2905E
FPL358E-DMS2906E
FPL359E-DMS2907E
FPL360E-DMS2908E
FPL361I-DMS2909I
FPL362E-DMS2910E
FPL363E-DMS2911E
FPL364E-DMS2912E
FPL365E-DMS2913E
FPL366E-DMS2914E
FPL368E-DMS2916E
FPL369I-DMS2586I
FPL370E-DMS2918E
FPL371E-DMS2599E
FPL373E-DMS2921E
FPL380E-DMS2922E
FPL391E-DMS2925E
FPL392E-DMS2926E
FPL393E-DMS2927E
FPL400E-DMS2929E
FPL401E-DMS2930E
FPL402I-DMS2931I
FPL405E-DMS2934E
FPL406E-DMS2935E
FPL407E-DMS2936E
FPL409E-DMS2938E
FPL410E-DMS2939E
FPL411I-DMS2940I
FPL412I-DMS2937I
FPL413I-DMS2942I
FPL420E-DMS2941E
FPL509E-DMS2949E
FPL510E-DMS2950E
FPL511E-DMS2951E
FPL512E-DMS2952E
FPL513E-DMS2953E
FPL514E-DMS2954E
FPL515E-DMS2955E
FPL516E-DMS2956E
FPL517E-DMS2957E
FPL518E-DMS2958E
FPL530E-DMS2959E
FPL531E-DMS2960E
FPL532E-DMS2961E
FPL533E-DMS2962E
FPL534E-DMS2963E
FPL535E-DMS2964E
FPL536E-DMS2965E
FPL537I-DMS2966I
FPL538I-DMS2967I
FPL539E-DMS2968E
FPL540E-DMS2969E
FPL541E-DMS2970E
FPL542E-DMS2971E
FPL543E-DMS2972E
FPL544I-DMS2973I
FPL545E-DMS2974E
FPL546E-DMS2975E
FPL547E-DMS2976E
FPL548I-DMS2977I
FPL552I-DMS2980I
FPL554E-DMS2982E
FPL555I-DMS2983I
FPL556E-DMS2984E
FPL560I-DMS2988I
FPL561E-DMS2989E
FPL562E-DMS2990E
FPL564W-DMS2600W
FPL569E-DMS2993E
FPL571E-DMS2994E
FPL573E-DMS2584E
FPL575E-DMS2585E
FPL576E-DMS2587E
FPL611E-DMS2588E
FPL612I-DMS2589I
FPL613E-DMS2590E
FPL614E-DMS2591E
FPL615E-DMS2592E
FPL616E-DMS2593E
FPL617E-DMS2594E
FPL620W-DMS2595W
FPL627E-DMS2596E
FPL635E-DMS2597E
FPL639E-DMS2602E
FPL642E-DMS2603E
FPL650E-DMS2992E
FPL651E-DMS2605E
FPL652E-DMS2606E
FPL653E-DMS2607E
FPL654E-DMS2608E
FPL655E-DMS2609E
FPL656E-DMS2610E
FPL657E-DMS2611E
FPL660E-DMS2612E
FPL662E-DMS2613E
FPL663E-DMS2626E
FPL664E-DMS2614E
FPL680E-DMS2625E
FPL685E-DMS2601E
FPL686E-DMS2619E
FPL694E-DMS2627E
FPL700E-DMS2629E
FPL701E-DMS2630E
FPL702I-DMS2631I
FPL703I-DMS2632I
FPL704E-DMS2633E
FPL705E-DMS2634E
FPL706E-DMS2635E
FPL707E-DMS2636E
FPL708E-DMS2637E
FPL709E-DMS2638E
FPL710E-DMS2639E
FPL711E-DMS2640E
FPL712E-DMS2641E
FPL713E-DMS2642E
FPL714E-DMS2643E
FPL715E-DMS2644E
FPL716E-DMS2645E
FPL717I-DMS2646I
FPL718I-DMS2647I
FPL719I-DMS2648I
FPL720I-DMS2649I
FPL721I-DMS2658I
FPL725I-DMS2702I
FPL726I-DMS2765I
FPL727I-DMS2767I
FPL728I-DMS2778I
FPL729I-DMS2779I
FPL732E-DMS2795E
FPL733E-DMS2806E
FPL734E-DMS2812E
FPL735E-DMS2813E
FPL736E-DMS2840E
FPL737E-DMS2871E
FPL738E-DMS2873E
FPL740E-DMS2881E
FPL741E-DMS2915E
FPL742E-DMS2917E
FPL743I-DMS2919I
FPL744I-DMS2920I
FPL745E-DMS2928E
FPL746E-DMS2932E
FPL747E-DMS2933E
FPL748E-DMS2934E
FPL749E-DMS2943E
FPL750E-DMS2944E
FPL752E-DMS2946E
FPL753E-DMS2947E
FPL780E-DMS2948E
FPL1015E-DMS2583E
FPL1019E-DMS2598E
FPL1032E-DMS2615E
FPL1033E-DMS2616E
FPL1036E-DMS2618E
FPL1038E-DMS2620E

FPL1039E-DMS2621E
FPL1040E-DMS2622E
FPL1041E-DMS2623E
FPL1049E-DMS2624E
FPL1100E-DMS2670E
FPL1110I-DMS2677I
FPL1111I-DMS2700I
FPL1112I-DMS2979I
FPL1113I-DMS2981I
FPL1114I-DMS2986I
FPL1115I-DMS2987I
FPL1124E-DMS2628E

Appendix B. Sample Utilities for Converting to Configuration Files

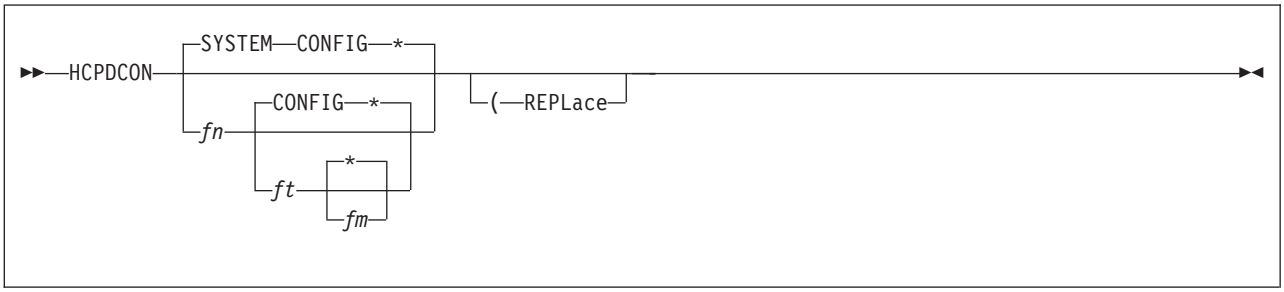
This appendix provides reference information for the following sample utility programs:

- HCPDCON
- HCPRDEV
- HCPTRIO
- HCPTSYS

Note: These sample utility programs were provided with z/VM V4R4 and earlier releases. **They are not included with the new z/VM release.** You must locate and use them on your current VM system. The sample utilities were shipped with a file type of SAMPEXEC; to use them, you must change the file type to EXEC.

Another utility that you might find useful when converting to configuration files is CPSYNTAX, which verifies the syntax of a SYSTEM CONFIG file. CPSYNTAX is described in the *z/VM: CP Commands and Utilities Reference*.

HCPDCON



Authorization

Privilege Class: G

Purpose

Use HCPDCON to examine a running system and generate a file of configuration statements.

Operands

fn is the name of the CMS minidisk file that CP should generate. The default is SYSTEM.

ft is the type of file to be generated. The default is CONFIG.

fm is the CMS minidisk on which the file is to reside. This disk must be accessed in write mode. An asterisk (*), the default, causes HCPDCON to use the first CMS minidisk accessed in write mode.

REPLace
replaces the existing file with the new one just generated, if a file with the same name already exists.

HCPDCON sets up a work file with a file type of '$' plus the first seven characters of the file type of the input file. If such a file already exists, HCPDCON erases the file. After the work file is written to the CMS minidisk, HCPDCON erases the original configuration file and renames the work file.

For example, if you have a file called SYSTEM CONFIG A and you enter `HCPDCON`, HCPDCON generates a work file named SYSTEM $CONFIG A. HCPDCON then erases SYSTEM CONFIG A and renames SYSTEM $CONFIG A to SYSTEM CONFIG A.

Examples

1. To examine the running system and generate a configuration file called SYSTEM3 CONFIG A, enter the following:

   ```
   HCPDCON SYSTEM3 CONFIG A
   ```

2. To examine the running system, generate a configuration file called SYSTEM CONFIG, and put this file on the first CMS minidisk accessed in write mode, enter the following:

   ```
   HCPDCON
   ```

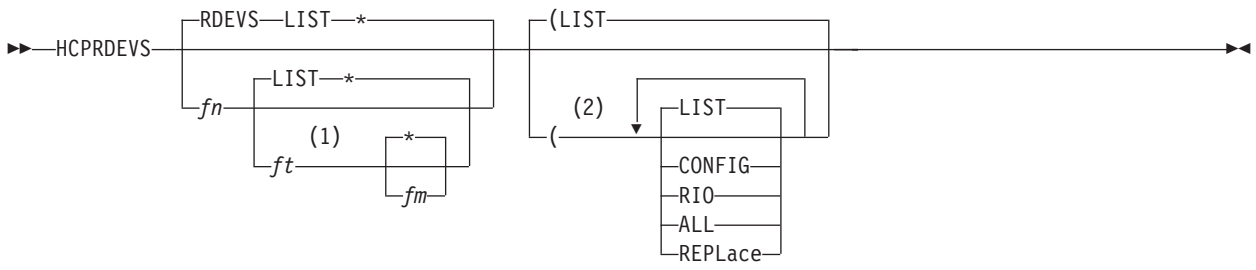
3. To examine the running system, generate a configuration file called SYSTEM4 NEWSTMTS, and put this file on the first CMS minidisk accessed in write mode, enter the following:

```
HCPDCON SYSTEM4 NEWSTMTS *
```

Messages

Code	Meaning
4	No minidisk accessed in R/W mode
8	User does not have necessary authority
12	Output file already exists and the REPLACE option was not specified
16	PIPE CMS RENAME error
20	I/O error writing to output file
24	Invalid option or too many options
9998	PIPE command not found
9999	Signal on NOVALUE routine exit

HCPRDEVS



Notes:

1 Default file type is based on the option chosen.

2 You can use the options in any combination, but they can only be used once.

Authorization

Privilege Class: G

Purpose

Use HCPRDEVS to do any or all of the following:

- Generate a list of all the real devices known to a system.
- Generate a system configuration-like file of those real devices that do not answer a sense ID request or do not return enough information. These devices must be defined to the system.
- Generate a file in an HCPRIO format.

Operands

fn is the name of the CMS minidisk file to be generated. The default is RDEVS.

ft is the type of file to be generated. The default depends upon the type of file requested. The option you choose (with the exception of ALL) denotes the default file type. For example, if the option is CONFIG, the default file type is CONFIG. The use of the option ALL results in the use of each default file type: LIST, RIO, and CONFIG.

fm is the CMS minidisk on which the file is to reside. This disk must be accessed in write mode. An asterisk (*), the default, causes the exec to use the first CMS minidisk accessed in write mode.

LIST
generates a list of real devices.

CONFIG
generates a system configuration-like file that contains statements only for those real devices that cannot be sensed completely.

RIO
generates a list of HCPRIO-like macroinstructions for all real devices on your system.

ALL
generates the information from the LIST, CONFIG, and RIO options. If you use ALL and a specific file type, the following files are generated:

- List of real devices with file type that you specified
- Information generated by the CONFIG option with file type of CONFIG
- Information generated by the RIO option with file type of RIO.

REPLace
replaces the existing file with the new one just generated, if a file with the same name already exists.

HCPRDEVS sets up a work file with a file type of '$' plus the first seven characters of the file type of the input file. If such a file already exists, HCPRDEVS erases the file. After the work file is written to the CMS minidisk, HCPRDEVS erases the original configuration file and renames the work file.

For example, `HCPRDEVS SYSTEM3 RIOLIST A (LIST REPL` generates a work file named SYSTEM3 $RIOLIST A. HCPRDEVS then erases SYSTEM3 RIOLIST A and renames SYSTEM3 $RIOLIST A to SYSTEM3 RIOLIST A.

Examples

1. To generate a file called MYRDEVS CONFIG, composed of configuration file statements for the real devices that do not return enough information to a sense ID request, and to place this file on your A-disk, enter the following:

   ```
   HCPRDEVS MYRDEVS CONFIG A (CONFIG
   ```

2. To create files called RDEVS LIST, RDEVS CONFIG, and RDEVS RIO, and to put them on the first CMS minidisk accessed in write mode, enter the following:

   ```
   HCPRDEVS (ALL
   ```

   RDEVS LIST contains a list of all the real devices known to the running system. RDEVS CONFIG contains a list of configuration file statements only for those real devices that cannot be sensed completely. RDEVS RIO contains a list of HCPRIO-like macroinstructions for real devices.

3. To generate two files, RDEVS LIST and RDEVS RIO, and to put them on the first CMS minidisk that CP has accessed in write mode, enter the following:

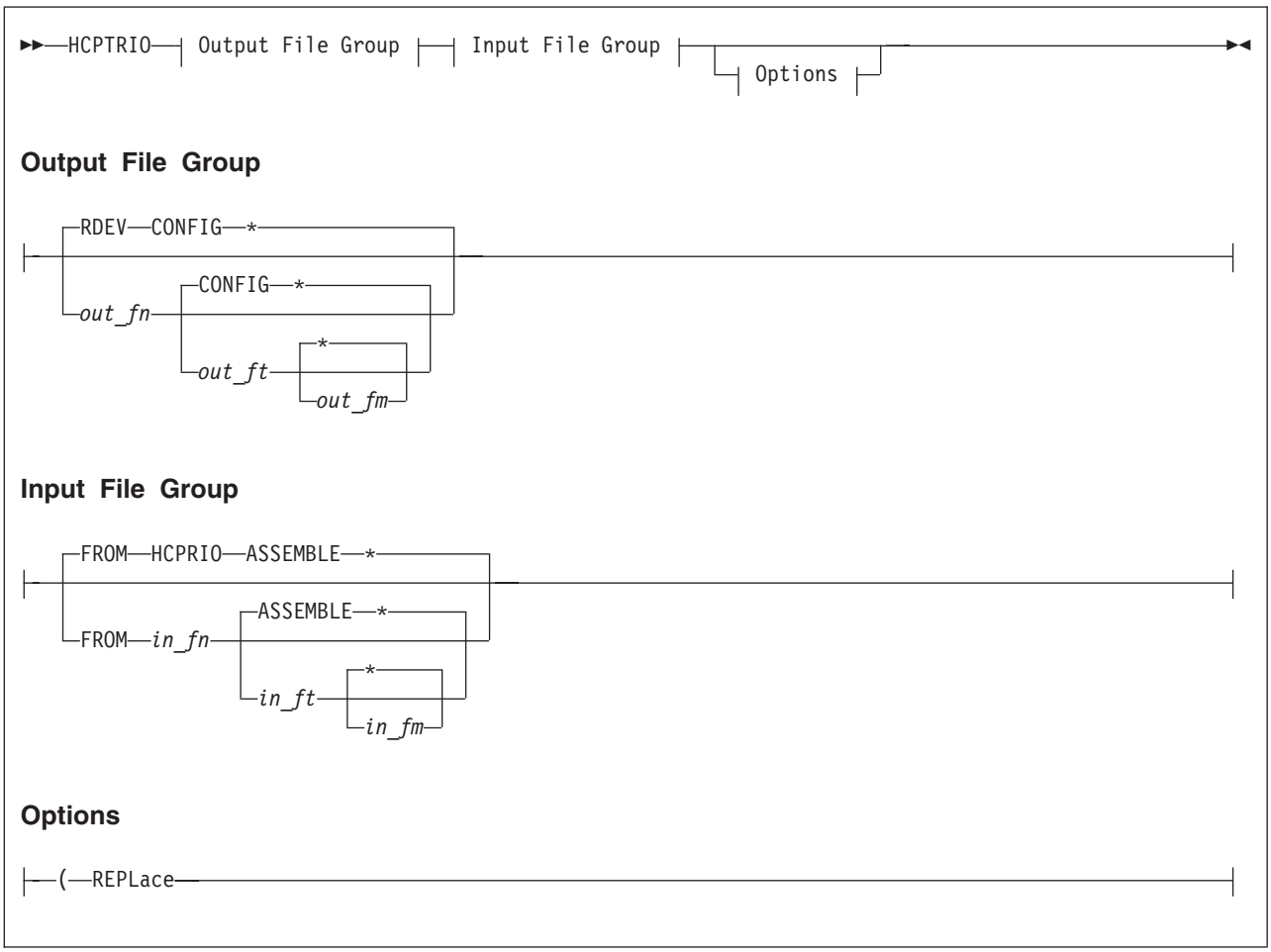
   ```
   HCPRDEVS RDEVS (LIST RIO
   ```

   RDEVS LIST contains a list of all the real devices known to the running system. RDEVS RIO contains a list of HCPRIO-like macroinstructions for real devices.

Messages

Code	Meaning
4	No minidisk accessed in R/W mode
8	User does not have necessary authority
12	Output file already exists and the REPLACE option was not specified
16	I/O error in creating output file
9998	PIPE command not found
9999	Signal on NOVALUE routine exit

HCPTRIO



Authorization

Privilege Class: G

Purpose

Use HCPTRIO to generate a system configuration file (SYSTEM CONFIG) from an HCPRIO ASSEMBLE file. The generated file will contain statements for those real devices that do not answer sense ID requests or that do not return enough information.

Operands

out_fn
is the name of the CMS file to be generated. The default is RDEV.

out_ft
is the type of the file to be generated. The default is CONFIG.

out_fm
is the CMS file mode on which the file is to reside. The file mode must be accessed in write mode. An asterisk (*), the default, causes the HCPTRIO to use the first file mode accessed R/W.

FROM
tells HCPTRIO that there is a specific source file it should use.

in_fn
is the name of the CMS file that contains the input. The default is HCPRIO.

in_ft
is the type of the CMS file that contains the input. The default is ASSEMBLE.

in_fm
is the file mode on which the file resides. An asterisk (*), the default, causes HCPTRIO to use the first file mode on which the file resides.

REPLace
indicates that if the output file already exists, it should be replaced.

Usage Notes

1. HCPTRIO uses a work file having a file type of "$" followed by the first seven characters of the file type of the input file. If such a file already exists, HCPTRIO erases it. After writing the work file, HCPTRIO erases the original configuration file and renames the work file.

   Example:

   ```
   hcptrio rdev config a from hcprio assemble b (repl
   ```

   In this case, HCPTRIO writes a work file named RDEV $CONFIG A, erases the old RDEV CONFIG A, and renames RDEV $CONFIG A to RDEV CONFIG A.

Return Codes

0	Successful execution
4	Disk not accessed or not accessed R/W
12	Output file already exists and the REPLACE option was not specified
16	Input file to translate was not found
20	I/O error in creating output file or in reading input file
24	Invalid option or too many options

Examples

Example 1

```
hcptrio cambvm3 config a from hcprio assemble d
```

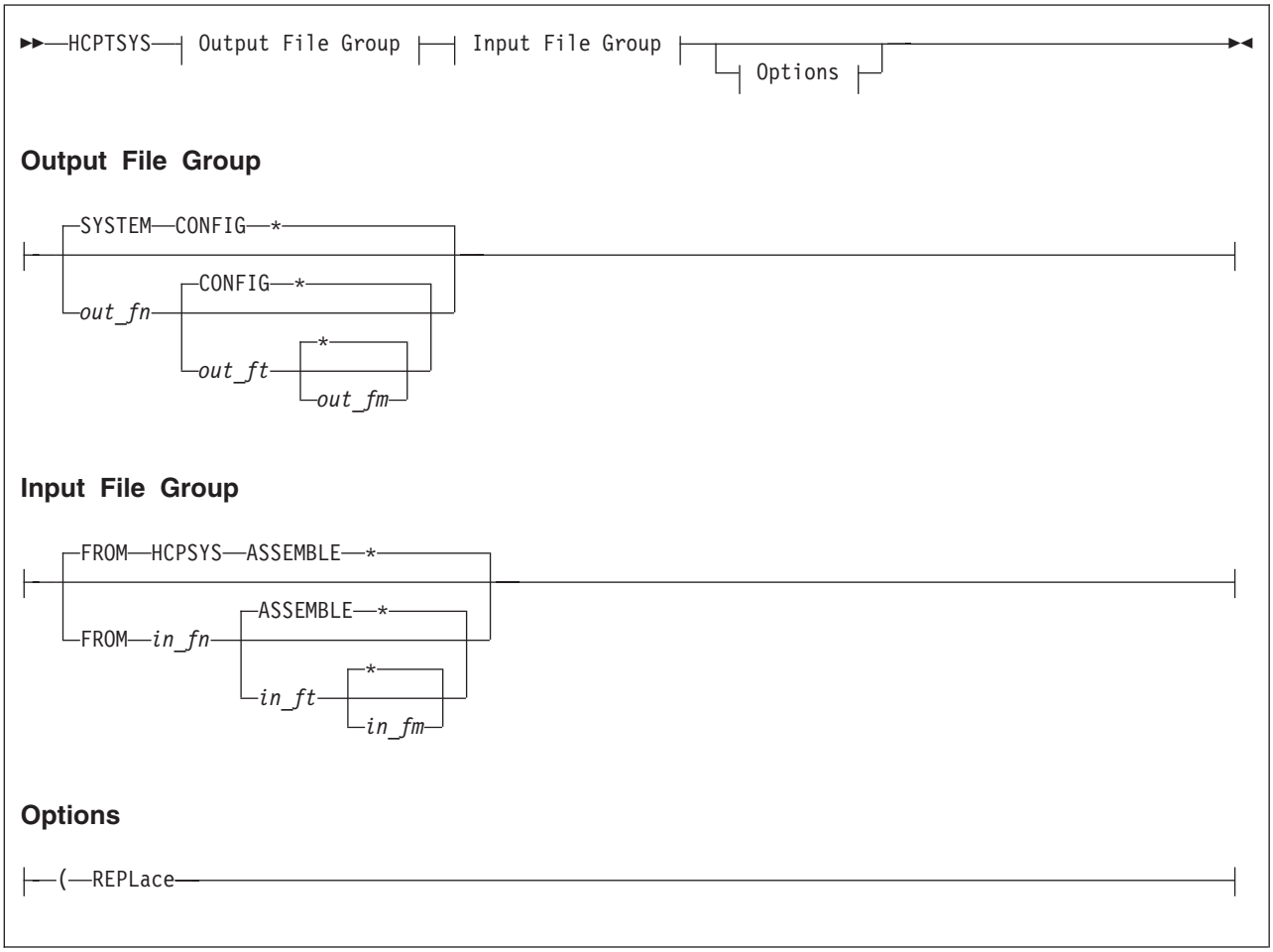
In this example, HCPTRIO uses the file HCPRIO ASSEMBLE D to generate a configuration file named CAMBVM3 CONFIG A.

Example 2

```
hcptrio
```

In this example, HCPTRIO reads the first file it finds in the CMS search order that is named HCPRIO ASSEMBLE. It creates a configuration file named RDEV CONFIG on the first file mode letter in the CMS search order that is accessed R/W.

HCPTSYS



Authorization

Privilege Class: G

Purpose

Use HCPTSYS to generate a system configuration file (SYSTEM CONFIG) from an HCPSYS ASSEMBLE file.

Operands

out_fn
is the name of the CMS file to be generated. The default is SYSTEM.

out_ft
is the type of the file to be generated. The default is CONFIG.

out_fm
is the CMS file mode on which the file is to reside. The file mode must be accessed in write mode. An asterisk (*), the default, causes the HCPTSYS to use the first file mode accessed R/W.

FROM
tells HCPTSYS that there is a specific source file it should use.

in_fn
is the name of the CMS file that contains the input. The default is HCPSYS.

in_ft
is the type of the CMS file that contains the input. The default is ASSEMBLE.

in_fm
is the file mode on which the file resides. An asterisk (*), the default, causes HCPTSYS to use the first file mode on which the file resides.

REPLace
indicates that if the output file already exists, it should be replaced.

Usage Notes

1. HCPTSYS uses a work file having a file type of "$" followed by the first seven characters of the file type of the input file. If such a file already exists, HCPTSYS erases it. After writing the work file, HCPTSYS erases the original configuration file and renames the work file.

   Example:

   ```
   hcptsys system config a from hcpsys assemble b (repl
   ```

   In this case, HCPTRIO writes a work file named SYSTEM $CONFIG A, erases the old SYSTEM CONFIG A, and renames SYSTEM $CONFIG A to SYSTEM CONFIG A.

Return Codes

0	Successful execution
4	Disk not accessed or not accessed R/W
12	Output file already exists and the REPLACE option was not specified
16	Input file to translate was not found
20	I/O error in creating output file or in reading input file
24	Invalid option or too many options

Examples

Example 1

```
hcptsys cambvm3 config a from hcpsys assemble d
```

In this example, HCPTRIO uses the file HCPSYS ASSEMBLE D to generate a configuration file named CAMBVM3 CONFIG A.

Example 2

```
hcptsys
```

In this example, HCPTSYS reads the first file it finds in the CMS search order that is named HCPSYS ASSEMBLE. It creates a configuration file named SYSTEM CONFIG on the first file mode letter in the CMS search order that is accessed R/W.

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Glossary

For a list of z/VM terms and their definitions, see the *z/VM: Glossary* book.

The glossary is also available through the online HELP Facility. For example, to display the definition of “cms”, enter:

```
help glossary cms
```

You will enter the glossary HELP file and the definition of “cms” will be displayed as the current line. While you are in the glossary HELP file, you can also search for other terms.

If you are unfamiliar with the HELP Facility, you can enter:

```
help
```

to display the main HELP menu, or enter:

```
help cms help
```

for information about the HELP command.

For more information about the HELP Facility, see the *z/VM: CMS User’s Guide*.

Bibliography

This bibliography lists the books in the z/VM product library. For abstracts of these books and information about current editions and available media, see *z/VM: General Information*.

Where to Get z/VM Books

z/VM books are available from the following sources:

- IBM Publications Center at www.ibm.com/shop/publications/order/
- z/VM Internet Library at www.ibm.com/eserver/zseries/zvm/library/
- *IBM eServer zSeries Online Library: z/VM Collection* CD-ROM, SK2T-2067

z/VM Base Library

The following books describe the facilities included in the z/VM base product.

System Overview

z/VM: General Information, GC24-6095

z/VM: Glossary, GC24-6097

z/VM: License Information, GC24-6102

z/VM: Migration Guide, GC24-6103

Installation and Service

z/VM: Guide for Automated Installation and Service, GC24-6099

z/VM: Service Guide, GC24-6117

z/VM: VMSES/E Introduction and Reference, GC24-6130

Planning and Administration

z/VM: CMS File Pool Planning, Administration, and Operation, SC24-6074

z/VM: CMS Planning and Administration, SC24-6078

z/VM: Connectivity, SC24-6080

z/VM: CP Planning and Administration, SC24-6083

z/VM: Getting Started with Linux on zSeries, SC24-6096

z/VM: Group Control System, SC24-6098

z/VM: I/O Configuration, SC24-6100

z/VM: Performance, SC24-6109

z/VM: Running Guest Operating Systems, SC24-6115

z/VM: Saved Segments Planning and Administration, SC24-6116

z/VM: Secure Configuration Guide, SC24-6138

z/VM: TCP/IP Planning and Customization, SC24-6125

eServer zSeries 900: Planning for the Open Systems Adapter-2 Feature, GA22-7477

eServer zSeries: Open Systems Adapter-Express Customer's Guide and Reference, SA22-7935

eServer zSeries: Open Systems Adapter-Express Integrated Console Controller User's Guide, SA22-7990

z/OS and z/VM: Hardware Configuration Manager User's Guide, SC33-7989

Customization

z/VM: CP Exit Customization, SC24-6082

Operation

z/VM: System Operation, SC24-6121

z/VM: Virtual Machine Operation, SC24-6128

Application Programming

z/VM: CMS Application Development Guide, SC24-6069

z/VM: CMS Application Development Guide for Assembler, SC24-6070

z/VM: CMS Application Multitasking, SC24-6071

z/VM: CMS Callable Services Reference, SC24-6072

z/VM: CMS Macros and Functions Reference, SC24-6075

z/VM: CP Programming Services, SC24-6084

z/VM: CPI Communications User's Guide, SC24-6085

z/VM: Enterprise Systems Architecture/Extended Configuration Principles of Operation, SC24-6094

z/VM: Language Environment User's Guide, SC24-6101

z/VM: OpenExtensions Advanced Application Programming Tools, SC24-6104

z/VM: OpenExtensions Callable Services Reference, SC24-6105

z/VM: OpenExtensions Commands Reference, SC24-6106

z/VM: OpenExtensions POSIX Conformance Document, GC24-6107

z/VM: OpenExtensions User's Guide, SC24-6108

z/VM: Program Management Binder for CMS, SC24-6110

z/VM: Reusable Server Kernel Programmer's Guide and Reference, SC24-6112

z/VM: REXX/VM Reference, SC24-6113

z/VM: REXX/VM User's Guide, SC24-6114

z/VM: Systems Management Application Programming, SC24-6122

z/VM: TCP/IP Programmer's Reference, SC24-6126

Common Programming Interface Communications Reference, SC26-4399

Common Programming Interface Resource Recovery Reference, SC31-6821

OS/390: DFSMS Program Management, SC27-0806

z/OS: Language Environment Concepts Guide, SA22-7567

z/OS: Language Environment Debugging Guide, GA22-7560

z/OS: Language Environment Programming Guide, SA22-7561

z/OS: Language Environment Programming Reference, SA22-7562

z/OS: Language Environment Run-Time Messages, SA22-7566

z/OS: Language Environment Writing ILC Applications, SA22-7563

End Use

z/VM: CMS Commands and Utilities Reference, SC24-6073

z/VM: CMS Pipelines Reference, SC24-6076

z/VM: CMS Pipelines User's Guide, SC24-6077

z/VM: CMS Primer, SC24-6137

z/VM: CMS User's Guide, SC24-6079

z/VM: CP Commands and Utilities Reference, SC24-6081

z/VM: Quick Reference, SC24-6111

z/VM: TCP/IP User's Guide, SC24-6127

z/VM: XEDIT Commands and Macros Reference, SC24-6131

z/VM: XEDIT User's Guide, SC24-6132

CMS/TSO Pipelines Author's Edition, SL26-0018

Diagnosis

z/VM: Diagnosis Guide, GC24-6092

z/VM: Dump Viewing Facility, GC24-6093

z/VM: System Messages and Codes - AVS, Dump Viewing Facility, GCS, TSAF, and VMSES/E, GC24-6120

z/VM: System Messages and Codes - CMS and REXX/VM, GC24-6118

z/VM: System Messages and Codes - CP, GC24-6119

z/VM: TCP/IP Diagnosis Guide, GC24-6123

z/VM: TCP/IP Messages and Codes, GC24-6124

z/VM: VM Dump Tool, GC24-6129

z/OS and z/VM: Hardware Configuration Definition Messages, SC33-7986

Books for z/VM Optional Features

The following books describe the optional features of z/VM.

Data Facility Storage Management Subsystem for VM

z/VM: DFSMS/VM Customization, SC24-6086

z/VM: DFSMS/VM Diagnosis Guide, GC24-6087

z/VM: DFSMS/VM Messages and Codes, GC24-6088

z/VM: DFSMS/VM Planning Guide, SC24-6089

z/VM: DFSMS/VM Removable Media Services, SC24-6090

z/VM: DFSMS/VM Storage Administration, SC24-6091

Directory Maintenance Facility

z/VM: Directory Maintenance Facility Commands Reference, SC24-6133

z/VM: Directory Maintenance Facility Messages, GC24-6134

z/VM: Directory Maintenance Facility Tailoring and Administration Guide, SC24-6135

Performance Toolkit for VM™

z/VM: Performance Toolkit, SC24-6136

Resource Access Control Facility

External Security Interface (RACROUTE) Macro Reference for MVS and VM, GC28-1366

Resource Access Control Facility: Auditor's Guide, SC28-1342

Resource Access Control Facility: Command Language Reference, SC28-0733

Resource Access Control Facility: Diagnosis Guide, GY28-1016

Resource Access Control Facility: General Information, GC28-0722

Resource Access Control Facility: General User's Guide, SC28-1341

Resource Access Control Facility: Macros and Interfaces, SC28-1345

Resource Access Control Facility: Messages and Codes, SC38-1014

Resource Access Control Facility: Migration and Planning, GC23-3054

Resource Access Control Facility: Security Administrator's Guide, SC28-1340

Resource Access Control Facility: System Programmer's Guide, SC28-1343

Index

Special characters

Numerics

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z

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