

z/OS



Introduction and Release Guide

Version 1 Release 12

z/OS



Introduction and Release Guide

Version 1 Release 12

Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 145.

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This edition applies to Version 1 Release 12 of z/OS (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this book

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

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

Who should read this book

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

Summary of changes

Summary of changes for GA22-7502-18 z/OS Version 1 Release 12

This edition contains information previously presented in *z/OS Introduction and Release Guide*, GA22-7502-17, which supports z/OS Version 1 Release 11.

New Information

This edition contains updated descriptions of new enhancements to the elements and features of z/OS for Version 1 Release 12 in Chapter 1.

Chapter 1. What's new in z/OS (z/OS V1R11 - z/OS V1R12)

Summary of what's new

This topic lists the major enhancements in z/OS that have been introduced in z/OS V1R11 through z/OS V1R12. Some enhancements require customization actions before you can use them. This topic refers you to the documents that describe the customization actions.

The following z/OS elements and features do not have exploitation information in this topic:

- Alternate Library for REXX
- BDT
- BDT File-to-File
- BDT SNA NJE
- BookManager[®] BUILD
- BookManager READ
- DCE Base Services
- EREP
- ESCON[®] Director Support
- FFST[™]
- GDDM[®]
- GDDM-PGF
- GDDM-REXX
- High Level Assembler (HLASM)
- High Level Assembler (HLASM) Toolkit
- IBM HTTP Server
- Metal C Runtime Library
- MICR/OCR
- OSA/SF
- SMP/e
- TIOC
- 3270 PC File Transfer Program

z/OS system-level new functions to consider

This topic describes new z/OS system-level enhancements.

IBM z/OS Management Facility

Description: IBM z/OS Management Facility (z/OSMF) is the new face of z/OS. z/OSMF provides a framework for managing various aspects of a z/OS system through a Web browser interface. By streamlining some traditional tasks and automating others, z/OSMF can help to simplify some areas of system management and reduce the level of expertise needed for managing a system.

In z/OSMF V1R12, you can:

- Manage z/OS Workload Manager (WLM) service definitions, and provide guidelines for WLM to use when allocating resources. Specifically, you can define, modify, view, copy, import, export, and print WLM service definitions. You can also install a service definition into the WLM couple data set for the sysplex, activate a service policy, and view the status of WLM on each system in the sysplex.
- Monitor the performance of the z/OS sysplexes or Linux images in your environment.

z/OS system-level

- Assess the performance of the workloads running on the z/OS sysplexes in your environment.
- Perform problem data management tasks through the Incident Log, which helps to centralize problem data for your system and simplifies the process of sending diagnostic data to IBM or another destination.
- Configure TCP/IP policy-based networking functions on z/OS.
- Manage user access to the z/OSMF product.
- Add links for external tools to the z/OSMF navigation area.

When change was introduced: z/OS V1R12.

Reference information:

- *IBM z/OS Management Facility Configuration Guide*

MVS (Base Control Program) new functions to consider

This topic describes BCP functions in z/OS.

Runtime Diagnostics quickly analyzes systems for potential problems

Description: Runtime Diagnostics is an MVS subsystem designed to help you analyze a system and can help you quickly identify a possible problems in as little as one minute. Runtime Diagnostics performs many of the same tasks you might typically perform when looking for a failure, such as:

- Reviewing critical messages in the log
- Analyzing ENQ contention
- Examining address spaces with high CPU usage
- Querying a job that has a task in a TCB loop
- Evaluating local lock conditions

Runtime Diagnostics can also perform a subset of its functions when analyzing a different system in the sysplex from where the function is running.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Problem Management*.

PFA monitors SMF records

Description: z/OS Predictive Failure Analysis (PFA) introduces a new check, PFA_SMF_ARRIVAL_RATE, that monitors the rate the system generates SMF records. When the rate is abnormally high for a particular system, the system issues an alert to warn you of a potential problem and has the potential of helping you avoid an outage.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Problem Management*.

PFA supervised learning enhancement

Description: PFA introduces the concept of supervised learning that helps avoid false positive results by excluding certain data that PFA uses when making predictions of future behavior. See *z/OS Problem Management* for a list of checks that support supervised learning.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Problem Management.*

Master Scheduler Initialization Dynamic Exit

Description: A dynamic exit CNZ_MSIEEXIT is defined during Master Scheduler Initialization before the IEFSSNxx parmlib member is processed, placing a dependency on the Dynamic Exit Facility to allow a parameter specification in PROGxx and to pass this parameter to the exit routine.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Installation Exits*

Auto-reply for WTORs

Description: A default policy of WTORs is provided that can be replied to by the system if an operator or user supplied automation has not provided a reply in a specified amount of time. The default policy is activated during IPL unless explicitly requested by the user to not activate. This allows WTORs issued during NIP to be automated. There is support for the user to add to or alter the default list of WTORs or to provide their own list of WTORs that can be merged with the default list. Operator commands are provided that allows the activation and deactivation of the auto-reply policy, displays the auto-reply policy and the list of current WTORs that are being monitored by auto-reply processing, and causes auto-reply processing to stop the monitoring of a specific outstanding WTOR. A new system parameter is provided that can be specified in the IEASYSxx parmlib member or in response to message IEA101A. This parameter allows an installation to provide the set of parmlib members to contain auto-reply policy or to request that auto-reply processing should not be activated.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS System Commands**z/OS MVS Planning: Operations**z/OS MVS Diagnosis: Reference**z/OS MVS Installation Exits**z/OS MVS System Management Facilities (SMF)**z/OS MVS Initialization and Tuning Reference*

Program Management

Description: Program Management has the following enhancements:

- Fast data access is enhanced to access PMR data and to support programs loaded into storage by loadhfs (BPX1LOD) in z/OS UNIX.
- A binder option is implemented to remove all unnamed sections from the resulting module. It also specifies unnamed sections and symbols on CHANGE and REPLACE control statements.
- C APIs will enhance the XPLINK application to do runtime stack switching when calling a non-XPLINK version of the C binder APIs. The C header mapping for the binder module map is established.
- Binder RAS enhancements consists of a number of fixes derived from features tracked under CMVC release HPMQUAL:
 - Provided an EBCDIC translation of the module text in amblist LISTLOAD and output in load modules.
 - Improvements to amblist header information for UNIX files, such as printing the pathname of the target module.

- Removed 8 byte member name restriction for LISTOBJ of object modules in UNIX files.
- Fixed message IEW2459W for archive libraries.
- Removed HFS from binder messages by changing the term to z/OS UNIX.
- Provided new diagnostic messages for errors using the RLD type which supports external symbols in relative-immediate instructions.
- Reworked binder ESPIE support so it removes callers ESPIE without getting control of itself.
- Included sample programs to illustrate user of binder APIs. These sample programs are expected to include programs illustrating the use of regular API and Fastdata, using both assembler language and C.
- The extended address volume (EAV) R2 supports non-VSAM data sets in the extended addressing space (EAS), which resides on cylinders beyond the first 65520 cylinders. To control the migration of non-VSAM data sets to EAS, a new data set level attribute is defined. Each data set will have a new attribute, EATTR=NOIOPTREQ to indicate whether the data set can support extended attributes.
- The RMODE option was enhanced in the following ways:
 - A new optional suboption will allow you to specify a scope for the specified RMODE option.
 - The default behavior when the optional suboption is not specified will be a new behavior.
 - There will be a suboption value to provide the current behavior, for compatibility.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Program Management: User's Guide and Reference*
- *z/OS MVS Program Management: Advanced Facilities*
- *z/OS MVS System Messages, Vol 8 (IEF-IGD)*
- *z/OS MVS Diagnosis: Tools and Service Aids*

Real storage management (RSM) enhancements

Description: RSM has been enhanced to include the following:

- Enhance storage management and scaling: Extended Address Volumes supports additional data set types, including sequential (both basic and large) data sets, partitioned (PDS/PDSE) data sets, catalogs, and BDAM data sets. Overall, EAV helps you relieve storage constraints as well as simplify storage management by providing the ability to manage fewer, large volumes.
- Reduce the likelihood that HypeSwap processing will be impeded by page faults through the new CRITICALPAGING function: Use the new CRITICALPAGING parameter that can be specified through the Program Properties Table (PPT) to identify which address spaces are critical with respect to paging, through the SCHEDxx parmlib member.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Initialization and Tuning Reference*
- *z/OS MVS Setting Up a Sysplex*

- *z/OS MVS System Commands*
- *z/OS MVS Programming: Sysplex Services Reference*
- *z/OS MVS Programming: Sysplex Services Guide*
- *z/OS MVS System Messages, Vol 7 (IEB-IEE)*

Resource Recovery Services

Description: Enhancements to the Pause, Release, and Transfer services include the following updates:

- Enhanced linkage options
- New PE Ownership rules.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*

System logger enhancements

Description: System logger RAS enhancements is used to reduce log stream exploiter sysplex outages by having system logger attempt to establish the minimum ShareOptions for data sharing of log stream data sets. LIST LOGSTEAM output on the IXCMIAPU utility can include (IDCAMS) LISTCAT information for each log stream data set for easier evaluation and detection of existing data set attributes that may need adjusting by the installation system programmer. Since the automatic updating of existing data set attributes is not likely appropriate for all clients, logger will continue to perform its detection and provide warning messages when it recognizes inappropriate attributes for existing log stream data sets. Due to an installation needing a reasonable mechanism to check existing log stream data sets for incorrect attribute settings, a new logger option on the IXCMIAPU DATA TYPE(LOGR) utility will provide the LISTCAT output for each log stream data set. When LISTCAT is requested, logger will include in the report output the information provided by an IDCAMS LISTCAT ENTRIES(cluster-data-set-name) ALL command request. The combined logger and catalog information in the utility output will allow for easier determination of data sets needing correction.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Setting Up a Sysplex*
- *z/OS MVS System Messages, Vol 10 (IXC-IZP)*
- *z/OS MVS Diagnosis: Reference*

System Management Facilities enhancements

Description: System Management Facilities (SMF) enhancements include:

- Use new SMFPRMxx keyword parameters to specify a list of valid exit names for the IFASMFDP and IFASMFDP programs.
- The SMF data set dump program creates a flood statistics report to display statistics for each record type that matches specified filters.
- Use the BUFSIZMAX, BUFUSEWARN, and NOBUFFS parameters to specify SMF buffering options.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS System Management Facilities (SMF).*

Tools and service aid enhancements

Description: The many tools and service aids enhancements include:

- The SNAP/SNAPX services and dump processing (including that for SVC, SYSABEND, SYSMDUMP, and SYSUDUMP dumps), and the AMASPZAP program support XTLOT.
- Stand-alone dump includes a new parameter, ADDSUMM=, that allows you to indicate the inclusion of additional address spaces in the dump.
- You can analyze z/OS UNIX System Services latches using the DGRS,ANALYZE,LATCH command. Find a full list of latch identities in *z/OS MVS Diagnosis: Reference*.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS MVS Diagnosis: Reference*

Global Resource Serialization (GRS) and Cross-System Coupling (XCF) enhancements

Description: Enhancements to GRS and XCF are as follows:

- Automatic partitioning allows GRS and XCF components to automatically initiate actions to preserve sysplex availability that helps reduce the incidence of sysplex-wide problems resulting from unresponsive critical components.
- XCF status monitoring is designed to incorporate information about system-critical XCF group members that identify themselves and initiate termination actions, including partitioning a system from the sysplex, if a monitored member fails to respond or is impaired. This function is intended to help reduce the incidence of sysplex-wide problems that can result from unresponsive critical components. GRS exploits these XCF critical member functions in both ring and star modes. Additionally, GRS is designed to monitor key tasks and notify XCF if it detects that GRS is impaired.
- An XCF design change helps reduce IPL time when very large sysplex couple data sets are in use.
- GRS allows unauthorized programs to use the ECB option on ISGENQ to implement waits for ENQs that are consistent with the way interruptions are normally handled.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Planning: Global Resource Serialization*
- *z/OS MVS Setting Up a Sysplex*
- *z/OS MVS Programming: Sysplex Services Reference*
- *z/OS MVS Programming: Sysplex Services Guide*
- *z/OS MVS System Codes*
- *z/OS MVS Programming: Assembler Services Reference IAR-XCT*
- *z/OS MVS Diagnosis: Reference*
- *z/OS MVS Diagnosis: Tools and Service Aids*

Restore-Subchannel Facility

Description: Restore-subchannel facility is added as a means of reducing system checkstops that may occur due to overlays of IOP control blocks. IOS enables the restore-subchannel facility if available and processes IPR CRWs if presented. When IOS enables this facility and receives an IPR CRW, IOS will not box the device if it is online.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS System Codes*

VARY CU Command

Description: A VARY CU command has been added that determines the devices and paths connected and invokes existing services to perform the desired action so as to drive a change in device number ranges. This VARY CU command supports all the options that the VARY DEVICE and VARY PATH commands support

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS System Commands*/*z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*

Unicode Services Pre-Built Image

Description: Unicode Services will no longer ship the pre-built image SYS1.SCUNIMG(CUNIDHC2) and no longer automatically load the pre-built image.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Unicode Services User's Guide and Reference*

BiDirectional Transformation and Character Shaping (Bidi)

Description: The existing Unicode Services Character Conversion API is enhanced with the highest level of Bidi support available. This new support has a significantly different interface than the existing support and is added alongside the existing support.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Unicode Services User's Guide and Reference*

Logrec messaging enhancements

Description: Logrec messaging enhancements that reduce message traffic to the console include:

- Message IFB100E is issued once when the return and reason codes being processed are the same as those previously processed.
- Message IFB098E is issued once until the condition causing the error is resolved. After resolution, the current IFB098E message is DOMed and a new occurrence of this message can then be issued.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS System Messages, Vol 8 (IEF-IGD)*.

WLM - enhanced performance management

Description: Non-enclave work of queue servers and enclave servers is now performance managed towards the first service class period of the goal of the address space. The IEAOPT parameter ManageNonEnclaveWork allows to switch on or off the management of non-enclave transaction work.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Programming: Workload Management Services*
- *z/OS MVS Initialization and Tuning Reference*

WLM - enhanced WLM administration

Description: z/OS Management Facility (z/OSMF) provides a browser-based user interface for managing WLM service definitions. With the Workload management task of z/OSMF you can define, modify, view, copy, import, export, and print WLM service definitions with improved ease-of-use.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Planning: Workload Management*
- *IBM z/OS Management Facility Configuration Guide*

WLM - managing performance with the guest platform management provider (GPMP)

Description: Starting with IBM zEnterprise System (zEnterprise), the guest platform management provider (GPMP) is the interface between the intranode management network (INMN) and the z/OS Workload Manager (WLM). It provides policy information to WLM about the platform wide performance goals of the workloads in which the z/OS system is participating. You can manage and administer the guest platform management provider with WLM. For example, you can start and stop the guest platform management provider, or display status information.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS MVS Planning: Workload Management*
- *z/OS MVS System Messages, Vol 9 (IGF-IWM)*
- *z/OS MVS System Commands*
- *z/Next Ensemble Performance Management Planning Guide*

WLM - improved batch management

Description: WLM takes the resource group maximum into account in order to avoid that the projected increase in service demand exceeds the resource group maximum. When a service is already capped due to the resource group maximum, then no more initiators are started.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Planning: Workload Management*

Allocation enhancements

Description: Allocation enhancements include:

- Tape Library Load Balancing
A new option SYSTEM TAPELIB_PREF(EQUALIBYDEVICES) in the ALLOCxx parmlib member is introduced to balance the workload across the eligible libraries based on the number of device exposures (i.e. device numbers) associated with libraries, all other things being equal.
- DISPLAY ALLOC and SETALLOC commands
Two new commands are introduced in V1R11: DISPLAY ALLOC and SETALLOC. The DISPLAY ALLOC command enables operators to determine what ALLOCxx settings are currently active; the SETALLOC command is used to dynamically modify Device Allocation parameters and settings without re-ILPing.
- Enabling DFSMShsm HDELETE processing from IEFBR14
When deleting data sets with DFSMShsm, users can now bypass unnecessary recall for PGM=IEFBR14 job steps by updating the ALLOCxx parmlib member to include a new statement SYSTEM IEFBR14_DELMIGDS(NORECALL), or by using the new SETALLOC command to enable the behavior after IPL with the command SETALLOC SYSTEM,IEFBR14_DELMIGDS(NORECALL).
- Demand tape library allocation
Support is enhanced to direct allocation to a specific device or devices in an esoteric that are also found in a tape library. The support can be implemented by coding a new JCL keyword SMSHONOR or the corresponding Dynamic Allocation Text unit '0076'x along with a specific device name or an esoteric name on the UNIT parameter.
- Allocation and Scheduler support for EAV II
In accordance with updates for extended address volume (EAV) II in V1R11, the Job Management components of Allocation and Scheduler are enhanced by introducing a new JCL keyword EATTR on DD statement (Scheduler) and the corresponding Dynamic Allocation text unit '8028'x (Allocation), thus enabling users or application programs to specify how the data set can be created on the DASD volume.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Commands*
- *z/OS MVS Programming: Authorized Assembler Services Guide*
- *z/OS MVS System Messages, Vol 8 (IEF-IGD)*
- *z/OS MVS Initialization and Tuning Reference*
- *z/OS MVS Planning: Operations*
- *z/OS MVS JCL User's Guide*
- *z/OS MVS JCL Reference*

BCPii APIs

Description: The Base Control Program Internal Interface (BCPii) function allows authorized applications to query, change, and perform basic operational procedures against the installed System z hardware base. As a base BCP component, the new BCPii address space allows authorized z/OS applications to access the local support element and other support elements in the HMC network to perform HMC-like functions.

BCP

A set of high-level application program interfaces (APIs) for data exchange and command requests are include:

- HWICMD Callable Service
- HWICONN Callable Service
- HWIDISC Callable Service
- HWIEVENT Callable Service
- HWILIST Callable Service
- HWIQUERY Callable Service
- HWIBeginEventDelivery Callable Service
- HWIEndEventDelivery Callable Service
- HWIManageEvents Callable Service
- HWIGetEvent Callable Service

When change was introduced: Integrated in z/OS V1R11 and available in z/OS V1R10 with APAR OA25426. A series of MCL hardware updates, and configuration updates on z/OS and various support elements enable the BCPii functionality.

Reference information:

- *z/OS MVS Programming: Callable Services for High-Level Languages*
- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS System Commands*
- *z/OS MVS Initialization and Tuning Reference*
- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS MVS System Codes*
- *z/OS MVS System Messages, Vol 6 (GOS-IEA)*

BCPii function enhancements

Description: The following enhancements are made to BCPii:

- New HWISET callable service is added to set various CPC and image (LPAR) attributes.
- BCPii applications can now query and modify all activation profile definitions on the support element. This includes reset, image and load activation profiles.
- A new IPL token attribute is introduced so that XCF can obtain knowledge about the status of another system, and upon the demise of the system, can potentially partition the sysplex out of the sysplex immediately and reset the demised system.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Callable Services for High-Level Languages*

AMODE64 Pause/Release services

Description: Every Pause/Release service IEAVxxx has an AMODE64 analog IEA4xxx, which supports the 64-bit addressing mode and allows storage above 2GB.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS Programming: Assembler Services Reference IAR-XCT*

RMODE64 support for non-executable directed LOAD

Description: When using the LOAD macro and providing a storage area into which the target module should be loaded, you have the option to provide storage above 2G and have the target module loaded into that area. This is to be used for non-executable modules only (though this is not validated). To get this RMODE64 support, instead of using the ADDR or ADRNAPF parameter, specify ADDR64 or ADRNAPF64.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Authorized Assembler Services Reference LLA-SDU*

Choosing whether to run zAAP work on zIIP processors

Description: You can specify the zAAPzIIP=YES/NO parameter on the IEASYSxx parmlib member to determine whether the system may run zAAP processor eligible work on zIIP processors when no zAAP processors are installed on the machine. The default in z/OS V1R11 is YES. This support is also provided at releases z/OS V1R9 and z/OS V1R10 via APAR OA27495 and the default for those releases is NO.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Initialization and Tuning Reference*

System REXX enhancements

Description: System REXX, originally introduced in z/OS V1R9, has been enhanced to support the following functions:

- Data sets can now be concatenated to SYS1.SAXREXEC. This is established using the new REXXLIB statement in the AXRnn parmlib member.
- The TSO/E STORAGE function is supported in read-only mode.
- Parmlib members other than AXR00 can be specified using the new AXR= keyword in IEASYSxx.
- JES affinity is acquired for AXRnn address spaces when the primary JES subsystem starts. Every TSO=YES AXREXX invocation has a JES jobid and joblog associated with it. This enables additional capabilities related to the JES spool to be leveraged within a REXX exec running under System REXX, including the ability to write JCL to an internal reader, retrieve output, and use the TSO/E TRANSMIT, RECEIVE and SEND commands.
- Support for z/OS UNIX callable services (syscalls) for TSO=YES AXREXX requests allows full use of available syscall commands.
- Two new built-in functions are provided: AXRINFO returns the name of the subsystem under which the exec is running (JES2, JES3, or MSTR), and AXRWAIT provides a wait function for use within a REXX exec.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Authorized Assembler Services Reference ALE-DYN*
- *z/OS MVS Programming: Authorized Assembler Services Guide*
- *z/OS MVS System Commands*
- *z/OS MVS Initialization and Tuning Reference*
- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS MVS System Messages, Vol 3 (ASB-BPX)*
- *z/OS MVS System Codes*
-

RRS Global Panel Options

Description: RRS Global Panel Options (ATRFPPVAR) is available to indicate how the timestamp of RRS panels is displayed by selecting either GMT time or LOCAL time. The default setting is GMT.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Resource Recovery*

Service aids enhancements

Description:

- Message IEA045I is issued when SVC dump capture is started.
- SVC dump data capture uses a lower limit for stopping data capture with the new AUXMGMT=ON default. No new dumps are allowed when auxiliary storage usage reaches 50%. New dumps are allowed again only after the auxiliary storage usage drops below 35%. Current SDUMP data capture stops when auxiliary storage usage exceeds 68%, generating a partial dump.
- As an enhancement to the SDUMP timer DIE, you can issue the CHNGDUMP SET,SDUMP,MAXSNDSP= command to specify the maximum time interval that an SVC dump can keep a system non-dispatchable. For example, a system should not stay non-dispatchable long enough to result in being partitioned from the sysplex. The default interval is 15 seconds.
- As exploitation of stage 2 of extended access volume support (EAV2), the following data sets are in support of placement in cylinder-managed space:
 - Formatted print files including ABEND dumps, SNAP dumps, and the print files from AMBLIST, SPZAP, and AMATERSE.
 - Unformatted dump data sets.
 - Unformatted external traces from component trace and GTF trace.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Commands*
- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS MVS System Messages, Vol 6 (GOS-IEA)*
- *z/OS Migration*

GRS: ENQ Contention Notification enhancements

Description: New ENF 51 contention signal filtering is introduced to provide improved monitoring and contention resolution capability. This signal-specific filtering capability can reduce ENF traffic and improve usability to ENF listeners.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS Programming: Authorized Assembler Services Guide*

GRS: Exit enhancements

Description: GRS provides the following enhancements:

- A new ISGNQXITQUEUED2 exit is provided to allow users to know if any of the ENQs are in contention and, as the exit runs under the user's task, to be able to gather requester context information.
- ISGCNFXITSYSTEM and ISGCNFXITSYSPLEX exits are modified to provide more information about each request.
- RscTokens are externalized for global resources. RscTokens are provided in ISGQUERY, ISGNQXITQUEUED1, and the ISGCNFXITSYSTEM/SYSPLEX exits.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Installation Exits*

GRS: Enhanced contention analysis for GRS latch

Description: The following enhancements have been made to provide some real time detection and greatly improved technical analysis for latches:

- New Enhanced Contention Analysis display commands for latches: D GRS,ANALYZE,LATCH
- New Latch Identity services: ISGLID and ISGLID64

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Planning: Global Resource Serialization*
- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS Programming: Authorized Assembler Services Guide*
- *z/OS MVS System Commands*
- *z/OS MVS System Codes*
- *z/OS MVS System Messages, Vol 9 (IGF-IWM)*

GQSCAN and ISGQUERY enhancements

Description: The following enhancements have been made to provide GRS STAR mode storage constraint relief for GQSCAN and ISGQUERY processing. All GRS Star Mode Query (GQSCAN and ISGQUERY) requests that required cross-system global ENQ gathering previously shared a single 2GB GRS dataspace. Now, 64-bit GRS private storage is used to store this data. This greatly increasing the amount of concurrent query requests that can be supported.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Codes*
- *z/OS MVS System Messages, Vol 6 (GOS-IEA)*

IOS: Basic HyperSwap Support Enhancement

Description: The Basic HyperSwap support is enhanced in V1R11:

- The SETHS RESUMEIO command resumes normal I/O activity to all DASD devices that have been stopped by Basic HyperSwap because the STOP option was used.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Commands*
- *z/OS MVS System Messages, Vol 9 (IGF-IWM)*

Message Flood Automation enhancement: Removing MFA use of customer exits

Description: In a z/OS R11 system or z/OS R9 or R10 system with APAR OA25602 installed, the use of IEAVMXIT and System Command Exit by Message Flood Automation is completely removed. Message Flood Automation processing is invoked directly within the message processing path. The advantages include:

- Eliminating the installation steps required to install Message Flood Automation
- Enabling Message Flood Automation to see and take action against all messages even if they are being sent through specific MPF exits

Because Message Flood Automation processing is invoked from directly within the message processing path, users must not have any obsolete version (pre-z/OS R11) of Message Flood Automation installed. To ensure that neither the IEAVMXIT message exit nor system command exit is installed, a new Consoles Health Check CNZ_OBSOLETE_MSGFLD_AUTOMATION is also introduced.

When change was introduced: Integrated z/OS V1R11 and available in z/OS V1R10 and z/OS V1R9 with APAR OA25602.

Reference information:

- *z/OS MVS Planning: Operations*
- *z/OS MVS System Commands*
- *z/OS MVS System Messages, Vol 4 (CBD-DMO)*
- *z/OS MVS System Messages, Vol 6 (GOS-IEA)*
- *z/OS MVS Dump Output Messages*
- *z/OS MVS System Codes*
- *z/OS MVS Diagnosis: Reference*
- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS MVS Initialization and Tuning Reference*

Program Management Binder IEWPARMS

Description: The new IEWPARMS DD statement is supported as an alternate source for binder options, and can also improve trace handling for diagnostic purposes.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Program Management: User's Guide and Reference*
- *z/OS MVS Program Management: Advanced Facilities*
- *z/OS MVS System Messages, Vol 8 (IEF-IGD)*

Predictive failure analysis

Description: Soft failures are abnormal yet allowable system behavior that can slowly lead to the degradation of the operating system. To help eliminate soft failures, z/OS has developed Predictive Failure Analysis (PFA) using remote checks from IBM Health Checker for z/OS to collect data about your installation. Using this data, PFA constructs a model of the expected (future) behavior of the z/OS images, compares the actual behavior with the expected behavior, and if the behavior is abnormal issues a health check exception. Beginning with z/OS V1R11, z/OS introduces the following Predictive Failure Analysis (PFA) checks:

PFA_COMMON_STORAGE_USAGE

The check is looking to see if there is a potential for storage in the common storage area (CSA) plus system queue area (SQA) or in the extended common storage area (ECSA) plus extended system queue area (ESQA) to be exhausted in the upcoming PFA model interval.

PFA_LOGREC_ARRIVAL_RATE

The check is looking at the arrival frequency of selected software logrec entries. By monitoring the counts of software LOGREC arrivals, PFA can detect when the number of errors occurring could indicate a damaged system or address space.

PFA_VIRTUAL_STORAGE_USAGE

This check is looking for a persistent job that is using an abnormal amount of virtual storage which might indicate that a job is leaking virtual storage.

PFA_MESSAGE_ARRIVAL_RATE

This check is looking at the arrival rate of messages normalized by CP utilization to detect when either a persistent job or the z/OS image is damaged and is generating an excessive number of messages.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Problem Management*

SMF enhancements

Description:

- When using the IFASMF DL program to dump SMF log stream data, you can specify the RELATIVEDATE parameter to filter the data recorded during a specific date range.
- The LSNAME parameter of the IFASMF DL program supports new OPTIONS keywords to delete data from the log stream:

- ARCHIVE, which deletes data after dumping the log stream to a data set.
- DELETE, which simply deletes the data from the log stream.
- You can specify the MAXDORM parameter in parmlib member SMFPRMxx for both data set recording and log stream recording.
- The following 8-byte fields are added to the Performance section of the SMF type 30 records: SMF30SRV_L, SMF30CSU_L, SMF30SRB_L, SMF30IO_L, SMF30MSO_L, and SMF30ESU_L. The contents of these fields are equivalent to their 4 byte counterparts: SMF30SRV, SMF30CSU, SMF30SRB, SMF30IO, SMF30MSO, and SMF30ESU, respectively; but the values in the new 8 byte fields continue to grow past X'FFFFFFFF'.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Management Facilities (SMF)*
- *z/OS MVS Initialization and Tuning Reference*

System logger enhancements

Description: There are three system logger enhancements:

- System Logger changes reduce concurrent log stream connection time involving staging data set allocations. These changes are intended to help improve IPL and Logger restart times.
- A threshold mechanism is provided to limit logger callers from causing excessive concurrent asynchronous IXGWRITE requests to be outstanding. Invokers are notified when the condition clears and additional write requests can be honored.
- System Logger provides log stream name identification for related latches, and the improved GRS latch analysis commands and messages improved analysis for latch contention, a new DISPLAY GRS,ANALYZE command, similar to the one available for enqueues, and can help make it easier to identify deadlocks and to find the root cause of latch contention.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS System Messages, Vol 10 (IXC-IZP)*
- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS Diagnosis: Reference*
- *z/OS MVS Programming: Assembler Services Guide*

WLM enhanced routing recommendations

Description: The WLM IWM4SRSC and IWMSRSRS services are enhanced to return detailed results and finetune the recommendations for routing work between servers in a sysplex.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Workload Management Services*

WLM supports classification of Tivoli Director Server work

Description: With the new WLM subsystem type LDAP supported, Tivoli Director Server can now classify its work and allow end users to set performance goals for different kinds of LDAP work.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Planning: Workload Management*
- *IBM Tivoli Directory Server Administration and Use for z/OS*

WLM maximum number of instances per WLM server address space extended

Description: The limit of server instances (the maximum number was 1000) per server address space is now removed.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Workload Management Services*

WLM supports more detailed reporting

Description: The number of report classes allowed in a WLM service definition is extended from 999 to 2047 which allows for more detailed reporting.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Planning: Workload Management*

WLM HiperDispatch mode improved for zIIPs

Description: The HiperDispatch function now supports dispatching to multiple zIIP affinity nodes.

When change was introduced: z/OS V1R11.

Reference information: None.

WLM REQLPDAT callable from unauthorized users

Description: The SYSEVENT REQLPDAT that provides system capacity data can now be invoked unauthorized thus improving the ease of use for the customer.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Programming: Authorized Assembler Services Reference SET-WTO*
- *z/OS MVS Programming: Authorized Assembler Services Reference EDT-IXG*
- *z/OS MVS System Codes*

XCF/XES enhancements

Description:

- By using the BCPII interfaces to invoke z/Series Hardware APIs, XCF can detect the state of remote images in the sysplex and use the obtained information to enhance and expedite sysplex partitioning processing.
 - The partition monitoring system can detect changes in the target system status, initiate partitioning actions, and might be able to bypass certain delays built into the partitioning process.
 - The default status update missing action is to isolate that system immediately using the fencing services.
- XCF can automatically adjust the failure detection interval (FDI) to use for systems in the sysplex when needed. The effective failure detection interval is the longer one of two intervals resulting from the user-specified FDI and a value based on the system's excessive spin parameters.
- XCF is updated to not immediately load a wait state when the GDPS/PPRC controlling system loses sysplex time synchronization and switches to local timing mode. However, XCF limits the amount of time that the controlling system can remain in the sysplex without external time synchronization.
- XES design is enhanced to accommodate processing large number of coupling facility subchannels:
 - The subchannel information returned by DISPLAY command is reformatted to provide the results with fewer lines.
 - The algorithm for subchannel operation completion, recovery, and notification processing is optimized to process more subchannel operation results in less time and with fewer spin loop timeouts.
- The size of XES hash tables has been increased to improve performance of serialized connections (lock and serialized list structures) and reduce contention related to these data structures.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Setting Up a Sysplex*
- *z/OS MVS Programming: Sysplex Services Guide*
- *z/OS MVS System Messages, Vol 10 (IXC-IZP)*
- *z/OS MVS System Commands*
- *z/OS MVS Initialization and Tuning Reference*
- *z/OS MVS Diagnosis: Reference*

C/C++ without Debug Tool new functions to consider

This topic describes new XL C/C++ functions in z/OS.

XL C/C++ compiler option MAKEDEP and the related options M and MF are introduced

Description: Before z/OS V1R11, the stand-alone makedepend utility was used to analyze source files and determine source dependencies. In z/OS V1R11, the XL C/C++ compiler option MAKEDEP and the related options M and MF are introduced and can be used to obtain similar information. The use of the compiler option MAKEDEP is recommended.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*
- *z/OS XL C/C++ Compiler and Run-Time Migration Guide for the Application Programmer*
- *z/OS UNIX System Services Command Reference*

XL C/C++ compiler option RTCHECK is introduced

Description: The RTCHECK option is introduced to generate compare-and-trap instructions that perform certain types of runtime checking. The messages can be used to debug C and C++ programs.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

XL C++ compiler suboption NAMEMANGLING(zOSV1R11_ANSI) and mangling-related compiler options and pragma directives are introduced

Description: By changing the name mangling rules, programmers have the capability to switch between linking to newly-compiled code or compiled legacy code. This capability may be necessary in the event that there are mangling-related mutual compatibility issues that affect the two pieces of compiled code.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*
- *z/OS XL C/C++ Language Reference*

XL C/C++ compiler option SHOWMACROS is introduced

Description: The SHOWMACROS option is used to display macros definitions to preprocessed output. This option can help to determine the available functionality in XL C/C++ compiler. The macro listing may prove useful in debugging complex macro expansions.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

XL C/C++ compiler option SKIPSRC is introduced

Description: When a listing file is generated using the SOURCE option, SKIPSRC option can be used to determine whether the source statements skipped by the compiler are shown in the source section of the listing file.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

XL C/C++ compiler option REPORT is introduced to produce pseudo-C code

Description: When the LIST option is specified, the z/OS XL C/C++ compiler generates a listing file for each source file named on the command line. When used with the REPORT option, pseudo-C code listing files are produced to show how sections of code have been optimized in both compile and link phases. You can use this information to understand your application code and to tune your code for better performance.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

XL C/C++ compiler option PREFETCH is introduced

Description: The PREFETCH option is introduced to insert prefetch instructions automatically where there are opportunities to improve code performance.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

XL C/C++ compiler option INLINE might behave differently

Description: XL C/C++ compiler option INLINE might behave differently than in prior releases because of the implementation of a new inliner. The functions that get inlined might be different, and the inline report might look different.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ Compiler and Run-Time Migration Guide for the Application Programmer*

Support for Unicode literals and character types

Description: As of z/OS V1R11, Unicode literals and character types are supported. In C mode, the Unicode literals are enabled under the extended language level and disabled under strictly-conforming language levels. In C++ mode, the Unicode literals and character types are enabled under the extended and extended0x language levels, and disabled under other language levels.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*
- *z/OS XL C/C++ Language Reference*

Support for GCC statement expression constructs in XL C compiler

Description: A statement expression construct is a GCC extension that is not offered in ISO standard C. This feature enables a compound statement enclosed in parentheses to appear as an expression, which enables the use of loops, switches, and local variables within an expression.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ Language Reference*

Support for zero-extent array members

Description: A zero-extent array is an array with no dimensions. Like a flexible array member, a zero-extent array can be used to access a variable-length object. Unlike a flexible array member, a zero-extent array is not a C99 feature, but is provided for GNU C compatibility.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ Language Reference*

MVS version of dbgld command

Description: The CDADBGLD utility is the MVS batch equivalent of the dbgld command and can be used in batch mode instead of using z/OS UNIX System Services. The compiler creates a debug side file for each compilation unit if the DEBUG compiler option is specified. The path names or data set names of all the debug side files are then stored in the module, which is an executable file or a DLL. The CDADBGLD utility opens all of the debug side files associated with the module and store all of the functions, global variables, external types, and source files in a module map. The performance of the debugger, especially the start time, is designed for significant improvement if the CDADBGLD utility is executed before the execution of a debugger.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*
- *z/OS XL C/C++ Messages*

Full support for MVS linkage conventions

Description: CICS Transaction Server for z/OS V4R1 adds full support for MVS Linkage conventions, which will relax the requirement for C/C++ users to use the FLOAT(AFP(VOLATILE)) option when compiling floating point code to be used in the CICS environment.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS XL C/C++ User's Guide*

Standard C++ Library enhancements

Description: The Standard C++ Library Reference includes information on feature enhancements, which are based in part on the ISO document ISO/IEC TR 19768 -- Technical Report on C++ Library Extensions. The enhancements are extensive. Some contribute to existing headers and others take the form of new headers. You may want to take advantage of these improvements to the Standard C++ libraries.

When change was introduced: z/OS V1R11

Reference information:

- *Standard C++ Library Reference*

Common Information Model (CIM) new functions to consider

This topic describes new Common Information Model (CIM) functions in z/OS.

SMI-S profiles

Description: The Storage Management Initiative Specification (SMI-S) specifies standards-based profiles to manage storage networks. It builds on other standards such as CIM. The scope of SMI-S includes storage, storage virtualizers, fibre channel fabrics and IP connectivity, and host storage-specific CIM-based profiles. For more information, refer to the SNIA Web site.

Starting with z/OS, CIM supports the SMI-S profiles "Host Discovered Resources (HDR)" and "Storage Host Bus Adapter (HBA)".

In order to implement these profiles, the following CIM classes for storage management are implemented by CIM for z/OS:

- IBMzOS_FCPort
- IBMzOS_FCPortStatistics
- IBMzOS_PortController
- IBMzOS_Product
- IBMzOS_SBProtocolEndpoint
- IBMzOS_SoftwareIdentity
- Association IBMzOS_ControlledBy
- Association IBMzOS_CSFCPort
- Association IBMzOS_CSFCPortController
- Association IBMzOS_ElementSoftwareIdentity
- Association IBMzOS_FCPortStatisticalData
- Association IBMzOS_SBHostedAccessPoint
- Association IBMzOS_InstalledSoftwareIdentity
- Association IBMzOS_ProductElementComponent
- Association IBMzOS_SBDeviceSAPImplementation
- Association IBMzOS_SBInitiatorTargetLogicalUnitPath

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Setting Up a Sysplex.*

Improved Multi-Level Security (MLS)

Description: Starting with z/OS 1.12 the MLS support activates the Out-Of-Process provider support and uses one address space per security label for full protection of classified documents and information.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Setting Up a Sysplex.*

Modified cimcli command

Description: The cimcli command has been modified:

- The new function *modifyInstance* allows the modification of an instance residing in the repository.
- The new function *testInstance* allows value testing of an instance.
- The function *createInstance* now allows to specify array values.
- A new syntax for instance names for *enumerateInstances* allows the specification of array values.
- New options have been implemented:
 - ic** sets the includeClassOrigin parameter to true
 - sort** sorts the output
- The option -ip for the function *invokeMethod* has become obsolete.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Setting Up a Sysplex.*

CICS / IMS transaction classes support

Description: Support for CICS and IMS transaction service classes in workload conditions within a Capacity Provisioning policy

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide.*

Set-up simplification

Description: Simplified set-up of the Capacity Provisioning CIM provider

Description: RACF security definitions provided as sample

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide.*

More status information in the Capacity Provisioning Control Center

Description: Detailed status information about the Capacity Provisioning Manager within the Capacity Provisioning Control Center

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide.*

Averaged PI

Description: Support for management on behalf of averaged PI

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide.*

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Vista support

Description: Support for Microsoft® Windows® Vista on the workstation running the Capacity Provisioning Control Center

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide*.

Hardware support

Description: Support for hardware with power save function

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Capacity Provisioning User's Guide*.

Tracing

Description: To facilitate the control of the CIM server, you can record tracing messages in a file, display them on the z/OS Comm system logger (syslog) daemon, or dump them to memory.

In addition, you can combine the tracing messages and the logging messages to a single message stream.

- With z/OS V1R11, the trace levels have been redefined. In addition to the former functionality, they now allow to
 - Set tracing on and off
 - Configure method enter and exit tracing messages
- The new property *traceFacility* allows to specify the destination of the tracing messages:
 - A fully qualified filename (in combination with the new property *traceFilePath*)
 - The logging facility (in combination with the property *logLevel*)
 - Memory (in combination with the new property *traceMemoryBufferKbytes*)
- The new trace component LogMessages routes the logging messages into the tracing message stream.
- The new default for *traceComponents* is ALL, which enables tracing for all components.
- The new default for *traceLevel* is 2, which means that basic flow trace messages are issued.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Common Information Model User's Guide*

IPv6 support

Description: CIM now supports IPv6.

When change was introduced: z/OS V1R11.

Reference information: None.

Property specification

Description: The new z/OS specific property *sequentialReleaseNumber* returns the release number of the operating system as an ever increasing number.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Common Information Model User's Guide*

Communications Server new functions to consider

This topic describes new Communications Server functions in z/OS.

Application integration, data consolidation, and standards

Description: z/OS V1R12 Communications Server improves application integration, data consolidation, and standards in the following areas:

- **Enhancements to IPv6 router advertisement** - Support is included for the enhancements to IPv6 router advertisement messages that are described in RFC 4191 and RFC 5175. The enhancements include:
 - The ability to learn indirect prefix routes from IPv6 router advertisement messages
 - The ability to associate preference values with default routes and indirect prefix routes that are learned from IPv6 router advertisement messages
- **Configurable default address selection policy table** - Support for RFC 3484 is implemented by providing a configurable policy table for default address selection for IPv6. The source address selection algorithm and destination address selection algorithm support additional address selection rules in conjunction with the configured or default policy table.

z/OS V1R12 Communications Server also enhances the SRCIP configuration statement so that you can indicate that the TCP/IP stack should prefer public IPv6 addresses over temporary IPv6 addresses.

- **Socket API support for source address selection** - Support for RFC 5014 is implemented by providing an IPv6 socket API for source address selection. This support implements sockets API extensions for the following languages:
 - z/OS XL C/C++
 - z/OS UNIX System Services (z/OS UNIX) callable services
 - LE C/C++
 - USS Assembler Callable (BPX1* and BPX4*)
 - REXX socket API EZASMI macro ASM
 - CALL instruction API
 - CICS C Sockets
 - CICS EZASMI macro ASM
 - CICS EZASOKET callable for ASM, PL/I and Cobol
- **Resolver support for IPv6 connections to DNS name servers** - The system resolver is allowed to send requests to the Domain Name System (DNS) name servers using IPv6 communication. You use the existing NSINTERADDR and NAMESERVER resolver configuration statements in the TCPIP.DATA data set to define the IPv6 address of the name server.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Enhancements to IPv6 router advertisement
- Configurable default address selection policy table
- Socket API support for source address selection
- Resolver support for IPv6 connections to DNS name servers

Scalability, performance, constraint relief, and accelerators

Description: z/OS V1R12 Communications Server includes the following enhancements to scalability, performance, constraint relief, and accelerators:

- **Performance improvements for sysplex distributor connection routing -** Processing for OSA-Express in QDIO mode supports inbound workload queueing. Inbound workload queueing uses multiple input queues for each QDIO data device (subchannel device) to improve TCP/IP stack scalability and general network optimization. You implement the performance improvements for sysplex distributor connection routing by enabling inbound workload queueing to process sysplex distributor traffic concurrently with other types of inbound QDIO traffic. When you enable these improvements for a QDIO interface, inbound sysplex distributor traffic is processed on an ancillary input queue (AIQ). All other inbound traffic is processed on the primary input queue or on an ancillary input queue for streaming bulk data.
- **Performance improvements for streaming bulk data -** Processing for OSA-Express in QDIO mode supports inbound workload queueing. Inbound workload queueing uses multiple input queues for each QDIO data device (subchannel device) to improve TCP/IP stack scalability and general network optimization. You implement the performance improvements for streaming bulk data by enabling inbound workload queueing to process streaming bulk data traffic concurrently with other types of inbound QDIO traffic. When you enable these improvements for a QDIO interface, inbound traffic for connections that exhibit streaming bulk data behavior is processed on an ancillary input queue (AIQ). All other inbound traffic is processed on the primary input queue or on an ancillary input queue for sysplex distributor connection routing.
- **Support for z/OS Communications Server for intra-ensemble networks -** This support offers communications access to two new internal networks through OSA-Express3 adapters that are configured with an appropriate channel path ID (CHPID) type. The following list describes the two new internal networks:
 - The intranode management network - It provides connectivity between network management applications within the node and it can be accessed through 1 gigabit OSA-Express3 adapters that are configured with a CHPID type of OSM.
 - The intra-ensemble data network - It provides access to other images that are connected to the intra-ensemble data network and to applications and appliances that are running in an IBM System z BladeCenter Extension (zBX). This internal network can be accessed through 10 gigabit OSA-Express3 adapters that are configured with a CHPID type of OSX.

z/OS V1R12 Communications Server adds support for OSA-Express3 adapters that are configured with the new OSM and OSX CHPID types, thus allowing TCP/IP connectivity to the two new internal networks.
- **Improvements to AT-TLS performance -** The Application Transparent - Transport Layer Security (AT-TLS) processing provides reduced CPU usage when encrypting and decrypting application data.

- **Sysplex distributor support for hot-standby server** - Sysplex distributor support for hot-standby server is provided through the use of a new distribution method, HotStandby. You configure a preferred server and one or more hot-standby servers. The preferred server that has an active listener receives all new incoming connection requests, and the hot-standby servers act as backup servers in case the designated preferred server become unavailable. You can rank the hot-standby servers to control which hot-standby server becomes the active server. You can also control whether the sysplex distributor automatically switches back to using the preferred server if it again becomes available, and whether the distributor automatically switches servers if the active target is not healthy.
- **Common storage reduction for TN3270E server** - The TN3270E Telnet server provides access method control block (ACB) sharing for Telnet logical units (LUs) as a way to reduce extended common storage area (ECSA) usage. Prior to z/OS V1R12 Communications Server, every Telnet LU name opened its own ACB to VTAM. You can code a new SHAREACB statement to enable multiple Telnet LUs to share a single ACB, which reduces the overall amount of ECSA (and Telnet private) storage allocated to support Telnet sessions.
Telnet LU ACB sharing can benefit your installation if you currently run a large number of connections to a given Telnet server.
- **Performance improvements for fast local sockets** - The performance of fast local sockets for TCP connections is enhanced.
- **Improved resolver reaction to unresponsive DNS name servers** - Provides notification to the operator console when a Domain Name System (DNS) name server does not respond to a certain percentage of resolver queries that are sent to the name server during a sliding 5-minute interval. In addition to the notification, statistics regarding the number of queries attempted and the number of queries which received no response are displayed for each currently unresponsive name server at 5-minute intervals.
The default value for the TCPIP.DATA RESOLVERTIMEOUT configuration statement, which controls the timeout value for UDP requests sent to a name server, is now 5 seconds instead of 30 seconds.
- **Sysplex autonomics monitoring TCP/IP abends** - Sysplex problem detection and recovery is improved so that the sysplex detects when the TCP/IP stack has ended abnormally five times in less than a minute.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Performance improvements for sysplex distributor connection routing
- Performance improvements for streaming bulk data
- Support for z/OS Communications Server for intra-ensemble networks
- Improvements to AT-TLS performance
- Sysplex distributor support for hot-standby server
- Common storage reduction for TN3270E server
- Performance improvements for fast local sockets
- Improved resolver reaction to unresponsive DNS name servers
- Sysplex autonomics monitoring TCP/IP abends

Security

Description: z/OS V1R12 Communications Server includes enhancements to security in the following areas:

- **IKE version 2 support** - Internet Key Exchange version 2 (IKEv2) is the second version of the Internet Key Exchange (IKE) protocol, which is used by peer nodes to perform mutual authentication and to establish and maintain Security Associations (SAs). In z/OS V1R12 Communications Server, the IKE daemon (IKED) supports IKEv2, in addition to supporting IKEv1. The z/OS Communications Server support for IKEv2 includes the following:
 - IPv4 and IPv6 support
 - A new identity type, KeyID.

Note: KeyID is also supported for IKEv1.

- Authentication using pre-shared keys or digital certificates; certificates can use RSA or elliptic curve keys
- Re-keying and re-authentication of IKE SAs and child SAs
- Hash and URL encoding of certificates and certificate bundles
- **IPSec support for certificate trust chains and certificate revocation lists** - The following enhancements are made the network security services (NSS) processing of IPSec certificate trust chains and certificate revocation lists:
 - All the certificate authorities in the trust chain are considered when NSS is creating or verifying a signature for certificate authorities that are in the key ring.
 - Certificate revocation information is used when available when NSS is verifying a certificate.

The z/OS Internet Key Exchange daemon (IKED) uses these new NSS daemon (NSSD) functions when a stack is configured as a network security client.

- **IPSec support for cryptographic currency** - The following enhancements are made to IPSec and IKE support for cryptographic currency:
 - Support for the Advanced Encryption Standard (AES) algorithm in Cipher Block Chaining (CBC) mode for IP security. In addition to the previously existing support of AES with a 128-bit key length, z/OS V1R12 Communications Server supports AES with a 256-bit key length in CBC mode. Use the longer key length for highly sensitive data.
 - Support for the AES algorithm in Galois Counter Mode (GCM) and in Galois Message Authentication Code (GMAC) mode for IP security. AES in GCM mode provides both confidentiality and data origin authentication. AES-GCM is a very efficient algorithm for high-speed packet networks. AES in GMAC mode provides data origin authentication but does not provide confidentiality. You should use AES-GMAC when confidentiality is not needed. AES-GMAC, like AES-GCM, is also a very efficient algorithm for high-speed packet networks. z/OS V1R12 Communications Server supports both 128-bit and 256-bit key lengths for these algorithms.
 - Support for the use of Hashed Message Authentication Mode (HMAC) in conjunction with the SHA2-256, SHA2-384, and SHA2-512 algorithms. You can use these algorithms as the basis for data origin authentication and integrity verification. The new algorithms, HMAC-SHA2-256-128, HMAC-SHA2-384-192, and HMAC-SHA2-512-256, ensure that the data is authentic and has not been modified in transit. Versions of these algorithms that are not truncated are available as pseudorandom functions (PRFs). These algorithms are called PRF-HMAC-SHA2-256, PRF-HMAC-SHA2-384, and PRF-HMAC-SHA2-512.

- Support for an authentication algorithm, AES128-XCBC-96, that ensures the data is authentic and not modified in transit.
- Support for elliptic curve digital signature algorithm (ECDSA) authentication
- **IPSec support for FIPS 140 cryptographic mode** - Support is implemented for Federal Information Processing Standard (FIPS) 140 security requirements for cryptographic modules for IP security. This standard is useful to organizations that use cryptographic-based security systems to protect sensitive or valuable data. Protection of a cryptographic module within a security system is necessary to maintain the confidentiality and integrity of the information that is protected by the module. FIPS 140 dictates security requirements that should be satisfied by a cryptographic module to obtain higher degrees of assurance about the integrity of the module. FIPS 140 provides four increasing, qualitative levels of security that are intended to cover a wide range of potential applications and environments. z/OS V1R12 Communications Server support is for security level 1.
- **Trusted TCP connections** - Support is included for trusted TCP connections, which enable a sockets program to retrieve sysplex-specific connection routing information and partner security credentials for a socket that is connected. You can retrieve partner security credentials if both endpoints of a TCP connection reside in the same z/OS image, z/OS sysplex, or z/OS subplex, and the endpoints are in the same security domain. In such a topology, partner programs can use trusted connections to authenticate each other as an alternative to using an SSL/TLS connection with digital certificates for client and server authentication.
- **Digital certificate access server (DCAS) MODIFY command for debug level** - The digital certificate access server (DCAS) is enhanced so that you can modify the debug level without restarting the application.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- IKE version 2 support
- IPSec support for certificate trust chains and certificate revocation lists
- IPSec support for cryptographic currency
- IPSec support for FIPS 140 cryptographic mode
- Trusted TCP connections
- Digital certificate access server (DCAS) MODIFY command for debug level

Simplification and consumability

Description: z/OS V1R12 Communications Server includes enhancements to simplification and consumability in the following areas:

- **Enhancements to the TN3270E server** - The TN3270E Telnet server is enhanced to:
 - Specify the jobname of the Telnet server issuing a Telnet message.
 - Automatically shut down when an OMVS,SHUTDOWN command is issued.
 - Pass the connection type (basic or secure) to the application on the CINIT using flags in the CV64 control vector.
- **IBM Health Checker for z/OS OMPROUTE checks** - The z/OS Health Checker for z/OS adds two new checks in z/OS V1R12 Communications Server; one check is for IPv4 routing and one check is for IPv6 routing. The checks determine whether the total number of indirect routes in the TCP/IP stack routing

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table exceeds a maximum threshold (the default value is 2000 for indirect routes). When this threshold is exceeded, OMPROUTE and the TCP/IP stack can potentially experience high CPU consumption from routing changes. A large routing table is considered to be inefficient in network design and operation.

Two new maximum threshold parameters are available that override the default values for the total number of IPv4 and IPv6 indirect routes in a TCP/IP stack routing table before warning messages are issued.

- **Command to drop all connections for a server** - You can use the VARY TCPIP,,DROP command to drop all established TCP connections for servers that match the specified filter parameters. When you issue this command, all established TCP connections are dropped for each server that is found to match the specified filter parameters. You can filter by port, jobname, or server ASID.
- **Control joining the sysplex XCF group** - You can use a new configuration parameter to prevent a TCP/IP stack from automatically joining the sysplex group at startup. The TCP/IP stack can join the sysplex group at a later time when you issue the VARY TCPIP,,SYSPLEX,JOINGROUP command.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Enhancements to the TN3270E server
- IBM Health Checker for z/OS OMPROUTE checks
- Command to drop all connections for a server
- Control joining the sysplex XCF group

SNA and Enterprise Extender

Description: z/OS V1R12 Communications Server includes enhancements to SNA and Enterprise Extender (EE) in the following areas:

- **Enterprise Extender connection health verification** - An option is provided to verify the health of an Enterprise Extender (EE) connection by sending an LDLC probe to the remote partner using all five ports. You can verify the connection at activation only or during activation and periodically while the connection is active. During activation, if the LDLC probe cannot reach a port for any reason, you will not be able to activate the connection and you will receive an error message. If the remote partner does not support an LDLC probe, VTAM issues an error message and activates the connection. If periodic checking is enabled and an LDLC probe is supported but the LDLC probe cannot reach a port for any reason, VTAM issues an error message.
- **Multipath control for Enterprise Extender** - You can use the VTAM start option MULTPATH to control the multipath function for EE.
- **Improved recovery from RTP pipe stalls** - Local and path MTU discovery is provided to learn the correct MTU size for Enterprise Extender (EE) connections. The updated information is used to update the link size for the EE connection. If the EE connection is one hop of a high performance routing (HPR) connection, this updated MTU size information is not propagated to the remaining HPR path. This function updates the HPR connection with the updated link size.
- **Enhancements to topology database diagnostics** - The APPN topology database update (TDU) processing has additional diagnostic information and new diagnostic displays.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Enterprise Extender connection health verification
- Multipath control for Enterprise Extender
- Improved recovery from RTP pipe stalls
- Enhancements to topology database diagnostics

System management and monitoring

Description: z/OS V1R12 Communications Server includes enhancements to system management and monitoring in the following areas:

- **Performance improvement to TCP/IP callable NMI (EZBNMIFR)**
GetConnectionDetail request - The GetConnectionDetail request of the TCP/IP callable network management interface (NMI) request is enhanced to reduce its CPU utilization. This enhancement is provided when all the filters that are specified for the request contain the complete identification (4-tuple) of established TCP connections. The 4-tuple of a TCP connection consists of the local IP address, local port, remote IP address, and remote port for the connection.
- **Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics** - New TCP/IP callable NMI requests for the following TCP/IP stack information are provided:
 - Network interface information
 - Network interface and global statistics

Network management applications can use the request output to monitor interface status and TCP/IP stack activity. z/OS V1R12 Communications Server provides the following new requests:

GetGlobalStats

Provides TCP/IP stack global counters for IP, ICMP, TCP, and UDP processing.

GetIfs Provides TCP/IP network interface attributes and IP addresses.

GetIfStats

Provides TCP/IP network interface counters.

GetIfStatsExtended

Provides data link control (DLC) network interface counters.

- **SMF event records for sysplex events** - New SMF 119 event records (subtypes 32 – 37) allow sysplex event notification to describe the following events:
 - DVIPA status change (subtype 32)
 - DVIPA removed (subtype 33)
 - DVIPA target added (subtype 34)
 - DVIPA target removed (subtype 35)
 - DVIPA target server started (subtype 36)
 - DVIPA target server ended (subtype 37)

The new SMF 119 event records are written to the MVS SMF data sets; you can obtain them from the real-time TCP/IP network monitoring Network Management Interface (NMI) (SYSTCPSM).

- **Management data for CSSMTP** - New SMF 119 record subtypes improve the management of the Communications Server SMTP (CSSMTP) application:

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- CSSMTP configuration data records (subtype 48)
- CSSMTP target server connection records (subtype 49)
- CSSMTP mail records (subtype 50)
- CSSMTP spool records (subtype 51)
- CSSMTP statistics records (subtype 52)

Applications that process the new SMF 119 subtypes obtain them using a traditional MVS SMF exit routine or obtain them in real time from the z/OS Communications Server Network Management Interface (NMI) for SMF, SYSTCPSM.

- **Data trace records for socket data flow start and end** - TCP/IP data tracing (DATTRACE) provides two new trace records for processing associated with TCP and UDP sockets:
 - A start record with the State field API Data Flow Starts, which indicates that the first data was sent or received by the application for the associated TCP or UDP socket.
 - An end record with the State field API Data Flow Ends, which indicates that the socket has been closed.
- **Enhancements to the TN3270E server - session manager sends CV64** - VTAM provides applications the ability to pass IP information. An application, such as a session manager, can use this function to inform VTAM and its session partner of any IP characteristics (such as IP address or port number) that are associated with the resource that the application is representing. This function enables VTAM displays of the IP information, and it can enable additional PLU functionality.
- **Operator command to query and display OSA information** - A new DISPLAY TCPIP,,OSAINFO command is available to retrieve information about an interface from an OSA-Express feature that is in QDIO mode. The new command is an alternative to using OSA/SF, which lacks information about many of the latest enhancements to the OSA-Express feature and to z/OS Communications Server.
- **Packet trace filtering for encapsulated packets** - The following packet trace improvements are included:
 - Packet trace filtering is available to encapsulated packets that are used in VIPAROUTE traffic.
 - The next-hop IP address is included on the trace output. This address can be obtained from the fully formatted packet trace using the Interactive Problem Control System (IPCS). The next-hop IP address is also available to applications that use the real-time packet trace through the real-time TCP/IP networking monitoring API.Packet trace filtering is available for encapsulated packets.
- **Verify Netstat message catalog synchronization** - The Netstat command provides support to verify that the message catalogs that are being used are at the correct level when the message catalog is opened. This function prevents Netstat from abending or not functioning correctly when the message catalog is out of synch with the Netstat command.
- **Enhancements to the TCP/IP storage display** - The DISPLAY TCPIP,,STOR command display and the NMI storage statistics report are enhanced to distinguish the common storage that is used by dynamic LPA for load modules from the ECSA storage that is used for control blocks.
- **Enhancements to SNMP manager API** - The SNMP manager API is extended so that the API can do the following tasks:
 - Create and retrieve SNMP values of type UNSIGNED32.

- Configure an authoritative engine ID for SNMPv3 traps. Currently, the SNMP manager API creates its own SNMPv3 authoritative engine ID, part of which is a randomized value. A configured authoritative engine ID can be used with SNMP trap receiver applications so that the trap receiver applications recognize specific SNMP manager API applications when they are processing SNMPv3 traps.

When change was introduced: z/OS V1R12.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Performance improvement to TCP/IP callable NMI (EZBNMIFR) GetConnectionDetail request
- Enhancements to TCP/IP callable NMI (EZBNMIFR) - network interface and TCP/IP statistics
- SMF event records for sysplex events
- Management data for CSSMTP
- Data trace records for socket data flow start and end
- Enhancements to the TN3270E server - session manager sends CV64
- Operator command to query and display OSA information
- Packet trace filtering for encapsulated packets
- Verify Netstat message catalog synchronization
- Enhancements to the TCP/IP storage display
- Enhancements to SNMP manager API

Application integration, data consolidation, and standards (previous enhancements)

Description: z/OS Communications Server improves application integration, data consolidation, and standards in the following areas:

- **New SMTP client for sending Internet mail** - A new mail-forwarding SMTP client application called Communications Server SMTP (CSSMTP) is introduced. CSSMTP processes spool files on the JES spool data set that contain mail messages and forwards the mail messages to target message transfer agents (MTAs) without resolving each recipient.
- **FTP access to UNIX named pipes** - FTP can transfer files to or from z/OS UNIX System Services named pipes.
- **FTP large-volume access** - FTP reports can display space statistics for volumes.
- **FTP passive mode enhancements** - The FTP client supports a new configuration option, PASSIVEIGNOREADDR. This option causes the z/OS FTP client to ignore the IP address in the PASV reply when it is establishing a data connection to the FTP server. Instead, the z/OS FTP client uses the IP address it used to log into the FTP server and the port number from the PASV reply to establish the data connection.
- **Customizable pre-logout banner for otelnetd** - The z/OS UNIX Telnet server (otelnetd) provides a new banner page that can be displayed prior to the login prompt when a user connects to the server.
- **Remote execution server enhancements** - The MVS remote execution server improves the availability of the MVS remote execution server by polling JES for the status of jobs that are flagged as residing on the spool when the internal job

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name table is almost full. Job names representing jobs that have been purged become available for reuse. The polling function is not related to the setting of the PURGE parameter.

- **TN3270 support of TSO logon reconnect** - In conjunction with TSO/E, z/OS Communication Server provides support for logon reconnect when the LOGONHERE parameter is correctly defined in SYS1.PARMLIB member IKJTSOxx. The logon reconnect will takeover the original TSO session even when the original TSO session is not disconnected.
- **IPv6 stateless address autoconfiguration enhancements** - A client application can use IPv6 temporary addresses that were automatically configured and that were generated from a random interface ID to address security and privacy concerns identified by RFC 4941, *Privacy Extensions for Stateless Address Autoconfiguration in IPv6*. The use of temporary addresses with random and changing interface IDs embedded in the address makes it more difficult for eavesdropping software to correlate independent transactions that use different IPv6 addresses that were automatically configured but that involve the same z/OS system.
- **New API to obtain IPv4 network interface MTU** - Applications can determine the MTU (maximum transmission unit) for a TCP/IP stack IPv4 interface using a new programming interface ioctl.
- **RFC 5095 deprecation of IPv6 type 0 route header** - TCP/IP is modified to deprecate support for IPv6 type 0 routing headers. The reason for this deprecation is described in RFC 5095.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- New SMTP client for sending Internet mail
- FTP access to UNIX named pipes
- FTP large-volume access
- FTP passive mode enhancements
- Customizable pre-logon banner for otelnetd
- Remote execution server enhancements
- TN3270 support of TSO logon reconnect
- IPv6 stateless address autoconfiguration enhancements
- New API to obtain IPv4 network interface MTU
- RFC 5095 deprecation of IPv6 type 0 route header

Availability and business resilience

Description: z/OS Communications Server improves availability and business resilience in the following areas:

- **Improved responsiveness to storage shortage conditions** - TCP/IP and OMPROUTE processing is improved to help relieve storage shortages.
- **Disable moving DVIPA as source IP address** - The TCPSTACKSOURCEVIPA function is enhanced to prevent the stack from using dynamic virtual IP addresses (DVIPAs) in MOVING state as source IP addresses.
- **Support for enhanced WLM routing algorithms** - Server-specific workload manager (WLM) recommendations are enhanced. The recommendations are

used by the sysplex distributor to balance workload when DISTMETHOD SERVERWLM is configured on the VIPADISTRIBUTE statement.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Improved responsiveness to storage shortage conditions
- Disable moving DVIPA as source IP address
- Support for enhanced WLM routing algorithms

Scalability, performance, constraint relief, and accelerators (previous enhancements)

Description: z/OS Communications Server improves scalability, performance, constraint relief, and accelerators in the following areas:

- **accept_and_receive API enhancements** - The accept_and_recv socket API includes significant enhancements.
- **TCP/IP support for system z10 hardware instrumentation** - TCP/IP uses the z/OS MVS CSVDYLPA service to load its load modules.
- **TCP/IP pathlength improvements** - The TCP layer is updated to detect and react transparently to two common sockets programming errors. The two cases that Communications Server now guards transparently against are traffic stalls caused by Nagle algorithms and delayed TCP acknowledgements and deadlock caused by insufficient TCP receive buffer size.
- **TCP throughput improvements for high-latency networks** - Performance is improved for inbound streaming TCP connections over networks with large bandwidth and high latency by automatically tuning the ideal window size for such TCP connections.
- **Virtual storage constraint relief** - Some data areas that map socket connections from ECSA to storage that is above the 2-gigabyte threshold are moved to provide additional common storage (ECSA) constraint relief; the ECSA storage reduction is directly proportional to the number of open sockets.
- **NSS private key and certificate services for XML appliances** - Network security services (NSS) is enhanced to improve XML appliance security as a logical extension of z/OS security.
- **Enterprise Extender IPsec performance improvements** - IP processing optimizes the Enterprise Extender (EE) path length when EE is protected by IPsec, as well as makes better use of zIIP processors for systems that are configured to use zIIPs.
- **Resolver DNS cache** - The resolver can use system-wide caching of domain name server (DNS) responses. The system resolver cache can be used to eliminate redundant network flows to DNS servers, which can provide significant performance improvements for z/OS workloads that perform repetitive resolver queries.
- **Sysplex autonomics improvements for FRCA** - The accuracy of the server efficiency factor (SEF) for server applications using the Fast Response Cache Accelerator (FRCA) function with persistent HTTP connections is improved.
- **QDIO routing accelerator** - The QDIO routing accelerator function provides accelerated forwarding at the DLC layer when the packets are flowing over any inbound OSA-Express QDIO or HiperSockets and outbound OSA-Express QDIO or HiperSockets DLC combination.

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- **Sysplex distributor connection routing accelerator** - The QDIO accelerator provides accelerated forwarding of packets that the sysplex distributor forwards to a target stack when the packets are flowing over one of the above inbound and outbound DLC combinations.
- **Sysplex distributor optimization for multi-tier z/OS workloads** - An optimization is provided so that if sysplex distributor is also being used as the load balancer for the tier 1 server applications, the tier 1 sysplex distributor can have visibility into both tiers of the z/OS server applications on a given system when making a load balancing decision on an incoming tier 1 connection request. When using WLM based recommendations, this optimization allows sysplex distributor to compute a composite WLM weight for each system that includes the capacity, performance, and health characteristics of both the tier 1 server applications and the tier 2 server applications.
- **Sysplex distributor support for DataPower** - Sysplex distributor is enhanced to provide workload balancing capabilities for IBM WebSphere DataPower appliances.
- **OSA-Express3 optimized latency mode** - An OSA-Express3 device can operate in optimized latency mode, which optimizes interrupt processing for both inbound and outbound data. When an OSA-Express3 device is operating in optimized latency mode, latency is decreased and throughput is increased, particularly for interactive, non-streaming workloads.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- accept_and_receive API enhancements
- TCP/IP support for system z10 hardware instrumentation
- TCP/IP pathlength improvements
- TCP throughput improvements for high-latency networks
- Virtual storage constraint relief
- NSS private key and certificate services for XML appliances
- Enterprise Extender IPsec performance improvements
- Resolver DNS cache
- Sysplex autonomics improvements for FRCA
- QDIO routing accelerator
- Sysplex distributor connection routing accelerator
- Sysplex distributor optimization for multi-tier z/OS workloads
- Sysplex distributor support for DataPower
- OSA-Express3 optimized latency mode

Security (previous enhancements)

Description: z/OS Communications Server improves security in the following areas:

- **IPsec enhancements** - The Internet Key Exchange (IKE) daemon's retransmission scheme better conforms to RFC 2408. Rather than using fixed intervals for IKE message retransmission, the daemon uses a geometrically increasing retransmission interval. Some fine-grained attributes are reported in the **ipsec** command reports as well as in the Network Management Interface (NMI) and System Monitoring Facility (SMF) records.

- **AT-TLS enhancements** - AT-TLS supports the System SSL functions that have been added since z/OS Communications Server V1R7.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- IPsec enhancements
- AT-TLS enhancements

Simplification and consumability (previous enhancements)

Description: z/OS Communications Server improves simplification and consumability in the following areas:

- **Configuration Assistant enhancements** - The following list identifies the new Configuration Assistant functions:
 - Configure the Policy Agent configuration file
 - Configure the Defense Manager Daemon (DMD)
 - Configure the base location
 - Customize EBCDIC codepage support
 - Set up Policy Agent tasks
 - Install an **all files** option
 - Notify the administrator when configuration data is changed
- **syslogd enhancements** - The internal structure of syslog daemon (syslogd) provides more efficient processing of log messages. The syslogd job name matches the name of the cataloged procedure, and a set of operator commands starts, stops, and controls the daemon. The syslog daemon also performs automatic archival of z/OS UNIX files, based on configurable options.
- **syslogd browser and search facilities** - An ISPF-based syslog daemon browser application is available. The browser supports browsing and searching active syslogd files (the files to which syslogd currently writes) and syslogd archive data sets that were created using the new syslogd archival function.
- **Policy infrastructure management enhancements** - The Policy Agent provides monitoring and automatic start and restart for the following set of related applications:
 - Defense manager daemon (DMD)
 - Internet key exchange daemon (IKED)
 - Network security services daemon (NSSD)
 - syslog daemon (syslogd)
 - Traffic regulation management daemon (TRMD)

A variety of EBCDIC code pages are supported for the configuration files and policy definition files for the following applications:

- Policy Agent
- syslogd
- IKED
- NSSD
- DMD
- **MVS console support for select TCP/IP commands** - Support is added for using selected z/OS UNIX shell commands from the MVS console, the TSO environment, and from NetView. The z/OS UNIX shell commands are supported by a new EZACMD command. The following z/OS UNIX shell commands are

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supported from the MVS console, TSO, and NetView: **trmdstat**, **ipsec**, **nssctl**, and **pasearch**. In addition, the z/OS UNIX **ping** command is supported from the MVS console and NetView.

- **IBM Health Checker for z/OS DNS server check** - A new z/OS Health Checker for z/OS migration health check is provided to help determine if you are using the BIND9 DNS server on your system.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Configuration Assistant enhancements
- syslogd enhancements
- syslogd browser and search facilities
- Policy infrastructure management enhancements
- MVS console support for select TCP/IP commands
- IBM Health Checker for z/OS DNS server check

SNA and Enterprise Extender (previous enhancements)

Description: z/OS Communications Server improves SNA and Enterprise Extender (EE) in the following areas:

- **Display potential model application name** - The DISPLAY MODELS command can identify which application model definition will be used to build a dynamic application definition. You can use the DISPLAY MODELS command to prevent dynamic application definitions from being built incorrectly.
- **Include data space VIT with INOP dump** - The VTAM INOP dump processing automatically captures the VTAM internal trace (VIT) data space (ISTITDS1) in the dump when the VIT data space is in use.
- **HPR performance enhancements** - High performance routing (HPR) performance is enhanced in the following ways:
 - A new progressive mode adaptive rate-based (ARB) pacing algorithm increases performance in virtualized or CPU-constrained environments.
 - Unproductive path switches are reduced or eliminated when an HPR endpoint is unresponsive.
 - ECSA and CSM storage utilization of HPR control blocks is reduced.
 - CPU usage may be reduced when packet loss occurs.
- **APPN topology database update enhancements** - APPN topology database update (TDU) processing is enhanced in the following ways:
 - TDUs might include unknown topology control vectors when they are sent to a partner network node that supports the receipt of unknown vectors. Unknown topology vectors are not sent to a partner network node that does not have this support. Previously, unknown topology control vectors were not included in TDUs sent to any partner network nodes if at least one partner network node did not support the receipt of unknown vectors. Any topology control vectors added since the original APPN architecture are considered to be unknown vectors.
 - Serviceability enhancements aid in the identification of the network nodes involved in a TDU war, which is the endless exchange of TDUs in contention over the same topology resource that results in continuous performance degradation of the APPN network.

- **Provide ACF/TAP as part of z/OS Communications Server - z/OS V1R11**
Communications Server includes Advanced Communications Function/Trace Analysis Program (ACF/TAP). ACF/TAP was previously included only as part of the Advanced Communications Function/System Support Program (ACF/SSP) product. ACF/TAP provides a full set of functions to format trace information, including VTAM buffer traces, VTAM internal traces, and NCP traces.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- Display potential model application name
- Include data space VIT with INOP dump
- HPR performance enhancements
- APPN topology database update enhancements
- Provide ACF/TAP as part of z/OS Communications Server

System management and monitoring (previous enhancements)

Description: z/OS Communications Server improves system management and monitoring in the following areas:

- **IBM Health Checker for z/OS RFC 4301 compliance** - A new z/OS Health Checker for z/OS migration health check is provided. This migration health check helps you determine whether IPsec filter rules that are not in compliance with RFC 4301 are active on your current systems. The check also provides guidance on the migration procedures and options available to migrate such IPsec filter rules to become compliant with RFC 4301.
- **Network management enhancements** - z/OS V1R11 Communications Server enhances its network management functions to provide the following information:
 - **Stack configuration data** - TCP/IP stack profile information is provided in a new SMF 119 event record. The same information is also provided in response to a new GetProfile request for the TCP/IP Callable NMI.
 - **SNA network management interface enhancements for detailed CSM usage** - The SNA NMI in z/OS V1R11 Communications Server provides additional storage ownership statistics in response to the CSM statistics request. You can request all ownership statistics or a subset of statistics that is based on ASID values.
 - **OSA network traffic analyzer data** - The OSA-Express network traffic analyzer trace facility provides real time trace collection similar to the SYSTCPDA packet trace collection.
 - **Sysplex networking data** - The TCP/IP Callable NMI, EZBNMIFR provides sysplex networking data. It has new request types.
- **Verbose ping** - The Verbose/-v parameter causes the Ping command to display details of the echo reply packets that have been received, and summary statistics regarding the echo packets (number of requests sent, number of replies received, and number of packets lost), and the round-trip times (minimum, maximum, average, and standard deviation) based on the response times from the echo replies that were received.

When change was introduced: z/OS V1R11.

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Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- IBM Health Checker for z/OS RFC 4301 compliance
- Stack configuration data
- SNA network management interface enhancements for detailed CSM usage
- OSA network traffic analyzer data
- Sysplex networking data
- Verbose Ping

Virtualization

Description: z/OS Communications Server enhances virtualization in the following areas:

- **QDIO enhancements for WorkLoad Manager IO priority** - A new WLMRIORITYQ parameter is provided on the GLOBALCONFIG profile statement. You can use this parameter to establish a mapping of Workload Manager (WLM) service class importance levels to outbound Queued Direct I/O (QDIO) priorities for data with the value 0 for an IPv4 type of service byte or for an IPv6 traffic class. This mapping is used to determine the QDIO write priority for outbound packets. This function automatically extends the preferential treatment of the most important workloads for a business through the QDIO device driver all the way to the LAN.
- **QDIO support for OSA interface isolation** - z/OS V1R11 Communications Server enables a stack that is using an OSA-Express feature to prevent packets from flowing directly between two stacks that are sharing the OSA device. This is called connection isolation and when it is in effect, the OSA-Express feature discards packets whose next-hop address was registered by a sharing stack.

When change was introduced: z/OS V1R11.

Reference information: See the following topics in *z/OS Communications Server: New Function Summary* for detailed descriptions that include any applicable restrictions, dependencies, and steps on using this function:

- QDIO enhancements for WLM IO priority
- QDIO support for OSA interface isolation

Cryptographic Services new functions to consider

This topic describes new Cryptographic Services functions in z/OS.

ICSF: Crypto Express3 (CEX3C) hardware support

Description: ICSF now provides support for the Crypto Express3 (CEX3C) and Crypto Express3-1P. These new features provide similar functionality to the CEX2C and Crypto Express2-1P with improved performance, reliability and serviceability.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

Reference information: *z/OS Cryptographic Services ICSF Administrator's Guide*.

ICSF: Protected-key CPACF

Description: The Symmetric Key Encipher and Symmetric Key Decipher callable services, which exploit CP Assist for Cryptographic Functions (CPACF) for improved performance, have been enhanced to support encrypted AES and DES key tokens. This support requires the Crypto Express3 Feature. The encrypted key tokens must be stored in the CKDS and have a CSFKEYS profile with the ICSF segment. The ICSF segment specifies rules for key use, and the SYMCACFWRAP field of the ICSF segment enables you to specify whether ICSF can rewrap the encrypted key using the CPACF wrapping key.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

Reference information: *z/OS Cryptographic Services ICSF Administrator's Guide.*

ICSF: Extended PKCS #11 support

Description: A new software cryptographic engine embedded in ICSF will allow PKCS #11 processing even if no cryptographic coprocessors are available. Since the cryptographic coprocessors are optional hardware, ICSF will determine their availability before routing work, and, if the hardware is not available, will use its own internal routines to accomplish the function. Additional algorithms that are supported with PKCS #11 include Digital Signature Algorithm (DSA), Diffie-Hellman (DH), Elliptic Curve, Galois/Counter Mode encryption for AES (AES GCM), Blowfish and RC4.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

Reference information: *z/OS Cryptographic Services ICSF Writing PKCS #11 Applications.*

ICSF: Improve product performance and stability

Description: A number of changes have been implemented within ICSF to provide better performance and stability:

- ***Non-cancellable, non-swappable region.*** ICSF has been made non-swappable and non-cancelable using standard z/OS conventions. Although prior versions of ICSF are non-swappable, this new support is implemented using standard conventions. Earlier versions of ICSF were cancelable by way of an operator command. If the operator issues the cancel command multiple times, the address space may be terminated before cleanup can be completed and this can sometimes cause problems to other ICSF started tasks that are sharing the key data sets (CKDS, PKDS, TKDS). By making ICSF non-cancelable, operations will have to issue an explicit command to stop the address space, driving it through normal termination routines.
- ***More consistent, simpler routing of ICSF console messages.*** To improve operational efficiency, ICSF now routes operational messages in a more consistent manner. In prior versions of ICSF, messages would be written to the console as well as data sets. Some messages could be read immediately on the console, while other records were written to the CSFLIST DD. Now, most ICSF messages will be written to the job log. Messages that require operator action will display on the operator console, and messages related to system security will display on the security console.
- ***Improved software paths and routine.*** Instruction pathlengths for invoking the hashing algorithms on the CPACF using the ICSF APIs have been tightened to

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provide better performance. Some operations routed to the CEX2C card have also been improved, providing better CPU utilization for those algorithms.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

ICSF: Support for translation of external RSA tokens into smart card formats

Description: Added new callable service PKA Key Translate (CSNDPKT and CSNFPKT). Using this callable service, applications can translate a source CCA RSA key token into a target external smart card key token.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

Reference information: *z/OS Cryptographic Services ICSF Application Programmer's Guide.*

ICSF: PKA key management extensions

Description: Key store policy has been extended, enabling you to place restrictions on how keys can be used. You can:

- restrict a particular AES or DES key from being exported, or allow it to be exported only by certain RSA keys (or only by RSA keys bound to identities in certain key certificates).
- restrict certain RSA keys from being used in secure export and import operations, or from being used in handshake operations.

When change was introduced: Cryptographic Support for z/OS V1R9-R11 Web deliverable.

Reference information: *z/OS Cryptographic Services ICSF Administrator's Guide.*

System SSL: Elliptic Curve Cryptography support

Description: System SSL now supports ECC-related data structures, signing data, and verifying signed data using ECDSA (Elliptic Curve Digital Signature Algorithm). This allows exploiters of z/OS System SSL to import ECC style certificates and private keys into key database files or PKCS#11 tokens and use ECDSA certificates in signing and verifying operations.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Cryptographic Services System SSL Programming.*

System SSL: Support for 4096-bit RSA keys, DSA keys, and Diffie-Hellman keys

Description: In earlier releases, System SSL supported X.509 certificates with RSA key sizes up to 2048 bits for use in PKCS#11 tokens. In V1.12, System SSL gskkyman has been enhanced to support the creation and management of X.509 certificates and keys within a PKCS#11 token that have RSA key sizes up to 4096-bits, DSA keys and Diffie-Hellman keys. These X.509 certificates and keys are usable through the System SSL APIs.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Cryptographic Services System SSL Programming.*

ICSF: Secure key AES support

Description: The Advanced Encryption Standard (AES) is a National Institute of Standards and Technology specification for the encryption of electronic data. It is expected to become the accepted means of encrypting digital information, including financial, telecommunications, and government data. AES is the symmetric algorithm of choice, instead of Data Encryption Standard (DES) or Triple-DES, for the encryption and decryption of data. The AES encryption algorithm will be supported with secure (encrypted) keys of 128, 192, and 256 bits.

The secure key approach, similar to what is supported today for DES and TDES, offers the ability to keep the encryption keys protected at all times, including the ability to import and export AES keys, using RSA public key technology.

Support for AES encryption algorithm includes the master key management functions required to load or generate AES master keys, update those keys, and re-encrypt key tokens under a new master key.

When change was introduced: Cryptographic Support for z/OS V1R8-V1R10 and z/OS.e V1R8 Web deliverable.

Reference information:

- *z/OS Cryptographic Services ICSF Overview*
- *z/OS Cryptographic Services ICSF System Programmer's Guide*
- *z/OS Cryptographic Services ICSF Administrator's Guide*
- *z/OS Cryptographic Services ICSF Application Programmer's Guide*

ICSF: Support for 13-digit through 19-digit PAN data

Description: Credit card companies sometimes perform card security code computations based on Personal Account Number (PAN) data. Currently, ICSF callable services CSNBCSV (VISA(TM) CVV Service Verify) and CSNBCSG (VISA CVV Service Generate) are used to verify and to generate a VISA Card Verification Value (CVV) or a MasterCard Card Verification Code (CVC). The ICSF callable services currently support 13, 16, and 19-digit PAN data. To provide additional flexibility, new keywords PAN-14, PAN-15, PAN-17, and PAN-18 are implemented in the rule array for both CSNBCSG and CSNBCSV to indicate that the PAN data is comprised of 14, 15, 17, or 18 PAN digits, respectively.

When change was introduced: Cryptographic Support for z/OS V1R8-V1R10 and z/OS.e V1R8 Web deliverable.

Reference information:

- *z/OS Cryptographic Services ICSF Application Programmer's Guide*

ICSF: Crypto query service

Description: The ICSF Web deliverable includes a new callable service, ICSF Query Algorithms, which retrieves information about the cryptographic and hash algorithms that are available based on hardware options and software installed on System z.

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When change was introduced: Cryptographic Support for z/OS V1R8-V1R10 and z/OS.e V1R8 Web deliverable.

Reference information:

- *z/OS Cryptographic Services ICSF Application Programmer's Guide*

ICSF: Enhanced SAF checking

Description: The ICSF Web deliverable introduces Key Token Policies to augment the existing security controls of symmetric and asymmetric keys stored in the CKDS and PKDS. The Key Token Policy provides a set control points for the management of keys stored in an ICSF key data set. The policy control points are designed to:

- Enable Key Token Checking
- Enable Default Key Label Checking
- Identify and prevent duplicate keys tokens from being stored in the ICSF key data sets.

As part of the Key Token Policy support, ICSF is replacing the PKDS cache with an in-storage copy of the PKDS similar to the in-storage copies of the CKDS and the TKDS. In addition, the in-storage copies are designed to be kept current in a sysplex environment where the PKDS is shared through the use of sysplex messaging.

When change was introduced: Cryptographic Support for z/OS V1R8-V1R10 and z/OS.e V1R8 Web deliverable.

Reference information:

- *z/OS Cryptographic Services ICSF Administrator's Guide*

System SSL: Transport Layer Security (TLS) support

Description: System SSL design has been updated to support the Transport Layer Security (TLS) V1.1 protocol as defined in RFC4346. This support is intended to allow System SSL applications to exploit the protocol as well as ensuring continued interoperability with other SSL implementations that support the TLS V1.1 protocol.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS Cryptographic Services System SSL Programming*

System SSL: Transport Layer Security (TLS) extensions

Description: System SSL is updated with support for TLS Extensions (RFC4366). TLS Extensions are designed to be used to provide additional functionality for the Transport Layer Security (TLS) protocols by allowing TLS clients and servers to exchange supplementary information during the SSL Handshake. Support is provided for the Server Name Indication, Maximum Fragment length Negotiation, and Truncated HMAC extensions.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS Cryptographic Services System SSL Programming*

System SSL: Support for X.509 v3 certificates and X.509 v2 Certificate Revocation Lists (CRLs)

Description: System SSL is updated to support X.509 v3 certificates and X.509 v2 Certificate Revocation Lists (CRLs) at the RFC3280 level. Currently z/OS System SSL is coded to create and validate X.509 certificates according to RFC2459, Internet X.509 Public Key Infrastructure Certificate and CRL Profile. This support will allow System SSL applications to create and utilize certificates based on RFC3280 while retaining backward compatibility with existing applications of z/OS System SSL which may be using X.509 certificates created according to RFC2459.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS Cryptographic Services System SSL Programming*

System SSL: New operational mode designed to meet NIST FIPS 140-2 Level 1 criteria

Description: National Institute of Standards and Technology (NIST) is the U.S. federal technology agency that works with industry to develop and apply technology, measurements, and standards. One of the standards published by NIST is the Federal Information Processing Standard Security Requirements for Cryptographic Modules referred to as FIPS 140-2. In z/OS V1R11, System SSL provides a mode of operation designed to meet the NIST FIPS 140-2 Level 1 criteria. This mode restricts a System SSL application to using FIPS approved algorithms, key sizes, and SSL protocols.

When change was introduced: z/OS V1R11

Reference information:

- *z/OS Cryptographic Services System SSL Programming*

PKI Services: Support for the certificate management protocol (CMP)

Description: The certificate management protocol (CMP) is an internet protocol used to manage X.509 digital certificates within a PKI. A certificate request message object is used within the protocol to convey a request for a certificate to a certificate authority. A CMP client can communicate with PKI Services to request, revoke, suspend and resume certificates.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS Cryptographic Services PKI Services Guide and Reference*

PKI Services: Configurable daily maintenance task

Description: PKI Services runs a maintenance task to perform tasks such as removing old and expired certificates, processing certificate expiration notification warning messages, and processing automatic certificate renewal messages. Before z/OS V1R12, PKI Services ran this task when the PKI Services daemon started, and then once per day at the same time. Beginning in z/OS V1R12, PKI Services provides configuration parameters that allow you to specify:

- The days of the week that the maintenance task runs
- The time of day that the task runs

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- Whether the task runs during daemon initialization

The default is for the task to run when the daemon starts and every day at midnight.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: CRL post on demand

Description: A new utility, `createcrls`, creates LDAP posting objects for certificate revocation lists (CRLs). The PKI Services daemon later posts the CRLs to an LDAP directory. You can use this program to create a CRL immediately, instead of waiting for PKI Services to do it automatically.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Certificate post on demand

Description: A new utility, `postcerts`, creates LDAP posting objects for certificates, which the PKI Services daemon later posts to an LDAP directory. You can use this utility if you have created certificates that PKI Services did not automatically post to an LDAP directory; for example if you created certificates before you configured PKI Services to automatically post them.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Include reject reason on rejection notice

Description: A PKI administrator who rejects a certificate request can make a comment about the reason for the rejection. This comment can now be included on the rejection notice that is sent to the user who made the request. A new tag, `%%rejectreason%%`, contains the reason for the rejection. The sample rejection notice, `rejectmsg.form`, is updated to include the new tag.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Custom certificate extensions

Description: X509 V3 certificates support extensions. Before z/OS V1R12, PKI Services supported specific extensions on certificate requests. Beginning with z/OS V1R12, PKI Services supports any extension whose definition meets certain requirements. You can update the PKI Services Web pages to accept custom extensions on certificate requests and pass the custom extensions to the `R_PKIServ` callable service.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Multiple instances of name forms in Subject Alternate Name

Description: The Subject Alternate Name certificate extension allows additional identities to be bound to the subject of the certificate. PKI Services now supports multiple instances of the AltDomain, AltIPAddr, AltURL and AltEmail name forms.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Support for elliptic curve cryptography (ECC)

Description: Elliptic curve cryptography (ECC) is an algorithm that is faster than RSA and can provide the same security as RSA with a smaller key size. PKI Services can generate and verify certificates and certificate requests with ECC keys.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Additional SHA algorithms for RSA keys

Description: PKI Services supports the SHA384, SHA512, and SHA224 algorithms for RSA keys. The default signing algorithm is changed to SHA256 with RSA.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: New default signing algorithm

Description: The default signing algorithm is changed to SHA256 with RSA.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Larger key size limit for RSA keys

Description: The key size limit for RSA keys is increased to 4096 bits.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Cryptographic Services PKI Services Guide and Reference

PKI Services: Support for SHA-256 with RSA encryption

Description: PKI Services now supports SHA-256 with RSA encryption as a signature algorithm.

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When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Cryptographic Services PKI Services Guide and Reference*

PKI Services: Key generation and archiving

Description: PKI Services now allows a certificate requestor to request that PKI Services generate the public and private keys for a certificate. PKI Services uses the PKCS #11 APIs provided by ICSF to generate the key pair and store the keys and certificate in the token data set (TKDS). It packages the certificate and private key in a PKCS #12 package, and sends the requestor a link via e-mail to retrieve the package. PKI Services also provides functions to recover the certificate package if the requestor loses the original package.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Cryptographic Services PKI Services Guide and Reference*

PKI Services: Support for Java server pages (JSPs)

Description: PKI Services now allows you to create and customize the PKI Services Web application using Java server pages (JSPs) as an alternative to REXX CGI execs. The JSPs use an XML template to define certificates instead of the text template used with the REXX CGI execs. A new utility validates the syntax of the XML template.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Cryptographic Services PKI Services Guide and Reference*

DFSMS new functions to consider

This topic describes new DFSMS functions in z/OS.

Indirect volser support for z/FS data sets

Description: A zFS file system uses a VSAM linear data set, and like all VSAM data sets needs to be cataloged using a real volume serial number (volser). In previous releases, the need to use a real volser posed problems for cloning and maintenance for USS version-Root File systems – the USS Version-Root File system could not be migrated to zFS without changing the cloning process. In z/OS R12, IDCAMS DEFINE RECATALOG commands now accept a symbolic value on the VOLUMES parameter. You can use the symbolic value in a catalog entry when you want to use different volsers for different systems. The symbolic value can be set to a different volume serial number in an IEASYMxx parmlib member on each system. Then you can clone the zFS file systems to those different volumes on the different systems.

When change was introduced: z/OS V1R12.

Reference information: See *z/OS DFSMS Using the New Functions*.

Access method enhancements

The BSAM, BPAM, and QSAM access methods now support the existing XTIO (extended task input/output table), UCB nocapture, and DSAB-above-the-line options of dynamic allocation. Previously, VSAM and EXCP were the only access methods to support these dynamic allocation options. In z/OS V1R12 the EXCP support is enhanced and BSAM, BPAM and QSAM support is provided. This new support applies to dynamic allocation of DASD, tape, and dummy data sets, and cases where PATH= is coded. EXCP support including the EXCPVR and XDAP macros is also affected. These enhancements provide virtual storage constraint relief especially in the areas of DASD and tape support, and enable you to have more than about 3200 dynamically-allocated data sets.

To exploit these enhancements, you need to set a new DEVSUPxx PARMLIB option and change certain types of existing programs. For details, see *z/OS DFSMS Using the New Functions*.

When changes were introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using the New Functions*.

EAV enhancements

Description: For z/OS R12, the following EAV enhancements were made:

- Almost all types of data sets are EAS-eligible. EAS-Data eligible data sets added in V1R12 include:
 - Sequential data sets (basic and large formats)
 - Partitioned data sets
 - Direct data sets
 - Catalogs (BCS and VVDS)
- In z/OS V1R12, you can control allocation of catalogs in cylinder managed space using the EATTR parameter on the DEFINE USERCATALOG command.
- z/OS V1R12 adds the ability to control allocation of catalogs in cylinder managed space using the EATTR parameter on the DEFINE USERCATALOG command.

When change was introduced: z/OS V1R12.

Reference information: See Using the z/OS V1R12 extended address volumes enhancements in *z/OS DFSMS Using the New Functions*.

Open/Close/End of Volume enhancements

DFSMS's Open/Close/EOV component provides the following enhancements:

- A new indicator for the DCB ABEND exit's Ignore option, to suppress the write-to-programmer message that is normally issued when a given Open/Close/EOV abend occurs.
- New reason codes for ABENDs 413 and 637 indicating errors in reading multivolume tape data sets returned by the label anomaly exit.
- A new message indicating the reason for a FREE=CLOSE failure
- A new reason code 24 for ABEND code 50D, pointing to IEC999I messages for details on indeterminate errors.

When changes were introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using the New Functions*.

DFSMS Catalog enhancements

DFSMS's catalog component provides the following enhancements:

- **Extended Addressable Catalogs:** This enhancement allows catalogs to grow beyond the previous four-gigabyte size limit, using extended addressability. Extended addressability (EA) support already exists for VSAM data sets; this new support lets you define basic catalog structure (BCS) catalogs as extended format data sets to give them extended addressability.
- **Contention Detection:** This enhancement provides a way to identify certain catalog service tasks waiting on the input/output table resources (SYSZTIOT) to see if any are waiting beyond the default or specified wait time.
- **VSAM Partial Release on Multiple Volumes:** In previous z/OS releases, VSAM partial release did not support releasing unused space that spanned multiple volumes. In z/OS R12, VSAM partial release is enhanced to release unused space on extended format SMS data sets that spans multiple volumes.

When changes were introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using the New Functions, z/OS DFSMS Managing Catalogs.*

Access Method Services enhancements

The DFSMS access method services commands include the following enhancements:

- A wildcard on the DELETE command, to delete all the members of a PDS or PDSE in one command invocation.
- New output from the DCOLLECT command, including all attributes specified in the SMS data class as well as new DADSM, OAM, and storage class attributes.

When changes were introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using the New Functions.*

AUTOR support

Description: The z/OS auto-reply (AUTOR) facility provides replies to write-to-operator with reply (WTOR) messages in cases where there is no automation or when the operator is unaware of the outstanding request or is taking too long trying to determine what the response should be. When AUTOR is active, z/OS will use the auto-reply policies provided for the subset of the DFSMSrmm WTORS that are included in the default AUTOR00 parmlib member provided by z/OS. AUTOR00 also contains comments that provide the message text for each WTOR and the rule used to select the WTOR. You can define your own AUTORxx member to customize the auto-reply policies for DFSMSrmm. You can override or supplement the policies in AUTOR00 to add more WTORS to be handled automatically and to change the replies for these WTORS already included in AUTOR00. DFSMSrmm provides these AUTORxx parmlib members, which you can use as-is or use as the base for your customization:

- **AUTORRM** Includes, for all DFSMSrmm WTORS, an automated response suitable for production running.
- **AUTORRP** Includes, for all DFSMSrmm WTORS, an automated response suitable for use when running DFSMSrmm in a mode other than OPMODE(PROTECT).

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSrmm Implementation and Customization Guide*, SC26-7405.

CONTROL STATUS dialog

Description: The new CONTROL STATUS dialog option provides the operator and systems programmer a means to display and control task status interactively.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSrmm Managing and Using Removable Media*, SC26-7404.

Separate VOLSELMSG and TRACE parameters

Description: Before z/OS R12, the VOLSELMSG and SMS TRACE diagnostic facilities shared three parameters: TYPE, ASID and JOBNAME. The values for these parameters, set by the IGDSMSxx PARMLIB member or a SETSMS command, applied to both VOLSELMSG and SMS TRACE. Starting in R12, you can optionally specify that a value for any of those parameters should apply to one of these facilities and not both.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Initialization and Tuning Reference* and *z/OS MVS System Commands*.

Option to copy volume definitions for pool storage groups

Description: When copying a pool storage group definition from one CDS to another, you can now specify that the volume list in the source storage group be copied into the target storage group. To do this, use a new *Copy Storage Group Volumes* field on the ISMF Copy Entry panel.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdfp Storage Administration*.

High threshold value of 100% for pool storage groups

Description: When defining a pool storage group, you can now specify a value of 100% for the high value for migration and allocation thresholds. Previously, the maximum was 99. SMS uses the high value as a guide in assigning data sets to DASD volumes in the storage group. The default high threshold value is 85 percent.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdfp Storage Administration*.

REXX support for the ANTRQST API

Description: The new program ANTTREXX lets you use the REXX programming language with the ANTRQST API. ANTTREXX supports FlashCopy, Global Mirror, peer-to-peer remote copy (PPRC) and extended remote copy (XRC) requests.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Advanced Copy Services* .

DFSMSdss: Help in identifying and converting VSAM data sets with IMBED, REPLICATE or KEYRANGE attributes

Description: In its restore and dump processing, DFSMSdss helps you to identify and convert VSAM data sets with the IMBED, REPLICATE, or KEYRANGE attributes. Data sets with these attributes have not been supported for new allocations for many releases. DFSMSdss issues a message for any indexed VSAM data set that is restored and retains these attributes. Logical restore automatically converts indexed VSAM data sets that have the IMBED or REPLICATE attributes (but not the KEYRANGES attribute) to data sets that do not have these attributes.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdss Storage Administration.*

DFSMSdss: Fast reverse restore support

Description: DFSMSdss supports fast reverse restore, which is available with the IBM® System Storage® DS8000® series. Fast reverse restore allows recovery to be performed from an active, original FlashCopy target volume to its original source volume without having to wait for the background copy to finish.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdss Storage Administration* and *z/OS DFSMSdfp Storage Administration.*

DFSMSdss: BSAM I/O for DUMP output, RESTORE input and COPYDUMP

Description: For backups to and from tape, and for backups on DASD when the backup data set is in the extended format, DFSMS now uses BSAM instead of EXCP to read from and write to DFSMSdss dump data sets during DUMP, COPYDUMP and RESTORE operations. This allows DFSMSdss to support 256K blocks when writing to and reading from a tape. It also allows the use of Extended Format Sequential (extended addressable, compressible or striped) data sets on DASD.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdss Storage Administration .*

DFSMShsm: Dump stacking volume limit expansion

Description: The DFSMShsm dump function copies source disk volumes, in their entirety, to a target tape volume. The dump function allows stacking multiple source volumes on a single target tape volume. Previously, the dump function allowed up to 99 source disk volumes to be dumped to a single target tape volume. With increasing tape capacity, this limit has been increased from 99 to 255 volumes.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS DFSMShsm Storage Administration*
- *z/OS DFSMS Using the New Functions*

DFSMShsm: Fast reverse restore support

Description: DFSMShsm supports fast reverse restore, which is available with the IBM System Storage DS8000 series. Fast reverse restore provides the ability to reverse the direction of an existing FlashCopy® relationship and restore the source volume to the point-in-time state when it was last flashed to the target without waiting for the background copy to complete.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS DFSMShsm Storage Administration*
- *z/OS DFSMSdss Storage Administration*
- *z/OS DFSMS Using the New Functions*
- *z/OS DFSMS Advanced Copy Services*

DFSMShsm: Multi-task volume recovery from dump

Description: The multi-task volume recovery from dump enhancement simplifies the task of recovering volumes from a dump backup copy. This enhancement provides the ability for multiple RECOVER commands to be processed concurrently and provides the ability to use a single FRRECOV command to recover all volumes within a copy pool from tape (in addition to from DASD).

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS DFSMShsm Storage Administration*
- *z/OS DFSMS Using the New Functions*

DFSMShsm: Expanded control of the DFSMSdss cross memory interface

Description: Expanded, more granular control of the DFSMSdss cross memory interface is provided by five new SETSYS DSSXMMODE parameters: BACKUP, CDSBACKUP, DUMP, MIGRATION, and RECOVERY; in addition to the existing N (no) or Y (yes) options. These parameters allow control over whether the DFSMSdss cross memory interface will be invoked for the backup, CDS backup, dump, migration, and recovery functions of DFSMShsm.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS DFSMShsm Storage Administration*
- *z/OS DFSMS Using the New Functions*

DFSMsrmm dialog CLIST processing

Description: The DFSMSrmm CLIST Processing dialog now enables you to specify that a search results list is not to be created when generating a CLIST from the search panels. This might enable you to process all the resources in a shorter time and bypass any system memory size limitations.

When change was introduced: z/OS V1R12.

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Reference information: *z/OS DFSMSrmm Managing and Using Removable Media*, SC26-7404.

LISTCONTROL STATUS subcommand

Description: The new DFSMSrmm TSO LISTCONTROL STATUS subcommand can be used to request information about DFSMSrmm subsystem address space status, tasks, and queued requests. The information returned is very similar to the results of the operator 'QUERY ACTIVE' command.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSrmm Managing and Using Removable Media*, SC26-7404.

DFSMSrmm inventory management and reporting

Description:

- *Retention Limit Reporting for EXPDTDROP and VRSRETAIN:* The ACTIVITY file now contains information about the volume related changes DFSMSrmm makes to the control data set during inventory management. New report files are created by EDGJACTP for:
 - EXPDTDROP retention limit reporting are EXPDROP and EXPDROPS
 - VRSRETAIN retention limit reporting are VRSRETN and VRSRETNS.
- *Enhanced HOLD Support:* You can now set the volume HOLD attribute to prevent automatic expiration and to prevent use of the RMM DELETEVOLUME subcommand with RELEASE.
- *Copy Export Reporting:* DFSMSrmm now provides a new EDGJCEXP sample job to report on copies of logical volumes that have been exported from TS7700 Virtualization Engine. The report consolidates point in time information from the copy export status file, the library and from DFSMSrmm to enable you to more easily identify tape data that has been copy exported.
- *Volume HOLD Reporting:* DFSMSrmm now provides a new sample report EDGGAHLD to list all volumes where the Hold attribute is set.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSrmm Implementation and Customization Guide*, SC26-7405.

DFSMSrmm programming support

Description:

- *EAV support.* When not shared with a z/OS release below z/OS V1R12, the DFSMSrmm journal is now EAS eligible. It cannot be an extended format sequential data set. Any of the data sets used by or created by DFSMSrmm processing can be directed to EAS. One exception is the RMM CLIST data set when created automatically by SEARCH subcommand processing. You direct data sets to EAS by exploiting DC attributes, SMS ACS routines and JCL keywords. For those data sets created dynamically by DFSMSrmm the EATTR=OPT is specified so that you can use the system to decide where the data set is allocated. This includes sort input/output files created by EDGHSKP and EDGUTIL processing (DFSORT V1R12 is required for this).

- *Dynamic allocation support:* DFSMSrmm and all of its utilities support the new BSAM, BPAM, QSAM and OCE support of the XTIO, UCB nocapture, and DSAB-above-the-line options of dynamic allocation.
- *IPv6 support:* DFSMSrmm supports the use of IP addresses that are compliant with either IPv4 or IPv6. To use IPv6, you must first configure z/OS Communication Server TCP/IP.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSrmm Implementation and Customization Guide*, SC26-7405.

Enabling a storage group to multiple systems in a non-OAMplex environment

Description: OAM removes the restriction that a storage group can only be enabled to single system in a non-OAMplex environment. OAM object processing now allows object and object backup storage groups enabled to more than one system in a non-OAMplex environment to be defined within OAM, when the new MULTISYSENABLE keyword is specified in the CBROAMxx PARMLIB SETOPT statement.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*.

Displaying "Immediate Backup" and "Recall to DB2" queue statistics

Description: The output of the MODIFY OAM,D,OSMC command now includes "Immediate Backup" and "Recall to DB2" queue statistics to more accurately characterize the workload in OSMC. A new message, CBR9364I, shows the name of the task, type of task, the number of Immediate Backup tasks that are currently active and the number of Immediate Backup tasks that are currently queued to process, followed by the number of Recall to DB2 tasks that are currently active and the number of Recall to DB2 tasks that are currently queued to process.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using the New Functions*.

CA reclaim for key-sequenced data sets

Description: A new CA reclaim function lets you specify that empty CA space be reclaimed automatically for key-sequenced data sets (KSDSs). This can reduce fragmented DASD space and so reduce the need for reorganizing KSDSs to reclaim the space.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using Data Sets*.

Disk striping support

Description: The previous restriction on accessing striped data sets from VSAM RLS is removed. All current VSAM striping rules now apply to VSAM RLS.

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When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMS Using Data Sets*.

Enhancements to the record management trace facility

Description: New PARMLIB support allows you to enable VSAM record management trace dynamically, without using the DD card of the JCL. This extends VSAM record management trace support to data sets that are allocated dynamically, and allows you to enable VSAM record management trace without taking the application or data set offline.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSMSdfp Diagnosis*.

Open/Close/End of Volume enhancements

Description: DFSMS's Open/Close/EOV component provides the following enhancements:

- Displaying the fact that a data set has an expiration date set to never expire, in message IEC507D
- The system no longer reprocesses the same volume when duplicate volume serial numbers are detected during multi-volume tape processing (automatic recovery for message IEC708I)
- Providing improved mapping for SMF type 14 and 15 records, with the option to provide DSECTs for the individual segments of the records.
- Providing an installation-wide abend option for multi-volume tape conditions that generate messages IEC709I, IEC710I, IEC711I, and IEC712I. New parameter bits and a new return code are added for the label anomaly exit, to allow abending of jobs for these conditions.

When changes were introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMS Using the New Functions*

Data set separation by volume

Description: z/OS now supports separating data sets at the volume level as well as the physical control unit (PCU) level. Data set separation allows you to designate groups of data sets in which all SMS-managed data sets within a group are kept separate from all the other data sets in the same group.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMSdfp Storage Administration*

Enhanced striping volume selection

Description: Several restrictions have been removed and new support added, including the use of volume selection preference attributes, so that striping volume selection now functions much more like conventional volume selection. Striping volume selection is used for SMS allocation or recall of a striped data set, that is, an extended format data set that occupies multiple volumes.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMSdfp Storage Administration*

EAV enhancements for extended format datasets

Description: z/OS V1R10 introduced extended address volumes (EAVs) which allowed DASD storage volumes to be larger than 65,520 cylinders. The space above the first 65,520 cylinders is referred to as cylinder-managed space and is extended addressing space (EAS). Data written in cylinder-managed space uses EAS access techniques. Data sets that are able to use cylinder-managed space are referred to as being EAS-eligible. The following table shows enhancements to the EAV function for z/OS R11:

Table 1. EAV enhancements for z/OS V1R11

z/OS V1R10 EAV	z/OS V1R11 EAV enhancement
Only VSAM data sets are EAS-eligible.	Extended format sequential data sets are now EAS-eligible.
Control whether VSAM data sets can reside in cylinder-managed space by including or excluding EAVs in particular storage groups. For non-SMS managed data sets, control the allocation to a volume by specifying a specific VOLSER or esoteric name.	Controlling whether the allocation of EAS-eligible data sets can reside in cylinder-managed space using both the methods supported in z/OS V1R10 and by using the new EATTR data set attribute keyword.

When change was introduced: z/OS V1R11.

Reference information:

- Using extended address volumes enhancements for R11 in *z/OS DFSMS Using the New Functions*
- *Device Support Facilities (ICKDSF) User's Guide and Reference*
- *z/OS DFSMS Access Method Services for Catalogs*

Health Check to identify catalogs with IMBED and REPLICATE Attributes

Description: z/OS no longer supports the IMBED and REPLICATE attributes for user catalogs and master catalogs. These attributes have become obsolete, and they can have adverse effects on catalogs that were originally defined with them. In z/OS R11, z/OS provides a new IBM Health Checker for z/OS check that you can use to identify catalogs which have these attributes defined. IBM recommends that you re-define all catalogs that currently have the IMBED or REPLICATE attributes, to remove them.

When changes were introduced: z/OS V1R11.

Reference information: See the section on deleting obsolete catalog attributes in:

- *z/OS DFSMS Managing Catalogs*

DFSMShsm enhancements

Description: DFSMShsm is enhanced with a new data set backup retention period, improvements to fast replication data set recovery, and enhanced support for migration level 1 (ML1) volumes.

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- DFSMShsm's data set backup support is expanded to let users specify the minimum number of days to retain a specific backup copy of a data set, using the new RETAINDAYS keyword. The RETAINDAYS keyword is also added to the ARCHBACK macro and the ARCINBAK program. The (H)RECOVER command and ARCHRCOV macro have new TIME keywords added, to allow recovery by time as well as by date. In addition, the (H)BDELETE command and ARCHBDEL macro have a new ALL parameter which must be specified to delete all backup versions of the data set.
- DFSMShsm removes a restriction on the recovery of pre-allocated cataloged data sets, which previously could only be recovered if they resided on the same volume or volumes where they resided at the time of the backup. DFSMShsm removes this restriction by adding a new SMS copy pool definition field, enabling the capture of the catalog information for a data set at the time of backup, and then using that information to recover the data set if it has been moved or deleted since the last backup. Additional enhancements include moving ALLOWPPRC command parameters to the copy pool definition, un-allocating catalogs prior to a copy pool recovery, automatically re-initializing a volume if its VTOC was in a flash copy relationship when the relationship was withdrawn, and improvements to the ARC1803I message.
- Beginning in z/OS V1R11, DFSMShsm enables ML1 overflow volumes to be selected for migration processing, in addition to their current use for data set backup processing. DFSMShsm enables these ML1 overflow volumes to be selected for migration or backup of large data sets, with the determining size values specified by a new parameter of the SETSYS command. Use the new ML1OVERFLOW parameter with the subparameter of DATASETSIZE(dssize) to specify the minimum size that a data set must be in order for DFSMShsm to prefer ML1 overflow volume selection for migration or backup copies.

In addition, DFSMShsm removes the previous ML1 volume restriction against migrating or backing up a data set whose expected size after compaction (if active and used) is greater than 65536 tracks. The new limit for backed up or migrated copies is equal to the maximum size limit for the largest volume available.

When changes were introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMS Using the New Functions*
- *z/OS DFSMShsm Storage Administration*

DFSMS OAM Enhancements

Description: OAM has the following enhancements for z/OS V1R11:

- OAM 2GB Object support (Stage 2) extends the support to the tape tier of the OAM storage hierarchy. This support provides full functionality for objects up to 2000M in size on DASD and tape.
- The following OAM Archive Retention Enhancements have been added:
 - Deletion-hold: Prevents object deletion while the object is in deletion-hold mode.
 - Retention-protection: Prevents object deletion prior to object's expiration date, and do not allow expiration date to be changed to an earlier date.
 - Deletion-protection: Prevents object deletion prior to object's expiration date.
 - Event-based-retention: Object expiration date dependent on external event notification.

- Wildcards for OSREQ Query enhances the wildcard support for OSREQ QUERY requests. Prior to this support, a generic search could be requested by putting an asterisk (*) in the right most qualifier of the name. With this support, one or more percent signs (%) and/or underscores (_) can be used as wildcards anywhere in the object name.
- Utility to Modify Collection Defaults provides a utility to modify the storage class and management class defaults associated with an OAM collection.
- CBRUXSAE Enhancement provides more granular return codes to be processed by the CBRUXSAE security authorization user exit.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMS OAM Application Programmer's Reference*
- *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support*
- *z/OS DFSMSdfp Diagnosis*
- *z/OS DFSMS Using the New Functions*
- *z/OS DFSMS Access Method Services for Catalogs*
- *z/OS MVS System Messages, Vol 4 (CBD-DMO)*

DFSMSrmm report generator enhancements

Description: The DFSMSrmm report generator is extensively enhanced. Using DFSMSrmm V1R11, you can now:

- Override a data type within the dialog. The updated data type is saved in the report type and report definition. The report generator remembers the original data type and your override.
- Inherit changes in report types into existing report definitions. This enables changes in data types, comments, and other criteria to be merged into pre-existing report definitions. This enables your existing reports to benefit from improved report types shipped with DFSMSrmm.
- Select which fields are to be excluded from total and break totals. When you specify that a field used for a report column is not to be subject to totaling, the report generator uses the NOST option with the ICETOOL reporting tool. When used with ICETOOL, all numeric fields are automatically totaled, unless you request that they be excluded.
- Specify a list of field values and the text to be used for them in the report. The report generator uses existing field equate values to construct an initial list of possible values. Before you can use any of these, you must provide a new value to which the field will be changed for the report. Only those that have a change value are used for report generation.
- Use substring for record selection criteria, regardless of the data type of the field.
- Specify that the reports created from the DFSMSrmm report extract include the date and time when the extract was created. The report extract type and samples are updated to exploit this. You can do this for any type of report where the input records include one or more values that you want to include in the report title. This exploits new DFSORT ICETOOL capability to specify multiple report TITLE strings
- Use the equated assembler symbols, instead of the absolute value, when specifying field compare values used for record selection. An option in the dialog displays the available equates ready for you to use. When equates are available,

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the report generator uses these as a basic set to allow the use of an alternate value (called a 'change value') in the report. For example, 'I' can be changed to 'INFO'.

- Override the default ICETOOL processing for the generated ICETOOL statements when you specify the column width to be used. If no override is provided, the width is set to the larger of the column header text or the data size.
- Use guidance information that is now provided within report types and report definitions. This information is presented to the user on request and when generating JCL. You can edit and add to this information, which is stored in the definitions. Existing report types and definitions are updated with help and guidance information about (for example) what variables to set in JCL or how to run the HSM preprocessor to convert data. The help information is split into three parts; Type, Report, and JCL help. It is browsed or edited as a single set of help information.

All report types are updated to include the relevant data types and help information. In addition, all report samples are updated to inherit all new information from the report type, including the data type and help information.

- Manipulate records with DFSORT by using a new DFSMSrmm reporting tool. The output of this tool is not a report, but rather reformatted records. The JCL generated by the reporting tool includes comments that contain DFSORT symbol definitions, so that you can easily process the record further using DFSORT or ICETOOL.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMSrmm Reporting*

DFSMSrmm EDGXHINT programming interface

Description: The DFSMSrmm EDGXHINT programming interface provides a function call based interface, rather than an executable assembler macro.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMSrmm Application Programming Interface*

DFSMSrmm operational and ease of use enhancements

Description: DFSMSrmm has been enhanced to improve operations and ease of use:

- The DFSMSrmm TSO SEARCHVOLUME subcommand has additional operands to provide more flexibility and scope for querying a wider range of volume attributes, such as dates, actions, options, and flag settings.
- DFSMSrmm TSO command line parsing is improved by ensuring that similar values support the same syntax, reducing variance and enabling a wider scope of values.
- You can now exploit multiple installation exit routines for each of the DFSMSrmm installation exits by exploiting the z/OS Dynamic Exit Facility for DFSMSrmm exits.
- Using the DFSMSrmm ISPF dialog, you have more flexibility in:
 - Adding new volumes. You can specify the volume type, storage group name, and creation date and time.

- Navigating from data set information to the policies that are being used for the data set.
- DFSMSrmm vital record specifications (VRS) handling is simplified by allowing you to change location definitions after a VRS has been defined without re-defining all VRSEs.
- A new EDGUPDT utility can process the CDS transactions from test and recovery systems back into the original CDS. This ensures that, even after testing or recovery exercises you can ensure that the DFSMSrmm CDS reflects the actual content of the tape volumes in your library. Based on a new JRNLTRAN parmliib option, DFSMSrmm now additionally writes the previous level of the updated record to the journal along with the updated record and updated, related records. This option results in additional journal records being written each time a CDS record is updated.
- The DFSMSrmm tape utility EDGINERS is updated to support the reading and cross-verification of label information with the records defined in the DFSMSrmm control data set.
- New DFSMSrmm parmliib options provide flexibility in how tape generation data sets are managed for cyclic retention. You no longer need a USERMOD to enable duplicate generation retention.
- The sample "volume not in library" installation exit, CBRUXVNL, is enhanced to enable fewer installations to require customization. Volumes will be requested to be entered into the tape library whenever possible.
- The scalability and performance of the DFSMSrmm TSO command line interface and API are planned to be improved by:
 - Enabling API callers to request multiple resources returned in a single API call (APAR OA25714 for z/OS V1R9 and z/OS V1R10 also shipped this function)
 - Reducing the overhead of API and command processing
 - Setting Rexx variables to null instead of blank
 - Reducing the numbers of REXX stem variables set with the count of entries returned

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS DFSMS Using the New Functions*

DFSORT new functions to consider

This topic describes new DFSORT functions in z/OS.

Improved diagnostics

Description: DFSORT now provides additional information in new messages ICE248I and ICE249I when message ICE083A, ICE254I or ICE258I is issued. These new messages will assist with determining why DFSORT was unable to dynamically allocate all of the requested disk work space and what corrective action may be required.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide*.

File size for improperly closed VSAM data sets

Description: When a VSAM data set is opened for output by a program or utility, but not closed properly, the statistics associated with the data set are not updated. This may result in inaccurate file size information for the VSAM data set. When possible, DFSORT will attempt to calculate a more accurate file size for such an improperly closed VSAM fixed-length record data set.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide*.

Improved first failure data capture

Description: When an error message (ICExxxA) is issued and the message data set is available, DFSORT will display the diagnostic messages (ICE75xl, ICE8xxl and ICE9xxl) unless MSGPRT=NONE is in effect. This can improve first failure data capture and remove the need to rerun the application to display diagnostic messages.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide*.

Dynamic allocation improvements

Description: DFSORT's dynamic allocation of work data sets has been enhanced to improve reliability in situations where the disk work space requirements are larger than expected. A new DYNAPCT installation and run-time option allows you to specify additional work data sets to be allocated with zero space. DFSORT only extends these data sets when necessary to complete a sort application. New message ICE278I is issued if these additional work data sets are used.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide*.

Extended address volumes

Description: DFSORT supports EAS-eligible data set types on Extended Address Volumes to the extent that z/OS supports these data sets. With full track blocking, the maximum number of 1048576 tracks can be used for a single work data set allocated in the cylinder managed space on an Extended Address Volume. Without full track blocking, less than 1048576 tracks may be used.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide*.

XTIOT, uncaptured UCBs and DSAB above 16 Megabytes virtual

Description: A program that invokes DFSORT, ICETOOL or ICEGENER can dynamically allocate input, output and work data sets using the options for XTIOT, uncaptured UCBs, and DSAB above 16 megabyte virtual. These data sets are supported to the extent that z/OS supports them.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Application Programming Guide.*

Incorrect statistics message for VSAM copy

Description: When an error message (ICExxxA) is issued and the message data set is available, DFSORT will display the diagnostic messages (ICE75xl, ICE8xxl and ICE9xxl) unless MSGPRT=NONE is in effect. This can improve first failure data capture and remove the need to rerun the application to display diagnostic messages.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Messages, Codes and Diagnosis Guide.*

Additional diagnostic messages

Description: To improve first failure data capture, diagnostic messages ICE75xl, ICE8xxl and ICE9xxl will now be displayed for error situations (ICExxxA message issued) unless MSGPRT=NONE is in effect. Any automated actions based on the presence of diagnostic messages should be evaluated; these messages may now be present if an error message is issued.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Messages, Codes and Diagnosis Guide.*

Dynamically allocated work data sets

Description: DFSORT's new shipped installation default of DYNAPCT=10 increases the number of dynamically allocated work data sets by 10%. These additional work data sets are allocated with zero space and only extended if required to complete a sort application. The availability of these additional work data sets can improve reliability in situations where the disk work space requirements are larger than expected. The DYNAPCT=n percentage can be changed at installation or run-time, if appropriate. If you want DFSORT to behave as it did in prior releases, you can set DYNAPCT=OLD.

When change was introduced: z/OS V1R12.

Reference information: *z/OS DFSORT Messages, Codes and Diagnosis Guide.*

Find and replace

Description: FINDREP is a new option that allows you to do various types of find and replace operations on your records. FINDREP makes it easy to replace character or hexadecimal input constants anywhere in your records with character, hexadecimal or null output constants. For input and output constants of different lengths, bytes after the replaced constants will be shifted left or right, as appropriate. For fixed-length records, blanks will be filled in on the right as needed. For variable-length records, the record length will be changed as needed.

FINDREP can be used in an INREC, OUTREC or OUTFIL statement, or in an IFTHEN clause, in the same way BUILD and OVERLAY can be used.

Various options of FINDREP allow you to define one or more input constants and a corresponding output constant (IN, OUT), define one or more pairs of input and output constants (INOUT), start and end the find scan at specified positions (STARTPOS, ENDPOS), stop after a specified number of constants are replaced

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(DO), increase or decrease the length of the output record (MAXLEN), define the action to be taken if nonblank characters overrun the end of the record (OVERRUN), and specify whether output constants are to replace or overlay input constants (SHIFT).

DFSORT symbols can be used for constants specified with FINDREP.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

Group operations

Description: WHEN=GROUP is a new type of IFTHEN clause that allows you to do various types of operations involving groups of records. WHEN=GROUP makes it easy to propagate fields from the first record of a group to the other records of the group, add an identifier to each record of the group, or add a sequence number to each record of the group. These functions are useful by themselves, and can also facilitate other types of group operations such as sorting groups, including or omitting groups, and so on.

WHEN=GROUP can be used in IFTHEN clauses in an INREC, OUTREC or OUTFIL statement in the same way WHEN=INIT can be used.

Various options of WHEN=GROUP allow you to use logical expressions to define the beginning and end of a group (BEGIN, END), define the number of records in a group (RECORDS), and define the fields, identifiers and sequence numbers to be added to the records of each group (PUSH).

DFSORT symbols can be used for columns, fields and constants specified with WHEN=GROUP clauses.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

DATASORT

Description: DATASORT is a new operator of ICETOOL that allows you to sort data records between header (first) records and trailer (last) records. DATASORT makes it easy to sort the data records while keeping one or more header records and/or one or more trailer records in place. DATASORT does not require an "identifier" in the header or trailer records; it can treat the first n records as header records and the last n records as trailer records.

Various options of DATASORT allow you to define the number of header records and/or trailer records (HEADER or FIRST, TRAILER or LAST), the ddname for the input data set (FROM), the ddname for the output data set (TO), and the SORT and other DFSORT control statements to be used for the DATASORT operation (USING).

DFSORT symbols can be used for the number of header and trailer records specified with DATASORT.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

SUBSET

Description: SUBSET is a new operator of ICETOOL that allows you to create a subset of the input or output records by specifying that you want to keep or remove header (first) records, trailer (last) records, or records with specific relative record numbers. SUBSET makes it easy to keep or remove records based on these criteria. SUBSET does not require an "identifier" or "sequence number" in the records to be kept or removed.

Various options of SUBSET allow you to define the criteria (HEADER or FIRST, TRAILER or LAST, RRN), the ddname for the input data set (FROM), the ddname for the output data set to contain the records that meet the criteria and/or don't meet the criteria (TO, DISCARD), whether the records that meet the criteria are to be kept or removed (KEEP, REMOVE), whether the criteria are to be applied to the input or output records (INPUT, OUTPUT), and DFSORT control statements to be used for the SUBSET operation (USING).

DFSORT symbols can be used for the number of header and trailer records and for the relative record numbers specified with SUBSET.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

SELECT first n duplicates

Description: ICETOOL's SELECT operator now allows you to select the first n records with each key or the first n duplicate records with each key. New FIRST(n) and FIRSTDUP(n) options make it easy to select records representing "top" and "bottom" categories (for example, the top 5 students in each class).

DFSORT symbols can be used for n with FIRST(n) or FIRSTDUP(n).

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

SPLICE with non-blank fields

Description: ICETOOL's SPLICE operator now allows you to create a single record for each key by splicing the base record with every specified nonblank field from each overlay record. A new WITHANY option makes it easy to collect information from multiple records with the same key. You can now do a splice involving duplicate records with nonconsecutive or missing WITH fields, something that could not be accomplished previously with the existing WITHEACH option.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

DISPLAY with count

Description: ICETOOL's DISPLAY operator now allows you to display counts in reports. New COUNT('string'), EDCOUNT(formatting), BCOUNT('string') and EDBCOUNT(formatting) options make it easy to print overall record count and break record count statistics in various forms in a report, similar to the existing statistics for a report (overall total, maximum, minimum and average and break total, maximum, minimum and average).

DFSORT symbols can be used for 'string' with COUNT('string') and BCOUNT('string').

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

DISPLAY and OCCUR with multiple and multipart titles

ICETOOL's DISPLAY and OCCUR operators now allow you to display up to three title lines, each composed of up to three strings. The enhanced TITLE('string1','string2','string3') option makes it easy to use multiple strings for each title, including a combination of inline constants, and constants from DFSORT symbols including system information. The use of up to three TITLE options makes it easy to display multiline titles.

A new TLEFT option allows you to left justify the title lines instead of centering them. A new TFIRST option allows you to only display the title lines on the first page of the report instead of on every page of the report.

DFSORT symbols can be used for 'string1', 'string2' and 'string3' with TITLE('string1','string2','string3').

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

DISPLAY and OCCUR without carriage control

Description: ICETOOL's DISPLAY and OCCUR operators now allow you to create reports without carriage control characters and with RECFM=FB instead of RECFM=FBA. A new NOCC option makes it easy to suppress the carriage control character. With NOCC, a blank line is used instead of a page eject control character to separate elements of the report.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*
- *z/OS DFSORT: Getting Started*

COUNT in output record

Description: ICETOOL's COUNT operator now allows you to create a count data set with an output record containing the record count. New WRITE(countdd), TEXT('string'), DIGITS(n) and EDCOUNT(formatting) options make it easy to create an output data set with a record containing text and the record count in various forms.

DFSORT symbols can be used for 'string' with TEXT('string').

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

COUNT with add and subtract

Description: ICETOOL's COUNT operator now allows you to add a value to, or subtract a value from, the record count. New ADD(n) and SUB(n) options make it easy to increase or decrease, respectively, the actual record count to get a resulting modified record count. This is especially useful for dealing with data sets that contain header and/or trailer records.

The resulting modified record count is displayed in the count message in TOOLMSG and in the count data set, and used to determine if the criteria specified by the existing EMPTY, NOTEMPTY, HIGHER(x), LOWER(y), EQUAL(v) or NOTEQUAL(w) option is satisfied.

DFSORT symbols can be used for n with ADD(n) and SUB(n).

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

BLKSIZE default for input DUMMY

Description: DFSORT will no longer terminate for a SORTIN DD DUMMY or SORTINnn DD DUMMY statement with RECFM and LRECL, but no BLKSIZE. Instead, DFSORT will use an appropriate BLKSIZE to process the DUMMY data set successfully.

Note: If DFSORT's Blockset technique is not selected, DFSORT may still terminate for a SORTIN DD DUMMY or SORTINnn DD DUMMY statement with RECFM and LRECL, but no BLKSIZE.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

SKIP=0L default for SECTIONS

Description: DFSORT will no longer terminate when an OUTFIL SECTIONS field is not followed by a keyword (SKIP, HEADER3, TRAILER3). Instead, DFSORT will use a default keyword of SKIP=0L to process the sections successfully with no blank lines between sections on the same page.

DFSORT symbols can be used for section fields.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

SORTOUT=ddname default for FNames

Description: DFSORT will now use the ddname specified by a SORTOUT=ddname option in DFSPARM, the ddname specified by a SORTOUT=ddname option in a parameter list, or the ddname specified in a TO(ddname) option of an ICETOOL operator, as the default ddname for an OUTFIL statement without a FNames or FILES option.

When change was introduced: z/OS V1R10 with APAR PK66222/PTF UK90014 and DFSORT V1R5 with APAR PK66222/PTF UK90013.

Reference information:

- *z/OS DFSORT Application Programming Guide*

Distributed File Service new functions to consider

This topic describes new Distributed File Service functions in z/OS.

SMB provides health and migration checking

Description: SMB offers two new checks, a Health Checker and a Migration check. The SMB_NO_ZFS_SYSPLEX_AWARE check, available from IBM Health Checker for z/OS, determines if the SMB File Server is running in a z/OS UNIX System Services shared file system environment (SYSPLEX=YES) in the BPXPRMxx parmliB member). If so, it also determines if any member of the sysplex is running

zFS sysplex-aware. The migration check, ZOSMIGREC_SMB_RPC, determines if DFS/SMB File Server is running in conjunction with the Distributed Computing Environment and/or Distributed Computing Environment/Distributed File Services (DCE/DFS) functionality. If so, issue a z/OS Health Checker message warning the z/OS system administrator that support for this environment will be removed in the near future.

When change was introduced: z/OS V1R12.

Reference information:

- z/OS Distributed File Service SMB Administration

SMB: Disallowing export of zFS sysplex-aware file systems

Description: Beginning with z/OS V1R11, the SMB server cannot export zFS read/write file systems when zFS is running sysplex-aware on the same system the SMB server is running or on the system that owns the zFS file system. If you want to export zFS file systems using the SMB server, ensure that zFS is configured as non-sysplex aware by specifying sysplex=off in the zFS IOEFSPRM configuration file.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service SMB Administration*
- *z/OS Distributed File Service zSeries File System Administration*
- *z/OS Distributed File Service Messages and Codes*

SMB: Supporting Windows Vista

Description: SMB now supports Windows Vista Business and Windows Vista Enterprise. When you use Windows Vista, you might have to define your domain name, which was not necessary in previous releases of Windows.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service SMB Administration*

SMB: Enhancing SMB trace variables

Description: The modify subcommand now supports reset, print, and resize of the internal trace table.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service SMB Administration*

SMB: Supporting NT LAN Manager version 2 (NTLMv2)

Description: Beginning in z/OS V1R11, SMB now supports NT LAN Manager version 2 (NTLMv2) authentication protocol.

When change was introduced: z/OS V1R11.

Distributed File Service

Reference information:

- *z/OS Distributed File Service SMB Administration*

SMB: Running SMB under a unique nonzero UID

Description: You now have the option of running SMB with a unique nonzero userid (UID(0)).

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service SMB Administration*

zFS: zFS checks from IBM Health Checker for z/OS

Description: Beginning with z/OS V1R11, zFS introduces three new checks:

ZOSMIGV1R11_ZFS_INTERFACELEVEL

Verifies that the system is running `sysplex_admin_level=2` for zFS V1R11 toleration support. After all members of the sysplex are running `sysplex_admin_level=2`, zFS V1R11 can be brought into the sysplex.

ZOSMIGREC_ZFS_RM_MULTIFS

For z/OS V1R9 and above, verifies that the system has no multi-file system aggregates attached. Do not use multi-file system aggregates. Use compatibility mode aggregates.

ZOSMIGV1R11_ZFS_RM_MULTIFS

For z/OS V1R9 – V1R11, verifies that a system running in a sysplex environment has no multi-file system aggregates attached. Do not use multi-file system aggregates. Use compatibility mode aggregates.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Health Checker for z/OS: User's Guide*
- *z/OS Migration*
- *z/OS Distributed File Service zSeries File System Administration*
- *z/OS Distributed File Service SMB Administration*
- *z/OS Distributed File Service Messages and Codes.*

zFS: Running sysplex-aware for read/write and read-only mounted file systems

Description: Beginning with z/OS V1R11, zFS can run sysplex-aware for read/write mounted file systems. As in previous releases, zFS continues to support running sysplex-aware for read-only mounted file systems. Typically, running zFS sysplex-aware for read/write mounted file systems on all systems in a shared file system environment provides a performance improvement. When you specify `sysplex=on` in the `IOEFSPRM`, in addition to supporting read/write mounted file systems that are accessed in sysplex-aware mode, zFS automatically moves zFS ownership of a zFS file system to the system that has the most read/write activity.

Notes:

1. The SMB server cannot export zFS read/write file systems when zFS is running sysplex-aware on the same system the SMB server is running or on the system that owns the zFS file system.

2. The Fast Response Cache Accelerator support of the IBM HTTP Server for z/OS V5.3 uses an API called register file interest (BPX1IOC using the locc#RegFileInt subcommand). that cannot support zFS sysplex-aware file systems. Other servers that use this API can also be impacted. Typically, these are servers that cache files and must be aware of file updates from other sysplex members without having the server read the file or the file modification timestamp.
3. Even when your installation does not run sysplex-aware, you must follow the appropriate migration actions.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service zSeries File System Administration*
- *z/OS Distributed File Service SMB Administration*
- *z/OS Distributed File Service Messages and Codes.*

zFS: Excluding multi-file system aggregates in a sysplex shared file system environment

Description: Beginning with z/OS V1R11 and above, you cannot attach a zFS multi-file system aggregate in a sysplex shared file system environment. Multi-file system aggregates are not supported in a sysplex shared file system environment. In z/OS V1R8, you became unable to mount zFS file systems contained in multi-file system aggregates in a shared file system environment. Multi-file system aggregate support is not planned to be enhanced and will be removed sometime in the future.

Compatibility mode aggregates have a single file system in the aggregate and are fully supported in a sysplex shared file system environment.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service zSeries File System Administration*
- *z/OS Distributed File Service Messages and Codes*

zFS: Introducing namespace validation and correction

Description: zFS introduces the concept of namespace validation and correction. zFS namespace validation compares the zFS namespace information stored in each zFS member. If zFS validation detects an inconsistency, it issues messages and then begins to correct the inconsistency using one of the following actions:

- Updates the inconsistent information
- Remounts a file system
- Restarts the zFS address space on one or more members.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Distributed File Service zSeries File System Administration*
- *z/OS Distributed File Service Messages and Codes.*

EREP new functions to consider

There are no new EREP functions in the last releases of z/OS.

HCD and HCM new functions to consider

This topic describes new HCD and HCM functions in z/OS.

HCD: I/O Autoconfiguration

Description: With the I/O Autoconfiguration function, HCD discovers undefined FICON storage devices (DASD and tape) on a switch. HCD can automatically define the devices in a work IODF that is based on the active IODF. A new dialog shows the discovered controllers. For control units and devices of selected discovered controllers, HCD proposes definitions, which are based on user-controlled policies. You can accept the proposed definitions without changes, or you can update them before committing them to your specified work IODF.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Support of a third subchannel set

Description: Starting with zBX processors (processor type 2817), users can define a third subchannel set with ID 2 (SS 2) on top of the existing subchannel set (SS 0) and another optional subchannel set (SS 1) in a channel subsystem. In this third subchannel set, users can configure a maximum of 64K-1 devices.

When defining a IBM zEnterprise 196 (z196) processor, all three subchannels are defined for the maximum number of devices. With z/OS V1R12, you can define Parallel Access Volume (PAV) alias devices (device types 3380A, 3390A) of the 2105, 2107 and 1750 DASD control units, PPRC secondary devices (3390D) and DB2 data backup volumes (3390S) to SS 2.

As device numbers may be duplicated across all channel subsystems and subchannel sets, the number of devices that can be used within one partition or sysplex is tripled in comparison with only one available subchannel set.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Generation of the a D/R site OS configuration

Description: For GDPS managed environments, when defining an OS configuration, HCD provides new functionality to specify the name of an OS configuration for the disaster recovery (D/R) site in a peer-to-peer remote copy (PPRC) environment. The generation of the D/R site OS configuration as a mirror of the primary production site is automatically triggered during the *Build production I/O definition file* or *Build validated work I/O definition file* task.

When defining DASD devices, you can optionally define the PPRC usage (peer-to-peer remote copy), if they should be used for a synchronous copy of a volume or disk for disaster recovery, device migration, and workload migration. This PPRC usage type is also displayed in the I/O Device List when scrolling to the right.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Enhancement of the CSS/OS Device Compare report

Description: The *CSS/OS Device Compare* report displays the subchannel set ID for devices or device ranges which are located in a subchannel set with a subchannel set ID > 0.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Classification for severe warning messages

Description: To distinguish the severity of warning messages when building the production IODF, HCD introduces a new severity classification **S** in the *Message List* (when working in the HCD dialog) or in the HCD message log (when working in batch processing). This classification designates severe warning messages that users should carefully consider. Though these messages do not prevent the function to be terminated, the reason for these messages may lead to undesirable results.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Support of over-defined CIB channels

Description: You can now over-define CIB channel paths in order to avoid an outage of the coupling facility when defining new CIB connections. You can install an over-defined CIB path later and perform a dynamic activation of the configuration.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Hardware support

Description: z/OS supports the IBM zEnterprise BladeCenter® Extension (zBX) processor family (processor types 2817-M15, -M32, -M49, -M66, -M80). These processors support three subchannel sets (SS IDs 0 through 2).

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Channel path types

Description: To support the communication tasks of the networks that connect to a zBX processor, two new channel paths are introduced:

- OSX for the intraensemble data network (IEDN)
- OSM for the intranode management network (INMN)

HCD and HCM

From an HCD perspective, these new CHPID types follow the OSD rules almost exactly. However, device priority queuing is always disabled for the INMN. This is handled by the CHPARM keyword for the CHPID statement for OSM CHPIDs.

When change was introduced: z/OS V1R12.

Reference information: *z/OS HCD User's Guide*.

HCD: Profile Options dialog

Description: HCD provides a new Profile Options dialog which displays the current values of all possible HCD profile keywords as they are either explicitly set in the HCD profile data set or as they are defaulted by HCD. This dialog allows you to verify or modify HCD profile options.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Profile option

Description: There are new profile keywords for the following purposes:

- **Showing partition information in IOCP decks:** Use profile option SHOW_IOCP_DEFAULTS to explicitly show and document the partition defaults of CHPID and IODEVICE statements in generated IOCP decks. The option causes HCD to write this additional information as comments into the IOCP deck.
- **Extend the change log data set to provide space for updates:** Use profile option CHLOG_EXTENSION to specify the percentage of additional space that is to be allocated beyond the default size of the IODF when a change log data set is created.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Changes in HCD reports

Description: The following HCD reports are enhanced:

- The **Control Unit Summary Report** now shows the number of logical paths per control unit.
- The **Control Unit Detail Report** now shows the number of logical paths for a control unit per channel subsystem and the number of logical paths per control unit port.
- The **EDT Report** now shows values for columns NAME, NAME TYPE, VIO, and TOKEN also for an esoteric that has no device numbers assigned to it.
- For the **Processor Compare Report**, HCD now also compares the processor tokens of work/production or work/work IODFs. In previous releases, HCD compared only the tokens of production IODFs.
- In the **CSS/OS Device Compare Report**, devices with adjacent ranges are joined before printing. Additionally, the device range is increased to show a maximum of 4 digits.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Indicating channel path mode changes

Description: When working with channel paths in the HCD dialog, you could specify a partition assignment that does not match the specified channel path mode, or vice versa. In such a case, HCD would not accept your channel path mode specification but would implicitly adjust it to the defined partition assignment. Starting with this release, HCD issues a new informational message to inform you that the channel path mode is adjusted to reflect the specified partition assignment.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Specifying multi-user access mode when creating a work IODF from a production IODF

Description: You can now choose multi-user access mode for a new work IODF that you create from a production IODF.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Support of the WWPB Prediction Tool

Description: From the currently accessed IODF, you can export the FCP channel/device specific part of the I/O configuration into a comma-separated value (CSV) output format. You can then use the generated file as input to the WWPB Prediction Tool to assign world-wide port names to virtualized FCP ports for configuring SAN devices.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Miscellaneous dialog enhancements

Description: HCD provides the following dialog enhancements:

- **Enhanced prompting for available IODFs:** The **Available IODFs** panel invoked by prompting for IODFs indicates whether an IODF can be accessed in multi-user access or in single-user access mode only.
- **Enhanced Channel Path List:** The **Channel Path List** is enhanced to show the processor ID when you scroll to the right to see which partitions are in the access and candidate lists for a channel path (partition matrix).
- **Enhanced deleting of partitions with CHPIDs uniquely assigned:** A partition that has CHPIDs uniquely assigned to it in either the access or candidate list, can't be deleted until you first remove the CHPIDs from the partition. If you try, you receive a message informing you that you can't delete the partition and which identifies a single CHPID that has to be removed first. If the partition has more than a single CHPID uniquely assigned to it, you receive multiple

HCD and HCM

messages, one for each CHPID uniquely assigned to the partition. This could make deleting a partition a cumbersome and inefficient task.

To address this problem, the **Confirm Delete Partition** dialog is enhanced to indicate all CHPIDs exclusively assigned to a partition by flagging them with an asterisk (*). Now you can remove the flagged CHPIDs in one step and then delete the partition more efficiently.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS HCD User's Guide*

HCD: Hardware support (previous enhancement)

Description: HCD provides the following hardware support:

- HCD supports the IBM z10 BC processor (processor type 2098-E10).
- For the z/TPF operating system, 3215 consoles are supported on channel paths of type OSC. IOCP needs to distinguish between OSC-3270 and OSC-3215 attachments. This is done using the CHPARM keyword on the CHPID statement

When change was introduced: z/OS V1R10 via SPE.

Reference information:

- *z/OS HCD User's Guide*

HCM: Support of the WWPB Prediction Tool

Description:

You can use HCM to generate an FCP I/O configuration file as input to the WWPB Prediction Tool in order to assign worldwide port names to the FCP device paths. The HCM **WWPB Prediction Tool Support** exports and downloads a file containing the FCP I/O configuration data of a selected XMP processor from the host. If the WWPB Prediction Tool is correctly installed on your workstation, HCM also launches the WWPB Prediction Tool with the exported file as input.

When change was introduced: z/OS V1R12.

Reference information: *z/OS and z/VM HCM User's Guide*.

HCM: Installation process

Description: The installation process for HCM has changed. The code is delivered as an MSI package and is installed using the Windows Installer.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS and z/VM HCM User's Guide*

HCM: Location of the HCM INI file

Description: The location of the EEQHCM.INI file has changed from C:\WINDOWS user-specific application data directory. HCM creates separate versions if multiple users are working on the same workstation. Each user has the advantage of his

own preferred session settings. Due to changes in the user authorization methods for Windows versions, the change of the location is necessary to allow users who are administrators to update this file.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS and z/VM HCM User's Guide*

HCM: Supporting IPv6

Description: HCM supports the Internet Protocol Version 6 (IPv6) which you allows you to establish a communication session with HCD.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS and z/VM HCM User's Guide*

HCM: Handling multi-user access enabled IODFs

Description: HCM lets you load a multi-user access enabled IODF from HCD configuration file and lets you also open an existing HCM configuration with a multi-user access enabled IODF. You can use the viewing features of HCM on such configuration diagrams and you may changes. However, you cannot update the associated IODF.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS and z/VM HCM User's Guide*

IBM Tivoli Directory Server for z/OS new functions to consider

This topic describes new IBM Tivoli Directory Server for z/OS (IBM TDS for z/OS) functions in z/OS.

Password policy

Description: Password policy rules can be set that determine how passwords stored in the LDBM, TDBM and CDBM backends are controlled and used. In addition, native authentication and SDBM authentication have been updated to return the **PasswordPolicy** control response by mapping RACF® responses to password policy responses, where possible.

When change was introduced: z/OS V1R12.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS.*
- *IBM Tivoli Directory Server Client Programming for z/OS.*
- *IBM Tivoli Directory Server Messages and Codes for z/OS.*

ACL filters

Description: ACL filters are an extension to standard ACLs that allow permissions to be augmented, reduced, or replaced based on logical combinations of the following:

IBM Tivoli Directory Server for z/OS (IBM TDS for z/OS)

- Bind distinguished name (DN)
- Alternate distinguished names (DNs)
- Pseudo DNs (such as cn=anybody)
- Groups that the bind or alternate DNs belong to
- The IP address of the client connection
- The time of day the directory entry was accessed
- The day of the week that the directory entry was accessed
- The authentication or bind mechanism used
- Whether encryption ciphers are required on SSL connections

ACL filters are allowed to be specified on **aclEntry** and **entryOwner** attribute values.

When change was introduced: z/OS V1R12.

Reference information:

IBM Tivoli Directory Server Administration and Use for z/OS.
IBM Tivoli Directory Server Messages and Codes for z/OS.

Activity log enhancements

Description: The activity log now supports automatic log file rollover or archiving, filtering log records based on the client's IP address, and a merged log record that is issued at the end of a client operation.

When change was introduced: z/OS V1R12.

Reference information:

IBM Tivoli Directory Server Administration and Use for z/OS.
IBM Tivoli Directory Server Messages and Codes for z/OS.

LDAP schema syntaxes and matching rules

Description: Additional syntaxes and matching rules are now supported in the LDAP schema. Attributes using these syntaxes and matching rules can be added to the schema and the attributes can then be used in directory entries.

When change was introduced: z/OS V1R12.

Reference information:

IBM Tivoli Directory Server Administration and Use for z/OS.
IBM Tivoli Directory Server Messages and Codes for z/OS.

Salted SHA (SSHA) password hashing

Description: The **userPassword** attribute values of entries in the TDBM, LDBM, and CDBM backends are now allowed to be hashed in Salted SHA (SSHA). Salted SHA is an enhanced version of the SHA algorithm where a salt is randomly generated to help randomize the resulting hash.

When change was introduced: z/OS V1R12.

Reference information:

IBM Tivoli Directory Server Administration and Use for z/OS.
IBM Tivoli Directory Server Messages and Codes for z/OS.

Displaying and managing RACF classes and general resource profiles

Description: The SDBM backend is enhanced to display and manage RACF general resource profiles using SDBM add, compare, delete, modify, and search operations. In addition, the hierarchy of RACF classes and the resource profiles in each class can be displayed. RACF SETROPTS options that affect classes (such as refreshing RACLIST) can also be performed using LDAP. New attributes and object classes are added to the LDAP schema to represent the fields in RACF classes, general resource profiles, and class options.

This support also includes enhancing the GDBM backend to create a change log entry to represent a change to a RACF general resource profile. The change log entry is similar to those created when RACF user, group, or connection profiles are changed.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS*

WLM support for setting performance goals

Description: The LDAP server is enhanced to use Workload Manager (WLM) which enables an installation to set performance goals for LDAP server operations.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS*

Advanced replication

Description: Advanced replication supports many functions that are not available in basic replication. These functions provide better synchronization of data throughout an enterprise.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS*
- *IBM Tivoli Directory Server Client Programming for z/OS*

CDBM backend

Description: CDBM stores some LDAP server configuration information, including the information used to configure advanced replication. The CDBM backend, like the LDBM backend, uses a z/OS UNIX System Services file system to store its entries.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS*

Control values in ds2ldif LDIF output file

Description: The ds2ldif utility has been enhanced to unload by default the replicateOperationalAttributes control for each entry that is unloaded.

When change was introduced: z/OS V1R11.

Reference information:

- *IBM Tivoli Directory Server Administration and Use for z/OS*

ICKDSF new functions to consider

This topic describes ICKDSF (Device Support Facilities) functions in z/OS.

Change to INIT command

Description: A new parameter, NODSEXIST, has been added to the INIT command to not allow volumes which contain data sets other than the index data set and/or VVDS to be initialized.

When change was introduced: ICKDSF R17 with APAR PK83260.

Reference information:

- *Device Support Facilities (ICKDSF) User's Guide and Reference*

Infoprint Server new functions to consider

This topic describes new Infoprint Server functions in z/OS.

Enhanced support for multiple output data sets in an output group

Description: The IP PrintWay™ extended mode component of Infoprint Server can now process a greater number of documents in the same print job. This means that you can submit jobs that create a large number of output data sets (up to approximately 32,640 data sets) in the same output group.

Infoprint Central now lets authorized users see information about all the documents in an Infoprint Server print job, up to a limit specified by the administrator.

Note: The format of the Infoprint Server Printer Inventory has been changed to support a large number of output data sets in the same print job. Infoprint Server automatically migrates an existing Printer Inventory to the new format when you start Infoprint Server in V1R12 for the first time.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Infoprint Server Customization*/*z/OS Infoprint Server Customization*

IP PrintWay Response Notification exit

Description: IP PrintWay extended mode now supports the same Response Notification exit that IP PrintWay basic mode supports. The Response Notification exit lets you take an action based on the status of the transmission of an output data set to a printer. For example, the exit can send a message to the operator's console when a transmission to a printer fails.

When change was introduced: z/OS V1R12.

Reference information: z/OS Infoprint Server Customization *z/OS Infoprint Server Customization*

LPD support for files larger than 2 GB

Description: The Infoprint Server Line Printer Daemon (LPD) can now receive files larger than 2 GB. This means that you can, for example, use a TCP/IP LPR command or the Infoprint Server Port Monitor for Windows® client to print large files through Infoprint Server.

When change was introduced: z/OS V1R12.

Reference information: z/OS Infoprint Server Customization *z/OS Infoprint Server Customization*

Workload prioritization

Description: Infoprint Server now gives higher priority to processing existing print jobs than to receiving new print jobs. This change is expected to improve throughput of existing print jobs.

When change was introduced: z/OS V1R12.

Reference information: z/OS Infoprint Server Customization *z/OS Infoprint Server Customization*

Support for large workloads

Description: Infoprint Server now supports a greater number of jobs active in the system at one time, up to the maximum that JES currently allows.

When change was introduced: z/OS V1R12.

Reference information:

Infoprint Port Monitor Version 3.0

Description: Version 3.0 of Infoprint Port Monitor for Windows adds support for Windows Vista. It lets you print from Windows Vista, Windows Server 2003, Windows Server 2008, and Windows XP systems to any printer defined in the Infoprint Server Printer Inventory. Version 3.0 also adds support for Windows Terminal Services and Windows fast user switching.

Version 2.6.0 runs on Windows Server 2003 and Windows XP. Version 2.0.6 also runs on Windows NT 4.0, Windows 95, Windows 98, Windows Millennium Edition (ME), and Windows 2000; however, IBM support for these Windows systems has been discontinued.

You can download the z/OS Infoprint Port Monitor for Windows from:

- <http://www.ibm.com/printers/download.html>
- z/OS: /usr/lpp/Printsrv/win/En_US/aopwin.msi (Version 3.0)
- z/OS: /usr/lpp/Printsrv/win/En_US/aopwin.exe (Version 2.6)

For Windows configuration information, see the Infoprint Port Monitor help that is installed on your desktop with the Infoprint Port Monitor.

Infoprint Server

When change was introduced: Available in z/OS V1R8, z/OS V1R9, z/OS V1R10, and z/OS V1R11 with APAR OA28158/PTF UA46392.

Reference information: None.

Infoprint Central performance improvement

Description: In z/OS R11, Infoprint Central has improved the performance of searches for JES print jobs when you search either by job name or by job ID. To obtain the performance improvement, you must run either JES3 at the R11 level or JES2 in z11 mode. You must use the JES2 \$ACTIVATE command to activate z11 mode.

When change was introduced: Available in z/OS V1R11 with the PTF for APAR OA28194.

Reference information: For information about the \$ACTIVATE command, see:

- *z/OS JES2 Commands*

Integrated Security Services new functions to consider

This topic describes new Integrated Security Services functions in z/OS.

Integrated Security Services includes DCE Security Server, Open Cryptographic Enhanced Plug-ins (OCEP), Network Authentication Service, and Enterprise Identity Mapping (EIM).

Introducing Network Authentication Service

Description: The “Authentication” on page 1-2 subject of Chapter 1, “Introducing Network Authentication Service,” on page 1-1 was updated with new information.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Administration*

Configuring Network Authentication Service

Description: The “Configuring Network Authentication Service” topic was updated with a new step for file permissions and other considerations.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Administration*

Configuration profile file sections

Description: Information was added to the use_dvipa_override topic.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Administration*

Information on Kadmin subcommands

Description:

- The following **Kadmin** subcommands have had a note added to them regarding z/OS not supporting hardware authentication:
 - **get_principal**, **REQUIRES_HW_AUTH** attribute
 - **add_principal**, **+requires_hwauth** attribute
 - **modify_principal**, **+requires_hwauth** attribute

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Administration*

krb5_c_string_to_key_with_params API

Description: A new API, **krb5_c_string_to_key_with_params**, has been added for generating an encryption key from a text string.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Programming*

Enhanced usage details for select APIs

Description: Enhanced usage details for the following APIs have been added:

- **krb5_rd_req** (process a Kerberos AP_REQ message),
- **krb5_rd_req_verify** (process a Kerberos AP_REQ message and verify checksum data)
- **krb5_rcvauth** (receive authentication message)
- **gss_accept_sec_context** (accept a security context)
- **gss_acquire_cred** (acquire a GSS-API credential)
- **gss_krb5_acquire_cred_ccache** (acquire a GSS-API credential)
-

When change was introduced: z/OS V1R12.

Reference information: *z/OS Integrated Security Services Network Authentication Service Programming*

ISPF new functions to consider

This topic describes new ISPF functions in z/OS.

ISPF product changes

Description: ISPF product changes include:

- Changes to the ZENVIR variable. Characters 1 through 8 contain the product name and sequence number in the format ISPF x.y, where x.y indicates the version number and release. Note that the x.y value is not the same as the operating system version. For example, a value of "ISPF 6.1" represents ISPF for z/OS Version 1 Release 11.0.
- The ZOS390RL variable contains the level of the z/OS release running on your system.

ISPF

- The ZISPFOS system variable contains the level of ISPF that is running as part of the operating system release on your system. This might or might not match ZOS390RL. For this release of ISPF, the variable contains ISPF for z/OS 01.11.00.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS ISPF Services Guide*
- *z/OS ISPF User's Guide Vol II*

ISPF Dialog Manager component changes

Description: The DM component of ISPF includes these new functions and enhancements:

- The new)INEXIT panel processing statement allows a panel source statement input exit to be specified. The input exit can perform dynamic modification of the ISPF panel. The exit is passed each panel source record as it is read by ISPF and is able to change, insert, or delete panel source records.
- Support for extended member statistics. This allows ISPF to store number of lines values greater than 65,535.
- The File Tailoring)DOT control statement supports the OPT parameter. If the OPT parameter is used and the table specified with the)DOT control statement does not exist ISPF will behave as though the table is empty rather than terminate file tailoring processing with message ISPF122.
- ISPF Configuration Utility changes:
 - New keyword USE_ADDITIONAL_QUAL_FOR_PDF_DATA_SETS is used to specify an additional qualifier included in the default data set name for data sets generated by PDF utilities.
- Dialog Tag Language (DTL) changes:
 - There are no changes to Dialog Tag Language (DTL) for this release.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS ISPF Dialog Developer's Guide and Reference*

ISPF PDF component changes

Description: The ISPF PDF component contains these new functions and enhancements:

- Support for the display of Extended Address Volumes (EAV) data set level attribute EATTR.
- The ISPF Editor COMPARE command is enhanced to allow the name of a data set containing SuperC process statements and allocated to the SYSIN DD to be specified as part of the command syntax.
- New ISPF Editor line commands HX and HXX are provided to allow the display of individual records in hexadecimal format.
- New option Prefix Dsname Level is added to the Data Set list Utility entry panel. When this option is selected the Dsname Level can be specified with or without quotes. When the quotes are omitted the TSO prefix (if running with PREFIX ON) will be prefixed as the first qualifier of the Dsname Level. When the option is not selected the behavior of the entry panel remains unchanged.

- These enhancements to the z/OS UNIX Directory List Utility are provided:
 - New line commands are available to display and update these attributes for files and directories:
 - Owning user
 - Owning group
 - File format and tag information
 - User auditing options
 - Auditor auditing options
 - A new line command is available to display information about the file system for a file or directory.
 - z/OS UNIX commands can be entered from the primary command field on the directory list display panel.
 - Options are provided to allow a user to define default line commands for different file types. The default line command is invoked when a user puts the cursor in the line command field and presses enter without supplying a line command.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS ISPF Edit and Edit Macros*
- *z/OS ISPF User's Guide Vol II*

ISPF SCLM component changes

Description: The ISPF SCLM component contains these new functions and enhancements:

- The Search utility is provided to allow users to search a combination of SCLM groups, types and members for one or more strings.
- The ability to encode members stored in SCLM is available. These members are stored in a compressed format and are not viewable from outside SCLM.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS ISPF Software Configuration and Library Manager Guide and Reference*

JES2 new functions to consider

This topic describes new JES2 functions in z/OS.

JES2 enhances \$TRACE for SAPI SSI requests

Description: JES2 has enhanced the \$TRACE SAPI trace point to provide more granular trace information instead of a core dump of input and output SSI information.

When change was introduced: z/OS V1R12.

Reference information: *z/OS JES2 Diagnosis*.

JES2 supports EAV spool and checkpoint data sets

Description: JES2 now supports allocation of spool and checkpoint data sets in EAV cylinder managed space.

JES2

When change was introduced: z/OS V1R12.

Reference information: *z/OS JES2 Commands* and *z/OS JES2 Messages*.

JES2 DS notification

Description: Prior to z/OS V1R12, only true client tokens created by dynamic allocation (DYNALLOC) using the DALRTCTK text unit sent ENF58 notifications. JES2 now supports ENF58 notifications for tokens returned from the SYSOUT Application Program Interface (SAPI) – SSI Function Code 79 subsystem interface in output field SSS2DSTR.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Using the Subsystem Interface*.

JES2 enhances SSI 82

Description: JES2 is enhanced to return MAS-wide information for the Initiators function of the Properties Information SSI (SSI 82).

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Using the Subsystem Interface*.

JES2 supports SSI 83

Description: JES2 supports the printer function of the Device Information SSI (SSI 83). This information supports SDSF displays that are common to JES2 and JES3.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Using the Subsystem Interface*.

JES2 supports z11 mode

Description: In z/OS V1R11, JES2 introduces several new functions that are available when the member is operating in z11 mode. The primary new function is the ability to extend the \$JOE with variable size extensions. Other new functions include an increase in the maximum number of JQEs (up to 400,000), an increase in the maximum number of JOEs (up to 1,000,000), an increase in the maximum number of BERTs (up to 1,000,000), and an increase in the number of checkpoint versions (up to 50). To control the activation of these new functions in the release, JES2 reintroduces the \$ACTIVATE command. The \$ACTIVATE command can be used to activate the new level of functions once all members have completed their migration to z/OS V1R11. The \$ACTIVATE command can also be used to fall back to the pre-z11 mode (z2 mode), if necessary.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES2 Commands*
- *z/OS JES2 Diagnosis*
- *z/OS JES2 Initialization and Tuning Reference*
- *z/OS JES2 Installation Exits*
- *z/OS JES2 Macros*

- *z/OS JES2 Messages*

JES2 supports data set creation on Start Spool

Description: JES2 has enhanced the Start SPOOL (\$S SPL) command to enable the creation of a new SPOOL volume data set, if the SPOOL volume being started is a new volume.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES2 Commands*
- *z/OS JES2 Messages*

JES2 enhances Spool Data Set Browse

Description: Spool Data Set Browse (SDSB) has been enhanced to allow applications to read the SYSLOG data set.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES Application Programming*

JES2 returns APPC transaction data for extended status

Description: JES2 now includes APPC transaction data in the terse output from extended status. More fields are added to the IAZSSST (extended status SSOB extension) data area to return terse information for APPC transaction output.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Using the Subsystem Interface*

JES2 supports APPC filters

Description: JES2 now supports filtering for APPC transaction output with Subsystem Interface requests using code 79 (SYSOUT Application Programming Interface – SAPI) and 80 (Extended Status). APPC transactions can be identified by APPC transaction job name, APPC transaction job id, and APPC transaction owner (SSI 80 only). Transactions are typically entered because a task to be performed by a user (typically on a workstation) is to run under an APPC or BPXAS initiator and is given its own job identifier. Therefore, if the task prints output, it can be distinguished from other similar tasks performed by different users.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Using the Subsystem Interface*

JES2 supports SSI 82

Description: JES2 supports Subsystem Interface code 82 (JES Property Information Services). This provides a requesting program with the ability to obtain

information about JES managed structures. Five requests types are provided: NJE node information, SPOOL volume information, Initiator information, JESplex information, and Job Class information.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Using the Subsystem Interface*

JES3 new functions to consider

This topic describes new JES3 functions in z/OS.

JES3 supports EAV spool data sets

Description: JES3 now supports allocation of spool data sets in EAV cylinder managed space.

When change was introduced: z/OS V1R12.

Reference information: *z/OS JES3 Commands* and *z/OS JES3 Messages*.

JES3 DS notification

Description: Prior to z/OS V1R12, only true client tokens created by dynamic allocation (DYNALLOC) using the DALRTCTK text unit sent ENF58 notifications. JES3 now supports ENF58 notifications for tokens returned from the SYSOUT Application Program Interface (SAPI) – SSI Function Code 79 subsystem interface in output field SSS2DSTR.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Using the Subsystem Interface*.

JES3 supports SSI 83

Description: JES3 supports the local printer function of the Device Information SSI (SSI 83). This information supports SDSF displays that are common to JES2 and JES3.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Using the Subsystem Interface*.

JES3 returns APPC transaction data for extended status

Description: JES3 includes APPC transaction data in the output from extended status. More fields are added to the IAZSSST (extended status SSOB extension) data area to return both terse and verbose information for APPC transaction output.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Using the Subsystem Interface*

JES3 supports APPC filters

Description: JES3 now supports filtering for APPC transaction output with Subsystem Interface requests using code 79 (SYSOUT Application Programming Interface - SAPI) and 80 (Extended Status). APPC transactions can be identified by APPC transaction job name, APPC transaction job id, and APPC transaction owner (SSI 80 only). Transactions are typically entered because a task to be performed by a user (typically on a workstation) is to run under an APPC or BPXAS initiator and is given its own job identifier. Therefore, if the task prints output, it can be distinguished from other similar tasks performed by different users.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS MVS Using the Subsystem Interface*

JES3 adds an SVC dump exit

Description: In z/OS V1R11, JES3 establishes a dump exit. Whenever a dump is taken in a user address space, either because it fails, because the operator requests a dump, or because a dump is triggered by a SLIP trap, JES3 determines if a subsystem interface request is active for the address space. If so, the dump exit adds the JES3, JES3AUX, and JESXCF address spaces to be included in the dump.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES3 Diagnosis Reference*

JES3 supports SSI 70

Description: JES3 supports Subsystem Interface code 70 (Scheduler Facilities Call). This provides a requesting program with the ability to modify or obtain the characteristics of SYSOUT data sets which are controlled by subsystem maintained scheduler data (for example, SWBTU).

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES3 Diagnosis*
- *z/OS JES3 Diagnosis Reference*
- *z/OS MVS Using the Subsystem Interface*

JES3 supports SSI 82

Description: JES3 supports Subsystem Interface code 82 (JES Property Information Services). This provides a requesting program with the ability to obtain information about JES managed structures. There are five requests types:

- NJE node information
- SPOOL volume information
- Initiator information
- JESplex information
- Job Class information

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES3 Diagnosis*
- *z/OS JES3 Diagnosis Reference*
- *z/OS MVS Using the Subsystem Interface*

JES3 enhances Spool Data Set Browse

Description: Spool Data Set Browse (SDSB) has been enhanced to include active buffers of a SYSOUT data set across systems. The JES3 z/OS V1.10 support for SDSB provided access to active buffers only when the browser and data set owning jobs were on the same system. This has been added to enhance the SDSF support for JES3.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES3 Diagnosis*
- *z/OS JES3 Diagnosis Reference*
- *z/OS JES Application Programming*

JES3 adds SYSLOG browse

Description: JES3 provides the capability to browse all SYSLOG data sets for all SYSLOG jobs on a system as a single, logically concatenated SYSLOG data set. This has been added to enhance SDSF support for JES3.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS JES3 Diagnosis*
- *z/OS JES3 Diagnosis Reference*
- *z/OS JES Application Programming*

JES3 adds Spool Data Set Browse

Description: JES3 adds Spool Data Set Browse (SDSB) to view SYSOUT data sets. SDSB has advantages over the SYSOUT Application Programming Interface (SAPI) including viewing SYSOUT data sets which are open and allowing multiple users to concurrently access a data set. This provides the initial SDSF support for JES3.

When change was introduced: z/OS V1R10.

Reference information:

- *z/OS JES3 Diagnosis*
- *z/OS JES3 Diagnosis Reference*
- *z/OS JES Application Programming*

Language Environment new functions to consider

This topic describes new Language Environment functions in z/OS.

Product enhancements

For z/OS Version 1 Release 12, Language Environment has the following changes:

- **Application enablement**

- **Support for constructed calendar times beyond 2038**

z/OS Language Environment provides a solution to the `time_t` problem for AMODE 31 XL C/C++ applications. The `time_t` overflows and wraps after 03:14:07 UTC on January 19, 2038. New typedefs, structures, and functions are added so that an AMODE 31 XL C/C++ application can work with constructed calendar times up to and including 23:59:59 UTC on December 31, 9999. AMODE 64 XL C/C++ applications do not have this restriction.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*

- **Support for C++ TR1**

Language Environment supports Chapter 8: C compatibility of ISO/IEC DTR 19768: Draft Technical Report on C++ Library Extensions for XL C++ applications.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*

- **Support for Extended Addressable KSDS Alternate Index**

Language Environment provides C/C++ run-time support for accessing an extended addressable VSAM KSDS data set through an alternate index.

For more information, see:

- *z/OS XL C/C++ Programming Guide*

- **C-RTL support for `__poe` r/w support**

Language Environment provides the XL C/C++ run-time changes needed to support z/OS UNIX System Services updates to the `__poe` (BPX1POE) service.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*

- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*

- **SMF IEFU83 support**

Language Environment provides the XL C/C++ run-time changes needed to support z/OS UNIX System Services updates to the `__smf_record` (BPX1SMF) service. The change allows users to specify they want user exit IEFU83 to be called (rather than IEFU84) when writing an SMF record.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*

- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*

- **IPv6 Socket API for Source Address Selection**

Language Environment provides enhancements to IPv6 socket API functions to support RFC 5014 for source address selection.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*

- **Parmlib enhancements**

Language Environment addresses the inability to set run-time options as overrideable or nonoverrideable in a CEEPRMxx parmliib member or on a

Language Environment

SETCEE command. Previously, the only method for marking run-time options as nonoverrideable was at the installation default level (other than CEEROPT). This required installing USERMODs. Now, you can do this in CEEPRMxx members and using the SETCEE operator command.

For more information, see:

- *z/OS Language Environment Customization*
- *z/OS MVS Initialization and Tuning Reference*.

- **Globalization**

Language Environment updates locale support for Slovakia. Beginning January 1 2009, Slovakia has adopted the Euro as its national currency.

For more information, see:

- *z/OS XL C/C++ Programming Guide*

- **BSAM support for large format sequential data sets under record I/O**

Language Environment provides C/C++ run-time support for large-format sequential data sets under record I/O opened using BSAM.

For more information, see:

- *z/OS XL C/C++ Programming Guide*

- **realloc() control**

Language Environment provides a mechanism to control the C/C++ realloc() function and the CEECZST callable service in order to allow for performance improvements in applications that frequently change the size of heap storage elements.

For more information, see:

- *z/OS XL C/C++ Run-Time Library Reference*
- *z/OS Language Environment Programming Guide*
- *z/OS Language Environment Programming Reference*

- **BAM XTIO support**

Language Environment provides support for the extended task I/O table (XTIOT), uncaptured UCB, and DSAB above-the-16 MB line options of dynamic allocation. The common execution library (CEL) supports these options for the ddname associated with the MSGFILE run-time option and the CEEDUMP ddname, but does not support those options for the CEEOPTS ddname. The C/C++ run-time library (C-RTL) supports these options for all ddnames provided to the fopen() function.

For more information, see:

- *z/OS XL C/C++ Programming Guide*
- *z/OS Language Environment Customization*
- *z/OS Language Environment Programming Reference*

Application enablement

Description: z/OS V1R11 provides the following application enablement enhancements:

- **IEEE decimal floating-point (DFP) support** z/OS Language Environment provides additional DFP functions in the C/C++ run-time library and adds new conversion specifiers for the printf() family of functions.
- **Assembler macro support** z/OS Language Environment provides a new assembler macro, CEEGLOB. Support is added for the RMODE and AMODE keywords on the CEEENTRY macro. Support is added to the CEEFETCH macro

to handle non-Language Environment routines. Support is added for the SERVICE keyword on the CEEPPA macro.

- **CICS additional floating-point support** Language Environment, with CICS Transaction Server for z/OS V4, is designed to support IEEE binary floating-point (BFP) and IEEE decimal floating-point (DFP) in applications run under the Language Environment-CICS extended run-time language interface (ERTLI).

When change was introduced: z/OS V1R11.

Reference information:

- For more information on IEEE decimal floating-point (DFP) support, see:
 - *z/OS XL C/C++ Run-Time Library Reference*
 - *z/OS XL C/C++ Programming Guide*
- For more information on Assembler macro support, see:
 - *z/OS Language Environment Programming Guide*
 - *Enterprise COBOL for z/OS, V4R2, Compiler and Runtime Migration Guide*
- For more information on CICS additional decimal floating-point support, see the CICS chapter in:
 - *z/OS Language Environment Programming Guide*

AMODE 64 enhancements

Description: z/OS V1R11 provides the following AMODE 64 enhancements:

- **Support for GETSTORE, FREESTORE, and MSGRTN** z/OS Language Environment provides support in CELQPIPI for the GETSTORE, FREESTORE, and MSGRTN service routines similar to those routines in CEEPIPI.
- **Large page support** Language Environment provides support in __moservices() for allocating memory objects that are to be backed with large page frames.

When change was introduced: z/OS V1R11.

Reference information:

- For more information on GETSTORE, FREESTORE, and MSGRTN support, see:
 - *z/OS Language Environment Programming Guide for 64-bit Virtual Addressing Mode*
- For more information on large page support, see:
 - *z/OS XL C/C++ Run-Time Library Reference*

Reliability, availability, and serviceability

Description: z/OS V1R11 provides the following reliability, availability, and serviceability enhancements:

- **Syscall trace**
Language Environment, with z/OS UNIX System Services, provides a new signal, SIGTRACE, that can be used to start and stop the syscall trace.
- **Heap pools**
Language Environment provides LEDATA formatting of heap pool information. In addition, the heap pools trace capability is enhanced.
- **File I/O tracing**
Language Environment provides a stream I/O tracing mechanism within the C/C++ run-time library.

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When change was introduced: z/OS V1R11.

Reference information:

- For more information on syscall trace, see:
 - *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
 - *z/OS Language Environment Debugging Guide*
-
- For more information on heap pool enhancements, see:
 - *z/OS Language Environment Debugging Guide*
 - *z/OS Language Environment Programming Reference*
- For more information on file I/O tracing, see:
 - *z/OS XL C/C++ Programming Guide*

Globalization

Description: z/OS Language Environment provides locale support for Serbia.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS XL C/C++ Programming Guide*

File system remount

Description: Language Environment, with z/OS UNIX System Services, provides a new option for `umount()` that supports a remount (`unmount` and `mount`) in the same mode.

Reference information:

- *z/OS XL C/C++ Run-Time Library Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*

Asynchronous I/O support

Description: Along with z/OS UNIX System Services changes, updates made to the C/C++ run-time header file `<aio.h>` support an asynchronous I/O form of `accept_and_recv()`.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS XL C/C++ Run-Time Library Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*

I/O support for extended address volumes (EAVs)

Description: Language Environment provides I/O support within the C/C++ run-time library for extended format sequential data sets residing in the extended addressing space on extended address volumes (EAVs).

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS XL C/C++ Programming Guide*

XPLINK

Description: z/OS Language Environment improves performance for certain pthread condition variable functions.

When change was introduced: z/OS V1R11.

Reference information: None.

Library Server new functions to consider

This topic describes new Library Server functions in z/OS.

Administration interface upgrade

Description: Library Server V3.3 has added an entirely new administration interface which is implemented as a Java applet. This new interface replicates and extends all existing administrative functions using an object-based design in which an Windows Explorer-like dialog exists for each of the LibraryCenters, Bookcases, InfoCenters, Shelves, Collections and Settings objects. The new dialogs now provide a tree node selection interface for specifying directories, and the ability to navigate between dialogs without the user ever needing to push the browser's back-arrow button. The original HTML-based administration interface is still available, and the administrative user has the ability to toggle between the Html and Java based administration interfaces, as desired.

When change was introduced: z/OS V1R11.

Reference information:

- *Library Server: Getting Started*

InfoCenter indexing performance enhancements

Description: Performance improvements for indexing and displaying InfoCenters have been implemented in Library Server V3.3. These improvements greatly enhance Library Server's scalability for InfoCenters that contain huge numbers of topic nodes.

When change was introduced: z/OS V1R11.

Reference information:

- *Library Server: Getting Started*

Metal C Runtime Library new functions to consider

There are no new functions for Metal C Runtime in the last z/OS releases.

NFS new functions to consider

This topic describes new Network File System (NFS) functions in z/OS.

Password phrase support for MVSLOGIN client utility

Description: This support enables a RACF user to be defined with a password phrase and supports a password phrase to be specified in the MVSLOGIN Client utility.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Network File System Guide and Reference.*

- The **cbsniff** operand has been added to the **MODIFY mvsnfs** command

NFS server display accounting statistics

Description: The nfsstat command can now be used to display the RPC and NFS statistics of all the z/OS NFS servers that reside in an LPAR.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Network File System Guide and Reference.*

SMF records for z/OS Unix file and MVS dataset/members

Description: A new SMF Record subtype has been created: SMF Record Type 42 subtype 26. This record includes Client information, the type of operation (create, remove, rename), and object descriptive information (depending on Filesystem type, MVS, z/OS Unix). For z/OS Unix objects, the file system name, device number, object name, inode, and parent inode information are saved. For MVS objects, the volume name, full dataset name, and member name (if appropriate) are saved. The [, **none** | **all** | *subtype_list*] values have been added to the **MODIFY mvsnfs** command's **SMF** parameter.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Network File System Guide and Reference.*

NFS server cache monitoring and reporting

Description: NFS Server site attribute **bufhigh** has been modified so that you can specify when to issue a data buffer utilization alert message. **bufhigh** now contains two variables:

- The high water mark (in bytes) of data buffers
- The watermark in percent of the high water mark, for printing a data buffer utilization alert message.

When change was introduced: z/OS V1R12.

Reference information: *z/OS Network File System Guide and Reference.*

mvslogin and mvslogout requirement for RPCSEC_GSS requests in the NFS Server eliminated

Description: mvslogin and mvslogout are no longer required for RPCSEC_GSS requests in the NFS server.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

z/OS NFS server site attributes

Description: The following new z/OS NFS server site attributes are added:

- A new `mvs` prefix enables the customer to explicitly specify a prefix for identifying MVS data sets, like the `hfs` prefix does for z/OS Unix files. This includes new server site attributes: `HFSPREFIX(prefix)`, `MVSPREFIX(prefix)`, and `IMPPREFIX(impprefix)`
- `DELEGATION/NODELEGATION` specifies whether the NFS server will allow NFS v4 file management delegation to NFS clients for MVS data sets or not. The default setting is `NODELEGATION`.
- `DlyDTimeout` specifies the minimum delay detection time value in seconds before the Delay Detection mechanism observes a delay in an external call from the NFS component and prints a warning console message. The valid range is from 5 to 60 seconds, with a default of 10. The mechanism can be disabled by specifying a value of zero.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

Console completion messages added

Description: z/OS NFS Server has added console completion messages for all NFS server console operator commands that did not previously display a successful completion message.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

Reasons code format generation enhanced

Description: z/OS NFS Client has changed its generation of the reason code format such that more of the reason codes are publishable and more meaningful.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

NFS Client console message Japanese National Language Support

Description: z/OS NFS Client now provides Japanese language National Language Support (NLS) for NFS Client console messages.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

Support to dynamically detect excessive delays from requests external to NFS

Description: z/OS NFS Server adds support to dynamically detect excessive delays from requests external to the NFS component. The z/OS NFS Server will report these delays with a console message.

The DlyDTimeout site attribute has been added to provide the customer with the capability of configuring the timeout value.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

NFS V4 file access delegation support

Description: z/OS NFS Server adds support to exploit NFS V4 File access delegation for MVS data sets to NFS Clients. File access delegation for z/OS UNIX files is not supported in this release.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

NFS Server NFS V4 Mount with symlink restriction is eliminated

Description: z/OS NFS Server NFS V4 Mount with symlink restriction is eliminated. NFS v4 mounts can now contain symlinks in the mount path specification.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

Value range expanded for client BUFHIGH space attribute

Description: The buffer space attribute value range - BUFHIGH(n) - will be expanded so that the maximum value is 1024 (i.e. 1GB) and its default value will be changed from 32 (i.e. 32 MB) to 128 (i.e. 128 MB). For compatibility with prior releases and to avoid migration impacts, the minimum value will be left at 4 (i.e. 4 MB).

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

z/OS NFS Client implementation of security negotiation through SECINFO

Description: Security Negotiation using the SECINFO operation is now performed by the z/OS NFS Client in the following instances:

- During mount point establishment
- During NFS4ERR_WRONGSEC handling

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Network File System Guide and Reference*

RMF new functions to consider

This topic describes new Resource Measurement Facility (RMF) functions in z/OS.

Statistics on running or waiting work units in the CPU Activity report

Description: Instead of in-ready statistics on address space level, the CPU Activity report now provides more granular statistics based on single work units that are running or ready to run. With more than one work unit running on an address space, the new in-ready distribution of work units provides a more detailed view on the CPU demand than the previous in-ready distribution of address spaces. Also, the number of work units is presented per processor type (CP, zAAP, zIIP).

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF Report Analysis*.

Enhanced Postprocessor Enterprise Disk Systems report and new overview conditions for error and performance counters

Description: The **ESS Rank Statistics** section of the Postprocessor **Enterprise Disk Systems** report is enhanced to indicate whether a solid state drive is defined in a rank array or not.

In addition, RMF provides new overview conditions for the Postprocessor based on SMF records 74-5 and 74-8.

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF Report Analysis*.

Information about processing in power-save mode

Description: The Monitor III CPC Capacity report and the Postprocessor CPU Activity report are extended to provide information about the currently used processor capacity, thus indicating whether the machine is running at normal capacity or in one of the available power-saving modes. The CPU Activity report also indicates whether the reason for the capacity change is initiated by the user or the machine.

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF Report Analysis*.

Support of Crypto 4096-bit RSA operations

Description:

RMF enhances the Postprocessor Crypto Hardware Activity report to provide measurements about 4096-Bit RSA operations.

When change was introduced: z/OS V1R12.

RMF

Reference information: *z/OS RMF Report Analysis.*

Accessing Postprocessor historical data using the DDS

Description: The DDS is enhanced to grant access to a selection of long-term historical Postprocessor data available with the following reports:

- CPU, DEVICE, CRYPTO, ESS, FCD, and OMVS (single system reports)
- WLMGL (sysplex report)
- CFACT, WLMGL (sysplex reports)
- OVERVIEW report

You can exploit this new functionality in the following ways:

- Application programs can exploit this new application programming interface and send standard URL requests for historical RMF data to the DDS. Similar to the RMF Monitor III performance data, the requested historical Postprocessor data, too, is exported to the requestor in a documented XML format for further processing.
- You can use the RMF Spreadsheet Reporter to request these new XML sysplex reports for display in a web browser.

By specifying a new ddname in the job for Postprocessor output, the Postprocessor can generate the WLMGL sysplex report in XML format.

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF User's Guide.*

SMF log streams allowed as Postprocessor input

Description: When generating a Postprocessor job, users can now also specify SMF log streams as the SMF input data type in addition to SMF data sets and data from the SMF buffers.

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF User's Guide.*

Supporting generic Overview control statements for XML Overview reports

Description: The Postprocessor supports generic Overview control statements when creating a Postprocessor Overview report in XML output. Only one control statement without qualifier or with a qualifier using wildcards needs to be specified for an Overview condition. The values of all matching instances found in the SMF input records are provided in the resulting output.

Description: When generating a Postprocessor job, users can now also specify SMF log streams as the SMF input data type in addition to SMF data sets and data from the SMF buffers.

When change was introduced: z/OS V1R12.

Reference information: *z/OS RMF User's Guide.*

Documentation of the DDS API

Description: The DDS grants direct access to Monitor III RMF performance data. The DDS API is now published in the current edition of this document. By exploiting this API, customers can write their own performance management application programs.

When change was introduced:

Reference information: *z/OS RMF Programmer's Guide*.

Report on OPT parameter settings

Description: RMF provides a new Monitor II **OPT Settings** report which displays information about the active OPT PARMLIB member and the settings of all OPT parameters.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF Report Analysis*

Replacement of the Postprocessor Plot report

Description: Plot reports by the RMF Postprocessor are no longer available. Each type of plot report can be replaced by a corresponding Overview control statement. After creating Overview records, the Spreadsheet Reporter with the **Open RMF Overview Spreadsheets** macro can be used for graphical presentation of Postprocessor data.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF User's Guide*

Real storage measurements

Description: The **Frame and Slot Counts** section of the Postprocessor **Paging Activity** report is enhanced to provide measurements about real storage requests and page faults.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF Report Analysis*

Measuring WLM's promotion for workloads holding locks

Description: The Postprocessor **Workload Activity** report is enhanced to show the CPU time consumed for work units while they have been promoted by WLM to free a local suspend lock quicker. In addition, RMF provides new overview conditions for the Postprocessor based on SMF record 72-3.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF Report Analysis*

Enhanced group capacity reporting

Description: RMF enhances its reporting about capacity groups. The **Partition Data** report displays the long term average capacity which is not used by members of the group but would be allowed by the defined limit. The **Group Capacity** report displays a column CAPPING WLM% which indicates to what extent the partition is subject to capping. Column CAPPING ACT% is added which displays how capping really limited the usage of processor resources. In addition, the RMF Distributed Data Server provides a new metric. Besides the remaining time until capping, RMF PM can display the remaining time until group capping which is the projected time until the group becomes subject to capping.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF Report Analysis*

Overview conditions for special purpose processors

Description: The RMF Postprocessor provides additional Overview conditions based on SMF record 70 for measuring the CPU activity of zAAPs and zIIPs.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF User's Guide*

RMF Postprocessor reports in XML format

Description: The Postprocessor can now generate certain reports in XML format. You can generate reports in XML format instead of in text format by specifying new ddnames for the Postprocessor output. Currently available in XML format are the CPU, CRYPTO, ESS, FCD, and OMVS reports as well as the Overview report. You can use the RMF Spreadsheet Reporter to request the reports in XML format for display in a web browser.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF User's Guide*

Selective deactivation of Monitor III reports

Description: You can temporarily deactivate selected Monitor III reports which are not required by any monitoring client from being provided by the Distributed Data Server.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS RMF User's Guide*

Run-Time Library Extensions new functions to consider

This topic describes new Run-Time Library Extensions functions in z/OS.

Ddpi_Sourcefile APIs provide information about a source file

Description: The `ddpi_sourcefile_get_source_lines` operation returns the contents of the source file at the given line numbers. The returned string will be NULL terminated.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Common Debug Architecture Library Reference*

SDSF new functions to consider

This topic describes new SDSF functions in z/OS.

Expanded function in the JES3 environment

Description: The Printer (PR) panel is now available in the JES3 environment. It shows data for JES3 locally attached printers.

When change was introduced: z/OS V1R12.

Reference information: Online help and *z/OS SDSF Operation and Customization*, SA22-7670.

Support for the Java programming language

Description: You can now access SDSF function with the Java™ programming language. This provides a simpler and more powerful alternative to using SDSF in batch, and complements SDSF's support for the REXX programming language.

When change was introduced: z/OS V1R12.

Reference information: *z/OS SDSF Operation and Customization*, SA22-7670.

Access to the SYSLOG with SDSF REXX

Description: SDSF simplifies access to the SYSLOG through REXX with a new ISFLOG command and special variables.

When change was introduced: z/OS V1R12.

Reference information: Online help and *z/OS SDSF Operation and Customization*, SA22-7670.

Display of check history

Description: A new check history panel shows all of the instances of a check for IBM Health Checker for z/OS. To display the check history, use the L action character on the Health Check (CK) panel.

When change was introduced: z/OS V1R12.

Reference information: Online help and *z/OS SDSF Operation and Customization*, SA22-7670.

Elimination of the requirement for WebSphere MQ for sysplex-wide printer and initiator panels

Description: You no longer need WebSphere MQ and the SDSF server to display sysplex-wide data on the printer (PR) and initiator (INIT) panels in a JES2 environment. For this support, JES2 on the remote systems must be at this minimum level:

- z/OS V1R11, for PR
- z/OS V1R12, for INIT.

WebSphere MQ and the SDSF server are still required to make other JES2 device panels sysplex-wide.

When change was introduced: z/OS V1R12.

Reference information: *z/OS SDSF Operation and Customization*, SA22-7670.

Search function for SDSF help

Description: You can now search the SDSF help under ISPF. Type the SEARCH command on the SDSF command line. (You cannot use the command from within SDSF help.) The syntax of the command is:

```

>> SEARCH _____
           |_____|
           | phrase |
  
```

where *phrase* is one to four words. SEARCH is English only.

When change was introduced: z/OS V1R12.

Reference information: Use this command:

```
SEARCH SEARCH
```

Expanded support for the JES3 environment

Description: SDSF has added support for the SYSLOG, Job Class (JC) and Spool Volumes (SP) panels in the z/OS JES3 environment. These complement the support for the Display Active Users (DA), Input Queue (I) and Status (ST) panels that was made available in z/OS V1R10 SDSF.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS SDSF Operation and Customization*

Enhanced support for the REXX programming language

Description: SDSF simplifies entering system commands with a new ISFSLASH command, and allows multiple actions or column modifications to be performed with a single ISFACT command. A new ISFRESET function drops all special variables. The COLSHELP command, which shows information about columns, is now context-sensitive and includes filter and locate functions.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS SDSF Operation and Customization*

Elimination of the need for the HASPINDEX data set with the SYSLOG

Description: The HASPINDEX-based SYSLOG is replaced by a logical log that eliminates the need for a HASPINDEX data set.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS SDSF Operation and Customization*

Elimination of the need for the SDSF sysplex support with the SYSLOG

Description: When displaying the SYSLOG for a system other than the one you are logged on to, you no longer need the SDSF sysplex support, which uses the SDSF server and WebSphere MQ, to see the latest data (data not yet written to spool). The SDSF sysplex support is still required for JES2 sysplex-wide device panels.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS SDSF Operation and Customization*

Security Server new functions to consider

This topic describes new Security Server functions in z/OS.

Support for ICSF encrypted symmetric keys and CP Assist for Cryptographic Function (CPACF)

Description: RACF adds a new suboperand called SYMCPCFWRAP to the ICSF operand of the RALTER and RDEFINE commands to allow the security administrator to specify whether certain encrypted symmetric keys are eligible to be rewrapped by CP Assist for Cryptographic Function (CPACF). This support extends the ability of the security administrator to implement the installation's policy related to the use of keys stored in ICSF and enforce restrictions on their use.

When change was introduced: Integrated in z/OS V1R12 and available in z/OS V1R9, V1R10, and V1R11 with APARs OA29193 and OA29194 installed.

Reference information:

- *z/OS Security Server RACF Command Language Reference.*
- *z/OS Security Server RACF Security Administrator's Guide.*

Generic profile load performance

Description: RACF provides the ability to improve system performance for installations with large numbers of generic profiles that either share a data set high-level qualifier (HLQ) or are associated with a general resource class that is not enabled for in-storage processing by the SETROPTS RACLIST or GENLIST command or by RACROUTE REQUEST=LIST,GLOBAL=YES. Installations can now use the new GENERICANCHOR operand of the SET command to customize the number of generic profile lists that RACF maintains to keep these generic profiles in storage. In addition, the TRACE operand of the SET command is enhanced with a new GENERICANCHOR option to support tracing for events related to generic profile loading.

Security Server (RACF)

When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference
z/OS Security Server RACF System Programmer's Guide

RACF usability and serviceability improvements

Description: RACF provides several usability improvements to help the installation avoid a condition that occurs when generic processing is enabled for a general resource class that includes a discrete profile with a generic character its profile name. Once generic processing is enabled, such a profile becomes unusable for authorization checking and can be difficult to remove. Usability improvements include new warning messages to raise awareness of the condition and new command options to detect and delete an unusable profile.

RACF also provides serviceability improvements that include new TRACE options for the SET command that limit trace records by resource class and user ID.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference
z/OS Security Server RACF Messages and Codes

Keys generated with elliptic curve cryptography (ECC) algorithms

Description: RACF enhances support for digital certificates by supporting keys generated with elliptic curve cryptography (ECC) algorithms. Shorter keys generated with ECC algorithms achieve comparable key strengths when compared with longer RSA keys. All functions of the RACDCERT command now support keys generated with ECC algorithms in accordance with the standards proposed by the following organizations:

- National Institute of Standards and Technology (NIST)
- ECC Brainpool working group of the Internet Engineering Task Force (IETF)

When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference

Long distinguished names

Description: RACF enhances support for digital certificates in the following ways:

- The ADD and GENCERT functions of the RACDCERT command accept certificates with long distinguished names.
- RACF callable services R_data1ib and initACEE support certificates with long distinguished names.
- The RACDCERT MAP command supports IDNFILTER and SDNFILTER values of up to 1024 characters.

In support of long distinguished names, RACF changes the way that certificate profile names in the DIGTCERT class are formed and stored in the RACF database.

When change was introduced: Integrated in z/OS V1R12 and available in z/OS V1R10 and V1R11 with APAR OA30560 installed.

Reference information:

z/OS Security Server RACF Command Language Reference

z/OS Security Server RACF Security Administrator's Guide

Long certificate validity periods

Description: All functions of the RACDCERT command now support digital certificates with long validity periods.

When change was introduced: Integrated in z/OS V1R12. For z/OS V1R10 and V1R11 systems with APAR OA30951 installed, all functions of the RACDCERT command support *existing* certificates with long validity periods; however, the RACDCERT GENCERT and REKEY functions cannot be used to create or renew certificates with validity periods that extend beyond the year 2041.

Programming interface change: If your installation uses an application program that extracts and processes the CERTSTRT and CERTEND fields of the CERTDATA segment of the GENERAL template, ensure that the program correctly processes the returned values on z/OS V1R12 systems and on V1R10 and V1R11 systems with APAR OA30951 installed. The format of these fields is changed to accommodate long validity periods.

Reference information:

z/OS Security Server RACF Command Language Reference

z/OS Security Server RACF Macros and Interfaces

Support for ICSF encrypted symmetric keys and CP Assist for Cryptographic Function (CPACF)

Description: RACF adds a new suboperand called SYMCPCFWRAP to the ICSF operand of the RALTER and RDEFINE commands to allow the security administrator to specify whether certain encrypted symmetric keys are eligible to be rewrapped by CP Assist for Cryptographic Function (CPACF). This support extends the ability of the security administrator to implement the installation's policy related to the use of keys stored in ICSF and enforce restrictions on their use.

When change was introduced: Integrated in z/OS V1R12 and available in z/OS V1R9, V1R10, and V1R11 with APARs OA29193 and OA29194 installed.

Reference information:

z/OS Security Server RACF Command Language Reference.

z/OS Security Server RACF Security Administrator's Guide.

Generic profile load performance

Description: RACF provides the ability to improve system performance for installations that use a large number of generic profiles for a particular general resource class or data set high-level qualifier (HLQ). The installation is now able to customize the way RACF loads certain generic profiles into storage by specifying several options with the new GENERICANCHOR operand of the SET command. The TRACE operand of the SET command is also enhanced with a new GENERICANCHOR option to support tracing for events related to generic profile loading.

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When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference.
z/OS Security Server RACF System Programmer's Guide.

RACF serviceability improvements

Description: RACF improves serviceability with several improvements such as a new RDEFINE message ICH10321I to warn a user who creates a discrete profile name containing a generic character in a RACF resource class that is not enabled for generic profile processing. The RLIST and SEARCH commands are also enhanced to display the UNUSABLE indicator in the listing of a discrete profile that is unusable because its profile name contained a generic character when generic profile processing was enabled for the class. Additionally, the RDELETE command is enhanced with a new ICH12306I warning message and a new NOGENERIC operand that allows the user to delete an unusable discrete profile that matches a generic profile name in the same class. Other serviceability improvements include new TRACE options for the SET command that improve tracing by class and user ID.

When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference.
z/OS Security Server RACF Messages and Codes.

Keys generated with elliptic curve cryptography (ECC) algorithms

Description: RACF enhances support for digital certificates by supporting keys generated with elliptic curve cryptography (ECC) algorithms. Shorter keys generated with ECC algorithms achieve comparable key strengths when compared with longer RSA keys. All functions of the RACDCERT command now support keys generated with ECC algorithms in accordance with the standards proposed by the following organizations:

- National Institute of Standards and Technology (NIST)
- ECC Brainpool working group of the Internet Engineering Task Force (IETF)

When change was introduced: z/OS V1R12.

Reference information:

z/OS Security Server RACF Command Language Reference.

Long distinguished names

Description: RACF enhances support for digital certificates in the following ways:

- The ADD and GENCERT functions of the RACDCERT command accept certificates with long distinguished names.
- RACF callable services R_data1ib and initACEE support certificates with long distinguished names.
- The RACDCERT MAP command supports IDNFILTER and SDNFILTER values of up to 1024 characters.

In support of long distinguished names, RACF changes the way that certificate profile names in the DIGTCERT class are formed and stored in the RACF database.

When change was introduced: Integrated in z/OS V1R12 and available in z/OS V1R10 and V1R11 with APAR OA30560 installed.

Reference information:

z/OS Security Server RACF Command Language Reference.

z/OS Security Server RACF Security Administrator's Guide.

Long certificate validity periods

Description: All functions of the RACDCERT command now support digital certificates with validity periods that extend beyond the year 2041.

When change was introduced: Integrated in z/OS V1R12. A portion of this support is available in z/OS V1R10 and V1R11 with APAR OA30951 installed.

Reference information:

z/OS Security Server RACF Command Language Reference.

EAV R2 toleration

Description: A RACF database must not reside in the extended addressing area of DASD volumes. If a RACF database is allocated in the extended addressing area, RACF and its related utilities may not work correctly. To ensure that RACF databases are not allocated in the extended addressing area, the following DD statements for the following RACF utilities must not contain the keyword parameter EATTR unless its value is NO (EATTR=NO):

- the SYSRACF DD statement for the IRRMIN00 utility
- the SYSUT1 DD statement for the IRRUT200 utility
- the OUTDD DD statement for the IRRUT400 utility

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF System Programmer's Guide.*

Extending support for multi-byte UTF8 characters that are outside the IBM-1047 code page

Description: You can now install, display certificates, retrieve, and authenticate certificates, certificate requests and certificate filters with distinguished or alternate names containing UTF8 characters that are outside of the IBM-1047 code page through the RACDCERT command, and the R_Datalib and initACEE callable services.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Callable Services.*
- *z/OS Security Server RACF Command Language Reference.*

Automatically assign unique IDs through UNIX applications

Description: You can now automatically assign a unique UID for each user and a unique GID for each group that needs access to z/OS UNIX functions and resources. This assignment does not require the specification of the AUTOUID or AUTOGID operands on the RACF TSO commands but happens automatically when

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a user without an OMVS segment invokes a UNIX function. The support uses the BPX.UNIQUE.USER profile in the FACILITY class, which is the recommended replacement for using a shared UID or GID from the BPX.DEFAULT.USER profile.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Auditor's Guide*
- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Command Language Reference*
- *z/OS Security Server RACF Macros and Interfaces*
- *z/OS Security Server RACF Security Administrator's Guide*

Signing and verifying programs

Description: z/OS signature verification is now provided in order for RACF to digitally sign and verify programs. As an option, RACF can enforce that a program module be digitally signed and verified before being loaded for execution on a z/OS system. In addition, you can now authorize selected users to digitally sign program modules that are bound at your installation.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Auditor's Guide*
- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Command Language Reference*
- *z/OS Security Server RACF Macros and Interfaces*
- *z/OS Security Server RACF Security Administrator's Guide*
- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACF Diagnosis Guide*
- *z/OS Security Server RACF Messages and Codes*
- *z/OS Security Server RACROUTE Macro Reference*
- *z/OS Security Server RACF System Programmer's Guide*

Define distributed identity mappings

Description: The ability to associate a RACF user ID with a distributed identity, while maintaining the user's original identity information for audit purposes, is added.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Auditor's Guide*
- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Command Language Reference*
- *z/OS Security Server RACF Macros and Interfaces*
- *z/OS Security Server RACF Security Administrator's Guide*
- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACF Diagnosis Guide*

- *z/OS Security Server RACF Messages and Codes*
- *z/OS Security Server RACROUTE Macro Reference*
- *z/OS Security Server RACF System Programmer's Guide*
- *z/OS Security Server RACF General User's Guide*

Recording logon statistics

Description: You can reduce the system impact of recording logon statistics for selected applications by recording statistics for only the first daily logon by each user, rather than for every daily logon by each user.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Auditor's Guide*
- *z/OS Security Server RACF Command Language Reference*
- *z/OS Security Server RACF Macros and Interfaces*
- *z/OS Security Server RACF Security Administrator's Guide*
- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACF Messages and Codes*
- *z/OS Security Server RACROUTE Macro Reference*
- *z/OS Security Server RACF System Programmer's Guide*

R_admin (IRRSEQ00) callable service support for extracting RACF general resource profiles

Description: The R_admin callable service (IRRSEQ00) has added a new function code, ADMN_XTR_RESOURCE, which extracts a general resource profile, and a new function code, ADMN_XTR_NEXT_RESOURCE, which iteratively extract profiles within a class. In addition, supervisor state callers can now enforce an authorization check in the FACILITY class.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Security Administrator's Guide*
- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACROUTE Macro Reference*

R_admin (IRRSEQ00) callable service enhancement to the SETROPTS extract function

Description: The R_admin callable service (IRRSEQ00) has changed to allow problem state callers to extract SETROPTS information. A FACILITY class check is enforced, as are the rules of the SETROPTS LIST command. Supervisor state callers can control which authorization checks are performed.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Security Administrator's Guide*

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- *z/OS Security Server RACF Data Areas*

A new REXX interface to extract RACF profile and SETROPTS information

Description: An interface is being added for use by REXX programs to obtain RACF profile and SETROPTS information using the R_admin (IRRSEQ00) callable service. The extracted information is saved in a REXX stem variable. An interface (IRRXUTIL) is being added.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Callable Services*
- *z/OS Security Server RACF Macros and Interfaces*

Providing profile name in authorization exits

Description: RACF will provide the RACF profile name used in the authorization check to RACROUTE REQUEST=AUTH and RACROUTE REQUEST=FASTAUTH post-processing exits.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACF System Programmer's Guide*
- *z/OS Security Server RACF Macros and Interfaces*

ICSF segment on the RACF general resource profile

Description: An ICSF segment is added to contain ICSF policy information. The segment applies to profiles in the CSFKEYS/GCSFKEYS and XCSFKEY/GXCSFKEY classes which protect symmetric and asymmetric keys stored in the ICSF CKDS and PKDS. This limits the symmetric keys that can be exported from ICSF and identifies the asymmetric keys that can be used in the export operation.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS Security Server RACF Command Language Reference*
- *z/OS Security Server RACF Macros and Interfaces*
- *z/OS Security Server RACF Security Administrator's Guide*
- *z/OS Security Server RACF Data Areas*
- *z/OS Security Server RACF Messages and Codes*
- *z/OS Security Server RACROUTE Macro Reference*
- *z/OS Security Server RACF System Programmer's Guide*
- *z/OS Security Server RACF Callable Services*

ServerPac new functions to consider

This topic describes new ServerPac functions in z/OS.

ServerPac withdraws 34xx media

Description: With z/OS V1R12, customers are no longer able to order Customized Offerings deliverables 3480, 3480C and 3490.

When change was introduced: z/OS V1R12.

Reference information:

ServerPac supports installing orders from DVD

Description: With z/OS V1R12, ServerPac customers can install orders from DVD.

When change was introduced: z/OS V1R12.

Reference information:

- ServerPac: Using the Installation Dialog

ServerPac supports ordering Customized Offering Driver on DVD

Description: With z/OS V1R12, ServerPac supports ordering the Customized Offering Driver (COD) on DVD in ShopzSeries. This feature enables customers outside of the z/OS coexistence window, who do not have tape drives compatible with ISC-supported media, and customers who have no tape drives.

When change was introduced: z/OS V1R12.

Reference information:

ServerPac removes prior version migration jobs

Description: The EUPDATE and UPDATE jobs are migration actions for eServerPac which were introduced with z/OS V1R6. Because the minimum level for z/OS V1R10 is z/OS V1R8, these migration actions are moved to CPAC.SAMPLIB.

When change was introduced: z/OS V1R12.

Reference information:

- ServerPac: Using the Installation Dialog

ServerPac offers electronic ESP

Description: This solution enables customers to download their z/OS V1R12 ESP electronic orders outside of ShopzSeries using Secure FTP (FTPS). This solution replaces the ESP electronic order download solution where customers access an IWM "campaign website" and download a TAR file.

When change was introduced: z/OS V1R12.

Reference information:

ServerPac extends SMP/E zone options

Description: With z/OS V1R12, SMP/E zone options are extended for ease-of-use. Customers can now change zone names before going into "Modify System Layout" and have those zone names propagated forward by variable substitution so that they only have to provide zone names once.

ServerPac

When change was introduced: z/OS V1R12.

Reference information:

- ServerPac: Using the Installation Dialog

ServerPac provides zOSMF enhancements

Description: With z/OS V1R12, ServerPac provides additional customization for the zOSMF product. The new customization is available for the WLM and RMF applications. The support for WLM includes providing a user ID authorized (RACF security changes) for CIM work and a WLM address space. The support for RMF includes security and a DDS server.

When change was introduced: z/OS V1R12.

Reference information:

ServerPac provides JES/SDSF zone merging

Description: With z/OS V1R12, during ServerPac JES configuration, when you merge a JES2 or JES3 element with the BCP zones, the SDSF zone is automatically merged with the BCP zones.

When change was introduced: z/OS V1R12.

Reference information:

- ServerPac: Using the Installation Dialog

SMP/E new functions to consider

There are no new SMP/e functions in this release.

TSO/E new functions to consider

This topic describes new TSO/E functions in z/OS.

TSO/E supports duplicate logons in a sysplex

Description: In z/OS V1R4, JES2 allowed users to log on once per system in a sysplex. However, TSO/E support for multiple logons failed because the JESXCF service that called from TSO/E LOGON RECONNECT and TSO/E SEND failed if a user was logged on more than once. With z/OS V1R12, JESXCF services support multiple logons for TSO/E. TSO/E users can now log on once per system in a sysplex. Users can also configure JES2 MAS to prevent duplicate logons.

When change was introduced: z/OS V1R12.

Reference information:

- z/OS TSO/E Customization

TSO/E supports logon for passwords with special characters besides @, #, \$

Description: With z/OS V1R12, TSO/E users can optionally log on with new or existing passwords that can include special characters besides the following: @, #, or \$. With this support, any characters are allowed in the password with no syntax check, and passed to the security product for verification. This means that

installations can have stricter password rules and allows TSO/E users to conform to those password security rules that may already be in effect on other systems.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS TSO/E Customization*

TSO/E EAV R2 support

Description: Description: As of z/OS V1R10, 64K is the maximum amount of cylinders allowed for non-VSAM data sets. With z/OS V1R11, non-VSAM data sets in the EAS of an EAV volume can be greater than 64K cylinders. This requires support for TSO/E because unlike VSAM data sets, non-VSAM data sets are supported by many TSO/E functions. TSO/E EAV R2 support now allows users to use data sets that reside in the EAS without seeing ABENDs or incorrect calculations from TSO/E. Along with TSO/E EAV R2 support, a new operand for the ALLOCATE command and two new LISTDSI variables in REXX and CLIST have been added. The new operand for the ALLOCATE command specifies whether the data set can support extended attributes (format 8 and 9 DSCBs) or not, while the two new LISTDSI variables indicate whether a data set can reside in the EAS and whether the data set has extended attributes (format 8 and 9 DSCBs) respectively. Users can use them for data management. In addition, a new one-byte text unit called INMEATTR is defined to preserve extended attribute status for the TSO/E TRANSMIT and RECEIVE commands.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS TSO/E CLISTs*
- *z/OS TSO/E Customization*
- *z/OS TSO/E REXX Reference*
- *z/OS TSO/E Command Reference*

TSO/E LOGONHERE support for VTAM unconditional reconnect

Description: TSO/E LOGONHERE support for VTAM unconditional reconnect now allows you to reconnect to your session even if no disconnection has been detected. By default in z/OS V1R11, LOGONHERE support is turned on. By specifying the reconnect option, you can easily switch from one computer to another or reestablish a session after a loss of connectivity (even with a new IP address).

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS TSO/E Command Reference*
- *z/OS TSO/E Customization*
- *z/OS TSO/E Messages*
- *z/OS MVS Initialization and Tuning Reference*

z/OS UNIX new functions to consider

This topic describes new z/OS UNIX functions in z/OS.

Listing all mounted HFS file systems

Description: Previously, it was not possible to compile a list of all mounted HFS file systems. Now, because zFS is the strategic file system, IBM Health Checker for z/OS has made available a check (USS _HFS_DETECTED) that compiles a list of mounted HFS file systems as an aid in migrating from HFS to zFS.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS UNIX System Services Planning*
- *IBM Health Checker for z/OS: User's Guide*

Displaying latch identities on MVS consoles

Description: Previously, latch numbers could not be related to any specific resource without taking a dump and analyzing it. In z/OS V1R12, the D GRS,ANALYZE operator command displays the latch identity on MVS consoles.

When change was introduced: z/OS V1R12.

Reference information: *z/OS MVS Diagnosis: Reference*

Dynamically increasing MAXSOCKETS value for AF_UNIX and INADDRANYCOUNT value for CINET

Description: Previously, the MAXSOCKETS value for AF_UNIX and the INADDRANYCOUNT value for Common Inet (CINET) in the BPXPRMxx parmlib member could not be increased without having to stop and then restart z/OS UNIX. Now both values can be dynamically increased.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS UNIX System Services Planning*
- *z/OS UNIX System Services Messages and Codes*
- *z/OS MVS System Messages, Vol 3 (ASB-BPX)*

Reliability, availability, and serviceability

Description: z/OS UNIX System Services is enhanced to provide the following:

- An additional message will be put out when MaxSharePages reaches 60% to warn the installation when copy-on-write (COW) processing for fork() is about to be disabled (which occurs at a usage of 62.5%). This message is replaced when the next limit is reached or removed from the console when the limit falls under 60%.

When change was introduced: z/OS V1R12

Reference information: None.

Sharing point of entry data with other processes

Description / RFA information: Previously, the __poe (BPX1POE) service did not receive or return port of entry (POE) data to and from the caller. Because the caller did not have direct access to POE data, the data could not be shared beyond the caller's process. Now POE data can be obtained from multiple sources and returned

to the caller, who can then share the data with other processes. In addition, the ___poe service can receive POE data from the caller and register that data for use by z/OS UNIX authentication services.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS XL C/C++ Run-Time Library Reference*

Specifying SMF record exit IEFU83 instead of IEFU84 when writing SMF records

Description: Previously, only SMF record exit IEFU84 could be specified when writing SMF records. Now user exit IEFU83 can be specified instead of IEFU84. Record exit IEFU83 can issue supervisor call (SVC) routines while IEFU84 cannot.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS MVS Installation Exits*

Support added for memory mapping of NFS Client files

Description: Previously, memory mapping of NFS Client files was not available. Now NFS Client files can be memory-mapped. If there are page fault errors, the file involved is identified in a hardcopy log message.

When change was introduced: z/OS V1R12.

Reference information: *z/OS UNIX System Services Programming: Assembler Callable Services Reference*

Support added for the RECORD file format

Description: Support is added to set the new RECORD file format to a UNIX file and display it using ISHELL. Only z/OS applications accessing these files via QSAM, BSAM, VSAM, or BPAM and coding FILEDATA=RECORD will be able to take advantage of the record file format by writing data as records and reading data as records.

When change was introduced: z/OS V1R12.

Reference information:

- *z/OS Using REXX and z/OS UNIX System Services*
- *z/OS UNIX System Services File System Interface Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS UNIX System Services Messages and Codes*
- *z/OS UNIX System Services Command Reference*

Support added for the Shell and Utilities version of the `tsocmd` shell command

Description: Previously, the `tsocmd` shell command was available only from the Tools and Toys section of the z/OS UNIX Web site. As of V1R12, Shell and Utilities support of the `tsocmd` shell command has been added. Unlike the `tso` shell command, it can be used to issue authorized TSO/E commands.

When change was introduced: z/OS V1R12.

Reference information: *z/OS UNIX System Services Command Reference*

Dynamically replacing the sysplex root file system with an alternate sysplex root file system

Description: If the current sysplex root file system becomes unavailable, it can be dynamically replaced with an alternate sysplex root file system.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services Planning*

Editing ASCII data using ISPF Edit

Description: Previously, it was difficult using the TSO/E command OEDIT to edit ASCII data. Now ASCII data can be edited using OEDIT, as long as the file is tagged as ASCII.

When change was introduced: z/OS V1R11.

Reference information: For more information about ISPF, refer to the ISPF documentation.

Improved performance for dbx symbolic discovery and queries

Description: The `dbx` debugger can now load debug data on demand and to query symbol information from a module level mapping. Because all of the debug data files do not have to be loaded at startup, debugging of programs can start very quickly. Global module information is kept in a mapping and only a small working set of the debug data is loaded at any time. As a result, symbol queries during a debug session can occur more quickly and the storage requirement for the loaded debug data decreases dramatically.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services Command Reference*
- *z/OS UNIX System Services Programming Tools*

Remounting file systems without changing the mount mode

Description: File systems can now be remounted without changing the mount mode.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services Command Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS Using REXX and z/OS UNIX System Services*
- *z/OS XL C/C++ Run-Time Library Reference*

Support for asynchronous I/O interface to the accept_and_recv (BPX1ANR) callable service

To improve performance for high-volume server applications such as web servers, an asynchronous I/O (BPX1AIO) interface to the accept_and_recv (BPX1ANR) callable service is provided.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services File System Interface Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS XL C/C++ Run-Time Library Reference*

Tracing z/OS UNIX system calls made by user processes

Description: Previously, printf() calls or the like had to be used to trace application activity. Now users can trace application activity with the new user syscall trace capability. The user syscall trace can be activated at the start of the application or after an application is already running.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services Command Reference*
- *z/OS UNIX System Services Programming: Assembler Callable Services Reference*
- *z/OS UNIX System Services User's Guide*
- *z/OS MVS System Messages, Vol 3 (ASB-BPX)*
- *z/OS MVS System Commands*
- *z/OS MVS Diagnosis: Tools and Service Aids*
- *z/OS XL C/C++ Run-Time Library Reference*

Using automatically generated UIDs and GIDs instead of default OMVS segments

Description: Previously, if the BPX.DEFAULT.USER profile in the FACILITY class was defined, users that accessed z/OS UNIX services who did not have an OMVS user or group segment were assigned the default OMVS segments for the length of the user session. All users of the default OMVS segments shared the same UID and GID. As of z/OS V1R11, if BPX.UNIQUE.USER has been defined, users that access z/OS UNIX services who do not have an OMVS user or group segment are automatically assigned an OMVS segment with a unique UID and GID. The new OMVS segments are added to the user and group profiles in the RACF database. It

is strongly suggested that unique UIDs and GIDs be automatically generated instead of assigning default OMVS segments.

When change was introduced: z/OS V1R11.

Reference information:

- *z/OS UNIX System Services Planning*
- *z/OS Migration*
- *z/OS Security Server RACF Security Administrator's Guide*

Chapter 2. z/OS elements and features

z/OS base elements

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

An additional set of integrated features is available on an optional basis, see “z/OS optional features” on page 122.

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

- Alternate Library for REXX
- Base Control Program (BCP)
- BookManager READ
- Bulk Data Transfer (BDT)
- Common Information Model (CIM)
- Communications Server
- Cryptographic Services (includes ICSF, OCSF Base, PKI Services, and System SSL)
- DCE Base Services
- Distributed File Service
- DFSMSdfp
- EREP
- ESCON Director Support
- FFST
- GDDM (includes PCLK and OS/2 Link)
- Hardware Configuration Definition (HCD)
- High Level Assembler (HLASM)
- IBM HTTP Server (includes IBM HTTP Server NA Secure)
- IBM Tivoli Directory Server for z/OS (IBM TDS for z/OS)
- ICKDSF
- Integrated Security Services (includes DCE Security Server, Enterprise Identity Mapping (EIM), Network Authentication Service, and Open Cryptographic Enhanced Plug-ins (OCEP))
- ISPF
- JES2
- Language Environment®
- Library Server
- Metal C Runtime Library
- MICR/OCR Support
- Network File System
- OSA Support Facility
- Run-Time Library Extensions
- SMP/E
- TIOC
- TSO/E
- z/OS UNIX® System Services
- 3270 PC File Transfer Program

z/OS optional features

Some optional features are not priced, but priced as well as unpriced features are included in z/OS integration-testing. All priced, host-based features are capable of being dynamically enabled or disabled. For the version and release levels of those features that also exist independently, see *z/OS Planning for Installation*, GA22-7504.

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

- BookManager BUILD
- Bulk Data Transfer (BDT) File-to-File
- Bulk Data Transfer (BDT) SNA NJE
- C/C++ without Debug Tool
- Communications Server Security Level 3
- DFSMSdss
- DFSMSHsm
- DFSMSrmm
- DFSMSStvs
- DFSORT
- GDDM-PGF
- GDDM-REXX
- High Level Assembler (HLASM) Toolkit
- Hardware Configuration Manager (HCM)
- Infoprint Server
- JES3
- RMF™
- SDSF
- Security Server (includes RACF)
- z/OS Security Level 3 (includes OCSF Security Level 3, IBM Tivoli Directory Server for z/OS Security Level 3, Network Authentication Service Security Level 3, and System Secure Sockets Layer (SSL) Security Level 3)

Chapter 3. z/OS base elements descriptions

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

Alternate Library for REXX

Alternate Library for REXX enables users who do not have the REXX on zSeries library installed to run compiled REXX programs. It contains a language processor that transforms the compiled programs and runs them with the REXX interpreter, which is shipped as part of the z/OS operating system.

Software developers are no longer required to distribute the Alternate Library for REXX with their compiled REXX programs. Customers who have the REXX on zSeries Library installed will gain the performance benefits of running compiled REXX, while those customers who have the Alternate Library for REXX installed may still run the programs as interpreted.

By using the Alternate Library for REXX with z/OS, software developers gain the benefits of shipping compiled REXX programs without the source code:

- Maintenance of the program is simplified since the code can not be modified inadvertently.
- Compiled programs can be shipped in load module format, simplifying packaging and installation.
- The Alternate Library for REXX does not need to be shipped and installed with the software program.
- Maintenance of the Alternate Library for REXX is handled by the z/OS system administrator.

BCP (Base Control Program)

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

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

z/OS XML System Services: z/OS XML System Services is an integrated component of the BCP. It is a system level XML parser intended for use by system components, middleware, and applications that need a simple, efficient, non-validating XML parser. It provides a buffer-in, buffer-out processing model in which the document to parse is provided by the caller in one buffer; the z/OS XML System Services parser creates a parsed record stream in another buffer, also provided by the caller. Large documents can be processed by replenishing the input buffer with more data, and re-using the output buffer or specifying a new one when it is filled. z/OS XML System Services can natively handle the following character

set encodings: UTF-8, UTF-16 (big endian), EBCDIC-1047 and EBCDIC-037. z/OS XML System Services is invoked as a callable service and provides an assembler interface for callers to use. It is accessible from normal environments such as batch and z/OS Unix System Services, as well as from more esoteric environments such as SRB mode and cross-memory.

BookManager READ

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

BDT (Bulk Data Transfer)

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

Common Information Model (CIM)

The Common Information Model (CIM) is a standard data model for describing and accessing systems management data in heterogeneous environments. It allows system administrators or vendors to write applications (CIM monitoring clients) that measure system resources in a network with different operating systems and hardware. With z/OS CIM, it is possible to use the DMTF CIM open standard for systems management which is also implemented on further major server platforms (for example, Linux® on zSeries®, Linux on xSeries®, i5/OS®, or AIX®).

z/OS CIM implements the CIM server which is based on the OpenPegasus open source project. A CIM client invokes the CIM server which, in turn, collects z/OS data from the system and returns it to the calling client. To get the z/OS data, the CIM server invokes a CIM provider which retrieves the data from z/OS system resources.

The metrics obtained by this new API are common across server platforms so you can use it to create end-to-end monitoring applications.

Communications Server

IP IP (formerly known as IBM TCP/IP) is a set of industry standard protocols and applications that allow you to share data and computing resources with other computers, both IBM and non-IBM. UNIX applications use IP. By using IP commands at your workstation, you can perform tasks and communicate easily with a variety of other systems and workstations. IP allows you to perform tasks independent of the computer type. Some common uses of IP include: electronic mail, file transfer, remote logon, and the Internet.

IP CICS® Sockets

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

IP IMS™ Sockets

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

This element consists of three parts:

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

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

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

To help users control a network, SNA receives commands from an operator to perform network services. Through operator messages, the operator is kept informed about those services and about any network conditions.

Cryptographic Services

Cryptographic Services includes ICSF, PKI Services, OCSF, and System SSL, and provides cryptographic functions for data secrecy, data integrity, personal identification, digital signatures, and the management of cryptographic keys.

ICSF and PKI Services are provided through the combination of secure cryptographic hardware, the ICSF cryptographic API, and the ICSF administration interface. ICSF supports the Common Cryptographic Architecture (CCA), as well as the DES algorithm, RSA public key cryptography, and the Digital Signature Standard. Cryptographic services support a wide variety of applications with high performance, security, and availability.

Additional functions include:

- Trusted Key Entry—the key entry unit for master keys has been replaced by a secure channel version implemented on a workstation known as the Trusted Key Entry Workstation. The unit is an optional cost feature.
- Commercial Data Masking Facility supports privacy functions.
- Public Key API (PKA Support) provides additional formatting or message digest standards.
- Public Key Cryptography Standards #11 (PKCS #11)

Public Key Infrastructure Services (PKI Services) allows you to establish a PKI infrastructure and serve as a certificate authority for your internal and external users, issuing and administering digital certificates in accordance with your own organization's policies. You can use a PKI Services application to request and obtain certificates through their own Web browsers, while your authorized PKI administrators approve, modify, or reject these requests through their own Web browsers. The Web applications provided with PKI Services are customizable, and

a programming exit is also included for advanced customization. The approval for certificate requests can be manual or automatic if additional authentication such as RACF user IDs, is provided. You can issue certificates for different purposes, such as virtual private network (VPN) devices, smart cards, and secure e-mail, through different types of templates. PKI Services supports Public Key Infrastructure for X.509 version 3 (PKIX) and Common Data Security Architecture (CDSA) cryptographic standards.

The OCSF Architecture consists of a set of layered security services and associated programming interfaces designed to furnish an integrated set of information and communication security capabilities. Each layer builds on the more fundamental services of the layer directly below it.

These layers start with fundamental components such as cryptographic algorithms, random numbers, and unique identification information in the lower layers, and build up to digital certificates, key management and recovery mechanisms, and secure transaction protocols in higher layers. The OCSF Architecture is intended to be the multiplatform security architecture that is both horizontally broad and vertically robust.

System SSL supports the SSL V2.0, SSL V3.0 and TLS (Transport Layer Security) V1.0 protocols. TLS V1.0 is the latest version of the secure sockets layer protocol.

z/OS provides a set of SSL C/C++ callable application programming interfaces that, when used with the z/OS Sockets APIs, provide the functions required for applications to establish this secure sockets communications.

In addition to providing the API interfaces to exploit the Secure Sockets Layer and Transport Layer Security protocols, System SSL is also providing a suite of Certificate Management APIs. These APIs give the capability to create/manage your own certificate databases, utilize certificates stored in key database and key rings for purpose other than SSL and to build/process PKCS #7 standard messages.

DCE (Distributed Computing Environment)

The DCE Services provides the strengths of a distributed computing environment:

- Transparency of data and logic
- Distributed, consistent directory service
- Security for both clients and servers integrated in execution path
- Scalability of distributed applications
- Interoperability and portability.

DCE Services supports the following:

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

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

Distributed File Service

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

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

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

DFSMSdftp

DFSMSdftp provides the foundation for:

Storage management

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

Tape mount management

SMS provides a means for implementing tape mount management, a

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

Data management

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

Program management

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

Device management

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

Distributed data access

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

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

Environmental Record Editing and Printing Program (EREP)

The Environmental Record Editing and Printing Program (EREP) edits and prints reports for the records placed in the error recording data set (ERDS), helping IBM service representatives fix problems.

ESCON Director Support

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

FFST/MVS (First Failure Support Technology/MVS)

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

FFST/MVS provides the following services for IBM products:

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

GDDM (includes PCLK and OS/2 LINK)

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

HCD (Hardware Configuration Definition)

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

HLASM (High Level Assembler)

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

- Many new and expanded cross reference facilities and diagnostics that enable substantial savings in time and in human and machine resources, and support integration of HLASM into tool and development environments.
- Numerous language enhancements that improve the speed and accuracy of application development and the quality and reliability of the resulting code.
- Assembly-time options extensions and enhancements that allow increased flexibility and precision in controlling the processes you use to manage application development.

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

IBM HTTP Server

The IBM HTTP Server provides for scaleable, high performance webserving for critical e-business applications. It is exclusive to z/OS. This element was previously known as a base element of z/OS under the names Lotus® Domino® Go, the Internet Connection Secure Server (ICSS) and the Internet Connection Server (ICS).

Included in IBM HTTP Server is IBM HTTP Server North America (NA) Secure. With IBM HTTP Server, IBM HTTP Server NA Secure uses Secure Sockets Layer (SSL) to provide secure communications over an open communications network, such as the Internet. The HTTP server uses SSL to initiate a secure connection between the

client and itself. The server then uses SSL to decrypt and encrypt all of the information in the client request and the server response.

IBM Tivoli Directory Server for z/OS (IBM TDS for z/OS)

The IBM Tivoli Directory Server for z/OS (IBM TDS for z/OS) provides secure access for applications and systems on the network to directory information held on z/OS using the Lightweight Directory Access Protocol (LDAP). This component consists of the LDAP server, LDAP client, and utilities.

ICKDSF (Device Support Facility)

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

Integrated Security Services

Integrated Security Services includes:

DCE Security Server

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

LDAP Server

LDAP Server has been removed from Integrated Security Services in z/OS V1R11 and is replaced by IBM Tivoli Directory Server for z/OS (IBM TDS). You will need to migrate to IBM TDS in a z/OS release prior to z/OS V1R11.

Network Authentication Service

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

Open Cryptographic Enhanced Plug-ins (OCEP)

OCEP provides an application interface for managing server certificates and help protect server private keys in a uniform and secure way. Applications complying with Common Data Security Architecture (CDSA) standard interfaces can use OCEP. Open Cryptographic Services Facility, a base z/OS element, provides these interfaces. Application developers and independent software vendors will find it easier to develop and port

applications to the zSeries platform. It helps customers apply consistent security rules to e-business applications that use digital certificates and helps protect server private keys.

ISPF

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

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

ISPF has four major components:

Dialog Manager (DM)

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

Program Development Facility (PDF)

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

Software Configuration and Library Manager (SCLM)

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

Client/Server component

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

JES2

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

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

JES2 differs from JES3 in two main processing areas:

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

Language Environment

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

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

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

Language Environment supports the VS FORTRAN compiler's object/load module compatibility, which means FORTRAN load modules can be run under Language Environment and object code can be link-edited with Language Environment and run under it. Language Environment also provides a set of assembler macros for running assembler language routines.

Language Environment supports, but is not required for, an interactive debug tool for debugging applications in your native z/OS environment. The interactive IBM Debug Tool is available with the latest release of the PL/I compiler or this product can be ordered separately for use with the IBM XL C/C++, COBOL, and PL/I compilers on z/OS. For more information, see IBM Debug Tool at <http://www.ibm.com/software/awdtools/debugtool>.

Some benefits are that you can:

- Mix old code with new code.
- Handle conditions, such as program checks or abends, in your COBOL programs without having to use assembler.
- Share common run-time services.
- Run applications that conform to the POSIX 1003.1 standard or the X/Open Single UNIX Specification, also known as UNIX 95 or XPG4.2.
- Access CICS and IMS transactions and data through a C, COBOL, or PL/I server from any client in your network.
- Perform interlanguage communication more efficiently.
- Manage storage dynamically for your C/C++, COBOL, and PL/I routines with a common storage manager.
- Access a rich set of math services.

Library Server

Library Server enables customers to provide entire libraries of documents via the World Wide Web. Customers are able to serve BookManager books to HTML browsers connected to either the Internet or an intranet. The information is stored in a virtual library, which is composed of books, bookshelves, and collections.

MICR/OCR

MICR/OCR provides the device support code for the following devices:

- 1287/1288 - IBM Optical reader and page reader respectively
- 3540 - IBM Disk device
- 3886 - IBM Optical Character reader
- 3890 - IBM Magnetic Ink Reader
- 3895 - IBM Printer device

msys for Setup

msys for Setup allows enablement, setup, and configuration of DB2.

Metal C Runtime Library

The Metal C runtime library element provides a set of header files and functions for use with the XL C METAL compiler option.

The XL C METAL compiler option generates code that does not require access to the Language Environment support at run time. Instead, the METAL option provides C-language extensions that allow you to specify assembly statements that call system services directly. Using these language extensions, you can provide almost any assembly macro, and your own function prologs and epilogs, to be embedded in the generated HLASM source file. When you understand how the METAL-generated code uses MVS linkage conventions to interact with HLASM code, you can use this capability to write freestanding programs.

Prior to the introduction of Metal C runtime library, all z/OS XL C compiler-generated code required Language Environment. In addition to depending on the C runtime library functions that are available only with Language Environment, the generated code depended on the establishment of an overall execution context, including the heap storage and dynamic storage areas. These dependencies prohibit you from using the XL C compiler to generate code that runs in an environment where Language Environment did not exist.

Network File System (NFS)

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

Open Systems Adapter Support Facility (OSA/SF)

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

- Transmission Control Protocol/Internet Protocol (IP) network protocol
- Systems Network Architecture Application Peer-to-Peer Networking
- Internet Packet Exchange (IPX)

The OSA-2 features provide connection to Ethernet, Asynchronous Transfer Mode (ATM), Token Ring and Fiber Distributed Data Interface (FDDI) networks.

OSA-Express provides connection to Ethernet networks supporting Fast Ethernet (FENET), 1000Base-T Ethernet and Gigabit, as well as Token Ring and ATM.

OSA/SF provides a user-friendly interface for monitoring and controlling the OSA features. Beginning in z/OS V1R4, OSA/SF introduces support for a Java-based GUI interface, continues support for the OSA-2 features, and continues to provide the OS/2-based GUI.

Run-Time Library Extensions

Run-Time Library Extensions delivers the following libraries and utilities to support existing programs:

Common Debug Architecture (CDA) Libraries

Introduced in z/OS V1R5, CDA provides a consistent format for debug information on z/OS. The CDA Libraries provide a set of APIs to access this information.

c89 Utility

This utility compiles, assembles, and binds z/OS UNIX System Services C/C++ and assembler applications.

UNIX System Laboratories (USL) Libraries

The USL I/O Stream Library provides the standard input and output capabilities for C++. The USL Complex Mathematics Library provides the facilities to manipulate complex numbers and to perform standard mathematical operations

Note: The UNIX System Laboratories (USL) I/O Stream Library and Complex Mathematics Library are still supported on z/OS. Although support for these classes is not being removed at this time, it is recommended that you migrate to the Standard C++ iostream and complex classes. This is especially important if you are migrating other USL streaming classes to Standard C++ Library streaming classes, because combining USL and Standard C++ Library streams in one application is not recommended. For more information about the Standard C++ I/O Stream Library, see *Standard C++ Library Reference*.

SMP/E

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

Time Sharing Option/Extensions (TSO/E)

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

Terminal Input Output Controller (TIOC)

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

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

z/OS UNIX System Services Application Services (Shell, Utilities, and Debugger)

Shell and Utilities provides the standard command interface familiar to interactive UNIX users. z/OS includes all of the commands and utilities specified in the X/Open Company's Single UNIX Specification, also known as UNIX 95 or XPG4.2. This feature will allow your UNIX programmers and other users to interact with z/OS as a UNIX system without necessarily having to learn the z/OS command language or other interactive interfaces. The z/OS UNIX Services Debugger provides a set of commands that allow a C language program to be debugged interactively. The command set is familiar to many UNIX users.

z/OS UNIX System Services Kernel

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

3270 PC File Transfer Program

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

Chapter 4. z/OS optional features descriptions

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

BookManager BUILD

BookManager BUILD lets you create your own online books from files marked up with:

- GML (Generalized Markup Language) Starter Set
- IBM Publishing Systems BookMaster

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

Books built with BookManager BUILD can be read with any of the BookManager READ or BookServer products, such as:

- BookManager READ/MVS, which is part of the z/OS base
- BookManager READ/VM
- BookManager READ/2
- BookManager READ/6000
- BookManager READ for Windows
- BookManager READ/DOS
- BookManager BookServer

Bulk Data Transfer (BDT) File-to-File

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

Bulk Data Transfer (BDT) SNA NJE

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

C/C++ without Debug Tool

This language-centered XL C/C++ application development environment on the z/OS platform includes a C compiler, a C++ compiler, and C/C++ application development utilities. This feature exploits the C/C++ run-time environment and library of run-time services available with the Language Environment and Run-Time Library Extensions elements of z/OS.

Communications Server Security Level 3

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

DFSMS Features (DFSMSdss, DFSMShsm, DFSMSrmm, and DFSMStvs)

There are four DFSMS features:

DFSMSdss

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

DFSMShsm

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

DFSMSrmm

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

DFSMStvs

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

DFSORT

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

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

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

For more information on DFSORT, visit the [DFSORT Web site](#).

GDDM-PGF

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

Interactive Chart Utility

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

Vector Symbol Editor

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

An application programming interface

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

Online Presentation Services (OPS)

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

Typical applications of GDDM-OPS are:

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

GDDM-REXX

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

HCM (Hardware Configuration Manager)

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

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

High Level Assembler Toolkit

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

The Toolkit provides six components:

- A disassembler which converts binary machine language to assembler language source statements.

- A flexible source-code analysis and cross-referencing tool to help determine variable and macro usage, analyze high-level control flows, and locate specific uses of arbitrary strings of characters in single or multiple modules.
- A workstation-based program analysis tool that displays control-flow graphs and source-code views within single programs or across entire application modules.
- A powerful and sophisticated low-level symbolic debugger for applications written in assembler and other compiled languages. It handles programs using 24, 31, and 64-bit addressing. (It does not support debugging privileged or supervisor-state code.)
- A rich set of macro instructions that implement a complete menu of the most widely used structured-programming constructs (IF/ELSE/ELSEIF, DO/ITERATE/ASMLEAVE, CASE, SEARCH, SELECT/WHEN/OTHERWISE, etc.). These macros simplify and clarify coding, and help eliminate errors in writing additional labels and branch instructions.
- A versatile file searching and comparison tool (*SuperC*) that scans or compares single file or groups of files with an extensive set of selection and rejection criteria.

Infoprint Server

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

Print Interface

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

IP PrintWay

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

NetSpool

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

Infoprint Central

This component is a Web-based application that lets help desk operators and other authorized users or job submitters work with print jobs (output data sets) on the JES spool, printers controlled by IP PrintWay extended mode or PSF, and NetSpool logical units. It also lets operators see system status and printer definitions.

Windows Client

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

JES3

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

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

JES3 differs from JES2 in two main processing areas:

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

RMF (Resource Measurement Facility)

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

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

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

SDSF (System Display and Search Facility)

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

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

Security Server

The Security Server includes:

Resource Access Control Facility (RACF)

RACF provides a strong security base that enables the Security Server element of z/OS to incorporate additional components that aid in securing

your system as you make your business data and applications accessible by your intranet, extranets, or the Internet.

z/OS Security Level 3

z/OS Security Level 3 includes IBM Tivoli Directory Server for z/OS Security Level 3 (new in z/OS V1R8; replaces LDAP Security Level 3), Network Authentication Service Security Level 3, OCSF Security Level 3, and System Secure Sockets Layer (SSL) Security Level 3.

Appendix. Accessibility

Publications for this product are offered in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when using PDF files, you may view the information through the z/OS Internet Library Web site or the z/OS Information Center. If you continue to experience problems, send an e-mail to mhvrcfs@us.ibm.com or write to:

IBM Corporation
Attention: MHVRCFS Reader Comments
Department H6MA, Mail Station P181
2455 South Road
Poughkeepsie, NY 12601-5400
U.S.A.

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

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

Using assistive technologies

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

Keyboard navigation of the user interface

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

z/OS information

z/OS information is accessible using screen readers with the BookServer/Library Server versions of z/OS books in the Internet library at:

<http://www.ibm.com/systems/z/os/zos/bkserv/>

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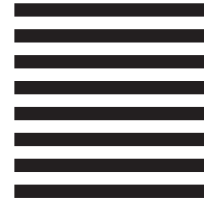
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