



# Preview: IBM z/OS Version 2 Release 1 and IBM z/OS Management Facility -- The foundation for Smarter Computing

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## At a glance

z/OS® V2.1. Get ready to innovate with Smarter Computing. Get ready to innovate with z/OS V2.1.

The new version of z/OS , z/OS Version 2 Release 1, marks a new era of z/OS . Version 2 sets the groundwork for the next tier of mainframe computing, allowing you to pursue the innovation to drive highly scalable workloads -- including private clouds. Its unrivaled security infrastructure is designed to help secure your data; its highly optimized availability can help you deliver new data analytics solutions, and its continued improvements in management are targeted to help automate the operations of IBM® zEnterprise® systems. With support for and exploitation of the new IBM zEC12 server, z/OS V2.1 is designed to offer unmatched availability, scalability, and security to meet the emerging business challenges of cloud, data analytics, and the security demands of mobile and social applications. Through its unique design and qualities of service, z/OS delivers the foundation you need to support demanding workloads such as operational analytics and clouds alongside your traditional mission-critical applications.

With enhancements to management and operations, z/OS V2.1 and z/OS Management Facility V2.1 (z/OSMF V2.1) are planned to improve ease of configuration and software service level management to help reduce the cost and improve the quality of your configuration and management processes. z/OS and z/OSMF together can help systems administrators and other personnel handle configuration tasks with ease.

Planned enhancements for z/OS V2.1 are designed to help you achieve the scale and availability needed for cloud, deliver a superior data serving environment, and secure your mission-critical assets. For instance, z/OS V2.1 is designed to help you:

- Further optimize data placement with significant enhancements to policy-based storage tiering.
- Provide a top-down perspective on performance and capacity planning efforts across zEnterprise ensembles with RMF™ support for new SMF records for the Linux™ on System z®, and for the Linux on System x® and AIX® operating systems running on zBX blades. RMF V2.1 also adds support for Windows™ Server running on zBX blades.
- Extend existing batch runtime environment support for COBOL-based applications to interoperate with PL/I programs in addition to Java™ programs, all with shared DB2® with transactional integrity, and extended support to encompass DFSMSStvs processing for VSAM record-level sharing data sets. These enhancements are intended to provide flexibility in application development and provide modern programming models to help you extend business applications.
- Reduce batch run times by having DFSMSHsm-migrated data sets allocated by batch jobs recalled in parallel, in order to reduce overall elapsed recall times.

- Simplify I/O configuration tasks with improvements for z/OS FICON® Discovery and Auto Configuration (zDAC), which provides improved support for installations with less-complex I/O configurations.
- Improve auditing granularity for digital certificates stored in RACF® , helping you meet compliance requirements.
- Enable the use of additional standards, with support for Japanese Industrial Standards for Extended UNIX™ Code and the Unicode 6.0 standard, amongst others, to allow you to better serve new customers.
- Exploit available fonts, with fonts included as a new base element of z/OS to give you capabilities you need for print in a global marketplace.

z/OSMF V2.1 is planned to introduce capabilities designed to help you to:

- Manage your software service levels with new reporting and display capabilities, to help you determine at a glance the currency of your installed system software portfolio
- Use a new workflow application intended to help with simplification of configuration tasks
- Manage On/Off Capacity on Demand in an intuitive way

These select highlights of z/OS V2.1 contribute to the foundation of a highly secure, available, and scalable enterprise infrastructure for efficiently running business-critical applications. Some new IBM solutions well suited for this environment include:

- IBM Smarter Analytics Anti-Fraud Infrastructure to help banking, insurance, healthcare, and other customers deploy real-time, prepayment fraud-detection capabilities into operational systems
- IBM Smarter Infrastructure for Social Services to provide a leading and highly flexible solution for end-to-end social program service delivery, ensuring privacy with a single source of secure data
- IBM Enterprise Key Management Foundation, a comprehensive highly secure key management system, which is ideal for banks and payment card processors that must comply with industry standards and manage keys and certificates

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## Overview

To compete in today's globally connected markets, organizations need an infrastructure capable of delivering extraordinary service levels. Such an infrastructure must be able to react swiftly to dynamic changes in workloads, deliver extreme scale to support workload shifts, and offer unrivaled availability by reducing opportunities for downtime. Given new increasingly creative security threats, this infrastructure must be "security-ready" by design, and be able to process workloads and data with reduced risk. And it must be able to support solutions using new service delivery models, such as cloud, that depend heavily on the integrity of data and applications.

IBM's z/OS V2.1 operating system in conjunction with zEnterprise and its remarkable hybrid design is such a platform: one that can free you to deliver new solutions to support both your core business-critical applications as well as your next-generation business applications. z/OS V2.1 qualities of service are enhanced through smarter computing to help you reduce opportunities for downtime and achieve superior performance and availability with efficient operations. Smarter computing is built into the core fabric of z/OS V2.1: workload management, I/O, systems configuration, security, operations, and other functions allow you to invest more time on your business.

Planned enhancements are designed to help keep your applications that require near total up time available to support the demands of your business. Several examples include further exploitation of Flash technology, Transactional Execution support for improved throughput, large pages for superb performance availability, and a new smarter task structure to help improve logging performance.

To further strengthen its quality of service, z/OS V2.1 is enhanced to deliver new platform performance capabilities and enhancements in support of data serving and analytics. For instance, in a Parallel Sysplex® environment, z/OS V2.1 is planned to extend support for the VSAM record-level sharing (RLS) environment to catalogs in order to allow you to improve both single-system and shared catalog performance. Other enhancements support data tiering, for intelligent policy-based movement of data, to help you better meet availability, utilization, and performance goals automatically.

With its highly acclaimed security capabilities, z/OS V2.1 can help you deploy the mainframe as your secured enterprise service delivery hub. The z/OS platform is capable of serving the most highly secured and regulated industries. The security fabric of z/OS helps you deliver innovative solutions, including the ability to deploy enterprise-wide Public Key Infrastructure (PKI) services, secure data for use by both business partners and customers, and host solutions that support new cryptographic standards and industry needs. By making cryptography-as-a-service available to Linux clients, including those not running on the zEC12, z/OS extends the strength of centralized and secured key management to more enterprise applications.

Customers recognize that z/OS applications do not run in isolation; new enhancements planned for z/OS Language Environment® can help overcome potential inhibitors to effective application integration, and new RESTful interfaces planned for z/OSMF, such as the Jobs REST API, are intended to help bridge batch-based and web-based applications.

z/OS V2.1 and z/OSMF V2.1 offer enhancements to simplify the user experience and reduce error-prone aspects of systems administration. New z/OSMF enhancements are designed to help you achieve more standardized management processes, automate repeatable tasks, and improve process quality. A new software management application is planned to provide reporting and display capabilities to show end of service dates for software inventory and fix status for SMP/E-installed products. Also, a new workflow application is planned to provide the infrastructure needed to further automate the flow of management tasks to people in the appropriate roles, improving the quality and efficiency of management.

Successful organizations are those best able to gain rapid insight into their businesses to quickly transform data into insightful knowledge for improved decision making. They want to optimize the scale and availability of System z to support private clouds. They want to protect and defend their critical data as new mobile and social applications take root in a global market. These capabilities will become more critical with next-generation workloads. New enhancements to z/OS can help you achieve these processing goals, drive processing of data to new limits, simplify operations, and deliver the superb qualities of service you need to create innovation for your customers.

Get the freedom to innovate with z/OS V2.1.

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## Key prerequisites

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z/OS V2.1 is planned to run on these IBM System z servers:

- IBM zEnterprise EC12 (zEC12)
- IBM zEnterprise 196 (z196)
- IBM zEnterprise 114 (z114)
- IBM System z10® ( z10™ EC, z10 BC)<sup>1</sup>
- IBM System z9® ( z9® BC, z9 EC)<sup>1</sup>

<sup>1</sup> These products are withdrawn from marketing.

In addition, beginning with z/OS V2.1, IBM plans to support these and later IBM storage control units:

- 3990 Model 3 and 3990 Model 6
- 9393
- 2105
- 2107
- 2421, 2422, 2423, and 2424

For a complete description of z/OS V2.1 software prerequisites, refer to *z/OS V2R1 Planning for Installation* (GA22-7504), when available.

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## Planned availability date

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September 2013

Previews provide insight into IBM plans and direction. Availability, prices, ordering information, and terms and conditions are provided upon product announcement.

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## Description

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### Cloud-ready qualities of service

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z/OS V2.1 is a platform designed to dynamically respond and scale to workload change with planned enhancements to scalability and performance that cover operations, I/O, virtual storage constraint relief, memory management, and more. These enhancements are suitable for organizations that would like to catalyze a journey to highly scalable virtualized solutions like cloud.

IBM intends to deliver improved scalability and performance for outstanding throughput and service within your existing environment. Smarter scalability can better prepare you to handle growth and spikes in workloads while maintaining the qualities of service and balanced design that customers have come to expect of the IBM mainframe.

As customers consider all the components of downtime, the true costs can surprise organizations, which is why superior availability continues to remain a key factor in platform selection. With z/OS V2.1, IBM plans to introduce new capabilities designed to improve upon the already legendary z/OS system availability. The industry-leading resiliency and high availability of System z remain key reasons why organizations keep their most critical processing on System z. With its attention to outage reduction, the availability of System z and z/OS is well recognized in the industry. In z/OS V2.1, IBM continues enhancements that improve critical IT systems availability, helping you achieve an even higher level of service for your customers.

Updates for z/OS V2.1 are planned to include:

- New RMF support includes RMF XP support for Windows Server 2008 running on zBX blades and new SMF 104 records for Linux on System z and Windows Server 2008, AIX, and Linux on System x operating systems running on zBX blades. In today's business environment, the ability to deliver business solutions that exceed service level agreements is vital. New z/OS function is designed to help you achieve that goal.
- EXCP support for System z High-Performance FICON (zHPF) is planned to help you improve I/O start rates and improve bandwidth for more workloads on your existing hardware and fabric.
- Usability and performance improvements for z/OS FICON Discovery and Auto Configuration (zDAC), including discovery of directly attached devices.
- Serial Coupling Facility structure rebuild processing, designed to help improve performance and availability by rebuilding coupling facility structures more quickly and in priority order.

- JES2 and SDSF support for over four billion (4,000,000,000) spin data sets, to help improve availability for long-running address spaces and not face limits that would require these systems to be taken down.

Additional function, descriptions, and details in support of scalability and performance enhancements planned for z/OS V2.1 include:

z/OS V2.1 is planned to support 100-way symmetric multiprocessing (SMP) support in a single LPAR on IBM zEC12 servers. z/OS V1.12 and z/OS V1.13 (5694-A01) with PTFs running on IBM zEnterprise EC12 (zEC12) servers also support up to 100 processors configured in a single LPAR. z/OS supports combinations of general-purpose processors (CPs), zIIPs, and zAAPs.

In z/OS V2.1, support for 2 GB pages is planned to be provided on zEC12 servers. This is designed to reduce memory management overhead and improve overall system performance by enabling middleware to use 2 GB pages. These improvements are expected due to improved effective translation lookaside buffer (TLB) coverage and a reduction in the number of steps the system must perform to translate a 2 GB page virtual address. Exploitation is planned for the IBM 31-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W43) and SDK7 IBM 64-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W44). This support is also planned to be available for z/OS V1.13 with the z/OS V1R13 RSM Enablement Offering web deliverable and the PTF for APAR OA40967.

In z/OS V2.1 running on IBM zEnterprise zEC12 servers, the system is designed to support the use of hardware transactional memory in additional production environments. The capability to use the Transactional Execution Facility for IBM 31-bit and 64-bit SDK7 for z/OS Java Technology Edition, Version 7 (5655-W43 and 5655-W44) was introduced for z/OS V1.13 with PTFs on zEC12 servers. The capability to write and test applications using XL C/C++ compiler using hardware built-in functions to enable applications to use the Transactional Execution Facility was also provided with a PTF for z/OS V1.13. The z/OS V1.13 XL C/C++ support is intended to be used for development and testing. In z/OS V2.1, support for the use of transactional memory by applications written in XL C/C++ and High Level Assembler (HLASM) is intended for production use as well.

In z/OS V2.1, JES2 and SDSF will be designed to support over 4 billion spin data sets (up to 4,294,967,296) an increase from the prior limit of almost 10 million (9,999,999). This is intended to help improve availability for long-running address spaces by enabling you to offload their output from the spool for a longer period. This support is also available on z/OS V1.12 and z/OS V1.13 with the PTFs for APARs OA38944 and PM59496.

In z/OS V2.1, Capacity Provisioning Manager will be designed to provide support for policy-based changes for Defined Capacity and Group Capacity Limits. This is intended to broaden the range of automatic, policy-based responses available to help you manage capacity shortage conditions when WLM cannot meet your workload policy goals.

In z/OS V2.1, DFSORT is planned to improve its memory resource management to better balance the memory requirements of multiple large concurrent sort operations and other workloads. A new TUNE option is designed to allow you to specify that DFSORT obtain storage incrementally and check on storage availability before allocating additional storage, to better balance utilization for sort operations and other workloads initiated within a short time. Also, DFSORT is planned to be updated to increase the memory object work space maximum from 64 GB to 1 TB, allowing you to sort larger amounts of data in memory object work files.

In z/OS V2.1, support is planned for specifying job classes up to eight characters in length. This new support is planned to be available for both JES2 and JES3 when the class is specified on the JCL JOB statement. SDSF is planned to support these longer job classes, which will also be stored in SMF Type 24 records on JES2 systems and Type 26 records on JES3 systems.

In z/OS V2.1, a new MODIFY VLF command is planned to allow you to specify that the contents of a COFVLFxx parmlib member be used to update VLF classes, update

their associated major names, and change the values of MaxVirt and AlertAge for existing VLF classes. This is designed to improve system performance when making these changes to VLF by making it unnecessary to restart VLF.

VSAM supports the use of system-managed buffering (SMB) for VSAM data sets. In prior releases, SMB access bias (ACCBIAS) specifications could be made in JCL, but not specified at the system level. In addition to the existing support in JCL, z/OS V2.1 DFSMS will be designed to allow you to specify SMB Record Access Bias values for VSAM data sets in the SMS data classes. Also, the system will be designed to allow you to override the ACB RMODE31 parameter with SMS data class specifications. The new support is intended to help you make changes for a large number of VSAM data sets without having to make a correspondingly large number of JCL changes.

In z/OS V1.9, System Logger design was enhanced to support separate task structures for managing test and production log streams. In z/OS V2.1, System Logger is planned to provide task separation between coupling facility-based and DASD-only log streams as well. This is intended to support higher rates of log stream offload data set allocations, reduce primary storage full conditions, and support higher overall concurrent log stream offload rates. This function is also available for z/OS V1.13 with the PTF for APAR OA38613.

These performance-related z/OS V2.1 SMF enhancements are planned:

- In z/OS V1.13, the SMF logstream dump program (IFASMF DL) was updated with a new SMARTENDPOINT keyword. In z/OS V2.1, SMF is planned to support similar processing in the SMF logstream subsystem exit (IFASEXIT) to avoid reading until the end of the logstream for all requests. This is intended to improve performance for IFASEXIT.
- In z/OS V2.1, SMF is planned to allow you to specify the buffer size for SMF logging to log streams in a way similar to using the BUFSIZMAX specification for SYS1.MAN data sets. This support is designed to allow you to specify the size of each individual SMF log stream buffer using a new DSPSIZMAX parameter in an SMFPRMxx member of parmlib and change it dynamically using either a SET SMF command or a SETSMF command. Support for DSPSIZMAX to be set when SMF is initialized was also made available for z/OS V1.12 and V1.13 with the PTF for APAR OA35175.

In z/OS V2.1, NFS Server will be designed to use multi-tasking for the RPCSEC\_GSS authentication flavor of the Remote Procedure Call (RPC) protocol, which is supported by z/OS NFS server for NFS V4 workloads. This is expected to improve performance for workloads using RPCSEC\_GSS.

In z/OS V2.1, the IDCAMS utility is planned to support REPRO and PRINT operations for data sets on tape with block sizes up to 256 KB (262,144 bytes). Also, when processing z/OS UNIX files with REPRO, the maximum block size planned to be supported on the JCL DD statement is 64 KB (65,535 bytes), up from the previous limit of 32,760 bytes. This is intended to allow this processing to support data sets that were created using the large block interface (LBI).

The initial support for System z High-Performance FICON zHPF in z/OS V1.11 was for data sets accessed using the media manager component of DFSMS, including VSAM data sets. z/OS V1.13 added support for QSAM, BSAM, and BPAM and allowed EXCPVR callers to use zHPF channel programs. With z/OS V2.1, support for EXCP is planned. This function is also available for z/OS V1.12 and V1.13 with the PTF for OA38185. This is intended to provide function that programmers can use to achieve significant I/O performance improvements for programs using EXCP.

## **Availability**

IBM zEC12 Flash Express exploitation was provided with z/OS V1.13 in 2012 with the z/OS V1R13 RSM Enablement Offering web deliverable. This function is planned to be integrated in z/OS V2.1. With this support, z/OS is designed to help improve system availability and responsiveness by using Flash Express across transitional workload events such as market openings, and diagnostic data collection. z/OS is also designed to help improve processor performance by supporting middleware such as IMS™, with its exploitation of pageable large (1 MB) pages. Exploitation is provided for:

- z/OS V1.13 Language Environment when used with a runtime option.
- Java, with the IBM 31-bit SDK for z/OS, Java Technology Edition, V7.0.0 (5655-W43) and SDK7 IBM 64-bit SDK for z/OS, Java Technology Edition, V7.0.0 (5655-W44).
- The IMS Common Queue Server, which is designed to use pageable large pages for selected buffers when running IMS 12 (5635-A03) on an IBM zEnterprise EC12 server (zEC12) with the PTF for APAR PM66866.

With this support, z/OS is also designed to make the pageable link pack area (PLPA) and common page data sets optional, used only for quick and warm start IPLs.

Also, z/OS V2.1 will be designed to support concurrent update for Flash Express on IBM zEC12 servers. This function is designed to allow concurrent updates of Flash Express licensed internal code without interrupting system operation. This support is also available on z/OS V1.13 with the z/OS V1R13 RSM Enablement Offering web deliverable.

In z/OS V1.13, JES3 support for dynamically adding a spool volume was introduced. In z/OS V2.1, new support is planned to allow JES3 to remove a spool volume dynamically. Also, support is planned for JES3 to display spool information for individual jobs, display which jobs have data on a particular spool data set, and dump the spool data associated with jobs having data on a particular spool volume to make it easier to remove a spool volume from the JES3 configuration dynamically. In combination, these functions are intended to allow you to discontinue the use of a JES3 spool volume using either a \*MODIFY operator command or during a JES3 hot start with Refresh, removing the existing requirement for a JES3 complex-wide IPL when removing spool volumes. In addition, subsystem interface (SSI80) support is planned to provide track group usage for an individual job.

In z/OS V2.1, the system will be designed to allow you to specify that RRS attempt to recover by quiescing its processing, updating its logs, and resuming its processing without restarting RRS. This is expected to help improve RRS availability in certain recovery situations.

In z/OS V2.1, support is planned to allow you to add and remove MCS consoles dynamically when they are being used in distributed mode. SET CON command processing will be designed to process a CONSOLxx parmlib member and add new consoles, up to the system and sysplex limits for the maximum number of consoles, while the SETCON command will be designed to allow you to specify a console to be removed. This is intended to help you improve availability by removing another reason for system and sysplex-wide IPLs.

In z/OS V2.1, NFS Server is planned to exploit 64-bit addressing to support larger sequential data sets, and PDS and PDSE members. This new function is designed to support processing for files as large as 4 TB, up from the prior limit of 800 MB, and intended to help improve application performance for random access.

In z/OS V2.1, the RPCBIND and NFS Servers will be designed to allow the NFS Server to re-register with RPCBIND when RPCBIND is restarted, without an NFS Server restart. This is designed to help preserve existing connections to the NFS Server and to allow new mounts when RPCBIND is restarted and intended to help improve availability by eliminating a reason for NFS Server restarts.

In z/OS V2.1, two Infoprint Server improvements are planned to improve availability. First, Infoprint Server will be designed to allow you to change most configuration options without a restart. Second, Infoprint Server will be designed to support the use of System Logger for the common message log, rather than files in the z/OS UNIX System Services file system. Using System Logger is intended to allow you to set appropriate retention periods for message log data and offload it at appropriate intervals without having to restart Infoprint Server.

In z/OS V2.1, System Data Mover (SDM) will be designed to allow z Global Mirror (z/GM, formerly called XRC) primary volumes to be offline when the XSTART and XADPAIR commands are issued to start or restart mirroring for existing volumes. This is intended to improve availability by eliminating the need to wait for all devices to be varied online.

In z/OS V2.1, a new operand is planned for the FORCE operator command, to allow you to specify the TCB address of a particular task for the system to terminate. This function is intended to be used to preserve system availability when a task holds resources required by other critical functions when there seems to be no other alternative to IPL.

In z/OS V2.1, two enhancements are planned for synchronous WTOR processing using the disabled consoles communication facility (DCCF). The first is designed to extend the Timed Auto Reply function introduced in z/OS V1.12 to allow it to respond to WTORs displayed through DCCF. The second is intended to notify all locally attached MCS consoles about the current destination of a WTOR displayed by DCCF, in order to make it easier and faster to locate the console on which the response may be entered. These changes are expected to make it easier to automate responses to critical WTORs and to help you respond to unautomated WTORs displayed through DCCF more quickly.

In z/OS V2.1, Basic HyperSwap® is planned to be enhanced to reduce the number of "false freezes" by detecting common reasons for PPRC link suspensions that do not require a volume to be frozen when you specify a new configuration option. Also, while IBM System Storage® DS8700 and DS8800 series storage controllers are designed for high availability, certain recovery processing operations can cause delayed responses to I/O requests. Basic HyperSwap will be designed to use notifications issued by these storage controllers, when installed with a minimum microcode level, to detect these long-running recovery processes and initiate a swap when appropriate. This is intended to allow application processing to continue with minimal disruption during storage subsystem recovery processing. This function is also available for z/OS V1.12 and z/OS V1.13 with the PTFs for APAR OA37632.

In z/OS V2.1, enhancements to the System Logger component are planned to help you avoid log stream primary storage full conditions that can lead to performance degradation and outages. New function is designed to allow you to specify that warning messages be issued based on thresholds for log stream primary storage consumption above the HIGHOFFLOAD value.

In z/OS V2.1, support for updating the values of system symbols dynamically is planned. A new keyword on the SETLOAD operator command will allow you to specify that the values of local static system symbols be updated using the values from an IEASYMxx member of parmlib.

Planned XCF improvements in z/OS V2.1 include:

- Coupling facility (CF) rebuild processing and the way structures are processed when CF duplexing is initiated is planned to be changed. The new design is intended to improve performance and availability when a large number of structures will be rebuilt by allowing you to specify which structures should be rebuilt or duplexed first, and processing them in priority order to rebuild the most important structures for your workloads ahead of other, less critical, structures.
- XCF is planned to be designed to perform additional validation of certain CF cache requests, collect diagnostic information when validation fails, and terminate affected connectors to avoid CF cache corruption. This new function is

also available with the PTF for APAR OA40966 on z/OS V1.12 and later on IBM zEC12 servers.

z/OS V1.12 DFSMSdfp added support for a catalog contention display command. In z/OS V2.1, additional information is planned to be made available to make it easier to determine the causes of serialization contention problems that affect catalog address space (CAS) processing. Detection was added for SYSZTIOT resource contention in z/OS V1.12. In z/OS V2.1, support is planned to detect resource contention for SYSIGGV2 and SYSZVDS resources, and for the CAS allocation lock.

### ***Networking-related enhancements***

A number of networking-related enhancements are planned in z/OS V2.1 Communications Server:

- System resolver enhancements are planned that will allow the resolver to start even if errors are detected with statements in the resolver setup file. This allows TCP/IP stacks and other applications dependent on resolver processing to continue their initialization despite any resolver setup file errors.
- Implementation of RFC 2018 and RFC 3517 is planned to provide support for selective acknowledgment (SACK) and selective packet retransmission based on SACKs. This is intended to help improve performance when multiple packets are lost in a single TCP window.
- Make fast path sockets the default for all applications using the supported socket APIs. Fast path sockets can provide a significant reduction in CPU utilization, especially for interactive workloads.
- Support for specifying QDIOACCELERATOR in a TCP/IP profile with IPSECURITY enabled. Existing QDIOACCELERATOR function is designed to improve performance by allowing packets to be directly routed between HiperSockets™ and OSA QDIO connections. This enhancement is designed to provide that support under certain conditions for those TCP/IP stacks that have IPSECURITY enabled.
- The ability for an application-instance dynamic VIPA to be created with an affinity for a particular address space is planned. This ensures the correct routing of application traffic destined for one of multiple applications that bind to the same application-instance DVIPA.
- Enhancements to trace processing are planned so that the coupling facility services (CFS) component will always trace connection-related activities and other important information in the mini-trace table for the coupling facility structures ISTGENERIC, EZBDVIPA, and EZBEPOR. Also, Communications Server is planned to enhance the APPN route selection trace to provide additional trace entries to diagnose the selection of incorrect routes through the APPN network. These enhancements are intended to reduce problem diagnostic time and to reduce the likelihood of problem re-creates for additional documentation.
- Enhancements to the INTERFACE statement in the TCP/IP profile are planned to support configuration of IPv4 interfaces for HiperSockets and static virtual IP addresses (VIPAs). This enhancement provides a simpler method for configuring IPv4 HiperSockets interfaces and static VIPAs than using DEVICE/LINK/HOME statements.
- New TCP/IP profile configuration statements are planned to allow you to specify the range of ephemeral ports to be assigned to UDP and TCP sockets. This is intended to help simplify firewall configuration rules.
- Support is planned for two new FTP subcommands, MVSPut and MVSGet. These commands are designed to simplify the transfer of sequential and partitioned (PDS and PDSE) data sets between z/OS systems.

In z/OS V2.1, these **UNIX System Services enhancements** are planned:

- In z/OS V1.13, support was added to z/OS UNIX System Services for the vi and ex editors to allow you to edit untagged text files and have them treated as if they contained ASCII-encoded text data. In z/OS V2.1, this support is planned for a number of additional commands, including cat, cmp, comm, cut, diff, dircmp, ed, egrep, expand, fgrep, file, grep, head, more, paste, tail, sed, strings, unexpand, uniq, and wc. In addition, for the above commands, z/OS

V2.1 is planned to support code pages other than IBM-819, including Unicode code pages. This new function is intended to make it easier to work with text files when using z/OS UNIX .

- In z/OS V2.1, z/OS UNIX System Services is planned to use a larger common area data space (CADS) for VSM limit processing when necessary. This new design is intended to significantly increase the number of threads that can be active in a single address space.
- In z/OS V2.1, z/OS UNIX System Services is planned to increase the number of mutexes (mutual exclusions) and condition variables the system will support for authorized programs from 131,072 to 16,777,215, and increase the overall system limit to 4,294,967,295. This is intended to make it easier to port applications that require a large number of mutexes and condition variables to z/OS UNIX .
- In z/OS V2.1, the z/OS UNIX System Services automount facility is planned to be enhanced to support setting permission bits other than the default for file systems it creates, the use of static system symbols in the master file, and other usability improvements.

## **Operational data**

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The strength of System z and z/OS V2.1 in delivering huge volumes of data has long established the IBM mainframe as the ideal platform for data-centric applications. Businesses running transactional and batch applications on z/OS value traditional high availability, scale, and security, while enjoying the freedom to run z/OS seamlessly alongside new workloads. The ability to run new z/OS applications gives you the business agility you need while providing integration with your existing core applications. z/OS V2.1 features many capabilities to allow you to harness the value of your transactional and operational data by:

- Strengthening efficiencies and capabilities of batch processing
- Providing a robust and highly performing I/O infrastructure
- Including enhancements to file systems, paging, and access methods

Enhancements to data and file functions are designed to further improve foundational capabilities to support the scale and performance needed for future analytics and other data applications.

Planned updates for z/OS V2.1 include:

- An updated z/OS Batch Runtime Environment designed to allow COBOL, Java , and now PL/I programs to interoperate using shared DB2 for z/OS , along with support for DFSMStvs as a resource manager, intended to provide increased flexibility in leveraging existing application assets
- Automatic policy-based movement of SMS-managed data within the primary DFSMSHsm storage hierarchy designed to provide improved automation and better management of storage resources
- A new zFS file system version designed to significantly improve performance for file systems with large directories, and a larger maximum file system size of 16 TB for greater scalability
- Improvements to batch processing of DFSMSHsm-migrated data sets intended to reduce elapsed time and improve throughput
- New support for VSAM record-level sharing (RLS) in a sysplex intended to improve catalog sharing, reduce contention, and improve coupling facility caching in a Parallel Sysplex to deliver high throughput and optimal performance
- Global Resource Serialization support designed to allow programs to synchronously change an exclusive enqueue to a shared enqueue to help reduce contention, in addition to existing support for changing an enqueue from shared to exclusive
- Hardware support intended to help drive data serving:
  - Support for 2 GB large fixed pages and pageable 1 MB large pages
  - Hardware transactional memory support

Additional function, descriptions, and details in support of application integration planned for z/OS V2.1 include:

In z/OS V2.1, DFSMSHsm is planned to provide policy-based movement of SMS-managed data within the primary (Level 0) storage hierarchy. This support is intended to enable DFSMSHsm to use existing storage class and storage group constructs to recognize devices with different characteristics within the primary storage hierarchy and apply management class policies to move the data from one class of device to another. For example, you might specify that the primary storage hierarchy is to span tiers that include IBM System Storage DS8700 and DS8800 series devices based on solid-state device (SSD) drives, traditional hard disk drives (HDD), Serial Advanced Technology Attachment drives (SATA), or a mix of these devices, which can include Easy Tier® devices. Support is planned for policy-based management based on age and the elapsed time since last reference. DFSMSHsm will continue to support Migration Levels 1 and 2 (ML1 and ML2) in addition to the planned support of the primary storage hierarchy to help you manage data residency to meet your business goals and data management policies.

Also, a number of small enhancements are planned for DFSMSHsm. They are designed to provide storage constraint relief, improve recycle processing, and automate DFSMSHsm recovery from SMSVSAM restarts.

In z/OS V2.1, Catalog support for VSAM record-level sharing (RLS) is planned for user and volume catalogs in a Parallel Sysplex . This new design is intended to substantially reduce catalog contention and improve performance. Additional catalog enhancements are designed to suspend catalog requests for a specified catalog across a sysplex to allow you to minimize application disruption during catalog maintenance. Also, new support is planned to allow you to preserve user catalog connector alias entries when you temporarily delete a user catalog so they need not be redefined when the catalog is reallocated, and prevent new catalog entries using those aliases from being defined until the new catalog is available. This is intended to simplify the reallocation of user catalogs.

Additional planned RLS-related enhancements include:

- Support for directory-only caching. This enhancement is intended to allow you to optionally bypass caching all RLS data for files, including the index component, when the cost of caching any data in the coupling facility outweighs the benefits, such as in limited-sharing environments.
- Movement of a number of RLS buffer-related control blocks from the SMSVSAM data space into 64-bit storage. This is intended to increase the amount of available SMSVSAM data space storage and is expected to help you improve performance when processing a large amount of VSAM RLS data.
- IDCAMS support for VSAM record-level sharing data sets is planned to be enhanced to access VSAM RLS data sets in RLS mode. This support is planned for IDCAMS PRINT, REPRO, IMPORT, and EXPORT functions.

In z/OS V2.1, Allocation support is planned to allow you to specify that DFSMSHsm-migrated data sets that are to be allocated by batch jobs be recalled in parallel, before each job step starts. This new function is designed to speed batch processing by reducing overall data set recall wait time.

In z/OS V2.1, zFS is planned to be designed to significantly improve performance for file systems with large directories. A new file system version is designed to store directories in a tree for faster processing, particularly for large directories. A number of conversion options are planned to allow you to convert existing file systems to the new format. Also, this new version is designed to remove explicit limits on the number of names that can be stored in zFS directories, including the prior limit of 65,535 subdirectories, and to increase the maximum file system size to 16 TB from 4 TB. This new support is intended to allow you to migrate HFS file systems that contain directories with a large number of files to zFS.

A number of z/OS V2.1 DFSMS enhancements are planned:

- In z/OS V2.1, PDSE processing is planned to be enhanced with a new format, PDSE Version 2. PDSE Version 2 will be designed to allow all unused space to be released, consolidate directory pages when possible, improve read performance, and reduce virtual storage utilization for PDSE processing. Also, the PDSE API is planned to support much larger members for PDSE data sets. The new limit on PDSE member size is planned to be over 125 times larger than the current limit in many circumstances, and substantially larger than the maximum supported size of a PDS member. These enhancements are intended to provide additional scalability and usability benefits of using PDSEs in place of PDSs, make it feasible to use PDSEs instead of multiple large sequential data sets, and help reduce the space required for PDSEs while improving performance for most PDSE read operations. Toleration of the new PDSE format is planned for z/OS V1.12 and z/OS V1.13.
- A new type of Extended Format data set, Version 2, is planned. DFSMSdss will be designed to support the use of FlashCopy® for Version 2 Extended Format sequential data sets when copying nonstriped multivolume Extended Format data sets, in addition to the existing support for other Extended Format data sets. IDCAMS REPRO processing is also planned to be enhanced to support CI mode processing for nonstriped multivolume Extended Format data sets.
- DFSMSdfp will be designed to improve tape performance by processing consecutive files without reading each prior tape file's trailer labels when DISP=PASS is coded on the DD statement. This is expected to be most noticeable when reading a large number of small consecutive tape files.
- In z/OS V2.1 DFSMS, improvements in the processing of catalog aliases are planned. For data set aliases in the master catalog that specify a different high-level qualifier for a data set, the system will be designed to reorient the search with the master catalog or the appropriate user catalog. Also, creation dates are planned to be stored for alias entries and listed by the IDCAMS utility.
- In z/OS V1.11, support was introduced for data set name masking in the IDCAMS DELETE command, and in z/OS V1.12, support was introduced for deleting all members of a PDS or PDSE. In z/OS V2.1, support for the DELETE command is planned to be extended to allow you to specify a mask for deleting members from PDS and PDSE data sets. This is intended to improve the usability of the DELETE command.
- IEBCOPY is planned to support the COPYGROUP function, a superset of the existing COPYGRP function. COPYGRP is designed to copy all aliases when source or destination data sets are PDSEs. COPYGROUP is designed to copy all aliases for any combination of PDS and PDSE data sets.
- IEBCOPY is also planned to be extended to accept special characters on SELECT statements that identify patterns of member names to be copied by the COPYGROUP command. This function is designed to use percent signs (%) and asterisks (\*) to determine whether one or more characters match the desired pattern of member names to be copied.
- DFSMS is planned to make the allocation of SMS-managed data sets better aligned with the cluster and extent pool boundaries on IBM DS8000® devices. This enhanced function will be designed to improve data set Fast Replication operations and more uniform performance for striped data sets by changing SMS volume selection to attempt to allocate multi-volume data sets and extensions within a cluster or Storage Facility Image (SFI) based on storage class attributes and to allocate striped data sets and their extensions across different extent pools when possible.
- Under some circumstances, such as changing a volume's size on a sharing system that is not part of the SMS configuration for another system, the volume space information stored by SMS can become out of date. A new VARY SMS command operand is planned to allow you to refresh volume space information stored by SMS so that the output of commands such as ISMF LISTSYS will reflect up-to-date information.
- In z/OS , setting Dynamic Volume Count (DVC) along with the Space Constraint Relief attribute in the SMS data class used for a data set can be used to determine the maximum number of volumes it will be allowed to span, to increase the original volume count specified for data sets in JCL or when using Dynamic Allocation. This enables the data set to be extended later should it run out of space on the volumes on which it was originally allocated, and is intended to help you prevent space-related abends. Support for Dynamic Volume Count is

planned to be extended to support VSAM RLS data sets once all sharing systems are running z/OS V2.1. This is intended to help prevent space-related abends when data sets grow during VSAM RLS processing.

- DFSMS is planned to automatically change the VSAM SHAREOPTIONS attributes of the active configuration data set (ACDS) and communications data set (COMMDS) if they have been defined with incorrect sharing options. Also, a new IGDSMSxx parmlib member parameter and SETSMS command operand are planned to allow you to specify that partitioned data sets be unconditionally allocated as PDSE when DSNTYPE=LIBRARY is specified, whether or not directory space is also specified in JCL.
- A new variable is planned to be provided for automatic class selection (ACS) routines to indicate whether data sets are eligible to reside in the extended addressing space (EAS) on extended address volumes (EAVs). This is intended to allow you to code ACS routines that direct data sets to appropriate storage groups and set appropriate data set space allocation values.
- Space can be released for a SMS-managed multi-volume sequential data set on disk storage using the RLSE JCL parameter or equivalent function in dynamic allocation. In z/OS V2.1, the system will be designed to release unused space for such a data set on the current volume and on all subsequent volumes on which the data set resides. Also, when a tape data set is extended to a new volume and a new JFCB extension (JFCBX) is required for it, the system will create one automatically rather than issuing abend 837 with reason code 08. Finally, comments will now be allowed in parmlib member IEAAPP00, which can be used to define authorized I/O appendage routines.
- The IDCAMS utility will be designed to allow you to use the ALTER command to nullify the management class for an SMS-managed data set.
- IDCAMS DIAGNOSE processing for generation data groups (GDGs) is planned to be enhanced to detect additional problems. This is intended to help you find the causes of GDG processing errors.
- DFSMSdss is planned to support a new RESET keyword on the RESTORE command used for physical (full-volume and track-based) restore operations, to allow you to specify whether data set changed indicators should be reset for the data sets on the restored volume. Corresponding support is planned for DFSMSHsm when full volumes are restored under DFSMSHsm control. This function is intended to make policy-based storage management more effective for recently restored volumes.

In z/OS V1.13, the Batch Runtime Environment was introduced to allow COBOL and Java programs to interoperate using a shared DB2 for z/OS database while maintaining transactional integrity. In z/OS V2.1, this support is planned to be extended to include PL/I programs in addition to COBOL and Java programs. This is intended to provide more flexibility for extending your existing applications. In addition, z/OS Batch Runtime is planned to be extended to support recoverable RLS data sets processed using transactional VSAM (DFSMSStvs), in addition to DB2 databases. This is designed to increase the scope of the z/OS Batch Runtime environment beyond transactions using DB2 databases. This support is planned to require IBM 31-bit SDK for z/OS , Java Technology Edition, V6.0.1, Enterprise PL/I Version 4 Release 2 (5655-W67), and DB2 V9 (5635-DB2) or DB2 10 (5605-DB2) with PTFs.

In z/OS V2.1, Global Resource Serialization (GRS) is planned to support synchronously changing an exclusive enqueue to a shared enqueue, in addition to the existing support for changing an enqueue from shared to exclusive. Corresponding support is planned in JCL for a new JOB statement keyword to allow you to specify that access to data sets can transition from exclusive to shared after the last step in which they are allocated with a disposition of OLD, NEW, or MOD. Also, support is planned for a JES2 initialization statement (inish deck) to specify whether this function should be allowed, and whether it should be used by default if not specified in JCL. This function is intended to allow more parallelism in resource processing by allowing resources to be available for read access before the process that originally requested exclusive use ends in single-system and GRS Star environments.

z/OS V2.1 with IBM DB2 10 for z/OS (5605-DB2) running on IBM zEnterprise EC12 (zEC12) or later servers with CFLEVEL 18 is planned to exploit new function to allow batched updates to be written directly to disk without being cached in the coupling facility in a Parallel Sysplex . This is designed to keep the data in the cache that is used by online transactions more current, which is expected to help improve performance during batch update periods. Also, this can help avoid application stalls that might sometimes occur during large concurrent batch updates. This function is also available on IBM zEnterprise 196 (z196) servers with CFLEVEL 17 and an MCL, and on z/OS V1.12 and z/OS V1.13 with the PTF for APAR OA40966.

## **Ultimate security**

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Security of critical information assets remains a top priority for organizations, especially in light of today's sophisticated attacks and new threats. You must defend against increasingly creative attacks and deliver secured information to maintain customer privacy. With corporate data accessed through mobile applications, social networks, and new cloud environments, the challenges around data privacy and custody are even more critical. New z/OS V2.1 capabilities are intended to assist you to further reduce risk, improve compliance, and manage data security in your z/OS environment.

Today, z/OS offers a huge breadth of security capabilities built into the fabric of the operating system. Many z/OS security functions, such as data encryption, key management, PKI infrastructure, and password synchronization can be deployed to harden the overall security level of your computing environment. Security is built into both the technology and design processes as well as middleware for z/OS fortifying the enterprise infrastructure stack. In addition, enhancements are designed to further support compliance to new regulations and standards in banking, public sector, and other business areas.

Security for z/OS V2.1 is planned to offer additional enhancements:

- New Communications Server capabilities to support security exits for z/OS FTP clients you can use to help secure file transfers.
- The RACF database unload utility is planned to unload additional information about digital certificates to help you more easily perform auditing activities on certificates stored in RACF databases.
- z/OS UNIX System Services is planned to allow you to specify whether a user should be logged off after a period of inactivity.
- JES2 and JES3 support for access controls on job classes, which you can use to remove the need for exits.
- New health checks on expiration of trusted certificates and increased resources checked in sensitive resource class.

Additional function, descriptions, and details in support of security enhancements planned for z/OS V2.1 include:

In z/OS V2.1, support is planned for SAF control over the use of job classes for both JES2 and JES3 environments using new profiles in the JESJOBS class. This new support is designed to provide more flexibility in job class naming, and to help eliminate the need for JES2 and JES3 user exits used solely to restrict the use of job classes to authorized users.

In z/OS V2.1, enhancements are planned for RACF Remote Sharing Facility (RRSF). z/OS V1.13 introduced support for TCP/IP-based RACF Remote Sharing Facility (RRSF) connections using IPv4. In z/OS V2.1 RACF , support is planned for RRSF connections over TCP/IP using IPv6. This is intended to allow you to choose between IPv4 and IPv6 addressing when setting up RRSF connections over TCP/IP. Also, RRSF uses Application Transparent Transport Layer Security (AT-TLS) to encrypt data between RRSF nodes. In z/OS V2.1, RRSF is planned to support the use of elliptic curve cryptography (ECC)-based certificates for establishing these AT-TLS sessions. This is intended to allow you to use stronger encryption algorithms to protect the RACF profile data transmitted using RRSF. Additionally, support for placing comments in RACF parameter library members is planned.

In z/OS V2.1, ITDS (LDAP) is planned to comply with NIST SP 800-131a and NSA Suite B by supporting the TLS 1.2 protocol. ITDS is planned to provide support for the SHA-256 and SHA-384 algorithms during SSL handshakes, AES-GCM ciphers, and for TLS V1.1 in addition to TLS V1.2. This is intended to provide better security for LDAP, particularly when used as a user registry, and to help you meet industry standards for security protocols.

Currently, z/OS System SSL supports validation of certificates according to RFC 2459 "Internet X.509 Public Key Infrastructure Certificate and CRL Profile" and RFC 3280 "Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile," and is designed to create certificates according to RFC 3280. An additional RFC, RFC 5280, has been created to update standards for certificates. In z/OS V2.1, certificate validation processing is planned to be extended to encompass three modes of certificate validation. These modes are intended to allow certificate validation to be performed according to RFC 5280, RFC 3280, or RFC 2459.

In z/OS V2.1, a number of additional digital certificate processing enhancements are planned. The system will be designed to support:

- The generation of Extended Validation (EV) X.509 digital certificates in PKI Services.
- The IBM HTTP Server based on Apache for serving PKI web pages.
- Improved display certificates for RACF certificates, certificate chains, and key rings.
- RACF is planned to enhance certificate request processing for certificates issued by external Certificate Authorities to help ensure that the private keys associated with the fulfilled certificates are not inadvertently deleted.
- A PKI Services option to issue a message when certificate revocation list (CRL) processing has ended; this can allow you to automate follow-on actions such as CRL archival.
- Optional, more granular administrative authority controls for PKI Services administrative functions.

In z/OS V2.1, z/OS UNIX System Services will be designed to support a new BPXPRMxx parmlib member parameter that allows you to specify whether a user who is logged in using rlogin, telnet, ftp, or the TSO OMVS command should be logged off the system after a period of inactivity at the user's terminal. This new function is intended to help you improve system security.

### ***RACF health checks***

Several RACF health checks are planned in z/OS V2.1:

- RACF is planned to check more resources in the RACF\_SENSITIVE\_RESOURCE health check, including FACILITY class profiles that control the use of functions that affect the content of the active APF, link, and LPA lists; allow access to system dump data; and allow access to certain z/OS UNIX System Services functions. These additional checks are intended to alert you about potential security exposures on your systems.
- Three health checks are planned for RACF . The first is designed to determine whether the RACF database has been upgraded to application identity mapping (AIM) stage 3 as recommended, and the second to determine whether RACF will automatically assign unique z/OS UNIX System Services identities when users without OMVS segments use certain UNIX services. These checks are also available for z/OS V1.12 and z/OS V1.13 with the PTF for APAR OA37164. Also, RACF is planned to add a new health check to detect that a trusted certificate that is connected to one or more key rings is due to expire within a time period you specify. This is intended to help alert you of pending certificate expiration in time to allow you to take an action to prevent applications that rely on valid certificates from failing.

In z/OS V2.1, the RACF database unload utility, IRRDBU00, is planned to be extended to unload additional information about digital certificates, including the issuer and subject distinguished names (DN) and signature algorithm for each

certificate. This is intended to help you more easily perform auditing-related activities for the digital certificates stored in your RACF databases.

z/OS V2.1 RACF is planned to be enhanced to allow you to specify &RACUID in the home directory path name of the model user ID used for BPX.UNIQUE.USER to help simplify system administration for z/OS UNIX user IDs.

### ***ICSF and cryptography-related enhancements***

Advances in cryptography available on IBM zEnterprise EC12 (zEC12) servers planned for z/OS V2.1 are now available for z/OS V1.12 and z/OS V1.13 with the Cryptographic Support for z/OS V1R12-V1R13 web deliverable, available at

<http://www.ibm.com/systems/z/os/zos/downloads/>

These new ICSF functions are intended to help banking and finance sector clients meet standards and provide better cryptographic security with:

- Support for Derived Unique Key Per Transaction (DUKPT) for message authentication code (MAC) and data encryption keys. This support is intended to be compliant with the ANSI X9.24 part 1 Retail Financial Services Key Management standard, and intended for the symmetric key management used for financial services such as automated teller machine (ATM) transactions.
- Support for a new Cipher Text Translate CCA function designed to process sensitive data encrypted under one key by re-encrypting under another key within the boundary of the Crypto Express coprocessor. This support is designed to provide the ability to securely change the encryption key of encrypted data without exposing it in plain text. This is designed to help to improve the security of sensitive data.
- In order to comply with industry cryptographic standards, including ANSI X9.24 Part 1 and PCI-HSM, ICSF now supports enhanced cryptographic key wrapping to help ensure that keys are not wrapped with weaker keys. This support relies on enhanced CCA firmware in the Crypto Express coprocessor and is designed to enhance the security of sensitive keys.
- A new random number cache. This cache is designed to be asynchronously replenished, and is intended to improve application performance by decoupling the generation of the random data from application requests.

Similarly, ICSF has enhancements designed to provide new functions for public sector clients, including industry-standard APIs for System z for better interoperability with other platforms to help improve application portability and simplify system setup:

- The Crypto Express4S coprocessors support a new mode where the Crypto Express4S may be configured in Enterprise PKCS #11 mode that provides secure key PKCS #11 services in addition to the CCA and accelerator modes of operation. RACF, z/OS PKI Services, and z/OS System SSL are planned to provide support to use this new capability. RACF is planned to support the generation of Elliptic Curve Cryptography (ECC) and RSA secure keys using the Crypto Express4S in EP11 mode through the addition of new keywords to the RACDCERT command. Corresponding PKCS #11 secure key support is planned for PKI Services to allow the use of a secure key PKCS #11 CA certificate, and generation of secure key pairs for key generation requests and CMP requests. System SSL is planned to allow certificates with secure PKCS #11 ECC and RSA certificates to be used during a subset of the SSL/TLS handshakes and through its Certificate Management APIs supporting the generation of digital signatures. This new function is designed to provide the cryptographic services and assurance needed to meet the European Union's requirements for Qualified Digital Signatures and is used in the secure digital identities.
- ICSF setup for FIPS verification processing at the application level has been simplified. Cryptographic requests for FIPS 140-2 compliant key processing can be issued by applications. A new option has now been added to allow applications to request a random number be generated in a FIPS-compliant fashion as well. Processing these requests will no longer require the ICSF FIPS start option FIPSMODE to be set to YES, or require it to be set to COMPAT with

the corresponding RACF profiles defined in the CRYPTOZ class. This is intended to help simplify setup for individual applications and programs that must run in a FIPS-compliant mode.

Last, ICSF is designed to improve I/O performance for the public key data set (PKDS) and PKCS #11 token key data set (TKDS), and to provide a random number cache to help improve performance for applications that use random number generation functions.

In z/OS V2.1, the system will be designed to issue a message when you use a Server Timer Protocol Coordinated Timing Network and an External Time Source to obtain standard time, and specify a maximum time variance between Coordinated Universal Time (UTC) and the hardware Time of Day (TOD) clock. This new function is intended to help stock exchange members meet Securities and Exchange Commission (SEC) rules for record timestamps for the Order Audit Trail System (OATS).

### ***Secured networking***

Today's enterprise environment accesses data from many untrusted network sources, such as from mobile devices or from social computing sites. As a result, companies are paying more attention to defending their networks, to protecting their data, and to authenticating users and business partners. Both z/OS Communications Server and z/OS security functions help you meet this security challenge, with layered network defenses that help protect your critical business assets from unauthorized use.

Networking enhancements planned for z/OS V2.1 are targeted to help strengthen the use of z/OS as a secured networking hub:

In z/OS V2.1, System SSL is planned to provide support for the TLS V1.2 protocol. TLS V1.2 adds support for exploiters to utilize higher-strength cryptographic ciphers defined in RFCs 5246, 5288, and 5289, which allow for the use of SHA-256 and SHA-384 hashing, and of ciphers utilizing the AES-GCM symmetric algorithm during the TLS handshake and application payload exchange. This support is also available on z/OS V1.13 with the PTF for APAR OA39422.

In z/OS V2.1, System SSL is planned to provide support for NSA Suite B Profile for Transport Layer Security, as defined by RFC 5430 for TLS V1.2. This is intended to meet US government cryptographic algorithm policy for national security applications.

In z/OS V2.1, Communications Server is planned to support two new security exits for the z/OS FTP client. This is designed to help provide more control over FTP file transfer activities. An EZAFCCMD exit will be designed to allow inspection, modification, and rejection of FTP commands, and the cancellation of FTP client sessions. An EZAFCREP exit will be designed to allow inspection of reply message lines from FTP servers and cancellation of FTP client sessions.

Sysplex-wide security associations (SWSA) are intended to allow IPSec-protected traffic to be distributed through a Parallel Sysplex while maintaining end-to-end security to all endpoints within the sysplex. In z/OS V2.1, SWSA is planned to be extended to provide support for IPv6. This is intended to preserve the benefits of SWSA when you use IPv6 in a Parallel Sysplex .

In z/OS V2.1, Communications Server is planned to support the new cryptography suites implemented in TLS, and used by System SSL, in Application Transparent Transport Layer Security (AT-TLS). This is intended to allow these new cipher suites to be used to encrypt application traffic through system programmer-defined policy without application changes.

In z/OS V2.1, z/OS Communications Server is planned to introduce configuration settings to allow control over the level of caching used for network access control checks. A reduction in the level of caching allows more network access control checks to be passed to the System Authorization Facility (SAF), thereby allowing the security manager product to provide more meaningful auditing of access control

checks. Additionally, z/OS V2.1 Communications Server is planned to add the IP address the user is attempting to access to the log string provided to the external security manager on each network access control check.

In z/OS V2.1, z/OS Communications Server is planned to provide a configuration option to limit the number of defensive filter messages written to syslog when defensive filtering is enabled through the Defense Manager Daemon (DMD).

In z/OS V2.1, Communications Server is planned to provide enhanced diagnostics for the IKE and NSS daemons as well as the AT-TLS function when FIPS 140-2 processing is in use.

In z/OS V2.1, Communications Server is planned to enhance the Intrusion Detection Services algorithm to reduce IDS false positives in networks with small packet fragments.

## **Management and usability capabilities**

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Unlike platforms that are optimized for one type of workload, a key strength of z/OS workload management is the ability to run multiple disparate workloads concurrently, within and across images, even when they have competing resource requirements. z/OS V2.1 is designed to run on System z servers at 100% utilization. System z and z/OS provide dynamic workload management that helps you balance your workloads by assigning resources to workloads and workloads to resources automatically. With its ability to intelligently manage workloads, improve performance, and optimize resource allocations, z/OS can help you meet your most demanding processing priorities. These z/OS built-in management capabilities are designed to help bolster efficiency, availability, and throughput while meeting your most demanding application and business processing priorities. In addition, z/OSMF V2.1 enhancements are designed to help with the standardization of common processes, helping improve the quality of your software management activities.

For example, z/OS V2.1 is planned to include enhancements to offer the following:

- z/OSMF V2.1 planned use of the Liberty profile in WebSphere® Application Server for z/OS , V8.5 is intended to provide significant reductions in resource requirements.
- The z/OSMF V2.1 Software Management application is planned to be extended to help you better manage your z/OS software inventory and to provide a number of new reporting and display capabilities.
- Support for IBM Batch Programming Model similar to that of WebSphere Compute Grid, designed to enable Java Applications to be written to a standard model that helps make them more portable.
- Support for new C/C++ instructions and facilities on the IBM zEC12 with new ARCH(10) and TUNE(10) options intended to improve optimization of code on zEC12 servers; also new functions to support transactional execution intended to deliver increased performance through reduced locking.
- Improved Symbol processing in JCL in JES2 environments expected to help ease programming efforts.

Additional function, descriptions, and details in support of optimization and management capabilities planned for z/OS V2.1 include:

### **Systems management**

In z/OS V2.1, DFSMSHsm Fast Replication support is planned to be enhanced to add support for consistency groups, data set recovery to different volumes, and data set recovery to differently named data sets. The consistency group support is designed to allow DB2 users to create consistent backups of log copy pools and recover them without performing conditional DB2 restarts. The support for recovering data sets to different volumes is intended to avoid out-of-space conditions that can occur during recovery when one or more volumes no longer have enough space for the data sets being recovered. Also, support for recovering both VSAM and non-VSAM data sets with different names is planned.

In z/OS V2.1, two DFSMSHsm processing improvements are planned. First, DFSMSHsm will be designed to improve performance for both tape and disk devices by increasing the multitasking level when a new SETSYS command is specified. This improvement is expected to be greatest when moving a large number of small data sets to tape. It is intended to reduce the elapsed time required to migrate large numbers of small data sets significantly. Second, DFSMSHsm is planned to remove its 40-volume limit for migration and backup, and allow you to use up to 254 tape volumes. This is intended to allow you to migrate and back up larger data sets, particularly when using the typically small tape volume sizes configured for virtual tape subsystems.

In z/OS V2.1, zFS file system processing and DFSMSdss are planned to be changed to help reduce unnecessary backups for mounted file system data sets. This function is designed to set an indication that a file system has changed, allow its use in DFSMSdss dump command filtering to back up changed file systems, and reset it after a successful dump.

These Workload Manager (WLM) enhancements are planned for z/OS V2.1:

- WLM is planned to support new types of classification groups and qualifier types, and enhanced qualifier types, that you can use in WLM service definitions. This is intended to allow you to define classification rules for qualifiers such as subsystem parameter (SPM) in a way more consistent with how other classification rules are defined, and help you improve the readability of WLM service definitions.
- WLM is planned to support up to 3,000 application environments, up from the prior limit of 999. This is intended to make it easier to maintain common service definitions for multiple sysplexes and to provide support for the growth of large DB2 environments. Customers with large SAP DB2 environments or who use common WLM service definitions across a number of sysplexes are expected to be able to benefit from the raised limit.

In z/OS V2.1, these RMF enhancements are planned:

- RMF will be designed to offload a portion of its processing to zIIP processors, when zIIP processors are installed and configured in the LPAR.
- A new interrupt delay time measurement is available on IBM zEnterprise EC12 (zEC12) servers. With z/OS V2.1, or z/OS V1.12 or V1.13 and the PTF for APAR OA39993, RMF is designed to report on interrupt delay time to help you determine whether I/O processing delays are occurring. This new measurement is designed to measure the time between when primary status is presented to the channel subsystem and when the operating system clears the primary status to begin processing the interrupt. RMF is also designed to write this information to new fields in SMF type 74 subtype 1 and SMF 79 subtype 9 records, and to display averaged interrupt delay times in the Postprocessor Device Activity report.
- RMF will be designed to provide additional information about Global Mirror collisions in RMF Monitor I and in SMF 74 subtype 5 records. A Global Mirror collision happens when a consistency group is in the process of being mirrored and an update to one of the volumes occurs. The update must sometimes wait for the original data to be mirrored, which can cause I/O write delays. This support is also available on z/OS V1.12 and z/OS V1.13 with the PTF for APAR OA40376.
- New RMF function is planned to allow the Monitor I Postprocessor Coupling Facility Activity report and the Monitor III CFSYS report to be used to provide additional information about the coupling facility and CF links. This design extends both to indicate channel path details for each of the Coupling over InfiniBand (CIB) link types, including:
  - Indication whether the CHPID is running in a "degraded" status
  - Channel path type
  - HCA adapter and port number
  - Calculated length of each of the links

This information is intended to help with monitoring and tuning of the Parallel Sysplex . This support is also available on z/OS V1.12 and z/OS V1.13 with the PTF for APAR OA37826.

- With z/OS V1.13 and z/OSMF V1.13, RMF provided CIM-based performance data gatherers for Linux on System z , Linux on System x , and AIX systems to provide a consistent monitoring solution for zEnterprise ensembles. Along with the Resource Monitoring plug-in for the z/OS Management Facility, first made available with z/OSMF V1.12, this function is intended to display performance metrics from those platforms and combine them with z/OS metrics in common graphic views. In z/OS V2.1, this capability is planned to be extended by providing new SMF 104 Records to provide performance-related information about Linux on System z , and also about Linux on System x , AIX , and Windows Server 2008 operating systems running on zBX blades. This is intended to help provide the basis of performance and capacity planning management for these operating systems on zBX blades in addition to the support already provided by z/OS related SMF records. Windows Server support is planned to require the Standards Based Linux Instrumentation for Manageability CIM client API, which is part of the IBM Systems Director Platform Agent for Windows . This function is planned to be available to be downloaded from <http://www.ibm.com/systems/software/director/downloads/agents.html>
- In z/OS V2.1, a number of RMF reporting enhancements are planned for 1 MB pages and Flash Express . The RMF Monitor I Paging Activity and Virtual Storage Activity reports, Monitor I and Monitor II Page Data Set Activity reports, and Monitor III STORM display are planned to provide additional information intended to help you manage both fixed and pageable 1 MB pages and Flash Express . This function is also available on z/OS V1.13 with the PTF for OA38660 when the Flash Express feature is installed on IBM zEC12 servers and the z/OS V1R13 RSM Enablement Offering web deliverable is installed.

In z/OS V2.1, several OAM enhancements are planned that are intended to improve tape performance by supporting larger block sizes for tape, allow you to remove unneeded backup copies of your objects automatically, enable the OSREQ Store Sequence support on smaller object sizes, improve OAM interoperation with products such as IBM Tivoli® Automated Tape Allocation Manager for z/OS (ATAM, 5698-B15), and enable you to tune tape library operations through a new SETTLIB command option in the CBROAMxx PARMLIB member. OAM will be designed to:

- Support larger tape block sizes with OAM's object support
- Allow you to specify that backup copies of your objects be deleted automatically when an object is moved to a management class that requires fewer backup copies
- Allow you to specify how long OAM's object support should wait before issuing a message when no tape devices are available
- Reduce the minimum object size required to utilize the OSREQ Store Sequence processing from 256 MB + 1 (268,435,457 bytes) to 50 MB + 1 (52,428,801 bytes)
- Allow you to control the issuance of your tape library cartridge entry messages through the new SETTLIB command option in the CBROAMxx PARMLIB member

In z/OS V2.1, support is planned to allow the Hardware Management Console Integrated 3270 Console on System z and zEnterprise servers to be used as a z/OS console during and after IPL. This capability is intended to add another backup console and to allow z/OS LPARs to be operated without OSA-ICC 3270 connections when necessary.

In z/OS V2.1, a number of usability and performance improvements are planned for the z/OS FICON Discovery and Auto Configuration (zDAC) function. These include improved support for Dynamic Channel Path Management (DCM) for FICON channels, improved processing of device number-constrained configurations and those with constrained unit addresses for specific channels, a new capability to allow you to specify switch and CHPID maps to guide path selection, and improved discovery performance. z/OS V2.1 is planned to enhance z/OS FICON Discovery and Auto Configuration (zDAC) to discover directly attached storage devices, in addition

to those connected to a switch. This is expected to be especially useful for small I/O configurations that do not require a switch, making z/OS I/O definitions easier in those environments.

In z/OS V2.1, support is planned for a new DISPLAY PPT command. This support is designed to allow you to see the currently assigned program properties in use by the system and whether each originated in the system's default program properties table or was the result of an entry in a SCHEDxx member of parmlib.

In z/OS V2.1, Communications Server is planned to provide a new command to allow you to validate the syntax of statements in your TCP/IP profile. This is intended to help you find any errors in the profile that might exist before making configuration changes, which can help prevent network problems from occurring.

z/OS V2.1 Communications Server is planned to provide additional flexibility in configuring Enterprise Extender by allowing progressive mode ARB to be configured on the GROUP definition in the switched major node. Additionally, z/OS Communications Server is planned to enhance your ability to configure an IPv6 address for an EE connection by allowing the IPADDR parameter to accept either an IPv6 address or an IPv4 address.

Dynamic channel path management (DCM) for FICON channels was introduced in z/OS V1.11 with support for a single intermediate FICON switch between the channel and control units. In z/OS V2.1, z/OS is planned to enhance DCM to support FICON channel path connections through two intermediate switches. This is intended to make it easier for you to use a smaller number of channels and optic fiber connections for FICON I/O, particularly for multi-site installations.

In z/OS V2.1, DFSMSrmm is planned to add support to allow you to specify retention periods for tape data sets set using SMS management classes. This support is intended to set the resulting expiration dates automatically. Also, DFSMSrmm will be designed to extend EXPDT-based retention management to allow it to be based on volume sets or first files, and to support expiration of tape data sets after a specified period of inactivity based on when they were last used.

In z/OS V2.1, support for the TS7700 Virtualization Engine's device allocation assistance (DAA) and scratch allocation assistance (SAA) functionality is planned to be provided for JES3-managed tape devices. This support is designed to allow you to use esoteric names specified in HCD and in JES3 initialization statements to enable JES3 to differentiate between composite and distributed library "clusters" during main device scheduling, and select the most appropriate devices to satisfy tape allocation requests for the TS7700 Virtualization Engine.

In z/OS V2.1, the Problem Documentation Upload Utility is planned to be enhanced to support partitioned data sets (PDS) and partitioned data set extended data sets (PDSE). This is intended to improve the usability of the utility when sending large amounts of documentation data to IBM for problem diagnosis.

The CIM Server is planned to be upgraded to a newer version of the OpenPegasus CIM Server. Also, the CIM Servers Schema repository is planned to be updated to CIM Schema version 2.31, and the CIM Client for Java to version 2.1.10. This is intended to keep the z/OS CIM Server and schema current with the CIM standard from OpenGroup and DMTF, and to allow z/OS management applications to manage z/OS in an enterprise environment.

### ***Application development***

z/OS V2.1 XL C/C++ is planned to support new instructions and facilities available on IBM zEnterprise EC12 (zEC12) servers with new ARCH(10) and TUNE(10) options, designed to optimize code for zEC12 servers. These options are planned to support the execution-hint, load-and-trap, miscellaneous-instruction-extension, and transactional-execution facilities. Also, new hardware built-in functions are planned to support transactional execution on zEC12 servers. These functions can be used to provide two-phase commit processing for multiple memory updates without using software locking. These functions are also available for prototyping and testing

purposes on z/OS V1.13 with the PTFs for APARs PM59592, PM59593, PM59589, and PM59595.

Also, z/OS V2.1 XL C/C++ is planned to introduce nine new debug level options, designed to allow you to make different trade-offs between optimization and ease of debugging, making it easier to generate fast code that can still be easily debugged.

In z/OS V2.1, a new base element is planned to include the fonts that are included in the AFP Font Collection for S/390™ (5648-B33) and in IBM Infoprint Fonts for z/OS V1.1 (5648-E76), as well as World Type fonts that were not previously available in the z/OS environment but form part of the InfoPrint Font Collection V3.1 available for other operating system platforms, and double-byte Asian fonts. This is intended to eliminate the need to include font products and features in z/OS orders and assure that fonts are always available on z/OS systems.

In z/OS V2.1, a number of JCL improvements are planned:

- Support for passing parameter lists up to 32,760 bytes in length to a program from JCL. A new PARMDD DD statement keyword is planned to allow more than 100 characters to be passed to any program in JCL. A new LONGPARM binder attribute is planned to enable APF-authorized programs to use this new function. No changes are planned to be needed for unauthorized programs. This new support is intended to make it easier to pass a large number of parameters to a program without writing intermediate programs.
- Enhancements for symbol processing in JCL in JES2 environments. This new function is designed to make both JCL and system symbols available during job execution. For example, you will be able to specify that symbols be used in instream data sets, such as SYSIN data sets, and that symbols be retrieved from the system using new programming services. This support is intended to make symbols more usable and accessible and to make it easier to use identical copies of JCL in multiple environments.
- Support for the use of exported JCL symbols that are accessible in other contexts, including programmatic access. A corresponding function is planned for Language Environment .
- Support for new, JES-independent JCL specifications. New SYSTEM and SYSAFF keywords for the JOB statement are planned to allow you to specify z/OS MVS™ system names, JES2 MAS member names, and JES3 main system names. Both job entry subsystems will be designed to direct the job to an appropriate system.
- JES2 is planned to add support to allow you to specify the JES2 procedure library concatenation to be used for a job, improve OUTPUT processing by allowing you to specify that an OUTPUT statement be used for multiple SYSOUT data sets, and optional improvements in converter/interpreter processing. These changes are intended to make it easier to write JCL that can run unchanged under either primary subsystem, JES2 or JES3.
- JES3 is planned to support in-stream data sets in cataloged procedures and INCLUDE groups. This is intended to allow you to simplify the JCL used in PROCs by using in-stream data sets in place of those pointed to by DD statements that use the DSN keyword.

Planned z/OS V2.1 Language Environment enhancements include:

- Support for multiple preinitialized main environments under a single task. This is intended to allow you to call main routines in one preinitialized environment from another, and take advantage of multiple persistent preinitialized environments to improve application performance.
- Support for a new option programmers can use to expose memory overlays that cause heap damage. A new HEAPZONES runtime option is designed to allow you to specify that each storage area requested have a check zone appended to it. This function is designed to allow you to specify that Language Environment either detect that a program has stored data in the check zone to help you find problems that might otherwise be more difficult to identify or that storing data within check zones be ignored. This new function is intended to help you test your application code that uses Language Environment .

- Support for a new callable service designed to provide programmatic access to the value of a specified JCL symbol. This is intended to provide another way to pass information to running programs from JCL.
- Support for reading, writing, and repositioning of data sets by blocks in the Language Environment C runtime library I/O interfaces. Allowing the program to access data by blocks, rather than by bytes or records, is intended to provide significant performance improvements when there is no need to manipulate data within the blocks.
- Additional file I/O programming interfaces for z/OS UNIX System Services. These interfaces, while not part of a formal UNIX standard, have been implemented on other UNIX platforms, and are planned to be provided with a new header, <stdio\_ext.h>. This is intended to make it improve the portability for these applications between z/OS and other UNIX platforms.

In z/OS V2.1, memory management services are planned to be enhanced. 31-bit large (1 MB) page support will be designed to provide additional authorized subpool support, CPOOL support, and dataspace support. Exploitation of this function by certain kinds of memory-intensive applications is expected to help improve system performance by relieving memory management constraints. Also, the real storage manager (RSM) is planned to support requests for 128 KB blocks using the IARST64 service. This can reduce the number of calls to the service for programs that need to obtain a large number of blocks.

In z/OS V2.1, SYSREXX is planned to support additional functions that are available when using REXX under TSO/E. Support is planned for the CONSOLE host command environment, to allow you to issue system and subsystem commands and monitor message traffic with an extended MCS console session in a SYSREXX exec such as one intended to provide system automation functions.

In z/OS V2.1, BCPii will be designed to reduce the time it takes to perform queries significantly when multiple attributes are requested for a CPC, image, capacity record, activation profile, or image user group on IBM System z9 , System 10, and zEnterprise servers. Also, BCPii is planned to use this function when processing calls for the HWILIST service. This is expected to yield performance benefits that are most noticeable for interactive system management applications.

In z/OS V2.1, BCPii is planned to support a System REXX (SYSREXX) API. This is intended to make it easier to use BCPii services in system management applications.

In z/OS V2.1, the Program Management Binder is planned to support the exact boundary alignment specified in object modules for all powers of two from byte alignment through 4K page alignment when building program objects and load modules. This is intended to allow programmers to better optimize code and data structures to improve cache alignment, which can help improve performance of customer applications. Also, the binder is planned to support a new SYMTRACE option, which will be designed to add new messages intended to trace the progress of binder symbol resolution processing, to help with program debugging.

In z/OS V2.1, DFSMS is planned to provide support for using generation data groups (GDGs) comprising PDSE generation data sets. This support, planned to be similar to existing GDG support for PDS data sets, is intended to allow you to extend your use of PDSEs.

In z/OS V2.1 DFSORT, several usability enhancements are planned. DFSORT will be designed to support new alphanumeric tests for both compare fields and parse fields, including combinations of alphanumeric character sets (uppercase and lowercase, and numeric). This support is intended to allow you to specify various sets of characters using a single compare condition or PARSE keyword rather than using compare conditions or PARSE keywords. Also, enhancements are planned for symbol processing, allowing symbols to be used for more DFSORT operands, and the number of parse fields supported is planned to be increased from the prior limit of 100 fields to 1,000 fields. Finally, new support is planned to allow you to specify that a string up to 50 characters in length be appended to variable-length output records.

In z/OS V2.1, both JES2 and JES3 are planned to provide support for 64-bit storage for SSI 80 (Extended Status) callers.

In z/OS V2.1, support is planned to be introduced for the IBM Batch Programming Model, similar to that available for WebSphere Compute Grid. This is designed to allow Java applications to be written to conform to a standard batch programming model, making them portable among the supported environments.

In z/OS V1.13, support was added to a number of z/OS UNIX System Services for many commands to allow you to edit untagged text files and have them treated as if they contained ASCII-encoded text data. This support is planned to be extended to additional commands in z/OS V2.1. In addition, z/OS V2.1 is planned to support code pages other than EBCDIC IBM-1047 and ASCII IBM-819, including Unicode code pages, to allow conversion of files tagged with Coded Character Set IDs (CCSIDs) to CCSIDs that can be processed by a program or displayed by a user. This new function is intended to make it easier to work with text files when using z/OS UNIX .

In z/OS V2.1, the Upgrade Case and Collation, Character Conversion, and Normalization services in z/OS Unicode are planned to be designed to meet the Unicode 6.0 standard.

In z/OS V2.1, Unicode support is planned for three Japanese Industrial Standards (JIS) for Extended UNIX Code (EUC), JIS X 0201, JIS X 0208, and JIS X 0212. This new support is designed to add three new coded character set identifiers (CCSIDs), 17338, 21434, and 37818, which collectively extend the Japanese Unicode support to include 83 additional NEC characters. Also, support is planned for the new currency symbol used for the rupee used by the Republic of India, with CCSID 5233.

In z/OS V2.1, z/OS UNIX System Services is planned to support a larger number of UNIX pipes. z/OS UNIX will be designed to support a system maximum of 15,360 pipes, up from the prior limit of 8,730.

In z/OS V2.1, XCF is planned to introduce a new programming interface, IXCNOTE, that allows applications to create and delete "note pads." This is designed to support notes containing up to 1024 bytes of application data, and allow a connected application to create, read, modify, or delete notes in the note pad. XCF will be designed to create note pads in a coupling facility list structure. This new programming interface is intended to help improve Parallel Sysplex flexibility and usability for application programmers. It is also available on z/OS V1.13 with the PTF for APAR OA38450.

**z/OS V2.1 Communications Server** is planned to provide these new and enhanced application programming interfaces:

- A new API to allow retrieval of configuration information for the TN3270 server. This will improve the ability of network management applications to verify the best practices compliance of the z/OS CS TN3270 server.
- A new API to allow retrieval of configuration information for the z/OS FTP server and FTP client. This will improve the ability of network management applications to verify the best practices compliance of the z/OS FTP server and client.
- Support for an additional network management interface (NMI) that can allow multiple independent, concurrent TCP/IP traces. This is designed to allow both real-time packet traces and data traces in a single trace data stream. With proper RACF authorization, it is also designed to allow you to include unencrypted IPsec and AT-TLS data. These extensions are intended to be used by network management applications to provide additional functions.
- A mechanism that allows a sockets application to issue a synchronous or asynchronous receive socket API call that only completes when a TCP connection is terminated. This provides an application with the ability to improve performance by choosing either an asynchronous or synchronous communication model (whichever is more beneficial for the application) while assuring the ability to respond to connection termination events.
- An option to activate an interface without an IP address. This allows applications that implement a DHCP client, such as IBM Rational® Developer for System z

feature (RD&T), to communicate with DHCP servers to dynamically obtain an IP address.

In z/OS V2.1, the Catalog Search Interface (CSI) is planned to be enhanced to return additional information about catalog entries. For VSAM data sets, CSI will be designed to provide more information about index and data buffers, indexes, the maximum number of concurrent requests allowed, and the number of tracks per volume for VSAM data sets. CSI is also planned to return additional information about data set alias entries defined using the SYMBOLICRELATE keyword.

In z/OS V2.1 with z/OSMF V2.1, the z/OS Jobs REST Interface is planned to be extended to add support for submitting jobs from data sets and z/OS UNIX files, optional asynchronous notification upon job completion, passing JCL symbols to a job being submitted, and an optional job correlator that is unique across the JES2 spool. These extensions are intended to make it easier to reuse existing JCL and detect job completion. Also, JES2 is planned to support displaying job information using correlators to identify jobs. This support is designed to be used by programs to help eliminate or reduce requirements for manual input and interaction.

The DFSMSdfp VSAM SHOWCB macro provides information about open VSAM data sets. In z/OS V2.1, SHOWCB is planned to return the number of buffers built and the number of buffers actually used, for local shared resources (LSR) and nonshared resources (NSR). This new support is intended to help application programs to, for example, determine whether to change their LSR buffer pool sizes.

In z/OS V2.1, Distributed File Service is planned to provide SMB support for Microsoft™ Windows 2008 Server acting as a domain controller for pass-through authentication.

In z/OS V2.1, DFSORT is planned to provide Blockset sorting support for programs running in 64-bit addressing mode. This new function is designed to be available to programs, using new parameter lists for DFSORT applications that use E15, E35, or E32 exits to process 64-bit addressed records. 64-bit addressing support in DFSORT is expected to help relieve storage constraints for programs calling DFSORT to perform certain sort operations.

In z/OS V2.1, the JES2 Extended Status Subsystem Interface (SSI) is planned to be extended to allow programs without APF authorization to cancel, hold, purge, and release jobs, and to change their job classes. New profiles in the RACF JESJOBS class will be used to determine whether a user is allowed to use these functions. This is intended to improve the usability of the Extended Status SSI and allow additional automation to be done using unauthorized programs.

In z/OS V2.1, JES3 is planned to support ENF 70 events to provide the capability to track jobs, started tasks, and TSO/E users as they are processed by showing that their states have changed. For example, a job can have been selected for processing, completed processing, or been purged. This support is intended to allow programs to monitor job status without using repetitive Subsystem Interface (SSI 80) calls.

In z/OS V2.1, TSO/E is planned to provide a number of REXX enhancements to EXECIO, LISTDSI, and STORAGE, and to provide a new variable to indicate the level of the operating system. These enhancements are intended to make it easier to retrieve information about data sets in the extended addressing space (EAS) of extended address volumes (EAVs), as well as multi-volume, PDSE, and concatenated data sets; to support I/O to undefined and spanned record format data sets; to improve the usability of EXECIO; and to eliminate unnecessary calls from LISTDSI to an external security manager, such as RACF .

In z/OS V2.1, a new authorized HISSERV service is planned to provide Hardware Instrumentation Services (HIS) data gathered from the CPU Measurement Facility available on IBM System z10 and zEnterprise servers to multiple consumers on the same system. It is also designed to provide new software-based counter data. This new service is intended to make it easier to write programs that sample counter data.

## ***Simplification and usability***

A number of enhancements are planned for z/OS V2.1 with z/OSMF V2.1:

- z/OSMF is planned to use the Liberty profile in WebSphere Application Server OEM (WASOEM) for z/OS , V8.5. This is expected to provide significant reductions in the resource requirements for z/OSMF and simplify z/OSMF setup considerably.
- The Software Management application is planned to be extended to help you manage your z/OS software inventory. This new function is designed to provide a number of new reporting and display capabilities you can use. Among them are one intended to cross-check SMP/E inventory information with catalog entries, volume residency, and data set content; another to retrieve and display end of service information about installed products; another to provide a number of reporting functions to help with service level (PTF) management, and one to display the location and content of software instances created using the Software Deployment application. These new functions are designed to help you manage your system software more easily, and are also available on z/OS V1.13 with the PTF for APAR PM73833.
- A new z/OSMF Workflow Application is planned. This application is designed to allow exploiters to provide configuration assistance for functional setup tasks to simplify z/OS configuration. This application is planned to route tasks among a number of defined people assigned to specific roles, such as "system programmer" and "security administrator," to complete setup tasks.
- The z/OSMF Resource Monitoring application is planned to link to the WLM application in context, and the WLM application is planned to link to the Resource Monitoring application. This function is also available with z/OS V1.13 and z/OSMF V1.13 with the PTF for APAR PM74517 and APAR PM74508. The System Status task is planned to link to WLM for list entries that represent a z/OS system, such as linking to service definitions and active WLM policies, and the WLM application is planned to link to the Resource Monitoring System Status task. This is intended to simplify performance monitoring and management.
- In z/OSMF V2.1, enhancements are planned for the capacity provisioning application, which will be designed to replace the Microsoft Windows based Capacity Provisioning Control Center (CPCC), which is planned to be removed in z/OS V2.1. This function is also available with z/OS V1.13 and z/OSMF V1.13 with the PTF for APAR PM74519. In addition, the Capacity Provisioning Manager application is planned to be enhanced to allow you to create, edit, and install domain configurations and policies. Existing reports are planned to be extended to support IFL and SAP processors in addition to CP, zIIP, and zAAP processors. These new functions are intended to improve the usability of Capacity Provisioning within z/OSMF and support all the functions available in the Microsoft Windows-based Capacity Provisioning Control Center (CPCC). Note that z/OS V1.13 is planned to be the last release to include the Windows based version of CPCC.

In z/OS V2.1, TSO/E will be designed to provide additional information on the screen when an attempt to log on fails for a number of reasons other than user authentication failures. This information is intended to make it easier to identify and resolve the reasons for logon failures.

In z/OS V2.1, TSO/VTAM is planned to provide support for translating Extended English characters for the TPUT EDIT macro instruction.

A catalog parmlib member (IGGCATxx) was introduced in z/OS V1.13. In z/OS V2.1, DFSMSdfp is planned to be enhanced to add parameters for the remaining Modify Catalog command parameters, and for additional specifications currently made in a SYSCATxx member of the nucleus data set or in a LOADxx member of a SYS1.IPLPARM or SYS1.PARMLIB data set that are not required early during IPL processing. These extensions are intended to make it easier to specify options for catalog processing.

In z/OS V2.1, HCD is planned to support dynamic I/O configuration changes from a single system across all LPARs running z/OS V1.12 and z/VM® V5.4 (5741-A05)

and later releases on IBM System z9 , System z10 , and zEnterprise servers that are controlled by the same Hardware Management Console. This extension to the current support that allows you to make dynamic I/O configuration changes for all the LPARs on a server that are within the same Parallel Sysplex is intended to help improve system programmer productivity by reducing the number of systems you must interact with to make these changes.

In z/OS V2.1, Infoprint Server is planned to allow you to move a number of customization settings from AOP environment variables to settings stored in the printer inventory, where they can be managed by the Infoprint Server Printer Inventory Manager. This is intended to make it easier to examine and change these settings and to eliminate the need to restart Infoprint Server for the changes to take effect.

In z/OS V2.1, Infoprint Server is planned to replace most attributes in the aopd.conf file with information stored in the Printer Inventory. This is designed to allow you to use Infoprint Server's ISPF application to perform most System Administrator and Printer Administrator tasks. In z/OS V2.1, Infoprint Server is planned to add job accounting information to SMF Type 6 records. This is intended to make it easier to write job accounting and chargeback programs that process these records.

In z/OS V2.1, SMP/E is planned to be changed to allow you to use the SMP/E dialog with multiple ISPF logical screens at a time when different SMP/E zones are in use with each logical screen. This is intended to improve the usability of the SMP/E ISPF dialog.

In z/OS V2.1, DFSMS is planned to extend the function introduced in z/OS V1.13 that allows you to specify that explanatory text for a number of DFSMS abends be included in job output. This will make it easier to determine the reasons for these errors more quickly. This function is also available in z/OS V1.13 with the PTFs for APARs OA37505 and OA37957. Also, open processing for non-SMS-managed data sets using DISP=MOD is planned to be made consistent with the processing for that for SMS-managed data sets.

A number of enhancements are planned for z/OS V2.1 ISPF:

- The ISPF editor is planned to support the editing of Unicode data stored in data sets and z/OS UNIX files.
- ISPF Edit is planned to allow longer data set names to be used with the COMPARE command and to allow a volume serial to be specified so the data set being edited can be compared to an uncataloged data set. This is designed to improve the usability of Edit Compare.
- ISPF Edit is planned to support an expandable command field with a length of 255 bytes. This is designed to allow you to use a popup panel to enter long editor commands that do not fit in the field on the existing edit panel. In z/OS V2.1, it is planned to enhance the ISPF editor HILITE command to highlight the invalid use of lowercase characters in JCL statements.
- The ISPF editor is planned to allow regular expressions to be specified as arguments to the FIND and CHANGE commands.
- ISPF editor external data commands will be designed to allow you to specify the encoding for the external data. This is designed to cause the editor to convert the external data from its original encoding to the specified encoding. For example, you could use the CUT command to have data from a file containing ASCII data stored in the clipboard as EBCDIC data.
- Support for data sets using an extended TIOT (XTIOT), when dynamically allocated and processed by ISPF services including EDIT, BROWSE, LMINIT, and LIBDEF.
- An improved enhanced member list function. When used to enter a TSO/E command, CLIST, or REXX exec to be run for a particular member, this function will be designed to support passing additional information to the command, CLIST, or exec. Also, the ISPF directory list display for z/OS UNIX is planned to support a SRCHFOR command similar to that available from member list displays. This command is designed to allow you to search for data strings in all the regular files in the currently displayed directory. Similar function is planned for the UDLIST command and DIRLIST service.

- Enhanced flexibility and usability of the SWAPBAR command.
- Support for multiple logical screens to be created when you invoke ISPF. In addition, support to allow you to end multiple logical screens simultaneously when exiting ISPF.
- Support for numeric scroll amounts greater than 9,999 lines when scrolling displays for browse, edit, view, member lists, and the data set list.
- Support to allow you to enter a path name mask and have the z/OS UNIX Directory List Utility display only those files with a path name that matches the mask.
- Enhanced ISPF member list displays to show member count values greater than the current limit of 99,999.
- Support for a new DEFAULT keyword option for the MEMLIST service. This will be designed to allow applications calling the MEMLIST service to define a line command to be invoked when the "S" line command is entered by the user.
- Support in the Data Set List Utility "F" line command to free unused space for a multi-volume data set.
- An enhanced z/OS UNIX Directory List Utility designed to support the entry of line commands in blocks. This will be designed in a way similar to the block line command support in the Data Set List Utility. It is also planned to have ISPF save z/OS UNIX commands previously entered in the command field for the directory list. This will allow you to easily recall and execute previously entered z/OS UNIX commands.
- Support in the UDLIST command for lowercase path names. This improves the usability of the command by suppressing automatic capitalization of data entered in the command field and allowing the UDLIST command to process lowercase path names.

In z/OS V2.1, the Health Checker address space is planned to be started at IPL time, and support is planned to allow you to specify the HZSPRMxx member to be used for Health Checker parameters in an IEASYSxx parmlib member. This is intended to help assure that the information provided by health checks will be available and simplify Health Checker setup. In addition, a number of new health checks are planned:

- Two health checks are planned for RACF . The first is designed to determine whether the RACF database has been upgraded to application identity mapping (AIM) level 3 as recommended, and the second to determine whether RACF will automatically assign unique z/OS UNIX System Services identities when users without OMVS segments use certain UNIX services. These checks are also available for z/OS V1.12 and z/OS V1.13 with the PTF for APAR OA37164.
- A health check is planned to determine whether extended task I/O tables (XTIOTs) are enabled for non-VSAM data sets and warn you if they are not. Using XTIOTs is recommended because it provides virtual storage constraint relief (VSCR) below the 16 MB line.
- A health check is planned to help you manage the amount of virtual storage used by the virtual lookaside facility (VLF). This is designed to allow you to specify a minimum age for VLF-cached data and notify you when the time objects that have been cached fall below that minimum. This is intended to help you choose the best settings for the MAXVIRT parameters for each class of objects specified in the COFVLFxx member of parmlib to improve overall system performance.
- Three new health checks are planned to help you find diagnostic functions that can cause performance degradation that might have been left enabled. The first will be designed to warn you that branch tracing in the system trace table has been active for an extended period of time, the second to provide a similar warning for mode tracing, and the third to warn you about long-running PER SLIP traps. These functions, while sometimes necessary for problem diagnosis, can degrade overall system performance.
- IBM makes specific recommendations about what to specify in global resource serialization resource name lists (GRS RNLs) to prevent catalog-related deadlocks when using shared volumes and catalogs. A catalog health check will be designed to alert you when a deadlock condition might arise due to RNLs that do not follow the recommendations.

In z/OS V2.1, new support is planned for the DISPLAY MATRIX=CONFIG and CONFIG CPU commands to allow you to validate that the active processors (CPs, zAAPs, and zIIPs) in a configuration are of the type and number you expect. This is intended to make it easier to detect CPU-related configuration errors.

In z/OS V2.1, z/OS DFSMS and Allocation processing are planned to be enhanced to allow you to specify that all the members of a generation data group (GDG) be returned in order from oldest to newest when the generation data set (GDS) name is specified without a generation number. This is intended to allow all the members of a GDG to be processed in chronological order without being sorted.

In z/OS V2.1, HCD will be designed to use new IOS system services to perform IODF validation when Tivoli System Automation (5698-SA3) I/O Operations is not available. This is intended to provide a minimum level of validation reporting.

In z/OS V2.1, a new tracking facility, with additional function, is planned to replace the Tracking Facility, which has also been referred to as the Console ID Tracking Facility and the EAV migration assistance tracker. For example, many migration actions require you to determine whether specific system functions are in use. This new facility is intended to allow exploiters to use a simple method to call the tracker from within their code so that you can easily determine whether specific functions are being used on each system. Also, a programming interface is planned to allow other programs, such as health checks, to determine whether tracked functions are in use. This new tracker is designed to return more information than the Consoles Tracker (CNZTRKR) when the new programming interface is used. Existing calls using the CNZTRKR interface are planned to be automatically routed to this new facility, and an operator command is planned to provide tracking information.

### ***z/OS Support for zEnterprise EC12 (zEC12) servers***

z/OS V2.1 provides exploitation of many of the IBM zEnterprise EC12 (zEC12) features and functions, including Flash Express , hardware transactional memory, improved channel load balancing, a new I/O processing delay measurement, coupling facility write-around support, and 100-way symmetric multiprocessing (SMP) support in a single LPAR. You can use current HOLDDATA and the SMP/ E REPORT MISSINGFIX command to help you identify which PTFs are needed on current z/OS systems. Some of this support is also available for z/OS V1.12 and later releases with PTFs, and z/OS V1.10 and z/OS V1.11 with the Lifecycle Extension for z/OS V1.10 (5656-A01) or the Lifecycle Extension for z/OS V1.11 (5657-A01) with PTFs.

Flash Express exploitation on z/OS is designed to help improve system availability and responsiveness by using Flash Express across transitional workload events such as market openings, and diagnostic data collection. z/OS is also designed to help improve processor performance by supporting middleware such as IMS , with its exploitation of pageable large (1 MB) pages. Exploitation is planned for:

- z/OS V1.13 Language Environment when used with the runtime options PAGEFRAMESIZE and PAGEFRAMESIZE64.
- Java , with the IBM 31-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W43) and SDK7 IBM 64-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W44). For more information about Java , see the [Statements of general direction](#) section.
- The IMS Common Queue Server, which is designed to use pageable large pages for selected buffers when running IMS 12 (5635-A03) on an IBM zEnterprise EC12 server (zEC12) with the PTF for APAR PM66866.

Flash Express exploitation is also available with the z/OS V1R13 RSM Enablement Offering web deliverable.

z/OS V2.1 is also designed to help improve processor performance by enabling middleware to use 2 GB pages. Exploitation is planned for the IBM 31-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W43) and SDK7 IBM 64-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W44). Also, along with that support, z/OS will be designed to make the pageable link pack area (PLPA) and common page

data sets optional, used only for quick and warm start IPLs. This support is also available on z/OS V1.13 with PTFs and the z/OS V1R13 RSM Enablement Offering web deliverable.

z/OS V2.1 is planned to provide support for FICON channel-to-channel adapter support for GRS Rings. This support is also available for z/OS V1.12 and later releases with a PTF, and z/OS V1.10 and z/OS V1.11 with the Lifecycle Extension for z/OS V1.10 (5656-A01) or the Lifecycle Extension for z/OS V1.11 (5657-A01) with a PTF. With this support, you can migrate your existing ESCON® CTC links to FICON before installing a zEC12 server to help simplify your migration.

z/OS V2.1 provides full support for hardware transactional memory on zEC12 servers. Transactional memory provides atomic processing for multiple storage areas, which can reduce serialization overhead for exploiters. z/OS V1.13 with PTFs also provides limited support for hardware transactional memory on zEC12 servers. Java exploitation is planned with IBM 31-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W43) and SDK7 IBM 64-bit SDK for z/OS , Java Technology Edition, V7.0.0 (5655-W44).

IBM zEnterprise EC12 (zEC12) servers incorporate improved channel load balancing algorithms, designed to provide more consistent I/O rates across the channel subsystem and help improve I/O response times, even when abnormal conditions occur. In support of this new function, z/OS V2.1 is designed to provide an updated health check based on an I/O rate-based metric, rather than on initial control unit command response time.

New RMF function is planned to allow the Monitor I Postprocessor Coupling Facility Activity report and the Monitor III CFSYS report to be used to provide additional information about the coupling facility and CF links. This design extends both to indicate channel path details for each of the Coupling over InfiniBand (CIB) link types, including:

- Indication whether the CHPID is running in a "degraded" status
- Channel path type
- HCA adapter and port number
- Calculated length of each of the links

A new interrupt delay time measurement available on IBM zEnterprise EC12 (zEC12) servers is planned to be supported by z/OS V2.1 RMF , which is designed to report on interrupt delay time to help you determine whether I/O processing delays are occurring. This new measurement is designed to measure the time between when primary status is presented to the channel subsystem and when the operating system clears the primary status to begin processing the interrupt. RMF is also designed to write this information to new fields in SMF type 74 subtype 1 and SMF 79 subtype 9 records. This support is also available with z/OS V1.12 or z/OS V1.13 and the PTF for APAR OA39993.

z/OS V2.1 is planned to provide support for IBM DB2 10 for z/OS (5605-DB2) running on zEC12 servers with CFLEVEL 18 to exploit new function to allow batched updates to be written directly to disk without being cached in the coupling facility in a Parallel Sysplex . This is designed to keep the data in the cache that is used by online transactions more current, which is expected to help improve performance during batch update periods. Also, this can help avoid application stalls that might sometimes occur during large concurrent batch updates. This function is also available on IBM zEnterprise 196 (z196) servers with CFLEVEL 17 and an MCL, and is also available for z/OS V1.12 or z/OS V1.13 with the PTF for APAR OA40966.

In z/OS V2.1, XCF is planned to be designed to perform additional validation of certain coupling facility cache requests, collect diagnostic information when validation fails, and terminate affected connectors to prevent or limit cache corruption. This new function is also available with the PTF for APAR OA40966 on z/OS V1.12 and later on IBM zEC12 servers.

z/OS V2.1 running on IBM zEnterprise EC12 (zEC12) servers is designed to support up to 100 processors configured in a single LPAR. z/OS supports combinations of

general-purpose processors (CPs), zIIPs, and zAAPs. This support is also available on z/OS V1.12 and z/OS V1.13.

z/OS V2.1 is planned to include support introduced for z/OS V1.13 with a PTF, which adds XL C/C++ compiler support for new instructions and facilities available on zEC12 servers. New ARCH(10) and TUNE(10) compiler options can be used to optimize code that is intended to run on these servers.

IBM continues to support running zAAP workloads on zIIP processors ("zAAP on zIIP"). z/OS V2.1 is designed to remove the restriction that prevents zAAP-eligible workloads from running on zIIP processors when a zAAP is installed on the server. This is intended only to help facilitate migration and testing of zAAP workloads on zIIP processors. This support is also available with the PTF for APAR OA38829 for z/OS V1.12 and z/OS V1.13.

IBM recommends the use of GRS Star in a Parallel Sysplex . For GRS Ring, IBM recommends using XCF communications rather than GRS-managed CTCs. However, IBM zEC12 and later servers are planned to support only FICON channels. In z/OS V2.1, to support those who would find it difficult to migrate to GRS Star or XCF communications, z/OS Global Resource Serialization (GRS) is planned to support FICON channel-to-channel (CTC) connections for GRS Rings. In addition, z/OS V1.12 and V1.13 with the PTF for APAR OA38230, and z/OS V1.10 and z/OS V1.11 with the Lifecycle Extension for z/OS V1.10 (5656-A01) or the Lifecycle Extension for z/OS V1.11 (5657-A01) with the PTF for OA38230, also provide support for FICON channel-to-channel adapter support for GRS Rings. You can migrate your existing ESCON CTC links to FICON before installing an IBM zEnterprise EC12 (zEC12) to help simplify your migration.

### **Secure z/OS Software Delivery**

IBM plans to remove support for unsecured FTP connections used for z/OS software and service delivery October 1, 2013. At that time, it is planned that new System z software (products and service) downloads will require the use of FTPS (FTP using Secure Sockets Layer) or of Download Director with encryption. You will be able to download orders created prior to October 1, 2013, using any currently supported method until they expire, or until November 1, 2013, when IBM plans to refuse unsecured FTP connections to the IBM servers used for System z software downloads (deliverycb-bld.dhe.ibm.com and deliverycb-mul.dhe.ibm.com). If you plan to use FTPS, IBM recommends that you visit the Connectivity Test website to verify your system setup well in advance. No change is required for Download Director with encryption; however, you can also verify Download Director with the Connectivity Test. The Connectivity Test can be found at

[https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en\\_US&source=cbct](https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=cbct)

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## **Statements of general direction**

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z/OS V1.13 is planned to be the last release to support the Microsoft Windows based Capacity Provisioning Control Center (CPCC) function for use with the Capacity Provisioning Manager (CPM). IBM intends to enhance the z/OSMF-based Capacity Provisioning application to allow you to control your CPM policies.

z/OS V2.1 is planned to be the last release to include Version 1 of the Standards Based Linux Instrumentation for Manageability (SBLIM) CIM client for Java . Version 1 support for the SourceForge open source project was sunset in 2010. Version 2 of the SBLIM client, which is designed to be a JSR48-compliant implementation, is included in z/OS V1.13 and planned to be included in z/OS V2.1. IBM recommends that users of SBLIM Version 1 convert to Version 2.

z/OS V1.13 is planned to be the last release to provide support for Integrated Call Level Interface (ICLI).

The Cryptographic Support for z/OS V1R12-R13 web deliverable is planned to be the last level of ICSF to support IBM eServer™ zSeries® z800 and z900 servers. Future levels of ICSF are planned to require an IBM eServer zSeries z890, z990, or later server.

**Note:** The Cryptographic Support for z/OS V1R12-R13 web deliverable includes the level of ICSF planned to be incorporated in z/OS V2.1. However, z/OS V2.1 itself is planned to require an IBM System z9 EC, IBM System z9 BC, or later server.

z/OS V2.1 is planned to be the last release to include the IBM HTTP Server Powered by Domino® (IHS powered by Domino ). IBM recommends you use the IBM HTTP Server Powered by Apache, which is available in z/OS Ported Tools as a replacement. IHS powered by Apache supports IPv6, 64-bit execution, and includes security authentication and authorization capabilities similar to those provided in IHS powered by Domino . Also, a refresh of IBM HTTP Server powered by Apache is planned later in 2013. IBM plans to provide documentation help with customer migration to IBM HTTP Server Powered by Apache.

z/OS V2.1 is planned to be the last release to support the z/OS BookManager® Build optional feature.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

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## Coexistence, release migration, and fallback

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z/OS gives you compatibility and flexibility as you migrate systems in a multisystem configuration by allowing multiple releases of z/OS to coexist. This includes non-Parallel Sysplex and Parallel Sysplex multisystem configurations. Coexistence allows systems within a multisystem configuration to be upgraded to a new release level of z/OS one system at a time. This is contingent on the fact that the release you are migrating to can coexist with the lowest release running in your multisystem configuration.

**Note:** These statements represent the current intention of IBM. IBM reserves the right to change or alter the Coexistence-Migration-Fallback policy in the future or to exclude certain releases beyond those stated. IBM development plans are subject to change or withdrawal without further notice. Any reliance on this statement of direction is at the relying party's sole risk and does not create any liability or obligation for IBM.

IBM plans to provide the following coexistence, migration, and fallback for z/OS V2.1:

### Table: Planned Coexistence-Migration-Fallback for z/OS V2.1

Release	Coexistence-Migration-Fallback supported with release in Column 1
z/OS V2.1	z/OS V1.12, z/OS V1.13, z/OS V2.1

This consistent coexistence, migration, and fallback policy applies to release migrations for all configurations, whether they are:

- Single system configurations
- Individual systems within a multisystem configuration
- Cases where a simultaneous IPL is used to migrate all systems in a multisystem configuration at the same time

## License Metric Change

z/OS V2 will only be offered with NALC pricing for customers using NALC for z/OS V1 who are using PSLC for their middleware programs. z/OS V2 customers using WLC or AWLC pricing for their middleware programs must migrate from NALC to zNALC pricing.

All z/OS customers using NALC pricing are encouraged to migrate to zNALC pricing to obtain the zNALC advantages such as sub-capacity pricing for z/OS with zNALC supported by the SCRT reports, lower prices above 45 MSUs, and aggregated pricing across qualified Parallel Sysplexes.

See Software Announcement [207-006](#), dated January 09, 2007 , (IBM System z New Application License Charges) and Software Announcement [907-245](#), dated December 04, 2007 , (Software withdrawal: Selected IBM System z products Some replacements available).

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## Reference information

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Software Announcement [207-339](#), dated December 11, 2007 ( IBM Enterprise COBOL for z/OS V4.1)

Software Announcement [209-244](#), dated August 25, 2009 ( IBM Enterprise COBOL for z/OS V4.2)

Software Announcement [211-341](#), dated September 27, 2011 ( IBM Enterprise PL/I for z/OS V4.2 delivers performance improvements and usability enhancements)

Software Announcement [210-199](#), dated July 06, 2010 ( IBM Ported Tools for z/OS Version 1.2)

Software Announcement [207-041](#), dated March 06, 2007 ( IBM DB2 V9.1 for z/OS )

Software Announcement [210-380](#), dated October 19, 2010 ( IBM DB2 10 for z/OS )

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## Important websites

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- z/OS website  
<http://www.ibm.com/systems/z/os/zos/>
- General literature  
<http://www.ibm.com/systems/z/resources/>
- Previously announced statements of direction  
[http://www.ibm.com/systems/z/os/zos/zos\\_sods.html](http://www.ibm.com/systems/z/os/zos/zos_sods.html)
- z/OS Internet Library  
<http://www.ibm.com/systems/z/os/zos/bkserv/>
- z/OS Basic Skills Information Center  
<http://publib.boulder.ibm.com/infocenter/zos/basics/index.jsp>
- Descriptions of courses worldwide  
<http://www.ibm.com/services/learning>
- z/OS downloads  
<http://www.ibm.com/systems/z/os/zos/downloads/>
- CustomPac  
<http://www.ibm.com/services/custompac>
- ShopzSeries  
<http://www.ibm.com/software/shopzseries>
- z/OS Communications Server  
<http://www.ibm.com/software/network/commserver/zos/>

- z/OS Management Facility  
<http://www.ibm.com/systems/z/os/zos/zosmf/>

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## **Corrections**

### **(Corrected on February 12, 2013)**

Added "Coexistence, release migration, and fallback" topic and "License Metric Change" topic.