# IBM z/OS V2.5 2Q 2022 enhancements

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## Overview

IBM(R) z/OS(R) is designed to keep applications and data available, systems highly secure, server utilization high, and to enable agile development. z/OS continuous delivery (CD) offers clients the opportunity to use new z/OS functions, capabilities, and technologies by applying service rather than upgrading to a new z/OS release.

This quarter's CD update further extends the capabilities of z/OS V2.5 with key features that include the following:

- z/OS Parallel Sysplex(R) enhancements for the IBM z16™ CFLEVEL 25: Enhancements include z/OS support for the new z16™ coupling facility, CFLEVEL 25, which provides a variety of enhancements for improved Parallel Sysplex performance, scalability, and resiliency.
- CFRM support for 4096 CF structures in a Parallel Sysplex: Previously announced support for up to 4096 CF structures in a sysplex has been temporarily disabled/ withdrawn, pending a complete resolution to issues found with the support.
- z/OS support for System Recovery Boost: Enhancements to accompany the IBM z16 can provide boosted processor capacity and parallelism for specific recovery events. Client-selected middleware starts and restarts may be boosted to expedite recovery for middleware regions and restore steady-state operations as soon as possible. SVC dump processing and HyperSwap(R) configuration load and reload may be boosted to minimize the impact to running workloads.
- z/OS upgrade improvements for IBM z16: The z/OS IBM z16 Upgrade Workflow has been provided in a program temporary fix (PTF) to help position z/OS for usage on the new IBM z16 server.
- z/OSMF ServerPac update: Because the z/OSMF Software Management data set merge function is now available and the z/OSMF ServerPac Portable Software Instance has enabled it, the CustomPac Dialog installation method is planned to be removed.
- IBM z/OS Management Facility (z/OSMF) enhancements: New capabilities allow users to better leverage existing CFRM Policy Editor functions, support creating or deleting USS symbolic links, and easily validate the connection status of managed systems.
- Cloud Provisioning and Management for z/OS: Enhancements expand the type of potential configurations a user can modify during the provisioning process.
- z/OS Management Services Catalog enhancements: Numerous enhancements to the user experience flow have been delivered to efficiently create and manage z/ OS management services. In addition, two new sample services are provided.
- z/OS Job REST Completion Notification to eliminate Common Information Model (CIM): The asynchronous job completion notification function of the REST jobs API has been enhanced to eliminate the dependency on CIM and Common Event Adapter (CEA).

- z/OS Container Extensions (zCX) enhancements: A new performance improvement has been delivered to reduce the chances of lock contention in high frequency code paths.
- Data Set File System: The new physical file system renders traditional z/OS data sets accessible by programs, shell scripts, and end users of z/OS UNIX® System Services.
- COBOL-Java™ interoperability: The IBM Semeru Runtime Certified Edition for z/OS has been enhanced to provide the 31-bit/64-bit interoperability support.
- New IBM Open XL C/C++ 1.1 compiler: A new component for z/OS V2.4 and V2.5 adds C/C++ language standards support, ideal for z/OS UNIX users porting applications from distributed platforms.
- Resource Measurement Facility (RMF) and Advanced Data Gatherer (ADG) enhancements: Support has been added to report on the new Crypto Express 8S card of the IBM z16 and allow machine configurations with up to 256 physical processors.
- MEMLIMIT diagnostics for CICS® and Java enhancements: Serviceability is enhanced for MEMLIMIT diagnosis in high virtual memory.
- z/OS Encryption Readiness Technology (zERT) Network Analyzer enhancements: Passphrase support is added and usability is improved for database connection authentication.
- RACF® Database Encryption: This function allows an installation to encrypt a VSAM data set that is used as a part of a RACF database as well as share that data set among z/OS systems in certain configurations to help further strengthen the overall security posture of the z/OS platform.
- Compliance support for z/OS: z/OS has been enhanced to modernize compliance data reporting. This support enables the collection of compliance data from numerous IBM z16 and z/OS products and components, and simplifies auditing by publishing z/OS hardening guidelines.

## Key requirements

z/OS V2.5 operates on the following IBM Z® servers:

- IBM z16 Model A01
- IBM z15™ Models T01 and T02
- IBM z14® Models M01-M05
- IBM z14 Model ZR1
- IBM z13®
- IBM z13s®

If you run z/OS V2.5 as a guest of IBM z/VM, z/VM® must be at a supported level.

For a complete description of z/OS V2.5 hardware requirements, see *z/OS V2.5 Planning for Installation* (GA32-0890) in IBM Documentation.

## Planned availability date

June 30, 2022

Availability within a country is subject to local legal requirements.

## Description

### z/OS Parallel Sysplex enhancements for the IBM z16 CFLEVEL 25

In Hardware Announcement AG22-0002, dated April 5, 2022, IBM announced z/OS support for the new IBM z16 level of coupling facility, CFLEVEL 25. This support provides enhancements for improved Parallel Sysplex performance, scalability, and resiliency. Specific z/OS enhancements provide improved CF cache and lock structure resiliency and new CF cache structure object residency time monitoring. Enhancements include the following:

- CF cache and lock structure resiliency improvements

  IBM z16 CFLEVEL 25 provides improved resiliency support for CF cache and lock structure usage. The CF now implements a functional retry buffer capability that applies to the subset of CF cache and lock commands that cannot always be safely retried when an interface control check (IFCC) or other link-related error interrupts the normal request flow to or from the CF image. Retry buffers make it possible for z/OS to always determine the outcome of such CF operations following a transient link error, avoiding any ambiguities related to the CF structure updates made by those requests.

  z/OS now makes use of CF retry buffers to improve the resiliency of these CF structure operations without requiring any software updates by the user function that is exploiting the CF structure for its data-sharing purposes. With the PTFs for APAR OA60275, the z/OS operating system support for retry buffer enhancements is available on z/OS V2.2 and later. Additionally, IBM z16 CFLEVEL 25 provides lock structure exploiters with the new capability to dedicate a subset of lock structure record data entries that are reserved for recovery use only. Exploiters may reserve these record data entries and thereby ensure that even when all the normal record data entries in a lock structure have been used up, the special pool of dedicated recovery-use entries remain available for use in recovering from this structure-full condition. With the PTFs for APAR OA60650, the z/OS operating system support for reserved lock structure record data entries is available on z/OS V2.3 and later.
- CF cache structure object residency time monitoring and metrics

  New CF cache structure monitoring and metrics are provided for IBM z16 CFLEVEL 25 coupling facilities. These metrics provide cache structure exploiters with additional cache object information that can be used to provide improved cache management, either directly by the exploiter or through improved cache usage reporting by the exploiter.

  New storage class statistics are provided to report on cache directory entry and data area "residency times", defined as the average time between when a cache directory entry or its associated data area is first created until the time that those cache structure resources are reclaimed for use to satisfy a more-current cache structure request. Residency time metrics can be used to provide insights into the overall cache effectiveness for CF cache structures.

  With the PTFs for APAR OA60650, the z/OS operating system support for cache structure object residency time metrics is available on z/OS V2.3 and later.

**CFRM support for 4096 CF structures in a Parallel Sysplex**

In Software Announcement AP21-0381, dated November 23, 2021, z/OS announced support for formatting Coupling Facility Resource Management (CFRM) couple data sets to support definition and use of up to 4096 CF structures (raised from 2048) in a Parallel Sysplex environment. This support was made available in z/OS V2.5 and with the PTFs for APAR OA60356 on z/OS V2.3 and V2.4.

Shortly after this support became available, a problem was identified in which a partial write to a CFRM couple data set formatted for more than 2048 CF structures could occur, affecting either the primary or alternate couple data set instance, and rendering that couple data set corrupted and unusable. If both the primary and alternate couple data sets experience such an error, a sysplex-wide outage is possible and a sysplex-wide IPL with new couple data sets will be needed to recover.

To avoid this problem, z/OS has provided HIPER APAR OA62794 on z/OS V2.3 and later to disable the previously delivered support for formatting a CFRM couple data set for more than 2048 CF structures, pending a complete solution to the issue. In

the future, z/OS intends to provide a complete solution and re-enable the support for formatting a CFRM couple data set for up to 4096 CF structures with APAR OA63039 on z/OS V2.3 and later.

Clients are cautioned not to format CFRM couple data sets for more than 2048 CF structures, until APAR OA63039 is installed.

IBM recommends installing APARs OA62823 and OA63039 when available.

**z/OS support for System Recovery Boost enhancements**

System Recovery Boost provides boosted capacity and parallelism to accelerate image-level recovery, such as shutdown and startup, and it enables accelerated processing of workload backlogs that may occur for those image-level events following a re-IPL. System Recovery Boost also provides short-term recovery process boosts to mitigate specific recovery-related impacts and restore steady-state sysplex operation as quickly as possible, and to enhance workload catch-up following the recovery event.

Participating images may receive an IPL boost of up to 60 minutes, an image shutdown boost of up to 30 minutes, and a pool of 30 minutes per image per day of recovery process boost time. System Recovery Boost provides additional processing capacity and parallelism for the boosting images using two underlying technologies: Speed Boost, enabling sub-capacity general-purpose processors to run at full-capacity speed, and IBM Z Integrated Information Processor (zIIP) processors boost, making general-purpose work eligible to run on zIIP processors.

Now, z/OS has extended the System Recovery Boost solution with additional recovery process boost use cases to provide value for a new set of z/OS recovery and diagnostic events. As mentioned in Hardware Announcement AG22-0002, dated April 5, 2022, these new use cases are only available when running on IBM z16, or higher, systems.

- Client-selected middleware starts and restarts: Boosts z/OS systems that are performing startup or restart for client-selected started-task (STC) middleware regions. By default, no middleware regions are boosted, but clients may configure this function for use by specifying which started-task middleware regions they want to be boost-eligible using WLM Service Definition Classification Rules. This recovery process boost is designed to expedite recovery for the middleware regions and restore steady-state operations as quickly as possible, and to provide additional capacity for workload catch-up once the middleware region is started.
- SVC dump processing: Boosts z/OS systems that are performing diagnostic data capture for an SVC dump that is estimated to be over a certain size threshold. By default, no dumps are boosted, but clients may configure this function for use by using the CHNGDUMP command to set a dump size threshold over which SVC dumps will be boosted. This recovery process boost is designed to minimize the impact of the SVC dump processing on your running workloads and provides additional capacity for workload catch-up following the completion of the SVC dump.
- HyperSwap configuration load and reload: Boosts z/OS systems that are participating in a load or reload of a HyperSwap configuration policy. This recovery process boost is designed to minimize the impact of the HyperSwap configuration change processing on your running workloads and provides additional capacity for workload catch-up following the completion of the configuration change.

These new IBM z16 use cases share the same recovery process boost time pool of 30 minutes per image per day with the Parallel Sysplex recovery use cases that were previously introduced on IBM z15.

z/OS provides the necessary administrative and operational controls in CHNGDUMP to manage which SVC dumps may receive a boost, and in the WLM Service Definition Classification Rules to manage, through z/OSMF or ISPF, which middleware starts and restarts may receive a boost. Additionally, when running on IBM z16, z/OS display commands for System Recovery Boost are enhanced

to provide additional information about the current usage of the recovery process boost time pool that is available to the z/OS image and when that time pool will be refreshed.

z/OS also provides new System Recovery Boost support for dynamically enabling and disabling recovery process boosts for all use cases, which clients can use to better control how the system makes use of the available recovery process boost time. Furthermore, z/OS now provides improved display, monitoring, and SMF logging capabilities that cover both the actual and potential use of recovery process boost time to assist clients in managing and understanding the usage of recovery process boost time in their z/OS images.

The z/OS support for IBM z16 System Recovery Boost requires PTFs for z/OS V2.4 or V2.5. The z/OS PTFs are included in a z/OS FIXCAT designated specifically for System Recovery Boost support, named "IBM.Function.SystemRecoveryBoost".

In addition, RMF now reports System Recovery Boost for Middleware. Monitor II provides for filtering address spaces by boost state while Monitor III reports on each address space boost state. With the PTFs for APAR OA62806 for RMF and OA61036 for ADG, this function is available on z/OS V2.4 and later.

**z/OS upgrade improvements for the IBM z16**

IBM is making continual enhancements to provide assistance for z/OS for upgrading to the new IBM z16 server. The z/OS IBM z16 Upgrade Workflow, which provides all the necessary information to position z/OS on the IBM z16 server, will be provided in a z/OS program PTF, which has been identified with the SMP/E FIXCAT IBM.Device.Server.z16-3931.RequiredService. Any updates and fixes for the z/OS IBM z16 Upgrade Workflow will be provided with PTFs and service supported through the standard z/OS service process. By including the z/OS IBM z16 Upgrade Workflow both in the z/OS product and in an exported form on the Abstract for the z/OS Upgrade Workflow web page, this important technical material is conveniently available for use while preparing for and learning about your upgrade to the IBM z16.

**z/OSMF ServerPac Update**

In the z/OS V2.5 Software Announcement AP21-0381, dated November 23, 2021, IBM announced the intention to keep the CustomPac Dialog ServerPac as an installation option until the z/OSMF Software Management data set merge function is available and the z/OSMF ServerPac Portable Software Instance has enabled it.

On March 23, 2022, the z/OSMF Software Management data set merge function was made available with the PTF for APAR PH42028 on z/OS V2.3 and later. In addition, the z/OSMF Software Management data set merge function is enabled in z/OSMF ServerPac Portable Software Instance orders as of May 6, 2022.

The CustomPac Dialog installation method choice from Shopz is planned to be removed on July 10, 2022. After July 10, 2022, IBM intends that any ServerPac for z/OS, IBM CICS, IBM Db2®, IBM IMS, or program products ordered through Shopz will be packaged and installable only with z/OSMF.

On June 1, 2022, the Customized Offerings Driver was updated to include support for the IBM z16 server and was also updated to include the z/OSMF Software Management data set merge function.

For more information about how to install ServerPac with z/OSMF Software Management, see the ServerPac Installation using z/OSMF content solution.

**z/OSMF enhancements**

z/OSMF continues to deliver new and enhanced functions to enable higher efficiency and easier management of z/OS. The following z/OSMF enhancements have been delivered:

- The z/OSMF Sysplex Management plug-in is enhanced to support Import/Export of CFRM policy data. This plug-in will help users to better leverage existing CFRM Policy Editor function so that existing policies saved in data sets can be imported into CFRM Policy Editor and policies edited by CFRM Policy Editor can also be exported for offline review or any other purpose. The Sysplex Management plug-in is also enhanced to support bulk copy of structures so that editing multiple structures could be efficient and less error prone. With the PTFs for APAR PH39687, these functions are available on z/OS V2.4 and later.
- The REST data set and file APIs are enhanced to support creating or deleting UNIX System Services (USS) symbolic links. It also supports passing in TSO procedures and region size with headers for more flexibility. With the PTFs for APAR PH44068, this function is available on z/OS V2.4 and later.
- z/OSMF Systems task has been enhanced to support validating the connection status of managed systems with just a few clicks. With the PTFs for APAR PH44158, this function is available on z/OS V2.4 and later.

**Cloud Provisioning and Management for z/OS enhancements**

z/OS V2.5 introduced a new capability in Cloud Provisioning and Management for z/OS to allow z/OS system programmers to create a new z/OS system in a monoplex configuration from scratch. IBM is enhancing the z/OS provisioning user experience by expanding the type of potential configurations a user can modify during the provisioning process. This can help with creating a more complete z/OS system from the start. It is intended to save time and streamline the provisioning experience, as opposed to performing several manual configurations on a provisioned system after-the-fact. Cloud Provisioning and Management for z/OS now supports the following in z/OS Provisioning template for a more comprehensive provisioning experience:

- Addition of an empty RACF database for security configuration
- NJE, SMS, and ICSF support for jobs, storage, and crypto configuration, respectively
- Health Checker for z/OS support for identifying configuration and runtime issues
- Shared resource pool support for the z/OS provisioning service that allows one resource pool to be shared across multiple service templates and instances

In addition, IBM continues to enhance the Cloud Provisioning and Management framework with the following user experience changes that apply when provisioning any software service instance:

- Users can now see template and resource pool associations and public or private variables to make faster and better-informed decisions on existing resources and provisioned software service instances.
- With the automatic creation of a default shared resource pool for use during provisioning in "default" domain, first-time users can get started with creating a software service efficiently.
- Users can archive history captured for various actions performed against software templates and resource pools.
- The template approval process is enhanced such that a RACF group can be provided as RunAsUser step approver and any user in a RACF group can approve a RunAsUser step associated with the software service template.

With the PTFs for APAR PH44613, these enhancements are available on z/OS V2.4 and later.

**z/OS Management Services Catalog enhancements**

The new release of z/OS Management Services Catalog is designed to provide numerous improvements to the user experience flow to help z/OS system programmers more efficiently and effectively create and manage z/OS management services. Some highlights include:

- Service creation enhancements:
  - System programmers can drag-and-drop inputs to different pages. Additionally, multiple inputs can now be selected for drag-and-drop within

the same page. In addition, category management is now extended from Administration to enable users who are creating a service to also select or create a new service category.

- Service management enhancements:
  - Administrators who perform an action on a service now receive a confirmation that the action has completed.
- Service submission enhancements:
  - Suspended services are now visible in the Catalog. Non-administrators can start a service submission of the suspended service that saves to "My drafts" until the service is resumed. Administrators can test run the suspended services.
- Monitoring service submissions enhancements:
  - System programmers can see the final values of modified workflow variables when viewing completed, terminated, or failed service submissions.
  - When submissions are automatically removed from History, according to History settings, associated archived workflow instances are now also deleted.

New sample services: z/OS Management Services Catalog provides two new sample services to help system programmers get started creating and running services, and demonstrate best practices:

- Create a RACF digital certificate
- Encrypt a zFS file system

To learn more, including helpful instructions about how to get started, see the z/OS Management Services Catalog website. With the PTFs for APAR PH44234, these enhancements are available on z/OS V2.4 and later.

**z/OS Job REST Completion Notification to eliminate CIM**

JES2 and z/OS have support for indicating a server that is the target of job completion notifications. This is done by specifying a notification URL on the z/OSMF REST Jobs API or passing a parameter on the allocation of the JES2 internal reader during job submission. This interface is designed to "post" the specified URL when a job completes normally or abnormally.

The asynchronous job completion notification function of the z/OS REST jobs API has been enhanced to:

- Remove the dependency on CIM and CEA, thus simplifying configuration
- Issue the notifications for jobs that fail early in input phase processing
- Reissue notifications if the target URL is not available when the job completes

These changes should not require any changes to existing users of the REST job API. These improvements are designed to enhance the resiliency of the asynchronous job completion notification function.

With the PTFs for APAR OA61231, this support is available on z/OS V2.5. This level of the code is shipped disabled and should be enabled when the prior CIM and CEA configuration has been disabled. Failure to properly migrate to the new support could result in duplicate notifications being sent, one by JES2 and one by CIM/CEA.

**zCX enhancements**

A new performance improvement has been delivered to z/OS Container Extensions that enables clients using zCX to improve the performance of containerized Linux® on IBM Z workloads by reducing the amount of locking and optimizing critical high frequency code paths. With the PTFs for APAR OA62255, this function is available on z/OS V2.4 and later.

**Data Set File System**

IBM provides a new physical file system called Data Set File System that renders traditional z/OS data sets accessible by programs, shell scripts, and end users of z/OS UNIX System Services. Satisfying many customer requirements, the Data Set File System is designed for z/OS UNIX applications, tools, and utilities to provide transparent access to data in these data sets in a secure and consistent manner. Data Set File System provides:

- Support for cataloged data sets, including sequential data sets, partitioned data sets (PDS), and partitioned data sets extended (PDSE) with various record formats (RECFM) including: Fixed (F), Fixed Block (FB), Fixed Standard (FS), Fixed Block Standard (FBS), Variable (V), Variable Blocked (VB), and Undefined (U)
- Support for both compressed and uncompressed data sets
- Support for both encrypted and unencrypted data sets
- The ability for users to create new data sets, create new members in existing data sets, delete data sets, and delete members from existing data sets
- Access to data sets using a familiar syntax and governed by a user's permission as specified in the security database

z/OS UNIX users can use existing shell commands and utilities to access z/OS data sets using the Data Set File System. In addition, z/OS UNIX applications can access cataloged data sets using a familiar hierarchical directory and file system syntax. With the PTFs for APAR OA62150, this function is available on z/OS V2.5.

**COBOL-Java interoperability**

The IBM Semeru Runtime Certified Edition for z/OS, Version 11 (Java) has been enhanced in FixPack 11.0.14.1 to provide the 31-bit/64-bit interoperability support. With this support, 31-bit COBOL applications can be extended to call 64-bit Java programs using the IBM Semeru Runtime. See APAR IJ33273 for additional details.

**IBM Open XL C/C++ 1.1 compiler component**

A new IBM Open XL C/C++ 1.1 compiler component for z/OS V2.4 and z/OS V2.5 is available. This compiler is ideal for porting distributed applications, and to improve and simplify C/C++ 64-bit application development for the IBM z/OS UNIX Systems Services environment.

Open XL C/C++ 1.1 for z/OS delivers C11, C17/C18, C++11, C++14, and C++17 language standards support, and targets the recent hardware features, including the latest technology advancements in IBM z16. Open XL C/C++ is based on the Clang and LLVM open source infrastructure to deliver more current language standards, support for an easier migration of applications from distributed platforms, and to provide access to the latest IBM z/Architecture(R) capabilities.

Open XL C/C++ 1.1 is an optional compiler for z/OS clients that have enabled the optionally priced XL C/C++ compiler feature on z/OS V2.4 or z/OS V2.5. It coexists with, and does not replace, the base XL C/C++ z/OS V2.4/V2.5 compiler, nor the XL C/C++ 2.4.1 compiler. XL C/C++ 2.4/2.5, XL C/C++ 2.4.1, and Open XL C/C++ 1.1 compilers are designed to be used independently and are also serviced and supported independently.

IBM Open XL C/C++ 1.1 for z/OS V2.4 and z/OS V2.5 is a web deliverable compiler and was made available on May 27, 2022, from the z/OS Downloads website.

**Resource Measurement Facility and Advanced Data Gatherer enhancements**

The following enhancements have been delivered to RMF and ADG:

- RMF and ADG have been enhanced to report on the new Crypto Express 8S (CEX8S) card of the IBM z16. With the PTFs for APAR OA60737 for RMF and OA59874 for ADG, this function is available on z/OS V2.3 and later.
- The RMF Monitor III CPC report has been enhanced to show all logical partitions of a central processor complex (CPC). With the PTFs for APAR OA63142 for RMF

and OA63108 for ADG, this function is available on z/OS V2.3 and later and is required on the IBM z16 to allow machine configurations with up to 256 physical processors.

**MEMLIMIT diagnostics for CICS and Java**

Serviceability is enhanced for MEMLIMIT diagnosis in high virtual memory; for example, Java out-of-memory conditions.

Using existing IPCS subcommands, a user can ascertain high virtual memory usage in a dump whether it is an SVC, a Stand-Alone, or a Transaction dump. Problem diagnosis and resolution can be faster as the need for re-creates and requests for additional problem documentation decreases as service personnel can more easily access relevant data regarding high virtual memory usage. With the PTFs for APAR OA63030, this function is available on z/OS V2.4 and later.

**z/OS Encryption Readiness Technology (zERT) Network Analyzer**

The zERT Network Analyzer z/OSMF plug-in is enhanced to support the use of passphrases as an authentication credential for the network analyzer's Db2 user ID on the plug-in's database settings panel. Additionally, the same panel is enhanced to allow the saving of empty Db2 user ID and password and passphrase values. This gives flexibility to users who want to support multiple Db2 user IDs. This function is available on z/OS V2.3 with the PTF for APAR PH43118, and on z/OS V2.4 and V2.5 with the PTF for APAR PH43119.

**RACF database encryption**

Continuing the pervasive encryption roadmap, RACF now supports RACF database encryption. This function is designed to allow an installation to encrypt a RACF VSAM data set so that all of its information is encrypted while at rest. In addition, with this support, a VSAM data set can be shared among z/OS systems in certain configurations; see the documentation referenced by the APAR for details. This function is designed to further strengthen the overall security posture of the z/OS platform through this defense-in-depth access control to the external security manager's own data set. With the PTF for APAR OA62267, this function is available on z/OS V2.5.

**Compliance support for z/OS**

For highly regulated industries, such as financial services, demonstrating compliance is a critical step in ensuring customer and application data protection. Compliance officers need to adhere to multiple regulations or laws at the same time. They are responsible for understanding and implementing the controls that are required for their organization. They also have a responsibility to provide data that proves to external auditors that security checks are in place. The following z/OS support for compliance has been delivered:

- Modernized reporting

  z/OS V2.4 and later is enhanced to enable the collection of compliance data from IBM z16 CP Assist for Cryptographic Function (CPACF) counters and several z/OS products and components. A new z/OSMF compliance data collection REST API sends an event notification facility (ENF) signal to all systems within the sysplex as determined by the selected systems within the sysplex. Participating products and components will collect and write compliance data to new SMF 1154 records associated with its unique subtype. These new SMF 1154 records can be integrated into solutions, such as the IBM Z Security and Compliance Center. To learn more, see the IBM Z Security and Compliance Center web page.

  This support requires PTFs for z/OS V2.4 and z/OS V2.5. The PTFs are identified by a fix category designated specifically for compliance data collection support named IBM.Function.Compliance.DataCollection. Use this fix category to identify and install the specific PTFs that enable compliance data collection.

- Simplified auditing

IBM has contributed to the IBM z/OS V2R5 with RACF Benchmark v1.0.0, which provides security best practices and guidance to clients and auditors. Clients are encouraged to consult system hardening guidelines for security configuration to understand how to audit and remediate your z/OS environment.

## Statement of direction

### Validated Boot for z/OS

IBM plans to deliver a solution providing Validated Boot, also known as Secure Boot or Boot Integrity Validation, capability for z/OS IPLs. This solution is intended to validate digital signatures for loaded z/OS executables that have been built and signed as part of the solution. This solution is designed to meet the requirements for achieving the National Information Assurance Partnership (NIAP) OS Protection Profile 4.2.1 Certification.

### Package signing

IBM plans to provide the capability to digitally sign electronically and physically delivered software packages. This new capability is designed to allow a user to ensure the package hasn't been tampered with and that the package was signed by the expected provider of the package by verifying the signature of the package. Software packages from IBM that are intended to be signed include: ServerPac, CBPDO, Shopz PTF orders, SMP/E RECEIVE ORDER PTFs, and HOLDDATA. This support for signing and verification is planned to be available in both SMP/E and z/OSMF Software Management on all supported z/OS releases.

### Encryption of tape data sets

IBM intends to enhance pervasive encryption to perform encryption within the access methods for tape data sets. It is expected to be transparent to the application program unless it uses EXCP. This new data set encryption support is intended to be independent of any encryption that occurs in the tape subsystem.

### Deprecation of DFSMS Distributed FileManager

z/OS V2.5 is planned to be the last release to support the DFSMS Distributed FileManager (DFM), a seldom used function in z/OS. To determine if DFM is being used, it is recommended to look for JCL that starts DFM; for example, START DFM,SUB=MSTR. If you use DFM to enable remote clients in your network to access data on z/OS systems, it is recommended to use the z/OS Network File System (NFS) instead.

### System Display and Search Facility (SDSF) ISFPARMS removal

For many z/OS releases, a recommended update action has been to specify z/OS SDSF customization with the ISFPRMxx parmlib member. There are several major advantages to using the ISFPRMxx parmlib member format over the original format, which involves an assembler module and SDSF macros. Beginning with the following release after z/OS V2.5, IBM plans that only the ISFPRMxx parmlib member format will be supported. For this reason, if the parmlib member ISFPRMxx is not currently being used, IBM recommends clients convert to using ISFPRMxx to avoid being impacted in the future.

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## Reference information

For information about z/OS V2.5, see:

- Software Announcement AP22-0079, dated March 15, 2022
- Software Announcement AP21-0381, dated November 23, 2021
- Software Announcement AP21-0249, dated July 27, 2021
- Software Announcement AP21-0051, dated March 2, 2021

For information about IBM z/OS Change Tracker, see Software Announcement AP22-0013, dated April 5, 2022.

For information about IBM Z Platform for Apache Spark, see Software Announcement AP22-0043, dated April 5, 2022.

For information about IBM zCX Foundation for Red Hat® OpenShift®, see Software Announcement AP22-0088, dated March 15, 2022.

For information about IBM Container Hosting Foundation, see Software Announcement AP21-0119, dated June 1, 2021.

For information about z/OS V2.4 and CD enhancements for z/OS V2.4, see:

- Software Announcement AP21-0206, dated June 22, 2021
- Software Announcement AP21-0094, dated March 16, 2021
- Software Announcement AP20-0469, dated December 8, 2020
- Software Announcement AP20-0455, dated October 13, 2020
- Software Announcement AP20-0362, dated September 22, 2020
- Software Announcement AP20-0211, dated June 16, 2020
- Software Announcement AP20-0097, dated March 17, 2020
- Software Announcement AP19-0199, dated December 10, 2019
- Software Announcement AP19-0326, dated July 23, 2019
- Software Announcement AP19-0011, dated February 26, 2019

For information about IBM z16, see Hardware Announcement AG22-0002, dated April 5, 2022.

For information about IBM z15, see:

- Hardware Announcement AG20-0056, dated August 4, 2020
- Hardware Announcement AG20-0006, dated April 14, 2020
- Hardware Announcement AG20-0013, dated January 14, 2020
- Hardware Announcement AG19-0094, dated November 26, 2019
- Hardware Announcement AG19-0032, dated September 12, 2019

For information about IBM z14 Model ZR1, see:

- Hardware Announcement AG18-0074, dated October 2, 2018
- Hardware Announcement AG18-0018, dated April 10, 2018

For information about IBM z14, see:

- Hardware Announcement AG18-0074, dated October 2, 2018
- Hardware Announcement AG17-0093, dated November 28, 2017
- Hardware Announcement AG17-0044, dated July 17, 2017

For information about IBM z13, see:

- Hardware Announcement AG19-0045, dated May 7, 2019
- Hardware Announcement AG19-0017, dated February 12, 2019
- Hardware Announcement AG16-0058, dated June 7, 2016
- Hardware Announcement AG15-0060, dated March 3, 2015
- Hardware Announcement AG15-0001, dated January 14, 2015

For information about IBM z13s, see:

- Hardware Announcement AG16-0058, dated June 7, 2016
- Hardware Announcement AG16-0002, dated February 16, 2016

## Availability of national languages

The z/OS national language support features will become generally available when the executable code becomes available.

Translation information, if available, can be found at the Translation Reports website.

## Program number

| Program number | VRM | Program name |
|---|---|---|
| 5650-ZOS | 2.5.0 | z/OS |

## Services

### IBM Systems Lab Services

Systems Lab Services offers infrastructure services to help build hybrid cloud and enterprise IT solutions. From servers to storage systems and software, Systems Lab Services can help deploy the building blocks of a next-generation IT infrastructure to empower a client's business. Systems Lab Services consultants can perform infrastructure services for clients online or onsite, offering deep technical expertise, valuable tools, and successful methodologies. Systems Lab Services is designed to help clients solve business challenges, gain new skills, and apply best practices.

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For assistance, contact Systems Lab Services at ibmsls@us.ibm.com.

To learn more, see the IBM Systems Lab Services website.

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For additional information, see the IBM Consulting website.

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Get preventive maintenance, onsite and remote support, and gain actionable insights into critical business applications and IT systems. Speed developer innovation with support for over 240 open-source packages. Leverage powerful IBM analytics and AI-enabled tools to enable client teams to manage IT problems before they become emergencies.

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For details on available services, see the Technology support for hybrid cloud environments website.

**IBM Expert Labs**

Expert Labs can help clients accelerate their projects and optimize value by leveraging their deep technical skills and knowledge. With more than 20 years of industry experience, these specialists know how to overcome the biggest challenges to deliver business results that can have an immediate impact.

Expert Labs' deep alignment with IBM product development allows for a strategic advantage as they are often the first in line to get access to new products, features, and early visibility into roadmaps. This connection with the development enables them to deliver First of a Kind implementations to address unique needs or expand a client's business with a flexible approach that works best for their organization.

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For more information, contact Security Expert Labs at sel@us.ibm.com.

For additional information, see the IBM Security Expert Labs website.

## IBM Support

IBM Support is your gateway to technical support tools and resources that are designed to help you save time and simplify support. IBM Support can help you find answers to questions, download fixes, troubleshoot, submit and track problem cases, and build skills. Learn and stay informed about the transformation of IBM Support, including new tools, new processes, and new capabilities, by going to the IBM Support Insider.

## Additional IBM support

### IBM Client Engineering for Systems

Client Engineering for Systems is a framework for accelerating digital transformation. It helps you generate innovative ideas and equips you with the practices, technologies, and expertise to turn those ideas into business value in weeks. When you work with Client Engineering for Systems, you bring pain points into focus. You empower your team to take manageable risks, adopt leading technologies, speed up solution development, and measure the value of everything you do. Client Engineering for Systems has experts and services to address a broad array of use cases, including capabilities for business transformation, hybrid cloud, analytics and AI, infrastructure systems, security, and more. Contact Client Engineering at sysgarage@ibm.com.

## Technical information

### Specified operating environment

#### *Hardware requirements*

z/OS V2.5 operates on the following IBM Z servers:

- IBM z16 Model A01
- z15 Models T01 and T02
- z14 Models M01-M05
- z14 Model ZR1
- z13(R)
- z13s(R)

For a complete description of z/OS V2.5 hardware requirements, see *z/OS V2.5 Planning for Installation* (GA32-0890) in IBM Documentation.

#### *Software requirements*

The z/OS base is a system that can be IPLed. There are no software prerequisites to IPL. Specific functions might require additional products not included in the z/OS base or optional features of z/OS. See *z/OS V2.5 Planning for Installation* (GA32-0890) in IBM Documentation for a list of specific software requirements.

If you run z/OS V2.5 as a guest of IBM z/VM , z/VM must be at a supported level.

#### *Compatibility*

**Coexistence, release migration, and fallback**

z/OS gives you compatibility and flexibility as you migrate systems in a multisystem configuration by enabling multiple releases of z/OS to coexist. This includes non-Parallel Sysplex and Parallel Sysplex multisystem configurations. Coexistence enables 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 whether 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 provides the following coexistence, migration, and fallback for z/OS V2.5:

IBM plans to support an n-2 approach, where three consecutive releases are planned to be supported for coexistence, fallback, and migration. For example, where "n" is z/OS V2.5, IBM intends to enable you to upgrade from z/OS V2.4 directly to z/OS V2.5 with full coexistence, migration, and fallback support to maximize the value of your investment, and from z/OS V2.3 to z/OS V2.5 with full coexistence, migration, and fallback support.

Migration forward as well as fallback should be made within the same z/OS releases supported by the coexistence policy.

**Coexistence-Migration-Fallback for z/OS V2.5**

| Release | Coexistence-Migration-Fallback supported with release in column 1 |
|---|---|
| z/OS V2.3[3] | z/OS V2.1[1], z/OS V2.2[2], z/OS V2.3[3], z/OS V2.4, z/OS V2.5 |
| z/OS V2.4 | z/OS V2.2[2], z/OS V2.3[3], z/OS V2.4, z/OS V2.5 |
| z/OS V2.5 | z/OS V2.3[3], z/OS V2.4, z/OS V2.5 |

**End of service**

[1] z/OS V2.1 end of service was September 30, 2018.

[2] z/OS V2.2 end of service was September 30, 2020.

[3] z/OS V2.3 end of service is planned for September 30, 2022.

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 is only offered with NALC pricing for clients using NALC for z/OS, V1 who are using PSLC for their middleware programs. z/OS V2 clients using AWLC or WLC or AEWLC or EWLC pricing for their middleware programs must migrate from NALC to zNALC pricing.
- All z/OS clients 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.

### Security, auditability, and control

Data security and auditability in the z/OS environment are enhanced by the functions available in the optional Security Server for z/OS feature.

The client is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

## Ordering information

### Ordering z/OS through the internet

Shopz provides an easy way to plan and order your z/OS packaged offering. It will analyze your current installation, determine the correct product migration, and present your new configuration based on z/OS. Additional products can also be added to your order. Shopz will determine whether all product requisites are satisfied. Shopz is available in all countries. For more details and availability, go to the Shopz website.

## New licensees

Not applicable.

For ordering information about the base program, z/OS V2.5, see Software Announcement AP21-0249, dated July 27, 2021.

For ordering information about additional orderable z/OS programs or features since the initial release of z/OS V2.5, see Software Announcements:

- IBM zCX Foundation for Red Hat OpenShift AP22-0088, dated March 15, 2022
- IBM Z Platform for Apache Spark AP22-0043, dated April 5, 2022
- IBM z/OS Change Tracker AP22-0013, dated April 5, 2022

Based on the client-requested arrival date (CRAD) and to allow for order processing, the first client shipment will begin within seven business days after the planned availability date.

### *Publications*

A program directory is supplied automatically with the basic machine-readable material.

To access the unlicensed z/OS product documentation, start at the z/OS Internet Library. It contains direct links to the following repositories and content:

- IBM Documentation sections for z/OS V2.5 and other supported releases.
- z/OS V2.5 Library, hosted on Resource Link(R) , to download individual or grouped PDFs. An IBMid and password are required.
- Adobe™ Indexed PDF Collections (SC27-8430) to easily conduct offline searches on z/OS product documentation.
- Downloadable collections of IBM Documentation plug-ins for clients who host their own instances of IBM Documentation for z/OS.
- IBM Z and LinuxONE content solutions, which provide comprehensive and interactive content such as workflows, videos, and content collections.
- IBM Z Publications Library Archive, to obtain as-is content for out-of-service products and releases.

PDF collections are provided in the Zip format that any modern Zip utility can process.

Subsequent updates (technical newsletters or revisions between releases) to the publications shipped with the product will be distributed to the user of record for as long as a license for this software remains in effect. A separate publication order or subscription is not needed.

## Customized Offerings

Product deliverables are shipped only through CBPDO and ServerPac. These customized offerings are offered for internet delivery from Shopz. For more details on internet delivery, go to the Help section on the Shopz website.

IBM recommends internet delivery. However, if you still require physical media, you can choose DVD.

Many products can be ordered in ServerPac the month following their availability in CBPDO. z/OS can be ordered through CBPDO and ServerPac on the planned availability date. Many products will also be orderable in a ServerPac without also having to order the z/OS operating system or subsystem.

Shopz and CFSW will determine the eligibility based on product requisite checking. For more details on the ServerPac, go to the Help section on the Shopz website.

Production of software product orders will begin on the planned availability date.

- CBPDO shipments will begin within 3 business days after the planned availability date.
- ServerPac availability and shipments will begin within 3 - 4 weeks after the planned availability date due to additional customization and data input verification.

## Terms and conditions

The terms are unaffected by this announcement.

## Statement of good security practices

IT system security involves protecting systems and information through prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed, or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a lawful, comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective.

**Important:** IBM does not warrant that any systems, products, or services are immune from, or will make your enterprise immune from, the malicious or illegal conduct of any party.

## Prices

Current charges are unaffected by this announcement.

## Regional availability

Australia, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, People's Republic of China, Christmas Island, Cocos (Keeling) Islands, Cook Islands, Fiji, Heard Island and McDonald Islands, Hong Kong, India, Indonesia, Kiribati, Republic of Korea, Lao People's Democratic Republic, Macao, Malaysia, Maldives, Mongolia, Myanmar, Nauru, Nepal, New Zealand, Niue, Norfolk Island, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Timor-Leste, Tokelau, Tonga, Tuvalu, and Socialist Republic of Viet Nam

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## Corrections

**(Corrected on June 29, 2022)**

The Statement of direction section was revised.

**(Corrected on June 23, 2022)**

The Description and Statement of direction sections were revised.