



## IBM z/OS Version 2 Release 3

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### Highlights

- Exploits the latest IBM z14™ (z14), supporting up to 170 configurable processors
  - Enhanced data security extends encryption to the data set level and Coupling Facility structures
  - Simplified end-to-end z/OS® management with z/OSMF
  - Tools to simplify management of sysplex infrastructure and new cloud management capabilities
  - Real-Time SMF Analytics infrastructure support
  - Enhancements to zFS file system for uninterrupted operations
  - Increased JES2 resiliency
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Digital transformation has become ubiquitous, driving higher data and transaction volumes and accelerating the rate of application changes made by enterprises. This creates an emerging need for a software-driven infrastructure that is more flexible and scalable, leading to better utilization of compute, storage, and network resources.

The response is a rapid evolution toward hybrid IT architectures that rely on combinations of off-premises and on-premises IT resources. This evolution has surfaced challenges in capacity, scale, availability, and throughput required to improve business performance, meet response time objectives, protect sensitive data and transactions, and minimize operational risk for an exceptional customer experience. All areas of IT are affected, including data center investment, development of next-generation cloud applications, and application lifecycle management.

IBM's z/OS V2.3 operating system delivers innovations designed to build the highly scalable and highly securable next-generation infrastructure needed. z/OS V2.3 delivers the performance, availability, scale, I/O support, and security to provide the infrastructure, on or off premises or provisioned as-a-service, that allows for instant reacting to business opportunities.



Companies need technologies that are smart, adaptive, trusted, and efficient in building an IT infrastructure that can respond quickly to change while reducing cost and driving profit. IBM Z and z/OS V2.3 with world-class workload management are the right choice for infrastructure and workload needs as companies transition into next-generation computing. z/OS is designed to help clients keep applications and data available, system resources secure, server utilization high, and programming environments adaptable while maintaining compatibility for existing applications. With investment protection coupled with leading qualities of service, z/OS provides solution longevity and is a trusted foundation for next-generation IT solutions.

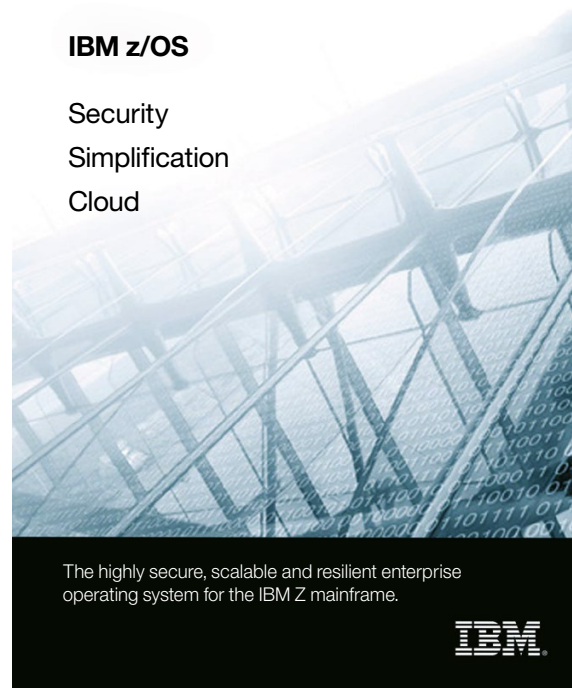
z/OS is designed to support companies' most mission-critical work while meeting stringent service levels, illustrated by clients that include the world's leading banks, financial services companies, healthcare enterprises, and governments. Focusing on three critical areas, Security, Simplification, and Cloud, z/OS V2.3 helps to provide a simple, transparent, and consumable approach to enable extensive encryption of data, simplify the overall management of the z/OS ecosystem to increase productivity, and provide a simple, consumable approach for self-service provisioning and rapid delivery of software as a service, while enabling for the API economy.

## IBM z/OS Version 2 Release 3—Engine for digital transformation

### New approach to encryption

At the core of every enterprise lies data representing core business assets, which if lost or compromised can cause irreparable damage. This core business data may fall within the scope of various regulatory requirements that can govern how it can be used and mandate actions to be taken in the event of loss or inadvertent disclosure.


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**IBM z/OS**

Security  
Simplification  
Cloud

The highly secure, scalable and resilient enterprise operating system for the IBM Z mainframe.



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This has changed the perspective about how core business data should be handled and protected. The use of strong encryption is one of the most impactful ways to reduce risk and financial loss arising from unauthorized access to data. It helps you meet complex compliance mandates by creating a fortified perimeter around core business data. Establishing this perimeter has become more practical and z/OS V2.3 together with z14 can drive pervasive encryption efforts within an enterprise.

z/OS is designed to provide new policy-based pervasive encryption options that take full advantage of the improvements in the z14 models and can help you build that intrinsic, fortified perimeter around your critical business data. These new capabilities include:

- Enhanced data protection for many z/OS data sets, zFS file systems, and Coupling Facility list structures give users the ability to encrypt data without needing to make costly changes to applications to imbed encryption APIs within applications.
- New z/OS policy controls make it possible to use pervasive encryption to protect user data and simplify the task of compliance.
- z/OS Communications Server includes encryption-readiness technology to enable z/OS administrators to determine which TCP and Enterprise Extender traffic patterns to and from their z/OS systems meet approved encryption criteria and which do not.

### Simplify and modernize the user experience to enhance productivity

Clients are faced with a mixed skills workforce composed of professionals who are new to z/OS and those who are already skilled in z/OS. z/OS V2.3 will simplify and modernize the user experience and help make pertinent information readily available and easily accessible:

- In z/OS V2.3, z/OSMF will be started during the z/OS IPL process. This helps to ensure that z/OSMF services, such as notification services, are present for exploiters of z/OSMF.
- Continuing to lay the foundation for installation improvements through enhancements to the software packaging and installation capabilities in z/OSMF that provide the basis for a common installer.

- A new z/OSMF plug-in, Sysplex Management, provides detailed views of sysplex infrastructure resources such as sysplexes and z/OS systems, CFs and CF structures, CF structure connectors, couple data sets and policies, and coupling links.



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IBM z14 Models M01-M05 and IBM z14 Model ZR1

## Transform from an IT cost center to a value-generating service provider

As the API economy develops, customers are incented to move their IT operations from a cost center model to a revenue-generating profit center model. The z/OS platform, known for its outstanding vertical scalability and speed, coupled with leading-edge security and reliability, provides the foundational capabilities that are ideal for private cloud service delivery:

- z/OSMF supports workflow extensions for IBM Cloud Provisioning and Management for z/OS.
- z/OS V2.3 delivers Real-Time SMF Analytics infrastructure support, which will enable faster processing for high-volume SMF data, providing the response time required for real-time analysis of SMF data in analytics and cloud applications.

Enabling the z/OS platform with these cloud capabilities delivers innovations not only in certain infrastructure elements and components of the z/OS operating system, but also in selected levels of various z/OS software subsystems such as IBM CICS® Transaction Server for z/OS, IBM IMS™ for z/OS, IBM DB2® for z/OS, IBM MQ® for z/OS, and IBM WebSphere Application Server for z/OS.

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## *IBM z/OS V2.3 Next Generation Infrastructure*

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## IBM z/OS V2.3 leverages the IBM z14 capabilities

New functions in z/OS V2R3 continue to enhance the role of IBM Z®, with support for the IBM z14 models and their role in helping you provide solutions for a trusted digital economy. Capabilities designed to optimize high availability, performance, security, and operational flexibility can help organizations grow and to secure their most critical transaction environments.

In addition to base processor support, z/OS provides the support for these IBM z14 functions and features:

- Improved cryptographic capabilities that can be leveraged to begin implementation of IBM's pervasive data encryption strategy
- The IBM zHyperLink™ Express feature
- Asynchronous Memory Clear using System Assist Processors (SAPs)
- Additional new I/O attachment options including the OSA-Express6S, RoCE Express2, and FICON Express 16S+ features
- Coupling Facility Level (CFLEVEL) 22 and new Coupling link features
- The Guarded Storage Facility, exploited by IBM SDK for z/OS, Java Technology Edition, Version 8 (5655-DGG).
- The Instruction Execution Protection Facility
- IBM Virtual Flash Memory.

## Improved Cryptographic Capabilities

z14 provides cryptographic performance improvements with the Crypto Express6S (#0893) and the IBM Z processor based cryptography with the CP Assist for Cryptographic Functions that help enable the protection of data in flight or at rest. The Crypto Express6S coprocessor with CCA 6.0 is designed to comply with the Payment Card Industry (PCI) Pin Transaction Security (PTS) Hardware Security Module (HSM) Standard.

The Crypto Express6S compliance with PCI PTS HSM and with CCA 6.0 introduces several new capabilities both for PCI PTS HSM compliance mode and for general use:

1. A new derived key hierarchy so that PCI PTS HSM compliance-tagged key tokens may be used alongside existing keys and services in a non-disruptive fashion—with existing master keys.
2. Non-disruptive transition to PCI PTS HSM mode using TKE 9.0.
3. Secure Audit Log hosted from the Crypto Express6S coprocessor with CCA 6.0.
4. Secure public key infrastructure, native X.509 certificate support including PKCS #10 certificate request generation through a new PKI hosted from the coprocessor.
5. Migration planning assistance through active application reporting.
6. CPACF exportable AES cipher key support added for AES cipher keys created using new options in CCA 6.0.

## Scalability, availability and performance

The z14 models are designed to scale up and out. z/OS V2.3 continues to support the highest levels of scalability and availability to meet service requirements for traditional workload growth as well as new computing initiatives. For instance, the qualities of service, workload isolation and security of z/OS are designed to support your transformation to private cloud or other platform-as-a-service solutions.

For instance:

- z/OS V2.3 with z14 processors supports up to 4 terabytes (TB) of available Redundant Array of Independent Memory (RAIM) real memory per server to help improve transaction response times, lower CPU costs, simplify capacity planning, enlarge in-memory buffer pools, helping you improve performance of DB2, WebSphere® MQ, batch, SAP and other workloads.
- Economies of scale with next-generation multithreading (SMT) for zIIP eligible workloads, new support for the I/O System Assist Processor (SAP), 2x AES performance over IBM z13™ (z13), a True Random Number Generator, SHA3 support, and RSA/ECC acceleration.
- FICON Express16S+ is designed with a boost in I/O rates and a reduction in single stream latency to help absorb large application and transaction spikes driven by large unpredictable analytic and mobile workloads.
- Optimized z/OS Platform for Apache Spark.
- Java performance: support for reducing program pauses during Java Garbage Collection.
- IBM Virtual Flash Memory is the replacement for the Flash Express features, offering up to 6.0 TB of virtual flash memory in 1.5 TB increments for improved application availability and to handle paging workload spikes.
- IBM zHyperLink Express uses a direct connect short distance link (zHyperLink) to deliver low latency connectivity between z14 and FICON® storage systems. Working in conjunction with your existing FICON SAN infrastructure, zHyperLink Express delivers the next generation of I/O for IBM Z storage.

## Excellence in Workload Management and Resource Optimization

With the ability to intelligently manage workloads, allocate system resources to applications quickly and efficiently and dynamically provision additional server capacity according to policy, z/OS and IBM Z can handle workload spikes to allow you to better meet business needs. With IBM z/OS Workload Manager (WLM) you can manage the processing of mixed diverse workloads to meet business response time goals.

WLM can be used to manage service across the entire Parallel Sysplex® to provide a single point of control, and is designed to eliminate the need for individual image management.

- z/OS V2.3 allows shorter Workload Management response time goals. WLM is designed to allow goal definitions for average and percentile response time goals down to 1 ms. z/OSMF RMF is designed to report these shorter response times.
- z/OS V2.3 enhances Workload Manager (WLM) to support Tenant Resource Groups (TRGs) as a way to group work, with the ability to independently measure and cap such groups. For example, customers can classify a group of address spaces and instruct WLM to limit (“cap”) CPU consumption related to that group, to a limit also specified in the WLM service definition. Similarly, the cap can be removed, allowing CPU consumption for that workload to continue unrestrained.
- WLM is designed to record CPU consumption for each Tenant Resource Group, leading to enhanced Resource Measurement Facility (RMF™) reporting for the specified workload.
- z/OS Workload Management provides a control that allows service classes to be defined such that their specialty processor eligible work will not execute on general purpose processors. In addition, WLM resource groups are enhanced to limit the amount of real storage that may be used by the associated service classes. In particular for workloads that exploit this function, such as Apache Spark workloads, this capability provides the ability to specify that all the applications or jobs submitted to a particular Spark cluster do not exceed a specified real memory limit, and that they do not receive help from standard processors when the zIIP capacity is exceeded.

## Security and Resiliency to Help You Reduce Risk

With today’s more-complex supply chains and the proliferation of mobile devices, data security is under more scrutiny than ever. Cloud and mobile computing models strengthen the need for data custody and resilience. z/OS and IBM Z form the ideal hub for securing and auditing your data and transactions through the use of secured authentication, audit, secured access, cryptography, secured networking, and more.

z/OS V2.3 is designed to provide policy-enabled enhanced data protection for z/OS data sets, zFS file systems, and Coupling Facility structures, providing the ability to encrypt data to help strengthen the protection for mission-critical data. These capabilities are designed to help meet compliance and audit requirements.

The z/OS Communications Server includes z/OS Encryption Readiness Technology (zERT) to help z/OS administrators to determine which TCP and Enterprise Extender (EE) traffic patterns to and from their z/OS systems meet approved encryption criteria and which do not.

In z/OS V2.3, RACF® introduces the new ZMF CLOUD class. This class is used to define z/OS cloud-related resources, giving z/OS Cloud security administrators the ability to control access to z/OS cloud-related resources.

## Simplification - Making z/OS Easy to Manage

You need solutions that are easy to manage and operate so that your expert skills can be more optimally deployed. To help meet this challenge z/OS continues to simplify diagnosis and problem determination, network and security management, as well as overall configuration and operations. These improvements can help shorten time to value through simpler systems management, improved productivity, and more intuitive management using functions that are easier to understand and use.

The z/OS SDSF feature has had a long history in displaying information on system workloads. In z/OS V2.3, the SDSF browser-based UI is updated with new capability aligned with the 3270 UI. SDSF now provides a new user guide that is designed to provide detailed information for the end user on how to get started with SDSF and how to use the various functions provided as part of SDSF. The new user guide is available with the rest of the z/OS product documentation. This makes user information easy to search and bookmark, which should improve the user experience with SDSF. SDSF in z/OS V2.3 supports new enhancements in JES2, particularly in the areas of resiliency, providing visibility to reserved space as well as measurements of spool and control block consumption.

z/OSMF, the web browser-based z/OS management interface, is now a required component of z/OS and is expected to be installed and configured on at least one system in every sysplex. z/OSMF is designed to help you more easily manage a main-frame by simplifying day-to-day configuration, administration and management of z/OS software. This helps extend skills and maximize productivity allowing you to create a repeatable and more standardized management approach. z/OSMF automation is designed to help reduce the learning curve and extend your skills using modern capabilities like workflows, REST services, graphical interfaces, support for management of non-z/OS software, and more. Its active user assistance helps guide you through tasks, simplifying operations.

## New z/OSMF Enhancements:

z/OSMF has been enhanced to include:

- A new z/OSMF plug-in, Sysplex Management, provides detailed views of sysplex infrastructure resources such as Parallel Sysplexes and z/OS systems, CFs and CF structures, CF structure connectors, couple data sets and policies, and coupling links.
- The z/OSMF WEBISPF plug-in is enhanced in z/OS V2.3 to allow single sign on within a sysplex. This eliminates the need to continuously log on and off as you navigate system to system.
- z/OS V2.3 z/OSMF contains a new function called Operator Consoles. This function provides an improved visualization of the z/OS operator consoles, including support for multiple systems in a sysplex.
- z/OS V2.3 adds a new Workflow Editor to z/OSMF to enable you to edit workflows in the UI instead of directly editing XML files.
- z/OS V2.3 z/OSMF Software Management is designed to enable you to use a common process to download portable format packages from any software vendor that makes them available. This enables you to use common tools to download packages from participating vendors in the same user interface.

For more information on the z/OS Management Facility, see: [ibm.com/systems/z/os/zos/zosmf/](https://ibm.com/systems/z/os/zos/zosmf/)

## Enabling Application Development

z/OS delivers support to enable application development and integration with existing investments. With z/OS multiple programming environments can be supported concurrently on the same hardware—all while meeting established service levels. Current z/OS V2.3 applications can be extended and modernized in place, leveraging capabilities of the z14 to deliver value without incurring the cost of replacing or rewriting assets.

z/OSMF supports workflow extensions for IBM Cloud Provisioning and Management for z/OS. This includes improvements to jobname creation, job card attributes, REST workflow steps, and a Workflow Editor.

IBM SDK for Java 8 SR5 provides the following enhancements:

- Pauseless Garbage Collection (GC) delivering more consistent response times for large heap, response-time sensitive applications, by reducing GC stop-the-world pause times through exploitation of z14's Guarded Storage Facility. This new mode is an extension to existing GenCon GC policy, enabled through `Xgc:concurrentScavenge`. This function requires a z14 processor.
- IBM Java for z/OS will exploit RMODE64 to place JIT code cache above the bar, enabled by default in IBM SDK for z/OS, Java Technology Edition, Version 8.0.5 (IBM Java for z/OS V8 SR5).
- Performance and features:
  - General throughput, footprint, and CPU usage/ramp-up improvements for Liberty and analytics workloads

z/OS V2.3 XL C/C++ provides enhancements in the following areas:

- Usability:
  - Metal C creates new function pointers that can act on environments as well as calling a function to allow similar coding patterns and automatic environment-based calling.
  - Hexadecimal offsets are provided for structure listings. The layout information can then be better compared and analyzed.
  - The DSECT utility creates C structures/unions that align closer to the original assembler DSECT, to give the same size and member offsets as the original DSECT.
  - Exploitation of new z14 instructions; for example, new ARCH(12) and TUNE(12) support exploits new instructions on the z14 processors, including support for the vector float type.
- Performance: The architecture default is changed to ARCH(10) (zEC12) to align with the minimum hardware level that z/OS V2.3 supports.
- Security: Stack protection to protect buffers that are susceptible to overflow and to stop returning from functions that detect overwriting.
- Debugging:
  - Metal C debug data blocks provide information linking the assembly or objects with the debugging data, providing synchronization of these files.
  - The Saved Option String Information (SOSINFO) utility emits options encoded in the PPA blocks to help in diagnosing problems.
  - DWARF debugging information in object files is added to the executable in an area that is not loaded at run time to allow access to both the debug data and executable code within the same file. The dbx utility supports this feature.



z/OS now includes a copy of the IBM WebSphere Liberty for z/OS application server as an element of z/OS. It is licensed for use by approved products and other z/OS elements to reduce the number of instances of WebSphere Liberty that must be maintained. IBM supports this new WebSphere Liberty element in conjunction with the other elements of z/OS that use it. However, this copy of WebSphere Liberty for z/OS is also available for customer use. Such use is not supported and limited to nonproduction purposes on z/OS as outlined in z/OS Licensed Program Specifications.

### Support for open standards

z/OS supports a number of languages to develop software. Language Environment® is the prerequisite runtime environment for applications generated with the following IBM compiler products:

- XL C/C++
- Enterprise COBOL for z/OS
- Enterprise PL/I for z/OS
- IBM REXX™
- Java

Some industry standards and protocols that are supported include, at minimum, full or partial implementations:

- Java
- XML (z/OS XML System Services)
- Unicode
- METAL C facility
- C language standard
- Eclipse
- Web services standards
- SOAP
- IPv4, IPv6
- JIS
  - JIS X 0201, JIS X 0208, and JIS X 0212
- CIM
- EMVCo
- FIPS
- PKCS #11 #12
- PCI DSS
- ISO Common Criteria
- IETF standards
- ANSI standards
- OASIS
- NIST
- REST
- Others

## Delivering Innovations to Build the Next-Generation Infrastructure

Today's economy requires organizations to quickly consume, manipulate, and deliver vast amounts of information, extracting business insight while leveraging the capabilities of cloud services. The information must be securely managed, processed, and delivered across the globe. Such a fundamental shift away from traditional processing needs calls for a highly responsive and reliable platform that can support new workloads without impacting service levels of mission-critical work. The enhancements delivered in z/OS V2.3 provide the infrastructure to smoothly transition businesses for this new IT environment.

## Compatibility

z/OS delivers compatibility and flexibility to run multiple releases of z/OS together on the same system, or within a multisystem Parallel Sysplex. For example, see the following coexistence capabilities:

- z/OS V2.1 coexists with: z/OS V1.13, z/OS V2.1, z/OS V2.2 and z/OS V2.3<sup>1</sup>
- z/OS V2.2 coexists with: z/OS V1.13, z/OS V2.1, z/OS V2.2, z/OS V2.3
- z/OS V2.3 coexists with: z/OS V2.1, z/OS V2.2, z/OS V2.3

## Migration

Migration checks and comprehensive migration manuals (in the base of z/OS) can help simplify migrations. The migration checks help determine whether a z/OS migration action is applicable to your system or if a migration action was completed properly. These checks do not perform any migration actions and are intended to be used along with the information in the z/OS migration book to help you create your own migration plan.

For additional information on z/OS migrations, see:

[ibm.com/systems/z/os/zos/installation/](http://ibm.com/systems/z/os/zos/installation/)

## Support

z/OS V2.3 runs on these IBM Z family servers:

- IBM z14 Models M01-M05 and Model ZR1
- IBM z13
- IBM z13s™ (z13s)
- IBM zEnterprise® EC12 (zEC12)
- IBM zEnterprise BC12 (zBC12)

For a complete description of z/OS V2.3 hardware requirements, see z/OS Planning for Installation (GA32-0890) in IBM Knowledge Center.

## General product availability

z/OS Version 2 Release 3 will be available in September 29, 2017. For additional operating system availability dates, see: [ibm.com/systems/z/os/zos/support/zos\\_eos\\_dates.html](http://ibm.com/systems/z/os/zos/support/zos_eos_dates.html)

z/OS V2.3 features many other functions to allow you to harness the value of your transactional and operational data by strengthening efficiencies and capabilities of batch processing and providing a robust and high-performing I/O infrastructure, including enhancements to file systems and access methods.

Please refer to the following to learn about the components of z/OS V2.3:

[z/OS Knowledge Center](#)

Please also refer to z/OS V2.3

System-Level, Planning for Installation, Learning about z/OS—List of base elements and optional features.



## Why IBM?

As you transform your business by examining your business processes, technology, products and services, IBM remains your trusted business partner. IBM can help you with your transformation to support cloud, analytics and mobile workloads while preserving the needed qualities of service for your existing mission critical workloads.

- IBM can help you drive revenue growth and reduce costs using proven technology solutions.
- Our experts can help you configure, design and implement a z/OS solution optimized for the needs of your business.
- IBM has the business and technical expertise in systems, software, delivery and financing to help you optimize your technology environment to meet the opportunities and challenges of the digital economy.



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