

IBM z/OS Version 2 Release 4

IBM z/OS V2.4 Unleashing Innovation

Highlights

- Exploits the latest z14
 - Supports up to 170 configurable processors
 - Build and deploy new containerized Docker apps on z/OS
 - Enhanced IBM Z data analytics ecosystem
 - User productivity improved with further automation
 - Improved security with pervasive encryption enhancement
-

Enterprises are turning to digital transformation to address new business challenges, reach new markets, and deliver new value to clients. Addressing new business opportunities demands effective digital transformation through the orchestration of technologies ranging from cloud, analytics, cognitive computing, mobile, and the Internet of Things to enable new internal and external client experiences.

IBM's approach to enable this transformation is to liberate the rich application development talent that clients possess by enabling new application development processes and optimizing their existing application investment in new and innovative ways, while providing the application-level resiliency and security that clients have come to expect from IBM Z.

Business success will be predicated on embracing agility, optimization, and resiliency:

- Agility in the adoption of new technologies in DevOps, microservices, and consumption models that are delivered as a service to accelerate their time to value
- Optimization through the ability to run computing workloads in the most efficient environment
- Resiliency to deliver continuity of business services through exploitation of attributes such as encryption and high availability

These factors provide the ability to deliver results on demand and without interruption, which is critical to creating and maintaining a highly satisfying client experience.

With the IBM z/OS V2.4 operating system, IBM unleashes innovation through an agile, optimized, and resilient platform that helps clients build applications and services based on a

highly scalable and secure infrastructure that delivers the performance and availability for on premises or provisioned as-a-service workloads that enable businesses to transform digitally.



IBM z/OS - Innovative, Agile, Optimized, Resilient

IBM z/OS Version 2 Release 4 – Unleashing innovation with an agile, optimized, and resilient platform

IBM's z/OS V2.4 is designed to help IT organizations meet service level requirements while providing an ability to host multiple different workloads concurrently serving diverse needs of multiple users, all with exceptional qualities of service. z/OS offers asset protection and is designed to offer compatibility with applications written years ago while allowing customers to leverage the full suite of capabilities on the latest hardware.

z/OS V2.4 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 reaction to business opportunities.

Companies need technologies that are agile, optimized to their business needs and resilient to allow them to build an IT infrastructure that can respond quickly to change while reducing cost and driving profit. z/OS is designed to help clients keep applications and data available, system resources secure, server utilization high, and programming environments agile while maintaining compatibility for existing applications and running newer Linux on IBM Z Docker containers. With investment protection coupled with leading qualities of service, z/OS provides

solution longevity and is an agile, optimized and resilient foundation for clients to digitally transform their business.

Improving and simplifying application development

IBM z/OS Container Extensions

By leveraging the planned open source componentry, clients will gain access to a wide variety of existing Linux on IBM Z applications with a standard packaging approach that is consistent with the latest technology available. With z/OS Container Extensions (zCX), these can be deployed and co-located within a z/OS address space, enabling significant workload modernization as well as improved and simplified application development.

In addition to open source packages available on Dockerhub, IBM is also announcing a new open source project with the Open Mainframe Project (OMP) centered on curated open source Docker packages for both Linux on z and z/OS. This helps traditional z/OS clients by providing a level of governance around maintenance for open source software. Clients still need to consider service contracts where they feel that is needed. Along with popular open source packages, IBM plans to have third-party software available.

In addition, IBM software such IBM Service Management Unit (SMU), the time-saving user interface for IBM Service Management Suite for z/OS (5698-AAF) and IBM Z Service Automation Suite (5698-SA1), already ship Docker images that are compatible and are able to run on a zIIP processor inside a zCX container.

Although developed on Linux, applications and services in zCX will directly leverage z/OS Qualities of Service (QoS). Workloads in zCX will benefit from high availability and disaster recovery planning with features like IBM HyperSwap, storage replication, and IBM Geographically Dispersed Parallel Sysplex (GDPS) as well as leverage z/OS workload management capabilities for capacity planning and tuning.



IBM z14 Models M01-M05 and IBM z14 Model ZR1

Integrating z/OS into your private and multi-cloud

IBM Cloud Provisioning and Management for z/OS

The z/OSMF Cloud Provisioning Resource Management task is enhanced to provide memory metering and capping functions for a tenant. System programmers can view memory consumed by software service instances that are provisioned by a specific tenant and set a cap for memory consumption.

Clustered composite templates enable you to leverage sysplex capability to provision a continuously available middleware environment. With a single provisioning action, you can provision network-clustered instances of a specific middleware environment in a sysplex.

Enhancements to the Workflow Editor task include:

- The Workflow Editor provides a "toolbox" of IBM-supplied steps, which are designed for performing common tasks on z/OS, such as creating a data set or submitting a REST request. You will be able to quickly learn z/OSMF workflow capability and save time by importing an IBM-supplied step from the shared step library and modifying it, rather than creating your own step.
- The Workflow Editor now supports definition of a variable of an array type. An array type of variable helps reduce the number of variables because a single variable now can have multiple values.
- The workflow definition XML file, fragment files, and the variable input file now allow an option to reside in sequential or partitioned data sets. This allows you to use the Workflow Editor to edit your workflow definition directly from the data sets without moving them to z/OS UNIX file system.

IBM z/OS Cloud Broker

IBM z/OS Cloud Broker is the first offering to open access to z/OS services within the IBM Cloud Private ecosystem for consumption by the broader development community. The z/OS Cloud Broker interacts with IBM Cloud Provisioning and Management for z/OS and:

- Provides direct self-service access to z/OS computing resources by cloud application developers, no special IBM Z skills required
- Creates connectivity from an industry standard K8s container run time to z/OS with an emphasis on simplicity, robustness, and portability
- Allows complete control over resources and z/OS software subsystem instances with z/OS configurable cloud security
- Grants access to service catalogs with customized z/OS services that exploit the multitenancy and rapid elasticity of z/OS provided by IBM Cloud Provisioning and Management for z/OS

Cloud storage access for z/OS

Data is at the heart of every business, and how that data gets stored and managed is critical. Cloud storage makes it possible to store practically limitless amounts of data, simply and cost effectively, and to access it from anywhere in the world using internet protocols.

Transparent cloud tiering utilizes hybrid cloud as a new storage tier. Transparent cloud tiering improves business efficiency and flexibility and is designed to reduce capital and operating expenses with direct data transfer from IBM DS8880 to hybrid cloud storage environments for simplified data archiving operations on IBM Z. Archiving the less frequently used data in the cloud can potentially reduce costs while keeping the information available when needed.

Simplify and modernize the user experience to enhance productivity

z/OSMF and other simplification enhancements

z/OSMF continues to implement browser-based user interface capability. Sysplex management, workflow improvements, and software management are all aimed at reducing complexity. z/OSMF delivers an enhanced sysplex management application which gives a system programmer a detailed view of their sysplex, and now provides the capability to change the configuration, such as eliminating a single point of failure by enabling Coupling Facility structure duplexing or adding an alternate couple data set. Commands are aggregated for sysplex operations in one command log so that two or more colleagues can see what the other has done. The application provides both graphical and table-based views of the data for both viewing and modification.

The z/OSMF configuration process is restructured to provide more flexibility. The new configuration process helps users to configure a minimum z/OSMF setup. Once users are satisfied with the minimum z/OSMF setup, they can choose to configure most z/OSMF functions separately by their own needs.

A new task, Security Configuration Assistant, is introduced to simplify z/OSMF security setup and troubleshooting. z/OSMF Security Configuration Assistant can automatically check if the required security configuration for z/OSMF is satisfied. With graphic interface and functions such as filter, a user can easily check z/OSMF security configuration status at any time.

z/OSMF diagnostic data can be generated with one click. A new task, Diagnostic Assistant, is introduced to enable a user to collect z/OSMF diagnostics with one click from z/OSMF. The workflow engine is improved with support for array variables, parallel step execution, and improved job management. Many of the added features support product installation and upgrade, including the ability to generate a PDF of a workflow.

System Display and Search Facility (SDSF) enhancements

SDSF for z/OS V2.4 continues to add significant new function with 16 tables of new information, 31 new columns on existing displays, and 24 new actions on displays, as well as general usability and functional improvements. These improvements span the ISPF-based user interface, the z/OSMF browser-based user interface, and SDSF REXX support. New tables include: Extended Operator Console, DisplayOMVS options, Link pack directory Coupling (XCF) members and groups, JES subsystems, JES2 resource monitor alerts, Enqueue by data sets, Workload Manager policy information, Workload Manager service classes, Workload Manager report classes, Workload Manager resource groups, Workload Manager workloads, Job memory objects, Job DD names, JES3 Job-class members, and JES2 Checkpoint information.

SDSF has added new general usability enhancements in the area of ISPF view support wherever ISPF browse was previously supported, along with the ability to hide columns on any table, the ability to better control point and shoot field highlighting, and improvements to the z/OSMF browser-based user interface.

IBM Open Data Analytics for z/OS

Open Data Analytics for z/OS has made several improvements:

- For Spark:
 - Support for Workload Manager integration, allowing the ability to differentiate Spark users based on business priority and resource restrictions.
 - Enhanced security with End-User Authentication and Encryption with the ability to authenticate users deploying to Spark as well as ensuring encryption of all data flowing

between connections.

- System programmers can now utilize new z/OSMF workflows to simplify configuration, new configuration checkers, and scheduling support for easier tuning of memory and CPU.
- Spark can now leverage more z/OS infrastructure to allow enhanced auditing and support to associate users with their applications to allow tracking of resource usage as well as leverage started tasks that enable the Spark master and worker to run on z/OS, consistent with running other MVS batch jobs, job steps, or started tasks.
- For Mainframe Data Service (MDS), the following improvements have been released to support usability, performance, and security:
 - MDS now supports real-time SMF data streaming and better performance for accessing IBM Db2 data with enhancements to the IBM Db2 Direct subcomponent in MDS.
 - Security administrators can leverage new security enhancements as well with DRDA Authentication support, and userID encoding support between driver and Data Service server.
- For Anaconda, the following improvements have been made:
 - New Apache Maven support for better build automation.
 - New XGBoost utilizes the implementation of gradient boosted decision trees designed for speed and performance.

Enhanced security and data protection

Pervasive encryption

z/OS V2.4 continues to drive pervasive encryption efforts within an enterprise with support for additional z/OS data set types, including PDSE and sequential basic format and large format SMS-managed data sets, and to provide JES2 encryption of JES-managed data sets on SPOOL. These enhancements give users the ability to encrypt data without application changes and simplify the task of compliance.

Encrypted PDSEs are allocated as an extended format V2 PDSE with all user data and metadata, including PDSE directory and member generations, stored as encrypted. However, program objects cannot reside in encrypted PDSEs. Encrypted PDSEs may be larger due to the 32-byte extended format suffix, which is appended to each physical block.

New support for sequential basic format and large format SMS-managed data sets enables applications using standard BSAM and QSAM APIs to encrypt data with no, or minimal, changes, and applications using EXCP to encrypt data with the use of a new access method encryption

callable service. Encrypted basic and large format data sets have an enhanced physical format, where each physical block has an 8-byte prefix. This is transparent on reads and writes when using BSAM or QSAM to access the data but may affect space calculations.

IBM z/OS V2.4 leverages the IBM z14 capabilities

z/OS V2R4 supports IBM z14 models with capabilities designed to optimize high availability, performance, security, and operational flexibility that can help organizations grow and secure their most critical transaction environments.

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

- Cryptographic capabilities that can be leveraged to as part of a pervasive data encryption strategy
- The IBM zHyperLink Express feature
- Asynchronous Memory Clear using System Assist Processors (SAPs)
- 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.

Enhancing availability, scalability and performance

Dynamic activation of I/O configurations for stand-alone Coupling Facilities

Coupling Facilities (CFs) provide locking, caching, and list services between coupling-capable z/OS processors. They are a significant component of highly available Parallel Sysplex configurations. Stand-alone CFs (Coupling Facility images that reside on a server without a co-resident z/OS image), are now able to participate in dynamic I/O configuration changes that affect the stand-alone CF and no longer require the server to be restarted to activate such changes.

Stand-alone CF servers can now seamlessly make hardware-only dynamic I/O configuration changes on behalf of the CF partitions that reside there without requiring a disruptive reset. This capability both improves client workload availability and minimizes the risks associated with relocation of CF structures. This enhancement requires z14 GA2 firmware support for the stand-alone CF server, and it requires that an IML or POR action be performed on the stand-alone CF server after the z14 GA2 firmware is present to enable subsequent use of this support. This enhancement also requires z14 GA2 enhanced firmware support on the connected server where the driving HCD system resides.

Application transparency for unplanned outages affecting zFS file systems shared in a sysplex environment

A new mount option for zFS file systems allows applications that are running in a sysplex environment and sharing read-write mounted zFS file systems to no longer be affected by unplanned outages. With this new support, unplanned outages are transparent to the application and no longer result in zFS file system I/O errors.

Effective systems management providing businesses proactive IT guidance and support

z/OS platform software installation improvements

With z/OS V2.4 additional capabilities can be incorporated into a software artifact and during deployment to assist with the improved configuration capabilities. To assist with configuration, z/OSMF Software Management automatically provides properties for the datasets and products of a software artifact to any workflows created when the artifact is deployed. In addition, the supplier of that software artifact can add their own user defined customized properties for data sets, products, and specific provided configuration workflows. For instance, if the supplier of a z/OSMF software artifact wants to indicate that a specific data set needs unique customization, such as link list inclusion, a data set property can be indicated. By having both automatic Software Management properties and supplier properties accommodated, an enhanced opportunity for configuration is offered to the client.

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

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 V2.2 coexists with: z/OS V1.13, z/OS V2.1, z/OS V2.2, z/OS V2.3, z/OS V2.4
- z/OS V2.3 coexists with: z/OS V2.1, z/OS V2.2, z/OS V2.3, z/OS V2.4
- z/OS V2.4 coexists with: z/OS V2.2, z/OS V2.3, z/OS V2.4

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/

Support

z/OS V2.4 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 V2.4 hardware requirements, see z/OS Planning for Installation (GA32-0890) in IBM Knowledge Center.

General product availability

z/OS Version 2 Release 4 will be available September 30, 2019. For additional operating system availability dates, see: ibm.com/systems/z/os/zos/support/zos_eos_dates.html

z/OS V2.4 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.

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.

Next steps

→ [IBM z/OS Homepage](#)

→ [z/OS Knowledge Center](#)

For more information

Please refer to the following to learn about the components of z/OS V2.4:

[z/OS Home page](#)

[z/OS Knowledge Center](#)

Please also refer to z/OS V2.4 System-Level, Planning for Installation, Learning about z/OS—List of base elements and optional features.

Additionally, IBM Global Financing provides numerous payment options to help you acquire the technology you need to grow your business. We provide full lifecycle management of IT products and services, from acquisition to disposition. For more information, visit: ibm.com/financing

© Copyright IBM Corporation 2019.

IBM, the IBM logo, and ibm.com are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at <https://www.ibm.com/legal/us/en/copytrade.shtml>, and select third party trademarks that might be referenced in this document is available at https://www.ibm.com/legal/us/en/copytrade.shtml#section_4.

This document contains information pertaining to the following IBM products which are trademarks and/or registered trademarks of IBM Corporation:



Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

UNIX is a registered trademark of The Open Group in the United States and other countries.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.