What’s New in z/OS V3.1

1Q2024 Edition

Table of Contents (3.1 GA Availability Announcement)

(CD) – Base z/OS 3.1 items that were **C**ontinuous **D**elivery on previous release(s)
(CD) – **C**ontinuous **D**elivery items post-z/OS 3.1 General Availability
(SOD) – Statement of Direction
 - Content solution pages

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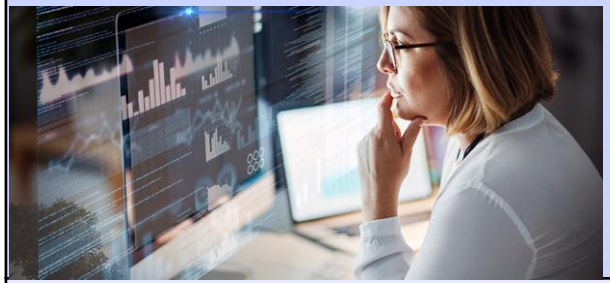
IBM z/OS 3.1: An AI-infused operating system for the next generation of computing

IBM z/OS 3.1 marks a new era in operating system intelligence. The new version of z/OS infuses AI throughout the system, enabling intelligent systems administration guidance and automation that learns and improves. With z/OS 3.1 as the foundation of a hybrid cloud strategy, enterprises can deploy and co-locate Linux-based applications together with existing core business workloads and enjoy the unique value propositions of both environments.

3.1 Overview		
		
AI Infusion	Application Modernization & Simplification	Cyber Resiliency
Scale the value of data and drive digital transformation powered by AI and intelligent automation	Build new and modernize existing applications while optimizing and simplifying technology infrastructure	Protect and thrive with unparalleled security and resilience capabilities with quantum-safe technologies

Release notes: First reversion in 10 years, updated license requirements, no price adjustment for base

IBM z/OS 3.1 – AI-Infused OS

Scale the value of data and drive digital transformation powered by AI and intelligent automation

- Continues support for HW-accelerated AI that allows clients to apply AI and machine learning to their most valuable enterprise data on IBM Z.
- AI capabilities have demonstrated strong opportunities to simplify and automate tasks, so we are building it into z/OS!
- AI Framework for IBM z/OS, intended to augment z/OS with intelligence that optimizes IT processes, simplifies management, improves performance, and reduces skill requirements.
- AI-Powered WLM, designed to intelligently predict upcoming batch workload and react accordingly for optimized system resources is the first to leverage the AI System Services.

z/OS 3.1 Release Overview - Release Highlights

Segment	Description
AI Platforms & Operations	Scale the value of data and drive digital transformation powered by AI and intelligent automation, including support for a new AI Framework for system operations, and a certified Ansible collection for automation.
Application Modernization	Build new and modernize existing applications and workloads with a flexible hybrid cloud strategy based on modern APIs and DevOps platforms, including continued enhancements to z/OS Container Extensions (zCX).
OS Management Simplification	Manage and optimize technology infrastructure with industry-popular interfaces for system programmers of all experience levels, with help from new features like IBM z/OS Change Tracker to comprehensively track, manage, and control changes to software libraries.
Security & Resiliency	Protect and thrive with exceptional security and resilience capabilities, including a new Authorized Code Monitor to guard against potential vulnerabilities, expanded System Recovery Boost solutions, and new interfaces for runtime diagnostics and resource monitoring.
Data Serving & Storage	Create a resilient, modern infrastructure that integrates mainframe data, operations, and applications with hybrid cloud environments, allowing new and existing data alike to be accessed through NoSQL APIs or stored to the cloud with standard object storage interfaces.

z/OS 3.1 Release Overview – z/OS support summary

Release	z10 EC z10 BC WdfM	z196 Z114 WdfM	zEC12 zBC12 WdfM	z13 Z13s WdfM	z14 ZR1 WdfM	z15	z16	End of Service	Extended Defect Support
z/OS V2.2	X	X	X	X	X	X	X	9/20	9/23[2]
z/OS V2.3			X	X	X	X	X	9/22	9/25[2]
z/OS V2.4			X	X	X	X	X	9/24[1]	9/27[2]
z/OS V2.5				X	X	X	X	9/26[1]	9/29[2]
z/OS 3.1					X	X	X	9/28[1]	9/31[2]

Notes:

[1] - All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

[2] - Extended support dates are projected and are subject to change or withdrawal without notice.

WdfM - Server has been withdrawn from Marketing

Legend

Defect support provided with IBM Software Support Services for z/OS
Generally supported

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Z Hardware Support

IBM **z16 (3931) Model A01** Functions & Features

One hardware model, Five Features, 1-4 19” Frame System
Up to 85 user partitions, 32 TB per partition, 200 CPUs/zIIPs/IFLs per partition, up to 224 Pus **-Up to 16 TB per z/OS LPAR with z/OS V2.5**
•2 CP chips on a Dual Chip Module (DCM), 5.4 GHz **•L1 Private 128K i & 128K d** **•L2 n/a** **•L3 Shared 32 MB / core, 192 MB effective shared** **•L4 n/a**
256 GB HSA, 40 TB maximum, 10 TB per drawer
Channel Subsystem scalability **•Up to six (6) Channel Sub Systems (CSSs)** **•4 Subchannel Sets per CSS**
HiperDispatch Enhancements
IBM Z Integrated Accelerator for AI
Hardware Instrumentation Services (CPUMF)
New machine instructions
Crypto Express8S
OSA Express7S 1.2

(z/OS support in blue)

IBM System Recovery Boost
Coupling Express2 LR 10Gb (CX6-DX) PCIe adapter
CF Level 25 **•Retry buffers for cache and lock commands** **•Cache residency time metrics** **•Scalability improvements** **•Request latency/performance improvements**
ICA-SR 1.1 **Max ICA SR per CEC 48 adapters/96ports (same as z15)**
Max ICP CHPIDs per CEC – 64
10 GbE and 25 GbE RoCE Express 3 SR and LR (CX6-DX)
FICON Express 32S
zHyperLink® Express1.1 **• Maximum 16 Adapters /32 ports**
IBM Flexible Capacity for Cyber Resilience
z/OS Validated Boot

IBM **z16 (3932) Model A02** Functions & Features

One hardware model, Single frame configuration, 1 19” Frame, or rack mount for client-supported racks
Up to 40 user partitions, 68 client-configurable cores distributed across 2 processor drawer. 80 PUs maximum. • Up to 16 TB per z/OS LPAR with z/OS V2.5
•2 CP chips on a Dual Chip Module (DCM), 4.6 GHz •L1 Private 128K instruction & 128K data •L2 Shared 32 MB / core, 192 MB effective shared •L3 and L4 Virtual.
160 GB HSA, 16 TB maximum, 8 TB per drawer
3 Logical CSS each, with 3 Subchannel Sets
HiperDispatch Enhancements
IBM Z Integrated Accelerator for AI
Hardware Instrumentation Services (CPUMF)
New machine instructions
Crypto Express8S
OSA Express7S 1.2

IBM System Recovery Boost
Coupling Express2 LR 10Gb (CX6-DX) PCIe adapter
CF Level 25 •Retry buffers for cache and lock commands •Cache residency time metrics •Scalability Improvements •Request latency/performance improvements
ICA-SR 1.1 Max ICA SR per CEC 24 adapters/48 ports
Max ICP CHPIDs per CEC – 64
10 GbE and 25 GbE RoCE Express 3 SR and LR (CX6-DX)
FICON Express 32S
zHyperLink® Express1.1 • Maximum 16 Adapters /32 ports
IBM Flexible Capacity for Cyber Resilience
z/OS Validated Boot

(z/OS support in blue)

Z Hardware Support

IBM z16 highlights (CD)

- Up to 16 TB of memory per z/OS instance, used by select middleware
- 20 new instructions to help improve COBOL and AI applications, including instructions to leverage the new AI accelerator
- A new level of coupling facility support, CFLEVEL 25, which provides Coupling and Parallel Sysplex enhancements
- IBM Z Integrated Accelerator for AI is designed to provide machine learning acceleration with high throughput and low latency
  - IBM Deep Learning Compiler (DLC) enables deep learning models to be deployed on IBM Z, exploiting the IBM Integrated Accelerator for AI.
  - IBM Z Deep Neural Network library (zDNN) is a software library that provides high-level C APIs, which enable simplified exploitation of the IBM Z Integrated Accelerator for AI by AI frameworks and libraries.

Enhanced zIIP Eligibility (CD)

- The zIIP eligibility list is extended to include Python-based applications
  - This change will assist clients, especially those working in Python for AI, to continue scaling up smoothly
  - Up to 70% of Python execution can be zIIP-eligible
- IBM z16 servers can now be configured with more zIIPs (removing the 2:1 max ratio of zIIPs to CPs).
  - This change allows clients to scale up the workloads on zIIPs with z/OS Container Extensions, including with IBM Foundation for Red Hat OpenShift (IBM PID 5655-ZCX/ZCY), and other zIIP-exploiting workloads.

Z Hardware Support

ICSF HW Support Enhancements (CD)

- Full Support for IBM z16
  - Support for new Crypto Express 8 Coprocessor
  - New Quantum Safe Algorithms, CRYSTALS-Dilithium 8,7 and CRYSTALS-Kyber
- New TR-31 Export/Import options in support of updated Visa Payment Network requirements
- Enhancements to TR-34 services to support a large Certificate Revocation List (CRL) and allow controlled use of expired certificates.
- Support for IBM z16 GA 1.5
  - Support for operational ANSI X9.143 Key Blocks as a supplement to traditional CCA key tokens.
  - DES, AES, and HMAC key types.
  - KDS support for key blocks on HCR77D2 only, w/ KDSRL format CKDS
  - Services that use these key types will be updated to accept CCA key tokens OR ANSI X9.143 Key Blocks

z/OS Validated Boot (CD)

- Validated Boot (IPL) of z/OS systems, using digital signatures to provide an IPL-time check that the z/OS system, including z/OS nucleus and LPA load module executables, is intact, untampered with, and originates from a trusted source from the time at which it was built and signed.
- This enables the detection of subsequent unauthorized changes to those software executables, whether those changes be accidental or malicious in nature.
- Designed to meet standards such as the National Information Assurance Program (NIAP) Protection Profiles 4.3.
- Custom Offerings Driver support for z16 and support for optionally verifying incoming SW packages

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z/OS 3.1 Release Overview

Usability and Skills
z/OSMF File compare utility, upload/download, Security Configuration assistant, Sysplex Mgmt and CFRM Policy Editor (CF structure sizing), Release Upgrade, ServerPac improvements, z/OSMF remote sysplex, Parmlib Syntax REST APIs…

Application Development
Artificial Intelligence, z/OS Container Extensions, Red Hat OpenShift, z/OS Container Platform, JSON Parser improvements, ISPF member generations, ABO, Java 11, Node.js, Python, Go, Enhanced zIIP usage

Enhancing Security
RACF DB encryption, RACF custom fields, ICSF/Crypto, zACS monitor, compliance support, GIMZIP code package signing/validation, z/OS Validated Boot, CCA 8.2 updates…

Scalability & Performance
Greater than 4TB memory, Dedicated Memory Pools, RMF UI improvements, CF performance and scalability, RMF reporting enhancements…

Data Serving & Storage
Cloud Data Access, EzNoSQL APIs, DFSMSrmm z/OSMF plug-in, simplified Catalog recovery & management, DFSMShsm & SMS enhancements, NFS Server enhancements, Union File System, Data Set File System…

Availability
Anomaly Mitigation, PFA and RTD improvements, System Recovery Boost, XCF Notepad resiliency…

Systems Management
AI infused z/OS, JES2 expanded policy support, Change Tracker, z/OS System Provisioning Service, z/OS Management Services Catalog, zWIC, SDSF new displays…

Networking
zERT, RDMA over ROCE 3, SyslogD, FTP security, zERT reporting…

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Application Development Resources

AI on z/OS – New materials to help jump start your AI adoption journey

- Journey to AI on IBM Z and LinuxONE content solution
  - Guidance on identifying use cases, available solutions, recent developments and more.
  - https://www.ibm.com/support/z-content-solutions/journey-to-ai-on-z/
- AI on IBM Z and LinuxONE community
  - Read recent blogs and announcements
  - Engage with subject matter experts on the latest topics around AI on IBM Z
  - https://ibm.biz/BdPBud
- Client Engineering Workshops
  - Learn about analytics and AI technologies and solutions on IBM Z and where you are in your AI Journey
  - Each workshop is tailored to fit your needs
  - Contact ce4s@ibm.com or your local IBM Client Engineering team to find out more
  - https://ibm.biz/aionz-workshop
- AI on IBM Z and LinuxONE Getting Started pages:
  - Learn about the ecosystem and landscape for exploiting AI on IBM Z and LinuxONE systems.
  - https://ibm.github.io/ai-on-z-101/

Application Development- Ecosystem

Optimize libraries and compilers to leverage Integrated Accelerator for AI

- zDNN is a high-level language interface for the Integrated Accelerator for AI, packaged with z/OS
- IBM Snap ML now installable in Linux environments using PyPI (pip install)
  - Developed by IBM, a library for training and scoring traditional ML models.
  - Exploits the AI accelerator for inferencing of tree-based models. This includes random forest and boosted tree model types.
- TensorFlow and the IBM Z Deep Learning Compiler (DLC) are available as pre-built images in the IBM Z and LinuxONE Container Registry. Both enable use of the IBM z16 Integrated Accelerator for AI.

For more details on exploiting AI frameworks on IBM Z, see: https://ibm.github.io/ai-on-z-101/

IBM Z Platform for Apache Spark 1.1 [5698-SPK]

- Apache Spark 3.2 available on z/OS
- In-memory compute engine and analytics runtime, supports big data popular languages Java, Scala, Python and R
- Foundational capabilities for leveraging lightning-fast data processing on large volumes of z/OS data.

IBM Z Content Solutions | Journey to open data analytics

Application Development- Ecosystem

Python AI Toolkit for IBM z/OS 1.1 [5698-PAL]

- Industry leading AI Python packages available on z/OS
- Unlocks verified open-source software with supply chain security
- Familiar, flexible, and agile package installation process leveraging PyPI


IBM Z Content Solutions | Journey to open data analytics

AI Toolkit for IBM Z and LinuxONE [Available on Passport Advantage]

- Popular used open-source AI frameworks with IBM Elite Support, fully adapted for IBM Z and LInuxONE
  - Includes IBM Z Accelerated for TensorFlow and IBM Snap ML, IBM Z Deep Learning Compiler, IBM Z Accelerated Serving for TensorFlow and IBM Z Accelerated for NVIDIA Triton Inference Server


IBM Z Content Solutions | Journey to open data analytics

Application Development- Strategic Offerings

IBM (Watson) Machine Learning for z/OS 3.1 (MLz Enterprise) 3.1 [5698-WME]

- Real-time analytics at the source with machine learning and deep learning models without impacting SLAs.
- Supporting build anywhere and deploy on Z strategy: easily import, optimize and deploy Open Neural Network Exchange (ONNX) deep learning models to z/OS natively
  - Leverages the IBM Deep Learning Compiler
  - In-transaction scoring for native CICS, IMS & Batch COBOL applications with near-zero latency
  - Telum on-chip AI Accelerator exploitation for AI inferencing at scale
  - IMS and batch Cobol native scoring capability

(Watson) Machine Learning for z/OS Core edition (MLz Core) 3.1, [5698-WMC]

- A lightweight version of Machine Learning for z/OS providing the essential services that are REST-API-based for machine learning operations including online scoring capabilities on IBM Z
- Supports full lifecycle management of models
- Provides developer-friendly APIs for applications on IBM Z
- Primarily aiming for AIOps use cases through AI solutions offered by IBM or IBM partners.
- Runs on IBM z/OS and leverages proven IBM machine learning capabilities on IBM Z, including IBM Z platform for Apache Spark serves as the data processing cluster for WML for z/OS and delivers advanced data analytics through z/OS Spark (Spark).

Application Development

z/OS Container Extensions – Run Linux Containerized workloads on z/OS!

- z/OS Container Extensions provides a virtual appliance for running Linux on Z workloads on z/OS
- The **same binary** container images that run on Linux on Z under z/VM or zKVM will run in zCX
  - No porting is typically required from Linux on Z
- The open mainframe project Ambitus provides an ecosystem for zCX

- Scalable to: (CD)
  - Up to 64 servers per z/OS image
  - Up to 1 TB of guest memory per server
  - Up to 245 virtual devices per server
    - Disk devices up to 1TB each
  - Up to 1000 containers per server
  - zIIP eligibility - 98%+ ziip offload in lab measurements*

- A self-service trial is available to all z/OS customers, after 90 days purchase Container Hosting Foundation product to continue using zCX

For more information, see the zCX content solution (https://www.ibm.com/support/z-content-solutions/container-extensions/).

Application Development

zCX Currency and LDAP Function (CD)

- zCX large UID and GID range support.
- zCX Linux kernel is updated to use 5.4.0-81-generic.
- zCX Docker update and latest container runtime packages
- zCX Linux kernel updates **(CD 4Q23 – OA65546, OA65547, OA65548)**

zCX Workflow Recovery (CD)

- zCX support to back out disk allocation failures

zCX NFS persistent storage (CD)

- Securely store and access stateful data using z/OS NFS server

Application Development

IBM zCX Foundation for Red Hat OpenShift -[5655-ZCX]

- Bringing Red Hat OpenShift Benefits to z/OS
- Key value
  - IBM zCX Foundation for Red Hat OpenShift that provides enterprise-level container orchestration and management capabilities around containerized software.
  - Clients can extend and modernize their native z/OS ecosystem through an agile and flexible deployment of Linux on Z applications in a self-contained Red Hat OpenShift cluster on z/OS while exploiting z/OS Quality of Service.
  - Enables Red Hat OpenShift applications to run on z/OS.
- Key information
  - Entitlement to Red Hat OpenShift is included in the purchase of IBM zCX Foundation for Red Hat OpenShift via ShopZ
  - The license for Red Hat OpenShift on z/OS (via zCX) is non-transferable between zCX and Linux on Z
  - Committed Term License options (1,3, and 5 years)
  - Price is based on zIIPs (not IFLs, as zCX and zCX for OpenShift do not run on IFLs)
  - Priced per core (this is comparable to OpenShift on Linux on Z)

Products like IBM Security and Compliance Center, IBM WebSphere Hybrid Edition, etc. will pre-req this new product.

Application Development

zCX for OpenShift shared persistent storage support (CD)

- IBM Storage Fusion (Spectrum Fusion), provides highly scalable, resilient, enterprise-grade, persistent data storage options leveraging Red Hat OpenShift Data Foundation (ODF).
- Clients that are licensed to deploy and use IBM Storage Fusion (5900-AOY) today can enjoy the benefits of enterprise-grade data storage and protection services on IBM zCX for OpenShift running on z/OS.

zCX Support for WebSphere Hybrid Edition (CD)

- IBM zCX for Red Hat OpenShift can now support WebSphere Hybrid Edition co-located with z/OS

Single Node OpenShift (SNO) supported **(CD 4Q23 (2.4) - OA65756)**

- Only 2 SMT-2 enabled zIIPs required!
- Great for testing or PoC of running application on OpenShift on z/OS without a huge investment
- Not suitable for most production workloads
- Available with RH OCP 4.14.0 and higher

Multi-architecture support **(CD 4Q23 (2.4) - OA65756)**

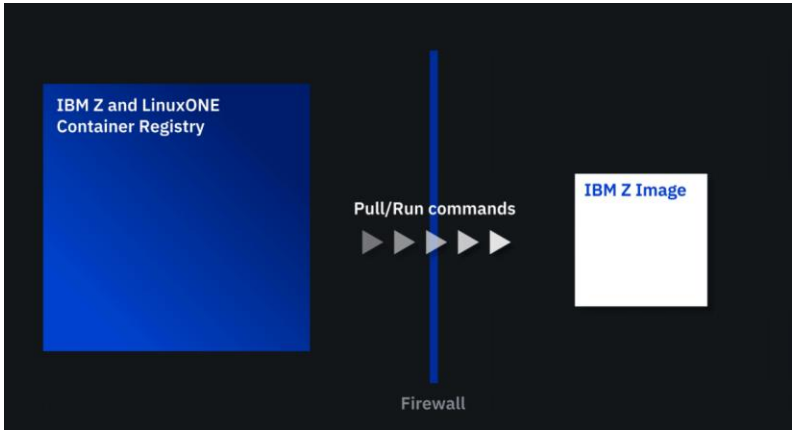
- Allows for the control plane machines (control nodes) can operate on x86 architecture while the compute plane machines (compute nodes) utilize zCX (s390x architecture)
- Allows the facilitation of workloads running on z/OS with both HA and co-location advantages without the need for a separate s390x RH OCP cluster installation
- Available with OCP 4.14.0 and above

IBM Z and LinuxONE container registry

IBM Z® and LinuxONE Container Registry contains an ever-growing collection of common open-source images that are used to create new workloads. Providing a trustworthy channel that enables IBM zSystems clients running z/OS®, Linux®, and LinuxONE to fully participate in the open-source ecosystem

Benefits of the IBM Z and LinuxONE Container Registry

- Images are built from source - no un-intended binary payloads
- Images are scanned for known vulnerabilities with reports provided
- Hashes for each image are published for reference and secure image pulls
- Free of charge



Click the icon and get started today!

https://ibm.biz/BdfAdW

Application Development

z/OS Container Platform (zOSCP) [5655-MC3]

- Application Modernization and Co-location
  - Run containerized z/OS UNIX applications on z/OS to modernize existing workloads and build new applications
- Industry-standard cloud technologies
  - Based on industry-standard open-source technologies such as an OCI container runtime, Kubernetes container orchestration and more
- Container images
  - IBM-provided “base” images to utilize for building your own container images on the IBM Container Registry

- A new unpriced program product, available to all z/OS licensees, with optional Service & Support available since March 15, 2024 on z/OS 2.5 or z/OS 3.1.

-  Content Solution website (https://www.ibm.com/products/zos-container-platform) has everything needed to get started!

Latest Compiler Offerings on z/OS

IBM Enterprise COBOL for z/OS 6.4

IBM Automatic Binary Optimizer 2.2

IBM Enterprise PL/I for z/OS 6.1

z/OS 3.1 XL C/C++
(entitled also to IBM Open XL C/C++ 1.1)

IBM Semeru Runtime Certified Edition for z/OS 11 **& 17**

IBM Open Enterprise SDK for Node.js – z/OS v18 & 20

IBM Open Enterprise SDK for Python v3.12

IBM Open Enterprise SDK for Go v1.21

Application Development

z/OS 3.1 and Java

- z/OS 3.1 supports Semeru 11 as the minimum required Java level for z/OS itself(*1)
    - Java 8 support for application compatibility
- IBM Semeru Runtime Certified Edition for z/OS, Version 17 anticipated to be required in the lifecycle of z/OS 3.1 in the future
    - Semeru 11 has announced End of Service for November 30, 2024.

Java service stream updates

- See features blog for latest service release levels
- Java on z/OS security providers are available for download (link)
- Installing Semeru 11 via Installation Manager now available (link)

Ecosystem support of Semeru 11 on z/OS – Liberty, CICS, IMS, Db2, MQ, etc (link)

Celebrating 25 Years of Innovation: Java on z/OS – see more details here

*1 Java 8 is still required for Capacity Provisioning Manager, XML System Services, Infoprint Server, HCM (Java 11 support with **CD 4Q23 - IO28559**)

Application Development

ISPF Enhancements

- ISPF support for PDSE V2 member generations
  - Support specification of generation numbers in the Edit and View panels and primary commands BROWSE, EDIT, and VIEW.
  - A “generation list” can be viewed for members with generations, allowing the use of line commands to access commonly-used functions for desired generations.
  - Select ISPF services are also enhanced with additional member generations information.
- ISPF Allocate New Data Set and Define Cluster panels add ‘dataset key label’ in support of pervasive encryption.
- z/OS UNIX Directory List Utility now supports case-insensitive sort option
- The settings from the ”Edit Color Settings” panel are available programmatically through ISPF variables. (CD)

Z Shell (Zsh) on z/OS

- A ported version of Zsh v5.8.1 for z/OS 3.1.
- A unix shell that includes command line editing, spelling correction, programmable command completion, shell functions (with autoloading), a history mechanism and more…

Application Development

z/OS UNIX Utility Enhancements

- **su** auditing capability by issuing SYSLOGD message (CD)
- **date** utility support for Julian date conversion (CD)
- **find** utility enhancement to print filenames with a null character. (CD)
  - Allows file names that contain newlines or other white space to be correctly interpreted by programs that process the find output.
- Address column collapsing in **ps** command output (CD)
- grep –r/-R to search directories recursively
- New utilities **readlink** and **banner**

z/OS UNIX Callable Service for RACF Identity Tokens **(CD 1Q24 (2.4) – OA64356, PH55271)**

- New __authenticate() syscall to allow applications to authenticate using User ID, Password or Passphrase, or a signed or unsigned Identity Token against the security database. This service addresses the needs of new authentication methods being adopted by the industry.

zlib encryption Enhancement

- Support for **CRC-32** - a practical algorithm commonly used in digital networks and storage devices to detect accidental changes to digital data. Optimization for z hardware using SIMD instructions. **(CD)**
- New thread-safe method to set compression implementation for multi-thread scenarios **(CD 1Q24 (2.5) – OA65661)**

New C runtime APIs and header constants

- New APIs and constants to facilitate the porting of UNIX/Linux programs to z/OS.

Application Development

JSON Parser Improvements (CD)

- JSON Parser comment support
  - Toleration support for single-line and multi-line comments as defined by JSON5
  - The parser will Successfully parse commented JSON text, but the application will not be able to retrieve or Modify any comments that may have been encountered in the JSON text
- CPU and elapsed time associated with the parsing of JSON content is reduced by up to 50%[1]

[1] Disclaimer: This reduction is based on internal measurements done on an IBM z15 using a z/OS V2.5 LPAR with 8 CPs. The z/OS JSON Parser was used to parse a 568 MB JSON input file containing public property tax records and geospatial data. The input file included 7,875,189 numbers, 3,038,859 arrays, 2,217,825 strings, 54,336 nulls, no booleans, and no comments. The maximum nesting depth of any member or element was 7 levels. Reported results were derived from measurements that tested 100 parses of the input file back to back. Results may vary.

z/OS Client Web Enablement toolkit HTTP/HTTPS Enabler connection timeout **(CD 4Q23 (2.5) - OA65298)**

- HWTHSET services supports connection timeout option in milliseconds
- Allows user to limit how long a TCP connection request will wait before timing out

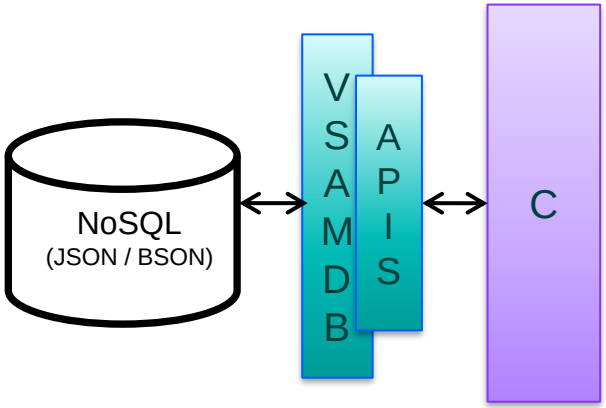
OpenSSH 8.4p1

- Support for FIDO/FIDO2 based keys, and currency

XML Toolkit V1.11

- The XML Toolkit V1.11 is now included in z/OS. The Xerxes and Xalan XML parsers can now be used within the z/OS Operating system.

Application Development (Data Serving and Storage)



EzNoSQL APIs (CD)

- NoSQL for z/OS provides a key:value document store on z/OS and allows applications the ability to store open standard BSON/JSON (UTF-8) objects.
- EzNoSQL provides a set of modern APIs, with a C-based, key-value interface, to simplify the application effort needed to access NoSQL VSAMDB data sets on z/OS in real-time, at scale, and with consistency.
  - C-based key-value interface to a NoSQL database enables higher level languages and interfaces such as JAVA
- New support to scan NoSQL documents sequentially using a new ordered index parameter **(CD 1Q24 (2.5) – OA64954)**

Content Solution website (https://www.ibm.com/support/z-content-solutions/eznosql) has everything needed to get started!

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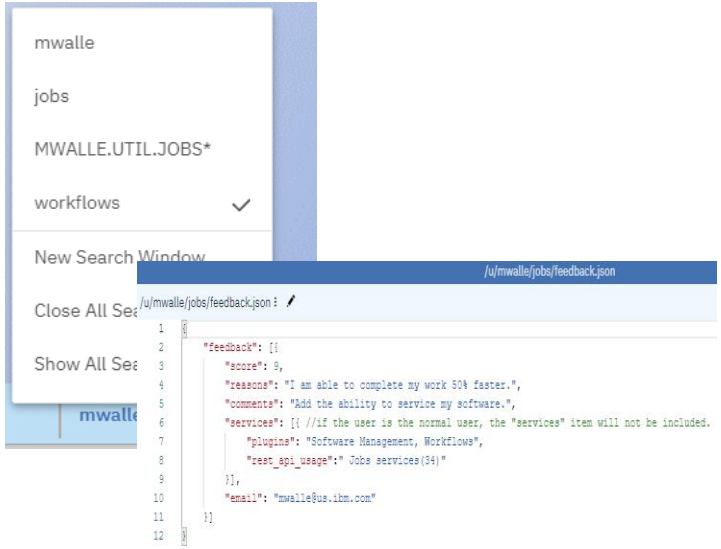
Usability & Skills

z/OSMF Desktop Productivity Enhancements

- Ability to perform data set and z/OS UNIX actions on a remote system, such as: search, view jobs, compare
- Syntax highlighting for python programming language.

(CD 1Q24 (3.1) - PH56708)

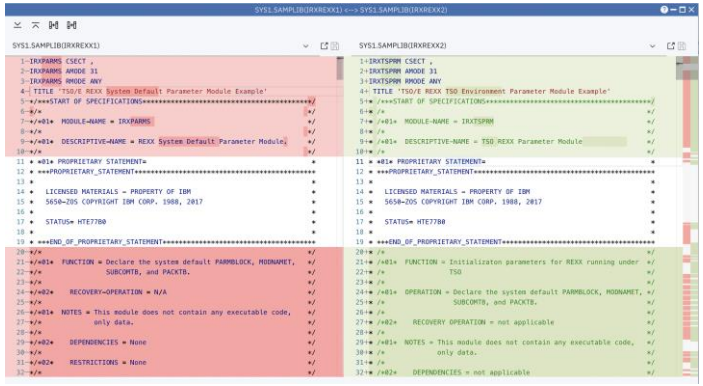


- Open a new data set and file search window from the search icon. Multiple search windows are supported.
- Syntax highlighting for JSON and YAML files.
- Save z/OS UNIX file with user-specified code page, from desktop editor.

(CD 2Q23 (2.5) – PH47653)

z/OSMF Data Set and File Compare (CD)

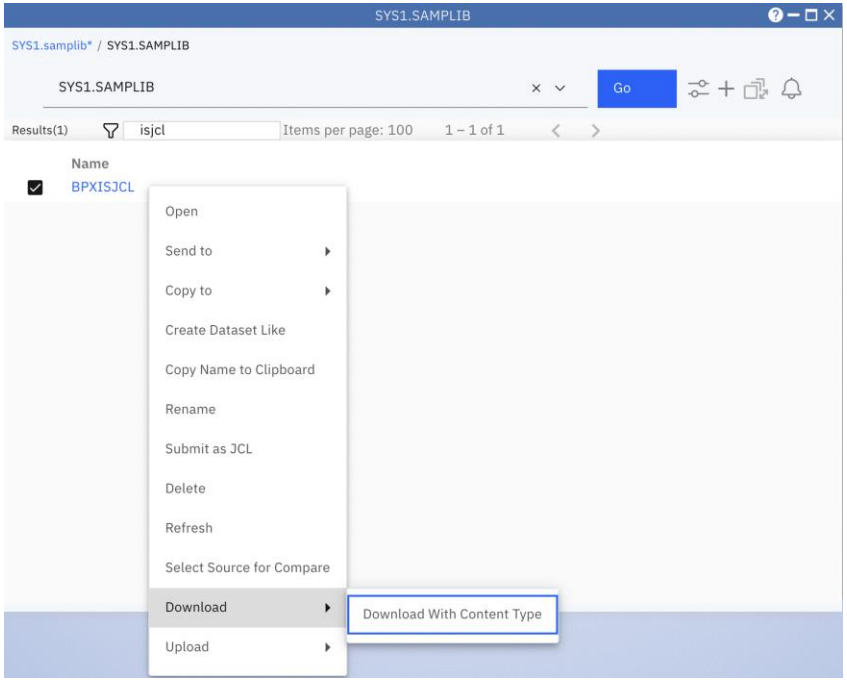
- Enhanced desktop editor to compare two files and visualize the differences.

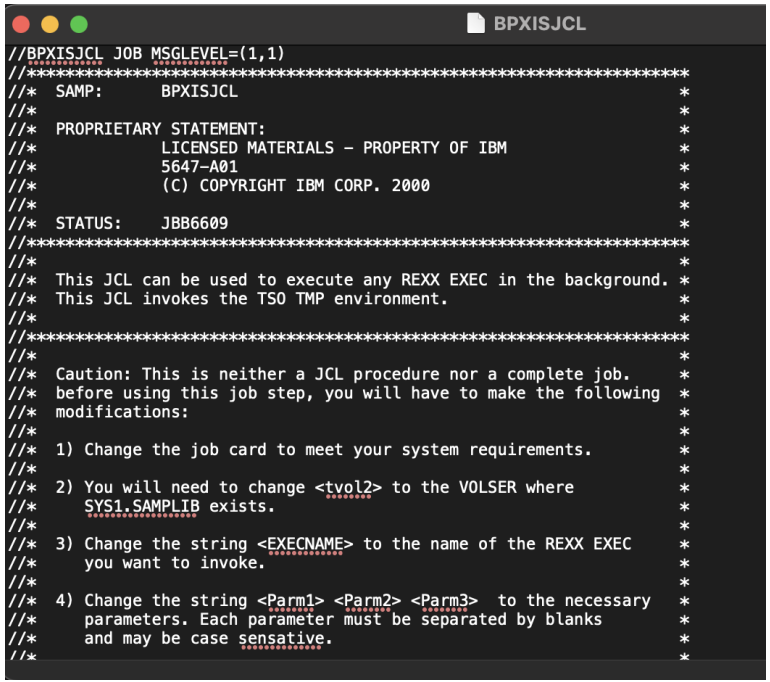


Usability & Skills

z/OSMF Upload & Download files on Desktop (CD)

- Users can upload or download a sequential data set, PDS(E) member, or zFS file between z/OS and their workstation with a few clicks or drag and drop





Usability & Skills

z/OSMF Parmlib Syntax Validation REST APIs **(CD 1Q24 (3.1) – PH56207, PH56233)**

- New REST API to help simplify the management of parmlib by driving automatic and consistent syntax validation of many z/OS parmlib members.
- The new z/OSMF Parmlib Management plugin is a common parser that is able to understand the syntax format description of parmlib members, no matter how different the syntax format is
  - An end user can validate the syntax of most z/OS parmlib member types (38 different types in first release) with a single REST API without needing to understand the syntax format

Example1: Validate SYS1.PARMLIB.POK(BPXPRMA4)
Request URL: PUT https://zosmfHost/zosmf/parmlib/v1/BPXPRM/validate? member=BPXPRMA4&dataset=SYS1.PARMLIB.POK
Response:

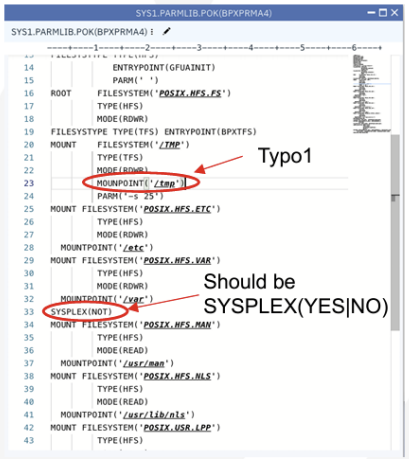
Case 1: validation is success

Validation result


```
{
  "result": "success",
  "numberOfMembers": 1,
  "numberOfFailedMembers": 0,
  "parmlibDatasets": [
    {
      "dataset": "SYS1.PARMLIB.POK"
    }
  ],
  "details": {
    "member": "BPXPRMA4",
    "dataset": "SYS1.PARMLIB.POK",
    "validationResult": "success"
  }
}
```


Case 2: validation is failed

Content of BPXPRMA4



Validation result


```
{
  "result": "failed",
  "numberOfMembers": 1,
  "numberOfFailedMembers": 1,
  "parmlibDatasets": [
    {
      "dataset": "SYS1.PARMLIB.POK"
    }
  ],
  "details": {
    "member": "BPXPRMA4",
    "dataset": "SYS1.PARMLIB.POK",
    "validationResult": "failed",
    "numOfFailure": 2,
    "failures": [
      {
        "index": 1,
        "location": {
          "line": 23,
          "position": 10
        },
        "currentField": "MOUNTPOINT",
        "expectedFields": [
          "AUTOMOVE",
          "MKDIR",
          "MOUNTPOINT",
          "NOAUTOMOVE",
          "NOSECURITY",
          "NOSETUID",
          "PARM",
          "SECURITY",
          "SETUID",
          "SYSNAME",
          "TAG",
          "UNMOUNT"
        ],
        "afterField": "RDWR)",
        "input": "  MOUNT    FILESYSTEM('/TMP')\n           TYPE(TFS)\n           MODE(RDWR)\n           MOUNTPOINT('/tmp')\n           PARM('-s 25')",
        "message": "SYNTAX ERROR 1 START AT LINE 23, POSITION 10 :\nCURRENT FIELD : MOUNTPOINT\n  EXPECT ONE OF THE FOLLOWINGS AFTER RDWR):\n    [AUTOMOVE, MKDIR,
      },
      {
        "index": 2,
        "location": {
          "line": 33,
          "position": 9
        },
        "currentField": "NOT",
        "expectedField": [
          "NO",
          "YES"
        ],
        "afterField": "SYSPLEX(",
        "input": "SYSPLEX(NOT)",
        "message": "SYNTAX ERROR 2 START AT LINE 33, POSITION 9 :\nCURRENT FIELD : NOT\n  EXPECT ONE OF THE FOLLOWINGS AFTER SYSPLEX(:\n    [NO, YES]\n"
      }
    ]
  }
}
```


Position of the error (line and colume)

The field we found error

What are the expected fields

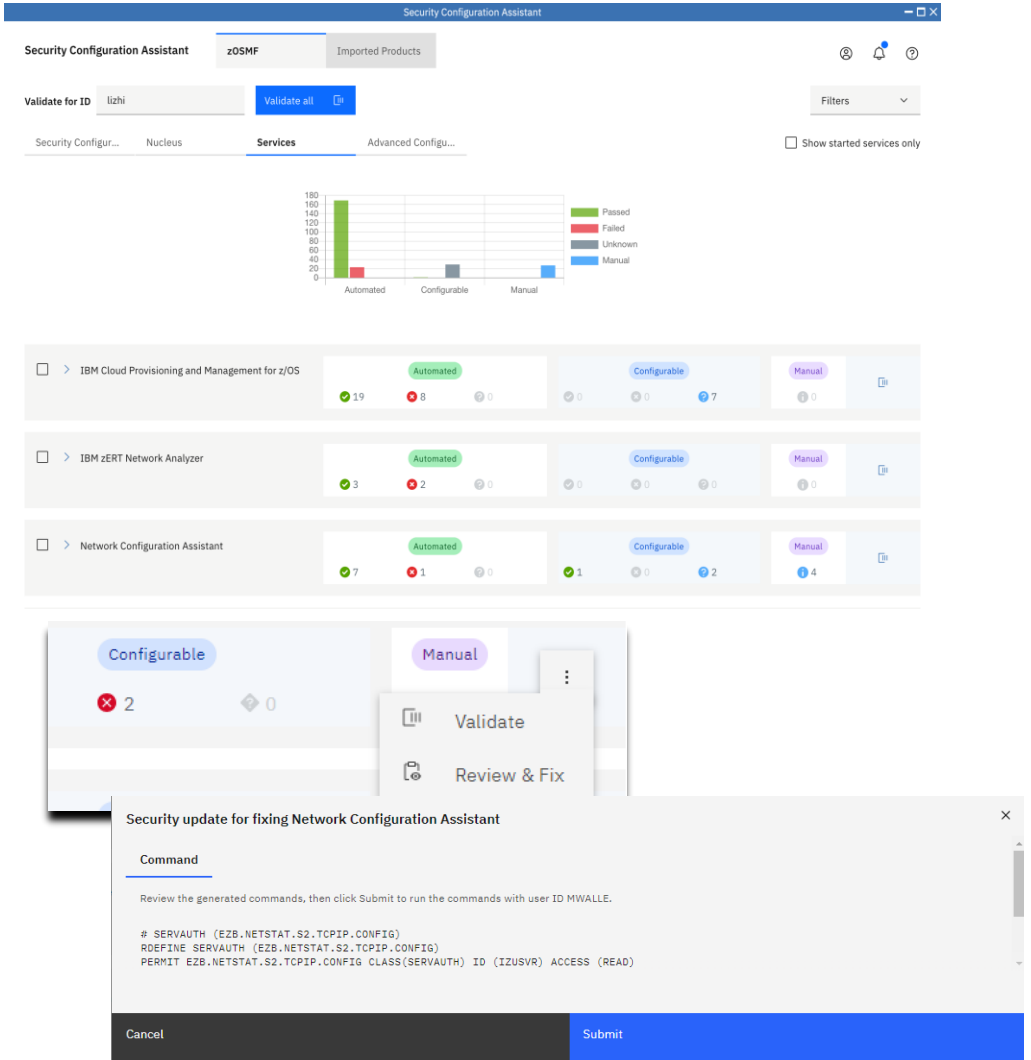
The original input where we found the error

How we report invalid value if there are fixed options

Usability & Skills

Security Configuration Assistant (SCA)

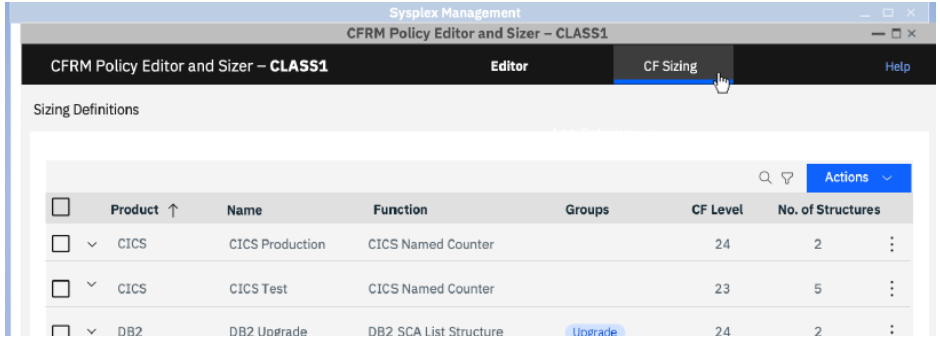
- A z/OSMF application to help system programmers to configure z/OS security
  - Support for variable substitution, user groups, external applications
    - SDSF, DFSMSdss, DFSMShsm, etc.
- **Validation** REST API (CD)
  - Allows applications to verify proper security configuration before execution
- Support to create or optionally **fix** security configuration (CD)
  - Allows authorized personnel to add or change security rules
- **Line mode** SCA support for use before z/OSMF starts (CD)
  - SCA can be used to setup z/OSMF security

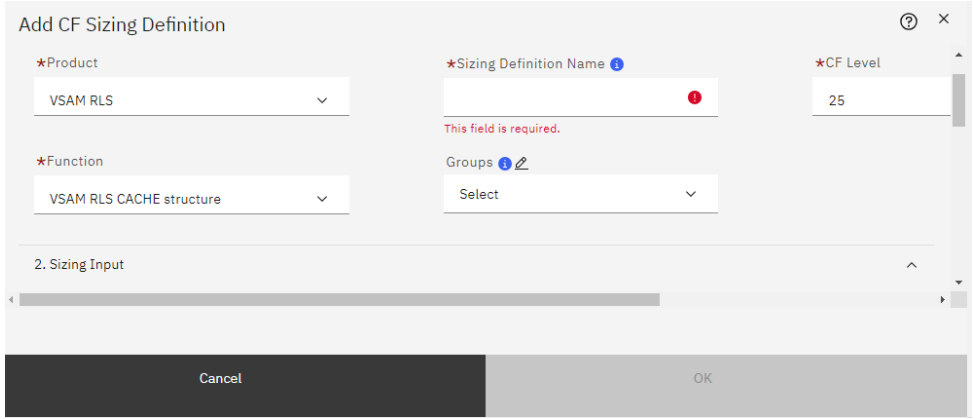


Usability & Skills

z/OSMF Sysplex Management Plugin

- **View** Sysplex configuration
  - Table and graphical views
- **Modify** Sysplex configuration
  - Sysplex-wide commands and results display
  - Command Log retained across IPL
  - Allows review of who took what action when (and the detailed results of each action)
  - Optionally view generated commands before issuing them
  - Actions include Rebuild, Duplex, Reallocate, CF actions, CF connectivity management, Couple Dataset Mgmt.
- Sysplex CFRM **Policy Editor**
  - Edits information about Sysplex CFRM policy including structure sizes
  - Policy actions – create, delete, rename, activate, copy
  - CF and CF structure definition, modify, delete, rename, copy
  - Bulk edit/modify of structures
  - Full referential integrity, health checking and best practices
    - Prevent mistakes rather than recover from them!
  - Replacing the need for IXCMIAPU batch utility
    - Co-exists and interoperates with IXCMIAPU batch utility
- CF Structure **Sizer** for re-sizing Structures **(CD 4Q23 (2.5) - PH47561)**
    - Retains CF sizing information for future use
    - Based on CF Level going forward, supp for CFLEVEL25
- Programmatic REST APIs (CD)
  - Copy, Rename, Delete, Changing CFRM Policy
- Import/Export of CFRM policy data and bulk copy of struct (CD)
- Exporting policies in CSV format and comparing policies after changes (CD), and Policy Comparison (CD)





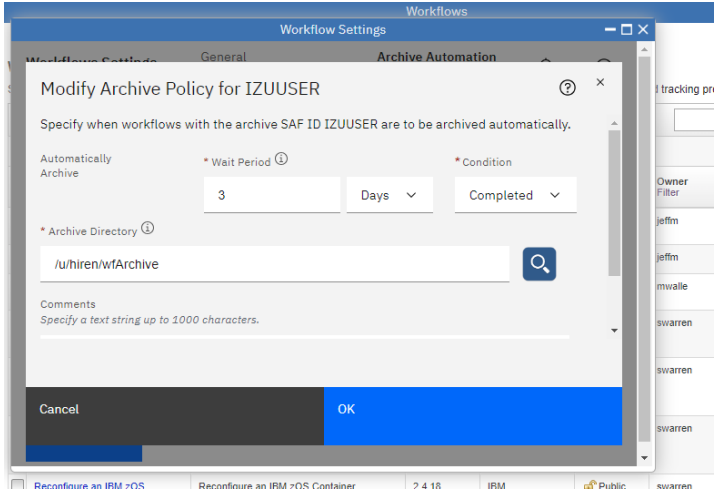
Usability & Skills

z/OSMF REST JOBS Updates

- Remove dependency on CIM and CEA and replace with JES2 function (CD)
- Additional notification points when a job is submitted and when a job begins execution (CD)

z/OSMF Storage Management REST APIs

- New APIs to retrieve data class or storage class available (CD)
- New API to add a volume to a storage group (CD)



z/OSMF REST files and datasets Updates

- Support for international characters in a data set or file name (CD)
- Support for adding and removing z/OS UNIX symbolic links (CD)
- Support for creation of symlinks (CD)
- Improvements in header management (CD)

z/OSMF Workflow updates

- Automated Policy-based archive workflow management (CD)
- Enhanced with new support for signed Workflow steps. This enhancement is designed to allow more secure Workflow automation, even when Workflow steps need to be executed under different users' credentials. (CD)
- Catchall workflow archive policy (CD)

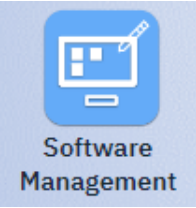
Usability & Skills

z/OS Release Upgrade Enhancements

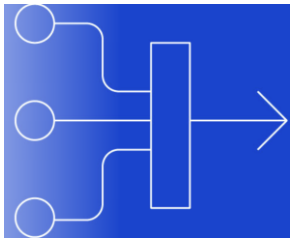
- z/OSMF *z/OS 3.1 Upgrade Workflow* ***is part of and serviced with z/OS***
  - Use the *z/OS 3.1 Upgrade Workflow* directly from your z/OS system. Resides in: `/usr/lpp/bcp/upgrade/`
  - z16 Upgrade Workflow has been separated from the z/OS 3.1 Upgrade Workflow, and is also shipped in the same location. Find the Workflow update PTFs with SMP/E FIXCAT `IBM.Coexistence.z/OS.3.1`
- New enhancements for *z/OS 3.1 Upgrade Workflow* :
  - Assistance with coexistence service verification
  - Help with identifying those upgrade actions already performed during the service cycle
  - Step ordering is now chronological
- Continued enhancements still allow for discovering functions used, tailoring information specific to your system, and verification of many upgrade action.
- The exported format of the *z/OS 3.1 Upgrade Workflow* continues to be available on IBM Documentation for those that prefer a viewable copy from IBM Documentation.

Usability & Skills

z/OSMF Software Management Installation of z/OS 3.1 ServerPac



- Uses a simplified web-based GUI replacing the ISPF CustomPac Dialog
  - Manages allocation and placement of data sets, cataloging, and deployment in z/OSMF Software Management
  - Customization and verification is done in z/OSMF Workflows
  - Data set merge and disconnect Master Catalog on driving system (CD)
  - Remove temporary catalog aliases are supported (CD)
  - REST APIs to run missing critical updates, missing FIXCAT updates, and software update search (CD)
  - A new UUID fetchable from a running z/OS can be used to locate the corresponding SW Instance on an active system (CD)



- IBM (and participating major ISVs) deliver z/OSMF Portable Software Instances as a common installation method for z/OS stack software.
  - IBM z/OS, IMS, Db2, and CICS Transaction Server and associated products, all can be installed with z/OSMF today. CBPDO remains available and is unchanged.
  - z/OS 3.1 ServerPac is only provided as a z/OSMF Portable Software Instance
    - z/OSMF is a driving system requirement for all IBM ServerPacs. (CD)

For more information, see the z/OSMF ServerPac content solution

Try a sample package to be familiar with the install, before you install any ServerPac. Earn a badge!.

Usability & Skills

z/OS Software Package Signing (CD)

- z/OS SMP/E and z/OSMF Software Management now provide the capability to digitally sign and verify the signature of GIMZIP packages of software that may be delivered both electronically and physically, on all supported z/OS releases.
  - This capability ensures that a software package has not been modified since it was created and the package was signed by the expected provider, designed for nonrepudiation and authenticity.
  - The choice to do this additional verification is left to the user upon receipt of the software package if the software provider has chosen to exploit this additional capability.
- IBM has chosen to compatibly sign the following software packages to allow clients more secure coverage for z/OS software deliverables:
  - z/OSMF ServerPac (also known as z/OSMF portable software instances)
  - CBPDO
  - SMP/E RECEIVE ORDER PTFs and HOLDDATA
  - Electronic Shopz PTF orders
- Designed to satisfy z/OS NIAP Certification with OS Protection Profile (OSPP) 4.3 package signing.
- Available with the PTFs for SMP/E FIXCAT IBM.DrivingSystem-RequiredService.

Usability & Skills

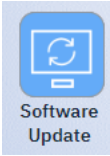
z/OSMF enhancement to run TSO as surrogate User ID **(CD 4Q23 (3.1) - PH56564)**

- Currently, a z/OSMF user cannot start a TSO address space with an owner/identity other than the request submitter.
- With this new support, if the request submitter has the SAF permission to start a TSO address space using a surrogate user ID, the TSO address space owner could be the surrogate user ID, and any actions performed in this address space will also be under the surrogate user ID.

z/OSMF Software Management Improves zFS Processing **(CD 4Q23 - PH56073, driving system requirement)**

- Customers no longer need to grant authorization to a provider's originating data set names for a given portable software instance for zFS data set names (reducing potential for a security exposure)
- To allocate zFS data sets that are SMS-managed and greater than 4GB in size, an SMS data class specification is required. '
  - z/OSMF now allows a data class to be specified and used to allocate all data sets, including zFS data sets.
- Supports to now install z/OS data sets on non-SMS managed volumes. z/OSMF will now convert SMS-managed data sets from a provider into non-SMS-managed data sets during installation

Usability & Skills



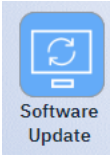
z/OSMF Software update task

- GUI provides a simplified and guided process to install any SMP/E-packaged PTF, regardless of software vendor.
- Enables you to review and track SMP/E HOLD data in an orderly fashion. All installation output is saved so you can review it at any time.
- Supports three update use cases:
  1. **Corrective.** Install individual software updates to fix a problem.
  2. **Recommended**. Install all software updates that are recommended by software vendors. The IBM recommendations are those designated as IBM Recommended Service Upgrade (RSU) fixes.
  3. **Functional**. Install software updates to support new hardware, software, or functions identified with a SMP/E FIXCAT.

- Existing traditional methods to install SMP/E-packaged software updates (batch JCL jobs) are still possible, but z/OSMF Software Upgrade is expected to provide a simpler experience requiring lesser SMP/E skill.
- Now displays a list of cancelled or completed processes on the Completed Updates page. **(CD 4Q2023 (3.1) - PH56074)**
  - Users will be allowed to remove processes they no longer need by means of a new Delete action.
  - Saving of cancelled or completed updates should be done before removal if the output is desired to be reviewed later.
  - help to manage the size of the z/OSMF repository.
- Performance improvement in elapsed time to gather HOLDDATA information. **(CD 4Q2023 (3.1) - PH56074)**
  - Previously, this HOLDDATA gathering might have taken several minutes, depending on how many entries were in the global zone.
  - Now, delivery of the necessary HOLDDATA is faster, and with a reduction in the saved output size.

For more information about z/OSMF Software Update, including helpful instructions on how to get started, see the Software Update with z/OSMF content solution (https://www.ibm.com/support/z-content-solutions/software-update-zosmf/).

Usability & Skills



z/OSMF Feedback Collection enhancement **(CD 1Q24 (3.1) – PH56716)**

- Clients can now learn more about their functional exploitation across their enterprise.
- Can now gather certain z/OSMF product usage information as well as system operational usage
  - Sent back to IBM on monthly basis
  - Stored in z/OSMF data directory for client usage
- General Settings Task
  - Option to enable or disable the monthly collection (Enabled by default)
- Provide IBM Feedback Task
  - Option to collect system operational data

Usability & Skills

Assembler Skills Reduction

- JES2 policy-based exit reduction
  - Intended to provide a non-assembler facility to *extend* JES2
    - Can be mixed with traditional JES2 exits
  - Support for
    - Job input is new (approximately exit 20/50)
    - Pre conversion
    - Post conversion (approximately exit 44)
    - Sysout Group (approximately exit 40)

```
{ "policyName": " JINPUT1 ",
"policyVersion": 1,
"policyType": " JobInput ", /* at the end of input phase*/
"definitions":
[   /* if the estim # of spool bytes is > 9999k */
    { "condition" : " EstByteNum > 9999 ",
        "actions" :
            [
                {"action" : " modifyJob ",  /* modify the job */
                 "attribute" : " EstByteOpt ",
                 "value" : "'CANCEL'" /* cancel it …. And …   */
                },
                {"action" : " SendMessage ", /* send message */
                "message" : " 'Job ' || JOBNAME || ' will be canceled' "
                }
.....
```

- New predicates and actions
  - Ability to access symbols during input processing
  - Ability to use system symbols in JES2 policy

- Policy files are Release neutral and do not require change during release or service upgrades (no reassembly required)
- Dynamically enabled – Changes can be applied and removed while JES2 is running
- Policies generally apply across the JESplex

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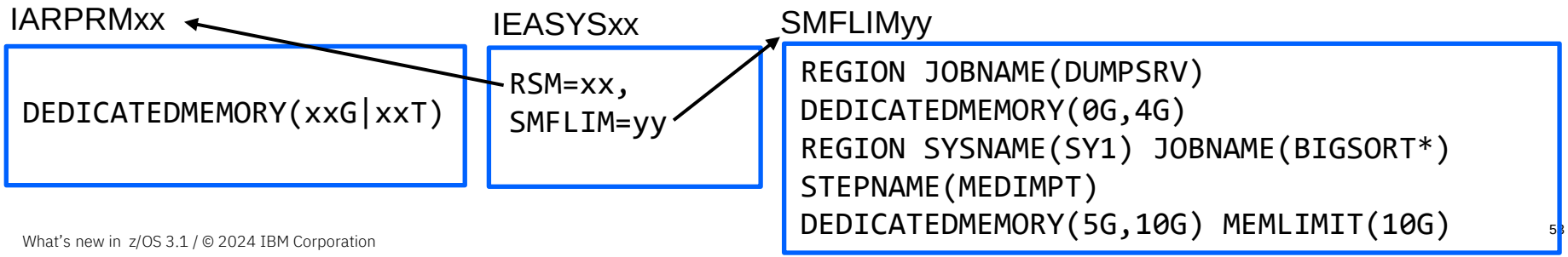
Scalability & Performance

Increase z/OS Memory limit to 16TB

- 16TB of real storage in a single z/OS Operating system Image
  - Prior to z/OS 2.5 the limit for real storage consumption in z/OS was “only” 4 TB
- Storage above 4TB is delivered in fixed storage with 2GB frame sizes.
- Requires use of new API’s and therefore limited to a subset of z/OS applications
- Useful for zCX and other large memory consumers

Dedicated Real Memory Pools

- Dedicated memory pools allow the installation to set aside assigned memory for specific applications
- These applications then do not have to compete with the rest of the system for this storage
- Designed for very large memory users such as: zCX, DB2 Buffer Pools, SVC Dumps, Java etc.
- Available in 2G, 1M, and 4K frame sizes for real storage above 4TB



Scalability & Performance

WLM Implicit Long-term CPU Protection

- WLM now automatically assigns long-term CPU protection for:
  - Any Importance 1 work or importance 2 work when System Recovery Boost in effect, for the first period of a service class
  - Starting with z/OS 3.1, this approach is supplemented. CPU protection is also assigned to critical work when no boost is in effect. That is, any work of importance 1 is implicitly set to CPU critical.

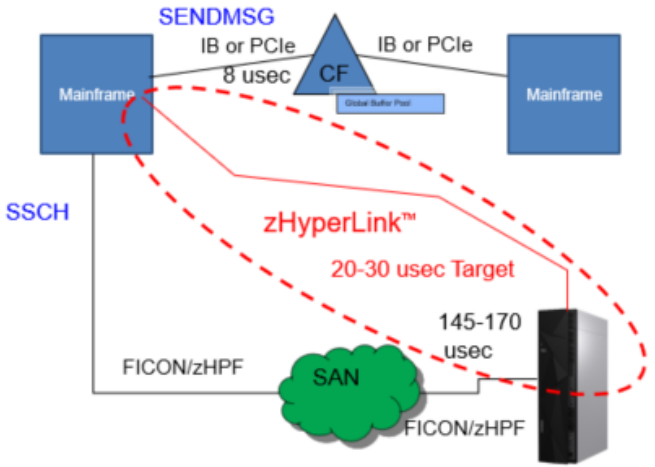
z/OS Unix skulker

- A facility that runs periodically doing cleanup
- Improved performance
- Automatically deletes directories when they become empty
- Continues even when a non-zero return code is encountered

Scalability and Performance

zHyperLink write support for multi-volume data sets (CD)

- With the DFSMS Media Manager support for zHyperLink writes, Db2 12 or Db2 13 for z/OS can improve log throughput by exploiting zHyperLink for active log writes.
  - zHyperLink write processing can speed up commit by making the log write faster.
  - Designed to improve transaction response time, reduce the latency for log writes, and potentially speed up commits of the transactions.
- Enhancements to Media Manager provide support for multivolume data sets, which expands the zHyperLink use cases for Db2 log data sets and IMS write ahead data sets.



Scalability & Performance

IBM Resource Measurement Facility – RMF Priced Feature

- A new browser-based UI based on Open Source Grafana is available for monitor III metrics and reports
- Grafana has many libraries of open-source visualization widgets including bar charts, line charts, timeline visualization etc.
- The new UI is designed to support setting thresholds and issuing alerts
  - A rich array of alerting mechanisms is available
  - Configurable duration of a time-slice
  - Data from various sources can be integrated into the dashboard
- The IBM RMF for z/OS Grafana plugin can be configured to work with your system by creating a datasource connection to a DDS. **(CD 1Q24 (3.1) – OA66145)**
- A new DDS server which is designed to exploit 64-bit addressing and additional security options
  - The new DDS server is also zIIP-eligible
  - Options exist to output data from the DDS server in JSON format to ease integration into other modern tooling
- RMF is enhanced to report on crypto express 8S card (CD)
- RMF monitor III has been enhanced to show all logical partitions of a CPC and allows machine configurations up to 256 physical processors (CD)
- WLMGL report enhancements to support AI-infused WLM batch initiators **(CD 1Q24 (3.1) – OA66145)**
- Service class and Service Class Period reports enhanced to support Implicit CPU Protection **(CD 1Q24 (3.1) – OA66145)**

Systems Management

zWIC – Workload Interaction Correlator Priced Feature

- A priced feature of z/OS that implements a facility to report on high frequency events which can be used to improve diagnosis on z/OS
- zWIC is entitled with either RMF or the Advanced Data Gatherer (ADG) feature (CD)
- Addresses the problem of capturing data on a production system running under load by providing an efficient way to capture and report on various diagnostic items
- Input/Output (IOS) information is now added to zWIC data.
- IBM priced product IBM z/OS Workload Interaction Navigator can be used to visualize the data

- https://www.ibm.com/docs/en/zos/3.1.0?topic=wptmuwic-zos-workload-interaction-correlator

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Availability

z/OS Anomaly Mitigation client pain points

- Improve client triage of anomaly observations and predictions with IBM System Automation mechanism to capture report details, including recommended actions
- Predictive Failure Analysis (PFA)
  - Predicts health based on velocity metrics, JES2 spool consumption, common storage consumption, above the bar private area etc.
  - IBM recommends all clients enable PFA
- Runtime Diagnostics (RTD) enhancements
  - A New REST API will expose RTD data to other management products such as IBM Z Anomaly Analytics (ZAA)
- Detection of active SLIP/PER events enabled. (CD)

Availability

System Recovery Boost – Sysplex Recovery enhancements

- System Recovery Boost initially provided recovery acceleration via additional processor capacity and parallelism, but only during image-level events like image Shutdowns and re-IPLs
  - IPL and Shutdown boosts
    - Speed boost and/or zIIP boost
    - GDPS orchestration performance and parallelism enhancements
    - Up to 60 minutes of boost at IPL and up to 30 minutes of boost at shutdown
    - Optional, priced SRB Upgrade temporary zIIP capacity for zIIP Boost
- Support was later extended to provide recovery process boosts for smaller-scope, occasional sysplex recovery activities, which can introduce small-scale disruptions when they occur
  - Boosts automatically initiated when these events occur
  - And on the relevant set of systems in the sysplex where the recovery is taking place
  - Short-term boost periods (from one to several minutes), limited in total amount (up to 30 minutes per LPAR per day)
- **New support for z16 includes: (CD)**
  - **Middleware start-up boosts** for policy-selected STC middleware
  - **SVC Dump boosts** for selected dumps based on dump size
  - **Hyperswap configuration load and reload**
- All with no planned increase in IBM software licensing costs!
-

For more information see the Systems Recovery Boost Content solution (https://www.ibm.com/support/z-content-solutions/system-recovery-boost/).

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Systems Management

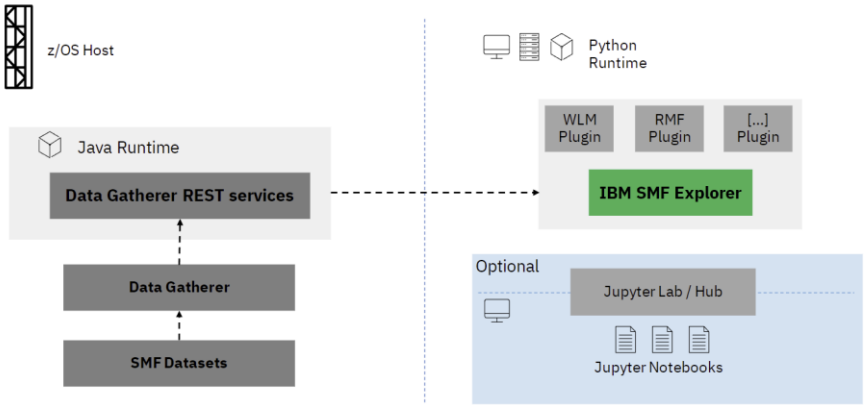
AI System Services for IBM z/OS 1.1 [5655-164]

- New offering designed to deliver a subset of the AI Framework for IBM z/OS capabilities, intended to support AI infusion into z/OS
- Delivers support of key AI lifecycle phases including data ingestion, AI model training, inference, AI model quality monitoring, and retraining services.
- Integrates seamlessly with the other AI Framework for IBM z/OS components delivered with z/OS 3.1 to build an AI platform that is designed to support both initial and future intelligent z/OS management capabilities
- No-charge bundling offering including Watson Machine Learning for z/OS Core edition and IBM Z Common Data Provider, supporting AI infusion into z/OS base components only*

IBM SMF Explorer with Python (CD)

- Data access/analysis toolkit designed to help access SMF data and extract insights in an easy and modern way
- Leverages state-of-the-art technologies like Jupyter Notebooks and Python
- Understand, interpret SMF data and unlock value from it, even with limited z/OS skills
- Additional capabilities to support SMF type 30 records that include information related to address spaces' and jobs' activities. **(CD 4Q23 - OA64270)**
- https://ibm.github.io/IBM-SMF-Explorer/
- Hot Topics Blog - How to turn your SMF data into valuable insights without z/OS expertise

Systems Management



Systems Management

JES2 Policy Enhancements

- Replace JES2 exits with policies
  - See section on usability and skills
  - New JobInput policy, access to JES symbols and system symbols now supported

JES2 Job Notifications

- With JES system symbol SYS_JOB_NOTIFYX=http://somehost/uri job notification is extended to submission and start of execution in addition to end of job (CD)
- Job notification is done using the client web enablement toolkit (without dependency on CIM)
- Job notifications are retained on spool to improve delivery in the event the target server is unavailable
- Job notifications include failures early in job processing

JES2 Resiliency Improvements

- New Default spool policies to reduce situations leading to spool full conditions
- JES2 wide and Job based defaults for spool usage
  - Can be tailored by installation through JES2 Policy
- Default policy is for the job to wait until the resources are available
  - Other options are ”none” and “fail”
- Installation resource groups can be assigned to a job for display and policy enforcement

Systems Management

SDSF – System Display and Search Facility Priced Feature

- New feature: Module Fetch Monitoring
  - Designed to show modules fetched, from where, at what time and by what address space
- New feature: System Event Log Display
  - Indication of significant events such as volumes coming on and offline, actions etc. with handy link to the Operlog based on the time an event occurred
- New feature: Dashboard
  - A summary of the system configuration with highest resource consumers
- Several new Primary Displays of RACF information including tabular SDSF display of classes, profiles, access lists etc.
- More than ten new primary displays including Sysplex, LPARs, Program Properties Table (PPT), and SMF data
- More than 20 new columns, and more than 20 new actions on existing panels
- The browser-based UI (in z/OSMF) is updated to continue to match function with ISPF
- SDSF is enabled for the Security Configuration Assistant of z/OSMF to ease security settings
- SDSF now can display individual fields on a panel with unique highlighting, for example the return code fields in the job status display are color coded based on the return value making it easier to spot problems.
- …and so much more.

```
 Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF FETCH DATA SETS  CB8A      CB8A       ACTIVE          LINE 1-18 (19)
COMMAND INPUT ===>                                        SCROLL ===> HALF
NP    DSNAME                        Fetch   AvgDASD   MaxDASD    AvgVLF    MaxVLF FetchDAS
      CEE.SCEERUN                       8   198.848  1111.462     0.000     0.000
      CEE.SCEERUN2                      8    47.488   115.786     0.000     0.000
      CICSTS61.CPSM.SEYUAUTH            1     1.691     1.691     0.000     0.000
      CICSTS61.SDFHAUTH                16     0.971     1.606     0.000     0.000         1
      CICSTS61.SDFHLINK                 1     3.015     3.015     0.000     0.000
      CICSTS61.SDFHLOAD               401     0.556     7.952     0.000     0.000        40
      CSF.SCSFMOD0                     13     8.316    28.282     0.000     0.000         1
```

```
 Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF FETCH JOBNAMES  CB8A      CB8A       ACTIVE          LINE 1519-1536 (10000)
COMMAND INPUT ===>                                        SCROLL ===> HALF
NP    JOBNAME  Module     Fetch   AvgDASD   MaxDASD    AvgVLF    MaxVLF ASIDX Dataset
      CHRISP9  CELQDCPP        1     1.038     1.038     0.000     0.000 0128  CEE.SCE
      CHRISP9  CE
      CHRISP9  CE
      CHRISP9  C6
      CICS2A71 DF
      CICS2A71 DF
      CICS2A71 DF
```

z/OSMF SDSF

Home / Program / Fetch modules

Fetch modules

Catalog

Search

Export data

MODULE	Fetch	Type	Size	AvgDASD
ACBFUTO2	2852	PGM	3B8	0.391
ADRDSSU	1	PGM	26B000	766.330
ADRDSSU	1	PGM	26B000	356.541
ADRDSSU	32	PGM	26B000	51.900

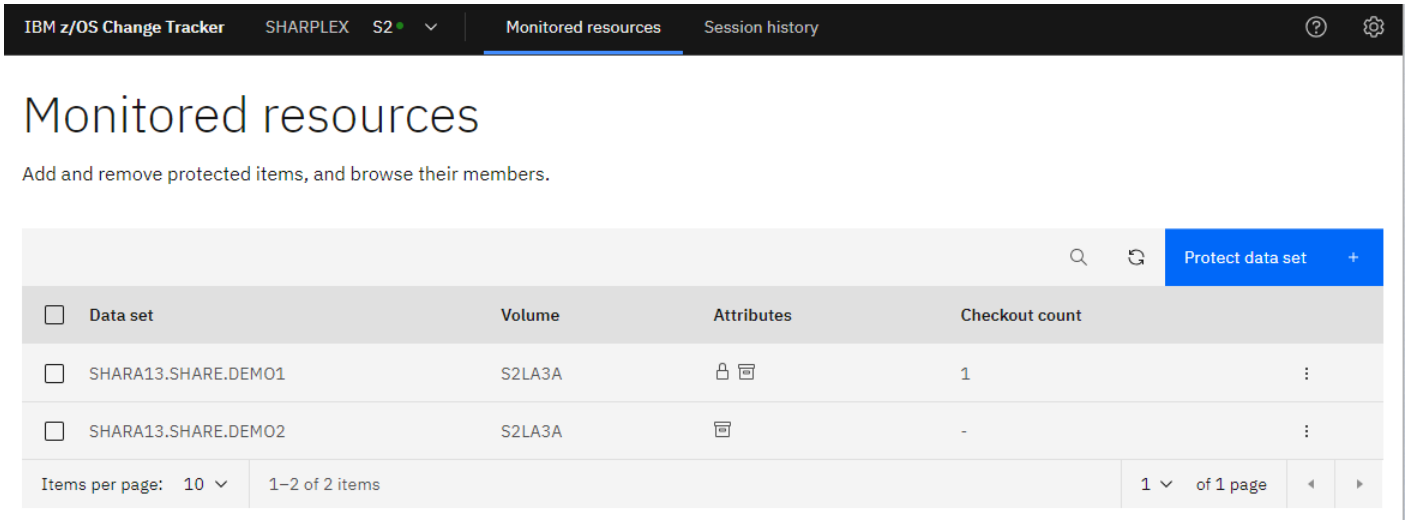
…and in z/OSMF!

Systems Management

IBM z/OS Change Tracker: *Software solution for system management* (CD)

IBM z/OS Change Tracker is a comprehensive configuration change management tool for tracking, controlling, and managing changes in software across the z/OS platform

- Real-time software configuration change tracking and control for system libraries
- Identify and protect against undesired configuration changes
- Enhance system resiliency with automatic data set versioning and recovery



Self-service 90-day trial with APAR PH51954.
For more information, visit the z/OS Change Tracker content solution page.

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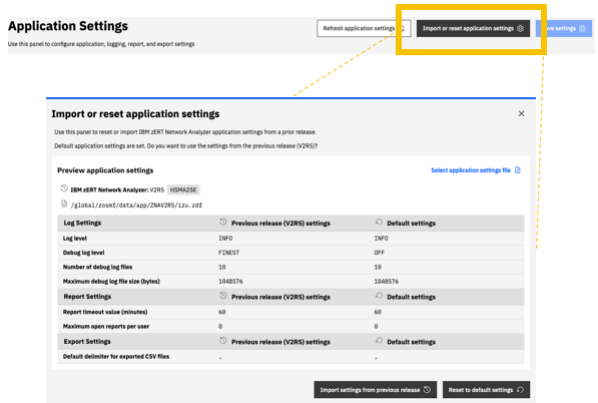
Networking

z/OS Encryption Readiness Technology (zERT)

- zERT Network Analyzer, a z/OSMF plug-in, that provides an easy-to-use web UI for analyzing zERT data reported in SMF 119 subtype 12 records
  - Significantly improves Time-To-Value of gaining insights into zERT data and driving a Pervasive Encryption strategy for all z/OS network communications
  - With z/OS 3.1, the zERT Network Analyzer is enhanced to automatically upgrade application and database settings from those configured for V2R4 or V2R5 releases.
  - Additionally, new tooling is provided to easily upgrade an existing V2R4 or V2R5 zERT Network Analyzer database to the 3.1 schema.
- **zERT security improvements** (CD)
  - Support for passphrases
  - Support for saving DB2 users password or passphrase values
- **zERT support for new SSH cryptographic attributes**
  - New SSH key exchange methods and new SSH key types supported in TCP/IP **(CD 1Q24 (3.1) – PH58110)**
  - zERT Network Analyzer recognizes new attributes **(CD 1Q24 (3.1) – PH58105)**
  - zERT Policy Enhancement and Network Configuration Assistant recognize new attributes **(CD 1Q24 (3.1) – PH57412)**



Networking

Communications Server support for RDMA over Converged Ethernet (RoCE) Express3 (CD)

- SMC – Shared Memory Communication is a more efficient protocol for sending data to and from z/OS.
- An improved protocol SMCv2 allows for multiple IP subnet support.
  - SMC-Rv2 is used over IBM RoCE Express2 adapters beginning with the IBM z15.
- z/OS 3.1 Communications Server extends the Shared Memory Communications over Remote Direct Memory Access (SMC-R) function to support the next generation IBM RoCE Express3 feature. The IBM RoCE Express3 feature is designed to allow TCP/IP stacks located on separate central processor complexes (CPC) to leverage the RDMA capabilities of these state-of-the-art adapters to optimize network connectivity for mission-critical TCP workloads by using Shared Memory Communications technology.

Networking

More Granular Control Over the FTP Server JES Mode (CD)

- New System Authorization Facility (SAF) resource to control which z/OS users are permitted to use FTP server JES mode.

z/OS UNIX syslogd support for secure logging over TCP (CD)

- z/OS UNIX syslog daemon (syslogd) is enhanced to support network connectivity to other syslogd instances over TCP, with or without AT-TLS protection.

SNA Application and Session Reporting (CD)

- Communications Server is enhanced to regularly store information about the maximum number of SNA applications and sessions in the IBM Function Registry for z/OS. This information provides z/OS clients with insight into the amount of SNA application workloads executing on z/OS.

Managing Sysplex Distributor Targets

- Enhanced to allow pause/resume to specific z/OS application servers
- Regardless of the state of the application, the target stack/LPAR, and across sysplex failovers

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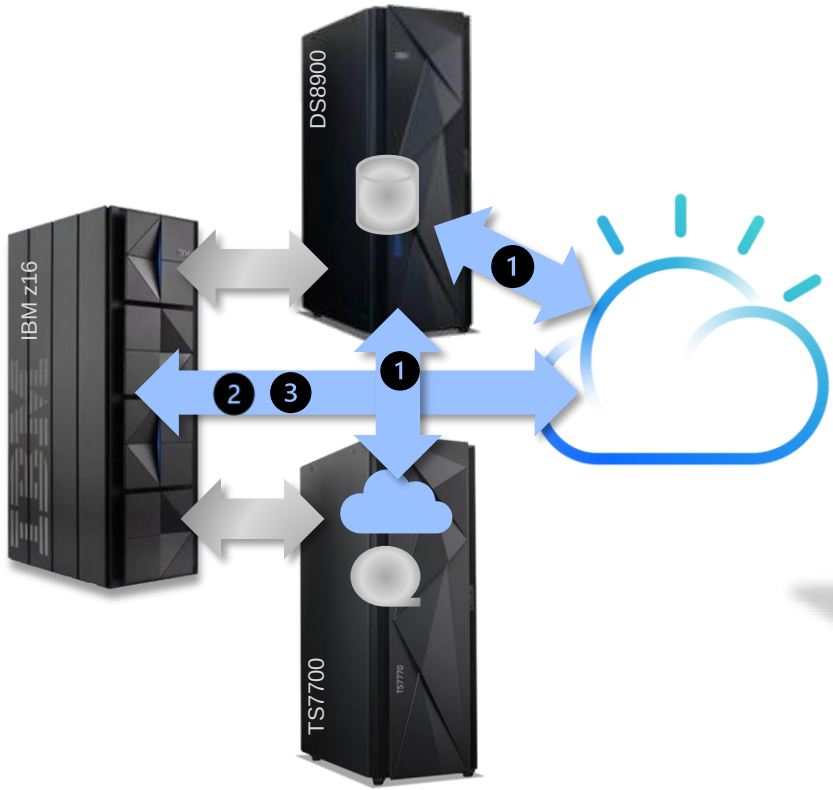
Data Serving and Storage



Cloud Storage

z/OS clients are integrating cloud object storage into traditional disk and tape environments to create a hybrid storage architecture that enables clients to leverage the strengths of on-premises disk and tape storage while adding the intrinsic strengths of cloud solutions for backup, archive, and unstructured data to enable new use cases, increase business agility, reduce the complexity of storage environments, and provide cost optimization.

There are *several* existing DFSMS Solutions that leverage Cloud Object Storage …

Serverless Data Management

1. DS8900 Transparent Cloud Tiering (TCT) and TS7700 DS8000 Object Store enable DFSMS backup and archive to be performed with *none* of the data passing through z/OS, *minimizing MIPS*

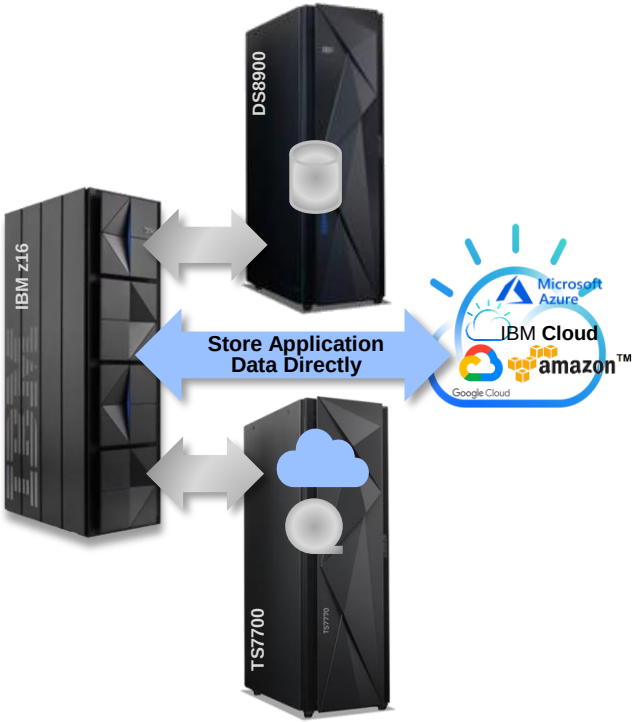
Store Application Data Directly

2. OAM stores and manages unstructured data as objects to public, private, or hybrid cloud infrastructures
3. Cloud Data Access will provide a simple method to store any z/OS data directly onto cloud object storage

Data Serving and Storage

Cloud Data Access

- Provides a simple method to store and share any z/OS data directly onto cloud object storage.
  - Enables S3 / Cloud Object Storage as another tier for z/OS applications.
  - Simplified data sharing – reduce and/or eliminate ETL.
  - Simplified application development and flexibility with a single API to interact with various Cloud Object Storage providers.
  - Simplified authentication with the Provider Configuration File describing the target Cloud Object Storage provider.
  - Supported cloud providers include IBM Cloud Object Storage, Amazon Simple Storage Service (Amazon S3), Azure Blob Storage, and Google Cloud Storage. **(Azure support also available on 2.5 1Q24 - OA65925)**



Data Serving & Storage

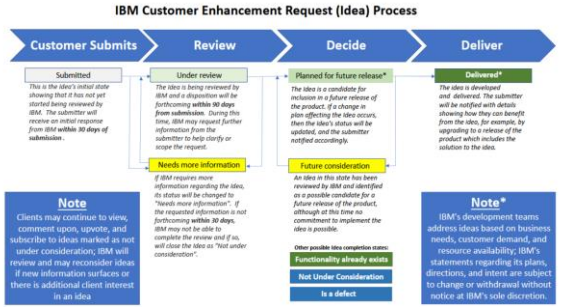
Cloud Storage Access for z/OS (CD)

- Cloud object storage enables a low-cost storage tier that's easily accessible and provides a simple mechanism to share data.
- A new utility, GDKUTIL, can download or upload between cloud objects and z/OS using S3 APIs.
  - Supported data set types include UNIX files, sequential data sets, PDS or PDSE members, or GDG versions.
  - Can be invoked through JCL.
  - Data can be converted from EBCDIC to UTF-8 on upload, and from UTF-8 to EBCDIC on download commands.
  - Quick-Start Guide provided to help with initial configuration.
- Allows specification of metadata to be associated with the Cloud Object on an UPLOAD command with a new keyword, METADATA(<dd_name>) **(CD 4Q23 OA64874)**
  - Specifies the DD name containing the key:value pairs that should be sent to the Cloud Object server for association with the object.
  - GDKUTIL LIST command can be used to display the metadata associated with a specified object.

Data Serving and Storage

Enhancements to address client requirements

- Enhanced Catalog Recovery
  - Simplified catalog recovery with the use of more granular timestamps in the Catalog SMF records for more accurate merging of updates, and one IDCAMS command that drives the ICFRU recovery.
- MODIFY CATALOG Enhancements
  - Additional information about catalogs and their environment to more effectively manage and maintain them.
  - Updates to the MODIFY CATALOG,REPORT output to indicate the current number of active tasks to provide a more accurate measure of the current activity in the Catalog Address Space (CAS).
  - Updates to the MODIFY CATALOG,ALLOCATED command to optionally filter by catalog name instead of VOLSER could potentially reduce the size of an IEC348I display for more efficient viewing.
- Simplified Catalog Address Space Startup
  - Enable the CAS and full catalog function to be available earlier during system startup and potentially improve the overall time it takes to startup or restart the system.

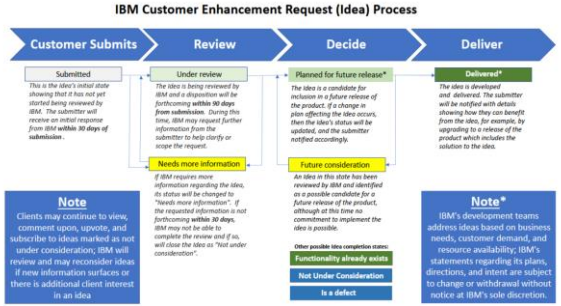


IBM Ideas Portal

Data Serving and Storage

Enhancements to address client requirements

- Improved access control to DFSMShsm FIXCDS command
  - Provide controlled access to specific capabilities of the DFSMShsm (HSM) FIXCDS command to allow users to display records but limit who can modify the control data sets.
- Improved DFSMShsm Extent Consolidation Configuration
  - Configure HSM such that extent consolidation only occurs on data sets for which a valid backup exists, providing the ability to recover in case a problem occurs while consolidating the extents.
- Task Automation for DFSMShsm ARC0100I messages
  - Write ARC0100I message to syslog when HSM HOLD and RELEASE commands are issued from TSO or ISPF, to enable system automation to carry out necessary tasks to confirm the request.
- Direct DFSMShsm HSENDCMD commands to a specified host
  - Provide equivalent TSO functionality to ARCHSEND macro.

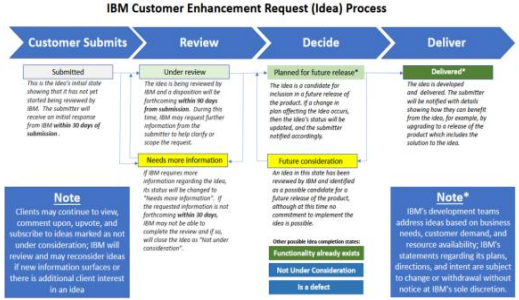


IBM Ideas Portal

Data Serving and Storage

Enhancements to address client requirements

- Simplified IGD306I Messages
  - SMS enhancements to clean-up logrec records cut due to internal errors and avoid filling up sys1.logrec datasets.
- Improved Data Set Allocation Processing
  - Display a new message indicating how many candidate volumes are marked as primary, secondary, tertiary, or rejected which can help determine the effectiveness of various configuration settings related to performance.
- Improved SMS Reporting
  - Provide additional message diagnostics to easily identify the datasets not assigned to a storage group so ACS routines can be reviewed and modified to rectify any issues.
  - Provide additional information to SMF 42.6 records to help optimize in-memory buffers for improved performance and utilization.
- SMS Storage Class Enhancements
  - Provide a storage class option that specifies if allocation should prefer or require an allocation to a storage controller that enables FlashCopy to be used as a copy technique.
- Improved SMS Storage Group WRITE Statement
  - SMS ACS WRITE statement will print out the entire list of assigned storage groups, instead of just the first one in the list, to assist in testing and troubleshooting SMS ACS routines.
- Dynamic SMS Exits
  - Install a new version or replace an existing version of SMS ACS installation exits (IGDACSDC, IGDACSMC, and IGDACSSC) without scheduling an IPL, as exits will use dynamic exit services.



IBM Ideas Portal

Data Serving & Storage

Union File System (CD)

- Union file system works on top of the other file systems.
- It enables a user to obtain a merged view of one more directories.
- This merged view is obtained by accessing the union mount point and gives a single coherent and unified view of files and directories.
- It is more of a mounting mechanism than a file system.
- Usage:
  - Union file systems are used extensively by containers.
  - They allow many containers to use one image without having to make multiple copies - saves on disk space.
  - Any changes made by one container will not affect any other container.
- It is not a port of a union file system from Linux, but rather one that is purposefully built for z/OS.

Data Serving & Storage

Data Set File System (CD)

- A new file system type that will allow customers to access data in data sets from the z/OS UNIX space.
- Enables z/OS UNIX applications, tools, and utilities to use data in data sets in a secure and consistent manner.
- Supports Sequential, PDS, PDSE data sets; RECFM = F, FB, FBS,V, VB,U
- Compressed or encrypted data sets are also supported
- Existing cataloged data sets (DASD) can be read and written.
- **UNIX file extended attributes utilized to represent data set characteristics (e.g. data set type, name, LRECL, RECFM, etc..) (CD 1Q24 (2.5) – OA63902)**
- **Direct access to jobs on the JES Spool (CD 1Q24 (2.5) - OA65560)**
- **Support for migrated data sets (CD 1Q24 (2.5) – OA63902,OA65560)**
- Data Set File System can also create new data sets or delete a data set or PDS / PDSE member.
- Data set serialization is consistent with serialization done by ISPF edit.
- Access to a data set is governed by user permission to the data set - UNIX permissions are **not** used.
- User needs to know the type of data that is in the data set in order to use it under z/OS UNIX.
- **New support that allows specification of multiple data set qualifiers for the HLQ directory - useful to reduce scope of data sets being accessed by DSFS** (CD)
- Use case scenarios:
  - Use **grep** to search for things in data sets.
  - Use **vi** to edit data sets
  - **sftp** data sets

```
$ diff /dsfs/txt/mwalle/sonnets.txt /dsfs/txt/mwalle/util.jobs/iefbr14
1,74c1,5
< Shall I compare thee to a summers day?                                000001
00
< Thou art more lovely and more temperate:                              000002
00
< Rough winds do shake the darling buds of May,                         000003
00
< And summers lease hath all too short a date;                          000004
00
< Sometime too hot the eye of heaven shines,                            000005
00
```

Data Serving & Storage

zFS Health Check and Conversion Utility **(CD 1Q24 (2.5) – OA63911)**

- Two new zFS health checks now support the ability to tune and configure z/OS UNIX file systems to prevent outages and failures
  - ZFS_CACHE_PERFORMANCE
    - Reports when the zFS file cache hit ratio or meta cache hit ratio are low
  - ZFS_EXCEPTIONS
    - Detailed file system information for mounted zFS file systems that have one or more exception states such as Low on Space, Disk I/O error, XCF communication error and much more
- New conversion utility to help customers migrate their zFS directories from V4 to V5, which provides better performance characteristics

DFSMShsm Incremental UNIX File Backup Enhancement **(CD 1Q24 (2.5) – OA65319)**

- A single LPAR can have more than one DFSMShsm hosts to better balance backup workload and improvement performance
- A newer feature allowed a FILEMODE option enabling designation of a particular DFSMShsm host to process UNIX files (`HOSTTYPE=FILE`) vs regular data sets (`HOSTTYPE=CLASSIC`)
- **New support allows a `-i` option on the Java `hbackup` command to specify which DFSMShsm host should receive the request.**

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Security

RACF Database Encryption **(CD 2Q22 (2.5) - OA62267)**

- RACF supports the encryption of a RACF database which must be migrated to an SMS-managed VSAM linear data set. With this support, the RACF VSAM data set can be shared among z/OS systems in additional specified configurations.

RACF Password Phrase Interval (CD)

- RACF provides a password phrase change interval (PHRASEINT), that is separate from the password interval, and can be set above the system limit for individual users.

Custom Fields in the ACEE

- RACF adds support to allow security administrators to identify the user-related custom fields that should be anchored in the user's Accessor Environment Element (ACEE) at logon time.
- Problem-state applications can retrieve this information using the R_GetInfo callable service (IRRSGI00) without incurring RACF database I/O.

Security

Application availability improvement for SPECIAL user revocation (CD)

- RACF allows an installation to suppress, on an application-by-application basis, the prompting for an additional password or password phrase attempt for a SPECIAL user who has exceeded the installation limit for consecutive incorrect password attempts.

Enforcement of RACF for z/OS Database Sharing (CD)

- z/OS RACF now checks for and issues warning messages when a RACF database is shared with z/VM 7.3 or later.

Audit Records for successful Application logons

- z/OS RACF now has extended SETROPTS APPLAUDIT to apply to any application. This enables SMF records for successful logons.

Job Processing Improvement

- z/OS Initiator will place user parameters in non-executable memory to protect the system from poorly coded applications.

Security

ICSF Enhancements

- Distribution of Master Key Ownership
  - Allows customers to distribute the ownership of key parts across multiple users
    - When using ICSF panels to enter master keys
  - Controlled with a new SAF profile in the XFACILIT class.
  - Users can be permitted to enter the FIRST, MIDDLE, or FINAL master key parts individually.
  - Can also be separately permitted to the RESET capability.
- BCRYPT Hashing
  - The CSNBOWH callable service has been updated to support the BCRYPT hashing algorithm.
- Support for CCA 7.5 and 8.2 **(CD 4Q23 (2.4) - OA64883)**
  - Strengthens RSA encryption possibilities by implementing 8192-bit key size.
  - Provides additional flexibility for quantum safe key exchange with additional CRYSTALS-Kyber keys, creates a new callable service CSNBMMS “Multi Mac Scheme” in support of the evolving German Banking Industry Committee standards, and implements the CKM-RAKW algorithm for RSA import operations.
- Exploit an EP11 Crypto Express Coprocessor (CEXxP) running in new FIPS compliance modes **(CD 1Q24 – (2.4) – OA65205, OA65206)**
  - Supports both FIPS 2021 or FIPS 2024 mode.

Read-only archive key support (CD)

- Enables restricting the use of old keys from encrypting new data
- Encrypted data can still be accessed but avoid creating new encrypted data with the archived key

Security

TLS v1.0, TLS v1.1 and TLS 1.2 Support for x25519 & x448 Key Exchange (CD)

- System SSL provides the ability for client and server connections to use x25519 or x448 curves for their key exchanges when utilizing ephemeral Elliptic Curve Diffie Hellman ciphers.
- Server configurations can limit the acceptable elliptic curves for the key exchange.
- AT-TLS provides the ability to use the new System SSL function
- Network Configuration Assistant supports the new AT-TLS function

GSKKYMAN use stash file support instead of requiring password entry

- System SSL's gskkyman utility when executed in command line mode will accept the key database file stash file or password options in place of the password prompt when dealing with key database files.

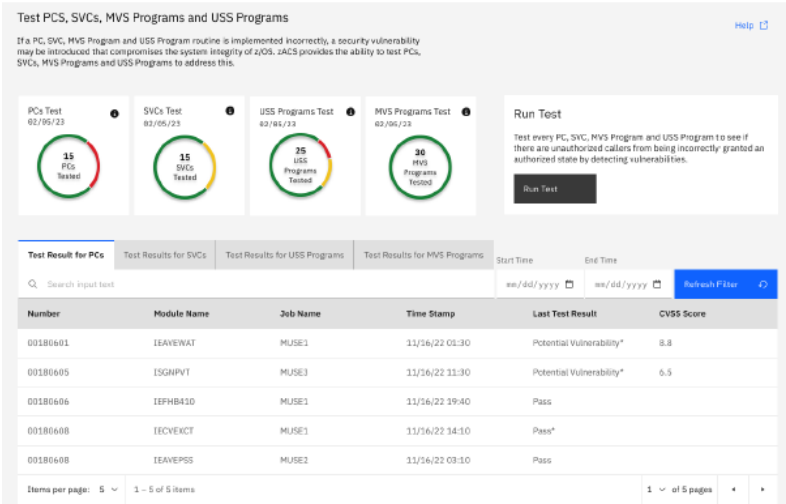
TLS 1.3 Sysplex Session Ticket Caching

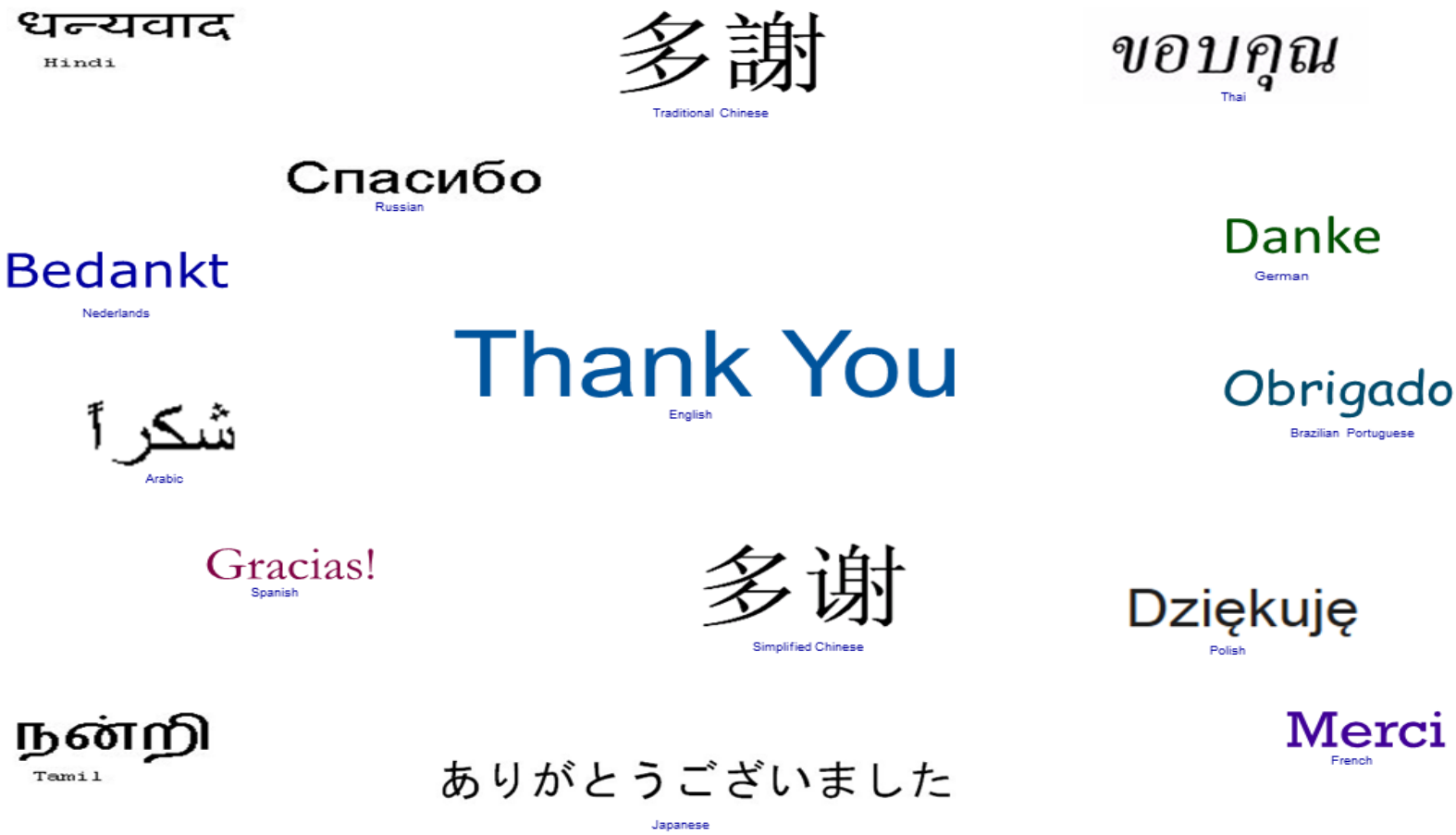
- System SSL's TLS v1.3 sysplex session ticket caching support will provide the ability for handshake session ticket information to be shared among like servers within a single system or across multiple systems in a sysplex. Sharing provides the ability to perform cached (abbreviated) handshakes instead of full handshakes when resuming connections to the servers.
- AT-TLS provides the ability to use the new System SSL function
- Network Configuration Assistant supports the new AT-TLS function

Security

z/OS Authorized Code Scanner and Monitor Priced Feature

- The IBM **z/OS Authorized Code Scanner** is an optional priced feature of z/OS that provides system integrity testing in a development/test environment as part of DevSecOps modernization. It scans for Program Calls (PCs) and Supervisor Calls (SVCs) and generates a series of tests that dynamically scan them for integrity.
- zACS has extended its scanning ability to include AC(1) code found in MVS data sets and z/OS UNIX files, providing users greater coverage in testing their development/test system for potential vulnerabilities for remediation as needed. (CD)
- **z/OS Authorized Code Monitor** (zACM) is now available, as a non-disruptive tool for production systems, examining ABENDs from z/OS recovery processing and reporting on potential vulnerabilities found there for remediation as needed. (CD)




धन्यवाद
Hindi
多謝
Traditional Chinese
ขอบคุณ
Thai
Спасибо
Russian
Bedankt
Nederlands
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German
Thank You
English
شكراً
Arabic
Obrigado
Brazilian Portuguese
Gracias!
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多谢
Simplified Chinese
Dziękuję
Polish
நன்றி
Tamil
Merci
French
ありがとうございました
Japanese

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Continuous delivery

- z/OS embraces continuous delivery through new function APARs
- Get weekly emails when APARs close with My Notification: start at
  - https://www.ibm.com/support/entry/portal/support
- Look on the web, updated monthly:
  - https://www-03.ibm.com/systems/z/os/zos/installation/zosnfapars.html

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IBM’s Statements of Direction

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

IBM’s Statements of Direction

January 2024 - IBM DFSMSdfp Object Access Method: IBM intends that IBM z/OS 3.1 will be the last release that DFSMSdfp Object Access Method (OAM) supports the IBM 3995 optical libraries and drives for unstructured (object) data. The other layers of the OAM storage tier such as IBM Db2, z/OS zFS, NFS, tape, and cloud will continue to be supported.

September 2023 – Security on z/OS: IBM plans to provide a software solution that introduces cyber anomaly detection and notification for the z/OS platform to mitigate the potential risk of malicious software. IBM plans to provide the option of quarantine functionality that further extends existing remediation options. It is the intent for these combined functions, per NIST guidelines, to be used by the client to satisfy compliance regulations requiring anti-malware coverage for z/OS. This intent includes standards such as the Payment Card Industry Data Security Standard (PCI DSS) version 4.0.
To further defend against the potential risk of malicious software, IBM plans to enhance the IBM z/OS Authorized Code Scanner to provide static scanning of authorized code, adding to the IBM z/OS Authorized Code Scanner feature's existing collection of its dynamic scanning for development and test environments and its authorized code monitor for production systems.
IBM also plans to provide a software solution that simplifies z/OS data set encryption, encrypting and re-encrypting data at scale for both key rotation and initial encryption, and leveraging analytics to minimize application downtime. This is designed to simplify adherence to expanded compliance regulations such as PCI DSS v4.0.

IBM’s Statements of Direction

August 2023 - IBM Documentation for z/OS (DOC4Z): IBM intends to deliver a new component called DOC4Z on z/OS to replace Knowledge Center for z/OS (KC4Z). DOC4Z is a web application that provides IBM product publication content to web browser clients directly from a local z/OS server system. IBM also intends to provide IBM Documentation APIs for clients to programmatically interact with DOC4Z.

August 2023 - Dashboard for resilience: IBM intends to deliver a new dashboard for resiliency. This solution will be a z/OSMF plug-in that is expected to provide clients with capabilities to summarize their resiliency posture. The solution will help enable clients to proactively address resiliency deficiencies and to help to do better planning for future improvements on the resilience of their business environment.

August 2023 - z/OS 3.1 is the last release to include the CIM server: z/OS 3.1 is planned to be the last z/OS release in which IBM intends to include the Common Information Model (CIM) server. All z/OS software that depends on a CIM server running on z/OS will need to be upgraded to remove the dependency.

August 2023 - z/OS 3.1 is the last release to support DFSMSdfp Checkpoint/Restart: z/OS 3.1 is planned to be the last release to support DFSMSdfp Checkpoint/Restart. The intent is not to require changes to applications with regards to usage of the CHKPT macro. Usage of the CHKPT macro is intended to be syntax checked and ignored. Any remaining z/OS software that still depends on checkpoint restart capability may need to be redesigned to remove the dependency on checkpoint/restart. Updates to allow identification of usage of checkpoint/restart are planned to be available with the Generic Tracking Facility. z/OS continues to provide job restart processing, which works on a step basis as well as capabilities like Transactional VSAM which may provide the basis for solutions that could replace checkpoint/restart.

IBM’s Statements of Direction

COMPLETED June 2023 - IBM z/OS Change Tracker enhancements: IBM plans to deliver new functions within the IBM z/OS Change Tracker z/OSMF plug-in in which users can intuitively compare resources and view their comparison summaries. This new comparison ability is intended to give users granular insight into the differences that exist between selected data sets or members.

COMPLETED June 2023 - Digital signatures for electronic PTF orders and SMP/E RECEIVE ORDER and HOLDDATA: IBM plans to sign packages for electronic Shopz PTF orders and SMP/E RECEIVE ORDER. See the "Digital signatures for z/OSMF ServerPac and CBPDO software packages" topic in the Description section for additional details on available product package signing options.

COMPLETED June 2023 - Additional z/OSMF ServerPac portable software instance support for z/OS Validated Boot: z/OSMF ServerPac portable software instances that include the z/OS V2.5 product provide assistance for Validated Boot by providing optional support in the PostDeploy workflow steps to set up IPL text, stand-alone dump text, and sign in-scope z/OS executables. IBM intends to extend this existing support for signing in-scope executables to all other z/OSMF ServerPac portable software instances where z/OS V2.5 has not been included in the order.

June 2023 - National Information Assurance Partnership (NIAP) OS Protection Profile (OSPP) certification: IBM intends to pursue obtaining NIAP OSPP 4.3 certification for z/OS V2.5 and IBM z16. Customers operating in industries which must meet stringent security certifications may then be able to rely on the tamper-protection that the certification ensures, including operating system kernel boot integrity validation for their z/OS operating system images. It is intended that this will better enable customers’ z/OS deployments to comply with specific government or industry requirements.

IBM’s Statements of Direction

June 2022 – **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.

June 2020 – **IBM intends to deliver containers and Kubernetes orchestration support for IBM z/OS:** IBM intends to provide clients with capabilities that will help accelerate their transformation to greater portability and agility in a hybrid cloud environment by delivering containers and Kubernetes orchestration support for existing and new IBM z/OS applications and workloads.

This move towards greater portability and agility will be supported by taking advantage of architecture-independent standards and technology for container-based development and deployment on z/OS. As this container-based technology is deployed on core systems of record, it will ensure the isolation of environments and other users from the effects of other containers.

By providing a container runtime for z/OS, and the orchestration of those containers, users can:

- Increase speed from development to deployment of z/OS-based applications
- Increase predictability and repeatability across the application lifecycle for z/OS applications
- Enhance practices across z/OS development, testing, and operations through a wide ecosystem of open-source application container-based tools

These proposed capabilities for z/OS will reinforce and further strengthen the IBM focus on hybrid cloud to unlock business value and drive growth for clients. This can be achieved by providing technology that incorporates the client's core mission-critical applications and workloads across their z/OS middleware into a container-based cloud-native strategy.

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