
# What's New in z/OS V2.4

## z/OS V2.4 – 4Q2019 Enhancements Edition (Announce)

**Statements regarding IBM future direction and intent are subject to change or withdrawal, and represent goals and objectives only.**

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(CD) - Continuous Delivery items

# z/OS V2.4 Release Overview

## Release Themes

### AGILITY

Agility in the adoption of new technologies in DevOps, microservices, and consumption models that can be delivered as a service to accelerate their time to value

### OPTIMIZATION

Optimization through the ability to run computing workloads in the most efficient environment

### RESILIENCY

Resiliency to deliver continuity of business services through exploitation of functions such as encryption and high availability

# z/OS V2.4 Release Overview

## z/OS V2.4 Content Overview

***Usability and Skills***

z/OSMF Desktop; Sysplex management; Software management & workflows; Assembler skill reduction; XCF transport class simplification; Improve z/OSMF configuration; Improved z/OS upgrade experience; …

***Application Development***

**z/OS Container Extension; IBM Open Data Analytics for z/OS**; LE support for C++; Unicode V9; NFS support for Unicode; Web enablement toolkit UTF8 support; xvfb support; DFSORT improvements; …

***Scalability & Performance***

AMODE 64; Alternate subchannels set for XRC & Linux; Improved dump capture time; Asynchronous XI for CF cache; …


***Enhancing Security***

Encryption for sequential, basic & large format; Encryption for PDSE; RACF ACEE privilege escalation; TSO logon time out; MCS console passphrases; OpenSSH V7; …

***Availability***

Dynamic I/O for standalone CFs; TVS Auto Commit; JES2 resiliency; Remote pair flashcopy for XRC; Logger support for GDPS k system; zFS HA improvements; …

***Systems Management***

**Tailored Fit Pricing**; zFS file back-up & restore; JES2 enhancements for JES3 migration; z/OS cloud provisioning for z/OS middleware; NFS improvements for SMB; Multiple NFS servers on a system; SDSF improvements; RMM improvements; …

***Networking***

Code page enhancements for CSSMTP; HiperSockets Converged Interface (HSCI); TLS 1.3 support; z/OS Encryption Readiness Technology (zERT); …

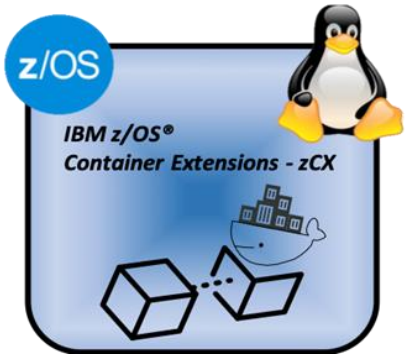
# z/OS V2.4 Release Overview

## Release Highlights

| Feature | Description |
|---|---|
| z/OS Container Extensions | Workload Enablement: *A solution architect can create a solution to be deployed on z/OS based on components available as Docker containers in the LoZ ecosystem transparently exploiting z/OS QoS, without requiring z/OS development skills.* |
| Tailored Fit Pricing for IBM Z | Pricing Transparency: *As a solution architect, I want the ability to deploy a new solution, co-located or on a new LPAR, without any direct impact to the rolling 4-hour average. Additionally, I'd like an alternative to the R4HA for my z SW pricing for my entire enterprise* |
| Open Data Analytics on z/OS | Modernization: *Any application developer can further their mainframe modernization initiative by building business solutions using cognitive, analytic, and well-known building blocks/tools to leverage z/OS qualities of service without requiring deep z-specific skills.* |

# z/OS V2.4 Release Overview

## What is z/OS Container Extensions (zCX)?




**z/OS Container Extensions is intended to Modernize and Extend your z/OS Applications**

**Optimization**

Co-location of applications ushers in a new level of optimization. The ability to run nearly any Linux on IBM Z Docker container in direct support of z/OS® workloads on the same z/OS® system.

**Agility**

Access the most recent development tooling and processes available in the Linux on z ecosystem and deploy on z/OS®. Reusing popular Linux skills and patterns.

**Operational Efficiency**

Retain the operational benefits of z/OS®, mature business processes, and the ability to maintain overall operational control within z/OS® with z/OS® Quality of Service.

- Learn more at: http://ibm.biz/zOSContainerExtensions

# z/OS V2.4 Release Overview

## z/OS Container Extensions

- This is the capability to run Linux on z Docker images directly in z/OS
  - Linux distribution and Docker CE provided
  - Service entitled as part of z/OS service entitlement
- IBM software is planned to be licensed and priced in line with Linux on z offering
- Intended for workloads with affinity to z/OS
  - For data or applications
- Provide ease of use in Lifecycle Management of a Docker Appliance
  - z/OSMF Workflow for creation and removal
  - Additional support for applying service
- This workload is planned to be zIIP eligible
- Operational consistency with z/OS

# z/OS V2.4 Release Overview

## z/OS Container Extensions (cont.)

Pre-packaged Docker Environment provided by IBM

- Includes Linux and Docker Engine components
- Supported directly by IBM
- Can include clustering and registry capabilities
- Initial focus is on base Docker capabilities
- Competitive price/performance (Exploits zIIPs)

Application developers can deploy software using Docker interface

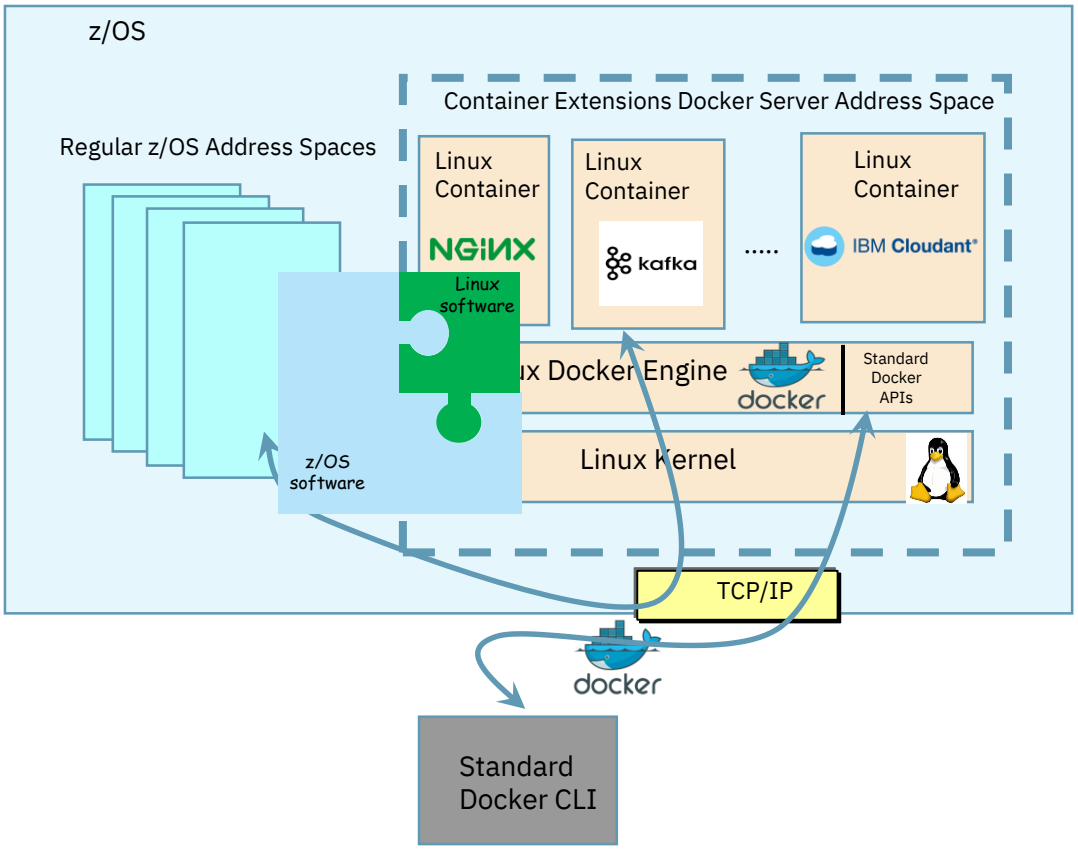
- Any software available as a Docker image on Z System (growing ecosystem available on Docker Hub)
- Any home-grown Linux for Z application packaged as a Docker image
- Using standard Docker interfaces

Limited visibility into Linux environment

- No root access
- Access as defined by Docker interfaces
- Limited Linux administrative overhead

Also provides IBM and ISVs a means of delivering solutions into this environment

- Requires packaging of software as Docker images



# z/OS V2.4 Release Overview

## z/OS Container Extensions Qualities of Services

- Integrated Disaster Recovery & Planned Outage coordination
  - z/OS DR/GDPS for site failures
  - Integrated planned outage coordination
  - No need to coordinate with non-z/OS administrators

- z/OS storage resilience
  - Eliminate single points of failure
  - Transparent encryption and failure detection with hyperswap
  - Configuration validation I/O health checks
  - Automatic detection of zHyperlink

- z/OS networking virtualization
  - Support for VIPAs
  - High speed communications

- z/OS Workload Management
  - WLM service goals and resource caps
  - Capacity Provisioning Manager (CPM)
  - SMF support for accounting and chargebacks

# z/OS V2.4 Release Overview

## What is Tailored Fit Pricing for IBM Z

**Tailored Fit delivers transformative new pricing models for IBM software.**

**Features two new enterprise models that provide comprehensive alternatives to the rolling four-hour average.**

- Delivers simple, flexible, and predictable cloud-like pricing, with economies of scale for all workloads on IBM z/OS.
- Removes the need for complex and restrictive capping, and offers reduced pricing for all types of workload growth.
- Existing “Container Pricing for IBM Z” workload solutions are rebranded under the Tailored Fit umbrella:
  - Application Development and Test Solution
  - New Application Solution
- Learn more: https://www.ibm.com/it-infrastructure/z/software/pricing-tailored-fit

# z/OS V2.4 Release Overview

## Tailored Fit Pricing

- Simple and predictable pricing models unlocked by z/OS technology
  - Flexible deployment options that support best technical fit
    - z/OS ability to define tenant resource groups (TRG) to meter workloads
    - SCRT enhancements to utilize RMF TRG data for co-located workload
    - SCRT enhancements to enable full LPAR containers
  - Enables Solution Consumption License Charges
    - Utilizes z/OS ability to provide detailed resource consumption metrics
    - SCRT calculates and reports true MSU consumption of a solution
- A Technical Pricing strategy for the ecosystem
  - Enhancements provide:
    - More flexible product registration and usage services
    - Sub-LPAR (TRG) tracking of product usage
    - RMF Monitor III reporting functionality of WLM Resource Groups & TRGs
  - LE wrapper enables easier use of product usage services (IFAUSAGE) in supported languages
  - SCRT support allows ISVs to take advantage of z/OS enhancements to track non-IBM products for ISV specific reporting

# z/OS V2.4 Release Overview

## What is IBM Open Data Analytics for z/OS?

**Solution designed to simplify data analysis. It optimizes the runtime of open source technologies, including Apache Spark, Anaconda and Python to gain insights from data at its source by:**

- Incorporating a wide variety of current data on and off z/OS, to reduce latency of insights and derive higher value from analytics.
- Reducing data movement and protecting business data with IBM Z systems crypto cards, which zero out when tampered with. Encrypt your data and analyze it at the source of origin.
- Improving interoperability with its integration with enterprise business applications.
- Integrating data across a heterogeneous environment using modern analytic capabilities commonly used by data scientists everywhere.
- Learn more by searching for 'IzODA' or starting here: https://www.ibm.com/us-en/marketplace/open-data-analytics-for-zos

# z/OS V2.4 Release Overview

## IBM Open Data Analytics for z/OS

- 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
  - 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
  - z/OSMF workflows are provided to simplify configuration
- Anaconda
  - Apache Maven support for better build automation
  - Support for XGBoost that is highly preferred in the industry for its implementation of gradient boosted decision trees designed for speed and performance

# z/OS V2.4 Release Overview

## IBM Open Data Analytics for z/OS (cont.)

- Mainframe Data Services (MDS)
  - MDS now supports real-time SMF data streaming and better performance for accessing IBM DB2 data with enhancements to Ibm DB2 direct sub-component 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

- z/OS Infrastructure with Metering and Capping
  - The new metering and capping support for z/OS allows the system capacity planner more granular control over CPU and memory consumption for various workloads and enables the system to host new workloads more easily.

# z/OS Support Summary

| Release | z9 EC<br>z9 BC<br>WdfM | z10 EC<br>z10 BC<br>WdfM | z196<br>Z114<br>WdfM | zEC12<br>zBC12<br>WdfM | z13<br>Z13s<br>WdfM | z14<br>ZR1 | z15 | End of Service | Extended Defect Support |
|---|---|---|---|---|---|---|---|---|---|
| z/OS V2.1 | X | X | X | X | X | X | X | 9/18 | 9/21[2] |
| z/OS V2.2 | | X | X | X | X | X | X | 9/20 | 9/23[2] |
| z/OS V2.3 | | | | X | X | X | X | 9/22[1] | 9/25[2] |
| z/OS V2.4 | | | | X | X | X | X | 9/24[1] | 9/27[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** |

# z/OS V2.4 Release Overview

## Release Notes

- JES3
  - JES3 is planned to be included in z/OS 2.4 and z/OS.next but not beyond that, customers affected can get more information by emailing: JES3Q@us.ibm.com
  - Starting in z/OS v2.4 ServerPac, IBM will no longer offer an option to remove JES2 during configuration.

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# Hardware Support

## IBM z15 Functions & Features

| System, Processor, Memory |
|---|
| One model: T01;<br>Five features: Max34, Max71, Max108, Max145, Max190 |
| 12 core 5.2GHz 14nm PU SCM |
| 1 - 190 PUs configurable as CPs, zIIPs, IFLs, ICFs, (up to 215 PUs) |
| Increased Uniprocessor capacity |
| Up to 34 sub capacity CPs at capacity settings 4, 5, or 6 |
| Enhanced Out-of-Order and new IBM Integrated Accelerator for zEDC (on-chip HW compression) |
| Enhanced processor/cache design with **2x L3 on-chip** and **1.4x L4 (SCM)** cache sizes |
| Up to 40 TB DRAM, protected by Redundant Array of Independent Memory (RAIM) – z/os supports 4TB per image |
| Virtual Flash Memory (VFM) granularity – 0.5 TB / Feature , up to 12 |
| 256 GB HSA |
| Improved pipeline design and cache management |

Items in blue are z15 improvements

| I/O Subsystem, Parallel Sysplex, STP, Security |
|---|
| PCIe+ Gen3 I/O fanouts with 2 x 16 GBps Buses |
| 6 CSS, 4 Subchannel sets per CSS |
| 0 – 12 PCIe+ I/O Drawers (Gen3) – PDU Models |
| 0 – 11 PCIe+ I/O Drawers (Gen3) – BPA Models |
| Next generation **FICON Express16SA** |
| **25GbE and 10 GbE RoCE Express2.1** |
| Integrated Coupling Adapter (**ICA SR1.1**) and Coupling express LR for coupling links |
| Support for up to **384 coupling** CHPIDs per CPC<br>**Support for 64 Internal Coupling CHPIDs** |
| **CFCC Level 24 (HMC 2.15.0, Driver Level 41)** |
| **Crypto Express7S** and **IBM Integrated Accelerator for zEDC (On-chip compression (DEFLATE))** |
| STP configuration and usability enhancements (GUI) |
| **IBM zHyperLink Express1.1** |
| **OSA-Express7S** |
| IBM Secure Service Container |

| RAS, simplification and others | |
|---|---|
| L3, **L4** Cache Symbol ECC | Enhanced Dynamic Memory Relocation for EDA and CDR |
| **N+2** pumps design for Air Cooled System | **Coupling Facility Resiliency enhancements** |
| ASHRAE Class A3 design | **Enhanced SE and HMC Hardware (security)** |
| Support for ASHRAE Class A3 datacenter | **TKE 9.2 LICC and new Smart cards** |
| **System Recovery Boost*** | Simplified and enhanced functionality for STP configuration |
| Universal Spare SCMs (CP and SC) | Virtual Flash Memory |

| PR/SM |
|---|
| **Up to 190 CPUs per partition** |
| IBM Dynamic Partition Manager updates |
| **Up to 85 LPARs** |
| 16 TB Memory per partition |

# Hardware Support

## IBM z14 ZR1 Functions & Features (Driver level 36)

| System, Processor, Memory |
|---|
| One model, one CPC drawer, four available sizes |
| 10 core 14nm PU SCM (5, 6, 7, 8, or 9 active cores per PU SCM) |
| Up to 30 configurable PUs as CPs, zIIPs, IFL, ICFs, or optional SAPs (up to 6 CPs) |
| Increased uni-processor capacity |
| 156 Capacity settings |
| 19" Rack, ASHRAE class A3 (for Data Center requirements relief) |
| Enhanced SMT (for IFLs and zIIPs only) and SIMD |
| Enhanced processor / cache design with bigger cache sizes |
| Up to 8 TB of Memory protected by Redundant Array of Independent Memory (RAIM) |
| 16U Reserved (rack space) feature |
| Up to 40 LPARs |
| IBM Dynamic Partition Manager |
| Secure Service Container |
| LPAR Group Absolute Capping |
| CPUMF sampling w/o PE Mode enablement |


**New features and functions**
**Announce: Oct. 2nd, 2018**

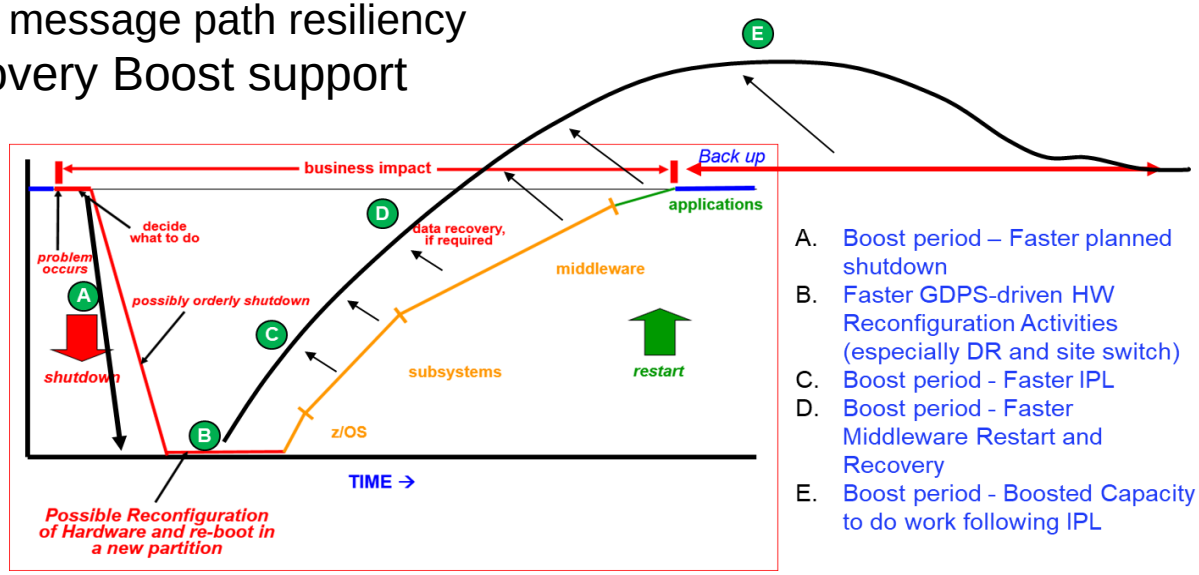
| I/O Subsystem, Parallel Sysplex, STP, Security |
|---|
| Up to eight (8) PCIe Gen3 I/O fanouts with 16 GBps Busses |
| New PCIe+ I/O Drawer (up to 4 per system, up to 64 PCIe features) |
| 3 LCSS, 3 Subchannel sets per LCSS |
| Next generation FICON Express16S+ |
| 32K I/O Devices for all FICON features |
| **25 &** 10 GbE RoCE Express2 |
| Integrated Coupling Adapter (ICA SR) and Coupling express LR for coupling links |
| **CFCC Level 23 (HMC 2.14.1)** |
| Crypto Express6S and CMPSC compression and Huffman Coding compression |
| **STP Enhancement - CTN Split and Merge** |
| Virtual Flash Memory (512 GB per feature, up to four features) |
| IBM zHyperLink Express |
| **OSA-Express7S 25GbE - SR** |
| OSA-Express6S |
| IBM Secure Service Container |

| RAS, Other Infrastructure Enhancements | |
|---|---|
| Keyboard Video Monitor Switch, single display console | Ethernet switches replace SCHs |
| STP Enhancements - Configuration | Rack-Mounted Support Elements (CPC rack) |
| Key Locks for doors | Tower & Rack-mounted HMCs and TKEs |
| Support for ASHRAE Class A3 datacenter | **TKE 9.1 LICC and new Smart Cards** |

# Hardware Support

## IBM z15 Highlights

- Protection of sensitive Data in dumps
- Improved compression performance
- Improved Crypto support
- Up to 20% More coupling links and up to 50% more CHPIDs
- z/OS SLIP to monitor an address or range for a key change and take diagnostic action
- CFCC improvements
  - Thin interrupt as the default
  - Improved fairness in dispatching
  - Improved message path resiliency
- System Recovery Boost support




A. Boost period – Faster planned shutdown
B. Faster GDPS-driven HW Reconfiguration Activities (especially DR and site switch)
C. Boost period - Faster IPL
D. Boost period - Faster Middleware Restart and Recovery
E. Boost period - Boosted Capacity to do work following IPL

# Hardware Support

## ICSF HCR77D1 WD#19

- Available via web deliverable download only
- HW features being exploited by ICSF:
  - New crypto coprocessor, CEX7
  - New CCA releases for CEX5 and CEX6
    - CCA Release 5.5
      - New and updated services for DK PIN processing
    - CCA Release 6.3
      - Support for ANSI TR-34
      - PCI HSM support for AES and RSA key types
  - CPACF enablement for Elliptic Curve cryptography
    - CPACF can now be used for ECC operations, including new Edwards curves Ed448/Ed25519
    - Sign/Verify, Key Pair Generate, Key Derivation
- New features
  - Quantum Safe algorithms for digital signature operations
  - New Edwards curves, Ed448 and Ed25519, supported via PKCS#11 APIs
  - Additional audit records when changing a master key
  - A new health check to examine a system's ability to use PKCS PSS signatures
    - PSS is the NIST recommended digital signature algorithm

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# Usability & Skills

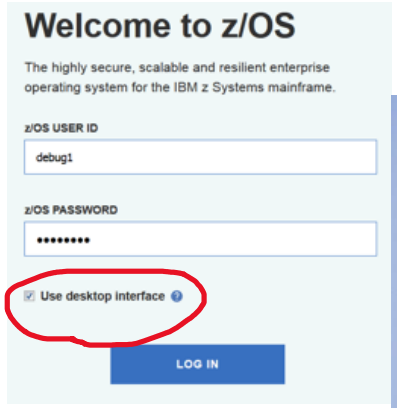
## Overview, goals & directions

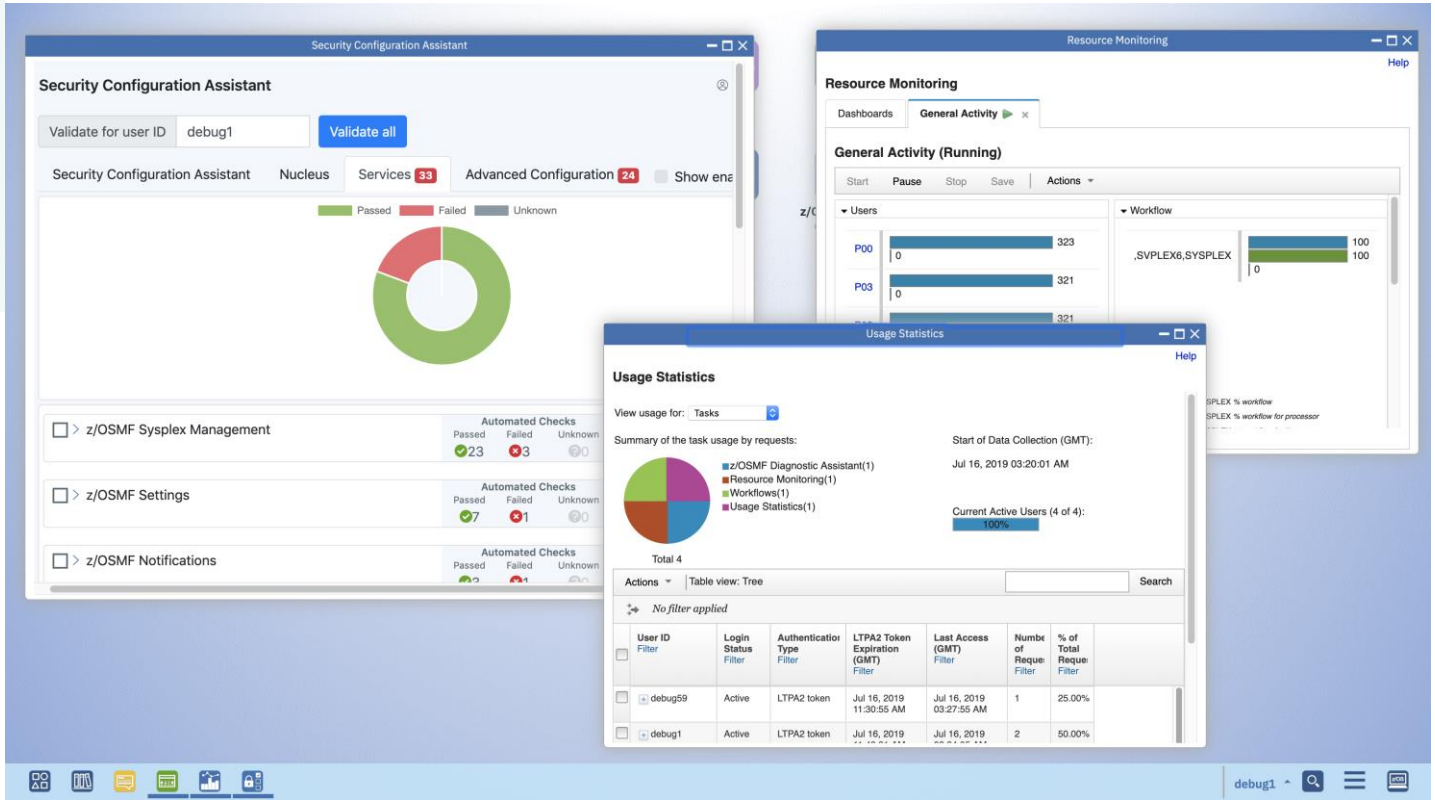
- Bring a browser based ecosystem to z/OS Management
  - Consistent with other platform User interfaces
  - Modern compared to ISPF 3270
  - Client platform agnostic – OS, devices etc.
  - Exploit graphics and other techniques where appropriate
- Develop Applications focused on z/OS unique needs
  - Task Oriented
  - Reduced effort
- Integrate and expand the z/OS ecosystem
  - Provide API’s for public consumption
  - Securely and efficiently
- Reduce Reliance on Assembler Skills
  - Provide solutions that don’t require code where possible
  - Support higher level language extensions of z/OS

# Usability & Skills

## z/OSMF Desktop

- z/OSMF a desktop-like user interface, default for z/OS 2.4
- Benefits – Multi-tasking, more screen available, intuitive to new users

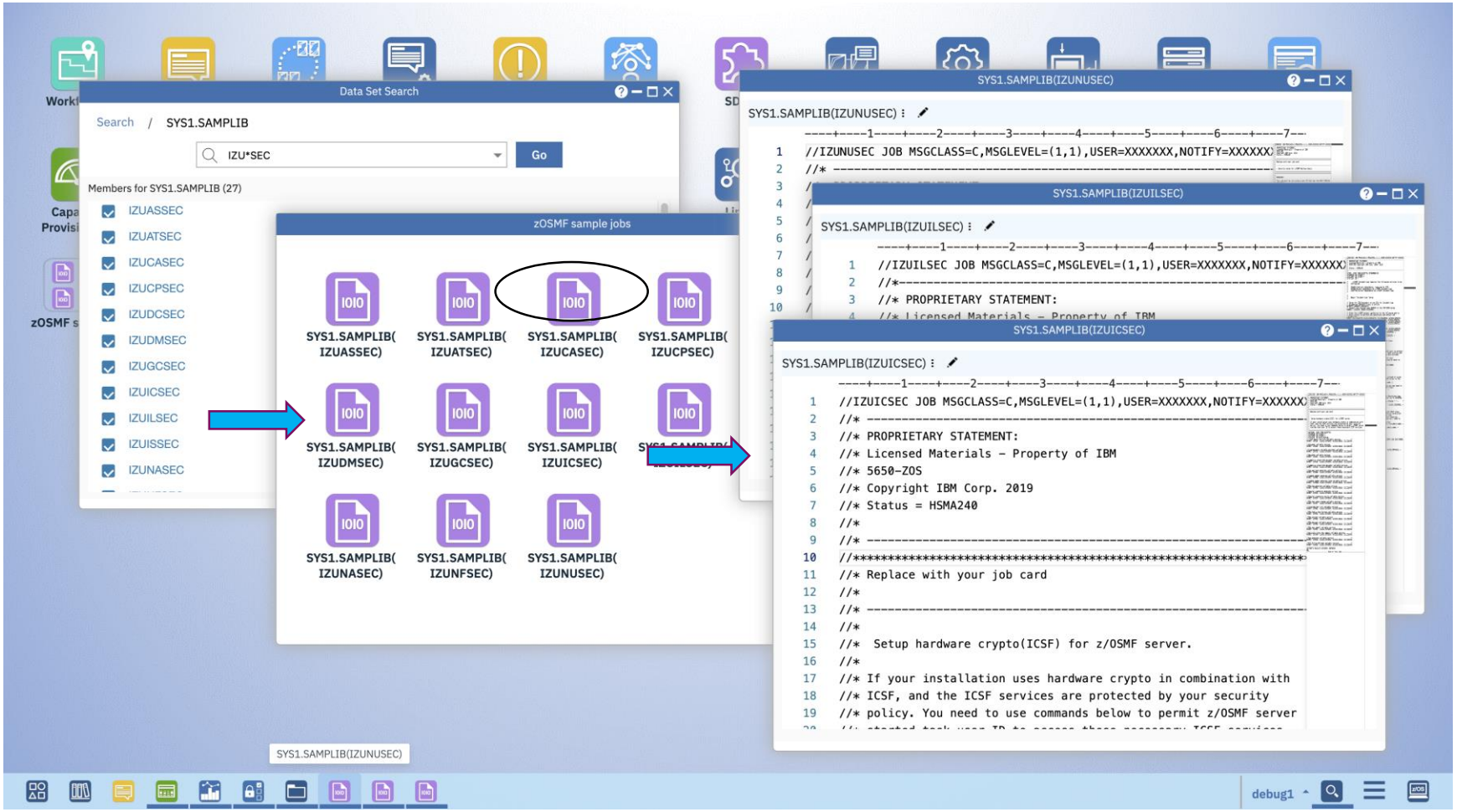


# Usability & Skills

## z/OSMF Desktop

- Benefits – customer grouping of items such as data sets



# Usability & Skills

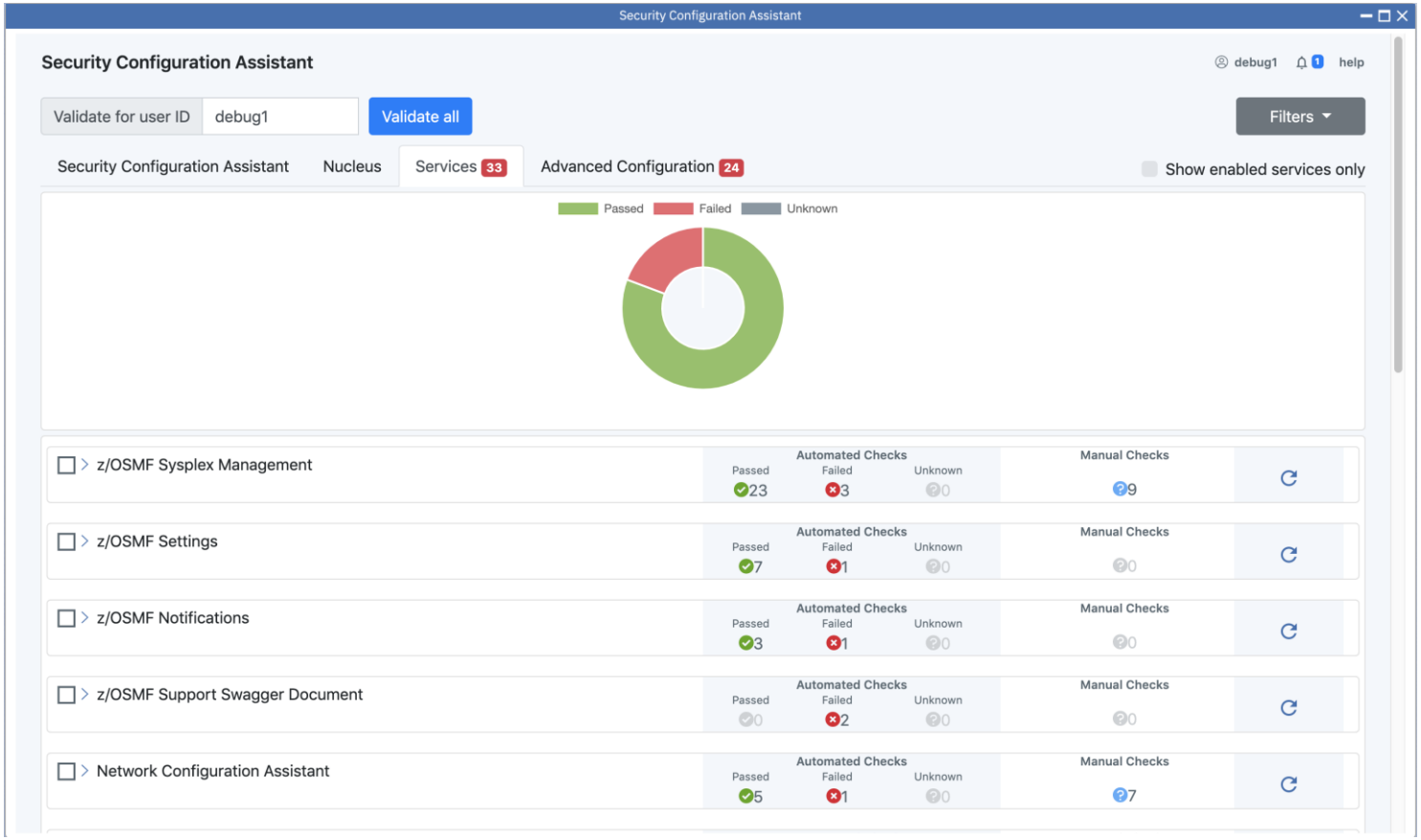
## z/OSMF Improved Configuration

- Configuration book planned to be restructured to make it possible to:
  - Allow an administrator to complete z/OSMF Nucleus setup very quickly
    - z/OSMF nucleus is just enough config to bring up the user interface
  - Allow an administrator to configure desired services as they are needed
- Resturcture Security Set-up
  - IZUNUSEC security sample contains only ALL-MUST-DO setup for Nucleus
  - Every service will have its own security sample job
  - Security requirement will be described more precisely for feature mapping
- Support using certificate/smart card to logon to z/OSMF UI

# Usability & Skills

## z/OSMF Improved Configuration

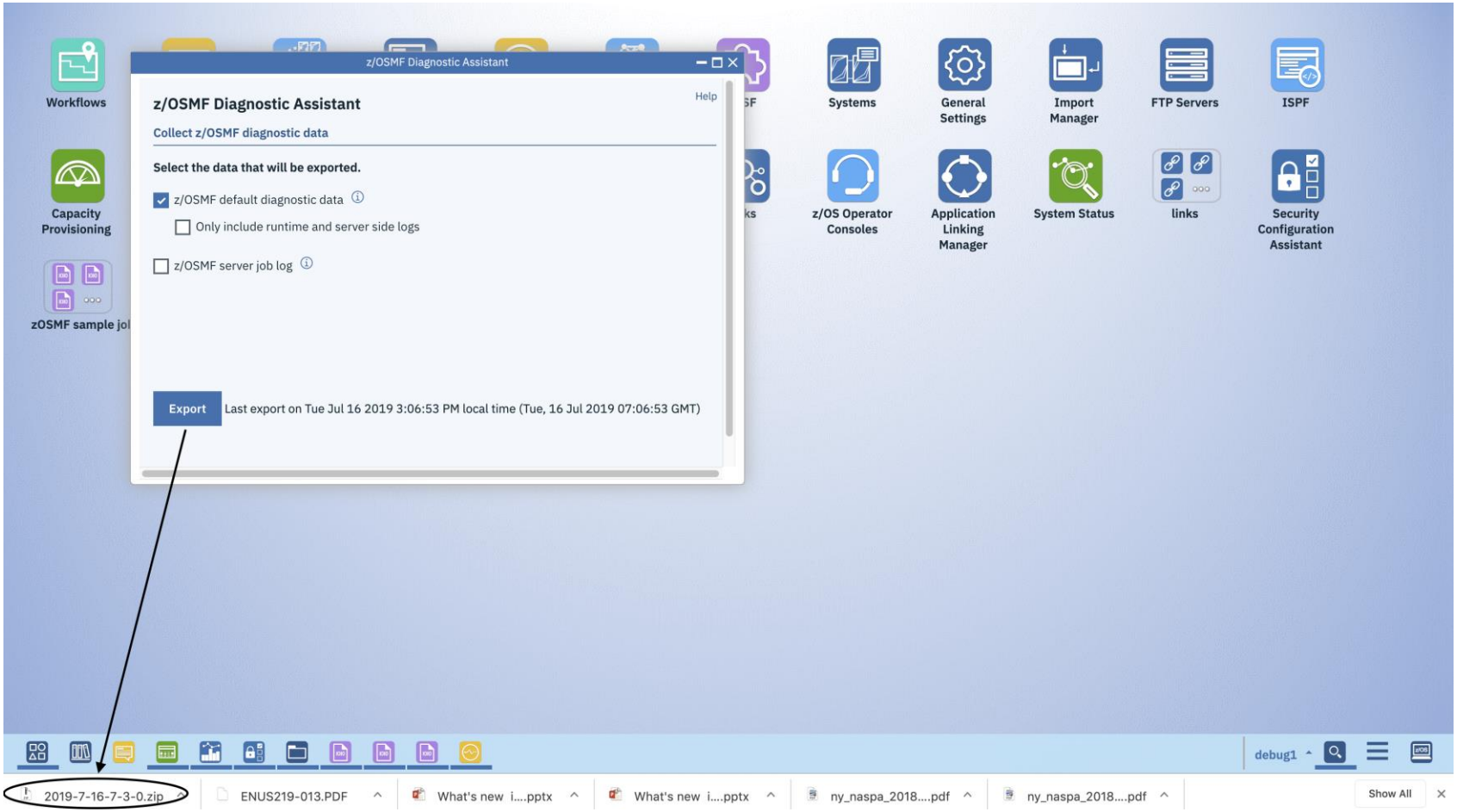
- NEW Security Configuration Assistant
  - A new z/OSMF application to help in configuring securirty



# Usability & Skills

## z/OSMF Diagnostic Assistant

- Collect z/OSMF diagnostic data with one click



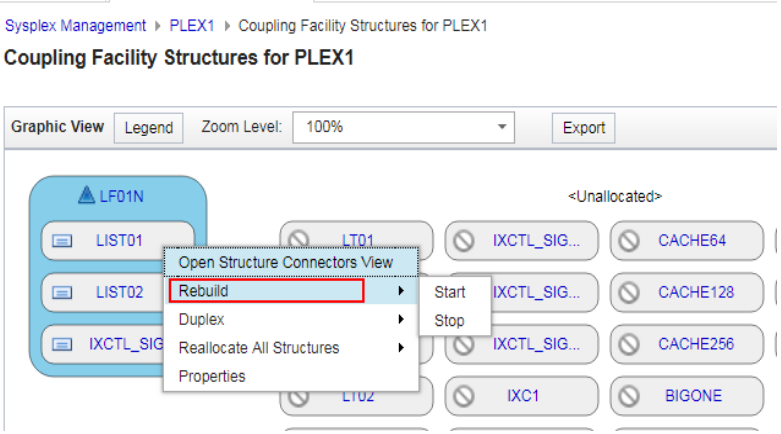
# Usability & Skills

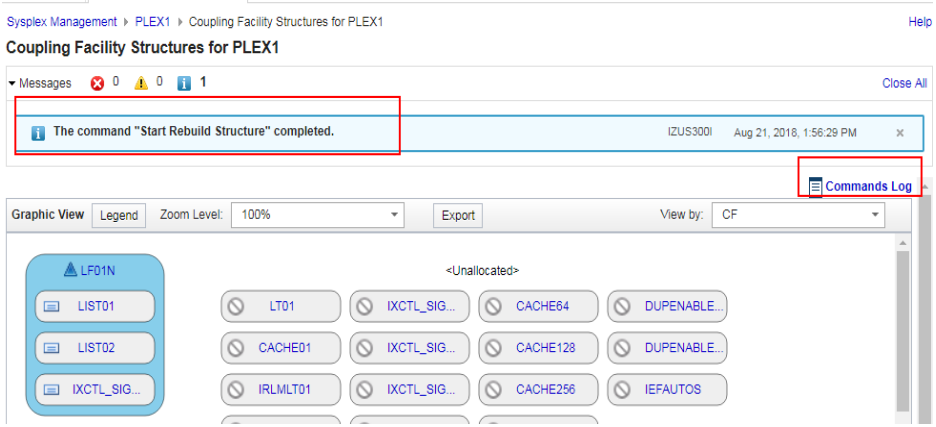
## z/OSMF Sysplex Management

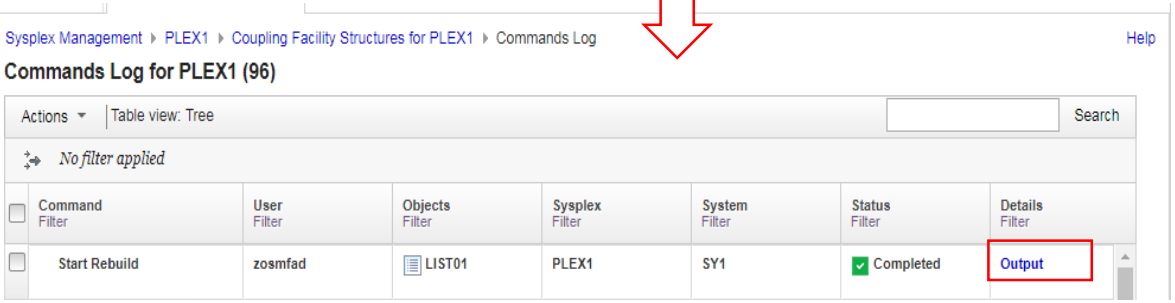
- View Sysplex configuration
  - Table and graphical views
    - Physical and logical views, by CPC, by sysplex, by Coupling Facility, by Structure
    - Coupling Facility, Links, Structures
  - Available in z/OS 2.2 and up
- Modify Sysplex configuration
  - Sysplex-wide commands and results display
  - Command Log retained across IPL's
  - 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 structure(s), all structures
  - Duplex structure(s), all structures
  - Reallocate
  - Couple dataset creation, addition, switching
  - CF actions
  - CF connectivity (link and CHPID) management

# Usability & Skills

## z/OSMF Sysplex Management – Modify structures




# Usability & Skills

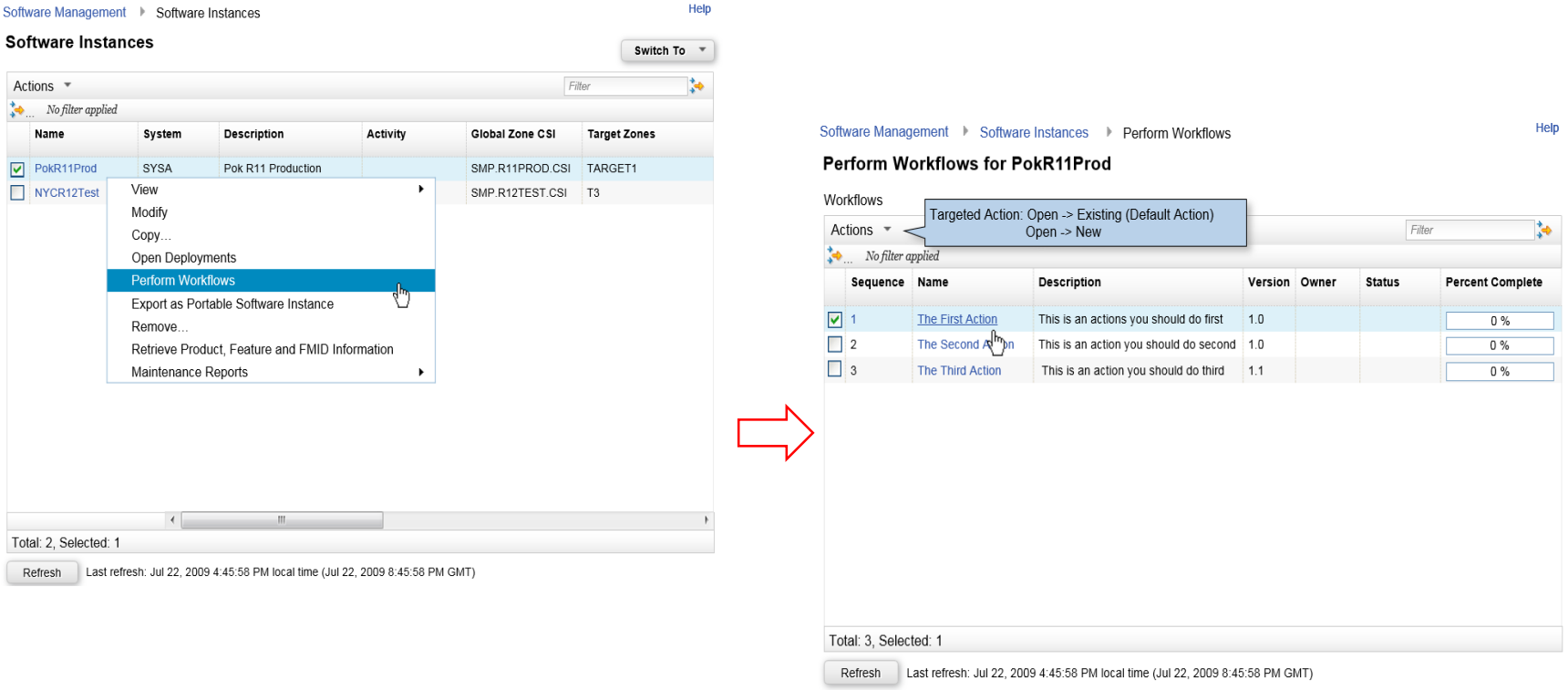
## z/OSMF Software Management

- Ultimate goal is to provide a single approach to software maintenance and management
  - Acquisition
  - New installation
  - Upgrades
  - Fixing a problem
  - Applying preventative maintenance
- An application in z/OSMF to manage software binaries
  - Portable software instances
  - Can be SMP/e or non-smp/e or a mixture
  - Installation via dialog
- Use of z/OSMF Workflows for configuration
  - Standardize the configuration of software
  - Both IBM and non-IBM software
  - Can be instructions or automated or a combination

# Usability & Skills

## z/OSMF Software Management integration with Workflow

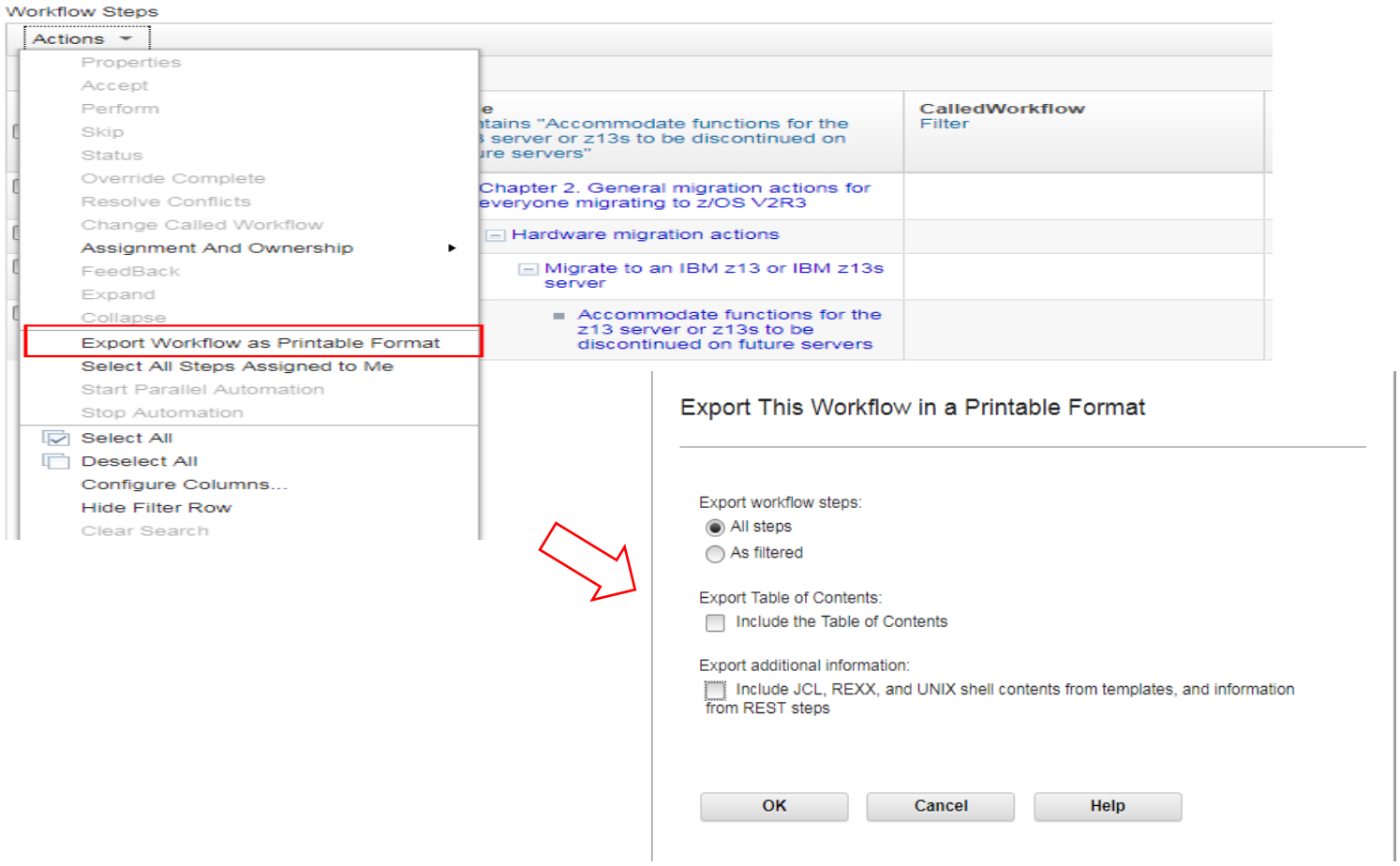
- Workflows associated with software instance (PH02650)
- Define workflows for a software instance
- Run workflows for a software instance



# Usability & Skills

## Workflow – Export workflow as printable format

- The z/OSMF Workflows task is enhanced to support a new function called “Export Workflow As Printable Format”, which is to export workflow information and steps information into a readable and printable format HTML page via PH00582



# Usability & Skills

## z/OS Release Upgrade Assistance

- Generally, the term “migration” will be referred to as “upgrade” as of z/OS V2.4

- z/OSMF *z/OS V2.4 Upgrade Workflow* is planned to be provided from current github location for V2.2 and V2.3 upgrade paths.
  - This Workflow allows for discovering functions used, tailoring information specific to your systems, and verification of many upgrade actions.
  - IBM Strongly recommends that you become familiar with z/OSMF Workflows to take advantage of these benefits!

- *z/OS Migration* publication in its current form will not be provided.
  - Exported formats for both upgrade paths of the *z/OS V2.4 Upgrade Workflow* is planned to be provided in Knowledge Center for co-location with the rest of the z/OS books. These files will allow for reading, searching, and printing without z/OSMF.
  - Note that these exported files are not tailored for your environment, so determining applicability and tracking status is not possible if you use the exported formats.

# Usability & Skills

## Software Management installation of ServerPac (SoD)

- IBM's first delivery of a ServerPac as a Portable Software Instance planned for CICS Transaction Server and associated CICS products, which can be installed with z/OSMF
  - Choosing this option means you will use z/OSMF on your driving system
- Existing ISPF CustomPac Dialog format will still be offered. Choice is yours
- Both formats offered in internet download on in DVD

# Usability & Skills

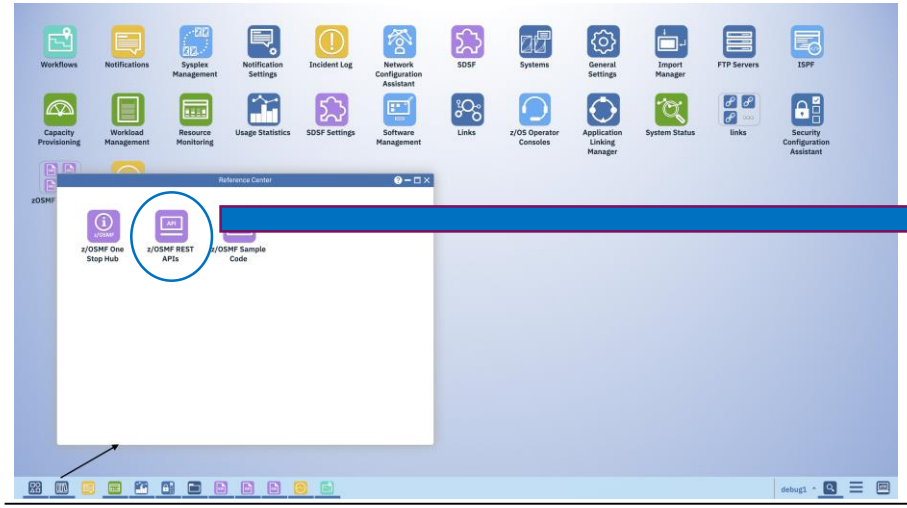
## Console application

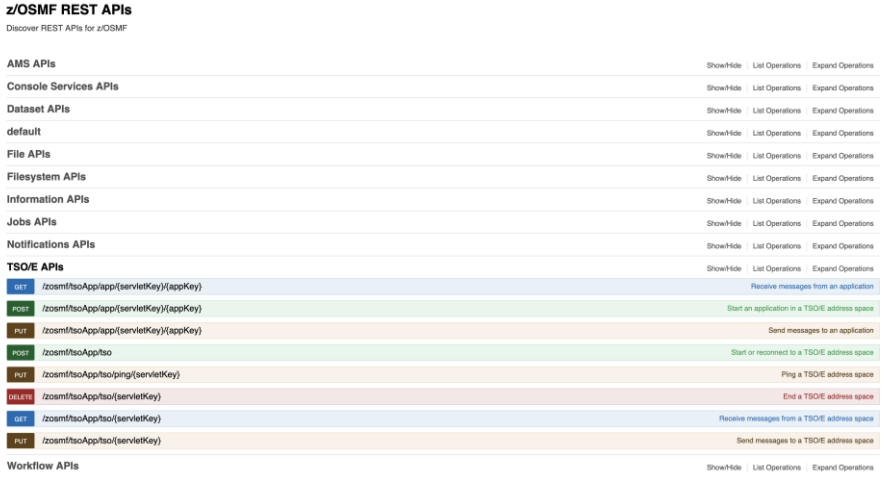
- Support for WTOR/HOLD messages
- Improved handling of large amounts of messages

# Usability & Skills

## z/OSMF Updates

- z/OSMF Workflow task will now support parallel-step workflows. One or more automated steps of a parallel-step workflow can run at the same time
- Workflow support for array type variables via PH03053
- The z/OSMF Incident Log task is enhanced to support the CASE parameter in addition to the existing PMR number when sending diagnostic data to the IBM support site. The CASE parameter is a new format for problem management.
- OpenAPI1.0 support for most z/OSMF REST APIs



# Usability & Skills

## XCF Transport Class Simplification

- Continuing enhancements to earlier work in this space are planned to make XCF transport classes more self-managing and self-tuning, as well as to improve resiliency by avoiding monopolization of message buffer space
  - ***Vision:*** *Customers will no longer need to define, tune, or manage XCF transport classes when configuring their sysplex. The task of configuring XCF communication in a multi-system sysplex is simplified and reduced to defining the number of XCF signal paths needed to support the workload, which will help avoid badly configured sysplex messaging (and performance issues/outages) as a result.*
- Focus for 2.4 timeframe is autonomic management of transport class “segregation by size” and of the associated message buffer space
  - New automatic _XCFMGD transport class
  - No need for clients to properly “tune” XCF transport class message sizes to match the signaling workload characteristics, to achieve good results
  - Simplification and improved resiliency – avoid performance and resiliency impacts from poorly-tuned transport class sizes
- IXCMG and IXCYAMDA accounting and measurement changes, and accompanying SMF data changes are provided
  - New/improved statistics for reporting message path utilization, signal counts, and no-buffer conditions
- Resiliency support for management of transport classes for “segregation by XCF group” is a future objective
  - Improved resiliency in the event of “runaway” message senders or “stalled” message receivers, automatically preventing them from monopolizing the available resources in the transport class, protecting other groups that are sharing those transport class resources

# Usability & Skills

## Assembler Exit Reduction

- Add support to SMFLIMxx
  - Memory limits add filters for SAF, and overriding JCL specified memory
  - Memory limits add actions to set dataspace limits and message suppression
- Add Support for JES2 policy based exit reduction
  - Ability to do basic policy based detection and actions
  - Designed to augment existing exits
  - Release independent implementation
- Add support for RACF to validate custom field values with a Rexx program
  - The exit uses system Rexx
  - Existing IRRVAF01 assembler exit support remains
  - Both mechanisms are available for all RACF profile types

# Usability & Skills

## C Header Files

- z/OS 2.4 delivers some C Header files analogous to maclib/modgen mapping macros, in order to facilitate C code development of programs that need to access z/OS data areas.

- The header files are provided in both a data set (SYS1.SIEAHDR.H) and the file system (in /usr/include/zos – a new sub-directory).

- An area of concentration is SMF record mappings, for which header file IFACSMFR is provided. IFACSMFR, via nested includes, provides C mappings for many of the SMF records covered by the IFASMFR macro.

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# Scalability & Performance

## Overview, goals & directions

- Goal is release to release equivalence
  - Ensure smooth release to release migration
  - Performance focus on selected areas

- Exploit hardware features
  - Synergistic improvements with new hardware including:
    - Hardware instructions and memory topology
    - Accelerators
    - I/O technology exploitation
  - Expand the software that can exploit features

- Constraint relief
  - Identify and remediate constraints before client impact
  - Long term continue AMODE 64 and RMODE 64 roadmap items

- System scalability and performance metrics
  - Metrics for resource consumption
  - Capacity planning tools

# Scalability & Performance

## AMODE 64 Support / Exploitation

- Exploitation of 64-bit memory, large pages, and non-executable memory
  - RMF Monitor I and II exploitation
  - JES2 Exploitation of 64-bit (post GA deliverable)
  - JES2 Exploitation of read-only and non-executable memory
  - WLM SRM exploitation
  - LE exploitation of read-only and non-executable memory
- Shared storage obtained using IARVSERV no longer requires ESQA
  - Improved scalability of shared storage
- z/OS v2.4 no longer allows or supports user-key common storage by default
- 64-bit obtains (IARV64) now support explicit address with the INORIGIN keyword

# Scalability & Performance

## Alternate Subchannel Set for Linux

- In configurations where Linux for Z is running on the same IBM Z server as z/OS and z/VM, many customers traditionally define the entire I/O configuration in z/OS.
- Therefore, HCD (z/OS) needs to be able to define and dynamically activate I/O configurations for any type of OS on the server.
  - With this support, a configuration administrator can define and dynamically activate an I/O configuration for a partition running Linux for Z without losing any capabilities for z/OS or z/VM operating systems.
  - With this support, an HCD/HCM user can define FCP devices to an alternate subchannel set as long as they are not used by z/VM, in order to get relief on usable device numbers in the primary subchannel set.

# Scalability & Performance

## Improve SVC Dump Capture Time

- SVC Dump processing improved capture times in an unconstrained environment
  - Improved parallelism
  - More aggressive memory usage (CHNGDUMP SDUMP,OPTIMIZE=YES)

- Larger dumps
  - Increase maximum dump size > 200 Gb

## Uncaptured Volume I/O Statistics

- SMF type 42 subtype 5 – added I/O stats, volume contention, cloud data transfers

- SMF type 42 subtype 6 – dataset I/O statistics has added storage subsystem ID

- Can be used to diagnose performance problems

# Scalability & Performance

## Enhanced Capacity management

- z/OS capacity provisioning manager is enhanced with new commands to set and report on LPAR weights

## Larger log stream staging data sets

- Support for IBM zHyperwrite for logger staging datasets and offload datasets

## Allocation throughput improvements

- Enhancements are provided for device availability and serialization when using tape devices

## VSAM exploitation of zHyperLink

- zHyperLink Express® is designed to provide a high-performance data access method on storage subsystems
- Allow VSAM zHyperLink support to be enabled through SMS StorageClass and VARY SMS commands.

*** All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided "AS IS" and no warranties or guarantees are expressed or implied by IBM.**

# Scalabilty & Performance

## RMF Updates for Hyperlink

- RMF stores synchronous I/O link statistics on storage controller level in a new data section of SMF 74.8 records (ESS Statistics)
- Cache device related synchronous I/O performance data is collected in SMF 74.5 records (Cache Subsystem Device Activity)
- Reporting on synchronous I/O link statistics per storage controller is added to the RMF Postprocessor ESS report
- Synchronous I/O cache device activity is reported in the RMF Postprocessor CACHE Subsystem Activity report
- New/modified OVW Conditions are provided for synchronous I/O metrics.

## 2038/2042

- All application API's should support 2038 or greater
- z/OS still does not support setting the TOD beyond 2042, individual components will support
  - SSL 2038/2042 Updates
- Progress, but not yet at end of job

# Scalability & Performance

## Inbound Workload Queueing (IWQ) support for IBM z/OS Container Extensions (CD)

- z/OS Communication Server's OSA-Express Inbound Workload Queueing support is enhanced to add a new input queue for zCX network traffic.
- The OSA-Express IWQ separation of the zCX traffic from native z/OS traffic provides an optimal Communications Server processing environment for zCX traffic.
  - When IWQ is enabled, the z/OS TCP/IP inbound processing for the zCX traffic becomes zIIP eligible.
  - OSA-Express will direct zCX traffic for protocols TCP and UDP to the zCX input queue. The z/OS IWQ zCX solution will be made available on OSA-Express6S and beyond.
- IWQ zCX is enabled on z/OS V2.4 with PTFs for APARs PI16581 and OA58300.

# Scalability & Performance

## Enhanced Transparent Cloud Tiering (CD)

- IBM TS7700 Virtualization Engine to be the object storage target for transparent cloud tiering
- This new feature enables DS8000 transparent cloud tiered object data and traditional FICON logical volume data to coexist within the same physical TS7700 cluster
- DFSMShsm supports
  - Migrating data directly from DS8000 disk to TS7700 clusters using transparent cloud tiering and the TS7700 DS8000 object store capability
  - Manages this data the same as cloud object storage data, such that there is no host CPU consumed for data movement and no need for recycle processing
- No additional hardware is required as data movement is done through existing GRID interfaces between the DS8000 and the TS7700, and data is logically partitioned out of the existing resident cache

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# Availability

## Overview, goals & directions

- Provide industry-leading availability
  - For mission-critical application workload through synergy between resilient hardware, operating system, middleware, and storage technologies
- Exploit Parallel Sysplex and the coupling technology to mitigate impacts from planned or unplanned outages
  - Extend Data Sharing exploitation and efficiency
  - Provide workload balancing and routing optimizations and efficiencies
  - Enhance sysplex recovery mechanisms for improved performance and recovery time (e.g. CF structure duplexing)
  - Provide near-continuous access to data stored in Filesystems (e.g. zFS, NFS)
- Detect and Mitigate system resource problems
  - Monitor resource consumption and system/sysplex operations in real-time
  - Provide operational insight into anomalies and trends that require attention
  - To mitigate problems quickly, proactively, and autonomically
- Support dynamic modification of shared resources without incurring disruptions in which the resources are temporarily unavailable (“always on”)
- Support state-of-the-art disk replication technologies
  - Data availability (Hyperswap) – locally and at distance
  - Disaster recovery for 2-site, 3-site, and 4-site DR configurations
- Provide support for protecting data against malicious or accidental logical data corruption or deletion, through the use of multiple point-in-time protected copies of the data that can be used to restore or recover the data to its pre-corruption state, either granularly or in aggregate
- Extend Geographically Dispersed Parallel Sysplex (GDPS) environments
  - Multi-site “stretched” Parallel Sysplex across metro distances and improved isolation/availability of the GDPS k-system
  - Continuous Availability (Active/Active Sites) solution through improved software replication technologies, and innovative solutions to improve the achievement of RPO and RTO objectives to near zero

# Availability

## Sick But Not Dead – JES2 Spool Throttling

- JES2 SBND avoidance – SSI provides externals for spool usage resiliency data
- SSI externals can be used by monitoring products for reporting, alerting, etc. in situations where spool resources are nearing their limits

## RACF remote sharing VSAM checkpoint files can be relocated or resized dynamically

- New keywords on the TARGET command allow reconfiguration
- Allows for renaming data sets to achieve consistent naming conventions

## TSO/E LOGON Timeout Support

- TSO user at logon screen gets timed out after 5 minutes

# Availability

## z/OS Global Mirror (zGM) Enhancements

- zGM (aka Extended Remote Copy or XRC) combines hardware and z/OS software for an *asynchronous* remote copy solution that enables critical data to be mirrored between the application and recovery sites while maintaining consistency.
  - Increasing numbers of large enterprises are adopting 4-site DR configurations, with a high availability (HyperSwap) configuration within each region, and some form of DR between regions.
- New XRC enhancements alleviate constraints and allow for more flexible 4-site configurations that enable data center growth while maintaining both high availability and disaster recovery capability without recovery point objective (RPO) increase.

## Remote Pair FlashCopy (RPFC) for XRC

- XRC was enhanced to allow a FlashCopy between primary volumes at the application site which is then mirrored at the recovery site between secondary volumes without disrupting the mirror or consistency at the recovery site.
- Enables production data, production point-in-time copies, and backup data to be available at all sites while maintaining both high availability and disaster recovery capability.

# Availability

## Logger support for single-system logger for GDPS k-system environment

- GDPS k-systems participate in the sysplex environment, but need to be isolated “as much as possible” from other systems in the sysplex so that they can perform their role in DR failover automation orchestration, even when the sysplex at large is having problems

- To this end, System Logger single-system scope Couple Data Sets (LOGRY & LOGRZ CDS) support provide clients with an isolated set of logger CDSes used only on the GDPS-k-system, isolating its logger functionality from the remainder of the sysplex
  - Isolate GDPS k-systems from OPERLOG, LOGREC, and other “sysplex-wide” logstreams used by the rest of the sysplex
  - While preserving the ability to take advantage of pervasive sysplex and z/OS log stream capabilities/technologies, such as OPERLOG, LOGREC, SMF digital signatures and compression, and also to continue to use similar tools/utilities as currently used throughout the sysplex to extract log data, even on the GDPS k-systems.

# Availability

## Logger transport affinity IBM zAware communication (stack affinity)

- z/OS system logger has been enhanced to allow use of a transport provider name for TCP/IP stack affinity in C-INET configurations when communicating to the IBM zAware server
- This enhancement allows TPNAME(transport-name) to be specified on the z/OS system logger IXGCNFxx ZAI statement
- System logger will use the specified transport-name to set the affinity when establishing the IBM zAware socket communications

## Device-based Management & Multiple Subchannel Sets (MSS) Exploitation

- XRC was enhanced to utilize 5 digit device numbers, instead of volsers, to enable MSS exploitation for the volumes in the XRC session.
- Allowed for more flexible and easier to manage configurations and provided constraint relief for 64K device numbers.

# Availability

## Online zFS to zFS migration

- Introduced in z/OS V2.3, the BPXWMIGF migration tool provided ability to migrate HFS to zFS transparently.
- In z/OS V2.4, it now supports zFS to zFS migration transparently also.
- Useful in migrating zFS file systems from one volume to another volume, without impacting the application.

## zFS High Availability support *

- Applications running in a sysplex environment and sharing read-write mounted zFS file systems will no longer be affected by an unplanned outage.
  - Unplanned outages will be transparent to the application on other members of the sysplex and will no longer result in zFS file system I/O errors.
  - Can be specified:
    - as a mount option on individual mount statements to affected individual zFS file systems
    - globally in IOEFSPRM to enable this support for all read-write mounted zFS file systems
    - dynamically to change already mounted zFS file systems.
  - Will be ignored for applications that use zFS file systems in a single system environment.

# Availability

## Transactional VSAM (TVS) Auto-Commit Support

- TVS is an optional z/OS feature that enables batch jobs and CICS transactions to concurrently update shared recoverable VSAM data sets thus reducing the batch window for CICS and other VSAM applications and improving system availability.
  - Currently, to fully exploit TVS, batch applications must be modified to use z/OS Recoverable Resource Services (RRS) to issue sync point commits in order to avoid holding too many locks which could result in elongated CICS response times.
- With the new TVS Auto-commit support, users can avoid making costly source code changes to batch applications and instead TVS will invoke RRS to issue sync points commits on behalf of eligible batch applications based on specified parameters.
  - Specify the TVSAMCOM parameter in the job step JCL OR
  - Specify a system level commit parameter in the IGDSMSxx member of SYS1.PARMLIB.
  - Note: The JCL value will override the value specified in IGDSMSXX.

## Runtime Diagnostics

- Runtime Diagnostics now has more comprehensive message analysis to pinpoint problems by identifying critical and other outstanding WTORs

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# Systems Management

## Overview, goals & directions

- Provides system programmer efficiency, confidence, and consistency
  - Consistent z/OS installation platform for IBM & Vendors
    - Packaging, delivery, installation, deployment, configuration, and validation
  - Simplified installation of SMP/E service
  - Improved security integration
    - Detection, validation and correction
  - Focus on common tasks
    - Deliver standard service catalog
    - Capturing site unique activities
    - Can be integrated with change management
    - Optionally self service provisioning (Cloud)
  - Enhanced z/OS release upgrade process
    - More discovery and more automated actions
- Basic facilities to ‘get the job done’
  - Entitled with the operating system
- Enhanced facilities available
  - Features or products (IBM or Vendor)

# Systems Management

## DFSMS UNIX File Backup

- Clients want to use the same tools and applications to backup and restore individual z/OS UNIX files residing in z/OS File System (zFS) data sets as other z/OS data sets.
- New enhancements to backup and restore individual z/OS UNIX files residing in zFS (z/OS File System) data sets is integrated into existing DFSMShsm backup / recover and DFSMSdss dump / restore capability, allowing for centralized data management across the z/OS platform.
  - The support is intended to subsume the capabilities provided by the existing IBM Tivoli Storage Manager (TSM) z/OS UNIX System Services Backup-Archive Client.
  - DFSMS will **not** provide support for z/OS UNIX files found in Hierarchical File System (HFS) data sets.

## New Automount Function

- Can be configured to create new zFS file systems that will be cataloged in user catalogs instead of the master catalog
- Allows for segregation of catalog entries based on naming conventions and integrates into clients' existing storage management and security policies

# Systems Management

## New support in NFS to help customers migrate from DFS/SMB *

- A new migration health check to help customers identify their usage of DFS/SMB (Distributed File System / Server Message Block)
- To aid in NFS Server configuration, a z/OSMF (documentation only) work flow with step-by-step instructions - especially useful for the first time user.
- New z/OS NFS Client utilities, namely MVSLOGIN and MVSLOGOUT (that allow a non-z/OS client to manage SAF authentication to a z/OS host) and SHOWATTR (that displays the z/OS NFS server attributes) are delivered for the Windows 10 NFS Client.
- Kerberos support has been provided for NFS V3 - the level of protocol supported by Windows 10 to control access to NFS network shares
  - Also allows for integration with Active Directory for UID/GID specification
  - Can enable end-to-end encryption between z/OS and Windows environments
- Multiple NFS servers in a single LPAR (OA 57577)
- **Note:** z/OS V2.3 will be the last release to support the DFS/SMB file-sharing protocol

## NFS Server

- UNICODE conversion support based on mount system attributes.
- Support for sharing of compressed data sets requires no configuration changes to the NFS Server and is transparent to end users.

## JES2 Enhancements for Migration

- JES3 Statement of Direction will lead to migration to JES2
- JES3 to JES2 migration support
  - Disk reader support now in JES2
  - //*ROUTE XEQ JECL support
  - Support for multiple jobs in an NJE job stream
- JES2 will always be installed with z/OS

## JES2 enhancements

- Checkpoint version improvements (post GA deliverable)
  - Exploit 64 bit storage
  - Improved performance and reduced working set size
- Replace exits with policies
  - JES2 will provide support for conditions and actions
  - Built in to policies that allow actions based on conditions
  - Condition: job name is ABC, action: set job class to Q

# Systems Management

## z/OS Cloud Provisioning and Management

- Support for IBM Cloud Private (ICP)
  - IBM z/OS Cloud Broker (Announcement)
- z/OS Cloud provisioning security and RACF simplification
- Sysplex clustered instance
  - z/OS Cloud cluster support
  - z/OS Cloud networking support for sysplex clustered instances
- DB2 cluster support dependency for DB2 data sharing group workflows
- Common Security XML Descriptor for Cloud
  - Improved administration of non-RACF security
- Metering and capping for memory
  - System programmers are able to view memory consumed by software service instances that are provisioned by a specific tenant and set a cap for memory consumption
- The Workflow Editor task enhancements
  - The Workflow Editor includes a "toolbox" of IBM-supplied steps that are designed for performing common tasks on z/OS, such as creating a data set
  - The files for a workflow, the primary XML file, fragment files, and the variable input file are supported from sequential or partitioned data sets. Previously, they were required to be z/OS UNIX files.
- For additional details about these enhancements, see the What's new in IBM Cloud Provisioning & Management for z/OS blog.

# Systems Management

## Cloud Storage Access for z/OS

- Cloud storage makes it possible to store practically limitless amounts of data, simply and cost effectively and access it from anywhere in the world using internet protocols.
  - Data and its associated metadata are stored as discrete objects with a unique ID in a flat address space designed to be both scalable and flexible.
  - Cloud storage allows users to reduce the complexity of their data storage environments and to minimize total cost of ownership.

## Transparent cloud tiering (TCT) for DS8000

- TCT developed in conjunction with z/OS and DFSMShsm and provides automated, policy-based, server-less movement of archive and backup data directly to a cloud object storage solution using OpenStack Swift or S3-compatible interfaces.
  - DFSMShsm automatic migration supports TCT via SMS management class policy and continues to automatically recall a data set to primary storage when it is referenced without any parameter changes.
  - TCT supports migrate and recall of data to volumes in both simplex and copy services relationships, including 2-site Metro Mirror, FlashCopy, and Global Mirror.  Only MTMM and XRC continue to be restricted.
  - TCT supports encryption to provide security of data in flight.

# Systems Management

## zlsof Extended Processing

- Enhancements have been provided to the zlsof (list open files) utility of z/OS UNIX System Services that show extended processing information, including start time, elapsed time, CPU time, thread number, state of the process read-write open mode, and other related information.
- In addition, the zlsof utility can generate output in JSON (JavaScript Object Notation) format, enabling clients to parse and build reports

## OpenSSH Direct CPACF Support

- Improved performance using direct CPACF instructions
- This function is mutually exclusive with FIPS 140-2 compliance

## True Random Number Generation for z/OS UNIX

- Simplified configuration for random numbers when running on IBM z14

## Hardware Configuration manager (HCM) Performance Improvement

- An option is provided to limit diagram re-painting to improve large configuration displays

# Systems Management

## BCPii

- LPAR Group
  - Provides the user with real time information regarding what is currently configured for the group
  - Updates will take effect immediately  for all active images associated with the group

- Group Profile
  - These profiles allow the user to provide and alter information that will be used when an image is activated
  - The updates will not take effect until all active CPC images that correspond to the referenced Group Profile are deactivated and then re-activated

# Systems Management

## Health Checks

- A number of health checks have been added for various z/OS core components and other system products to run under the IBM Health Checker for z/OS

- For example:
  - CHECK(IBMJES2, JES2_CKPT_CONFIG_nnnnnnnn)
  - CHECK(IBMINFOPRINT, ZOSMIGV2R3_NEXT_INFOPRINT_DYNCFG)
  - CHECK(IBMINFOPRINT, ZOSMIGV2R3_NEXT_INFOPRINT_IPCSSL)
  - CHECK(IBMINFOPRINT, INFOPRINT_CENTRAL_SECURE_MODE)
  - CHECK(IBMISPF, ISPF_WSA)
  - CHECK(IBMALLOC,ALLOC_TAPELIB_PREF)
  - CHECK(IBMUSS, ZOSMIGV2R3_NEXT_USS_SMB_DETECTED)
  - CHECK(IBMVSM, ZOSMIGV2R3_NEXT_VSM_USERKEYCOMM)
  - CHECK(IBMVSM, VSM_RUCSA_THRESHOLD)
  - CHECK(IBMICSF,ICSFMIG_WEAK_CCA_KEYS)
  - CHECK(IBMICSF,ICSF_WEAK_CCA_KEYS)
  - <check for withdrawal of VTAM Common Management Information Protocol (CMIP) after V2R4 >
  - …

## LPA APF Authorization

- Starting in z/OS 2.4 LPA ADD commands such as SETPROG and PROGxx can indicate APF authorization for specified data sets.

# Systems Management

## SMF Dump Utility enhancement

- Add support to the IFASMFDP and IFASMFDL SMF dump utilities to optionally summarize the data processed by record type and subtype.

## Device Allocation enhancements

- Externalize TIOT usage information to allow installations to proactively track and monitor TIOT usage for jobs.
  - TIOT usage information will be available to the IEFACTRT installation exit to allow installations to perform their own monitoring.
  - TIOT usage information will also be included in SMF type 30 records.
- Enhancements to Job Unallocation processing for tape devices
  - Changes to autoswitchable tape device management that will reduce or eliminate job failures when system functions are using a tape device (failures associated with message IEF474I).
  - No JCL updates or system configuration changes are needed for this

# Systems Management

## SDSF – System Display and Search Facility

- 18 new tables of information, 31 new columns on existing displays, 24 new actions on displays as well as general usability and functional improvements
- New tables include:

| | |
|---|---|
| Extended Operator Console Display | OMVS options |
| Link pack directory | JES subsystems |
| JES2 resource monitor alerts | Enqueue by datasets |
| 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 |
| JES2 Checkpoint information | Coupling (XCF) members/groups |
| JES2 Resource usage by job name | JES2 Resource information |

- SDSF new general usability enhancements
  - ISPF view support is addition to ISPF browse
  - Ability to hide columns on any table
  - Ability to better control point and shoot field highlighting
  - Improvements to the z/OSMF browser based user interface
- New functions for JES2 spool encryption (2Q2020 plan), and resiliency
  - Reporting on encryption
  - Reporting on spool and control block usage
- Coverage in ISPF based user interface, z/OSMF browser based user interface, and SDSF REXX

# Systems Management

## DFSMSrmm Enhancements

- Extend usage of SMS management class with new attributes for retention and volume set management
- Enhance EDGUTIL for repairing some attributes of tape volumes and data sets
  - Attributes include expiration date, retention method, fields related to catalog status, and last reference time
- An easier to use ‘Default Table’ replaces the UXTABLE
- Tape data sets that are expired and no longer retained but reside on a volume that is not scratched can be denied access
- Improvements to warning messages, multi-system parmlib, and searching

# Systems Management

## Infoprint Server updates

- Dynamic configuration enables configuration changes without stop/restarting of the Infoprint Server daemons
  - Dynamic-Configuration is now the default

- Infoprint Central (web browser application) enhancements
  - Increase message classes up to 36 for PSF and AFP Download Plus work selection criteria
  - Provide predictable UID for Infoprint Central's Apache web server task so WLM can be used to manage the task resources
  - A secure connection to the Apache server will be the expected default (SSL usage and https:)

- Improve diagnostics
  - SAF denied accesses will be logged to the Infoprint Server log

- Improved Administration through ISPF
  - Panels are provided for updating the printer inventory rather than editing a file

# Systems Management

## Content (Product Documentation) Changes and Enhancements

- General
  - Timely content refreshes will continue after V2.4 GA with as-needed updates. Subscribe to the z/OS library PDFs to receive notifications about updated content.
  - The Migration guide is replaced by the Upgrade workflow.
  - The "Summary of Message and Interface Changes" (SMIC) is retitled "Release Upgrade Reference Summary" (RURS) and streamlined to contain only the lists of new/changed/deleted messages and the five tables for SMF and SYS1 member changes.
  - New content solutions provide assistance for all phases of the user experience for a function.
    - They can consist of a variety of content, including comprehensive content collections in the Knowledge Center (c3s), videos, z/OSMF workflows, podcasts, and other content.
    - Web solutions help you get started with the function and provide links to all of the related content.
    - A new content solution home page helps you browse and use content solutions.
  - z/Favorites is updated to highlight new function in V2.4.

**Find it all at the z/OS Internet Library:**
**https://www.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosInternetLibrary**

# Systems Management

## Content (Product Documentation) Changes and Enhancements

- Search
  - Search catalog function is fully integrated into KC for z/OS V2.4. In addition to searching the entire release, you can search at the element/feature library level or within an individual book.
  - Looking up messages is easier than ever with two new LookAt-based options:
    - The "IBM Z: Look@ Knowledge Center" online tool lets you conduct targeted message searches within or across products in KC.
    - With the new LookAt API, you can look up messages in KC4z using a KC based version of the original LookAt facility.
  - KC4z has a new component that "normalizes" HTML content to improve search.

- KC4z
  - KC4z is upgraded to 2.0 and now has the same look and feel as the online IBM Knowledge Center.
  - V2.4 includes a new workflow to help you provision the KC4z plug-ins that you obtain from the FTP site.
  - The content repository for KC4z is expanded to include several software products.

**Find it all at the z/OS Internet Library:**
**https://www.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosInternetLibrary**

# Systems Management

## IBM z/OSMF enhancements (CD)

- The z/OSMF desktop UI is enhanced by the PTF for APAR PH16076 to support searching, browsing, and editing the USS files and directories from the same place where the user can do similar operations with data sets today.
  - The existing data set function is also enhanced to support create data set and data set member.
- The z/OSMF Workflows task is enhanced to support creating workflow instances from workflow definitions located in remote systems by the PTF for APAR PH14185.
- z/OSMF REST data set and file service is enhanced to support accessing data sets and files in remote systems by the PTF for APAR PH15263.
- Several new z/OSMF V2.4 functions are also rolled back to z/OSMF V2.3 with the PTF for APAR PH15504. These new functions include:
  - A new Security Configuration Assistant task provides graphic views to validate z/OSMF security setup.
  - A new z/OSMF Diagnostic Assistant task allows a user to collect z/OSMF diagnostic data with one click.
  - An enhanced z/OSMF desktop UI provides a more powerful editor for data sets.
- z/OSMF supports using a client certificate to log on to z/OSMF in a browser.

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# Networking

## Overview, goals & directions

- Exploit platform features and enable efficient network access
  - Support latest OSA and RoCE hardware adapters, HiperSockets, and provide for efficient network communications, including external network and intra-CPC communications
- Provide support for network security standards and enable network security monitoring and compliance
  - Support pervasive encryption by protecting data-in-flight with evolving security standards such as TLSv1.3
  - Assist in determining security compliance posture through the use of z/OS Encryption Readiness Technology (zERT) and the zERT Network Analyzer (zNA)
- Simplify network configuration through the IBM Network Configuration Assistant (NCA)
  - Simplify networking configuration, including the configuration of TCP/IP stacks as well as policy-based networking functions
- Application development and workload enablement
  - Enable efficient network access to Linux applications deployed in z/OS Container Extensions (zCX)
- Enhance availability and resilience
  - Enhance application availability in parallel sysplex environments through improved sysplex autonomics

# Networking

## System SSL and AT-TLS support for TLS V1.3

- Basic support for the latest TLS version standard (RFC8446)
- RACF and PKI support for new signature types
- Improves the security of TLS-protected traffic

- AT-TLS is enhanced to allow new System SSL TLS 1.3 features to be exploited via policy enhancements (transparently to software depending on AT-TLS configuration)

- Exploitation is component specific, check component documentation for support

## TN3270E Telnet Server Express Logon Feature support for Multi-Factor Authentication

- TN3270E Express Logon Feature can use either passticket or a multi-factor authentication token from SAF
  - Note: this function has a dependency on RACF and IBM MFA

# Networking

## HiperSockets Converged Interface (HSCI)

- HiperSockets Converged Interface (HSCI) allows configuration of HiperSockets on z/OS without defining additional network interfaces.

- Specifying the new AUTOIQDC keyword in the TCP/IP profile dynamically and transparently adds a HiperSockets interface that is converged with the OSA interface, and is treated as one interface by the layers above.

- TCP/IP will automatically use HiperSockets when the peer is co-located on the same CPC and reachable over HiperSockets

- This provides two major benefits:
  - Supports layer 2 connectivity from z/OS to Linux and the z/VM HiperSockets bridge
  - Simplifies the move of a z/OS instance to another CPC by removing the requirement for reconfiguring the HiperSockets interface to match the IP subnet(s) on the new CPC.

# Networking

## z/OS Encryption Readiness Technology (zERT)

- zERT positions the TCP/IP stack as a central collection point and repository for cryptographic protection attributes for:
  - TCP connections that are protected by TLS, SSL, SSH, IPsec or are unprotected
  - Enterprise Extender connections that are protected by IPsec or are unprotected

- zERT discovers the security sessions and their attributes via:
  - Stream observation (for TLS, SSL and SSH) – the TCP/IP stack observes the protocol handshakes as they flow over the TCP connection
  - Advice of the cryptographic protocol provider (System SSL, zERTJSSE, OpenSSH, TCP/IP's IPsec support)

- Reported through new SMF 119 records via:
  - SMF or
  - New real-time NMI services

# Networking

## z/OS Encryption Readiness Technology (cont.)

- zERT Discovery – V2.3 base element
  - Attributes are collected and recorded at the connection level
  - SMF 119 subtype 11 “zERT Connection Detail” records – written at each SMF interval
  - These records describe the cryptographic protection history of each TCP and EE connection
  - Measures are in place to minimize the number of subtype 11 records, but very large numbers of these records could still be generated depending on the network traffic into and out of the z/OS system

- zERT Aggregation
  - Attributes collected by zERT discovery are aggregated by security session
  - SMF 119 subtype 12 “zERT Summary” records
  - These records describe the repeated use of security sessions over time
  - Aggregation can greatly reduce the volume of SMF records while maintaining the fidelity of the information – well suited for reporting applications

- zERT network analyzer, a new 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

# Networking

## IBM Configuration Assistant renamed IBM Network Configuration Assistant

## Network Configuration Assistant support for alternate Configurations

- The Network Configuration Assistant is enhanced to support TCP/IP profile alternate configurations
- Alternate configurations can be used for planned or unplanned outages, failover or flexibility in moving z/OS images

## Multiple installation support for Network Configuration Assistant

- The Network Configuration Assistant is enhanced to enable you to install multiple configuration files in a single action.
- With this support, you no longer have to enter and act on a separate installation panel for each file in a group to be installed.
- You can use this new action on any installation panel that has more than one file listed on it.

# Networking

## Inbound Workload Queueing (IWQ) Support for IPSEC

- In support of OSA-Express6S, z/OS Communication Server's Inbound Workload Queuing (IWQ) support (enabled with INBPERF DYNAMIC WORKLOADQ) for QDIO interfaces (OSD CHPID type) is enhanced to add a new input queue in support of IPSEC network traffic.

- With IWQ enabled, OSA-Express6S will direct IPSec traffic for protocols ESP and AH to the IPSec input queue.

- The OSA-Express6S separation of the IPSec protected traffic from non-IPSec protected traffic provides for an optimal Communications Server processing environment for both types of traffic

## Code page enhancements for CSSMTP

- The Communications Server SMTP (CSSMTP) mail client is enhanced to support multibyte character sets and to provide improved code page support for non-1047 characters in the mail headers.

- Enhancements are intended to facilitate migration from SMTPD to CSSMTP

# Networking

## TCP/IP Sysplex Autonomics Enhancements (post GA deliverable)

- Planned support to optionally incorporate health monitoring of IPSEC Sysplex Wide Security Associations (SWSA)
  - Includes monitoring of the health of the IKED (Internet Key Exchange Daemon) and related infrastructure to ensure it is active and operational

## Sysplex Notification of TCP/IP Stack Join or Leave

- Support for ENF notification when TCP/IP triggers a recovery event (leaving the TCP/IP Sysplex group) as a result of a “sick but not dead” condition, and when/if it rejoins the Sysplex
  - New events for ENF 80 signal
  - Allows middleware/software to perform any needed recovery actions
  - Should only be interesting to any middleware that has specific requirements for coordinated recovery with TCP/IP (most middleware or software will not require awareness)

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# Security

## Overview, goals & directions

- Pervasive Encryption
  - Additional support for more data (in flight and at rest)
  - Simplified ability to achieve security compliance

- System hardening
  - Detection of elevating privilege
  - Multi-Factor Authentication advancements
  - Provide password alternatives for APIs
  - Identification of common configuration concerns

- Standards
  - Continue strong encryption support for the platform
    - Evolve ahead of industry standards

# Security

## Pervasive Encryption

- z/OS V2.4 plans to continue to drive pervasive encryption efforts within an enterprise:
  - z/OS policy-based encryption options that can help clients protect their critical business data have been enhanced to support additional z/OS data set types, including:
    - PDSE V2 (not including program objects)
    - Basic and large format SMS data sets (post GA deliverable)
    - RACF remote sharing VSAM checkpoint files
  - These enhancements allow users the ability to encrypt data, in most aces, without application changes and simplify the task of compliance.

## RACF Enhancements`

- Improved PassTicket security
  - Today, a PassTicket key can either be masked and stored in the RACF database, or encrypted, and stored in ICSF.
  - Enhancements in RACF provide new capabilities to facilitate the use of encryption with ICSF as the key store for PassTicket keys in order to provide enhanced PassTicket keys security and protection against cyber attacks. The new functions include :
    - Command and programming interfaces to report on the method of protection for PassTicket keys, and, for encrypted keys, the ICSF key label name.
    - A function to convert masked keys to encrypted keys without needing to change the keys.
    - The ability o use pre-existing keys in ICSF for application PassTickets.

# Security

## RACF Enhancements

- Enhanced RACF usability and threat detection
  - RACF is enhanced to enabled with custom fields to RACF general resource and DATASET class profiles
    - For all profile types, the ability to validate the value of a field using a System Rexx program is provided, removing the need to code the existing IRRVAF01 exit, which is also supported for all profile types, in assembler.
  - RACF is enhanced to allow the retrieval of DATASET class profile fields using the R_admin callable service (IRRSEQ00) and the IRRXUTIL rexx interface.
    - This capability allows for extensive scripting of security administrator functions using the Rexx programming language.
  - The RACF IRRXUTIL rexx interface is enhanced to allow the retrieval of a general resource class definition from either the static or dynamic Class Descriptor Table (CDT).
    - There is a corresponding "next" function that enables a caller to iterate through CDT entries.
    - The current SETROPTS settings for the class can be optionally requested in the same call.
    - This capability enhances the RACF scripting ability mentioned above.
  - RACF also can detect changes to a user's security environment, including change in privileges.
    - A new message is issued when such a modification is detected.
    - Exceptions can be defined for trusted applications in order to suppress the message for users of such an application.

# Security

## Security Standards

- OpenSSH is the predominant secure terminal and file transfer program on open source systems and encrypts all traffic to eliminate eavesdropping, connection hijacking, and other attacks.
- To maintain currency and ensure z/OS clients have the latest enhancements and fixes, z/OS OpenSSH is updated to the openssh.com 7.6p1 level.
- With OpenSSH 7.6p1, significant new features include:
  - Support for new key exchange (KEX) algorithms, including:
    - diffie-hellman-group14-sha256
    - diffie-hellman-group16-sha512
    - diffie-hellman-group18-sha512
    - curve25519-sha256
  - Support for new ssh-ed25519 and ssh-ed25519-cert-v01 key algorithms.
  - Support for the new chacha20-ploy1305 cipher.
  - Enhancements to the SMF Type 119 subtype 94 and 95 (ssh / sshd connection started) records will include a section that identifies the IP addresses and ports for the connection.
  - Elliptic-curve DSA (ECDSA) keys are now supported in key rings and in FIPS mode.
  - Key ring keys will now use System SSL for signature creation and verification.
  - A new ssh-proxyc command is added, which can be used by the ssh client to connect through SOCKS5 proxy servers.

# Security

## Logger support for more granular security controls for logstreams

- Ability to permit logstream write-only access
- Reading, deleting, or modifying a logstream can be defined with a higher privilege level than basic write-only access
- Enhanced security options for logstream write-only access

## System SSL support for PKCS#7

- System SSL supports the creation of PKCS#7 signed data message with a detached signature
  - This allows the data to reside outside of the PKCS#7 signed message

## User Key Common Requestors update

- A new healthcheck, slip trap, and SMF reporting are available to identify users of user key common storage.
- An enhanced protection mechanism is provided as well as the means to restrict access through SAF security protection

# Security

## Support for RACF Identity Tokens

- Enhance SAF and RACF authentication processing to support generation and validation of Identity Tokens
- Identity Tokens are in the format of a JSON Web Token (JWT)
  - https://tools.ietf.org/html/rfc7519
- Identity Token support will allow z/OS applications and RACF to link together multiple authentication API calls and replay proof of authentication.

## MCS passphrases

- z/OS Console Services is enhanced to enable the use of MCS logon passphrases (long passwords) through security policy profile specification.

## LDAP RACF back-end (SDBM) enhancement

- LDAP is enhanced to eliminate the 4096 restriction on the number of RACF entries returned on a search request
- Enhanced search filters allow more standard queries of RACF information

# Security

## PDUU (Problem Diagnostic Upload Utility) Enhancements

- PDUU is enhanced to support HTTPS protocols to transfer service documentation to IBM.
- Sending service documentation via HTTPS provides additional secure options for customers

## TSO/E LOGON Special Character Support

- Allows line mode LOGON to accept special characters, exploiting full character set supported by Security product

## RMF Monitor III support for Crypto

- New RMF Crypto activity reports
  - Hardware overview, accelerator activity, co-processor activity
- Available in 3270 , DDS Server & browser

## NAS (Kerberos)

- Support Flexible Authentication Secure Tunneling (FAST)
- Support new SHA2 encryption types

# Security

## PKI Services

- Support for Enrollment over Secure Transport (EST)
- Support the generation of certificates for TLS 1.3
- Support synchronous certificate generation from the web page interface

## User Key Common

- Removed, improving application isolation and security

RUCSA priced feature (Restricted Use Common Service Area) available

# Security

## IBM SMF Quantum Safe Signatures (CD)

- z/OS V2.4 extends the digital signature support for SMF records written to log streams to optionally include a second digital signature. When enabled, the second signature uses a quantum safe algorithm to provide an alternative to current algorithms that have been deemed at risk in a quantum computing environment
- SMF signature verification function is extended to include this second signature to help you determine if SMF records have been altered or removed. This function is intended to protect SMF data into the future.
- The support is provided through a PTF for APAR OA57371 and requires Cryptographic Support for z/OS V2.2 - V2.4 (HCR77D1) and IBM z15.

## IBM z/OSMF Security Configuration Assistant (CD)

- z/OSMF Security Configuration Assistant is enhanced to support validation by user group with the PTF for APAR PH17871.

## IBM z/OSMF support for JSON Web Token (CD)

- z/OSMF supports JSON Web Token (JWT) by returning JWT token during authentication and accepting JWT token for authorization of z/OSMF services by the PTF for APAR PH12143.

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# Application Development

## Overview, goals & directions

- Expand scope of existing application functions driven mainly by customer usage scenarios
  - Provide new APIs or services
  - Unique support for building and deployment of executables
  - Enhance debugging capability
  - Support for specific standards where required
- Provide timely internationalization support
  - Support Unicode character sets
  - Other support driven by world events
- Upgrade open source and other imbedded IBM technology to current levels and take advantage of z/OS QoS
  - OpenSSH, Xvfb
  - WAS Liberty
- Exploitation of IBM Z-specific technology (including HW) to further advantage application deployment on our platform

# Application Development

## Web enablement toolkit

- New sample program for JSON text-rendering
- HWTJDEL service enables JSON deletion
- HTTP proxy support has been enhanced to provide both basic authentication to “authenticating” proxy servers and AT-TLS interoperability support for proxy users
- The JSON parser can now parse and perform various other services on text in Unicode. The parser will auto-detect if the text is in EBCDIC (codepage IBM-1047) or UTF-8 (codepage IBM-1208) encoding and process the text appropriately.
- New HWTJSENC service can be used to manually set the encoding.
- New HWTJGENC service can be used to retrieve the encoding used to parse the document.
- The user application can now limit the search scope of a JSON text by using the new SearchType value, HWTJ_SEARCHTYPE_SHALLOW. This value limits the depth of the search and does not consider content within any nested object(s). This additional scoping can greatly improve the performance cost of searching JSON.

# Application Development

## Upgraded X-Windows Virtual Frame Buffer

- An upgraded version of X-Windows Virtual Framebuffer (Xvfb) has been provided. Formerly included in IBM Ported Tools for z/OS product, this delivers Xvfb X11R6.9 and is now included as part of the z/OS program product. Xvfb is an in-memory display server and enables a customer to run graphical applications without a physical display device. It is especially useful when testing an X-Windows server without using real hardware.

## Program Management Binder

- New option called STRIPSEC=IGNEXP (Ignore Export) will remove unreferenced sections (CSECTs) even though they are in the exported symbols table. This has the potential of reducing the size of the program object or load module.
- COMPAT helps with program object compatibility
  - A new sub-option can be specified on the COMPAT option, that will allow the PM Binder to select the minimum PM level that supports the features actually in use for the current bind. This new function is especially useful for software vendors or anybody building and distributing programs to other customers/sites/locations where valuable information needs to be preserved in the PO (problem determination attributes, compression, etc…).

# Application Development

## Language Environment Improvements

- CEEDUMP and IPCS LEDATA Verbexit improvements show full service level information in the traceback section, when users use the SERVICE compiler option to specify the service level string of COBOL, PL/I or XL C/C++ programs.

- Language Environment-enabled applications can now be rolled back when they are terminated using a POSIX-defined terminating signal and when there are no registered signal handlers. This allows applications to no longer commit in-progress updates in situations with unhandled terminating signals.

- Taking advantage of the Instruction Execution Protection Facility (IEPF) introduced in z14 family of servers, Language Environment has added a new non-executable heap storage to the 31-bit environment used for variable buffer allocation. In addition, the entire 64-bit library heap is allocated as non-executable memory. The use of non-executable memory is enabled by default and can be turned off by a new run-time option called CEENXSTG.

# Application Development

## Cloud Provisioning and management for z/OS

- Composite templates, shared resource pool and sysplex placement
- Consume REST APIs described in the OpenApi 1.0 specification.
- For additional details about these enhancements, see the What's new in IBM Cloud Provisioning & Management for z/OS blog.

## iconv Utility

- New **-**B option allow for the removal of the BOM (Byte-Oriented Mark) from the beginning of Unicode (UTF-8, UTF-16 and UTF-32) byte streams, useful when converting data from Unicode to other CCSIDs.

## Unicode Services

- New utility called CUNMITG4 has been provided
- Allows user to create the binary files associated with user-defined conversion tables with composition characters on both sides (the "from" and the "to" sides) of the table.
- Will allow customers to implement solutions that meet certain regional IT standards associated with surnames and first names.

# Application Development

## VSAMDB

- New data store for BSON and JSON objects in VSAM KSDS
- Sysplex data sharing via VSAM RLS
- Includes indexing with VSAM alternate keys

## cp Utility Enhancements

- Copy load modules and program objects from MVS data sets to UNIX directories and vice versa while maintaining ALIAS information

## WebSphere Application Server

- WAS Liberty for embedders is updated with the latest upgrades and service

## TSO/E LISTDSI support

- Reports additional information about datasets (PDSE version and Encryption information)

# Application Development

## New Japan Era (Reiwa) Support

- On May 1, 2019, a new era named Reiwa, reflecting a change to the Japanese imperial reign, went into effect.
- IBM provided support across multiple elements/components of z/OS including Language Environment, Unicode Services and z/OS Font Collection
- A new ligature (symbol) has been defined representing the Reiwa era.


- IBM is adding a new Japanese era ligature to three font families:
  - WorldType fonts
  - AFP Raster fonts
  - AFP Outline fonts

# Application Development

## DFSORT Enhancements

- Support
  - Regular expressions in INCLUDE and OMIT statements
  - Unicode data formats UTF-8, UTF-16 & UTF-32 in OMIT and INCLUDE statements
  - ASCII free format numeric data in SORT, MERGE, INCLUDE and OMIT statements
  - Encrypted PDSE data sets

- Exploit
  - System Z High Performance Ficon (ZHPF) for sort work files

# Application Development

## Proxy server for IBM z/OS Container Extensions (CD)

- zCX is enhanced to support proxy configuration capabilities for the Docker daemon. The HTTP/HTTPS proxy support allows the Docker daemon to use the proxy server in your enterprise to access external public and private Docker registries that are restricted or located outside of your enterprise network, or both.
- The optional proxy configuration for z/OS Container Extensions can be configured using the provisioning and reconfiguration z/OSMF workflows.
- The proxy capabilities are enabled with the PTF for APAR OA58267.

# Application Development

## IBM SDK for Java 8.0.6.0 (SR6)

- General performance optimizations to deliver up to 20% average throughput improvements on IBM z15 over IBM z14 with Java 8.0.5.0 (SR5)
- Exploitation of 30+ new z15 instructions to accelerate Sort, String, Data Access (DAA) and cryptographic Java APIs
- Transparent acceleration of java/util/zip/* APIs with on-chip Integrated Accelerator for z Enterprise Data Compression
  - Existing IBM SDK for Java 8 will exploit z15 Integrated Accelerator on z/OS transparently. Improved buffering / performance with IBM SDK Java 8 SR6.
- Improved Pause-less Garbage Collection (GC) for more consistent response times for large heap applications with response-time sensitive SLAs
- Automated JVM adaptation for changing system resource and capacity, optimized for System Recovery Boost
  - Dynamic scaling of Garbage Collection and JIT compilation threads based on available CP resources
  - Shared classes improvements - Up to 30% faster JVM startup and application ramp up over Java 8.0.5.0 (SR5)

# Application Development

## XL C/C++ Support

- To increase application performance on IBM Z, the best way is to to stay current with compiler technologies
- z/OS V2.4 XL C/C++ compiler fully exploits the Vector Enhancements Facility 2 and Miscellaneous-Instruction-Extensions Facility 3 in IBM z15
- MASS (Mathematical Acceleration Subsystem) libraries that include a set of scalar and vector mathematical elementary functions that serve as a higher performance alternative to the standard math library and are optimized and highly tuned for IBM z15
- Performance Benefits:
  - *z/OS V2R4 XL C/C++ can reduce CPU usage by an average of **16%** and up to **22%** on z15, over the same set of key numerically intensive double-precision floating-point applications built by z/OS V2R3 XL C/C++ running on z14.*
  - *z/OS V2R4 MASS high-performance mathematical library functions, built with z/OS V2R4 XL C/C++, reduce CPU usage by an average of **7.1x** and up to **91x** on z15 over the corresponding z/OS V2R4 C/C++ Runtime Library functions on z14.*

*** All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided "AS IS" and no warranties or guarantees are expressed or implied by IBM.**

# Application Development

## New z/OS XL C/C++ compiler adds support to help IBM z/OS UNIX users port applications from distributed platforms (CD)

The IBM z/OS XL C/C++ V2.4.1 web deliverable for z/OS V2.4 delivers C11, C++11, and C++14 language standards support, and hardware exploitation capabilities, including exploitation of the latest IBM z15. It is the integration of IBM advanced XL optimization technologies with the LLVM open source Clang infrastructure that gives the IBM z/OS XL C/C++ V2.4.1 web deliverable more current language standards support, ease in migrating apps from distributed platforms, and z/Architecture exploitation capabilities.

- The z/OS XL C/C++ V2.4.1 compiler supports EBCDIC and ASCII execution character sets, and generates AMODE 64 code, making it ideal for z/OS UNIX users porting applications from distributed platforms.
- The XL C/C++ V2.4.1 web download is a no-charge add-on feature for clients that have enabled the XL C/C++ compiler (an optionally priced feature) on z/OS V2.4.
  - It coexists with, and does not replace, the base XL C/C++ V2.4 compiler. XL C/C++ V2.4 and V2.4.1 compilers are both designed to be used independently and are also serviced and supported independently.
- The z/OS XL C/C++ V2.4.1 web deliverable will be available on December 13, 2019, from the z/OS Downloads website.

# Requirements

## z/OS Requirements

- z/OS accepts requirements through Request for Enhancements (RFE)
  - Any customer can open a requirement on any part of the operating system at this URL https://www.ibm.com/developerworks/rfe/
- You can also search and vote on RFE's at that location
  - You need an IBM ID
  - Go to the search tab
  - Brand: Servers and System Software, z Software, z/OS
- z/OS also accepts requirements through user groups like SHARE

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# Continuous Delivery

## Continuous Delivery

- z/OS embraces continuous delivery through new function APARs
- Get weekly emails when APARs close with MyNotification: 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

# Continuous Delivery

## 4Q2019 Continuous Delivery Overview

- Scalability & Performance
  - Inbound Workload Queueing (IWQ) support for IBM z/OS Container Extensions (link)
  - Enhanced Transparent Cloud Tiering (link)
- Systems Management
  - IBM z/OSMF enhancements (link)
- Security
  - IBM SMF Quantum Safe Signatures (link)
  - IBM z/OSMF Security Configuration Assistant (link)
  - IBM z/OSMF support for JSON Web Token (link)
- Application Development
  - New z/OS XL C/C++ compiler adds support to help IBM z/OS UNIX users port applications from distributed platforms (link)
  - Proxy server for IBM z/OS Container Extensions (link)

- SODs
  - Removing support for IBM z/OSMF tree mode interface
  - IBM z/OS Integrity Scanning Tool
  - DFSMSrmm plug-in for z/OSMF
  - DFSMSrmm Web Services removal

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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*

***Note:*** *The statements of direction in this presentation have been edited for brevity.*

# IBM's Statements of Direction

**December, 2019** – IBM z/OS V2.4 is planned to be the last release to support the z/OSMF classic-style user interface (the tree mode interface) and in future releases will only support the desktop-style user interface. The z/OSMF desktop-style user interface supports all the functions that the traditional tree mode interface does, and provides a more modernized and personalized UI, by displaying the z/OSMF tasks in a desktop style with task icons, taskbar, and other desktop elements that can be user tailored, which allows users to interact with z/OS using a familiar interface that is similar to other operating environments. The desktop UI also has more capabilities, such as the ability to search for data set names, quickly locate a task, group tasks in a folder, and perform similar actions.

**December, 2019** – IBM intends to deliver a new feature of z/OS to scan Program Call (PC) and Supervisor Call (SVC) routines to further strengthen the integrity of the z/OS solution stack and simplify compliance requirements.

**December, 2019** – Today, user interfaces for DFSMSrmm (RMM) include TSO and ISPF dialogs. RMM intends to provide support for a modern graphical user interface via a z/OSMF plug-in. The plug-in would augment the existing TSO and ISPF dialog support with an easy-to-use graphical interface.

**December, 2019** – z/OS V2.4 is planned to be the last release of z/OS to support DFSMSrmm (RMM) Web Services. Today, RMM provides support for remote Java applications to connect to the RMM application programming interface (API) running on a z/OS system over the internet via a package that is deployed on a web server such as z/OS WebSphere Application Server or Apache Tomcat. Use of the RMM API, which accesses the RMM control data set to obtain information about RMM managed resources, would still be available to applications using either high-level or assembler languages.

# IBM's Statements of Direction

**July, 2019** – z/OS V2.4 is planned to be the last release in which the z/OS TN3270E Telnet server, FTP server, and Digital Certificate Access Server (DCAS) will support direct invocation of System SSL APIs for TLS/SSL protection. In the future, the only TLS/SSL protection option for these servers will be Application Transparent Transport Layer Security (AT-TLS). The direct System SSL support in each of these components is functionally outdated and only supports TLS protocols up through TLSv1.1. IBM recommends converting your TN3270E Telnet, FTP server, and DCAS configurations to use AT-TLS, which supports the latest System SSL features, including the TLSv1.2 and TLSv1.3 protocols and related cipher suites. Note that while native TLS/SSL support for z/OS FTP client is not being withdrawn at this time, no future enhancements are planned for that support. IBM recommends using AT-TLS to secure FTP client traffic.

**July, 2019** – z/OS V2.4 is planned to be the last release of z/OS to allow specifying service coefficients in the Workload Manager (WLM) service definition on the Service Definition Details page. The IBM recommended values are CPU=1, SRB=1, MSO=0, and IOC=0, which will be the default values in a later release. IBM recommends that you adjust your service coefficients before upgrading to a later release.

***Note:*** *If you do adjust your service coefficients, you may have to recalculate the duration of your service class periods, and your accounting procedures.*

**July, 2019** – z/OS V2.4 is planned to be the last release to support EIM (Enterprise Identity Mapping) and OCSF (Open Cryptographic Services Facility), and all of its plug-ins, such as OCEP (Open Cryptographic Enhanced Plug-ins) and PKITP (PKI Services Trust Policy). These components have not been widely utilized nor enhanced for several releases of z/OS. IBM recommends using other applications such as ICSF (Integrated Cryptographic Services Facility) and System SSL for comparable functionality.

# IBM's Statements of Direction

**July, 2019** – IBM intends to leverage Kubernetes clustering in the future for the orchestration and management of z/OS Container Extensions with compatible cloud platforms.

**July, 2019** – z/OS V2.4 will be the last release that the Network Configuration Assistant (NCA) z/OSMF plug-in supports the policy data import function, which allows you to import existing Policy Agent configuration files into the Network Configuration Assistant. After z/OS V2.4, import of policy configuration files will no longer be supported for AT-TLS, IPSec, PBR, and IDS technologies.

Import of TCP/IP profiles into NCA is not affected.

**July, 2019** – z/OS V2.4 is the last release to support Sysplex Distributor target controlled distribution to DataPower Gateway products. This feature is deprecated in the DataPower Gateway. IBM recommends that you implement another solution for workload balancing that might be through an external load balancer. This removal does not impact any other Sysplex Distributor functions, only configurations that have TARGCONTROLLED specified on the VIPADISTRIBUTE statement.

# IBM's Statements of Direction

**February, 2019** – z/OS V2.4 is planned to be the last release in which JES2 will support the z11 level for checkpoint data sets. z22 mode was introduced in z/OS V2.2. IBM recommends you migrate toz22 mode if you have not already done so.

**February, 2019** – In Software Announcement 217-246, dated July 17, 2017, IBM announced that JES2 is the strategic Job Entry Subsystem (JES) for the z/OS Operating System and that JES3 would continue to be supported and maintained. To date, IBM has made significant investment in JES2 by delivering unique functions such as email support in JCL, spool migration and merge, and dynamic checkpoint expansion and tuning to make management easier. In z/OS V2.4, IBM plans to deliver in JES2 Spool Encryption and a new user exit alternative based on defining policies that allow exit programs to be implemented in a parameterized rule-based approach. To help JES3 to JES2 migration efforts, JES2 has added functionality, including dependent job control, deadline scheduling, 8-character job classes, and interpreting JES3 JECL control statements. For z/OS V2.4, additional function to aid in migrations is planned, including Disk Reader capability and enhanced JES3 JECL support in JES2 (ROUTE XEQ). Today, as a result of our strategic investment and ongoing commitment to JES2, as well as continuing to enhance JES3 to JES2 migration aids, IBM is announcing that the release following z/OS V2.4 is planned to be the last release of z/OS that will include JES3 as a feature.

If you are one of the clients who remains on JES3, IBM encourages you to start planning your migration. For questions, contact jes3q@us.ibm.com.

# IBM's Statements of Direction

**February, 2019** – IBM's first delivery of a ServerPac in z/OSMF Software Management portable software instance format is planned for CICS Transaction Server and associated CICS products. Initially, IBM intends to allow you to choose to order ServerPac for CICS and associated products in either the new z/OSMF portable software instance format or the existing CustomPac Dialog-based format. The z/OSMF portable software instance format is designed to be installed using z/OSMF Software Management. The requirements for using the CustomPac Dialog-based format remain unchanged, and this is the first of many offerings that are planned to be delivered in the PSI format. For both formats, IBM plans to continue to offer delivery via internet download or on DVD. This initial offering of an IBM ServerPac in a z/OSMF portable software instance represents the next step in IBM's collaboration with other leading z/OS platform software vendorsto deliver a consistent package format intended to be used with z/OSMF software management as a common installer.

**February, 2019** – IBM intends to add support for the TLS V1.3 protocol, as specified in RFC 8446, to z/OS Cryptographic Services' System SSL component and to the z/OS Communications Server's Application Transparent TLS (AT-TLS) function. This support is intended to make the latest and most secure TLS standard available to use by any z/OS System SSL application and any application that accesses System SSL through AT-TLS.

**February, 2019** – z/OS V2.4 is planned to be the last release to support the VTAM Common Management Information Protocol (CMIP). CMIP services is an API that enables a management application program to gather various types of SNA topology data from a CMIP application called the topology agent that runs within VTAM. IBM recommends using the SNA network monitoring network management interface (NMI) to monitor SNA Enterprise Extender and High Performance Routing data.

# IBM's Statements of Direction

**February, 2019** – z/OS V2.4 is planned to be the last release to support the ISPF Workstation Agent (WSA),also known as the ISPF Client/Server Component. WSA is an application that runs on yourlocal workstation and maintains a connection between the workstation and the ISPF host. It is primarily used to transfer files between the workstation and the host. IBM recommends usingmore current file transfer solutions such as those provided by the Zowe Dataset Explorer, z/OSFTP, and similar file transfer mechanisms. These solutions have more capabilities, including the ability to provide secure communications.

**November, 2018** – IBM intends to deliver a new cloud tier to OAM's existing storage hierarchy, which will provide the ability to store and manage primary copies of OAM objects on cloud storage, via public or private cloud infrastructures supporting the Amazon S3 API, and the ability to recall an object stored in the cloud to the disk level of the storage hierarchy. OAM managed backup copies will continue to be supported as they are today to removable media, typically virtual or physical tape.

**February, 2017** - z/OS V2.4 is planned to be the last release of the operating system to support the HFS (Hierarchical File System) data structure used by the z/OS UNIX environment. IBM has provided equivalent if not superior functionality with the z/OS File System (zFS). Customers should migrate from HFS to zFS using the utilities provided in the operating system to convert their entire file system hierarchy.

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