What's New in z/OS V2.5

z/OS V2.5 GA Announce (GA RFA)

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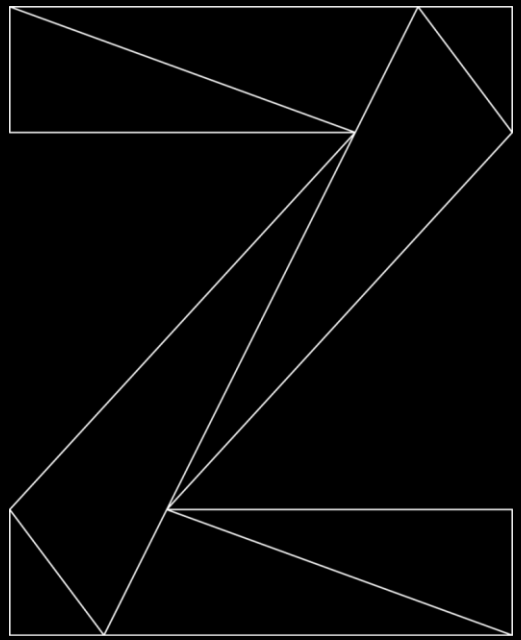

Statements regarding IBM future direction and intent are subject to change or withdrawal, and represent goals and objectives only.

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(CD) – Base V2.5 items that were **C**ontinuous **D**elivery on previous release(s)
(CD) – **C**ontinuous **D**elivery items post V2.5 General Availability

z/OS V2.5 Release Overview - Release Highlights

Feature	Description
Workload Enablement	**Workload Enablement:** An **Application Developer,** can treat z/OS the same as any other operating system platform with respect to hybrid cloud deployment, achieving rapid application development and provisioning, demonstrating z/OS's ability to match or exceed any other operating system.
Intelligent Resiliency	**Resiliency**: An **Infrastructure Architect** will gain enhanced resiliency capabilities that provide heightened application availability, modernized tools and automated detection/mitigation procedures, enabling them to maintain exceptionally resilient environments in half the time and with reduced skill requirements.
Cyber Threat Secure Z	**Security:** A **Security Architect** can leverage cyber security system hardening and analytics to readily exceed regulatory compliance requirements and to provide a new level of cyber resiliency for the enterprise.
OS Management Simplification	**Systems Management**: An **early tenure z/OS System Programmer**, can independently, confidently, and successfully deploy, maintain, and manage z/OS (and stack) software functions using guided and customized instructions and workflows.

z/OS V2.5 Release Overview

Usability and Skills
z/OSMF Desktop filter and type ahead, Workflow management and logging, simpler configuration, performance improvements, SCA for external apps, Diag Assist, Sysplex Mgmt and Policy Editor, Console UI enhancements, zMSC…

Application Development
z/OS Container Extensions, REST-enabled BCPii, Web Enablement toolkit, OAM with DB2, ISPF, ABO, Java, Node.js, Python, Go…

Scalability & Performance
VTOC I/O, zHyperLink write Stats, WLM batch improv., IWQ for zCX, TCT, RMF…

Enhancing Security
PassTicket Improv, spool encrypt, Certificate simplification, FIPS, Data Privacy for Diagnostics, TCT full volume dump, zACS…

Availability
ARM, Anomaly Mitigation, Catalog improvements, logical corruption protection, system recovery boost, CF monopolization avoidance…

Systems Management
z/OSMF install of products/fixes, DFSMShsm UNIX indiv file backup and to new directory, Multiple NFS servers on a system, JES2 MAS-wide policy support, CP&M time limits, zWIC, SDSF SRB displays, DFSMSrmm z/OSMF plug-in. IEBCOPY for PDSE V2 gens…

Networking
SMC-Dv2 SMC-Rv2, TLS V1.3, zERT, Sysplex Network Health, stack services…

z/OS V2.5 Release Overview – z/OS support summary

Release	z9 EC z9 BC WdfM	z10 EC z10 BC WdfM	z196 z114 WdfM	zEC12 zBC12 WdfM	z13 z13s WdfM	z14 zR1	z15	End of Service	Extended Defect Support
z/OS V2.1	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]
z/OS V2.5[3]					X	X	X	9/26[1]	9/29[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.

[3] - z/OS 2.5 is the last release of z/OS that will include IBM JES3 & BDT

WdfM - Server has been withdrawn from Marketing

Legend

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

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Z Hardware Support

IBM z15 highlights

- **Up to 16TB of memory per z/OS instance** (used by select middleware)
- **System Recovery Boost** (both IPL and sysplex recovery boost)
- **Improved compression performance** (up to 17x throughput improvement*)
- Up to 20% more coupling links and up to 50% more CHPIDs for the T01 model and 2-3x more coupling links and up to 50% more CHPIDs for the T02 model (CD)
- CFCC improvements
  - Thin interrupt as the default for shared-engine CFs
  - Improved fairness in CF dispatching and better CF efficiency/scalability
  - Improved message path resiliency (CD)
  - CF monopolization avoidance exploitation for resiliency (CD)
- z/OS SLIP to monitor an address or range for a key change and take diagnostic action
- **Sort accelerator – updates to DFSORT** (CD)
  - New **SORTL** instruction, which is standard on the z15.
  - Designed to cut the CPU costs and improve the elapsed time for eligible sort workloads
  - DFSORT and DB2 for z/OS utilities Suite exploit the SORTL instruction
  - DFSORT is available on z/OS V2.3 with PTF UI90067 and V2.4 with PTF UI90068

z15 DFSORT with the Integrated Accelerator for Z Sort vs z14 DFSORT

- *Exploiting Z Sort for DFSORT in-memory sort jobs can reduce elapsed time by up to 30% and CPU time by up to 40% for large format data sets with record lengths up to 500 bytes.**

*** 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.

Z Hardware Support

ICSF is changing how Cryptographic HW support is delivered (CD)

- **No more web deliverables.** ICSF will ship new HW support via APARs with SMP/E FIXCAT tag `IBM.Device.Server.z15*`
- New ICSF FMIDs will be delivered with new z/OS releases only. Older FMIDs will remain in service as appropriate.
- **HCR77D1 is the last web deliverable and z/OS 2.4 and earlier will have future maintenance only via HCR77D1.**

ICSF updates planned for z/OS V2.5

- Key data set updates to support larger keys, such as lattice-based keys asymmetric keys.
- Improved capability to demonstrate compliance with key rotation policies related to CEX master key changes
- New protections for elliptic-curve cryptography (ECC) keys – the “private key name” in the token can now be SAF checked.
- The ability to restrict the use of archived keys to “decrypt” operations only, allowing re-encrypt of old ciphertext but not creating new
- Additional HW exploitation for certain SSL/TLS ciphers

With APAR OA58880, available on z/OS V2.4

- Digital signature support for Edwards curves, Ed448 and Ed25519, and lattice-based keys
- CPACF protected key support for a subset of ECC keys
- TR-31 key block support for HMAC keys.
- CVN-18 support for EMV (Europay MasterCard, and Visa) services

With APAR OA60317, available on z/OS V2.4

- Clear key capability added to Hash-based Message Authentication Code (HMAC) related callable services with CPACF exploitation.

With APAR OA59593 (z15) and OA60355 (z14), available on z/OS V2.4

- Additional ISO-4 format PIN bock integration, and the addition of AES DUKPT capability
- New Format Preserving Encryption (FPE) services exploiting FF1, FF2, and FF2.1 algorithms

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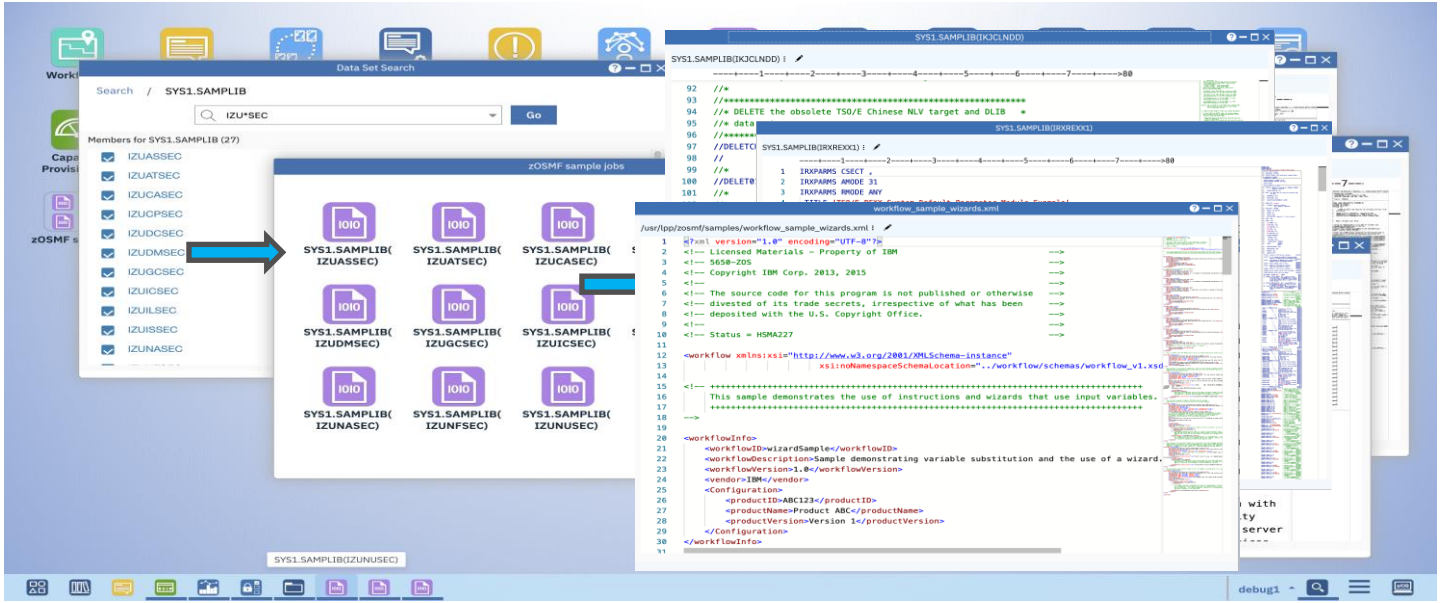
Usability & Skills

z/OSMF Desktop – Replaces Tab UI in z/OS 2.5

- Customer grouping of items in folders, such as data sets via PH24527 (CD)
- Search, Browse, Edit files and data sets via PH16076 (CD)
- Submit, query, browse jobs – Job Output Task via PH16076 (CD)
- Syntax highlighting, user created links, improved performance PH24527 (CD)



Usability & Skills

z/OSMF Type Ahead Search (CD)

- The z/OSMF desktop utilities are enhanced with the PTF for APAR PH28692. The search function is enhanced to provide typeahead capability for searching data sets, UNIX System Services (USS) files, and USS directories.

z/OSMF Create Data Set (CD)

- The PTF for APAR PH30398 also adds the function of “create data set” into the z/OSMF desktop. Clients can create a new physical sequential or partitioned data set based on an existing data set, a predefined template, or fully specified attributes.

z/OSMF Desktop File and Data Sets Hot-links (CD)

- The z/OSMF desktop editor is enhanced to highlight data set names and zFS file paths as hot-linkable URLs. A user can open the referenced data set or a zFS file from the z/OSMF desktop editor simply by clicking on the link.

z/OSMF Browser Support for V2.5

- For z/OS 2.5 z/OSMF now formally supports Chrome, Firefox, and Edge. Other browsers should work such as Safari.

Usability & Skills

z/OSMF Granular Configuration (CD)

- z/OSMF is enhanced by the PTF for APAR PH24527 to provide a simple UI to enable or disable most z/OSMF services.
- Simplified settings deployment with a simple JSON file

z/OSMF Start Up Improvements (CD)

- z/OSMF startup time and resource consumption during startup is improved with the PTFs for APARs PH19227, PH28921, PH28920, PH28971, PH28990, PH28451, PH29230, PH29243, PH28832, and PH28872. In laboratory measurements of a small z15 LPAR, the startup time improved by 30% elapsed time and 48% CPU time. Results depend on a client's configuration.

z/OSMF Dynamic Parmlib Update (CD)

- New z/OS operator commands (SETIZU and SET IZU) are planned to be added for z/OSMF to dynamically change z/OSMF parmlib options without requiring an IPL or in some cases a full server restart. This function is also available on z/OS 2.3 and higher with PTF for APAR PH24088

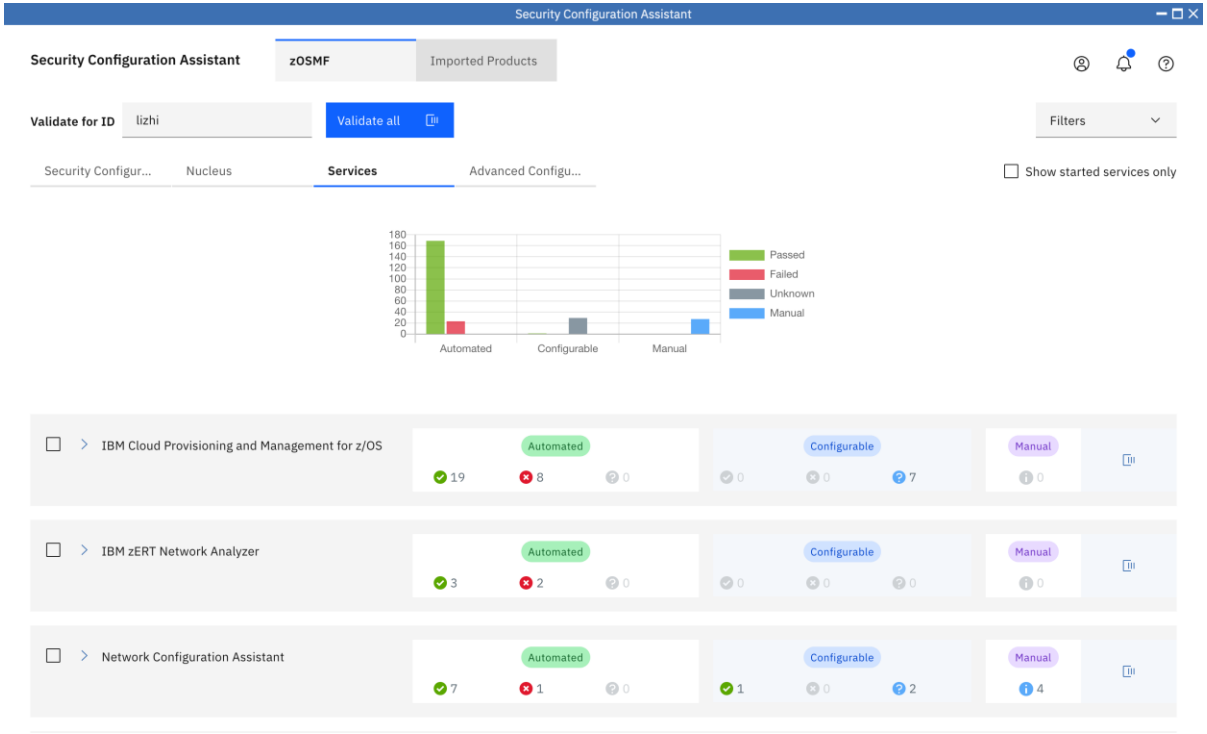
DFSMSrmm plug-in for z/OSMF (CD)

- In addition to the ISPF dialogs and TSO user interfaces available today for DFSMSrmm (RMM), support for a modern graphical user interface via a z/OSMF
- The RMM plug-in for z/OSMF has been improved to view data sets defined to RMM and the related data set information and export this data to a CSV format file.

Usability & Skills

z/OSMF Improved Configuration (CD)

- Security Configuration Assistant
  - A new z/OSMF application to help in configuring security, is enhanced to support validation by user group with the PTF for APAR PH17871.
- Support for external applications
- Support for variable substitution



Usability & Skills

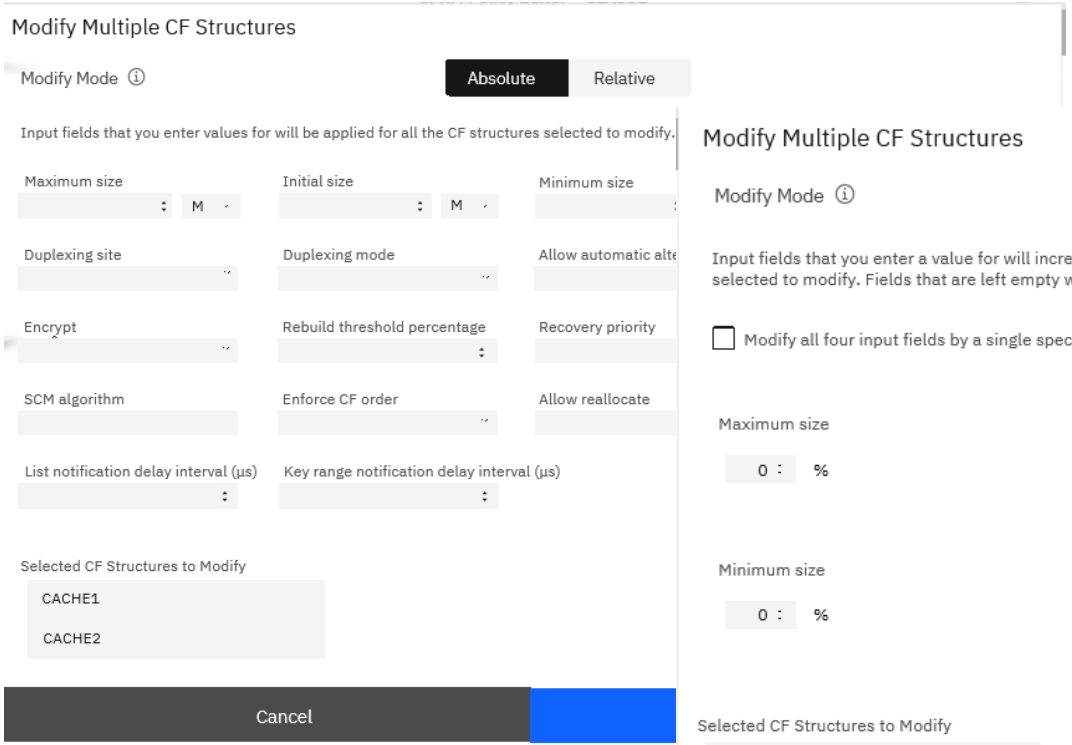
z/OSMF Sysplex Management

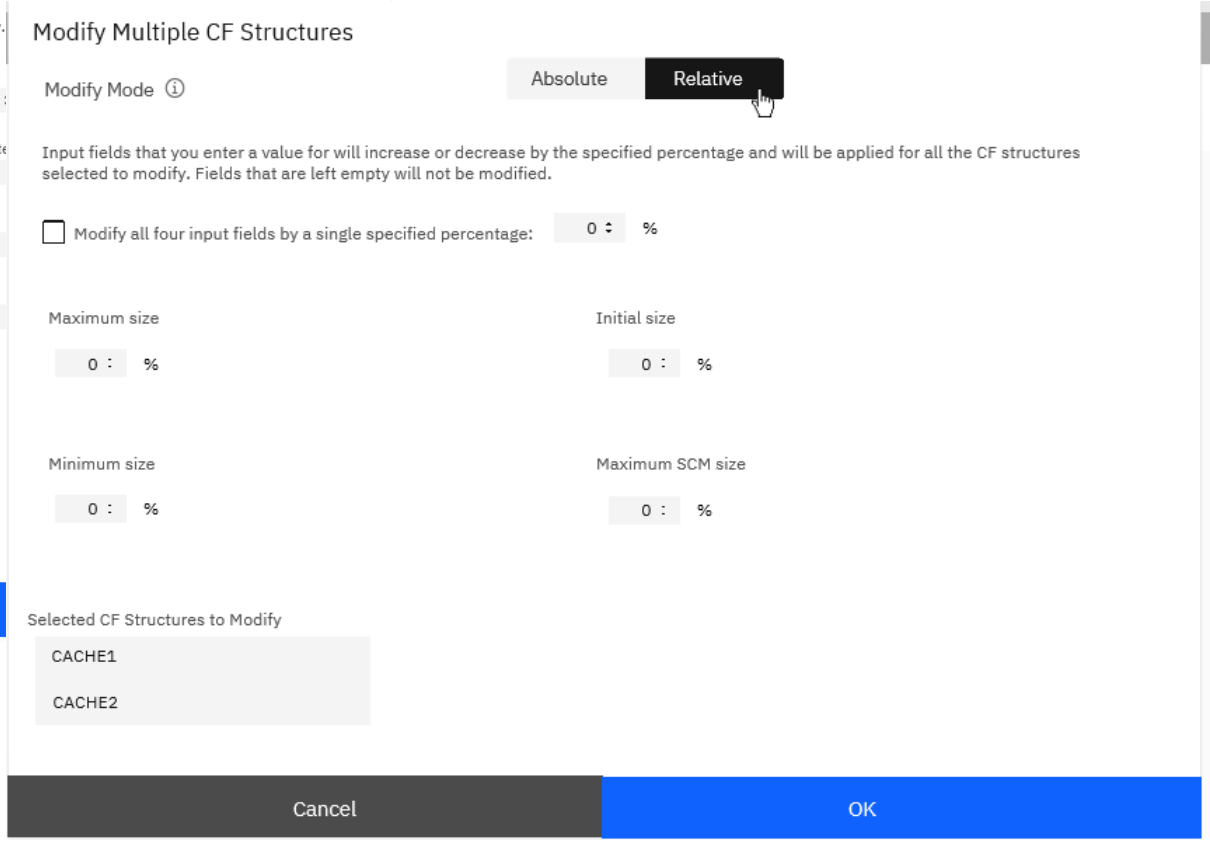
- View Sysplex configuration
  - Table and graphical views
    - Physical and logical views, by CPC, by sysplex, by Coupling Facility, by Structure
    - Coupling Facility, Links, Structures
  - Available in z/OS 2.2 and up

- Modify Sysplex configuration
  - Sysplex-wide commands and results display
  - Command Log retained across IPL'
  - Allows review of who took what action when (and the detailed results of each action)
  - Optionally view generated commands before issuing them
  - Actions include Rebuild, Duplex, Reallocate, CF actions, CF connectivity management, Couple Dataset mgmt. via PTF for Apar PH15554 (CD)

- Sysplex CFRM Policy Editor
  - Edits information about Sysplex CFRM policy including structure sizes
  - Bulk editing of CF structures
  - Policy actions – create, delete, rename, activate
  - CF and CF structure definition, modify, delete, rename, etc
  - Full referential integrity, health checking and best practices, etc.
    - Prevent mistakes rather than recover from them!
  - Replacing the need for IXCMIAPU batch utility
    - Coexists and interoperates with IXCMIAPU batch utility

Usability and Skills





Usability & Skills

z/OSMF Software Management Installation of ServerPac

- Installation method uses a simplified web-based GUI replacing the ISPF CustomPac Dialog
  - Manages allocation and placement of data sets, cataloging, and deployment in z/OSMF Software Management
  - Customization and verification is done in z/OSMF Workflow

- IBM has been delivering ServerPac in Portable Software Instance format (CD)
  - IMS, DB2, and CICS Transaction Server and associated products, all can be installed with z/OSMF today.
  - Consistent packaging and installation method as other leading software vendors.

- z/OS 2.5 ServerPac
  - Is available in Portable Software Instance format, and only that format after January 2022.
  - Initially available in the existing ISPF CustomPac Dialog format, will be disabled in January 2022 *for all products (z/OS, IMS, Db2, CICS, MQ, and program products).* Prepare now.
- z/OS V2.4 will not be offered as a Portable Software Instance and remains installable with the ISPF CustomPac Dialog.

- Learn more: https://www.ibm.com/support/z-content-solutions/serverpac-install-zosmf/ and try a sample Portable Software Instance to be familiar with the install.

- z/OSMF is required on your driving system to install a ServerPac in Portable Software Instance format

Usability & Skills

z/OSMF Software update task (CD) with APAR PH28412 on z/OS V2.3 and V2.4

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

- Existing traditional methods to install SMP/E-packaged software updates (batch JCL jobs) are still possible, but z/OSMF Software Upgrade is expected to provide a simpler experience requiring lesser SMP/E skill.

- To learn more about z/OSMF Software Update, including helpful instructions on how to get started, see the Software Update with z/OSMF web page.

Usability & Skills

z/OS Release Upgrade Enhancement

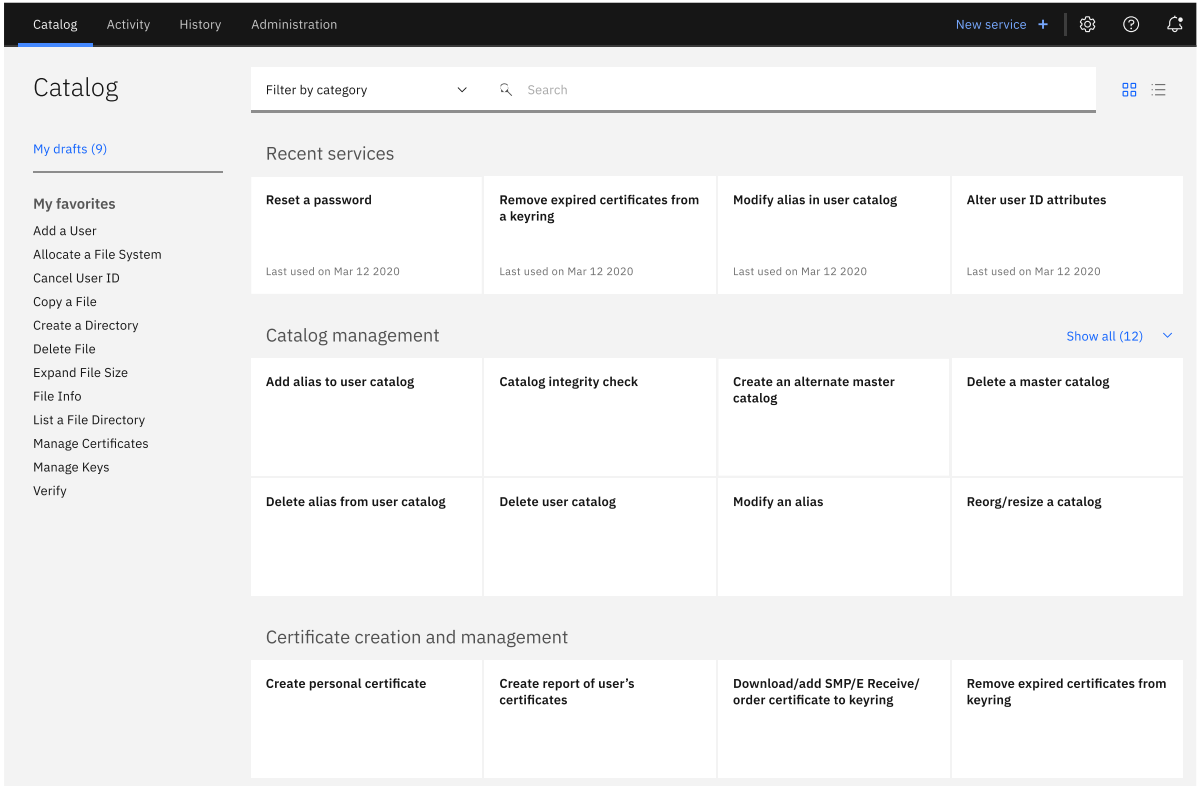
- z/OSMF *z/OS V2.5 Upgrade Workflow* ***will be a part of and serviced with z/OS*** (CD) with APAR OA60711 on V2.3 and V2.4
  - Use the z/OS V2.5 Upgrade Workflow directly from your z/OS system, since you do not need to retrieve from github.
    - /usr/lpp/bcp/upgrade/
  - z15 Upgrade Workflow will also be part of and serviced with z/OS in that same APAR.
  - Will be identified with FIXCAT IBM.Coexistence.z/OS.V2R5
  - IBM strongly recommends that you become familiar with z/OSMF Workflows to take advantage of these benefits!
    - Allows for discovering functions used, tailoring information specific to your systems, and verification of many upgrade actions.
- *z/OS Migration* publication will not be provided for V2.5
  - However, an exported format of the z/OS V2.5 Upgrade Workflow will be available on KnowledgeCenter for those that prefer to use it.

Usability & Skills

IBM z/OS Management Services Catalog – Planned new plugin

z/OS Management Services Catalog in z/OSMF plans to leverage the power of z/OSMF workflows to enable system programmers to run services that help complete z/OS management tasks faster and with fewer errors.

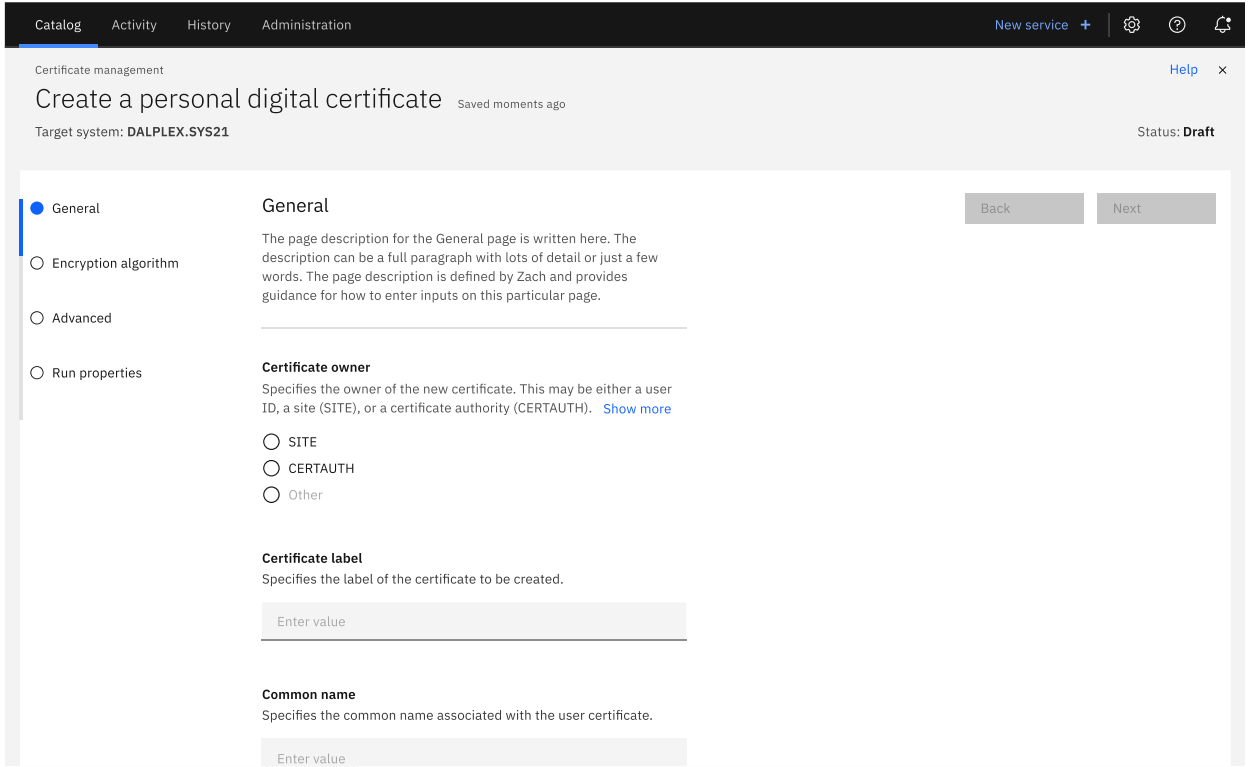
- Experienced z/OS system programmers are planned to be able to create a catalog of customized services, each written with unique institutional knowledge, protocols, and processes.
- These services can then be run by less experienced colleagues.
- IBM plans to provide an initial set of services to help z/OS system programmers of all skill levels get started, demonstrate accepted practices, and simplify information sharing.



Usability & Skills

When you select a service, zMSC will launch into a guided step-by-step journey to allow the client to complete the task easily
Capabilities:

- Planned are a powerful graphical interface for creating new services, editing IBM-provided services, and updating existing services
- History of all services performed on a system is planned
- Admin has capabilities to add to catalog, delete, and determine authorities to catalog



Usability & Skills

z/OSMF Incident Log Task Support for CASE numbers (CD)

- 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.
- The z/OSMF Incident Log application adds support for viewing diagnostic data using the z/OSMF desktop editor application. This standardizes the user experience using a more native browser look and feel. Previously, viewing the diagnostic data was performed only using the z/OSMF ISPF application.

z/OSMF Open API 1.0 or Swagger Support (CD)

- OpenAPI 1.0 support for most z/OSMF REST Services
- Shipped with z/OSMF

z/OSMF Change Password API (CD)

- z/OSMF adds a REST API to support changing a user's z/OS passphrase.

z/OSMF ISPF Application Global Settings (CD)

- The z/OSMF ISPF application, provides system-wide defaults for the ISPF application settings rather than requiring each user to configure those values.
- The setting values of the z/OSMF ISPF application also can be captured in a file and used by an administrator to set up other systems' global configurations.

Usability & Skills

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.

z/OSMF REST JOBS Updates via Apar PH23046 (CD)

- New spool Search options, improved spool codepage support, option to retrieve active jobs, return additional data
  - `X-IBM-Target-System` request header
  - `X-IBM-Intrdr_File-Encoding` request header for submit
  - List jobs for an owner, prefix, and even execution data like when submitted, when started, ended

Usability & Skills

z/OSMF REST file and data set updates via Apar PH22030 (CD)

- Allocate like another dataset, handling carriage returns automatically

z/OSMF File and Data set Compression (CD)

- Support is added to compress content when retrieving large amounts of data. This can speed up the REST files and Datasets API when transferring over long or slow links. This function is also available with PTF for Apar PH22030

z/OSMF Request Queueing (CD)

- z/OSMF REST Data Set and File service is enhanced to queue concurrent requests from the same user when the number of Time Sharing Option (TSO) address spaces are exhausted. This can improve the processing when a large number of requests are sent to z/OSMF. This function is also available on earlier z/OS releases with the PTF for APAR PH29745

z/OSMF CEA Increased TSO Sessions (CD)

- z/OS CEA is updated to increase the maximum TSO sessions allowed per user from 10 to 99. This function is also available on earlier z/OS releases with PTF for Apar OA57346

Usability & Skills

z/OSMF Workflow updates (CD)

- 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, support creating workflow instances from workflow definitions located in remote systems by the PTF for APAR PH14185.
- z/OSMF Workflows task is enhanced to support saving job output in a specified zFS directory with APAR PH21919. auto-
- Deletion after a workflow is completed with the PTF for APAR PH24190
- Workflow selection now supports typeahead searching with PTF for Apar PH28532
- Workflow steps can be keyword searched with PTF for Apar PH27725
- z/OSMF Workflow Engine has several enhancements with the PTF for APAR PH28532. The workflow administrator can delete multiple workflow instances at a time.
- To perform a workflow on a remote sysplex, a single sign-on among z/OSMF instances is no longer strictly required. In the absence of a single sign-on, the request prompts for a user and password, if necessary.

Usability & Skills

Assembler exit reduction

- JES2 policy-based exit reduction – intended to provide a non-assembler facility to extend JES2
  - MAS Wide definitions for policy (CD)
  - Also available on z/OS 2.4 with PTF for Apar OA58190
  - New predicates and actions are planned
  - Release neutral and is planned to not require change during release upgrade
  - Dynamically enabled – Changes can be applied and removed while JES2 is running **($POLICY IMPORT command)**

Additional C Header files for SMF records generated by z/OS

```
{  "policyName":     "PCONV1",
                    "policyVersion":  1,
                    "policyType":     " PreConversion ",
                    "definitions":
                       [
                         { "condition" : " JobIsProtected  ",
                            "actions"  :
                               [
                                  {  "action"    : " ModifyJob ",
                                     "attribute" : " MsgClass ",
                                     "value"     : " 'A' "
                                  },
                                  {  "action"  : " SendMessage ",
                                     "message" : " JobName || ' now has MSGCLASS: ' || MsgClass"
                                  }
                               ]
                         }
                       ]
                }
```

Example of preconversion policy…..Test if the job's output is protected….if it is…then modify the job's msgclass to A and send a message.

Usability & Skills

Data Set File System (SOD)

- A new file system type that will allow customers to access data in data sets from the z/OS UNIX space.
- Enables z/OS UNIX applications, tools, and utilities to use data in data sets in a secure and consistent manner.
- Supports Sequential, PDS, PDSE data sets.
- Supports RECFM = F, FB, FBS, V, VB, U
- Compressed or encrypted data sets are also supported
- Existing cataloged data sets (DASD) can be read and written.
- “Data Set File System” can also create new data sets or delete a data set or PDS / PDSE member.
- Data set serialization is consistent with serialization done by ISPF edit.
- Access to a data set is governed by user permission to the data set - UNIX permissions are **not** used.
- User needs to know the type of data that is in the data set in order to use it under z/OS UNIX.
- A new class of applications can be developed using this technology.
- Use case scenarios:
  - Use **grep** to search for things in data sets.
  - Use **vi** to edit data sets
  - Write data sets into **tar** archives
  - Make data sets part of a **pax** file
  - **sftp** data sets
  - etc…

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Scalability & Performance

Increase z/OS Memory limit above 4 TB

- Prior to z/OS 2.5 the limit for real storage consumption in z/OS was 4 TB
- New support allows z/OS 2.5 to address more than 4TB
- The new storage requires the use of new API's and is therefore limited to a subset of z/OS applications
- The limit is now 16TB of real storage in a single z/OS Operating system Image.
- Storage above 4TB is delivered in fixed storage with 2GB frame sizes.
- It can be used for z/OS Container Extensions, and is planned for other large memory consumers

zHyperLink write statistics (CD)

- Enhancements in DFSMS provide a command to allow users to display zHyperLink write statistics for a data set and optionally clear them.
- Additionally, new SMF fields are created in the SMF type 42 subtype 6 record to show information related to zHyperLink write failures.
- Support is available on z/OS V2R2 and above with APARs OA57717, OA57718, and OA58230.

Scalability & Performance

WLM Batch Initiator Enhancements

- Historically Workload Manager has managed initiators based on the available capacity of general-purpose processors. New support is planned to start and stop batch initiators also taking into account available zIIP capacity.
- Separation of heavy zIIP using batch jobs by service class will allow WLM to start initiators for zIIP using jobs on systems in a sysplex that have available zIIP capacity
- Ready for use “out of the box” with z/OS V2R5
  - Provided you are using WLM-managed batch initiators today
  - If you are not using separate sets of service classes for initiators running on specialty processors and service classes for initiators running on standard GPP, you may wish to consider modifying the WLM config to allow for a more accurate management of initiators

SMF.py Support (SOD)

- IBM intends to deliver a System Management Facility (SMF) data access toolkit leveraging Python and Jupyter Notebooks.
  - This new capability can help clients access SMF data in an easy and modern way.
  - This can enable data science solutions, IT analytics solutions, or artificial intelligence solutions

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 optimized Communications Server processing for zCX network 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 also available on z/OS V2.4 with PTFs for APARs PH16581 and OA58300.

Scalability & Performance

Faster Mount of zFS Filesystems

- Improved IPL time is planned to be provided when mounting zFS filesystems
    - In the event that the file system was copied while it was mounted the process of mounting the copy has to go through a quiesce period. That period has been reduced or eliminated.
- Requires apars to be applied on both the copying and restoring systems in the Sysplex
- Available on z/OS 2.3 and later with PTF for Apar OA59145

JES2 Memory Improvements

- JES2 checkpoint structures move into above the bar private area from dataspaces
    - Eliminates the need to copy them and to manage the dataspaces
- JES2 Spool track group map is moved to above the bar private area to relieve some memory in the below the bar private area.

Scalability & Performance

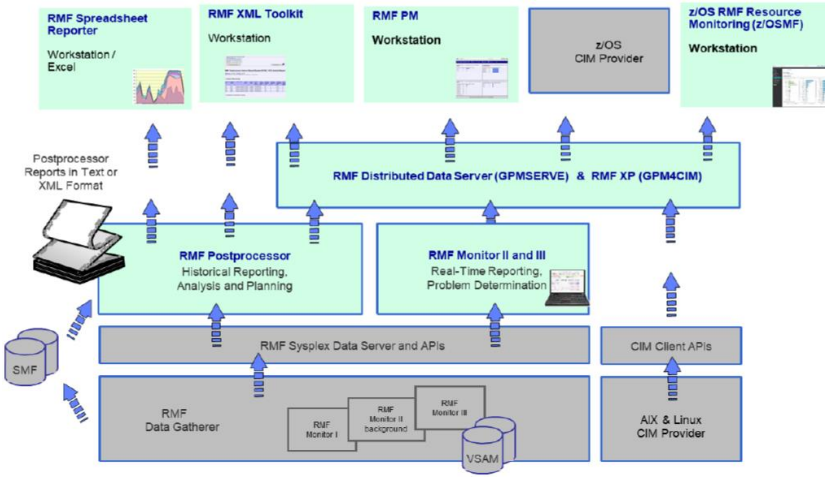
More Concurrently ”Open” Datasets

- More VSAM linear data sets (LDS) are planned to be able to be concurrently ”opened” in address spaces such as DB2
  - Each data set is represented by several internal z/OS data areas which reside in below the bar storage.
  - This support moves both VSAM and allocation data areas above the bar to reduce the storage usage in the below the bar storage area
- The support is optional, control is with ALLOCxx’s `SYSTEM SWBSTORAGE()`
  - `SWA` will cause SWBs to be placed in 31-bit storage, as they have been in prior releases.
  - `ATB` will cause SWBs to be eligible to be placed in 64-bit storage
  - `SETALLOC SYSTEM,SWBSTORAGE=SWA` *or* `SETALLOC SYSTEM,SWBSTORAGE=ATB`
    - Changing the setting will not affect jobs that are already running.
  - `DISPLAY ALLOC,OPTIONS`
- DB2 Apar PH09189 is required to enable this support
- IBM also recommends DB2 Apar PH33238 get the most value out of this support

Scalability & Performance

IBM Resource Measurement Facility (RMF) Restructure (CD)

- RMF will be restructured into the Data Gatherer and Reporter components
  - **z/OS Data Gatherer** collects performance measurements from the hardware and OS and provides access to these metrics across the sysplex
  - **RMF Reporter** (priced feature) uses the collected measurements to report performance stats in tabular and graphical reports (avails you to the Advanced Data Gatherer)
  - **Advanced Data Gatherer** (priced feature) that collects SMF 70-78 record data and access to Monitor II. Monitor III. and SMF 70-78 SMF data



- **New RMF product structure will be introduced in z/OS V2R5**
  - Make Data Gatherer and Reporter independent from each other
  - Move the Data Gatherer into the z/OS base
  - Offer more flexible licensing model for users who require raw performance data from z/OS
  - Keep migration/upgrade actions for RMF users at a minimum

Scalability & Performance

IBM Resource Measurement Facility (RMF) (CD)

- Display information about System Recovery Boost also available for z/OS 2.3 and above with the PTFs for APARs OA59852 and OA59321
- CF monopolization avoidance is supported and is also available with the PTF for APAR OA58726
- Reports about storage class memory (SCM) busy percentage on a z15. RMF adds input/output processor (IOP) utilization SCM busy percentage for all IOPs in the I/O Queuing Activity (IOQ) report this enhancement is also available with the PTF for APAR OA58727
- Support for XCF Transport Class Statistics
- Crypto Support
  - The capability to analyze the performance of recently delivered hardware using callable services, such as Integrated Cryptographic Service Facility (ICSF) format-preserving encryption, Feistel-based encryption, and Quantum Safe digital signatures, is now available with the RMF Postprocessor Crypto hardware report.
- Health checks
  - Verify the HTTPS (AT-TLS) configuration of the RMF Distributed Data Server (DDS) with the PTF for APAR OA60403.
  - Warn users when SESSION_PORT(8801) and DM_PORT(8802) are still being used with the PTF for APAR OA60404. RMF client code no longer uses both ports and IBM recommends removing the options SESSION_PORT, MAXSESSIONS_INET, TIMEOUT, DM_PORT, and DM_ACCEPTHOST from the GPMSRV## PARMLIB member.

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Availability

Automatic Restart Manager (ARM) support for restarting a system task (CD)

- Enhancement to IXCARM REGISTER support, to enable system tasks (for example, ICSF) to register with ARM and be restarted. This is provided on z/OS 2.3 and later with PTF for APAR OA59120

Coupling Facility (CF) Monopolization Avoidance (CD)

- New function introduced by coupling facility control code level (CFLEVEL) 24 on z15 servers to prevent a runaway sysplex application from monopolizing a disproportionate share of CF resources. Also available on z/OS 2.3 and higher with PTF for Apar OA56774

BPXPRMxx improvements

- LIMMSG default is changed to issue warning messages when system limits are reached in z/OS Unix
- The BPXPRMxx syntax checker now checks parameters to ROOT and MOUNT statements

Availability

f hzr,analyze

z/OS Anomaly mitigation client pain points

- WLM-based triggering based on changes in velocity metrics (and other anomalies)
- Specific RTD enhancements
  - Allow address spaces time to warm up before SERVERHEALTH event – avoid anomalies detected during component startup
  - Remove HIGHCPU event (CPU usage data) in favor of other instrumentation such as RTM Loop Detection
  - Add parameterization to allow RTD to analyze subsets of symptoms – messages only, for example – and to have RTD process address spaces without re-analyzing the system for all other events
- Invoke and consume the output of Predictive Failure Analysis (PFA) and Runtime Diagnostics (RTD), along with other diagnostic inputs, to create…
- Report-style output from analysis in these components, containing diagnostic summary *and recommended actions* – with sorting/grouping by component
  - Graphical-style output for visualization of trend lines, growth over time, etc.
  - JSON description of report contents, consumable by z/OSMF, automation, or ISV/other products
- Improve client triage of anomaly observations and predictions with IBM System Automation mechanism to capture report details, including recommended actions, in problem report

Availability

z/OS Catalog Enhancements

- Catalog address space is planned to be re-startable and to support dynamically changing the Master Catalog. (Previously this required a re-IPL)
  - `F CATALOG,RESTART(new-mcat-name)`
  - Must be a valid master catalog to switch to
- Catalog Modify command plans to support comments following the command parameters
  - `F CATALOG,RESTART(new-mcat-name)  I want this as my new mcat!`
- Catalog entries can be validated for the rename in progress indicators using IDCAMS DIAGNOSE function
  - `IDC01382I RENAME IN PROGRESS FLAG FOUND FOR dsn`

Access Method Services - IDCAMS

- DELETE MASK has two new options TEST and EXCLUDE
  - TEST will return all the objects that would have been deleted if TEST wasn't specified
  - EXCLUDE will allow a subset of objects that match the MASK to be excluded from those being deleted

```
DELETE SMS.MASK.** MASK TEST EXCLUDE(SMS.MASK.KSDS%, SMS.MASK.NONVSAM1)
```

- DEFINE MODEL is enhanced to also model the KEYLABEL parameter to support encryption attributes
- REPRO is enhanced to move its I/O buffers above the line to reduce the instances of out of space (878) abends

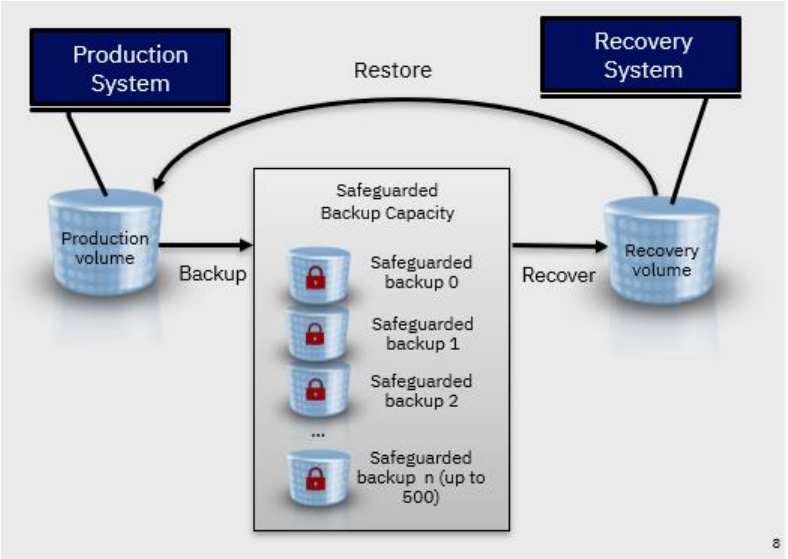
Availability

Logical corruption protection and recovery (CD)

DS8880 Safeguarded Copy:

- Safeguarded Copy provides up to 500 backup copies to restore data in case of logical corruption or destruction of primary data
  - The Safeguarded Capacity does not consume any of the regular DS8K volume addresses
  - Management and data consistency is provided by CSM or GDPS and copies can be maintained at production and/or recovery sites
  - Data can be restored to an additional recovery copy and can be used or copied to the source device depending on scenario
- A new TSO query, SGCQUERY**,** allows users to query the state of Safeguarded Copy relationships for a volume and the available recovery points (consistency groups)
  - Enables a storage administrator to access Safeguarded Copy information from TSO when other interfaces are not usable or not available and thereby continue to leverage persistent SGC recovery copies, potentially improving data availability.
  - Available on z/OS V2R2 and above with APAR OA58172.

IBM DS8880 Safeguarded Copy prevents sensitive point in time copies of data from being modified or deleted due to user errors, malicious destruction or ransomware attacks



Availability

System Recovery Boost – Sysplex Recovery enhancements (CD)

- Initial support for System Recovery Boost provided recovery acceleration via additional processor capacity and parallelism, but only during image-level events like image Shutdowns and re-IPLs
  - IPL and Shutdown boosts
    - Speed boost and/or zIIP boost
    - GDPS orchestration enhancements
    - Up to 60 minutes of boost at IPL and up to 30 minutes of boost at shutdown
    - Optional, priced SRB Upgrade temporary capacity for zIIP Boost
- New support extends this to provide recovery boosts for smaller-scope, occasional sysplex recovery activities, that introduce small-scale disruptions when they occur
  - Boosts automatically initiated when these events occur
  - And on the relevant set of systems in the sysplex where the recovery is taking place
  - Short-term boost periods, limited in total amount (30 minutes per LPAR per day)
- Sysplex recovery activities that are boosted include:
  - Sysplex Partitioning – planned or unplanned removal of a system from the sysplex
  - CF Structure Recovery – recovery from CF or CF structure problems that require structure-level rebuild or duplexing recovery
  - CF Datasharing Member Recovery – recovery from disconnect or failure of a CF locking datasharing member with locking resources held
  - HyperSwap – planned or unplanned HyperSwaps from primary to secondary disk sets
- No increase in IBM software licensing costs!

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

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Systems Management

z/OS System Provisioning

Problem : z/OS system provisioning in a single system or sysplex environment is complex, cumbersome and time consuming. Frequently z/OS systems are defined using configuration approaches that no longer exploit current system capabilities

Solution : z/OS Cloud Provisioning and Management (CP&M) is enhanced to provide capability to provision an entire new z/OS system.

- Entry level system programmers can provision a new z/OS system in less than one hour using Cloud Provisioning and Management automation and a template provided by an experienced system programmer.
- A z/OS System is configured from scratch using an IBM provided best practices workflow. Experienced system programmers can customize a small set of environment specific properties and provide them as a template in the CP&M Catalog.
- One or more z/OS Systems can be provisioned on pre-defined LPARs identified by the system programmer in the CP&M LPAR Pool.
- Initial capability is provided to provision a z/OS with a “MONOPLEX” configuration.

Systems Management

UNIX file backup / restore enhancements (CD)

- 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.
- The initial support 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 and shipped on z/OS .
  - The support shipped on z/OS V2.3 and 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.

DFSMShsm UNIX file-level backup and recovery with EXCLUDE criteria (CD)

- Unix files can be filtered with a new exclude option that includes directories, specific file names as well as file name patterns.
- Example:
  - `BACKDS '/u/ibmuser/' RECURSE`
    `EXCLUDE('logs/,*.log,*.tmp,a??B.java,/u/ibmuser/app/logs/')`
  - `hrecover -voX -e 'logs/,*.log,*.tmp,a??B.java,/u/ibmuser/app/logs/' /u/ibmuser/`
- This is available on z/OS 2.3 and later with APAR OA57868.

Systems Management

DFSMShsm file mode hosts (CD)

- A new FILEMODE for DFSMShsm enables an additional HSMplex to exclusively process UNIX files.
  - Any DFSMShsm requests for UNIX files are automatically directed to the DFSMShsm hosts configured with `HOSTTYPE=FILE` in Filemode host PARM stmt (or ARCSTRxx member). (Requires existing DFSMShsm host to specify `HOSTTYPE=CLASSIC`.)
  - This support enables clients with very large existing DFSMShsm environments to add DFSMShsm UNIX data set backup processing without impacting their classic volume and data set environment.
- This support is available on z/OS V2R3 and later with APAR OA58870.

DFSMShsm recover UNIX files to a new directory (CD)

- DFSMShsm adds the capability to recover UNIX files to a directory other than the original directory from the time of the backup. New directory must exist.
  - Important if you would like to examine the differences between the current and backed up files
  - Example:
    - `RECOVER '/u/ibmuser/appdir/' NEWDIR('/u/ibmuser/tmp/appdir/') RECURSE`
    - `hrecover -oX -N /u/ibmuser/tmp/appdir/ /u/ibmuser/appdir/`
- This support is available on z/OS V2R3 and later with APAR OA58612.

Systems Management

DFSMSdfp IEBCOPY Enhancements (CD)

- IEBCOPY can be used to preserve member generations when copying a PDSE V2.
  - Previously, DFSMSdss DUMP and RESTORE had to be used.
  - This now provides another popular method for retaining member generations and to avoid possible inadvertent loss of member generation data.
  - Exploit with new keyword on IEBCOPY to copy the member generations, on either COPYGRP or COPYGROUP:
    - `OUTDD=ddname,INDD={ddname|((ddname,R))}[,LIST={YES|NO}],GENS={ALL|NONE}`
    - **`GENS=`** is ignored when:
      - Input data set or Output data set are not PDSEs, with warning IEB1181I
      - Input data set is not V2 PDSE
      - If input data set is a PDSE V2 with generations and the output is a PDSE with no generations
      - If output data set has smaller generation count than the input data set, the oldest generations will be dropped.
  - Provided in APAR OA60639, on z/OS V2.3 and higher

Customer Requirement RFE 88392 (78 RFE votes, 8 watchers)

Systems Management

JES2 enhancements

- Spool compression and encryption via APAR OA57466 (CD)
  - There are some prereqs that need to be addressed first for encryption
  - Once satisfied, then to enable encryption: `$T SPOOLDEF,ADVANCED_FORMAT=ENABLED`
  - To request compression (z15 required) of SYSOUT data sets for a particular output class:
    `$T OUTCLASS(D),COMPRESS=YES`
- Replace exits with policies
  - JES2 will provide support for conditions and actions
  - Built-in policies that allow actions based on conditions
  - Condition: job name is ABC, action: set job class to Q
- MAS wide Policy support updated and is also available on V2.4 with the PTF for OA58190 (CD)

Better administration for zFS (CD)

- zfsadm chaggr now supports wildcard capability
- Protection from rm –r recursively removing files in the root or across file systems

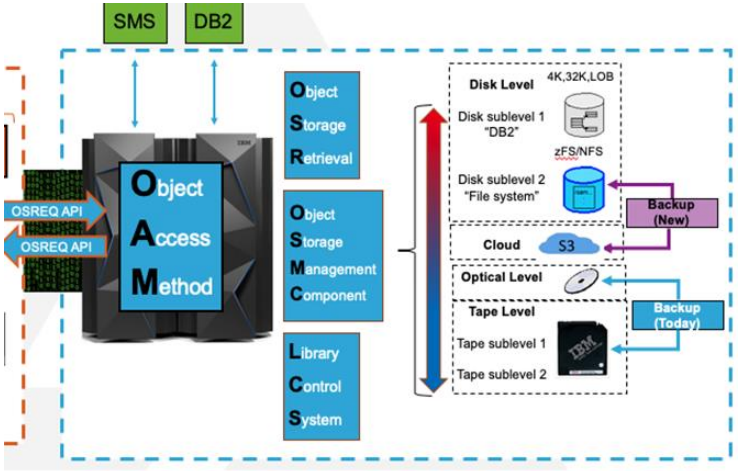
PDSE Member Compression (CD)

- PDSE's now can have members optionally compressed using the on-board compression engine. This support complements the member level encryption that was previously available .
  - PDSE V2, non program object, member larger than 64K - transparent
- The new support is intended to reduce the amount of disk space required to store PDS members. Members that are compressed before they are encrypted should see improved encryption and decryption time as the amount of data to be managed goes down.

Systems Management

OAM Cloud Tier Support

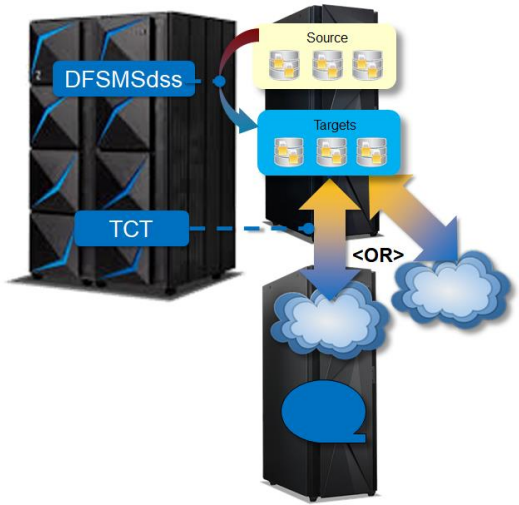
- DFSMS OAM has included a new cloud tier to its existing storage hierarchy. OAM objects can be managed and stored as objects to public, private, or hybrid cloud infrastructures supporting the S3 API.
  - Through SMS policies, OAM objects can be stored directly to the cloud or can transition to the cloud, based on access requirements. Also provided is the capability to recall an object stored in the cloud to the disk level of the storage hierarchy.
  - This support is available for z/OS V2.3 and later with APAR OA55700 and satisfies a previously announced statement of direction.
- New with z/OS V2.5 is the ability for OAM-managed backup copies to be additionally supported in the cloud, a zFS, or NFS.
  - OAM is planned to continue to support up to two backup copies of an OAM object.



System Management

Transparent Cloud Tiering Full Volume Dump Support (CD)

- Full volume copies of data can be backed up to the cloud with DFSMSdss where they can later be used to repair or recover a production environment that has been corrupted by system failures, human error, or compromised by either a cyberattack or internal attack.
- DFSMSdss leverages transparent cloud tiering to target either cloud object storage or a TS7700 configured as an object store.
  - To minimize the time a volume is locked, an initial full volume FlashCopy can be performed which can then be dumped to the object store.
  - Because the I/O for the FlashCopy is also completed within the DS8000, this could provide a point-in-time full volume dump to TS7700, with **none** of the data passing through the z/OS host.
- Utility commands, list and delete, added to assist in managing full volume dumps.
- Available on z/OS V2R3 and z/OS V2R4 with APAR OA57526.



Systems Management

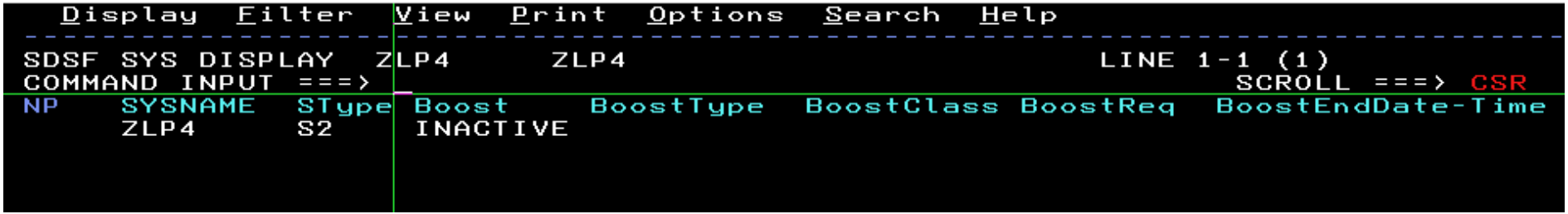
SDSF – System Display and Search Facility Priced Feature (CD)

- Eight new Primary Displays
  - Address space diagnostics, Couple Datasets, System IPL Parameters, SVC and PC routines
- Four new Secondary Displays
  - Job Common Storage, Job storage Subpools, Job Private Storage, Memory Structure Map
- Fifteen new viewable fields
  - Used filesystem space, used storage group space, used storage volume space
- New general function to allow permitted users to view the contents of any memory
- New Help facility replacing ISPF help menus and adding more context sensitive information
- Point and Shoot fields for memory browsing
- Wide screen support for operator commands and log positioning for WTOR and Action messages
- A new browser-based UI (in z/OSMF) which is more responsive and covers more function
- SDSF now adheres only to SAF-based security making it more secure

Systems Management

SDSF – System Display and Search Facility

- SDSF is enhanced with the PTF for APAR PH26552 to display information about System Recovery Boost. (CD) Go to the SYS panel



- **Boost** – ACTIVE, INACTIVE
- **BoostType** – SPEED, ZIIP
- **BoostClass** – IPL, SHUTDOWN, RECOVERY
- **BoostReq** – When BoostClass=RECOVERY: SYS-PART, CF_STRUCT,CF-DSMEM, HYPERSWAP
- **BoostEndDate-Time** – Expected end data-time for current boost
- **BoostInt** – Interval until expected end of boost

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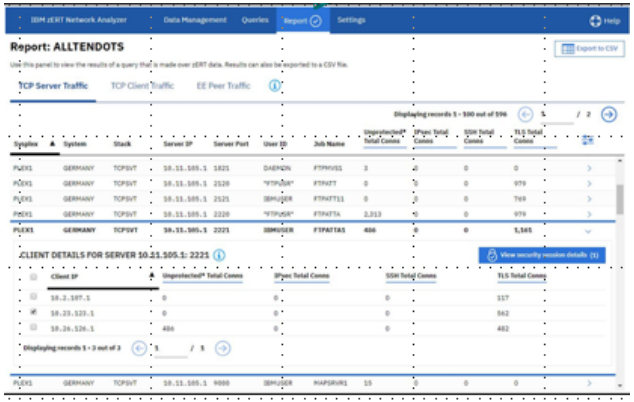
Networking

z/OS Encryption Readiness Technology (zERT)

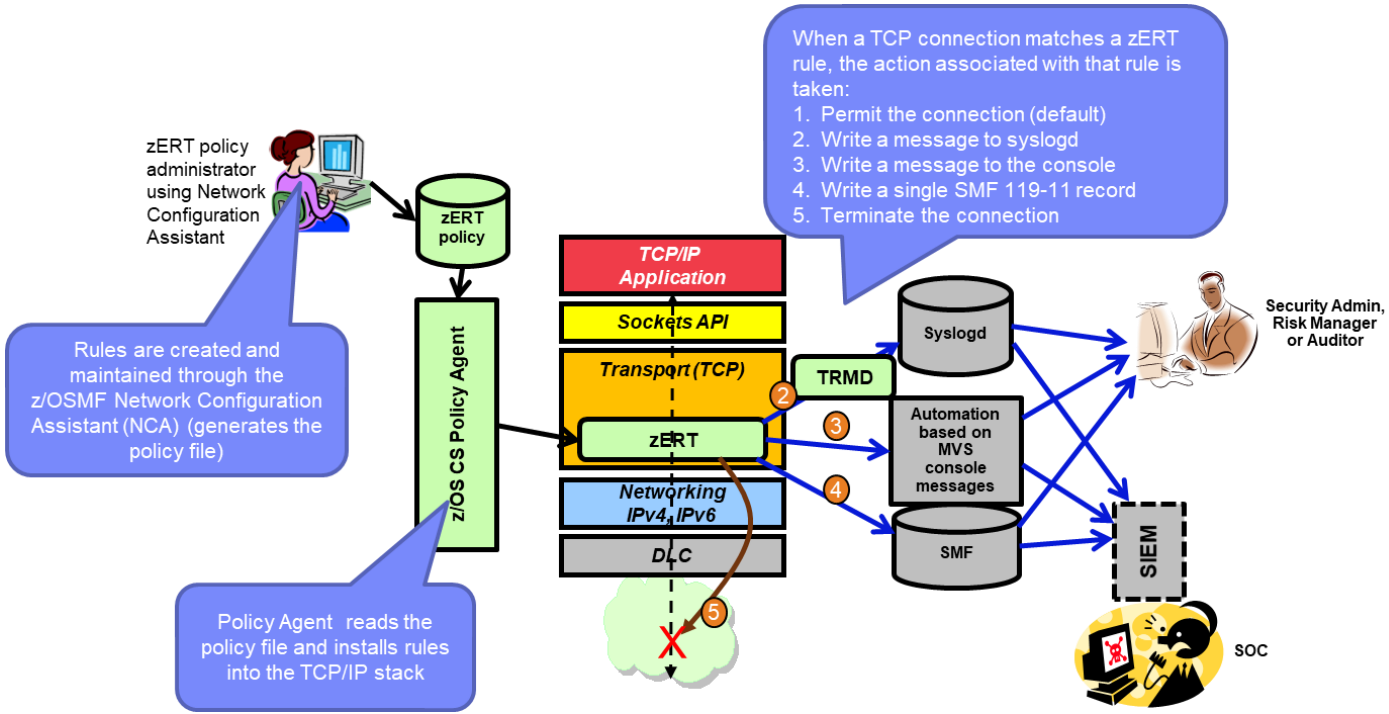
- zERT aggregation recording interval
  - The recording interval for zERT can be customized up to one call in 24 hours. This reduces the records produced and improves the performance of the zERT Analyzer. This support is also available for z/OS 2.3 and up with PTF's for Apars PH25049 and PH24543. (CD)
- zERT Network Analyzer, a z/OSMF plug-in, that provides an easy-to-use web UI for analyzing zERT data reported in SMF 119 subtype 12 records
  - Significantly improves Time-To-Value of gaining insights into zERT data and driving a Pervasive Encryption strategy for all z/OS network communications
  - Enhances flexibility in the zERT Network Analyzer Db2 for z/OS database schema definitions and reduces the access privileges required by the zERT Network Analyzer's database user ID through the use of Db2 partitioned tables. Available for z/OS V2.3 and z/OS V2.4 with Apar PH24492 and Apar PH24494, respectively.(CD)



Networking

z/OS Encryption Readiness Technology (zERT) policy-based enforcement

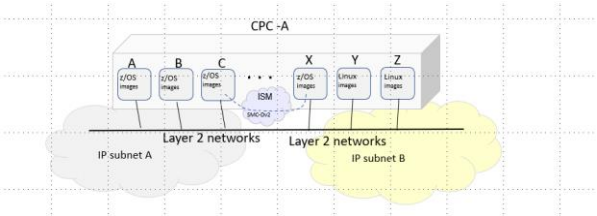
- zERT is extended to support policy-based rules that describe different levels of cryptographic protection along with optional actions to take when TCP connections match those rules.



Networking

Shared Memory Communications Version 2 (SMCv2) multiple IP subnet support

- SMC – Shared Memory Communication is a more efficient protocol for sending data to and from z/OS.
- An improved protocol SMCv2 allows for multiple IP subnet support.
  - This is now available for both Direct and Remote access types for SMC.
  - SMC-Dv2 is a local protocol for communicating between peers on the same physical machine. SMC-Rv2 is used over IBM RoCE Express2 adapters on z15.
- In z/OS v2.5 SMC-R and SMC-D are no longer limited to communications for hosts attached to a common IP subnet.
  - SMCv2 defines SMC over multiple IP subnets. The SMCv2 multiple IP subnet support extends SMC capability to additional application workloads that were previously ineligible for SMC.
  - z/OS V2.5 delivers SMCv2 multiple IP subnet capability for SMC-R (SMC-Rv2). SMC-Rv2 is enabled with new IBM Z capability provided by the RoCE Express2 adapters for z15.
  - z/OS V2.5 also delivers SMCv2 multiple IP subnet capability for SMC-D (SMC-Dv2). SMC-Dv2 is enabled with new IBM Z capability provided by the IBM Z Internal Shared Memory (ISM) function. The new ISMv2 capability is available on the z15. (CD)



Networking

Notification of Availability of TCP/IP extended services

- Currently, TCP/IP issues a message when the stack completes initialization.

```
EZZ4202I Z/OS UNIX - TCP/IP CONNECTION ESTABLISHED FOR TCPIP
EZB6473I TCP/IP STACK FUNCTIONS INITIALIZATION COMPLETE.
EZAIN11I ALL TCPIP SERVICES FOR PROC TCPIP ARE AVAILABLE.
```

- A new message is issued when optional extended TCP/IP services have completed initialization. These optional services include Sysplex DVIPA, IP security, and Network Policy initialization.

```
EZD1314I TCP/IP AND EXTENDED SERVICES ARE NOW INITIALIZED
FOR STACK: tcpstackname
```

- New ENF message is planned
  - User will create a new ENF 80 exit and listen for QUAL (x'20000000')
  - ENF signal will contain flag bits representing TCP/IP stack and extended services being fully initialized
  - The jobname of the TCP/IP stack that initialized

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Security

Pervasive encryption

- z/OS V2.5 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:
    - Basic and large format SMS data sets provided on z/OS 2.3 and later with PTF's for APAR OA56622 (CD)
    - JES2 spool encryption (CD)
    - Support for the EXCP API for encryption of data sets accessed via EXCP (CD)
  - These enhancements allow users the ability to encrypt data, in most cases, without application changes and simplify the task of compliance.
  - For more information, see the pervasive encryption content solution (https://www.ibm.com/support/z-content-solutions/pervasive-encryption/).

Security

RACF Enhanced PassTicket Support

- z/OS V2.5 plans to add additional RACF PassTicket support. This includes:
  - Stronger cryptographic algorithm
  - Configurable expiration time
  - Optionally Expanded character set
  - Improved diagnostics
  - Recording to SMF
  - Co-existence and Migration
- Available on z/OS 2.3 and up with PTF’s for Apar OA59196 and OA59197 (CD)

Security

RACF Support for Restricted Profile Management

- z/OS V2.5 includes a new installation option to limit a user who has ALTER access to a discrete profile from changing the profile
- This is intended to separate profile management from the access rights that a profile represents which should improve compliance.
- Here are some examples of the new support how to not allow people with ALTER authority from managing the profile and how to give management authority to a particular userID:

To completely remove profile management authority of all classes for those with ALTER authority:

```
RDEFINE FACILITY IRR.ALTER.* UACC(NONE)
```

To allow profile management authority for user STEVE, but only for the FACILITY class:

```
RDEFINE FACILITY IRR.ALTER.FACILITY UACC(NONE)

PERMIT IRR.ALTER.FACILITY CLASS(FACILITY) ID(STEVE) ACCESS(UPDATE)
```

Security

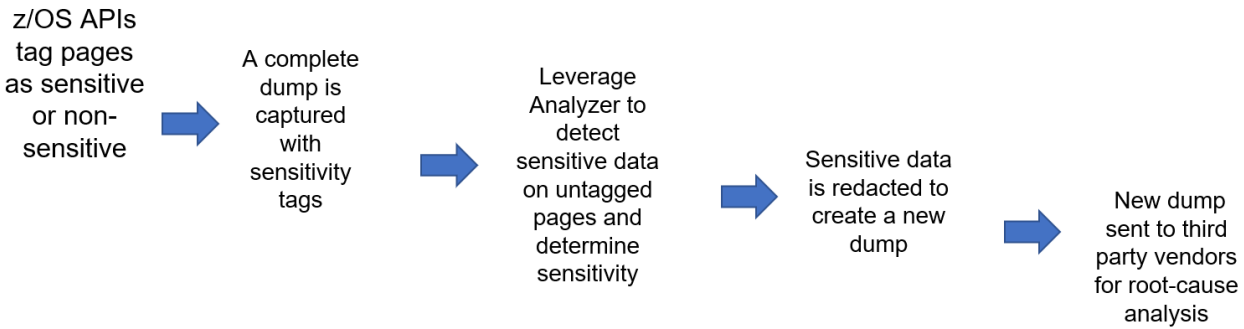
RACF New Health Checks

- New Health checks are provided to:
  - Verify all datasets are protected by RACF by verifying that SETROPTS PROTECTALL(FAILURES) option
  - Ensure all residual information is erased when data sets are deleted by verifying that SETROPTS ERASE(ALL) is enabled
  - Verify that all Passticket keys are encrypted and stored in ICSF
  - Verify that the RACF Address space is active
  - Verify that either RACF Sysplex communication or datasharing mode is active

Security

Data Privacy for diagnostics (CD)

- Support redacting sensitive user data in dumps **(requires a z15)**
- Mark sensitive memory areas and remove from a dump before sending to IBM or a vendor
- New options on z/OS API's to tag known sensitive memory areas
- New optional post-processing step will remove previously tagged sensitive pages, and new z/OS Diagnostics Analyzer will detect and redact additional sensitive data in untagged pages
- All intended to be done without impacting the dump capture time.
- Required and available maintenance for Data Privacy for Diagnostics:
  - Fix Category IBM.Function.DataPrivacyForDiagnostics



Security

z/OS Authorized Code Scanner (feature)

- The IBM z/OS Authorized Code Scanner is an optional priced feature of z/OS that provides automated system integrity testing in a dev/test environment as part of DevSecOps modernization. It scans for Program Calls (PCs) and Supervisor Calls (SVCs) available to all address spaces on a z/OS image and generates a series of tests that dynamically scan them for integrity.
- The output of this scan provides in-depth diagnostics whenever a potential vulnerability is found to facilitate remediation in order to further strengthen the security posture of the client's configuration of z/OS.
- It is also available on z/OS 2.4 with PTF's for Apar OA59702 and OA60166

- **New Feature Announce** (Announce)

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Application Development

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

- z/OS Container Extensions provides a virtual appliance for running Linux on Z workloads on z/OS
- The same binary container images that run on Linux on Z under VM or KVM will run in zCX
- The open mainframe project Ambitus provides an ecosystem for zCX
- For more information, see the zCX content solution (https://www.ibm.com/support/z-content-solutions/container-extensions/).

z/OS Container Extensions Performance Enhancements (CD)

- Improved performance and reduced locking
  - zIIP eligibility improved - 95%+ ziip offload in lab measurements*
  - Also available on z/OS 2.4 via PTF for Apar OA58296
- Support for SIMD – single instruction multiple data
  - Also available on z/OS 2.4 with PTF for APAR OA59111
- Support for 1MB and 2GB Large pages, containers per server raised up to 1000, and maximum guest memory raised to 1 TB
  - Also available on z/OS 2.4 with the PTF for APAR OA59865
- The number of data and swap disks per appliance is increased to as many as 245.
  - This enables zCX to address more data at one time
  - Also available on z/OS 2.4 with the PTF for APAR OA60452

Application Development

z/OS Container Extensions trial (CD)

- 90 day trial without HW feature code 104

(90-day trial is free subject to normal hardware and software consumption when adding a workload to z/OS)

- Customer self service
- Also available on z/OS 2.4 with PTF for Apar OA58969

z/OS Container Hosting Foundation **Product, 5655-HZ1** (CD)

- A new monthly license charged software product to optionally replace the required z14 or z15 HW feature code 0104
- Customers have a choice with z15 to purchase the HW Feature code or the new Product
- The SW product is for zCX only, but requires only one instance per machine

z/OS Container Extensions IBM License Metric Tool (ILMT) (CD)

- For use with sub-capacity pricing of IBM Linux on z software
- Manual counting no longer required

z/OS Container Extensions IPv6 Support (CD)

- Support is added to zCX in support of IPv6
- Also available on z/OS 2.4 with the PTF for APAR OA59508

Application Development

z/OS Container Extensions resiliency (CD)

- Support to monitor and log zCX resource usage of the root disk, guest memory, swap disk, and data disks in the servers job log.
- A new operator command option to display the version and service information about any zCX server and all the relevant components used to provision and run it.
- The zCX instance root disk can be enlarged when using the software upgrade workflow of the zCX appliance.
- zCX resource shortage z/OS alerts. These proactive alerts are sent to the z/OS system log (SYSLOG) or operations log (OPERLOG) to improve monitoring and automated operations. This function is available with PTF for APAR OA60303.
- These changes are also available for z/OS 2.4 PTFs for APARs OA59835 fand OA60303

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

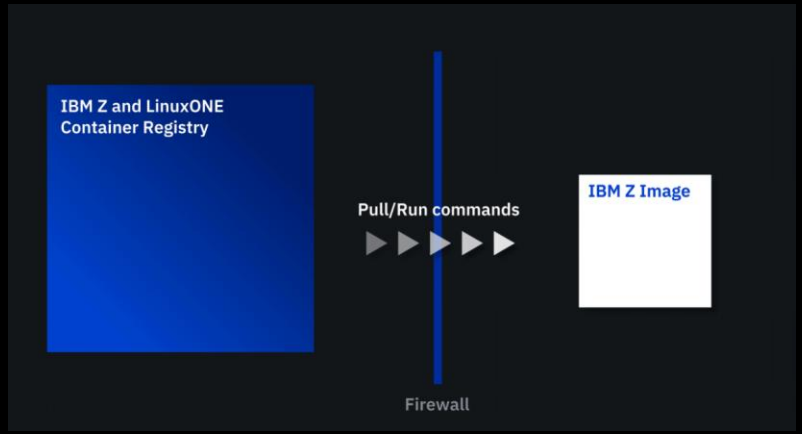
- zCX is enhanced to support proxy configuration, allowing the Docker daemon to use the proxy server in your enterprise to access external public and private Docker registries.
- The optional proxy configuration for z/OS Container Extensions can be configured using the provisioning and reconfiguration z/OSMF workflows.
- The proxy capabilities are also available for z/OS 2.4 with the PTF for APAR OA58267

IBM Z and LinuxONE container registry

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

Benefits of the IBM Z and LinuxONE Container Registry

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



Click the icon and get started today!

Application Development

z/OS Containers (SOD)

- In June of 2020 IBM® made the following statements of general direction:
  - *IBM intends to deliver a container runtime for IBM z/OS® in support of Open Containers Initiative (OCI) compliant images comprising traditional z/OS software.*
  - *IBM intends to deliver Kubernetes orchestration for these containers on z/OS.*

- z/OS intends to provide the basis for future support of an OCI container runtime and Kubernetes container orchestration for **IBM z/OS applications and workloads**. This will enable clients to adopt a container-based cloud native strategy for application development and operation of mission critical z/OS applications

- As a future item in z/OS - z/OS Containers intends to provide an industry standard container experience for z/OS that is consistent and familiar to application developers.

Application Development

Web enablement toolkit (CD)

- PATCH and OPTIONS HTTP request methods added to Web Enablement Toolkit
- Server Name Indication (SNI) when System SSL usage is specified
- Enhanced tracing to help with debugging using environment variables.
- Support provided on z/OS 2.3 and later by PTF for APAR OA58707
- Support for TLS 1.3 when using system SSL. Also available on z/OS 2.4 with PTF for Apar OA58708

REST-Enabled BCPii (CD)

- Provides new REST programming model as documented in the HMC Web Services API publication
  - HTTP method, URI resource, query parms, request and response bodies in JSON, etc..
- Still communicates internally to SE without going through the TCP/IP network
- Gives access to loads of new attributes not previously available with classic API interface
- Positions BCPii to be able to “automatically” support new hardware features when delivered by hardware, rather than waiting for z/OS BCPii to provide matching support
- Support provided on z/OS 2.4 by PTF for APAR OA60351. HMC and SE firmware updates for z15 also required.

Application Development

ISPF Enhancements

- Updates to ISPF in support of PDSE V2 member generations, providing improved messages for edit, browse, and view of members.
- Enhancement to SUBMIT command to add an optional parameter SUBSYS which allows submission of jobs to an alternate JES other than the Primary subsystem. This is useful for directing jobs to the JES2 emergency subsystem if required.

Application Development

z/OS V2.5 and Java

- The Java 8 level of Java will be supported at z/OS 2.5 GA.
- Anticipate z/OS 2.5 may support newer Java levels when they are available
- Java 11 Statement of Direction (SOD) reiterated in recent blog posting:
    - IBM intends to deliver IBM SDK for z/OS, Java Technology Edition version 11 in phases. The initial phase of the SDK is planned to support the language specification compliant with Java Platform Standard Edition (Java SE) 11 application programming interfaces (APIs).

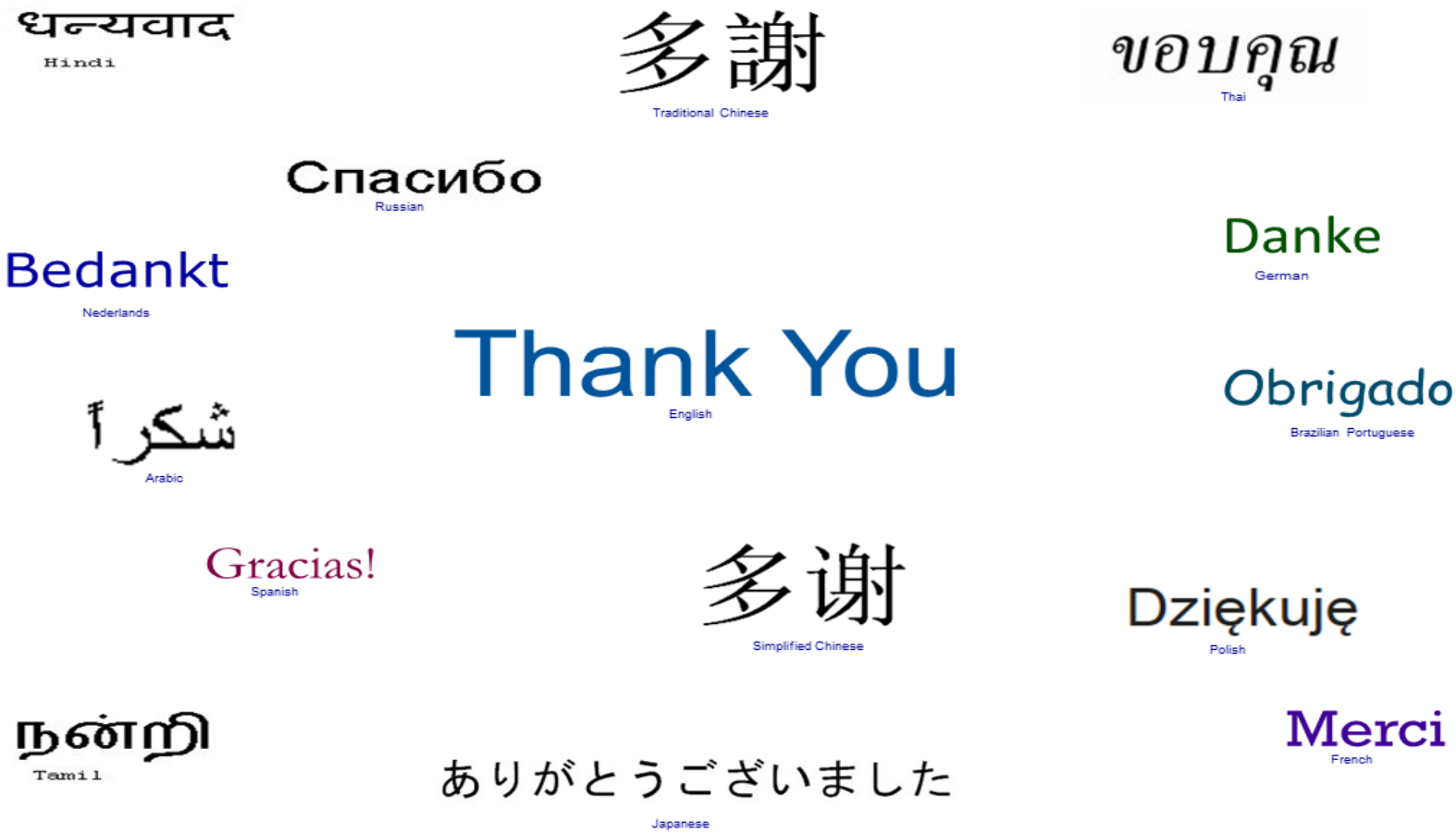
Requirements

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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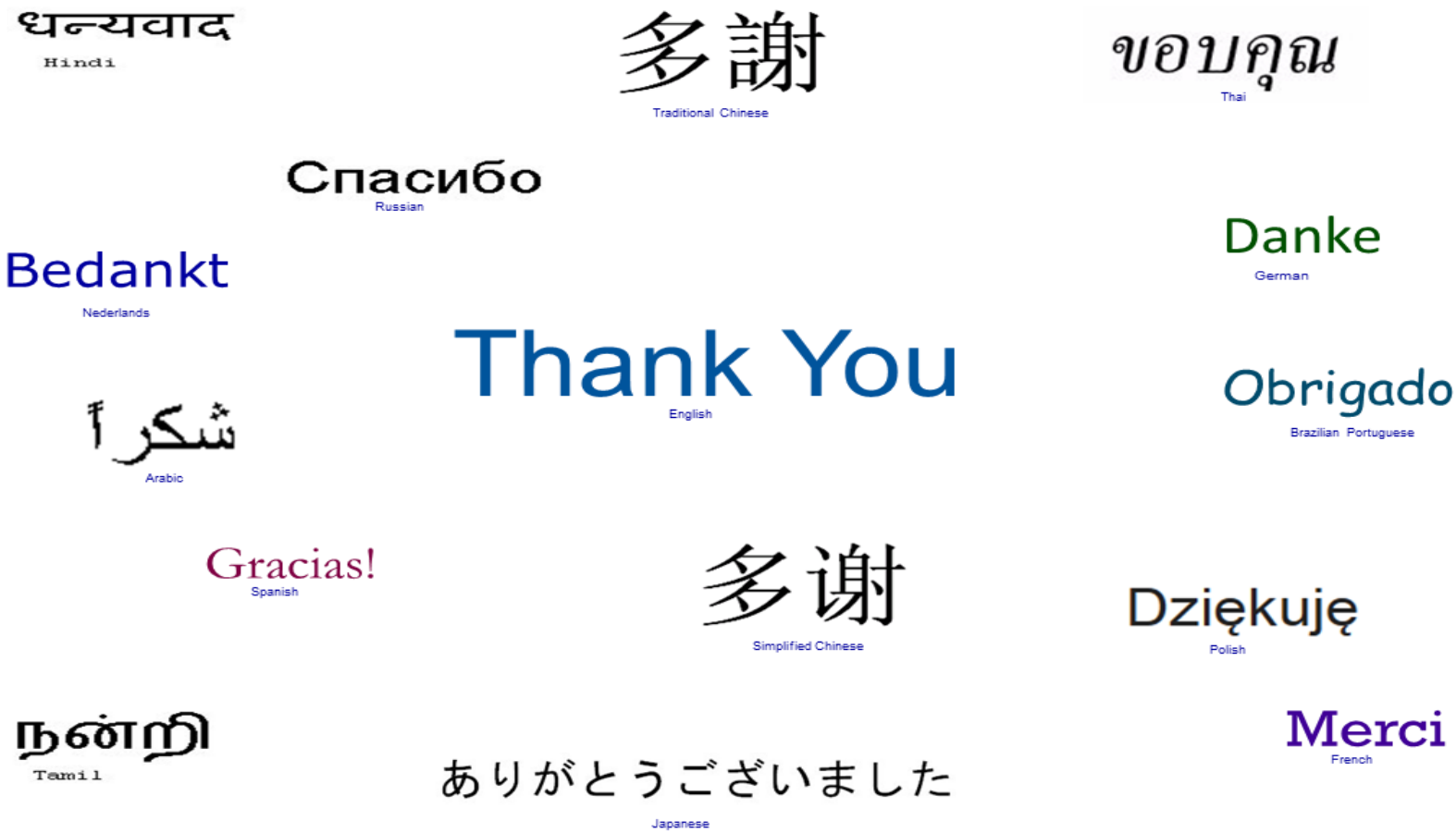
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Continuous delivery

- 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

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

IBM’s Statements of Direction

March 2021 - As previously announced, for clients that use JES3, z/OS V2.5 is the last release for which IBM plans to include the JES3 feature. Clients should be making plans to migrate to JES2 or an alternative.

March 2021 - In the future, IBM intends to extend zERT to support policy-based rules that describe different levels of cryptographic protection along with optional actions to take when TCP connections match those rules. Since z/OS V2.3, zERT has provided a detailed view of the cryptographic protection attributes used on connections that terminate on the z/OS TCP/IP stack. The zERT policy-based enforcement feature would enable immediate notification through messages, auditing through SMF records, and even automatic connection termination when questionable or unacceptable cryptographic protection is used. IBM plans to enable z/OS network security administrators to create and manage zERT enforcement rules and actions through the z/OSMF Network Configuration Assistant and the z/OS Communications Server policy agent.

March 2021 - For decades, IBM has offered two asynchronous replication strategies, IBM z/OS Global Mirror, also known as extended remote copy, or XRC, and DS8000 Global Mirror. IBM plans to support and maintain z/OS Global Mirror on z/OS with its current function only, and z/OS V2.5 will be the last release to provide such support. This withdrawal aligns with what was previously announced in Hardware Announcement 920-001, dated January 07, 2020 which indicated the DS8900F family would be the last platform to support z/OS Global Mirror. New functions to support asynchronous replication technology are intended to be developed only for DS8000 Global Mirror, and it is intended that no new z/OS Global Mirror functions will be provided with DS8900F and z/OS.

IBM’s Statements of Direction

March 2021 - IBM intends to enhance pervasive encryption through RACF support for the use of an encrypted VSAM data set as its data base in specific configurations.

March 2021 - With the rapidly growing need to derive AI insights from data in critical business workloads, IBM is planning to optimize z/OS by introducing highly performing AI functionality targeted for clients' critical business workloads. These enhancements are planned to be delivered iteratively and are intended to enable IBM Z as a highly competitive AI inferencing platform. Areas of focus would include:

- Native z/OS solutions providing AI capabilities that would be tightly integrated with z/OS workloads
- Utilizing z/OS Container Extensions that broadly expand the AI libraries and tools ecosystem, including, but not limited to, technologies such as TensorFlow and ONNX
- Optimizations that would be focused on ensuring AI libraries and runtimes can utilize the latest IBM Z hardware capabilities
- Guidance and content that would be focused on accelerating the path to adoption of AI technology

These capabilities are planned to further strengthen z/OS position as the premier platform for enterprise computing.

IBM’s Statements of Direction

March 2021 - On April 30, 2021, IBM is planning to remove support for Transport Layer Security (TLS) 1.0 and TLS 1.1 from the IBM software download servers. The affected servers are used for downloading files for the following z/OS software offerings:

- PTFs and HOLDDATA ordered using the SMP/E RECEIVE ORDER command
- PTFs ordered using Shopz
- PTFs ordered using ServiceLink
- Products in ServerPac and CBPDO offerings ordered using Shopz
- Products in CustomPac offerings

If clients currently download files for any of the listed offerings directly to their z/OS system using the HTTPS protocol, they will not be affected. However, if the FTPS protocol is used to download any of the listed offerings directly to their z/OS system, they might be affected and should take action now to ensure that the capability to download software products and fixes is not impacted.

More specifically, on April 30, 2021, the IBM software download servers will require download operations to connect to the server using TLS 1.2 or higher. Connection attempts using TLS 1.0 or TLS 1.1 will no longer be accepted. The SMP/E HTTPS client used for download operations will automatically use TLS 1.2 when connecting to the server. However, the z/OS Communications Server FTP client program will use TLS 1.2 only if configured to implement TLS using AT-TLS. Therefore, if clients currently use FTP as the download protocol, they must do one of the following to ensure that they can continue to download from the IBM software download servers:

- Use HTTPS instead as the download protocol. IBM recommends clients consider using HTTPS instead of FTPS, as this method often alleviates network, proxy, and firewall issues in an enterprise typical of using FTPS, and it is currently in use by many clients.
- Verify that the FTP client program is configured to implement TLS using AT-TLS (the TLSMECHANISM statement in FTP.DATA indicates ATTLS).

To learn more about using the HTTPS download protocol and how to indicate which download protocol SMP/E will use, see the Preparing for secure Internet delivery web page.

For information on configuring an IBM z/OS Communications Server FTP client, see the TLSMECHANISM (FTP client and server) statement webpage.

IBM’s Statements of Direction

March 2021 - To ensure that clients can install Shopz-orderable software in the future, it is recommended that clients take steps to prepare their driving system for z/OSMF-based installations. For an overview of ServerPac with z/OSMF Software Management and the steps to follow, see the ServerPac Installation using z/OSMF content solution website. Here, clients can find a sample portable software instance that can be used to verify that their z/OS driving system is operational for installing a CICS, IMS, Db2, or z/OS ServerPac.

Care is advised when clients plan to install z/OS V2.5, because the delivery choices are expected to change in Shopz in January 2022. At the general availability of z/OS V2.5, except for z/OS V2.4, and prior to January 2022, IBM intends to make all IBM z/OS software on Shopz orderable as a ServerPac, and installable as a portable software instance or by using the CustomPac dialog. It is not intended that z/OS V2.4 ServerPac will be offered as a portable software instance. Prior to January 2022, all other software (CICS, IMS, Db2, z/OS V2.5, and licensed programs) are planned to be offered as ServerPac orders deliverable through z/OSMF or the CustomPac dialog.

In January 2022, the CustomPac dialog delivery option is planned to be removed for all software, including CICS, IMS, Db2, z/OS V2.5, and all licensed programs. Thereafter, it is planned that all software that is orderable as a ServerPac must be installed with z/OSMF Software Management.

Although it is planned that z/OSMF will become a driving system requirement, it would be a requirement only for the system in a client’s enterprise from which software installation activities are performed. However, clients might find that using z/OSMF throughout their enterprise offers tremendous benefits. If clients cannot meet the z/OSMF driving system requirements for ServerPac, the Customized Offerings Driver (5751-COD) is available on Shopz. It provides a z/OS system with z/OSMF, which will be activated at z/OS V2.5 availability.

IBM’s Statements of Direction

September 2020 - Today, SMC for both SMC-R and SMC-D is limited to communications for hosts attached to a common IP subnet. SMCv2 defines SMC over multiple IP subnets. The SMCv2 multiple IP subnet support extends SMC capability to additional application workloads that were previously ineligible for SMC. z/OS V2.4 delivers SMCv2 multiple IP subnet capability for SMC-D (SMC-Dv2). See details in the Description section. IBM plans to make SMCv2 multiple IP subnet capability available for SMC-R exploiting "routable RoCE" (RoCEv2) in a future z/OS deliverable. IBM is working with Linux distribution partners to provide SMCv2 support for Linux on IBM Z and IBM LinuxONE.

September, 2020 – For more than a decade, IBM has been strongly recommending that SDSF security definitions use SAF resources, such as RACF and other security programs, rather than the SDSF-specific ISFPARMS/ISFPRMxx method. Using SAF has the benefit of placing security controls in the hands of the security administrator, reducing the manual task of reassembly of ISFPARMS during each upgrade, and elimination of maintenance of security definitions outside the external security manager. In the release after z/OS V2.4 IBM plans to require the use of SAF based security for the SDSF feature. In the case where a client is using ISFPARMS/ISFPRMxx-based security, there will be a required migration to SAF based security. The SDSF feature plans migration documentation and tooling to assist in the conversion. In preparation for this removal for those affected, IBM recommends clients start their conversion to SAF based security on their current z/OS release.

IBM’s Statements of Direction

June 2020 – The release after z/OS V2.4 is intended to be the last release to support the ability to share RACF databases between z/VM and z/OS systems. While databases may remain compatible, sharing between operating systems is discouraged due to the distinct security and administration requirements of different platforms. A future z/OS release will be updated to detect whether a database is flagged as a z/VM database and reject its use if so marked. Sharing of databases between z/OS systems is not affected by this statement.

June 2020 – z/OS DFSMSdss and DFSMShsm plan to provide full volume dump support for transparent cloud tiering. This capability will enable all I/O for full volume dumps to be performed by a DS8000 directly to a TS7700 enabled as an object store, or directly to cloud object storage. To minimize the time that a volume is locked while performing this offload, an initial full volume FlashCopy can be performed which can then be dumped to the object store. Because all of the I/O for the FlashCopy is also completed within the DS8000, this will provide a point-in-time full volume dump to TS7700, with none of the data passing through the z/OS host. DFSMShsm also plans to integrate this capability into the FRBACKUP / FRRECOV functions, utilized by Db2 BACKUP / RESTORE SYSTEM.

IBM’s Statements of Direction

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

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

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

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

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

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

IBM’s Statements of Direction

Superseded – 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.

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