What's New in z/OS V2.3

3Q 2018 edition

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

Table of contents

4Q2017 Update Overview

The following topics were added to the presentation as part of the 4Q2017 update

- Performance
  - z/OS V2.3 Performance (link)
  - VSAM RLS upgrade locking and constraint relief (link)
- Container pricing (link)
- Transparent Cloud Tiering
  - DFSMShsm enhancements (link)
- IBM Cloud Provisioning and Management for z/OS (link)

- SODs
  - OpenSSH statement of direction (link)
  - GDPS statement of direction (link)

1Q2018 Update Overview

The following topics were added to the presentation as part of the 1Q2018 update

- TS7700 R4.1.2 (link)
- RMF Enhancements (link)
- z/OSMF Enhancements (link)
- NFS Server: Encryption Support (link)
- Tape Support EOL (link)
- OpenSSH CPACF Support (link)
- IBM Operational Server Certificates (link)
- HiperSockets Converged Interface (link)
- z/OS Encryption Readiness Technology (link)
  - zERT Aggregation (link)
- User Key Common Requestors (link)

- SODs
  - None

2Q2018 Update Overview

The following topics were added to the presentation as part of the 2Q2018 update

- What's new with the z14 Model ZR1 (link)
- z/OSMF Enhancements (link)
- Continuous delivery for ID (link)
- Content Solution Feature (link)
- Inbound Workload Queueing (IWQ) support for IPSEC (link)
- IBM Cloud Provisioning & Management (link)

- SODs
  - SCLM functionally stabilized statement of direction (link)
  - SMB and NFS statement of direction (link)
  - zFS file level backup statement of direction (link)
  - z/OS Encryption Readiness Technology (zERT) statement of direction (link)
  - PMA withdrawal statement of direction (link)

3Q2018 Update Overview

The following topics were added to the presentation as part of the 3Q2018 update

- Simplify and modernize the user experience to enhance productivity
  - IBM z/OSMF
    - Desktop option (link)
    - Other enhancements (link)
  - Network Configuration Assistant support for multiple location TCP/IP configuration (link)
- Enhancing availability, scalability, and performance
  - IBM zHyperwrite data replication (link)
  - zlsof extended processing information (link)
  - Enhanced Capacity Management (link)
- Enhanced security and data protection
  - MCS passphrases (link)
- Improved content delivery
  - Obtaining z/OS content for IBM Knowledge Center for z/OS (link)
  - IBM z/OS Search Scope Catalog (link)
  - IBM Z: Look@ Knowledge Center Message Lookup Facility (link)
- Enhanced code page support
  - Code page enhancements for CSSMTP (link)
  - NFS Server Unicode support (link)
- Improving application development
  - VSAMDB (link)
  - JSON text-rendering sample program (link)
  - Web Enablement Toolkit delete element support (link)
  - cp utility enhancements (link)
  - True random number generation for z/OS UNIX (link)

- SODs
  - None

Table of contents

Hardware Support

- Five hardware models and Five LinuxONE models
- zArchitecture Mode ONLY
- Up to 170 processors configurable as CPs, zIIPs, IFLs, ICFs or optional SAPs (no zAAPs)
  - Up to 170-way on z/OS V2.1 and later (non-SMT mode)
  - Up to 128-way on z/OS V2.1 and later (SMT mode)
- Up to 32 TB of Redundant Array of Independent Memory (RAIM) – 1TB Memory Increment – 8TB/Drawer - Max
  - Up to 4 TB per z/OS LPAR with z/OS V2.1 and later
- Changed Node/Cache structure
- 192 GB Fixed HSA
- Channel Subsystem
  - Up to 85 LPARs
  - Up to six (6) Channel Sub Systems (CSSs)
  - 4 Subchannel Sets per CSS
- HiperDispatch Enhancements
- Two-way simultaneous multithreading (SMT)
  - Support for SAPs
- New and enhanced instructions
- XL C/C++ ARCH(12) and TUNE(12) exploitation:
  - New z14 hardware instruction support
  - Vector Programming Enhancements
  - Auto-SIMD enhancements to make use of new data types
  - Packed Decimal support using vector registers
- IBM zAware: z/OS & Linux on z System monitoring (IOAz)
- Hardware Instrumentation Services (CPUMF)

(z/OS support in blue)

- Fast Memory Clear
- Much faster CPACF - Pervasive Encryption
  - Coupling Facility Encryption
  - z/OS Data Set Encryption
  - Network Encryption
- IBM Virtual Flash Memory & CF Exploitation of VFM
- Guarded Storage Facility (GSF)
- Instruction Execution Protection (IEP)
- CF Level 22:
  - List Notification Enhancements
  - CF Processor Scalability
  - CF Request Diagnostics
  - Encryption Support
- Next Gen RoCE 10 GbE (RoCE-Express2)
- Entropy-Encoding Compression Enhancements
- FICON Express16S+
- OSA Express6S
- zHyperLink®
- Crypto Express6S exploitation
  - Next Generation Coprocessor support
  - Support for Coprocessor in PCI-HSM Compliance Mode
- Architected for up to 85 domains on Crypto Express6S
- Integrated Coupling Adapter (ICA-SR) links CHPID CS5
- Coupling Express LR (CE LR) CHPID CL5

Hardware Support

What's new with z14 Model ZR1

IBM z13s

Machine Type
- 2965

2 Models
- N10 and N20
- Single 24" frame
- Air cooled PU
- Non-raised floor feature
- Overhead Cabling required
- DC Power Options

Processor Units (PUs)
- N10: 10 Client Configurable, 13PUs
- N20: 20 Client Configurable, 26PUs
- 6 CPs max

Memory
- Up to 4 TB, Min 64G, 8-256GB increments
- Virtual Flash Memory 4x1.4TB increments

I/O
- 64 PCIe Gen3 channel features
- HCA and New Coupling

IBM z14 Single Frame

Machine Type
- 3907

1 Model
- ZR1
- Single 19" frame
- Air cooled PU
- Non-raised floor support
- Top Exit and/or Bottom Exit Cabling feature enhancements
- PDU based power

Processor Units (PUs)
Feature Driven: 6 CPs Max
- Max4: 4 Client Configurable, 8PUs
- Max12: 12 Client Configurable, 16PUs
- Max24: 24 Client Configurable, 28PUs
- Max30: 30 Client Configurable, 34PUs

Memory
- Up to 8 TB, Min 64G, 8-512GB increments
- Virtual Flash Memory 4x512GB increments

I/O
- 64 PCIe Gen3 channel features
- New 19" I/O Drawer
- New I/O features: zHyperlink
- New Coupling Express LR only

Hardware Support

SIMD/Vector Extensions

- New set of BCD/PD Vector instructions for COBOL 6.2
  - Faster BCD operations – Register-Register vs Storage-Storage
- New vector modes to support Float32
- Next XL C/C++ compiler: Built-ins, Auto-SIMD, BCD operations
- Next PL/I compiler: Auto-SIMD, BCD operations
- Java Next: Data Access Accelerator (DAA) APIs + Auto-SIMD

Pause-less Garbage Collection for Java

- Goal: More consistent response times for large heap, response-time sensitive applications.
- Reduce GC stop-the-world pause times via exploitation of z14's *Guarded Storage Facility*.
- An extension to existing GenCon GC policy, enabled via –Xgc:concurrentScavenge
- Additional Java capabilities documented in Application Development section

Hardware Support

Processor Encryption (CPACF) changes

- Significant performance improvement
- New SHA-3 Hashing algorithm added to the KIMD and KLMD instructions.
- Parallel computation of AES and GHASH enabled via new AES GCM instruction

N-Way Limit remains 256

- z/OS architecturally supports up to 256 simultaneous hardware threads

z/OS Memory limits

- Minimum 8 GB LPAR storage will be required to IPL z/OS 2.3 and later releases on z14
- If you IPL z/OS 2.3 on z14 with <8 GB, a WTOR will be issued and if you continue, you understand that less amount of memory could impact system availability
  - This WTOR will **not** be issued on pre-z/OS 2.3 systems on z14
- A health check will remind you of this recommendation
- z/OS 2.3 and later releases running as z/VM guest and zPDT on z14 will require 2 GB storage
- The maximum memory for a z/OS 2.3 LPAR is 4 TB.

Hardware Support

Access Method Encryption

- Enhancing data security by extending encryption to the data set level
  - Exploitation of ICSF and CPACF
  - Access methods and other system services are enhanced to fully support encrypted data sets…***transparently***.
- ***No application changes or awareness*** that BSAM/QSAM/VSAM data is encrypted
  - Data encrypted/decrypted only when accessed via supported access methods.
  - Data remains encrypted during backup/recover, migration/recall, and replication.
- Utilizes existing policy based management
  - Storage Administrator can provide encryption capabilities via storage management policies (SMS dataclass constructs).
  - Security Administrator can provide encryption capabilities via RACF DS profile.
  - Security Administrator must grant access to the key labels.

Memory Affinity

- Adjunct to Hiper-Dispatching to improve aggregate performance
- Try to allocate memory close to affinity nodes
- Help reduce memory access latency

Hardware Support

DS8880 – planned zHyperLink support

- Short distance mainframe link
- Up to 10x lower latency expected over High Performance FICON

DS8880 – Transparent cloud tiering

- Command based migration of data sets for which a slow recall time is acceptable
  - Compressed with zEDC
  - Data set level encryption
- Cloud storage provider used as a migration level

TS7700 R4.1.2 - CUIR Support for Tape **(1Q2018 add)**

- Control unit initiated recovery (CUIR) for tape
- Ability to automatically vary devices in a service cluster offline and online
- Refer to OA52376

True Random Number Generator

- Entirely non-deterministic random number generation
- Can be used to generate more-secure keys
- A processor resident true random number generator

Hardware Support

Instruction Execution Protection (IEP)

- IEP is a hardware function provided by z14 (based on DAT table entry bit)
- RSM provides new function to request that non-executable memory be allocated
  - Exploitation support new EXECUTABLE=NO option on IARV64 and STORAGE
  - Any attempt to execute an instruction within such an area will result in a program check
  - Could be an indication of an attempt to violate system integrity
- RTM will write LOGREC record of any program-check that results from IEP
- Support will also be available for z/OS 2.2 and later running on z14

Virtual Flash Memory (VFM)

- Replacement for IBM Flash Express on z14
  - VFM implements EADM Architecture using HSA-like memory instead of Flash card pairs
  - Saves at least two PCIe I/O Drawer Slots, Less power consumption and no API changes
  - Up to four 1.5TB features
- Reliability, Availability, Serviceability
  - VFM Concurrent Add
  - The memory associated with the VFM can be evacuated to another processor drawer along with the “regular” customer memory
- Remains applicable to z/OS Paging and CF offload for MQ shared queues

Hardware Support

CF Level 22 exploitation

- Coupling Facility processor scalability
- Coupling Facility SMSG Diagnostics
- XCF/XES List Notification Enhancements
- CF encryption
- Structure and Coupling Facility Storage Sizing with CF Level 22
  - May increase storage requirements when moving from:
    - CF Level 21 (or below) to CF Level 22
    - CFSizer Tool recommended (http://www.ibm.com/systems/z/cfsizer)

Parallel Sysplex Coupling links

- IBM Integrated Coupling Adapter (ICA SR) – Short Range (150m)
  - ICA SR is Recommended for Short Distance Coupling z13 to z13 and beyond
- Coupling Express LR (CE LR) – Long Range
  - Coupling Express LR is recommended for Long Distance Coupling z13 to z13 and up

Hardware Support

RoCE Express2 – RDMA over Converged Ethernet

- z/OS Communications Server (CS) provides a new software device driver for RoCE Express2
- Provides:
  - Increased Bandwidth: Dual port cards for 10 GbE
  - Increased Sharing: 126 VFs per PCHID port (63 per port)
- SMC-R transparently exploits RoCE Express2

zHyperLink

- Reduce I/O latency and re-dispatch time
- RMF support is provided to collect IBM zHyperLink related performance measurements in SMF **(1Q2018 add)**
  - Updated Records - SMF 74 subtype 1 Device Activity records, SMF 74 subtype 5 Cache Activity records, SMF 74 subtype 8 ESS Activity records, and SMF 74 subtype 9 PCIE Activity records
  - These measurements are reported in the appropriate RMF Postprocessor Device, Cache, ESS, and PCIE Activity reports in the RMF Monitor III PCIE Activity report.
  - This support is available on z/OS V2.1 and z/OS V2.2 with the PTFs for RMF APARs OA50755 and OA53411 as well as on z/OS V2.3 with the PTF for RMF APAR OA53411.

Hardware Support

2042 TOD clock

- The z/OS 8-byte Store Clock (STCK) TOD clock timestamp will wrap in the year 2042 (and wrap for any “future date/time” calculation that extends beyond 2042), which may cause many kinds of problems for programs using such timestamps
- The existing Store Clock Extended (STCKE) instruction provides a 16-byte clock/timestamp that greatly extends the time until the clock wraps
  - Clock is extended on the left with a 1-byte “epoch index” into which the clock can wrap, and on the right with finer-granularity stepping bits
- Programs that use 8-byte STCK-format timestamps need to investigate their usage and take remedial actions if necessary to avoid wrap-related problems
  - Convert to 16-byte STCKE-format timestamp usage instead
  - Extend existing 8-byte STCK-format clock/timestamp with an epoch index, contiguous or not, effectively implementing a 9-byte timestamp
  - Use “windowing” techniques in conjunction with existing 8-byte STCK-format clock usage, e.g. treat wrapped values as representing dates/times occurring post-2042, rather than occurring early in the 20th century (pre-1970)
  - “No change needed” – existing 8-byte STCK timestamp usage is OK
- Consider timestamps present in APIs/externals, hardened record formats, future-date calculations such as expiration dates, interval calculations, etc.
- z/OS will start down the road to remediating this issue in z/OS system code in z/OS V2.3
  - **Note:** z/OS V2.3 Does not support running the clock beyond 2042

Hardware Support

ICSF Cryptographic Support for z/OS V2R1 – z/OS V2R3 (FMID HCR77C1)

- ICSF support for z14 CPACF enhancements
  - SHA-3 hash, TRNG random number generation, AES GCM performance improvements
- ICSF support for PCI HSM configured CCA coprocessor
  - Enforces PCI HSM compliant algorithms, keys, and key management
- Crypto Statistics Monitor
  - Tracks ICSF usage statistics related to cryptographic hardware engines (e.g. CCA coprocessor), ICSF CPACF usage, algorithms, and services.
  - Facilitates crypto HW capacity planning, problem determination, and standards compliance.
- FIPS Certification as part of z/OS V2R2 certification
- ISPF based Browser for Cryptographic Key Data set (CKDS)
- Improved auditing for CICS applications that make use of ICSF resources
- Access to ICSF services during early IPL processes
  - Supporting the pervasive encryption z/OS theme
- Support for international algorithms (DES, AES, RSA, ECC) via Regional Crypto Enablement (RCE) in ICSF
- Relief from 2038/2042 date restrictions
- Updated key data set list service in support of ACSP application ports to z/OS

z/OS Support Summary

Release	z900/z 800 WdfM	z990/ z890 WdfM	z9 EC z9 BC WdfM	z10 EC z10 BC WdfM	z196 Z114 WdfM	zEC12 zBC12 WdfM	z13 z13s	z14	End of Service	Extended Defect Support
z/OS V1.12	X	X	X	X	X	X	X		9/14	9/17[2]
z/OS V1.13	X	X	X	X	X	X	X	X	9/16	9/19[2]
z/OS V2.1			X	X	X	X	X	X	9/18	9/21[2]
z/OS V2.2				X	X	X	X	X	9/20[1]	9/23[2]
z/OS V2.3						X	X	X	9/22[1]	9/25[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

Table of contents

z/OS V2.3 Hills

Cloud Enablement for z/OS

Vision: Provide a simple, consumable approach for self-service provisioning and rapid delivery of as a Service (aaS), while enabling for the API Economy. This allows customers to convert from an IT cost center to a value generating model.

z/OS Security Enhancements

Vision: Provide a simple, transparent, and consumable approach to enable extensive encryption of data in-flight and at-rest to substantially reduce the costs associated with protecting data and achieving compliance mandates.

Deliver z Systems operating system infrastructure to enable encryption of data by policy, without application change.

z/OS Simplification

Vision: Simplify the overall management of the z/OS ecosystem, increasing the productivity and value of system administrators and easing the on-boarding of new team members.

z/OS V2.3 Content Overview

Usability and Skills

z/OSMF Configuration Assistant enhancements for TCP/IP (import, dynamic updates), Sysplex Management stage 1, Operator Console plug-in, Software Management, Workflow applications, z/OSMF AutoStart, Cloud provisioning, …

Application Development

z/OS UNIX System Services support for year 2038, year 2042 TOD Clock Issue, e-Mail notification for job completion, Web Enablement Toolkit Enhancements, ISPF improvements, Language improvements (Java, C++, etc.), …

Scalability & Performance

RMODE 64, Open Data Set Constraint Relief, SMF Constraint Relief, SMF real-time APIs, VSAM RLS Constraint Relief, Container pricing, zFS compression, …

Enhancing Security

SAF Security Deployment Descriptor, Encrypting access methods, FIPS Mode for System SSL Services, Network Authentication Services Improvements, Audit Key Lifecycle Events & FIPS Mode Audit Trail, …

Availability

zFS dynamic attribute changes, SSL hardware auto-detect, HFS to zFS online migration tool, JES2 Resiliency, VTOC update tracking, SVC dump thread time-outs…

Systems Management

JES3 to JES2 Migration aids, 8-Character TSO/E User IDs, BCPii Performance and constraint relief, zFS Shrinking, Liberty in the base, KC4Z Improvements, zFS Improvements, Multiple OAM instances, SDSF enhancements, …

Networking

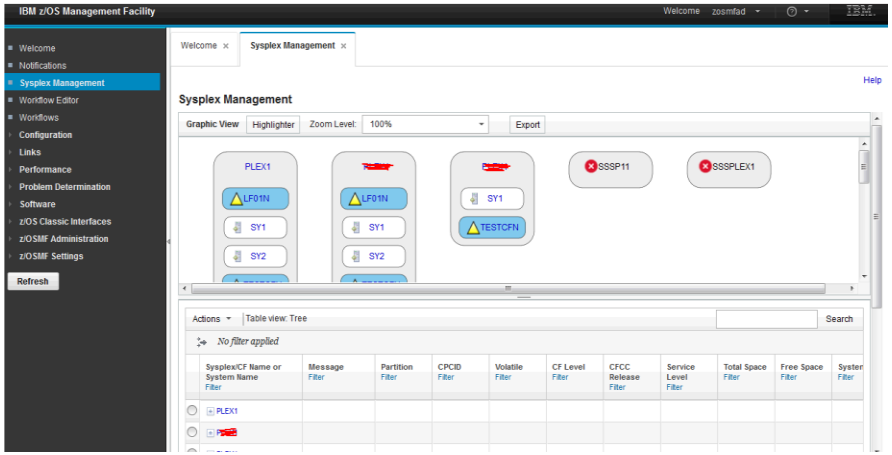
SMC-D, Improved reporting of Network Security Encryption protocol usage, AT-TLS Currency, flexible configuration improvements, z/OS Encryption Readiness technology (zERT), ...

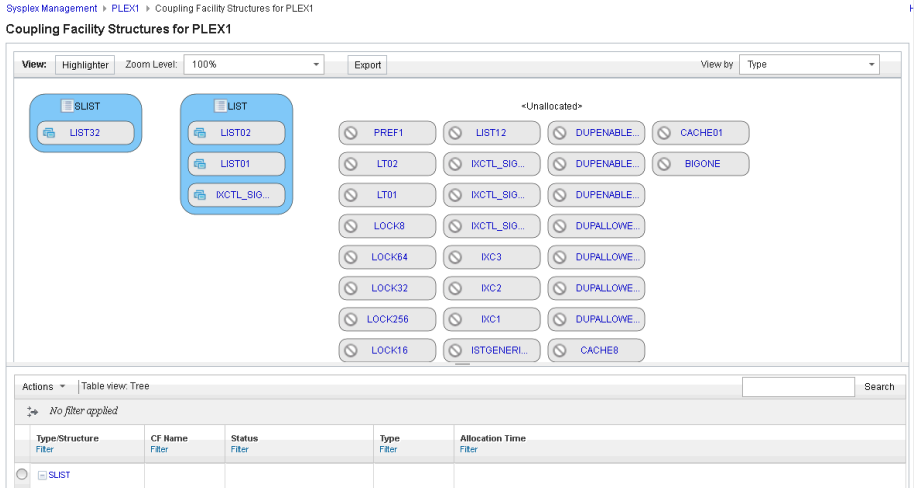
Table of contents

Usability & Skills

Parallel Sysplex management – NEW!!

- Stage 1 in the z/OS V2.3 timeframe provides display-only capabilities for sysplex resources such as z/OS systems, coupling facilities, coupling facility structures, programs using coupling facility structures, couple data sets and the policies they contain, coupling link connectivity resources, etc.
  - Graphical and tabular displays
  - Physical and logical views of sysplex resources
  - Visualizations and drill-downs

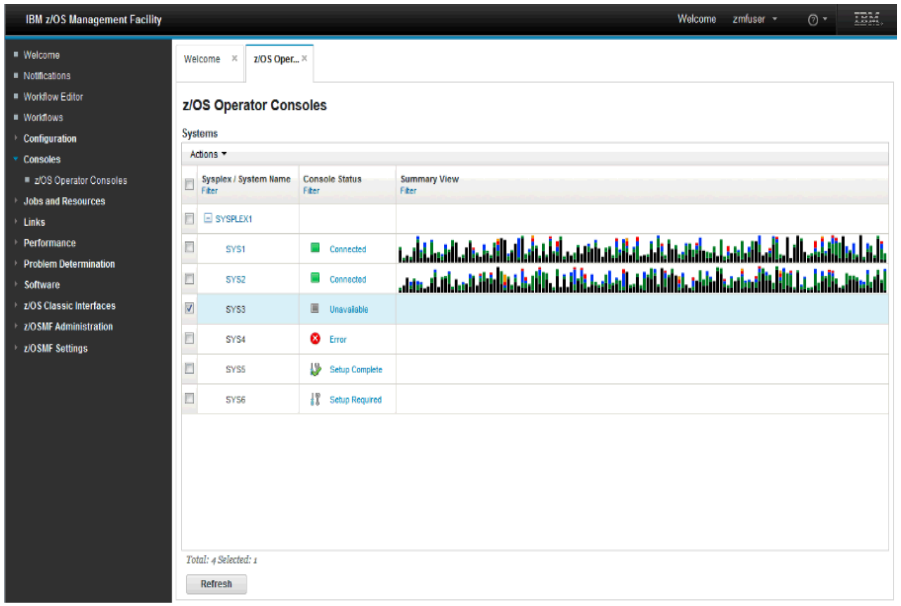


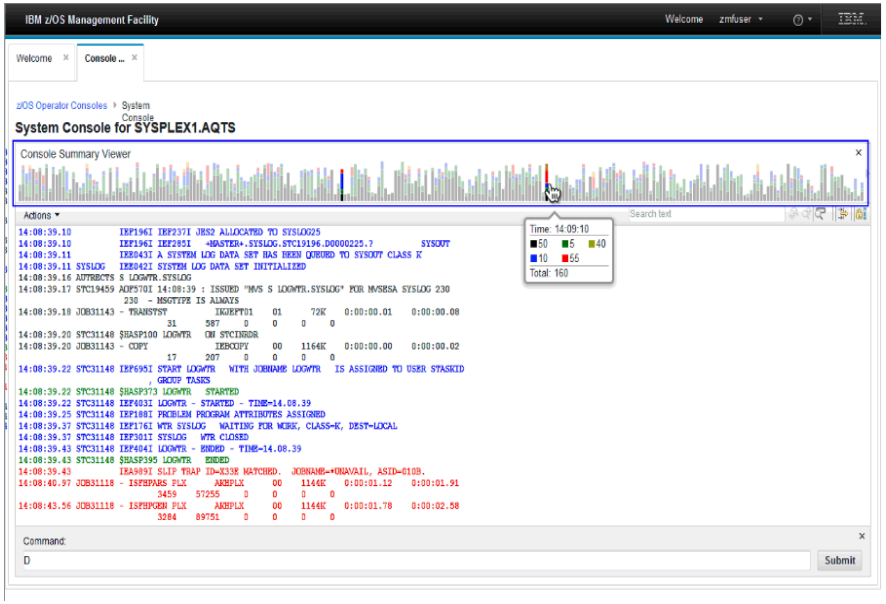


Usability & Skills

Console application – NEW!!

- Provide ability to see messages on browser in real time
- Supports multiple systems in a sysplex
- Filtering, highlighting, searching, and message help

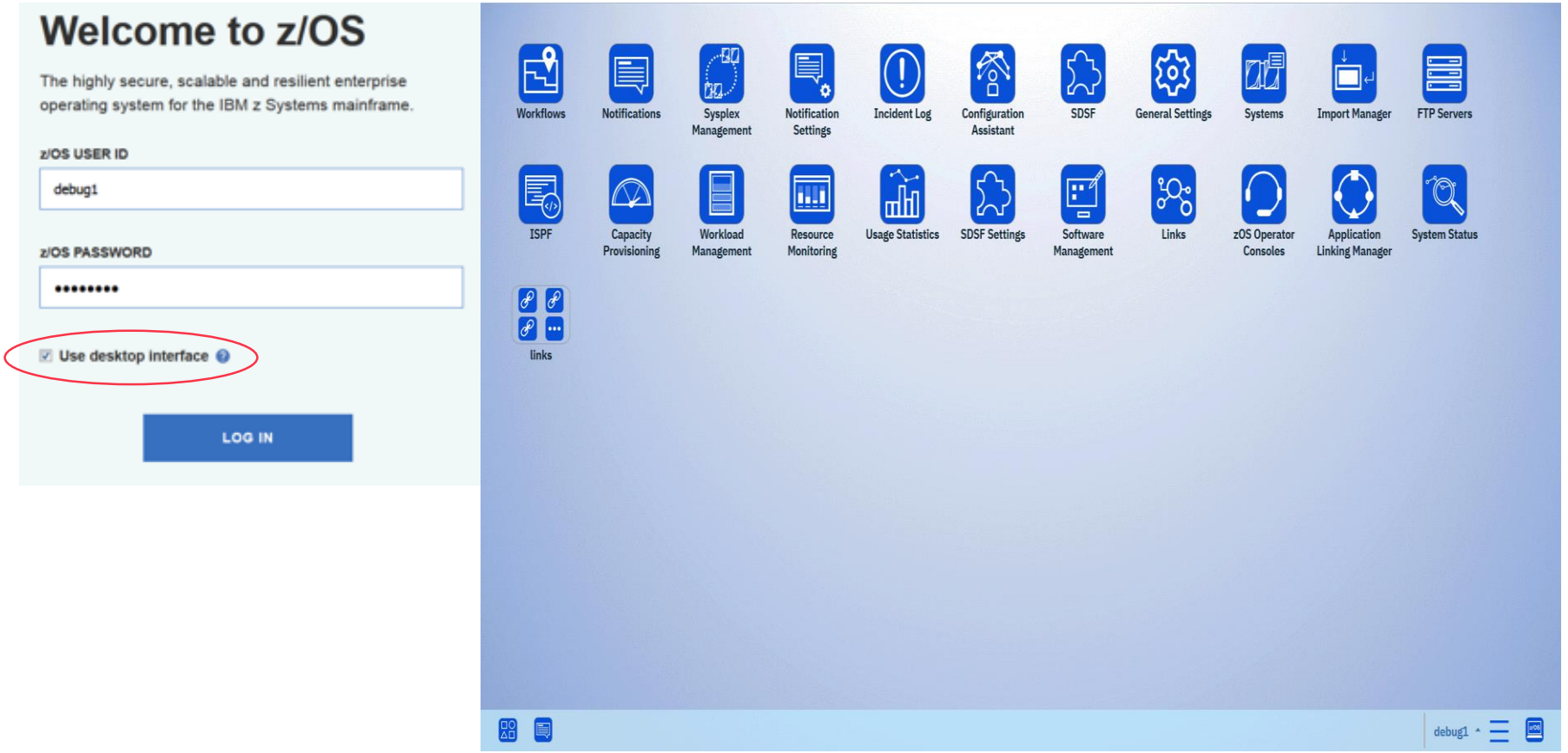




Usability & Skills

z/OSMF Desktop Option **(3Q2018 add)**

- New look and feel following a desktop metaphor
- Provides more usable screen space, customer grouping of tasks, and the ability to see multiple tasks at one time (PI96462)



Usability & Skills

z/OSMF “AutoStart” – Start during IPL

- Must be configured and running somewhere in the sysplex
  - IZUPRMxx may be specified in IEASYSxx
- Use of Liberty in the z/OS base
- New logon dialog

More dynamic configuration

- Most actions are available in the z/OSMF UI for managing z/OSMF
- For example
  - Setting up the header/footer and gif on the main page

z/OS Cloud – middleware provisioning

- Self service provisioning facility
- Introduces catalog, registry, workflow editor and tenant definitions
- Basic metering and capping
- Along with the middleware, such as CICS, can provision in minutes versus months

Usability & Skills

z/OSMF Updates

Notification updates

- Email notification
- Push notification

Improved files and data sets REST API

- Full complement of services: allocate, delete, copy, rename, migrate, recall, etc.
- In addition to browse, edit, list data sets with attributes and files with attributes

Workflow engine

- Improved security allowing more granular control over who can see workflows and workflow steps
- Support for immediate REXX and Script execution
- More flexible Job Card information

SDSF browser UI

- Added features including ENQ and SYM
- Added a number of additional primary commands

Usability & Skills

z/OSMF Updates

Incident log

- Manually-created incidents (not originated via SVC Dump)
- APAR search from within an incident with z/OSMF-generated search arguments

Software management

- Remove requirement for an SMP/E zone to define a software instance; allows Software Management to manage non-SMP/E-packaged software distribution within an enterprise
- Export a software instance (creates a portable format that is SMP/E-agnostic)
- Import an exported software instance
- API extensions

User display capability

- “Who’s using z/OSMF right now?”
- What are people using in z/OSMF

RMF central configuration of DDS server

Usability & Skills

z/OSMF Updates **(1Q2018 add)**

- z/OSMF server is able to detect if the version of z/OSMF started procedure is compatible or not via APAR PI92213

- z/OS data set and file REST service is enhanced (APAR PI91339) to support:
  - Directory tree walking and filtering results for list/searching
  - Use of regular expressions to replace content when editing data set
  - Display all volume names for listing cross volume data sets
  - Specifying "dsntype" when creating data sets

- z/OSMF is upgraded to use Liberty 17.0.0.3 via PI89954.

- z/OSMF allows users to customize the z/OSMF Angel Name via APAR PI88651

- 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

Usability & Skills

z/OSMF Updates **(2Q2018 add)**

- z/OSMF REST TSO/E address space services support initiating TSO/E address spaces and applications on other systems in the sysplex with PTFs for APAR PI92905.

- The z/OSMF Workflows task supports the ability to use the TSO Rest Services to access any system in a sysplex to run a job, REXX script, or UNIX script in local and remote systems with PTFs for APAR PI92884.

- The z/OSMF WebISPF (z/OSMF Classic ISPF interface) task supports opening ISPF on remote systems in the local sysplex on which z/OSMF is running with PTFs for APAR PI94193.

- The default location of the z/OSMF user directory is changed from /var to /global with the PTF for APAR PI92211, with updated samples.

- z/OSMF will support Liberty 18.0.0.1 with PTFs for APAR PI96793.

Usability & Skills

z/OSMF Updates **(3Q2018 add)**

- z/OSMF WLM and z/OSMF RMF are enhanced to support a new type of processor called a container-based processor in support of future pricing models. (APARs PI98413 and PH00039)

- The z/OSMF Incident Log task is enhanced to support the CASE parameter with PTFs for APAR P196024 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.

Usability & Skills

Reducing Assembler Skills

RACF PARMLIB for data set name and range tables

Extended Samples and other material

Usage of github for consolidation of associated z/OS files

- z/OS V2.3 Migration Workflow
- z/OS IBM Education Assistant modules
- https://github.com/IBM/IBM-Z-zOS

Table of contents

Scalability & Performance

z/OS V2.3 Overall Release Performance **(4Q2017 add)**

- Performance tests show equivalent system CPU usage when migrating from z/OS V2.2 to z/OS V2.3*.

Enhanced Capacity management **(3Q2018 add)**

- z/OS capacity provisioning manager is enhanced with new commands to set and report on LPAR weights (OA55039)

SMF constraint relief

- Expand available IBM-reserved record name space
- Using remaining reserved bit and one of the IBM types, SMF will compatibly extend the SMF header to allow for up to 2048 record types, increasing the name space for both IBM and non-IBM record types

*** 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.**

Scalability & Performance

RMODE 64

- RMODE 64 roadmap continues
  - Contents Supervisor and Loader infrastructure
  - Binder support
  - Target is enough to support the Java JIT

SMC-D (Direct)

- Local Shared Memory Communications for LPAR-to-LPAR links within a CPC
- Like HiperSockets but with higher throughput, lower latency and much less overhead
- Performance Improvements (based on z13 GA2)
  - Up to **61%** CPU savings for FTP file transfers across z/OS systems versus HiperSockets*
  - Up to **9x** improvement in throughput with more than a **88%** decrease in CPU consumption and a **90%** decrease in response time for streaming workloads versus using HiperSockets*
  - Up to **91%** improvement in throughput and up to **48%** improvement in response time for request/response workloads versus using HiperSockets*
- RMF is updated for SMC-D channel path activity and PCI activity

*** 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.**

Scalability & Performance

Larger log stream staging data sets

- Support for extended addressability (>4GB) staging duplex data sets
- Keep ahead of data rates for logging functions
- Support for IBM zHyperwrite added by APAR OA54814 **(3Q2018 add)**

Workload manager improvements

- Performance goals can now be set at a lower level of granularity (as low as 1 millisecond)
- Updates to allow separation of workloads that consume specialty engine capacity
- Resource groups enhanced to limit the real storage for the associated service classes.
- Support for absolute MSU capping (soft cap limit regardless of 4 hour rolling average)

Scalability & Performance

SMF real-time APIs/services

- New real-time SMF services provided on top of existing buffer technology
- Define new ‘real-time resources’ for specific records
- Request SMF records only to a real-time resource – no disk required
  - Co-exists with SMF logstream technology
- APIs allow application to access SMF data as it is buffered
  - Unauthorized access policed via SAF
  - Connect/Get/Disconnect model similar to traditional QSAM access
- Potential use cases include:
  - Detecting security violations in real-time
  - Real-time monitoring resource usage
  - Job scheduling optimizations

High Frequency Throughput Statistics (HFTS)

- New SMF 98 record
- Details about dispatching, locking and queueing

WLM sysplex routing

- Designed to be sensitive to upcoming, but not yet active, soft capping enabling clients to optimize the 4 hour rolling average

Scalability & Performance

DFSORT performance improvements

- Improvement in CPU and elapsed time for several DFSORT function that generate runtime code.
- E15/E35 user exits updated to handle blocks of records

VSAM RLS upgrade locking and constraint relief

- DFSMSdfp VSAM record-level sharing (RLS) **(4Q2017 add)**
  - Replaces the existing alternate index (AIX) upgrade lock with record locks and redo processing to keep the upgrade set and the base cluster in sync for update requests without forcing the updates to be single threaded
  - Allowing concurrent AIX updates is expected to improve both CPU and elapsed time performance, most notably when updating numerous large records with many alternate keys
  - Jobs doing inserts, erases, and updates saw up to 48% CPU time improvements and up to 30% elapsed time improvements*.
- Constraint relief with above the bar record storage
  - Additional enhancements in V2.3 for RLS requests will provide new 8 byte interfaces to allow the user to specify that the record area and argument reside above the bar in the user's address space.

*** 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.**

Scalability & Performance

z/OS NFS client RSIZE/WSIZE

- RSIZE/WSIZE parameters can now be from 1KB to 64 KB

zFS cache performance improvements

zFS compression

- Individual files can be compressed using zEDC compression technology
- New and existing file systems are eligible for compression
- File systems can be compressed while in use

Open data set constraint relief

- Improved scalability for workloads such as DB2
  - As customers consolidate workloads, and DB2 encourages customers to put one DB2 table per data set, the number of data sets needed goes up dramatically.
- Enhancements in V2.3 are intended to allow the number of concurrent open data sets in a single address space to grow.
- Target is 400,000 open data sets per address space

Scalability & Performance

XML system services exploits 64 bit addressability

Exploitation of fast memory clear to clear 1M frames

XES locking dataspaces move to 64 bit primary

- Greater total sysplex locking capacity
- Increase the number of lock structures for an address space

z/OS Support for Container Pricing

- New tenant resource group (TRG) defined in workload manager (WLM)
- Identifies workload to be separately measured
- SMF records will contain capacity consumed by a TRG
- SDSF, RMF updated to display TRG information **(4Q2017 add)**
- SCRT enhanced to capture and report on this information
- z/OS provides the mechanism, but eligibility and pricing are managed outside of the operating system

Table of contents

Availability

Runtime diagnostics deadlock detection

- Follows the blockers of ENQUEUE contention
- Follows the blockers of GRS latch contention
- Support is sysplex enabled

zFS online salvage

- New command to initiate an online salvage of a zFS aggregate while the file system is still mounted

z/OS Global Mirror (XRC) Resiliency

- z/OS Global Mirror increased buffer storage will reduce transient events

Shorten SVC dump capture time

- Time out on non-dispatchable threads

Multiple OAM Address Spaces per LPAR

- Test/production or two production

Availability

JES2 resiliency

- Dealing with limited resources
  - Spool space and control blocks in the JES2 checkpoint
- Multi-facet approach
  - Better identifying what is consuming resources
    - Including top consumers by rate vs amount
    - More detailed tracking information
  - Reserved space for emergency situations
    - Ability to identify processes that can use reserved space
  - Static analysis of initialization settings in light of current usage
    - Are things poorly configured?
  - Historical tracking of resource usage over time
    - Creating new (to JES2) SMF records
- Intent is to:
  - Better identify shortages before they happen
  - Give installation standard tools to manage system in shortage
  - Reduce situations requiring an IPL

Availability

SSL hardware auto-detect

- System SSL to detect availability of crypto card
- Optionally, drive software encryption while card is unavailable
- Shift back to hardware when card comes back

Online migration from HFS to zFS

- Conversion on the fly, with no application outage
- Part of the effort to make the release after z/OS V2.3 be the last release to support HFS

PKI Services tolerance of DB2 availability

- PKI services will either shut down or wait when DB2 is unavailable.

New support for secondary volumes

- SAM and VSAM provide read-only access to data sets that reside on PPRC secondary volumes

Table of contents

Systems Management

z/OS UNIX file system management

- Reduce the size of an online zFS dynamically (“zFS shrinking”)
- Dynamic zFS attribute changes
  - For example: change RWSHARE (read-write share) attribute
- Compressed zFS file system and/or files in the file system
- SMF accounting support for zFS
  - Type 92 used to record important events and performance indicators (e.g. monitoring dynamic growing or disablement of an aggregate and general performance information)
- Unmount not-in-use Version Root
- Extend user mount capability to allow mounting of filesystems in a privileged manner
- zFS user cache non-disruptive resizing
- zFS keyword on IDCAMS for definition of VSAM linear data set that will be used as a zFS

8 character TSO/E user IDs

- Enable use of 8 character TSO/E user ids, removing the current 7 character limit
- Help customers close auditing exceptions
- Consistency with job name length maximum

Systems Management

KC4Z

- Upgrade to latest level of KC Customer Installed 1.5 for improved topic navigation
- Capability to look up messages using a new KC based version of the LookAT facility
  - Utilizing the LookAt for KC4z message look-up API, enter a message ID into the search field to retrieve a link that takes you directly to the message explanation **(3Q2018 Add)**
- Support configuration and documentation sharing in a shared sysplex
- Exploitation of z/OSMF workflows for configuration

Systems Management

Product Documentation Improvements

- IBM Resource Link now hosts the z/OS V2.3 PDFs
  - A subscription service and last publish dates communicate updated content
- More timely information refresh now possible with service and APAR information integrated daily **(2Q2018 Add)**
  - Replaces previous quarterly refresh approach
- Use either HTTPS or FTP to download the KC4Z plug-ins from the Index director: (https://public.dhe.ibm.com/systems/z/zos/sftp/kc/zosv2r3/) **(3Q2018 Add)**
- New content solution navigation pane to easily view all technical content for key solutions (**link**) **(2Q2018 Add)**
- An alternate method to search the z/OS content in IBM Knowledge Center at the element level or individual book or information deliverable level can be found here: https://www.ibm.com/support/knowledgecenter/SSLTBW_2.3.0/com.ibm.zos.v2r3/zos-search/zossearchscopes.html **(3Q2018 Add)**

Systems Management

JES2 declared the strategic JES

- JES2 to consume most JES3 JECL
  - Translated to JES2 equivalents where possible
  - Some are not possible…e.g., JES2 does not have a “JGLOBAL”
- JES3 continues to be supported and maintained with its current function

zlsof Extended Processing **(3Q2018 add)**

- Enhancements have been provided to the zlsof (list open files) utility of z/OS UNIX System Services with PTFs for APAR OA55246 for z/OS V2.2 and z/OS V2.3 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

Systems Management

NFS Server

- UNICODE conversion support based on mount system attributes. l. This support is provided with PTFs for APAR OA51979 for z/OS V2.2 and APAR OA55124 for z/OS V2.3. **(3Q2018 Add)**
- Support for encrypted data sets added by APAR OA53223 **(1Q2018 Add)**

SMB

- Allow configurable name for the SMB started task name (see SOD for additional information)

GDGBIAS

- The GDGBIAS keyword on the JOB statement will allow the user to specify how generation data sets are treated across job steps, such that jobs that use GDGs will not need to be modified when restarted. (JES2 & JES3)
  - Eliminates a common user mod

pax and tar improvements

- Support long file names and long link names generated by GNU utilities

AMASPZAP (super ZAP)

- Partial updates are now preventable by exploiting CHECKSUM

Systems Management

z/OS BCPii improvements

- Performance improvements
  - All queries for activation profile, capacity record, and user-defined image group connections
  - Set of multiple attributes can be done on a single API call
  - With GA2 of z13/z13s and higher some cases are more than 10x faster
- Constraint relief
  - Amount of data that can be returned on a query request greatly increased (greater than 28k)
  - 5-digit IPL address support on HWICMD API for Load, SCSI Load and SCSI Dump commands
  - Dynamic CPC name change
  - New set service allows for multiple attributes to be set simultaneously
- Support for newer hardware attributes
  - Absolute capping
  - Absolute capping LPAR group

Common Event Adapter (CEA) cross system support

- The TSO launcher allows specification of a target system within a sysplex

Systems Management

VTOC update SMF records

- Designed to help prevent accidental corruption to the VTOC
  - New DFSMS CVAF interface provides checking to insure crucial fields are not being updated.
    - A new parameter, VALIDATE=(YES,**NO**) will be added to indicate that the existing DSCB(s) will be read and compared to the ones passed by the user to ensure essential fields are not being modified.
- Additional logging of VTOC updates
  - Additional V2.3 enhancements
    - DFSMS DADSM/CVAF will build SMF 42, subtype 27 record and include before/after DSCB image.
    - New Volume Event SMF Record 42 Subtype 28 will log events that affect the entire volume.

IBM Function registry for z/OS

- ISV and IBM extension for function discovery and enablement

Healthchecker

- Filter support for parmlib – e.g. system name, sysplex name
- Syntax check entire parmlib member

Systems Management

XCF Healthcheck

- Improved reporting of system status detection environment requirements
- Expanded checks on connection status to other active CPC images.

CIM server Changes

- New option to configure number of repository back-ups
- Mechanism to automatically delete old repository back-ups
- CIM server update to Open PEGASUS 2.14

/global

- A new directory has been created in the sysplex root, that can be a repository for files that need to be consistent across a sysplex or when needing a convenient way to access multiple level of program products not shipped with z/OS.
- For "symmetry" this directory has also been created in the version root. Hence in non-sysplex situation, where the version root is root filesystem, this directory can be used to serve the same purpose.
- Recommendation: Create a new filesystem and mount it on **/global**, so that the sysplex root isn't updated and being filled up with files, etc...

Systems Management

SDSF Enhancements

- Substantial increase in the number of primary commands with 25 new commands added for z/OS V2.3
  - Rolled up PTFs from v2.2 - Link list, paging, link pack area, apf list, parmlib, search, system panel (22 minor commands)
  - GRS enqueue's, Enqueue contention, system symbols, N for DA
  - Address space memory, JES2 proclibs, dynamic exits
  - New for V2.3 - Scrollable menu, point and shoot, property sheets
  - Device activity, file systems, generic tracker, network activity, SMS groups and volumes, subsystems, CF connections and structures, common storage remaining, virtual storage map, job modules, job tasks

- New SDSF end users guide
  - Searchable, bookmark capable
  - Online helps remain

Sub-Capacity Reporting Tool (SCRT)

- SCRT is now included as a component of z/OS
  - Continues to be available as a web download
- SCRT is made available for ISVs to generate ISV-based reports

Systems Management

DFSMShsm Enhancements **(4Q2017 add)**

- Support for DS8880 Transparent Cloud Tiering
  - Automatically migrate eligible data sets to the cloud
  - Migration to cloud object storage does not pass through Z processor

- SMS management class adds size based criteria
  - DFSMShsm can be directed to migrate data based on the size of the data set

Tape Support EOL **(1Q2018 add)**

- IBM will discontinue delivery of z/OS platform products and service on magnetic tape on July 1, 2018
- If you have a requirement for physical media, products and service remain available on DVD
- IBM's recommended method for obtaining products and service is by electronic download

Systems Management

DFSMSrmm Enhancements

- Improved usability through UXTABLE simplification
- Add new tape specific attributes to the management class, that can be used by RMM
- DFSMSrmm introduces a new feature for tapes created by programs that provide their own tape management.
  - Controlled by External Data Manager
  - Prevents tapes from being accidentally released by users they do not belong to
- Parameters added to report generator to support additional statistic elements
- Continuation of WHILECATALOG Support
  - ADDDATASET supports WHILECATALOG and EXPTM
  - ADDVOLUME and GETVOLUME support EXPTM
  - SEARCHDATASET supports WHILECATALOG, Expiration time, Last Changed time, Catalog Retained status
  - SEARCHVOLUME supports Assigned Time, Expiration Time, Last Changed time, Catalog retained status
  - SEARCHVRS supports Time Last Referenced and Last Changed Time

Systems Management

Infoprint Server automatic failover

- Automatic failover of the primary printer to an alternate printer
- Improved specification of form names using limited prefixes and wild cards
- Currency for Sendmail and 8-character TSO user IDs
- Port monitor for Windows 10

Additional fonts added to z/OS font element

- 8 additional font products to now be included in the base V2.3 font collection

‘z/OS Liberty Embedded’ now a z/OS base element

- For use by elements of z/OS and IBM embedded products
- Customers can use this copy
  - Unsupported/non-production
  - Requires a proper WebSphere license for support

Systems Management

OpenSSH Direct CPACF Support **(1Q2018 add)**

- Improved performance using direct CPACF instructions
- Available with APAR OA54299
- This function is mutually exclusive with FIPS 140-2 compliance

IBM Operational Server Certificates **(1Q2018 add)**

- IBM plans to replace a number of server certificates (SSL) over the course of 2018
- These are for things like:
  - RECEIVE ORDER and download servers
  - Shopz
  - Testcase, ecurep, Blue Diamond
- Recommendation:
  - Install certificates as soon as convenient
    - DigiCert Global Root CA (link)
    - DigiCert Global Root G2 (link)
- For more information, see the WSC flash: WSC Flash

Table of contents

Networking

IP security tunnel capacity increased

- EZBDVIPA CF Structure increased to support up to 16,384 lists, thus increasing the capacity for simultaneous IPSEC tunnels in a sysplex

Improved network management

- Wildcard support for job names on PORT/PORTRANGE statements
- Long system symbol support for network configuration files

z/OS Communications Server

- Ease of Use: z/OS Configuration Assistant Enhancements – Defining TCP/IP configuration
  - Ability to import existing TCP/IP profiles and support for dynamic updates to existing configuration by generating the required VARY OBEY member
- z/OS Encryption Readiness Technology (zERT): Improved reporting of Network Security/Encryption protocols used by z/OS TCP and Enterprise Extender workloads
  - Address gap in common reporting across various network security protocols that can be used (IPSec, TLS, SSL, and SSH)
- AT-TLS currency: Updates to AT-TLS to support latest System SSL features

Networking

VTAM start option

- Default VTAM internal trace options can now be disabled

HiperSockets Converged Interface (HSCI) **(1Q2018 add)**

- 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.
- HSCI will be available first quarter 2018 with the PTFs for APARs OA53198.

Networking

z/OS Encryption Readiness Technology (zERT) **(topic added 1Q2018)**

- 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
    - Each peer-to-peer UDP port is considered a separate EE connection

- 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, 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.) **(topic added 1Q2018)**

- zERT Discovery
  - Attributes are collected and recorded at the connection level
  - SMF 119 subtype 11 “zERT Connection Detail” records
  - 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 – **(1Q2018 add)**
  - 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
  - Available 1Q2018 via PI83362.

Networking

Inbound Workload Queueing (IWQ) Support for IPSEC **(2Q2018 add)**

- 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. The z/OS IWQ IPSec solution requires OSA-Express6S and is enabled on z/OS V2.2 and z/OS V2.3 with PTFs for APARs PI77649 and OA52275.

IBM Configuration Assistant renamed **IBM Network Configuration Assistant (3Q2018 add)**

Network Configuration Assistant support for alternate Configurations **(3Q2018 add)**

- 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 (PI97737)

Networking

Code page enhancements for CSSMTP **(3Q2018 add)**

- The Communications Server SMTP (CSSMTP) mail client is enhanced to support multibyte character sets and to provide improved code page support for characters in the mail subject line
- Enhancements are intended to facilitate migration from SMTPD to CSSMTP
- This support is enabled on z/OS V2.1, V2.2, and V2.3 with the PTF for APAR PI93278

Table of contents

Security

Coupling Facility Structure Encryption

- Data transiting to and from the coupling facility will be encrypted
- Data remains encrypted while it resides on the coupling facility
- Structure level granularity
- No application or middleware changes required

RACF field level access checking granularity

- Additional granularity for administrators that do not have RACF special attributes
- Reduces need to grant administrator access

PKI Services Enhancements

- z/OS Liberty Embedded support
  - Reduced footprint and simplified configuration
- Enhance simple certificate enrollment protocol for improved usability

Security

Policy enabled data set encryption

- No application changes or awareness
- Extended format BSAM & QSAM, VSAM, VSAM RLS, zFS are targets
- Helps clients meet compliance mandates and requirements for data privacy
- Controlled by DFSMS policy and/or SAF policy
- Data remains encrypted during administrative functions such as backup/restore, migration/recall, and replication.
- zFS supports encryption of individual files, access control lists, security information and symbolic links.
- Support for DIV for encrypted linear VSAM data sets
- System logger support for encrypted logstream and offload data sets

Note You should take in to account all of the places where your encrypted data needs to be read (Shared systems, replication, backup & recovery, disaster recovery)

User Key Common Requestors update **(1Q2018 add)**

- A new healthcheck, slip trap, and SMF reporting are available to identify users of user key common storage with APAR OA53355.

Security

Non-executable memory

- New option on IARV64 and STORAGE OBTAIN
- Indicates that the memory contains data (not opcodes)
- Exploits z14 Instruction Execution Protection (IEP)

NJE security

- Ensuring that nodes are authenticated to reduce chance of spoofing
- Health checks in place to ensure communication links are protected by TLS
- Updates to both JES2 and JES3

FIPS standard compliance

- PKI services, ITDS Server, DSA support, Network Authentication service (Kerberos), System SSL components attain compliance with NIST SP800.

System SSL support

- RFC 6960 (OCSP) support for online certificate status protocol
- RFC 6961 / RFC 6066 support for multiple certificate status request extension and TLS extensions.

Security

Multi-Factor Authentication (MFA)

- Potential extensions to SAF to support additional authentication tokens
- Roll up of RACF service into V2.3 base

SAF security deployment descriptor

- New callable service that allows an authorized application to express security attributes of users, groups, resources and their relationships
- Design of the service is intended to be security product agnostic
  - “CA Technologies is working together with IBM to design this new SAF based callable service to provide simplified security administration in an ESM neutral implementation. Provides the foundation for simplifying SAF security configuration for applications and products”

System SSL FIPS mode enforcement

- Run with a FIPS-compliant key length and cipher

Stackguards for program stacks in LE

- Improved protection for applications against malicious exploitation

Security

Network authentication services and Kerberos

- Remove need for UID(0)
- FIPS Mode enforcement (similar to SSL's)

IBM Tivoli Directory Server performance

- A new health check will suggest when DB2 REORG or RUNSTATS utilities should be run
- Support DB2 partitioning by growth, multi-row fetch for performance

RACF UID mapping

- RACF will extend the use of the Unix System Services PARMLIB BPXPRMxx keyword called SUPERUSER to provide consistent UID=0 reporting

z/OS UNIX SMF service security

- In addition to BPX.SMF, a new Facility class BPX.SMF.xxx.yyy where xxx is the type and yyy is the sub-type will be supported.

Security

MCS passphrases **(3Q2018 add)**

- z/OS Console Services is enhanced on z/OS V2.2 and later releases with PTFs for APAR OA54790 applied to enable the use of MCS logon passphrases (long passwords) through security policy profile specification.

Table of contents

Application Development

z/OS UNIX support for year 2038

- 31-bit C/C++ programs on z/OS needs to support dates after 2038
- Original UNIX date support runs out a bit after 0300 on 19 January 2038
- Like other 64 bit platforms:
  - Double the z/OS UNIX time fields (from 32 bits to 64 bits) used to count seconds since 1 January 1970

LE SYSDUMP recording service

- Eliminate duplicate dumps when multiple interested parties are involved

ISPF

- Automatically generate extended statistics for a PDS member when needed

Enhancements to grep utility to support After, Before, Context

XML System Services is enhanced to reduce split records

Application Development

JES2 job group enhancements

- Job group level notification support
- Job group level output descriptors
- More flexible scheduling of job groups

JES2 JCL improvements

- The DLM keyword on SYSIN is extended from 2 characters to 18 characters
- 2 new JCL symbols are added: current job name, current job number

z/OS Communications Server getaddrinfo

- Updates to comply with RFC 3493 the Single UNIX Specification version 3

z/OSMF REST JOBS API

- Retrieve active step information with JES2
- Support for job groups with JES2

Unicode System Services support for Unicode 9.0

Application Development

Cloud Provisioning and management for z/OS

- Entitled capability delivered as part of z/OSMF
- Sample self service provisioning portal
- Infrastructure to provision middleware as a service
  - Templates available from CICS, IMS, DB2, MQ and WAS
    - z/OSMF Cloud Provisioning
  - Users can create their own templates
- Ability to define tenants (i.e. collections of users)
- Ability to control access by tenant
- Ability to measure consumption and control resource usage
- Programming APIs are provided to integrate with other provisioning tools
- Composite templates, shared resource pool and sysplex placement with PTF PI88944 **(4Q2017 add)**

- "Stand up a CICS region in minutes versus months!!"

- The following Cloud provisioning and management enhancements will be available with PTFs for APAR PI96931 **(2Q2018 add)**
  - Simplify security setup for cloud provisioning. A new sample IZUPRSEC is provided.
  - Consume REST APIs described in the Swagger specification.

Application Development

DFSORT UNICODE Support

- SORT/MERGE UNICODE data with field lengths up to 450 bytes for UTF-8, UTF-16 and UTF-32
- Convert UNICODE from one CCSID to another
- Enhanced support for UNICODE collation services

VSAMDB **(3Q2018 add)**

- New data store for BSON and JSON objects in VSAM KSDS
- Sysplex data sharing via VSAM RLS
- Includes indexing with VSAM alternate keys
- Support provided by APAR OA55153

cp Utility Enhancements **(3Q2018 add)**

- Copy load modules from MVS data sets to Unix directories and vice versa while maintaining ALIAS information (OA55299)

True Random Number Generation for z/OS Unix **(3Q2018 add)**

- Simplified configuration for random numbers when running on IBM z14 (OA55437)

Application Development

Job completion notifications via e-mail for JES2

- Associate an e-mail address with a user ID in the security database
- Use a new JCL statement to send information about job completion
  - e.g. // NOTIFY EMAIL=sample@us.ibm.com,WHEN='RC!=0'
  - Multiple notify statements are supported
- Support e-mail as identifier on JOB card (in place of USER=)
  - Support is added to RACF to associate an e-mail address with a user profile

Allow passphrases as PASSWORD= on job cards for JES2

Web enablement toolkit

- Provide REXX language support for all JSON and HTTP toolkit services, in addition to C, Cobol, PL/I and Assembler
- Allow application to send and receive very large data (request & response bodies) thru the use of staged (streamed) sends and receives
- New sample program for JSON text-rendering (OA55438) **(3Q2018 add)**
- HWTJDEL service enables JSON deletion (OA54901) **(3Q2018 add)**

Application Development

IBM SDK for Java 8 SR5

Pause-less Garbage Collection (GC)

- Goal: More consistent response times for large heap, response-time sensitive applications.
- Reduce GC stop-the-world pause times via exploitation of z14's *Guarded Storage Facility*.
- An extension to existing GenCon GC policy, enabled via –Xgc:concurrentScavenge

IBMJCE Cryptography Performance

- Acceleration of AES-GCM via z14 hardware exploitation.
- Improved quality of randomness via z14 *True Random Number Generator* to seed SecureRandom.
- Improved ECC acceleration with z14's 128-bit multiply instructions.

Performance + Features

- General throughput, footprint and CPU usage / ramp-up improvements for Liberty and Analytics workloads.
- V2R3 RMODE64 exploitation to place JIT compiled code above the 2GB bar.
- Data Access Accelerator Packed Decimal APIs acceleration via exploitation of z14's vector BCD instructions.

Updates to minimum hardware requirements

- **Java 8 SR5** will only support z9 or newer processors.

Application Development

z/OS V2.3 XL C/C++ enhancements

Usability

- Metal C will create new function pointers that can act on environments as well as calling a function, to allow similar coding patterns and automatic environment based calling
- Hexadecimal offsets will be provided for structure listings, the layout information can then be better compared and analyzed
- DSECT utility will create C structures/unions that align closer to the original assembler DSECT, to give the same size as the original DSECT

Performance

- Architecture default will change to ARCH(10) (EC12) to align with the minimum z/OS V2.3 hardware level
- Exploitation of z14 architecture with ARCH(12), TUNE(12)

Security

- Stack protection will protect buffers that are susceptible to overflow and to stop returning from functions that detect overwriting

Debugging:

- Metal C debug data blocks will provide information linking the assembly or objects with the debugging data, providing synchronization of these files
- Saved Option String Information (SOSINFO) utility will emit options encoded in the PPA blocks
- DWARF debugging information in object files will be added to the executable in an area that is not loaded at runtime, to allow access to both the debug data and executable code within the same file

Table of contents

IBM’s Statements of Direction

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

IBM's Statements of Direction

May, 2018 – The Software Configuration and Library Management (SCLM) component of ISPF, which is a component of z/OS, is a library system that provides services uniquely related to the ISPF environment. IBM is declaring that the SCLM component is functionally stabilized. While it will continue to be maintained and supported, it won't be enhanced with new features in the future. IBM recommends that clients consider migrating to IBM Rational Team Concert Enterprise Extensions (RTC/EE) or Git with IBM Dependency Based Build (DBB) when looking for improved capabilities.

For additional details on RTC Enterprise Exensions, see the Enterprise Platforms Extensions website.

For additional details on DBB, see the IBM Dependency Based Build website.

May, 2018 – z/OS V2.3 is planned to be the last release of the operating system to support the DFS/SMB (Distributed File System / Server Message Block) functionality. IBM had previously announced that NFS (Network File System) is the strategic file sharing protocol for the z/OS platform. In order to help clients shift to use NFS technology, IBM plans to deliver new function on existing levels of the operating system, including installation, security, availability, and operational enhancements. These planned enhancements will enable clients to more easily migrate to NFS prior to upgrading to the next release of z/OS.

May, 2018 – z/OS V2.3 is planned to be the last release to include the SMP/E Planning and Migration Assistant (PMA). The set of functions provided by PMA, which was introduced in 1998, has largely been supplanted by newer functions provided by Shopz and by z/OSMF Software Management or duplicate other functions available in SMP/E. For those functions, IBM recommends you use the replacements instead. However, no replacements are planned for the Intermediate Product Migration Changes report or for the PMA ISPF tables.

IBM's Statements of Direction

May, 2018 – IBM intends to deliver DFSMS support to back up and restore individual z/OS UNIX files residing in zFS (z/OS File System) data sets. This support will be integrated in the existing DFSMShsm and DFSMSdss backup and restore capability, allowing for centralized data management across the z/OS platform. When available, the DFSMShsm Backup and Recover support will subsume the capabilities provided by the existing IBM Tivoli Storage Manager z/OS UNIX System Services Backup-Archive Client. However, the planned DFSMS support will not back up or restore individual z/OS UNIX files found in Hierarchical File System (HFS) data sets, given that HFS functionality has been stabilized and given the impending withdrawal of HFS in a future release of the operating system.

May, 2018 – To further enable Pervasive Encryption for IBM Z regarding z/OS network traffic, IBM intends to deliver a new z/OSMF plug-in to visualize the data recorded by z/OS V2.3 Communications Server z/OS Encryption Readiness Technology (zERT). With this new web-based interface, z/OS network security administrators will be able to formulate and execute queries over the data reported in SMF 119 subtype 12 "zERT Summary" records to easily determine which z/OS TCP and Enterprise Extender traffic is or is not protected according to the specific query criteria.

IBM's Statements of Direction

November, 2017 – z/OS V2.3 plans to be the last release of the operating system to provide support in OpenSSH for the following functions. Many of these changes are being driven by the OpenSSH community as a response to providing improved security for the entire industry:

- SSH Version 1 protocol (also referred to as SSH-1)
- Running without privilege separation for sshd (SSH Daemon)
- Support for the legacy v00 OpenSSH cert format
- Support for pre-authentication compression by sshd (SSH Daemon). SSH clients will either need to support delayed compression mode or otherwise compression will not be negotiated
- Support for Blowfish and RC4 ciphers and the RIPE-MD160 HMAC (Hash Message Authentication Code)
- Accepting RSA keys smaller than 1024 bits

In addition, z/OS V2.3 plans to be the last release of the operating system to have enabled at run time the following functions by default:

- Support for the 1024-bit Diffie Hellman key exchange, specifically diffie-hellman-group1-sha1
- Support for ssh-dss, ssh-dss-cert-* host and user keys
- Support for MD5-based and truncated HMAC algorithms, specifically hmac-sha1-96
- Support for the Triple DES cipher, specifically 3des-cbc, in the SSH client's default algorithm proposal

IBM's Statements of Direction

November, 2017 – IBM intends to extend the capabilities of GDPS to the IBM Db2® Analytics Accelerator for z/OS, V7.1 deployment on IBM Z (Accelerator on IBM Z). The initial support will be in GDPS / Multi-Target Metro Mirror. GDPS/MTMM consists of a multisite sysplex cluster with all critical data synchronously mirrored and provides Continuous Availability and Disaster Recovery (CA/DR) protection for customers with two sites separated by up to 200 fibre kilometers.

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IBM's Statements of Direction

July, 2017 – z/OS V2.3 is planned to be the last release of the operating system to provide national language translation in languages other than Japanese. As such, the handful of z/OS elements that provide message and panel translation to Chinese (Simplified and Traditional), Danish, Dutch (Netherlands), French (including Canadian French), German (including Swiss German), Italian, Korean, Norwegian, Portuguese (Brazilian), Spanish, and Swedish today, will no longer provide translations into these languages in the release after z/OS V2.3.

Superseded – Network File System (NFS) is the strategic file sharing protocol for z/OS. The DFS/SMB (Distributed File System / Server Message Block) functionality has been stabilized. DFS/SMB is expected to continue shipping as part of the operating system and will be supported in accordance with the terms of a customer's applicable support agreement. IBM intends to continue enhancing the NFS functionality, including RAS and performance capabilities, in future z/OS releases. All requirements for file sharing with z/OS are expected to be addressed in the context of NFS only.

July, 2017 – z/OS V2.3 is planned as the last release to include the z/OS BookManager READ and Library Server base elements, the latter of which includes the BookRead API. Over time, IBM's platform for delivering product documentation to customers has evolved to IBM Knowledge Center technology, and production of documentation formats that are supported by BookManager Read and Library Server has greatly diminished. IBM recommends now using IBM Knowledge Center for z/OS (KC4z), which was introduced as a base element of z/OS in version 2.2, to maintain local repositories of product documentation and serve content.

IBM's Statements of Direction

July, 2017 – Removal of support of YES setting for VSM ALLOWUSERKEYCSA DIAGxx parmlib parameter. z/OS V2.3 will be the last release of z/OS to support the YES setting for the ALLOWUSERKEYCSA DIAGxx parmlib parameter. If you run any software that requires the setting of this parameter to YES, the software will need to be changed to no longer require the setting of this parameter to YES. All IBM provided software should not require this setting. If you have any other non-IBM provided software that requires this setting, contact the owner of the software regarding this usage.

July, 2017 – Removal of support for obtaining user key CSA/ECSA Storage. z/OS V2.3 will be the last release of z/OS to support the usage of the GETMAIN, CPOOL, and STORAGE OBTAIN interfaces to obtain user key (8-15) CSA/ECSA storage. If you have any software that obtains user key CSA/ECSA storage, the software will need to be changed to no longer require this capability.

July, 2017 – Removal of support for changing ESQA Storage to user key. z/OS V2.3 will be the last release of z/OS to support the usage of the CHANGKEY interface to change ESQA storage to user key (8-15). If you have any software that changes ESQA storage to user key, the software will need to be changed to no longer require this capability.

July, 2017 – Removal of support for creating SCOPE=COMMON data spaces in user key. z/OS V2.3 will be the last release of z/OS to support the usage of the DSPSERV CREATE interface to create a SCOPE=COMMON data space in user key (8-15). If you have any software that creates a SCOPE=COMMON data space in user key, the software will need to be changed to no longer require this capability.

IBM's Statements of Direction

July, 2017 – IBM intends to deliver VSAM exploitation of z14 and DS8880 zHyperLink Express. zHyperLink Express is a short distance mainframe attach link designed for up to 10x lower latency than High Performance FICON.

July, 2017 – For several decades, z/OS has offered two spooling subsystems. JES2 (formerly HASP) and JES3 (formerly ASP). JES2 is used by the majority of z/OS customers and has evolved into nearly a superset of functionality over JES3. IBM is affirming that JES2 is the strategic Job Entry Subsystem for z/OS. New function in spooling subsystems will be primarily developed only for JES2. JES2 supports unique features in the area of availability such as spool migration, online merging of spool volumes, and in the area of function such as support for email notification when a job completes and soon in the area of security with encryption of spool data.

JES3 continues to be supported and maintained with its current function.

IBM's Statements of Direction

February, 2017 - z/OS V2.3 will be the last release of z/OS to support the Server-Requester Programming Interface (SRPI). SRPI was introduced in TSO/E in the 1980s to provide a programming interface that enhances the environment of IBM workstations communicating with IBM mainframes running z/OS. Customers with applications using SRPI should start using TCP/IP for z/OS to provide similar function. Documentation for SRPI is available in *TSO/E Guide to the Server-Requester Programming Interface,* SA22-7785, and this publication as well as documentation for SRPI-related functions, such as the MVSSERV command, will be removed.

Fulfilled - Starting in z/OS V2.3, the Library Server ALS indexed z/OS Elements and Features PDF collection, SK4T-4949, is deprecated. Included instead are the z/OS V2R2 Acrobat Indexed PDF Collection, SC27-8430, and the z/OS Base and Features KC4z plug-in collection, SK4T-9263. To provision KC4z, use Softcopy Librarian as you have done in the past for BookManager books and PDFs.

Fulfilled - Starting at z/OS V2.3 GA, IBM Knowledge Center will no longer contain z/OS V1R13 documentation plug-ins. You can continue to access and download z/OS V1R13 documentation in PDF format through the IBM Publications Center.

IBM's Statements of Direction

February, 2017 - This is a statement of direction to notify Infoprint Server clients of a planned change in default behavior in a future release. IBM intends to enable dynamic configuration as the default behavior. This change in default behavior will be mandatory and not reversible. You can disregard this statement if you already enabled dynamic configuration. See the Infoprint Server Customization publication (SA38-0691) for details on how to enable and the advantages of enabling dynamic configuration.

Some advantages of enabling dynamic configuration include:

- Authorized administrators can use the Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) to view and change the dynamic attributes rather than editing the /etc./Printsrv/aopd.conf file.
- If you change an attribute in the system configuration definition, with a few exceptions, you do not need to stop and restart Infoprint Server for the change to take effect.
- You can configure Infoprint Server to start and stop individual daemons.
- You can benefit from new functions in Infoprint Server that require dynamic configuration. For example, you can use the MVS system logger function.

Fulfilled - IBM intends to discontinue delivery of z/OS platform products and service on magnetic tape in the future. IBM recommends downloading products and service. However, if you have a requirement for physical media, products and service are also available on DVD.

IBM's Statements of Direction

February, 2017 - IBM intends to extend the ServerPac offering to provide the capability for it to support products packaged in ways that currently make them unavailable in ServerPac, including products that are not packaged using SMP/E. ServerPac will be designed to support packages with SMP/E-packaged products, non-SMP/E-packaged products, and a combination of both. This improvement will be intended to enable you to standardize your installation processes for the IBM products available for the z/OS platform. ServerPac will initially continue to use the existing ISPF-based CustomPac Dialog for installation.

In this announcement, statements of direction appear for three new, related functions.

- **Fulfilled** - The first will be designed to allow software product information to be added to a z/OSMF software instance that includes products that are not packaged with SMP/E so that information about software instances containing such products can be displayed. In addition, infrastructure is planned to be made available for providing end-of-service information for products that are not managed using SMP/E to complement the information already available for SMP/E-managed products for vendors who provide it.

- **Fulfilled** - The second will be designed to enable you to download portable software instances from a remote server to a z/OS system, where they can be managed and installed by z/OSMF. This will be intended to simplify the process for acquiring portable software instances from software vendors who choose to provide products in this format.

- The third will be designed to support defining one or more z/OSMF workflows associated with a software instance, and executing those workflows during a z/OSMF Software Management deployment operation. In addition, this function will be designed to allow an Export action to include defined Workflows into portable software instances, and run during deployment for those software instances. This is intended to help you complete setup tasks for the products included in the software instance provided by a software vendor that provides the necessary supporting Workflows.

IBM's Statements of Direction

Fulfilled - Starting with IBM SDK for z/OS, Java Technology Edition, V8 SR17_03, support will be for z9 hardware and forward only.

February, 2017 - The release after z/OS V2.3 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.

Fulfilled - Starting in z/OS V2.3, z/OS system logger will no longer support the log stream DRXRC duplex mode option.

Fulfilled - It was previously announced that z/OS V2.2 would be the last release to include a number of System Data Mover (SDM) TSO/E commands. Based on client feedback, IBM now intends to continue to support these commands in the future, including the query and XSET commands. However, IBM plans no future enhancements for them. IBM recommends you use the equivalent REXX versions of these commands instead, which are intended to be updated as needed to support any new functions in the future.

IBM's Statements of Direction

October, 2016 - In the future, IBM intends to provide a linkage between z/OSMF Software Management's deployment function and z/OSMF workflows so a workflow can be initiated by a deployment operation. z/OSMF already supports one workflow calling another workflow. The new function will be designed to allow workflows to be used to manage installation-related and deployment related tasks by linking from package-level workflows to product-level and component-level workflows as needed to help you perform these activities both for initial installation (for example, on a test system) and later deployments to additional systems (such as application test, application development, and production systems).

Also, IBM intends to extend the ServerPac offering to provide the capability for it to support products packaged in ways that currently make them unavailable in ServerPac, including products that are not packaged using SMP/E. ServerPac will be designed to support packages with SMP/E-packaged products, non-SMP/E-packaged products, and a combination of both. This improvement will be intended to enable you to standardize your installation processes for the IBM products available for the z/OS platform. ServerPac will initially continue to use the existing ISPF-based CustomPac Dialog for installation.

Fulfilled - IBM plans to deliver application transparent, policy-controlled data set encryption in IBM z/OS. IBM DB2 for z/OS and IBM Information Management System (IMS) intend to exploit z/OS data set encryption.

IBM's Statements of Direction

October, 2016 - IBM intends to support new capability in z/OS for metering and capping workloads over CPU and memory consumption. This capability will be delivered in stages with the initial focus on workloads that run only on specialty engines.

Fulfilled - z/OS 2.2 is the last release of z/OS that will include the Guest Platform Management Provider (GPMP) component in z/OS which provides data to the Ensemble management function of the Unified Resource Manager (aka zManager). Additional information on GPMP can be found at zEnterprise System Ensemble Workload Resource Group Management Guide

Fulfilled - IBM z/OS V2.3 is planned to be the last release to include the Library Server element. IBM recommends that you use the Knowledge Center for z/OS that was introduced in z/OS V2.2 to create your own local repositories and manage their content.

December, 2015 - z/OS V2.3 is planned to be the last release to support the Batch Runtime component. The z/OS Batch Runtime component provides the framework for Java™ interoperation with COBOL and PLI, with transactional updates to IBM DB2® and Transactional VSAM. It is recommended that you use IBM WebSphere® Application Server JSR 352 instead.

IBM's Statements of Direction

Fulfilled - IBM intends to deliver a number of SDSF enhancements, including new commands that will be designed to display:

- Things to help you perform address space level diagnosis: active TCBs, CDEs, allocated data sets, and ENQ conflicts
- Virtual storage map and common storage utilization, including orphaned common storage
- Info about catalogs, mounted z/OS UNIX file system data sets, and SMF data sets
- ASID-related virtual storage information, including allocated storage by subpool
- Information about real, virtual, and auxiliary storage consumption by ASID
- Information about active subsystems, and identify a number of IBM subsystems such as DB2 and WebSphere MQ

Additional SDSF displays will be intended to provide:

- SMS-related information, including active classes and the volumes in storage groups
- Parallel Sysplex information about XCF structures, groups, and members
- WLM-related information, including service and reporting classes
- Support for browsing virtual memory contents for an address space
- Generic tracker information

Finally, SDSF is planned to provide a new facility that will be designed to help you manage dynamic exits, which will be intended to make it easier to display active exits and to manage activation, deactivation, and replacement of system exits.

IBM's Statements of Direction

Previously announced SODs for v2.2 withdrawals

Fulfilled - As previously announced, the Simple Mail Transport Protocol Network Job Entry (SMTPD NJE) Mail Gateway and Sendmail mail transports are planned to be removed from z/OS. IBM now plans for z/OS V2.2 to be the last release to include these functions. If you use the SMTPD NJE Gateway to send mail, IBM recommends you use the existing CSSMTP SMTP NJE Mail Gateway instead. Also, IBM announced plans to provide a replacement program for the Sendmail client that would not require programming changes. Those plans have changed, and IBM now plans to provide a compatible subset of functions for Sendmail in the replacement program and to announce those functions in the future. Programming changes or alternative solutions to currently provided Sendmail functions might be required. No replacement function is planned in z/OS Communications Server to support using SMTPD or Sendmail as a (SMTP) server for receiving mail for delivery to local TSO/E or z/OS UNIX System Services user mailboxes, or for forwarding mail to other destinations.

Fulfilled - z/OS V2.2 is planned to be the last release to support the DFSMSrmm™ CIM Provider.

Fulfilled - z/OS V2.2 is planned to be the last release to include the Trivial File Transfer Protocol Daemon (TFTPD) function in z/OS Communications Server.

IBM's Statements of Direction

Previously announced SODs for v2.2 withdrawals (cont.)

Fulfilled - z/OS V2.2 is planned to be the last release to provide support in the Common Information Model (CIM) component for the Java Managed Provider Interface (JMPI).

Fulfilled - z/OS V2.2 is planned to be the last release to support:

– The HCD LDAP backend for use with the IBM Tivoli Directory Server for z/OS (LDAP)
– The DRXRC log stream option for system logger. IBM recommends you use other available mirroring options with IBM z/OS Global Mirror (zGM), also known as Extended Remote Copy (XRC), or GDPS instead

Fulfilled - z/OS V2.2 is planned to be the last release to include the TCP/IP legacy device drivers for FDDI and Token Ring (LCS with LINKs FDDI and IBMTR), Token Ring (MPCIPA with LINK IPAQTR), and ENet and FDDI (MPCOSA with LINKs OSAENET and OSAFDDI). If you are using any of these devices, IBM recommends you migrate to newer devices such as OSA Express QDIO and HiperSockets. Note that this withdrawal is only for TCP/IP device types, and not for any of the SNA device drivers.

Fulfilled - z/OS V2.2 is planned to be the last release to include the RMF XP support for Microsoft Windows Server.

IBM's Statements of Direction

Fulfilled - IBM plans to remove support for unsecured FTP connections used for z/OS software and service delivery 1Q2016. For z/OS software (products and service) direct-to-host downloads will require the use of FTPS or HTTPS. Use the Connectivity Test website to verify your system setup well in advance. Note: No change is required to use Download Director with encryption to download packages to a workstation and transfer them to z/OS later; however, you can also verify Download Director with the Connectivity Test. The Connectivity Test can be found at: https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=cbct

Fulfilled - IBM plans extend the Configuration Assistant for z/OS to support making dynamic configuration changes to an active TCP/IP configuration, and to import existing TCP/IP profile data.

Superseded - z/OS V2.2 is planned to be the last release to include a number of TSO/E-based System Data Mover (SDM) related commands. Except for the query commands (CQUERY, FCQUERY, RQUERY, XQUERY, XSTATUS), and the XSET command, which will remain, IBM recommends you use the REXX version of these commands instead. For more information about using the REXX commands, see z/OS DFSMS Advanced Copy Services.

Table of contents

Appendix

Continuous Delivery

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

Appendix

Notice Regarding Specialty Engines (e.g., zIIPs, ICFs and IFLs)

Any information contained in this document regarding Specialty Engines ("SEs") and SE eligible workloads provides only general descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g., zIIPs, ICFs, and IFLs). IBM authorizes customers to use IBM SE only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the “Authorized Use Table for IBM Machines” provided at www.ibm.com/systems/support/machine_warranties/machine_code/aut.html (“AUT”).

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