What's New in z/OS V2.3?

Marna WALLE, mwalle@us.ibm.com, Member of the IBM Academy of Technology
z/OS System Installation
IBM Z Systems, Poughkeepsie NY USA

IBM

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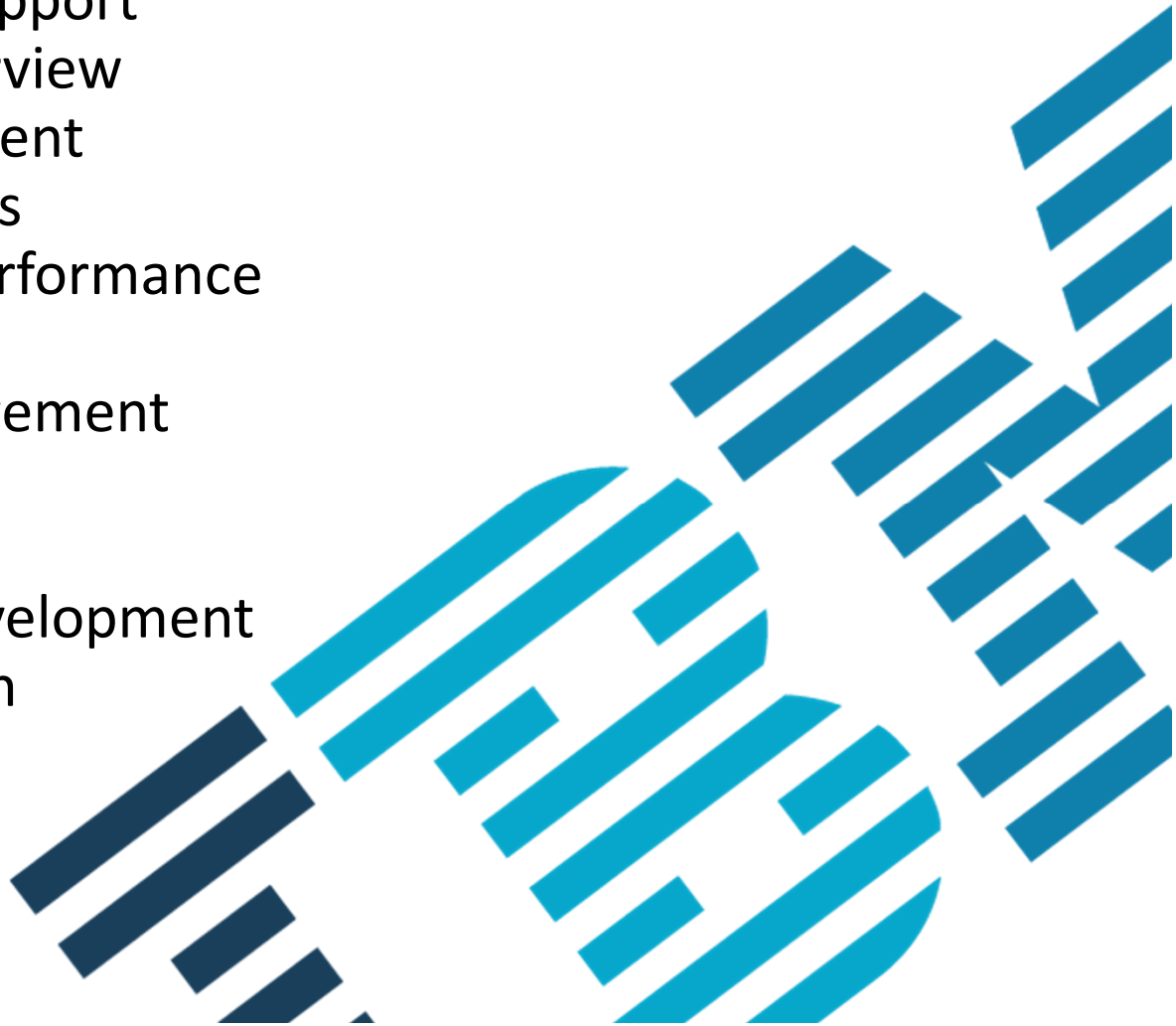

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z/OS Support Summary

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WdfM - Server has been withdrawn from Marketing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

Hardware Support

z/OS Minimum memory limit

- Minimum **8** GB LPAR storage will be required to IPL z/OS V2.3 and later releases on z14
- If you IPL z/OS V2.3 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 V2.3 systems on z14
- A health check will remind you of this recommendation on V2.1 and higher.
- z/OS V2.3 and later releases running as z/VM guest and zPDT on z14 will require **2** GB storage

Instruction Execution Protection (IEP)

- IEP is a hardware function provide 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

Hardware Support

Coupling Facility Encryption

- Support is added for XCF to implement hardware encryption and decryption on all coupling facility links
- Using CFRM policy, you direct encryption of List and Cache structure data
- Adds an additional level of security
- Requires sysplex to be all z/OS V2.3 level.

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.
- z/OS V2.3, z/OS V2.2 APAR OA50569, and toleration on z/OS V2.1 with OA50569

Hardware Support

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

Processor Encryption (CPACF) changes

- New SHA-3 Hashing algorithm added to the KIMD and KLMD instructions.
  - KIMD = Compute Intermediate Message Digest
  - KLMD = Compute Last Message Digest
- Parallel computation of AES and GHASH **(**Galois Hash**)** enabled via new AES-GCM (Galois Counter Mode) instruction

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

Virtual Flash Memory (VFM)

- Replacement for IBM Flash Express on z14
  - VFM implements Extended Asynchronous Data Mover (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

DS8880 – planned zHyperLink support

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

DS8870 7.5 – Transparent cloud tiering, to V2.1 via APARs

- 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

Hardware Support

CF Level 22 exploitation

- Coupling Facility processor scalability
- Coupling Facility SMSG Diagnostics
- XCF/XES List Notification Enhancements
- 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

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-1972)
  - “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 (HCR77C1 Web Deliverable, Sept 14, 2017)

- 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 Dataset (CKDS)
- Improved auditing for CICS applications that make use of ICSF resources
- Access to ICSF services during early IPL processes (`S CSF,SUB=MSTR`)
  - 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 dataset list service in support of ACSP application ports to z/OS

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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 Years 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, ...

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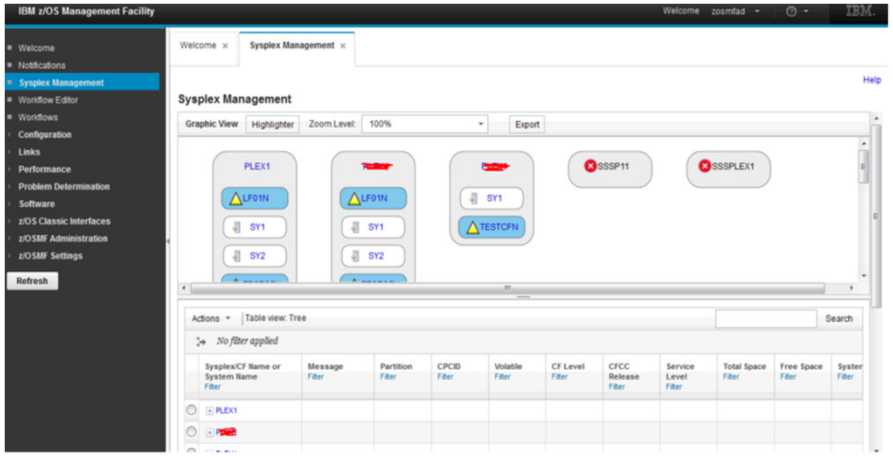
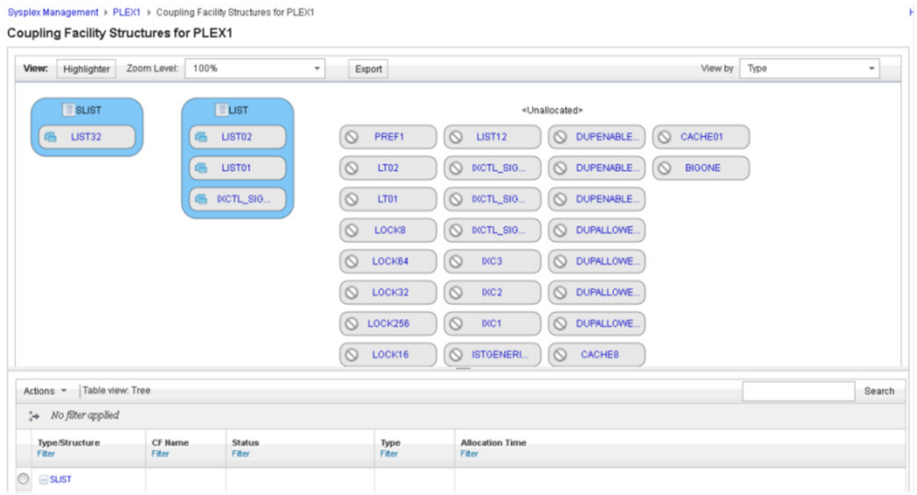
Usability & Skills

Parallel Sysplex Management Plug-In !!

- 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 datasets 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

```
/* PLUGINS( INCIDENT_LOG,
            COMMSERVER_CFG,
            WORKLOAD_MGMT
            RESOURCE_MON,
            CAPACITY_PROV,
            SOFTWARE_MGMT,
            SYSPLEX_MGMT,
            ISPF)                 */
```

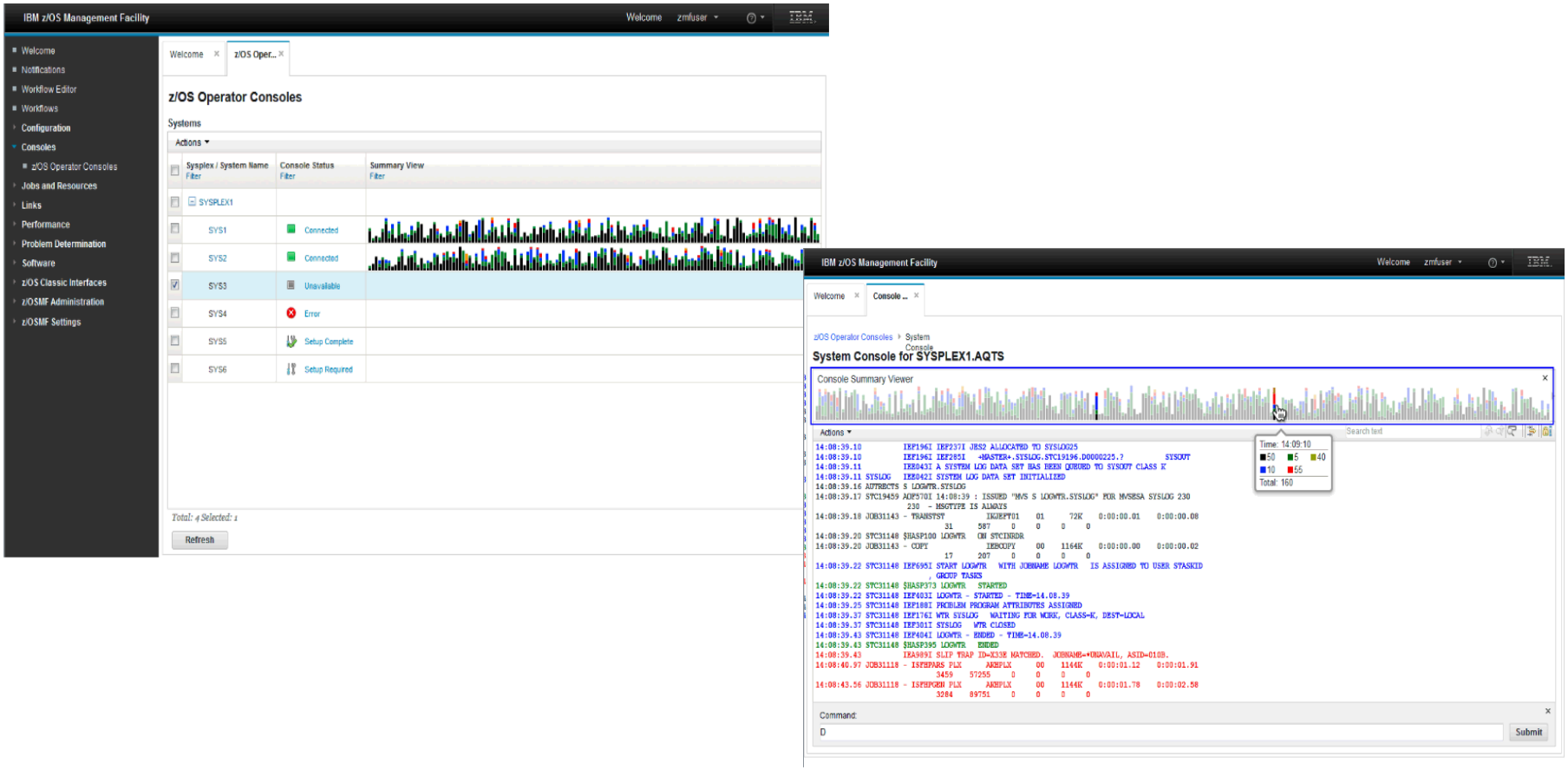




Usability & Skills

Console application in z/OSMF Core!!

- 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 "AutoStart" – Start during IPL

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

More dynamic configuration

- More 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, via APARs PI70526,PI71068

- 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 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

Usability & Skills

z/OSMF Incident log, via APAR PI69173

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

z/OSMF Software Management, via APAR PI66832

- 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

z/OSMF User display capability, via APAR PI69100

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

Usability & Skills

z/OSMF 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

z/OSMF SDSF browser UI

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

IRRPRMxx RACF PARMLIB for data set name (ICHRDSNT) and range (ICHRRNG) tables

- Reducing assembler skills
- One less usermod to install
- IEASYSxx RACF=

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Scalability & Performance

RMODE 64

- RMODE 64 roadmap continues, in v2.3:
  - Contents Supervisor and Loader infrastructure
  - Binder support
  - Target is enough to support the Java JIT

SMC-D (Direct), on V2.1 with APARs

- 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
  - 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

- XES locking dataspaces move to 64 bit, and exploit 1M large pages

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

SMF record type constraint relief (256 -> 2048)

- 0 -> 127 and 1152->2047 for IBM, 128 -> 1151 for external to IBM.
- 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
- Expand available IBM-reserved record name space

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, on V2.1 via OA49263 and OA51878

- 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
  - Can co-exist with current SMF data set/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), on V2.1 via OA48570 / OA48571

- New SMF 98 record with an interval length in seconds to highlight workload inefficiencies before experiencing the consequences.
- Details about dispatching, locking and queueing

WLM sysplex routing

- Planned to be sensitive to upcoming, but not yet active, soft capping which enables clients to optimize the 4 hour rolling average

Scalability & Performance

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

VSAM RLS upgrade locking and constraint relief

- Improved performance for processing VSAM alternate indexes using RLS
  - Existing RLS upgrade locking causes all update requests for VSAM alternate index and base records to be single threaded.
  - New “redo” processing allows concurrent update requests for improved performance, especially when updating many large records.
- 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.

Scalability & Performance

DFSORT performance improvements

- Improvement in CPU and elapsed time for several DFSORT function that generate runtime code, with no end user changes.
- E15/E35 user exits updated to handle blocks of records

z/OS NFS client for max size to be read/written to server by single RPC packet

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

zFS cache performance improvements

zFS compression

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

XML system services exploits 64 bit addressability

Exploitation of fast memory clear to clear 1M frames

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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 ($D LIMITS, …)
    - More detailed tracking information ($D CKPTSPACE,BERTIES, …)
  - Reserved space for emergency situations, to allow use of standard tools to help shortages
    - A small percentage of each resource = Privileged Space
    - Only option is on (all V2.3) or off.
    - Ability to mark jobs, started tasks, and logons that can use Privileged Space, via “emergency subsystem”
  - Static analysis of initialization deck settings in light of current usage. Poorly config’d?
    - Batch JCL job, or JES2 command
  - Historical tracking of resource usage over time
    - Creating new (to JES2) SMF 84 records for JES2 resources, subtype 21
- Intent is to:
  - Better identify shortages before they happen
  - Give installation standard tools to manage system in shortage
  - Reduce situations requiring an IPL

Multiple OAM Address Spaces per LPAR: Test/production or two production

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, with BPXWMIGF utility with OA53128

- 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.

DFSMSdfp new support for secondary volumes

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

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

- To use more buffer storage for in-flight updates, making it more resilient to transient events that may otherwise cause suspension or stalls.

Shorten SVC dump capture time

- Introduces an installation-specified maximum task nondispatchable time (MAXTNDSP on CHNGDUMP command) value for three address space categories (SRM critical, important, and normal from WLM service class).
- If the maximum nondispatchable time has hit, task is reset dispatchable.

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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
- 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)
- Automatically unmount not-in-use Version Root via BPXPRMxx VERSION(..,UNMOUNT)
- Extend user mount capability to allow mounting of filesystems in a privileged manner
- zFS user cache non-disruptive resizing
- IDCAMS DEFINE ZFS keyword for definition of VSAM linear data set that will be used as a zFS

8 character TSO/E user IDs

- Enable use of 8 char TSO/E user ids, removing the current 7 character limit
- Help customers close auditing exceptions
- Consistency with job name length maximum
- SMP/E FIXCAT is **IBM.Function.TSO.8CharUserid**

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
- Support configuration and documentation sharing in a shared sysplex
- Exploitation of z/OSMF workflows for configuration

Product Documentation Improvements

- IBM Resource Link now hosts the z/OS v2.3 PDFs
- A subscription service on MyNotifications and last publish dates communicate updated content
- More timely information refresh now possible

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”

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

pax and tar improvements

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

AMASPZAP (super ZAP)

- Prevent partial updates by exploiting CHECKSUM

Systems Management

NFS Server

- UNICODE conversion support based on mount system attributes
- Support for encrypted data sets in OA53223

SMB

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

GDGBIAS

- JOB JCL statement to indicate how you want relative and absolute generations treated:
  - GDGBIAS = JOB traditional behavior, on a job basis
  - GDGBIAS = STEP behavior of associating on a step basis
- JES2 and JES3 job class attribute, for when JOB statement is not used.
- Can help to restart jobs without modification.
- Eliminates a common usermod.

Systems Management

z/OS BCPii improvements, to V2.1 via OA51493

- 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 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 (MCL P00339.090, Bundle S09)
  - Absolute capping
  - Absolute capping LPAR group

Common Event Adapter (CEA) cross system support

- Ability to manage a TSO session on **any** system in the sysplex, and have data returned to the caller, with continued vigilance in regard to system access.

Systems Management

VTOC update SMF records

- 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
  - v2.2 provides a new SMF Record 42 Subtype 27 built by EXCP
  - 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

- IBM and ISV extension for function registration. All can query.

IBM Health Checker for z/OS HZSPRMxx

- Filter support for parmlib with WHEN DO..END – 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.
- Suggestion: 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

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 element (z/OS Font Collection)

IBM z/OS Liberty Embedded as a z/OS base element

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

Systems Management

SDSF Enhancements

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

- New SDSF Users Guide
  - Searchable, bookmark capable

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

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Networking

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
- 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

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

VTAM start option

- Default VTAM internal trace options can now be disabled

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Security

RACF field level access checking granularity

- RACF Field Level Access Checking support is enhanced to optionally scope Field Level Access only to those profiles for which the user already has administrative access based on profile ownership or group-SPECIAL scope.
- Reduces need to grant administrator access

PKI Services Enhancements

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

Security

Policy enabled data 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 plans to support 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 data sets

Security

NJE security

- Ensuring that nodes are authenticated to reduce chance of spoofing
- IBM Health Check 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 IBM 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 PARMLIB BPXPRMxx keyword called SUPERUSER(xxxxxxx) 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.

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Application Development

JES2 Email Delivery Service: job completion notifications via e-mail

- 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'
  - Up to 8 NOTIFY statements in a job or job group.
- 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
- Requires z/OSMF services

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

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

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
- We plan to:
  - Double the z/OS UNIX time fields (from 32 bits to 64 bits) used to count seconds since 1 January 1972

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

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 and 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 binary-coded decimal** (**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++ provides enhancements in the following areas:

Usability:

- Metal C creates 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 are planned to be provided for structure listings, the layout information can then be better compared and analyzed
- DSECT utility is planned to create C structures/unions that align closer to the original assembler DSECT, to give the same size as the original DSECT

Performance:

- Architecture default is planned to change to ARCH(10) (EC12) to align with the minimum hardware level for z/OS V2.3

Security:

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

Debugging:

- Metal C debug data blocks is planned to provide information linking the assembly or objects with the debugging data, providing synchronization of these files
- Saved Option String Information (SOSINFO) utility is planned to emit options encoded in the PPA blocks, to help in diagnosing problems
- DWARF debugging information in object files is planned to 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

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

- “Stand up a CICS region in minutes versus months!!”

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

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.

July, 2017 – 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 keyz/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 keyz/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.

February, 2017 - 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.

- 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.

Fullfilled - 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.

October, 2016 - IBM plans to deliver application transparent, policy-controlled dataset encryption in IBM z/OS. IBM DB2 for z/OS and IBM Information Management System (IMS) intend to exploit z/OS dataset 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.

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