z/OS 2.4 Preview

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## Release Themes

Enable new application development processes and optimize existing application investment while providing IBM Z application-level resiliency and security

| **Agility** in the adoption of new technologies in DevOps, microservices, and consumption models that are delivered as a service to accelerate their time to value | **Optimization** through the ability to run computing workloads in the most efficient environment | **Resiliency** to deliver continuity of business services through exploitation of functions such as encryption and high availability |

Build applications and services based on a highly scalable and secure infrastructure that delivers the performance and workload availability to enable digital transformation
Content Overview

▪ **Usability and Skills**
  – z/OSMF Desktop; Sysplex management; Software management and workflows; Assembler skill reduction; XCF transport class simplification; …

▪ **Application Development**
  – z/OS Container Extensions; IBM Open Data Analytics for z/OS; XML4J; LE support for C++; Unicode v9; NFS support for Unicode; Web enablement toolkit; UTF8 support; XVFB support; …

▪ **Enhancing Security**
  – Encryption for sequential, basic, and large format; Encryption for PDSE; Encryption for JES2 spool; TLS 1.3 support; RACF ACEE privilege escalation; TSO logon timeout; MSC console passphrases; OpenSSH V7; …
Content Overview

- **Scalability and Performance**
  - AMODE 64; Alternate subchannel set for XRC and Linux; Improved dump capture time; Async XI for CF cache; ...

- **Availability**
  - TVS auto commit; JES2 resiliency; Remote pair Flashcopy for XRC; Logger support for GDPS k system; zFS HA improvements; ...

- **Systems Management**
  - Container Pricing; zFS file back-up and restore; JES2 enhancements for JES3 migration; z/OS cloud provisioning for z/OS middleware; NFS improvements for SMB; Multiple NFS servers on a system; ...

- **Networking**
  - CSSMTP support for DBCS; HiperSockets Converged Interface (HSCI); zEncryption Readiness Tool (zERT); ...
# z/OS Support Summary

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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.

**Legend**

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

GlassHouse Systems
Continuous Delivery
Continuous Delivery

- z/OS embraces continuous delivery through new function APARs
- Get weekly emails when APARs close at https://ibm.com/support/mynotifications
Announcement letters are issued as required to document the enhancements made through continuous delivery:
- November 21, 2017 [link]
- March 6, 2018 [link]
- May 15, 2018 [link]
- August 7, 2018 [link]
- November 13, 2018 [link]
- March 5, 2019 [link]
- April 23, 2019 [link]
What is z/OS Container Extensions (zCX)?

- **zCX is intended to modernize and extend your z/OS applications**
- **Optimization**
  - Co-location of applications ushers in a new level of optimization
  - The ability to run nearly any Linux on IBM Z Docker container in direct support of z/OS workloads on the same z/OS system
- **Agility**
  - Access the most recent development tooling and processes available in the Linux on Z ecosystem and deploy on z/OS
  - Reusing popular Linux skills and patterns
- **Operational Efficiency**
  - Retain the operational benefits of z/OS, mature business processes, and the ability to maintain overall operational control within z/OS with z/OS Quality of Service

Learn more at: [http://ibm.biz/zOSContainerExtensions](http://ibm.biz/zOSContainerExtensions)
z/OS Container Extensions

- Provides the capability to run Linux on Z Docker images directly in z/OS
  - Linux distribution and Docker CE provided
  - Service entitled as part of z/OS service entitlement
- IBM software is planned to be licensed and priced in line with Linux on Z offering
- Intended for workloads with affinity to z/OS
  - For data or applications
- Provide ease of use in Lifecycle Management of a Docker Appliance
  - z/OSMF Workflow for creation and removal
  - Additional support for applying service
  - This workload is planned to be zIIP eligible
  - Operational consistency with z/OS
Pre-packaged Docker Environment provided by IBM
- Includes Linux and Docker Engine components
- Supported directly by IBM
- Can include clustering and registry capabilities
- Initial focus is on base Docker capabilities
- Competitive price/performance (exploits zIIPs)

Application developers can deploy software using Docker interface
- Any software available as a Docker image on Z (growing ecosystem available on Docker Hub)
- Any home-grown Linux for Z application packaged as a Docker image
- Using standard Docker interfaces

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

Also provides IBM and ISVs a means of delivering solutions into this environment
- Requires packaging of software as Docker images
Integrated Disaster Recovery and Planned Outage coordination
- z/OS DR/GDPS for site failures
- Integrated planned outage coordination
- No need to coordinate with non-z/OS administrators

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

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

z/OS Workload Management
- WLM service goals and resource caps
- Capacity Provisioning Manager (CPM)
- SMF support for accounting and chargebacks
Hardware Support
# IBM z14 Functions and Features

## System, Processor, Memory
- Five hardware models: M01, M02, M03, M04, M05
- 10 core 5.2GHz 14nm PU SCM
- 1 - 170 PUs configurable as CPs, z1IPs, IFLs, ICFs, up to 196 PUs
- Increased Uniprocessor capacity
- Up to 33 sub capacity CPs at capacity settings 4, 5, or 6
- CPC Drawers and backplane Oscillator
- Enhanced SMT and new instructions for SIMD
- Enhanced processor/cache design with 1.5x more on-chip cache sizes
- Up to 32 TB DRAM, protected by Redundant Array of Independent Memory (RAIM)
- Virtual Flash Memory (VFM)
- 192 GB HSA
- Improved pipeline design and cache management

## I/O Subsystem, Parallel Sysplex, STP, Security
- PCIe Gen3 I/O fanouts with 16 GBps Buses
- 6 CSS, 4 Subchannel sets per CSS
- 0 – 5 PCIe I/O Drawer Gen3 (no I/O Drawer)
- Next generation FICON Express16S+
- 25 & 10 GbE RoCE Express2
- Integrated Coupling Adapter (ICA SR) and Coupling express LR for coupling links
- Support for up to 256 coupling CHPIDs per CPC
- CFCC Level 23 (HMC 2.14.1)
- Crypto Express6S and CMPSC compression and Huffman Coding compression
- STP enhancement – CTN split and merge
- STP configuration and usability enhancements (GUI)
- IBM zHyperLink Express
- OSA-Express7S 25 GbE SR
- OSA-Express6S
- Secure Service Container

## RAS, simplification and others
- L3 Cache Symbol ECC
- Acoustic and thin covers (space saving)
- N+1 radiator design for Air Cooled System
- Drop “Classic” HMC UI
- ASHRAE Class A3 design
- Enhanced SE and HMC Hardware (security)
- Support for ASHRAE Class A3 datacenter
- TKE 9.1 LICC and new smart cards
- LargeScale TCP/IP hardware Checksum (OSA-Express6S)
- Pause-less garbage collection
- Universal Spare SCM s (CP and SC)
- Simplified and enhanced functionality for STP configuration
- Enhanced Dynamic Memory Relocation for EDA and CDR
- Virtual Flash Memory (replaces IBM zFlash Express)

## PR/SM
- Up to 170 CPUs per partition
- IBM Dynamic Partition Manager updates
- Up to 85 LPARs
- 16 TB Memory per partition

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New features and functions

Announce: October 2, 2018
IBM z14 ZR1 Functions and Features

System, Processor, Memory

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

I/O Subsystem, Parallel Sysplex, STP, Security

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

RAS, Other Infrastructure Enhancements

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

New features and functions
Announce: October 2, 2018
CCA 5.4 and 6.1 support
- ISO-4 PIN block formats, 3-key TDES keys, New DK directed key derivation
- Delivered via APAR OA55184

CCA 6.2 Support
- CPACF export controls and PCI HSM compliance tagging for 3-key TDES keys

New EP11 “BSI 2017” compliance mode

ICSF Security Enhancements
- KGUP granular update controls and CSFKEYS checking
- SAF resource name prefixing
- CSFKEYS permission specification for a user provided list of ICSF services

ISPF browser for PKDS

Console command to pause requests & restart ICSF w/ new service libraries
- Including ARM registration

Ability to have ICSF start much earlier during IPL process

ChaCha20 and Poly1305 algorithms (clear key only)

FIPS compliant key wrapping mechanism for PKCS#11 Wrap Key

SMF records updated to honor MAXKCVLEN installation option keyword

Select CCA services enhanced to route requests to regional crypto servers
Usability and Skills
Overview, Goals, and Directions

- Bring a browser based ecosystem to z/OS Management
  - Consistent with other platform user interfaces
  - Modern compared to ISPF 3270
  - Client platform agnostic – OS, devices etc.
  - Exploit graphics and other techniques where appropriate

- Develop applications focused on z/OS unique needs
  - Task oriented
  - Reduced effort

- Integrate and expand the z/OS ecosystem
  - Provide APIs for public consumption
  - Securely and efficiently

- Reduce reliance on Assembler skills
  - Provide solutions that don’t require code where possible
  - Support higher level language extensions of z/OS
- z/OSMF a desktop-like user interface, default for z/OS 2.4
- Benefits – Multi-tasking, more screen available, intuitive to new users, customer grouping of items
Sysplex Management

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

- **Modify Sysplex configuration**
  - Sysplex wide commands and results display
  - Retained across IPLs
  - Allows review of who took what action when
  - Optionally view commands before issuing them

- **Actions include**
  - Rebuild structure(s), all structures
  - Duplex structure(s)
  - Reallocate
  - Couple dataset creation, switching
  - CF actions
  - Paths management
z/OSMF Software Management

- Ultimate goal is to provide a single approach to software maintenance and management
  - Acquisition
  - New installation
  - Upgrades
  - Fixing a problem
  - Applying preventative maintenance

- An application in z/OSMF to manage software binaries
  - Portable software instances
  - Can be SMP/E, non-SMP/E, or a mixture
  - Installation via dialog

- Use of z/OSMF Workflows for configuration
  - Standardize the configuration of software
  - Both IBM and non-IBM software
  - Can be instructions, automated, or a combination
- Support for WTOR messages
- Improved handling of large volumes of messages
Scalability and Performance
Overview, Goals, and Directions

- Goal is release to release equivalence
- Exploit hardware features
- Long term continue AMODE 64 and RMODE 64 roadmap items
AMODE 64 Support / Exploitation

- Exploitation of 64-bit memory, large pages, and non-executable memory
  - RMF Monitor I and II exploitation
  - JES2 Exploitation of 64-bit
  - JES2 Exploitation of read-only and non-executable memory
  - WLM SRM exploitation
  - LE exploitation of read-only and non-executable memory
- z/OS v2.4 no longer allows or supports user-key common storage by default
- 64-bit obtains (IARV64) now support explicit address with the INORIGIN keyword
- SSL RACF Certificate above the bar for AT-TLS 64-bit exploitation
- RHSSSL64 System SSL certificates in 64-bit memory
  - Communications Server and System SSL
Alternate Subchannel Set for XRC

- Alternate subchannel sets for XRC for 4-site support
- XRC Device-based management offline final phase
- Region switch RTO improvements for XRC
- Multi-task volinit enhancements
- Configure XRC using a symmetrical configuration across multiple sites and maximize the number of supported volumes
  - Full exploitation of GDPS 4-site configurations (e.g. 2P4L sites) requires 4 sets of volumes, the use of GDPS/PPRC and GDPS/XRC, and a configuration which supports 4 subchannel sets (zEC12/zBC12 or later processor with appropriate IODF)
  - XRC Device Based Management is a pre-req
  - GDPS exploitation of 5-digit device numbers, and 4-site integration, are necessary to support a complete solution
- Planned support includes:
  - XRC device-based management (offline final phase) provides the capability for XRC to handle primary volumes that are offline, and possibly never have been online
  - XRC Alternate Subchannel Set provides flexibility to add larger numbers of volumes and simplifies the configuration
Alternate Subchannel Set for Linux

- In configurations where Linux for Z is running on the same IBM Z server as z/OS and z/VM, many customers traditionally define the entire I/O configuration in z/OS.
- Therefore, HCD (z/OS) needs to be able to define and dynamically activate I/O configurations for any type of OS on the server.
  - With this support, a configuration administrator can define and dynamically activate an I/O configuration for a partition running Linux for Z without losing any capabilities for z/OS or z/VM operating systems.
  - With this support, an HCD/HCM user can define 3390B and FCP devices to an alternate subchannel set as long as they are not used by z/OS or z/VM, so that he can get relief on usable device numbers in the primary subchannel set.
**Improve SVC Dump Capture Time**

- **Vision**
  - SVC Dump data for larger z/OS systems and address spaces can be captured and written out quickly and without causing workload disruptions due to address space non-dispatchability, or caused by spikes of memory management activity associated with capturing the dump.
  - This support helps unlock customers’ ability to successfully exploit large memory on z/OS.

- **Value:**
  - Reduced address space non-dispatchability window and other workload disruptions caused by dump capture (e.g. real storage consumption spikes, paging spikes), for equivalent size dumps.
  - Or alternatively, much larger dumps can be taken, for equivalent levels of disruption.

- **Planned support includes:**
  - Improved parallelism in dump capture process.
  - Capturing global storage in DUMPSRV high-private buffers.
  - Parallelism in various dumping modules.
Asynchronous Cross-Invalidation for CF Cache Structures

- Enables improved efficiency in CF data sharing by adopting a more transactional behavior for cross-invalidate (XI) processing, which is used to maintain coherency/consistency of data managers’ local buffer pools across the sysplex
  - Instead of performing XI signals synchronously on every cache update request that causes them, data managers will be able to “opt in” for the CF to perform these XIs asynchronously (and then sync them up with the CF at or before transaction completion)
  - Faster completion of cache update CF requests, and the transactions that depend on them for data sharing, particularly when cross-site distance is involved in the cross-invalidate traffic

- Requires z14 GA2 CFCC support, plus z/OS PTFs on every exploiting system
- Requires explicit data manager exploitation/participation – not transparent
  - Exploitation by Db2 V12 only
- No SMF data changes are provided for CF monitoring/reporting
RMF stores synchronous I/O link statistics on storage controller level in a new data section of SMF 74.8 records (ESS Statistics)

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

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

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

- **Larger log stream staging data sets**
  - Support for IBM zHyperWrite for logger staging datasets and offload datasets
Availability
Transactional VSAM (TVS) Auto-Commit Support

- TVS is an optional z/OS feature that enables batch jobs and CICS transactions to concurrently update shared recoverable VSAM data sets thus reducing the batch window for CICS and other VSAM applications and improving system availability
  - Currently, to fully exploit TVS, batch applications must be modified to use z/OS Recoverable Resource Services (RRS) to issue sync point commits in order to avoid holding too many locks which could result in elongated CICS response times

- With the new TVS Auto-commit support, users can avoid making costly source code changes to batch applications and instead TVS will invoke RRS to issue sync points commits on behalf of eligible batch applications based on specified parameters
  - Specify the TVSAMCOM parameter in the job step JCL OR
  - Specify a system level commit parameter in the IGDSMSxx member of SYS1.PARMLIB.
    - Note: The JCL value will override the value specified in IGDSMSXX
zGM (aka Extended Remote Copy or XRC) combines hardware and z/OS software for an asynchronous remote copy solution that enables critical data to be mirrored between the application and recovery sites while maintaining consistency.

- Increasing numbers of large enterprises are adopting 4-site DR configurations, with a high availability (HyperSwap) configuration within each region, and some form of DR between regions.

New XRC enhancements alleviate constraints and allow for more flexible 4-site configurations that enable data center growth while maintaining both high availability and disaster recovery capability without recovery point objective (RPO) increase.

- Device-based Management and Multiple Subchannel Sets (MSS) Exploitation
  - XRC was enhanced to utilize 5 digit device numbers, instead of volser, to enable MSS exploitation for the volumes in the XRC session.
  - Allowed for more flexible and easier to manage configurations and provided constraint relief for 64K device numbers.

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

**Online zFS to zFS migration**  
- Introduced in z/OS 2.3, the BPXWMIGF migration tool provided ability to migrate HFS to zFS transparently  
- In z/OS V2.4, it now supports zFS to zFS migration transparently also  
- Useful in migrating zFS file systems from one volume to another volume, without impacting the application

**zFS High Availability support**  
- Applications running in a sysplex environment and sharing read-write mounted zFS file systems will no longer be affected by an unplanned outage  
- Unplanned outages will be transparent to the application on other members of the sysplex and will no longer result in zFS file system I/O errors  
- Can be specified:  
  - As a mount option on individual mount statements to affected individual zFS file systems  
  - Globally in IOEFSPRM to enable this support for all read-write mounted zFS file systems  
  - Dynamically to change already mounted zFS file systems  
- Will be ignored for applications that use zFS file systems in a single system environment
Systems Management
Clients want to use the same tools and applications to backup and restore individual z/OS UNIX files residing in z/OS File System (zFS) data sets as other z/OS data sets.

New enhancements to backup and restore individual z/OS UNIX files residing in zFS (z/OS File System) data sets is integrated into existing DFSMShsm backup/recover and DFSMSdss dump/restore capability, allowing for centralized data management across the z/OS platform.

- The support is intended to subsume the capabilities provided by the existing IBM Tivoli Storage Manager z/OS UNIX System Services Backup-Archive Client.
- DFSMS will not provide support for z/OS UNIX files found in Hierarchical File System (HFS) data sets.

Support provided on z/OS 2.3 via the following APARs:
- DFSMSdss OA52836
- DFSMShsm OA52703
- zFS OA56145
- USS OA54218
- RACF OA55165
JES2 Enhancements

- JES3 to JES2 migration support
  - Disk reader support now in JES2
  - //*ROUTE XEQ JECL support
  - Support for multiple jobs in an NJE job stream
- Checkpoint version improvements
  - Exploit 64 bit storage
  - Improved performance and reduced working set size
- Replace exits with policies
  - JES2 will provide support for conditions and actions
  - Built in to policies that allow actions based on conditions
    - Condition: job name is ABC, action: set job class to Q
- Encryption and compression of JES2 managed spool data sets
  - Compression done based on job/SYSOUT class
  - Encryption done based on JCL or RACF profiles
  - Encryption implies compression
z/OS Cloud Stage 2

- z/OS Cloud provisioning security and RACF simplification
- Sysplex clustered instance
  - z/OS Cloud cluster support
  - z/OS Cloud networking support for sysplex clustered instances
  - DB2 cluster support dependency for DB2 data sharing group workflows
- Common Security XML Descriptor for Cloud
- Metering and capping for memory
  - z/OS Cloud metering and capping support
  - z/OSMF plugins support for metering and capping for memory
Cloud Storage Access for z/OS

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

**Transparent cloud tiering (TCT) for DS8000**
- TCT developed in conjunction with z/OS and DFSMShsm and provides automated, policy-based, server-less movement of archive and backup data directly to a cloud object storage solution using OpenStack Swift or S3-compatible interfaces
  - DFSMShsm automatic migration supports TCT via SMS management class policy and continues to automatically recall a data set to primary storage when it is referenced without any parameter changes
  - TCT supports migrate and recall of data to volumes in both simplex and copy services relationships, including 2-site Metro Mirror, FlashCopy, and Global Mirror (only MTMM and XRC continue to be restricted)
  - TCT supports encryption to provide security of data in flight.

**OAM Cloud as a Tier**
- Enhancements to OAM provide a new cloud tier to the existing storage hierarchy
  - Supported is the ability to store and manage primary copies of OAM objects on cloud storage, via public or private cloud infrastructures supporting the Amazon S3 API, and the ability to recall an object stored in the cloud to the disk level of the storage hierarchy
  - OAM managed backup copies will continue to be supported as they are today to removable media, typically virtual or physical tape
**General:**
- Timely content refreshes will continue after 2.4 GA with as-needed updates
  - Subscribe to the z/OS library PDFs to receive notifications about updated content
- The Migration guide is replaced by the Upgrade workflow
- The “Summary of Message and Interface Changes” (SMIC) is retitled “Release Upgrade Reference Summary” (RURS) and streamlined to contain only the lists of new/changed/deleted messages and the five tables for SMF and SYS1 member changes
- New content solutions provide assistance for all phases of the user experience for a function
  - They can consist of a variety of content, including comprehensive content collections in the Knowledge Center (c3s), videos, z/OSMF workflows, podcasts, and other content
  - Web solutions help you get started with the function and provide links to all of the related content
  - A new content solution home page helps you browse and use content solutions
- z/Favorites is updated to highlight new function in 2.4

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

- **Search:**
  - Search catalog function is fully integrated into KC for z/OS 2.4
    - In addition to searching the entire release, you can search at the element/feature library level or within an individual book
  - Looking up messages is easier than ever with two new LookAt-based options:
    - The “IBM Z: Look@ Knowledge Center” online tool lets you conduct targeted message searches within or across products in KC
    - With the new LookAt API, you can look up messages in KC4z using a KC based version of the original LookAt facility
  - KC4z has a new component that "normalizes" HTML content to improve search

- **KC4z:**
  - KC4z is upgraded to 2.0 and now has the same look and feel as the online IBM Knowledge Center
  - 2.4 includes a new workflow to help you provision the KC4z plug-ins that you obtain from the FTP site
  - The content repository for KC4z is expanded to include several software products
Networking
AT-TLS support for TLS V1.3

- Planned support for the latest TLS version standard
- Improves the performance and security of TLS-protected traffic
- AT-TLS will be enhanced to allow new System SSL TLS 1.3 features to be exploited via policy enhancements (transparently to software depending on AT-TLS for their TLS support)
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.
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
**z/OS Encryption Readiness Technology (zERT)**

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

- **zERT plug-in for z/OSMF provides an easy to use UI for querying data reported in SMF 119 subtype 12 records**
IBM Network Configuration Assistant

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

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

1. IBM Configuration Assistant has been renamed to IBM Network Configuration Assistant
Security
Pervasive Encryption

- z/OS 2.4 plans to continue to drive pervasive encryption efforts within an enterprise:
  - z/OS policy-based encryption options that can help clients protect their critical business data have been enhanced to support additional z/OS data set types, including PDSE
  - Also supported is JES2 encryption of JES managed data sets on SPOOL
  - Both enhancements allow users the ability to encrypt data without application changes and simplify the task of compliance
Today, a PassTicket key can either be masked and stored in the RACF database, or encrypted, and stored in ICSF.

Enhancements in RACF provide new capabilities to facilitate the use of encryption with ICSF as the key store for PassTicket keys in order to provide enhanced PassTicket keys security and protection against cyber attacks.

The new functions include:
- Command and programming interfaces to report on the method of protection for PassTicket keys, and, for encrypted keys, the ICSF key label name.
- A function to convert masked keys to encrypted keys without needing to change the keys.
- The ability to use pre-existing keys in ICSF for application PassTickets.
OpenSSH is the predominant secure terminal and file transfer program on open source systems and encrypts all traffic to eliminate eavesdropping, connection hijacking, and other attacks.

To maintain currency and ensure z/OS clients have the latest enhancements and fixes, z/OS OpenSSH is updated to the openssh.com 7.6p1 level.

With OpenSSH 7.6p1, significant new features include:

- Support for new key exchange (KEX) algorithms, including:
  - diffie-hellman-group14-sha256
  - diffie-hellman-group16-sha512
  - diffie-hellman-group18-sha512
  - curve25519-sha256

- Support for new ssh-ed25519 and ssh-ed25519-cert-v01 key algorithms

- Support for the new chacha20-poly1305 cipher

- Enhancements to the SMF Type 119 subtype 94 and 95 (ssh/sshd connection started) records will include a section that identifies the IP addresses and ports for the connection.

- Elliptic-curve DSA (ECDSA) keys are now supported in key rings and in FIPS mode.

- Key ring keys will now use System SSL for signature creation and verification.

- A new ssh-proxyc command is added, which can be used by the ssh client to connect through SOCKS5 proxy servers.
Application Development
Web enablement toolkit

- New sample program for JSON text-rendering
- HWTJDEL service enables JSON deletion
- HTTP proxy support has been enhanced to provide both basic authentication to “authenticating” proxy servers and AT-TLS interoperability support for proxy users
- The JSON parser can now parse and perform various other services on text in Unicode
  - The parser will auto-detect if the text is in EBCDIC (codepage IBM-1047) or UTF-8 (codepage IBM-1208) encoding and process the text appropriately
- New HWTJSENC service can be used to manually set the encoding
- New HWTJGENC service can be used to retrieve the encoding used to parse the document
- The user application can now limit the search scope of a JSON text by using the new SearchType value, HWTJ_SEARCTHETYPE_SHALLOW
  - This value limits the depth of the search and does not consider content within any nested object(s)
  - This additional scoping can greatly improve the performance cost of searching JSON
Credit for creating the basis for this presentation goes to the team at IBM in Poughkeepsie and to Gary Puchkoff who presented this material (and more) at SHARE in Phoenix in March 2019