

SHARE 2023 New Orleans August 13-18, 2023

Notes

By Ed Webb of SPARTA

Items of Interest

SHARE 2023 New Orleans is also SHARE 141

Handouts at <https://www.share.org/Events/Past-Events/Proceedings>

search for SHARE New Orleans 2023

z/OS 3.1 Announcement

<https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/fiona-king1/2023/08/03/announcing-ibm-zos-31>

<https://www.ibm.com/docs/en/announcements/zos-31-availability?region=US>

01Mar2023 SHARE Individual Membership (New for 2023!)

<https://www.share.org/Connect/Membership/Join-SHARE>

New Individual Membership

\$149 in 2023, auto-renew in 2024 for \$199

New education platform only available to Individual Members

Voting requirements

Be more active

Access to SHARE'd Intelligence newsletter and other digital communications

Affiliate membership

14Aug2023 Monday

SHARE is now using Focus>Tracks instead of Programs>Projects

SHARE Opening and Keynote

March 3-7, 2024 Orlando, FL

August 4-8, 2024 Kansas City, MO

Resilience in Age of AI

Panel

Use AI but be careful of security threats

AI infusion APAR OA64632 https://www.ibm.com/docs/en/SSLTBW_3.1.0/pdf/

[izsa100_v3r1.pdf](#)

Joe Theismann is keynote speaker

NFL Super Bowl winner multiple times
T E Achieve More

Core Platform z/OS Communities Welcome

by Ed Jaffe of Phoenix Software International

Core platform focus area includes Systems programming, hardware, storage, communication server

z/OS Service and APARs

By John Shebey, IBM

OA65009 HIPER/PE Wait084 requires IPL 2.4 through 3.1 (APAR fix available)
OA65114 HIPER/PE Catalog ENQ hang 2.4 and 2.5 affected (APAR fix available)
ENQ cleanup dynamically via command if needed

What's New in IBM z/OS 3.1 - The Big Easy Edition

By Gary Puchkoff of IBM

New version (first in 10 years), updated license requirements, same pricing (no V for version in front of 3.1)

AI Infusion, Application modernization and simplification, Cyber resiliency

z/OS IBM Education Assistant at GitHub

z13 and z13s no longer supported

z16 - 20 new instructions for COBOL and AI, CFLEVEL 25, Python is ZIIP-enabled

z16 - new quantum-safe CRYSTALS-Dilithium and CRYSTALS-Kyber encryption algorithms

- Validated Boot

z/OS 3.1

AI on z/OS, Open Source AI Frameworks run on zCX, ZENN language, Apache Spark, Python AI Toolkit for IBM z/OS

IBM Watson Machine Learning for z/OS and WML Core Edition

z/OS Container Extensions (zCX) - self-service trial available

IBM zCX Foundation for Red Hat OpenShift - 5655-ZCX

Container Registry - free, scanned, compiled for distribution

z/OS Containers (SOD) coming soon

z/OS 3.1 and Java - Java 11 required, Java 8 will run on 3.1, Java 17 (SOD)

Expect to move 3.1 to Java 17 during its lifetime (Java 11 End-of-

Support November 2024)

- COBOL-Java Interoperability (31-bit to 64-bit capable)
- ISPF - PDSE member generations, other enhancements
- Z Shell (Zsh) on z/OS
- USS - su, date, find ps enhanced, new read link and banner utilities
- JSON Parser improvements (CD-Continuous Delivery)
- OpenSSH 8.4p1 level
- XML Toolkit v11 is now part of z/OS 3.1 (not separably orderable)
- EzNoSQL APIs (CD)

z/OSMF

Usability and Skills - z/OSMF Desktop, data set and file compare, upload and download files on Desktop (CD)

- Security Configuration Assistant (SCA)
 - Line-mode SCA support before z/OSMF starts
- z/OSMF Sysplex Management enhanced
 - Includes CF Sizer function
 - REST JOBS and Storage Management APIs enhanced
 - Files and datasets updates

- z/OSMF Workflow updates including signed Work Flow, archive policy
- REST API for SYSLOG, System Symbols
- z/OS Management Services Catalog (CD)
- z/OS Release Upgrade Work Flow enhancements
- z/OSMF Software Management install of 3.1
- z/OS Software Package signing (CD)
- z/OS Software update task

Scalability and performance

- 16TB memory support
- Dedicated real memory pools
- WLM long-term CPU protection
- z/OS Unix Skulker improvements
- zHyperlink now supports writes for multi-volume data sets
- RMF new UI using Open Source Grafana, new DDS server is 64-bit and ZIIP-eligible

Availability

- PFA (Performance Failure Analysis), RTD (Run-Time Diagnostics), SLIP/PER
- IBM Z Anomaly Detection Product
- System Recovery Boost (SRB) Sysplex enhancements

System Management

- AI System Services for IBM z/OS
 - WML for z/OS Core and Common Data provider
- SMF Explorer with Python (CD)
- JES2 Policy, Job Notifications, Resiliency improvements
- MEMLIMIT diagnostics, BCPII and HCM are 64-bit and support JAVA 11

SDSF (Priced feature)

- Module fetch monitor
- System Event Log Display
- Dashboard
- New 10+ commands, new columns and actions
- SCA support

z/OS Change Tracker (priced)

- z/OSMF interface, 90-day free trial available

zWIC (priced but also part of RMF)**Networking**

- zERT network analyzer
- FTP Server JES Mode granularity

Data Serving and Storage

- Cloud Storage via DASD or Tape or directly (cloud data access (CD))
- DFhsm hierarchical support for cloud
- DFdfp Catalog enhancements, exits, reporting
- DFHSM enhancements
- DFrmm z/OSMF plug-in
- UNIX file backup and restore including EXCLUDE
- NFS server and Union File System (CD)
- Data Set File System (CD) for Unix access to z/OS data sets

Security

- Database encryption moving to VSAM DB
- Improvement for SPECIAL user revocation
- ICSF Master Key Ownership, Read-Only Archive keyword
- TLS improvements
- z/OS Authorized Code Scanner and Monitor priced feature
 - zACM monitor for production
- Compliance Support for z/OS - better reporting, health checks

Requirements via Ideas portal**z/OS User Sponsor Program****What's New for z/OSMF 3.1**

By Joey Zhu, z/OSMF Development, and Fiona King, z/OSMF Product Manager

Separate development teams for various plug-ins

Agenda

- z/OSMF 3.1 and CD (continuous delivery)

z/OSMF Desktop

- Desktop widgets before 3.1
- Multiple search windows (CD)

- Upload and download files or data set (PH44157) (CD)
- Compare and Merge files or data sets (PH39605) (CD)
- AI Control Interface (AICI) for z/OS
 - AICI plugin
 - AI framework Overview
 - AI Bridge and EzNoSQL
- System management
 - 3.1 and CD provide graphic-based CFRM policy editing
 - Sysplex policy editor, compares, exports to CSV
 - CF Sizing policy editor replaces CF Sizer Web application
- Security Configuration Assistant (SCA)
 - SDSF support (import SDSF SCA file) PH48846 for any source input
 - Fix security failure with a few clicks (PH39327) and REST API support
 - PH44158 System Task to validate connection status among Sysplex members
- Storage Management
 - 3.1 added more REST APIs for Storage
- REST APIs
 - Updated for OPERLOG and SYSLOG
 - Security Validation - action is validate or provision
 - Data sets and file API - see Tuning the APIs
 - <https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/hong-liang-zhao1/2020/10/13/tune-zosmf-rest-service>
 - Jobs - notification updates
- Ansible support
 - z/OSMF Ansible Collection - see Ansible Galaxy and Red Hat Automation
- Hub
 - <https://ibm.biz/zOSMFAnsibleCollection>
- Workflow Engine enhanced
 - RunAsUser
 - Signer
 - WF step signing process
 - WF definition + z/OSMF signing certificate
 - Improved Workflow UX (user interface)
 - support search
 - REST API
- Improved z/OSMF management
 - IZUSECJL(SAMPLIB) and PROCLIB(IZUSECSV) to validate Nucleus setup before initial start
 - New z/OSMF configuration Trial
 - Nucleus setup
 - DevOps setup
- z/OSMF Community Guild [IBM.biz/zOSMFGuildHome](https://ibm.biz/zOSMFGuildHome) monthly
- z/OS New Function APARs <https://www.ibm.com/support/pages/new-function->

apars-zos-platform

z/OS Containers

By Kershaw Mehta of IBM

Open Container Initiative for container runtime and Kubernetes orchestration technology

z/OS Container Extensions (zCX) - run linux, docker or OpenShift apps on z/OS

z/OS Containers (OCI-compliant) native on z/OS

Containers for Application Deployment

Personal computer>virtual machines >Containers

Remove VM layer and update OS to run containers

Container

Standard unit of software that package app code and all required dependencies

Use facilities in OS to run apps in isolated environment

Moving, stacking, unstacking of compliant software easier - app portability and isolation containers, like applications, are OS and HW dependent

Containers are the currency for Cloud applications

Containers Today

X86, Linux on Z, z/OS Container Extensions, Windows Containers

z/OS Containers (ZC) are new

App, config, monitoring agent, software libraries

z/OS Connect will probably be the first z/OS containerized application

Enable sysprogs to create templates (images) for consumption by developers in a regulated manner

Benefits behind containers

Skills consistency (tools and skills are aligned across organization)

Standardization, orchestration (deploy and management such as Kubernetes) across container-supporting platforms

Container Orchestration with Kubernetes

Kubernetes [K] is de facto standard for Container orchestration and management
K is open source software for managing containers that run apps, deploy, scaling, and failover; manage at scale

K provides API through control planes that define how and where containers run

App containers>K control plane>worker nodes

Isolation versus density challenge

Open source tech being used to implement containers on z/OS

OCI, Kubernetes [kubelet is Started task], CRI-O (lightweight alternative to Docker - runs as Started Task), RunC is container runtime, Podman (POD manager) [CLI build, run for lifecycle of container], skopeo [CLI to manage images], umoci [image build]

Red Hat Open Shift runs these same technologies

K Control Plane (zCX-like address space) - built to run as a appliance (zCPA)

K cluster has odd number of zCPAs to vote to manage apps

DevOps pipeline

Code, build, provision, deploy applications

Similar for containers -

ZC Use Cases

Targeting z/OS Unix applications initially

New workload growth

ZC Rollout

z/OS Unix applications - z/OS Connect, Java, Node.js, Python

Traditional middleware apps - CICS, IMS, Db2

z/OS Containers

separate from z/OS release 3.1, available by EOY 2023

APF authorized libraries are a challenge

Core Platform z/OS, Storage, and Security requirements

By Mike Shorkend and Barbara McDonald

Nothing has changed since Atlanta

SHARE Requirements at <https://www.share.org/Connect/Advocacy-Requirements-System>

Voting 1-10 where 10 is high

z/OS (a.k.a. MVSE)

IDEA ZOS-I-2728 JES2 JOBDEF symbolic substitution

IDEA ZOS-I-3394 SDSFAUX Service Class

IDEA ZOS-I-2439 HWIREXX arguments to REXX exec

IDEA ZOS-I-2097 (delivered) warn about second z/OSMF on same Sysplex

Storage (a.k.a. MVSS)

Wants better prioritized list of SHARE requirements

IDEA DSFS full supported for PDSE Member Generations

IDEA OAM zEDC for compression and encryption

Proof of concept in the works

IDEA Dynamic update to change ACS installation Exits

IDEA Stepname and number to SMF 42.6

IDEA F CATALOG,ALLOCATED

IDEA MVSLOGIN for non-interactive user

USERID/PSWD from STDIN like TCPIP does

IBM DFSMS Community and Mainframe Data management on LINKEDIN

15Aug2023 Tuesday

ISPF Recent and Coming Updates

By Sam Reynolds of IBM RTP

Changes in V2R5

Removal of ISPF Workstation Agent

PDSE Member Generation (slightly more support)

Upcoming in 3.1

ISPF development moved to Sofia, Bulgaria in 2022

May help in zOSNext enhancements, now 3 full time developers

Sam R. is still Product Owner

RFE 145682 ISPF Color “z” variables to help CUCI provide better language support

ISPF support for pervasive dataset allocation

IDEA ZOS-I-1893 add DSKEYLBL for ISPF 3.2 Data Set Utility

Sequential, VSAM, ...

If new data set is not encryption-enable, then allocation is still done with a warning message

ISPF UNIX Directory (option 3.17)

trying to provide ISHELL compatibility

UDLIST ZOS-I-1298 provide Sort that is not case-sensitive

Set Unix directory list options to make it sticky

Sort caseless for one-time choice

PDSE V2 Member Generations enhancements

Edit, View, Browse now allow PDSE Generation that you can work with

Primary commands for Browse, Edit: gen nn or -nn

More Return Codes for failures

Z variables from STATS(YES) - ZLGxxx

Member Generation List

New Line command for members - N or n to show all relative generations for that member and then use other member line commands on a specific member

i line command shows relative and absolute generation number

IBM Ideas Portal

Submit new requirements

<https://ibm-z-hardware-and-operating-systems.ideas.ibm.com/ideas?project=ZOS>

SHARE Requirements

<https://www.share.org/Connect/Advocacy-Requirements-System>

Compare different generations of a PDSE member is a current high-priority for zOSNext

Needs SUPERC help which is difficult to get

Upgrading to 3.1: Planning 1 of 2

By Marne Walle of IBM

z16 HW workflow is located on z/OS system at /usr/lpp/bcp/upgrade/
z16_zOS_Upgrade_Workflow.xml

95+ attendees

FYI: associate a z/OS release with an MVS FMID: <https://www.ibm.com/support/pages/mvs-release-level-fmid-table>

Content of 3.1

Crypto HCR77E0 is element of z/OS 3.1 - no web-deliverable needed

“Future function” related to IBM Documentation Function

Empty FMID that will be update later

XML Toolkit V1.11 is now base element

Order z/OS Security Level 3 (four elements) still have export controls

Comm Server SL3 added

JES3 and BDT are gone

DFSMSStvs priced feature is now part of base

RMF enables z/OS Advanced Data gatherer, and enabling ADG enables zWIC

New Priced feature z/OS Change Tracker for 2.5 and 3.1

Several things removed at 2.5 level - see charts

Removed from 3.1

KC4Z, ISFPARMS, global mirror, JES3 and BDT

DOC4Z coming to replace KC4Z

After 3.1 - DFSMS checkpoint/restart and CIM will be removed

Ordering a deliverable

z/OS v2.5 - Ordering started Sept. 17, 2021, ending Jan. 2024

z/OS 3.1 - Ordering starts Sept. 19, 2023

requires entitlement (new version but no price change) so get human involved

Crypto 2.5 HCR77D2 and 3.1 HCR77E0 are incorporated in z/OS 2.5 and 3.1

respectively

IBM Semeru Runtime Certified Edition [Java] for z/OS V1.11

====>>> z/OS 3.1 requires this Java 11 - EOM Apr2024 and EOS Nov2024

Java 8 still runs but 3.1 requires V1.11 but some 3.1 functions still need V8

as well but are being updated

z/OS will move to Java V17 before end of life of 3.1

Have Java 8 - EOM 20Jan2024 and EOS 30Sep2026

No charge orderables but require S&S paid:

IBM AI System Services for IBM z/OS

SDK for Node.js 16.0 and 18.0

z/OS policies

V2.4 end of service Sept 2024 (5 years)

V2.5 EOS

IBM.Coexistence.z/OS.3.1. Use IBM.Coexistence.z/OS.* for FIXCAT

Planning for 3.1

Use this website to search for PSP buckets: <https://www.ibm.com/support/pages/ibmsearch> . For z/OS 3.1, search for “upgrade zos31”. see ZOS31 upgrade

DASD sizing

Target libraries - PDS and PDSE (about same as 2.4 and 2.5)

DLIB about the same

Root 4500>5600 CYLs - Extended Addressability volume is strongly

recommended

Fonts file system are the same size as z/OS 2.5

Driving System

z/OS 2.4 with z/OSMF active and Software Management available

READ access to CB.OS* and CB.ST* data set names

PTFs IBM.DrivingSystem-RequiredService FIXCAT

Optional Package signing needs Keyring with RACF-delivered STG Code

Signing Certificate Authority-G2

PTF signing is coming!

Target system

z14 or newer, z13 models are not supported

8 GB memory for native LPAR, 2 GB under z/VM

Software

Coexistence on other z/OS systems

Target - supported application products on 2.5 run on 3.1

See 3.1 Planning for Installation to verify requirements are satisfied

PFA, XML, CPM, and InfoPrint Server need Java 8 until PTFs are

available

z/OSMF Software Management to see upcoming out-of-service software

FIXCAT IBM.Coexistence.z/OS.3.1 and IBM.Function.HealthChecker

Activate migration HealthChecks on current system to see any upgrade

actions

OpenSSH level HC coming very soon

SDSF ones are high impact

Upgrade workflow (WF)

/user/lpp/BCP/upgrade has Workflows for 2.4>3.1 or 2.5>3.1

Updates to 3.1 upgrade workflow, will have same FIXCAT

Post-GA APAR to update book links

“Create new based on existing” to pick up updates and continue

using your upgrade WorkFlow

Chart 29 MISSINGIX instead of MISSINGFIX

Reordered steps by time sequence instead of component order

HOLD Action PTFs are in WF, so WF determines if PTF is installed and removes steps

Automatically runs REPORT MISSINGFIX

Planning to provide as Exported 3.1 Workflow Upgrade after 3.1 book links are implemented https://www.ibm.com/docs/en/zos/3.1.0?topic=level-zos-upgrade-workflow#abstract__title__12

General z/OSMF Portable Software Instance (ServerPac)

<https://www.ibm.com/support/z-content-solutions/serverpac-install-zosmf/>

Upgrading to 3.1 part 2 of 2: Technical Actions

By Marne Walle

94+ attendees

z/OS 3.1, not v3.1

What is an upgrade action?

Not exploitation, just getting current stuff running on 3.1

Upgrade actions

Now, Pre-First-IPL, Post-First IPL is new order for Upgrade Workflows

Required, Required-IF, Recommended are attributes for each upgrade step

Overview to 3.1 from 2.5 or 2.4

80+ new upgrade actions, will discuss some

No new address spaces

SDSF cleanup: SISFLINK and SISFMIG removed from LPALST and LNKLST

New in 3.1: XML toolkit target, dlibs, paths

HealthChecks

2.5 added 9 checks, 3.1 added 3 checks

Before IPL Upgrades

SSD-capable [System Status Detection] sysplex couple data sets are required- see upgrade HC

Req-IF:

System now uses non-executable storage for passing parameters to a program (before parameters areas are in executable storage), that is, via PARM or PARMDD keyword on EXEC

DIAGxx CBATTR EXECUTABLE(JCLPARM) to override default

Verify default change for CHNGDUMP to OPTIMIZE=YES instead of NO

CHNGDUMP COMMNDxx and remove OPTIMIZE

ALLOCxx SYSTEM TAPELIB_PREF default is BYDEVICES instead of

EQUAL

In 3.1 , ASVT recommended to move above 16M

DIAGxx set CBLOC VIRTUAL31(IHAASVT) because the default is 24-bit
 In 3.1, OSPROTECT=SYSTEM but SYSTEM is different (is now level 1), fallback is
 MIN

Affects unauthorized programs, May affect system performance

JES2:

Now: Req-IF

Enforce job resource limits for Track-groups (TG) and Job Output
 Elements (JOE) - action is JOB in WAIT except for privileged jobs are not subject to
 limits

JOBCLASS LIMIT and ACTION values can be changed

Leave on by default but can be changed or bypassed

Now: Req-IF z22 by z/OS 2.5

OUTCLASS BLNKTRC=YES/NO are no longer supported

HCD:

Now: Req-IF remove out of service processors before 3.1

RMF:

Now: libraries names change in 2.5 - watch PARMLIB entries

Now: Workstation RMF is no longer supported so clean it up

z/OSMF

Now: WF with definition files that have undeclared referenced entities cannot
 be accessed in 3.1, finish WF, archive before 3.1

Now: Desktop interface only available (no tree-style display)

zCX:

Now: OA64231 removed unreferenced entities before 3.1

Now: Vim is replace by Nono in zCX CLI container

SDSF:

ISPPARMS assembler macros are removed

Use ISFPRMxx (conversion tool ISFACP)

In z/OS 2.5, SAF-based security, use z/OSMF SCA to verify setup

OpenSSH:

Req-IF Now: 8.4p1 in 3.1 was 7.6p1 in 2.4 and 2.5

Several differences in ported levels

Less secure algorithms are deprecated or removed

RACF:

Cleanup - TSO/E Help removed in 2.5

>>> Save existing SYS1.HELP and related libraries before 2.5 or 3.1

Remove RACF dynamic classes IZP and ZOWE (IBM provides these now)

IRRUT200 uses IDCAMS instead of IEBGENER

IP Services: TLS/SSL FTP must use AT-TLS

Big Migs for 2.5

HFS removal

SDSF SAF security

JES2 z22

RMF data set name changes
 [TSO HELP RACF members saved?]
 Big Migs for 3.1
 JES3 and BDT removal
 SDSF Parameters in ISFPRMxx
 sysplex requires SSD
 SSH 8.4p1
 See charts for other actions discussed here

JES2 Updates

By Tom Wasik
 52 attendees (of whom 12 are standing)

JES2 3.1 enforces limits on TGs and JOEs

environment for each option
 small TG<10K or JOE<600
 then wait job using more than 75%
 Large TG>10K or JOE>600
 then wait job using more than 25%
 Default is Wait
 Any job will be waited
 Control via JOBCLASS or Policy or Exit
 JOBCLASS RESOURCE(TG|JOE) =(LIMIT=xxx,ACTION=DEFAULT)
 Bound at start of conversion
 Scope is MAS-wide
 WARM start using previous settings
 If ACTION=FAIL, job is failed
 If ACTION=WAIT,
 Purge resources used by Job if possible, OR
 Cancel or purge job, OR
 \$TJQnnnn,RAISE_LIMITS and raises limit for that Job by 10% for all

resources

\$JD STATUS
 \$D JQ(*),LIMITS_IMPACT=YES
 \$TJOBCLASS(*),RESOURCE(*)=ACTION=NONE to disable limit checks

Job Resource Groups

Resource use recorded for the Group
 \$ADD RESGROUP...
 Future ACTIONS are on the way
 Input processing re-ordered so TG and JOE is determined after exit 2/52 and
 Input Policy are executed

New Job Submit Symbols

Passed on internal reader

Added to SMF 26 and 30 records for better tracking

WLM Initiator Enhancements

Updates to Sample data provided to WLM (via IRABQS)

Policy updates

JobCreate applied very early in job's life

After JOB card and exit 2/52 are run...

JobInput applied at end of input phase

Right before Exits 20/50 are called

Variables section in policy

PolicyVersion 2 required

Name, type, scope

Scope is Local or Instance

JESSymbol access from Policies

access SYSSymbolSub(string) to see System Symbols

Restricting JES Cancel Job (\$C command)

JESCANCEL=ALLOWED|RESTRICTED

Set at job level or JOBCLASS

Symbols in NOTIFY Email subject Line

My requirement?

archive ICSF Key Label Support

ASCB in 31-bit Storage

ATTR=ASCBV31

Upgrade and Coexistence

APARs

OA65252 is important

Keep current because recent APARs are important, particularly Security

Mainframe Penetration Testing

By Mark Wilson

Wikipedia: "Pentest is method of evaluating the security of a computer system or network by simulating an attack by a malicious hacker"

What is it?

Security test with permission

Use bad guy techniques

MW says he has never failed to elevate his privileges

Phase one:

Data Gathering

z/OS, RACF/TSS/ACF2

Installed tools MXI, DSF, Sysview, ISRDDN, IPLINFO, etc.

Footprinting

Gather as much data as possible about a system system, an

infrastructure and networks to see what opportunities to perpetrate them
 Download SYSLOG and scan ICH408I looking for mistyped userid
 (password)

Test

Used non-privilege userid to run the test to try to elevate the privilege
 Probe system - depends on what we found

Results

Elevate privileges or exfiltrate and steal data
 seen poor APF and SURROGAT profiles
 Poorly coded SVCs

Why test?

Don't do security right>poor documentation>effects persist until someone finds them>make sure it's you that finds the exposure and not someone else

Various ways to install new versions of z/OS have been used over time - rolling forward old stuff

Bad actors want data

Footprint a system

OpenSSH or z/OSMF or TSO or FTP

No playbook

Look at SYSLOG

D IPLINFO to find LOADXX and IODF Device and IEASYM

And look at PARMLIB for IEASYSxx and IEASYMxx

==>> Secure PARMLIB and PROCLIB and all System Data Sets with

UACC NONE

provide READ to Authorized USERID only, no trust

D PROG,APF

D APPC, D ASCH, D CONSOLES, D CNGRP, many others

Get a set of tools

<http://www.mzelden.com/mvsutil.html> for IPLINFO

ISRDDN

SHOWMVS

Awesome-Mainframe-Hacking on GitHub

Tools, links to presentations and videos

RACF SEARCH command

NOMASK to see all data sets that you can READ

NOMASK CLIST(LD DA(' ') ALL')

ISPF 3.4 searching for data sets that might exist

testing

controled manner, not on PROD; on a DR version of PROD is ideal

Security System like RACF

Subsystems

Network information

What about ISV software?

Non-MF Software that intersects with the MF

Looking for Anything or everything

authorized libraries

Can you issue command?

Results

What Could we do?

SMTP is favorite way to get data off of the MF

Skills

Assembler, REXX

Summary

Penetration testing is not just about External Security Monitor (RACF, ACF2, or TSS)

Proactive security posture that checks and validates your security controls across all elements of your mainframe

MF must be part of your Enterprise Security process, procedures, and activities

16Aug2023 Wednesday

Have You Heard of A.I. Foundation Models?

By Elpida Tzortzatos of IBM

What is Generative AI (GenAI)?

Foundation Model (FM) self-supervised training

Large, trained on large amounts of data, large amount of unlabeled data

FM are foundational because they are the base for other AI tasks

Pre-trained, self learning, multiple applications, large language models

Generalized and adaptable

Translated, summarization, answer finding prompts plus input text plus data produces translated, summarized, answer to input question

Task-specific fine-tuning to produce results

Fine-tuning the model needs labeled data, and more resources to rebuild the model

Prompt-tuning, provide context for an answer, labeled data and sample data but FM not changed - Tuning Studio

Prompt-engineering - Prompt Lab

What are Foundation Models and why are they important?

Transformer architecture 2017 “attention is all you need” paper revolutionized AI work

Developed to succeed at translation tasks: sequence to sequence translations

Prior architecture like RNN doesn't perform well with distant or out of context dependencies in data

RNNs are sequential - no parallel processing of input

parallelization changed AI work significantly

Generative Pre-trained Transformer

Very large transformer-based modules (large language models)

Pre-trained on large sets of Unlabeled Data (Self-supervised)

Huge number of parameters.....

History 2017 to late 2022 ChatGPT, but several others like CodeGen and CodePilot, Bloomberg-GPT (better than ChatGPT for financial data)

Foundation model libraries -

Encoder (Google BERT) - not new content, just from documents it is already trained on

Decoder (Generative Pre-Trained Transformer (ChatGPT)) - produce new output, may be hallucination

Encoder-decoder (combines both (Google Transfer Translator))

AI is not magic, it's still garbage-in, garbage-out

Guard against AI hallucination, Bias, Explainability

Generative AI has benefits but use with caution

Not enterprise-ready

Generative AI - such as native language processing (NLP), ChatGPT good at personal performance, summary reports and resumes, passing exams

What does it enable you to do?

Watsonx - platform for AI and data

watsonx.data, .ai, .governance

Hugging Face open-source models

Security exposures that can alter the behavior of the model, make it reveal

Personal ID info (data leakage)

Prompt Lab - provide good context for model to improve the results

Tuning Studio - find-tune the model to customize the model to your use case

Watsonx.data - enterprise-ready data acquisition, curation, provenance, and governance

Deduplication, annotation,

Watsonx.governance

How does it intersect with Z?

Q&A resources, summarize

Business insights

Accelerate developer velocity and productivity - address skill challenges

boost system engineer and expertise

Goal is self-managed system

What use cases take advantage of Foundation Models?

Financial crimes

Compliance and risk
Expert app advisor - help understand legacy app code and develops better code

Change gears of Foundation Models
How do you get started?

z/OS Validated Boot

By Dave Surman of IBM

See Kurt Quakenbush's Digital Signatures for z/OS Software Packages session in New Orleans [or Atlanta] for basics

What is z/OS Validated Boot?

Applying digital signatures at IPL-time to verify the code is true and not corrupted or altered

Unauthorized changes to a software executable

Not talking about firmware verification and not about secure execution

What value does it provide?

Regulatory compliance

Early detection of accidental IPL data changes

Detection of malicious IPL data changes to stop certain types of attacks

Related solutions (see z16 GA 1.5 and z/OS Product Announcement)

GIMZIP package signing

Validated Boot for z/OS

Secure Boot for ECKD devices

Design approach

Load module signing and validation with firmware support

CPV

Secure build

IPL platform firmware (Z Bootloader) validates the IPL text using client's public keys

As z/OS loads subsequent authorized load modules during IPL, validates their signatures using client public keys

NIAP Certification and Regulatory compliance

Targeting Z and z/OS NIAP certification with OS Protection Profile (OSPP) 4.3 which requires package signing and boot integrity validate for IPLed kernel software

Software Requirements - overall solution

CPACF digital signature ECDSA-P521 and SHA-512 hashing support

Virtual Flash Memory (VFM) also Storage Class memory (SCM) for z/OS LPA pages

z16 GA1.5 firmware supports Linux on Z and z/OS IPL

Certificate Store for Validated Boot

Via SE/HMC and DPM certificate import and management, mapping imported certificates to specific LPARs for IPL-time validation use
 z/OS 2.5 post-GA support and base 3.1 support
 FIXCAT IBM.Function.ValidatedBoot

z/OS Validated Boot is Optional and bimodal

Build IPL volumes in “classic” way that does not support validated boot
 Client can build IPL volumes and sign load modules in new way Validated Boot and perform IPLs;

Validated Boot Enforce Mode

Causes a Wait state

Validated Boot Audit mode

Use to discover signing and certificate setup issues, and correct them

Invalidated using CCW-IPL

Fallback exists at all times

Desired IPL mode is specific by SE/HMC at Load

Software-initiated IPLs (AUTOIPL) cannot change the IPL mode

LD-IPL is List-Directed IPL

Support requirements

zOS Software

ServerPac install WF

One-time setup

RACF setup (creation and assignment of signing certificates) need for load module signing

Build Target System’s IPL volume with LD-IPL artifacts need to support validated boot

Recurring processes

Build/re-build zOS target

Sign/re-sign zOS Target system IPL Text, nucleus, and LPA modules

Rotate/delete/replace signing certificates as needed, and re-sign target

system

Validated Boot

SE/HMC - import public-key certificates and assign to LPARs

Load/IPL each module validated with hash

rotate/delete/replace signing certificates via SE/HMC and reassign to LPAR as needed

Customize LOAD profiles and panel usage

Scope of Validated Boot

IEAIPL00

all load modules through LPA creation

SYS1.NUCLEUS including IEANUCxx

LPA load (LPALST) and MLPA...

IPL as Cold Start on Validated Boot IPLs

Avoid tampering with executable code on PLPA page data set

Building LPA via load module load

Cannot support LPA pages to disk - must be SCM/VFM Flash Memory ONLY

Fail the IPL in Enforce Mode

SE/HMC load panel redesigned

RACF Signing Service used by Signing Utility (IEWSIGN is new program in z/OS) and ICKDSF to sign load modules and IPL text

IRRSPS00 SAF callable service

ServerPac Post-Deploy Workflow “create IPL Text” and “S/A IPL Test” steps optionally to use new ICKDSF to build LD-IPL artifacts

ServerPac can optionally invoke the Signing Utility to sign all necessary z/OS load modules as needed

IEWSIGN appends metadata to end of load module and can remove metadata and signing data if required

BINDER changes for Directory Entry records

Re-build or re-linked removes signature and requires re-signing

Validated Boot Log Data format Utility

In-memory area mapped by IHAVBA has results. During z/OS IPL-time validation IEAVBPRT to print or IEAVBIPC for format data areas

Stand-alone Dump (SAD)

Can be signed and do a validated boot

Supported LD-IPL process and store status

z/VM only supports for Audit mode Validated Boot so it always reports lack of VFM paging for PLPA for guest z/OS

ISV's can sign code packages with ISV keys and ISV public key for customer

IBM Signing Utility can sign ISV modules for IPL

Installing z/OS 3.1 z/OSMF Software Management

By Kurt Quakenbush of IBM

Software Management [SM] is the z/OSMF application that helps you install software SMP/E GIMZIP packages are familiar

Generated RACF job is Sample - verify before running

Three post-restore workflows

Your Order

Post-deployment

Deployment verification

A.I. Framework Overview

By Steve Partlow and Dieter Wellerdiek of IBM

Why AI for z/OS?

Skills gap, helps novices increase productivity and efficiency, detect hidden patterns and extract actionable insights from data, optimize processes through automation armed with intelligence, improve user experience

- simplify z/OS management
- Key objectives
 - Predict upcoming workload(performance), meet business requirements, leverage newest technologies, build a common AI framework
- one framework for consistent effective use

AI framework Overview

end-to-end AI model lifecycle

Built-in AI capabilities

Enable

Paving way for providers of future AI projects

Designed simplification

Data Collection - IBM Z Common Data Provider (java-based) runs on ZIIPs

EzNoSQL for z/OS is database for training data (VSAM RLS). Model training and deployed model

AI Model Server

IBM Watson Learning for z/OS Core Edition (Java) - WMLz Core

z/OS AI base

New in BCP, accessed via z/OS macros and handles connection to REST

APIs

User Interface

z/OSMF workflow configuration support

AI Control Interface for IBM z/OS - a new plugin

Use Case Providers

AI System Services for IBM z/OS - no charge offering, not in base

Configuration

WLMz runs one or more systems per sysplex

z/OSMF on one or more systems of sysplexes

WLM

z/OS AI Base on every system

zCDP on every system and writes to one EzNoSQL database per system

WLM models are system scope

Training

Deployment

Configuration workflows

- 7 started tasks

- z/OSMF workflows

- Super WF > each component WF> add system WF to configure multi-systems

- In WF, use bubbles for more information

- Scripts, REST, JCL

- AT-TLS requires PAGENT

- No Security Configuration Assistant interface file

Management Interface

- AI Control Interface on z/OSMF

- Visualization is coming, but SMF is currently where results are stored

Your z/OSMF Software Management Experience Just Got Easier!

By Dawn Damone and others from Broadcom

z/OSMF Journey

Intro and timeline

- Common Vendor Install (CVI) - Our Journey

- 2016 CVI begins

- Broadcom donates CSM Software Update to IBM z/OSMF

- Nov 2020 z/OSMF SM released

- Jan 2023 all Broadcom products available as Portable Software Instance

- Jun 2023 Software Toolkit for z/OSMF - available from Broadcom for use by

others

- z/OSMF Software Management - Our Adoption Status

- All Broadcom CSM products are now installed via PSWI

- Working on WF for all BC products - many are done, but more work to be

done

- Maintenance- SU in z/OSMF for all SMP/E-managed software

- Software Toolkit Plugin for z/OSMF is available

Acquiring products and solutions

- Receive PSWI from network (vendor portal and its download server)

- fewer manual steps, acquire directly into z/OSMF, PSWI acquisition plug-in

- RECEIVE ORDER

- One-time setup with security keyring

Maintaining Your products

- Software Toolkit from Broadcom

- Works for products from any vendor!

Powered by Mainframe Essentials (available if you have any Broadcom products)

Use REST API to talk to vendor Support portal

Software Update

Broadcom has a Consolidated HOLDDATA Report using CAISMPH

SMP/E Restore Utility coming soon to generate RESTORE job stream

z/OSMF and the Power of Collaboration: Enhancing the z/OS User Experience and Customer Value

By Rolando Perez and Fiona King of IBM

Community - IBM

z/OS Installation Planning Wizard was first attempt to automate install using the web

z/OSMF for Systems Management, Zowe for Application Developers, Ansible for Automation

Zorow [Open Mainframe Project] provides Open-Source Workflows

20+ core plug-ins

z/OSMF Adoption 41% in 2017 is now 85% in 2023

Seeing uptake with plugin use beyond Software Management

Modernization Catalyst for z/OS

z/OSMF Guild- [IBM.biz/zOSMFGuildHome](https://ibm.biz/zOSMFGuildHome)

2100+ registered members

285+ average live attendees

515+ companies/organizations represented

Average registration per session 472

Ask z/OSMF Anything program is successful <https://ibm.biz/askzosmf>

Future

More Plug-in specific sessions, Ask plug-in team anything

Specific plug-in Resources pages

micro-communities

Community Guild Learning Badge

Collaboration - Broadcom

Common Vendor Install Journey since 2016

All Broadcom software available via z/OSMF SM

Configuration Workflows in progress

Software Toolkit plug-in, powered by Mainframe Essentials (only available if you have a BC product)

Workflows4z - Visual Studio Code Extension (VS marketplace)

Validates XML being generated

IntelliSense provides related options for every action to create and edit workflow

Generate variable input file in editable input format
Education materials
Best practices internally - looking for design critiques, usability testing, design thinking workshops

Customer Education - Ensono

Ensono Mainframe Academy [EMA]
Materials DIY early-career mainframe (MF) communities
Blueprint reinforce the foundation of MF
ROI benefits for you and community
EMA is good to help new MF developers and users
Discord “System z Enthusiast” community

Software Developer Day using Visual Studio Code and Git

Technical issues prevented session being completed by anyone

17Aug2023 Thursday

Managing your z/OS Environment Using System Services

By Hiren Shah of IBM

z/OS Management Services Catalog (zMSC)

Not a Service! A z/OSMF plug-in
Management Complexity and Skills Transfer and reduce Errors

Services are based on z/OSMF Workflows

Experienced Sysprog can simplify complexity and pass basic activities to less experienced Sysprog

RunAsUser for experienced and mid-level z/OS system programmers

7 sample services provided with zMSC including SMP/E RECEIVE ORDER certificate

What's New in zMSC with z/OS 3.1?

Share services across multiple systems
Allow a service to use secondary workflows
Update Workflow definition file after starting to build a service - rollback to 2.5 as

well

More sample services

- Remove expired certificates from RACF keyring

- Create RACF digital certificate

- Encrypt a zFS file system

- List User ID attributes

- Rename zFS file system

- z/OS Add load library to LNKLIST

Preview a service without testing it (see this new option next to Publish)

Hide pre-identified sets of inputs when running the service

- Need requirement for persona-based option

See returned values of modified workflows

Search and select workflow definitions files

Change category and other inconsequential fields for published services

Support up to 1000 active workflows

z/OS Tools and Toys are now at <https://github.com/IBM/IBM-Z-zOS/tree/main/zOS-Tools-and-Toys>

Maximize Your z/OS Support Experience

By John Shebey and Laura Sperling of IBM

Initial Problem description

What are the symptoms?

Which z/OS release? Which release of associated products?

When did problem start?

- Were any changes recently made to system or job?

- Any maintenance recently applied?

Use Problem Diagnostic Worksheet?

- [IBM.com/docs/en/zos/2.5.0?topic=material-problem-diagnostic-worksheet](https://www.ibm.com/docs/en/zos/2.5.0?topic=material-problem-diagnostic-worksheet)

What is Impact?

Webex can be done for screen-sharing to assist Problem Determination (PD) and recovery efforts

- Useful for viewing real-time system and recovery

- Do not record session

- Not recommended for subsequent root cause analysis

Documentation Collection Guidance

Abends

- z/OS MVS system Codes. ABENDxxx (hex number)

- User Abends for applications. ABENDUdddd (decimal number)

LOOKAT webpage to interpret ABENDs and messages from IBM Doc
 High CPU, loop, hang, or other persistent problem
 Broad or system-wide impact

Invoke z/OS Runtime Diagnostics (RTD) if system degradation issue

Analyzes system for potential problems and soft failures

Generates further diagnostic recommendations

If IPL required, collect Stand-Alone Dump (SADUMP) or address spaces and data spaces prior to IPL

What is SLIP? Serviceability Level Indication Processing

Used to trap ABENDs and messages

Primarily software-driven

SLIP/PER SVCDump

Console DUMP command

RunTime Diagnostics (RTD)

[IBM.com/docs/en/zos/2.5.0?topic=management-runtime-diagnostics](https://www.ibm.com/docs/en/zos/2.5.0?topic=management-runtime-diagnostics)

MODIFY | F HZR,ANALYZE[,DEBUG]

Stand-alone Dump (SADUMP)

Create and test SADUMP program when migrating to new hardware or z/OS release

Use multi-volume DASD for SADUMP data set to improve performance

SYSLOG or OPERLOG (sysplex)

LOGREC - IFCEREP1 utility

[IBM.com/docs/en/zos/2.5.0?topic=management-diagnosing-component-specific-problems](https://www.ibm.com/docs/en/zos/2.5.0?topic=management-diagnosing-component-specific-problems)

Sending documentation securely to IBM

Support File Transfer ID, Case number, keyring information

Use PDUU

see potential pitfalls when sending documentation in session charts

In My Notifications: subscribe to ECURep notice

z/OSMF Incident Log: see tutorial videos for setup and Use z/OSMF: see videos at z?OSMF One Stop Hub : <https://ibm.github.io/zOSMF/>

Security/Integrity issues requires authorized access to IBM Security Portal

Use Recommended Service Upgrade (RSU)

Quarterly (RSUyy03/06/09/12)

Monthly (RSUyy01/02/04/05/07/08/10/11)

Properly written problem description+complete set of doc.+best maintenance practices=happy customer experience

The Magic of PSWs and Registers

By John Shebey and Laura Sperling of IBM

Exordium (beginning of treatise)

No diagnostic procedures or IPCS commands in this presentation

PSW Analysis

AMODE

Enablement and disablement

Program Status Word (4 words long in Z architecture)

Information about execution program

Instruction

General Purpose, Access, Floating Point registers, and Control Registers

Status Save Area

PSW Scrunching and Unscrunch - 128 bits>64bits and vice versa

Bit 31-32 are zero = AMODE24, 01 AMODE31, 11 AMODE64

Register Analysis

Data and what it tells you

Common register conventions

R0 reason code

R1 parameter list pointer or ABEND code

R9-R12 used for Base Registers

R13 Save Area Pointer

R14 Return Address

R15 Next Address

XPLINK Registers - not discussed in this presentation

BALR registers usually R14/R15

IP VERBX VSMDATA 'NOASID SUMMARY' to get storage map

CSA Tracker

F4SA eye-catcher for F4SA - had different format

End-to-End Demo of z/OS Containers

By Marie Laser and Neil Johnson of IBM

SOD Open Container Initiative (OCI)

Working to deliver an OCI container runtime and Kubernetes orchestration tech in support of z/os applications and workloads

Part 1 Intro/Overview

Container Image

Software package + dependencies (layers) and runtime configuration information

Build/Package image using podman

Deploy container with podman and Kubectl

Isolate instance

Distribute image (podman and Skopeo; container registers)

Demo container image lifecycle with CLI tools on z/OS

Podman to build and distribute

Then use kubectl to production Kubernetes cluster

z/OS technology in support of z/OS Containers

Union File System, Namespaces, DVIPA, WLM

Demo explanation

Part III Deploying with Kubernetes

Overview of kubectl - Command-line interface (CLI) to work with Kubernetes

Kubernetes demo cluster overview

Deploy demo java App using image

Pod is smallest unit of work to deploy

Deployment YAML to describe desired configuration of deployment

Demo**New z/OS Unix File Systems**

By Kershaw Mehta of IBM

Data Set File System (G.A. 2.5 and 3.1)

Unique to z/OS

Access data in data sets from z/OS UNIX space

Sequential, PDS, PDSEs, compressed and encrypted (RECFM=VBS is not supported, no support for generation data sets, not VSAM)

No support for catalog aliases yet

Cataloged data sets on DASD (no tape) read/write

ISPF ENQ on data sets provide protection, at the member or data set level

ENQ released 30 seconds after Close

UNIX permissions not used, SAF data set profiles are honored

DSFS has single Mount point at /dsfs with /txt and /bin and /rec subdirectories

Case-insensitive file names

/dsfs/txt/HLQ/[rest of dsname] but HLQ can be more than one qualifier (same for /bin and /rec)

BPXPRMxx needs one MOUNT utility filesystem per system

Disallow list in PARMLIB member BSUPRMxx to prevent DSFS accessing specified HLQs

DSFS cache is in 64-bit storage in DSFS Address Space

Dsadm command to set data set allocation parameters for a HLQ

6 parms for txt, bin, or rec

Allocate - use mkdir for PDS and PDSE, touch to allocate seq. data set
see Columbus 2022 presentation

Union File System (G.A. 2.5 and 3.1)

Unix/Linux

Logical filesystem on top of other filesystems

used extensively by Containers

IBM wrote their own, specifically for z/OS

use case says set Union FS on mount command, usually not in PARM

No NFS support now

Proc File System (coming PTF on 2.5 and 3.1 in 4Q2023)

Unix/Linux

Virtual filesystem in UNIX-like OSES that presents info about processes and other system info in a hierarchical file-like structure

Usually data found in control blocks or via output of operator commands

Mounted on /proc directory

Proc is read-only in z/OS for now

Mainframe, Movies and Me

By Joe Winchester of IBM

Movies with mainframe references [that are mostly funny or wrong]

Independence Day

Hackers

Castle (TV series)

NCIS (TV series)

War Games 1983

“Desktops and server computers are puny mammals to be trodden underfoot”

18Aug2023 Friday

Yes! I Can Do This: Setup z/OSMF Security and Get it to Work

By Julie Bergh of IBM, Americas zSecurity Technical Lead

15 attendees

Security is a challenge setting up z/OSMF and its plug-ins

<https://newera-info.com/eBooks.html> is book the JB wrote

Angel server
z/OSMF server
WebSphere Liberty
PARMLIB
Plug-Ins

Security Class ZMFAPLA for z/OSMF task-based resources
GASP is Generally Accepted Security Practices

SAMPLIB jobs IZUxxSEC

IZUSECJL plus PROCLIB(IZUSECSV) to verify security before first z/OSMF
start

IZUUNSEC to set up z/OSMF Core functions

3 basic security groups

IZUADMIN - z/OSMF administrator

IZUUSER - z/OSMF users

IZUSECAD - z/OSMF security admin

PARMLIB - IZUPRMxx

PLUGINS

Security Configuration Assistant (SCA)

>>> Why are there manual steps for SCA Nucleus processing?

>>> SCA Advanced Configuration setup

Avoiding z/OSMF Pitfalls: How to Resolve the Most Common Problems

By Ken Irwin and Trevor Geisler of IBM
2 speakers and 15 attendees

REST APIs - 150+ in z/OSMF

More coming with z/OS 3.1

https://galaxy.ansible.com/ibm/ibm_zosmf IBM zOSMF Collection

Increase MAXTHREADS (default is 200 per address space)

- 0. If exceeded, then Java fails (OutOfMemory) and then server fails
- 0. BPXPRMxx MAXTHREADS and THREADSMAX in RACF user profile

Security Configuration Assistant (SCA)

- 0. IZUxxSEC jobs in SAMPLIB

REST Basic Authentication

- 0. Userid:password needs to be base64 encoded when passed through REST

SMF REST Services

- 0. If SMF REST Services (z/OS Data Gatherer plug-in) enabled, the all other

zOSMF REST services will be disabled

- 0. zDG is a “pig”
- 0. Use a Separate z/OSMF Server is required for z/OS Data Gatherer (see z/OSMF Config Guide chapter 29-30)

Workflows

- 0. WF Editor relies on internal REST calls for GET/PUT/DELETE for files and data sets
- 0. Testing URL Connectivity

Additional Diagnostics

Diagnostic Assistant option to turn on logging actions and level dynamically without having to restart the server

DA actions logged in IZUG0.log in ASCII

z/OSMF can now view the IZUG0.log natively

Exception data may be in ffdc directory <user_dir>/data/logs/zosmfServer/logs/ffdc

z/OSMF Pitfalls

REST API setup in IZUPRMxx

1. RESTAPI_FILE amend COMMON_TSO
2. ACCTNUM IZUACCT Access level READ
3. TSOPROC IZUFPROC Access READ

TSO RL TSOPROC...

SEC_GROUPS in IZUPRMxx

Be sure Groups exist and Users are connected

TSO LU uuuuu and LG ggggg

<SAF-prefix> default is IZUDFLT

[IBM.com/docs/en/zos/2.5.0?topic=guide-security-structure-zosmf](https://www.ibm.com/docs/en/zos/2.5.0?topic=guide-security-structure-zosmf)

Security Configuration Assistant to validate REST API setup

IZUFPROC basic setup for TSO default LOGON

Must be in JES PROCLIB

Multi-Logon Support

REST API calls create at TSO session under userid

F CEA,DISPLAY,P to see MAXSESSPERUSER

ISFPROF Profile

CSRF (cross-site request facility)

IZUG846W remote request received and rejected

IZUPRMxx CSRF_Switch(on|off)

Application...

Browser-base - need define origin site in Allow list

S222 Abends

Normal operation in REST APIs

IDEA-ZOS-I-3687

REST API Explorer

Built in to z/OSMF installation

<your-prefix>/zosmf/api/explorer

Open a Case

/zosmf/restfiles (z/OSMF REST) or /restjobs (JES)

From Zero to Hero with IBM Z Xplore

By Shelly M. And Stephanie D. Of IBM

4 attendees and 2 speakers

IBM Global Skills will provide help to colleges and universities

Master the Mainframe sunsetted after 10 years

IBM Z Xplore is new Learning Experience with badges

[IBM.biz/ibmz-xplore](https://ibm.biz/ibmz-xplore)

16 or older

guided education paths and code

Used by educators in class

New hire onboarding resource for companies

IBM Z Xplore Essentials

PC, mobile app to provide hands-on connection to the Z Xplore education

Live learning environment available 24/7

Fundamentals and Concepts: First badge after 10 hours that provides access to virtual job fairs

VS Code|JCL|Python|USS|security|uptime|enterprise scalability | enterprise systems|RACF

Points earned for IBM swag

Advanced: second Badge - about 10 hours REXX| COBOL | Linux | SQL1

Extended: about 10-20 hours TSO/ISPF|Node.js|Machine Learning|Ansible|and more

Reporting and Dashboard for Educators or Clients

Automated reports, not required to participate in Z Xplore

New to Z Community

<https://www.ibm.com/community/z/talent/>

IBM Z Global Skills Accelerator

Costs are for Franklin Apprenticeships administration