IBM z/OS 3.1

An AI-infused operating system for the next generation of computing

—

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17.+18. Oktober 2023 @GSE z/OS Expertenforum in Churwalden

Agenda

- IBM Z DACH - Hot Topics
- z/OS 3.1 - Messaging and themes overview
- z/OS 3.1 – Features and Capabilities
  - AI on z/OS
  - OS management simplification
  - Application Modernization
  - Security
  - Cyber Resiliency
  - Foundational Support
  - IBM Z Hardware Support
- Statements of Direction
- Things to remember

Unser neuer Podcast

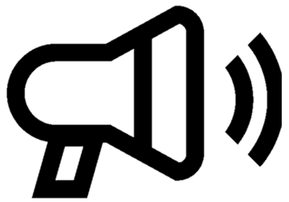
[Spotify](#) - [Apple Podcast](#) - [Google Podcasts](#) - [listen on web](#)

Neuer Podcast

- aus dem zStack Team heraus entstanden
- Launch am 15.12.2022
- alle zwei Wochen zwei neue Folgen
- mehrere Seasons mit diversen unterschiedlichen SprecherInnen geplant

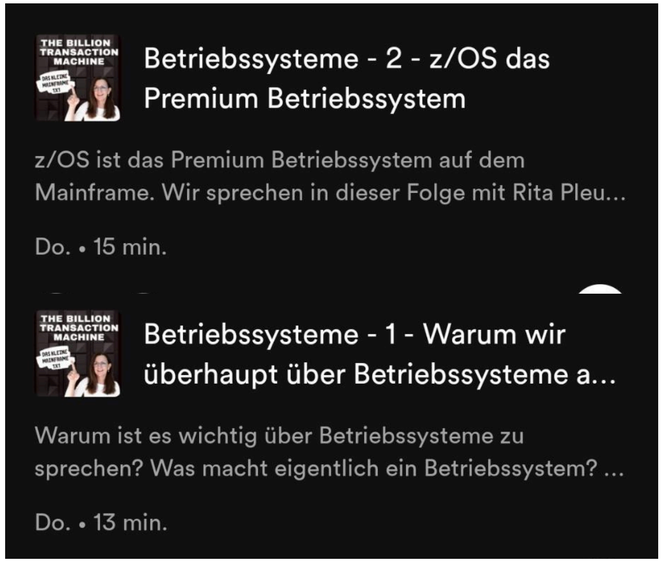
- Zielgruppe:
  - junge Leute, Studenten, an Mainframe interessierte Einsteiger und alle weiteren Interessierten

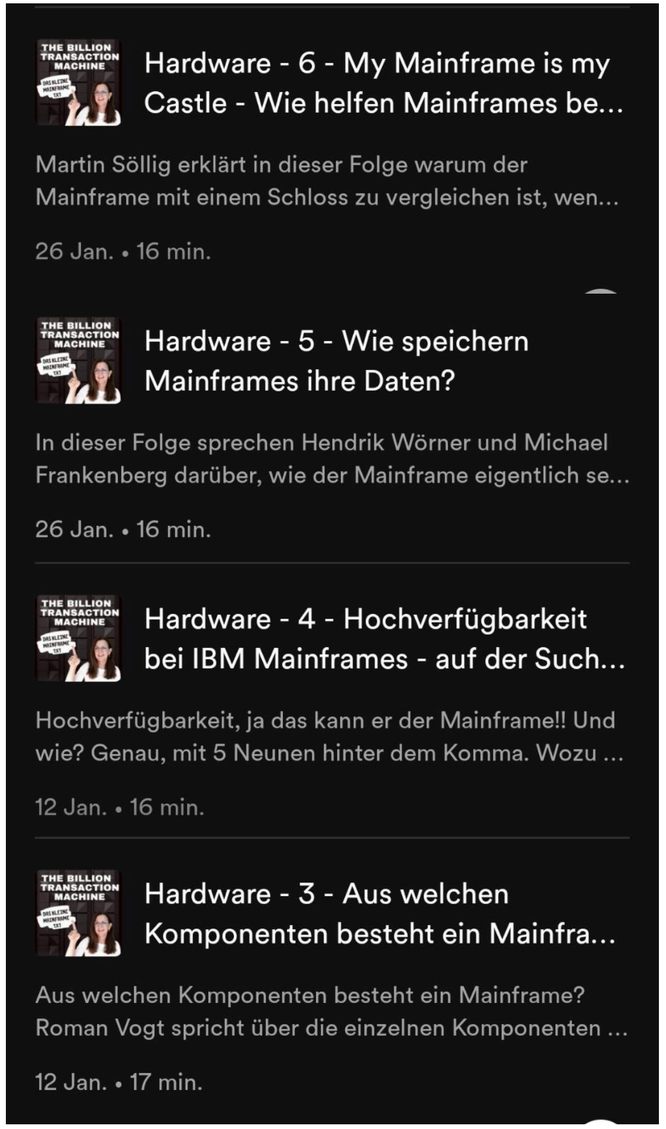
Ein Blick auf Spotify:

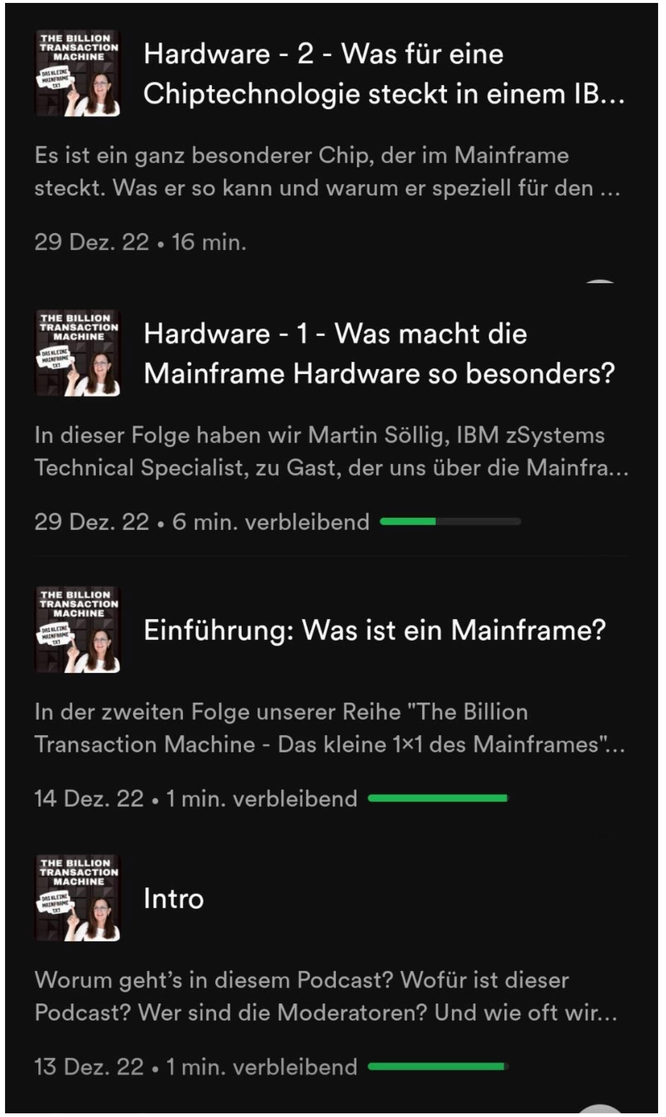


Unbedingt Reinhören und Weitersagen!

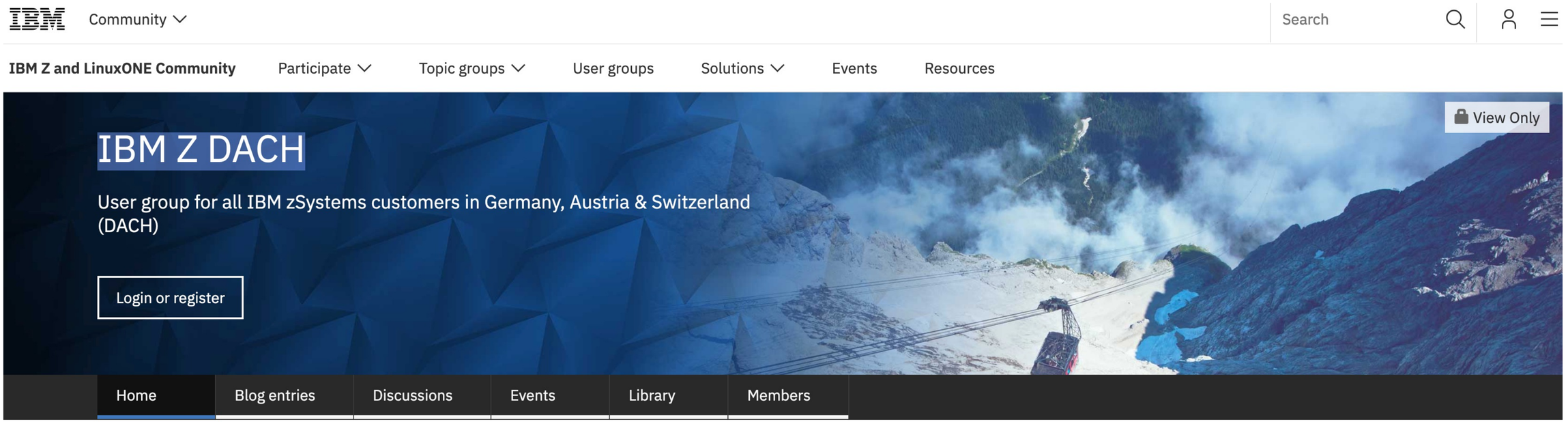
Jede Folge nur 10-15 Minuten!







IBM Z DACH Community



Announcements

Willkommen in der IBM Z DACH Community

Wir freuen uns auf regelmäßigen Austausch mit allen Kunden und Partnern in DACH!

Alle Information zu aufkommenden **IBM Z Veranstaltungen** sind unter *Events* zu finden.
Weitere Events sind im IBM DACH Eventkalender aufgelistet.
Informationen zu GSE Veranstaltungen können Sie hier finden.

Bei Fragen und Feedback kontaktieren Sie uns bitte unter cesa@de.ibm.com

Latest discussions

Log in to join in on our discussions
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IBM Z DACH Community

Blog entries

z/OS 3.1

Messaging and themes overview

IBM z/OS 3.1: An AI-infused operating system for the next generation of computing

IBM z/OS 3.1 marks a new era in operating system intelligence. The new version of z/OS infuses AI into the system, enabling intelligent systems administration guidance and automation that learns and improves. With z/OS 3.1 as the foundation of a hybrid cloud strategy, enterprises can deploy and co-locate Linux-based applications together with existing core business workloads and enjoy the unique value propositions of both environments.

3.1 Overview

AI-infusion

Scale the value of data and drive digital transformation powered by AI and intelligent automation

Application Modernization & Simplification

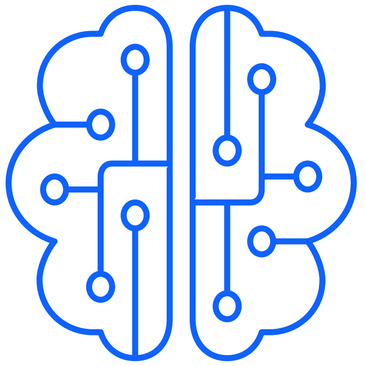
Build new and modernize existing applications while optimizing and simplifying technology infrastructure

Cyber Resiliency

Protect and thrive with unparalleled security and resilience capabilities with quantum-safe technologies

AI Infused z/OS

Scale the value of data and drive digital transformation powered by AI and intelligent automation



Continued support for *HW accelerated AI* that allows clients to apply AI and machine learning to their most valuable enterprise data on IBM Z.

AI System Services, intended to augment z/OS with intelligence that optimizes IT processes, simplifies management, improves performance, and reduces skill requirements.

AI-Powered Workload Manager (WLM), designed to intelligently predict upcoming batch workload and react accordingly for optimized system resources is the first to leverage the AI System Services.

New *AI-driven z/OS capabilities* that enable system self-management are paving the way for further internal and external exploiters for future AI projects.

Application Modernization and Simplification

Build new and modernize existing applications and workloads while optimizing and simplifying technology infrastructure with a flexible hybrid cloud strategy

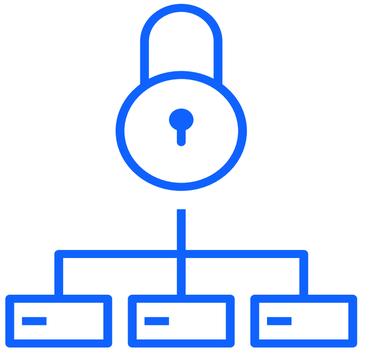
- Extract value from critical data for new business innovation with capabilities such as *Cloud Data Access* (CDA) to use data in cloud object stores, and new C-based API that simplifies the application effort needed to access *NoSQL* data sets on z/OS.

- Use industry standard technology to modernize applications across a hybrid cloud environment with *z/OS Container Extensions* (zCX), with support for NFS, HTTPS, and IBM WebSphere® Hybrid Edition, *Data Set File System* for z/OS UNIX® utilities, and enhanced *COBOL-Java™ interoperability* supporting IBM Semeru Runtime Certified Edition for z/OS, Version 11 (Java).

- Easily manage and administer z/OS day-to-day operations with new *z/OSMF* capabilities in a modern UI by utilizing *z/OS Management Services Catalog* enhancements that extend the range of supported intuitive processes. A new graphical user interface in *IBM z/OS Change Tracker* allows for comprehensive tracking of changes across software libraries and configuration data.

Cyber Resiliency

Protect and thrive with unparalleled security and resilience capabilities with quantum-safe technologies and ever-greater defense-in-depth functionality to mitigate the increasing risk to data privacy and protectior



IBM z16™ Crypto support enabling quantum-safe encryption with hardware acceleration, simplified crypto interfaces, and additional protection by distributing the ownership of master key parts.

Greater defense-in-depth capabilities with *RACF® database encryption* at rest, new scanning and monitoring ability *in z/OS Authorized Code Scanner* for production systems, *Validated Boot for z/OS®* that validates IPL data for tamper-protection and trusted origin - this leverages new z/OS *package signing* capabilities.

Achieve heightened levels of availability and improve capabilities for diagnosing and recovering from anomalous behavior with new use-cases for *System Recovery Boost,* and REST APIs in *Runtime Diagnostics* providing a consolidated view by certain management products such as *IBM Z Anomaly Analytics* (ZAA).

Resource Measurement Facility (RMF) delivers a new modern server and web-based UI along with new thresholding and alerting for improved monitoring capability

z/OS 3.1

Features and capabilities

AI on z/OS

In z/OS 3.1, AI and analytics solutions are infused into the operating system, using intelligent automation and accelerated inferencing at scale to extract and leverage valuable data insights.

Including:

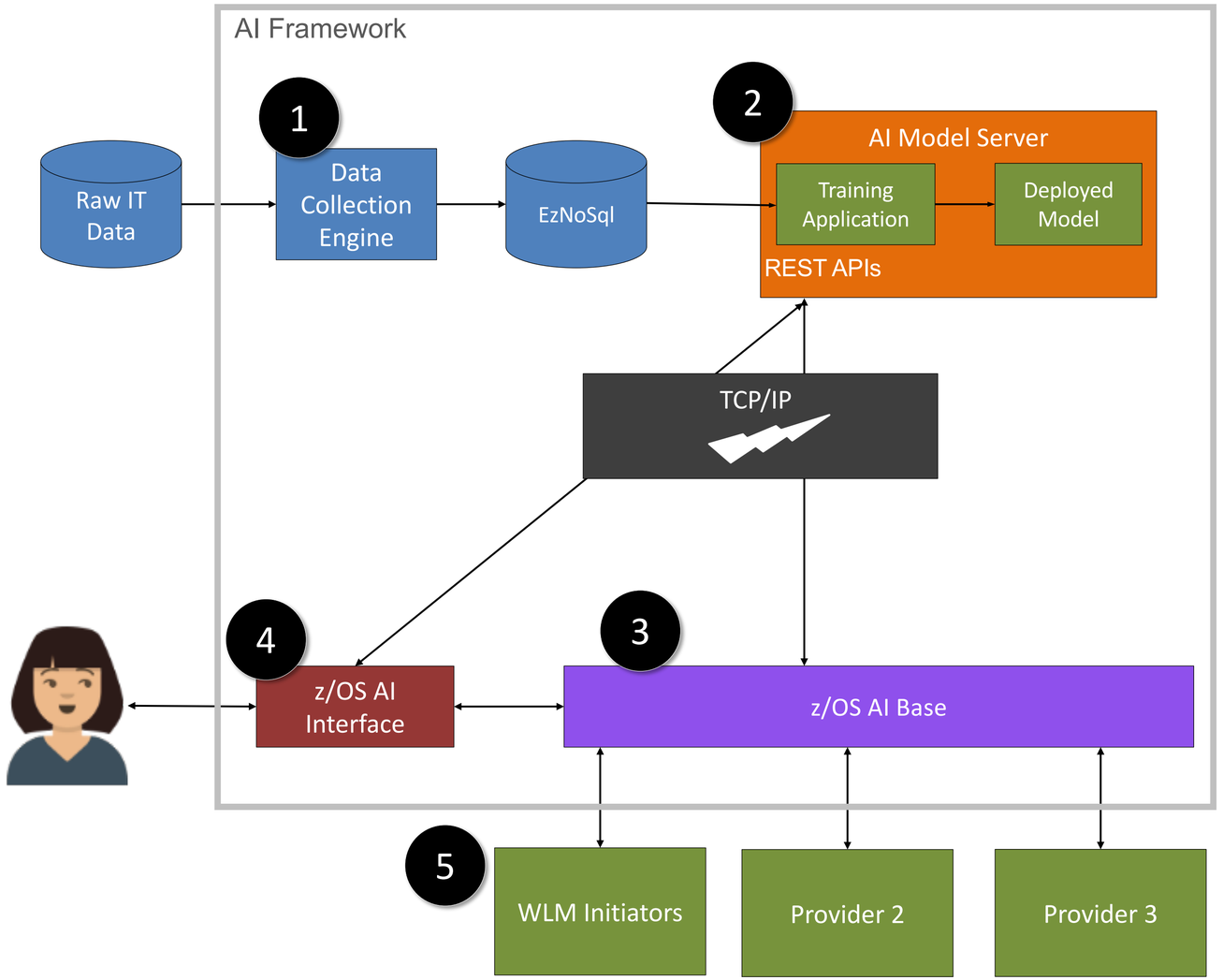
- AI Framework for IBM z/OS
- AI-powered Workload Manager (WLM)
- z/OSMF WLM Policy Advisor
- IBM SMF Explorer with Python

AI Framework | components

The AI Framework provides capabilities to infuse AI into z/OS products while simplifying management by clients.

The AI functionality consists of:

1. Data Collection
2. AI Model Server
3. AI Base Component
4. User Interface
5. Providers



Data collection

Data collection provides a common way to collect IT data for use in AI model training.

The **data collection engine** will:

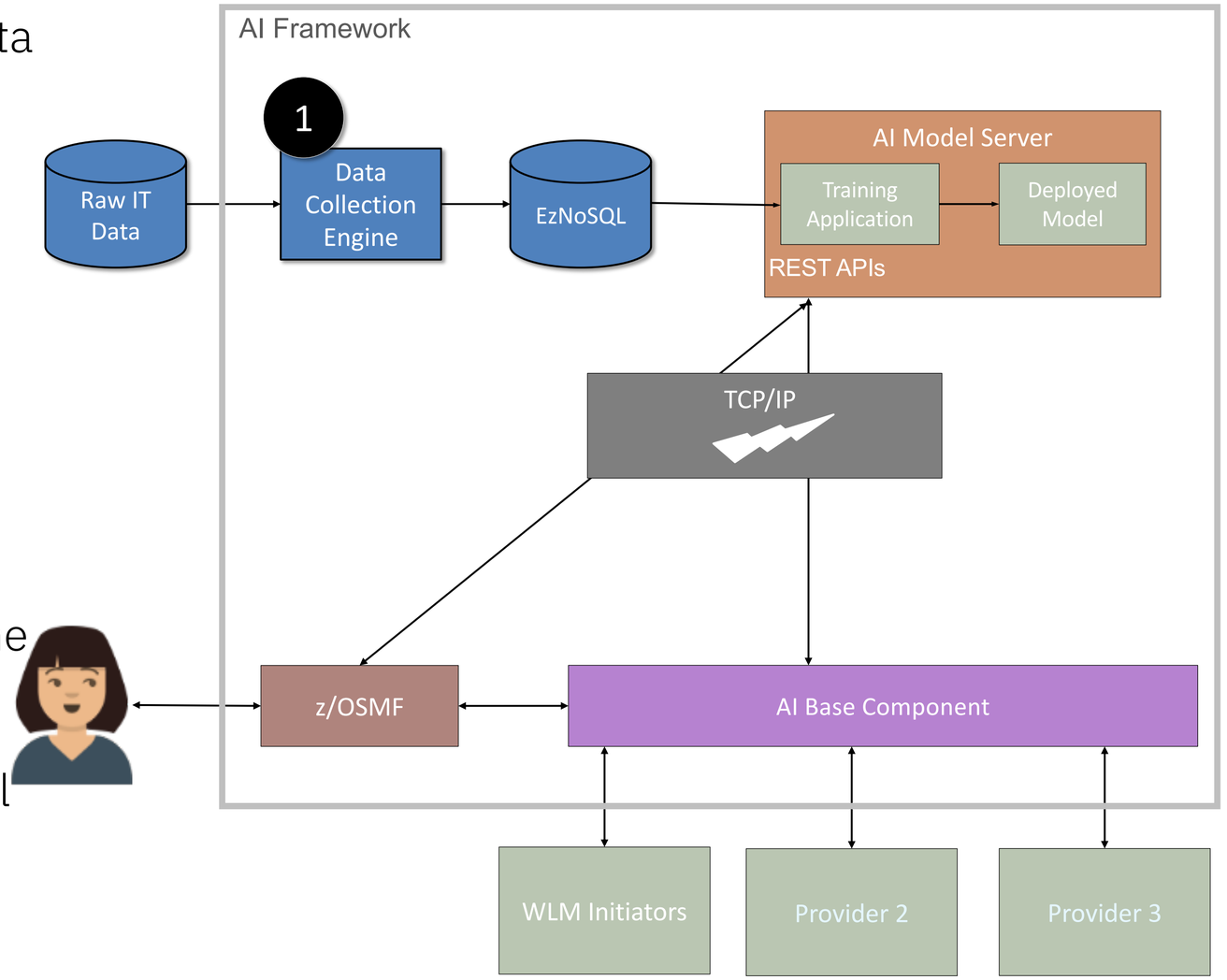
– Collect and parse the raw IT data

– Stream the data to the data store

We plan to use **EzNoSQL for z/OS** as the data store to contain data for training.

– Accessed by model training pipeline and optionally the deployed model

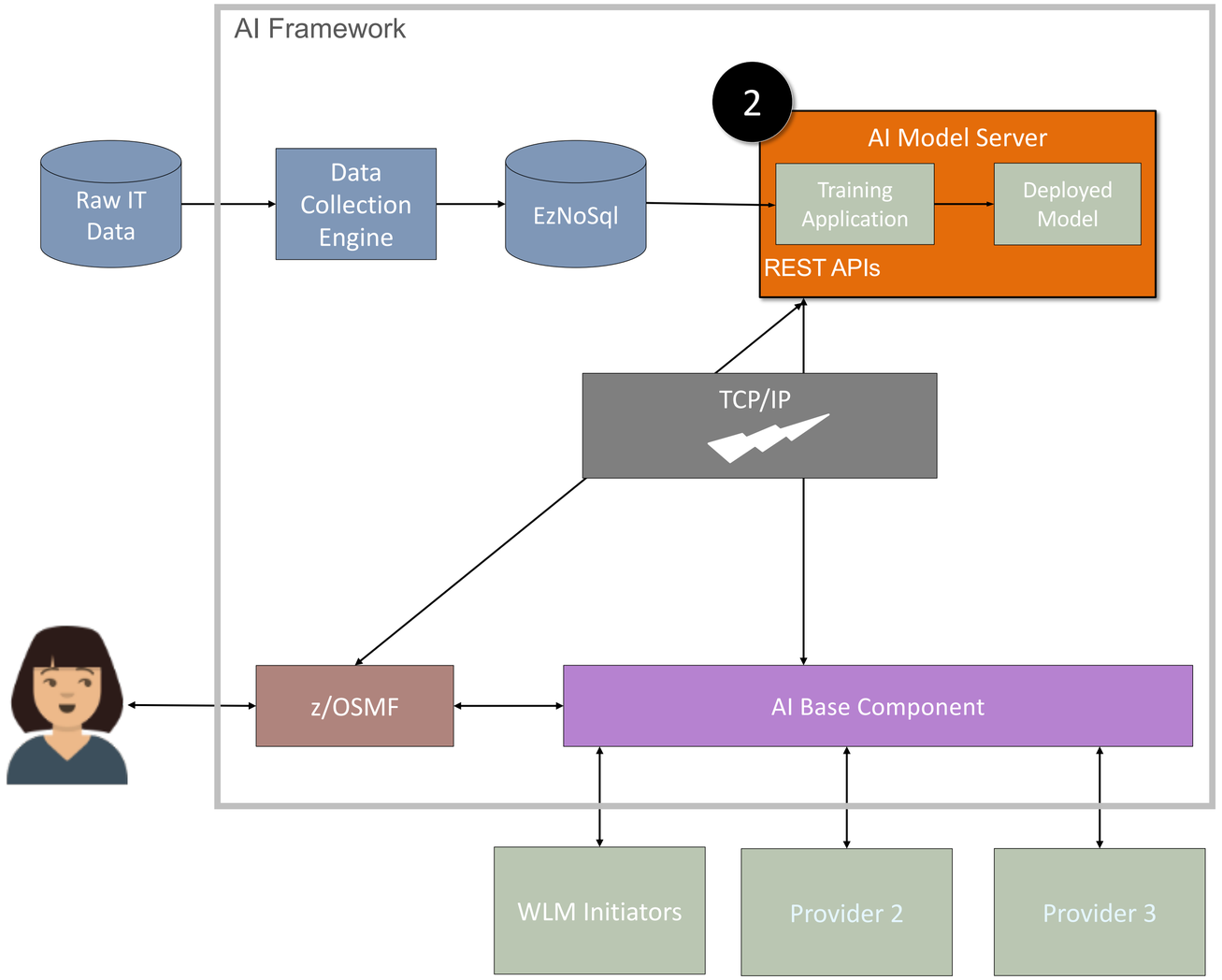
– Can be used both for training and the deployed model to store its own data



AI model server

The **AI model server** will host and manage the AI models.

- Manages model training, versioning, deploying, and monitoring
- Supports fail over for high availability
- Accessed by system via REST APIs

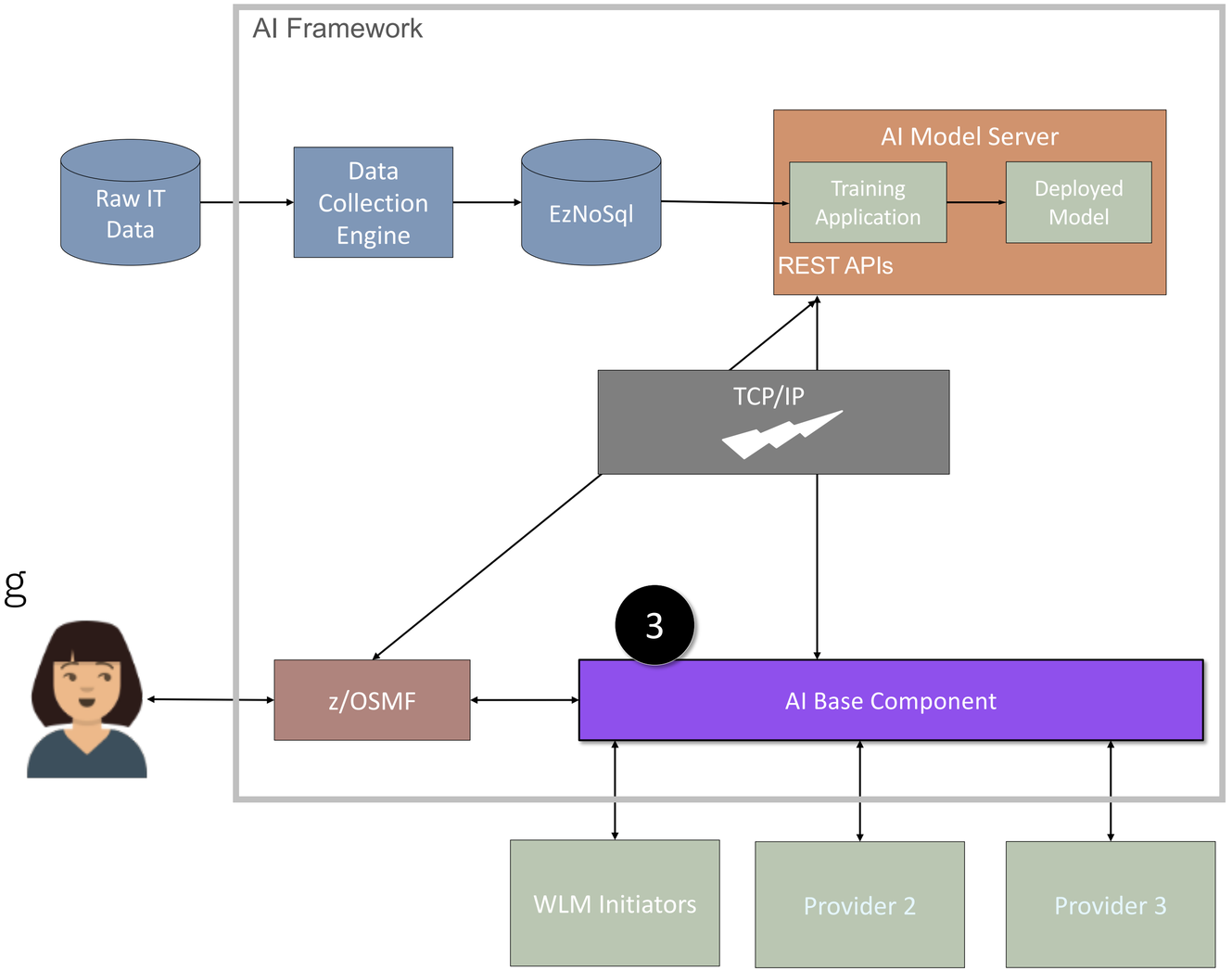


AI base component

The **AI Base Component** will assist Providers in communicating with the AI model server.

Enables traditional components to use AI models without need for frequent updates to latest technologies.

- Accessed via z/OS macros
- Handles connection to REST APIs
- Built-in logging to SMF for diagnostics and auditing

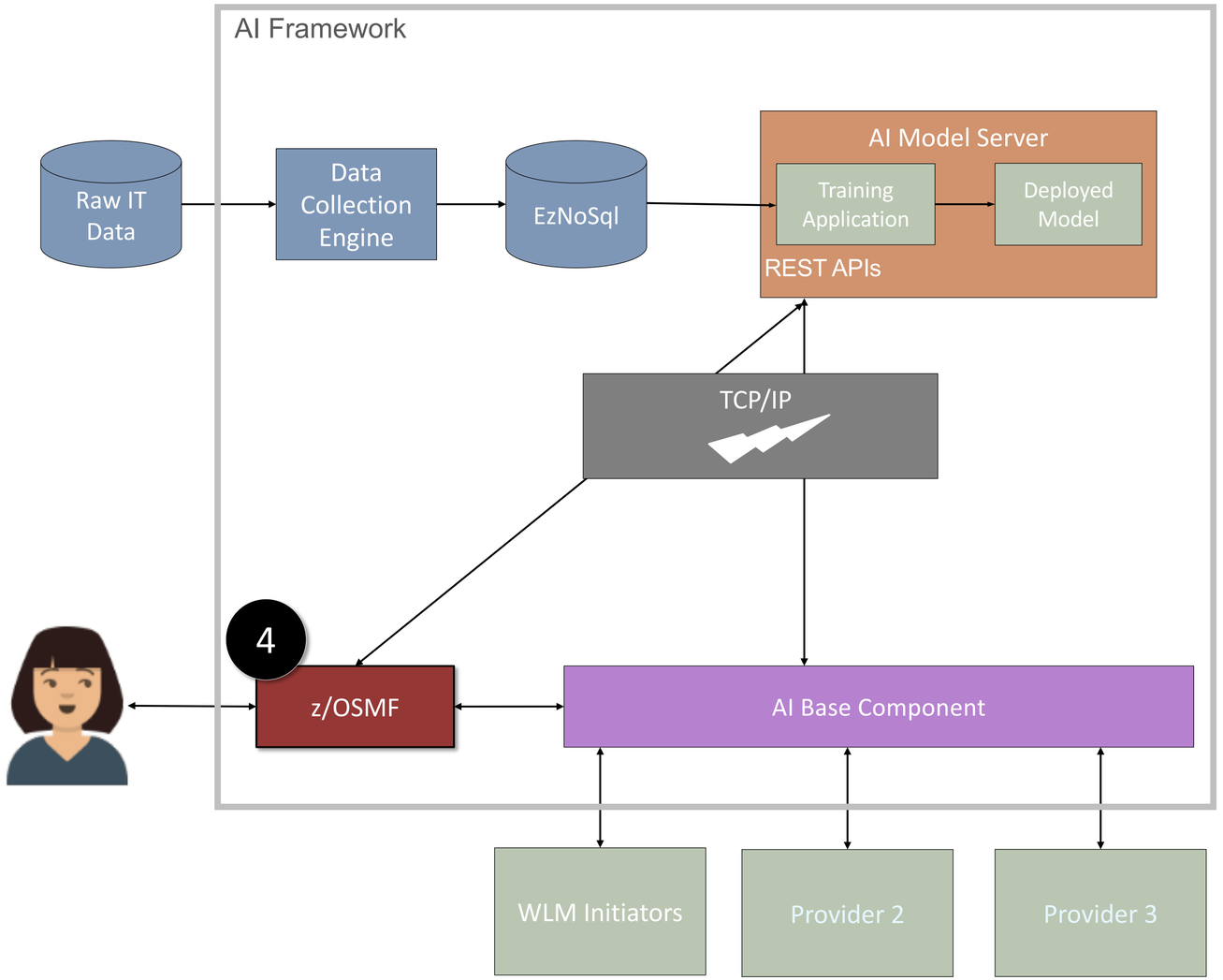


User interface

The **user interface** will be the end user's primary means of working with the AI Framework and managing AI models.

We plan to use **IBM z/OS Management Facility** (z/OSMF) to implement the AI Framework user interface.

- z/OSMF workflows will enable install and configuration
- A new z/OSMF plugin will provide AI model management

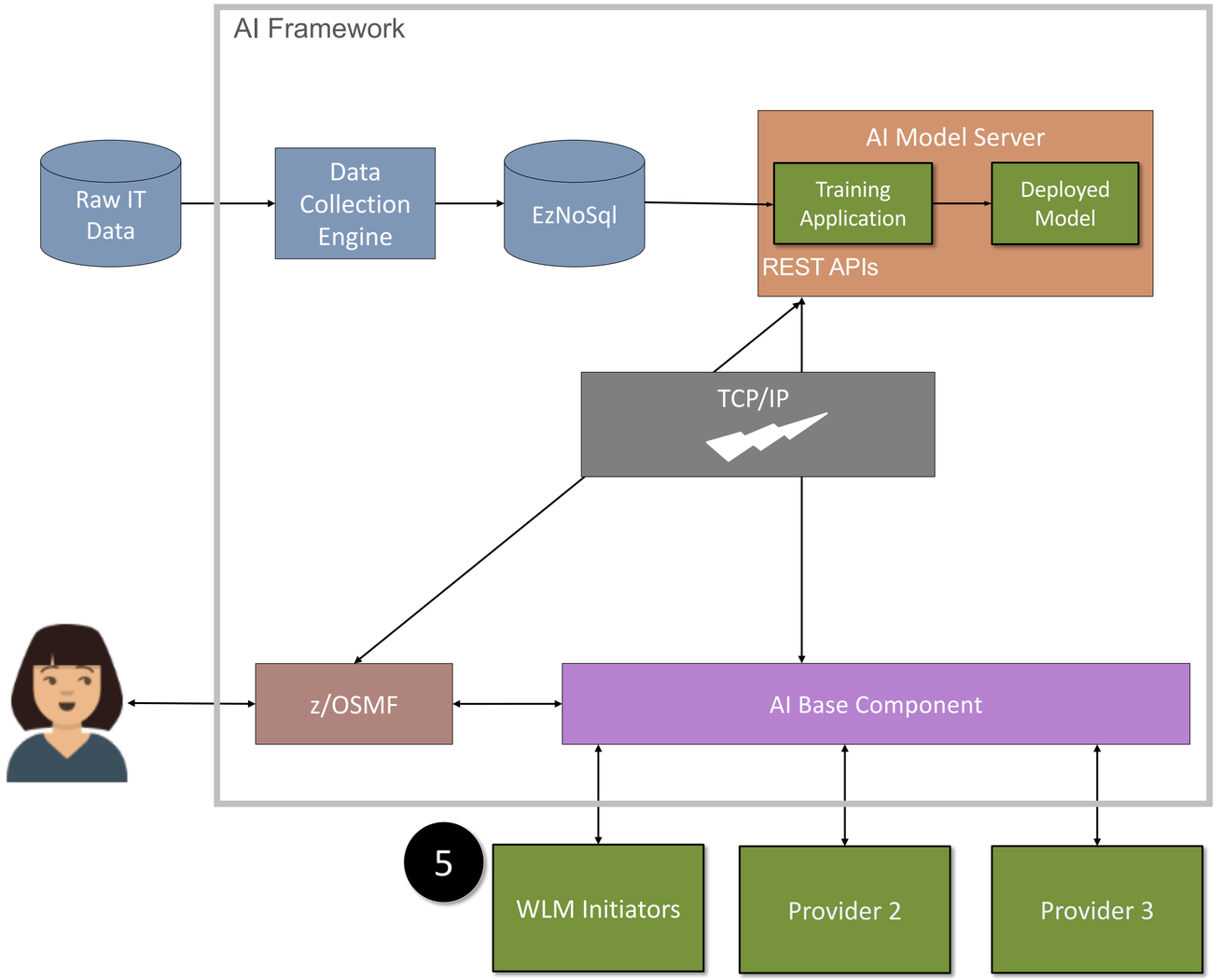


Framework providers

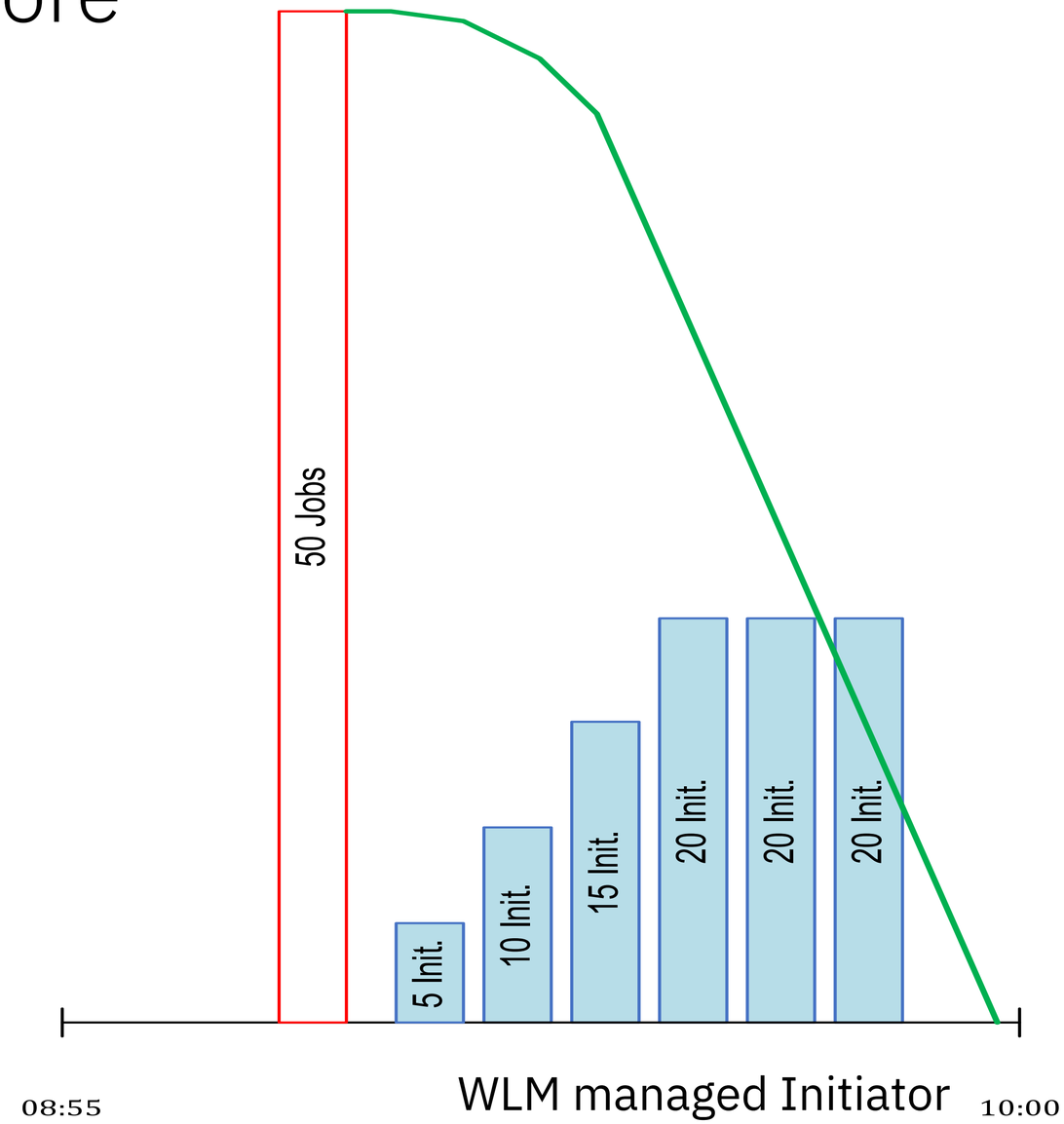
Providers plug into AI framework for simpler AI deployment.

- Define data collection
- Create model training pipeline
- Call AI Base Component
- Extend user interface

The framework is intended to be expandable for future use cases.



WLM managed initiators before



- Initiators are started after the workload arrives
- Workload can’t be processed right away

With z/OS 3.1 AI Powered WLM- Predict upcoming workload

Starting with batch workload

SMF records

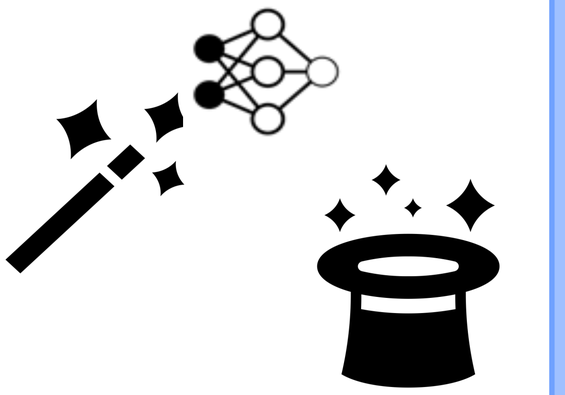
CLASS	P	I	N	SC	GT	SPI	LPI	DP	MPLI	MPLO	SWPT
APPC	1	2	N	-99	SRT	1.10	1.10	251	0	999	488
APPC	2	2	N	-99	SRT	0	0	251	0	999	0
APPC	3	2	N	-72	SRT	1.10	1.10	251	1	999	76206
APPC	4	3	N	-99	VEL	0	0	249	1	999	0
NRBATCH	1	3	N	-99	LRT	2.16	3.04	249	1	11	0
NRBATCH	2	4	Y	-98	LRT	.02	.03	247	2	999	0
NRBATCH	3	6	Y	-99	DIS	.81	.81	192	0	14	0
OFFBATCH	1	6	Y	-99	DIS	.81	.81	192	0	14	0
TSO	1	2	Y	-64	SRT	.10	.11	251	1	11	0
TSO	2	2	Y	0	SRT	1.84	1.84	251	1	999	1464
TSO	3	2	Y	-2	SRT	.91	.93	247	2	12	2440
TSO	4	3	Y	-99	VEL	.26	.26	245	7	999	0
$SRMDISC	1	6	Y	-99	DIS	.81	.81	192	0	14	0

1

Ingest historical data

2

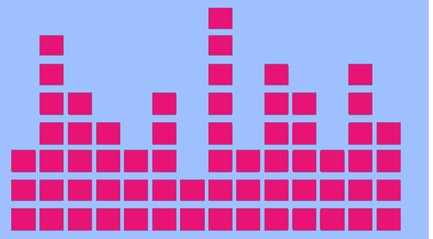
Ingest real time data

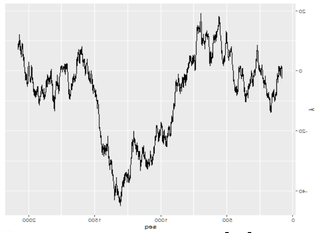


AI framework for z/OS

3

Predicted upcoming workload





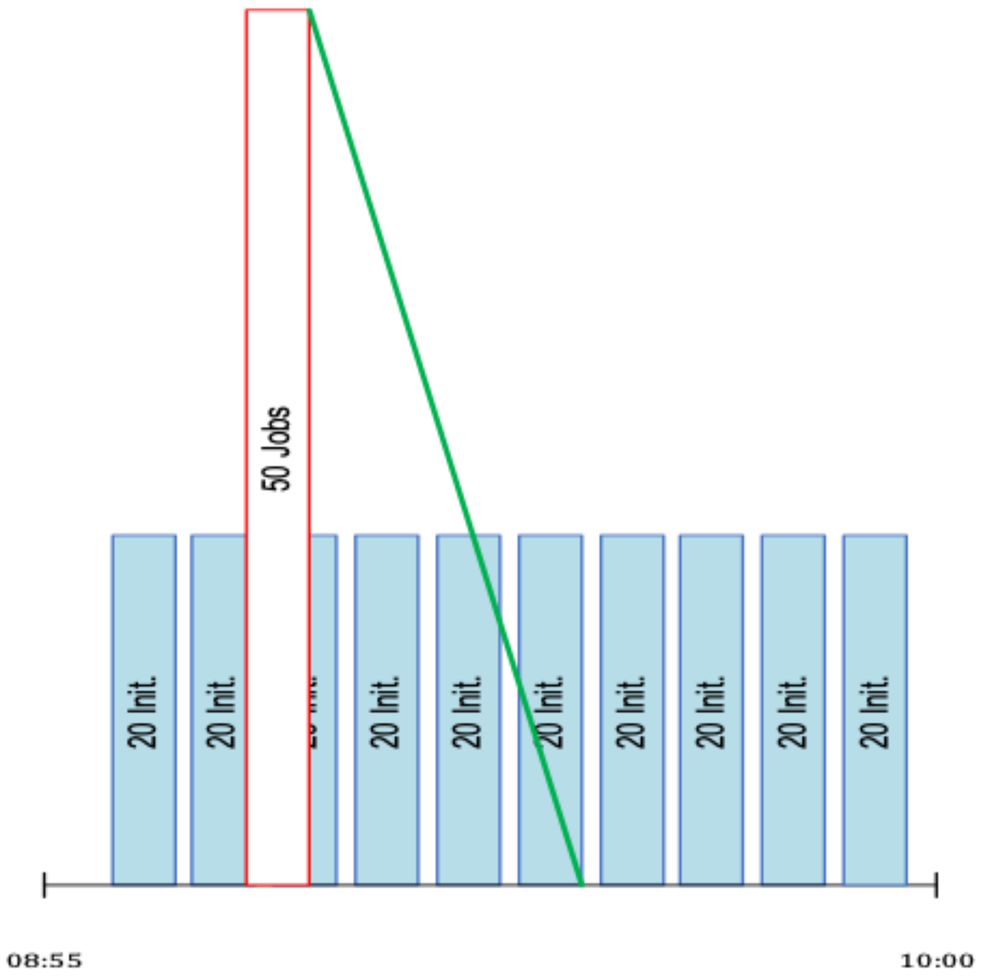
Current workload

WLM

4

Automatically start/stop initiators and assign resources proactively

AI powered WLM



Proactive AInitiator processing

- Batch Workload forecast driven by AI model
- AI provides WLM with recommendations to start the required number of initiators proactively (rather than initiators starting after the workload arrives as they currently do)
- Workload can start right away
  - Resource assignment of the correct priority is done before the work arrives
- Possibility to switch between AI-disabled, AI-enabled and simulation mode
- Future implementation intended to focus on online transactions

AI-powered WLM

No need for additional AI skills to deploy AI infused capabilities

Straightforward user experience

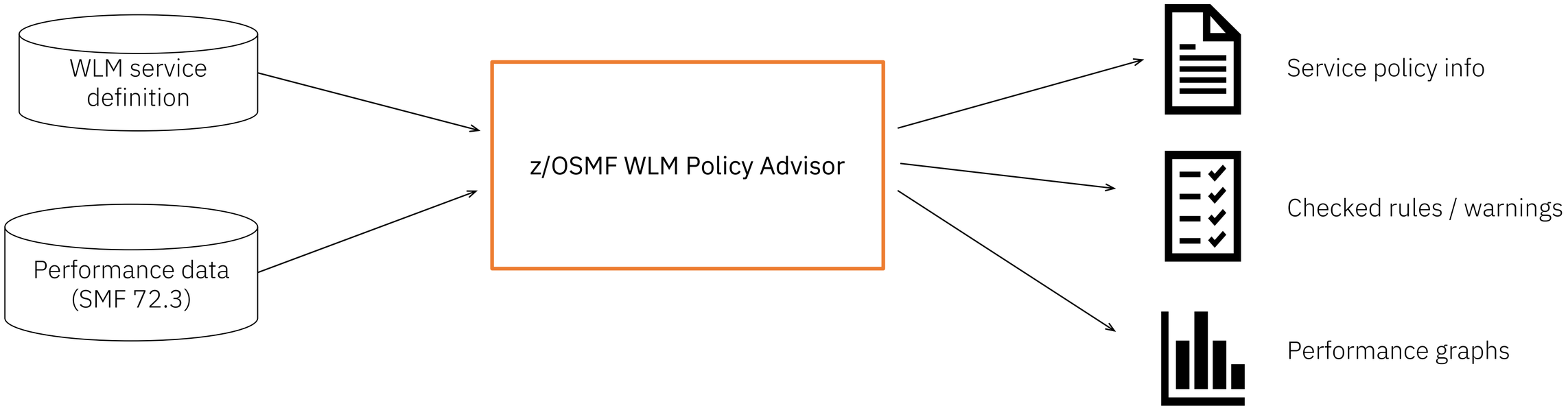
Continuous validation with clients from the early phase to delivery

Trust and confidence thanks to simulation mode and explainability

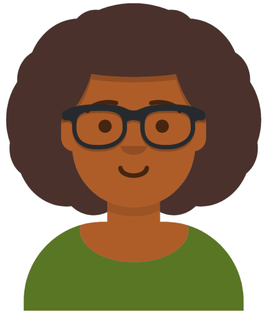
What is z/OSMF WLM Policy Advisor?

z/OSMF WLM Policy Advisor is a **tool**, that can help you **analysing** and **rating** your **WLM service definitions** regarding your defined workload importances und performance targets.

z/OSMF WLM Policy Advisor – The Idea behind it



z/OSMF WLM Policy Advisor – Who is the Target Audience?



Christina
Early tenure z/OS Systems Programmer

As a novice z/OS system programmer, I want to be assisted with **best practice** recommendations while editing a WLM service definition to **prevent common errors** before Alice or Zach can activate the policy.

Alice
Mid level z/OS Systems Programmer

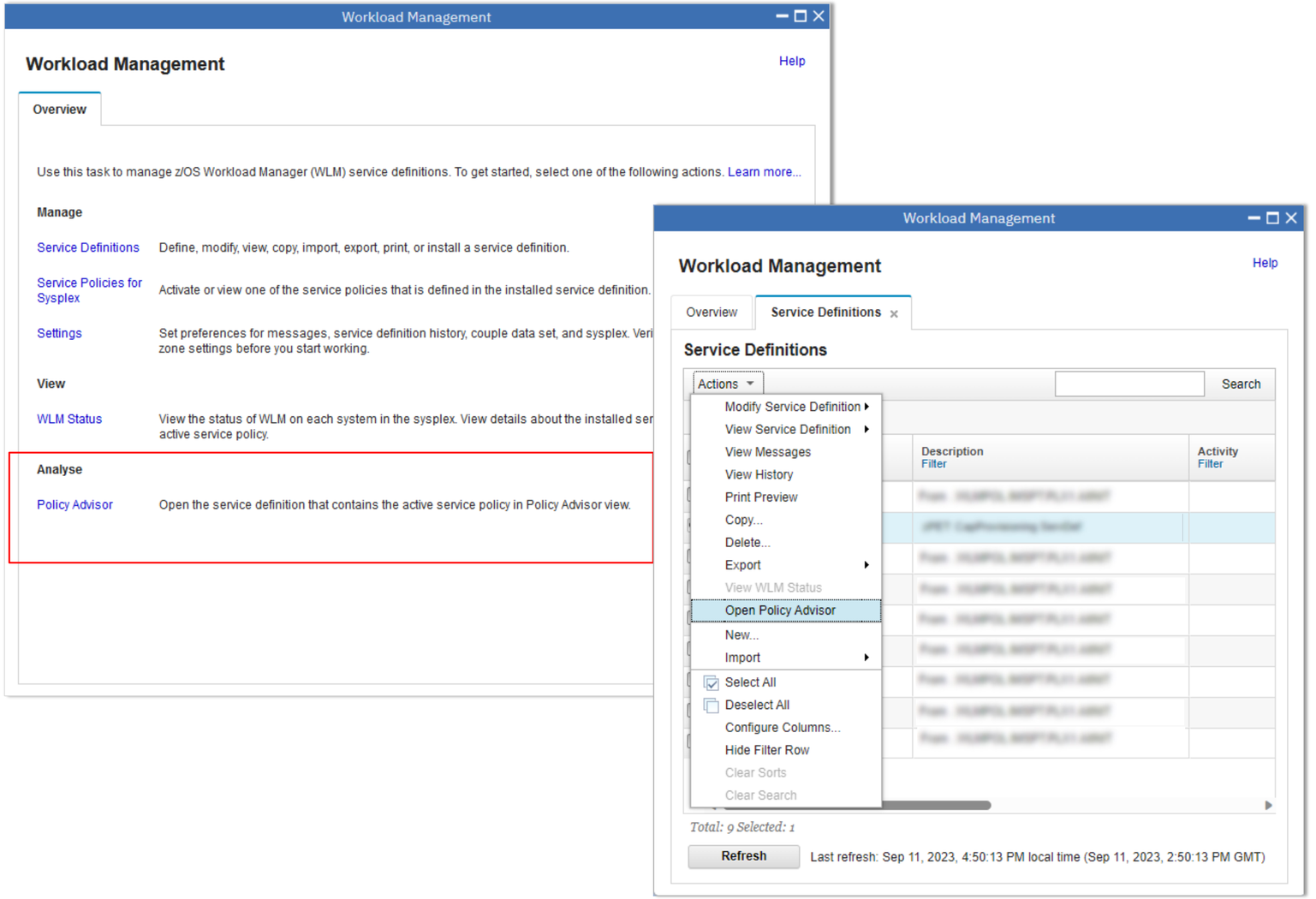
As a mid-level z/OS system programmer responsible for the WLM service definition, I want to **identify definition problems in the active WLM policy, with respect to the system's workload** as reflected in SMF performance data.

Zach
Senior z/OS Systems Programmer

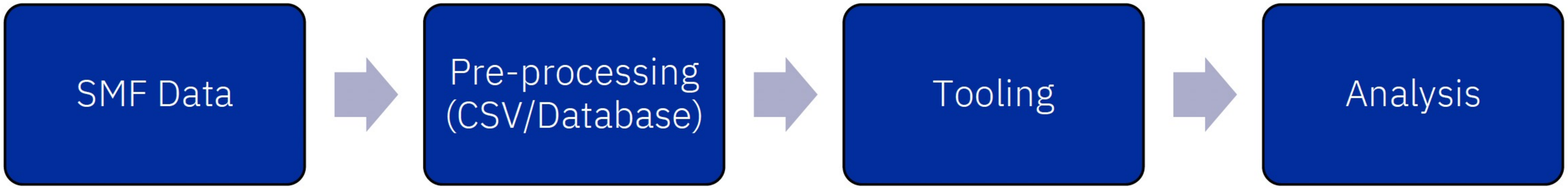
As a senior z/OS system programmer, the z/OSMF WLM Policy Advisor helps me to **teach my colleagues the dos and don'ts** of our WLM service definition.

z/OSMF WLM Policy Advisor – Where to find?

WLM PolicyAdvisor is an extension of the z/OSMF WLM Task (z/OS 3.1) und can be started from there.

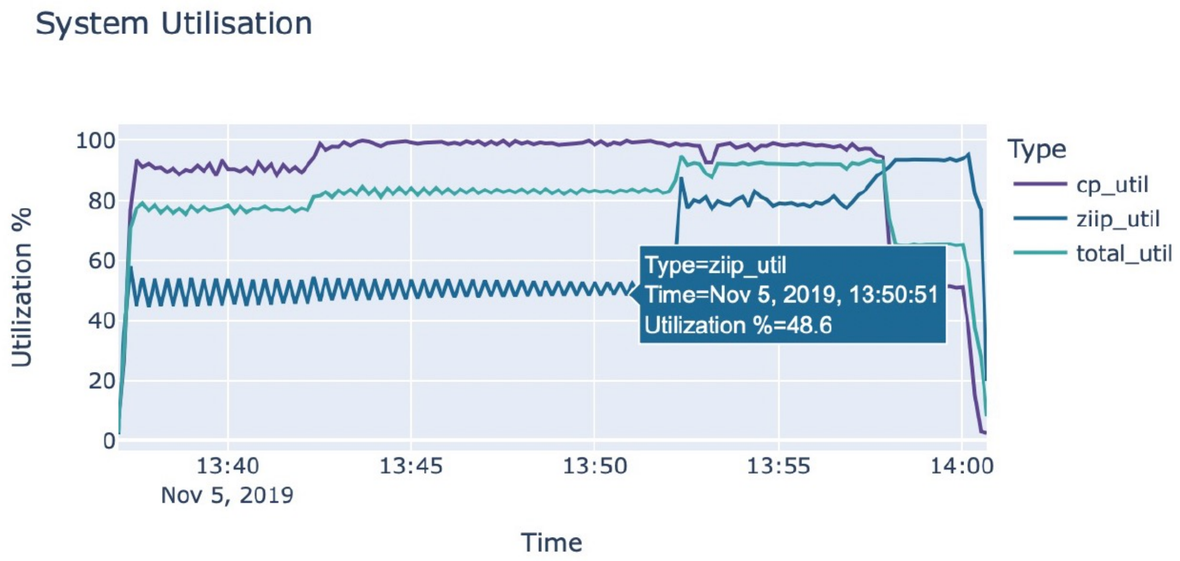


SMF Explorer with Python - SMF analysis today



- Limited knowledge about pre-processing
- Data offloading
- Time consuming
- Quick prototyping is often hard

IBM SMF Explorer



- SMF Explorer is a framework for SMF data access using Python
- Fetches pre-processed SMF data into Pandas DataFrames
- Features:
  - Filtering
  - Sorting
  - Multi-Dataset access

  ....

IBM SMF Explorer - Goals

- Accessing SMF data with a "modern" programming language
- Making data processing transparent
- No z/OS skill required (to get started)
- Quick prototyping

IBM SMF Explorer 1.0

- What will be included:
  - Performance Plugin (SMF 99, 113, 70-79)
  - Jupyter Notebook Tutorials
  - LPAR Topology Report
  - How will it be shipped:
  - pip installable package
  - GitHub Repository for notebooks, setup, and documentation

Download via:
https://github.com/IBM/IBM-SMF-Explorer

OS Management Simplification

z/OS 3.1 embraces aspects of cloud-native management of z/OS based on industry standards and access to consistent and modern browser-based interfaces, enabling users to efficiently update and configure z/OS and related software. With enhanced management infrastructure and self-service access to tasks, z/OS 3.1 continues to simplify and automate the management of the operating system to help guide the next generation of system programmers.

Including:

- z/OSMF
- Workflows
- z/OS Management Services Catalog
- z/OSMF ServerPac and Upgrade Workflows
- Desktop
- Sysplex Management
- APIs
- z/OSMF Ansible Collection
- IBM z/OS Change Tracker

z/OS Management Facility (z/OSMF)

A modern web-browser based management console for z/OS

4 z/OSMF Trials currently available!

z/OSMF helps system programmers more easily manage and administer a mainframe system by simplifying day to day operations and administration of z/OS system.

More than just a graphical UI, z/OSMF addresses the needs of a diversified skilled workforce:

- Automated tasks and APIs help reduce the learning curve and improve productivity.
- Embedded active user assistance (such as wizards) guide you through tasks and helps provide simplified operations.

For more information, visit the z/OSMF One Stop Hub

and z/OSMF Community Guild

With z/OS 3.1, the range of enhancements include:

- Desktop and plugin improvements for a reduced learning curve and improved efficiency for z/OS management
- New APIs that make it easier to drive z/OS operations
- Enhanced Workflow engine for persisting, streamline and collaborating z/OS tasks
- Improved z/OSMF management and security configuration abilities

Workflows - What are they?

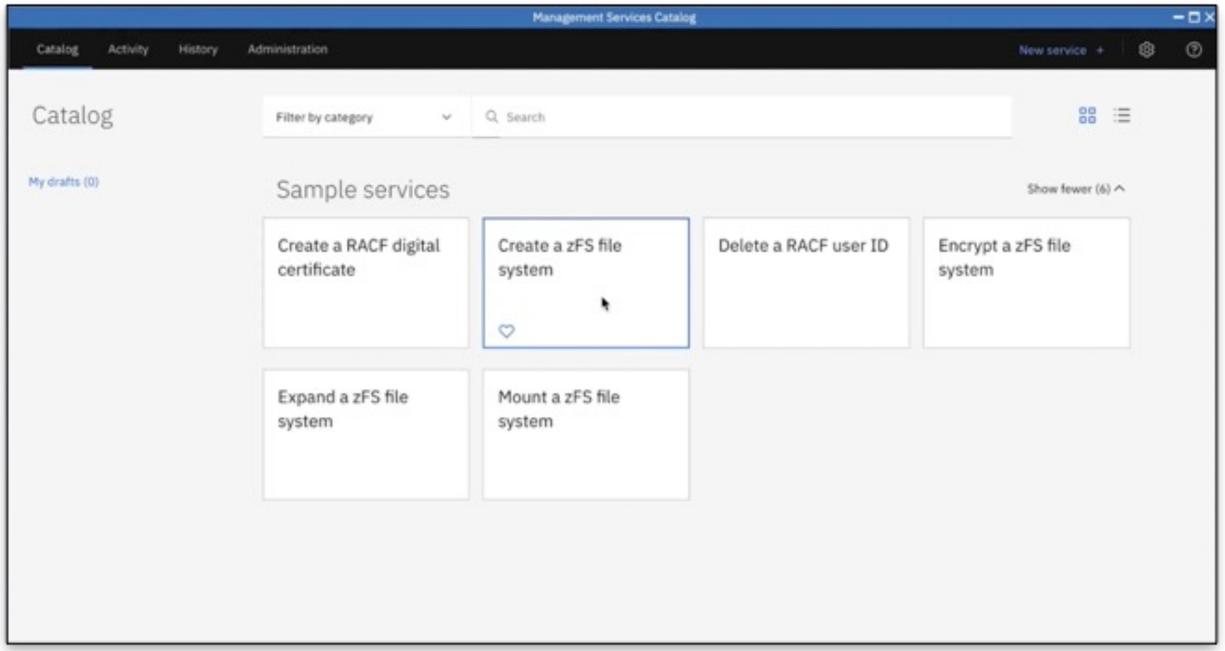
- A series of steps to accomplish a task and a tool to track each steps status
- Can involve one person or many people
- Workflow authors decide on style and technical approach of a workflow
- Can be: Manual instructions, Semi-automated instructions, Fully automated actions
- Consist of Jobs, Shell scripts, REXX execs, REST calls, file updates etc.
- Optionally retains a log of what has been done
- Useful for Installation, Service, Upgrade, or any configuration actions

[z/OSMF One Stop Hub (https://ibm.github.io/zOSMF/)](https://ibm.github.io/zOSMF/)

z/OS Management Services Catalog

Manage your z/OS environment using services

- Early tenure systems programmers can perform z/OS management tasks using a modern interface that does not expose them to the complexities of ISPF, command line, operator console, or JCL jobs
- Experienced systems programmer can reduce the complexity of their organization's z/OS management processes so they can transfer their knowledge to the next generation



Services are built using z/OSMF Workflows technology and make workflows more accessible.

New zMSC enhancements in z/OS 3.1 improve the user experience and simplify system programmers task related to creating and managing z/OS services:

- Export/import services capability to help system programmer share services across multiple systems
- System programmers can search and select workflow definition files at service creation time
- System programmers can preview a service without testing it
- Support for calling secondary workflows from a service
- System programmers can select and move multiple inputs at once during service creation
- System programmers can update the Workflow definition file after starting to build a service so that they can avoid wasted time on revisions

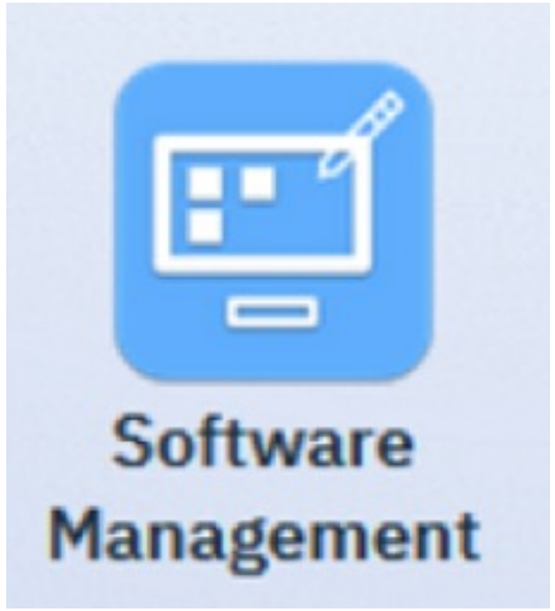
In addition, new services that help system programmers to streamline repetitive and frequent tasks as well as complex, infrequent tasks are provided

For more information, visit the zMSC content solutions

z/OSMF Software Management

Installation of z/OS 3.1 via ServerPac

- z/OS 3.1 uses a simplified web-based GUI (replacing the ISPF CustomPac Dialog)
  - Manages allocation and placement of data sets, cataloging, and deployment in z/OSMF Software Management
  - Customization and verification is done in z/OSMF Workflows
  - Data set merge and disconnect Master Catalog on driving system
  - Remove temporary catalog aliases are supported
  - REST APIs to run missing critical updates, missing FIXCAT updates, and software update search



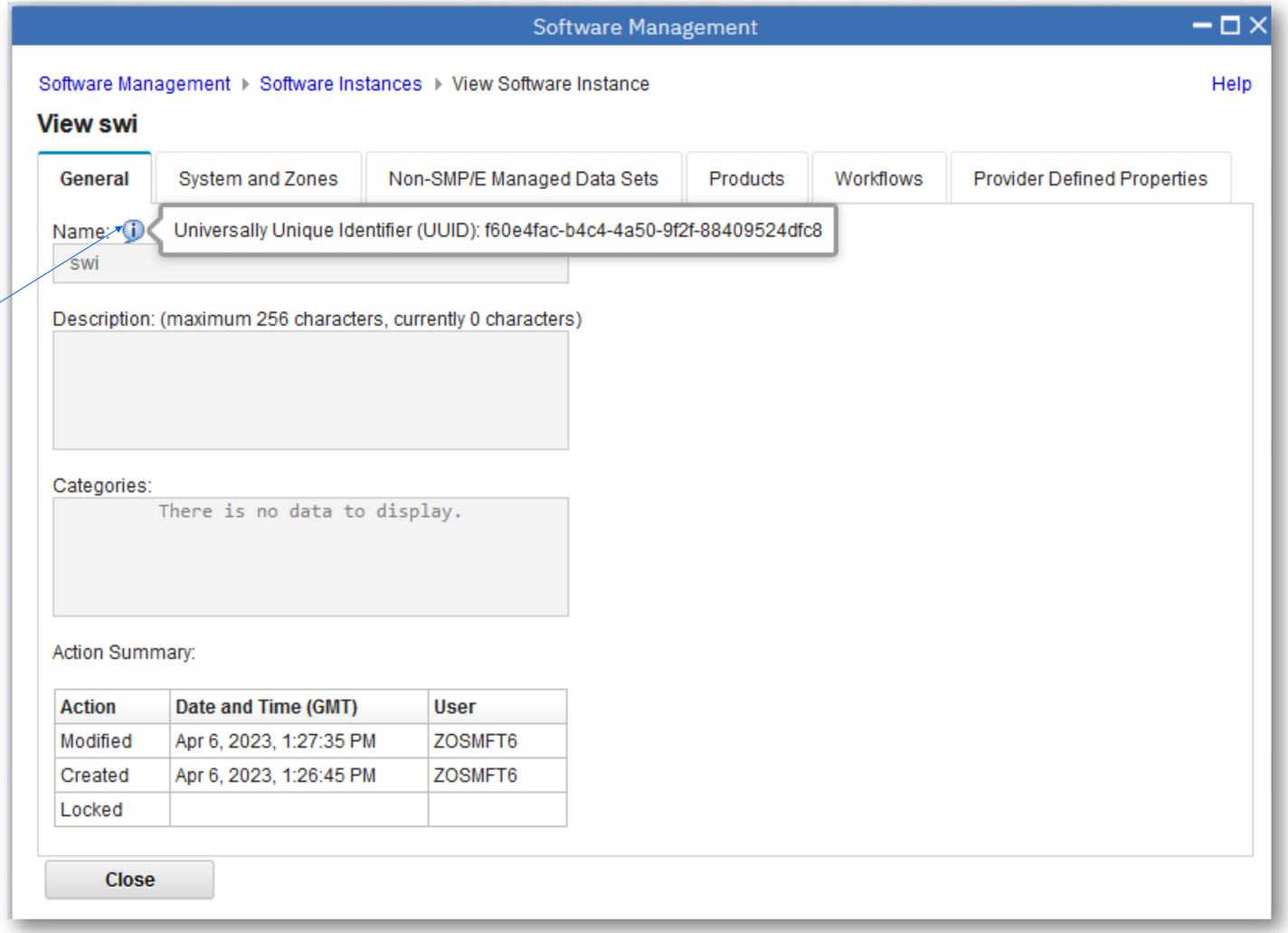
- IBM (and participating major ISVs) deliver z/OSMF Portable Software Instances as a common installation method for z/OS stack software
  - IBM z/OS, IMS, Db2, and CICS Transaction Server and associated products, all can be installed with z/OSMF today. CBPDO remains available.

- z/OS 3.1 also supports generating a Universally Unique Identifier (UUID) during the installation and deployment of z/OS, correlating the UUID with the z/OSMF Software Management software instance. This represents that copy of z/OS, storing the UUID value in a well-known location on z/OS, and retrieving the UUID from a running z/OS system to directly identify the proper software instance.

For more information, see the z/OSMF ServerPac content solution

Check UUID: Software Instances View action

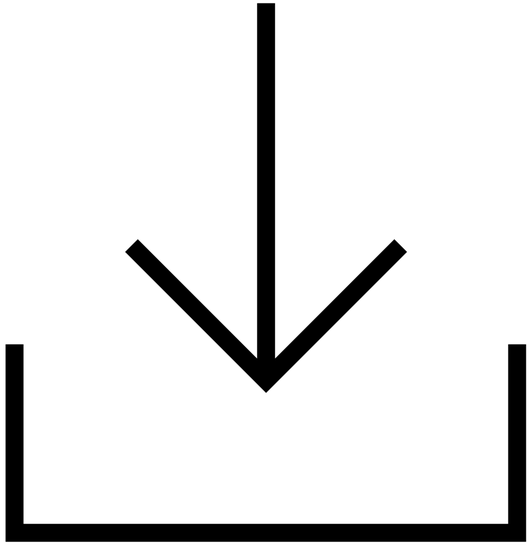
UUID is not intended as a human consumable value.
Therefore, the UUID for a SWI is not prominently displayed.
On the View action page, hover on the new “Info” bubble to display the UUID.



z/OSMF Upgrade Workflow

Update to z/OS 3.1 easily

IBM is making continual enhancements to z/OS Upgrades to making upgrading to the latest z/ OS release easier by reducing manual steps. The z/OSMF z/OS 3.1 Upgrade Workflow is now part of and serviced with z/OS.



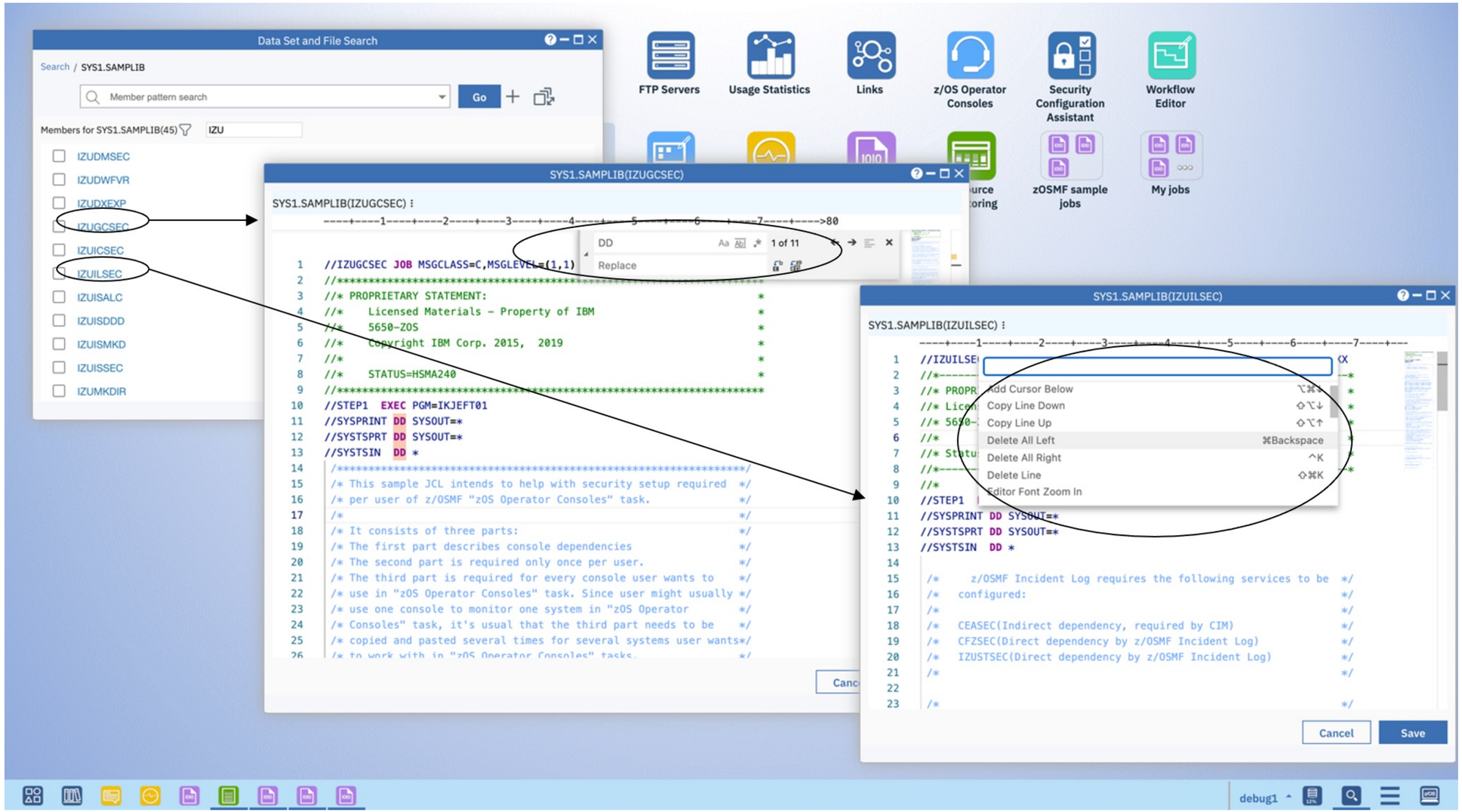
More capabilities have been added to:

- Assist with coexistence service verification
- Help with identifying upgrade actions which have already been performed during the service cycle.

Depending on whether you are upgrading from z/OS V2.5 or z/OS V2.4, simply select the workflow that applies to your upgrade path and open it in z/OSMF to begin the upgrade process.

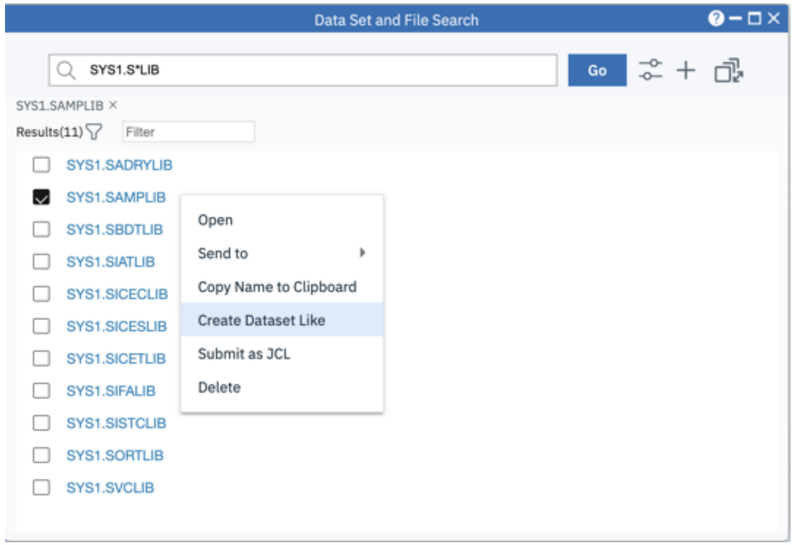
z/OSMF desktop UI

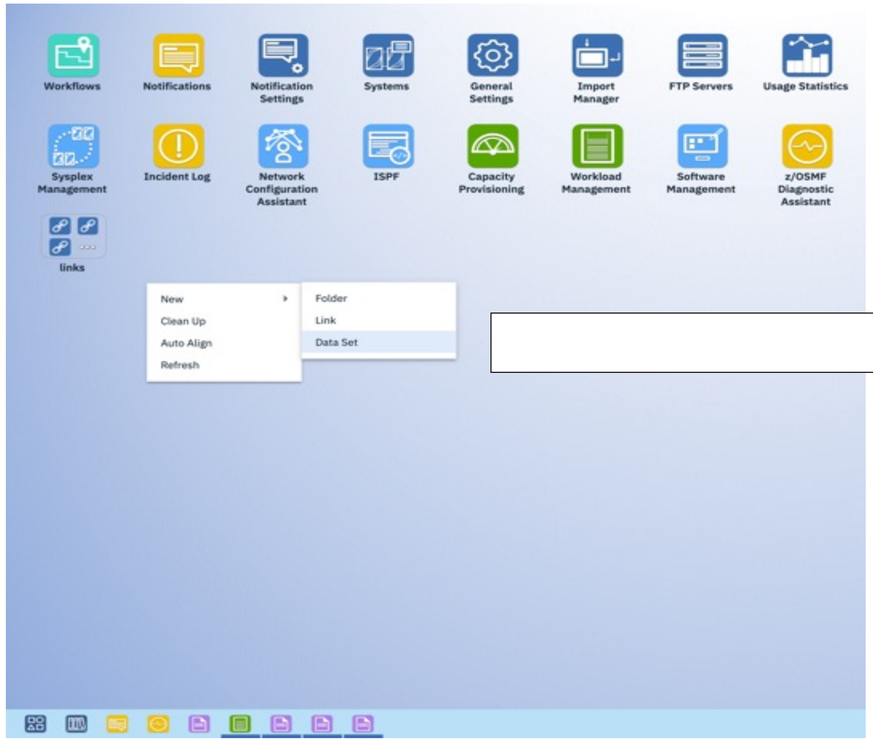
- Data set search, browse and edit

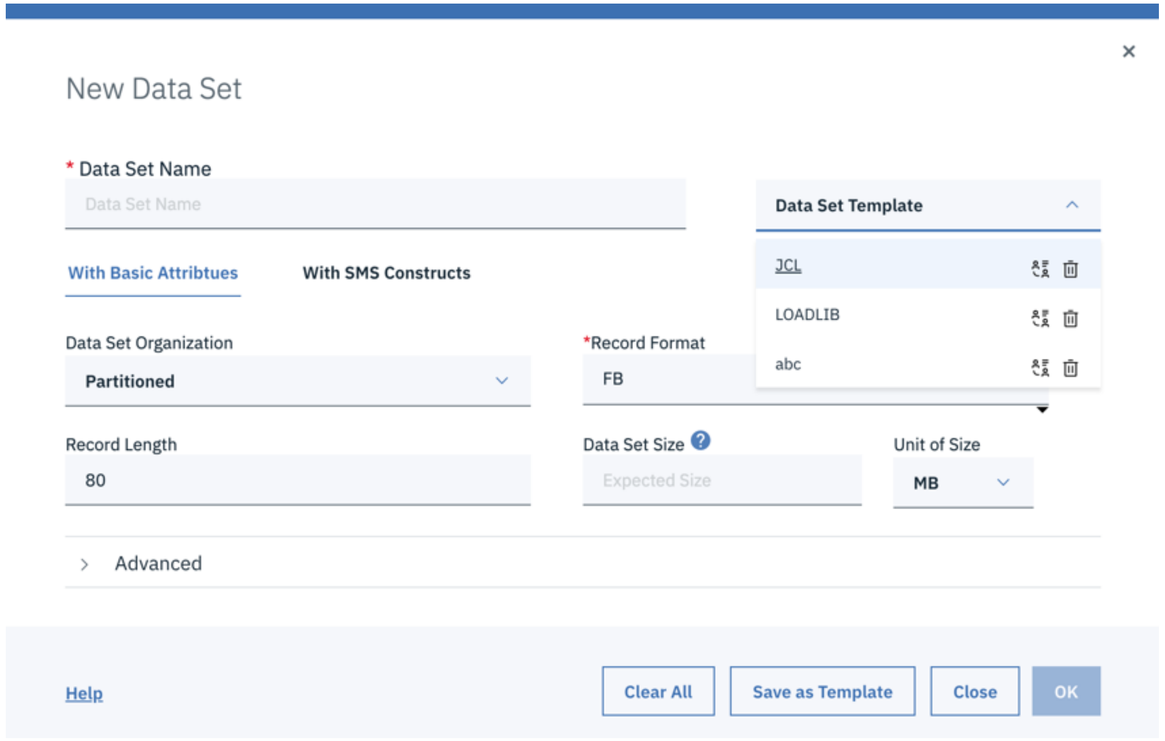


z/OSMF desktop UI

- Create data set like and Create data set

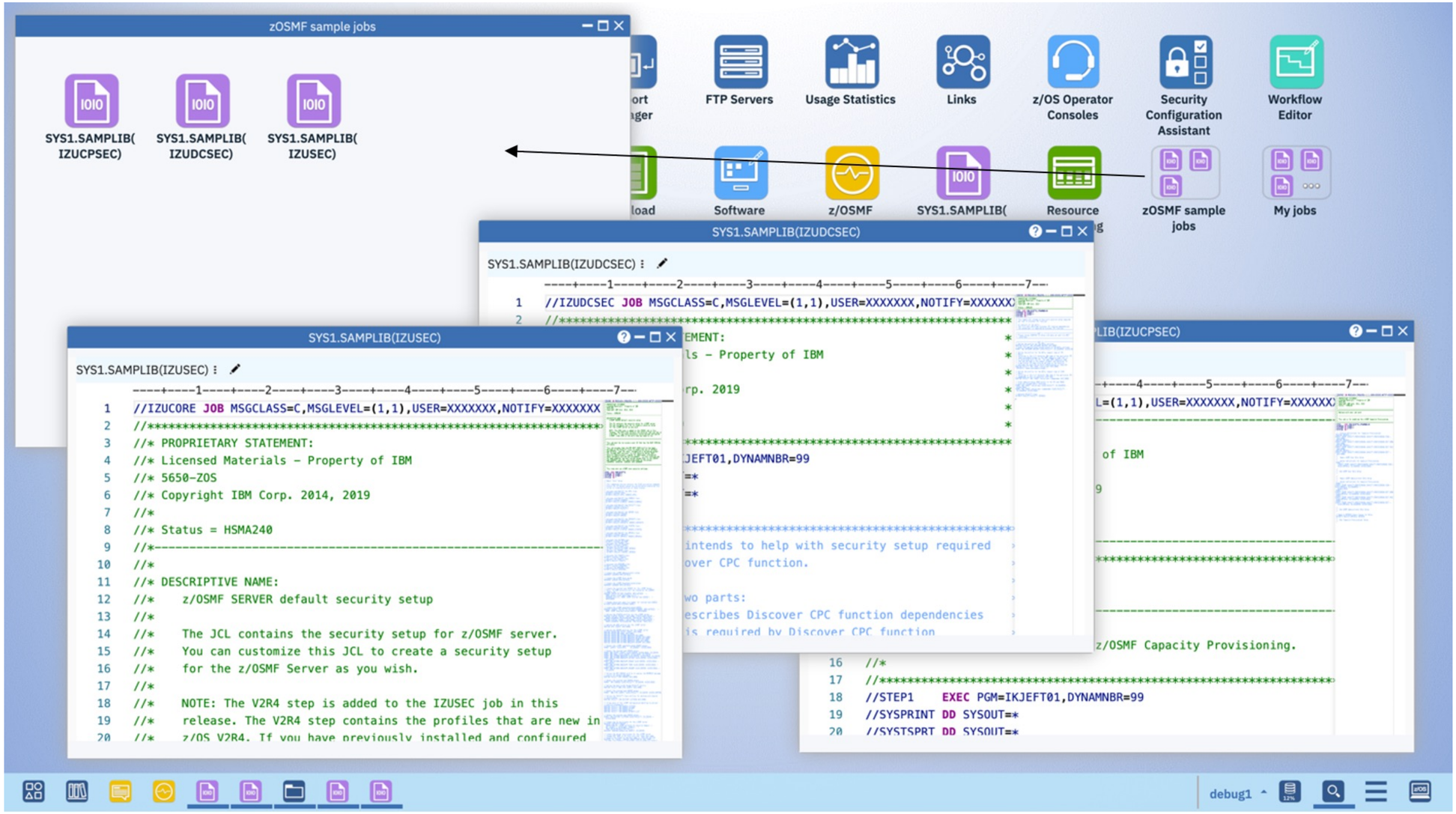






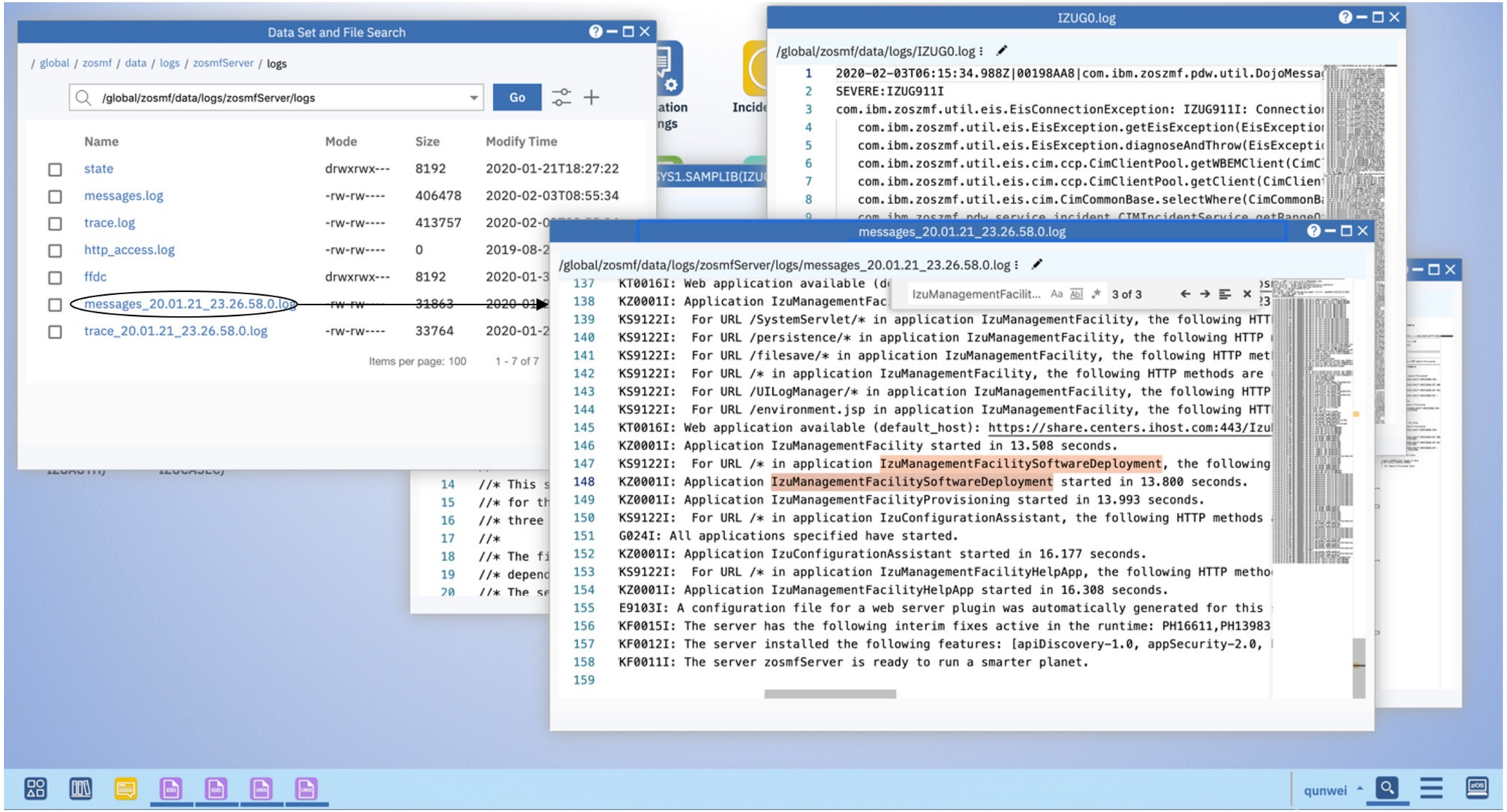
z/OSMF desktop UI

- Create shortcut for data sets and open data set with double click



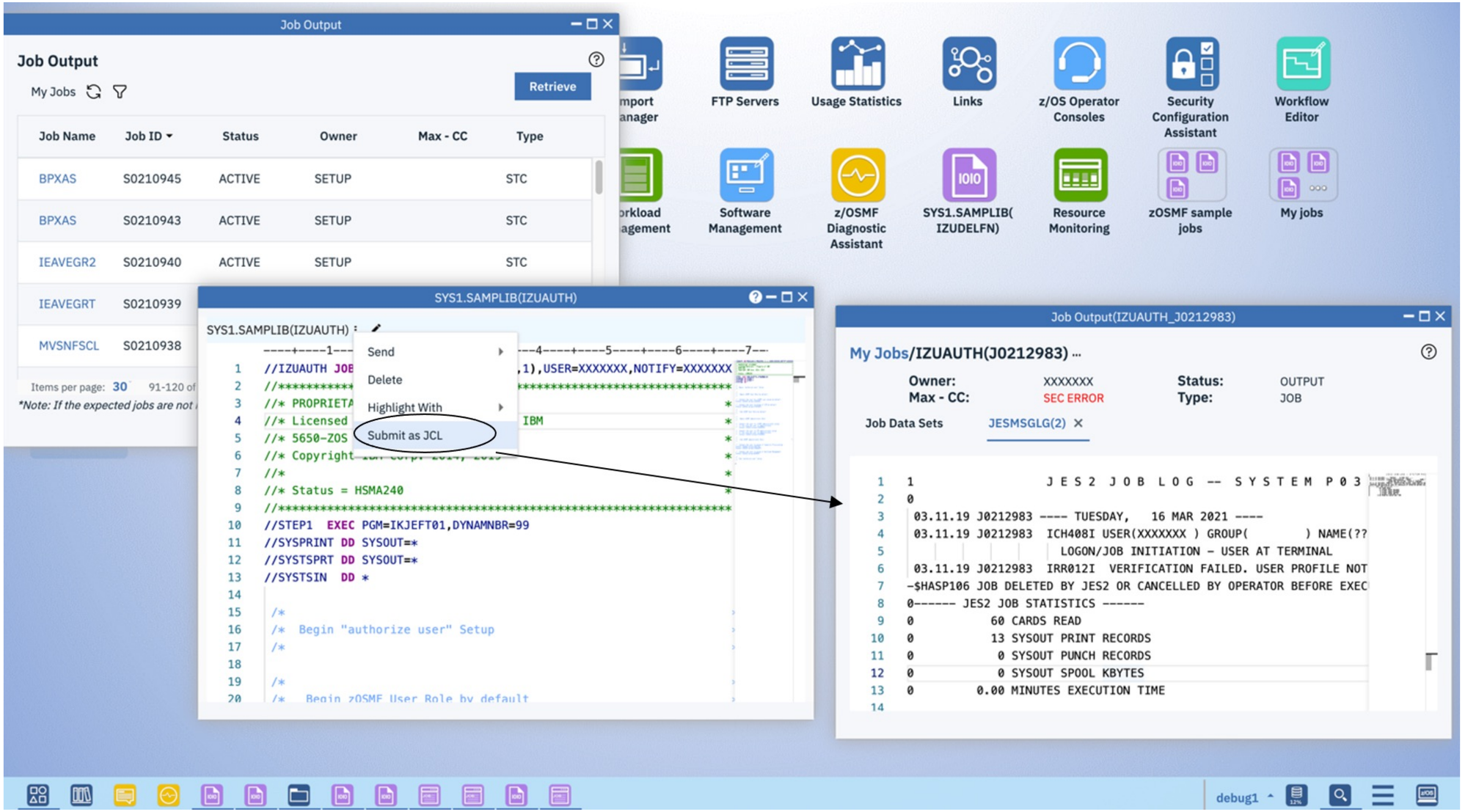
z/OSMF desktop UI

- Browse UNIX directory and files



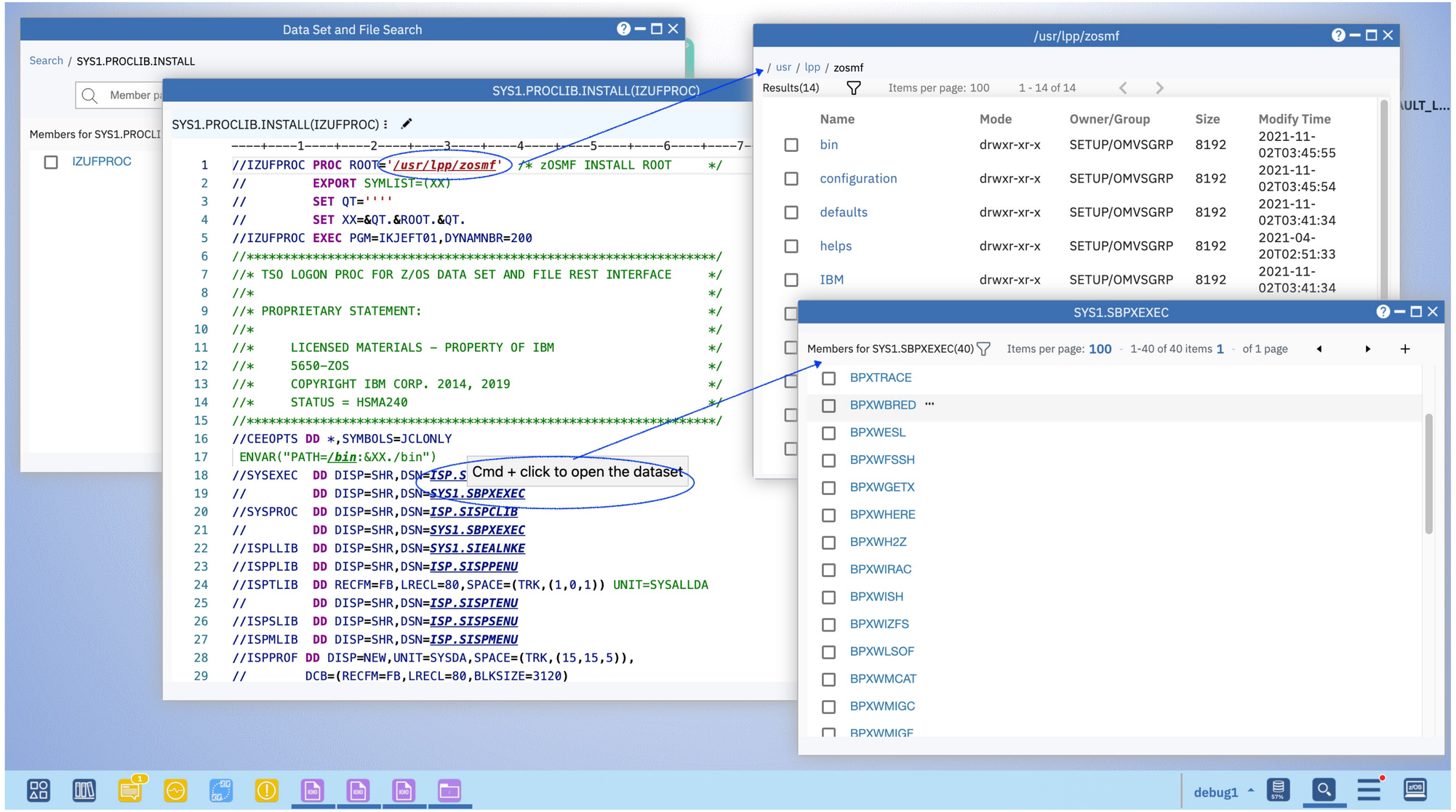
z/OSMF desktop UI

- Submit JCL and work with job outputs



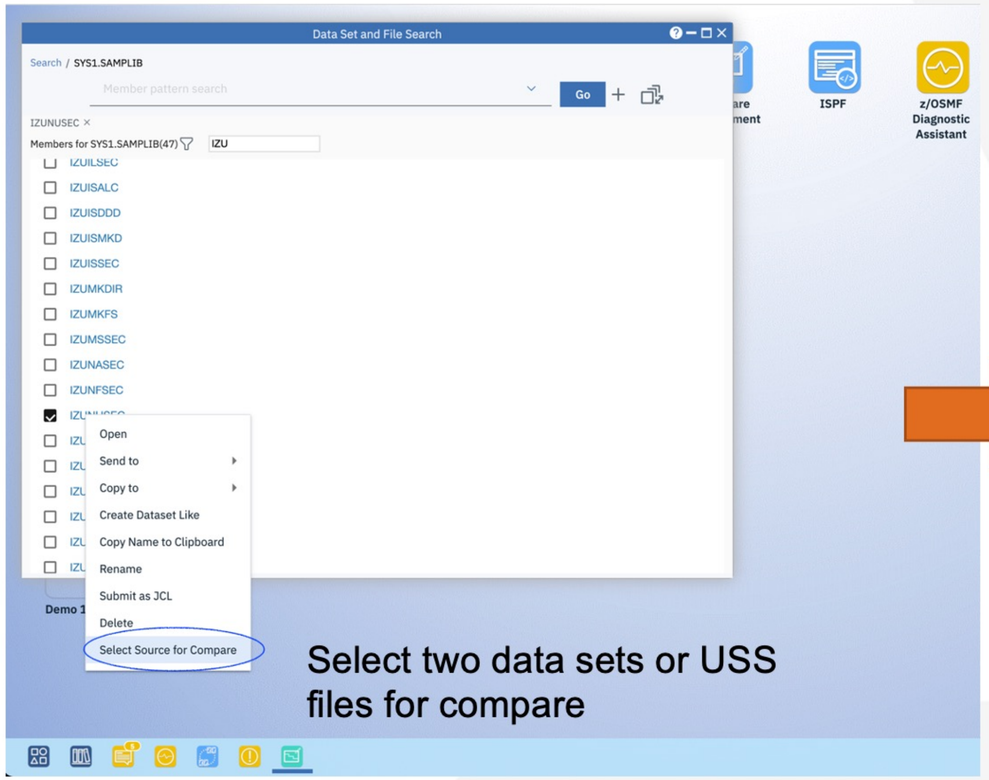
z/OSMF desktop UI

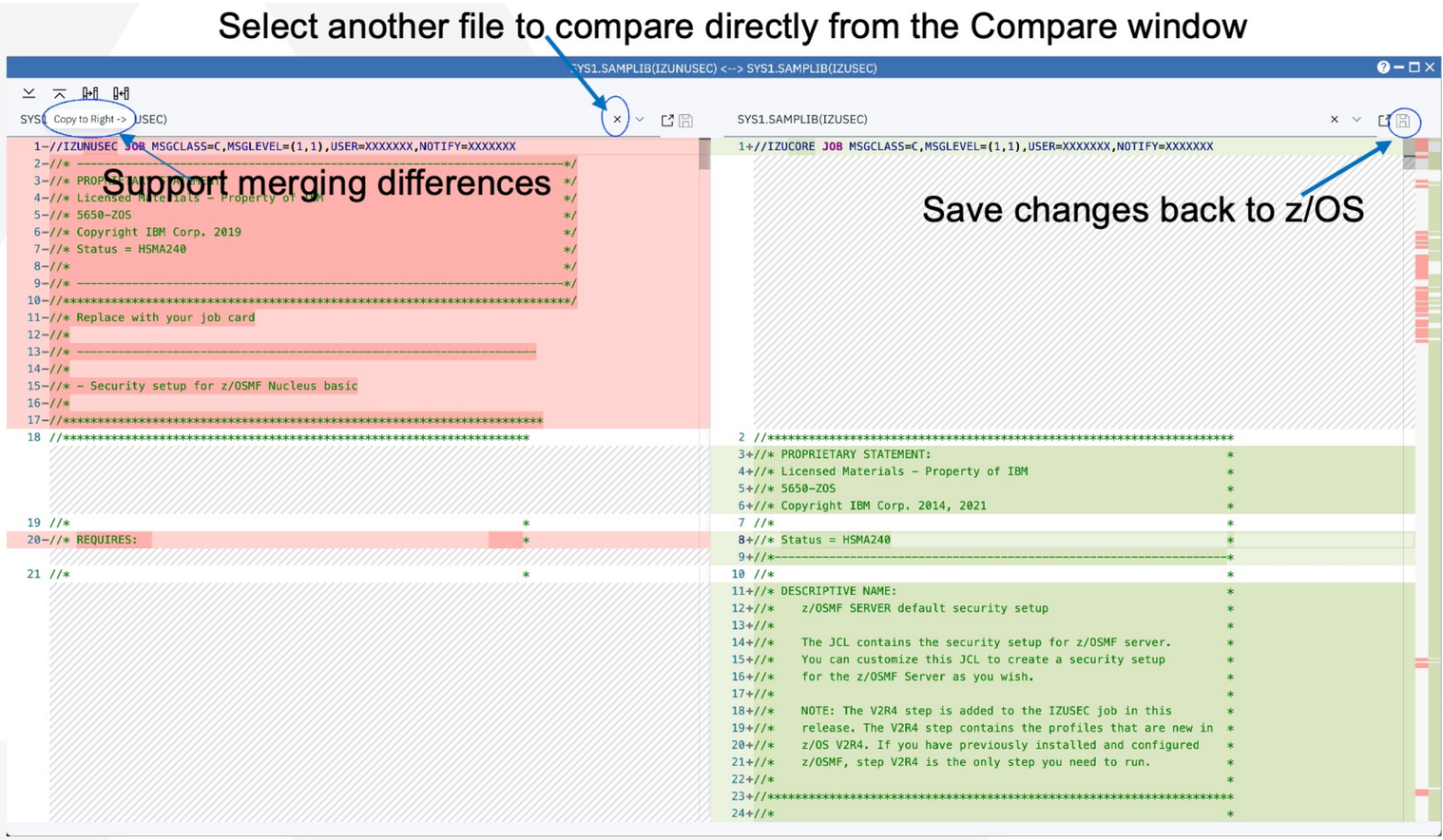
- Clickable references



z/OSMF desktop UI

- Compare

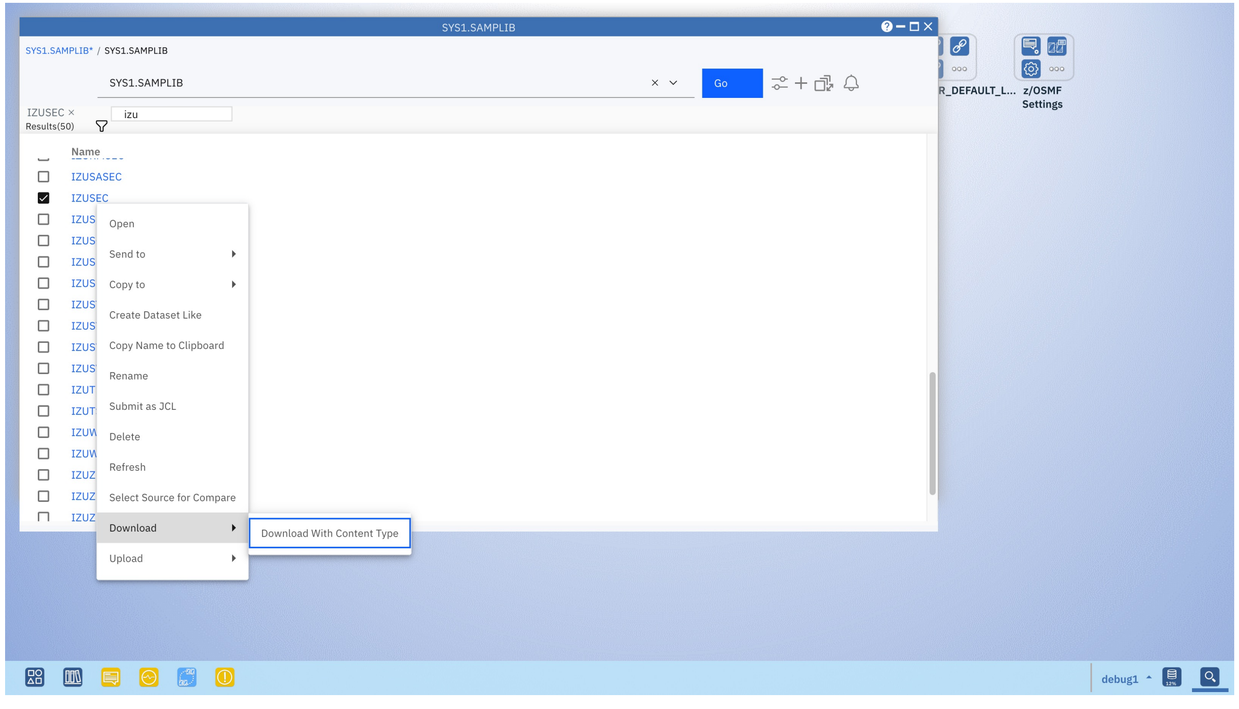




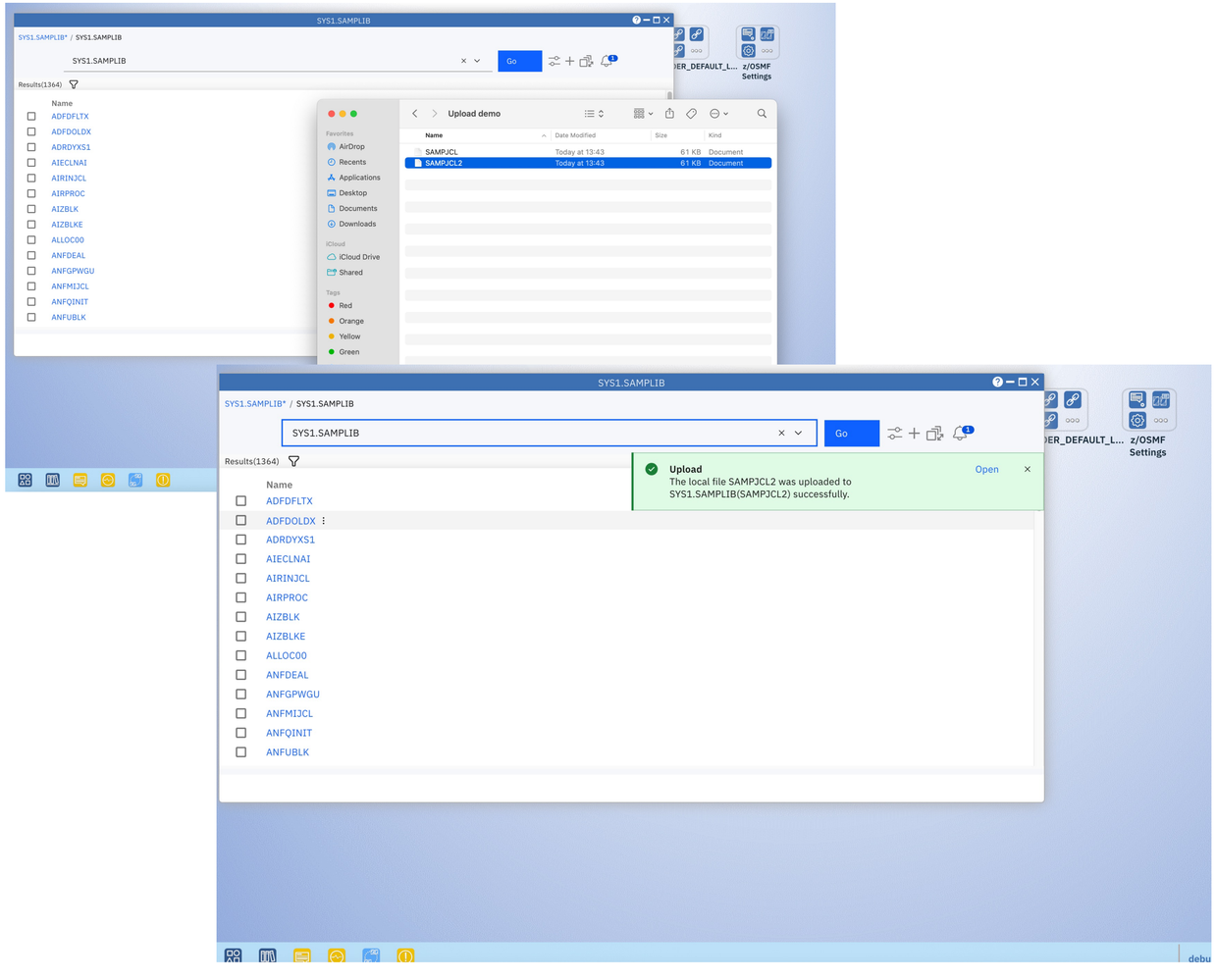
z/OSMF desktop UI

- Download or Upload data set or USS file

Download sequential data set or PDS/E member or USS file via context menu



Upload local file to z/OS with context menu or simply drag and drop

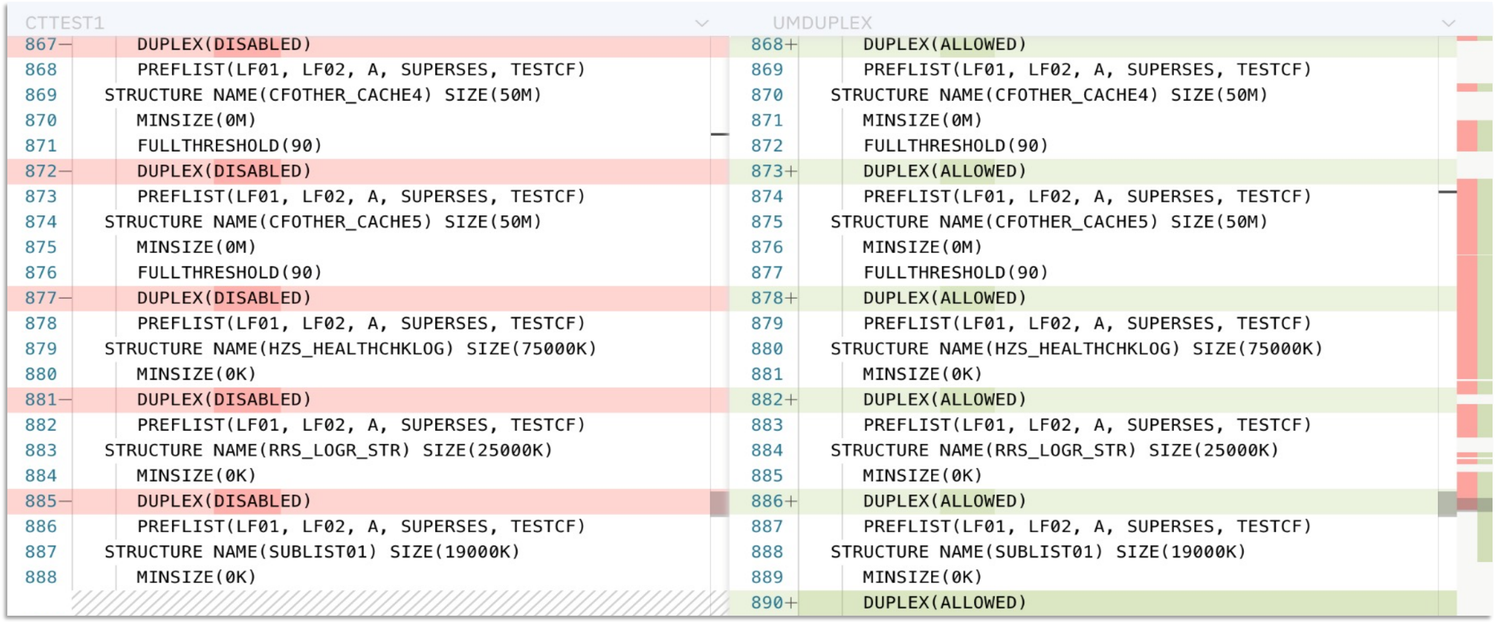


Sysplex Management

CFRM Policy Editor

CFRM Policy Editor provides a graphic interface to reduce the learning curve for editing CFRM policy and enable higher efficiency with less errors. With z/OS 3.1, functions include:

- Bulk editing and copy are supported to increase efficiency
- Built-in best practice to avoid human error
- Import CFRM policy from data set, USS file or JCL
- Export CFRM policy from CFRM Policy Editor to data set, CSV, or USS file
- Easily compare policies or show difference of policy change



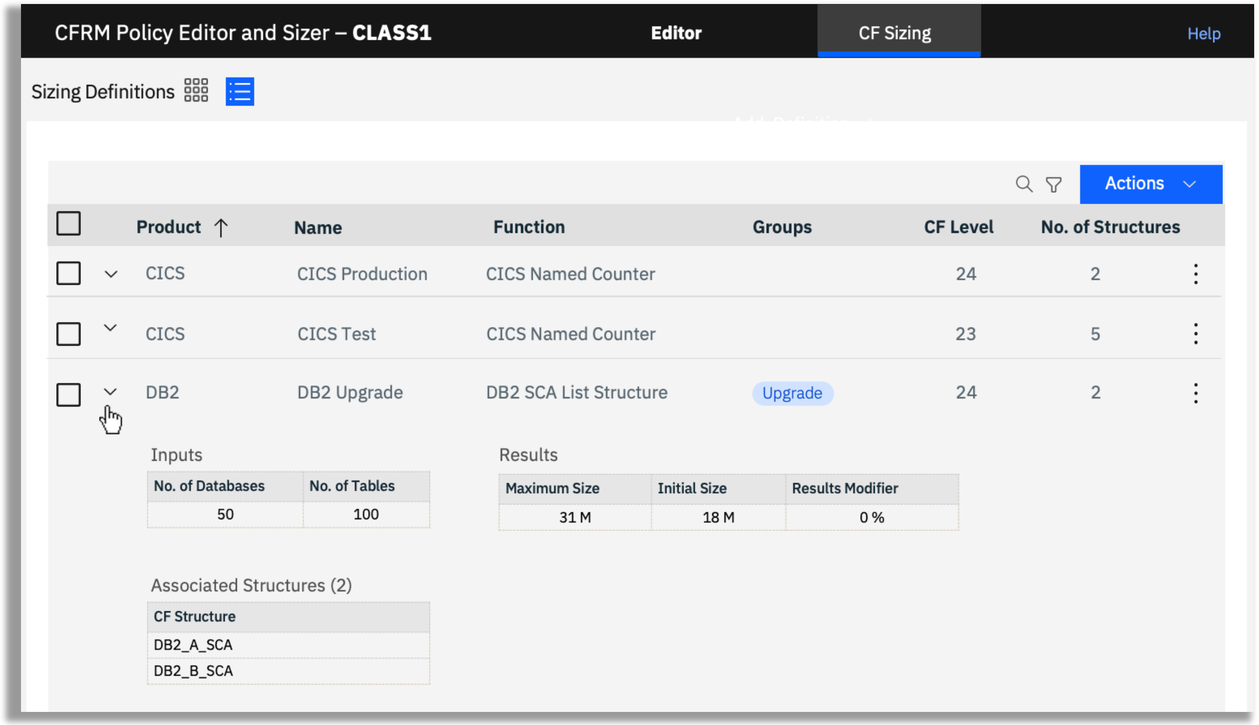
Select and compare two policies

"I've been working with sysplex for years! If the CFRM Policy Editor had been available back then, I wouldn't have so many gray hairs now. I would definitely recommend anyone that has to manage your CFRM policy to have a look at it [the CFRM Policy Editor]." – Frank Kyne, President Watson Walker

Sysplex Management
CF (Coupling Facility) Sizer

New and improved CF Sizer application integrated into the CFRM Policy Editor:

- Persistence of user sizing inputs
- Ability to map sizing inputs to (multiple) specific structures in a single action (bulk sizing)
- Define once, run sizing multiple times
- Minimize manual input
- Calculating structure sizings using CF levels that you already have or do not already have
- Flexible (ability to change CF Level)



Inputted parameters with calculated results

Why RESTful services?

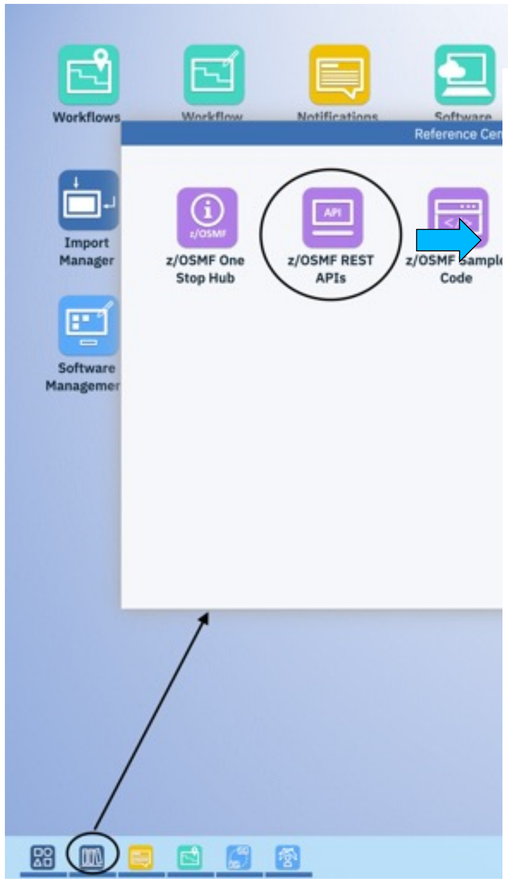
- Easy to call
- Could be driven remotely (via HTTPS) and securely
- Language and platform independent
- Exploiters could be anyone who can issue HTTP requests:
  - - Web application
  - - Stand alone application
  - - Mobile App

z/OSMF REST services

- z/OS jobs service
- z/OS data set and file service
- Application Linking Manager interface service
- TSO/E address space service
- Data persistence service
- Topology service
- Multisystem routing service
- z/OSMF workflow service
- Software Management service
- Notification service
- z/OS Operator Consoles services
- z/OS OPERLOG/SYSLOG services
- z/OS Symbol service
- Storage Management services
- Sysplex Management services

here

z/OSMF REST APIs support Open API specification



z/OSMF REST APIs

Discover REST APIs for z/OSMF

AMS APIs

Console Services APIs

PUT /zosmf/restconsoles/consoles/{consolename}

GET /zosmf/restconsoles/consoles/{consolename}/detections

GET /zosmf/restconsoles/consoles/{consolename}/solmsgs/{c

Dataset APIs

default

File APIs

Filesystem APIs

Information APIs

Jobs APIs

Notifications APIs

Published Software Catalog

Resource Management

Software Service Instance Names

Software Services Catalog

Software Services Registry

System Variables

TSO/E APIs

Workflow APIs

File APIs

Filesystem APIs

Information APIs

Jobs APIs

GET /zosmf/restjobs/jobs

Implementation Notes

You can use this operation to list the jobs for an owner, prefix, or job ID.

Response Class (Status 200)

On completion, the z/OS jobs REST interface returns an HTTP response with an array of matching jobs, each as a JSON job document.

Model | Example Value


```
{
  "application/json": [
    {
      "jobid": "JOB00023",
      "jobname": "TESTJOB2",
      "subsystem": null,
      "owner": "IBMUSER",
      "status": "OUTPUT",
      "type": "JOB",
      "class": "A",
```


Response Content Type application/json

Parameters

Parameter	Value	Description
owner		User ID of the job owner whose jobs are being queried; the default is the z/OS user ID. Folded to uppercase; cannot exceed eight characters. Wildcard characters are permitted in the owner and prefix query parameter values. Use an asterisk (*) for multiple characters, and a question mark (?) for a single character.
prefix	*	Job name prefix; defaults is *. Folded to uppercase; cannot exceed eight characters. Wildcard characters are permitted in the owner and prefix query parameter values. Use an asterisk (*) for multiple characters, and a question mark (?) for a single character.
jobid		Job ID. Folded to uppercase; cannot exceed eight characters. This query parameter is mutually exclusive with user-correlator.
max-jobs	1000	Maximum number of jobs returned. The value must be between 1 and 1000, inclusive. If this parameter is not specified, or is specified incorrectly, the default value of 1000 is us
user-correlator		The user portion of the job correlator. This value is 1 â€" 32 characters in length, where the first character must be uppercase alphabetic (A-Z) or special ($, #, @). The remainin combination of uppercase alphabetic, numeric (0-9), or special. Blank characters are not supported. This query parameter is mutually exclusive with jobid. This value is processed by the JES2 subsystem only; the JES3 subsystem does not process the correlator and, instead, indicates zero job matches. For a system with JES3 as t more JES2 secondary subsystems, the primary JES3 subsystem does not process the correlator, however, the JES2 secondary subsystems can process the correlator.'

Try it out!

PUT /zosmf/restjobs/jobs

DELETE /zosmf/restjobs/jobs/{correlator}

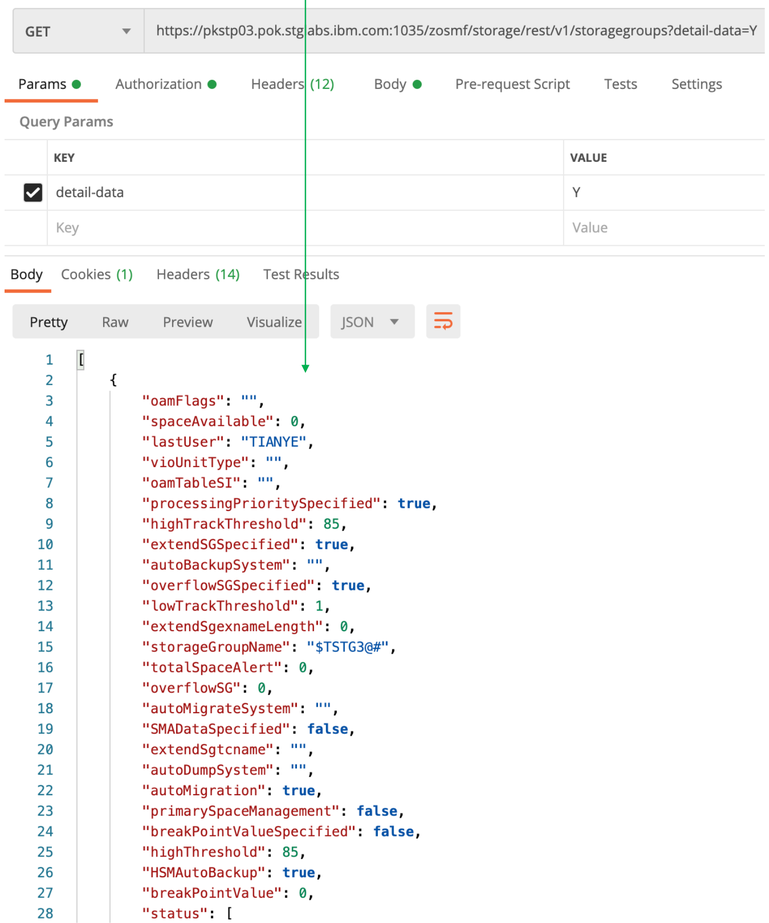
GET /zosmf/restjobs/jobs/{correlator}

PUT /zosmf/restjobs/jobs/{correlator}

GET /zosmf/restjobs/jobs/{correlator}/files

z/OSMF REST API sample

GET	/zosmf/storage/rest/v1/storagegroups	Get a list of storage groups that match specified storage properties.
GET	/zosmf/storage/rest/v1/storagegroups/{stg-name}	Get the storage group that matches a storage group name.
GET	/zosmf/storage/rest/v1/volumes	Get a list of volumes that match specified storage properties.
GET	/zosmf/storage/rest/v1/volumes/{volume-ser}	Get the volume that matches a volume serial number.




```
[
    {
        "oamFlags": "",
        "spaceAvailable": 0,
        "lastUser": "TIANYE",
        "vioUnitType": "",
        "oamTableSI": "",
        "processingPrioritySpecified": true,
        "highTrackThreshold": 85,
        "extendSGSpecified": true,
        "autoBackupSystem": "",
        "overflowSGSpecified": true,
        "lowTrackThreshold": 1,
        "extendSgexnameLength": 0,
        "storageGroupName": "$TSTG3@#",
        "totalSpaceAlert": 0,
        "overflowSG": 0,
        "autoMigrateSystem": "",
        "SMADataSpecified": false,
        "extendSgtcname": "",
        "autoDumpSystem": "",
        "autoMigration": true,
        "primarySpaceManagement": false,
        "breakPointValueSpecified": false,
        "highThreshold": 85,
        "HSMAutoBackup": true,
        "breakPointValue": 0,
        "status": [
            {
                "sysType": "1",
                "confirmedSmsStatus": "ENABLED",
                "sysName": "P00",
                "requestedSystemStatus": "ENABLED"
            },
            {
                "sysType": "1",
                "confirmedSmsStatus": "ENABLED",
                "sysName": "P01",
                "requestedSystemStatus": "ENABLED"
            },
            {
                "sysType": "1",
                "confirmedSmsStatus": "ENABLED",
                "sysName": "P02",
                "requestedSystemStatus": "ENABLED"
            },
            {
                "sysType": "1",
                "confirmedSmsStatus": "ENABLED",
                "sysName": "P03",
                "requestedSystemStatus": "ENABLED"
            },
        "libraryName": "",
        "updateDate": "2021/06/01",
        "intervalMigration": false,
        "spaceUsed": 0,
        "oamCycleStartTime": 0,
        "description": "ZOSMF API TEST",
        "storageGroupType": "POOL",
        "osmcSystemName": "",
        "vioMaxDss": 0,
        "processingPriority": 50,
        "guaranteedBackupFreqSpecified": true,
        "driveStartThresholdBit": 0,
        "extendSgtcnameLength": 0,
        "EAVTrackAllocThresholdSpecified": true,
        "tmsTotalSpaceAlert": 0,
        "lowThreshold": 1,
        "numberOfVolumes": 3,
        "guaranteedBackupFreq": 0,
        "updateTime": "22:00",
        "totalSpace": 0,
        "volumeFullThresholdBit": 0,
        "dumpClassesForAD": "",
        "targetCopySGSpecified": false,
        "thresholdsSpecified": true,
        "subsystemUse2": -20848,
        "subsystemUse1": 3,
        "extendSgexname": "",
        "autoDump": false,
        "libraryNameLength": 0,
        "oamCycleEndtime": 0
    },
```

z/OSMF Ansible collection “ibm_zosmf”

Red Hat Ansible Certified Content for IBM Z

The IBM z/OSMF Ansible collection provides a simple and consistent experience for Ansible users to drive z/OSMF REST APIs for z/OS operations and automation.

The “ibm_zosmf” collection drives z/OSMF REST APIs, including:

- Workflow operations (version 1.0 and above)
  - Drive a z/OSMF workflow to complete, Delete a workflow instance, Query workflow status, etc.
- Provision and Manage z/OS software instances via Cloud Provisioning and Management for z/OS
  - Provision or deprovision a z/OS middleware/software instance, start or stop the software instance, etc.
- Security validation based on SCA
- Security fix/provision based on SCA
- Software query based on z/OSMF Software Management

Available on both the Ansible Galaxy and Red Hat Ansible Automation Hub

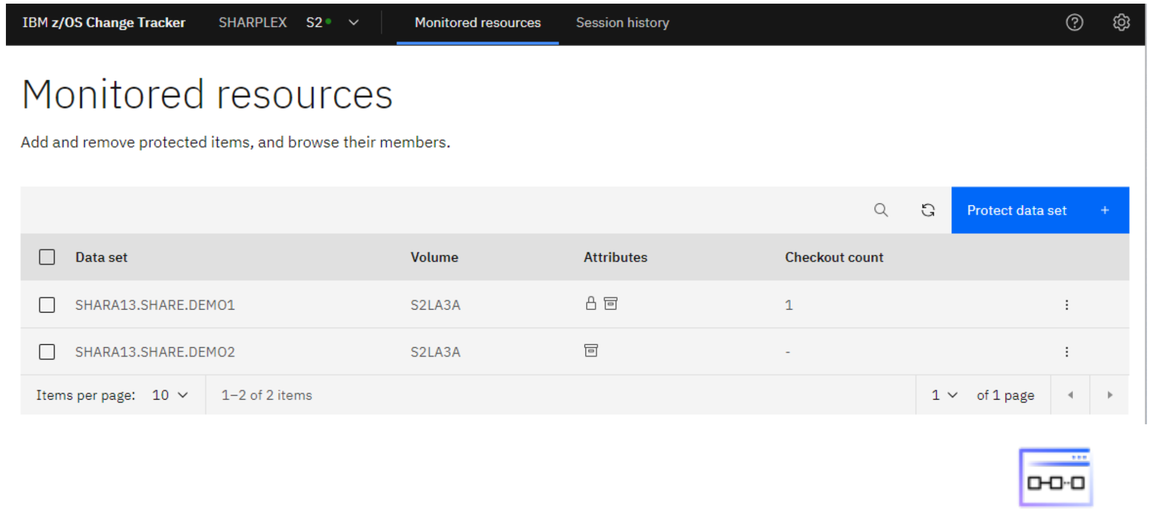
IBM z/OS Change Tracker

Software solution for system management

IBM z/OS Change Tracker is a comprehensive configuration change management tool for tracking, controlling, and managing changes in software across the z/OS platform

Real-time software configuration change tracking and control for system libraries	Identify and protect against undesired configuration changes	Enhance system resiliency with automatic data set versioning and recovery

IBM z/OS Change Tracker helps clients achieve a more secure, resilient IT system.

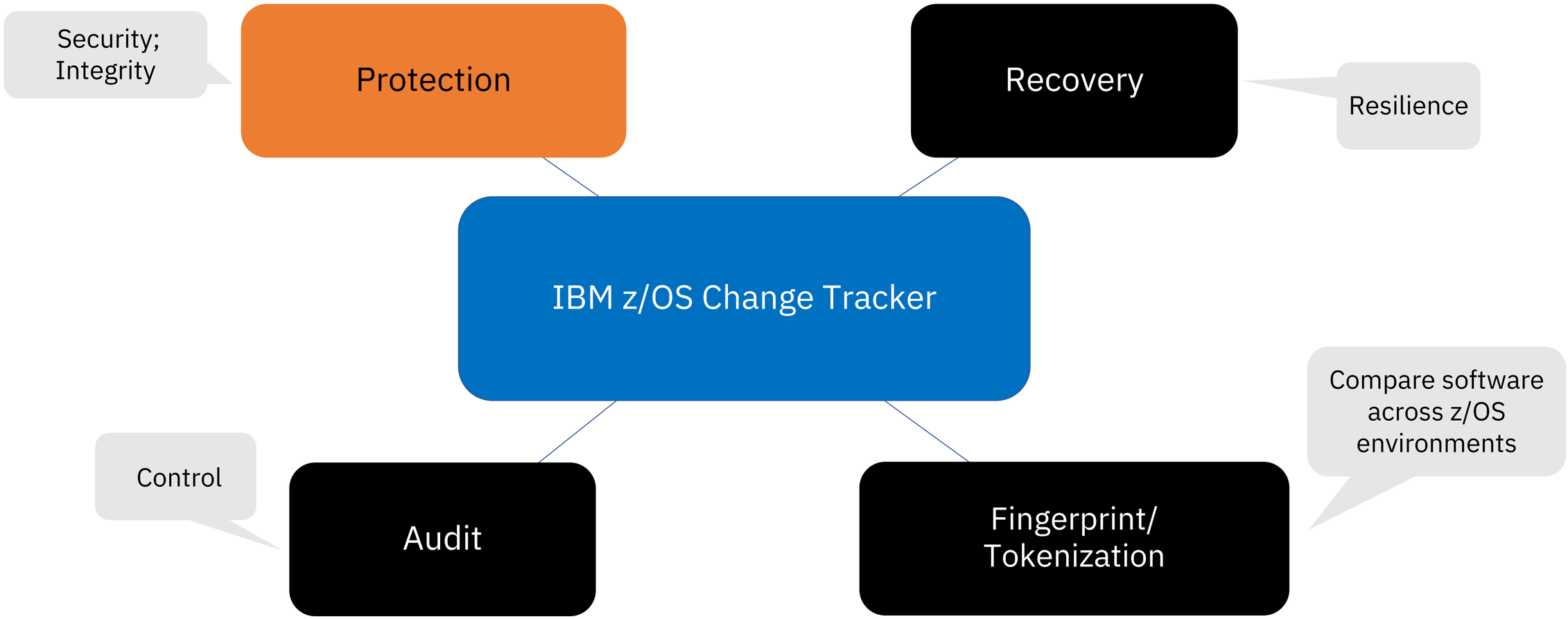


Now available as a new strategic Change Tracker plug-in on z/OSMF.

Self-service 90-day trial available with APAR PH51954.
For more information, visit the z/OS Change Tracker content solution page.

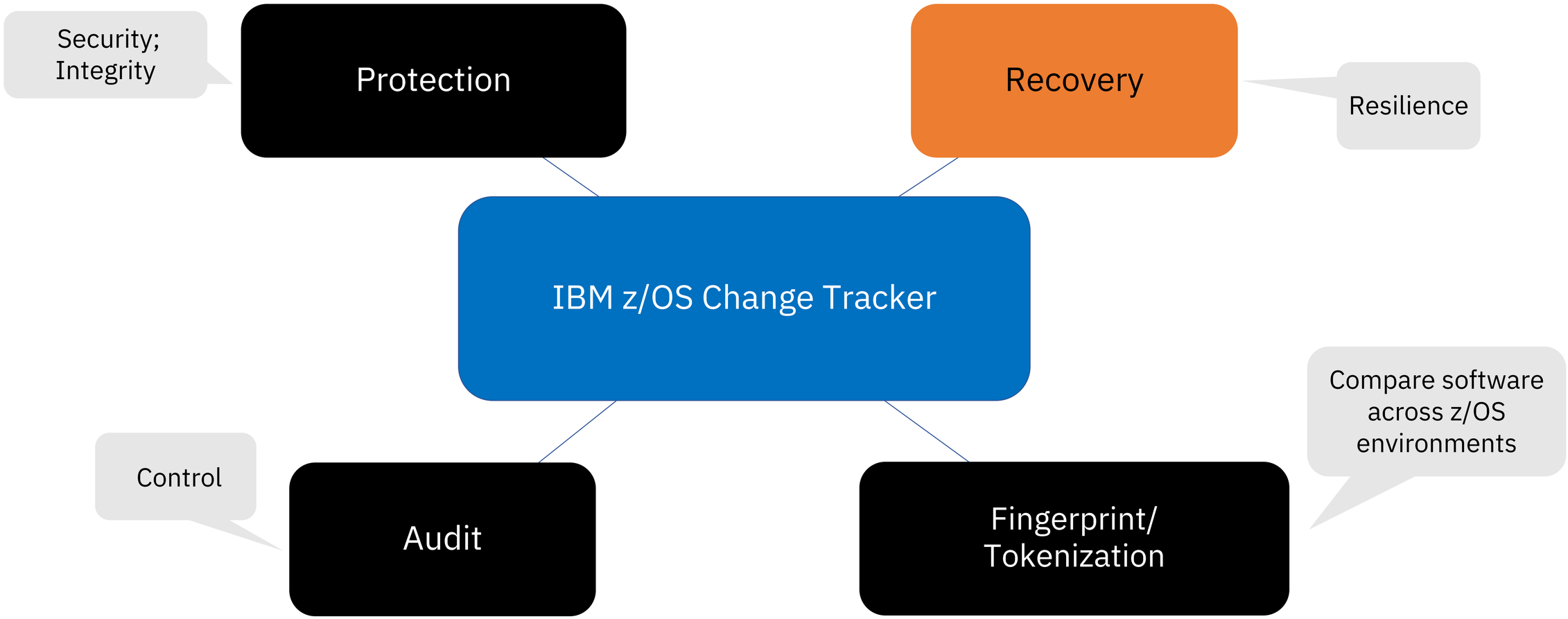
IBM z/OS Change Tracker core functions

Comprehensive software configuration management (SCM) tool for tracking, controlling, and managing changes in software



IBM z/OS Change Tracker core functions

Comprehensive software configuration management (SCM) tool for tracking, controlling, and managing changes in software



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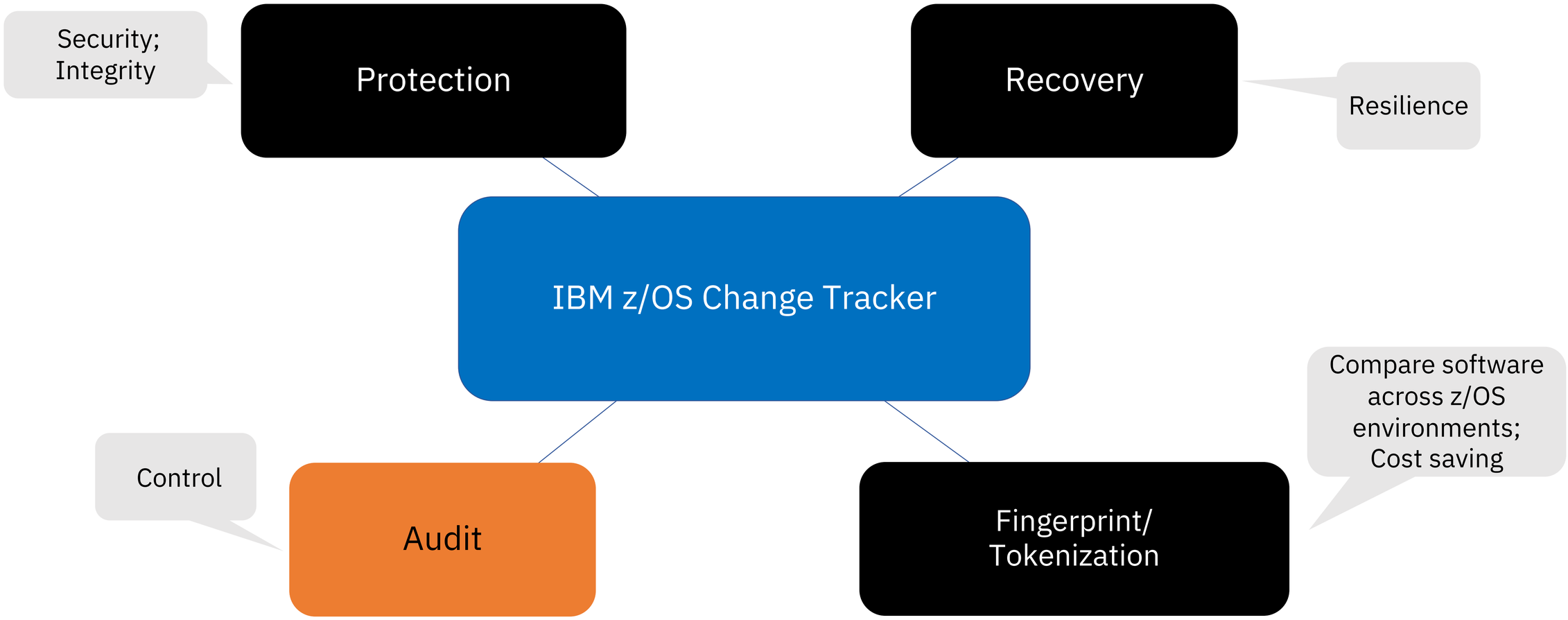
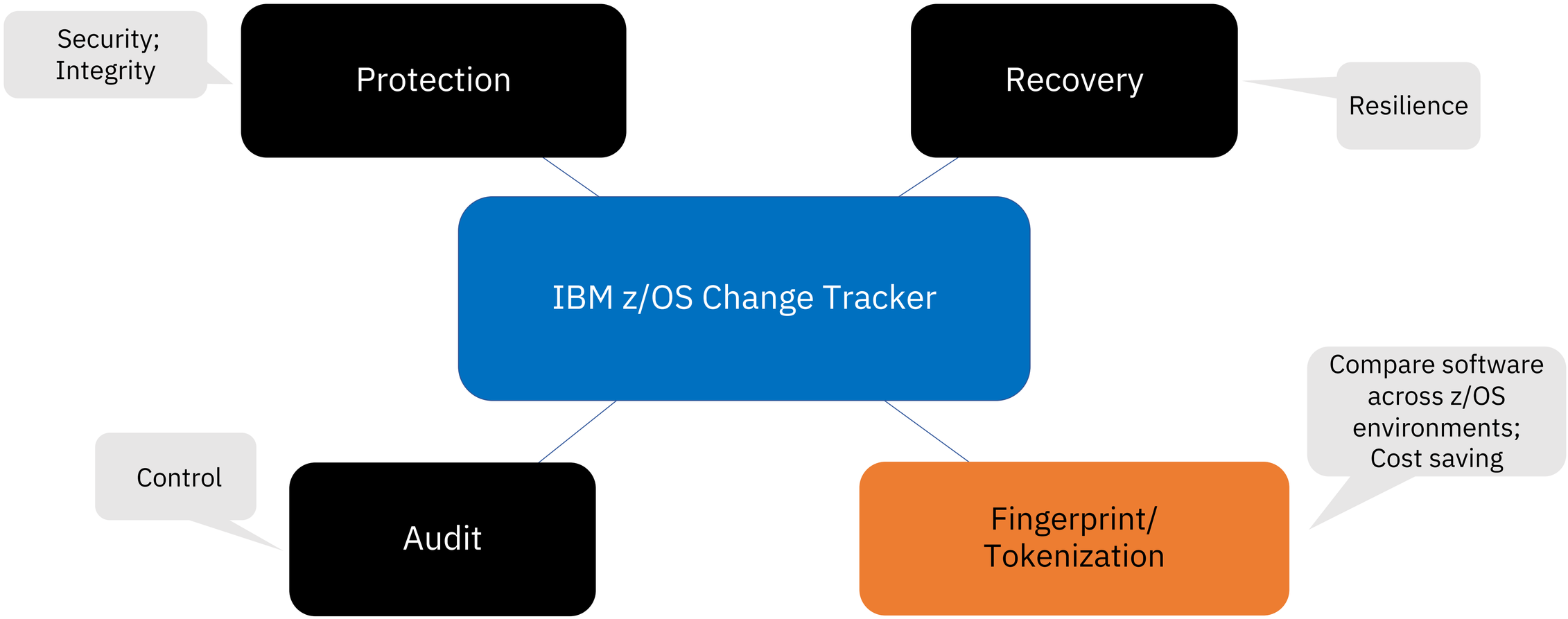


IBM z/OS Change Tracker core functions

Comprehensive software configuration management (SCM) tool for tracking, controlling, and managing changes in software



Application Modernization

z/OS 3.1 is designed for clients to leverage industry standard technology to increase development velocity and modernize their applications with new environments and APIs to consistently build, deploy, and manage workloads, both Linux and z/OS, across a hybrid cloud environment:

Including:

- z/OS Container Extensions (zCX)
- zCX Foundation for Red Hat OpenShift
- COBOL-Java interoperability
- Data Set File System
- Union file system (UFS)
- IBM Semeru 11 support
- z/OS Unix

z/OS Container Extensions

Run Linux containerized workloads on z/OS

z/OS Container Extensions provides a virtual appliance for running Linux on Z workloads on z/OS 3.1:

- The **same binary** container images that run on Linux on Z under z/VM or zKVM will run in zCX
- No porting is typically required from Linux on Z

Scalable to:

- Up to 64 servers per z/OS image
- Up to 1 TB of guest memory per server
- Up to 245 virtual devices per server
- Disk devices up to 1TB each
- Up to 1000 containers per server
- zIIP eligibility - 98%+ ziip offload in lab measurements*

(A self-service 90 day trial is available to all z/OS customers.)

For more information, see the zCX content solution

IBM zCX Foundation for Red Hat OpenShift (zCX for OpenShift)

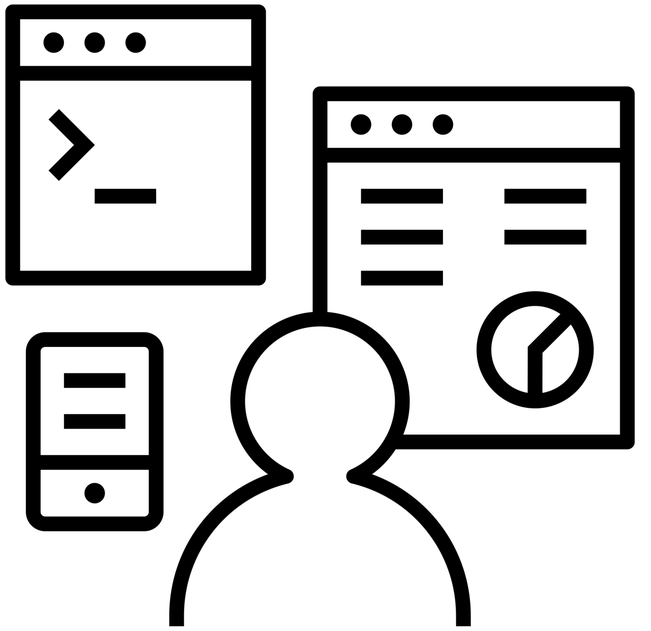
Run Red Hat OpenShift on z/OS using zCX

Enterprise-ready Kubernetes	Inherit Disaster Recovery	Operational management consistent with z/OS	Co-location (off platform)
zCX for OpenShift leverages Red Hat OpenShift, which is an enterprise-ready Kubernetes container platform built for an open hybrid cloud strategy. It provides a consistent application platform to manage hybrid cloud, multi-cloud, and edge deployments.	zCX Foundation for Red Hat OpenShift benefits from z/OS Qualities of Service (QoS) and provides automatic, integrated restart capabilities for site failures (using z/OS DR/GDPS).	zCX Foundation for Red Hat OpenShift has consistent operational management that is in line with z/OS, making it a seamless integration to leverage zCX Foundation for Red Hat OpenShift in your current z/OS environment.	zCX Foundation for Red Hat OpenShift provides the opportunity to co-locate certain applications and workloads closer to z/OS. This allows applications accessing z/OS data to be as close as possible and help minimize network latency.

With z/OS 3.1, clients that are licensed to deploy and use IBM Storage Fusion (5900-AOY) today can enjoy the benefits of enterprise-grade data storage and protection services on IBM zCX for OpenShift running on z/OS.

For more information, visit the zCX for OpenShfit content solution page.

COBOL-Java Interoperability



Modernize existing high-level language applications, such as COBOL/ Java™ interoperability, with support to manage parallel 31-bit and 64-bit addressing modes within the same address space.

This enables application developers with full application transparency, simplifying enterprise application modernization.

With z/OS 3.1:

- The IBM Semeru Runtime Certified Edition for z/OS Version 11 (Java) has been enhanced so that 31-bit COBOL applications can be extended to call 64-bit Java programs using the IBM Semeru Runtime.
- In addition, z/OS Language Environment new callable services CEEMICT/__le_ceemict() are introduced for high-level language applications such as COBOL, PL/I, Java, and others to determine whether they are running in the 31-bit or 64-bit interoperability environment.

Data Set File System

z/OS 3.1 has provided a new physical file system that renders traditional z/OS data sets accessible by programs, shell scripts, and end users of z/OS UNIX System Services.

- Designed for z/OS UNIX applications, tools, and utilities to provide transparent access to data in these data sets in a secure and consistent manner.
- Allows specification of multiple data set qualifiers for the high-level qualifier (HLQ) directory, which is designed to make it easier to manage and use data sets that are part of a large set under a single high-level qualifier. This reduces the scope of data sets being accessed by the application.

Union File System (UFS)

z/OS 3.1 has provided a UFS that works on top of other file systems:

- It enables a user to obtain a merged view of one more directories.
- Gives a single coherent and unified view of files and directories.

Union file systems are used extensively by containers.

- They allow many containers to use one image without having to make multiple copies, thereby saving on disk space.

Rather than porting, this UFS is purposefully built for z/OS.

IBM Semeru Support

z/OS 3.1 and Java

- z/OS 3.1 supports Semeru 11 as the minimum required Java level for z/OS itself (*1)
    - Java 8 support for application compatibility
- IBM Semeru Runtime Certified Edition for z/OS, Version 17 anticipated to be required in the lifecycle of z/OS 3.1 in the future

Java service stream updates

- See features blog for latest service release levels
- Java on z/OS security providers are available for download (link)
- Installing Semeru 11 via Installation Manager now available (link)

Ecosystem support of Semeru 11 on z/OS – Liberty, CICS, IMS, Db2, MQ, etc (link)

Celebrating 25 Years of Innovation: Java on z/OS – see more details here

*1 Java 8 is still required for Capacity Provisioning Manager, XML System Services, and Infoprint Server

New Zsh shell

- In z/OS 3.1, we have now introduced. We have ported:
  - Zsh 5.8.1 - exclusively available with z/OS a new shell3.1

- Zsh is a new and modern shell. It is is known for its extensibility, good customization, and advanced features.
- Zsh is very compatible with Bash. It has many features like Bash but some features of Zsh make it better than Bash, such as spelling correction, cd (change directory) automation, etc...
- In order to provide more modern and powerful shell on z/OS, making Zsh available on z/OS is an important step in z/OS modernization.

Security

z/OS security is enhanced to provide an ever-greater defense-in-depth functionality that is focused on mitigating the increased risk to data privacy and protection with overall system hardening. With additional simplification enhancements and compliance support, z/OS 3.1 enables clients in leveraging functions such as the following:

- z/OS Package Signing
- Validated Boot for z/OS
- Integrated Cryptographic Service Facility (ICSF)
- RACF
- z/OS Authorized Code Scanner and Monitor
- System SSL and AT-TLS
- Compliance support

Digital signatures for software packages

Providing higher standards for security and integrity of z/OS software packages

To provide higher standards for security and integrity of z/OS software packages delivered to clients, z/OS SMP/E and z/OSMF Software Management provide the capability to digitally sign and verify the signature of GIMZIP packages of software that may be delivered both electronically and physically, on all supported z/OS releases.

This capability, designed for nonrepudiation and authenticity, ensures that a software package has not been modified since it was created and the package was signed by the expected provider

In z/OS 3.1, IBM has signed the following software packages thus far to allow clients secure coverage for z/OS software deliverables:

- z/OSMF ServerPac portable software instances, all electronic and DVD packages for all products in all System Release Identifiers (SRELs)
- CBPDO – all electronic and DVD packages for all products in all SRELs

(With z/OS 3.1, IBM will ship z/OS 3.1 ServerPac and PTF’s with a signature that clients can verify.)

See the Preparing to verify signatures for GIMZIP packages web page to learn how to verify signatures.

Validated Boot for z/OS

Detect unauthorized changes to software executables

With z/OS 3.1 and the IBM z16, IBM has provided basic support for performing an optional Validated Boot (IPL) of z/OS systems, using IPL volumes defined and built on ECKD DASD devices.

The solution uses digital signatures to provide an IPL-time check that the z/OS system is intact, untampered with, and originates from a trusted source from the time at which it was built and signed. This enables the detection of subsequent unauthorized changes to those software executables, whether those changes be accidental or malicious in nature.

- When the target system is built and digitally signed as part of the client's secure build process, the target system can be IPLed using List-Directed IPL (LD-IPL) with digital signature validation in either Enforce or Audit mode, or IPLed without digital signature validation using CCW-IPL.
  - In Enforce mode, an IPL will terminate if there are validation failures for any of the load modules protected by Validated Boot or if the necessary configuration requirements are not met.
  - In Audit mode, the IPL will continue, but audit records will be produced to describe the validation problems encountered.

To learn more about Validated Boot for z/OS, see the Validated Boot for z/OS content solution web page.

The IBM Z and LinuxONE Security Portal

IBM utilizes internal and external sources to uncover potential vulnerabilities. IBM Z offers a Security Portal that allows clients to stay informed about patch data, associated Common Vulnerability Scoring System (CVSS) ratings for new APARs and Security Notices to address highly publicized security concerns.

See more at: https://www.ibm.com/it-infrastructure/z/capabilities/system-integrity

Authorized programs on z/OS and their associated application programming interfaces are critical to that integrity. These include authorized programs from:

- IBM
- The z/OS ecosystem
- In-house code specific to a client's enterprise

z/OS Authorized Code Scanner (zACS)

Authorized (critical) code needs a purpose-built scanner.

The IBM z/OS Authorized Code Scanner (zACS) is an optional priced feature of z/OS version 2 release 4 and above. It dynamically scans the client's authorized code and provides diagnostic information for subsequent investigation as needed.

Scanning includes:

- Program Calls (PCs)
- Supervisor Calls (SVCs)
- AC(1) load modules from batch
- AC(1) load modules from USS

This feature now also includes a production-side integrity monitor

Potential vulnerabilities detected can have CVSS scores of 6.5 or 8.8 (See https://www.first.org/)

IBM z/OS Authorized Code Monitoring (zACM)

The IBM z/OS Authorized Code Monitor (zACM)…

- Included as part of the zACS optional priced feature
- Runs as a separate started task
- Feeds off z/OS recovery processing non-invasively
- Unlike zACS, can be run on production systems!
- zACM output is similar to the output from zACS

Updated documentation found at

http://www.ibm.biz/zACSdoc2022

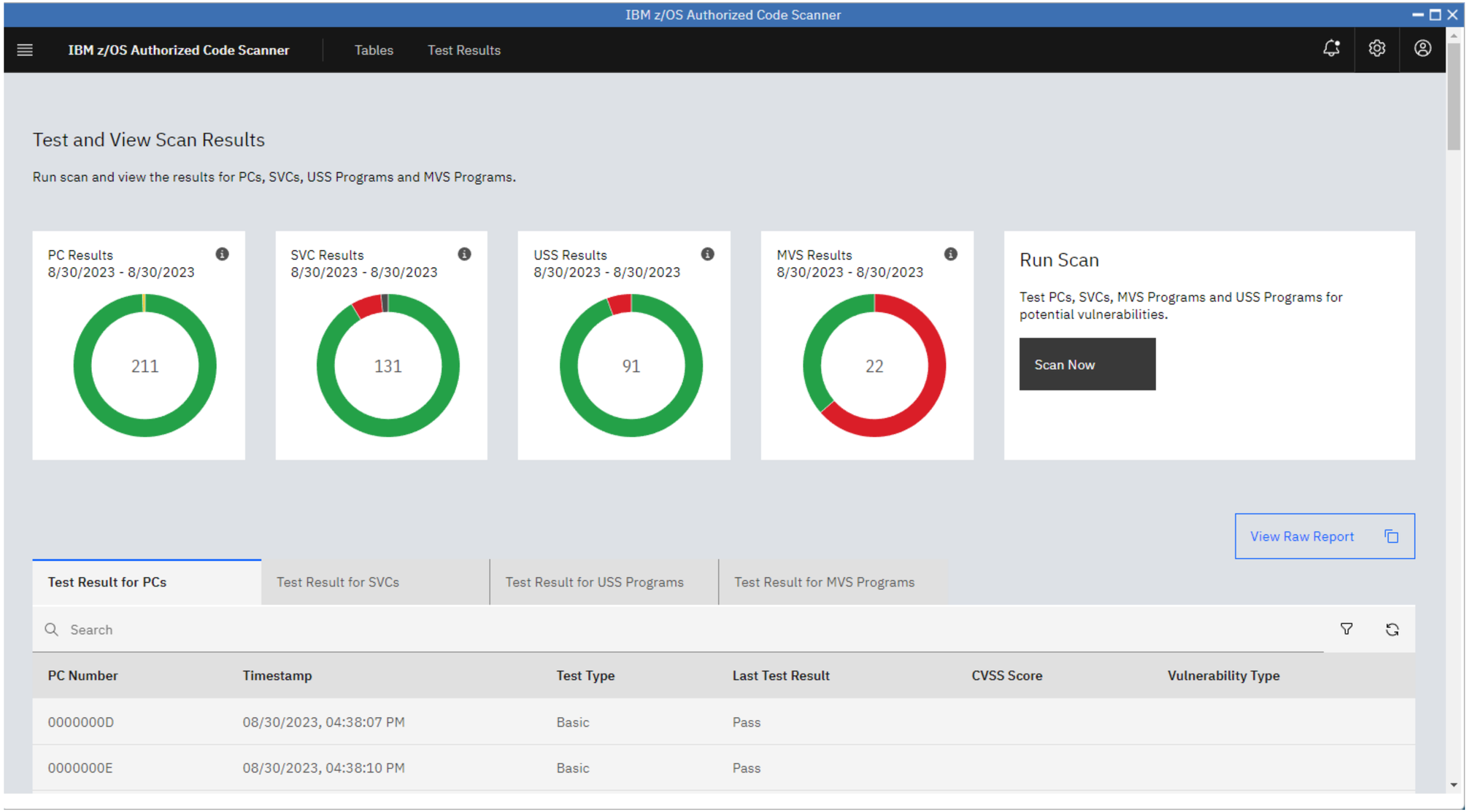
Sample Vulnerability Output

```
TEST IN PROGRESS ON 2020/06/22 AT 09:55:51 FOR PC 001080700 00000001
*** POTENTIAL VULNERABILITY FOUND IN PC 00180700 00000001 ***
ABEND COMPLETION CODE: 0C4000  REASON CODE: 00000011
PSW: 070C6000 8906F39A. MODULE: PVTMOD=(BPNTEST,0000139A)
INSTR LEN: 06. FAILING INSTR: B048 9A33 B04C D203 2000 3000
TRASNLATED INSTR: MVC     0(4,R2),0(R3)
TARGET ADDRESS CAUSING TRANSLATION EXCEPTION: 00000000_7FFFF401
CVSS: 8.8 (CVSS:3.0/AV:L/AC:L/PR:L/UI:N/S:C/C:H/I:H/A:H)
SLIP SAMPLE FOR PC 00180700 00000001:
SLIP SET,COMP-0C4,P=(BPNTEST,0000139A),SDATA=(TRT,RGN,SUM,CSA),END
+-----------------------------------------+
|General Registers before the service.    |
+-----------------------------------------+
|  R0:00000000_7FFFF7FF   R1:00000000_0006E000  |
|  R2:00000000_7FFFF7FF   R3:00000000_7FFFF7FF  |
|  R4:00000000_7FFFF7FF   R5:00000000_7FFFF7FF  |
|  R6:00000000_7FFFF7FF   R7:00000000_7FFFF7FF  |
|  R8:FFFFFFFF_00000000   R9:FFFFFFFF_005C6E08  |
|  RA:FFFFFFFF_005C6E00   RB:00000000_00043E58  |
|  RC:00000000_00071640   RD:00000000_7FFFF7FF  |
|  RE:00000000_7FFFF7FF   RF:00000000_7FFFF7FF  |
+-----------------------------------------+
```

Highlights:

- **Module & offset**
- ABEND code & reason
- PSW
- Assembler translation
- Target address
- Possible CVSS score
- SLIP sample
- General Regs
- Access Regs if applicable

z/OS Authorized Code Scanner (zACS)



The mockup screenshot above reflects how zACS would report potential vulnerability disoveries.

z/OSMF plugin now available via APAR OA64232, PTF UJ93434 supporting z/OS V2R4 and above.

Full documentation for zACS can be found here.

No-cost 90-day trial available.

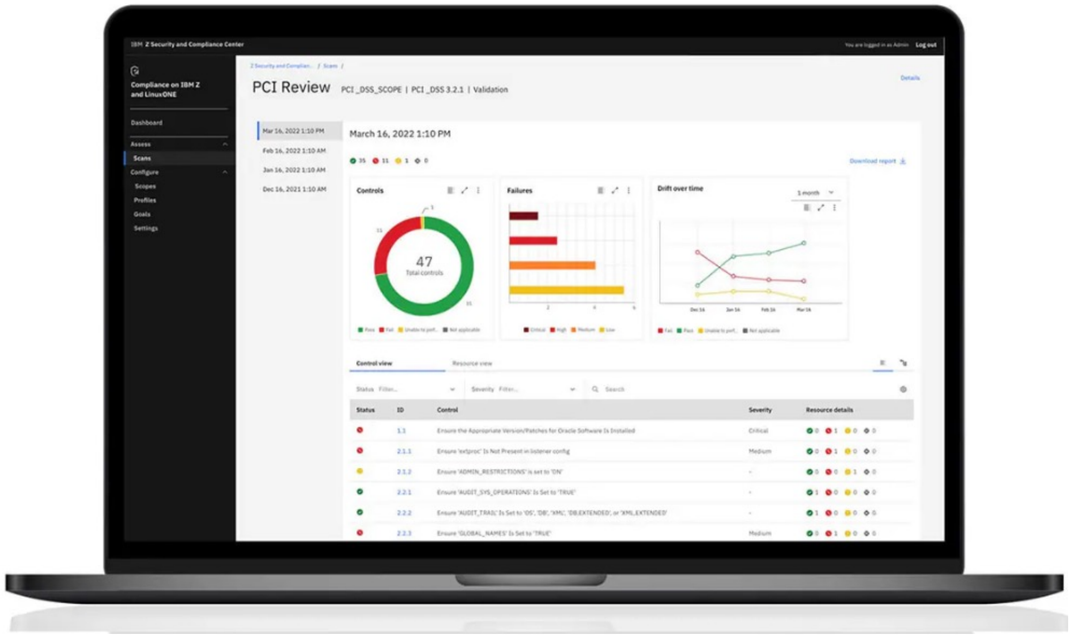
Compliance support for z/OS

Simplified collection and reporting of critical data

Using new SMF 1154 record subtypes and modernized reporting, z/OS 3.1 is enhanced to collect the following compliance evidence data:

- IBM z16 CP Assist for Cryptographic Function (CPACF) counters.
- ICSF crypto software usage tracking health checks that are established to monitor the state of ICSF and deliver a warning when ICSF is not available.
- Compliance-related evidence from several z/OS products and components including TCP/IP, FTP, TN3270E, CSSMTP, ICSF, CICS, Db2, XES/XCF, RACF, and JES2.

The new SMF 1154 records can be consumed by solutions, such as the IBM Z Security and Compliance Center .



IBM Z and LinuxONE Security and Compliance Center

Integrated Cryptographic Service Facility (ICSF)

With z/OS 3.1 a crypto administrator can leverage z/OS advancements in quantum-safe encryption for both data at rest and in flight with simplified crypto interfaces:

- Distribution of Master Key Ownership
  - Allows customers to distribute the ownership of key parts across multiple users when using ICSF panels to enter master keys
  - Controlled with a new SAF profile in the XFACILIT class.
  - Users can be permitted to enter the FIRST, MIDDLE, or FINAL master key parts individually.
  - Can also be separately permitted to the RESET capability.

- BCRYPT Hashing
  - The CSNBOWH callable service has been updated to support the BCRYPT hashing algorithm.

TLS V1.3
Sysplex Session Ticket Caching

System Secure Sockets Layer (SSL) is enhanced to provide support for TLS V1.3 sysplex session ticket caching:

- The TLS V1.3 sysplex session ticket caching support allows the ability for handshake session ticket information to be shared among like servers listening on the same port within a single system or servers across multiple systems in a sysplex.
- Sharing of the session information provides the ability to perform TLS V1.3 resumption (abbreviated) handshakes instead of full handshakes when a client is resuming connections.

Resource Access Control Facility (RACF)

Continuing the pervasive encryption roadmap

RACF Database Encryption

- RACF supports the encryption of a RACF database which will be migrated to VSAM linear data set format. With this support, the RACF VSAM data set can be shared among z/OS systems in additional specified configurations.

RACF Password Phrase Interval

- RACF provides a password phrase change interval, that is separate from the password interval, and can be set above the system limit for individual users.

Custom Fields in the ACEE

- Allows security administrators to identify the user-related custom fields that should be anchored in the user's Accessor Environment Element (ACEE) at logon time. Problem-state applications can retrieve this information using the R_GetInfo callable service (IRRSGI00) without incurring RACF database I/O

Cyber Resiliency

High-performing infrastructure components that can help to achieve heightened levels of service availability, reduce or eliminate the impact of disruptions, improve capabilities for diagnosing and recovering from anomalous behavior, and support business continuity throughout the enterprise

Including:

- RMF user interface
- z/OS Workload Interaction Correlator
- System Recovery Boost
- zAIOps and Runtime Diagnostics integration

IBM Resource Measurement Facility – RMF Priced Feature

- A new browser-based UI based on Open Source Grafana is available for monitor III metrics and reports
- Grafana has many libraries of open-source visualization widgets including bar charts, line charts, timeline visualization etc.
- The new UI is designed to support setting thresholds and issuing alerts
  - A rich array of alerting mechanisms is available
  - Configurable duration of a time-slice
  - Data from various sources can be integrated into the dashboard
- A new DDS server which is designed to exploit 64 bit addressing and additional security options
  - The new DDS server is zIIP eligible
  - Options exist to output data from the DDS server in JSON format to ease integration into other modern tooling
- RMF is enhanced to report on crypto express 8S card (CD)
- RMF monitor III has been enhanced to show all logical partitions of a CPC and allows machine configurations up to 256 physical processors (CD)

Advanced Data Gatherer – new Feature

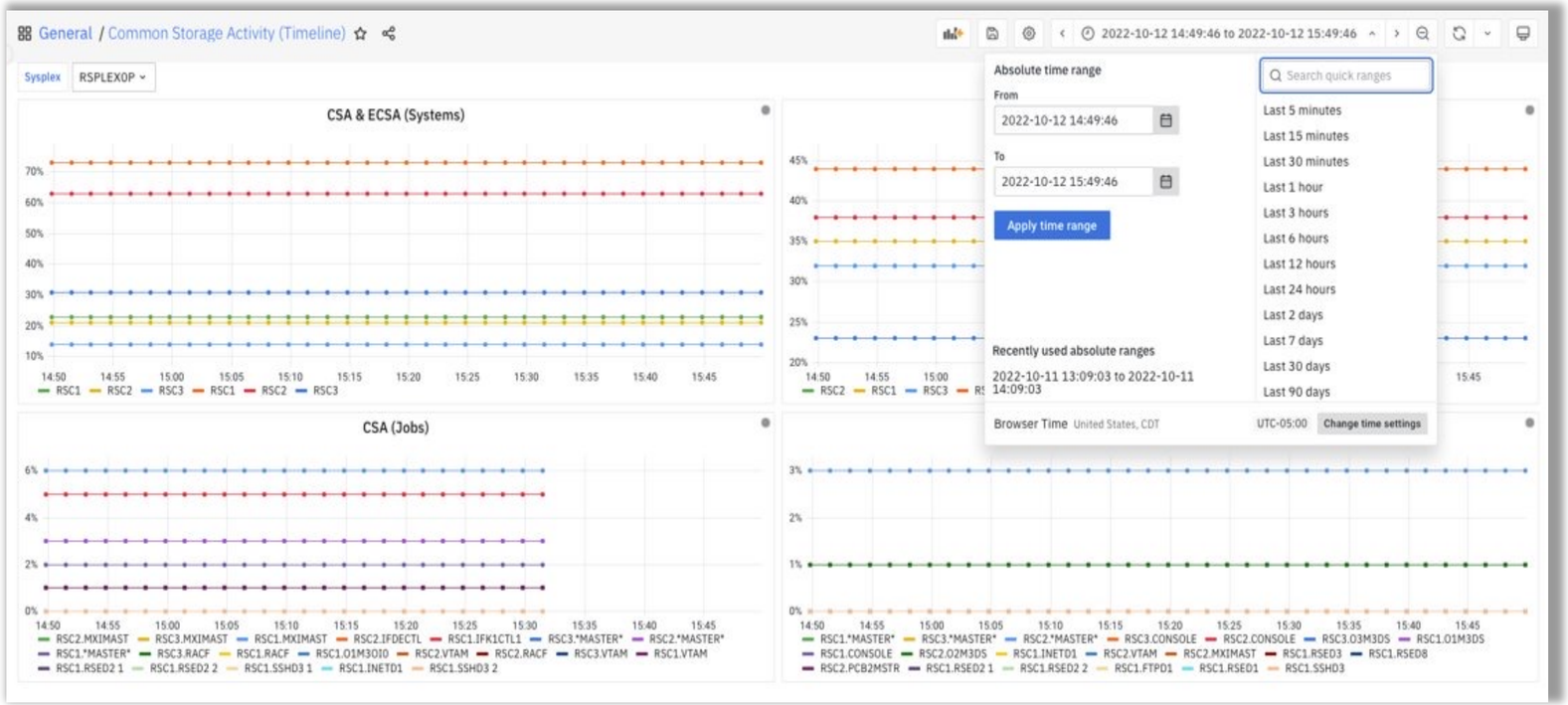
- The z/OS Advanced Data Gatherer (ADG) is a priced feature in z/OS 3.1
- All customers of RMF are entitled to this priced feature
- The data gatherer base element will generally be running all the time to capture utilization information
  - This usage is entitled with base z/OS
- In “advanced” mode it will also capture detailed performance information required by performance monitors like RMF.
  - Advanced mode is a priced feature

Resource Measurement Facility (RMF)

In z/OS 3.1, RMF is enhanced with a new modern Grafana- based user interface that supports both Monitor III Metrics and Reports. The user interface enables threshold configuration for various metrics and alerting. With thresholding functionality, the users can achieve better metric visualization to get insights into anomalous behavior.

Alerting capabilities support proactive management by defining actions based on one or more metrics from RMF and other sources. The user may access the Grafana interface directly or through the existing z/OSMF RM plug-in.

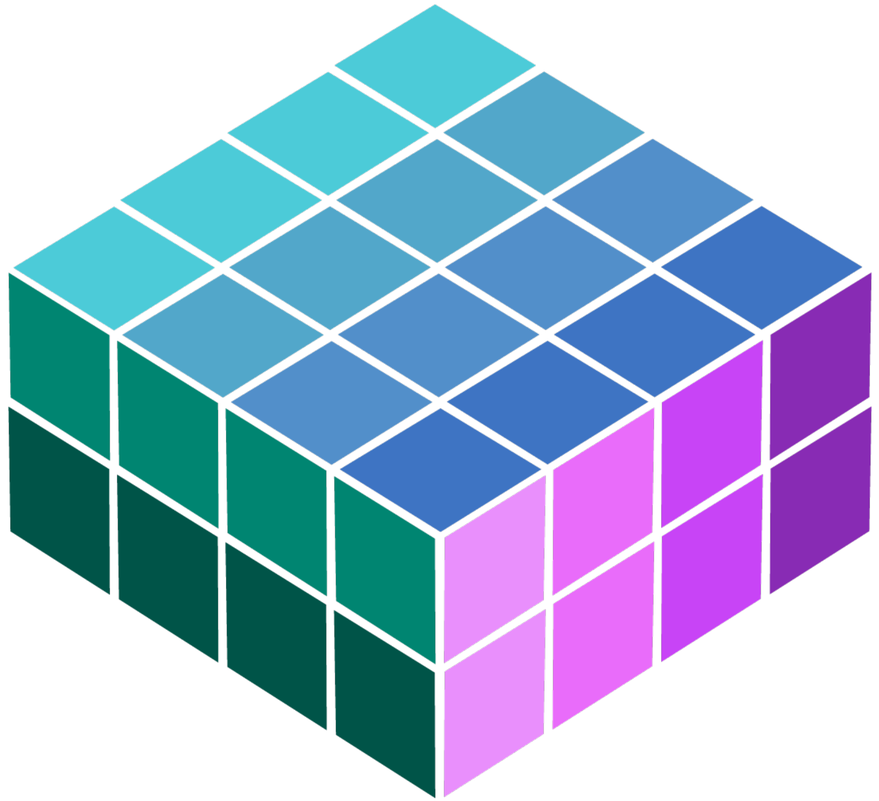
In addition, the DDS server has been enhanced and designed to increase security



New Modern UI: Timelines and Time Slice Control

z/OS Workload Interaction Correlator

- Enables z/OS components and middleware silos to generate **purpose built, 5-second synchronized, micro-summary, exceptionalism enriched data.**
  - Using IBM z/OS Workload Interaction Navigator, users are provided with the insights needed to reactively diagnose and proactively avoid I/O-related workload impacts, critical situations, and outages.
- z/OS, Db2, CICS and IMS currently generate Correlator data.
- Generating IBM Correlator records **does not measurably increase z/OS CPU overhead.**



New entitlement through RMF!
Read the Announcement

zWIC – Workload Interaction Correlator Priced Feature

- A priced feature of z/OS that implements a facility to report on high frequency events and can be used to improve diagnosis on z/OS
- zWIC is entitled with RMF or the Advanced Data Gatherer (ADG) feature
- Addresses the problem of capturing data on a production system running under load by providing an efficient way to capture and report on various diagnostic items
- Input/Output (IOS) information is now added to zWIC.
- IBM priced product IBM z/OS Workload Interaction Navigator can be used to visualize the data

- https://www.ibm.com/docs/en/zos/3.1.0?topic=wptmuwic-zos-workload-interaction-correlator

IBM System Recovery Boost (SRB)

Accelerate your recovery to maximize your availability!

Restore service and recover workloads substantially faster than on previous IBM Z® generations, with technology built into IBM z15® and IBM z16™, and with zero increase in IBM software licensing costs.

Faster IPL recovery

Accelerate the shutdown, restart and recovery of images, middleware environments and client workloads to accelerate return to pre-shutdown SLAs.

Utilize additional processor capacity and parallelism for a fixed period during recovery, so you can process backlog faster after either planned or unplanned downtime.

Drive faster and more efficient GDPS® automation actions to rapidly reconfigure and recover your environment.

Faster sysplex recovery

Accelerate specific Parallel Sysplex® recovery processes to minimize disruption and expedite return to steady-state operations.

Make use of short-duration Recovery Process boosts to power you through recovery processing and reduce the system impact from recovery events.

New on IBM z16 and z/OS 3.1

Accelerate image recovery during middleware region startup, SVC Dumps, and HyperSwap® configuration load, exclusively on IBM z16.

Extend the use of Recovery Process boosts to expedite and reduce the impact of SVC Dump diagnostic data capture, to accelerate middleware starts and restarts after a problem, and to complete HyperSwap configuration changes as quickly as possible.

For more information, visit the SRB Content Solution page.

System Recovery Boost – Sysplex Recovery enhancements

- System Recovery Boost provided recovery acceleration via additional processor capacity and parallelism, but only during image-level events like image Shutdowns and re-IPLs
  - IPL and Shutdown boosts
    - Speed boost and/or zIIP boost
    - GDPS orchestration enhancements
    - Up to 60 minutes of boost at IPL and up to 30 minutes of boost at shutdown
    - Optional, priced SRB Upgrade temporary capacity for zIIP Boost
- Support extended to provide recovery boosts for smaller-scope, occasional sysplex recovery activities, that introduce small-scale disruptions when they occur
  - Boosts automatically initiated when these events occur
  - And on the relevant set of systems in the sysplex where the recovery is taking place
  - Short-term boost periods, limited in total amount (30 minutes per LPAR per day)
- New support for z16 includes:
  - Middleware start-up boosts
  - SVC Dump boosts
  - Hyperswap configuration load and reload
- All with no planned increase in IBM software licensing costs!
-

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

z/OS Anomaly mitigation client pain points

- Improve client triage of anomaly observations and predictions with IBM System Automation mechanism to capture report details, including recommended actions
- Predictive Failure Analysis (PFA)
  - Predicts health based on velocity metrics, JES2 spool consumption, common storage consumption, above the bar private area etc.
  - IBM recommends all clients enable PFA
- Runtime Diagnostics (RTD) enhancements
  - A New REST API will expose RTD data to other management products such as IBM Z Anomaly Analytics (ZAA)
  - Detection of active SLIP/PER events enabled.

Data Serving and Storage

z/OS 3.1 is designed to enable simplified data storage and management that integrate mainframe data, operations, and applications with hybrid cloud environments. This allows them to operate for peak agility, flexibility, and performance to and extract value from mission-critical data in order to optimize the value of mainframe assets for new business innovation.

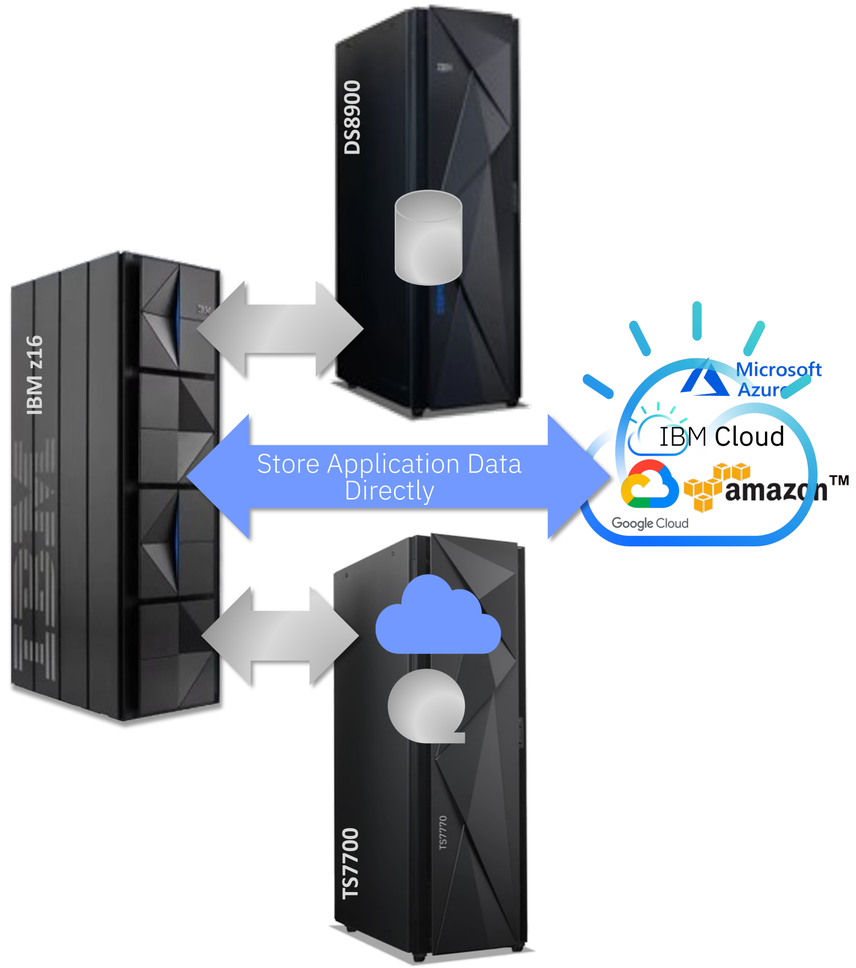
Including:

- Cloud Data Access (CDA)
- EzNoSQL C-based API
- DFSMSrmm enhancements
- Catalog enhancements

Cloud Data Access (CDA)

Cloud object storage enables a low-cost storage tier that's easily accessible and provides a simple mechanism to share data

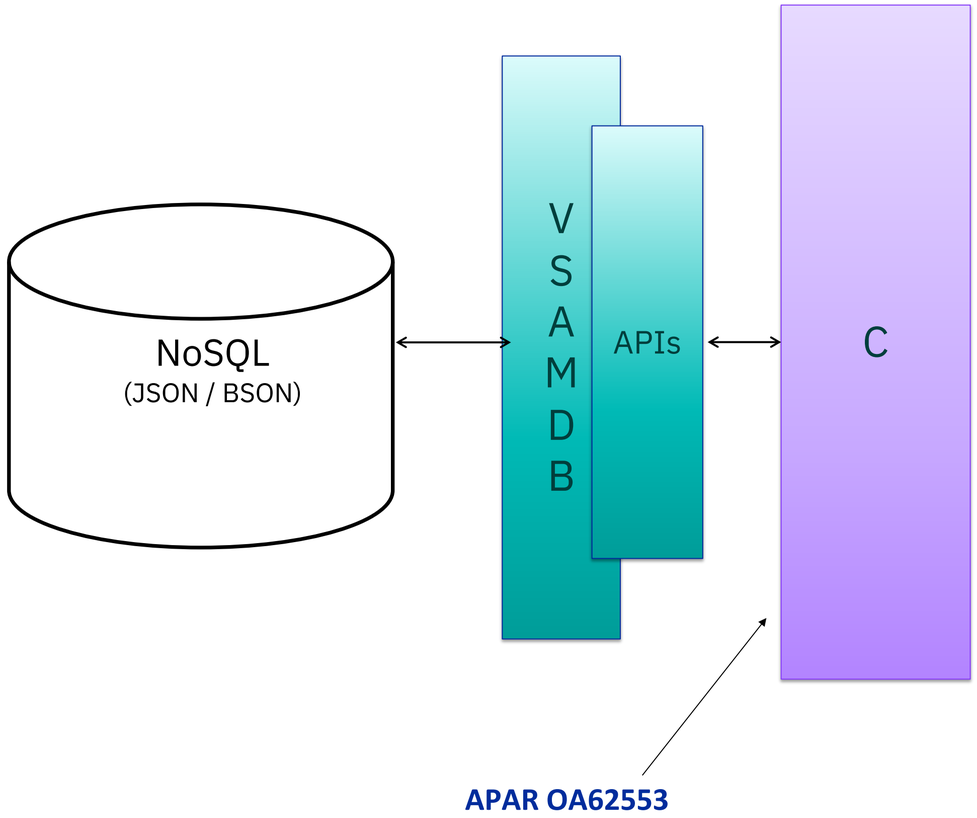
- Provides a simple method to store and share any z/OS data directly onto cloud object storage:
  - Enables S3/ Cloud Object Storage as another tier for z/OS applications
  - Simplified data sharing– reduce and/or eliminate ETL
  - Simplified application development and flexibility with a single API to interact with various Cloud Object Storage providers
  - Simplified authentication with the Provider Configuration File describing the target Cloud Object Storage provider
  - Supported cloud providers include IBM Cloud Object Storage, Amazon Simple Storage Service (Amazon S3), Azure Blob Storage, and Google Cloud Storage
- A new utility, GDKUTIL, can download or upload between cloud objects and z/OS using S3 APIs:
  - Supported data set types include UNIX files, sequential data sets, PDS or PDS/E members, or GDG versions.
  - Can be invoked through JCL.
  - Data can be converted from EBCDIC to UTF-8 on upload, and from UTF-8 to EBCDIC on download commands.



EzNoSQL APIs

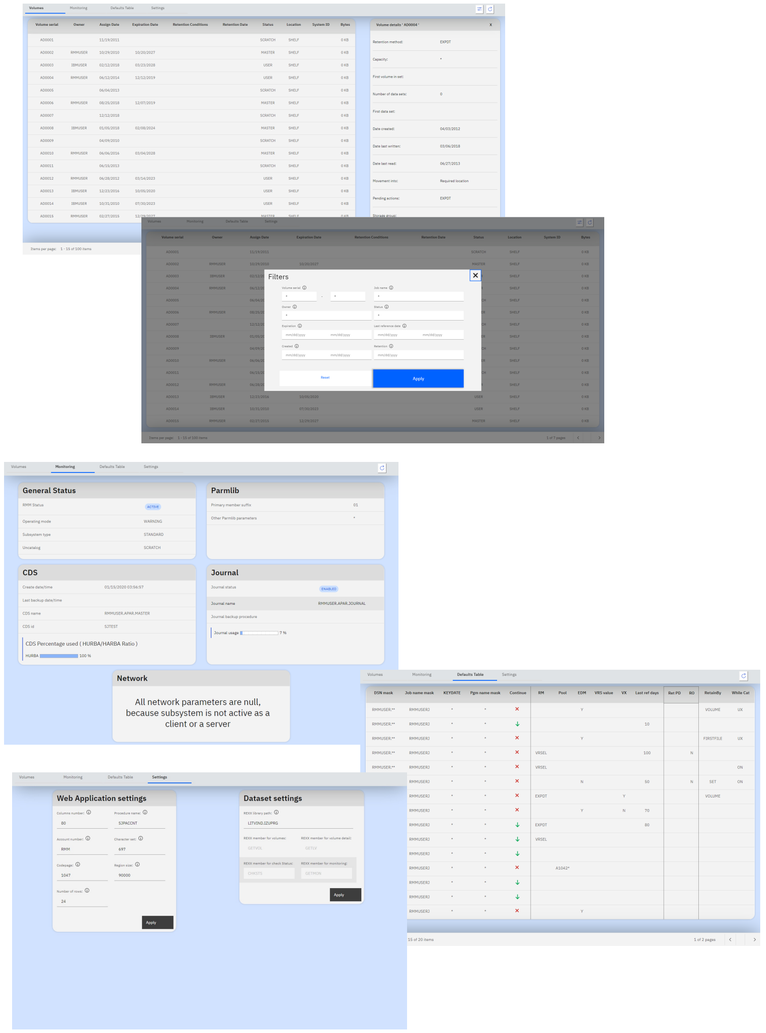
Easily create and access JSON databases

- NoSQL for z/OS provides a key:value document store on z/OS and allows applications the ability to store open standard BSON/JSON (UTF-8) objects.
- EzNoSQL provides a set of modern APIs, with a C-based, key-value interface, to simplify the application effort needed to access NoSQL VSAMDB data sets on z/OS in real-time, at scale, and with consistency.
  - C-based key-value interface to a NoSQL database enables higher level languages and interfaces.



Learn more on the EzNoSQL content solution

Data Serving and Storage



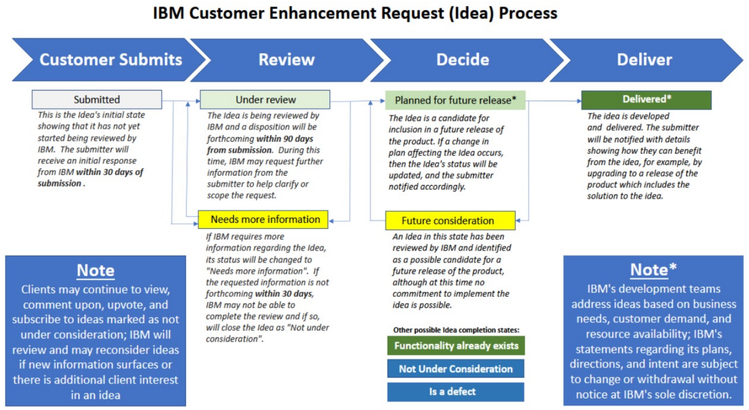
DFSMSrmm z/OSMF plug-in enhancements

- DFSMSrmm (RMM) supports a modern graphical user interface via a z/OSMF plugin in addition to the existing TSO and ISPF dialog support.
- Customizable RMM z/OSMF plug-in displays
  - Allow the table columns within Defaults Table view to toggle on/off and settings to be stored with the user profile providing improved usability.
- z/OSMF plug-in enhancements to provide additional features to support the RMM Defaults Table
  - Easily view defaults table entries that are applicable to an existing data set or to a specified set of conditions in order to ensure the policies are set up as expected.

Data Serving and Storage

Enhancements to address client requirements

- Enhanced Catalog Recovery
  - Simplified catalog recovery with the use of more granular timestamps in the Catalog SMF records for more accurate merging of updates, and one IDCAMS command that drives the ICFRU recovery.
- MODIFY CATALOG Enhancements
  - Additional information about catalogs and their environment to more effectively manage and maintain them.
  - Updates to the MODIFY CATALOG,REPORT output to indicate the current number of active tasks to provide a more accurate measure of the current activity in the Catalog Address Space (CAS).
  - Updates to the MODIFY CATALOG,ALLOCATED command to optionally filter by catalog name instead of VOLSER could potentially reduce the size of an IEC348I display for more efficient viewing.
- Simplified Catalog Address Space Startup
  - Enable the CAS and full catalog function to be available earlier during system startup and potentially improve the overall time it takes to startup or restart the system.



IBM Ideas Portal

Foundational support

z/OS 3.1 supports the performance and optimization of z/OS supported hardware and supports functions that enforce the scalability, availability, network efficiency, and general simplification of the operating system:

Including:

- z/OS Parallel Sysplex enhancement
- JES2 enhancements
- Dedicated real memory pools
- System Display and Search Facility (SDSF) enhancements
- z/OS Encryption Readiness Technology (zERT) Network Analyzer enhancements

z/OS encryption readiness technology

Monitor and record details about z/OS cryptographic network protection

Discovery
Discover the network encryption attributes for all transmission control protocol (TCP) and Enterprise Extender (EE) traffic and record them in systems management facility (SMF) format.

Aggregation
Summarize repeated use of security sessions into a condensed SMF representation that retains all the important cryptographic details.

IBM zERT Network Analyzer
A web-based guided user interface (GUI) for analyzing the SMF data that zERT records with enhanced flexibility in the for z/OS database schema definitions

zERT policy-based enforcement
Enforce local network encryption standards for TCP traffic in real time.
Policy-based rules you build in the Network Configuration Assistant describe acceptable or unacceptable levels of cryptographic protection along with the actions to take when TCP connections match hose rules.

Enabling zERT has little to no impact on latency or CPU consumption.

“ The zERT Network Analyzer's ability to export query results to CSV files provides exactly what we need to maintain a historical record of z/OS network protection coverage."

– *Large public sector client*

z/OS Communications Server
z/OS Encryption Readiness Technology (zERT)

The IBM zERT Network Analyzer is a web-based guided user interface (GUI) for analyzing the SMF data that zERT records with enhanced flexibility in the for z/OS database schema definitions.

With z/OS 3.1, IBM zERT Network Analyzer is enhanced to:

- **Reduce manual effort and optimize user experience** with IBM zERT Network Analyzer Upgrade Support
- **Support passphrases** and to allow clearing database user ID and password with IBM zERT Network Analyzer enhancements for database connection authentication

"zERT is my one stop shop to monitor and manage the usage of all cryptographic algorithms within my z/OS network stack. It even provides real-time policy-based notifications when cryptographic usage doesn't match my expectations!"

"zERT is simple and fast to setup and implement. It gives me immediate results and it increases z/OS network security in its full breadth at once - not just for a single component!"

– zSecurity Product Owner, Swiss Re Group

System Display and Search Facility (SDSF)

SDSF provides a powerful and secure way to monitor, manage, and control your z/OS sysplex. Data is presented in tabular format on more than fifty different panels. The panels are customizable by the system programmer and the user.

Many new features are delivered with z/OS 3.1, including:

- New feature Module Fetch Monitoring designed to show modules fetched, from where, at what time and by what address space
- New feature System Event Log Display (ELOG) which shows important system events in an easy to consume table with hotlinks to the operlog based on the time that an event occurred.
- New feature Dashboard, a summary panel of the system configuration with highest resource consumers
- Six new Primary Displays of RACF information including tabular SDSF display of classes, profiles, access lists etc.
- More than ten new primary displays including Sysplex, LPARs, Program Properties Table (PPT), and SMF data
- More than 20 new columns, and more than 20 new actions on existing panels

JES2 on z/OS 3.1

Policy Enhancements

The JES2 Policy function provides a non-assembler-based facility for extending JES2.
With z/OS 3.1, it's improved for flexibility and usability by:

- Implementing new policy type JobInput that provides analysis and customization of key job attributes
- Supporting the use of variables in the submitter environment
- Providing the ability to substitute system symbols utilized in JES2 policies

Job Notifications

Enhancements help to simplify the tracking of progress through the life cycle of a job:

- Identify when a job is eligible for execution and when a job is selected for execution by a JES or WLM initiator.
- Designed to post the specified URL when a job completes normally or abnormally
- Removed the dependency on CIM and CEA, thus simplifying configuration.
- Issues notifications for jobs that fail early in input phase processing and reissues notifications if the target URL is not available when the job completes.

Resiliency Improvements

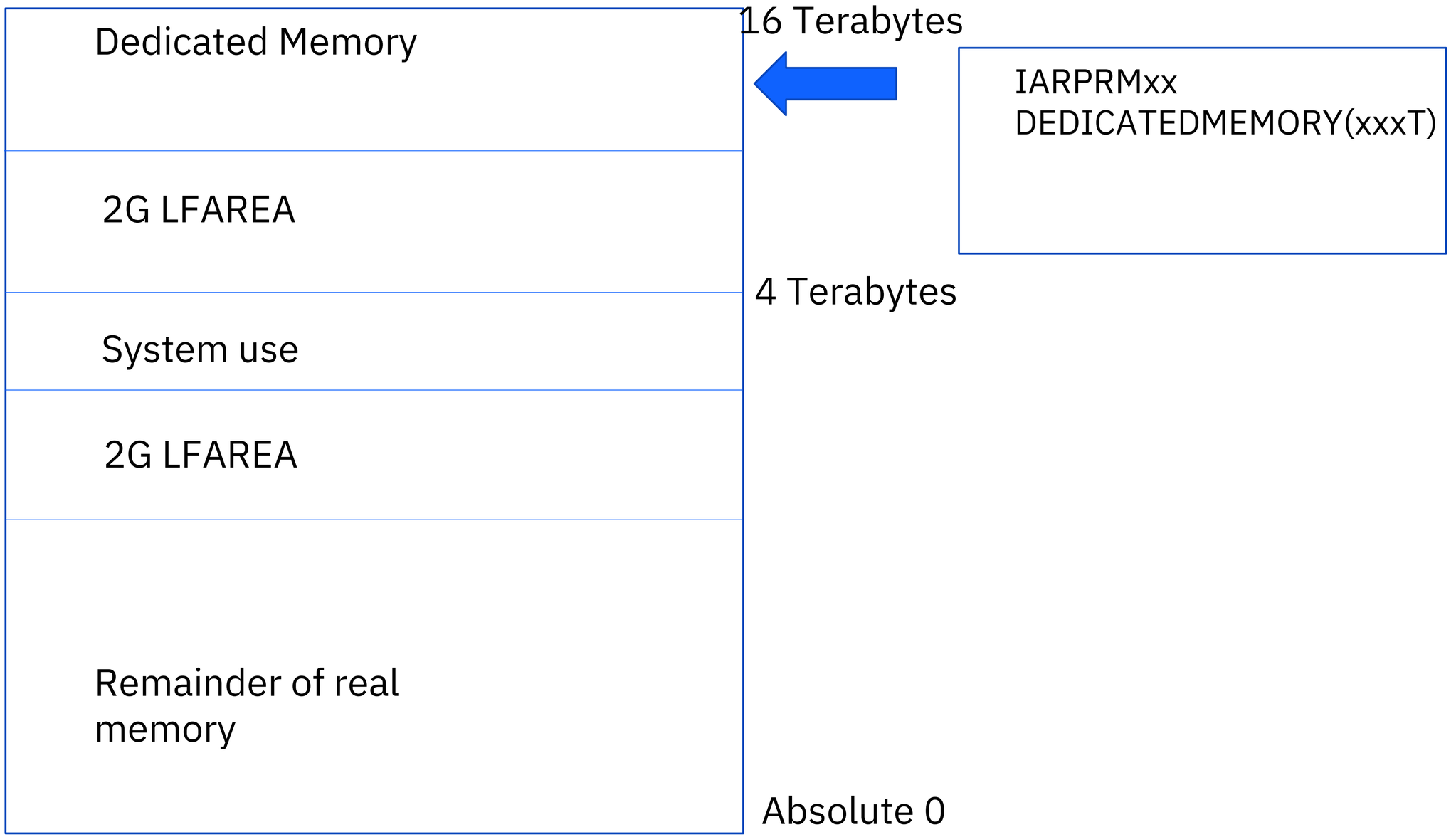
- New Default spool policies to monitor and reduce situations leading to spool full conditions
- JES2 wide and Job based defaults for spool usage
- Installation resource groups can be assigned to a job for display and policy enforcement

RSM Dedicated Real Memory Pools >4T for specific functions

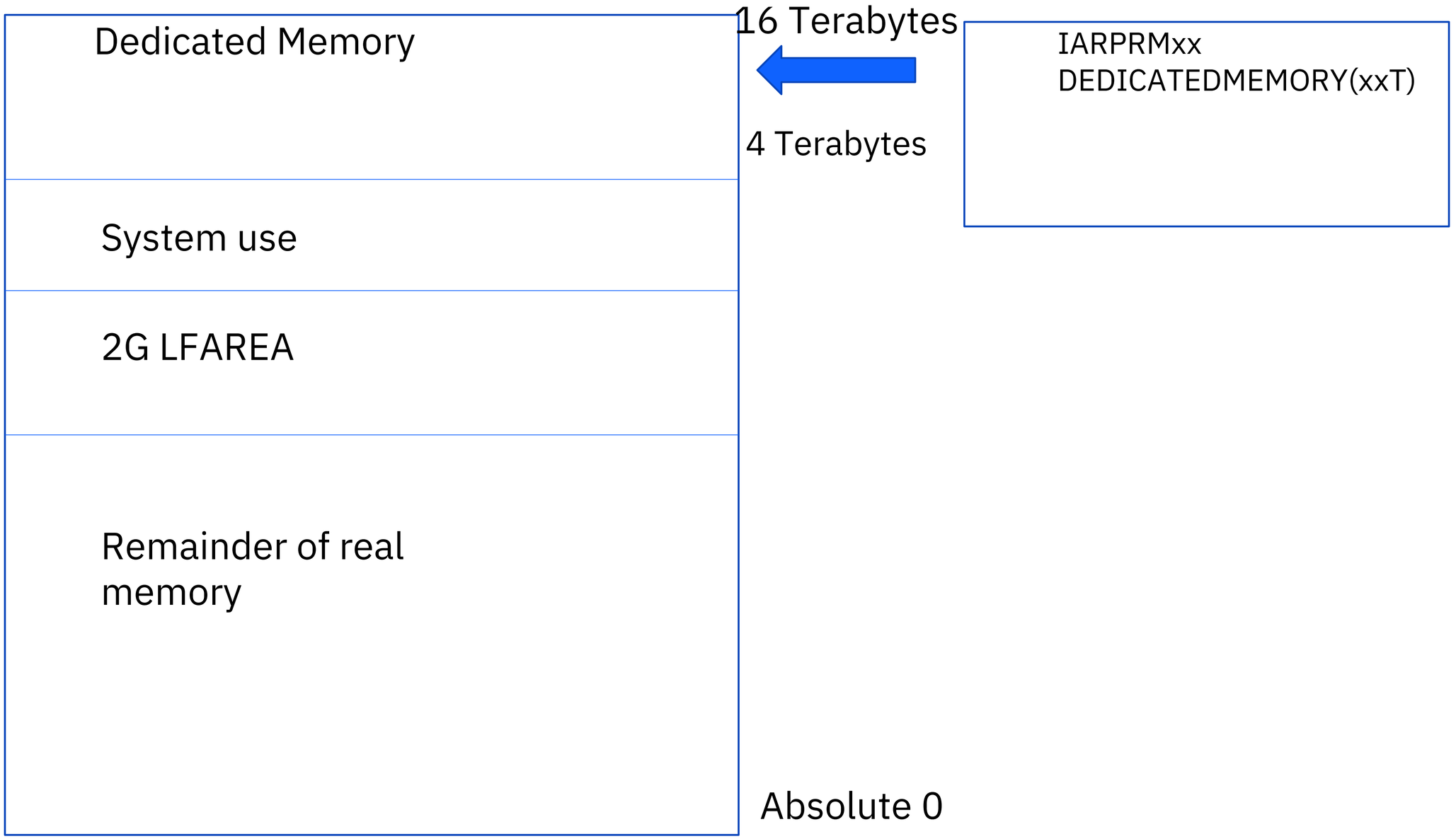
Dedicated Real Memory Pools

- Dedicated memory pools allow the installation to set aside assigned memory for specific applications
- These applications don’t have to compete with the rest of the system for this storage
- Designed for very large memory users such as: zCX, DB2 Buffer Pools, SVC Dumps, Java etc.
- Available in 2G, 1M, and 4K frame sizes for real storage above 4TB

Dedicated Memory and 2G LFAREA above 4T



Just Dedicated Memory above 4T



z/OS 3.1 Elements (changing* in z/OS V2.5 and V3.1)

- ➔BCP
  - ➔Program Binder
  - ➔Capacity Provisioning Manager
  - ➔BCP Support for Unicode
  - ➔Web Enablement Toolkit
- ➔Common Information Model (CIM)
- ➔Communications Server
- ➔Cryptographic Services:
  - ➔ICSF (FMID HCR77E0)
  - ➔PKI Services
  - ➔System SSL
- ➔DFSMSdfp
- ➔**DFSMSdss**
- ➔**DFSMShsm**
- ➔**DFSMSrmm**
- ➔**DFSORT**
- ➔HCD
- ➔**HCM**
- ➔*Future Function* (related to IBM Documentation for z/OS)
- ➔IBM Tivoli Directory Server
- ➔IBM Z Deep Neural Network (zDNN)
- ➔**IBM z/OS Change Tracker**

- ➔IBM z/OS Management Facility
- ➔**IBM z/OS Workload Interaction Correlator (zWIC)**
- ➔**Infoprint Server**
- ➔Integrated Security Services:
  - ➔Network Authentication Service
- ➔ISPF
- ➔JES2
- ➔Language Environment
- ➔Network File System
- ➔**RMF**
- ➔**RUCSA**
- ➔**SDSF**
- ➔**Security Server – RACF**

- ➔TSO/E
- ➔XML Toolkit (V1.11 level)
- ➔**z/OS Advanced Data Gatherer**
- ➔z/OS Data Gatherer
- ➔z/OS File System (zFS)
- ➔z/OS Font Collection
- ➔z/OS OpenSSH
- ➔***z/OS Security Level 3:***
  - ➔***Communications Server***
  - ➔***IBM Tivoli Directory Server Security Level 3***
  - ➔***Network Authentication Service Level 3***
  - ➔***System SSL Level 3***
- ➔z/OS UNIX

KEY:

- * **"Changing" means the FMID is changing.** Remember, PTFs might have added new functions on FMIDs that are not changing.
- **Black** (not in bold) are base elements
- **Green** (also in **bold**) are optional priced features
- ***Brown*** (also in ***italics***) are optional unpriced features with export controls
- ➔This element changed in z/OS V2.5
- ➔This element changed in z/OS 3.1
- All other elements not listed have not changed since z/OS V2.4.
- **New in V2.5: Data Gather, Adv Data Gatherer, IBM z/OS Change Tracker**
- **New in 3.1: XML Toolkit**

Functions Withdrawn from z/OS 3.1

JES3	Priced feature – many JES2 functions already added. Contact jes3q@us.ibm.com if you need more information. As of z/OS V2.4, JES2 SMP/E zones are merged into the base zones, for z/OSMF portable software instances (ServerPac).	z/OS 3.1
IBM Bulk Data Transfer (BDT) Features	Functional replacements for BDT F2F are IBM MQ Advanced for z/OS (5655-AV9), which include IMB MQ Managed File Transfer and MQ Advanced Message Security , and IBM Sterling Connect:Direct for z/OS (5655-X11).	z/OS 3.1
IBM z/OS Global Mirror(XRC)	New functions to support asynchronous replication technology are intended to be developed only for DS8000 Global Mirror, and it is intended that no new z/OS Global Mirror functions will be provided with DS8900F and z/OS.	z/OS 3.1
Distributed File Manager	Base element – DFSMS. If you use DFM to enable remote client, it is recommended to use z/OS NFS instead.	z/OS 3.1
ISFPARMS assembler macros	Priced feature – SDSF. Use ISFPRMxx parmlib member instead. This has been a long time recommendation.	z/OS 3.1
Knowledge Center for z/OS (KC4Z)	Base function – IBM intends to deliver a new component called DOC4Z on z/OS. DOC4Z is a web application that provides IBM product publication content to web browser clients directly from a local z/OS server system.	z/OS 3.1

z/OS 3.1

IBM Z Hardware support

IBM Z Hardware Support

IBM **z16 (3931) Model A01** Functions & Features

One hardware model, Five Features, 1-4 19” Frame System
Up to 85 user partitions, 32 TB per partition, 200 CPUs/zIIPs/IFLs per partition, up to 224 PUs • Up to 16 TB per z/OS LPAR with z/OS V2.5
•2 CP chips on a Dual Chip Module (DCM), 5.4 GHz •L1 Private 128K i & 128K d •-L2 n/a •L3 Shared 32 MB / core, 192 MB effective shared •L4 n/a
256 GB HSA, 40 TB maximum, 10 TB per drawer
Channel Subsystem scalability •Up to six (6) Channel Sub Systems (CSSs) • 4 Subchannel Sets per CSS
HiperDispatch Enhancements
IBM Z Integrated Accelerator for AI
Hardware Instrumentation Services (CPUMF)
New machine instructions
Crypto Express8S
OSA Express7S 1.2

(z/OS support in blue)

IBM System Recovery Boost
Coupling Express2 LR 10Gb (CX6-DX) PCIe adapter
CF Level 25 •Retry buffers for cache and lock commands •Cache residency time metrics •Scalability improvements •Request latency/performance improvements
ICA-SR 1.1 Max ICA SR per CEC 48 adapters/96ports (same as z15)
Max ICP CHPIDs per CEC – 64
10 GbE and 25 GbE RoCE Express 3 SR and LR (CX6-DX)
FICON Express 32S
zHyperLink® Express1.1 • Maximum 16 Adapters /32 ports
IBM Flexible Capacity for Cyber Resilience

IBM z16 (3932) Singe Frame - Model A02 and Rack Mount Functions & Features

One machine type, Four features, Choice of IBM 19” Single Frame System (A02) or Rack mount.
Up to 40 user partitions, 16 TB per partition, 6CP/ 67 zIIPs, or 68 IFLs per partition (up to 80 active PUs) • Up to 16 TB per z/OS LPAR with z/OS V2.5
•2 CP chips on a Dual Chip Module (DCM), 4.6 GHz •L1 Private 128K Instruction and 128K Data •L2 32 MB / core, semi-private •L3 Virtual Shared Victim up to 256 MB •L4 Virtual Shared Victim up to 2048 MB (2 GB)
160 GB HSA, 16 TB maximum, 8 TB per drawer
Channel Subsystem scalability • Up to three (3) Channel Sub Systems (CSSs) • 4 Subchannel Sets per CSS
HiperDispatch Enhancements
IBM Accelerator for Artificial Intelligence Unit (AIU)
Hardware Instrumentation Services (CPUMF)
New machine instructions
Crypto Express8S

Single Frame
Model A02

Rack Mount

• System Recovery Boost • Validated boot for z/OS
Coupling Express2 LR 10Gb (CX6-DX) PCIe adapter
CF Level 25 • Up to 4096 structures • Retry buffers for cache and lock commands • Cache residency time metrics • Scalability improvements • Request latency/performance improvements
ICA-SR 1.1 Max ICA SR per CEC 48 adapters/96ports (same as IBM z15)
Max ICP CHPIDs per CPC – 64
10 GbE and 25 GbE RoCE Express 3 SR and LR
FICON Express32S
OSA Express7S 1.2
zHyperLink® Express1.1 • Maximum 16 Adapters /32 ports

(z/OS support in blue)

z/OS 3.1 Release Overview – z/OS support summary

Release	z10 EC z10 BC WdfM	z196 Z114 WdfM	zEC12 zBC12 WdfM	z13 Z13s WdfM	z14 ZR1 WdfM	z15	z16	End of Service	Extended Defect Support
z/OS V2.2	X	X	X	X	X	X	X	9/20	9/23[2]
z/OS V2.3			X	X	X	X	X	9/22	9/25[2]
z/OS V2.4			X	X	X	X	X	9/24[1]	9/27[2]
z/OS V2.5				X	X	X	X	9/26[1]	9/29[2]
z/OS 3.1					X	X	X	9/28[1]	9/31[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

z/OS 3.1

Statement of Directions

SOD: IBM intends to deliver anti-malware for IBM z/OS from 2023-09-26)

IBM plans to provide a software solution that introduces cyber anomaly detection and notification for the z/OS platform to mitigate the potential risk of malicious software. IBM plans to provide the option of quarantine functionality that further extends existing remediation options. It is the intent for these combined functions, per NIST guidelines, to be used by the client to satisfy compliance regulations requiring anti-malware coverage for z/OS. This intent includes standards such as the Payment Card Industry Data Security Standard (PCI DSS) version 4.0.

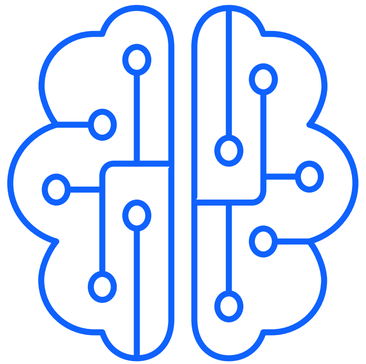
To further defend against the potential risk of malicious software, IBM plans to enhance the IBM z/OS Authorized Code Scanner to provide static scanning of authorized code, adding to the IBM z/OS Authorized Code Scanner feature's existing collection of its dynamic scanning for development and test environments and its authorized code monitor for production systems.

IBM also plans to provide a software solution that simplifies z/OS data set encryption, encrypting and re-encrypting data at scale for both key rotation and initial encryption, and leveraging analytics to minimize application downtime. This is designed to simplify adherence to expanded compliance regulations such as PCI DSS v4.0.

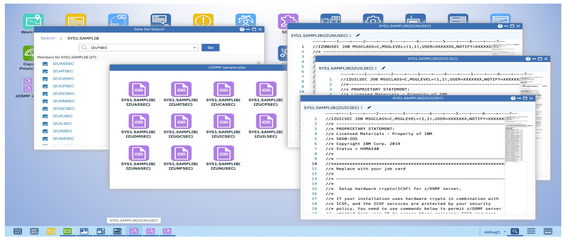
z/OS 3.1

Three things to remember

Three things to remember



- z/OS 3.1 has a **focus on AI**. AI-Powered Workload Manager (WLM) is the first use-case.



- Different components have now **modernized UI ➔** z/OS Change Tracker, z/OS Authorized Code Scanner, more z/OSMF support …

- **Synergy** exploitation between IBM Z Hardware and z/OS

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