

z/VM 7.3 Platform Update, News, and Recommendations

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Abstract

Version 7 of z/VM started the era of a two-year release cadence. z/VM 7.3 is the third release in this era. This presentation will look at what is in the base of z/VM 7.3 as well as all the enhancements that have shipped or are on the horizon. We'll look at both the value of these enhancements, but also cover some of the implementation requirements for them.

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Agenda

- Summary of current releases and cadence

- Overview of z/VM Version 7 Release 3
 - Statements of Direction
 - Linear Service

- Survey of enhancements in various focus areas
 - Scaling and TCO
 - Managing diverse workloads
 - Security
 - Resiliency and RAS
 - System Management improvements

- New Function on the Horizon

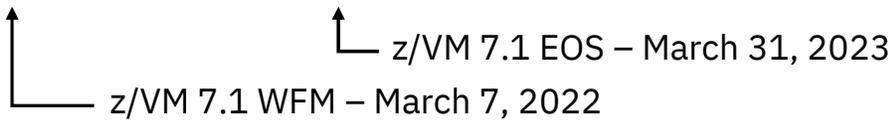
- Other Highlights and News

z/VM Releases and Cadence

z/VM Release Cycle Cadence

For illustrative purposes, not a commitment.

	2020				2021				2022				2023				2024				2025			
	1Q	2Q	3Q	4Q																				
7.1	R				R				R				EOS											
	N	N	SC	SC	SC	SC	SC	SC	WFM	SC	SC	SC												
7.2					R				R				R				R							
			GA	N	N	N	N	N	N	N	SC	SC	SC	SC	SC	SC	WFM	SC	SC	SC	EOS			
7.3									R				R				R							
									GA	N			N	N	N	N	N	N	SC	SC	SC	SC	SC	SC



1. GA 3rd Quarter of even years
2. In service ~ 4.5 years
3. New Function every quarter until GA of next release, and then service, RSU, processor compatibility
4. Six RSUs for life of a release, One with GA, next 3 are every 6 months

Legend:
 GA: Generally Available
 N: New function APAR PTFs available
 SC: Service and processor compatibility
 R: RSU
 WFM: Withdrawn from Marketing
 EOS: End of Service

z/VM Releases

Release	ProdId	GA	EOM	EOS	Notes
z/VM 7.3	5741-A09	Sept 16, 2022	TBD	TBD	
z/VM 7.2	5741-A09	Sept 18, 2020	TBD	TBD	
z/VM 7.1	5741-A09	Sept 21, 2018	Mar 7, 2022	Mar 31, 2023	Start of 2 Year Cadence ¹

Release ²	IBM z16 & IBM LinuxONE Emperor IV	IBM z15 & IBM LinuxONE III	IBM z14 & IBM LinuxONE II	IBM z13 & IBM LinuxONE Emperor	IBM z13s & IBM LinuxONE Rockhopper	IBM ZEC12	IBM ZBC12
z/VM 7.3	✓	✓	✓				
z/VM 7.2	✓	✓	✓	✓	✓ ³		
z/VM 7.1	✓	✓	✓	✓	✓	✓	✓

1. z/VM GA every 2 years with in service for ~4.5 years.
2. Service may be required for support of various servers.
3. The Rockhopper machine type 2828 does not meet ALS requirements and is not supported, but the rest of the IBM LinuxONE machines are.

z/VM Continuous Delivery Page

- Gives an overview of new function that is under consideration. Allows clients to:
 - Express interest in being a sponsor user for an item.
 - Plan for new support coming out in the future.
 - Understand the value, benefit, and impact of new enhancements.
- <https://www.vm.ibm.com/newfunction/>
- Subscribe for updates via “Notify me” link on left navigation bar.

The screenshot shows the 'z/VM Continuous Delivery News' page. On the left, a navigation menu includes 'z/VM', 'News', 'About z/VM', 'Events calendar', 'Products and features', 'Downloads', 'Technical resources', 'Library', 'How to buy', 'Install', 'Service', 'Support', 'Education', 'Site map', 'Site search', 'Printer-friendly', and 'Notify me'. The 'Notify me' link is circled in red with an arrow pointing to it from the text below. The main content area features a 'Change Summary' box with updates from October 6 and September 25. Below this is an 'Introduction' section explaining the continuous delivery process and how to become a sponsor user. At the bottom, there is a table titled 'New Function APARs' with columns for 'New function in progress', 'Target date', and 'Last updated'.

New function in progress	Target date	Last updated
Active Drain for PAGE Volumes *	TBD	October 14, 2019
AP Crypto Interruption Support *	2Q 2021	September 4, 2020
Automatic STANDBY Memory for Guests	1H 2021	July 29, 2020
CP New Feature Interrogation API *	October 2020	October 8, 2020
CP Query Devices	December 2020	October 8, 2020

z/VM Continuous Delivery Page

- Each item has information as seen in this example.
- The “Target availability” may also be listed as TBD or less granular such as a quarter or month.
- Since this is work in progress, the target availability dates can move multiple times and in different directions.

Improve I/O Time for Dump Processing	
Name	Improve I/O Time for Dump Processing
Description	This project exploits DASD zHPF I/O, when available, when writing CP Hard Abend and Snap Dumps to CP Dump / Spool space. The goal is to reduce the amount of time a system is unavailable while a dump is being taken, before the system is re-IPLed. This will shorten unplanned outages on systems with large amounts of real memory. This can be especially advantageous combined with the Fast z/VM Dump Distiller project, which reduces the time required to load and send a dump to IBM for diagnosis.
Status	Available March 1, 2021
Target availability	March 2021
Compatibility	No known incompatibilities.
Enablement	Apply PTF and rebuild CPLOAD MODULE. Also requires zHPF to be enabled on storage controller containing dump spool space.
Effect	Reduced time to take CP Hard and Snap Dumps. This enhancement has potential to reduce elapsed dump time by about 50%. Customers' actual results will depend upon their workloads and configurations.
ISV impact	No known impacts at this time.
Linux or hardware interaction	zHPF must be enabled on storage controller that contains the dump spool space. No Linux interaction.
Environment variable name	CP.FUNCTION.DUMP.SPEEDUP
Release(s)	z/VM 7.2 New Function APAR.
Service details	See below for the IBM service information.
APAR	VM66431
PTF	UM35822
RSU	z/VM 7.2 - 2102

z/VM Continuous Enhancements

- Continuous Delivery means continuous improvements
- New function ideas come from many sources, including our clients
- The Ideas Portal is a great way to:
 - Submit the functionality you need
 - Vote on other suggestions
 - Get latest status on what our team is considering.
- Visit the Ideas Portal today: <https://ibm.biz/zvmIdeas>

z/VM

7 **Increase CP areas to maximum supported size on VM installs**

VOTE Historically, VM delivered a modest average size for most CP areas like ckpt, warmstart, and dii management skills are increasingly rare, increasing the reserved areas to ...

🕒 about 1 month ago in z/VM 🗨️ 1 Not under consideration

15 **Support multiple PDR volumes for redundancy**

VOTE Currently there can only be one PDR volume for an SSI cluster. If the storage host where the PC systems in the cluster go down. Even if there are other storage host and a z/VM ...

🕒 4 months ago in z/VM 🗨️ 1 Not under consideration

10 **z/VM enhancement requested for z/OS GUESTS exploiting HYPERPAV**

VOTE Extending the z/VM MSS (Multiple Subchannel Set) management to allow z/VM and its guests e limit of UCB in SS0 of LCSS. More details in the attachement.

🕒 3 months ago in z/VM 🗨️ 0 Future consideration

2 **Increase limit for z/VM VSwitch HiperSocket Bridge Port connectivity to LPAR**

VOTE Customer environment uses VSWITCH with a hipersocket bridge and OSA to use a single netw connect to the hipersocket bridge. At DND each CEC has between eight to twelve zVM ...

🕒 about 1 month ago in z/VM 🗨️ 0 Under review

New to z/VM?

- Welcome new people to the z/VM Community

- Some resources beyond this presentation:
 - The z/VM 7.3 Library Page <https://www.vm.ibm.com/library/730pdfs.html>
 - The z/VM Presentations Page <https://www.vm.ibm.com/library/presentations/index.html>
 - The z/VM Ideas Portal <https://ibm.biz/zvmIdeas>
 - The IBMVM Mailing List, see https://www.vm.ibm.com/techinfo/listserv.html#Section_0.1 for details on subscribing.
 - The z/VM related events calendar <https://www.vm.ibm.com/events/>
 - z/VM Education Overview and Roadmaps <https://www.vm.ibm.com/education/>
 - z/VM Playlist on YouTube <https://ibm.biz/zvmhowto-yt>
 - MVMUA (Metropolitan VM Users Association) <http://www.mvmua.org/>
 - The VM Workshop
 - Webpage - <http://www.vmworkshop.org/>
 - YouTube Channel - <https://ibm.biz/vmworkshopyoutube>



z/VM Version 7 Release 3 Overview

z/VM 7.3 - At a Glance

- GA September 16, 2022
 - Preview announce April 5, 2022
 - See <https://www.vm.ibm.com/zvm730/> for more details

- New Architecture Level Set of IBM z14 and IBM LinuxONE II or newer processor families

- Includes all new function service shipped for z/VM 7.2 including:
 - 4 TB Real Memory
 - Dynamic Memory Reconfiguration
 - Improved LGR for Shared Crypto
 - z/Architecture Extended Configuration (z/XC) support
 - Direct to Host Service Download

New with z/VM 7.3

- Eight-Member SSI support
- NVMe EDEVICE support
- 4-character time zone identifier support
- External Security Manager (ESM) Control of Define MDISK Command
- Centralized Service Management (CSM) Usability Enhancements
- Performance Data Pump

- Default changes for the interest of
 - Security
 - Performance
 - Dropping function no longer needed

- Synergy for New Function APARs
 - Changing defaults at a release boundary rather than in service stream

z/VM 7.3 – System Default Changes

- User Directory TODENABLE
 - Some capabilities that previously required OPTION TODENABLE will be standard for all users in z/VM 7.3.
 - NOTE:** TODENABLE is still required for the FROMUSER and MSGPROC options of SET VTOD

- TCP/IP Configuration Statement Changes
 - ASSORTEDPARMS option NOUDPQUEUELIMIT replaced by UDPQUEUELIMIT
 - Default of 20 datagrams queued on UDP port. Previously no limit.
 - FOREIGNIPCONLIMIT default changed to 256

- Changes in location and size of MONDCSS and PERFOUT saved segments
 - Default CP MONITOR MONDCSS starting virtual address changed to 1 GB and size increased to 96 MB
 - PERFOUT starting virtual address changed to 1120 MB

- Host Crypto Polling
 - Default has changed to OFF, which enables exploitation of host cryptographic interruptions by default

z/VM 7.3 – Other Default Changes

- Default Password for User Directory
 - provides the ability to select a default password when installing or upgrading a z/VM system.

- Account Statement in IBM-provided User Directory
 - User directory will include an ACCOUNT IBM statement for all guest definitions.

- SCSI EDEVICE attribute handling when defining EDEVICES
 - When defining a SCSI EDEVICE, the actual device characteristics will be updated to the device attributes of the backing device when brought online.
 - Specified attributes will be used when device attributes for the backing device cannot be determined.
 - Subsequent queries of the EDEVICE will show **actual** attributes in use instead of what was passed with the initial SET command or EDEVICE statement.

z/VM 7.3 – Other Changes

- Sharing of RACF databases between z/VM and z/OS systems is prohibited (previously discouraged)

- Removal of CMSDESK support
 - The CMS CMSDESK, SET WORKSTATION, and QUERY WORKSTATION commands have been removed, along with many of the remaining CMS GUI references.

- After a first level installation of z/VM 7.3 is performed, when any system is IPLed in the same LPAR where the installation was performed, users who configure more than 2G initial storage in the LPAR activation profile will observe only 2G of storage configured for their system
 - Clients will need to issue a CP SET STORAGE command, or de-activate and re-activate the z/VM partition before IPLing a subsequent system.
 - More details: <https://www.vm.ibm.com/service/redalert/>

z/VM 7.3 - Related Statements of Direction

- IBM intends z/VM 7.3 to be the last release to provide TCP/IP support for the LAN Channel Station (LCS) device driver
- The release after z/VM 7.3 will continue to support ESA/390 CMS as the default (previous statement of direction was that z/VM 7.3 would be the last to support ESA/390 CMS as the default).
- IBM has no plans to include support for ProxyArp with any z/VM TCP/IP device drivers developed in the future
- IBM intends to remove DVD as a medium to receive an order for the z/VM product or z/VM service in a future z/VM release.

z/VM 7.3 - Related Statements of Direction (continued)

- z/VM 7.3 is the last z/VM release planned to support the ability to apply service in a selective fashion. A future z/VM release intends to implement a linear service model whereby applying one PTF will require all previous service for the same component to be installed.
- IBM intends to change how z/VM service is delivered in a future z/VM release, moving to full-part-replacement files instead of CMS update files. Full-part-replacement files will no longer contain sequence numbers.
- IBM plans to provide the capability to verify digitally signed, electronically delivered z/VM service in a future z/VM deliverable.

z/VM Linear Service

How does z/VM deliver service today?

- z/VM ships all service as APARs
 - Corrective Service APARs
 - New Function APARs
- Recommended Service Upgrade are released regularly containing a selection of APARs with pre-applied PTFs for the core z/VM components (CP, RACF, TCPIP, ...)
- Corrective Service APARs contain the fix for a single issue and only has the minimum pre-requisites such as file intersections or logical pre-requisites
- Challenges with the current service process
 - Time consuming and challenging process of selecting service to be applied
 - Problematic to compare service levels of z/VM Systems or check if a system is current on service
 - Huge New Function APARs create extensive APAR drag, leading to an “Illusion of Choice”
 - Huge number of valid configurations, creating service and validation challenges

What is linear service?

- z/VM will continue to ship all service as APARs
 - Hot Fix APAR
 - Fix Pack APAR
 - Feature Pack APAR
 - Hardware Support APAR
- All APARs will have a pre-requisite against the APAR that was released last in its component
- A **Hot Fix APAR** will contain a critical fix or a security issue that must be released immediately due to its critical nature or the severity of the security exposure
- **Fix Packs APARs** will be released on a regular cadence, containing all available fixes since the last released Fix Pack
- **Feature Packs APARs** will be released every 6 months, containing new features
- **Hardware Support APARs** will be released in support of new hardware and provide the necessary hardware toleration or exploitation
- **Recommended Service Upgrades (RSUs)** will be released shortly before a Feature Pack and will contain all available APARs pre-applied for the core components

Different APAR Types

Future Type	Rough Equivalent	Cadence	Description
Hot Fix APAR	Corrective Service APAR	When necessary	Fix for critical issue requiring an immediate solution
Fix Pack APAR	Corrective Service APAR	Every 2-4 weeks	Bundle of fixes for regular issues with in-depth validation
Feature Pack APAR	New Function APAR	Every 6 months	Bundle of new features
Hardware Support APAR	New Function APAR	When necessary	Support for new or updated hardware

What does this mean for you?

- Selecting applicable service will get significantly easier in the future
- Validating that all systems receive the same service will be simplified
- You will always run a service configuration that received extensive testing from IBM
- z/VM Development intends to improve the service experience with future Feature Packs
- However: You will no longer be able to select a single fix without having to apply other service

Available service paths in the future

- Manage and control the amount of service that must be applied by following one of these paths

Service Path	Conservatism	Features	Description
Stay on the oldest release in service	High	Delayed by up two years	Guarantee that no new features must be applied to receive corrective service
Latest RSU of current release	Medium	Delayed by 6 months	Stay on the latest RSU and adopt new features only after a delay of 6 months after availability
Latest released APAR	Low	As soon as available	Apply service and features as soon as available, recommended for development or test systems

Focused Value Areas of Enhancements

Focused Value Areas

- Improved scaling and TCO
 - More virtual machines in a single z/VM system
 - Lower costs of running a system

- Improved resource management for large diverse workloads
 - Fair and accurate resource control
 - Guest exploitation of IBM Z and IBM LinuxONE hardware

- Enhanced security
 - Protecting data
 - Policy management

- Improved resiliency and RAS
 - Scripting and automation frameworks
 - Problem determination

- Improved system management
 - Including things that make a system programmer happy



Improved Scaling and TCO

IBM z16

- Support availability May 31st, 2022 with z/VM 7.1 and z/VM 7.2. Support also included in the base of z/VM 7.3.
 - See <https://www.vm.ibm.com/service/vmreqz16.html> for details

- z/VM 7.1 and 7.2 PTFs include support for:
 - Imbedded AI Acceleration
 - CPACF Counter Support
 - Breaking Event Address Register Enhancements
 - Enhanced Vector Packed Decimal 2
 - Reset DAT Protection Facility
 - Consolidated Boot Loader (Allows guest IPL from a SCSI LUN)
 - RoCE Express3 Adapter
 - Crypto Express8S Adapter and Cryptographic Enhancements



Eight-Member SSI Support

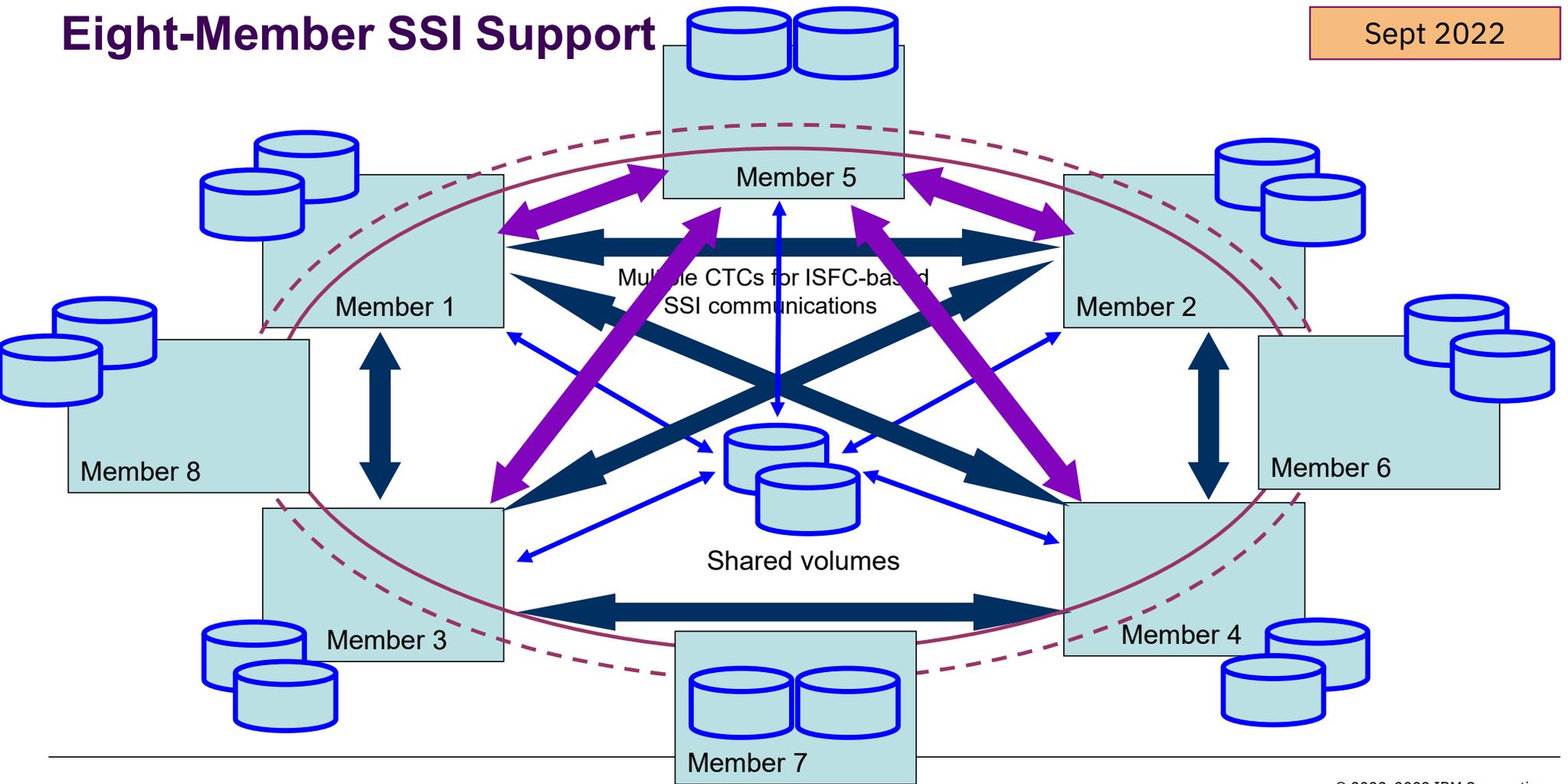
Sept 2022

- With z/VM 7.3, the benefits of a 4-member SSI cluster are extended for up to 8 members
 - Resources managed as a single resource pool
 - Virtual server mobility with Live Guest Relocation
 - Simplified system management of a multi-z/VM environment
 - Horizontal growth of z/VM workloads

- Some work required to migrate existing 4-member clusters to 8-member clusters

Eight-Member SSI Support

Sept 2022



Eight-Member SSI Support

Sept 2022

Non-SSI

USER: 9999 IDENTITY: 9999
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SSI-4

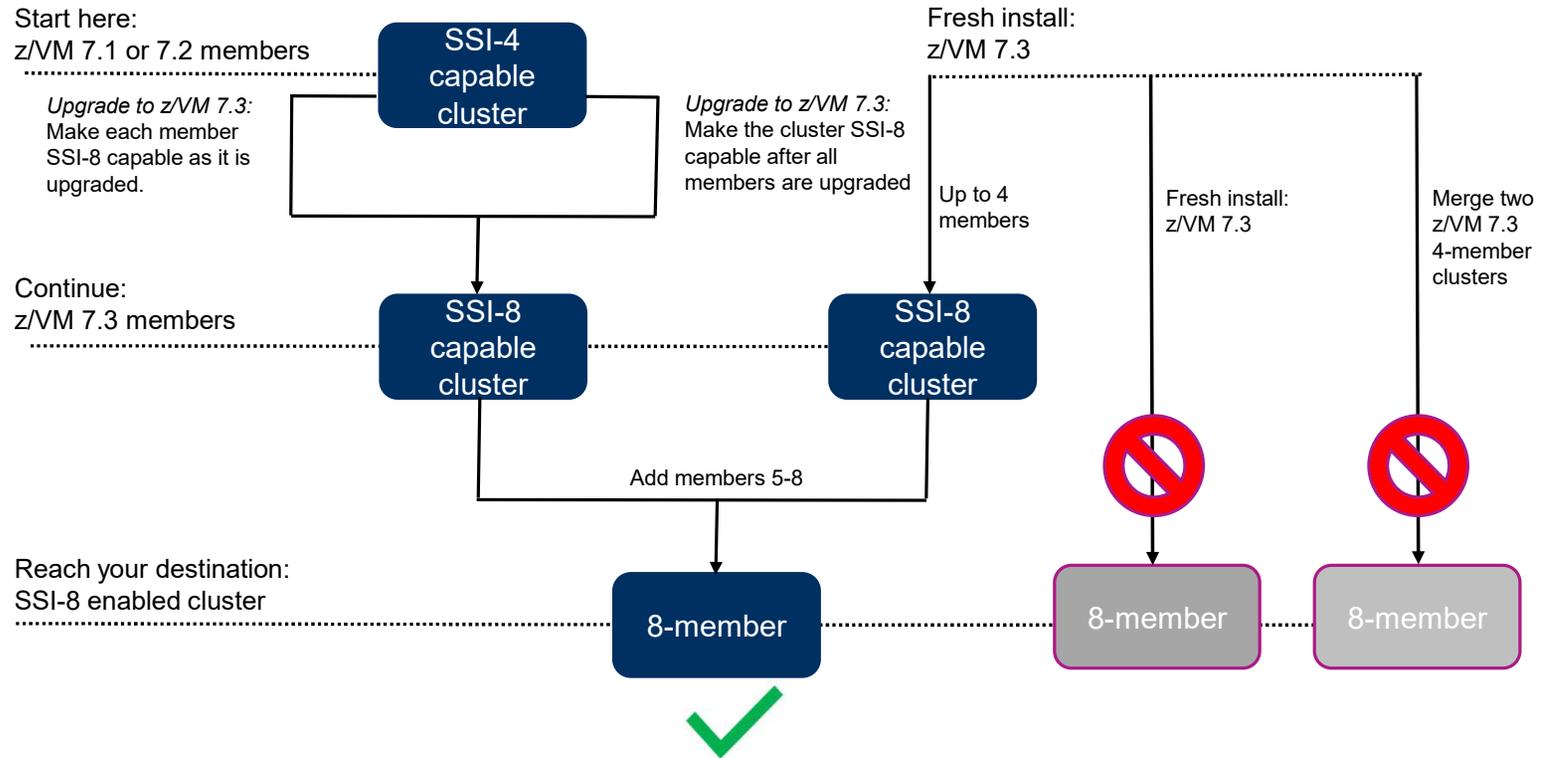
USER: 2500 IDENTITY: 9999	USER: 2500 IDENTITY: 9999	USER: 2500 IDENTITY: 9999	USER: 2499 IDENTITY: 9999
--	--	--	--

SSI-8

USER: 1250 IDENTITY: 9999	USER: 1249 IDENTITY: 9999						
--	--	--	--	--	--	--	--

Eight-Member SSI Support

Sept 2022



NVMe EDEVICE support for z/VM

Sept 2022

- Support included in the base of z/VM 7.3
- Enables the management of NVMe devices connected through PCIe Express adapters as FBA EDEVICES.
- Currently, NVMe devices are only available on IBM LinuxONE machines
- Linux Guests exploiting an EDEVICE which is defined on an NVMe adapter are not eligible for Live Guest Relocation (LGR).

Support for Larger NVMe EDEVICE Page Space Allocations

August 2023

- Allows paging space to be allocated anywhere on an NVMe EDEVICE and be up to any size (up to the available capacity)
- Allows NVMe EDEVICES to handle large paging workloads more effectively
- Enabled when the associated PTF is applied, and NVMe EDEVICES are allocated with large extents using CPFMTXA (ICKDSF)

Component	APAR	PTF	RSU
CP	VM66675	UM90336	-
ICKDSF	PH52513	UI92308	-

Greater than 1 TB Guest Support

August 2023

NO APAR REQUIRED

- Support guests that are defined with more than 1 TB of memory, subject to a set of documented [considerations](#)
 - Reset Time (see [VM66673](#) : Large Guest LOGOFF Reset Time Mitigation)
 - Live Guest Relocation times
 - Co-habitation between small and large guests
 - Dynamic Memory Operations
 - Shutdown times

- To exploit large memory effectively with Oracle, patch 33787325 should be applied

Large Guest LOGOFF Reset Time Mitigation

August 2023

- Reduces the amount of time that a large guest is unavailable for LOGON because of memory reset during LOGOFF.
- Once a guest enters the memory reset phase, its virtual devices have been released and it can be logged on again.
- Considerations:
 - An instance of the old guest still exists in memory, but memory demand will decrease over time.
 - **QUERY NAMES**, **INDICATE PAGING**, and **LOCATE VMDBK** commands will report the old instance in lowercase with a status of "LOGOFF"
 - Restarting a memory-intensive workload may not be advisable until adequate real memory is configured to accommodate the workload.

Component	APAR	PTF	RSU
CP	VM66673	UM90339	-

Improved Resource Management for Diverse Workloads

Warning Track Interruption Facility (WTIF) Exploitation

Dec 2023

- Intends to reduce suspend time and other poor performance symptoms observed when low entitlement LPARs consume borrowed power (more than their entitlement.)

- When PR/SM undispatches one of these logical processors, work on the logical processor ceases to make progress until PR/SM dispatches it again. This can cause:
 - Long transaction response times for guests
 - Excessive use of coping mechanisms by guests (diag x'44', diag x'9C')
 - Excessive use of coping mechanisms by CP (diag x'9C')
 - Generally poor performance

- Currently impacts vertical medium (VMd) and vertical low (VL) logical processors

- z/VM exploitation of WTIF will be enabled by default
 - PR/SM delivers an interrupt to the logical processor that it is about to undispatch
 - z/VM will clean up the guest's work and undispatch it so it can be dispatched elsewhere

Warning Track Interruption Facility (WTIF) Exploitation

Dec 2023

- New **WARNINGtrack** operand on **SRM** configuration statement and **SET SRM** command
 - Enable (default) or disable exploitation
- **QUERY SRM** displays warning track settings
 - New **WARNINGtrack** operand
 - Also displayed by **QUERY SRM ALL**
- **Available for z/VM 7.3**
 - <https://www.vm.ibm.com/newfunction/#warning-track>

Component	APAR	PTF	RSU
CP	VM66678	TBD	-
PERFKIT	VM66709	TBD	-

Enhanced Security

External Security Manager (ESM) Control of Define MDISK Command

- **DEFINE MDISK** is a command sometimes used in z/VM disaster recovery scenarios
 - E.g. when IPL'ing NODIRECT during a system restore
 - Similar functionality was controlled (Diagnose x'E4')
- Support has been updated to allow for control of this command by External Security Managers
 - Included in the base of z/VM 7.3
 - Audit remains through DEFINE.A in RACF/VM

KEYVAULT Utility and Enhancements for Centralized Service Management (CSM)

- **New CMS-based utility to be used to encrypt key/value pairs**
 - Associates system, userid, and password and encrypts using CPACF
 - PBKDF2 for protecting secrets
 - Allows for storage of encrypted data in CMS for persistent use
 - Wrapped protected key is unique to a given virtual machine
 - Protected keys may not be shared between userids within an LPAR
 - Data stored on local minidisk, on a per-userid basis

- **Designed for at-keyboard use**
 - Replacement for NETRC.DATA file for FTP
 - Eliminates the need for passwords stored in clear-text

- **Updates to FTP Server and CSM for safer automation of multi-system management**
 - Clue off of NETRC's configured info for system/userid
 - Recover password automatically and insert everything into FTP dialogue
 - Automate past continual logon prompts during maintenance application

KEYVAULT Utility and Enhancements for Centralized Service Management (CSM)

- **There shall be no passwords stored in clear-text**
 - Local flat file on CSM userid (or consumer userid) will hold encrypted values per system
 - NETRC DATA will no longer contain any passwords at all
 - Decrypted passwords will be stored in local variables, used for FTPS, and then erased
- **The 'encrypting token' is used for local password encryption**
 - **The system administrator must remember this token**
 - A hash of the encrypted token is temporarily maintained in memory
 - Never written to disk
 - Input for each time the admin logs onto the virtual machine
 - Treated with same delicacy as potential password input from CP LOGON
 - Shall not appear in console logs, shall not appear in the clear
 - Erased at the end of CSM processing or at virtual machine logoff
 - LOGON, IPL, or SYSTEM CLEAR creates new entry for protected keys
 - A protected key cannot be reused even in the same VM
- **Use of the TLS Server (your existing one) is still highly recommended**
 - Transmitting decrypted passwords over a clear channel makes this whole exercise useless
 - No requirement to build a second network

KEYVAULT Utility and Enhancements for Centralized Service Management (CSM)

June 2023

- Available for z/VM 7.3
 - <https://www.vm.ibm.com/newfunction/#keyvault>

Component	APAR	PTF	RSU
CMS	VM66453	UM90280	-
SES	VM66457	UM90289	-
TCPIP	PH51239	UI91775	-

z/VM Systems Security and Compliance Utility

June 2023

- **Problem: measuring security and compliance is difficult**
 - Security data for z/VM is hard to find and harder to collect
 - Auditors don't know for what to ask
 - Known client pain-point

- **Deliverable: new CMS-based utility for gathering system data**
 - Centralize security-relevant data collection via one interface
 - **Gathers** security-relevant system data; **does not make security determinations**
 - Future integration with the IBM Z Security & Compliance Center product
 - Plug-in for future vendor support or local add-ons

- **Execute on a per-need basis (not a continuously running task)**
 - Data provided useful in measuring compliance drift or misconfiguration
 - Output provided either to console, to file (default <sysname>.<date>.A), or to calling program via API

z/VM Systems Security and Compliance Utility

June 2023

PCI DSS Requirement		z/VM Specific Data Required
3	Protect stored card holder data	Clear_TDISK, Passwords_on_Cmnds, Set_Privclass, Disc_Operator Enabled/Disabled? Encrypted Paging TLS enabled (TLS 1.2) REQUIRED settings for Secure Telnet, FTPS, SMTP, RSCS VLAN configuration for Vswitch Is an ESM enabled Yes/No
7	Need To Know restrictions	How many machines are > Class G? Are they LBYONLY? Are there machines in the user directory with privileged options? Are they LBYONLY? Who's on the TCPIP OBEY List / SSL_Admin_List? RACF SPECIAL / OPERATIONS / AUDITOR / ROAUDIT users?
10	Track and monitor all access to network resources and cardholder data	Is anyone using anonymous FTP? Is the ESM controlling FTP? ESM control of VLAN settings (RACF VMLAN class)? Can a Class G guest create a transient Guest LAN? Are any guests in the PROFILE TCPIP running without TLS/SSL? (PORT/AUTOLOG statements)
2	Do not use vendor supplied defaults for system password and other security parameters	Scan z/VM User Directory for presence of default user password value ...And default minidisk password values RACF SYSSEC settings around DEFER RACF Audit SEVER=YES
8	Identify and authenticate access to system components	RACF: password/phrase intervals (min/max) RACF: password/phrase expiry RACF password history settings RACF password encryption – KDFAES? RACF: are the password exits enabled? Is MFA enabled? Is anyone enabled for PWFALLBACK? Are any users in the z/VM user directory not configured for LBYONLY / AUTOONLY?
6	Develop and maintain secure systems and applications (the “is it up on its service” question)	QUERY CPSERVICE QUERY CPLEVEL QUERY CMSLEVEL NETSTAT TCP/IP level output CP Environment variable output (if applicable)

z/VM Systems Security and Compliance Utility

June 2023

- Available for z/VM 7.3
 - <https://www.vm.ibm.com/newfunction/#qsec>

Component	APAR	PTF	RSU
CMS	VM66646	UM90295	-

Secure IPL for z/VM Guests

June 2023

- **Assures that the content an administrator boots is unmodified from time of install**

- **New supply-chain requirement for a lot of industry regulations**

- **z/VM provides support for secure boot of guest operating systems**
 - Support added when IPL'ing from ECKD or from SCSI storage (DASD)
 - A guest must IPL LOADDEV, not IPL *vdev*
 - A securely IPL'd guest will behave the same way as a guest booted in its own partition

Secure IPL for z/VM Guests

June 2023

How to use Secure IPL

- Upgrade machine firmware on your IBM z16 or IBM LinuxONE Emperor 4
 - Driver D51C bundle 19
- Install the levels of software required for support
 - z/VM PTFs as specified
 - z/OS PTFs as specified
 - Linux updates -- more support required than what was previously available for secure boot in an LPAR
- Import necessary certificate(s) with **public** key(s) into the HMC certificate store
 - Public key (.p7b format) must match signing private key
 - Check with your vendor(s) for more details
- Assign them to the LPARs where the guest will run
 - Any guest capable of, and attempting to, secure boot will use these certificates
- Use **SET LOADDEV** command to set load parameters
- **IPL LOADDEV** to boot your secure guest

SET LOADDEV SCSI (Class G)

June 2023

```
>>-Set--LOADDEV+--CLEAR-----+><
      |                +-SCSI--+                |
    +-+-----+--+-----+ | SCSI Operands |---+
      '-CLEAR-' ' ' '
                |--ECKD---| ECKD Operands |--'
```

SCSI operands

```
.-----
v
|-----+DEVICE--fcv_vdev-----+-----+
+-PORTname--hhhhhhh hhhhhhh-----+
+-LUN--hhhhhhh hhhhhhh-----+
+-BOOTprog--+-bootprog_number+-----+
|           |--AUTOMATIC-----|
|
+-BR_LBA--hhhhhhh hhhhhhh-----+
+-+NOSECURE+-----+
| '-SECURE---'
|           .-APPend-.
| '-SCPdata--+-+-----+--+-----+--+-'text'+--+
          +-NEW-----+ '-HEX-' '-text---'
          '-offset-'
```

- SECURE valid only when DEvIce operand is used
- LOADDEV directory statement updated accordingly
- DUMPDEV has similar enhancements
- Associated DIRMAINT support added (VM66424)

SET LOADDEV ECKD (Class G)

June 2023

```
>>-Set--LOADDEV+--CLEAR-----+><
      |                +-SCSI--+                |
    +-+-----+--+-----+ | SCSI Operands |---+
      '-CLEAR-' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
                    '--ECKD---| ECKD Operands |--'
```

ECKD operands

```
.-----
v
|-----+DEvIce--eckd_vdev-----+-----+
|
+-BOOTprog--+bootprog_number--+-----+
|           '--AUTOMATIC-----' |
|
+-BOOTREC--+cyl head rec--+-----+
|           '--LABEL-----' |
|
+-+--NOSECURE+-----+
| '-SECURE---' |
|           .-APPend-. |
| '-SCPdata+-----+-----+-----+ 'text'+-' |
|           +-NEW-----+ '-HEX-' '-text---' |
|           '-offset-' |
```

- SECURE valid only when DEvIce operand is used
- LOADDEV directory statement updated accordingly
- DUMPDEV has similar enhancements
- Associated DIRMAINT support added (VM66424)

IPL LOADDEV / DUMPDEV (Class G)

June 2023

```
>>--+Ipl--+system_name-----+--| Parameters |-----+--+
|      | '-vdev--| Device Operands |-|      |
|      |
|      |'---+---fcp_vdev---+-----+--| LDIPL Operands |-|
|      |           '-DUMP---+-----+--|
|      |           '-NSSDATA-' |
|      |'---LOADDEV-----|
|      |'---DUMPDEV-----|
|      |'---IPL-----|
```

LDIPL Operands

```
|---+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| '-LOADParm--load_parm-' '-STOP-' '-ATTN-'
```

- LOADDEV / DUMPDEV point to parms set with SET LOADDEV or DUMPDEV
- IPL directory statement contains new LOADDEV option
- OPTION directory statement can enforce use with SECUREIPLREQ

Secure IPL for z/VM Guests

June 2023

▪ Available for z/VM 7.3

- <https://www.vm.ibm.com/newfunction/#gsipl>
- Requires Driver D51C Bundle 19 for IBM z16 or IBM LinuxONE Emperor 4
- Refer to Machine Field Alert for required Linux OS services levels
 - <https://www-40.ibm.com/servers/resourcelink/lib03020.nsf/pagesByDocid/272B3DD994A65B538525899F005FA0E6?OpenDocument>

- z/OS will only run in audit-mode, due to a requirement for Virtual Flash Memory
 - Use SET LOADDEV...NOSECURE when IPL'ing z/OS guests under z/VM

Component	APAR	PTF	RSU
CP	VM66434	UM90281	-
DirMaint	VM66424	UV99435	-
SMAPI	VM66650	UM90300	-

Improved Resiliency and RAS

z/VM Performance Data Pump

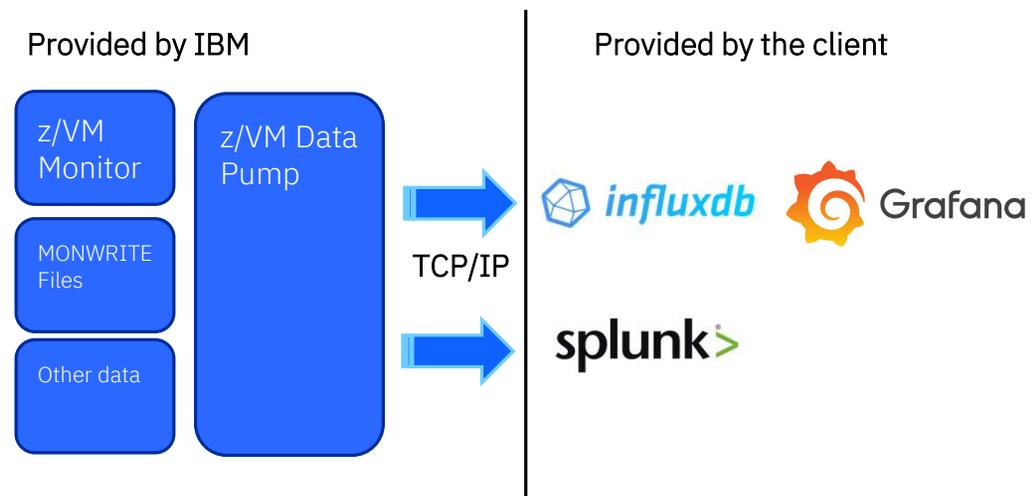
August 2023

- Enables the following performance monitoring usability enhancements:
 - Real time performance monitoring and analysis
 - Integration of z/VM performance data into popular observability platforms (Splunk and Grafana)
 - Aggregation of multiple z/VM systems into a single performance dashboard (like SSI-wide dashboards)
 - Integration with data from other sources (Linux, z/OS, applications)
 - Leveraging of existing customer processes for alerting and reporting on z/VM data
- Requires:
 - A small CMS virtual machine with minimal configuration files on each z/VM system to monitor
 - Observability platform to receive real-time data (commercial or open source)
- Ships as part of z/VM Performance Toolkit
 - <https://www.vm.ibm.com/related/perfkit/datapump/>

Component	APAR	PTF	RSU
PERFKIT	VM66687	UM90334 (z/VM 7.3)	-

z/VM Performance Data Pump

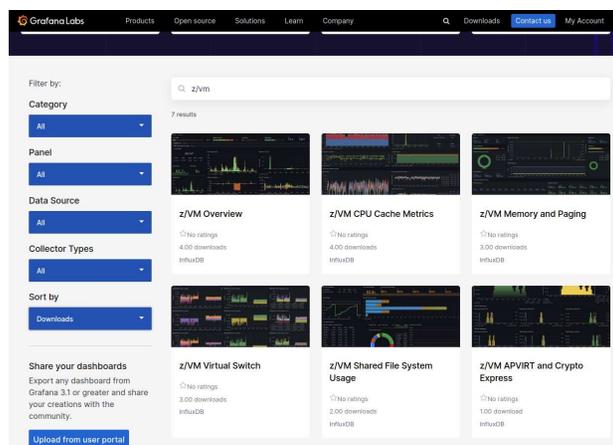
- Data Pump is technically independent of PERFSVM
 - Customers can run either one or both
- Real-time data is “pushed” through a TCP/IP connection
 - Open source components can run “anywhere”
 - IBM Z Container registry has s390x images
- Grafana dashboards can be installed as needed
 - Downloaded directly from Grafana web site
 - Uploaded from the workstation
- Sample dashboards were designed to work everywhere
 - Easy to customize for specific use case
 - Dynamic template variables to select systems
- When possible, keep all in a single InfluxDB database
 - Allows for powerful cross-system aggregation
 - Several options to add data from other sources
 - Single dashboard to show all your systems
- Videos:
 - Spotlight: <https://youtu.be/MmThTyT3MCo>
 - Education/Demo: <https://youtu.be/t0-30uiSHNg>



z/VM Performance Data Pump

Suggested solution based on two popular open source projects

- InfluxDB – NoSQL time-series database
 - Consumes real-time performance data from multiple systems
 - Attractive for aggregating enterprise data
 - Applications like Grafana can query the stored data by time range
 - REST API available to open up data for other applications
 - Data can be retained in InfluxDB “as long as you want”



- Grafana – Web application to present dashboards
 - Manages the installed dashboards and access control
 - Issues the InfluxDB queries to populate the dashboard
 - Unified set of dashboards for different purposes
 - Wall-mounted kiosk-style dashboard
 - Interactive dashboards to select and zoom into details
 - Includes web-based dashboard editor for customization
 - Options for alerting and reporting
- Set of sample dashboards available on Grafana web site

z/VM Performance Data Pump



z/VM Overview

☆ No ratings
5.00 downloads
InfluxDB



z/VM CPU Cache Metrics

☆ No ratings
4.00 downloads
InfluxDB



z/VM Virtual Switch Activity

☆ No ratings
4.00 downloads
InfluxDB



z/VM Memory and Paging

☆ No ratings
3.00 downloads
InfluxDB



z/VM Shared File System Usage

☆ No ratings
2.00 downloads
InfluxDB



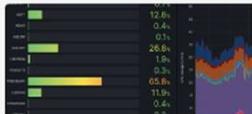
z/VM SSI Overview

☆ No ratings
2.00 downloads
InfluxDB



z/VM APVIRT and Crypto Express

☆ No ratings
1.00 download
InfluxDB



z/VM LPAR Overview

☆ No ratings
0 downloads
InfluxDB



z/VM Multi-System Overview

☆ No ratings
0 downloads
InfluxDB

System: RDBKSS12 | System: All

Current Status RDBKSS12

CPU Utilization		Memory Utilization		Page Space		Spool Space					
RDBKZVMA	106%	RDBKZVMA	271%	RDBKZVMA	37.2%	RDBKZVMA	7.76%	RDBKZVMA	7.3.0	2301	3932-206
RDBKZVMB	96.8%	RDBKZVMB	32.3%	RDBKZVMB	0%	RDBKZVMB	8.36%	RDBKZVMB	7.3.0	2301	3932-206
RDBKZVMC	55.9%	RDBKZVMC	44.1%	RDBKZVMC	0%	RDBKZVMC	8.55%	RDBKZVMC	7.3.0	2301	3932-206
RDBKZVMD	38.0%	RDBKZVMD	20.1%	RDBKZVMD	0%	RDBKZVMD	26.6%	RDBKZVMD	7.3.0	2301	3932-206

Current Status RDBKSS12

CPU Usage

CPU Usage RDBKZVMA



CPU Usage RDBKZVMB



CPU Usage RDBKZVMC



CPU Usage RDBKZVMD



I/O Throughput

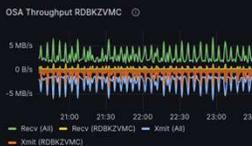
OSA Throughput RDBKZVMA



OSA Throughput RDBKZVMB



OSA Throughput RDBKZVMC



OSA Throughput RDBKZVMD



Improved System Management

Centralized Service Management (CSM) Usability Enhancements

- Several enhancements have been made to the Centralized Service Management function including:
 1. New option **COMPonent** to the **SERVLVL QUERY** command allows queries of specific components in a service level. Previously, all components were reported with each command invocation.
 2. The **SERVLVL QUERY** command is expanded to allow partial wildcard (*) support
 3. Improved diagnostics have been added for cases where a pending service level has stalled. A new **PRODPending** option to the **SYSTEM QUERY** command will retrieve and display the \$PRODS file for debug.
 4. Modifications have been made to the way that local mods are output during a query

4-character time zone identifier support

- Support has been added for 4-character time zones
 - **DEFINE TIMEZONE** and **SET TIMEZONE** commands now support 4-character time zone IDs as input
 - **TIMEZONE BOUNDARY** and **TIMEZONE DEFINITION** system configuration file statements now support 4-character time zone IDs as input
 - **QUERY TIME** and **QUERY TIMEZONE** commands are updated to display 4-character time zone IDs.
- Support includes time zone identifiers that are returned from the Server Time Protocol (STP) network.

DIRMAINT Automatic Sensing of Disk Volume Sizes

- DIRMAINT has made enhancements to obtain the size of a physical volume when it is added to a disk pool in the **EXTENT CONTROL** file.
- DIRMAINT's process of reloading the **EXTENT CONTROL** file (**RLDEXTN** command) is enhanced to query each volume listed in the **EXTENT CONTROL** file or source directory to determine their actual size.
- This ensures that DIRMAINT properly identifies the maximum size of the volume that is being used for minidisks as opposed to using the minimum default.

SMAPI FCP EQID API Support

January 2023

- Additional SMAPI API ([System_FCP_EQID_SET](#)) which enables modification of device equivalency IDs (EQID) for real FCP Adapter Devices
- Beneficial for customers who use SCSI disks connected to FCP (NOT EDEVICES) and desire to use Live Guest Relocation (LGR) in an SSI environment.

Component	APAR	PTF	RSU
CP	VM66658	<i>UM90247 (z/VM 7.2)</i> <i>UM90248 (z/VM 7.3)</i>	-

*VMEVENT Enhancements

June 2023

- The *VMEVENT CP system service is enhanced to provide additional system programming services
 - Virtual machine disconnect and reconnect from a terminal session (NEW EVENT)
 - Terminal session identification (e.g. device type, address, host virtual machine, IP address) on logon and reconnect event.
 - Full-precision timeout values to logoff-timeout-started and logoff-timeout-service events
- Redundant runnable-state-entered events are removed in cases where the virtual machine was already in a runnable state.

Component	APAR	PTF	RSU
CP	VM66679	UM90293	-

Other Highlights

Complete Solution for management of the z/VM and Linux on IBM Z environment

Single PID

5698-K01 OTC
5698-K02 Annual S&S

[Web Site](#)

Optional Priced Features

IBM Infrastructure Suite for z/VM and Linux V2.2

OMEGAMON XE on z/VM and Linux

Performance monitoring of z/VM and Linux guests

Spectrum Protect (formerly TSM)

File Level backup/recovery for Linux Virtual Servers

Operations Manager for z/VM

Facilitate operational monitoring and automated operations, take action based on events

Backup and Restore Manager for z/VM

Image and file level backup/restore of z/VM environment
Image level backup/restore of Linux

Tape Manager for z/VM

Manage tape volumes and devices for backup/recovery

Cloud Infrastructure Center

IaaS offering that provides an industry-standard user experience for both traditional and cloud infrastructure management

IBM Cloud Infrastructure Center

Scalable IaaS management for containerized and non-containerized workloads across the enterprise

Infrastructure management

Instantiate, define, capture, and manage the lifecycle of virtual machines

Automation

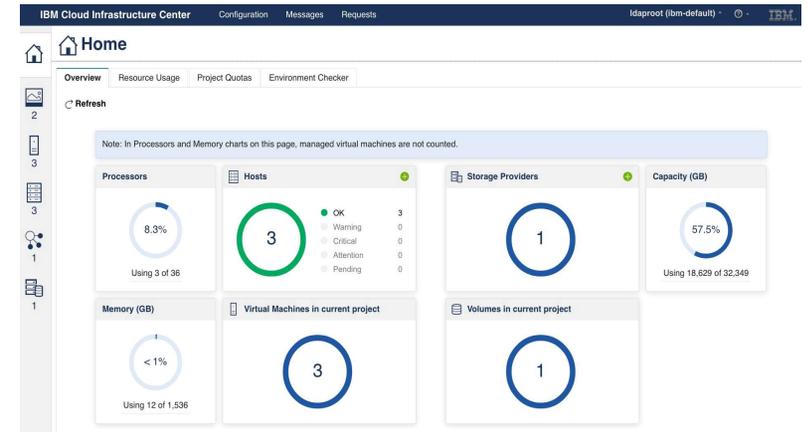
Build 'services' for automated infrastructure management

Cloud integration

Integrate via compatible OpenStack APIs with cloud management tools

Learn more

- Watch [IBM Cloud Infrastructure Center webpage](#)
- Read the [technical blogs and announcements](#)
- Check out the [technical details at the IBM Documentation](#)
- Get started using the [Content solution](#)
- Request a demo from your IBM or BP representative
- Contact: Stev Glodowski, PM: stev.glodowski@de.ibm.com

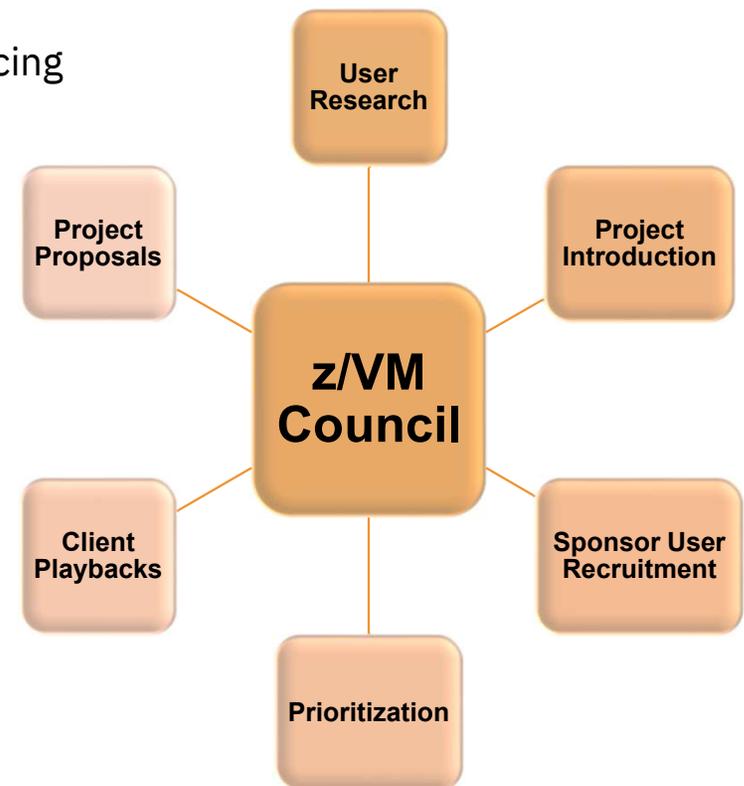


"IBM Cloud Infrastructure Center allows us to substantially improve our infrastructure management and reduce cost & complexity to manage from simple to complex environments"

—Eric Everson Mendes Marins,
PCS_ZVM squad at IBM CIO Office

z/VM Council – Client Communication and Collaboration

- z/VM-centric community started in June 2018
 - Meeting about once a month via telephone and web conferencing
 - Other collaboration done via membership web site
- Membership Requirements
 - IBM Z Feedback Program Agreement (FPA)
 - Regular participation
 - Sponsor User for at least one project per year
 - Homework assignments
- Additional details:
 - more information
http://www.vm.ibm.com/sponsor_user/zvm_council.html
 - Link to z/VM community - <https://ibm.biz/zvmCouncil>
 - Contact: Kerry Wilson – kerryw@us.ibm.com



z/VM Council – Educational Workgroup

- Workgroup focused on creating educational videos
 - Goal of shortening the time required to become comfortable with z/VM

- Two types of videos planned
 - Pure education
 - Shorter “How to” videos

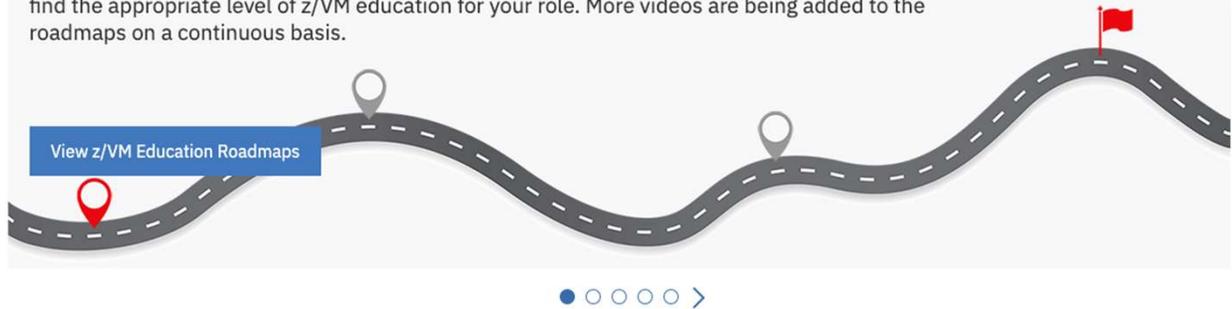
- Goal of providing roadmaps for education

z/VM Education Pages

- <https://www.vm.ibm.com/education/>
- Newly renovated landing page for z/VM education.
- View a tailored list of z/VM education videos based on experience levels via the z/VM Education Roadmaps.
- Access existing z/VM education resources.

z/VM education roadmaps

New z/VM education videos are now available. These videos have been created by the IBM z/VM Development team along with others within the IBM zSystems organization. Videos range from basic introductory courses to more advanced z/VM topics. Several roadmaps have been created for you to find the appropriate level of z/VM education for your role. More videos are being added to the roadmaps on a continuous basis.



More z/VM education resources

Additional Links to z/VM Education
Links to tutorials and more z/VM education resources

→ [Other education links](#)

z/VM How to Videos
Step-by-step videos that walks a user through a specific task

→ [View all](#)

z/VM Related Live Virtual Classes
Linux on IBM Z and LinuxONE - Technical Webcast Sessions

→ [View classes](#)

z/VM Education Pages

- <https://www.vm.ibm.com/education/>
- Easily prioritize the education that matches your need and skill level.
- New videos added regularly

z/VM education roadmap coverage

Reference the table below to find which videos are contained on the various z/VM education roadmaps.

Video Name	z/VM Basic Education Roadmap	New z/VM System Programmer Roadmap	z/VM Advanced Education Roadmap
100 - What is z/VM?	✓	✓	✗
101 - z/VM Virtualization Basics	✓	✓	✗
102 - CP and CMS Customization	✓	✓	✗
103 - Twelve Pillars of System Management	✓	✓	✗
104 - Introduction to System Administration	✓	✓	✗
105 - Introduction to CMS Pipelines	✓	✓	✗
106 - Introduction to RACF	✓	✓	✗
200 - Rexx Coding Techniques - Part 1	✗	✓	✗
201 - Rexx Coding Techniques - Part 2	✗	✓	✗
202 - Problem Determination	✗	✓	✗
203 - z/VM Virtual Switch (VSwitch): The Basics	✗	✓	✗
204 - z/VM Introduction to the Directory Maintenance (DirMaint)	✗	✓	✗
300 - What's Going Wrong? LPAR Weights	✗	✓	✓
301 - z/VM Virtual Switch (VSwitch): Advanced Topics	✗	✓	✓

z/VM Education Pages

- <https://www.vm.ibm.com/education/>
- View video's right from our education webpage, or go directly to Youtube to watch and subscribe.

Basic z/VM Knowledge Roadmap

This track assumes you have little or no experience with the IBM mainframe, and your role will only require a basic knowledge of the product. The courses in this roadmap will touch on the basics, but will not include some of the more technical courses intended for z/VM System Programmers.

Examples of this role may include: *Architect, Sales, Manager, General Operator*

+ Session 100 - What is z/VM?

+ Session 101 - z/VM Virtualization Basics

+ Session 102 - CP and CMS Customization

+ Session 103 - Twelve Pillars of System Management

+ Session 104 - Introduction to System Administration

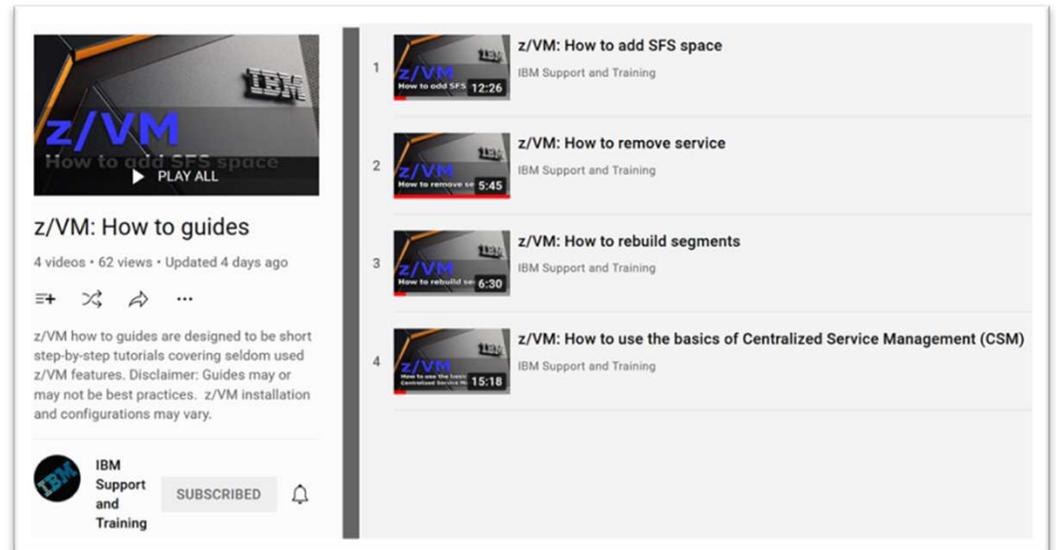
+ Session 105 - Introduction to CMS Pipelines

+ Session 106 - Introduction to RACF

 [Youtube: Basic z/VM Knowledge Roadmap playlist](#)

z/VM Education – How To Guides

- Short videos that provide guides on different z/VM related tasks.
- Part of the IBM Support and Training YouTube channel.
- Playlist - <https://ibm.biz/zvmhowto-yt>
- Please like and subscribe



Problem Determination - Must Gather Information

- There is a new set of web pages at <https://www.vm.ibm.com/support/>

z/VM Troubleshooting

Overview Preparation Troubleshooting Must Gather Sending Data

z/VM

News

About z/VM

Events calendar

Products and features

Downloads

Technical resources

Library

How to buy

Last Updated: 17 February 2021

This page provides a summary of materials for you to collect when you have a problem with your z/VM system. For more details, select the problem you are troubleshooting, and follow the instructions. Data that needs to be collected and sent to IBM is highlighted in the table below. If there is "data to collect" for your problem, refer to the "Must Gather - Details" section for details on how to collect the data.

Filter:

#	Category	Problem Description	Actions / Data to Collect
13.	Performance	z/VM system performance problems	z/VM Support may request the data below. Note: This data should be collected from time periods in which the system was performing well, as well as from time periods in which the system was running poorly: <ul style="list-style-type: none"> Collect and send MONWRITE data to IBM Collect and send CP OPERATOR's console to IBM

Open Mainframe Project – Project Feilong

Project Mission:

Contribute and further develop the RESTful API server that simplifies interaction with the IBM z/VM Hypervisor

Community Benefits:

- Have a strong codebase to use, contribute, and further develop thanks to the IBM contributions to the project
- The RESTful API server makes using z/VM easier especially for developers without deep knowledge of z/VM
- Enable development of self-service Infrastructure-as-a-Service automation of z/VM Guests, networking, and storage used by z/VM.

For more information: <https://www.openmainframeproject.org/all-projects/feilong>

Summary

Summary

- z/VM 7.3 is the newest release of z/VM
 - Enhancements include
 - Eight-Member SSI support
 - NVMe EDEVICE support
 - 4-character time zone identifier support
 - External Security Manager (ESM) Control of Define MDISK Command
 - Centralized Service Management (CSM) Usability Enhancements
 - Includes all New Function Service shipped for z/VM 7.2

- New Function Service will continue to be delivered on z/VM 7.3
 - Heavy dependence on the sponsor user program
 - Plans for new function are published on the z/VM website
 - <https://www.vm.ibm.com/newfunction/>

- Subscribe to or follow the websites referenced throughout this presentation for the latest news on new function, required service, and more