z/VM 7.2 Platform Update, News, and Recommendations (Part 1)

Version 3.24 – see https://www.vm.ibm.com/library/presentations/ for latest version.

Jacob Gagnon
z/VM Development Lab Client Focus & Care
jpgagnon@us.ibm.com

John Franciscovich
z/VM Development
francisj@us.ibm.com

Celebrating 50 years of VM

Agenda

- Summary of current releases and cadence

- Preview of z/VM Version 7 Release 3

- Overview of z/VM Version 7 Release 2

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

- 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	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
6.4			R		EOS																			
	WFM	SC	SC	SC																				
7.1	R				R							R	EOS											
	N	N	SC	SC	SC	SC	SC	SC	WFM	SC	SC	SC												
7.2			R		R		R		R				R						R		EOS			
		GA	N		N	N	N	N	N	N	SC	SC	SC	SC	SC	SC	WFM	SC	SC	SC				
7.3									R		R		R		R		R				R			
									GA	N	N	N	N	N	N	N	N	N	SC	SC	SC	SC	SC	SC

z/VM 7.1 EOS – March 31, 2023

z/VM 7.1 WFM – March 7, 2022

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WFM: Withdrawn from Marketing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

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z/VM Releases

Release	ProdId	GA	EOM	EOS	Notes
z/VM 7.3	TBD	3Q22	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]
z/VM 6.4	5741-A07	Nov 11, 2016	Mar 9, 2020	Mar 31, 2021	

Release[2]	z16	z15 & LinuxONE III	z14 & LinuxONE II	z13 & LinuxONE Emperor	z13s & LinuxONE Rockhopper	zEC12	zBC12	z196	z114
z/VM 7.3	Yes	Yes	Yes						
z/VM 7.2	Yes	Yes	Yes	Yes	Yes[3]				
z/VM 7.1	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
z/VM 6.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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 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.

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

New to z/VM?

- Welcome new people to the z/VM Community

- Some resources beyond this presentation:
  - The z/VM 7.2 Library Page https://www.vm.ibm.com/library/720pdfs.html
  - The z/VM Presentations Page https://www.vm.ibm.com/library/presentations/index.html
  - 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 Playlist on YouTube https://ibm.biz/zvmhowto-yt
  - The VM Workshop
    - Webpage - http://www.vmworkshop.org/
    - YouTube Channel - https://ibm.biz/vmworkshopyoutube

z/VM Version 7 Release 3 Preview

z/VM 7.3

- Planned GA 3Q22
  - Preview announce April 5, 2022
  - See https://www.vm.ibm.com/zvm730/ for more details

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

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

z/VM 7.3 Content

- Eight-Member SSI support

- NVMe EDEVICE support

- 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
  - Foundational changes (new modules and control blocks) for future new function APARs

z/VM 7.3 – System Default Changes

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

- 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

z/VM Version 7 Release 2 Overview

z/VM 7.2

- GA September 18, 2020
  - Preview announce April 14, 2020
  - GA Announce August 4, 2020

- Architecture Level Set of z13 and LinuxONE[1] or newer processor families

- Includes all new function service shipped for z/VM 7.1 including:
  - 80 Logical Processor support, Dynamic Crypto, Virtual Switch Priority Queuing, etc.

[1] – The machine type 2828 Rockhopper does not meet the ALS requirements and is not supported.

z/VM 7.2 Content

- Centralized Service Management

- Multiple Subchannel Set Multi-Target Peer-To-Peer Remote Copy support for the GDPS environment

- Adjunct virtual machine support

- 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
  - Foundational changes (new modules and control blocks) for future new function APARs

z/VM 7.2 – System Default Changes

- TDISK clearing
  - The default has changed to Enabled.
    - Note: the sample system configuration files mistakenly still have TDISK clearing disabled.

- The SRM unparking model
  - The default unparking model has changed from LARGE to MEDIUM.

- System Recovery Boost
  - SRB has been enabled by default
  - Still requires z15 or newer and appropriate configuration.

z/VM 7.2 – Other Default Changes

- z/VM Directory Maintenance (DirMaint)
  - NEEDPASS - the default value has changed to No
  - DVHWAIT BATCH and CLUSTER INTERVAL values have been updated to improve DirMaint's overall processing time in response to directory change requests.

- Telnet Server Certificate Check
  - Changed from CLIENTCERTCHECK NONE to CLIENTCERTCHECK PREFERRED
  - Change made to z/VM 7.1 with APAR PH18435

z/VM 7.2 – Other Changes

▪ The PAGING63 IPL parameter and associated external interfaces have been removed.
   – Previously available as a chicken-switch.

▪ The Environmental Record Editing and Printing Program (EREP) functional executables will be preinstalled and delivered as part of the z/VM 7.2 product and serviced via the CP component, simplifying the process for applying EREP service.

IBM-Supplied User IDs

- IBM-Supplied user IDs are identified Appendix N of the *z/VM Installation Guide*

- Lists have been enhanced for z/VM 7.2 to provide descriptive information

```
                  Default   Owning    Functional
User ID  Type     password  component area         Description
-------- -------  --------  --------- ----------   -----------
ADM      USER     NOLOG     VM        Posix        POSIX group
AUDITOR  IDENTITY LBYONLY   VM        Operations   SVM monitoring server
AUTOLOG1 IDENTITY WD5JU8QP  VM        Operations   VM Default system startup user ID
AUTOLOG2 IDENTITY LBYONLY   RACF      Security     RACF system startup user ID
AVSVM    IDENTITY LBYONLY   VM        Networking   SNA LU 6.2 comm server
BIN      USER     NOLOG     VM        Posix        POSIX group
BLDCMS   USER     LBYONLY   VM        Service      System maintenance build server
BLDNUC   USER     LBYONLY   VM        Service      System maintenance build server
BLDRACF  USER     LBYONLY   VM        Service      System maintenance build server
BLDSEG   USER     LBYONLY   VM        Service      System maintenance build server
CBDIODSP IDENTITY WD5JU8QP  VMHCD     HCD          HCD dispatcher server machine
CMSBATCH IDENTITY LBYONLY   VM        CMS Batch    CMS batch facility server
CSMSERVE IDENTITY LBYONLY   TCP/IP    Networking   TCP/IP Centralized Service Management (CSM) FTP server
CSMWORK  USER     WD5JU8QP  VM        Service      Centralized Service Management FTP work system
DAEMON   USER     NOLOG     VM        Posix        POSIX group
```

- New lists have been added:
  - Special "dummy" user IDs to protect CP-defined areas from being overlaid
    - $ALLOC$, $DIRECT$, $PAGE$, etc.

  - User IDs supplied with prior releases that are not included with z/VM 7.2
    - Cannot be changed or deleted if doing an Upgrade Installation

Identify Previous Service Included in z/VM 7.2

- In general, all service for z/VM 7.1 is included in the z/VM 7.2 base product
    - Due to processing time requirements, a few PTFs released just prior to z/VM 7.2 General Availability could not be included in the base

- z/VM CP and CMS APARs Released Between 7.1 GA and 7.2 GA
    - Tables listing APARs that are
        - Included in the z/VM 7.2 base
        - Not included in the z/VM 7.2 base
        - Required for specific z/VM 7.2 function

- CP4ZVM72 tool in z/VM Download library
    - Run on your z/VM 7.1 system to create a report that identifies CP APARs:
        - On your z/VM 7.1 system that are already in the base of 7.2
        - On your z/VM 7.1 system that are not in the base of 7.2
        - In the base of z/VM 7.2 that you do not have on z/VM 7.1

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 zSystems and 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
  - 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

Improved Resiliency and RAS

MSS MT PPRC Support for GDPS Environment

z/VM 7.2 Base

▪ Multiple Subchannel Set (MSS) Multi-Target Peer-To-Peer Remote Copy (MT PPRC) support for the GDPS environment

▪ Disk device can be the primary for up to three secondary devices in three alternate subchannel sets
  – May be configured in subchannel sets 1, 2 and 3
    • Must have corresponding device in subchannel set zero to be recognized
    • All non-disk devices must still be configured in subchannel set zero

  – ACTIVE configuration – devices currently in use by z/VM
    • Initially DASD in the IPLed subchannel set
  – STANDBY configuration – devices not in the ACTIVE configuration

MSS MT PPRC Support for GDPS Environment ...

z/VM 7.2 Base

- Subset of CP commands now accept and display five-digit device numbers
  - Independent of whether MSS MT PPRC is being exploited
  - Device address is prefixed by the subchannel set number (0-3)
    - QUERY 2793

      Old response: **DASD 2793 CP SYSTEM FR2793   1**
      New response: **DASD   2793 CP SYSTEM FR2793   1**
    - QUERY 22793

      New response: **DASD 22793 CP SYSTEM FR2793   1**

- SSI considerations
  - Multi-release SSI clusters are supported when zero or a single alternate subchannel set is exploited
  - All cluster members must be at z/VM 7.2 if two or more alternate subchannel sets are required

- z/VM System Management APIs (SMAPI) do not explicitly support five-digit device numbers
  - Caution is recommended when using SMAPI APIs that return information on device numbers.

MSS MT PPRC Support – Reference

z/VM 7.2 Base

- See *CP Planning and Administration,* Chapter 18: "Multiple Subchannel Set Support"

- If you use z/VM HCD, the following service is required:

Component	APAR	PTF	Available	RSU
z/VM	VM66385	7.1: UM35710 6.4: UM35709	August 13, 2020	TBD
z/OS	OA59720	2.3: UJ03585 2.2: UJ03586 2.1: UJ03587	August 12, 2020	

z/VM Adjunct Support

z/VM 7.2 Base

- Documented in z/VM 7.2

- Adjunct is a second virtual machine configuration for a userid
  - Distinct from the (primary) configuration created when userid is logged on

  - Intended to run CMS to aid in debugging the operating system in the primary configuration:
    - Displaying and modifying the primary's memory
    - Observing and manipulating a guest system running in the primary

- The primary and adjunct configurations each have their own virtual CPU(s), memory, and devices

- Adjuncts are enabled by default
  - Can be modified by
    - **FEATURES** statement in system configuration file
    - **SET ADJUNCTS OFF/ON** command

z/VM Adjunct Support (cont.)

z/VM 7.2 Base

- The **ADJUNCT** *directory statement* authorizes a user to create an adjunct virtual machine
  - For example - **ADJUNCT CMSADJ**

  - **CMSADJ** is an adjunct template defined as a USER in the directory
    - Must have the NOLOG option

- The **ADJUNCT** *command* controls operation of adjunct virtual machines
  - **ADJUNCT START** is analogous to logon

  - **ADJUNCT END** logs off the adjunct
    - Leaves the primary configuration active

  - Additional operands to control the adjunct's state and issue commands

Improved Systems Management

Centralized Service Management

- Deploy service to multiple z/VM systems
  - A centralized primary location
    - Manages distinct levels of service
    - The "Principal" system
  - Remote traditional z/VM systems
    - Transfer data over TCP/IP
    - Different remote systems can have different levels

- For non-SSI environments
  - SSI already provides centralized management within the SSI cluster

- Intended for installations with large numbers of non-SSI z/VM systems
  - Configuration and setup required
  - For just a few systems it is easier to continue using **SERVICE** and **PUT2PROD** to install service on each system

z/VM Centralized Service Management

z/VM 7.2 Base

- The Principal system uses the Shared File System (SFS) to manage service levels for the Managed systems

- The Principal system may be serviced either with Centralized Service Management or independently

- FTP is used for communication between the Principal and Managed systems
  - Special purpose FTP server

- New **SERVMGR** command
  - Handles all tasks associated with Centralized Service Management
  - Review documentation to understand options

Centralized Service Management – Requirements

- Principal and Managed systems must all be on **z/VM 7.2**

- Space must be added to the VMPSFS file pool
  - At least
    - 3000 4K blocks in Group 1
    - 520000 4K blocks in Group 2
  - Additional space will be required as new service levels are added

- **APAR VM66428 (PTF UM35726)** must be:
  1. Installed on all Principal and Managed systems
  2. Applied to any customer-defined z/VM CSM service level that is based on the BASE z/VM CSM service level
     - Service level that incorporates the initial z/VM 720 RSU

  - This PTF updates VMSES/E core components
    - Installation will end with a restart record
    - Issue **SERVICE RESTART** to complete the install

Centralized Service Management - More Information

z/VM 7.2 Base

- *z/VM 7.2 Service Guide,* Part 2:
  - "Using z/VM Centralized Service Management to service z/VM systems"

- z/VM Centralized Service Management web page:
  - http://www.vm.ibm.com/service/csmserv.html

- Full presentation by Richard Lewis:
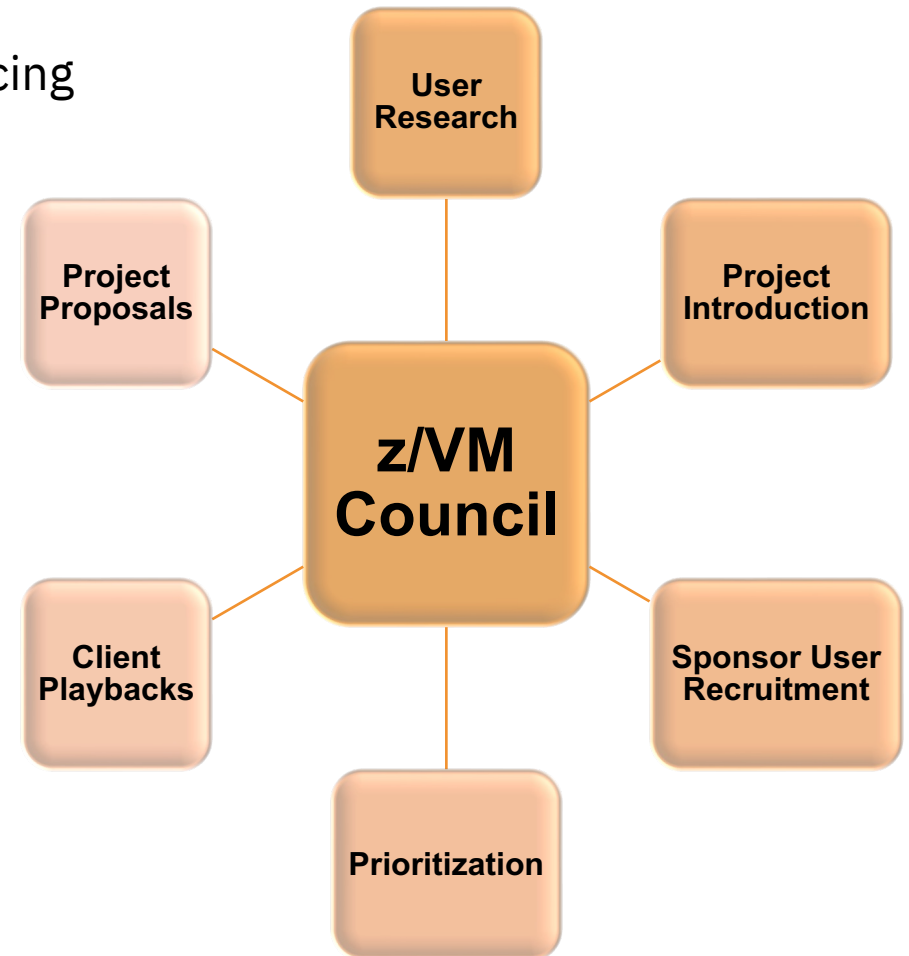 - http://www.vm.ibm.com/devpages/richardl/csm92020.pdf

Other Highlights

IBM Software Electronic Delivery Change

- IBM is planning on changing the public IP addresses for IBM Software download servers processing z/OS, z/VM, and z/VSE product and service orders from ShopZ.

- Any applications using public IP addresses should be updated to use the new IP addresses.

- Details and Information at: https://www.ibm.com/support/pages/node/6580101

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 zSystems Feedback Program Agreement (FPA)
  - Regular participation
  - Sponsor User for at least one project per year
  - Homework assignments

- Additional details:
  - http://www.vm.ibm.com/sponsor_user/zvm_council.html
  - Contact: Kerry Wilson – kerryw@us.ibm.com

User Research

Project Proposals

Project Introduction

z/VM Council

Client Playbacks

Sponsor User Recruitment

Prioritization

Problem Determination - Must Gather Information

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

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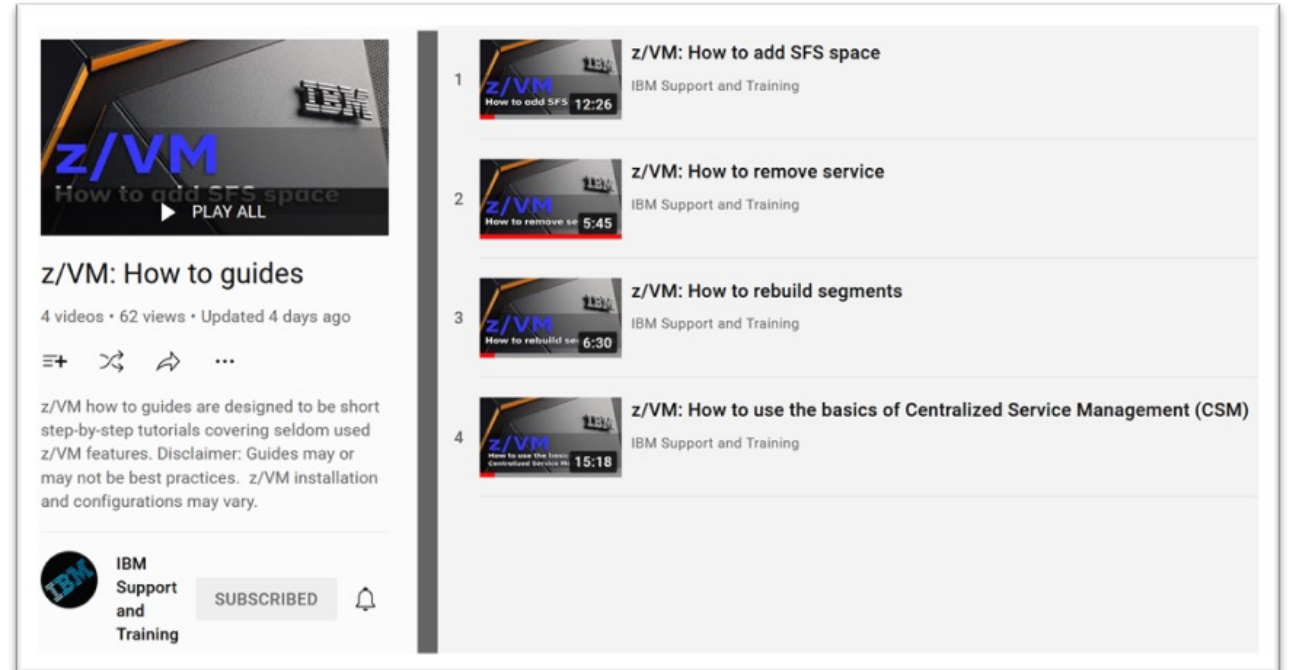
- Workgroup focused on creating educational videos
  - Goal of shortening the time required to become comfortable with z/VM

- Two types of videos planned
  - Pure education
  - Shorter "How to" videos

- Goal of providing roadmaps for education

z/VM Education – 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

z/VM Education – "Basics" roadmap

- Short to medium-length videos that go over the basics of z/VM.

- Part of the IBM Support and Training YouTube channel.

- Coming soon: still under development
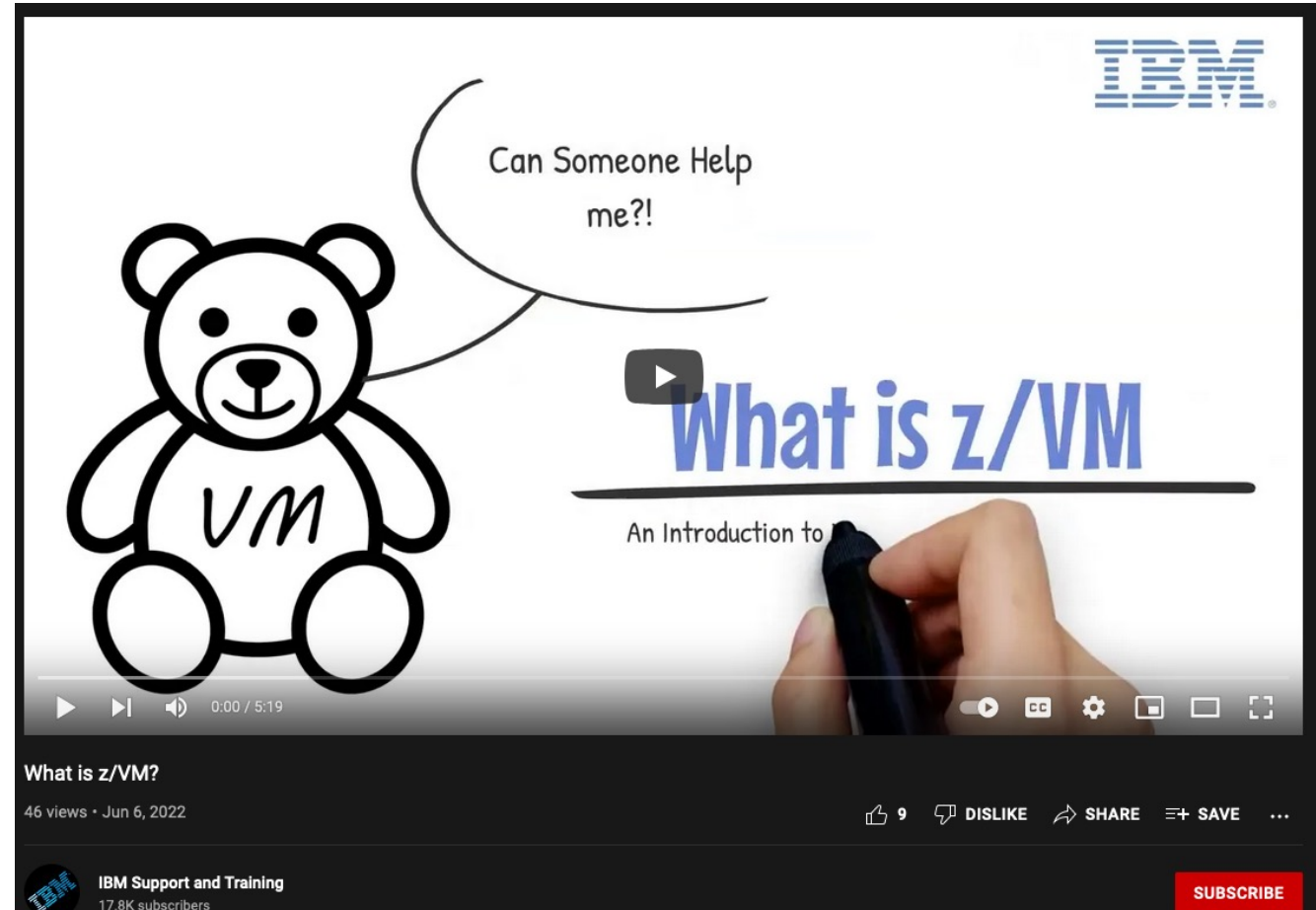
z/VM 7.2 Platform Update, News, and Recommendations (Part 2)

Version 3.24 – see https://www.vm.ibm.com/library/presentations/ for latest version.

Jacob Gagnon
z/VM Development Lab Client Focus & Care
jpgagnon@us.ibm.com

John Franciscovich
z/VM Development
francisj@us.ibm.com

Celebrating 50 years of VM

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  - RoCE Express3 Adapter
  - Crypto Express8S Adapter and Cryptographic Enhancements

Guest PCIe Performance Improvement

February 2021

- Improvement to how z/VM simulates an instruction used in driving virtual PCIe functions.

- Benefits guest environments where PCIe devices are used, e.g. RoCE, NVMe, etc.

- Improved response time & decreased Linux steal time.

RR-200x1000 Transaction Response Time

Prototype measurements z14 Measurement with IBM 25GbE RoCE Express2.
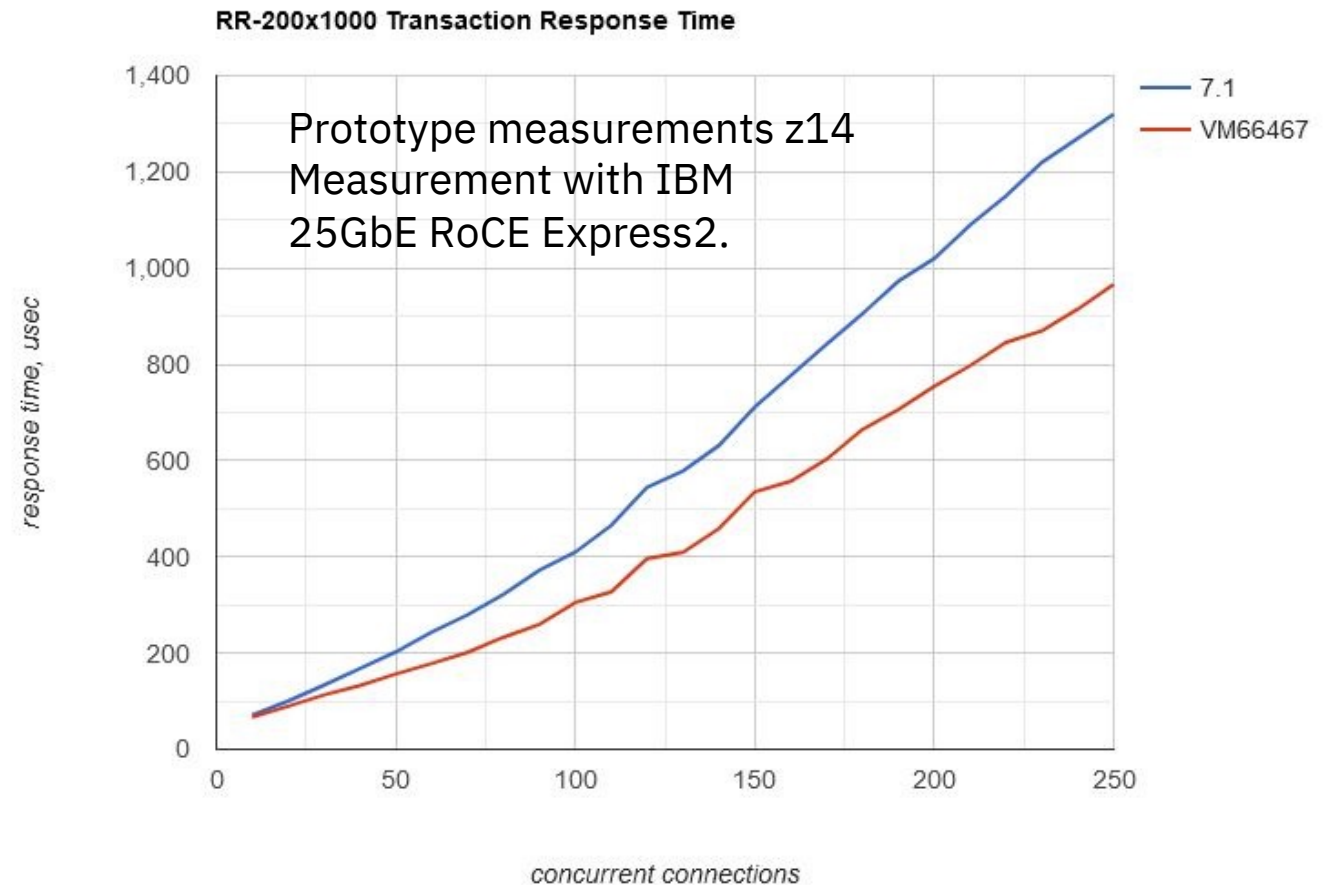
Guest PCIe Performance Improvement - Reference

- For more details, see the z/VM performance article
  - https://www.vm.ibm.com/perf/reports/zvm/html/1Q1rpc.html

Component	APAR	PTF	Available	RSU
CP	VM66467	z/VM 7.2 UM35834	February 23, 2021	2102

4TB Main Memory Support

- Support the definition and use of real memory up to the 4TB line for first level z/VM systems.

- Continue to support over-commitment of total virtual memory.

- Per guest limit of 1 TB of virtual memory remains unchanged.

4 TB Main Memory Support - Details

- New command syntax introduced in support of Dynamic Memory Downgrade

- Increased memory will increase dump space requirements

- Increased memory does not mean less paging space required

- Red Alert – Installing 4 TB Support
  - z/VM 7.2.0 users applying this PTF for 4TB REAL MEMORY SUPPORT will encounter VMSES/E errors if they are using RACF as their External Security Manager.

  - https://www.vm.ibm.com/service/redalert/#RACF1
    - Includes VMSES/E steps to address the error messages

  - APAR VM66508 for VMSES/E automatically handles this scenario

4TB Main Memory Support - Reference

March 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#4tb

- CP Function Environment Variable
  - **CP.LIMIT.MEMORY.REAL_TOTAL** = 4
  - **CP.FUNCTION.MEMORY.RECLAIM** = 1
  - **CP.LIMIT.MEMORY.RECONFIG** = 0 (changed with Dynamic Memory Management PTF)

Component		PTF	Available	RSU
CP	VM66173[1]	z/VM 7.2 UM35834	March 3, 2021	2201[2]
VMSES/E	VM66508	Z/VM 7.2 UM35859	Sept 30, 2021	2102

[1] – Originally this was the APAR for Dynamic Memory Downgrade. Foundational support for DMD is included here.
[2] – Includes PEs

DirMaint Performance Enhancements

March 2022

- Improvements for multi-member SSI and non-SSI configurations.
  - Improve the throughput of DirMaint when a number of requests are submitted to the server at the same time during...
    - Provision or deprovision of customer virtual machines
    - changes being made to a large number of virtual machines

- Benefits for
  - Large systems
  - Systems that are growing
  - Cloud environments where virtual machine creation/deletion is frequent

- Enhancements include
  - Reducing the types of requests that require DirMaint servers to obtain intersystem locking.
  - Improving throughput of requests that require the DirMaint server to interact with the satellite servers or DATAMOVE servers.

DirMaint Performance Enhancements - Reference

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/index.html#dpe

Component	APAR	PTF	Available	RSU
DirMaint	VM66298	z/VM 7.2 UV99411	March 16, 2022	2201

Improved Resource Management of Diverse Workloads

Automatic Standby Memory for Guests

- Allow for easier management of virtual machine memory
  - When the maximum memory of a virtual machine is increased, no longer need to issue a new **DEFINE STORAGE** command in order to increase "Standby" memory

- Old Approach:

```
USER LINUX21  NOLOG      4G 6G G
 COMMAND DEF STOR 4G STANDBY 2G
```

⬇

```
USER LINUX21  NOLOG      4G 8G G
 COMMAND DEF STOR 4G STANDBY 4G
```

⬇

```
USER LINUX21  NOLOG      8G 16G G
 COMMAND DEF STOR 8G STANDBY 8G
```

- New Approach:

```
USER LINUX21  NOLOG      4G 6G G
 COMMAND DEF STOR INITIAL STANDBY REMAINDER
```

⬇

```
USER LINUX21  NOLOG      4G 8G G
```

⬇

```
USER LINUX21  NOLOG      8G 16G G
```

Automatic Standby Memory for Guests - Reference

March 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#auto-standby

- CP Function Environment Variable
  - **CP.FUNCTION.MEMORY.RECLAIM** = 1

- Part of the 4TB Support

Component		PTF	Available	RSU
CP	VM66173[1]	z/VM 7.2 UM35834	March 3, 2021	2201[2]
VMSES/E	VM66508	Z/VM 7.2 UM35859	Sept 30, 2021	2102

[1] – Originally this was the APAR for Dynamic Memory Downgrade. Foundational support for DMD is included here.
[2] – Includes PEs

Dynamic Memory Downgrade

▪ Allows for real memory to be removed from a running z/VM system

▪ Complements the existing ability to add memory to a system

▪ Introduces "Perm" and "Reconfigurable"
- Maximum of 50% reconfigurable.

▪ Benefits:
- Add and remove memory for workload shifts and other load balancing
- Assist in DR scenarios
- Assist in Live Guest Relocation scenarios

Dynamic Memory Downgrade - Details

▪ Prereqs VM66173 (4 TB), so see red alert https://www.vm.ibm.com/service/redalert/#RACF1

▪ Note: "Reserved" on Logical Partition Activation profile may be different than in z/VM's view
  – LPAR Profile Reserved: How much memory z/VM could add to "Initial" if the memory is available.
  – z/VM Standby: How much memory z/VM could add right now because it is available
  – z/VM Reserved: How much memory z/VM could add beyond "Standby", if memory becomes available.

Central Storage

Amount in: Gigabytes (GB) ▾

Initial: 8.0

Reserved: 2.0

```
query store
16:20:24 STORAGE = 8G CONFIGURED = 8G INC = 128M STANDBY = 2G RESERVED = 0
16:20:24 Permanent = 4G Reconfigurable = 4G Maximum STORAGE = 10G
Ready;
```

▪ If you dynamically add memory to a system, think about:
  – Paging space
  – Dump space

Dynamic Memory Downgrade - Details

- **SET STORAGE RECONF** *decrease* command options
  - **TEST** – a good thing to use
  - **FORCE** – might be a bad thing to use if it results in PGT004 abend

- **SET STORAGE HALT** command just stops the reclamation progress, it doesn't put memory back

- **QUERY STORE IPL** useful new fields

```
 q store ipl
STORAGE = 256G CONFIGURED = 256G INC = 1G STANDBY = 0 RESERVED = 0
Permanent = 200G Reconfigurable = 56G Maximum STORAGE = 256G
IPL actual:    Permanent = 200G Reconfigurable = 56G
IPL requested: Permanent = 200G Reconfigurable = 200G
IPL requested data source: STORAGE system configuration statement(s)
Last start was a system restart from SHUTDOWN REIPL
```

Dynamic Memory Downgrade - Reference

August 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#dmd

- CP Function Environment Variable
  - **CP.LIMIT.MEMORY.RECONFIG** = 50 (Percentage of memory that can be reconfigurable)
  - **CP.FUNCTION.MEMORY.RECLAIM** = 1

- Additional support and usage information
  - https://www.vm.ibm.com/memman/dmd.html

- Requires z15, LinuxONE III, z14, LinuxONE Emperor II, LinuxONE Rockhopper II, or newer

Component	APAR	PTF	Available	RSU
CP[1]	VM66271	z/VM 7.2 UM35561	August 6, 2021	2201
Performance Toolkit	VM66285	z/VM 7.2 UM35562	August 4, 2021	TBD

[1] – Originally the APAR was VM66173, but that was changed to add foundational support as part of the 4TB support enhancement.

z/XC Architecture Support

- New virtual machine architecture mode
  - Enables CMS applications running in z/Architecture to take advantage of multiple address spaces

- **z/XC** guests can exploit VM data spaces with z/Architecture
  - the same way that ESA/XC guests can with Enterprise Systems Architecture

- Allows z/CMS to use VM data spaces to access Shared File System (SFS) Directory Control (DIRCONTROL) directories

- Programs can use z/Architecture instructions and registers* and exploit VM data spaces in the same CMS session
  - * (within the limits of z/CMS support)

z/XC Architecture Support...

- Performance Toolkit for z/VM is enhanced to display z/XC mode
  - USER, USER *userid*, USERLOG *userid*, and UCONF reports

- To enable z/XC architecture mode:
  - **SET MACHINE XC**
    - initially sets to ESA/XC mode
  - **IPL ZCMS**
    - Changes to z/XC mode

How to Get z/XC Architecture - Reference

March 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#zxc

- CP Function Environment Variable
  - **CP.FUNCTION.ZXC** = 1

- Available in March 2021 on z/VM 7.2
  - Limited support (for HCD only) on z/VM 7.1

Component	APAR	PTF	Available	RSU
CP	VM66201	z/VM 7.1 UM35770 z/VM 7.2 UM35771	March 19, 2021	2101 2201
CMS	VM66425	z/VM 7.1 UM35820 z/VM 7.2 UM35821	February 23, 2021	2101 TBD
Performance Toolkit for z/VM	VM66489	z/VM 7.2 UM35816	February 8, 2021	2102

Improved LGR for Mixed-Level Crypto Environments

August 2021

- Previously an attempt to do Live Guest Relocation (LGR) of a virtual machine between IBM zSystems or LinuxONE boxes with different Crypto Express Adapter types would **not** be allowed.
  - Example: Crypto Express6 vs. Crypto Express7
  - One could *force* the relocation if you took the risk.

- This enhancement enables successful LGR for virtual machines when the type of the shared crypto resource on the source system does not match the type of shared crypto resource on the target system.
  - The *force* will no longer be needed.

- This is most often needed when upgrading to a new IBM zSystems or LinuxONE server.

- This extends the concept of relocation domains to usage of shared Crypto Adapter usage (APVIRT).

Shared Crypto Resources in Relocation Domains

<div style="background-color: #f5b96c; border: 2px solid #8b2d8b; padding: 4px;">August 2021</div>

- APVIRT crypto guests will see the lowest type of Crypto Express (CEX) adapter that is available in the shared pools of all systems in a relocation domain.
  - This is the level of functionality that enables guests to relocate between systems in the relocation domain without using the **FORCE ARCHITECTURE** option.

- **QUERY VIRTUAL CRYPTO**
  - Shows the lowest type of CEX adapter available in a guest's relocation domain
  - Only displays CEX adapters in the guest's relocation domain that have the same shared crypto mode as the current system
    - Shared pools can have adapters with either Accelerator (A) or CCA coprocessor (C) mode

Upgrading APVIRT Guests to a New Server

SSI Relocation Domain (default)
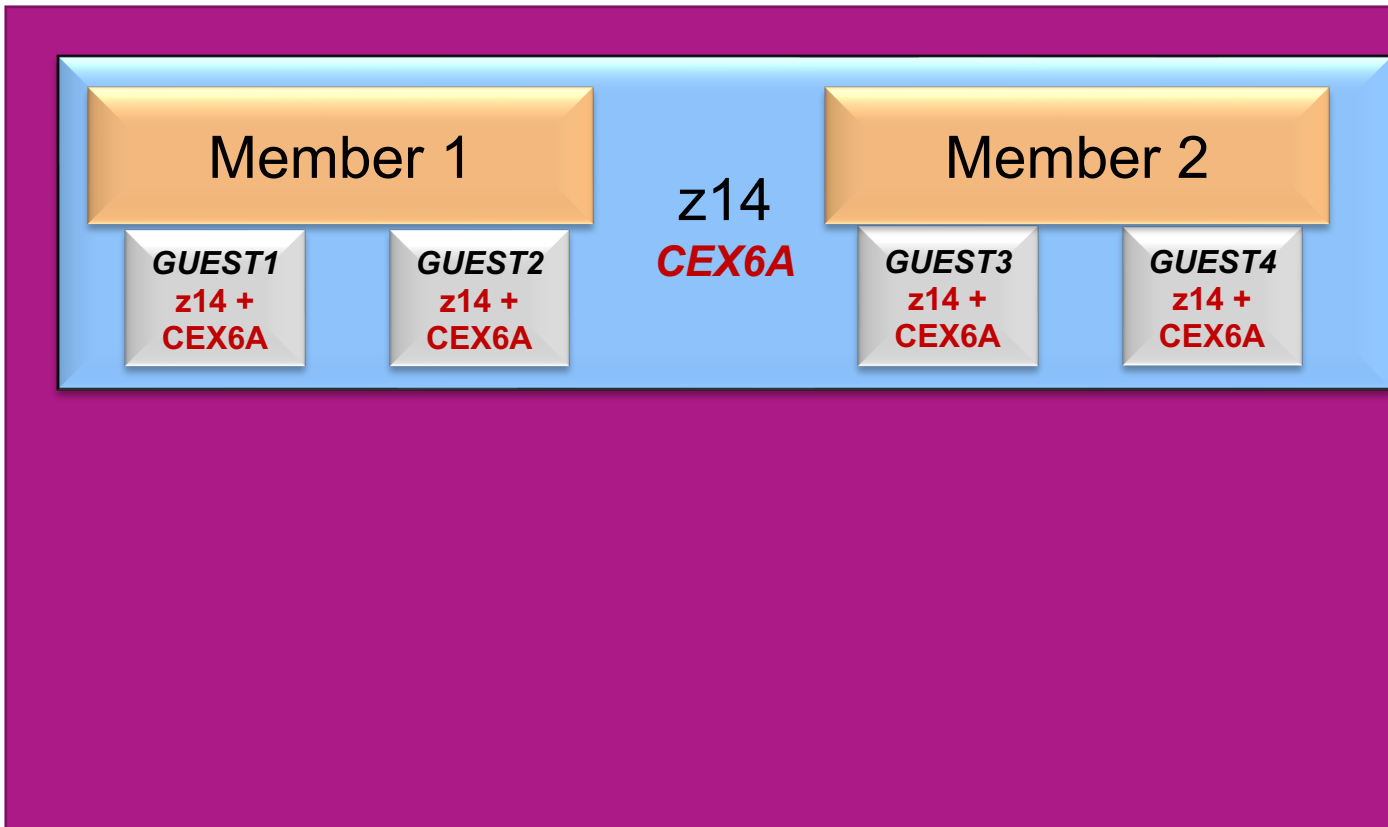
- 2 member SSI cluster
  - Both members on **z14** with **CEX6A** Crypto Express adapters
- SSI relocation domain
  - Includes all members of the cluster
- Crypto Express adapter level for APVIRT guests is **CEX6A**

* All systems have Improved LGR for Mixed-level Crypto function installed

Upgrading APVIRT Guests to a New Server…

August 2021

SSI Relocation Domain (default domain)

Member 1

z14
CEX6A

GUEST1
z14 +
CEX6A

GUEST2
z14 +
CEX6A

Member 2

GUEST3
z14 +
CEX6A

GUEST4
z14 +
CEX6A

Member 3

z15
CEX7A
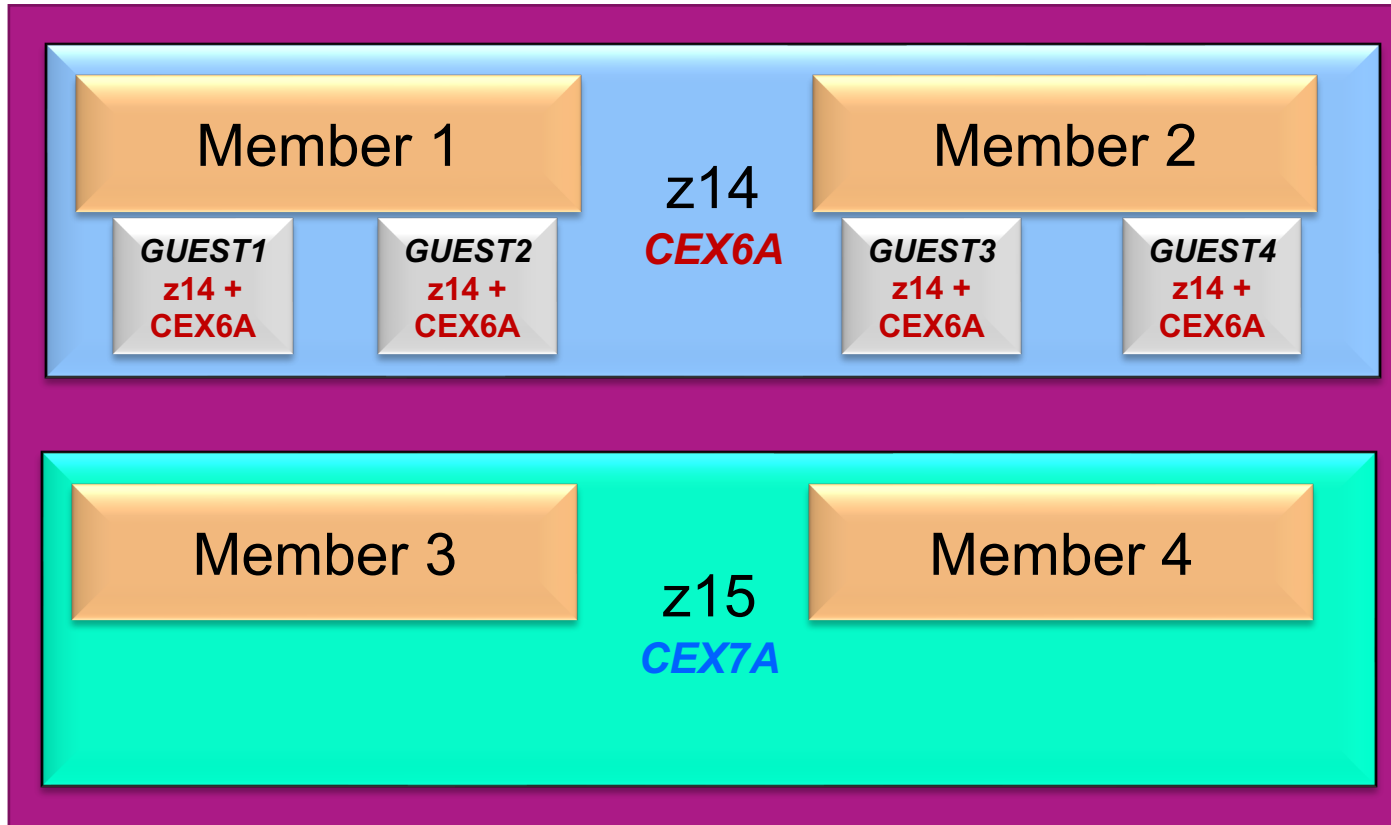
Member 4

- Add members 3 and 4
  - On **z15** with **CEX7A** adapters

- All members are in SSI relocation domain

* All systems have Improved LGR for Mixed-level Crypto function installed

Upgrading APVIRT Guests to a New Server…

SSI Relocation Domain (default domain)
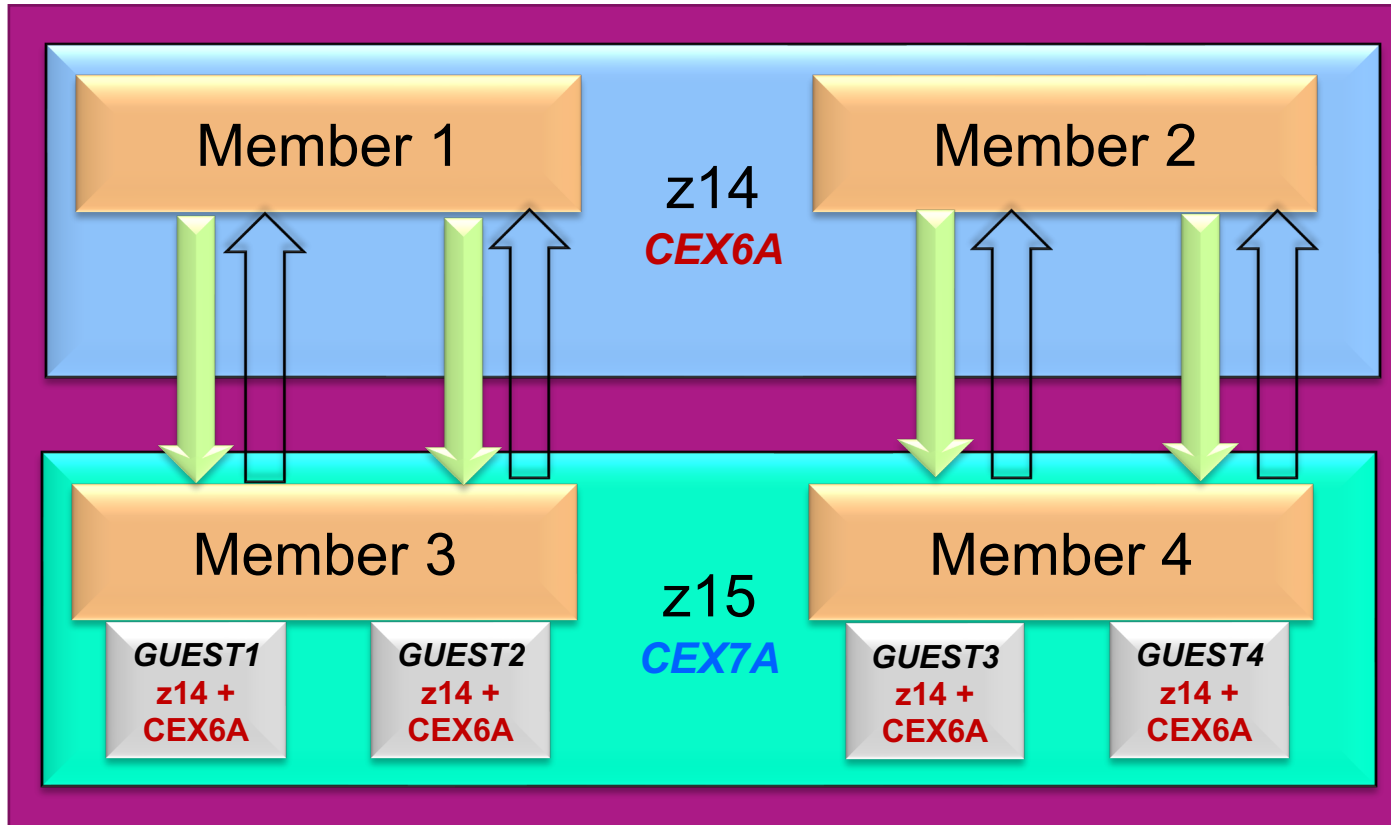
- Functional level for guests on all members is still
  - **z14**
  - **CEX6A** for APVIRT guests

- This allows relocation of guests among all members without **FORCE ARCHITECTURE**

* All systems have Improved LGR for Mixed-level Crypto function installed

Upgrading APVIRT Guests to a New Server…

SSI Relocation Domain (default domain)

z14
CEX6A

Member 3

GUEST1
z14 +
CEX6A

GUEST2
z14 +
CEX6A

z15
CEX7A

Member 4

GUEST3
z14 +
CEX6A

GUEST4
z14 +
CEX6A
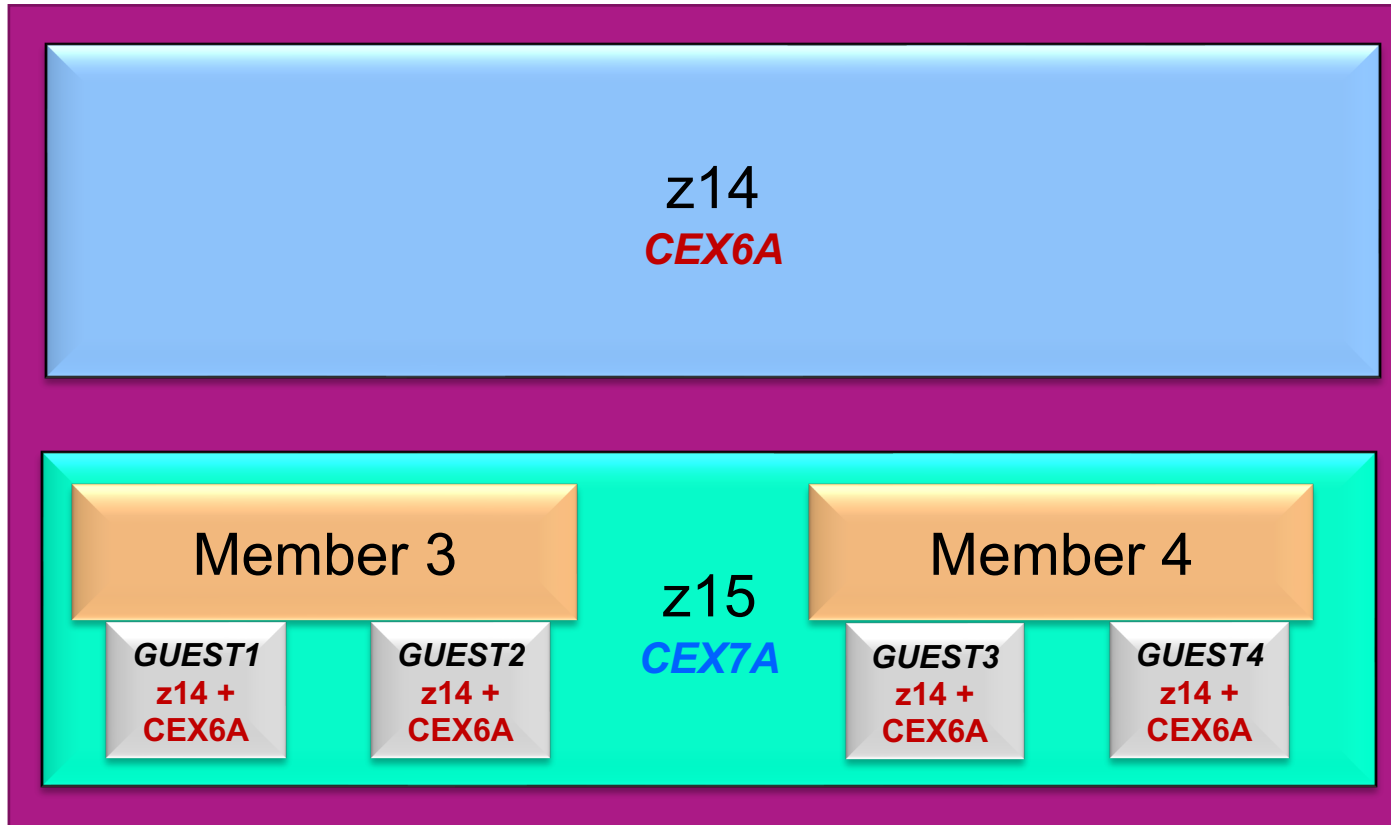
- Shutdown Member 1 and Member 2

- Remove them from SSI cluster configuration
  - **SET SSI SLOT 1 AVAILABLE**
  - **SET SSI SLOT 2 AVAILABLE**

- Update SSI statement in system config

* All systems have Improved LGR for Mixed-level Crypto function installed

Upgrading APVIRT Guests to a New Server...

August 2021

SSI Relocation Domain (default domain)

z14
CEX6A

Member 3   **z15**   Member 4

z15
CEX7A

GUEST1
z15 + CEX7A

GUEST2
z15 + CEX7A

GUEST3
z15 + CEX7A

GUEST4
z15 + CEX7A

* All systems have Improved LGR for Mixed-level Crypto function installed
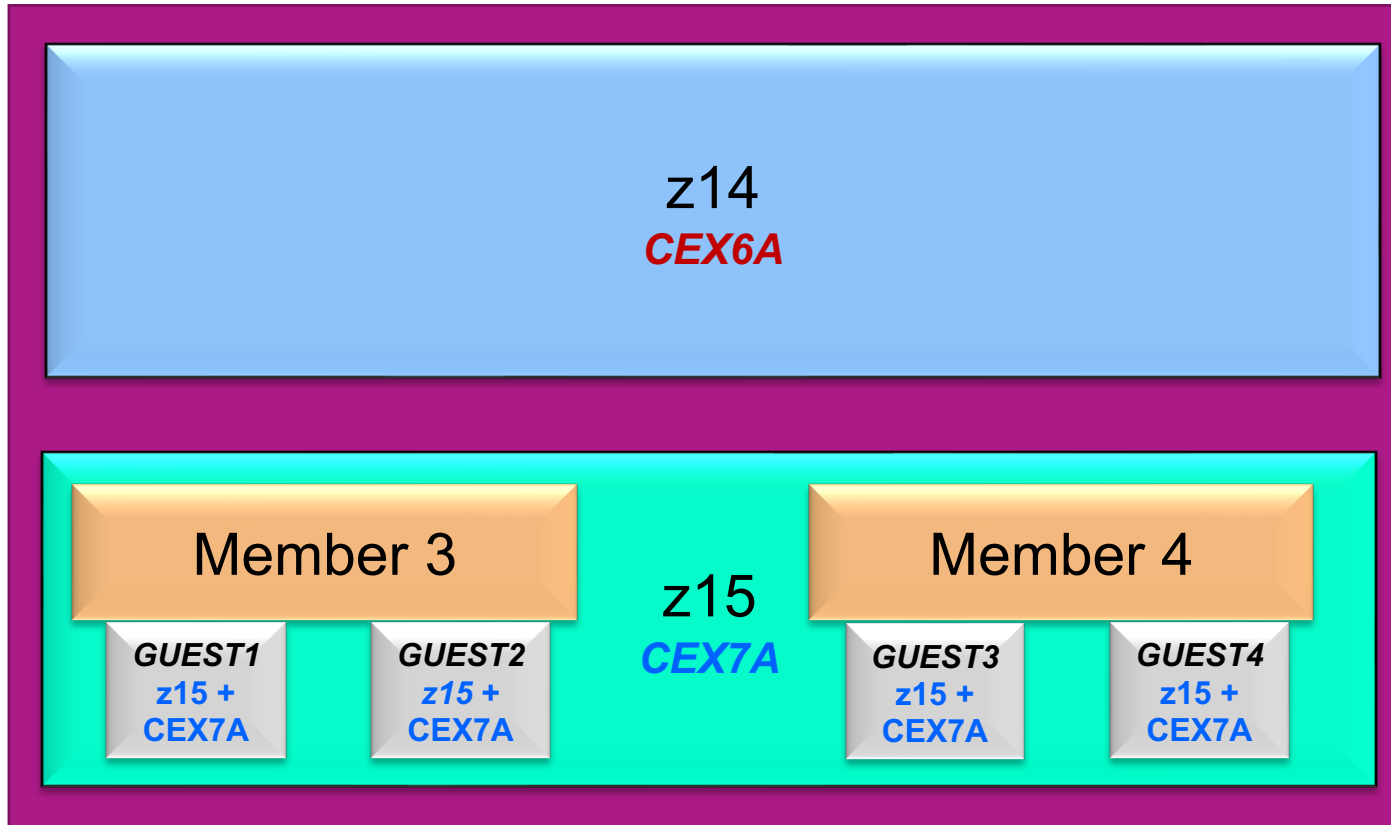
- Functional level for guests changes to
  - **z15**
  - **CEX7A** adapter level for APVIRT guests

Improved LGR for Mixed-Level Crypto - Reference

August 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/#lgr-apvirt

- CP Function Environment Variable
  - **CP.FUNCTION.CRYPTO.MIXED_APVIRT** = 1

- Updated *z/VM: CP Planning and Administration*
  - Chapter 5: Crypto Planning and Management

Component	APAR	PTF	Available	RSU
CP	VM66496	z/VM 7.2 UM35893	August 6, 2021	2201

Enhanced Security

Security Certifications

- z/VM 7.2 successfully completed its validation to US Federal Information Processing Standard (FIPS) 140-2.
  - August 12, 2021
  - This process does a deep examination of z/VM's cryptographic libraries (System SSL and ICSFLIB, and their interactions with the IBM zSystems and LinuxONE cryptographic hardware) to assure that they meet modern security requirements.

- You can find a link to the CMVP Certificate and the Security Policy on the z/VM Security News webpage: https://www.vm.ibm.com/security/news.html

- z/VM 7.2 successfully completed two Common Criteria evaluations.
  - April 30, 2021
    - This certifies the product is in accordance with the Operating System Protection Profile (OSPP), with Virtualization and Labeled Security extensions, at an assurance level of EAL 4+.
  - June 10, 2022
    - This certifies that the product is in accordance with the NIAP Virtualization Protection Profile (VPP), with Server Virtualization Extended Package.
  - Links to the Certification Reports can be found on the z/VM Security page at
    https://www.vm.ibm.com/security/news.html

TLS/SSL OCSP/CDP Support

January 2021

▪ Improved ability to validate certificates and ensure they have not been revoked.

▪ The SSL server can be configured to determine whether a partner's certificate has been revoked during authentication of an SSL/TLS connection
  – **OCSP** - Online Certificate Status Protocol
  – **CDP**   - CRL (Certificate Revocation List) Distribution Point

▪ The partner's certificate must be built with any combination of:
  – **OCSP** responders, either
    • Identified within the certificate's Authority Information Access (AIA) extension, or
    • Dedicated, identified with the responder's HTTP URL and port
  – An HTTP server identified within the certificate's **CDP** extension

TLS/SSL OCSP/CDP Support - Enablement

▪ Enabled and configured with new **:OCSPParms** DTCPARMS tag for the SSL/TLS server
  – **OCSPENABLE ON**
    • Enable use of the AIA extension
  – **OCSPURL** *url*
    • Specifies the HTTP URL and port of a dedicated OCSP responder
    • Only one can be present
  – **CDPENABLE ON**
    • Enables checking for the CDP extension in the certificate
  – Additional operands to specify the order that OCSP responders and/or CDP extensions are checked

  – See the latest version of *z/VM 7.2 TCP/IP Planning and Customization* for details

TLS/SSL OCSP Support...

January 2021

- When OCSP/CDP is enabled, handshake time will increase when a certificate with OCSP and/or CDP extensions is presented
  - A connection must be made to an external server

- TCP/IP applications that use the **CLIENTCERTCHECK** value of **PREFERRED** will conflict with OCSP/CDP revocation checking
  - If OCSP/CDP is enabled, **CLIENTCERTCHECK** will be upgraded to **REQUIRED**
    - A warning message will appear in the SSL console log

How to get TLS/SSL OSCP Support - Reference

January 2021

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/index.html#ocsp

Component	APAR	PTF	Available	RSU
TCP/IP	PH28216	z/VM 7.2 UI72963	January 6, 2021	2102

– Restart of the TCP/IP server is required after applying the PTF
– SSL servers need to be restarted after configuration changes are made to enable this support

▪ For more details:
  • *The Junior Woodchuck's Guide to Using TLS on z/VM* (Brian Hugenbruch)
      Brian Hugenbruch - Friday, 9:45

Improved Resiliency and RAS

DirMaint Health Checker

- Automated set of procedures to validate the configuration and health of the DirMaint servers daily and/or on demand.

- May specify:
  - Who to contact with results of the tests
  - What level of results causes results to be sent (any warning or only significant warnings)
  - Which tests to run and on which DirMaint servers

- Avoids configuration errors that could cause larger problems or affect availability of certain tasks

Component	APAR	PTF	Available	RSU
DirMaint	VM66175	z/VM 7.2 UV99389	December 7, 2020	TBD

Improved I/O Time for Dump Processing

February 2021

- Decreases the time to write a z/VM System Dump

- By decreasing dump processing time, this increases system availability time

- Applies to z/VM system where dump space is located on FICON ECKD disks (3390) where zHPF (High Performance FICON) is available.

Improved I/O Time for Dump Processing - Reference

February 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#improve-io-dump

- CP Function Environment Variable
  - **CP.FUNCTION.DUMP.SPEEDUP** = 1

Component	APAR	PTF	Available	RSU
CP	VM66431	z/VM 7.2 UM35822	February 12, 2021	2102

Fast z/VM Dump Distiller

February 2021

- Allows a much-abridged dump to be created from a z/VM system dump

- Smaller dump
    - Easier to manage
    - Faster to transmit to IBM

- Most beneficial for memory management dumps that contain the full frame table and present page tables.
    - Frame table and page tables can make up 95% of some dumps

Fast z/VM Dump Distiller - Details

February 2021

- New option **DISTILL** added to the **DUMPLOAD** command
  - Not on DUMPLD2 though that is usually recommended for large dumps

- Does not reduce the time to take the actual dump during abend processing or restart dump processing

- Does not reduce the size of the dump written to spool
  - Therefore, you still need sufficient dump space

- Intended
  - To allow IBM to start analysis sooner
  - To allow IBM to more easily confirm a duplicate of previous problems

- In some cases, IBM may still need the full size, undistilled, dump for analysis.

Fast z/VM Dump Distiller - Reference

February 2021

▪ Ships as CP PTF, but modifies the **DUMPLOAD** module that runs in CMS

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/index.html#dump-distiller

Component	APAR	PTF	Available	RSU
CP	VM66430	z/VM 7.2 UM35823	February 15, 2021	2102

Preserve Partial Dump Across IPL

- Allows a partial dump to be preserved if there is a re-IPL of the partition prior to dump completion

- Valid for CP Hard Abend dumps
  - Soft Abends are not included because they are quick and recoverable (CP does not terminate)
  - SNAPDUMP is not included because a SNAPDUMP is planned

- Most beneficial in emergency situations where reducing downtime is critical
  - Improves likelihood of problem determination in cases where a full CP dump is not allowed to complete

- You still need to allocate sufficient dump space to get any dump

- Intended
  - To provide IBM key diagnostic information in situations where previously, no dumps were available

Preserve Partial Dump Across IPL

December 2021

▪ New spool file names for dumps. Indicates how complete a dump is.

  – **NOCPDATA** : no CP storage is included. Only SYMPTOM, REGS and DUMPTYPE subcommands will work
  – **PARTIAL** : some CP storage is included. Additional subcommands will work if CP storage they use are in the dump
  – **CPDUMP** : a complete dump has been taken

▪ New message variations to indicate how much of the dump was captured

  – HCP8243I – 2 new variations for DUMPLD2
  – HCP8169I – new variation for DUMPLOAD

▪ It is still highly recommended to obtain complete dumps if the time to take a full dump is acceptable in recovery situations.

Preserve Partial Dump Across IPL- Reference

- Ships as CP PTF, but modifies the **DUMPLOAD** and **DUMPLD2** utilities that runs in CMS

- New Function Page
    - https://www.vm.ibm.com/newfunction/index.html#ppdaipl

Component	APAR	PTF	Available	RSU
CP	VM66560	z/VM 7.2 UM35921	December 10, 2021	2201

EDEVICE Path Management

- Improves health checking and path selection for SCSI-FCP emulated devices

- SCSI-FCP device driver updated in the following areas:
  - Path selection
  - Path state tracking
  - Path health checking

- Better path selection provides a more robust system.

- New information available to describe state and changes of environment

- Takes advantage of path optimization for ALUA storage devices
  - Asymmetric Logical Unit Access (ALUA) – a device capable of servicing I/O to a given LUN where access characteristics may differ across ports

EDEVICE Path Management - Reference

August 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/#edevice-pm

- CP Function Environment Variable
  - **CP.FUNCTION.EDEVICE.PATH_MANAGEMENT** = 1

Component	APAR	PTF	Available	RSU
CP	VM66507	z/VM 7.2 UM35902	August 31, 2021	2201

vSwitch Bridge Port Enhancements

December 2021

- Extends superior load balancing across OSAs from a vSwitch-only environment to a HiperSockets-vSwitch bridge environment

- This enhancement adds a new configuration option (**NICDISTRIBUTION**) in the **SET VSWITCH BRIDGEPORT** or **MODIFY VSWITCH BRIDGEPORT** statements.

  - Setting **NICDISTRIBUTION ON** will enable better balancing of outbound network traffic across a port-group.

NOTE: There could be an impact to CPU-utilization in some workloads due to additional frame inspection that must be done.

vSwitch Bridge Port Enhancements- Reference

- New Function Page
  - https://www.vm.ibm.com/newfunction/#vbpe

- CP Function Environment Variable
  - **CP.FUNCTION.VSWITCH.NICDISTRIBUTION**= 1

Component	APAR	PTF	Available	RSU
CP	VM66557	z/VM 7.2 UM35920	December 10, 2021	2201

Improved System Management

Direct to Host Service Transfer

August 2021

▪ New optional method to transfer service to your z/VM system through use of a web interface.

▪ Simplifies downloading service ordered through IBM Shopz
  – May eliminate extra data moves
  – Automates aspects of verification and unpacking of the data

Direct to Host Service Transfer – Reference

August 2021

- New Function Page
  - https://www.vm.ibm.com/newfunction/#d2h

- Additional information
  - https://www.vm.ibm.com/service/getshopz.html

Component	APAR	PTF	Available	RSU
CMS	VM66540	z/VM 7.2 UM35899	August 31, 2021	2102

CP New Function Interrogation API

October 2020

- New API simplifies scripting and automation to determine functionality on a running CP system
  - Facilitates adaptation of products and applications to varying CP code levels

- New **CP.FUNCTION.xxx** system environment variables
  - A variable will be defined for every new function that is part of the CP nucleus
    - Starting with z/VM 7.2 New Function APARs

- Full list of variable names, values, and descriptions at https://www.vm.ibm.com/newfunction/varlist.html

Release	APAR	APAR name	Environment variable name	Data type	Variable value	Variable value description	Last updated
7.2	VM66421	1-END HyperPAV Minidisk Support	CP.FUNCTION.DASD.HYPERPAV_1_END + More information	support level	1	Support for 1-END HyperPAV Minidisks is available.	December 12, 2020
7.2	VM66469	CP QUERY DEVICES	CP.FUNCTION.QUERY.DEVICES − Hide information This variable indicates the ability to report real device settings established by the DEVICES configuration statement and the SET DEVICES command.	support level	1	CP QUERY DEVICES function is installed.	October 8, 2020
7.2	TBD	Dynamic Memory Downgrade	CP.FUNCTION.MEMORY.RECLAIM + More information	support level	1	Dynamic removal of reconfigurable memory is supported.	August 18, 2020

CP New Function Interrogation API...

- **QUERY VARIABLE** command
  - Determine which CP functions are available

```
pipe CP QUERY VARIABLE | strfind /SYSTEM CP.FUNCTION./ | console
    SYSTEM CP.FUNCTION.DASD.HYPERPAV_1_END 1
    SYSTEM CP.FUNCTION.QUERY.DEVICES 1
    SYSTEM CP.FUNCTION.ZXC 1

query variable
    SYSTEM CP.FUNCTION.DASD.HYPERPAV_1_END 1
    SYSTEM CP.FUNCTION.QUERY.DEVICES 1
    SYSTEM CP.FUNCTION.ZXC 1
```

- Check for a specific CP function
  - A null string will be returned for an undefined variable

```
query variable system cp.function.zxc
1
```

Get CP New Function Interrogation API – Reference

October 2020

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/index.html#cp-nf

Component	APAR	PTF	Available	RSU
CP	VM66439	z/VM 7.2 UM35761	October 15, 2020	2101

Spool Information Enhancements

- Extends spool subsystem programming interfaces
  - Allows clients to manage spool files and volumes more effectively

  - Enables spool management software to facilitate DASD migration and backup activities
    - IBM Operations Manager for z/VM, etc.

- Updated programming interfaces
  - **Diagnose x'D8'** (Read Spool File Blocks on System Queues)
    - Optionally return information indicating **which CP-owned volumes contain at least one page** of a designated spool file
      - In an SSI cluster, does not include information for files that were created on a different member
    - Adds selection of the **System Data File queue** for processing
      - Includes NSS/DCSS, UCR, IMG, NLS, and TRF files

  - ***SPL IUCV System Service**
    - Extended to allow selection of files on the **System Data File queue** to be processed
      - Includes NSS/DCSS, UCR, IMG, NLS, and TRF files

Spool Information Enhancements – Reference

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#spool-enhancements

- CP Function Environment Variable
  - **CP.FUNCTION.SPOOL.EXTENSIONS** = 1

Component	APAR	PTF	Available	RSU
CP	VM66479	z/VM 7.2 UM35285	March 1, 2021	2102

CP QUERY DEVICES Command

- Displays CP settings that were not previously shown for real devices
  - Allows clients to validate settings
  - Specify individual devices or ranges of devices (0000-FFFF)
  - Same settings are used for a device number in all subchannel sets

- Settings are specified with
  - **DEVICES** system configuration statement
  - **SET DEVICES**, **SET RDEVICE**, and **SET SCMEASURED** commands

CP QUERY DEVICES Command

▪ Example

query devices 100 800-900

Device(s)	Accep-ted	Online at_IPL	Sensed	Sensed /Offln	Shared	Dynam I/O	Subch Meas	Throt-tled	Assign at_IPL
0100	Y	N	Y	N	N	Y	Y	Y	N
0800-083F	Y	Y	Y	N	N	Y	Y	Y	N
0840-085F	Y	N	Y	N	N	Y	Y	Y	N
0860-0900	Y	Y	Y	N	N	Y	Y	Y	N

CP QUERY DEVICES Command

- New Function Page
  - https://www.vm.ibm.com/newfunction/index.html#cpqd

- CP Function Environment Variable
  - **CP.FUNCTION.QUERY.DEVICES** = 1

Component	APAR	PTF	Available	RSU
CP	VM66469	z/VM 7.2 UM35797	December 7, 2020	2101

Guest 1-END HyperPAV Aliases

- Adds capability for guests to define and associate virtual HyperPAV Alias devices with Base devices defined as **1-END** minidisks
  - previously, 0-END (full-pack) minidisks were required

- Protects real volume label and allocation map by preventing guest from accessing cylinder zero

- Example (user directory):

COMMAND DEFINE HYPERPAVALIAS F101 FOR BASE F100
COMMAND DEFINE HYPERPAVALIAS F102 FOR BASE F100
COMMAND DEFINE HYPERPAVALIAS F103 FOR BASE F100

MDISK F100 3390 1 END PAK001

Guest 1-END HyperPAV Alias Support – Reference

December 2020

▪ New Function Page
- https://www.vm.ibm.com/newfunction/index.html#1-end

▪ CP Function Environment Variable
- **CP.FUNCTION.DASD.HYPERPAV_1_END** = 1

Component	APAR	PTF	Available	RSU
CP	VM66421	z/VM 7.2 UM35784	December 8, 2020	2101

Report IPv6 for Ethernet VSwitches

August 2021

- IPv6 addresses now displayed on the **QUERY VSWITCH** and **QUERY NIC** commands.

- IPv6 information added to Diagnose x'26C' subcode x'24' data.

- Small performance enhancement in management of the LAN IP table.

Report IPv6 for Ethernet VSwitches – Reference

- New Function Page
  - https://www.vm.ibm.com/newfunction/#ipv6l2

- CP Function Environment Variable
  - **CP.FUNCTION.VSWITCH.IPV6QUERY** = 1

Component	APAR	PTF	Available	RSU
CP	VM66485	z/VM 7.2 UM35894	August 9, 2021	2201

Query GSKKYMAN Certificates

- GSKKYMAN is a Unix-based z/OS utility which manages certificates in a key database.

- Prior to this support, a user would have to manually open a database using the GSKKYMAN utility in order to view certificate information.

- This enhancement to z/VM TCPIP provides a new command (CERTMGR) which allows a user an automated way to interact with the GSKKYMAN utility.

- A default database can be set with the CMS DEFAULTS command.

- This support is part of the z/VM TCP/IP streamlined SSL Configuration project

Query GSKKYMAN Certificates– Reference

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/#qgskkyman

Component	APAR	PTF	Available	RSU
TCP/IP	PH40080	z/VM 7.2 UI78359	December 10, 2021	TBD
CMS	VM66561	z/VM 7.2 UM35911	December 10, 2021	TBD
VMSES	VM66581	z/VM 7.2 UM35914	December 10, 2021	2201

CMS HELP Enhancements

August 2021

- HELP is a CMS command that provides information on various commands, tasks, and messages.

- Enhancements were made to add information for the following:
  - CP Source Directory statements
    - Example: **HELP DIRECTORY**
  - CP System Configuration file statements
    - Example: **HELP SYSCONFIG**

CMS HELP Enhancements – Source Directory

August 2021

- **HELP DIRECTORY** plus PF11 (Related)
  - Selectable list of directory statements

```
COMMANDS DIRECTORY              Related Help Information          line 1 of 120
 Related Information

For information on each Directory statement, place the cursor
under the topic of your choice and press ENTER or the PF1 key.


ACCOUNT        - ACCOUNT Directory Statement

ADJUNCT        - ADJUNCT Directory Statement

ACIGROUP       - ACIGROUP Directory Statement

APPCPASS       - APPCPASS Directory Statement
```

CMS HELP Enhancements – Source Directory...

August 2021

- **HELP DIRECTORY MENU**
  - Selectable list of help files
    - Most file names are first 8 characters of the directory statement name
    - XCONFIG has separate help files for ACCESSLIST and ADDRSPACE operands

```
DIRECTORY MENU              Menu Help Information              line 1 of 17
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Help for Directory Statements


To view a Help panel, move the cursor to any character of the name
and press the ENTER key or the PF1 key.
An asterisk (*) preceding the name indicates a MENU panel.



ACCOUNT     CONSOLE     GLOBALDE    LOAD        NICDEF      PROFILE     SUBCONFI
ACIGROUP    CPU         GLOBALOP    LOADDEV     NOPDATA     SCREEN      SYSAFFIN
ADJUNCT     CRYPTO      IDENTITY    LOGONBY     OPTION      SHARE       USER
APPCPASS    DASDOPT     INCLUDE     MACHINE     POOL        SPECIAL     VMRELOCA
AUTOLOG     DATEFORM    IOPRIORI    MAXSTORA    POSIXGLI    SPOOL       XAUTOLOG
BUILD       DEDICATE    IPL         MDISK       POSIXGRO    SPOOLFIL    XCONFACC
CLASS       DIRECTOR    IUCV        MINIOPT     POSIXINF    STDEVOPT    XCONFADD
COMMAND     D8ONECMD    LINK        NAMESAVE    POSIXOPT    STORAGE     XCONFIG
* * * End of File * * *
```

CMS HELP Enhancements – Source Directory

- **HELP DIREctory *help_file_name***

  - Displays help file for a specific directory statement

    - **HELP DIRECTORY NICDEF**

    - **HELP DIRECTORY XCONFIG**

    - **HELP DIRECTORY XFCONFADD**

CMS HELP Enhancements – System Configuration File

- **HELP SYSCONFIG** plus PF11 (Related)
  - Selectable list of system configuration file statements

```
COMMANDS SYSCONFIG              Related Help Information           line 1 of 286
 Related Information

For information on each system configuration statement, place the cursor
under the topic of your choice and press ENTER or the PF1 key.


ACTIVATE         - ACTIVATE ISLINK Statement
ISLINK


ALTERNATE_       - ALTERNATE_OPERATORS Statement
OPERATORS


ASSOCIATE        - ASSOCIATE EXIT Statement
EXIT


ASSOCIATE        - ASSOCIATE MESSAGES / MSGS Statement
MESSAGES


BEGIN            - BEGIN / END Statements
```

CMS HELP Enhancements – System Configuration File...   August 2021

- Help file naming conventions
  - Menu file names
    - **SYSC** + first four characters of the statement name
      - ➢**SYSCASSO** -> ASSOCIATE statement

  - Help command file names
    - When statement is one word, name is first (up to) 8 characters of the statement name

    - If statement is two or more words
      - o Up to five characters from first word plus characters from second word
        - ➢**ASSOCEXI** -> ASSOCIATE EXIT

      - o If the resulting name is not unique, the first character of the statement's third word is used
        - ➢**USERDEFA** -> USER_DEFAULTS
        - ➢**USERVOLE** -> USER_VOLUME_EXCLUDE
        - ➢**USERVOLI** -> USER_VOLUME_INCLUDE
        - ➢**USERVOLL** -> USER_VOLUME_LIST
        - ➢**USERVOLR** -> USER_VOLUME_RDEV

CMS HELP Enhancements – System Configuration File... August 2021

▪ **HELP SYSCONFIG MENU**
- Text explaining help file naming conventions
- Selectable list of help menus and files

```
To view a Help panel, move the cursor to any character of the name
and press the ENTER key or the PF1 key.
An asterisk (*) preceding the name indicates a MENU panel.


*SYSCASSO  *SYSCXLIN  CPXLOAD    ENCRYPAG   IMBED     PRIVCLAS  STORAGE
*SYSCDEFI  ACTIVISL   CRYPTAPV   END        INITMITI  PRODUCT   THROTTLE
*SYSCDISA  ALTEROPE   CU         ENFORBYV   IODF      RDEVICE   TIMEZBOU
*SYSCENAB  BEGIN      DEVICES    EQUATE     JOURNALI  RELOCDOM  TIMEZDEF
*SYSCMODI  CHARADEF   DISTRIBU   EXTERSYN   LOGOCONF  SAY       TOLERCON
*SYSCRDEV  CPACCESS   DRAIN      FEATURES   MULTITHR  SRM       TRANSTAB
*SYSCSET   CPADDONI   EDEVICE    FORMDEFA   OPERACON  SSI       USERFORM
*SYSCSYST  CPOWNED    EMERGMES   HOTIORAT   PRINTTIT  START     VMLAN
*SYSCUSER
```

CMS HELP Enhancements – System Configuration File... August 2021

- **HELP SYSConfig *file_name***

  - Display help file for a specific system configuration statement

    - **HELP SYSCONFIG SYSTEIDD**

    - **HELP SYSCONFIG FEATURES**

    - **HELP SYSCONFIG CRYPTAPV**

CMS HELP Enhancements – System Configuration File... August 2021

- Help for **RDEVICE** statement

  - **HELP SYSCONFIG RDEVICE**
    - General information about the RDEVICE statement
    - PF11 (Related) displays selectable list of RDEVICE statements for specific devices

  - **HELP SYSCONFIG MENU**
    - Select RDEVICE for general information about the RDEVICE statement
    - Select *SYSCRDEV for menu of individual RDEVICE statement help files

```
SYSCRDEV MENU                    Menu Help Information              line 1 of 11
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Help for RDEVICE system configuration statements

To view a help panel, move the cursor to any character of the name
and press the ENTER key or the PF1 key.
An asterisk (*) preceding the name indicates a menu panel.



RDEVIAFP   RDEVIDAS   RDEVIPUN   RDEVITAP   RDEVIUNS   RDEVI37X   RDEVI380
RDEVICOM   RDEVIPRT   RDEVIRDR   RDEVITER   RDEVI327
```

CMS HELP Enhancements – Reference

▪ New Function Page
  – https://www.vm.ibm.com/newfunction/#hfi

Component	APAR	PTF	Available	RSU
CP	VM66511	z/VM 7.2 UM35886	August 4, 2021	2102
CMS	VM66512	z/VM 7.2 UM35885	August 4, 2021	2102
VMSES	VM66513	z/VM 7.2 UM35875	June 30, 2021	2201

Performance Toolkit SMT Support

- Additional reports and information have been added to Performance Toolkit on the use of Simultaneous Multi-Threading (SMT)

- New reports to allow one to see
  - Thread related SMT metrics
    - SMT Metrics per Core Type Log (MTCTYPLG / FCX331)
    - SMT Metrics per Core Log (MTCORELG / FCX332)

  - Various views of processor time (raw, MT-1 equivalent, prorated core) consumed by virtual machines
    - User Processor Time (USRPRCTM / FCX333)
    - User Processor Time Log (USRTMLOG / FCX334)

- Display SMT settings and changes between SMT levels
  - System Configuration (SYSCONF / FCX180)

Performance Toolkit SMT Support...

- New reports to enable monitoring and analysis of the effects of SMT on your z/VM systems
  - (available when Multithreading is enabled (either MT-1 or MT-2))

- SMT Metrics Reports
  - SMT Metrics per Core Type Log (MTCTYPLG / FCX331)
    - Log report showing SMT metrics per-core-type

Interval End Time	Core Type	#Cores	Threads per Core	%Core Busy	Avg. Thread Density	%Capacity Factor	%Max Capacity Factor
03:33:23	CP	26	1	6.4	1.00	100.0	100.0
03:33:23	IFL	10	2	99.6	1.51	139.3	177.1
03:33:23	ZIIP	2	1	.0	1.00	100.0	100.0
03:33:23	ICF	2	1	.0	1.00	100.0	100.0

  - SMT Metrics per Core Log (MTCORELG / FCX332)
    - Log report showing SMT metrics per-core

Interval End Time	Core	Core Type	Threads per Core	PPD	Ent	%Core Busy	Avg. Thread Density
03:33:23	1A	IFL	2	Vh	100	100.0	1.63
03:33:23	1B	IFL	2	Vh	100	99.9	1.59
03:33:23	1C	IFL	2	Vh	100	99.9	1.41
03:33:23	1D	IFL	2	Vh	100	99.9	1.24
03:33:23	1E	IFL	2	Vh	100	100.0	1.74

Performance Toolkit SMT Support…

- User Processor Time Reports
  - User Processor Time (USRPRCTM / FCX333)
    - Activity report showing users' raw time, MT-1 equivalent time, and prorated core time

| | | | | | | | <--- Virt. CPUs ---> | | | |
Userid	T-Raw	V-Raw	T-MT1	V-MT1	T-Pro	V-Pro	Type	Aff	Def	Stop
CFT2NDB	.224	.115	.197	.100	.119	.061	IFL	On	12	0
CHG00002	.000	.000	.000	.000	.000	.000	IFL	On	1	0
IFG00001	59.895	59.879	52.951	52.937	59.821	59.806	IFL	On	1	0

  - User Processor Time Log (USRTMLOG / FCX334)
    - Log report showing a specific user's raw time, MT-1 equivalent time, and prorated core time

Processor Time Log for User IFG00001

| Interval | | | | | | | <--- Virt. CPUs ---> | | | |
End Time	T-Raw	V-Raw	T-MT1	V-MT1	T-Pro	V-Pro	Type	Aff	Def	Stop
03:22:23	55.468	55.437	55.143	55.112	55.468	55.437	IFL	On	1	0
03:23:23	59.782	59.759	59.432	59.408	59.782	59.759	IFL	On	1	0
03:24:23	59.805	59.783	59.454	59.433	59.805	59.783	IFL	On	1	0

Performance Toolkit SMT Support…

- System Configuration (SYSCONF / FCX180)
  - Enhanced to show SMT settings and log changes between the SMT levels

```
Multithreading              Enabled

                     <--------- Threads ---------->
                     H/W Requested System Activated
Max Threads                 MAX                  2
CP core          1          MAX       1          1
IFL core         2          MAX       2          1
ICF core         2          MAX       1          1
ZIIP core        2          MAX       1          1


-----------------------------------------------------------

Changed System Status
Date  Time       Changed
07/22 03:31:19   SMT Configuration change 2 has started
07/22 03:31:19   Processor 35 (Core 1A, Thread 1)  varied online
07/22 03:31:19   Processor 37 (Core 1B, Thread 1)  varied online
07/22 03:31:19   Processor 39 (Core 1C, Thread 1)  varied online
07/22 03:31:19   Processor 3B (Core 1D, Thread 1)  varied online
07/22 03:31:19   SMT Configuration change 2 has finished
                           <--------- Threads ---------->
                           H/W Requested System Activated
                 CP core          1     MAX      1          1
                 IFL core         2     MAX      2          2
                 ICF core         2     MAX      1          1
                 ZIIP core        2     MAX      1          1
```

Performance Toolkit SMT Support – Reference

December 2021

▪ New Function Page
- https://www.vm.ibm.com/newfunction/index.html#pk-smt

Component	APAR	PTF	Available	RSU
Performance Toolkit for z/VM	VM66215	z/VM 7.2 UM35495	December 8, 2020	2101

SMAPI Query Processors API

- Additional API which provides information about the real processors available to a z/VM system

- Provides information equivalent to the **CP QUERY PROCESSORS EXPANDED** command, including:
  - Real Processor Address
  - Real Processor Status (Master-processor, Alternate, Standby, or Parked)
  - Real Processor Type (CP, IFL, ZIIP, or ICF)

SMAPI Query Processors API– Reference

December 2021

▪ New Function Page
- https://www.vm.ibm.com/newfunction/index.html#smapi-qp

Component	APAR	PTF	Available	RSU
z/VM Systems Management API (SMAPI)	VM66568	z/VM 7.2 UM35922	December 10, 2021	TBD

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

Single PID

5698-K01 OTC
5698-K02 Annual S&S

Web Site

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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

Add Tape Manager for z/VM (5697-J08) for customers backing up from z/VM to physical or virtual tape

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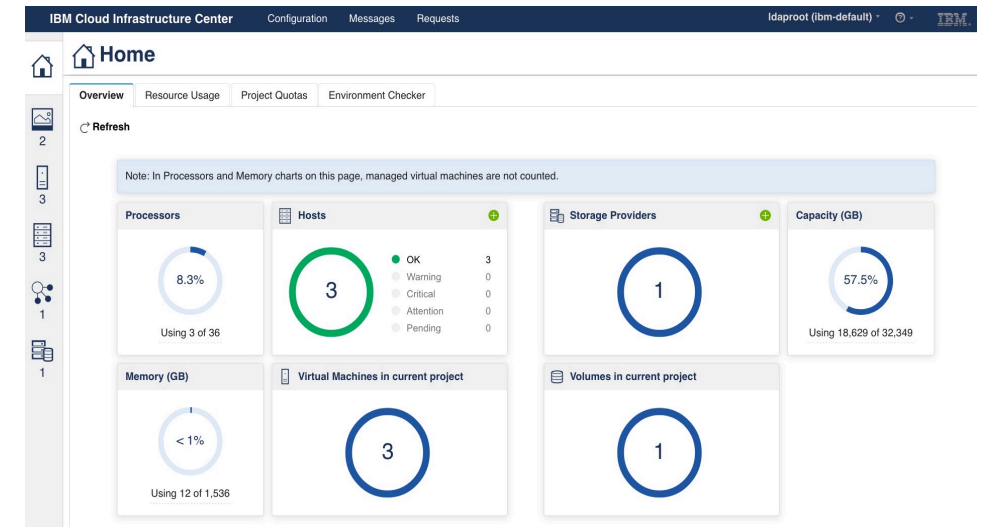
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"IBM Cloud Infrastructure Center allows us to substantially improve our infrastructure management and reduce cost & complexity to manage from simple to complex environments

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

Summary

Summary

- z/VM 7.3 is planned to GA in 3Q22.

- z/VM 7.2 is the current release of z/VM
  - Enhancements include
    - Centralized Service Management (for non-SSI environments)
    - Multiple Subchannel Set Multi-Target Peer-To-Peer Remote Copy support for the GDPS environment
  - Includes all New Function Service shipped for z/VM 7.1

- New Function Service will start to shift focus for delivery 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