



V53

z/VM Platform Update: Introducing z/VM V5.3 – Advancing the Art of Server Virtualization

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Session V53
Introducing z/VM Version 5.3 –
Advancing the Art of Server Virtualization

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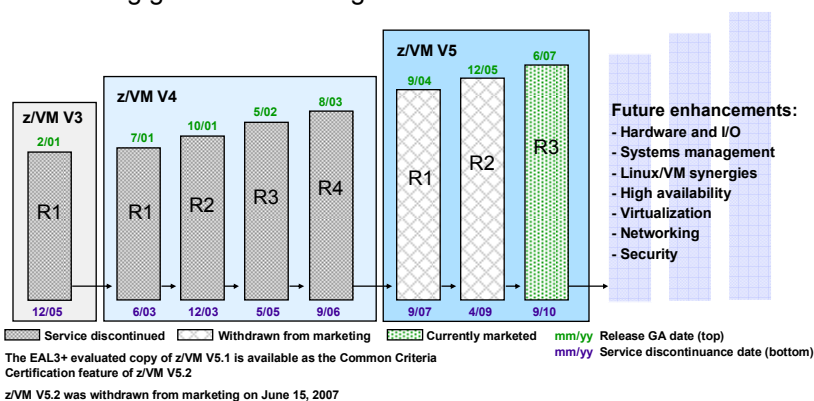
Topics

- **Recent z/VM Release History**
- **Key Linux and z/VM Product Releases from IBM**
- **z/VM Version 5 Product Information Update**
- **z/VM Version 5 Release 3 Functional Highlights**

Recent z/VM Release History

z/VM Version 5: High-Value Virtualization Technology

- ★ Generating new business with Linux on System z
- ★ Enabling growth for existing VM customers

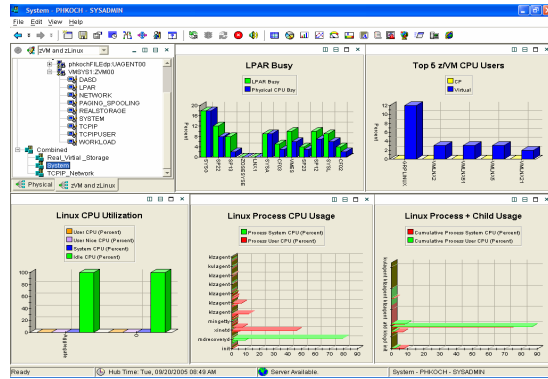


z/VM Systems Management Products from IBM

- **IBM Backup and Restore Manager for z/VM V1.2**
 - Provides z/VM system administrators and operators the ability to efficiently and effectively backup and restore files and data on z/VM systems
 - Can also backup and restore images of non-z/VM guest systems such as Linux
- **IBM Tape Manager for z/VM V1.2**
 - Manages and monitors tape resources, helping increase data availability and improve operator efficiency
 - Automates common daily tape operations and helps eliminate tedious, often error-prone, manual tasks
- **IBM Archive Manager for z/VM V1.1**
 - Addresses storage and data management concerns by allowing users to archive historical or other infrequently used data to increase data availability
 - Helps companies comply with data storage requirements mandated by fiscal or legal regulations and policies
- **IBM Operations Manager for z/VM V1.2**
 - Helps improve the monitoring and management of z/VM virtual machines by automating routine maintenance tasks
 - Enables users to automatically respond to predictable situations that require intervention

Monitoring System z Virtual Linux Servers Using IBM Tivoli OMEGAMON XE for z/VM and Linux

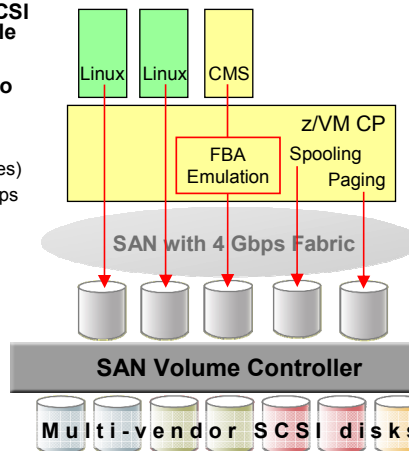
- Combined product offering* that monitors z/VM and Linux for System z
- Provides work spaces that display:
 - Overall system health
 - Workload metrics for logged-in users
 - Individual device metrics
 - LPAR Data
- Provides composite views of Linux running on z/VM



*Refer to IBM Software Announcement 206-251

IBM System Storage SAN Volume Controller Software V4.2

- z/VM and Linux for System z support SAN Volume Controller (SVC) V4.2
- SVC allows z/VM and Linux to access SCSI storage from multiple vendors as a single pool of disk capacity
- z/VM FBA emulation allows CMS users to access SVC-managed disk space
- New function in SVC V4.2:
 - Multi-target FlashCopy support (up to 16 images)
 - Higher number of active FlashCopy relationships at the cluster level
 - Designed for improved cluster performance, especially when installed on IBM System Storage SVC 2145-8G4 storage engine
 - Support for additional OEM devices
- Supported in z/VM V5.3 base product
 - z/VM V5.2 support available with PTF for APAR VM64128



Learn more at: ibm.com/storage/support/2145

IBM Director for Linux on System z V5.20

- **New product announced November 14, 2006**
 - Program number 5648-DR1
 - Available since January 12, 2007 for z/VM V5.2 and V5.3
- **IBM Director V5.20 replaces the IBM Director V5.10 base function in the IBM Virtualization Engine and Infrastructure Services for Linux on System z9 and zSeries product**
- **Includes two optional, priced features**
 - IBM Director z/VM Center
 - IBM Director Software Distribution Premium Edition
- **Other features still required from IBM Virtualization Engine and Infrastructure Services for Linux on System z9 and zSeries include:**
 - IBM Virtualization Engine Enterprise Workload Manager for Managing AIX, i5/OS, z/OS, Linux, and HP-UX Servers, V2.1
 - IBM Virtualization Engine Enterprise Workload Manager for Managing Solaris and Windows Servers, V2.1
 - IBM Resource Dependency Service, V2.1

Learn more at: ibm.com/systems/management/director

z/VM Version 5 Product Information

- **Runs on IBM System z9 (z9 EC and z9 BC) and IBM eServer zSeries (z800, z900, z890, z990) servers**
 - The z/VM V5 Control Program requires 64-bit addressing (z/Architecture)
 - 64-bit and 31-bit (ESA/390) virtual machines are supported
- **Runs on Integrated Facility for Linux engines as well as standard processors (engines)**
 - *Specialty processors (e.g., zAAPs, zIIPs) are supported for z/OS guest use*
- **IPLA software product (5741-A05) with new, improved pricing Ts&Cs**
 - One-time charge license fee, priced on a per-engine basis (CP and IFL engines only)
 - Price/engine decreases (on a tiered basis) as more engines are licensed
 - Engines can be aggregated across an enterprise for licensing purposes
 - Ordered via the System Delivery Option (SDO) (5741-A06)
- **Optional Software Subscription & Support (S&S) product (5741-SNS)**
 - Annual, renewable license charge; required to receive IBM support center services
 - Entitles customers to future z/VM releases and versions
- **Includes priced features**
 - DirMaint, RACF, Performance Toolkit for VM, RSCS
 - Pre-installed, but disabled (license required; same pricing model as base)

z/VM V5.3 changes are highlighted in **blue**

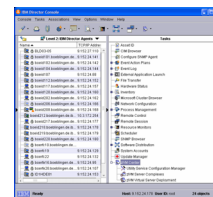
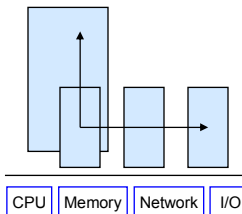
Remote Spooling Communications Subsystem (RSCS) Optional Priced Feature of z/VM V5.3

- **Remote Spooling Communications Subsystem (RSCS) V3.2.0 (5684-096) has been repackaged as a priced, optional preinstalled feature of z/VM V5.3**
 - One-time charge licensing using processor-based Value Units (consistent with z/VM V5 and other priced features)
 - Operates on standard and IFL processors
 - Operates **only** with z/VM V5.3
- **Provides dynamic command authorization support via a new server: RSCSAUTH**
 - Runs in a disconnected virtual machine and is authorized for all RSCS commands
 - Can eliminate the need to re-cycle RSCS when changing system and link authorizations
- **IBM intends to withdraw the standalone RSCS V3.2 product from marketing effective September 30, 2008**

Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Key z/VM V5.3 Business Value Propositions

- **Large, single-image, resource-balanced “Scale up” and “Scale out” support for hosting virtual server workloads**
 - Large real *memory* exploitation support (greater than 128 GB)
 - Single-image *CPU* support for 32 processors
 - Enhanced *networking* bandwidth and availability support with OSA-Express2 Link Aggregation
 - HyperPAV *I/O* support for IBM System Storage DS8000
 - Concurrent FlashCopy *I/O* support for one-to-many volumes
 - Enhanced *memory* management for Linux guests running on System z9 servers
- **Specialty processor support for z/OS guests**
 - Enhanced z/OS-on-z/VM development / test support
- **LDAP support for guest authentication**
 - Enhanced virtual server security infrastructure support
- **Staff productivity gains with IBM Director for Linux on System z and z/VM Integrated Systems Management**



z/VM Version 5 Release 3 New Function Highlights

Available Since June 29, 2007

- **Processor and I/O support**
 - Single-image support for up to 32 CPUs
 - Guest support for specialty processors
 - Enhanced SCSI support
 - HyperPAV support for IBM DS8000
 - FlashCopy I/O support enhancements
- **Virtualization support**
 - Additional z/VM support for large real memory configurations (>128 GB)
 - Collaborative Memory Management Assist
 - OSA-Express2 link aggregation (SOD)
 - Virtual Switch SNMP agent support
 - Enhanced usability for z/VM Virtual Switch and Guest LAN support
 - Guest program-directed IPL support
 - Guest MIDAW support
 - Guest ASCII console support
- **Networking**
 - z/VM TCP/IP support enhancements
 - Enhanced IP failover
 - Currency support for SSL server
 - Dynamic SSL/TLS support
- **Systems management**
 - z/VM system management API enhancements
 - z/VM integrated systems management with the System z HMC
 - User Directory COMMAND support
 - Asynchronous CP command API
 - RACF support enhancements
 - Password phrase support
 - LDAP server and client support
 - Installation and service enhancements
 - Performance Toolkit support



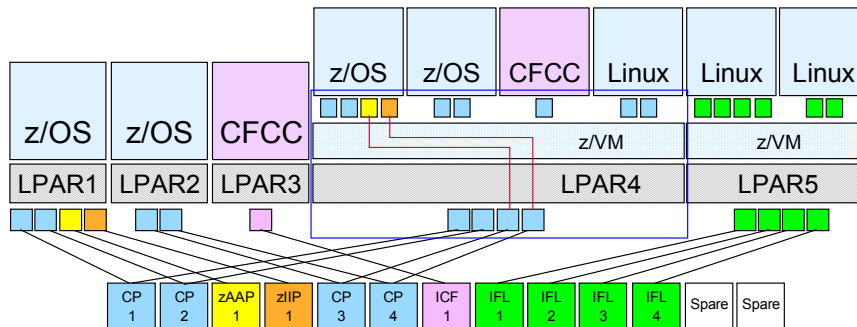
z/VM Support for Specialty Processors

- **z/VM V5.3 introduces support for zAAP and zIIP specialty processors**
 - System z Application Assist Processors (zAAPs) – provide an economical Java execution environment for z/OS and z/OS.e
 - System z9 Integrated Information Processors (zIIPs) – designed to help improve resource optimization and lower the cost for eligible z/OS and z/OS.e workloads by offloading software system overhead from standard Central Processors (CPs); this includes certain DB2 processing
- **z/VM support is provided for z/OS guest exploitation**
 - Offers additional hardware support for z/OS-on-z/VM development and test support
- **Two levels of z/VM support:**
 - *Simulation support*
 - z/VM dispatches virtual zAAPs and zIIPs on real CP engines
 - Only possible if the underlying hardware is capable of supporting the real engine type
 - Does not require activation of real specialty engine(s) within the mainframe server
 - *Virtualization support*
 - z/VM dispatches virtual zAAPs and zIIPs on corresponding real specialty engines
- **Consistent with z/OS, there are no z/VM license fees associated with real zAAP or zIIP processors**

Specialty Processor Support Example

Simulating Specialty Engines in Virtual Machines

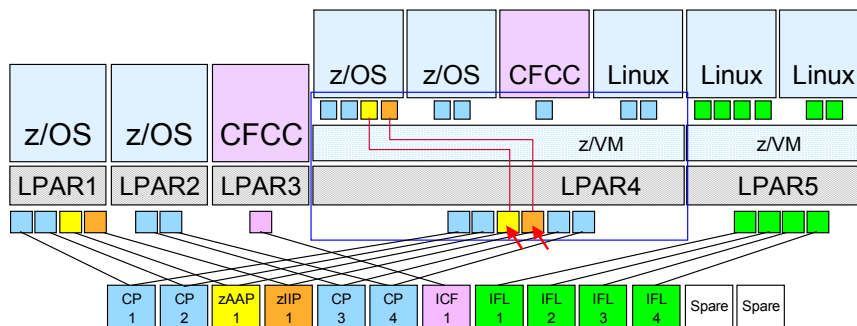
- Allows users to discover the operational aspects of using zAAPs and zIIPs in a z/OS environment without having to purchase real specialty processors
- May help users assess specialty-processor eligible workloads in a z/OS environment
- Provides a function test environment for z/OS workloads that use specialty processors
- Consumes CP processor capacity to host virtual zAAP and zIIP processor cycles



Specialty Processor Support Example

Using Real Specialty Engines in Virtual Machines

- Allows users to test and verify z/OS specialty processor support on the real hardware
- Users can maximize real specialty processor utilization by sharing processors among production and test LPARs
- Consumes specialty processor capacity to host virtual zAAP and zIIP processor cycles



z/VM V5.3 Enhanced SCSI Support

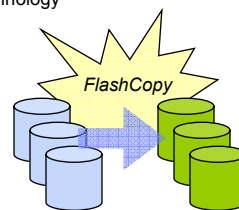
- **Support for Point-to-Point Fibre channel links**
 - May provide a lower-cost installation than the current requirement for a Fibre channel switched fabric
- **z/VM will dynamically determine preferred paths for emulated FBA devices on SCSI disks in an IBM System Storage DS6000**
 - Users no longer need to specify which paths are preferred in a SET EDEVICE command or an EDEVICE configuration-file statement
- **Faster formatting of emulated FBA devices on SCSI disks in an IBM Enterprise Storage Server (ESS) or IBM System Storage DS8000**
- **Additional SCSI device characteristics are displayed when using the QUERY EDEVICE DETAILS command**
- **z/VM will check for erroneous mapping of multiple emulated-device definitions onto the same SCSI disk when bringing emulated disks online**

z/VM HyperPAV Support

- **IBM System Storage DS8000 HyperPAV is designed to:**
 - Provide more efficient Parallel Access Volumes (PAV) function
 - Help customers who implement larger volumes to scale I/O rates without the need for additional PAV-alias definitions
 - Help reduce overhead, improve addressing efficiencies, and provide storage capacity and performance improvements
 - Enable a dynamic response to changing workloads
 - Reduce costs via simplified management of aliases
 - Enable customers to stave off migration to larger volume sizes
- **z/VM support is designed to:**
 - Potentially reduce the number of alias-device addresses needed for parallel I/O operations
 - Provide support of HyperPAV volumes as linkable minidisks for guest operating systems, such as z/OS, that exploit this new PAV architecture
 - Provide the potential benefits of HyperPAV volumes for minidisks owned or shared by guests that do not specifically exploit HyperPAV volumes (e.g., CMS, Linux)

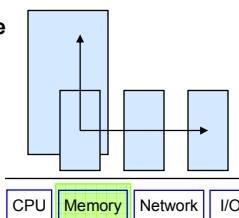
z/VM FlashCopy I/O Support Enhancements

- **Support enhancements intended to simplify the tasks required to automate backups and make multiple copies of disk data**
- **z/VM support for the FlashCopy V2 feature of IBM System Storage disk devices has been enhanced to include the capabilities to:**
 - Allow multiple targets (up to 12) of one source to be copied with a single operation
 - Determine the status of FlashCopy requests by allowing users to query the number of FlashCopy relationships active for one or more of their virtual disks
 - Exploit hardware support for asynchronous cache destage and discard
 - Designed to eliminate delayed hardware response messages
 - Makes a FlashCopy operation appear synchronous to the issuing virtual machine
 - May help facilitate automation of processes that exploit this technology



Enhanced z/VM Support for Large Real Memory Even Greater “Scale Up” and “Scale Out” Support

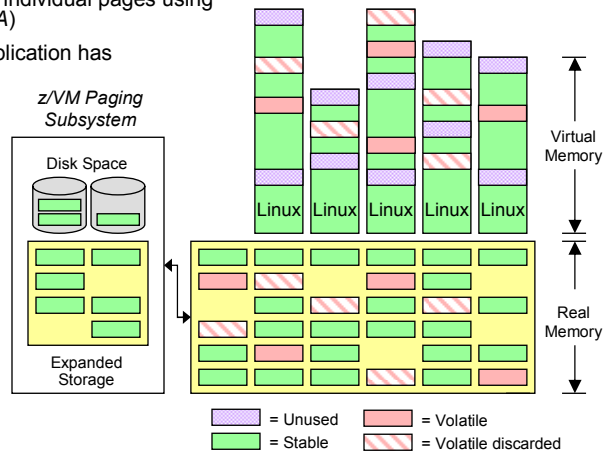
- **z/VM V5.3 increases the amount of real memory that can be used to host virtual server environments**
 - Up to 256 GB of memory can be supported in a z/VM V5.3 LPAR
 - This is a 100% increase over the previous z/VM V5.2 limit of 128 GB
- **z/VM V5.3 can support significantly more virtual memory**
 - z/VM V5.3 is architected to support up to 8 TB of virtual memory in use by guests
 - z/VM V5.2 constrained virtual memory utilization at 256 GB (or less)
 - Actual amount of supported virtual memory is affected by many factors, such as: machine model, firmware level, system configuration, number of guests and their workload characteristics
- **Users may be able to consolidate more memory-intensive virtual server images on a single copy of z/VM**
 - Should benefit most customers who experience memory constraints, regardless of the amount of central memory configured for z/VM use
 - May allow users to exploit z/VM data-in-memory techniques (e.g., virtual networking, virtual disks in storage, shared program executables) on an even greater scale



Linux and z/VM Technology Exploitation

Collaborative Memory Management Assist (CMMA)

- Extends coordination of memory and paging between Linux and z/VM to the level of individual pages using a new hardware assist (CMMA)
- z/VM knows when a Linux application has released a page of memory
- Host Page-Management Assist (HPMA), in conjunction with CMMA, further reduces z/VM processing needed to resolve page faults
- Can help z/VM host more virtual servers in the same amount of memory
- Supported by System z9 and z/VM V5.3
- IBM is working with its Linux distribution partners for exploitation support

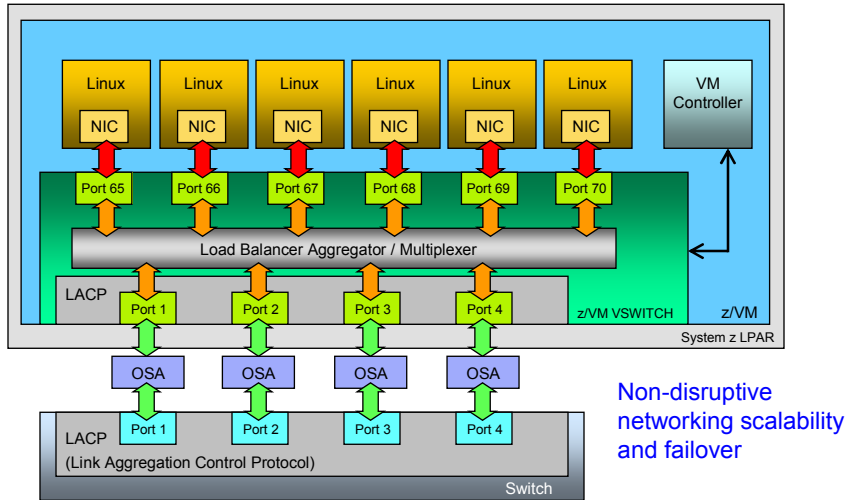


OSA-Express2 Link Aggregation Support

- **z/VM support for IEEE 802.3ad Link Aggregation**
- **Requires associated OSA-Express2 support announced on April 18, 2007 for IBM System z9 servers**
- **Groups available OSA-Express2 adapters for use by the z/VM Virtual Switch**
 - Up to 8 adapters can be aggregated per virtual switch
 - Increases Virtual Switch bandwidth and provides near seamless failover in the event of a failed controller, link or switch
 - Only supported for Layer 2 switches
- **Enables increased scalability for virtual network I/O**
- **Includes support to recover from a failed external switch**
- **Enhances support for business continuance**

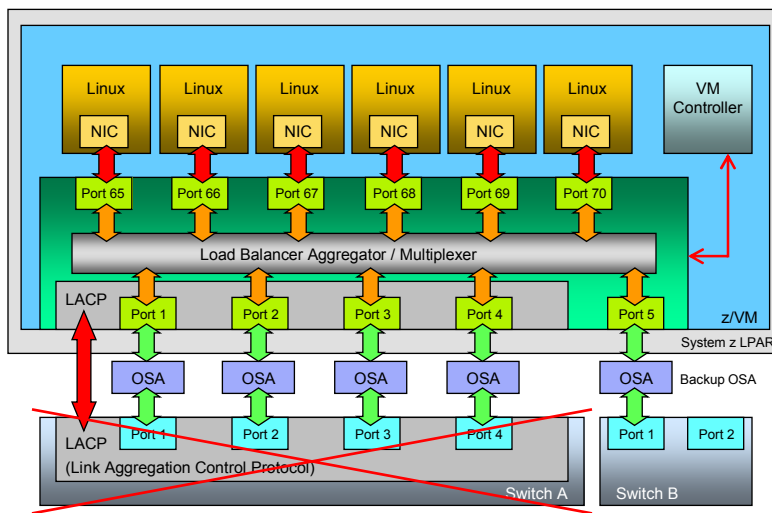
z/VM VSWITCH Link Aggregation Support

Enhanced Networking Bandwidth and Business Continuance



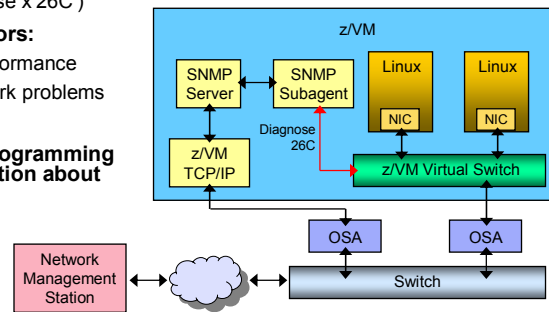
Recovery of a Failed Switch

Additional Business Continuance Support



z/VM Virtual Switch SNMP Support

- **Helps enhance virtual network management with additional support for Simple Network Management Protocol (SNMP)**
- **Provides an SNMP subagent that will return Bridge MIB (Management Information Base) data for the z/VM Virtual Switch**
 - MIB data returned is defined by RFC 1493
 - The subagent acquires the information using a Control Program Diagnose interface (Diagnose x'26C')
- **Helps network administrators:**
 - Manage virtual network performance
 - Find and solve virtual network problems
 - Plan virtual network growth
- **Support also provides a programming interface to obtain information about virtual networks**



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Virtual Switch and Guest LAN Usability Enhancements

- **Dynamic change support for VLAN ID and promiscuous mode authorization**
 - Changes are effective immediately and no longer require a revoke, grant, and uncouple/couple to take effect
- **New capability to configure a native VLAN identifier**
 - Provides ability to specify a native VLAN identifier for untagged traffic and a default VLAN identifier for guest ports
 - The DEFINE VSWITCH command now supports specification of a native VLAN identifier
- **New virtual network monitor domain**
 - Virtual NIC data counts are now included in records found in a new Virtual Network monitor domain
 - Recorded data includes:
 - Inbound packets
 - Outbound bytes
 - Frame counts per MAC/VLAN
 - Provided for virtual NICs coupled to any Guest LAN or VSWITCH

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Additional z/VM Guest Support

- **ASCII console support**
 - Allows the real System z ASCII console to be dedicated to a guest system
 - Can facilitate recovery of a Linux guest system during an emergency situation
 - Supports a VT220 data stream
- **Modified Indirect Data Address Words (MIDAW) support**
 - Allows guest use of MIDAWs when z/VM is running on MIDAW-capable servers
 - z/Architecture MIDAW facility offers an alternative to using CCW data chaining in channel programs
 - May reduce channel, director, and control unit overhead by reducing number of CCWs and frames that have to be processed
 - May improve I/O throughput, especially on faster FICON channels
 - Allows z/OS guests to exercise their MIDAW support in a z/VM test environment
- **Program-directed IPL support**
 - Enables a virtual machine to programmatically re-IPL using CCW-type or List-Directed (SCSI) IPL architectures
 - Linux is the exploiter of this function
 - Includes support to allow the setting and storing of IPL parameters

z/VM TCP/IP Support Enhancements

- **Virtual IP Addressing (VIPA) support for IPv6**
 - Enable and configure a virtual device for IPv6
 - Associate real IPv6-capable network adapters with a specific IPv6 virtual link
- **New Trace Route (TRACERTE) authorization**
 - Eliminates the restriction that TRACERTE can only be used by privileged users
 - TRACERTE is useful for anyone debugging networking issues
- **Dynamic DEVICE and LINK deletion support**
 - TCP/IP stack no longer has to be re-cycled to remove devices and links from the stack configuration
 - Programmatic access via C and REXX socket interface
- **SMTP**
 - Fixes SMTP processing of nickname files; improves host name resolution
 - Allows users to specify a nickname label in SMTP NAMES that matches any of the userids in the list defined by that nickname

Enhanced Failover Support for IPv4 and IPv6

- **Business Continuance support** – enables failover capability for the z/VM TCP/IP stack in the event of an adapter connection failure
- **Requires two QDIO or LAN Channel Station (LCS) Ethernet devices on the same network**
 - When one device stops or fails, the other device is designed to take over responsibility for the traffic destined for the failed device
- **Support includes:**
 - OSA-Express devices in QDIO Ethernet or LCS Ethernet mode
 - Virtual IP Addressing (VIPA)
 - Proxied addresses – those which PROXYARP services are being provided through a takeover-eligible device

z/VM SSL Server Upgrade Support for Additional Linux Distributions

- **z/VM V5.3 SSL server will support the following Linux distributions:**
 - Novell SUSE Linux Enterprise Server (SLES) 9 Service Pack 3 (64-bit)
 - Novell SUSE Linux Enterprise Server (SLES) 9 Service Pack 3 (31-bit)
 - Red Hat Enterprise Linux (RHEL) AS 4 Update 4 (64-bit)
 - Red Hat Enterprise Linux (RHEL) AS 4 Update 4 (31-bit)
- **SSL server enhancements:**
 - Linux guests can remain active after a critical error is encountered during server operations
 - SSL server can more easily exclude weak cipher suites; helps support enterprise requirements for strong encryption on network connections (128 bits or higher)
- **SSLADMIN command has been enhanced to:**
 - Allow the specification of the number of days that a self-signed certificate is to be valid
 - Improve the management of the SSL server LOG files by providing the ability to:
 - Maintain log information in a file named other than SSLADMIN LOG
 - Specify a maximum size to be established for the SSL server log
 - Purge log information accumulated by the SSL server



SSL / TLS Support

Conformance with Industry Standards

- **z/VM V5.3 provides Secure Socket Layer / Transport Layer Security (SSL/TLS) support for:**
 - Industry-standard secure FTP (RFC 4217)
 - Telnet (draft specification #6)
 - SMTP sessions (RFC 3207)
- **New socket APIs control the acceptance and establishment of TCP sessions that are encrypted with SSL/TLS**
- **Data transmission on a connection can now begin in clear text and later switch to secure text**
 - Helps reduce the need to dedicate a separate port for secure connections

Enhanced z/VM Systems Management Functions

For Allocating and Managing Guest Resources

- **New sockets-based server interface for z/VM Systems Management API**
 - Multitasking capable and supports both AF_INET and AF_IUCV socket requests
 - Replaces the Remote Procedure Call (RPC) and CSL routines of prior z/VM releases
 - RPC server is still available at a function level that matches z/VM V5.2
 - IBM intends to remove the RPC server in a future z/VM release
- **New APIs available with new server include:**
 - Create, delete, and query the IPL statement in a virtual image's directory entry
 - Create and delete virtual switches and guest LANs
 - Obtain processor, memory, and device information for active virtual images
 - Check the validity of a given user ID and password combination
- **Enhancements to existing functions include:**
 - Exploitation of new Asynchronous CP Command function
 - Password phrase support
 - Providing a list of active virtual images
 - Architected output is provided for some query functions that previously returned command responses in a data buffer



IBM Director for Linux on System z V5.20

With z/VM Center and Software Distribution Premium Edition

IBM Director Base Functions

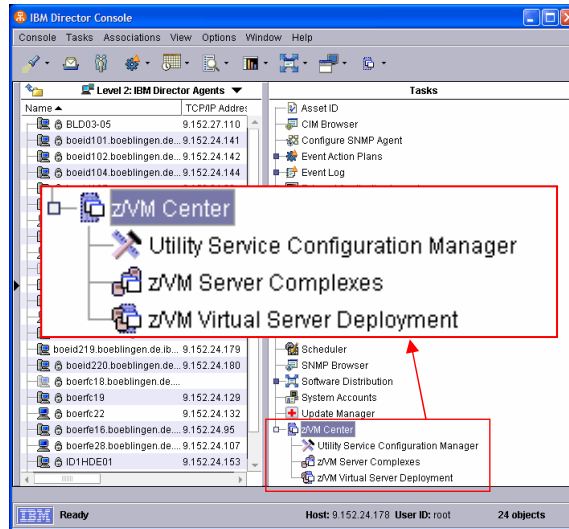
- Discovery
- Group Management
- Inventory
- Basic Resource Monitor
- Event Action Plan (EAP)
- Process Management
- Remote Session
- File Transfer
- Network Configuration
- Software Distribution
- SNMP Browser

z/VM Center

- Utility Service Configuration Manager
- z/VM Virtual Server Deployment
- z/VM Server Complexes

Software Distribution Premium Edition

- Software package distribution



z/VM Integrated Systems Management

Using the System z Hardware Management Console (HMC)

Included in z/VM V5.3

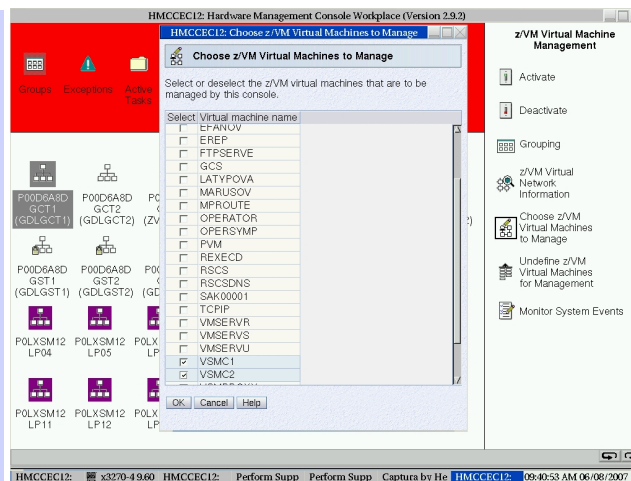
- Allows basic z/VM functions to be performed from HMC
- Network connection not required
- Uses SCLP hardware interface to access z/VM systems management APIs
- Requires PTFs for APARs VM64233 and VM64234

Supported operations:

- View z/VM guests
- Activate z/VM guests
- Deactivate z/VM guests
- Display guest configuration and status

Supported systems:

- z9 EC and BC machines
- z800, z900, z890, z990



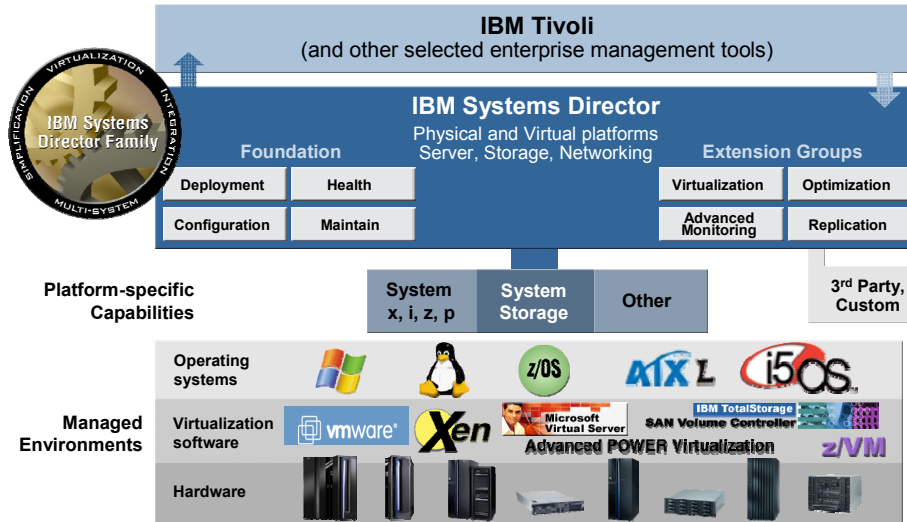
Provisioning Linux Virtual Machines on System z Using IBM Director for Linux on System z with z/VM Center

IBM Director deployment scope:
Templates for z/VM virtual machines and Linux

Provisioning Software in System z Virtual Linux Servers Using IBM Tivoli Provisioning Manager

Tivoli Provisioning Manager deployment scope:
Operating systems like Linux, AIX, Windows
Middleware like DB2 and WebSphere Application Server

IBM Systems Director End-to-End Management Approach



Additional Virtual Server Infrastructure Support

- **User Directory Command support**
 - DIRECTXA supports a new COMMAND statement that specifies a command to be issued on behalf of a virtual machine during the logon process
 - Commands may be associated with a directory profile; commands will be issued for each guest employing that profile
 - Offers added flexibility and convenience for configuring large-scale virtual server environments
- **Asynchronous CP Command API**
 - Provides an asynchronous method to initiate CP commands for another userid and capture responses which are specific to those commands
 - Introduces a new IUCV service (*ASYNCMD) and a new CP command (FOR)
 - The *ASYNCMD system service allows CP command responses from the FOR command to be captured by a program
 - The z/VM System Management API (SMAPI) server uses *ASYNCMD
 - A REXX exec using the "STARMSG" CMS Pipeline stage can capture the responses



RACF Security Server Enhancements

- **z/VM V5.3 RACF feature has been re-packaged and is now called “RACF Security Server for z/VM”**
 - Operates **only** with z/VM V5.3
- **Provides support for mixed-case passwords and password phrases**
 - RACF password phrases can be a string of up to 100 characters, including blanks; can be used in place of, or in addition to, traditional 8-character passwords
 - An installation exit is provided to help customers define rules for governing length and content of password phrases
- **Additional password management enhancements are included**
- **RACF SMF Unload utility has been updated to store unloaded data in industry-standard XML format**
 - Making the data suitable for examination by a variety of applications, including XML browsers and spreadsheets
- **IBM has withdrawn the RACF for VM V1.10.0 standalone product from marketing (effective March 5, 2007)**
- **IBM intends to discontinue service support for RACF for VM V1.10.0 effective April 30, 2009**

Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Password Phrase Support

- **z/VM V5.3 supports use of passwords greater than 8 characters; requires presence of an external security manager (e.g., RACF)**
- **A “password phrase” may contain mixed-case letters, numbers, blanks, and special characters**
- **New Callable Services Library (CSL) routine, DMSPASS, allows authorized CMS applications to authenticate passwords or password phrases**
- **z/VM facilities that have been updated to support passphrases:**
 - LOGON command
 - TCP/IP File Transfer Protocol (FTP)
 - Systems Management API
 - Remote Execution Protocol (REXEC) server
 - Internet Message Access Protocol (IMAP) server
 - Performance Toolkit for VM
- **Support helps a z/VM system meet the enterprise password requirements imposed by many companies, governments, and institutions**
- **If passwords greater than 8 characters is not an option, RACF provides support for mixed-case 8-character passwords**

z/VM LDAP Server and Client Support Services

- **z/VM LDAP server is adapted from the z/OS 1.8 Tivoli Directory Server**
- **Executes in a CMS virtual machine; a subcomponent of z/VM TCP/IP**
- **Enables a common user name space between z/VM and Linux**
- **z/VM LDAP server provides:**
 - LDAP Version 2 and Version 3 protocol support
 - Interoperability with LDAP V2 or V3 protocol-capable clients
 - Native authentication using:
 - Challenge-Response Authentication Method (CRAM-MD5)
 - DIGEST-MD5 authentication
 - Simple (unencrypted) authentication
 - Access controls on directory information
 - SSL communication (SSL V3 and TLS V1)
 - Client and server authentication using SSL/TLS
- **LDAP client utilities provide a way to add, modify, search, and delete entries in any server that accepts LDAP protocol requests**
- **Interoperates with z/VM RACF Security Server Feature**



Performance Toolkit for VM Enhancements

- **The Performance Toolkit for VM feature is a performance and reporting tool for the z/VM system and its guest images**
 - Real time and historical reporting
 - Offers threshold monitoring and user loop detection
 - Can monitor remote z/VM systems
 - Results can be viewed graphically with a web browser
- **z/VM V5.3 enhancements:**
 - Support for passphrases when accessing the Toolkit using the Web interface
 - Service is by individual parts instead of module (reduces size of service deliverable)
 - New or updated displays and reports for new function:
 - Linux monitor data for CPU IDs and “steal time” counters
 - Monitor data for virtual network devices and virtual switches
 - Monitor data for guest simulation of zAAPs, zIIPs, and IFLs
 - Monitor data for up to 32 processors in a z/VM image
- **IBM Tivoli OMEGAMON XE for z/VM and Linux V4.1 requires the Performance Toolkit for VM for data collection**



z/VM Installation and Service Enhancements

- **Additional DVD installation option**
 - Users can install z/VM V5.3 in a virtual machine using DVD product installation files that have been moved to a CMS minidisk or FTP server directory
- **Enhanced support for automated SERVICE command**
 - Displays the service and production levels for preventative service (RSU)
 - Displays applied, built, and production status for corrective service
 - Can help users more quickly and easily determine service status



Miscellaneous Updates

- **z/Architecture CMS Sample Program**
 - Enables use of z/Architecture instructions by CMS programs, including those that operate on 64-bit registers
 - Does not explicitly support 64-bit addressing mode, but does not impose serious restrictions on programs that enter 64-bit addressing mode themselves
- **CMS Store System Information (STSI) API support**
 - An addition to the REXX CMS function package that allows the capture of system information using the STSI instruction
 - Can be used instead of “Diagnose 0” to obtain information about the system
- **U.S. Daylight Saving Time (DST) support considerations**
 - U.S. Energy Policy Act of 2005 extends DST by four weeks beginning in 2007
 - New sample system configuration file statements will be delivered with z/VM V5.3
 - System programmers should change the dates that are specified in `TIMEZONE_BOUNDARY` statements in existing system configuration files
 - Apply Language Environment PTF for APAR VM64117 to z/VM V5.1 and V5.2
 - For more information, visit: www.ibm.com/support/alerts/daylightsavingsttimealert.html

z/VM Statements of Direction

- IBM intends to evaluate **z/VM V5.3** with the RACF Security Server optional feature for conformance to the Controlled Access Protection Profile (CAPP) and Labeled Security Protection Profile (LSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4). IBM no longer intends to evaluate z/VM V5.2.
- IBM intends to withdraw support for the **RPC/CSL interface** from the System Management API server in a future z/VM release.
- z/VM TCP/IP functions – IBM intends to withdraw support for the Network Database (NDB) system, Trivial File Transfer Protocol (TFTP) server, **X.25** interface (includes X25IBI server), and **SNALINK** server in a future z/VM release.
- IBM intends to withdraw **3480 tape as a distribution media** in a future z/VM release.
- IBM intends to support **3592 tape as a distribution media** by third quarter 2007.

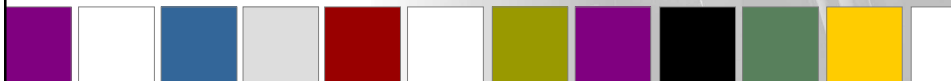
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Thank you

For more information, please contact

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ibm.com/systems/z



Backup Material

z/VM Version 5 Release 1 New Function Highlights Including Post-GA Support Enhancements

- **Processor and I/O support**
 - IBM z990 and z890 support enhancements
 - Coupling Facility Control Code Level 14
 - FICON Express2
 - PCI Express and Crypto Express2
 - Support for 24 CPUs
 - OSA-Express Integrated Console Controller support
 - CP/CMS support for SCSI disks and FCP LUN access control
 - DS8000 and DS6000 storage subsystems
 - TotalStorage 3592 tape subsystem
- **Server hosting support**
 - Dynamic virtual machine timeout
 - HyperSwap (GDPS PPRC Multiplatform Resiliency for zSeries)
- **Networking**
 - OSA-Express2 support
 - Enhanced OSA-Express connectivity
 - Layer 2 and 3 Virtual Switch support
 - RACF authorization support for Guest LANs and Virtual Switches
 - VM TCP/IP support for IPv6
- **Systems management**
 - Capacity on Demand enhancements
 - Additional System Management APIs
 - Performance Toolkit for VM enhancements
 - Service support enhancements
- **General**
 - New publication: *Getting Started with Linux on zSeries*
 - EAL 3+ certification



z/VM Version 5 Release 2 New Function Highlights

Including Post-GA Support Enhancements

- **Processor and I/O support**
 - IBM System z9
 - Dynamic LPAR naming support
 - Crypto Express2 Accelerator
 - IBM 3592 E05 tape encryption support
 - SCSI disk I/O performance enhancements
 - HiperSockets IPv6 support
 - N_Port ID Virtualization support
 - DS8000 and DS6000 storage systems
- **Server hosting support**
 - Enhanced z/VM support for large real memory configurations
 - Enhanced performance assists for z/VM guest images
 - z/VM Guest LAN and Virtual Switch sniffer support
 - Parallel Access Volume (PAV) support for z/VM minidisks
 - Cooperative Memory Management
- **Networking**
 - OSA-Express2 Open Systems Adapter for NCP support
 - OSA GARP VLAN Registration Protocol (GVRP) support
 - New MPROUTE server for z/VM
 - z/VM SSL Server upgrade
- **Systems management**
 - Enhanced z/VM systems management
 - Simplified user administration: DirMaint and RACF coordination
 - Enhanced directory management performance
 - Performance Toolkit for VM support
 - Product service and installation enhancements

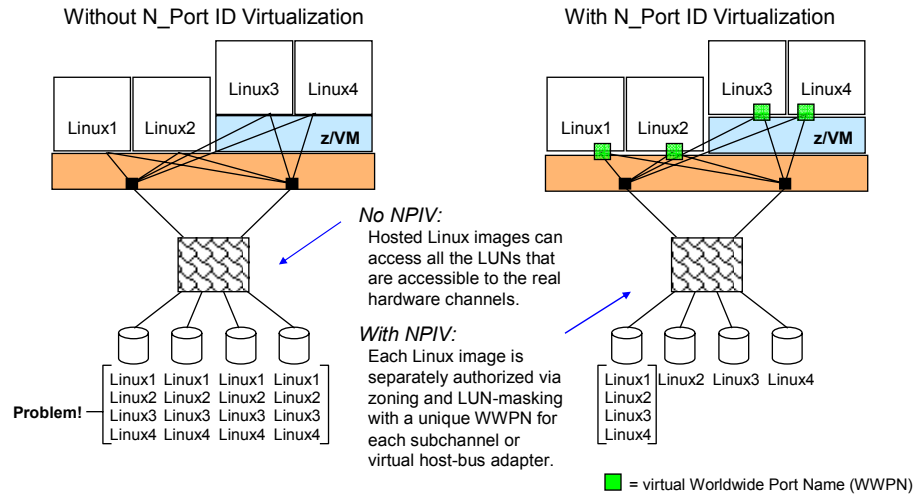


z/VM V5.2 Post-GA Support

- **Support for new processor instructions and facilities***
 - CP exploitation of Program-Event-Recording 3 (debug) and Store-Clock-Fast facility (overhead reduction)
 - Guest support for Signal Processor (SIGP) instruction Conditional-Emergency-Signal, Sense-Running-Status orders, and Program-Event-Recording 3
 - CP Trace support for new instructions
- **FICON Express4 (4 Gbps FICON/FCP)**
 - Enhanced capacity and performance with faster channel link data rates
 - More manageable migration to higher performance with 1/2/4Gb auto-negotiating links
- **Performance Toolkit enhancements***
 - Support for the Open Systems Adapter for NCP (CHPID type OSN)
 - Shutdown and restart of the Performance Toolkit is no longer required to add VM systems within the enterprise for performance-data retrieval
- **DS8000 and DS6000 support enhancements***
 - Recognition of unique real controller types (2105, 2107 and 1750)
 - Virtualization support to identify the level of controller support for z/VM guests
- **Query support for FCP N_Port ID virtualization***
 - New query capability allows z/VM users and guest operating systems to query hardware-defined virtual port names

*Requires the PTF for APAR VM63952

N_Port ID Virtualization (NPIV)



z/VM Support for NPIV

- FICON Express features on System z9 support FCP N_Port ID Virtualization
- NPIV enables zoning and LUN masking on a virtual machine basis
- Multiple operating system images can now concurrently access the same or different SAN-attached devices (LUNs) via a single, shared FCP channel
 - Can increase channel utilization
 - Less hardware required
 - Helps reduce the complexity of physical I/O connectivity
- Supported by z/VM V5.3 and V5.2; z/VM V5.1 support is available with the PTF for APAR VM63744
 - Note: z/VM V5.1 cannot be installed from DVD to SCSI disks when NPIV is enabled

z/VM V5.2 Post-GA Support (continued)

- **System and guest exploitation of real HiperSockets IPv6 support***
 - Includes support for simulated HiperSockets devices (HiperSockets Guest LANs)
 - z/VM TCP/IP support for IPv6 transmissions over real and simulated HiperSockets
- **OSA GARP VLAN Registration Protocol (GVRP) support***
 - Allows registration of VLAN IDs; OSA-Express can become a participant or end station in a GVRP network
 - Provides VLAN filtering for z/VM Layer 2 and Layer 3 switches (can reduce unwanted inbound VLAN traffic)
 - Support details: VLAN tagging for z/OS, z/VM and Linux; VLAN priority queuing for z/OS and Linux
 - Also supported by z/VM V5.1 with PTFs for APARs VM63784 and PK08444
- **Parallel Access Volume (PAV) support***
 - Provides full support for 2105/2107 PAV feature for minidisk I/O
 - z/VM I/O dispatcher will exploit real PAV hardware features for balancing workload across PAV alias volumes
- **Cooperative memory management****
 - Enhances efficiency of managing virtual memory page allocations
 - z/VM Virtual Machine Resource Manager instructs Linux guest images to reduce page consumption
 - Linux support currently available with SLES 9 and 10

*Requires the PTF for APAR VM63952

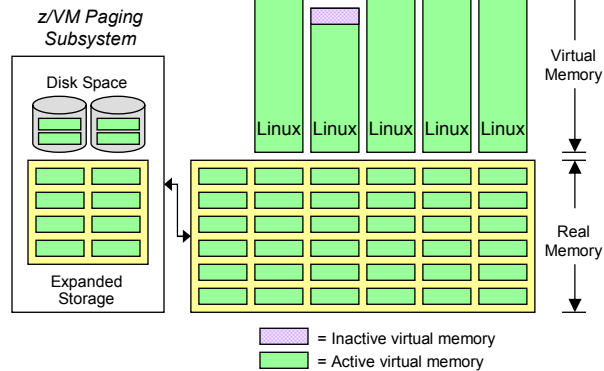
** Requires the PTF for APAR VM64085

z/VM Support for Parallel Access Volumes

- **PAVs allow:**
 - Multiple concurrent I/Os to the same volume by one or more users or jobs
 - Automatic coordinated Read and Write I/O referential integrity when needed
- **z/VM V5.2 with PTF for APAR VM63952:**
 - Supports PAVs as minidisks for guest operating systems that exploit the PAV architecture (e.g., z/OS and Linux for System z)
 - Provides the potential benefit of PAVs for I/O issued to minidisks owned or shared by guests that do not support native exploitation of PAVs, such as z/VSE, z/TPF, CMS, or GCS
- **IBM System Storage DASD volumes must be defined to z/VM as:**
 - 3390 Model 2, 3, or 9 on a 3990 Model 3 or 6 Controller
 - Or...2105, 2107, or 1750 Storage Controller
 - Note: 3380 track-compatibility mode for the 3390 Model 2 or 3 is also supported.
- **Potential benefit:**
 - Designed to improve I/O response times by reducing device queuing delays

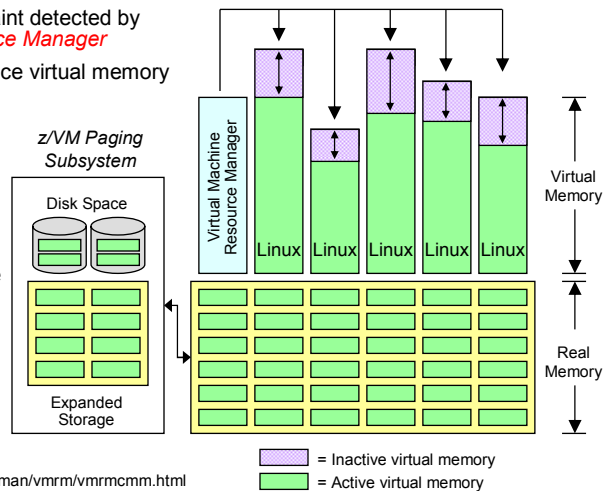
Linux and z/VM Technology Exploitation Cooperative Memory Management (CMM)

- Problem scenario: virtual memory utilization far exceeds real memory availability
- z/VM Control Program paging operations become excessive
- Overall system performance and guest throughput suffers



Linux and z/VM Technology Exploitation Cooperative Memory Management (CMM)

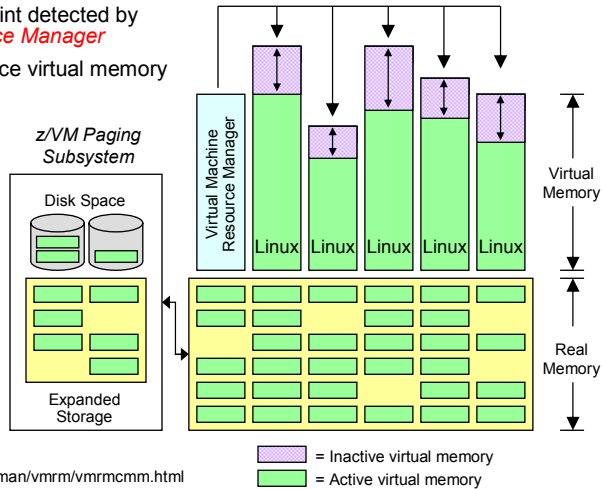
- Solution: real memory constraint detected by z/VM *Virtual Machine Resource Manager*
- Linux images signaled to reduce virtual memory consumption
- Linux memory pages are released
- Demand on real memory and z/VM paging subsystem is reduced
- Helps improve overall system performance and guest image throughput



Learn more at:
ibm.com/servers/eserver/zseries/zvm/sysman/vmrm/vmrmcmm.html

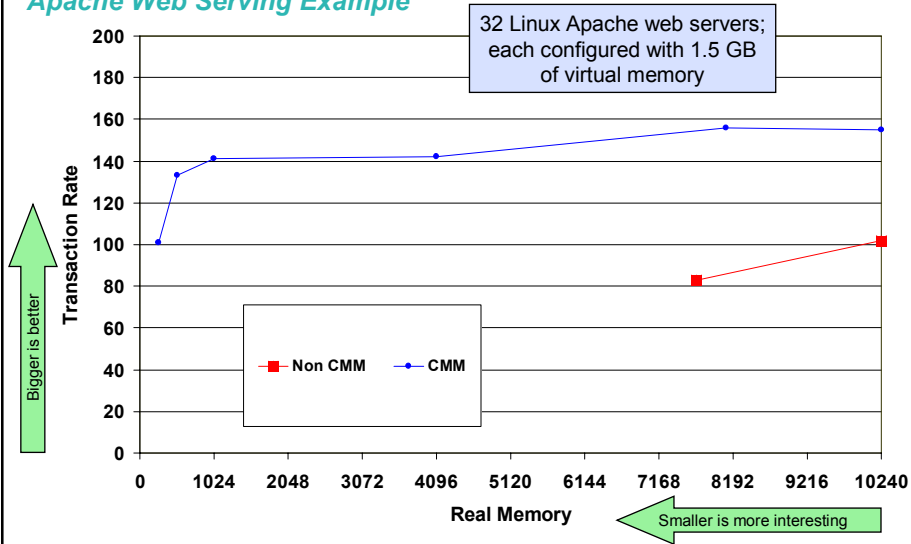
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Learn more at:
ibm.com/servers/eserver/zseries/zvm/sysman/vmrm/vmrmcmm.html

Cooperative Memory Management with Linux on z/VM Apache Web Serving Example



z/VM V5.2 Post-GA Support (continued)

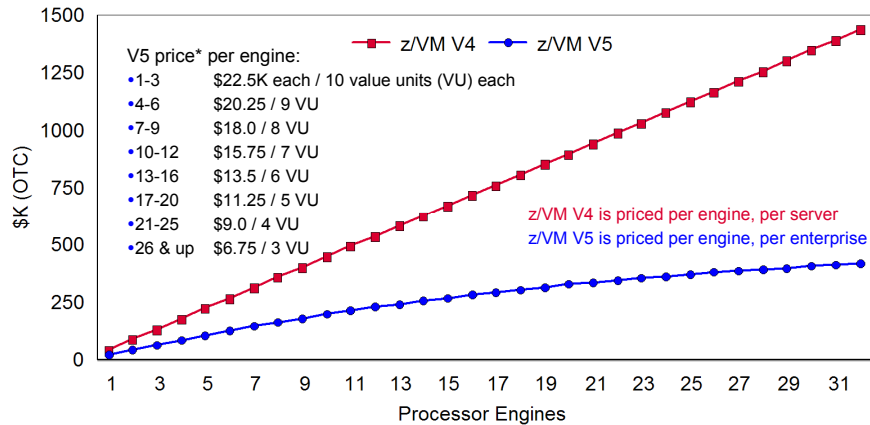
- **IBM System Storage TS1120 Tape Drive Model E05 encryption support**
 - IBM System Storage TS1120 tape drive is machine type 3592 Model E05
 - z/VM V5.1 and V5.2 will provide transparent support for z/VM guest images
 - z/VM support requires the Encryption Key Manager component to run on another operating system other than z/VM using an out-of-band connection
 - Java-based external key manager can run on z/OS, Linux, AIX, or Windows
 - Support available for z/VM V5.1 and V5.2 with PTF for APAR VM64063, available since December 19, 2006

IBM 3592 Model E05 Tape Drive Encryption Support *Addressing Data Security Needs*

- **Tape encryption support is a standard feature on all IBM System Storage TS1120 Model E05 drives**
- **z/VM supports drive-based data encryption**
 - Requires the IBM Encryption Key Manager to run on an operating system other than z/VM using an out-of-band connection (e.g., TCP/IP) to the tape control unit
 - Includes encryption support for DDR, SPXTAPE, and guest systems that do not provide their own encryption support (e.g., CMS, Linux)
 - Includes support for guests (e.g., z/OS) that can control the tape encryption facilities themselves and optionally run the Encryption Key Manager
- **z/VM V5.1 and V5.2 require PTF for APAR VM64063**
 - This support is included in the z/VM V5.3 base product
- **DFSMS/VM FL221 support available with PTF for APAR VM64062**
 - Locates encryption-capable 3592 tape drives in an Enterprise Automated Tape Library
 - Provides tape encryption capabilities for a z/VMSE guest running on z/VM
 - PTF is required for z/VM V5.1, V5.2 and V5.3



z/VM Version 5 Pricing



*U.S. prices as of 1 Aug 2007

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z/VM Version 5 Pricing

Detailed Information

- **z/VM V5 uses a Value Unit pricing model**
 - z/VM V5 value units correspond to the number of processors, not MIPS or MSUs
 - A single z/VM V5 value unit is priced at \$2,250 (U.S. pricing as of 1 Aug 2007)
 - Processors 1, 2, and 3 are priced at 10 value units each
 - Processors 4, 5, and 6 are priced at 9 value units each
 - Pricing continues on a tiered basis
- **z/VM Version 4 customers who have purchased Software Subscription and Support (S&S) are entitled to receive z/VM Version 5 at no charge**
 - No charge to run z/VM V5 on same number of V4-licensed processors
 - Subsequent S&S annual payments will be based on z/VM V5 pricing
 - Keep in mind z/VM Version 5 requires z/Architecture to operate
 - If the customer adds capacity (engines) after the migration, pricing for the added capacity will be based on the z/VM Version 5 pricing model
- **If z/VM V5 is licensed to run on an IFL engine, all IFLs must be counted to determine the z/VM V5 licensing fee**
- **If z/VM V5 is licensed to run on a standard processor, all standard processors must be counted to determine z/VM V5 licensing fee**

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z/VM Version 5 Product Packaging Changes

- **DFSMS/VM is no longer *automatically* shipped with the base product**
 - It is now a no-charge feature and must be ordered via the SDO
- **3270 PC File Transfer product (5664-281) is *included* with base product**
 - Delivered with z/VM V5 as a sample program (with no support)
- **Restricted source feature and PL/X source *no longer ship* with z/VM V5**
 - Both are available as no-charge downloads from IBM Resource Link for z/VM V5 customers
- **Tivoli Storage Manager for VM is *no longer pre-installed* with z/VM V5**
 - Consider TSM for Linux on zSeries for future TSM server support
- **National Language features for ISPF have been *removed* from the SDO**
 - Features can be ordered using the standalone ordering process
- **HCD/HCM *upgraded* to new level**
- **z/VM Collection Kit publications *available on DVD* (supplied with order)**
- **z/Architecture CMS is *shipped as a sample program* of z/VM V5.3**
- **RSCS is now a *per-processor, one-time-charge priced feature* of z/VM V5.3**

z/VM V5.3 changes are highlighted in *blue*

Functions Removed from z/VM Version 5

- **RTM and PRF features (replaced by Performance Toolkit for VM)**
- **SPTAPE (use SPXTAPE to backup Spool files)**
- **V=R and V=F virtual machine support**
- **CMS support for Java and NetRexx programs**
- **System Administration Facility**
- **Support for Server-Requester Programming Interface (SRPI)**
- ***ROUTED and BOOTP servers have been removed from z/VM V5.3***
- **Device support**
 - DASD/Controllers: 3370, 3375, 3380(1), Multiprise Internal Disk, 9332, 9335, 9336(2), 9340, 3830, 3880
 - Optical: 3995 Optical Dataserver
 - Tape/Controllers: 2440, 3420, 3422(3), 3424, 3430, 9348, 3803
 - Communications: all SDLC, BSC, and CBT ICA, 3705, 3720, and 3725 Communication Controllers, 8232 LAN Channel Station
 - Terminals: 2741 and TWX Terminal Model 33/35 (TTY) as virtual consoles
 - Refer to the z/VM V5.2 GIM for a complete listing of devices supported



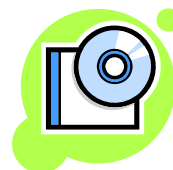
Notes:

- (1) RAMAC-emulated 3380 models J and K and 3390 DASD configured for 3380-track-compatibility are supported
- (2) 9336 is a supported device geometry for Virtual Disks in Storage and emulated SCSI LUNs
- (3) OMA/2 CD-ROM emulating a 3422 is supported

z/VM V5.3 changes are highlighted in *blue*

z/VM Version 5 Product Installation Support

- **z/VM V5.3 can be installed on:**
 - 3390-formatted DASD volumes (Models 3 and 9)
 - FCP-attached SCSI disks: ESS 750, ESS 800, DS8000, DS6000
- **Product media and distribution options:**
 - DVD
 - 3590 and 3480 tape
 - Electronic delivery of SDO-licensed products
- **System Residence (SYSRES) volume changes**
 - Spool and paging space removed from SYSRES
 - Located on separate installation volumes
- **New installation method simplifies the task for new and experienced users**



z/VM Version 5 Support for FCP-Attached SCSI Disks

Integrate Your z/VM Systems with Storage Area Networks

- **z/VM V5.3, V5.2 and V5.1 allow FCP-attached SCSI disks to be used for both system use (CP/CMS) and guest images (e.g., Linux, z/VSE)**
- **SCSI disks are emulated as 9336 Model 20 FBA devices for system use**
 - Enables support for install, paging, spooling, directory services, minidisks
 - Guest systems supporting FBA can also use emulated SCSI disks
 - Emulation support currently limits usable disk space to nearly 1 TB for CP volumes and 381 GB for CMS and GCS
 - Paging, spooling, and directory space must reside in first 64 GB
- **Non-emulated SCSI disks can still be attached to virtual machines**
 - For boot and/or data operations
 - Requires SCSI support in guest operating system
- **Currently supported SCSI disks:**
 - IBM TotalStorage Enterprise Storage Server Models 750 and 800
 - IBM System Storage DS8000 and DS6000
 - Generic SCSI driver available for other disks
- **SCSI-only disk configurations are now possible with z/VM V5**

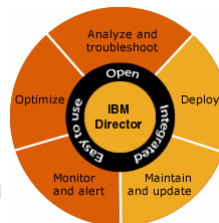


Understanding z/VM Support for SCSI Disks

- **z/VM ECKD I/O can achieve a higher level of performance than SCSI disk I/O**
 - Continue to use ECKD disks for CP/CMS I/O if it is an option
- **Increased path length of z/VM SCSI disk I/O can be offset**
 - Reduce over commitment of virtual-to-real memory (i.e., reduce paging)
 - Use minidisk cache for read-mostly I/O
 - Additional processor cycles will offset increased SCSI I/O path length
- **Sharing FBA-emulated SCSI disks among Linux images can offer disk and administrative savings**
 - Allows partitioning of SCSI disks using z/VM minidisk support (includes exploitation of minidisk cache support)
 - Allows use of tuning options like “Set Throttle” and “Set IOPriority”
 - Performance monitoring of emulated disks is functionally richer than SCSI disks accessed via dedicated FCP-subchannels
- **IBM System Storage DS6000 offers a low-cost ECKD option for z/VM data**

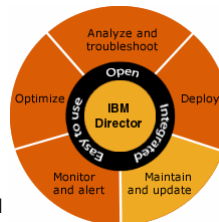
IBM Director V5.20 z/VM Center

- **Virtual Server Deployment – easy deployment of Linux servers on z/VM**
 - Create z/VM virtual machines using the IBM Director graphical user interface
 - Template-based provisioning of Linux virtual machines
- **Server Complexes – one-step provisioning of multiple Linux virtual servers**
 - Exploits Virtual Server Deployment task
 - Manages configuration settings of Linux virtual servers in order to reduce customization steps needed by Virtual Server Deployment
 - Definition of virtual networking, minidisk attachments
 - Supports configuration scripts
 - Controls virtual server resource assignment via z/VM Virtual Machine Resource Manager (VMRM)
- **Utility Service Configuration Manager**
 - New task that provides ease-of-use enhancements for installing and customizing Linux utility services
 - A utility service combines applications, configurations, and a system environment (e.g., network setup, storage) needed for a specific end-user function
 - Learn more about Linux utilities at: ibm.com/systems/z/os/linux/utilities
- **z/VM Center is priced on a per-managed processor basis**



IBM Director V5.20 Software Distribution Premium Edition

- **IBM Director includes a base level of software distribution**
 - It enables users to distribute IBM-provided software packages
- **Software Distribution Premium Edition allows users to build and distribute their own software packages for Director-managed systems**
- **Supported operating systems include:**
 - Linux
 - Windows
 - AIX
 - i5/OS
- **IBM Director Software Distribution Premium Edition is priced on a per server basis**
 - In the mainframe environment, a “server” is a mainframe model (e.g., 2094-S08) configured with any number of processors



“Getting Started with Linux on zSeries” Part of the z/VM Version 5 Product Library

- **Introduced with z/VM V5.1; intended for new z/VM users**
- **Provides an explanation of z/VM basics, including how to configure and use z/VM functions and facilities**
- **Focus is on creating and managing Linux virtual machines**
- **Subject material includes:**
 - Configuring, administering, and servicing a z/VM system
 - Configuring TCP/IP for z/VM
 - Creating and cloning Linux virtual machines
 - Setting up basic system automation
 - Monitoring performance and capacity
 - Diagnosing z/VM and Linux problems
- **A PDF version of the book is available at: ibm.com/zseries/zvm**
- **Other good resources to help you get started with Linux on z/VM:**
 - “z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES9” – available at: www.redbooks.ibm.com/abstracts/sg246695.html
 - “z/VM and Linux on IBM System z: The Virtualization Cookbook for Red Hat Enterprise Linux 4” – available at: www.redbooks.ibm.com/abstracts/sg247272.html



Linux and z/VM on System z

Business Value Propositions for Linux Workloads

