



The future runs on System z

z/VM Platform Update

Advancing the Art of Virtualization with z/VM Version 5 Release 4

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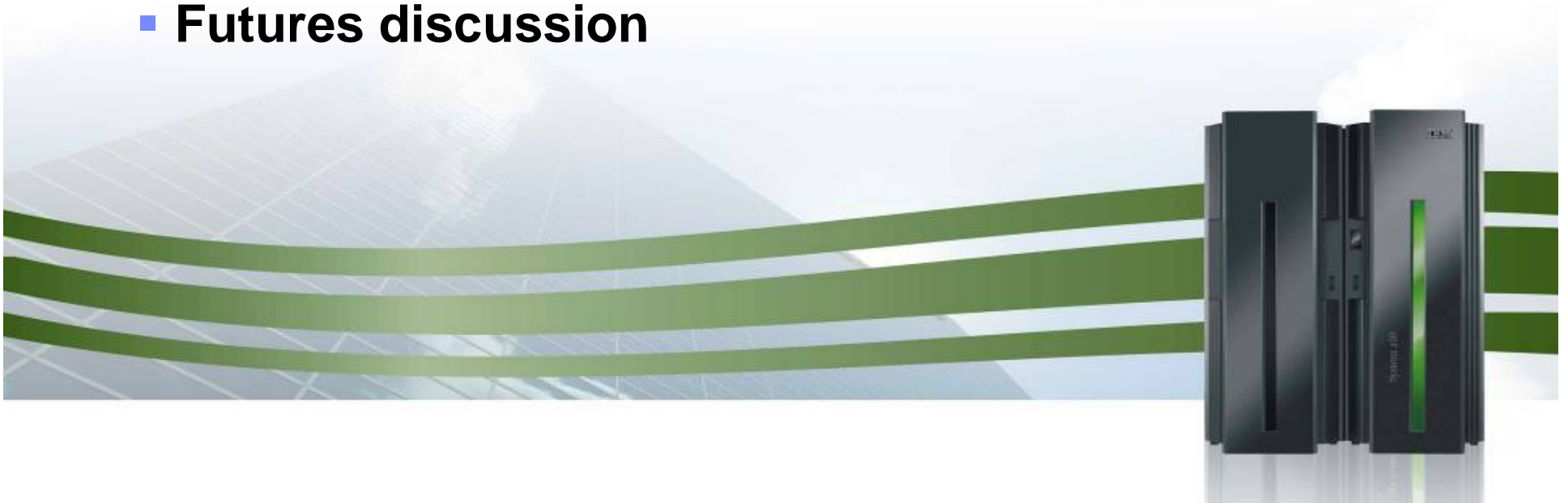
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Topics

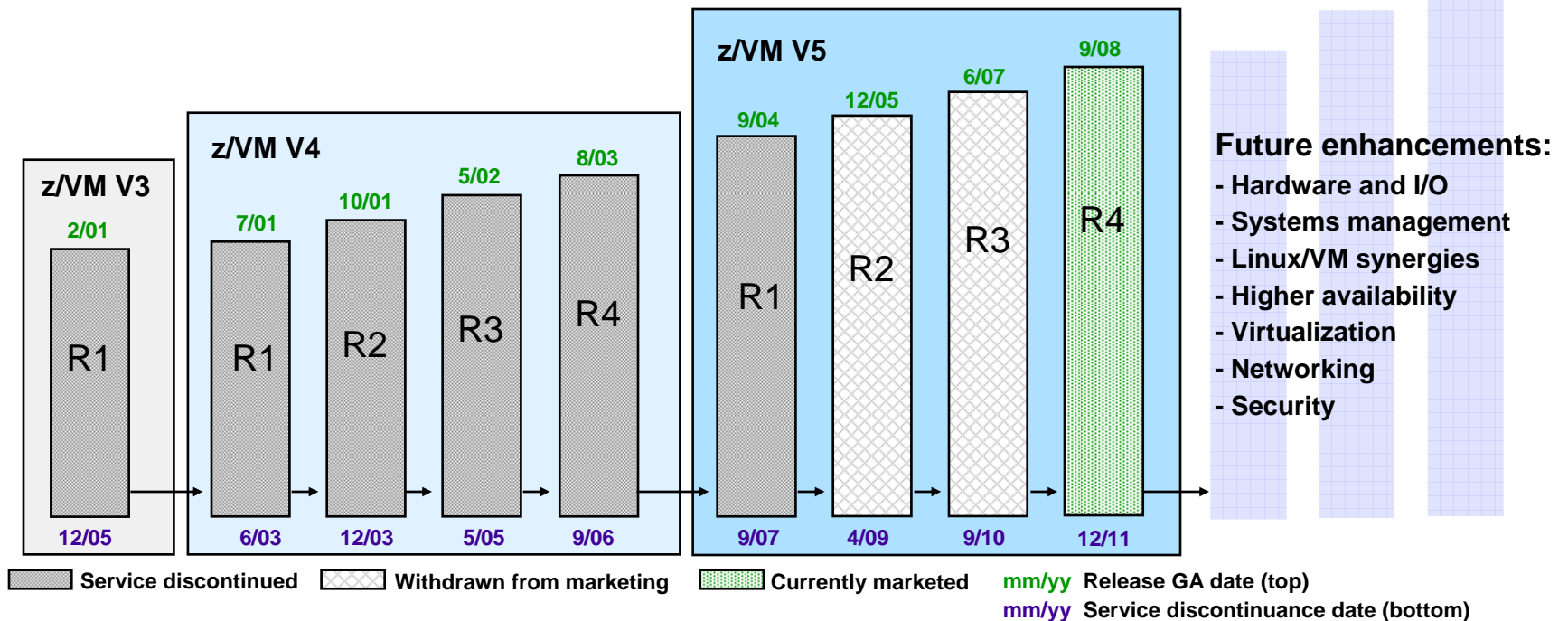
- **Key Linux and z/VM Product Releases from IBM**
- **z/VM Version 5 Release 3 Service Updates**
- **z/VM Version 5 Release 4 Functional Highlights**
- **Futures discussion**



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



IBM has completed evaluation of z/VM V5.3 for conformance to the Controlled Access and Labeled Security protection profiles (CAPP and LSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4+ (EAL 4+).

While z/VM V5.4 has not been officially evaluated for conformance, it is designed to meet the same standards.

z/VM Systems Management Products from IBM

- **IBM Operations Manager for z/VM**
 - 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
 - Assists with monitoring and problem determination by allowing authorized users to view and interact with *live consoles* of z/VM service machines or Linux guests
- **IBM Backup and Restore Manager for z/VM**
 - 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**
 - Manages and monitors tape resources; helps 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**
 - 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

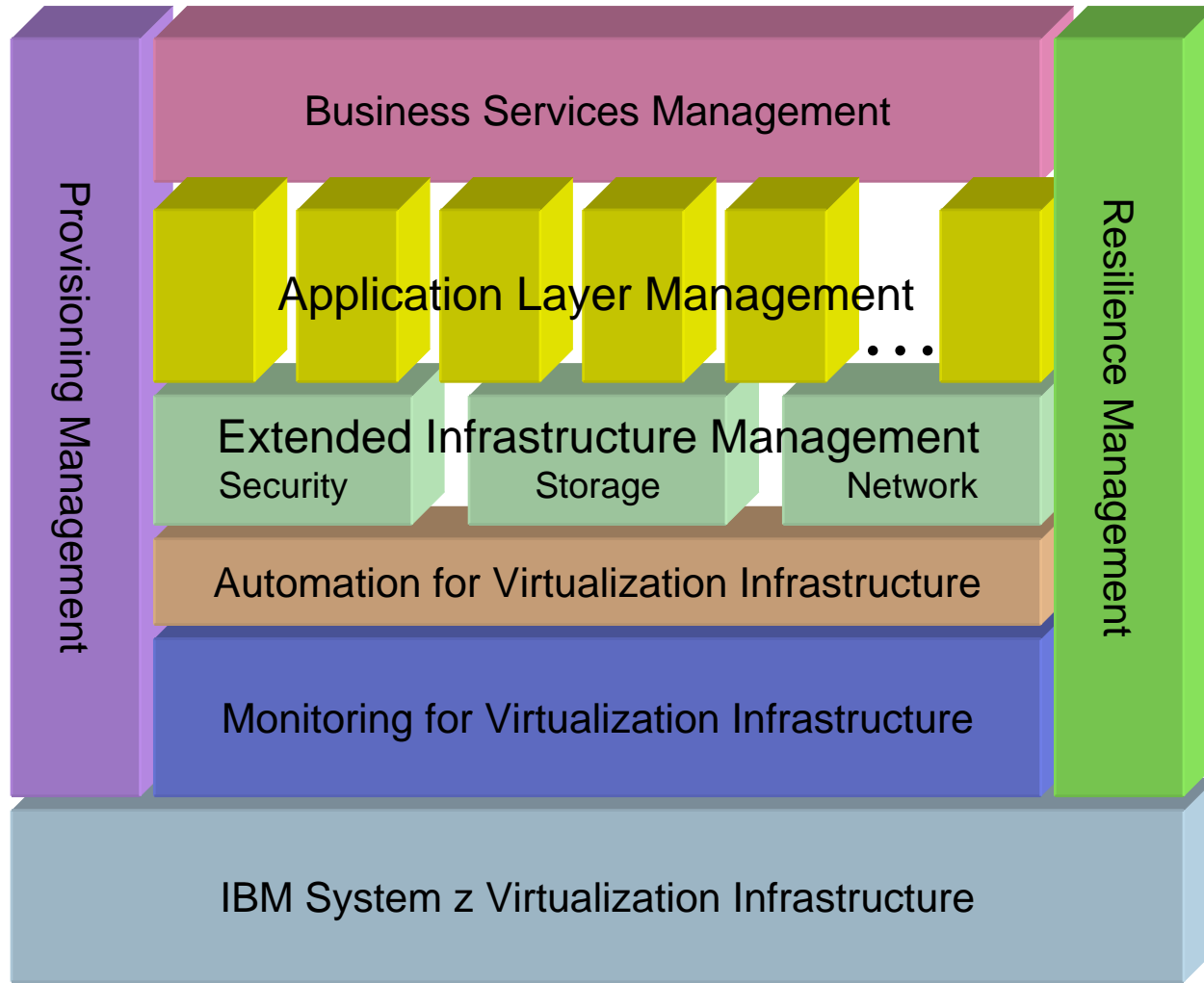
Monitoring System z Virtual Linux Servers Using IBM Tivoli OMEGAMON XE on z/VM and Linux

- **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**



IBM Tivoli Virtualization Management for System z

Helping Clients Manage and Control Their Virtualized IT Infrastructure



IBM System z Virtualization Infrastructure

- IBM System z hardware (including LPAR hypervisor)
- IBM z/VM Version 5

Monitoring for Virtualization Infrastructure

- z/VM Virtual Machine Resource Manager (1)
- IBM z/VM Performance Toolkit for VM feature (2)
- IBM Director
- IBM Tivoli OMEGAMON XE on z/VM and Linux
- IBM Tivoli Monitoring
- IBM Tivoli Composite Application Manager for SOA
- IBM Tivoli Usage and Accounting Manager

Automation for Virtualization Infrastructure

- IBM Operations Manager for z/VM
- IBM Tivoli Enterprise Console
- IBM Tivoli Workload Scheduler

Provisioning Management

- IBM z/VM DirMaint feature (2)
- z/VM Center task of IBM Director
- IBM Tivoli Provisioning Manager

Resiliency Management

- IBM Tivoli System Automation for Multiplatforms

Application Layer Management

- IBM Tivoli Application Dependency Discovery Manager
- IBM Tivoli OMEGAMON XE for Messaging
- IBM Tivoli Composite Application Manager for ... (3)
- IBM Tivoli License Compliance Manager

Extended Infrastructure Management (*Security*)

- IBM z/VM RACF Security Server feature (2)
- IBM Tivoli zSecure
- IBM Tivoli Access Manager for e-business
- IBM Tivoli Access Manager for OS
- IBM Tivoli Federated Identity Manager
- IBM Tivoli Identity Manager
- IBM Directory Server
- IBM Directory Integrator
- IBM Tivoli Risk Manager

Extended Infrastructure Management (*Storage*)

- IBM SAN Volume Controller (SVC)
- IBM Tivoli Storage Manager
- IBM TotalStorage Productivity Center
- IBM Backup and Restore Manager for z/VM
- IBM Tape Manager for z/VM
- IBM Archive Manager for z/VM

Extended Infrastructure Management (*Network*)

- IBM z/VM RSCS feature (2)

Business Services Management

- IBM Tivoli Business Service Manager (4)
- IBM Tivoli Service Request Manager (4)
- IBM Change and Configuration Management Database (CCMDB) (4)

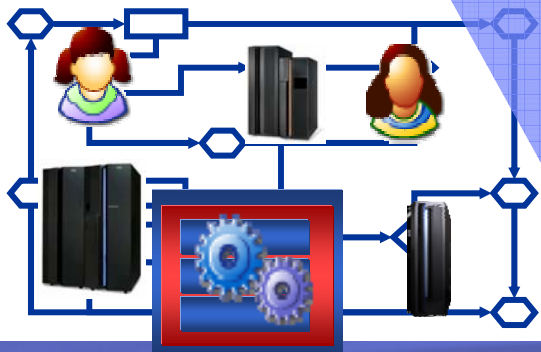
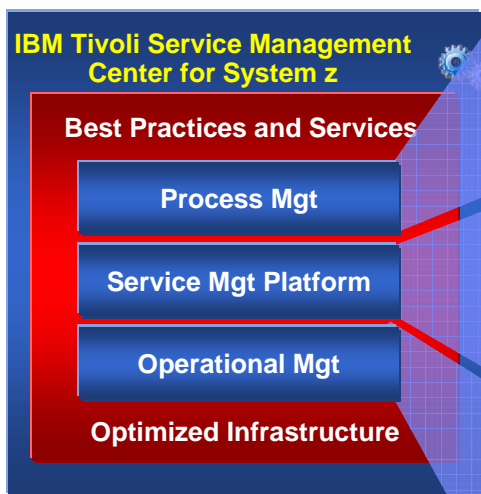
For specific releases, refer to Tivoli Platform Support Matrix at: ibm.com/software/sysmgmt/products/support/Tivoli_Supported_Platforms.html

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

(1) No-charge function included in z/VM (2) Priced feature of z/VM (3) ... = Response Time, Web Resources, Transactions. (4) Future plans

IBM Tivoli Service Management Center for System z

Enabling clients to strategically use their System z as an integrated, enterprise-wide hub for the efficient management of business and IT services



z/VM V5 Now Available for Download at ShopzSeries

- **Base z/VM operating system and features can now be ordered and delivered electronically via ShopzSeries**
- **Learn more at:**
 - ibm.com/software/ShopzSeries
 - www.VM.ibm.com/buy/edelivery

The screenshot shows the IBM ShopzSeries website. At the top, there is a navigation bar with the IBM logo, a search box, and a "Country/region [select]" dropdown. Below this is a main navigation menu with links for Home, Solutions, Services, Products, Support & downloads, and My IBM. A welcome message reads "Welcome [IBM Sign in] [Register]".

The main content area is titled "ShopzSeries" and includes a sidebar with links for ShopzSeries, Product catalog, Help, News, Feedback, and Customer service. The main text welcomes users and lists features: ordering tailored product and service packages, reviewing software licenses, and planning for future upgrades. It also provides links to a users' guide and video clips. A "Sign in" button is visible.

On the right, there is a "My ShopzSeries" section with "Sign in" and "Register" links, and a note for users without access. At the bottom right, there is a promotional banner for "zSeries software for the on demand world" with the tagline "Make on demand a reality".

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 Service Updates – 1H 2008

Including Support for IBM System z10 Enterprise Class

- **Improved memory management – may benefit paging operations for large-memory workload environments** (via PTF for APAR VM64349)
- **Guest exploitation of z10 EC at a System z9 level of functionality**
 - Support for execute-extensions facility (via PTF for APAR VM64180)
 - Support for IOP subchannel recovery (via PTF for VM64242)
- **Exploitation of select z10 EC functions**
 - Dynamic I/O configuration support to define, modify, and query a Coupling-over-InfiniBand (CIB) CHPID when z/VM V5.3 is the controlling system LPAR for I/O
 - Processors can be dynamically added/removed to/from a z/VM LPAR in reserve without preplanning (via PTFs for APARs VM64249, VM64323, and VM64389)
 - TCP/IP and Virtual Switch performance gains from use of 10 GbE OSA-Express3
- **Support for Logical Volume Expansion – can help simplify disk management by allowing dynamic increase of DS8000 volume size to accommodate application data growth** (via PTFs for APARs VM64305 and VM64354)
- **New port isolation security mechanism – provides ability to restrict guest-to-guest communications within a Virtual Switch** (via PTF for APAR VM64281)
- **Encryption Re-Key support – provides the capability to update a previously encrypted tape cartridge with a new set of Key Encryption information** (via PTF for APAR VM64260)

z/VM V5.4 Product Information

- **Runs on IBM System z10, IBM System z9 (z9 EC and z9 BC) and IBM eServer zSeries (z800, z900, z890, z990) systems**
 - The z/VM V5.4 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 (CP) processors**
 - zIIP and zAAP specialty processors are supported for z/OS guest use
 - ICF processors are supported for Coupling Facility Control Code (CFCC) guest images
- **IPLA software product (5741-A05)**
 - 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 Security Server, Performance Toolkit for VM, RSCS
 - Pre-installed, but disabled (license required; same pricing model as base product)

z/VM Version 5 Release 4 New Function Highlights

Announce August 5, 2008 – Available September 12, 2008

- **Processor support**
 - System z10 processor instruction exploitation
 - DAT table performance enhancements
 - Dynamic LPAR memory upgrade
- **Virtualization support**
 - Virtual CPU SHARE redistribution
 - Guest FCP dump
 - z/VM-mode LPAR support
 - Dynamic virtual machine memory upgrade
 - DCSS addressing above 2 GB
 - OSA-Express Multi-Port support
 - Virtual Switch networking management
- **Networking**
 - z/VM Telnet IPv6 support
 - TCP/IP OSD Layer 2 support
 - Path MTU discovery
- **Security**
 - LDAP upgrade
 - RACF change logging and password/phrase enveloping
 - SSL server re-host
- **Systems management**
 - Linux-on-z/VM installation using the Hardware Management Console (HMC)
 - z/VM system management API enhancements
 - Service and installation improvements
 - Performance Toolkit and DirMaint support enhancements
 - LE, C/C++, and Binder upgrades
 - System SHUTDOWN verification
- **Withdrawn**
 - 3480 tapes no longer supported as product distribution media

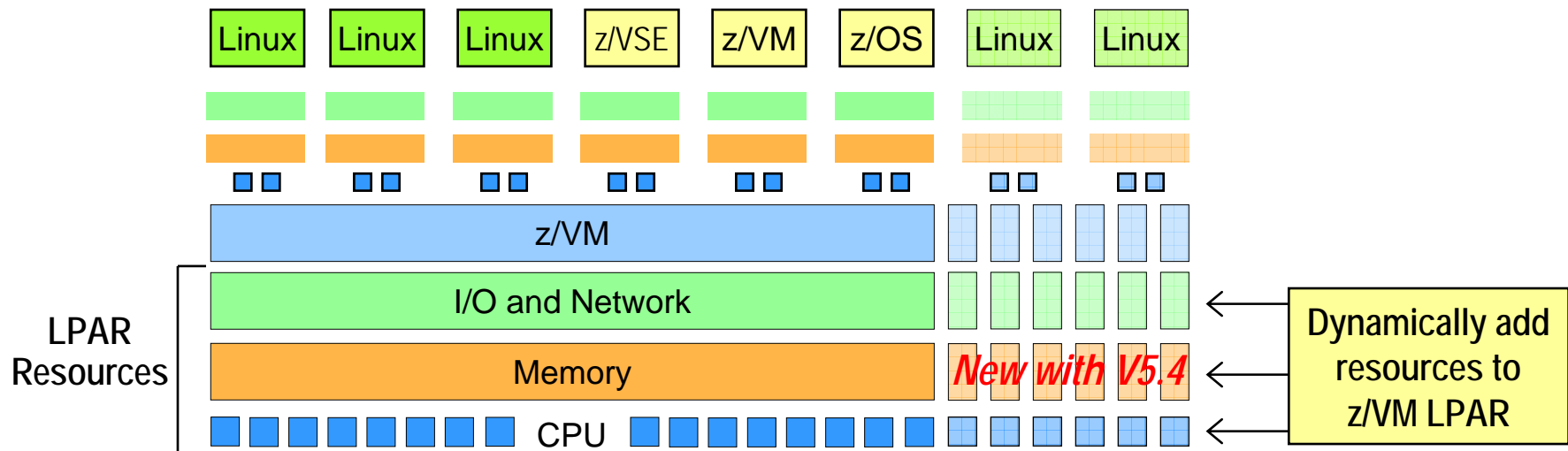
Processor Support

- **System z10 processor instructions**
 - Execute-Extensions facility
 - Execute Relative long (EXRL)
 - General-Instruction-Extension Facility
 - 71 new instructions
 - 4 new instruction formats
 - 7-character mnemonics
 - Parsing-Enhancement Facility
 - Translate and Test Extended, Translate and Test Reverse Extended
- **DAT table performance enhancements**
 - Support 64-bit host Control Registers
 - CR 1 (Primary Space)
 - CR 7 (Secondary Space)
 - CR 13 (Home Space)
 - Enables host Region and Segment tables to reside above 2 GB address line
 - Avoids “needle in the haystack” problem
 - Upper-level DAT tables require multiple contiguous frames
 - Can be difficult to find in constrained storage below 2 GB address line



z/VM Dynamic LPAR and Virtual Machine Memory Upgrade

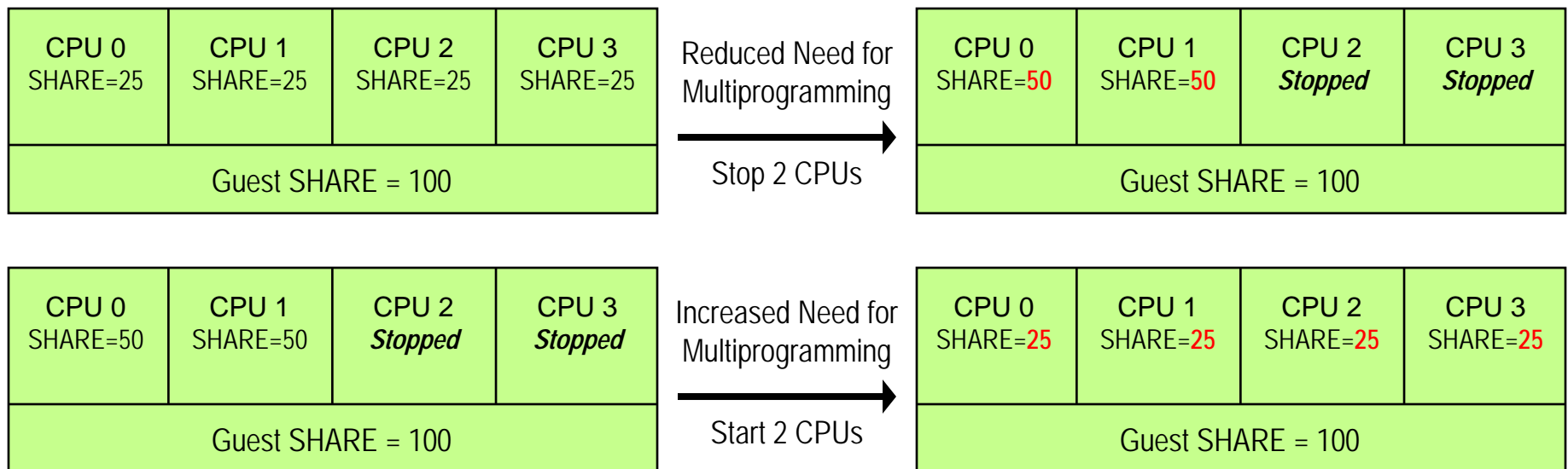
- **z/VM V5.4 exploits dynamic memory reconfiguration**
- **Users can non-disruptively add memory to a z/VM LPAR**
 - Additional memory can come from: a) unused available memory, b) concurrent memory upgrade, or c) an LPAR that can release memory
 - Memory *cannot* be non-disruptively removed from a z/VM LPAR
- **z/VM virtualizes this hardware support for *guest machines***
 - Currently, only z/OS and z/VM support this capability in a virtual machine environment



Smart economics: non-disruptively scale your z/VM environment by adding hardware assets that can be shared with every virtual server

Virtual CPU SHARE Redistribution

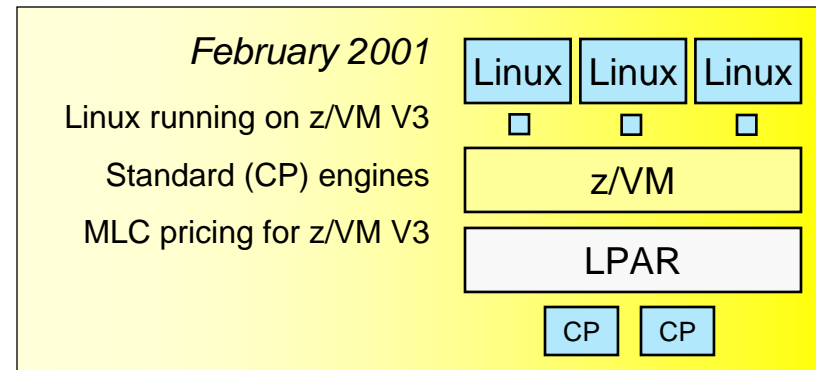
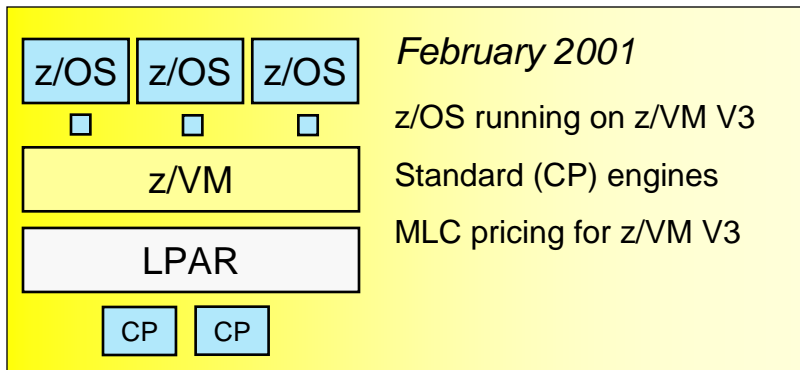
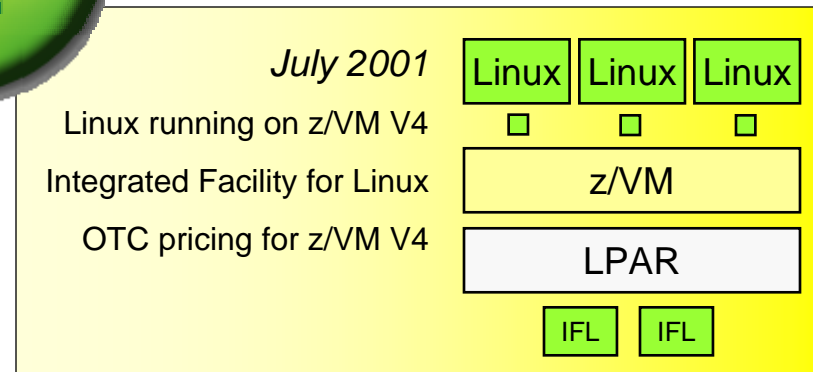
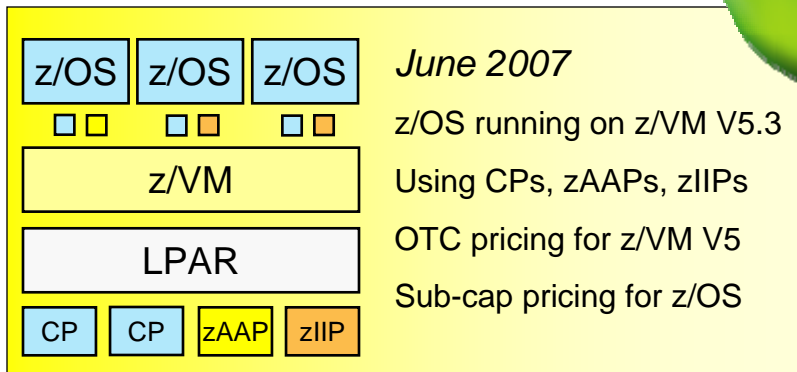
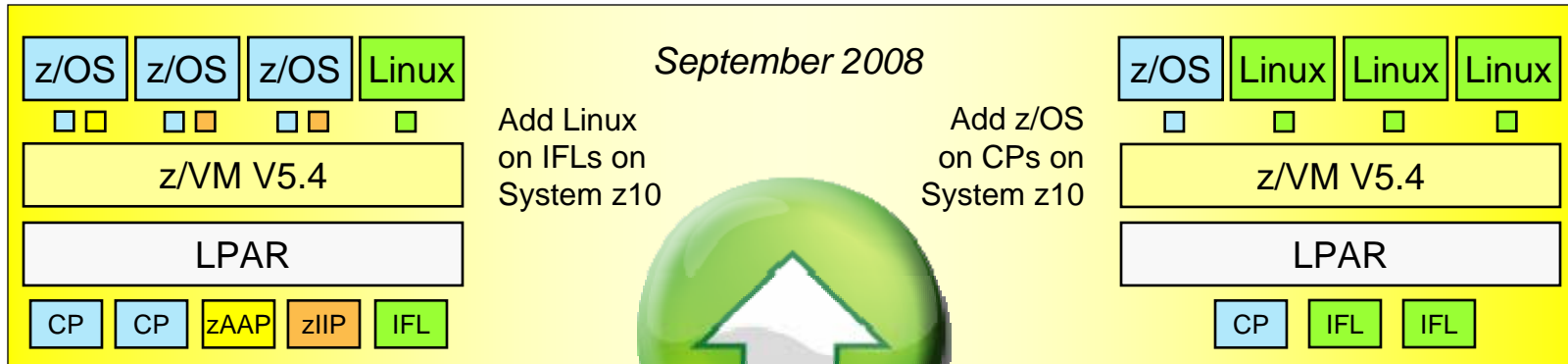
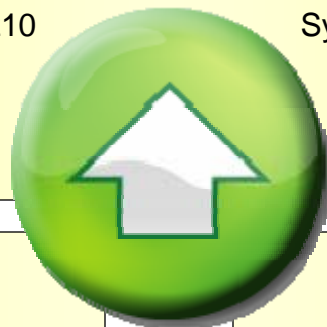
- **Allows z/VM guests to expand or contract the number of virtual processors it uses without affecting the overall CPU capacity it is allowed to consume**
 - Guests can dynamically optimize their multiprogramming capacity based on workload demand
 - Starting and stopping virtual CPUs does not affect the total amount of CPU capacity the guest is authorized to use
 - Linux CPU hotplug daemon starts and stops virtual CPUs based on Linux Load Average value
- **Helps enhance the overall efficiency of a Linux-on-z/VM environment**



Note: Overall CPU capacity for a guest system can be dynamically adjusted using the SHARE setting

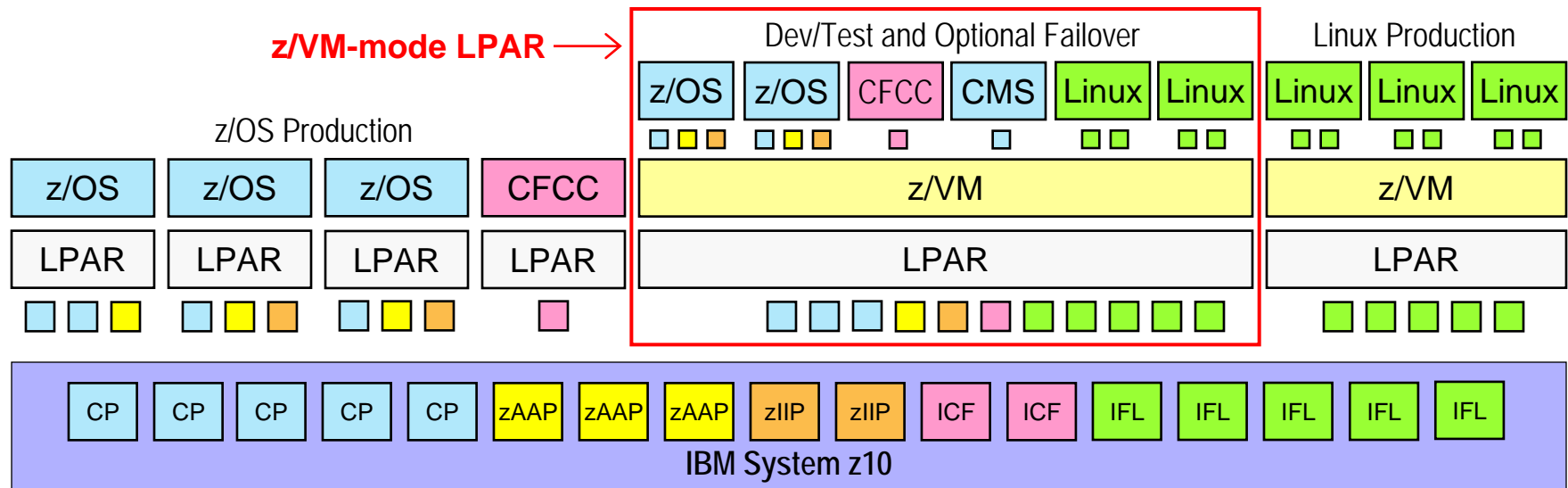
Guest FCP Dump Support

- **Enables guest system to dump to SCSI device**
 - SCSI disks offer added capacity
 - Performance
- **New DUMP option on IPL command**
- **New SET DUMPDEV command**
- **Supported by Linux and z/VSE**



z/VM-Mode LPAR Support for IBM System z10

- **New LPAR type for IBM System z10: z/VM-mode**
 - Allows z/VM V5.4 users to configure all CPU types in a z10 LPAR
- **Offers added flexibility for hosting mainframe workloads**
 - Add *IFLs* to an existing standard-engine z/VM LPAR to host Linux workloads
 - Add *CPs* to an existing IFL z/VM LPAR to host z/OS, z/VSE, or traditional CMS workloads
 - Add *zAAPs* and *zIIPs* to host eligible z/OS specialty-engine processing
 - Test integrated Linux and z/OS solutions in the same LPAR
- **No change to software licensing**
 - Software continues to be licensed according to CPU type

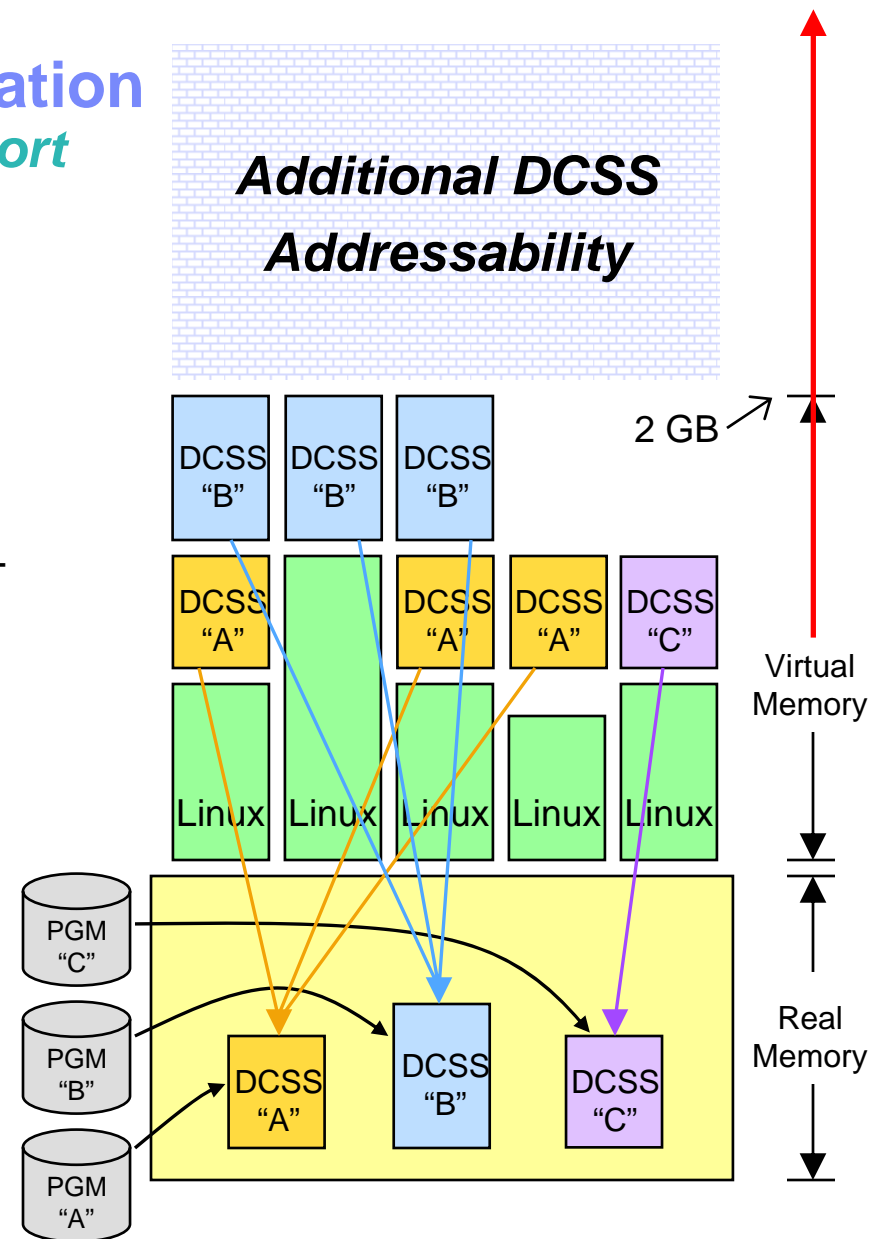


Extreme Linux-on-z/VM Virtualization

Linux Exploitation of z/VM DCSS Support

- Discontiguous Saved Segments (DCSS)
 - Share a single, real memory location among multiple virtual machines
 - Can reduce real memory utilization
- Linux exploitation: shared program executables
 - Program executables are stored in an execute-in-place file system, then loaded into a DCSS
 - DCSS memory locations can reside outside the defined virtual machine configuration
 - Access to file system is at memory speeds; executables are invoked directly out of the file system (no data movement required)
 - Avoids duplication of virtual memory
 - Helps enhance overall system performance and scalability
- **z/VM V5.4 support enhancements:**
 - Segments can reside above 2 GB address line
 - Enables even greater system scalability
 - New addressing limit is 512 GB

Note: Maximum size of a single DCSS is 2047 MB

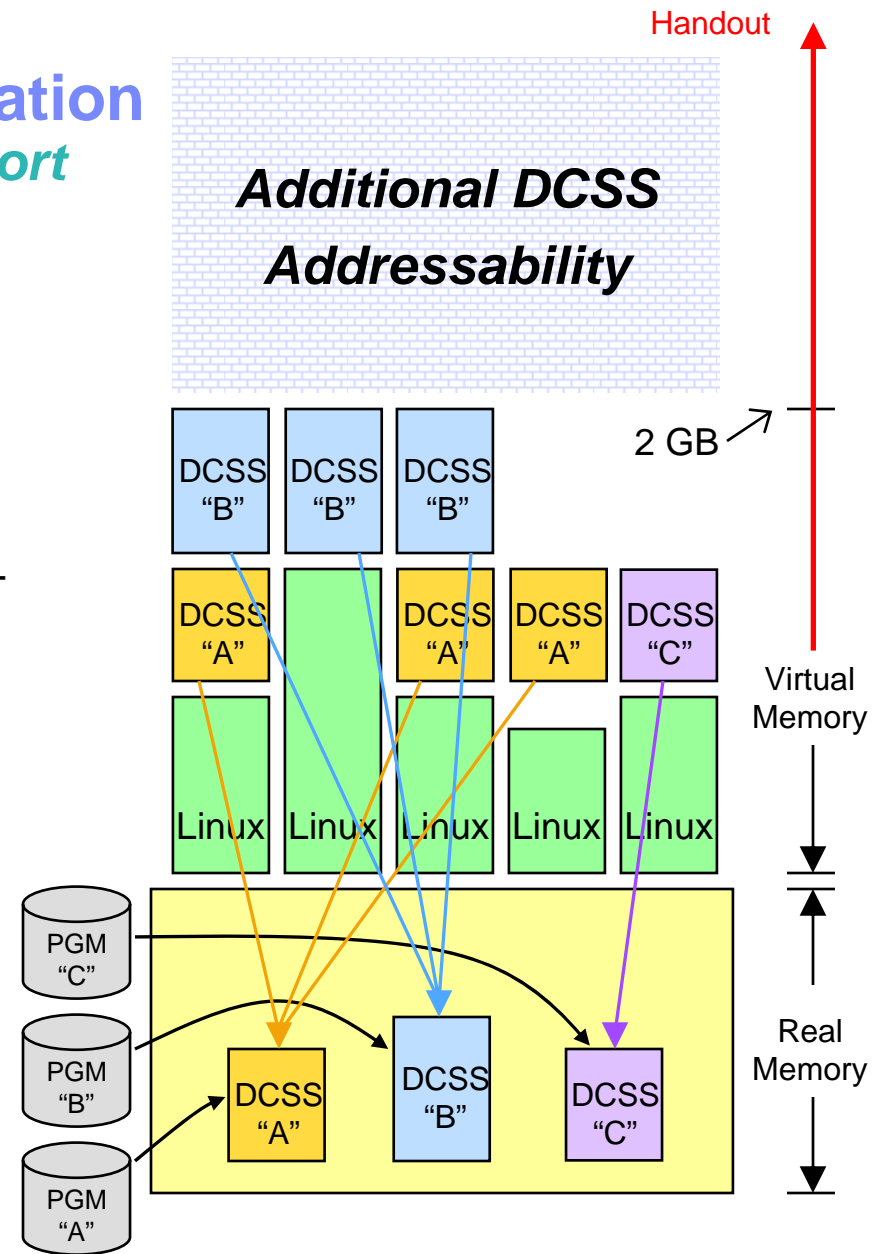


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OSA-Express Multi-Port

- **System z10 OSA-Express3 support**
 - Multiple ports per adapter on one CHPID
- **Allows port number to be specified for Virtual Switch and QDIO Guest LAN**
- **Virtualization enables any single port number to be specified**

z/VM Virtual Switch Support

Networking Management Enhancements

- **QUERY LAN and QUERY VSWITCH command enhancements**
 - Network administrators can simplify output from these commands by requesting information about specific ports only
- **SET VSWITCH and MODIFY VSWITCH command enhancements**
 - Detailed transmission counters can be turned on for a VLAN-aware virtual switch
- **New SNMPTRAP command**
 - Provides an easy way to generate traps using CMS
 - Previously offered as a sample program; fully supported in z/VM V5.4

z/VM TCP/IP Support Enhancements

- **Telnet IPv6 support**
 - z/VM V5.4 provides an IPv6-capable Telnet client and server
- **OSA-Express QDIO (OSD) Layer 2 Support**
 - z/VM TCP/IP can now use a Layer 2 connection on an OSA-Express adapter
 - Enables consolidation with Linux guests on a single Layer 2 virtual switch
 - Participation in Link Aggregation configurations increases bandwidth and availability for the z/VM TCP/IP stack
- **Path MTU discovery**
 - Allows a TCP/IP server to determine the Maximum Transmission Unit (MTU) for a given IPv4 or IPv6 connection
 - Helps optimize network throughput by reducing unnecessary fragmentation of large datagrams

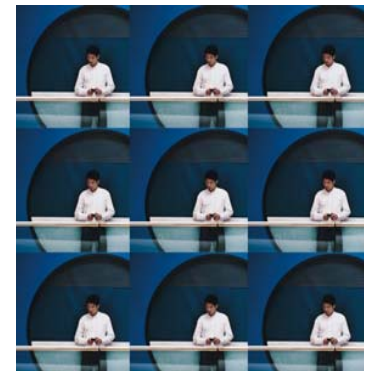
z/VM Security Enhancements

- **LDAP server upgrade**
 - Upgraded to the z/OS 1.10 level of IBM Tivoli Directory Server
- **RACF change logging and password / phrase enveloping**
 - Enables user, group, and password synchronization between z/VM and z/OS using IBM Tivoli Directory Integrator
 - Provides RACF change logging in LDAP
- **SSL server re-host**
 - The z/VM SSL server now operates in a CMS environment and no longer requires a Linux distribution
 - Simplifies installation, service, and release-to-release migration
 - New functions include:
 - Network-free SSL server administration
 - New encryption and decryption engine – uses z/OS 1.10 SSL technology
 - New certificate management services – renewal, signing, and exportation
 - Requires PTF for APAR PK65850 (planned availability December 2008)

Enhanced z/VM Systems Management Functions

For Allocating and Managing Guest Resources

- **z/VM Systems Management Application Programming Interface (API)**
 - Programming interfaces that enable platform provisioning applications like IBM Director to create and manage a large number of virtual system images running on z/VM
 - z/VM V5.4 offers improved processing speed, enhanced error recovery, and increased scalability of the Systems Management API via use of shared queues instead of files
- **New APIs include support to:**
 - Grant users access to a VLAN and determine which users have been authorized
 - Add, query, and delete virtual processors in a virtual image's configuration or directory
 - Manage profile directory entries
 - Accept and validate password phrases
 - Query the level of the Systems Management API to determine what functions are available
 - Allow a sort ordinal to be defined for local tags in directory entries
- **Enhancements to existing functions include:**
 - Allow creation (and deletion) of virtual network LANs to be either persistent or temporary
 - Increase the length of a virtual image's local tag to 1024 characters



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

HMCCEC12: Hardware Management Console Workplace (Version 2.9.2)

HMCCEC12: Choose z/VM Virtual Machines to Manage

Choose z/VM Virtual Machines to Manage

Select or deselect the z/VM virtual machines that are to be managed by this console.

Select	Virtual machine name
<input type="checkbox"/>	EFANOV
<input type="checkbox"/>	EREP
<input type="checkbox"/>	FTPSEVERE
<input type="checkbox"/>	GCS
<input type="checkbox"/>	LATYPOVA
<input type="checkbox"/>	MARUSOV
<input type="checkbox"/>	MPROUTE
<input type="checkbox"/>	OPERATOR
<input type="checkbox"/>	OPERSYMP
<input type="checkbox"/>	PVM
<input type="checkbox"/>	REXECD
<input type="checkbox"/>	RSCS
<input type="checkbox"/>	RSCSDNS
<input type="checkbox"/>	SAK00001
<input type="checkbox"/>	TCPIP
<input type="checkbox"/>	VMSEVR
<input type="checkbox"/>	VMSEVRV
<input type="checkbox"/>	VMSEVRU
<input checked="" type="checkbox"/>	VSMC1
<input checked="" type="checkbox"/>	VSMC2

OK Cancel Help

HMCCEC12: x3270-4 9.60 HMCCEC12: Perform Supp Perform Supp Captura by He HMCCEC12: 09:40:53 AM 06/08/2007

z/VM Statement of Direction

- IBM intends to enhance z/VM FlashCopy capabilities to support the FlashCopy SE function of the IBM DS8000 with the PTF for APAR VM64449 in fourth quarter 2008.
 - FlashCopy SE offers a space-efficient snapshot capability that reduces the storage capacity needed for point-in-time copies.
 - This function is especially useful for short-lived testing or backups, such as flash to intermediate volume for backup to tape.

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Questions?

The future runs on System z

