z/VM Platform Update

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Version 16

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Agenda

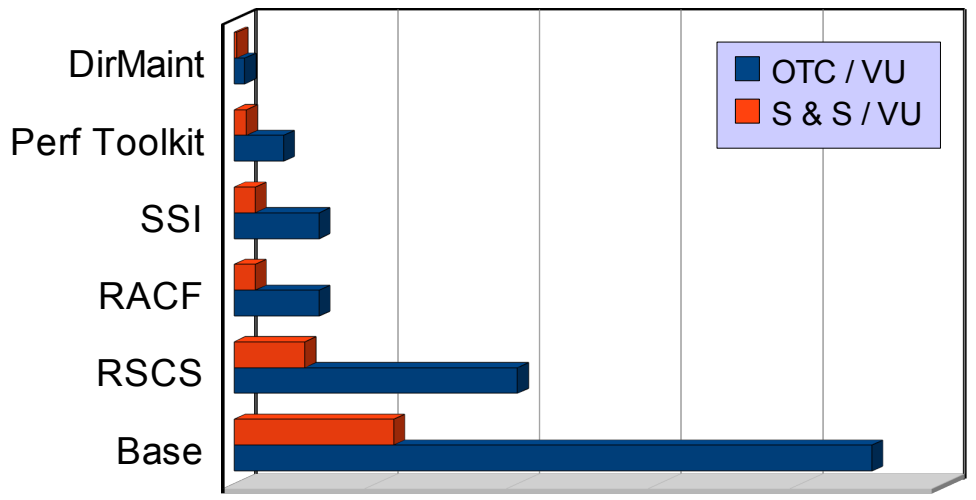
- Pricing review
- Status update for older releases
- Introducing z/VM V6.2
- IBM Statements of Direction
- New functions shipped as service

z/VM Pricing

- z/VM pricing consists of:
  - A one-time charge (OTC) per value unit
  - An annual charge for Service & Support, per value unit
- Number of value units is determined by number of engines, shown below on left.
- Prices are set per value unit, relative prices are illustrated below on right.
- The SSI feature includes LGR and it is priced in line with the RACF feature

z/VM Value Unit Schedule	
Number of Engines	**Value Units per Engine**
1 to 3	**10**
4 to 6	**9**
7 to 9	**8**
10 to 12	**7**
13 to 16	**6**
17 to 20	**5**
21 to 25	**4**
26 and above	**3**

Relative Prices per Value Unit



For illustrative purposes only. See IBM or Business Partner for details.

VM/370

- Happy Birthday, VM/370!
  - 5749-010 announced as a supported commercial product on August 2, 1972
  - Formally withdrawn April 24, 1989|

- *45 Years of Mainframe Virtualization: CP/67 and VM/370 to z/VM*
  Wednesday, 4:30 PM-5:30 PM Grand Ballroom Salon E/F
  Speaker: Jim Elliott, IBM

Join us afterwards for some delectable edibles!

z/VM Version 5 Release 4

- The last release of z/VM to support IBM System z9 and older processors
- **No longer available** as of March 12, 2012
- End of Service has been extended to December 31, 2014 or end of IBM service for System z9, whichever is ***later***
  - Was September 30, 2013
  - Later, but not *too* much later!
  - Be on the lookout for Delayed Onset Panic Syndrome

z/VM Version 6
Security Certification Plans

- Common Criteria (ISO/IEC 15408)
  - Statement of Direction issued 22 July 2010
  - **Evaluation in progress (BSI-DSZ-CC-0752)**
  - Security Target: Operating System Protection Profile (OSPP) at EAL 4+
    - Virtualization extension
    - Labeled Security extension

- Federal Information Protection Standard (FIPS) 140-2
  - z/VM 6.1 System SSL is FIPS 140-2 Validated(TM)
  - Enablement requirements for certificate database and servers

    - http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2012.htm#1735

- z/VM 6.2 is designed to conform to both Common Criteria and FIPS 140-2 evaluation requirements

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z/VM Release Status Summary

z/VM Level		GA	End of Service	End of Marketing	Minimum Processor Level	Security Level
Ver 6	Rel 2	12 / 2011	4 / 2015		z10	-
	Rel 1	10 / 2009	12 / 2014	12 / 2011	z10	EAL 4+ [1] OSPP-LS
Ver 5	Rel 4	9 / 2008	9 / 2013[2]	3 / 2012	z800, z900	-
	Rel 3	6 / 2007	9 / 2010	9 / 2010	z800, z900	EAL 4+ CAPP/LSPP

Marketed & Serviced

Serviced, but not Marketed

End of Service & Marketing

[1] Currently in evaluation

[2] Or later (Announced August 7, 2012)

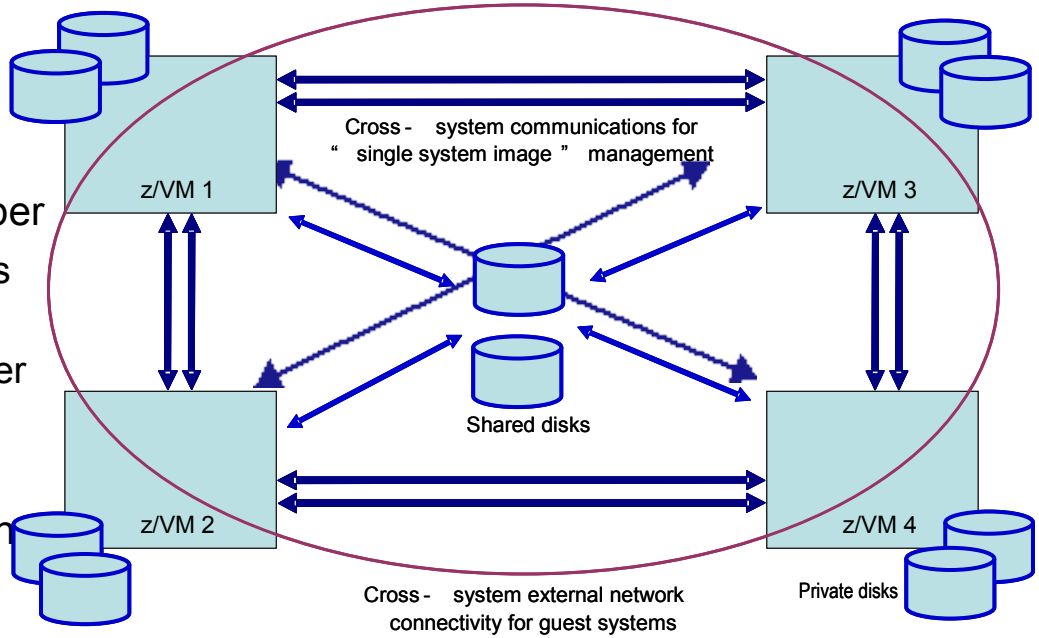
z/VM Version 6 Release 2

- Announced **October 12, 2011**
- Generally available **December 2, 2011**
- End of service **April 30, 2015**
- Major changes include:
  - Single System Image
  - Live Guest Relocation
  - Turnkey support for Unified Resource Manager

Replaced z/VM V6.1
- No longer available
- End of service April 2013

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Provided as an optional priced feature.
- Connect up to four z/VM systems as members of a Single System Image (SSI) cluster
- Provides a set of shared resources for member systems and their hosted virtual machines
- Cluster members can be run on the same or different System z servers
- Simplifies systems management of a multi-z/VM environment
  - Single user directory
  - Cluster management from any member
    - Apply maintenance to all members in the cluster from one location
    - Issue commands from one member to operate on another
  - Built-in cross-member capabilities
  - Resource coordination and protection of network and disks



SSI Cluster Management – Features for Greater Reliability

- Cross-checking of configuration details as members join cluster and as resources are used:
  - SSI membership definition and identity
  - Consistent definition of shared spool volumes
  - Compatible virtual network configurations (MAC address ranges, VSwitch definitions)

- Cluster-wide policing of resource access:
  - Volume ownership marking to prevent dual use
  - Coordinated minidisk link checking
  - Autonomic minidisk cache management
  - Single logon enforcement

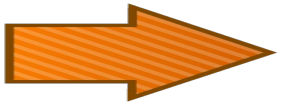
- Communications failure “locks down” future resource allocations until resolved

- Comprehensive checking for resource and machine feature compatibility during relocation:
  - Adjustment of “virtual architecture level” to support customer relocation policy

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Dynamically move Linux guests from one member to another with Live Guest Relocation
  - Reduce planned outages
  - Enhance workload management
  - Non-disruptively move work to available system resources and non-disruptively move system resources to work

- When combined with Capacity Upgrade on Demand, Capacity Backup on Demand, and Dynamic Memory Upgrade, you will get the best of both worlds



Bring additional resources to the workload!

Move the workload to the resources!

Safe Guest Relocation

- Eligibility checks done multiple times throughout the relocation process.

- Check more than just eligibility to move the virtual machine, but also check if it is “safe” to move.
  - Overrides are available

- Checks for:
  - Does virtual machine really have access to all the same resources and functions?
  - Will moving the virtual machine over commit resources to the point of jeopardizing other workload on the destination system?

- Pacing logic to minimize impact to other work in more memory constrained environments

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Unified Resource Manager *does not* support SSI and LGR
- IBM Director *does not* support SSI and LGR
- Suggested best practice is to not combine SSI and LGR with the above offerings
  - Work with your IBM Sales Team, IBM Lab Services, or z/VM Development Lab to determine which technologies are most critical to your environment and business.

z/VM Single System Image and Live Guest Relocation Implementation Services

IBM System z Lab Services Offering:

- In-depth education on the functions of VMSSI
- Cluster planning and deployment assistance
- Operational guidance and recommendations
- Migration assistance for users of CSE
- Demonstrate the technology in your own environment.
- Help you create system configuration files
- Analyze how SSI and LGR will affect your system initialization, recovery, and automation procedures
- Early identification of any inhibitors to use
- Identification of any required z/VM or Linux operating system patches

For more information, contact **systemz@us.ibm.com**

z/VM Storage Support

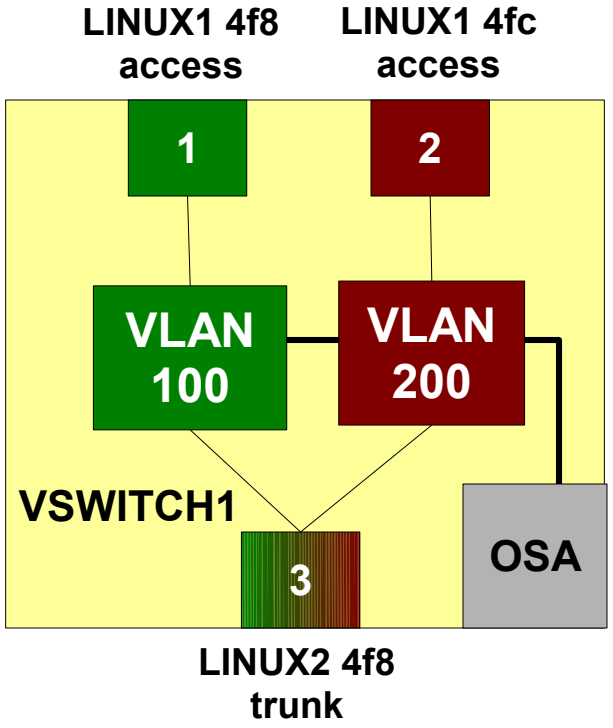
- z/VM 6.2 supports
  - DS8000 Series
    - DS8100, DS8300, DS8700, DS8800
  - DS6000 Series
  - XIV
  - IBM San Volume Controller
  - IBM Storwize V7000
    - See http://www.ibm.com/support/docview.wss?uid=ssg1S1003703#_zvm
  - As well as many of the older storage devices
- The System Storage Interoperation Center (SSIC) support page has some omissions of the above support
  - We are working to correct these
  - http://www.ibm.com/systems/support/storage/ssic/interoperability.wss
- The z/VM 6.2 General Information Manual has additional information, but had not been updated for Storwize, see URL above for requirements.

z/VM System Management

- **Operations Manager for z/VM V1.4**
  - Facilitates automated operations
  - Monitor, view, and interact with consoles without logging on to service machines or Linux guests
  - Take actions based on service machine console messages and other system events
  - Schedule events for immediate execution or on a regular schedule
- **OMEGAMON XE on z/VM and Linux V4.2**
  - Performance monitoring of z/VM and Linux guests
  - Part of the Tivoli Management Services, including Tivoli Enterprise Portal
  - Uses IBM Performance Toolkit for VM as its data source
- **Backup and Restore Manager for z/VM V1.2**
  - Backup and restore file level data for CMS minidisks and Shared File System
  - Backup and restore images of Linux guests and/or z/VM volumes
    - Use Tivoli Storage Manager for file level backup and restore of Linux data
- **Tape Manager for z/VM V1.3**
  - Manage tapes: retention, access control, data security erase
  - Manage devices: share with other z/VM and non-z/VM systems
  - Manage mount requests for ATL, VTS, and manual mount devices
- **zSecure Manager for RACF z/VM V1.11.1**
  - Automate complex, time consuming z/VM security management tasks
  - Quickly identify and prevent problems in RACF
  - Create comprehensive audit trails
- **Archive Manager for z/VM V1.1**
  - Users and administrators manage disk space more efficiently and effectively
  - Archive infrequently used or large files to tape or other disk

VSWITCH: Multiple access ports per guest

- One or more virtual ports on a VSWITCH are reserved for a guest
- Ports are associated with a VLAN – implicit authorization (exc. RACF)
- Authorization changes take effect immediately
- Eliminates need for VLAN-aware guests




```
define vswitch vswitch1 portbased vlan aware native none
set vswitch vswitch1 portnumber 1 userid LINUX1
set vswitch vswitch1 portnumber 2 userid LINUX1
set vswitch vswitch1 portnumber 3 userid LINUX2 porttype trunk
set vswitch vswitch1 vlanid 100 add 1 3
set vswitch vswitch1 vlanid 200 add 2 3

USER1:
Couple 4f8 to system vswitch1 portnum 1
Couple 4fc to system vswitch1 portnum 2

USER2:
Couple 4f8 to system vswitch1 [portnum 3]
```

Switch port number not available on NICDEF. Use `COMMAND COUPLE` in the directory.

Scalability and Performance Enhancements
Available by PTF to prior releases where shown

- Reduction of memory and CPU resources required to manage larger memory sizes
- Control of the guest page re-ordering process, improving the performance characteristics of guests with large memory footprints (VM64774)
- Reduced system overhead of guest page release function, thereby helping to increase guest throughput (VM64715)
- Improved contiguous frame coalescing algorithms help to increase system throughput (VM64795)

Scalability and Performance Enhancements
Available by PTF to prior releases where shown

- More accurate scheduling algorithm for guests that have LIMITHARD shares (VM64721)
- Reduce LPAR suspend time by reducing the number of DIAGNOSE 0x9C and 0x44 instructions issued when obtaining system locks (VM64927 for z/VM 6.1 only)
- Improve workload dispatch algorithm to eliminate erratic virtual machine pause in busy systems with more than 14:1 total virtual to logical CPU over-commitment (VM64887)

Advances in Processor Performance

- The CPU Measurement Facility is a System z hardware facility that characterizes the performance of the CPU and nest:
  - Instructions, cycles, cache misses, and other processor related information
  - Available on z10 EC/BC, z196, and z114
- IBM will be using data from this facility to influence future processor design and benchmark validation of those designs.
- Will also increase accuracy of future processor capacity sizing tools
- To assist, by providing sample Monwrite data containing the counters, please contact Richard Lewis (rflewis@us.ibm.com)

TCP/IP Enhancements

- Stack
  - RFC 4191: Router selection preferences
  - RFC 5175: IPv6 router advertisement flags extension
- FTP
  - IPv6
  - Passwords suppressed in server traces
  - Wildcards supported for BFS files
- SMTP
  - IPv6
  - Includes IPv6 support in CMS NOTE and SENDFILE

TCP/IP Enhancements
OSA Diagnostics

- The NETSTAT command has been updated to provide details taken from the OSA Address Table (OAT) via new OSAINFO option.
- OSA/SF no longer required to obtain device details
- OSA-Express3 and later

```
VM TCP/IP Netstat Level 620       TCP/IP Server Name: TCPIP

Device K4L3VSW6640DEV: data as of 09/23/11 01:05:21
  OSA Generation:                          OSA-Express3
  OSA Firmware Level:                      00000766
  Port Speed/Mode:                         1000 Mbs / Full Duplex
  Port Media Type:                         Multi Mode (SR/SX)
  PCHID:                                   0291
  CHPID:                                   0053
  Manufacturer MAC Address:                00-14-5E-78-17-F2
  Configured MAC Address:                  00-00-00-00-00-00
  Data Device Sub-Channel Address:         6640
  CULA:                                    00
  Unit Address:                            40
  Physical Port Number:                    0
  Number Of Output Queues:                 1
  Number Of Input Queues:                  1
  Number Of Active Input Queues:           0
  QDIO CHPID Type:                         OSD
  QDIO Connection:                         Not Isolated
  IPv4 L3 VMAC:                            00-00-00-00-00-00
  IPv4 VMAC Router Mode:                   No
  IPv4 L3 VMAC Active:                     No
  IPv4 L3 VMAC Source:                     n/a
  IPv4 L3 Global VLAN ID Active:           No
  IPv4 Global VLAN ID:                     0
  IPv4 Assists Enabled:                    00001C71
  IPv4 Outbound Checksum:                  00000000
  IPv4 Inbound Checksum:                   00000000

  IPv4 Address:                             IPA Flags:
-----------------------                  -----------------
9.60.29.53                               00000002

IPv4 Multicast Address:                  MAC Address:
-----------------------                  -----------------
224.0.0.1                                01-00-5E-00-00-01
```

Access controls for dedicated or attached devices

- The CP ATTACH and GIVE commands, as well as the DEDICATE statements in the directory will now engage ESM access controls
- Integrated ASCII console on the HMC is also managed
- Full discretionary and mandatory access controls
- RACF support included

Mandatory access controls for virtual consoles

- SET SECUSER and SET OBSERVER are now available when mandatory access controls (security labels) are active.
- Virtual security zones (“color coding” of users and resources) can now co-exist with system automation functions.
- Also applies to the user ID specified on CONSOLE directory statement.
- Users in different zones cannot see or manage each others' virtual console
  - Console cannot be given
  - Console cannot be taken
  - System administrators and automation solutions can use label SYSNONE to allow them access to all consoles

RACF Security Server

- Single System Image Support
  - Automatic propagation of most RACF commands
  - Also works with multiple RACF servers on same z/VM system
- Protected Users
  - User without a password or password phrase will not be revoked due to too many invalid password attempts or inactivity
- High Level Assembler no longer required for most common customizations
- Real device protection
  - ATTACH, GIVE, DEDICATE
  - New VMDEV class
  - Profiles: RDEV.*device.system_id*
- Support for Diagnose 0xA0 Subcode 0x48
  - Obtain information about any ESM in architected format

z/OS R12 Equivalency Upgrades

- LDAP
  - Change logging of general resources
  - Password expiry management
- Language Environment (LE) runtime libraries
- Program Management Binder
  - COMPAT supports ZOSV1R10, ZOSV1R11, ZOSV1R12
  - New suboptions on RMODE
  - Compiler parameters can be read from IEWPARMS DDNAME
  - New C/C++ API
- Support for **IBM XL C/C++ Compiler for z/VM, V1.3** (5654-A22)
  - Details can be found in US announcement letter 211-369
- MPROUTE

z/CMS

- Previously shipped with z/VM as a sample program, now supported as an optional CMS
  - IPL ZCMS
- Enables CMS programs to use z/Architecture instructions and 64-bit registers
- Existing ESA/390 architecture programs continue to run unchanged
  - CMS does not exploit memory above 2 GB
  - CMS does provide basic memory management API for memory above 2 GB
- Programs that examine or change architecture-sensitive memory locations (NUCON) must be updated in order to use z/CMS
- No architectural support for XC mode
  - VM Data Spaces not available

Installation Improvements

- Significant changes to system layout to support Single System Image
- Choose a non-SSI system or a complete 1- to 4-member SSI cluster
  - First or second level
- All installation information is gathered at one time
- All DASD volumes can be labeled at installation time, including the system residence volume
- Turnkey support for zEnterprise ensembles enables clients new to z/VM to easily get started with Unified Resource Manager (zManager)
  - If you have purchased a directory and/or security manager, decline this option during installation; manual enablement is required!

XEDIT – Default changed to mixed case

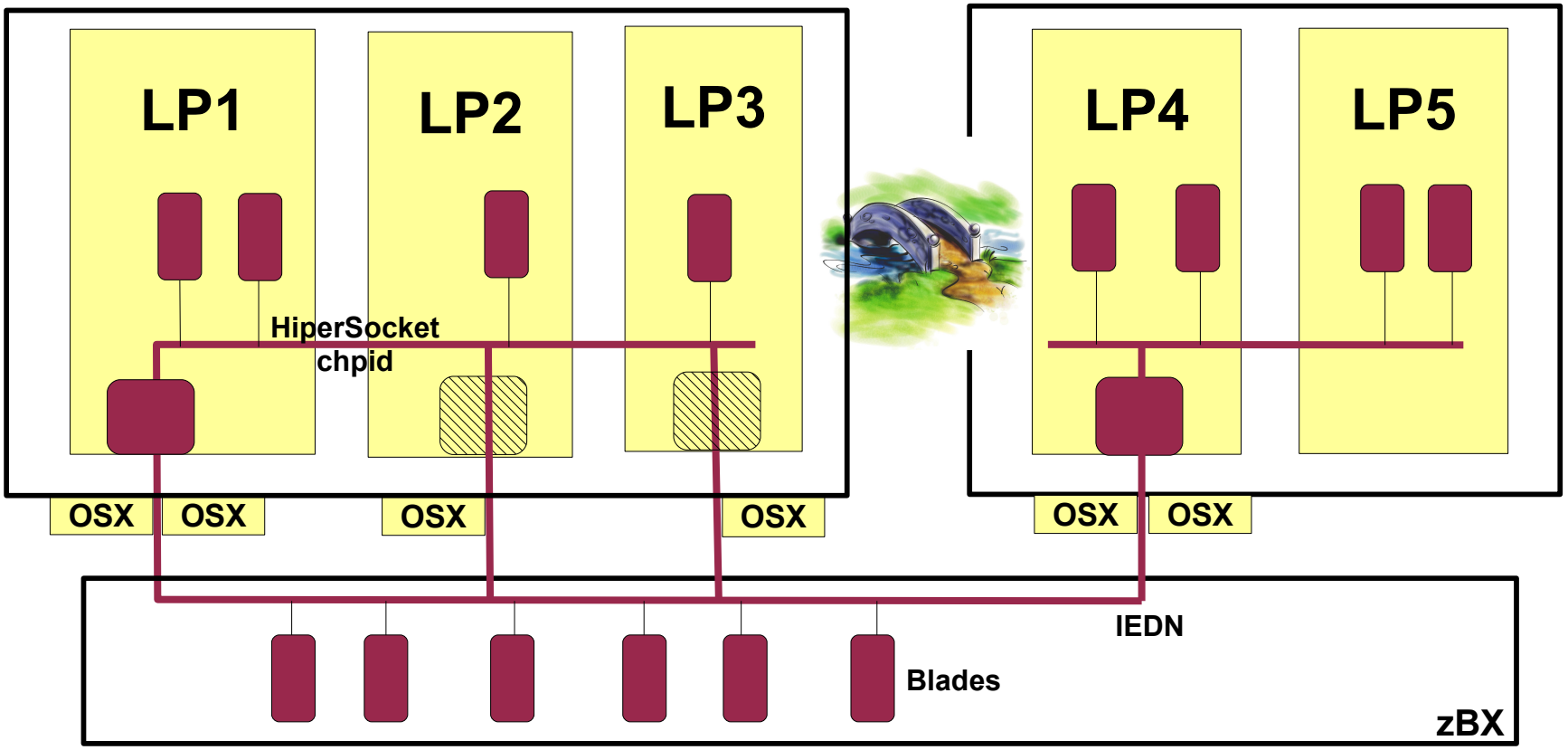
- For those coming to z/VM from an open system background, the folding of mixed case to upper case is surprising

- Many comments along the lines of “it hurts when you do that”
  - Linux can read CMS files
  - Often case-sensitive

- Default for other file types changed to CASE MIXED RESPECT
  - No folding
  - To get old behavior, update PROFILE XEDIT to
    SET CASE UPPER RESPECT
  - Or you may wish to consider
    SET CASE MIXED IGNORE

HiperSocket VSWITCH Integration with zEnterprise IEDN

Available: April 13, 2012



- Built-in failover and failback
- Bridge new IQDX chpid to OSX chpid
- Also works for IQD to OSD

- Same or different LPAR
- One active bridge per CEC
- PMTU simulation

HiperSocket VSWITCH Integration

Available: April 13, 2012

- Virtual Switch bridge between Ethernet LAN and HiperSockets
  - zEnterprise IEDN (OSX) or OSD connections
    - Original Statement of Directions only mentioned IEDN
  - Guests can use simulated OSA or dedicated HiperSockets
  - VLAN aware
  - One HiperSocket chpid only

- Full redundancy
  - Up to 5 bridges per CEC
  - One bridge per LPAR
  - Automatic takeover
  - Optionally designate one “primary”
    - Primary will perform “takeback” when it comes up
  - Each bridge can have more than one OSA uplink

- CP: VM65042 PTF UM33691
- TCP/IP: PM46988 PTF UK77220

High Performance FICON

Available: April 13, 2012

- Enable guests to use High Performance FICON for System z (zHPF)
  - Different I/O model
  - Single and multiple track I/O
  - CP APAR VM65041 PTF UM33646
  - DVF APAR VM65144 PTF UM33647
- Requires host and control unit compatibility
  - Consult a storage specialist for details
- z/OS and Linux provide exploitation
- Performance results available at:
  - http://www.vm.ibm.com/perf/reports/zvm/html/620jb.html

Removed Functions

- Kerberos authentication system
  - IBM Software Announcement 208-249
- CMS-based Domain Name Server (NAMESRV)
  - IBM Software Announcement 209-207
- RESOURCE option of VMSES/E VMFINS command
  - IBM Software Announcement 210-234
- z/VM Manageability Access Point (zMAP) agent and Platform agent for IBM Systems Director for Linux on System z
  - Both previously shipped with z/VM V6.1

z/VM 6.2 and GDPS Support

- All supported GDPS releases (3.7, 3.8, & 3.9) supported with non-SSI environment
  - See GDPS PSP buckets for required service (z/OS, Linux, & z/VM)
  - If GDPS environment shared with older z/VM releases, z/VM service is required on them before adding z/VM 6.2

- GDPS support in an SSI environment is under evaluation and test
  - Currently targeted for GDPS 3.9 only
  - Current target for full support is 8/2012
  - Design issue when z/OS controlling LPAR must reset z/VM SSI member
    - Development underway to remedy
    - Circumvention available.
    - Contact IBM support to see if circumvention will allow your SSI environment to be supported with z/VM Level 2 as first point of contact.

Statements of Direction

Subject to change or withdrawal without notice, representing IBM goals and objectives only.

Note for withdrawals: Unless otherwise stated, it is IBM's intent that z/VM V6.2 will be the last release of z/VM to support the indicated function.

HiperSockets Completion Queues
z/VM Statement of Direction: New function

Available April 13, 2012

- Transfer HiperSockets messages asynchronously
- Used whenever traditional synchronous queues are full
- Automatic enablement; no z/VM configuration required
- Helpful when traffic is “bursty”
- Exploitation by CP VSWITCH only; no guest simulation

z/VM Performance Toolkit: RMFPMS agent
z/VM Statement of Direction: Stabilize existing function

- Performance Toolkit processing of the output from Linux rmfpms agent, part of the z/OS RMF PM offering, will no longer be updated
- Performance Toolkit may give incorrect results as the underlying rmfpms agent evolves
- Support for the Linux rmfpms agent has already been withdrawn, but continues to be available on an as-is basis

HMC non-ensemble z/VM System Management
z/VM Statement of Direction: Withdrawal of existing function

- z/VM V6.2 is the last release of z/VM that will be supported by the non-ensemble z/VM System Management functions of the System z10, z196 and z114

- z/VM virtual server management will continue to be supported using the zEnterprise Unified Resource Manager on the z196 and later

TCP/IP Devices and Daemons
z/VM Statement of Direction: Withdrawal

- A220 HYPERchannel devices
- CLAW devices
- DHCP daemon
- LPSERVE (LPD)
  - RSCS LPD will continue to be provided at no charge
  - Does not affect LPR (client)

User Class Restructure and OVERRIDE utility
z/VM Statement of Direction: Withdrawal

- User Class Restructure (UCR) was first introduced in VM/SP Release 6 to allow changes to the privilege classes associated with CP commands and DIAGNOSE subcodes.

- OVERRIDE utility was a “compiler” used to create special UCR-type files in the spool

- Function was replaced by MODIFY COMMAND capability in VM/ESA
  - Use the CP MODIFY COMMAND command or SYSTEM CONFIG statement

Cross System Extensions (CSE)
z/VM Statement of Direction: Withdrawal

- The z/VM Single System Image (VMSSI) feature replaces the functions provided by CSE:
  - Logon once in the cluster, with exceptions
  - Cross-system MESSAGE and QUERY commands
  - Cross-system LINK (XLINK)
  - Shared spool
  - Shared source directory

- VMSSI brings additional value such as autonomic minidisk cache management and a single point of maintenance

Support for GDPS/PPRC
z/VM Statement of Direction: New function

- Disk subsystem preemptive HyperSwap
  - Storage controllers will notify host when failure is predicted
  - HyperSwap before I/O errors are generated

- HyperSwap scalability
  - Summary “PPRC Suspend” event notification by storage controller
  - Avoid separate notification for each disk

- Future z/VM release support for an alternate subchannel set in which to place PPRC secondary devices

Previously shipped Functional Enhancements Included in z/VM V6.2

- XRC timestamps
- Hyperswap improvements
- SSL Server Reliability and Scalability
- CPU Measurement Counter Facility Host support
- zEnterprise Unified Resource Manager

APAR numbers shown apply to z/VM 6.1 and z/VM 5.4 unless otherwise stated

XRC Timestamps

VM64814 and VM64816

- CP will sync with STP at IPL and, optionally, obtain time zone and leap seconds from STP
  - No need to deactivate/activate LPAR
- Correct time will be placed in all host and guest I/O
  - CP will monitor STP time signals
- Enabled via SYSTEM CONFIG with option to skip timestamp or delay I/O if CP is unable to sync with STP
- No virtualization of STP
  - Option for 2nd level systems to stamp I/O without use of STP

Hyperswap Improvements

VM64815 and VM64816

- CP HYPERSWAP command now has additional controls for missing interrupt handling
  - Do not trigger automatic quiesce (default)
    - GDPS will not be notified
  - Trigger automatic quiesce after specified number of MI detection intervals
    - GDPS will be notified
- Better management of PAV and HyperPAV devices
- Avoid unnecessary hyperswaps due to normal maintenance activities
  - Concurrent storage controller upgrade
- New wait state 9060 if abend occurs when Hyperswap is in progress
  - no checkpoint taken, no automatic dump
  - restart dump if dedicated dump volume, else standalone dump

SSL Server Reliability and Scalability

PK97437, PK97438, PK75662

- Major rewrite of SSL server
  - Updates to TCP/IP stack, as well
  - Scalable
- Multiple SSL servers with session cache manager and shared database
  - Balance total number of sessions against number of sessions per server
- Significant performance improvements
  - Interactive workloads such as telnet
  - Session establishment costs, particularly during mass reconnect
- Migration required if using pre-PTF version
  - http://www.vm.ibm.com/related/tcpip/tcsslspe.html
  - Not trivial; read carefully

CPU Measurement Facility Counters – Host Support
VM64961

- Sets of counters for each logical processor that count events such as cycle, instruction, and cache directory-write counts
  - Same COUNTER information as z/OS partitions
- Accumulation is a relatively low-overhead activity and is performed automatically by the machine when the counters are authorized, enabled, and activated
- Authorization controlled by a logical partition's Security settings in its activation profile
- Enablement, activation, and data collection controlled by z/VM MONITOR command

zEnterprise Unified Resource Manager

VM64822, VM64904, VM64917, VM64956, VM64957

- z/VM V6 only
  - Turn-key installation option to enable virtual server management via zEnterprise Unified Resource Manager (z/VM V6.2 only)
    - Only for “kicking the tires”
- Enables Unified Resource Manager to perform system and virtual server management tasks
  - Virtual server configuration
  - Disk storage management
  - Virtual network management
  - Performance monitoring
- CP, CMS, LE, TCP/IP, DIRMAINT, Performance Toolkit, HCD
- http://www.vm.ibm.com/service/vmrequrm.html

zEnterprise Unified Resource Manager
Ensemble Membership

- If configured to participate in an ensemble, z/VM will automatically join the ensemble at IPL
- Configuration tasks
  - Set up OSM and OSX channel paths
  - Set up controllers for IEDN and INMN networks
    - Pre-defined controllers DTCENS1 and DTCENS2 for exclusive use by ensemble networks
    - DTCENS1 automatically creates a VSWITCH to provide SMAPI connectivity to INMN network
  - Configure directory manager (REQUIRED)
  - Configure SMAPI servers
- See chapter "Configuring z/VM for an Ensemble" in CP Planning and Administration manual

Thanks!

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Session 11777

z/VM Platform Update

Alan Altmark

Senior Managing
z/VM and Linux
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Session 11777

Version 16

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- Brian Hugenbruch
- Romney White

Agenda

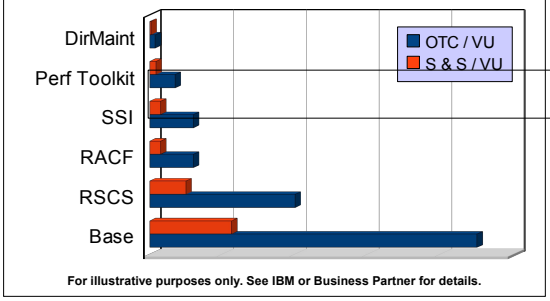
- Pricing review
- Status update for older releases
- Introducing z/VM V6.2
- IBM Statements of Direction
- New functions shipped as service

z/VM Pricing

- z/VM pricing consists of:
  - A one-time charge (OTC) per value unit
  - An annual charge for Service & Support, per value unit
- Number of value units is determined by number of engines, shown below on left.
- Prices are set per value unit, relative prices are illustrated below on right.
- The SSI feature includes LGR and it is priced in line with the RACF feature

z/VM Value Unit Schedule	
Number of Engines	**Value Units per Engine**
1 to 3	**10**
4 to 6	**9**
7 to 9	**8**
10 to 12	**7**
13 to 16	**6**
17 to 20	**5**
21 to 25	**4**
26 and above	**3**

Relative Prices per Value Unit



For illustrative purposes only. See IBM or Business Partner for details.

IBM

VM/370

- Happy Birthday, VM/370!
  - 5749-010 announced as a supported commercial product on August 2, 1972
  - Formally withdrawn April 24, 1989|
- *45 Years of Mainframe Virtualization: CP/67 and VM/370 to z/VM*
  Wednesday, 4:30 PM-5:30 PM Grand Ballroom Salon E/F
  Speaker: Jim Elliott, IBM

Join us afterwards for some delectable edibles!

5.3 is out of Service!

Extended support contracts

5.4 will stay in service as long as the z9 stays in service

- May be extended beyond current date

For those not moving off of z/VM 5.4 due to running on older hardware, the new z114 offers some good alternatives. A lot of the z9 configurations, even up to around 6 IFLs of the Enterprise Class machines will fit on a z114. Bill Bitner can provide more info on moving up to newer machines.

IBM

z/VM Version 5 Release 4

Update

- The last release of z/VM to support IBM System z9 and older processors
- **No longer available** as of March 12, 2012
- End of Service has been extended to December 31, 2014 or end of IBM service for System z9, whichever is ***later***
  - Was September 30, 2013
  - Later, but not *too* much later!
  - Be on the lookout for Delayed Onset Panic Syndrome

5.3 is out of Service!

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For those not moving off of z/VM 5.4 due to running on older hardware, the new z114 offers some good alternatives. A lot of the z9 configurations, even up to around 6 IFLs of the Enterprise Class machines will fit on a z114. Bill Bitner can provide more info on moving up to newer machines.

IBM

z/VM Version 6
Security Certification Plans

- Common Criteria (ISO/IEC 15408)
  - Statement of Direction issued 22 July 2010
  - **Evaluation in progress (BSI-DSZ-CC-0752)**
  - Security Target: Operating System Protection Profile (OSPP) at EAL 4+
    - Virtualization extension
    - Labeled Security extension
- Federal Information Protection Standard (FIPS) 140-2
  - z/VM 6.1 System SSL is FIPS 140-2 Validated(TM)
  - Enablement requirements for certificate database and servers
    - http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2012.htm#1735

- z/VM 6.2 is designed to conform to both Common Criteria and FIPS 140-2 evaluation requirements

TM *A Certification Mark of NIST, which does not imply product endorsement by NIST, the U.S. or Canadian Governments.*

The last Common Criteria Certification was z/VM Version 5 Release 3, which certified to the CAPP and LSPP Protection Profiles at EAL 4+. Those Protection Profiles have since expired – hence the new PP being used for z/VM Version 6 Release 1.

The Target of Evaluation for Common Criteria includes RACF. IBM makes no claims about the relative security of your configuration if you are using a different External Security Manager (ESM), because those products have not been evaluated.

FIPS APARs to note for z/VM 6.1:

- PM10616: System SSL enablement of FIPS
- PM43382: System SSL Self-Defense

z/VM Release Status Summary

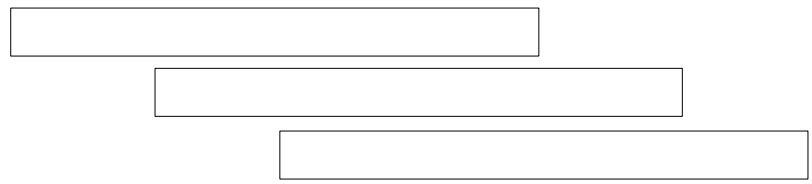
z/VM Level		GA	End of Service	End of Marketing	Minimum Processor Level	Security Level
Ver 6	Rel 2	12 / 2011	4 / 2015		z10	-
	Rel 1	10 / 2009	12 / 2014	12 / 2011	z10	EAL 4+ [1] OSPP-LS
Ver 5	Rel 4	9 / 2008	9 / 2013[2]	3 / 2012	z800, z900	-
	Rel 3	6 / 2007	9 / 2010	9 / 2010	z800, z900	EAL 4+ CAPP/LSPP

Marketed & Serviced

Serviced, but not Marketed

End of Service & Marketing

[1] Currently in evaluation
[2] Or later (Announced August 7, 2012)



z/VM Version 6 Release 2

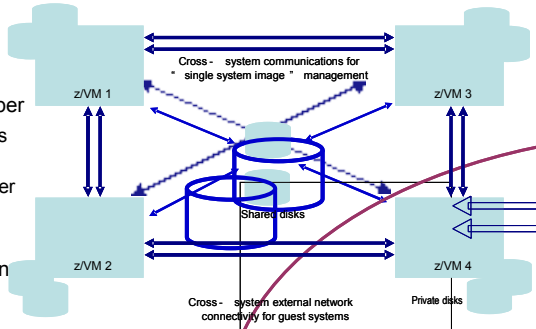
- Announced **October 12, 2011**
- Generally available **December 2, 2011**
- End of service **April 30, 2015**
- Major changes include:
  - Single System Image
  - Live Guest Relocation
  - Turnkey support for Unified Resource Manager

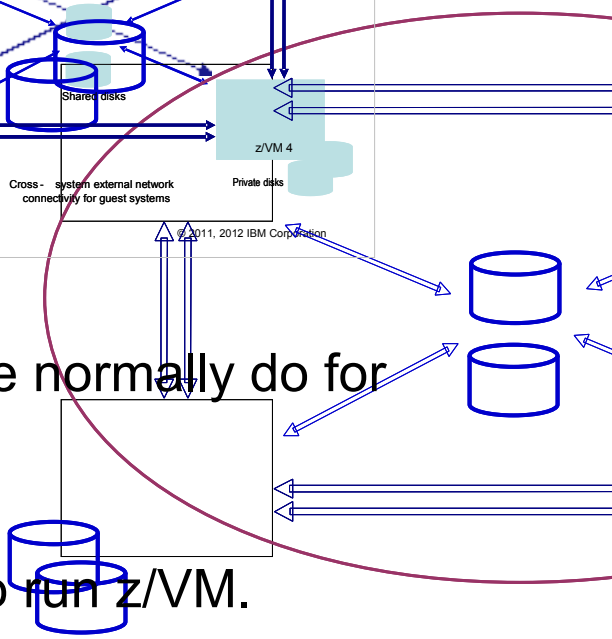
Replaced z/VM V6.1
- No longer available
- End of service April 2013

IBM

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Provided as an optional priced feature.
- Connect up to four z/VM systems as members of a Single System Image (SSI) cluster
- Provides a set of shared resources for member systems and their hosted virtual machines
- Cluster members can be run on the same or different System z servers
- Simplifies systems management of a multi-z/VM environment
  - Single user directory
  - Cluster management from any member
    - Apply maintenance to all members in the cluster from one location
    - Issue commands from one member to operate on another
  - Built-in cross-member capabilities
  - Resource coordination and protection of network and disks





Talking about it earlier than we normally do for new z/VM function.

Cluster will be "normal" way to run z/VM.

Don't have to rely on workload to do maintenance. Can move virtual machines and do maintenance on your own schedule.

Move workload to another server and let it keep running.

- without triggering High Availability flags/alarms.

SSI Cluster Management – Features for Greater Reliability

- Cross-checking of configuration details as members join cluster and as resources are used:
  - SSI membership definition and identity
  - Consistent definition of shared spool volumes
  - Compatible virtual network configurations (MAC address ranges, VSwitch definitions)

- Cluster-wide policing of resource access:
  - Volume ownership marking to prevent dual use
  - Coordinated minidisk link checking
  - Autonomic minidisk cache management
  - Single logon enforcement

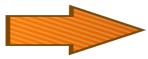
- Communications failure “locks down” future resource allocations until resolved

- Comprehensive checking for resource and machine feature compatibility during relocation:
  - Adjustment of “virtual architecture level” to support customer relocation policy

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Dynamically move Linux guests from one member to another with Live Guest Relocation
  - Reduce planned outages
  - Enhance workload management
  - Non-disruptively move work to available system resources and non-disruptively move system resources to work

- When combined with Capacity Upgrade on Demand, Capacity Backup on Demand, and Dynamic Memory Upgrade, you will get the best of both worlds



Bring additional resources to the workload!

Move the workload to the resources!

This is good slide to add pointer if given in a conference where the SSI Overview will be given as well.

Safe Guest Relocation

- Eligibility checks done multiple times throughout the relocation process.
- Check more than just eligibility to move the virtual machine, but also check if it is “safe” to move.
  - Overrides are available
- Checks for:
  - Does virtual machine really have access to all the same resources and functions?
  - Will moving the virtual machine over commit resources to the point of jeopardizing other workload on the destination system?
- Pacing logic to minimize impact to other work in more memory constrained environments

Single System Image Feature
Clustered Hypervisor with Live Guest Relocation

- Unified Resource Manager *does not* support SSI and LGR
- IBM Director *does not* support SSI and LGR
- Suggested best practice is to not combine SSI and LGR with the above offerings
  - Work with your IBM Sales Team, IBM Lab Services, or z/VM Development Lab to determine which technologies are most critical to your environment and business.

z/VM Single System Image and Live Guest Relocation Implementation Services

IBM System z Lab Services Offering:

- In-depth education on the functions of VMSSI
- Cluster planning and deployment assistance
- Operational guidance and recommendations
- Migration assistance for users of CSE
- Demonstrate the technology in your own environment.
- Help you create system configuration files
- Analyze how SSI and LGR will affect your system initialization, recovery, and automation procedures
- Early identification of any inhibitors to use
- Identification of any required z/VM or Linux operating system patches

For more information, contact **systemz@us.ibm.com**

z/VM Storage Support

- z/VM 6.2 supports
  - DS8000 Series
    - DS8100, DS8300, DS8700, DS8800
  - DS6000 Series
  - XIV
  - IBM San Volume Controller
  - IBM Storwize V7000
    - See http://www.ibm.com/support/docview.wss?uid=ssg1S1003703#_zvm
  - As well as many of the older storage devices
- The System Storage Interoperation Center (SSIC) support page has some omissions of the above support
  - We are working to correct these
  - http://www.ibm.com/systems/support/storage/ssic/interoperability.wss
- The z/VM 6.2 General Information Manual has additional information, but had not been updated for Storwize, see URL above for requirements.

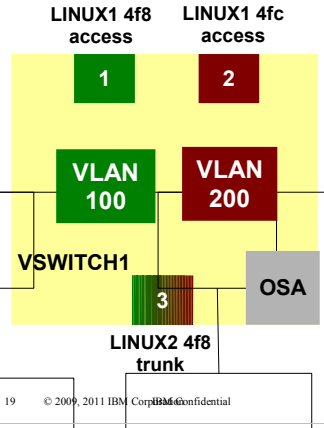
z/VM System Management

- **Operations Manager for z/VM V1.4**
  - Facilitates automated operations
  - Monitor, view, and interact with consoles without logging on to service machines or Linux guests
  - Take actions based on service machine console messages and other system events
  - Schedule events for immediate execution or on a regular schedule
- **OMEGAMON XE on z/VM and Linux V4.2**
  - Performance monitoring of z/VM and Linux guests
  - Part of the Tivoli Management Services, including Tivoli Enterprise Portal
  - Uses IBM Performance Toolkit for VM as its data source
- **Backup and Restore Manager for z/VM V1.2**
  - Backup and restore file level data for CMS minidisks and Shared File System
  - Backup and restore images of Linux guests and/or z/VM volumes
    - Use Tivoli Storage Manager for file level backup and restore of Linux data
- **Tape Manager for z/VM V1.3**
  - Manage tapes: retention, access control, data security erase
  - Manage devices: share with other z/VM and non-z/VM systems
  - Manage mount requests for ATL, VTS, and manual mount devices
- **zSecure Manager for RACF z/VM V1.11.1**
  - Automate complex, time consuming z/VM security management tasks
  - Quickly identify and prevent problems in RACF
  - Create comprehensive audit trails
- **Archive Manager for z/VM V1.1**
  - Users and administrators manage disk space more efficiently and effectively
  - Archive infrequently used or large files to tape or other disk

All support z/VM 6.2!

VSWITCH: Multiple access ports per guest

- One or more virtual ports on a VSWITCH are reserved for a guest
- Ports are associated with a VLAN – implicit authorization (exc. RACF)
- Authorization changes take effect immediately
- Eliminates need for VLAN-aware guests




```
define vswitch vswitch1 portbased vlan aware native none
set vswitch vswitch1 portnumber 1 userid LINUX1
set vswitch vswitch1 portnumber 2 userid LINUX1
set vswitch vswitch1 portnumber 3 userid LINUX2 porttype trunk
set vswitch vswitch1 vlanid 100 add 1 3
set vswitch vswitch1 vlanid 200 add 2 3

USER1:
Couple 4f8 to system vswitch1 portnum 1
Couple 4fc to system vswitch1 portnum 2

USER2:
Couple 4f8 to system vswitch1 [portnum 3]
```

Switch port number not available on NICDEF. Use COMMAND COUPLE in the directory.

Prior to z/VM 6.2 connection to Virtual Switch ports was granted by z/VM userid. Therefore if multiple virtual NICs were defined for a user for the same Vswitch then all the virtual NICs had the same attributes.

With z/VM 6.2, guests will be able to have multiple **unique** Access Ports which allows each virtual NIC to be in a different VLAN.

Vswitch Port numbers can be defined for connections that remain constant. Existing Vswitch definitions do not have to be changed when migrating to z/VM 6.2, the older non-port based Vswitch definitions remain valid.

Advantages:

Guest can have multiple unique access ports connected to a single virtual switch. Allows a guest to access multiple VLANs without being VLAN aware. Each NIC uses an access port with a unique VLAN.

Customers can define port numbers for connections that remain static. That is disconnect and reconnect and port number remains the same. This will make SNMP monitoring of switch status more useful to cusotmers, since they know the mapping of systems to switch ports ahead of time.

Scalability and Performance Enhancements
Available by PTF to prior releases where shown

- Reduction of memory and CPU resources required to manage larger memory sizes
- Control of the guest page re-ordering process, improving the performance characteristics of guests with large memory footprints (VM64774)
- Reduced system overhead of guest page release function, thereby helping to increase guest throughput (VM64715)
- Improved contiguous frame coalescing algorithms help to increase system throughput (VM64795)

Scalability and Performance Enhancements
Available by PTF to prior releases where shown

- More accurate scheduling algorithm for guests that have LIMITHARD shares (VM64721)
- Reduce LPAR suspend time by reducing the number of DIAGNOSE 0x9C and 0x44 instructions issued when obtaining system locks (VM64927 for z/VM 6.1 only)
- Improve workload dispatch algorithm to eliminate erratic virtual machine pause in busy systems with more than 14:1 total virtual to logical CPU over-commitment (VM64887)

Advances in Processor Performance

- The CPU Measurement Facility is a System z hardware facility that characterizes the performance of the CPU and nest:
  - Instructions, cycles, cache misses, and other processor related information
  - Available on z10 EC/BC, z196, and z114
- IBM will be using data from this facility to influence future processor design and benchmark validation of those designs.
- Will also increase accuracy of future processor capacity sizing tools
- To assist, by providing sample Monwrite data containing the counters, please contact Richard Lewis (rflewis@us.ibm.com)

TCP/IP Enhancements

- Stack
  - RFC 4191: Router selection preferences
  - RFC 5175: IPv6 router advertisement flags extension
- FTP
  - IPv6
  - Passwords suppressed in server traces
  - Wildcards supported for BFS files
- SMTP
  - IPv6
  - Includes IPv6 support in CMS NOTE and SENDFILE

“Ipv6: The Journey Continues...”

TCP/IP Enhancements
OSA Diagnostics

- The NETSTAT command has been updated to provide details taken from the OSA Address Table (OAT) via new OSAINFO option.
- OSA/SF no longer required to obtain device details
- OSA-Express3 and later

```
VM TCP/IP Netstat Level 620       TCP/IP Server Name: TCPIP

Device K4L3VSW6640DEV: data as of 09/23/11 01:05:21
  OSA Generation:                       OSA-Express3
  OSA Firmware Level:                   00000766
  Port Speed/Mode:                      1000 Mbs / Full Duplex
  Port Media Type:                      Multi Mode (SR/SX)
  PCHID:                                0291
  CHPID:                                0053
  Manufacturer MAC Address:             00-14-5E-78-17-F2
  Configured MAC Address:               00-00-00-00-00-00
  Data Device Sub-Channel Address:      6640
  CULA:                                 00
  Unit Address:                         40
  Physical Port Number:                 0
  Number Of Output Queues:              1
  Number Of Input Queues:               1
  Number Of Active Input Queues:        0
  QDIO CHPID Type:                      OSD
  QDIO Connection:                      Not Isolated
  IPv4 L3 VMAC:                         00-00-00-00-00-00
  IPv4 VMAC Router Mode:                No
  IPv4 L3 VMAC Active:                  No
  IPv4 L3 VMAC Source:                  n/a
  IPv4 L3 Global VLAN ID Active:        No
  IPv4 Global VLAN ID:                  0
  IPv4 Assists Enabled:                 00001C71
  IPv4 Outbound Checksum:               00000000
  IPv4 Inbound Checksum:                00000000

  IPv4 Address:                         IPA Flags:
-----------------------                 -----------------
9.60.29.53                              00000002

IPv4 Multicast Address:                 MAC Address:
-----------------------                 -----------------
224.0.0.1                               01-00-5E-00-00-01
```


OAT contains lots of information about the OSA, including registered IP and MAC addresses.

Access controls for dedicated or attached devices

- The CP ATTACH and GIVE commands, as well as the DEDICATE statements in the directory will now engage ESM access controls
- Integrated ASCII console on the HMC is also managed
- Full discretionary and mandatory access controls
- RACF support included

Mandatory access controls for virtual consoles

- SET SECUSER and SET OBSERVER are now available when mandatory access controls (security labels) are active.
- Virtual security zones (“color coding” of users and resources) can now co-exist with system automation functions.
- Also applies to the user ID specified on CONSOLE directory statement.
- Users in different zones cannot see or manage each others' virtual console
  - Console cannot be given
  - Console cannot be taken
  - System administrators and automation solutions can use label SYSNONE to allow them access to all consoles

In prior releases, enabling SECLABELs caused SET SECUSER and SET OBSERVER to issue an error message.

RACF Security Server

- Single System Image Support
  - Automatic propagation of most RACF commands
  - Also works with multiple RACF servers on same z/VM system
- Protected Users
  - User without a password or password phrase will not be revoked due to too many invalid password attempts or inactivity
- High Level Assembler no longer required for most common customizations
- Real device protection
  - ATTACH, GIVE, DEDICATE
  - New VMDEV class
  - Profiles: RDEV.*device.system_id*
- Support for Diagnose 0xA0 Subcode 0x48
  - Obtain information about any ESM in architected format

The PROTECTED attribute – Protected user ids cannot be used for normal logon to the system and they will not be revoked through inactivity or invalid password attempts.

VMDEV is a new general resource class that includes qualification by system ID. This allows for authorization across multiple systems. When the same device number is used, a generic resource can be defined: RDEV.0480.**

RDEV.SYSASCII.*systemid* is used to protect the integrated ASCII console.

z/OS R12 Equivalency Upgrades

- LDAP
  - Change logging of general resources
  - Password expiry management
- Language Environment (LE) runtime libraries
- Program Management Binder
  - COMPAT supports ZOSV1R10, ZOSV1R11, ZOSV1R12
  - New suboptions on RMODE
  - Compiler parameters can be read from IEWPARMS DDNAME
  - New C/C++ API
- Support for **IBM XL C/C++ Compiler for z/VM, V1.3** (5654-A22)
  - Details can be found in US announcement letter 211-369
- MPROUTE

z/CMS

- Previously shipped with z/VM as a sample program, now supported as an optional CMS
  - IPL ZCMS
- Enables CMS programs to use z/Architecture instructions and 64-bit registers
- Existing ESA/390 architecture programs continue to run unchanged
  - CMS does not exploit memory above 2 GB
  - CMS does provide basic memory management API for memory above 2 GB
- Programs that examine or change architecture-sensitive memory locations (NUCON) must be updated in order to use z/CMS
- No architectural support for XC mode
  - VM Data Spaces not available

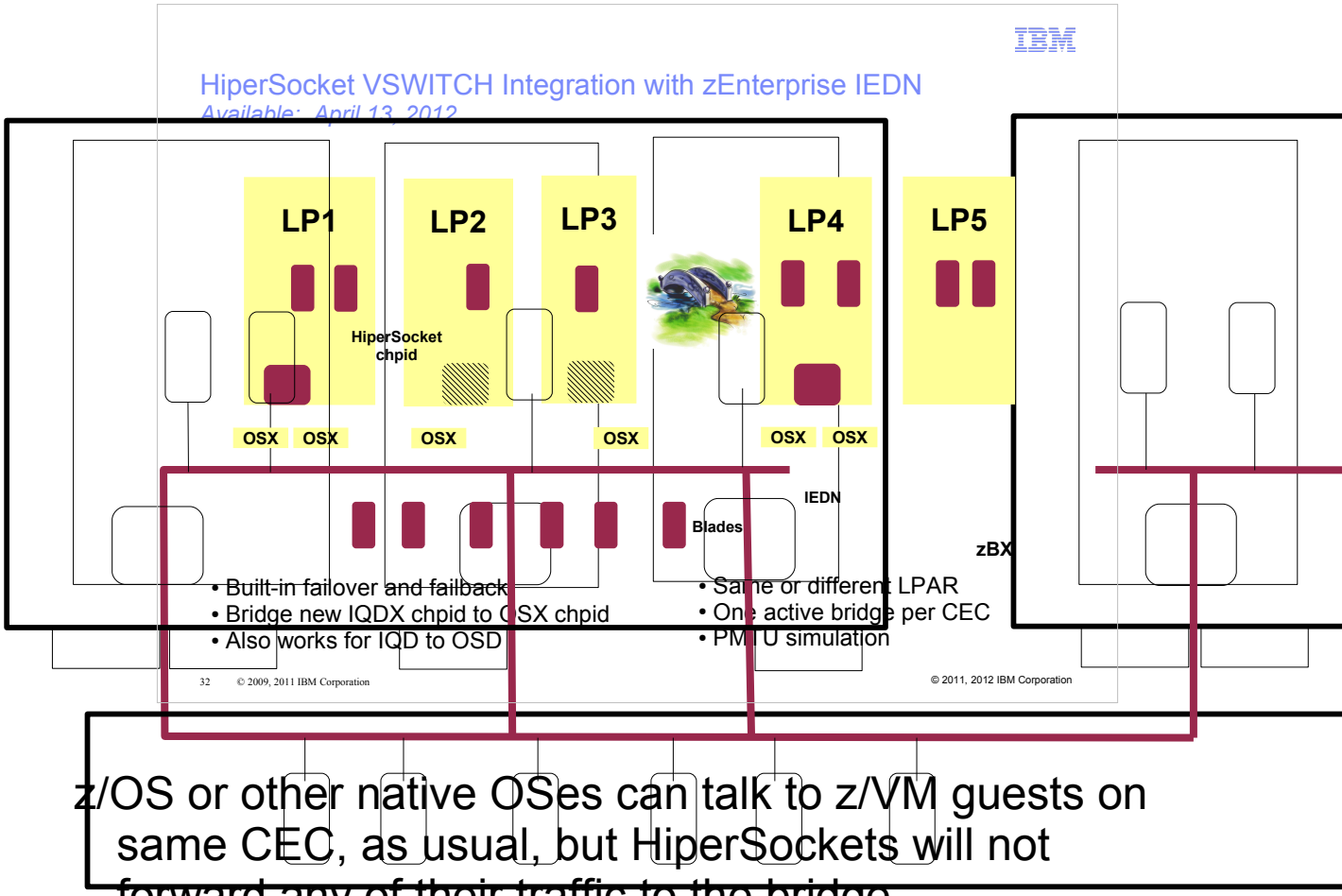
Installation Improvements

- Significant changes to system layout to support Single System Image
- Choose a non-SSI system or a complete 1- to 4-member SSI cluster
  - First or second level
- All installation information is gathered at one time
- All DASD volumes can be labeled at installation time, including the system residence volume
- Turnkey support for zEnterprise ensembles enables clients new to z/VM to easily get started with Unified Resource Manager (zManager)
  - If you have purchased a directory and/or security manager, decline this option during installation; manual enablement is required!

Turnkey: In this mode, a free version of DIRMAINT and Performance Toolkit are used. Customer cannot directly access DIRMAINT or PERFKIT services. Used to support zManager. Client can convert from turnkey to purchased version.

XEDIT – Default changed to mixed case

- For those coming to z/VM from an open system background, the folding of mixed case to upper case is surprising
- Many comments along the lines of “it hurts when you do that”
  - Linux can read CMS files
  - Often case-sensitive
- Default for other file types changed to CASE MIXED RESPECT
  - No folding
  - To get old behavior, update PROFILE XEDIT to
    SET CASE UPPER RESPECT
  - Or you may wish to consider
    SET CASE MIXED IGNORE



z/OS or other native OSes can talk to z/VM guests on same CEC, as usual, but HiperSockets will not forward any of their traffic to the bridge.

To perform similar function, native OS must provide its own “bridge” capability.

Will it support OSD? Not part of SOD. So, maybe.

CP generates Path MTU Discovery response packets automatically if frame size is too large for OSA.

- Allows large MTU for efficient local HiperSocket communications.

HiperSocket VSWITCH Integration

Available: April 13, 2012

- Virtual Switch bridge between Ethernet LAN and HiperSockets
  - zEnterprise IEDN (OSX) or OSD connections
    - Original Statement of Directions only mentioned IEDN
  - Guests can use simulated OSA or dedicated HiperSockets
  - VLAN aware
  - One HiperSocket chpid only
- Full redundancy
  - Up to 5 bridges per CEC
  - One bridge per LPAR
  - Automatic takeover
  - Optionally designate one “primary”
    - Primary will perform “takeback” when it comes up
  - Each bridge can have more than one OSA uplink
- CP: VM65042 PTF UM33691
- TCP/IP: PM46988 PTF UK77220

LPARs and z/VM Guests are separate entities. Only z/VM bridge can forward to an outside entity.

Provides a nice way to put HiperSocket connections on an IEDN or external subnet

High Performance FICON

Available: April 13, 2012

- Enable guests to use High Performance FICON for System z (zHPF)
  - Different I/O model
  - Single and multiple track I/O
  - CP APAR VM65041 PTF UM33646
  - DVF APAR VM65144 PTF UM33647
- Requires host and control unit compatibility
  - Consult a storage specialist for details
- z/OS and Linux provide exploitation
- Performance results available at:
  - http://www.vm.ibm.com/perf/reports/zvm/html/620jb.html

Removed Functions

- Kerberos authentication system
  - IBM Software Announcement 208-249
- CMS-based Domain Name Server (NAMESRV)
  - IBM Software Announcement 209-207
- RESOURCE option of VMSES/E VMFINS command
  - IBM Software Announcement 210-234
- z/VM Manageability Access Point (zMAP) agent and Platform agent for IBM Systems Director for Linux on System z
  - Both previously shipped with z/VM V6.1

z/VM 6.2 and GDPS Support

- All supported GDPS releases (3.7, 3.8, & 3.9) supported with non-SSI environment
  - See GDPS PSP buckets for required service (z/OS, Linux, & z/VM)
  - If GDPS environment shared with older z/VM releases, z/VM service is required on them before adding z/VM 6.2

- GDPS support in an SSI environment is under evaluation and test
  - Currently targeted for GDPS 3.9 only
  - Current target for full support is 8/2012
  - Design issue when z/OS controlling LPAR must reset z/VM SSI member
    - Development underway to remedy
    - Circumvention available.
    - Contact IBM support to see if circumvention will allow your SSI environment to be supported with z/VM Level 2 as first point of contact.

Statements of Direction

Subject to change or withdrawal without notice, representing IBM goals and objectives only.

Note for withdrawals: Unless otherwise stated, it is IBM's intent that z/VM V6.2 will be the last release of z/VM to support the indicated function.

HiperSockets Completion Queues
z/VM Statement of Direction: New function

Available April 13, 2012

- Transfer HiperSockets messages asynchronously
- Used whenever traditional synchronous queues are full
- Automatic enablement; no z/VM configuration required
- Helpful when traffic is “bursty”
- Exploitation by CP VSWITCH only; no guest simulation

z/VM Performance Toolkit: RMFPMS agent
z/VM Statement of Direction: Stabilize existing function

- Performance Toolkit processing of the output from Linux rmfpms agent, part of the z/OS RMF PM offering, will no longer be updated
- Performance Toolkit may give incorrect results as the underlying rmfpms agent evolves
- Support for the Linux rmfpms agent has already been withdrawn, but continues to be available on an as-is basis

HMC non-ensemble z/VM System Management
z/VM Statement of Direction: Withdrawal of existing function

- z/VM V6.2 is the last release of z/VM that will be supported by the non-ensemble z/VM System Management functions of the System z10, z196 and z114
- z/VM virtual server management will continue to be supported using the zEnterprise Unified Resource Manager on the z196 and later

The Announcement Letter refers to the "HMC z/VM Tower". This is the "z/VM Virtual Machine Management" task group on the HMC.

TCP/IP Devices and Daemons
z/VM Statement of Direction: Withdrawal

- A220 HYPERchannel devices
- CLAW devices
- DHCP daemon
- LPSERVE (LPD)
  - RSCS LPD will continue to be provided at no charge
  - Does not affect LPR (client)

User Class Restructure and OVERRIDE utility z/VM Statement of Direction: Withdrawal

- User Class Restructure (UCR) was first introduced in VM/SP Release 6 to allow changes to the privilege classes associated with CP commands and DIAGNOSE subcodes.
- OVERRIDE utility was a “compiler” used to create special UCR-type files in the spool
- Function was replaced by MODIFY COMMAND capability in VM/ESA
  - Use the CP MODIFY COMMAND command or SYSTEM CONFIG statement

Cross System Extensions (CSE)
z/VM Statement of Direction: Withdrawal

- The z/VM Single System Image (VMSSI) feature replaces the functions provided by CSE:
  - Logon once in the cluster, with exceptions
  - Cross-system MESSAGE and QUERY commands
  - Cross-system LINK (XLINK)
  - Shared spool
  - Shared source directory

- VMSSI brings additional value such as autonomic minidisk cache management and a single point of maintenance

Support for GDPS/PPRC
z/VM Statement of Direction: New function

- Disk subsystem preemptive HyperSwap
  - Storage controllers will notify host when failure is predicted
  - HyperSwap before I/O errors are generated
- HyperSwap scalability
  - Summary “PPRC Suspend” event notification by storage controller
  - Avoid separate notification for each disk
- Future z/VM release support for an alternate subchannel set in which to place PPRC secondary devices

If the I/O Updates part 1 & 2 are given at same conference, this is a good place for pointer to that.

Previously shipped Functional Enhancements Included in z/VM V6.2

- XRC timestamps
- Hyperswap improvements
- SSL Server Reliability and Scalability
- CPU Measurement Counter Facility Host support
- zEnterprise Unified Resource Manager

APAR numbers shown apply to z/VM 6.1 and z/VM 5.4 unless otherwise stated

XRC Timestamps
VM64814 and VM64816

- CP will sync with STP at IPL and, optionally, obtain time zone and leap seconds from STP
  - No need to deactivate/activate LPAR
- Correct time will be placed in all host and guest I/O
  - CP will monitor STP time signals
- Enabled via SYSTEM CONFIG with option to skip timestamp or delay I/O if CP is unable to sync with STP
- No virtualization of STP
  - Option for 2nd level systems to stamp I/O without use of STP

CP will sync with correct time from STP at IPL
STP is not virtualized to 2nd level guests
CP will track time changes (drift) – will be put in timestamps for I/O

Strictly for CP to timestamp I/O
– CP will not do STP synchronization for virtual machines

FEATURES statement
STP_Timestamping
tells CP to enable the STP protocol (if the STP facility is installed) and apply timestamps to all XRC-capable DASD devices.
STP_TimeZone / STP_TZ
tells CP to enable the STP protocol (if the STP facility is installed) and obtain timezone information automatically from the STP server.

XRC_OPTional
when STP_Timestamping is also enabled, this will allow non-timestamped I/O to be issued whenever STP is in an unsynchronized state, as opposed to deferring I/O until STP synhcronization completes.
XRC_TEST
tells CP to timestamp I/O regardless of STP availability. This option is meant only for vendor and testing purposes, and can only be specified for systems running within a virtual machine.

Hyperswap Improvements
VM64815 and VM64816

- CP HYPERSWAP command now has additional controls for missing interrupt handling
  - Do not trigger automatic quiesce (default)
    - GDPS will not be notified
  - Trigger automatic quiesce after specified number of MI detection intervals
    - GDPS will be notified
- Better management of PAV and HyperPAV devices
- Avoid unnecessary hyperswaps due to normal maintenance activities
  - Concurrent storage controller upgrade
- New wait state 9060 if abend occurs when Hyperswap is in progress
  - no checkpoint taken, no automatic dump
  - restart dump if dedicated dump volume, else standalone dump

Trigger is by device.

SSL Server Reliability and Scalability

PK97437, PK97438, PK75662

- Major rewrite of SSL server
  - Updates to TCP/IP stack, as well
  - Scalable
- Multiple SSL servers with session cache manager and shared database
  - Balance total number of sessions against number of sessions per server
- Significant performance improvements
  - Interactive workloads such as telnet
  - Session establishment costs, particularly during mass reconnect
- Migration required if using pre-PTF version
  - http://www.vm.ibm.com/related/tcpip/tcsslspe.html
  - Not trivial; read carefully

- PK97437: SSLADMIN, TCPRUN and Related Packaging Changes

- PK97438: SSLSERV Module Updates

- PK75662: TCPIP Module Updates

SSL Server now CMS based

- Old server was not scaling (telnet sessions)

Network-free SSL server administration.

The SSL server can be managed without requiring a network connection between the SSL server administrator and the SSL server.

Capacity and performance issues prevented scaling (from field)

Multiple SSL servers under a single TCP/IP stack

When number of sessions reaches max, spills over to another server

Migration required

CPU Measurement Facility Counters – Host Support
VM64961

- Sets of counters for each logical processor that count events such as cycle, instruction, and cache directory-write counts
  - Same COUNTER information as z/OS partitions
- Accumulation is a relatively low-overhead activity and is performed automatically by the machine when the counters are authorized, enabled, and activated
- Authorization controlled by a logical partition's Security settings in its activation profile
- Enablement, activation, and data collection controlled by z/VM MONITOR command

zEnterprise Unified Resource Manager

VM64822, VM64904, VM64917, VM64956, VM64957

- z/VM V6 only
  - Turn-key installation option to enable virtual server management via zEnterprise Unified Resource Manager (z/VM V6.2 only)
    - Only for “kicking the tires”
- Enables Unified Resource Manager to perform system and virtual server management tasks
  - Virtual server configuration
  - Disk storage management
  - Virtual network management
  - Performance monitoring
- CP, CMS, LE, TCP/IP, DIRMAINT, Performance Toolkit, HCD
- http://www.vm.ibm.com/service/vmrequrm.html

z/VM can take direction from z/Manager

z/VM is different than p and x

-Will discover that it is running in a CEC

-System will automatically join Ensemble

-Can be managed by Ensemble Manager (Unified Resource Manager) (NOT REQUIRED)

(uses SMAPI interfaces)

- Directory Manager is required

- If customer chooses Ensemble Management, just use Ensemble management – do not manage natively also – choose one way or the other

Example: Using both Perf Toolkit and Ensemble Perf Manager, they do not know about each other and could conflict

OSX dedicated to guests via z/Manager

Vswitch dedication handled by CP

z/Manager not required for all z/VM Management – but choose one or the other

- can choose to have virtual serves not managed – they are not managed, do not manage them separately

Requires many steps to implement – Red Alert

- Requires Linux servers

- SMAPI servers

If VM64904 is applied VM64917 should also be applied (SMAPI server updates)

zEnterprise Unified Resource Manager
Ensemble Membership

- If configured to participate in an ensemble, z/VM will automatically join the ensemble at IPL
- Configuration tasks
  - Set up OSM and OSX channel paths
  - Set up controllers for IEDN and INMN networks
    - Pre-defined controllers DTCENS1 and DTCENS2 for exclusive use by ensemble networks
    - DTCENS1 automatically creates a VSWITCH to provide SMAPI connectivity to INMN network
  - Configure directory manager (REQUIRED)
  - Configure SMAPI servers
- See chapter "Configuring z/VM for an Ensemble" in CP Planning and Administration manual

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Thanks!

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