IBM System z
July 2013

IBM z/VM V6.3 - Virtualization with Efficiency at Scale
z/VM Version 6 Release 3
Frequently Asked Questions

Worldwide

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z/VM Positioning

Question:

What is IBM System z® virtualization technology?

Answer:

System z virtualization technology allows customers to create virtual processors, communications, memory, I/O, and networking resources, thus helping to reduce the overhead of planning, purchasing and installing new hardware to consolidate and support new workloads.

Notice that the virtualization technology for System z platforms is composed of multiple dimensions. There is a hardware dimension and a software dimension, and both dimensions are considered at the time that the System z servers are designed. System z virtualization is not an afterthought; it is designed in from the bottom up.

Question:

What does the hardware dimension provide for System z virtualization technology?

Answer:

The IBM System z hardware provides the foundation dimension with functions critical to the success of virtualization, particularly on a large scale, such as the ability to partition the machine, device sharing, and inter-partition communication.

Question:

What does the software dimension provide for System z virtualization technology?

Answer:

The software dimension can extend the capabilities of the hardware from the standpoint of sharing hardware, virtualizing resources, and communication. It also introduces the flexibility required to support large numbers of virtual servers in an on-demand enterprise. Operational support, control, accountability and maintenance are a large part of the operation of any group of servers.
The z/VM® hypervisor is the IBM System z product providing the software dimension functionality.

Question:

Why is z/VM vital in the area of system virtualization?

Answer:

z/VM is vital because it helps to:
- Create a dynamic infrastructure
- Maximize the value of your IT investments
- Make your business become more efficient and responsive
- Integrate your business

Question:

What does z/VM virtualization technology contribute to a dynamic infrastructure?

Answer:

A dynamic infrastructure can be characterized by several attributes. One of them is virtualization. z/VM is the virtualization technology on System z servers and is a critical component of the Linux® on System z environment. For Linux on System z to embrace on demand business, z/VM provides significant virtualization support for Linux virtual servers, including exploitation of the System z capabilities, nondisruptive dynamic addition of memory and processors, improved systems management, ease of use enhancements, performance improvements for Linux guests, and enhanced networking for guests. The virtualized Linux environment on System z can help you in building a dynamic infrastructure.

Question:

How does System z virtualization technology help your business become more efficient and responsive?

Answer:

With virtualization technology as its foundation, z/VM provides new function and technology exploitation on the mainframe that helps enable customers to virtualize processors, communications, memory, I/O, and networking resources, with the potential to help reduce the need to plan for, purchase, and install hardware to consolidate and support new workloads.

With support for System z dynamic reconfiguration capabilities, z/VM helps enable resources, such as processors and memory, to be added to an active LPAR running z/VM nondisruptively. Customers can configure their systems to help reduce the need to re-IPL z/VM. They can dynamically add processors, channels, OSA adapters, I/O, and memory to both the z/VM system itself and to individual guests.

z/VM V6.3 General Availability announcement – July 23, 2013

Question:

When is z/VM V6.3 planned to be generally available and when can it be ordered?

Answer:

z/VM V6.3 will be generally available July 26, 2013.
z/VM V6.3 will be available for ordering on July 23, 2013.   At that time all version orders will be fulfilled with z/VM V6.3 instead of V6.2.

This also means that the last day to order V6.2 is July 22, 2013.

Question:

What did IBM announce related to z/VM on July 23, 2013?

Answer:

IBM announced the new release of z/VM v6.3: Some key pieces of functionally include:
- Memory Scalability
- HiperDispatch
- Systems Management Enhancements and OpenStack® Enablement
- Simplified z/VM migration to z/VM V6.3 from V6.2
- Support for IBM zEnterprise® EC12 (zEC12) GA2 and BC12 servers

For additional z/VM V6.3 release announcement from July 23, 2013, refer to the z/VM V6.3 RFA or the z/VM V6.3 Web site at: http://www.vm.ibm.com/zvm630/

Question:

Have any price changes been announced for z/VM V6.3?

Answer:

No. Pricing for z/VM V6.3 remains the same as V5 & V6.2 and continues to use the Engine-based Value Unit pricing metric. Pricing information is available at: http://www.ibm.com/support/
Choose the option under "Purchase / Upgrade Tools" link under Electronic Services.

Question:

How long does IBM plan to support z/VM V6.3?

Answer:

IBM announced plans to support z/VM V6.3 until April 30, 2017.

Question:

How long does IBM plan to support z/VM V5.4 & V6.1?

Answer:

The date planned for discontinuing service support for z/VM V5.4 is December 31, 2014, or until the IBM System z9® Enterprise Class and IBM System z9 Business Class are withdrawn from support, whichever is later.
z/VM V6.1 is no longer supported. The end of service date for that release was April 30, 2013.
It was also announced in an SOD in the V6.3 announce that the IBM zEnterprise EC12 and IBM zEnterprise BC12 are planned to be the last System z servers supported by z/VM V5.4 and the last System z servers that will support z/VM V5.4 running as a guest (second level).

Question:

Have there been any changes for IBM Business Partners to remarket S&S?

Answer:

Yes. With this announcement, IBM Business Partners in all geographies now have the option to remarket the z/VM S&S, program number 5741-SNS for up to three years if ordered at the same time as the associated IPLA license that is remarketed by that partner.

Question:

Have there been any changes for IBM Business Partners to remarket S&S for any other IPLA products associated with z/VM?

Answer:

Yes. Effective October 23, 2009, IBM Business Partners in all geographies will now have the option to remarket the associated S&S for the products listed in the following table for up to three years if ordered at the same time as the associated IPLA license that is remarketed by that partner. Previous to this announcement, S&S for these products could only be remarketed for 1 year and only by IBM Business Partners in EMEA.

Program Name	Program Number	S&S Program Number
IBM Tivoli® OMEGAMON® XE on z/VM and Linux, V4.1	5698-A36	5608-S73
IBM Tivoli zSecure Manager for RACF® z/VM	5655-T13	5655-T14
IBM Tape Manager for z/VM	5697-J08	5697-J11
IBM Archive Manager for z/VM	5697-J05	5697-J12
IBM Backup and Restore Manager for z/VM	5697-J06	5697-J13
IBM Operations Manager for z/VM	5697-J10	5697-J15

Question:

Where can I find more details on this announcement?

Answer:

Refer to the IBM Business Partner attachment of the IBM Software Announcement for z/VM V6.3, dated July 23, 2013 referenced on the z/VM Web Site at: http://www.vm.ibm.com/zvm630/

Question:

Where can I find more question, answers and information regarding z/VM V6.3?

Answer:

Refer to the questions and answers within the next section of this document or the z/VM Web site at: http://www.vm.ibm.com/zvm630/

Question:

Where can I find more information for the z/VM announcement on July 23, 2013?

Answer:

The z/VM Web Site at: http://www.vm.ibm.com/zvm630/ has numerous references to additional material including the official announce letter. This is the primary location to find additional material on V6.3.

Question:

Where can I find more information for the System z hardware announcements on July 23, 2013?

Answer:

Refer to IBM Hardware Announcement IBM zEC12 GA2 enhancements, dated July 23, 2013.
 And
Refer to IBM Hardware Announcement IBM zBC12 GA1, dated July 23, 2013.

Reference to these pages is at: http://www-03.ibm.com/systems/z/news/

Question:

What z/VM statements of direction were included with the July 23, 2013 announcement?

Answer:

Statements of Direction from the July 23, 2013 Announcement letter:

Security Evaluation of z/VM V6.3
IBM intends to evaluate z/VM V6.3 with the RACF Security Server feature, including labeled security, for conformance to the Operating System Protection Profile (OSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4+).

FIPS Certification of z/VM V6.3
IBM intends to pursue an evaluation of the Federal Information Processing Standard (FIPS) 140-2 using National Institute of Standards and Technology's (NIST) Cryptographic Module Validation Program (CMVP) for the System SSL implementation utilized by z/VM V6.3.

Support of the 10GbE RoCE Express feature
In a future z/VM deliverable IBM plans to offer support for guest exploitation of the 10GbE RoCE Express feature (#0411) on the IBM zEnterprise EC12 and IBM zEnterprise BC12 systems. This is to allow guests to utilize Remote Direct Memory Access over Converged Ethernet (RoCE) for optimized networking.

Support of the zEDC Express feature
In a future z/VM deliverable IBM plans to offer z/VM support for guest exploitation of the IBM zEnterprise Data Compression (zEDC) Express feature (#0420) on the IBM zEnterprise EC12 and IBM zEnterprise BC12 systems.

Stabilization of VM V5.4 support
The IBM zEnterprise EC12 and IBM zEnterprise BC12 are planned to be the last System z servers supported by z/VM V5.4 and the last System z servers that will support z/VM V5.4 running as a guest (second level). z/VM V5.4 will continue to be supported until December 31, 2014, or until the IBM System z9 EC and IBM System z9 BC are withdrawn from support, whichever is later. Refer to Withdrawal Announcement 912-144, (RFA56762) dated August 7, 2012.

Withdrawal of support for Expanded Storage
z/VM 6.3 will be the last release to support expanded storage (XSTOR) as part of the paging configuration. With the enhanced memory management support added in z/VM V6.3, expanded storage is no longer recommended as part of the paging configuration. z/VM can run efficiently in a configuration using only central storage.

z/VM V6.3 Content – July 23, 2013

Question:

What are the feature functions in z/VM V6.3?

Answer:

IBM z/VM V6.3 extends the mainframe virtualization platform with the following:

- Improved economies of scale with z/VM Support for 1 TB of real memory
  - Better performance for larger individual virtual machines with more real memory available to back those large virtual machines.
  - Quadruples memory scalability while continuing to maintain greater than 90% resource utilization.
  - Reduced LPAR sprawl for additional vertical scalability.
    - Considerably more virtual machines can be consolidated into a single LPAR, depending on workload characteristics.
  - Reduced administrative expense through managing a smaller number of larger capacity z/VM host servers.
  - Improved performance with HiperDispatch.
    - More efficient utilization of CPU hardware resources underneath multiple layers of virtualization running multiple and diverse workloads.
- OpenStack is an infrastructure as a service (IaaS) cloud computing open source project. IBM joined the project in 2012 and in support of System z is making contributions to the OpenStack project that are designed to enable z/VM V6.3 to be the first System z operating environment that can be managed with these open cloud architecture-based interfaces.
- Quicker cloud deployment with Extreme Cloud Administration Toolkit (xCAT).
  - Pre-installed and pre-configured with z/VM V6.3, xCAT provides the ability to provision, manage, and monitor physical and virtual machines.
- Simplified migration to z/VM 6.3 with upgrade in place installs z/VM as a second level system and the new guest system is then moved to your current systems with minimal impact to your current running system.
- Highly secure industry standard support that is required for banking and financial industry applications Support for and guest exploitation of the new IBM zEC12 and zBC12 servers.

Question:

Why isn't z/VM V6.3 a new version for z/VM rather than a new release of version 6?

Answer:

z/VM V6.3 requires the same architectural level as V6.1. This level is available on all IBM System z10® or zEnterprise servers. Licensing agreements for z/VM V6.3 have remained unchanged from prior V6 releases.

Question:

What will be the effect of the new release on support for z/VM V5.4?

Answer:

z/VM V5.4 is the last release to support the IBM System z9, IBM eServer™ zSeries® 990 (z990), 900 (z900), 890 (z890), and 800 (z800) servers. It has been withdrawn from marketing December 12, 2011.

The IBM zEnterprise EC12 and IBM zEnterprise BC12 are planned to be the last System z servers supported by z/VM V5.4 and the last System z servers that will be supported where z/VM V5.4 is running as a guest. z/VM V5.4 will continue to be supported until December 31, 2014, or until the IBM

System z9 EC and IBM System z9 BC are withdrawn from support, whichever is later. Refer to Withdrawal Announcement 912-144, (RFA56762) dated August 7, 2012.

 For Customers that plan a migration from a pre-z10 server to a server newer than zBC12 (when it is available), this will mean it is a double migration. Both hardware and software will need to be migrated concurrently. This is not the case today but it will be in the future.

Question:

What types of guests are supported for Live Guest Relocation in an SSI?

Answer:

Linux Guests are supported as they were in V6.2.

Question:

Can I still order z/VM V6.2?

Answer:

No. z/VM V6.2 is not available for ordering with the announcement of z/VM V6.3. z/VM V6.2 and its priced, optional features of SSI, RSCS, DirMaint™, RACF, and the Performance Toolkit for VM™ will be withdrawn from marketing on July 23, 2013.
IBM will discontinue service support for z/VM V6.2 has been previously been announced as April 30, 2015

Question:

Can I still license z/VM V6.2 for additional capacity after z/VM V6.3 is available?

Answer:

Customers that have z/VM V6.2 can add incremental Value Units of z/VM V6 and use incremental z/VM V6.2 capacity. This applies to the z/VM Base as well as all features.

To add additional capacity, contact your IBM Representative.

Question:

Can I add z/VM optional features (SSI, RSCS, DirMaint, RACF, and the Performance Toolkit for VM) to my existing z/VM license?

Answer:

Yes. Customers that have z/VM may license optional features of z/VM. These optional features were included in the base z/VM deliverable and only need enablement on your system.
To add any optional z/VM features contact your IBM Representative.

Question:

As an overview, what additional functions or enhancements are delivered in z/VM V6.3 in addition to Memory Scalability and CPU Efficiency by exploitation of HiperDispatch?

Answer:

Virtualization technology and Linux enablement

z/VM V6.3 includes extensions to z/VM virtualization technology in support of Linux on System z, z/OS, and other guests.

- **IPL Changes for NSS in a Linux Dump -** The IPL command function has been enhanced to provide the capability to retain the contents of a named saved system (NSS) in guest memory if one is in use. This enhancement allows standalone dump tools, such as those used with the Linux operating system, to include the contents of the NSS in a standalone dump.

Technology exploitation

z/VM V6.3 includes support for the newest IBM System z hardware technologies.

- **IBM zEnterprise EC12 and IBM zEnterprise BC12** z/VM supports the IBM zEnterprise EC12 (zEC12) and IBM zEnterprise BC12 (zBC12) and enables guests to exploit selected new features. Some of those features are: Local-TLB-Clearing Facility, Crypto Express4S, 2877 IBM Common Cryptographic Architecture (CCA) coprocessor, 2878 IBM Enterprise Public-Key Cryptography Standards (PKCS) #11 (EP11) coprocessor, 2879 Accelerator, Expanded features of the CPU-Measurement Counter Facility, OSA-Express5S (the next generation of devices in the OSA family)

- **Fibre Channel Protocol Data Router support** to allow guest exploitation of the Data Router facility to directly transfer data from guest memory to an FCP device.

- **FICON® DS8000® Series new functions**. The following functions are now supported:

  - **Storage Controller Health Message to** give more details and is intended to reduce the number of false HyperSwap™ events that have occurred with the less descriptive Equipment Check

  - **Peer-to-Peer Remote Copy (PPRC) Summary Unit Check** - a new Summary Unit Check has been created that gives only one interrupt per affected LSS to reduce the amount of false HyperSwap events by GDPS® and reduce the amount of processing required to handle PPRC suspend events, which previously came via state change interrupts.)

- **HiperSockets completion queue guest exploitation support** z/VM provides guest support for asynchronous HiperSockets™ data transmission provided by completion queues when deploying a HiperSockets network in a virtualized environment. This is particularly useful when data is received in bursts from the connectivity partner.

- **Multiple subchannel set support for mirrored DASD** to allow using an alternate subchannel set for Peer-to-Peer Remote Copy (PPRC) secondary volumes.

Systems management

z/VM V6.3 includes systems management improvements that help to provide self-configuring, self-managing, and self-optimization facilities.

- **Enhanced Performance Toolkit** function level 630, updated for CP memory management, z/VM HiperDispatch, High Performance FICON, HiperSockets Bridge & SSI live guest relocation

- **Enhanced z/VM systems management application programming interface (SMAPI)** enhancements include: Several new and updated APIs, The LOHCOST Data Base, used to cache directory and meta data, is now available for use in all SMAPI installations.

Network virtualization

z/VM V6.3 includes enhancements to z/VM network virtualization.

- **Live guest relocation support for port based virtual switches** This support builds on the existing live guest relocation framework to: allow relocation of a port based interface, prevent relocation of an interface that will clearly be unable to establish network connectivity & adjust the destination virtual switch configuration (when possible) by inheriting virtual switch authorization from the origin. The support adds the eligibility checks that are needed to safely relocate a guest with a port based virtual switch interface.

- Virtual switch recovery stall prevention provides additional error recovery.

- Virtual switch support has been enhanced to support Virtual Edge Port Aggregator (VEPA) mode, which allows advanced access, traffic, and security controls to be performed on network traffic.

Scalability
z/VM V6.3 includes scalability enhancements that can help support increased workloads on z/VM.

- **Memory management to support 1TB of main memory.** These enhancements are intended to improve efficiency for the over commitment of virtual to real memory for guests and to improve performance. Some benefits of these memory management changes are: Improved efficiency in the management of memory over-commitment & less need to use multiple LPARs by supporting more virtual machines in a single image and larger virtual machines in a single image, reducing system management complexity.

- **Enhanced dump support by the rewriting the stand-alone dump utility.** The new stand-alone dump creates a CP hard abend format dump, which is usually much smaller than a storage dump, and the dump is written to either ECKD™ or SCSI DASD and it supports larger memory sizes, up to a maximum of 1 TB.

Security
z/VM V6.3 includes enhancements to the security characteristics of z/VM.

- **Crypto Express4S support** for z/Architecture® guests can be authorized in the z/VM directory for shared or dedicated access to the Crypto Express4S. When Crypto Express4S is configured as an accelerator or a CCA coprocessor, z/VM supports the device for shared or dedicated use. When Crypto Express4S is configured as an EP11 coprocessor, z/VM supports the device for dedicated use only.

- **SSL server upgrade and TLS 1.2 support** to z/OS V1.13 equivalency. This upgrade includes support for Transport Layer Security (TLS) protocol, version 1.2, which provides support for SHA-256 certificates. A new PROTOCOL operand on the VMSSL command allows the system administrator to enable and disable SSL and TLS protocols for cryptographic use in the operation of the SSL server. The z/VM SSL server has also been enhanced to support secure IPv6 SSL connections.

Installation, serviceability, and packaging
z/VM V6.3 includes enhanced functions and processes to improve the installation and serviceability of z/VM.

- **Upgrade installation in place technique for achieving an upgrade to** z/VM V6.3 when upgrading from z/VM V6.2. This simplifies and accelerates the upgrade process.

- **Cross-systems highest level program handling** In an SSI cluster in which members have different levels of z/VM installed, certain programs that manage shared resources are required to be at the highest release level that is running in the cluster.

- **Service enhancements** z/VM includes the following service enhancements: The VMVFIEW EXEC has been updated to accommodate VMSES/E program-specific tracing output, Console data excluded from the SERVICE $CONS by the SERVICE EXEC is spooled to the reader as a file called SERVICE $CONXCLD

- **xCAT appliance packaged with z/VM V6.3** The Extreme Cloud Administration Toolkit (xCAT) appliance is packaged with z/VM V6.3.
  More details on the overall release can be found at: http://www.vm.ibm.com/zvm630/

Question:

What is the Memory Scalability enhancement announced with z/VM V6.3?

Answer:

As workloads continue to grow in size, they put significant pressure on the resource requirements of individual virtual machines. To address pressure on memory resources, z/VM V6.3 supports 1 TB of real memory, which may increase server consolidation ratios and will continue to support more virtual servers than any other platform in a single footprint. With the introduction of new functionality to increase memory scalability limits, z/VM V6.3 provides the capability to scale with efficiency both horizontally and vertically, supporting growing demands.

Question:

What is the HiperDispatch function announced with z/VM V6.3?

Answer:

To address increasing workload demands for processor cycles and for quicker access to memory, z/VM HiperDispatch can improve workload throughput by optimizing the utilization of processor cache. z/VM HiperDispatch attempts to re-dispatch a virtual server repeatedly on the same physical CPU, or on topologically adjacent CPUs. When a virtual server can be redispatched on the same CPU or on an adjacent one, it increases the chances of obtaining data from the processor cache, and avoids time delays incurred by having to access main memory.

Strengthening the affinity between dispatched work and logical and physical processors increases the probability of cache hits, which improves performance. The highest performance gains are most likely to be seen when running on large numbers (16 to 32) of physical processors with workloads that can benefit from various processor caches based on memory reference patterns, intensity and density. Additional detailed information on HiperDispatch can be found in the z/VM performance report that is referenced by the V6.3 web page at: http://www.vm.ibm.com/zvm630/

Question:

How has z/VM V6.3 changed how I can keep guest server machines in main memory?

Answer:

z/VM has changed the handling of SET RESERVED command such that it will always keep user pages in main memory except in emergency cases. When Pages are Reserved CP will not take frames from a virtual machine, NSS, or DCSS if doing so would reduce its resident storage footprint below its reserved storage setting unless a system outage is imminent due to a severe shortage of frames.

Question:

Can I Reserve frames in a NSS or DCSS?

Answer:

Yes. z/VM V6.3 now allows you to reserve frames in a DCSS or NSS. This is particularly effective with the MONWRITE DCSS. This keeps z/VM from paging this space and it enhances the performance of the VM Monitor.

Question:

What version of Linux is tested with z/VM V6.3 both in an SSI cluster and in a non-SSI environment?

Answer:

z/VM Development has tested with several levels of Linux which include but not limited to Novell SUSE SLES10, SLES11 and Red Hat REL6. Guidelines and or restrictions for specific releases and others will be identified prior to general availability of z/VM V6.3 at http://www.ibm.com/vm/zvm63ssi

IBM System z server and IBM System Storage information

Question:

Which servers are supported by z/VM V6.3?

Answer:

z/VM V6.3 supports the IBM System z10 Enterprise Class (z10 EC™), IBM System z10 Business Class™ (z10 BC™) servers IBM zEnterprise 196 (z196), IBM zEnterprise 114 (z114), IBM zEnterprise EC12 (zEC12), IBM zEnterprise BC12 (zBC12) servers

Question:

What supported versions and releases of z/VM support the z10 EC, z10 BC, z196, z114, zEC12 & zBC12 servers?

Answer:

z/VM releases V5.4 and V6.2 with applicable PTFs, and V6.3 or later.

Question:

Where can I find out more information on the IBM System z servers?

Answer:

For additional information on System z Servers see: http://www-03.ibm.com/systems/z/hardware/
FAQs are also available for the System z servers at: http://ibm.com/systems/z/resources/faq/index.html

Question:

What cryptography support is provided by z/VM for the z10 EC, z10 BC, z196, z114, zEC12 and zBC12 servers?

Answer:

z/VM provides guest exploitation support for the CP Assist for Cryptographic Function (CPACF) and Crypto Express2, Crypto Express3 and Crypto Express4S features.

Question:

What supported versions and releases of z/VM provide exploitation support for the z9 EC, z9 BC, z990, z900, z890, and z800 servers?

Answer:

z/VM release V5.4.

Question:

Does z/VM V6.3 support OSA-Express4S and OSA-Express5S?

Answer:

Yes. OSA-Express4S features for the local area network (LAN) provide for single mode fiber (LX, LR) and multimode fiber (SX, LR) environments. The 10 GbE features have one port per feature and one CHPID. The GbE features have two ports per feature and one CHPID shared by the two ports.

OSA-Express5S is the next generation of devices in the OSA family. It contains a technology update compared with the OSA-Express4S, with similar performance characteristics.
An APAR is required for the z/VM V6.2 NETSTAT OSAINFO command.

Question:

Can I use Unified Resource Manager to manage my z/VM V6.3 system?

Answer:

No. z/VM V6.3 is not eligible to be ensemble managed.
IBM zEnterprise Unified Resource Manager (zManager) is designed to provide systems management capabilities across the multi-architecture environment of zEnterprise. Many of you are planning to exploit these system management capabilities to deploy a framework for a heterogeneous cloud environment, thereby providing an effective means to help deliver IT services. To accelerate the delivery of its cloud offerings, IBM recently announced plans to base all of its cloud services and software on open architecture and standards, including OpenStack.

OpenStack is an infrastructure as a service (IaaS) cloud computing open source project. IBM joined the project in 2012 and in support of System z is making contributions to the OpenStack project that are designed to enable z/VM V6.3 to be the first System z operating environment that can be managed with these open cloud architecture-based interfaces.

Looking ahead, IBM will continue to enable OpenStack to provide heterogeneous systems management across zEnterprise, z/VM, and distributed platforms, which in turn can be exploited by subsequent IBM SmartCloud offerings. These offerings are designed to provide you enablement for enterprise-wide cloud deployments and greater flexibility by removing the need to develop specific interfaces for different cloud services.

Question:

Today, I'm using Unified Resource Manager to manage z/VM and virtual servers running on z/VM. When I upgrade to z/VM V6.3, can I continue to use the Unified Resource Manager?

Answer:

No. In light of IBM's cloud strategy and adoption of OpenStack, the management of z/VM environments in zManager is now stabilized at V6.2 as part of the evolution of the IBM cloud strategy and adoption of OpenStack. Accordingly, zManager does not provide systems management support for z/VM V6.3. However, zManager will continue to play a distinct and significant role in the management of virtualized environments created by zEnterprise integrated firmware hypervisors - PR/SM™, PowerVM™, and x hypervisor based on Kernel-based Virtual Machine (KVM).

The z/VM website for V6.3 will have more information on this. See: http://www.vm.ibm.com/zvm630/

Question:

How do I migrate my z/VM V6.1 or V6.2 system that is ensemble managed to an unmanaged V6.3 system?

Answer:

Clients can migrate from z/VM 6.2 to z/VM 6.3 in a shorter period of time with automation provided by a new upgrade installation procedure. Automation eliminates the effort required to copy and reconfigure your current environment and the hardware resources associated with migration. Taking advantage of live guest relocation in conjunction with such an upgrade can completely eliminate a planned outage of active workloads.

The z/VM web site for V6.3 will have more information specific to migration of ensemble managed systems. See: http://www.vm.ibm.com/zvm630/

Question:

So, if I was previously using Unified Resource Manager with z/VM, can I still use Unified Resource Manager to manage my POWER7® and IBM System x® blades even if I do not use it for z/VM?

Answer:

Yes. You will still use Unified Resource Manager to manage your POWER7 and System x blades even if you do not use it for z/VM?

Question:

Can z/VM V6.3 virtual servers be part of a zEnterprise ensemble?

Answer:

No. z/VM will no longer be part of the zEnterprise Ensemble but it can share data. Customer experience with the IBM zEnterprise BladeCenter® Extension (zBX) has led IBM to depart from its original requirement to exclusively support Layer-3 connectivity between the external data network and the intraensemble data network (IEDN) top-of-rack (TOR) switches in the zBX. With this change, a z/VM Virtual Switch can be used to provide a Layer 2 connection through the IEDN TOR switch using an OSD, thus extending IEDN connectivity to z/VM guests without requiring an OSX and without requiring z/VM to participate in an Ensemble.

A Redpaper is now available, illustrating a set of pre-tested configuration examples in support of both Layer-2 and Layer-3 connectivity. The Redpaper, IBM zEnterprise BladeCenter Extension: Network Connectivity Options (REDP-5036) includes a description of limitations and trade-offs when deploying Layer-2 versus Layer-3 connectivity.

The Redpaper can be accessed at the following website: http://www.redbooks.ibm.com/

Question:

I am interested in deploying z/VM V6.3 VMSSI. Are there resources to help me understand, plan and deploy a z/VM Single System Image?

Answer:

Yes. IBM STG Lab Services can assist with this. You can contact IBM STG Lab Based Services via the Internet at: http://www.ibm.com/systems/services/labservices/ or send email to mailto:systemz@us.ibm.com

Question:

Can I use the IBM Systems Director to manage z/VM V6.3?

Answer:

No, the Access Point Agent (MAP Agent) for IBM systems director is not support on z/VM V6.3

Question:

I am thinking about OpenStack Development and may want to contribute. How should I start with it?

Answer:

Go to the Devstack project - http://devstack.org/. This is a good starting point

Question:

Are there any planned installation changes in V6?

Answer:

Yes. IBM encourages all customers to review the installation process prior to trying to install the base z/VM V6 system or the VMSSI feature with V6 as there are significant changes and even experienced customers will need to be familiar with the new process.

Question:

Will the installation changes affect the way z/VM V6.3 is installed?

Answer:

Yes. With the installation changes in V6.2 & V6.3, a number of things have changed. The installation of V6.3 has been enhanced, regardless if you are using SSI or not. A new streamlined upgrade from V6.2 systems has been enabled. For those installing for the first time or those upgrading from another release of z/VM, additional automation has been added to the installation process.

Question:

What is the new upgrade in place function?

Answer:

A new upgrade installation process has been implemented in z/VM to facilitate ease of migration from V6.2 systems to V6.3. Customers can migrate from z/VM V6.2 to z/VM V6.3 in a shorter period of time with automation provided by a new upgrade in place installation technique. Automation installs z/VM V6.3 as a second level guest of the z/VM V6.2 system, eliminating the requirement to install z/VM on a separate set of volumes and allowing an upgrade in place to occur, whereby the current system is upgraded with minimal effect. Taking advantage of live guest relocation can completely eliminate a planned outage of active workloads.

Question:

Can I use upgrade in place from z/VM V5.4 or V6.1?

Answer:

You can upgrade from these releases but it is a manual process to install z/VM V6.3 on a second level system and then migrate from the prior release. This is the traditional upgrade mechanism and does not take advantage of the new upgrade in place function.

Question:

Do I have to apply maintenance to my z/VM V6.2 system to enable upgrade in place for migration to V6.3?

Answer:

Yes. APAR VM65317 must be installed on your z/VM V6.2 system to prepare the system for migration.

Question:

Can I use the Hardware Management Console for installation?

Answer:

Yes. Using z/VM V5.4 or later and the Hardware Management Console (HMC) 2.10.0, or later, in conjunction with the Support Element (SE) 2.10.0, or later, on IBM System z10 servers, z/VM can be installed in an LPAR and both z/VM and Linux on System z can be installed in a virtual machine from the HMC DVD drive. This can eliminate requiring any external network setup and a physical connection between an LPAR and the HMC, instead using the existing communication path between the HMC and the SE, and thus may make configuration easier and more secure, because the HMC does not have to reside on the intranet.

Question:

Are there any performance considerations when installing Linux from the HMC?

Answer:

Yes. This support is intended for customers who have no alternative, such as a LAN-based server, for serving the DVD contents for Linux installations. The elapsed time for installation using the HMC DVD drive can be an order of magnitude, or more, longer than the elapsed time for LAN-based alternatives.

Question:

Is there a migration path between a non-SSI environment and an SSI cluster environment?

Answer:

Yes. We do provide instructions but this does involve doing a fresh install for SSI.

Question:

Where can I get more information on the installation changes?

Answer:

The information is located in the installation manual and other documentation that can be referenced from the z/VM V6.3 web site at: http://www.vm.ibm.com/zvm630/

Question:

Does z/VM provide support for the DS6000®?

Answer:

Yes. The DS6000 is designed to deliver enterprise-class storage capabilities in a space-efficient, modular design at a low price.

Question:

Does z/VM provide support for the DS8000?

Answer:

Yes. z/VM supports the DS8000 and this support in V6.3 is enhanced with the following functions on the IBM System Storage DS8700 and later devices:

- **Storage Controller Health Message -** This new attention message will be generated from the hardware, one per corresponding Logical Storage System (LSS), to alert the operating system of a condition that in the past would have surfaced as a general Equipment Check.

- **Peer-to-Peer Remote Copy (PPRC) Summary Unit Check -** When a PPRC suspend condition existed in the past, a corresponding state change interrupt would be presented to each affected DASD in the LSS. When there are a large number of DASD involved, the amount of processing, time, and memory needed by the operating system to process each state change interrupt can accumulate. For customers with large numbers of DASD, this state change processing can cause

timeouts to occur in GDPS HyperSwap scenarios, because a PPRC suspend occurs on every DASD under HyperSwap control. To prevent these timeouts, a new Summary Unit Check has been created that gives only one interrupt per affected LSS.

Question:
What is the z/VM support for the IBM System Storage SAN Volume Controller (SVC) Storage Engine 2145?

Answer:
z/VM and its guest operating systems are designed to access SCSI FCP storage capacity from multiple vendors as a single reservoir of capacity that can be managed from a central point. z/VM supports the SVC through the z/VM generic SCSI device driver. The SVC handles the device-specific requirements for whatever collection of different storage devices a customer has attached to the SVC. z/VM support for the SVC allows the z/VM control program (CP) and guest operating systems that use SCSI devices (such as Linux on System z and z/VSE, as well as z/VM itself) to access IBM disk subsystems, including the DS8000, DS6000, DS4000®, IBM XIV® Storage System, as well as disk subsystems from other manufacturers that are supported by the SVC.

The SVC support adds "2145" as a parameter of the EDEVICE configuration statement, as well as the SET EDEVICE and QUERY EDEVICE commands.

The SVC can be used to provide SCSI devices as emulated FBA devices for use by CP and guest operating systems.

Use of SCSI devices accessed through the SVC by dedicated FCP subchannels is available to guest operating systems.

Supported hardware list, device driver and firmware levels for the SAN Volume Controller can be found at: http://www.ibm.com/support/docview.wss?rs=591&uid=ssg1S1002864

Question:
Does z/VM provide support for the IBM XIV Storage System?

Answer:
Yes. XIV devices can be used for z/VM system volume usage when attached to a SAN Volume Controller (SVC). For additional information on the IBM XIV Storage System, refer to: http://www.ibm.com/systems/storage/disk/xiv/index.html

Question:
Does z/VM V6.3 support the TS1140 Tape Drive (3592 Model E07)?

Answer:
Yes. z/VM V6.3 supports the IBM System Total Storage TS1140 Tape Drive (3592 Model E07) that can provide IBM System z customers with FICON® or ESCON® attachment of the highest capacity, highest performing tape drives offered by IBM.

In addition, tape library support for these drives is provided by DFSMS/VM™ FL221 with RMS APAR VM65005 and its prerequisite service.

Question:

Does the prior supported releases of z/VM (V5.4 & V6.2) support the TS1140 Tape Drive (3592 Model E07)?

Answer:

Yes. zVM V5.4 and V6.2 support for the 3592 Model E07 tape drive is provided with APAR VM64979. In addition, tape library support for these drives is provided by DFSMS/VM FL221 with RMS APAR VM65005.

Question:

What version of Linux runs on IBM Servers?

Answer:

The minimum version IBM tested and supported Linux environments for IBM servers are documented in the IBM "Tested Environments" page for System z.
See: http://www-03.ibm.com/systems/z/os/linux/resources/testedplatforms.html

Question:

Can I run z/VM V6.3 in an LPAR which has a mix of standard and IFL processors?

Answer:

Yes. The IBM System z10 introduced and the IBM z196, z114, zEC12 and zBC12 continue to support z/VM-mode logical partitions (LPARs), which allow multiple types of System z processors to be defined in the same z/VM LPAR, including:

- Central Processors (CPs)

- Integrated Facility for Linux Processors (IFLs)

- IBM System z Integrated Information Processors (zIIPs)

- IBM System z Application Assist Processors (zAAPs)

- Internal Coupling Facility Processors (ICFs)

z/VM V6 exploits this capability by expanding its guest support for specialty processors to allow these processor types to be defined as virtual CPUs. This capability increases flexibility and simplifies systems management by allowing a single z/VM V6 system to:

- Operate z/TPF, z/VSE®, and z/OS guests on CPs

- Operate Linux on System z as guests on IFLs and optionally on CPs

- Offload z/OS system software process requirements, such as DB2® workloads, on zIIPs

- Provide an economical Java™ execution environment under z/OS on zAAPs

- Operate coupling facility virtual machines in support of a Parallel Sysplex® test environment on ICFs and optionally on CPs

z/VM General

Question:

Are there any planned changes to the publications with V6.3?

Answer:

Yes. Many documents in the z/VM library have been refreshed.

z/VM product documentation published in BookManager® and Adobe PDF format is planned to be available at GA. The online locations are:

In the z/VM V6.3 VM Internet Library website at: <u>http://www.ibm.com/vm/library/</u>

or

In the z/VM V6.3 Information Center web site at: <u>http://publib.boulder.ibm.com/infocenter/zvm/v6r3/index.jsp</u>

The *IBM Online Library: z/VM Collection* on DVD is also available as a downloadable DVD image, SK5T-7098. This DVD image includes the IBM User Interface Help System framework, which allows you to install the information center on a workstation or intranet. The DVD image can be obtained from the z/VM V6.3 Information Center or the IBM Publications Center.

Question:

What is an Information Center?

Answer:

IBM now publishes the z/VM documentation (information for the z/VM base and optional features) in an information center using the IBM Eclipse Help System framework. The content of the Information Center is identical to that in the traditional BookManager and Adobe PDF formats; however, the presentation might differ to some degree.

Advantages of information centers are:
- Content is indexed by Google and other Internet search engines to help locate information more easily.
- Custom searches can be created that include only the information you need for a particular task or job role.

Question:

What features are optional for z/VM V6.3?

Answer:

The priced, optional features of the z/VM V6.3 base product are the VMSSI, Performance Toolkit for VM, DirMaint, RACF Security Server and Remote Spooling Communication Subsystem (RSCS) Networking.

Question:

What IBM tools are available to help manage multiple images of Linux, analyze performance, and act upon results?

Answer:

The following tools are designed to assist the system programmer with managing images, analyzing performance and adjusting the system for optimal resource utilization:

- **xCAT** – For customers who want to get started with Cloud computing, Extreme Cloud Administration Toolkit (xCAT), a scalable open source tool developed by IBM, can be used to provision, manage, and monitor physical and virtual machines. Because xCAT is integrated into z/VM V6.3, it no longer needs to be separately downloaded, installed and configured. Customers can quickly deploy xCAT with a small amount of tailoring.

- **HCM/HCD** – The HCM and HCD components are designed to reduce the amount of system administration input required to complete a z/VM installation and provide a comprehensive, easy-to-use I/O-configuration-management environment similar to that available with the z/OS operating system. The HCM and HCD programs work together to help you easily create and manage the hardware and software aspects of your z/VM system I/O configuration.

- **Performance Toolkit for VM** – The Performance Toolkit for VM provides enhanced capabilities for a z/VM systems programmer, operator or analyst to monitor and report performance data.

- **DirMaint** – IBM Directory Maintenance (DirMaint) Facility provides efficient and security-rich interactive facilities for maintenance of your z/VM system directory.

- **IBM Backup and Restore Manager** – IBM Backup and Restore Manager for z/VM is designed to provide z/VM system administrators and operators the ability to efficiently and effectively backup and restore files and data on z/VM systems, including guest operating systems, such as Linux on System z. Source files and data can be both CMS and non-CMS format, and the target media can be disk or tape. Backup and Restore Manager's full flexibility is apparent in its ability to do full physical and logical backup and restore operations with support for inclusion and exclusion of files, user IDs, and more. Additional information can be found at: http://www.ibm.com/software/stormgmt/zvm/backup/index.html

- **IBM Archive Manager** – IBM Archive Manager for z/VM is designed to address storage and data management concerns by allowing customers to archive historical or other infrequently used data to help increase data availability or to comply with business requirements mandated by fiscal or legal regulations and policies. Additional information can be found at: http://www.ibm.com/software/stormgmt/zvm/archive/index.html

- **IBM Operations Manager** – IBM Operations Manager for z/VM continues to provide automation capabilities for your z/VM environment, including those environments that support guest operating systems, such as Linux on System z. More information about Operations Manager for z/VM can be found at: http://www.ibm.com/software/sysmgmt/zvm/operations/index.html

- **IBM Tape Manager** – IBM Tape Manager for z/VM provides key functions to manage tape volumes and tape devices on your z/VM systems, including: Access control for your tape volumes, Resource monitoring, alerting you when scratch tapes are getting low, Retention management for tape volumes, Data Security Erase support for tapes containing sensitive data, Management of tape devices, both manual mount and library mounts for volumes located in an Automated Tape Library (ATL) or Virtual Tape Server (VTS), & Support for dynamically sharing tape devices across z/VM and non-z/VM systems. Additional information can be found at: http://www.ibm.com/software/stormgmt/zvm/tape/index.html

- **Tivoli OMEGAMON XE on z/VM and Linux** – Provides a wide range of information about the z/VM and Linux on System z operating systems, including information about your Linux instances running as z/VM guests and the Linux workloads, revealing how they are performing and affecting z/VM and each other. Additional information can be found at: http://www.ibm.com/software/tivoli/products/omegamon-xe-zvm-linux/index.html

- **Virtual Machine Resource Manager (VMRM)** – The Virtual Machine Resource Manager is a service that dynamically tunes the z/VM system. Virtual machines can be grouped into workloads by specifying workload and goal definitions and associations between them, and then adjusts virtual machine CPU and I/O and memory (Linux guests only) performance controls based on actual performance data to attempt to achieve the goals associated with each workload.

Many of these tools are enabled by the Systems Management API infrastructure built into z/VM.

These APIs provide a basic set of functions that may be called by applications to allocate and manage resources for guests running in z/VM virtual machines (virtual images). Use of the API through an application provided by a customer or solution provider are designed so that such applications can allow administrators who lack in-depth VM knowledge to manage large numbers of virtual images running in a single z/VM system.

Question:

What operating systems can z/VM host?

Answer:

z/VM V6.3 is a System z operating system designed to host guest operating systems including Linux on System z, z/OS®, z/VSE®, z/TPF, z/VM, and VM/ESA®. When z/VM V6.3 is installed on Integrated Facility for Linux (IFL) processors, Linux, z/VM V5.4, and V6 can be hosted as guest operating systems.

Question:

Can z/VSE run as a guest of z/VM V6.3?

Answer:

Yes. z/VM V6.3 supports z/VSE V4 and higher levels in z/Architecture (64-bit) mode only.

Question:

What software is available for z/VM from other Independent Software Vendors (ISVs)?

Answer:

IBM maintains a list of software vendor products that can be found at the following link: http://www.ibm.com/vm/vendor/

Please note: This vendor product information is provided by the ISVs without independent evaluation or validation by IBM. IBM makes no claim as to the completeness of the information provided.

Question:

Can I control access to my Linux guests with RACF on z/VM?

Answer:

Yes. When the RACF Security Server feature is ordered, it is licensed under IPLA and is supported on both standard and IFL processors. The RACF Security Server feature FL630 is designed to operate with z/VM V6.3.

Question:

Can I run High Level Assembler (HLASM) to reassemble CP or CMS source modules?

Answer:

Yes. HLASM is available for licensing on standard processors. The High Level Assembler is required for z/VM to:

- Apply corrective service to RACF associated CP parts

- Change exit routines or perform local modifications for any IBM VM product or vendor product

Question:

Can I license HLASM on IFL processors?

Answer:

No. The High Level Assembler is available for use with Linux on System z on IFL processors as a Programming Request for Price Quote (PRPQ). A PRPQ must be submitted to purchase the High Level Assembler for Linux on System z (5799-TCQ) and for its annual Subscription & Support (5799-TCR).

For pricing, terms and conditions, and special bid requests, contact your IBM representative or your IBM Business Partner.

Question:

Can I license ISPF/VM on IFL processors?

Answer:

No. However, ISPF/VM is available on a special bid basis for licensing on IFL processors.
For pricing, terms and conditions, and special bid requests, contact your IBM representative or your IBM Business Partner.

Question:

What software is available for z/VM from IBM?

Answer:

A list of IBM Licensed Programs available for z/VM can be found at the following
link: http://www.ibm.com/vm/related/

Question:

Will IBM maintain a list of Independent Software Vendor (ISV) products that are being offered for Linux?

Answer:

Yes. IBM maintains a list of Independent Software Developer products available for Linux on System z at:

- http://www.ibm.com/systems/z/solutions/isv/linuxproduct.html

- You can also access a list of the IBM products available for Linux at the following
  URL: http://www.ibm.com/software/os/linux/software

*Note: This information is provided by the ISVs without independent evaluation or validation by IBM. IBM makes no claim as to the completeness of the information provided.

z/VM Marketing

Question:

Who do I contact if I am interested in z/VM V6.3?

Answer:

You may contact:
IBM Sales Specialists
IBM Business Partner - Solution Providers
IBM Business Partner - Systems Integrators
IBM Business Partner - Distributors
IBM Sales Centers

Question:

What customers should be interested in z/VM V6.3?

Answer:

With the explosive growth of mobile devices, big data, cloud computing, and social media, there is a need to respond with increased agility to deliver new services, while addressing cost, complexity, and risk. This requires an optimized infrastructure that is integrated, flexible, and secure.

z/VM is a leading platform virtualization product that has been built on and expanded from the fundamentals of virtualization to help optimize IT environments. Virtualization is the entry point to build flexible and cost effective cloud environments that can differentiate service deliver to provide enhanced client experience. In essence, it can become a key control point in the service delivery value chain. The ultimate choice of hypervisor and its management capabilities heavily influences follow-on decisions about products selected to support implementations of cloud. Our objective is to continue to provide a launching point with z/VM for a new technology base and consolidation platform with Linux. Tactically, our objective is to expand the penetration of z/VM in the existing install base and also continue to leverage consolidation offerings that include z/VM to attract new customers to the platform. In order to accomplish this, z/VM V6.3 offers improvements to z/VM that provide a competitive advantage or eliminate a competitive gap.

One of the improvements for enhanced manageability in z/VM 6.3 is support for OpenStack, an infrastructure as a service (IaaS) cloud computing open source project. IBM joined the project in 2012, and in support of System is making contributions to the OpenStack project that are designed to enable z/VM V6.3 to be the first System z operating environment that can be managed with these open cloud architecture-based interfaces.

Looking ahead, IBM will continue to enable OpenStack to provide heterogeneous systems management across zEnterprise, z/VM, and distributed platforms, which in turn can be exploited by subsequent IBM SmartCloud offerings. These offerings are designed to enable enterprise-wide cloud deployments and provide greater flexibility by removing the need to develop specific interfaces for different cloud services.

The new capabilities of z/VM V6.3 offer clients significant increases in their ability to scale a single z/VM instance while continuing to maintain leadership in performance and consolidation ratio. In this release, the z/VM real memory limit increases from 256 GB to 1 TB. Increased scalability limits allow z/VM to stay competitive and continue to differentiate with its ability to scale both horizontally and vertically in a more economic model with greater qualities of service. Another primary benefit of z/VM V6.3 is to improve performance attributes with dispatching of work for more efficient utilization of CPU hardware.

The introduction of z/VM clustering technology, Single System Image, in z/VM V6.2 enabled clients to scale horizontally and enhance system manageability with live guest relocation. In this release, the emphasis is on vertical growth, enabling individual systems to have larger real memory sizes, greater processor effectiveness, and expanded virtual memory capacity. z/VM V6.3 provides our clients with the freedom to reduce costs through a system designed with massive scale for the consolidation of tens to hundreds of distributed servers on Linux on System z.

z/VM & Linux

Question:

Where can I get detailed information regarding Linux on System z?

Answer:

Visit the Linux on IBM system z web page at: http://www-03.ibm.com/systems/z/os/linux/

Question:

How does Linux perform under z/VM?

Answer:

System performance depends on the hardware resources allocated to z/VM V5 and V6 and on the level of activity within each Linux image. For assistance in understanding the performance implications for a particular situation, contact your IBM representative or your IBM Business Partner. You can also refer to the z/VM Performance Reports on the z/VM Web site at: http://www.ibm.com/vm/perf/docs/

Question:

How many Linux servers can I consolidate to run under VM?

Answer:

Our experience with server consolidations show that the number of servers depends on the types of the workload, the technology level of consolidated servers, the utilization factor, and other implementation requirements. Therefore, the answer varies by client and workloads.

IBM has a great experience with consolidation projects and customers can get sizings done through their IBM representative or an IBM Business Partner. Both channels have access to SIZE390 which is used for this purpose. More detailed performance information is available at: http://www.ibm.com/vm/perf/tips/linuxper.html

Question:

How does the introduction of 1TB real memory affect the Linux servers I can consolidate or run under VM?

Answer:

z/VM continues to support 1TB virtual machines as it did in V6.2. With V6.3 you can consolidate more Linux guests to a single z/VM image while maintaining the same memory over commit ratio as in previous releases.

Question:

What benefits do Linux guest get from HiperDispatch or Nodal Affinity?

Answer:

z/VM HiperDispatch can improve workload throughput by optimizing the utilization of processor cache. z/VM HiperDispatch attempts to re-dispatch a virtual server repeatedly on the same physical CPU, or on topologically adjacent CPUs. When a virtual server can be re-dispatched on the same CPU or on an adjacent one, it increases the chances of obtaining data from the processor cache, and avoids time delays incurred by having to access main memory.

Strengthening the affinity between dispatched work and logical and physical processors increases the probability of cache hits, which improves performance. The importance and value of this capability to customers grows as processor configurations become larger. z/VM HiperDispatch is expected to deliver a CPU performance boost depending on a workload's characteristics. Memory-intensive workloads running on large numbers (16 to 32) of physical processors are most likely to achieve the highest performance gains.

Question:

What is the support for Linux on System z guests using DSR (Dynamic Storage Reconfiguration)?

Answer:

z/VM storage (memory) management allows better cooperation with Linux on System z guests exploiting DSR. z/VM support:

- Allows operation when running second level on z/VM to be more compatible with operation when running directly on an LPAR

- Displays configured, standby, and reserved values for each virtual storage element via the QUERY VIRTUAL STORAGE command

- Improves z/VM handling of unexpected DSR conditions that may occur

Question:

What function does z/VM Guest RSA-Assist Support for Linux provide?

Answer:

With corresponding RSA-Assist Support function available from Linux on System z, the VM Guest RSA-Assist support enables Linux guest virtual machines to exploit the IBM CryptoExpress2, Crypto Express3 or Crypto Express4. This support provides clear-key RSA support for a large number of Linux guests enabling hardware Secure Socket Layer (SSL) acceleration on IBM servers.

Question:

How do Fast Channel Command Word Translation Extensions benefit my Linux environment?

Answer:

Fast Channel Command Word (CCW) Translation Extensions help improve the performance of traditional I/O (Start Subchannel (SSCH)) to network and DASD devices. The z/VM Control Program (CP) provides a fast CCW translator to translate a wide range of channel programs that perform I/O to network adapters. This fast translator for network devices includes support for 64-bit indirect data address words (IDAWs), which allows guest machines to read and write data above the 2 GB limit using 64-bit I/O addressing. 64-bit IDAW support was further extended to the existing DASD fast CCW translator. This is also designed to include 64-bit IDAW support for DASD channel programs that are simulated via the minidisk cache (MDC). Although the fast CCW translation extensions are based on analysis of Linux guest channel programs, any VM guest that does qualifying I/Os can benefit from this new function.

Question:

How is page fault handling enhanced in the z/VM?

Answer:

The current page fault handling support within CP is designed to allow Linux on System z guests to take full advantage of page fault notifications. With corresponding function available with Linux on System z, the Linux guest continues to process while the page fault is handled by CP

Question:

What is the Integrated Facility for Linux (IFL)?

Answer:

The Integrated Facility for Linux is a dedicated Linux on System z processor. It is an optional feature, designed to add additional processing capacity, exclusively for Linux workload, with no effect on the existing model designation.

Question:

Can I buy a server that has IFL processors without including a standard processor?

Answer:

Yes. You can order/configure IFL-only processor models with the z10 EC, z10 BC, z196, z114, zEC12 and zBC12 servers.

Contact your IBM representative or see the Enterprise Linux Server offering page for more details at: http://www-03.ibm.com/systems/z/os/linux/els.html

Question:

What benefits does z/VM provide for my Linux guest environment?

Answer:

z/VM enables you to run a large number of Linux server images on a single System z platform. It is ideal for integrating applications and data and consolidating select UNIX®, and Linux workloads deployed on multiple servers onto a single physical System z server, while maintaining the same number of distinct server images. These Linux images can be deployed on standard processors or IFL processors. Server consolidation may result in cost savings realized by managing large server farms deployed on virtual servers instead of multiple hardware servers.

Question:

 What are the specific value propositions of the IBM System z virtual Linux server environments for a dynamic infrastructure?

Answer:

A dynamic infrastructure helps allow for improved service, reduced costs, and reduced risk.
These aspects are very well supported by the IBM System z virtual Linux server environments:

- Improved service is not only provided by the high availability of the environment. Major elements are the high flexibility, the dynamic access to resources and services, and the very fast provisioning.

- Cost reduction can be achieved through the outstanding virtualization capabilities, allowing for higher resource utilization, less energy consumption, and less management effort.

- Risk reduction can be provided through the manifold security and resiliency features, that address today's and future risks that may come with a more connected and collaborative world.

Question:

What support is provided for Linux on System z running on z/VM?

Answer:

Support for Linux is provided by each distributor and through support providers such as your local System z IBM Business Partner and IBM Global Services. Please contact the distributors, your IBM Business Partner or IBM Global Services for specific support information.

Question:

Where can I find more information about running Linux in a VM environment?

Answer:

You can visit z/VM and Linux on System z Resources at: http://www.ibm.com/vm/linux
or the Linux on System z Web page at: http://www.ibm.com/systems/z/os/linux

In addition, there is a wealth of information including white papers, Redbooks® and Redpapers and porting information, and as well as Linux customer stories located on the Linux on System z – Library and Technical support/documentation pages and at
URL: http://www.ibm.com/os/linux/support_resources.html

Pricing, Licensing, & Ordering

Question:

What is IPLA?

Answer:

IPLA stands for IBM International Program License Agreement. There is a one-time license charge for use of the program, which includes defect support via e-mail, fax or postal service and no-charge upgrades for new releases and versions when a current S&S license is in effect. A separate Subscription and Support offering is available with an ongoing recurring charge (4-year OTC in AP - China) for enhanced support, which includes telephone support.

Question:

Will z/VM V6.3 continue to be offered as an IPLA product?

Answer:

Yes. IPLA offerings enable pricing on IBM Integrated Facility for Linux (IFL) processors.

Question:

Have any price changes been announced for z/VM V6.3?

Answer:

No. Pricing for z/VM V6.3 remain the same as V5 and V6 and continues to use the Engine-based Value Unit pricing metric. Pricing information is available at: http://www.ibm.com/support/
Choose the option under "Purchase / upgrade tools" link under Electronic Services.

Question:

How can z/VM be ordered?

Answer:

There is no change to the ordering process for z/VM V6.3. Refer to IBM Software Announcement 213-297 (US), dated July 23, 2013 for ordering information.

Question:

How is the tiered Value Unit concept different than a flat price per processor?

Answer:

The engine-based value unit pricing metric for z/VM V6 offers a declining per-processor price, on a tiered basis. Tiered value unit pricing provides a lower price per processor, on a tiered basis, as the number of standard and IFL processors licensed are increased within the enterprise. Engine-based Value Unit pricing for z/VM V6 is different than MSU-based Value Unit pricing, which is available on other IBM software products.

Processors	Value Units Per Processor	Processors	Value Units Per Processor
1-3	10	13-16	6
4-6	9	17-20	5
7-9	8	21-25	4
10-12	7	26 or more	3

The current price per value unit is $2,250*. As such, the entry OTC price per processor will be $22,500 for z/VM V6 base function. For example, if a customer were to license z/VM V6 for 10 processors, the total OTC price would be $198,000: {3*(2,250*10)}+{3*(2,250*9)}+{3*(2,250*8)}+{1*(2,250*7)}
*Price quoted in US currency and is subject to change.

Question:

How can a customer benefit from enterprise aggregation with Engine-based Value Unit pricing?

Answer:

Engine-based Value Unit pricing may give customers a price benefit as they grow their capacity across their businesses. Customers can aggregate the capacity for all the processors that the product is licensed on to achieve a more economical price. In other words, additional capacity will not be priced starting at the base with a higher price per unit, but on the capacity (processors) where z/VM V6 has already been installed. Enterprise aggregation is only available within the same country.

Question:

z/VM V6.3 is priced per processor. Do I have to license it on each processor on the system, both standard and the IFL?

Answer:

Yes. The following conditions apply:
- Your entitlement is for only the quantity of engine-based Value Units licensed. These engine-based Value Units can be for either standard or IFL processors.

- Your entitlement is for only the quantity of engine-based Value Units licensed. These engine-based Value Units can be for either standard processors (CPs) or Integrated Facility for Linux (IFL) processors.

- z/VM may run on IFL processors only if, on the IFL processors, z/VM is being used exclusively to run (1) Linux or OpenSolaris workloads and, (2) if required, z/VM applications in support of those Linux or OpenSolaris workloads.

- When ordering z/VM Version 6 release 3 to operate on standard processors (CPs) for a single server within the enterprise, you must specify Value Units equal to the Value Units to cover the number of standard processors (CPs) on your server.

- For a single server in an enterprise, the number of Value Units ordered for any optional feature to operate on standard processors must be equal to the number of Value Units ordered for the base z/VM V6 product operating on standard processors.

- When ordering z/VM version 6 release 3 to operate on IFL processors for a single server within the enterprise, you must specify Value Units equal to the Value Units to cover the number of IFL processors on your server.

- For a single server in an enterprise, the number of Value Units ordered for any optional feature to operate on IFL processors must be equal to the number of Value Units ordered for the base z/VM V6 product operating on IFL processors.

- If you are running z/VM version 6 release 2 in an LPAR specified as "z/VMmode" that is configured with both IFL processors and standard processors (CPs) and you intend to run software licensed under the IBM Customer Agreement (ICA) in a virtual machine in that LPAR, that virtual machine must be configured to execute only on standard processors (CPs).

- Within the scope of an enterprise aggregation, the number of Value Units ordered for the S&S license must equal the number of Value Units ordered for the OTC license(s).

Question:

What is the cost of migrating from z/VM V4, V5, V6.1 or V6.2?

Answer:

There is no cost to migrate from z/VM V4, V5, V6.1 or V6.2 to z/VM V6.3 if the customer has a current Subscription and Support (S&S) license for V4, V5 or V6 and is not increasing the number of processors licensed. Customers without current S&S licenses will pay the current price for the number of Value Units required per processor for the z/VM base and optional features.

Customers that wish to use the new z/VM Single System Image FL630 feature (VMSSI) will need to add this feature to their order at an additional cost unless they have already purchased VM Single System Image FL620 feature (VMSSI) on V6.2. This is the same for all the other features of the OS.

Question:

Do I get any credit for the MLC I have paid on prior VM or z/VM products?

Answer:

No. z/VM V6 is a new product, and charged as such.

Question:

Will IBM continue with model group pricing for other IBM z/VM related products when running on standard processors or will they be offered under IPLA?

Answer:

IBM currently offers certain software products that enhance the Linux environment under the International Program License Agreement (IPLA) with one-time charge (OTC) pricing. In addition to z/VM V6, the products currently offered as priced, optional features of z/VM V6 under the IPLA are:
- IBM z/VM Single System Image Feature
- Directory Maintenance Facility (DirMaint)
- Performance Toolkit for VM
- RSCS Networking
- RACF Security Server

Additional systems management products available from IBM and offered under the IPLA using the same pricing model as z/VM for operating on IFL processors are:
- IBM Tivoli zSecure manager for z/VM RACF (5655-T13)
- IBM Tivoli OMEGAMON XE on z/VM and Linux (5698-A36)
- IBM Tape Manager for z/ VM (5697-J08)
- IBM Backup and Restore Manager for z/VM (5697-J06)
- IBM Operations Manager for z/VM (5697-J10)
- IBM Archive Manager for z/VM (5697-J05)

Tivoli provides a host of systems management products for managing Linux on System z. For specific products and releases, refer to the Tivoli platform support matrix at: http://www.ibm.com/software/sysmgmt/products/support/Tivoli_Supported_Platforms.html

Question:

Can I transfer a z/VM V6.3 license?

Answer:

Yes. However, with Software Announcement 205-274 (US), dated November 1, 2005 and effective with the availability of z/VM V5.2, the terms and conditions regarding program transfer have been revised. IBM introduced the Limited Transfer term which stated:

"Licensee may only transfer the Program to another party, in connection with Licensee's transfer of the machine on which Licensee is entitled to operate the Program (referred to as a "Limited Transfer"), provided that any such Limited Transfer of the Program requires Licensee to transfer Licensee's rights and obligations under the Agreement to the transferee and therefore terminates Licensee's authorization to continue to use the Program. When the machine and the Program are transferred, Licensee must either provide a printed copy of the Agreement or, if electronic licensing is used for the Program, take the necessary actions that will require electronic acceptance of the Agreement by the transferee prior to the transferee's first use of the Program."

These terms and conditions are also applicable to z/VM V5.3, V5.4 & V6.

Question:

Is a license required in order to use the Internet print features of the RSCS product?

Answer:

No. Use of RSCS support for LPR, LPD, TN3270E and UFT protocols does not require a license. However, a license is required in order to use any other functions of the RSCS product. To receive the full function of RSCS, it is offered as an optional, priced IPLA feature.

Question:

When ordering z/VM, do I get a money-back guarantee?

Answer:

Yes. If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you. This is for programs licensed under the IPLA and the IBM International License Agreement for Non-Warranted Programs.

For more information please refer to the latest version of the IPL agreements. Please see the web page on IPLA License Agreements and License Information (LI) Documents Repository Web site at: http://www.ibm.com/software/sla

Question:

Can customers finance (or obtain financing for) their purchase of a z/VM software license?

Answer:

Yes. IBM Global Financing offers competitive financing to credit-qualified customers to assist them in acquiring IT solutions. Offerings include financing for IT acquisition, including hardware, software, and services, from both IBM and other manufacturers or vendors. Offerings (for all customer segments: small, medium, and large enterprise), rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or visit http://www.ibm.com/financing

IBM Global Financing offerings are provided through IBM Credit LLC in the United States, and other IBM subsidiaries and divisions worldwide to qualified commercial and government customers. Rates are based on a customer's credit rating, financing terms, offering type, equipment type, and options, and may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension, or withdrawal without notice.

Question:

Is the education allowance available for z/VM V6.3?

Answer:

Yes. A 15% education allowance applies to qualified education institution customers.

Question:

Does z/VM V6 have any software prerequisites?

Answer:

Yes. The prerequisite no-charge products EREP VM V3.5.0 (5654-260) and ICKDSF VM V1.17.0 (5684-042) are required. Both of these products are no-charge and are pre-installed on the base product System DDRs. If you are not already licensed for these products you will need to place a separate order for both products to establish a license.

Question:

Can I order z/VM on Shopz?

Answer:

Yes. You can use Shopz to order the operating system and software products for z/VM operating environments. Using Shopz, customers can quickly generate orders for the base operating system and software products with the z/VM SDO electronically. The z/VM base operating system can be ordered using internet delivery of Shopz. In the case of fully-entitled upgrades, it offers a fully-automated process so no IBM intervention is required. Additionally, Shopz will help to determine if your order is technically correct (i.e. to determine any co-req or pre-req or incompatibility conditions are resolved for timely order placement and processing). Shopz is available in all countries.
See: http://www.ibm.com/software/ShopzSeries

NOTE: Secure z/VM Software Delivery in Shopz
IBM plans to remove support for unsecured connections used for z/VM software and service delivery. It is planned that z/VM software (products and service) downloads from Shopz will require the use of Download Director with encryption or the currently available HTTPS method. No change is required for Download Director with encryption; however, you can verify Download Director with the Connectivity Test. https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=cbct

ServiceLink™ plans to provide similar capability. Details will be provided a later date.

Question:

Are V5.1, V5.2, V5.3, V5.4, V6.1 & V6.2 available for ordering?

Answer:

No, currently only z/VM V6.3 is still available for ordering. V5.4 and V6.2 are still supported, but have been withdrawn from marketing.

IBM discontinued marketing for z/VM V6.2 with the general availability of z/VM V6.3.

For more information on Marketing dates see: http://www.vm.ibm.com/techinfo/lpmigr/VMLWFM.HTML

Question:

What additional information is available on generating and receiving software products for z/VM electronically?

Answer:

z/VM SDO Internet Delivery is available for generating and receiving software products.

- Customers can specify Internet as a delivery option for the program products contained in the z/VM SDO. Customers place orders via Shopz specifying Internet as a delivery option.

- Customers can track the status of their orders in Shopz

- Customers will receive an e-mail notification when their order is ready to download.

- Customers then download the order to their workstation.

z/VM customers can order preventive service by RSU and corrective service (by PTF number, APAR number or ESO) through Shopz. z/VM Version 6 customers can also use the new installed inventory report generated by the VMFBTMAP command to tailor your Shopz service order and avoid receiving service you already have installed. If Internet delivery is supported in your geography, Shopz displays "Internet" as a delivery option.

If ordering to install from electronic delivery:

- Binaries from DVD for installation to SCSI disk are provided in a ZIP file.

- Binaries from DVD for installation to 3390 DASD are provided in a ZIP file.

- The RSU is shipped on the same DVD image as the 3390 and SCSI binaries and containing required service.

Question:

Is IBM planning to change the ordering process for z/VM V6.3?

Answer:

No. z/VM V6.3 can only be ordered using the System Delivery Offering (SDO) which includes a single deliverable containing z/VM V6.3 and a group of fully-serviced IBM Licensed Program Products. The z/VM SDO package contains:

- z/VM V6.3 System DDR (DASD Dump Restore) or a binary system image (DVD)

- z/VM SDO licensed products

Question:

What benefits does the z/VM SDO provide me?

Answer:

The key benefit of the z/VM SDO is the ability to update dynamically the SDO with new program products (versions and releases), to apply service when available, or to delete withdrawn products.

This capability makes the SDO a more effective solution for the z/VM customer.

For additional information on the z/VM SDO, refer to the z/VM SDO Web site at: http://www.ibm.com/vm/sdo/

Question:

Is DFSMS/VM provided as standard with z/VM V6.3?

Answer:

No. DFSMS/VM FL221 is orderable as a no-charge feature with z/VM System Delivery Option (SDO).

Question:

Are there any plans to add additional products to the z/VM V6.3 SDO?

Answer:

No. However, IBM continues to evaluate additional products for inclusion into the z/VM SDO.

Service & Support

Question:

What type of support is planned to be provided for z/VM V6.3?

Answer:

IBM provides optional Subscription and Support (S&S) which is available for z/VM V6.3. These programs have a one-time license charge for use of the program and an annual renewable charge for the enhanced support that includes telephone assistance (voice support for defects during normal business hours), as well as access to updates, releases, and versions of the program as long as support is in effect. If the customer has not purchased the optional S&S support, defect support provided under the terms of the IPLA license is provided only via e-mail, fax or postal service. Please reference the IPLA Terms and Conditions for more information on the defect support provided with the basic license.

Question:

Does the same type of support that applies to z/VM V6.3 also apply to the priced features?

Answer:

Yes. If you would like enhanced support for the priced optional features VMSSI, DirMaint, RSCS, RACF and Performance Toolkit for VM, you must purchase the S&S for each feature.

Please note: Within the scope of an enterprise aggregation, the number of Value Units ordered for the S&S license must equal the number of Value Units ordered for the OTC license(s).

Question:

Is the S&S optional for z/VM and the priced optional features?

Answer:

Yes. However, it is automatically added when you order z/VM V6.3 or any of the optional features of z/VM V6.3. If you do not desire S&S, you must decline this support when the order is placed. Please note: S&S for z/VM not only provides defect support but also provides you with access to updates, releases and new versions of the program for as long as the support is in effect.

Question:

If I have purchased S&S on a previous version of z/VM, will I be charged for ordering z/VM V6.3?

Answer:

No. If you have a current S&S for z/VM V4, z/VM V5 or z/VM V6, you are entitled to receive a no-charge upgrade to z/VM V6.3 and S&S for z/VM V6.3. This is also true for the priced, optional features of z/VM V6.3. If you have a current S&S for the any of the priced, optional features of z/VM V4, z/VM V5, or z/VM V6, you are entitled to receive a no-charge upgrade to that particular z/VM V6.3 priced, optional feature for which you have purchased and S&S license.

Question:

Is the z/VM S&S agreement separate from my Linux S&S agreement?

Answer:

Yes.

Question:

What type of support will be provided for z/VM V6.3 if I don't order the S&S feature?

Answer:

Without ordering the S&S feature, you are limited to central service provided by e-mail, fax, or postal service. You also have access to IBM databases containing information for known program defects, defect corrections, restrictions, and bypasses at no additional charge.

Question:

When I buy S&S, how will I be billed?

Answer:

You will be invoiced for one year (12 months) of support in advance. It will be automatically renewed at the end of the support period unless IBM is notified in writing to terminate the support charges.

Question:

What will I be charged if I do not buy S&S when I originally license z/VM V5 or V6, but decide to purchase S&S later?

Answer:

You will be charged a payment equal to the total of all S&S charges that you would have paid during the lapsed interval had you not declined Support at the time it was offered to you, or terminated and subsequently resumed support, plus one year of support charges.

Question:

Do I receive any credit if I terminate the S&S during the contract period?

Answer

No.

Question:

Where can I find the most up-to-date electronic version of this frequently asked questions list?

Answer:

Please visit: http://www.ibm.com/systems/z/faq/ to view any updates to this FAQ list and any additional FAQ lists for other IBM system offerings.

Question:

Whom can I contact for installation support?

Answer:

Installation and technical support is provided by your IBM System z Business Partner, local Field Technical Support Specialists (FTSS) and Advanced Technical Support (ATS) zSeries and S/390® Systems Support, Gaithersburg, Maryland. Support Line also provides installation support on a fee basis.

Question:

What if I need additional services for z/VM?

Answer:

IBM Global Technology Services (GTS) and IBM System z Business Partners can provide additional on-site services and support. GTS offers a comprehensive selection of services to address your individual service and support requirements. For more information call the IBM Information Center at 1-800-IBM-4YOU (1-800-426-4968) or reference the Internet at the following URL: http://www.ibm.com/services/

Question:

What service offerings are available to assist me with the installation and implementation of Linux?

Answer:

For assistance with the planning, installation and implementation of Linux on your System z platforms, contact either:

STG Lab Based Services via the Internet at: http://www.ibm.com/systems/services/labservices/
 or
IBM Global Technology Services (GTS) via the Internet at: http://www.ibm.com/services/

Each provides a full range of services in support of Linux for System z and either can be reached via 1-800-IBM-4YOU (1-800-426-4968) or reference the Internet at: http://www.ibm.com/services/

Education

Question

What public education courses does IBM provide for VM and Linux?

Answer:

IBM IT Education Services currently offers the following courses:
The z/VM and Linux course catalog includes:
- ZV020 - z/VM Introduction and Concepts (3 days)
- ZV100 - z/VM and Linux Connectivity and Management (3.5 days)
- ZV060 - Installing, Configuring and Servicing z/VM for Linux Guests (5 days)
- MZ062 - Installing, Configuring and Servicing z/VM for Linux Guests (ILO -5 days)
- ZV200 - z/VM RACF and DirMaint Implementation (4.5 days)

The Linux course catalog includes:
- ZL120 - Linux Basics - A zSeries Perspective (2 days)
- ZL100 - Linux Implementation for zSeries (3 days)
- ZL150- Advanced Solutions for Linux on zSeries (4 days)
- ZL180 - Automated Deployment of Linux Images under z/VM (4.0 days)

Private offerings of these classes and customized education may also be requested from IBM. For more information on educational opportunities, contact your local IBM IT Education Services (ITES) or call IBM Training at 800-IBM-TEACH (426-8322) for catalogs, schedules, and enrollments, or visit the IBM Training Web site at: http://www.ibm.com/training/

Courses listed may not be available in all countries. Please check with your local office to learn about offerings for your country.

Question:

Do IBM technical conferences offer tracks for z/VM and Linux on System z?

Answer:

Yes. IBM Training offers public and private z/VM classes and annual Technical Conferences in Europe (in the first half of the year) and in the United States (in the second half of the year).

For more information about IBM Technical Conferences, visit: http://www.ibm.com/services/learning/conf/

Additional z/VM Educational resources can be found on the z/VM Web site at: http://www.ibm.com/vm/education/

Related Information

Question:

Where can I go for more detailed information about z/VM V5.4, V6.2 or V6.3 and Linux and System z technology?

Answer:

See the following links for additional information:
General z/VM information:

- z/VM V5.4 resources: http://www.ibm.com/vm/zvm540/
- z/VM V6.2 resources: http://www.ibm.com/vm/zvm620/
- z/VM V6.3 resources: http://www.vm.ibm.com/zvm630/
- Linux on System z: http://www-03.ibm.com/systems/z/os/linux/

z/VM education:
http://www.ibm.com/vm/education

z/VM publications:

One basic z/VM publication is planned to be shipped in printed format automatically when you order the z/VM V6.2 base product. Publications are also available as Adobe PDF or IBM BookManager files and are provided in the IBM Information Center, on the IBM Online Library: z/VM Collection on DVD and on the IBM z/VM Web site at: http://www.ibm.com/vm/library
Or from the Publication Center at: http://www.ibm.com/shop/publications/order
FAQs:

- System z and z/VM: http://www.ibm.com/systems/z/resources/faq/index.html

Programs and Products for z/VM:

- IBM Licensed Programs available for z/VM: http://www.ibm.com/vm/related

- Independent Software Vendor products available for z/VM: http://www.ibm.com/vm/vendor/

Programs and products for Linux:

- Linux program requirements: http://www.ibm.com/systems/z/os/linux/dist.html

- Independent Software Developer Products for Linux on System
  z: http://www.ibm.com/os/linux/apps/all.html

Redbook/Redpapers:

IBM Redbooks/Redpapers are developed and published by the IBM International Technical Support Organization (ITSO). They are intended to develop and deliver skills, technical know-how, and materials to technical professionals of IBM, Business Partners, and customers. For access to the latest Redbooks and Redpapers see the following URL: http://www.ibm.com/redbooks/
Linux Distributions:

- Novell SUSE Linux: http://www.suse.com/
- Red Hat: http://www.redhat.com/

IBM Global Services Solutions:
IGS Linux Solutions: http://www.ibm.com/services/

[1] IBM modeling of Linux on zEnterprise EC12 vs. alternative distributed servers. Given there are multiple factors in this analysis such as utilization rates, application type, local pricing, etc., results may vary.
[2] Integrated Facility for Linux (IFL): ibm.com/systems/z/os/linux/solutions/ifl.html