z/VM Version 6 Release 3

Virtualization with Efficiency at Scale

Highlights

- More efficient use of CPU resources for improved price performance with support for multi-threading technology

- Multisystem virtualization to improve z/VM systems management and provide high levels of virtualization, I/O bandwidth, and system availability

- Leading the industry with increased availability and reduced cost of ownership in network environments

- Virtual server mobility to help clients avoid planned outages for virtual servers when performing maintenance

- Rapid deployment of Linux virtual servers for under $0.70 per day on IBM® z Systems™ [1]

- High server consolidation ratio with support for more Linux virtual servers than any other platform in a single footprint

Organizations around the world are recognizing the increasing role that technology plays in driving change as they shift investments from infrastructure maintenance toward new projects that create business innovation. The explosive growth of mobile devices, big data, cloud computing, and social media represents a clear opportunity to reshape business models, create competitive advantage, and help deliver significant business value. In order to capitalize on these emerging opportunities, you recognize the 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.

IBM z Systems is uniquely suited to deliver that optimized infrastructure with industry-leading innovation and value. It allows your organization to exploit new technologies to help improve efficiency and speed time to market. It is designed to unlock the power of big data with the integration of business intelligence and transactional processing to help deliver competitive advantages through actionable insights gained from real-time analytics. Advanced virtualization features provided by z/VM® with z Systems and Linux® on z Systems help to provide an efficient infrastructure for deploying private clouds to support workloads that scale both horizontally and vertically at a low total cost of ownership. With its high level of security, you can put your trust in IBM z Systems and z/VM to protect your most valuable information, helping to reduce organizational and reputational risk.

z/VM 6.3 is the premier virtualization platform, supporting more virtual servers than any other in a single footprint. It provides industry leading capabilities to efficiently scale both horizontally and vertically, enabling clients to support growing business demands while lowering the cost of service delivery.

More efficient use of resources for improved price performance

z/VM provides support for multi-threading technology that extends per-processor core capacity growth beyond single-thread performance for Linux on z Systems IFL workloads with support for two threads per core in IBM z13™ (z13). z/VM multi-threading technology support enables additional price performance benefits over previous hardware generations and meets workload requirements transparently. This design allows the z13 to deliver additional capacity across a wide range of CPU utilization for Linux and workloads, crucial for mission critical applications and cloud service delivery.

z/VM V6.3 multi-thread support increases the capacity of z/VM to perform multiple units of work simultaneously. When multiple virtual machines are active, multi-threading allows more of them to execute at the same time, increasing overall throughput. This can lead to completing more transactions, faster response times, and increased resource utilization. In addition, z/VM multi-threading support is transparent to guests; no guest customization or exploitation is required

In conjunction with multi-threading support, CPU scalability has been enhanced in z/VM 6.3 to support up to 64 dispatching units. As a result, it supports up to 64 cores without multi-threading enabled or up to 32 cores (and thus up to 64 threads) with multi-threading enabled.

With the increase of business scale, workloads are continuing to grow in size, putting significant pressure on the resource requirements of virtual machines. z/VM 6.3 now supports up to 1 TB of real memory to help clients keep pace with increasing business demands while continuing to allow for the highest levels of shared resource utilization. With a quadrupling of real memory scalability, this support may increase server consolidation ratios while maintaining greater than 90 percent resource utilization, unmatched in the industry for a multiple diverse workload environment.

In addition to more memory, z/VM enhancements address the increasing workload demands for processor cycles and for quicker access to memory. z/VM HiperDispatch does that by strengthening the affinity between where work is dispatched

and where the data used by that work exists, thereby avoiding delays to retrieve that data. z/VM HiperDispatch is expected to provide improved throughput depending on workload characteristics, with memory-intensive workloads running on larger numbers (16 to 32) of physical processors most likely to achieve the highest performance gains.

With enhanced memory management support added in z/VM V6.3, z/VM can run efficiently in a configuration using only central storage. While expanded storage continues to be supported with a limit of 128 GB, its use is no longer recommended

Multisystem Virtualization

Multisystem virtualization helps clients avoid the virtual machine sprawl challenges of competitive systems and extends z/VM virtualization technology to a new level allowing up to four instances of z/VM to be clustered together as members in a Single System Image (SSI). SSI is provided with the IBM z/VM Single System Image Feature (VMSSI) and extends a fundamental strength of z/VM to share all system resources with very high levels of resource utilization.

Simplified z/VM systems management is realized when z/VM instances are members of an SSI cluster and can be serviced and administered as one system. Coordination of members joining and leaving the cluster, maintaining a common view of member and resource states, and negotiating access to shared cluster resources are all done seamlessly. Servicing the z/VM software components in an SSI cluster is simplified by using a single service stream for all members. Sharing service resources allows service to be rolled out to each member of the cluster on individual schedules, avoiding an outage for the entire cluster.

Within a Single System Image, resources used by the z/VM hypervisors and the virtual machines are shared. This set of shared resources can be managed as a single resource pool and provides a more manageable infrastructure for cloud computing. These resources include User Directory, Minidisks, Spool files and Network device MAC addresses. Sharing minidisks among members improves the integrity and performance of the system. Through this sharing of resources, virtual servers have access to the same devices and networks regardless of which z/VM member they are logged on within the SSI cluster. The functionality of the SSI environment provides the foundation for Live Guest Relocation.

The VMSSI feature provides the basis for live guest relocation and extends the pool of resources that can be managed by administering multiple instances of z/VM as if they are one integrated system. While VMSSI contributes to an optimized system, tuned for the task of driving greater performance and efficiency for each Linux workload, base z/VM capability provides a great deal more.

Live Guest Relocation

The most prevalent outage type in a z Systems environment is for software or hardware maintenance or upgrades. The IBM z/VM Single System Image Feature provides live guest relocation, a process where a running virtual machine can be relocated from one z/VM member system of an SSI cluster to another. Virtual servers can be moved to another LPAR on the same or a different z Systems without disruption to the business. Virtual servers can even be moved across the IBM z Systems family between IBM z13 (z13), IBM zEnterprise® EC12 (zEC12), IBM zEnterprise BC12

(zBC12), IBM zEnterprise 196 (z196), IBM zEnterprise 114 (z114), IBM System z10® Enterprise Class (z10 EC™), and IBM System z10 Business Class™ (z10 BC™). This ability to provide flexible workload balancing now allows work to be moved to available system resources in addition to the long standing capability to non-disruptively move system resources to work. This reduces the effect of planned z/VM outages when performing z/VM or hardware maintenance delivering the application continuity clients need.

Optimized Systems for Improved Systems Management and Economics

CPU pooling[2] is designed to allow capping of CPU utilization for better systems management and resource consumption It provides a new way to control and limit the consumption of CPU resources by assigning one or more virtual machines to a CPU pool associated with a CPU utilization limit.

A possible use of CPU pooling is to control the amount of resource consumed by a set of related virtual machines. For example, when nightly backups are started simultaneously on several virtual machines, it might be desirable to limit the amount of CPU resource those backup tasks can consume to 20% of CPU capacity.

Limiting CPU resources consumed by a department of your organization is another possible use of CPU pooling. For example, an agreement might specify the amount of CPU resource to which a department is entitled and for which they pay. Assigning specific virtual machines to a CPU pool can ensure that the department does not consume more than the amount of CPU capacity agreed to.

CPU pooling can also help control software costs when it is used to limit the amount of CPU resource consumed by groups of virtual machines that run a licensed software product. If the cost of a software license is contingent on the associated number of CPUs or amount of CPU resource, then CPU pooling can provide a basis for limiting that cost. Many IBM software products are offered using this licensing model. Some software vendors have different licensing models that might not be aligned with this approach, but the CPU pooling technology could provide support for a new model if adopted.

z/VM V6.3 has been enhanced to provide guest support for the IBM z Systems Data Compression (zEDC) Express feature. The data compression capability provided by zEDC Express is designed to offer industry-standard compression that supports cross-platform data distribution. Providing high-performance, low-latency compression without significant CPU overhead, it also helps reduce disk space requirements and improve channel and networking bandwidth.

z/VM V6.3 has been enhanced to provide guest support for Remote Direct Memory Access over Converged Ethernet offered by the 10GbE RoCE Express feature. This support is designed to help reduce latency and CPU resource consumption as compared to traditional TCP/IP communications, without requiring any application changes. The 10 Gigabit Ethernet (10GbE) RoCE Express feature is designed to help reduce consumption of CPU resources for applications utilizing the TCP/IP stack such as WebSphere® Application Server accessing a DB2® database. The feature is also designed to help reduce network latency with memory-to-memory transfers utilizing Shared Memory Communications-Remote Direct Memory Access (SMC-R) in z/OS V2.1.

IBM z Systems with z/VM helps users optimize their spending on software, staffing, energy, and floor space by delivering superior resource sharing and virtualization efficiency. One of the greatest strengths of z/VM is its ability to share physical resources among virtual machines. z/VM allows customers to virtualize processor, memory, communications, I/O, and networking resources to help reduce the need to duplicate and manage hardware, programming and data resources. z/VM can significantly over-commit these real resources and allow users to create a set of virtual machines with assets that considerably exceed the amount of real hardware available.

z/VM supports virtual networks to help reduce cabling, hubs, switches, and routers, as well as help to reduce maintenance effort. No physical cabling or external connections are required with up to 32 independent, integrated, virtual local area networks (LANs) called HiperSockets™. Linux guests are able to communicate with hosts residing on both the same z Systems server and an external network through a single network inter-face, reducing configuration complexity. In addition, automatic failover provides high availability when multiple HiperSockets bridges are configured for a given HiperSocket LAN.

Enterprises that require multisystem server solutions will find that z/VM can help them address their IT infrastructure needs with concurrent support for virtual machines running different operating systems in a secure isolated environment. z/VM supports z/OS, z/VSE®, z/TPF, and Linux on z Systems operating environments in addition to the CMS application development platform. The ability to support multiple machine images and architectures enables z/VM to run multiple produc-tion and test versions of z Systems operating systems, all on the same z Systems server, providing a highly flexible test and production environment. The test environment, which can be designed to reflect the server production environment, can help simplify migration from one release to another and facilitate the transition to newer applications, providing a test system whenever one is needed. The efficient use of shared resources

enables z/VM utilization of greater than 90 percent of available system resources which is unmatched in the industry for a multiple diverse workload environment.

Meeting Customer Expectations for Service Levels

Ensuring high availability and the quality of existing services is fundamental, but meeting customer expectations for real-time, dynamic access to innovative new services such as cloud places requirements for an innovative approach. Today's security, resiliency, and compliance challenges need to be managed while also preparing for the new risks posed by an ever more connected and collaborative world. IBM z Systems with z/VM, with its superior IT optimization and consolidation capabilities, offers a clear advantage over competitive alternatives by delivering better business value in these key areas.

Increased availability is achieved with z/VM support for z Systems dynamic reconfiguration, which features non-disruptive dynamic changes to the configurations of processors, channels, OSA network adapters, and memory to both the z/VM system itself and to individual guests, helping to reduce the requirement to re-IPL z/VM. Real and virtual memory management is optimized for Linux and other guests, enabling additional workloads to run simultaneously, supporting the need for sizeable applications and expanding file systems.

z/VM supports both the FICON® Express16S feature for storage area network (SAN) and the OSA-Express5S feature for local area network (LAN) for single mode and multimode fiber environments.

Reduced impact on active workloads with upgrade installation procedure

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 simplified 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.

Leading the industry with increased availability and reduced cost of ownership in network environments

z/VM 6.3 provides Multi-VSwitch Link Aggregation Support[3]. This functionality, new with IBM z13, allows a port group of OSA-Express features to span multiple virtual switches within a single z/VM system or between multiple z/VM systems. Sharing a Link Aggregation Port Group with multiple virtual switches increases optimization and utilization of the OSA-Express when handling larger traffic loads. Higher adapter utilization protects customer investments, which is increasingly important as 10 Gigabit deployments become more prevalent.

Enablement support in z/VM allows Linux and z/OS guests to exploit IBM z Systems High Performance FICON (zHPF). The zHPF architecture, an open standard, has been adopted by all enterprise-class storage vendors for DASD attachment to System z10 or later z Systems servers. By deploying zHPF, clients will see an immediate improvement in system resilience because of its ability to handle I/O workload spikes. z/VM workloads exploiting zHPF average a 35 percent increase in the rate of I/O, an 18 percent decrease in service time per I/O, and a 45 to 75 percent decrease in the z/VM Control Program (CP) CPU per I/O[4].

z/VM support for z Systems dynamic reconfiguration features also allows the non-disruptive dynamic configuration of processors, channels, network adapters, and memory to individual Linux servers, helping to increase availability.

Managing Risk and Compliance with Enterprise Security

Now more than ever you have to protect your business from threats large and small, from external and even internal sources. Designed to work with z Systems, z/VM provides advanced security features that deliver value to the customer:

Common Criteria certification[5]

The security certification of z/VM validates the security of sensitive data and business transactions allowing you to run production servers side by side on the same machine with test and development servers. This can help to improve resource utilization and offers significant operational benefits as well.

Disk and tape encryption

To help ensure your data-at-rest stays safe and secure, z/VM supports the use of the IBM Full Disk Encryption features of the IBM DS8000®. z/VM also supports the ability of guests to use encrypted tape.

SSL Server with FIPS certification

The TCP/IP for z/VM SSL server is available to facilitate security-rich and private conversations between z/VM servers and external clients. With new z/VM support for TLS 1.2 and SHA-2 hashing, a z/VM server can use the latest cryptographic protocols in a FIPS 140-2 compliant mode to communicate securely with a client without a change to the server itself.

The z/VM V6.3 System SSL module has been validated as conforming to the Federal Information Processing Standard (FIPS) 140-2[6]. This industry-recognized cryptographic standard mandates modern digital key sizes and integrity checking for SSL and TLS operations. z/VM 6.3 System SSL is used by both the z/VM LDAP Server and z/VM SSL-TLS Server.

Cryptographic Acceleration

IBM z Systems Cryptographic features are designed to satisfy high-end server security requirements. They can be configured as coprocessors for secure key transactions or as accelerators for Secure Sockets Layer (SSL) communications, providing significant improvements in the performance of cryptographic algorithms used for encryption and public-private key pair generation and verification.

z/VM makes the Crypto Express5S feature, a tamper-resistant cryptographic coprocessor, available to guests with either dedicated access for use in both secure-key and clear-key operations or with shared access for clear-key operations. z/VM can virtualize z Systems cryptographic devices so they can be shared by many Linux systems and supports up to 256 domains for Crypto Express4S and Crypto Express5S.

z/VM can balance the workload across multiple cryptographic devices, and should one device fail or be brought offline, z/VM can transparently shift Linux systems using that device to an alternate cryptographic device without user intervention.

z/VM V6.3 security enhancements provide support for extending digital signature cryptography with support for the IBM Enterprise Public Key Cryptography Standards (PKCS) #11 (EP11) coprocessor. z/VM provides guest support to protect data and comply with Europay, MasterCard, and Visa (EMV), the global standard for authenticating credit and debit card transactions including new support for VISA Format Preserving Encryption (VFPE) algorithms. The CP Assist for Cryptographic Function (CPACF) is a part of each processor in the IBM z Systems server. It provides a set of cryptographic functions that focuses on the encryption/decryption function of SSL, Virtual Private Network (VPN), and data-storing

applications. The CPACF is used by SSL/TLS functions included in the z/VM Lightweight Directory Access Protocol (LDAP) client and server, and by the SSL functions provided by the z/VM SSL server. Any virtual machine can access the functions of the CPACF by using the Message-Security Assist (MSA) extensions of the z Systems processor architecture. No explicit z/VM authorization or configuration is required.

z/VM: A Key Cloud Infrastructure Component with Open Stack Enablement

OpenStack is an Infrastructure as a Service (IaaS) cloud computing project that is no-charge open source software. The project is managed by the OpenStack® Foundation. With IBM's adoption of OpenStack as part of its cloud strategy, z/VM 6.3 is the first z Systems operating environment to be managed by OpenStack open cloud architecture-based interfaces. z/VM drivers provide OpenStack enablement for z/VM, and for z/VM virtual machines running Linux on z Systems.

Open standards offer a common foundation and compatible interfaces for companies to augment computing resources at a moment's notice to meet changing customer demands, such as adding a new mobile application for a new group of customers to drive additional revenue. Standards help enterprises be more nimble and address major client concerns, like vendor lock-in, the need to hire expensive specialized experts, long application development cycles, and security challenges.

IBM Cloud Manager with OpenStack is designed to be an easy-to-deploy, simple-to-use cloud management offering that is built on OpenStack to help deliver new and improved private cloud and Service Provider solutions on z Systems. It exploits the z/VM enablement and is pre-installed and pre-integrated with z/VM.

Virtualization is the first key step in building a cloud infrastructure. The fundamentals of virtualization have been part of the z Systems platform since its inception and it is a leader in platform virtualization. Realizing the benefits of cloud computing begins with the foundation of smarter computing. z/VM is an integral component of that foundation where servers, operating systems, network resources, and disk storage are virtualized, shared, and dynamically provisioned to deliver Infrastructure as a Service. The business value of cloud computing can be realized with the benefits of virtualization provided by z/VM and the security, availability, efficiency and scalability of IBM z Systems.

IBM z Systems: Redefining Digital Business

IBM z Systems delivers a data and transaction system reinvented as a system of insight for digital business. For more than 10 years clients have deployed solutions on Linux on IBM z Systems with z/VM virtualization because of the outstanding consolidation capabilities and the unsurpassed qualities of service of the mainframe. The latest offerings, the IBM z13 strengthen these qualities with a new 141-core design to deliver massive scale across all workloads and enables cost saving consolidation opportunities. IBM z13 delivers better availability and more efficient use of critical data with up to 10 TB of available RAIM memory, improved ability to meet Service Level Agreements with new processor chip technology that includes simultaneous multithreading, analytical vector processing, re-designed and larger cache and enhanced accelerators for hardware compression and cryptography, and stronger and faster protection and integrity of data across an enterprise cloud environment with new Crypto Express5S cryptographic adapter.

The zEC12 server virtualization capabilities can support on average the equivalent of up to 60 virtual servers on a single IFL or 6,060 in a single footprint for large scale consolidations for under $0.70 per day.[1]

The virtualization capabilities of the zBC12 can support an average of 40 distributed servers on a single core depending on the workload, and scale out to consolidate up to 520 distributed servers in a single footprint delivering a virtual server for $1.00 per day.[1]

IFL Specialty engines offer affordable technology for workload optimization

z Systems Integrated Facility for Linux (IFL) specialty engines expand the use of the mainframe for a broader set of applications, while helping to dramatically improve mainframe economics. These integrated and aggressively priced offerings provide a cost-effective Linux application execution environment. They can be used independently or to complement general purpose processors to optimize workload execution and lower costs by enabling you to purchase additional processing capacity without affecting IBM software pricing and the MSU rating of the IBM z Systems model designation. This means that adding an IFL[7] will not cause increased charges for IBM z Systems software running on general purpose processors and may even help reduce the utilization and demands on general purpose processors and possibly lower overall MSU requirements and associated IBM software costs.

IFL specialty engines offer support for z/VM, Linux and open standards, creating a great opportunity for consolidation and infrastructure simplification. Linux brings a wealth of available applications that can be run in a real or virtual environment

within z Systems. If you need a virtualized stand-alone Linux environment, both the zEC12 and zBC12 can be configured as IFL only server offerings to run z/VM and Linux for z Systems.

z Systems Solution Edition Series offers additional levels of affordability

With the Solution Edition Series, IBM z Systems delivers bottom-line priced solutions for many of the key workloads you may need, without compromising qualities of service.

A Solution Edition is a packaged offering that brings together key components of hardware, software and maintenance, all at a single, affordable, bottom-line price. Each Solution Edition is tailored to meet key business needs and designed to help you get maximum value from your current IT infrastructure in the fastest possible time and at the lowest cost. The Solution Edition for Enterprise Linux is a system offering that provides a basic level of cloud infrastructure support well suited for deploying a development or test cloud

Contact your IBM Sales representative for more information on how the Solution Edition Series can help deliver the value your business needs at an affordable cost.

Transformative Technology Base for a Trusted Cloud System

With a history of being at the forefront of delivering leading business capabilities, extreme computing efficiency and with newly announced products and solutions, IBM z Systems and z/VM continue to be in a position to capitalize on, and support key market shifts and transformative technologies that enable smarter computing.

Today's z/VM provides a highly secure and scalable enterprise cloud infrastructure and an environment for efficiently running multiple diverse critical applications with support for more virtual servers than any other platform in a single footprint. Enhancements that provide improved scalability and better price performance strengthen z/VM as a foundation for optimized workload deployment with reduced costs per virtual server.

IBM z Systems solutions that include z/VM are built to help you embrace IT and shifting markets forces. They can help you reshape the value you deliver to your customers with a level of efficiency and economics unmatched in the industry – helping clients improve the services they provide, reach new markets, mitigate risks and ultimately distinguish themselves from the competition.

Optional Features for z/VM

The following optional priced features of z/VM ship preinstalled on the z/VM V6 base product media.

IBM z/VM Single System Image Feature (VMSSI)

The IBM z/VM Single System Image Feature (VMSSI) is designed to enhance the z/VM systems management, communications, disk management, device mapping, virtual machine definition management, installation, and service functions to enable multiple z/VM systems to share and coordinate resources within a single system image (SSI) structure. This combination of enhanced functions provides the foundation that enables live guest relocation, which is the ability to move a Linux guest from one z/VM system to another within the SSI cluster without disruption to the business.

Directory Maintenance Facility (DirMaint)

IBM DirMaint™ is designed to provide efficient and highly secure interactive facilities for maintaining the z/VM system directory. Extensive error checking ensures that only valid changes are made to the directory and only by authorized personnel. When integrated with the security management functions of the RACF® Security Server, manual definition and management of z/VM resources is eliminated. DirMaint also provides support for Systems Management API access to its services.

RACF Security Server

The RACF Security Server provides improved z/VM system access and data security controls. RACF is designed to help meet today's need for industrial-strength information security by providing a more secure, audit-ready foundation for users and virtual servers.

If your z/VM system will have access to sensitive programs or data you should consider an external security manager such as the IBM RACF Security Server to help ensure that access to those programs or data can be properly managed and audited in conformance with organizational and/or regulatory security policies.

Performance Toolkit for VM

The Performance Toolkit for VM™ provides enhanced capabilities for a z/VM systems programmer, operator or performance analyst to monitor and report performance information.

Remote Spooling Communications Subsystem Networking (RSCS)

RSCS is a networking product which enables users on one system to send messages, files, commands, and jobs to other users within a network. RSCS can also be used to print documents locally and remotely.

Simple ordering, installation, and maintenance

Shopz productivity tool is designed for planning and ordering of z Systems software products and service. Shopz capabilities for z/VM include:

- Access to reports for planning z Systems upgrades
- Request release-to-release upgrades of z/VM
- Place new orders for z/VM
- Order z/VM Base Operating System and Base options for delivery via tape cartridge, DVD, and electronic delivery in countries where Shopz is available.
- Order z/VM SDO licensed products for delivery via Internet in countries where Shopz is available.
- Track order status
- Order CORrective (APAR/PTF) and preventive (RSU or ESO) service for VM licensed products.
- Order a variety of tailored software packages for the z/OS, z/OS.e, OS/390®, z/VM, VM/ESA® and VSE/ESA™ environments.
- Shopz also lets you review your software licenses in these environments.

For details (including geographical availability), please see the Shopz page: **ibm.com**/software/ShopzSeries

Note: Not all Shopz features are supported in all countries.

Additional systems management products from IBM

IBM provides additional products to assist in the management of z/VM systems including:

IBM Wave for z/VM

 IBM Wave for z/VM allows IT organizations and service providers to transform administration and operations with an innovative graphical, content-rich approach for managing z/VM and Linux virtual servers. IBM Wave is designed to simplify operations, drive productivity, and extend the reach of existing technical skills. IBM Wave makes administra-tion highly intuitive by shielding staff from operational complexity allowing IT staff to manage more with existing skills. IBM Wave also helps with cloning and provision-ing of virtual servers and resources, accelerating the journey to a private cloud infrastructure on IBM z Systems using z/VM.

IBM Infrastructure Suite for zVM and Linux

IBM Infrastructure Suite for z/VM and Linux V1.1 contains the following products:
- IBM Tivoli® OMEGAMON® XE on z/VM and Linux V4.3
- IBM Tivoli Storage Manager Extended Edition V7.1
- IBM Operations Manager for z/VM V1.5
- IBM Backup and Restore Manager for z/VM V1.2
- IBM Wave for z/VM V1.1

IBM Operations Manager for z/VM

IBM Operations Manager for z/VM is designed to help improve the monitoring and management of z/VM systems and virtual machines, including guests such as Linux on z Systems by providing the ability to automate routine maintenance tasks and automatically respond to predictable situations that require intervention. Operations Manager allows z/VM system programmers and administrators to devote their time to other critical tasks. It also assists with monitoring and problem determination by allowing authorized users to view and interact with live consoles of z/VM service machines or Linux virtual servers.

IBM Backup and Restore Manager for z/VM

IBM Backup and Restore Manager for z/VM is designed to provide z/VM system administrators and operators the abil-ity to efficiently and effectively backup and restore files and data on z/VM systems, including guest operating sys-tems, such as Linux on z Systems. 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 logi-cal backup and restore operations with support for inclusion and exclusion of files, user IDs, and more.

IBM Tape Manager for z/VM

IBM Tape Manager for z/VM is designed to provide z/VM system administrators and operators the ability to manage, moni-tor, and protect tape resources on z/VM systems. By helping to automate common daily tape operations and eliminate tedious, often error-prone, manual steps, Tape Manager can help increase data availability and improve administrator productivity.

IBM Archive Manager for z/VM

IBM Archive Manager addresses storage and data management concerns by allowing users to archive his-torical or other infrequently used data to increase data availability and helps companies com-ply with data storage requirements mandated by fiscal or legal regulations and policies.

IBM Tivoli OMEGAMON XE on z/VM and Linux

IBM Tivoli OMEGAMON XE on z/VM and Linux provides a wide range of information about the z/VM and Linux on z Systems operat-ing systems, including information about Linux virtual servers and the Linux workloads, revealing how they are performing and affect-ing z/VM and each other. Tivoli OMEGAMON XE on z/VM and Linux V4.3 supports z/VM Single System Image and live guest relocation.

IBM Tivoli zSecure™ Manager for RACF z/VM

IBM Tivoli zSecure Manager for RACF z/VM is designed to provide administrators with tools to help unleash the potential of your mainframe system—enabling efficient and effective RACF administration, while helping use fewer resources. By automating many recurring system administration functions, Tivoli zSecure Manager for RACF z/VM can help you maximize IT resources, reduce errors, improve quality of services and demonstrate compliance.

For more information

To learn more about z/VM V6.3 and IBM z Systems, please contact your IBM marketing representative or IBM Business Partner, or visit the following websites:

- **ibm.com**/vm
- **ibm.com**/systems/z

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: **ibm.com**/financing

[5] z/VM 6.1 with the RACF Security Server optional feature has been certified to conform to the Operating System Protection Profile (OSPP) with Virtualization (-VIRT) and Labeled Security (-LS) extensions of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4+). 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+).

[6] IBM® z/VM® Version 6 Release 3 System SSL Cryptographic Module (Hardware Version: z10 CP Assist for Cryptographic Functions DES/TDES Enablement Feature 3863; Software Version: 5735FAL00: z/VM Version 6 Release 3 plus APAR PM95516) validated to FIPS 140-2. http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2014.htm

[7] No IFL is required unless ordering an IFL only server

[1] Based on IBM internal measurements and projections and US Enterprise Linux Server pricing. Pricing may vary by country. Model configuration included 101 IFL cores running a mixed workload averaging 60 virtual machines per core on zEC12 and 13 IFL cores running the same on 40 virtual machines per core on zBC12. Workloads on both zEC12 and zBC12 with varying degrees of activity. Includes zEnterprise hardware and z/VM virtualization software. Does not include Linux OS or middleware software.

[2] z/VM CPU Pooling support will be enhanced to enforce IFL pool capacities as cores rather than as threads in an environment with multi-threading enabled.

[3] Available 2Q 2015.

[4] The z/VM High Performance FICON Performance Report is available at http://www.vm.ibm.com/perf/reports/zvm/html/620jb.html

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