



IBM z/VM

Modernize for hybrid cloud –
with virtualization for extreme
scalability, security,
and efficiency



IBM® z/VM® delivers extremely high levels of security, scalability, and efficiency, providing a robust foundation for on-premises cloud computing using both containerized and noncontainerized workloads.

z/VM virtualization technology is designed to run up to thousands of Linux® and container workloads, e.g., based on Red Hat® OpenShift® Container Platform¹, as well as IBM z/OS®, IBM z/VSE®, and IBM z/TPF workloads, all on a single IBM Z® and IBM LinuxONE² server.

z/VM's ability to support numerous machine images and solution architectures provides highly flexible production, development, and test environments for IBM Z and LinuxONE operating systems. This simplifies enterprise solutions and infrastructure upgrades in a timely manner, provides a test environment whenever needed, and deploys and consolidates several systems onto one physical server.

z/VM, together with IBM Cloud Infrastructure Center, which helps to manage the lifecycle of virtual infrastructure, provides the foundation for on-premises cloud on IBM Z and LinuxONE as part of hybrid cloud.

z/VM's guest enablement of new IBM z16™ functions:

- The IBM Z Integrated Accelerator for AI, as provided by the new IBM Telum processor, is designed to reduce the overall time required to execute CPU operations for neural networking processing functions and help support real-time applications like fraud detection.
- 'Vector packed decimal enhancements 2' deliver new instructions intended to provide performance improvements.
- Reset DAT Protection facility is designed to provide a more efficient way to disable DAT protection.
- Support for the consolidated boot loader is designed to provide guest IPL from a SCSI LUN.
- The RoCE Express3 adapter enables guests to take advantage of low latency connectivity and SMC-Rv2 support.
- The Crypto Express8S adapter is supported as a dedicated or shared resource. Dedicated guests will be able to take advantage of all functions provided by the adapters, including assorted new enhancements and Quantum Safe APIs.
- Compliance-ready CPACF³ counters support allows guests to track crypto compliance and instruction usage.
- The Breaking Event Address Register (BEAR) enhancement facility improves the ability to debug wild branches.

Highlights

- Foundation for on-premises cloud computing on IBM Z and IBM LinuxONE
- Host Red Hat OpenShift in z/VM virtual machines
- Host different operating systems with different workloads in virtual servers
- Virtualize and share resources with very high levels of utilization
- Benefit fast from new functions via the continuous delivery model

“With z/VM, we can dynamically re-allocate and cap resources. z/VM is key to the efficiency of our IT operations.”

z/VM extends the capabilities of the IBM Z and IBM LinuxONE enterprise platforms from the standpoint of sharing hardware assets, virtualization facilities, cloud services, and communication resources.

z/VM technology provides leading-edge virtualization capabilities, for the deployment of both types of workloads:

- Cloud-native workloads based on Red Hat OpenShift Container Platform, IBM Cloud Paks®, or other container technologies,
- Noncontainerized workloads, deployed in an as-a-service or a traditional environment.

In addition, the z/VM hypervisor helps ensure continuous infrastructure availability by tightly integrating with IBM GDPS® resiliency-focused offerings and Live Guest Relocation support.

The foundation for on-premises cloud computing

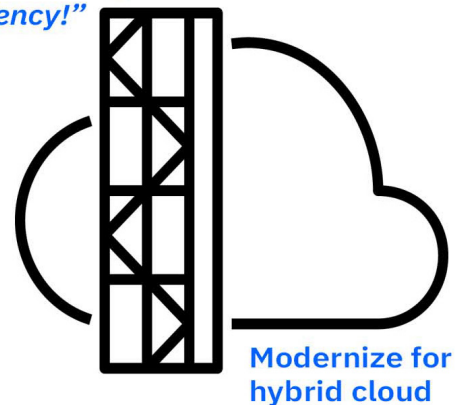
While cloud computing has become the standard use model for IT services, the IT infrastructure continues to be the foundation for every IT service.

Realizing the benefits of cloud computing requires an infrastructure that delivers strong virtualization technology, like z/VM, while also providing availability, reliability, security, scalability, and performance.

Virtualization is foundational to delivering infrastructure as a service (IaaS), a basic building block for cloud computing. z/VM, together with IBM Cloud Infrastructure Center⁴, can provide a consistent, industry-standard user experience for defining, instantiating, and managing the lifecycle of virtual infrastructure for a highly scalable, secure, and efficient on-premises cloud infrastructure as part of hybrid cloud.

z/VM provides support for all IBM

“I need virtualization for extreme scalability and efficiency!”



z16, IBM z15™ IBM z14®, IBM z13®, IBM z13s® and all LinuxONE servers, and the Linux distributions from Canonical, Red Hat and SUSE, and Red Hat OpenShift.

Sub-Capacity pricing⁵ is available with z/VM, allowing for software pricing at less than full machine capacity and providing more flexibility and improved cost of computing when managing the volatility and growth of new workloads.

Preview of IBM z/VM 7.3

z/VM 7.3 will provide:

- A doubling of the maximum size of a Single System Image (SSI) cluster from four to eight members.
- Enablement to allow Non-Volatile Memory Express solid-state drive adapters to be accessed as one or more EDEVICES.
- A new Architecture Level Set⁶.
- Timely, client-driven functions previously delivered in the service stream of z/VM 7.2.

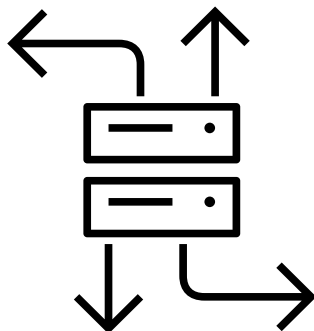
IBM z/VM 7.2

IBM z/VM 7.2 provides the hypervisor for hosting enterprise-class virtual servers to exploit the IBM Z and LinuxONE advantages in scalability, performance, and high security.

IBM z/VM 7.2 enhancements include:

- Centralized Service Management simplifies the process for applying and deploying maintenance across multiple non-Single System Image z/VM systems in a timely manner.
- Multiple Subchannel Set Multi-Target Peer-to-Peer Remote Copy exploitation enables a disk device to be the primary disk for up to three secondary devices in each of up to three alternate subchannel sets.

- z/VM ADJUNCT support enables the manipulation of a guest operating system running in a principal configuration from an adjunct configuration of the same virtual machine.
- With VSwitch Priority Queuing, when enabled, z/VM establishes multiple OSA QDIO Output queues and transmits data to the external network at different priorities based on customer-defined guest NIC importance.
- EAV Paging can reduce the number of paging devices required and the associated burden of managing a larger number of smaller paging devices. As systems continue to grow, this functionality helps when the need for paging space increases.
- 80 Logical processors are supported on IBM z16, IBM z15, IBM z14, IBM LinuxONE III, LinuxONE Emperor II, and LinuxONE Rockhopper II, allowing more workload to run on a single z/VM instance.
- Dynamic Crypto support enables dynamic changes to the Adjunct Processor (AP) Cryptographic environment on a z/VM system, allowing the addition or removal of crypto hardware to be less disruptive to the system and its guests.
- Fast Minidisk Erase capability provides a means to remove data from ECKD™ minidisks in a faster, more efficient manner when a user ID or a minidisk is deleted.
- RACF® Multifactor Authentication for z/VM enables a z/VM system with an External Security Manager to authenticate a z/VM user ID via a non-password token. This provides greater security by requiring an additional form of proof to help avoid an exposure if one token becomes compromised.
- TLS/SSL Certificate Verification allows authentication of client certificates, host name validation and extraction of fields from a certificate for TCP/IP network connections.
- CMS Pipelines SSL/TLS Enhancements improve the CMS Pipelines TCP/IP stages and allows applications to establish secure connections using SSL/TLS. Both implicit SSL/TLS connections (e.g., HTTPS) and explicit SSL/TLS connections (e.g., FTP) are supported.
- z/VM 7.2 includes a new Architecture Level Set (ALS) that requires an IBM z13, IBM z13s, IBM LinuxONE Emperor, LinuxONE Rockhopper, or later server.





z/VM 7.2 and z/VM 7.1 capabilities⁷

Efficiency and Scalability

- Elliptic Curve Cryptography Support
- ESM Authorization and Auditing of SMAPI Requests
- Dump Scalability
- Encrypted paging support
- Guest exploitation support for Pause-Less Garbage Collection
- Guest exploitation support for the Instruction Execution Protection Facility (IEPF)
- HyperPAV technology exploitation
- Support for the Enhanced-DAT facility
- Dump Processing Enhancements
- Processor Scalability Efficiency Improvements
- Extended Address Volume (EAV) Minidisk Support
- Virtual Switch Enhanced Load Balancing
- System ease of use
- RSCS Query System Service
- Control Program environment variables
- Query Shutdown command
- SCSI enhancements for z/VM
- z/VM CMS Pipelines Update
- z/VM RACF automate control of access list authority
- z/VM Performance Toolkit enhancements
- Network Security Enhancement
- Encryption of TCPNJE connections

Hardware Currency

- z/VM supported using IBM Dynamic Partition Manager (DPM)
- IBM Z-Thin Provisioning
- Dynamic Simultaneous Multithreading (SMT) Level
- I/O architecture enhancements on the z13 (Driver D27) and z13s
- Shared Memory Communications Direct (SMC-Dv2)
- IBM continues to expand z/VM and to offer the choice to deploy z/VM product enhancements via the ‘z/VM Continuous Delivery’⁷ model for faster adoption and benefit. New z/VM capabilities are delivered in the service stream of the latest release as new Function APARs, thus providing the flexibility to select and deploy new capabilities immediately, along with moving from one release to another on a regular two-year cadence.

z/VM 7.2 enhancements delivered in 2021 and 2020⁷

- CP New Feature Interrogation API
- FlashCopy[®] Preserve Mirror Support
- Performance Toolkit Support for SMT
- CP Query Devices
- SET EDEVICE Optional LUN Specification
- DirMaint[™] Health Checker
- TLS / SSL OCSP Support
- Fast z/VM Dump Distiller
- Improved I/O Time for Dump Processing
- Four Terabyte Main Memory Support
- Automatic STANDBY Memory for Guests
- z/XC Architecture Support
- Help File Improvements
- Dynamic Memory Downgrade
- Improved Live Guest Relocation (LGR) for mixed-level crypto environments
- IPv6 Layer 2 Query VSwitch Support
- z/VM Direct to Host Service Transfer
- EDEVICE Path Management
- Guest 1-End HyperPAV Aliases
- Preserve Partial Dump Across Initial Program Load (IPL)
- Query GSKKMAN Certificates
- SMAPI Query Processors API
- VSwitch Bridge Port Enhancements

Why IBM?

As you transform your business and differentiate yourself in a trust economy, IBM remains your partner.

We have the total expertise in systems, software, delivery, and financing to help you create a secure, open, and intelligent foundation for the future.

Our experts can help you configure, design, and implement z/VM on IBM Z and IBM LinuxONE, not only as your on-premises cloud infrastructure, but also optimized for your needs..

For more information

You can and subscribe to z/VM availability alerts⁷, and to learn more about the IBM z/VM offering, please contact your IBM representative or IBM Business Partner.

Learn more:

[IBM z/VM](#)

[IBM z16](#)

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1. *Deployment of Red Hat OpenShift Container Platform clusters with the deployment of Red Hat Enterprise Linux CoreOS as part of Red Hat OpenShift*
2. *IBM LinuxONE servers support IBM z/VM, Linux distributions and Red Hat OpenShift.*
3. *CPACF = Central Processor Assist for Cryptographic Functions*
4. See at: ibm.com/products/cloud-infrastructure-center
5. For more information read: ibm.com/downloads/cas/ZQ75A7YM
6. *The new Architecture Level Set (ALS) with z/VM 7.3 requires one of the following IBM Z servers: IBM z16 (all models), IBM z15 (all models), IBM z14 (all models), IBM LinuxONE III (all models, including LinuxONE III Express), IBM LinuxONE II Emperor, IBM LinuxONE II Rockhopper.*
7. *The details can be found at: www.vm.ibm.com/newfunction.*