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**IBM Z**

August 2020

# **IBM Wave for z/VM (IBM Wave)**

Frequently Asked Questions

Worldwide



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# Table of Contents

- IBM Wave for z/VM .....3
- Environments Supported, Prerequisites, Licensing.....7
- Buying IBM Wave ..... 10
- Skills Needed ..... 11
- IBM Wave for z/VM Enhancements ..... 12
- Virtualization ..... 13
- Other Linux Management Products ..... 15
- Resources for IBM Wave for z/VM, z/VM and Linux on IBM Z and LinuxONE ..... 17

## **IBM Wave for z/VM**

### **What is IBM Wave for z/VM®?**

IBM Wave for z/VM is a comprehensive management solution for z/VM-based virtual Linux server environments running on IBM Z® and IBM LinuxONE servers. It provides outstanding virtualization management capabilities through unique visualization and simplification technologies. IBM Wave's management facilities are designed for Linux and z/VM managers, system administrators, programmers and operators.

### **What are the key benefits of IBM Wave for z/VM?**

- IBM Wave for z/VM can help customers by improving their ability to manage highly virtualized environments running Linux® virtual servers. IBM Wave helps you extract the maximum value from your z/VM environment - virtualization savings, operational efficiency, and superior qualities of service.
- With IBM Wave, organizations can categorize, group, automate, monitor and manage resources easily, efficiently and accurately on their own—without relying on expert programmers or administrators.
- IBM Wave also allows you to discover and manage z/VM resources at a glance and helps you organize and clone Linux servers and provision virtual networks and storage, all very useful in transforming to private cloud environments.
- Best of all, IBM Wave does not require special training; its user interface is highly intuitive, and most tasks are accomplished using just a few simple mouse clicks. IBM Wave helps you improve efficiency, reduce administrative costs, simplify management and accelerate your virtualization efforts.

### **How will existing z/VM customers benefit from IBM Wave for z/VM?**

- Existing z/VM customers can gain benefit from improvements in the automated setup, monitoring, and management of the z/VM environment, and can bring new IT staff into that environment quickly to reduce dependency on expert skills to perform common tasks. Customers can benefit from the simplification achieved through IBM Wave's automation capabilities.
- The use of role-based management allows delegation of management tasks to the right sub-teams, such as network administrators, which allows users to manage only those resources that are in their scope.
- Reporting facilities allow users to generate customized reports of resources on demand.

## **How will new IBM Z and LinuxONE customers benefit from IBM Wave for z/VM?**

Customers new to IBM Z and LinuxONE can manage their z/VM and Linux environments consistently and easily and reduce the learning curve for administrators. IBM Wave's capabilities to help users clone virtual Linux servers and provision bare metal servers assist organizations in their transformation to private clouds on z/VM.

## **What does IBM Wave for z/VM provide today for provisioning?**

IBM Wave is designed to allow users to provision and manage Linux on Z or LinuxONE virtual servers easily, without requiring help from z/VM expert staff. This self-service capability is one characteristic common to cloud infrastructure or IaaS environments.

In addition, IBM Wave can provision virtual machines, as well as capture operating system images and use them to provision and customize new virtual machines or clones. IBM Wave allows existing Linux servers and other resources to be cloned quickly, using only a few mouse clicks.

## **What are the visualization capabilities of IBM Wave for z/VM?**

IBM Wave provides a highly intuitive and innovative graphical interface that simplifies and helps automate management of z/VM and Linux on Z and LinuxONE virtual servers. IBM Wave fully visualizes virtual and physical resources by:

- Monitoring and managing virtual servers and resources from a single panel – helping you turn complex activities into simple drag and drop actions
- Simplifying and automating day-to-day tasks including reporting and monitoring
- Provisioning virtual resources (Linux guests, virtual networks, storage)
- Fully supporting advanced z/VM virtualization capabilities, including Single System Image (SSI) and Live Guest Relocation (LGR) with a few mouse clicks
- Providing on demand reporting capabilities

## **Is it possible to manage z/VM guests manually when running IBM Wave for z/VM?**

Yes, IBM Wave co-exists with other z/VM management tools and methods. Changes made to the z/VM environment manually or by other tools are recognized by IBM Wave automatically, through agentless discovery of the environment.

## **Can I use IBM Wave for managing z/VSE® or z/OS® running in a z/VM environment?**

IBM Wave manages z/VM itself and Linux guests. It does not provide management functionality for other operating systems like z/VSE® or z/OS®. However, it will visualize, monitor, and manage the virtual machines in which those systems are deployed and can detect network connections (via OSA or HiperSockets™) to these systems. As IBM Wave supports automation

through shell scripts or REXX™ EXECs in z/VM, this may help support a mixed installation of Linux and z/VSE or z/OS.

### **Does IBM Wave for z/VM help me manage internal z/VM networks?**

Yes, IBM Wave simplifies network management in managed z/VM systems. It helps you create, update and remove Virtual Networks (Guest LANs and Virtual Switches), connect and disconnect Virtual Guests to and from Virtual Networks, and more.

### **Does IBM Wave allow me to manage FCP-SCSI devices?**

- Yes, SCSI devices (both dedicated FCP-SCSI devices and EDEVs) are supported.
- IBM Wave supports storage-based actions (like create guest, clone, manage storage, duplicate definitions) for EDEVs
- IBM Wave lets you discover and visualize SCSI disks for your z/VM instance
- Dedicated SCSI disks are shown and flagged as FCP on the associated disk map generated for selected server(s)

You can also:

- Add disks to a guest
- Create partitions on a SCSI disk attached to a guest
- Create/extend LVM volume group and logical volumes
- Create/resize new file systems
- Copy EDEV disks when cloning guests that have SCSI disks
- Generate dedicated SCSI real device definitions for a target cloned guest, although the disk content will not be copied

Note: This SCSI support is for z/VM 7.2, z/VM 7.1, and z/VM 6.4.

### **What level of z/VM do I need in order to use the enhanced IBM Wave support for SCSI devices?**

IBM Wave supports SCSI-only environments using EDEVs on z/VM 7.2, z/VM 7.1, and z/VM 6.4. This support handles all functions related to managing EDEVs, including creating and deleting them, adding and deleting paths, and displaying device and path information.

### **How is IBM Wave helpful in documenting the Linux on z/VM environment?**

IBM Wave visualizes the environment. It literally draws boxes to represent VM guests and disks and connects network resources with lines (a drag and drop UI). You can view those environment layouts and generate PDF files to document and archive your configuration.

## Does IBM Wave provide an audit trail?

- Yes, IBM Wave provides several types of logs: a Regular Log, a GUI Debug Log, and a BTS Debug Log and COR Log Entries. The Regular Log resides in the IBM Wave database. The GUI Debug Log resides on the client workstation. The BTS Debug Log resides on the WAVESRV server.
- All actions performed by IBM Wave users and all changes to the system are logged. IBM Wave administrative users can view all log entries, while regular users can view their own log entries. IBM Wave also keeps a record of the creating and last modifying user for every resource.
- IBM Wave can be configured to route messages written to the Regular Log to a specific SYSLOGD host for further processing.

## Environments Supported, Prerequisites, Licensing

### What environments are managed by IBM Wave for z/VM?

- IBM Wave helps customers manage z/VM systems along with virtual Linux servers and resources on one or more IBM Z or LinuxONE servers. It requires z/VM and does not manage native Linux LPARs. It can simplify z/VM and Linux guest management including processor, memory, storage (SCSI and ECKD™), and network resources. It can help Linux on IBM Z and LinuxONE customers manage their environments more easily while using fewer resources.
- In addition, IBM Wave can assist customers to quickly install and manage their Linux on IBM Z and LinuxONE environments under z/VM. IBM Wave for z/VM adds a graphical approach to managing z/VM and Linux on Z and LinuxONE that simplifies management of even the most complex environments.

What are the IBM servers supported by IBM Wave for z/VM?

- IBM z15™ (all models)
- IBM LinuxONE III (all models)
- IBM z14® (all models)
- IBM LinuxONE Emperor™ II, IBM LinuxONE Rockhopper™ II
- IBM z13®, IBM z13s®
- IBM LinuxONE Emperor, IBM LinuxONE Rockhopper
- IBM zEnterprise® EC12 (zEC12), IBM zEnterprise BC12 (zBC12)
- IBM zEnterprise 196 (z196), IBM zEnterprise 114 (z114)
- IBM System z10® Enterprise Class (z10 EC™), IBM System z10 Business Class™ (z10 BC™)

### What system resources are required to run IBM Wave for z/VM?

The resources required to run and manage IBM Wave depend on the number of logical partitions (LPARs) and virtual machines being managed, the size of the environment in terms of network and disk storage devices, and the nature and frequency of the management tasks being performed.

In general, the resource requirements are minimal and certain controls (e.g., the interval between scans for out of band configuration changes) can be tuned to control resource use.

IBM Wave for z/VM (IBM Wave) has very limited processor resource needs. The Wave Server (WAVESRV) is mostly idle when there is no user interaction. During initial discovery (auto detection) of the configuration and during refresh cycles where it checks for changes, resource consumption is low. IBM Wave uses an agentless technology in its discovery processes.

## What are the prerequisites for IBM Wave for z/VM?

IBM Wave requires one of the following operating systems:

- z/VM 7.2, z/VM 7.1, or z/VM 6.4

IBM Wave utilizes the z/VM System Management API (SMAPI) interface and requires the optional, priced IBM Directory Maintenance Facility (DirMaint™) feature or an equivalent product to perform various directory management functions.

- For networking:
  - TCP/IP for z/VM (IPv4) must be configured and active.
  - Telnet access must be enabled.
  - The FTP server must be running.
- The following prerequisites must be met on workstations running the IBM Wave GUI client:
  - Microsoft® Windows® 7 or 10 with Java® v1.8 installed (64-bit version is recommended)
  - IP access to all managed z/VM systems and to the IBM Wave WAVESRV server
- Secure Shell (SSH) server, Linux z/VM CP interface device driver (VMCP), and CMS File System (CMSFS) installed on all Linux on Z guests being managed by IBM Wave

To operate Linux on Z or LinuxONE as a guest of z/VM, a Linux on Z distribution must be obtained from a Linux distribution partner. IBM WAVESRV requires one of the following Linux distributions:

- Red Hat Enterprise Linux (RHEL) 6 or 7
- SUSE Linux Enterprise Server (SLES) 11 or 12

IBM Wave manages guests that use any of the following Linux distributions:

- Red Hat Enterprise Linux (RHEL) 5, 6, 7 or 8
- SUSE Linux Enterprise Server (SLES) 10, 11, 12, or 15
- Canonical Ubuntu 16.04

## What are the client requirements for IBM Wave?

- IBM Wave uses a GUI that is written in Java and runs on a standard Browser on a Windows Desktop.
- The IBM Wave GUI client requires Microsoft Windows® 7 or 10 with Java v1.8, 64-bit installed, and IP access to all managed z/VM systems and to the IBM Wave WAVESRV server.



## **What systems management software prerequisites are required for IBM Wave?**

- IBM Wave utilizes the z/VM System Management API (SMAPI) interface and requires the optional, priced IBM Directory Maintenance Facility (DirMaint) or an equivalent product to perform various directory management functions.
- The Performance Toolkit feature of z/VM is not required but is highly recommended as it will enable you to access performance data from the Wave dashboard.
- For networking TCP/IP for z/VM (IPv4) must be configured and active, Telnet access must be enabled, and an FTP server must be running.

## **Does IBM Wave for z/VM integrate with the Performance Toolkit for VM™?**

Yes, IBM Wave utilizes the Performance Toolkit for VM (if present) to collect performance information from z/VM and Linux guests for monitoring system behavior. Detailed performance data can be viewed for every active z/VM guest, as well as globally for the entire z/VM system.

## Buying IBM Wave

### How can I evaluate/test IBM Wave for z/VM before making a purchase decision?

Speak to your sales representative regarding a trial or request a hands on test drive using an IBM internal system by sending e-mail to [ibmwave@us.ibm.com](mailto:ibmwave@us.ibm.com). Also, please review the online demonstrations available on the website, [IBM Wave Resources](#).

### What are the license terms?

IBM Wave is delivered as an IBM Program Product and as part of LinuxONE servers, where the initial license and three years of service and subscription are included. It uses engine-based Value Unit pricing with a decreasing one-time charge (OTC) per engine. Value Unit pricing for IBM Wave Subscription and Support (S&S) also provides a lower price per processor as more Value Units are licensed.

### Is Sub-capacity pricing available on IBM Wave?

IBM announced Sub-capacity pricing for IBM Wave for clients running z/VM 6.3 or higher. Software pricing at less than full machine capacity can provide more flexibility and improved cost of computing as a client manages the volatility and growth of new workloads. Please see the [July 17, 2017 IBM Announcement Letter](#) or the [IBM Z software licensing Webpage](#).

### What can clients do with the implementation of sub-capacity pricing for IBM Wave?

- Pay for IBM Wave based on defined workload requirements and not necessarily the full engine capacity of the machine.
- Add hardware capacity for new workloads, capabilities, and functions, e.g. KVM or appliances, and not have IBM software pricing for Wave automatically increase for existing workload
- Buy new hardware capacity for future growth with no immediate increase to their IBM software bill provided that no additional software capacity is required at that time.
- Potentially benefit from improved price performance as workloads grow.

### Does IBM provide installation services for IBM Wave for z/VM?

Yes, IBM STG Lab Services (LBS) provides what is known as a Jumpstart service, which can help accelerate your IBM Wave implementation by providing planning, installation, and usage assistance. LBS can tailor the installation to a client's environment and provide skills transfer by reviewing common use cases for the interface with the client's support staff.

## Skills Needed

### Does IBM Wave for z/VM remove the requirement for z/VM skills in my organization?

No. IBM Wave removes or simplifies some of the activities associated with issuing z/VM commands and performing many complex system tasks. It does not eliminate the need for advanced skills in your environment. However, by empowering users to be more self-sufficient, IBM Wave relieves dependencies on scarce technical skills, allowing teams to manage virtualized environments more readily, and expand their management scope.

### Is there still a need for operators and administrators to know detailed VM commands?

IBM Wave provides a GUI with a point and click, drag and drop interface. While the administrator performs such actions, IBM Wave underneath issues appropriate sequences of commands after checking authorization and ensuring the operation can be performed. If the operation is not possible, Wave visualizes that situation. For example, it would change the color of an item to red if it were dragged to an inappropriate location by the administrator. While an administrator does not need to know all the underlying commands in detail, they should be able to understand z/VM and how it operates. Even very skilled z/VM administrators can use Wave productively because it speeds up and eases their tasks, freeing time for other activities.

## **IBM Wave for z/VM Enhancements**

### **What is IBM Wave's enhancement strategy?**

IBM Wave has adopted a continuous delivery (CD) support model, for delivering new functions via Service Packs to help enterprises receive function more quickly. New IBM Wave functions are delivered via regular Service Packs, with base stability recognized as a critical attribute. Clients will continue to receive the same world-class support and assistance that they are accustomed to from IBM. This support is included in the standard Software Subscription and Support (S&S) charges.

*FYI, IBM Wave for z/VM 1.2 Fix Pack 16 is planned to GA in Sep 2020.*

# Virtualization

## What is IBM Z and LinuxONE virtualization technology?

IBM Z and LinuxONE 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.

## How can Linux on IBM Z or LinuxONE help me transform to a highly virtualized, flexible environment?

- Linux on Z and LinuxONE is an infrastructure based on the combination of Linux, z/VM virtualization, IBM Wave software and the outstanding capabilities of the IBM Z and LinuxONE servers.
- Linux on IBM Z and LinuxONE is designed for:
  - Single server simplicity
  - Rapid deployment, configuration and management of virtual Linux servers
  - Workload and services management for dynamic responses
  - Fast data access and sharing of all resources for high utilization efficiency
  - Robust security, built-in from bottom to top
  - Resilience and availability with high qualities of service
- The Linux environment on IBM Z or LinuxONE can help lower your IT costs with its support for small to massive consolidation of x86 and UNIX® cores, running up to hundreds of virtual Linux servers concurrently.
  - Security – pervasive encryption is enabled via the on-chip cryptography and the Crypto Express adaptors, IBM Z Data Privacy Passports protects data across hybrid- and multi-cloud environments, access control and auditing functionality can be provided, and IBM Z are the world's only servers with EAL5+ hardware certification.
  - Software licensing – software licensing costs can be reduced because Linux commercial software is usually priced on a per-core basis and an IBM Z or LinuxONE server can support multiple x86 and UNIX cores on a single core.
  - Operational management – a single physical IBM Z or LinuxONE server can mean reduced efforts for the systems and operational management; fewer cables, switches and servers to configure.
  - Business continuity – an IBM Z or LinuxONE server can scale up and out to meet spikes in server activity, helping to minimize costly transaction delays and improve availability.
  - Energy and space consumption – using an IBM Z or LinuxONE server requires fewer servers and networks, which can result in savings in physical space, air conditioning and electricity costs.

## **Is IBM Wave OpenStack® compliant?**

OpenStack is a collaboration effort designed to produce open source cloud computing platforms for public and private clouds. IBM Wave's focus is on systems management. You can run OpenStack products in addition to IBM Wave, however IBM Wave is not included in current OpenStack products. Running OpenStack software does not inhibit you from running IBM Wave.

## Other Linux Management Products

### IBM Wave for z/VM provides monitoring functionality. How does that complement OMEGAMON® XE on z/VM and Linux?

- IBM Wave provides a high-level real-time monitoring view of system performance for z/VM environments. If you want deep-level performance monitoring, insight into performance history, threshold monitoring and the ability to issue operator commands, you should also consider deploying OMEGAMON XE.
- IBM Wave for z/VM complements the suite of other IBM systems management tools. IBM OMEGAMON XE on z/VM and Linux is one of a family of products that comprise an enterprise solution, providing deep visibility into performance functions across platforms and subsystems and delivering both real-time and historical information
- With its multiplatform and subsystem support, OMEGAMON XE on z/VM and Linux can help with performance monitoring, trending and detailed problem analysis across your enterprise, including z/VM and Linux on IBM Z and LinuxONE.
- IBM Wave also offers some monitoring capabilities, but also provides administration and virtualization management.

### What is IBM Infrastructure Suite for z/VM and Linux? Does it include IBM Wave?

IBM Infrastructure Suite is a single offering to monitor and manage z/VM and Linux on Z guests as well as support backup and recovery of the entire system. It includes IBM Wave for z/VM. In particular, it offers:

- Improved productivity with rapid cloning and provisioning of Linux guests on z/VM. It uses IBM Wave as a content rich user interface.
- Simplified administration with flexible reporting and detailed performance monitoring, including customized views and historical data.
- Operational flexibility, allowing different constituencies (operations, systems programming, application development, project management, and end users) to manage appropriate aspects of the z/VM environment.
- Faster problem identification from alert generation and automatic recovery.
- Comprehensive backup and recovery for both the z/VM and Linux environments, including:
  - Image level backup and recovery of volumes or minidisks containing z/VM data; Image level backup and recovery of volumes or minidisks containing Linux data.
  - File level backup and recovery of z/VM data; File level backup and recovery of Linux data.
- It includes in a single product offering: IBM Wave for z/VM, OMEGAMON XE on z/VM and Linux, Spectrum Protect, Operations Manager for z/VM, and Backup and Restore Manager for z/VM.

## **What benefit is there from buying these infrastructure capabilities as a suite versus as individual products?**

The suite provides all functions in a single product and has discounted pricing built in, including a discount on S&S.

## **How can I compare Operations Manager for z/VM to IBM Wave?**

Operations Manager for z/VM provides operational monitoring and automation. It monitors console messages and state information for z/VM service machines and Linux guests as well as z/VM spool and page space.

Operations Manager then creates automated responses to these monitors when they are triggered using email or SNMP alerts. It can integrate into a “manager of managers” like the IBM Tivoli® Netcool®/OMNIBus enterprise alert system. See “*IBM Infrastructure Suite for z/VM and Linux*” for more information on related tools.

IBM Wave provides a user interface for visualization of and human interaction with the z/VM environment. It complements the internal event-based automation that Operations Manager enables with powerful and flexible support for actions that are required as a result of events occurring outside the z/VM system.



## **Resources for IBM Wave for z/VM, z/VM and Linux on IBM Z and LinuxONE**

### **Where can I go for more detailed information about IBM Wave for z/VM?**

More information on IBM Wave for z/VM can be found online at the following sites:

- IBM Wave for z/VM: [ibm.com/marketplace/wave-for-zvm](https://ibm.com/marketplace/wave-for-zvm)
- IBM z/VM: [ibm.com/it-infrastructure/z/zvm](https://ibm.com/it-infrastructure/z/zvm)
- IBM Z: [ibm.com/it-infrastructure/z](https://ibm.com/it-infrastructure/z)
- Linux on IBM Z: [ibm.com/it-infrastructure/z/os/linux](https://ibm.com/it-infrastructure/z/os/linux)
- IBM LinuxONE: [ibm.com/it-infrastructure/linuxone](https://ibm.com/it-infrastructure/linuxone)

### **Are there planning and implementation assistance for the IBM Infrastructure Suite for z/VM and Linux (IISz), IBM Wave, z/VM, and Linux for Z and LinuxONE?**

Yes, IBM Systems Lab Services provides assistance to clients who want to plan and implement IISz, or to implement new levels of z/VM, IBM Wave, or Linux. You can contact IBM Systems Lab Services via the Internet at <https://www.ibm.com/it-infrastructure/services/lab-services> or by sending e-mail to [ibmsls@us.ibm.com](mailto:ibmsls@us.ibm.com)



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