16466: Advanced z/VM Systems Management with IBM Wave for z/VM

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IBM Corporation - WW IBM Wave Tiger Team Lead

March 3rd (3:15PM, Metropolitan A)
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<thead>
<tr>
<th>Trademark</th>
<th>Description</th>
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<tr>
<td>DirMaint</td>
<td>OMEGAMON*</td>
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<td>HiperSockets</td>
<td>Performance Toolkit for VM</td>
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<td>IBM*</td>
<td>RACF*</td>
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<td>IBM (logo)*</td>
<td>REXX</td>
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<td>System z*</td>
<td>System z10*</td>
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<td>IBM Wave for z/VM*</td>
<td>zEnterprise*</td>
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Agenda

- IBM Wave for z/VM
- Functionality
- Benefits
- Fit in Portfolio
- Test Drive Environment
- JumpStart Services
- IBM Wave Tiger Team
- Features and Architectural Overview
- Live Demo
What is IBM Wave for z/VM?

IBM recently acquired CSL International, and with that its flagship product CSL Wave, now known as IBM Wave for z/VM v1.1 (IBM Wave). In this session we will discuss IBM Wave and how one can leverage it to simplify the administration of z/VM and Linux on z environments, and drive more productivity.

IBM Wave enables the management of the entire Enterprise and its multiple z/VM guests across LPARs and CECs. Using the Enterprise Viewer and IBM Wave functions such as Projects and Grouping, one can cross manage multiple instances by custom attributes to match specific business needs!
Why Organizations need IBM Wave

- Reductions in budgets means IT needs to leverage existing staff to do more with less. 70-80% of IT spend goes to operations alone.
- Managers and administrators benefit from having tools offering self-service, with easier and simpler administration.
- z/VM® managers find they need fast and accurate insight into changes in their environment.
- Administrators need to eliminate the continual maintenance, and increased management complexity of writing and maintaining home grown solutions and scripts.
- Managers need to train staff new to z/VM to perform complex tasks quickly and easily.
- Linux® administrators need to manage a powerful mainframe environment without significant z/VM skills.

"IBM Wave is a virtualization management tool for administrators that could reduce the administration and management of IBM z/VM and Linux virtual servers up to 85 to 95 percent."

Robert Frances Group 2014

70 - 80% of IT budgets are spent on ongoing operations and maintenance costs.


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IBM Wave for z/VM V1.1 (IBM Wave)

- IBM Wave is a new virtualization management product for z/VM® and Linux® virtual servers that uses visualization to dramatically automate and simplify administrative and management tasks.
- Enterprise Linux Server (ELS) and the Enterprise Cloud System (ECS) solutions are also available with IBM Wave for z/VM.
- IBM Infrastructure Suite for z/VM and Linux V1.1.
- New! Jumpstart Services to help customers get started with IBM Wave.

Read the announcement here!


- General availability - February 28th, 2014.
Dimensions of Systems Management & IBM Wave for z/VM primary use

- Application Owner
- Middleware Administrator
- Linux System Administrator
- z/VM System Programmer

Who is doing the managing?
What are they managing?

z/VM System
Guest System (Linux)
Middleware
Application

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IBM Wave for z/VM
Helps Simplify and Automate Virtualization Management
For z/VM and Linux virtual servers

- Automate, simplify management and monitor virtual servers and resources—all from a single dashboard
- Perform complex virtualization tasks in a fraction of the time compared to manual execution
- Provision virtual resources (Servers, Network, Storage) to accelerate the transformation to cloud infrastructure
- Supports advanced z/VM® management capabilities such as Live Guest Relocation with a few clicks
- Delegate responsibility and provide more self service capabilities to the appropriate teams

A simple, intuitive virtualization management tool providing management, provisioning, and automation for a z/VM environment supporting Linux® virtual servers
IBM Wave - Intelligent Management for Virtualized Environments

Advanced Visualization
- Shorten the learning curve needed to manage your Linux and z/V M environment
- Organize and simplify administration of virtual Linux servers; automate and simplify management steps
- View servers and storage utilization graphically; view resource status at a glance
- Use graphical or tabular displays with layered drill down; customize and filter views
- Attach virtual notes to resources for additional policy based management

Simplified Monitoring
- Monitor z/VM system status through an innovative and interactive UI
- Monitor performance of CPU, paging devices, spool disks and more;
- Use agentless and lightweight resource discovery for an accurate and current view
- Use advanced filters, tagging, layout and layer selection to manage in a meaningful way
- Complements IBM OMEGAMON® XE used for in-depth performance monitoring and historical views

Resource Management
- Manage your system from a single workstation
- Assign and delegate administrative access using role based assignments
- Provision, clone, and activate virtual servers. Define and control virtual network and storage devices
- Perform complex management tasks such as live guest relocation using a few keystrokes
- Execute complex scripts with a single mouse click

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IBM Wave Simplified Monitoring
Intuitive Reports, Graphical Monitoring and Easy Integration

- **Agentless Resource Discovery**
  - Discover, manage and monitor z/VM resources and their relationships across multiple LPARs and CECs
  - Identify resource and relationship changes; reflect current environment in the user interface

- **Monitoring**
  - Allows the state of resources to be observed; icons show additional content for the resources
  - Use graphical and tabular displays with layered drill down to hone in on only the resources you need to view
  - Perform ongoing monitoring of changes that occur after initial auto-detection

- **Reporting**
  - Automatically generate charts like pie charts to report on utilization and more
  - All table-based views can be exported to a CSV file for import into other applications

- **Integration**
  - Use Automatic Guest Classification (AGC) to integrate with existing provisioning process
  - LDAP/Active Directory Support for Authentication and Authorization

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IBM Wave Intelligent Visualization
Quickly Understand the Status of System Resources

- **Get a current and accurate view of your managed environment**
  - Network Topology
    - Centralized view of the entire network topology per z/VM System, view Virtual LANS (VLANS)
    - Annotate network topology view to identify external resources - routers, switches, etc
  - Linux Servers
    - View performance gauges for all z/VM systems from one screen:
    - See resource consumption by guest or type
    - CPU, Virtual to Real, Paging, Spool
  - Storage
    - Visual representation of all storage resources (ECKD™ and FCP-SCSI)

- **Visualize and control virtual resources**
  - Views can be graphical or easily switched to tabular mode
  - View relationships between resources easily and graphically
  - View the entire environment graphically and easily zoom in

- **Advanced filters, tagging, layout and layer based views for every display**

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Performance Resource Monitoring
At a Glance Status of all z/VM instances

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Simplify Systems Management Tasks
Provision resources quickly and easily

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FCP/SCSI Support

• IBM Wave DOES SUPPORT FCP/SCSI environments
  – IBM Wave always supported FCP/SCSI environments.
  – IBM is very committed in enhancing IBM Wave’s support for FCP/SCSI-only environments.
  – New and important functionality was made available on IBM Wave FCP/SCSI-only environments, released in early July under the FixPack 5 (FP5).
  – IBM will keep investing on IBM Wave to continue to develop its capabilities not just on FCP/SCSI-only environments, but across the entire product.

• IBM Wave absolutely supports FCP/SCSI!
FCP/SCSI-only environments at GA level (Feb 28th 2014)

- Specifically for direct attached SCSI disks:
  - Visualize disks
  - Add disks to guest
  - Create partitions
  - Create/extend LVM volume group and logical volume
  - Create/resize new file system

- At GA in February:
  - The IBM Wave installation itself was possible, requiring one to manually create the IBM Wave service machines prior to installing the IBM Wave RPM. Note that IBM Wave utilizes EDEVs for its own disk space.
## Recent Enhancements In IBM Wave ...

<table>
<thead>
<tr>
<th>Benefits</th>
<th>IBM Wave Enhancement</th>
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</table>
| Easier to customize IBM Wave                 | - Use your LDAP configuration with IBM Wave  
- Use Exits for site-specific configuration                                                                                                          |
| More extensive support for distros, files    | - Bare Metal Install for SLES10, 11 and RHEL5, 6 + Layer 2 Network support  
- Ext4 File System Support (RHEL6 only)                                                                                                               |
| Improved storage support                     | - Enhanced storage support for  
  - FCP SCSI-only environments using EDEVs  
  - Richer EDEV support- Create Guest, Clone, Manage Storage, Duplicate Definitions, etc. management  
  - SAN (FCP/SCSI) support for direct attached FCP devices for SLE11 SP3, RHEL6 guests  
- Management from a central point of control - the IBM Wave Graphical User Interface                                                                    |
| Easier to get started with cloud Manage z/VM across the enterprise | Enhanced Cross System Cloning                                                                                                                          |
| Easier configuration, serviceability and support | - LDAP configuration checker  
- Improved Autodetect  
- First Failure Data Capture                                                                                                                           |
| Strengthened security and audit capabilities | - Verisign authenticated code signing certificates  
- Mixed case password support  
- Additional audit records generated                                                                                                                       |
<table>
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<th>Benefits</th>
<th>IBM Wave for z/VM Capabilities</th>
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<td>- Gain efficiencies in virtualization management</td>
<td>- IBM Wave provides a high level view of performance, storage usage, networks at a glance with built-in reporting</td>
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<tr>
<td>- Work with a current, accurate and complete view of your managed z/VM environment</td>
<td>- By providing an up to date, accurate view of the IT environment through its “agentless discovery” organizations can plan, change and optimize their virtualized resources accurately</td>
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<tr>
<td>- Simplify administrative, operations and systems functions</td>
<td>- IBM Wave enables automation of management tasks and can incorporate scripts.</td>
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<tr>
<td>- Enable improved self service to reduce costs</td>
<td>- Optimize z/VM capabilities by simplifying and automating management tasks that could otherwise take hours and require significant z/VM knowledge, (includes complicated tasks as LGR, Server Cloning, Storage provisioning, etc.).</td>
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<tr>
<td>- Respond quickly to changing business needs</td>
<td>- Make common management tasks accessible to more user roles</td>
</tr>
<tr>
<td>- Reduce errors with appropriate delegation</td>
<td>- Easily delegate administrative capabilities to the appropriate users</td>
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<td>- Enforce segregation policies at the individual administrator as well as the group level</td>
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<td>- Set scope and permissions to match business requirements</td>
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<td>✓ Improve service levels</td>
<td>▪ Offers easy, convenient access to performance and management information—at a glance</td>
</tr>
<tr>
<td>✓ Easily respond to changing requirements.</td>
<td>▪ Helps you quickly and easily administer and provision resources like servers, storage, user accounts.</td>
</tr>
<tr>
<td>✓ Reduce time spent on administrative efforts</td>
<td>▪ Tag resources with meaningful notes to help enforce installation defined rules.</td>
</tr>
<tr>
<td>✓ Easily manage virtualized environments</td>
<td>▪ Lets you provision new servers (bare metal installations) and easily clone Linux virtual servers and other resources</td>
</tr>
<tr>
<td>✓ Simplify and accelerate your journey to cloud</td>
<td>▪ Scripts allow customization of a golden master.</td>
</tr>
<tr>
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<td>▪ Support early virtualization steps needed to get to a private cloud.</td>
</tr>
<tr>
<td>✓ Create audit trails of IBM Wave users’ activities</td>
<td>▪ List tasks and status requested by the users with respect to their scope.</td>
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<td>▪ Log each operation that changes the system including logon and logoff to provide an audit trail. The logs may be then routed to a centralized logging mechanism for further filtering or processing.</td>
</tr>
<tr>
<td>✓ Simplify your administration</td>
<td>▪ IBM Wave automates a sequence of VM commands, reducing steps needed to complete common administrative and management tasks—and improve consistency.</td>
</tr>
<tr>
<td>✓ Extend the reach of your existing IT staff</td>
<td>▪ IBM Wave helps your team manage additional servers even if you do not have a deep expert skills bench available.</td>
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Cloud Computing – Based on Virtualization and Standardization

Helps facilitate better integration between infrastructure – system admins – and middleware/applications - developers/architects

Patterns and workflows are the connectors

Virtualization
Infrastructure & Virtualization Management

Entry Level Cloud
Standardization & Automation

Advanced Cloud
Orchestration & Optimization

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# Virtualization and Cloud Portfolio for Linux on z Systems

## Virtualization

**Infrastructure & Virtualization Management**

- **zEnterprise: zEC12, zBC12**
  - Massively scalable
  - Characterized by great economics / efficiencies
  - Highly secure / available

- **z/VM 6.3**
  - Support more virtual servers than any other platform in a single footprint
  - Integrated OpenStack support

- **Linux on z Systems**
  - Distributions available from RedHat and SUSE

- **IBM Wave for z/VM**
  - A tool that simplifies the management and administration of the z/VM and Linux on z Systems environment via an intuitive graphical user interface

## Entry Level Cloud

**Standardization & Automation**

- **Cloud Manager with OpenStack**
  - A simple, entry level cloud management stack
  - Based on OpenStack
  - Formerly known as SmartCloud Entry

## Advanced Cloud

**Orchestration & Optimization**

- **Cloud Management Suite for System z**
  - Builds on functionality of Cloud Manager with OpenStack and adds runbook automation and middleware pattern support for workload deployment
  - Includes SmartCloud Orchestrator
  - Also includes Tivoli Storage Manager and OMEGAMON XE on z/VM and Linux

**Differentiation**

- **Advanced Cloud**
- **Entry Level Cloud**

**Standardization**

- **Virtualization**
- **Entry Level Cloud**

**Service Lifecycle Management**

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Learn More with IBM Wave Client Hands on Experience

Hands on IBM Wave Environment now available
- Client hands-on experience using IBM Wave on a IBM zEnterprise EC12 (zEC12)
- Secure remote access from client site to zEC12 in Gaithersburg, MD
- Accessible 24 hours a day, 7 days a week (except for occasional planned outages)
- Guided exercises provide hands on experience with IBM Wave
- Contact your representative to get started today

Client Sites Worldwide
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STG Lab Services – IBM Wave Jumpstart Services for zEnterprise

- This Jumpstart service can help to accelerate your IBM Wave implementation.
- This service offering provides planning, installation, and usage assistance.
- We tailor the installation to your environment and provide skills transfer by reviewing common use cases of the interface with your support staff.

Key Features:
- This service helps accelerate the implementation and ROI with IBM Wave
- Assistance in planning the implementation by those who have implemented and used for several years
- Provide recommendations on integration and configuration in your environment
- Demonstrate how to implement custom REXX™ Execs with IBM Wave to extend functionality
- Integration with your AD for authentication
- Demonstration and review of common IBM Wave use cases with your staff in a workshop setting
- Demonstrate how to enable existing Linux servers to be managed by IBM Wave
- The Jumpstart is usually typically complete in one week depending upon the size of the deployment

Target Audiences:
- zEnterprise z/VM and Linux Administrators
- Existing and First in Enterprise customers
- Organization who want augment the z Systems support staff with less experienced IT professionals

Business Drivers:
- Reduced staff z/VM experience requirements
- Increased IT staff productivity
- Reduce systems management costs

Contact:
- stgls@us.ibm.com for questions specific to this service.

Our z Systems experts have years of experience in working with IBM Wave
Washington Systems Center – WW IBM Wave for z/VM TIGER TEAM

Ernest Horn
Eduardo C. Oliveira, Team Lead
Luis Ferreira Ramos
IBM System z Tiger Team:

Ivan Dobos
Roland Trauner
Marty Horan, Manager
Brant Zhang

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IBM Wave for z/VM  Features and Architectural Overview
Feature overview - Automation and simplification

- View the entire server farm laid out graphically
- Ordered Activation/Deactivation of servers
- Execution of customer’s REXX as part of the cloning process to allow local z/VM customization
- Run Linux shell scripts against dynamically grouped/filtered servers, as IBM Wave for z/VM background tasks, listing the results for each selected server - All via the GUI
- Run REXX EXECs against any virtual object with customized parameters and results listing - All via the GUI
- WAVECLI – A CLI for IBM Wave for z/VM actions that can be utilized from Linux shell scripts or Windows Batch files
- Access z/Linux guests directly from the GUI using SSH, 3270 or CLC—No hostnames or IP addresses to remember, simply right-click on the server and select the desired access
Feature overview - Provisioning

- Sophisticated guests cloning including Cross System Clone (across LPARs and CPCs)
- Ability to customize the first boot of a cloned server (before TCP/IP is initialized)
- Simple creating and manipulation of Vswitches and Guest LANs
- Connect/disconnect guests to Vswitches or Guest LANs via the GUI
- Storage management and provisioning at the z/VM and Linux levels (including LVM support)
- Automatic handling of Real or Dedicated devices via IBM Wave for z/VM’s user defined Device Pool
Feature overview – Auto-detection

- Agentless technology
- Automatic initial detection of all virtual server farms components (servers, prototypes, networks, network devices and storage)
- Ongoing monitoring of changes made outside of IBM Wave for z/VM after the initial auto-detection
Feature overview – Network support

- Centralized, layer based view of the entire network topology per z/VM system
- Define and control all network devices such as VSwitches and guest LANs
- Manipulation of servers-to-network connect/disconnect using GUI
- Support for VLAN usage
- Management of VSwitches with protocol layer 2 or 3
- Customize network topology view with external resources such as routers, LPARs etc.
IBM Wave Requirements

**Client**
- Windows 7 Workstation
- Internet Explorer or Firefox
- Java Runtime 1.7 with Web Start Support
- PuTTY or equivalent telnet/SSH client

**WAVESRV**
- z/VM Guest or LPAR
- RHEL 6 or SLES 11
- MySQL V12.22 or higher
- Java SE Runtime 1.7
- Apache

**TVP**
- IBM System z10® or later
- z/VM V5.4, V6.2 or higher with Systems Management API configured
- IBM Directory Maintenance for z/VM (DirMaint™) or equivalent
- Performance Toolkit for VM™ (Perfkit, optional but suggested)

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IBM Wave for z/VM: Tier 2 – WAVESRV server

- z/VM LPAR
- API Server
- WAVESRV Server
  - Background Task Scheduler (BTS)
  - IBM Wave for z/VM database
- IBM Wave for z/VM GUI client

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IBM Wave for z/VM WAVESRV server foundation

- **Background Task Scheduler (BTS)**
  - Employs Work Unit processing architecture for BTS worker threads
- **Knowledge Base**
  - Keeps track of the managed system components and their associated metadata
- **Common Output Repository (COR)**
  - Stores output generated by each BTS work unit
- **Message Brokers**
  - Efficiently moves messages across all system components
- **Security Enforcer**
  - Controls the scope and permission of every user action
- **Device Management**
  - Simple and automatic control of all virtual and real/dedicated devices
IBM Wave for z/VM Target Virtualization Platform (TVP)

- IBM Wave utilizes the SMAPI interface in order to mediate requests from the BTS and the GUI Client.
- Specific functions executed on the z/VM System using the following Service Machines:
  - **WAVEWRKS**
    - The Short Service Machine executes various compiled REXX EXECs to interact with the z/VM environment
  - **WAVEWRKTL**
    - The Long Service Machine provides an additional thread of execution to run longer scripts or executes some directory manager commands
  - **WAVEWRKKC**
    - This Cross-System Cloning Service Machine is used to stream minidisks from a source z/VM system to a target z/VM system during cloning actions.

- As part of the auto-detection process when adding a new z/VM System to IBM Wave management, these 3 service machines are created and started on the z/VM System automatically.
IBM Wave Operational Model

GUI Client

Linux on z: WAVESRV

Service Machines

zVM: TVP API

Scope

- Physical Servers
- z/VM instances, Virtual Linux Server Objects
- Virtual Networks (Guest LANs/VSwitches)
- Virtual-servers-to-Virtual Networks Connections
- Storage Volumes/Groups

- Elements
- Objects
- Users
- Log

- WAVESRV
- Repository DB
- WebServer
- IBM Wave BTS

- WAVEWRK – REXX executables, CP/CMS commands
- WAVWRKL – Directory Manager commands
- WAVWRKC – Cross System Clone feature

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Planning and Design

- **Sizing**
  - 1GB RAM
  - **Filesystems:**
    - /boot 100MB (approx. 100 Cyls)
    - / 2GB (approx. 3000 Cyls)
    - /var 3GB (approx. 4500 Cyls)

- **Sizing the log space areas**
  - By default, logs are stored in /var
  - configure the /var filesystem as a logical volume under LVM so it can be extended when needed

- **Location of WAVESRV server**
  The server is implemented as a virtual server within a z/VM LPAR.
Sample directory entry for the WAVESRV virtual server

********************************************************************
USER WAVESRV <Password Here> 1G 2G GC
CPU 00
IPL CMS
MACHINE ESA 4
OPTION QUICKDSP
CONSOLE 0009 3215
NICDEF 0800 TYPE QDIO LAN SYSTEM <GLAN/VSWITCH Name here>
SPOOL 000C 3505 A
SPOOL 000D 3525 A
SPOOL 000E 1403 A
LINK MAINT 0190 0190 RR
LINK MAINT 019D 019D RR
LINK MAINT 019E 019E RR
MDISK 0191 3390 1 3 <DASD Volume Name here> - This is a CMS minidisk
MDISK 0150 3390 1 3000 <DASD Volume Name here> - This minidisk will be used for "/"
MDISK 0151 3390 1 4500 <DASD Volume Name here> - This minidisk will be used for "/var"
MDISK 0152 3390 1 200 <DASD Volume Name here> - This minidisk will be used for swap
********************************************************************
IBM Wave Systems Management Task Example:
“Add Disk Space To A Virtual Server”

Without IBM Wave
1. Find requested disk space
2. Create disk definition
3. Activate definition
4. Connect storage to virtual server
5. Mount device
6. Create a File System

View Storage at a Glance

With IBM Wave
1. Open the “Add Storage” form
2. Fill the storage capacity requested
3. Press the “Go” button

Benefits:
- Reduce reliance on scarce skills
- Respond faster to IT customer needs
- Reduce costs
- Empower team to do more independently
- Simplify management
- Accurately depict current environment
- Reduce manual procedure errors
- Avoid problematic situations downstream

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IBM Wave Systems Management Task Example:

“Clone a Virtual Machine”

**Without IBM Wave**
1. Determine if required resources exist
2. Create clone VM definition
3. Define clone VM resources
4. Create copies of private VM resources (server)
5. Create copies of private VM resources (disk)
6. Customize clone VM
7. Authorize clone VM access / VSwitch Access
8. Add clone to management groups
9. Activate clone
10. Configure the network
11. Run middleware configuration scripts

**With IBM Wave**
1. Open the “Clone” form
2. Fill in the needed information
3. Press the “Go” Button

**Benefits:**
- Reduce time for a highly complex task
- Reduce costs
- Reduce reliance on scarce skills
- Improve speed to clone
- Simplify management
- Reduce errors associated with manual procedures
- No need to monitor every step of the process

Clone a Linux Virtual Server

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IBM Wave Systems Management Task Example:

“Live Guest Relocation”

**Without IBM Wave**

- Using manual control program commands

**With IBM Wave**

- Using the GUI’s Drag-and-Drop techniques
- Or Execute via menu selection

<table>
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<tr>
<th>Task</th>
<th>Task Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log into both z/VM instances</td>
<td>Login PBCVMA&lt;br&gt;Login PBCVMB</td>
</tr>
<tr>
<td>Find out which instance has the running guest</td>
<td>q HTTP2 in PBCVMA&lt;br&gt;q HTTP2 in PBCVMB</td>
</tr>
<tr>
<td>Verify the guest can be moved</td>
<td>vmrelo test HTTP2 to PBCVMB</td>
</tr>
<tr>
<td>Move the guest</td>
<td>vmrelo move HTTP2 to PBCVMB</td>
</tr>
<tr>
<td>Log out of both z/VM instances</td>
<td>Logoff PBCVMA&lt;br&gt;Logoff PBCVMB</td>
</tr>
</tbody>
</table>

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Saving Time with IBM Wave for z/VM

- Clone from Guest - as often as one would like to create a new virtual server. Developers could do this on an hourly basis, but more likely every few days, depending on the job.

- Activate/Deactivate Guest - turn guests on and off. A restart may be necessary to check the application, or possibly to stop a job from completing so another action could be taken.

- Add Virtual Switch - creating virtual LANS and switches might be performed depending on the needs of the developer and what they are looking to accomplish. This may be part of a one-time setup.

- Execute Scripts for Guest - could be on a near continual basis. Creating a new guest may likely require a script to run. More guests, more scripts.

- Monitor z/VM - continual process. This is already part of the application so this dashboard will be accessed often. Additional guests generate additional monitoring activity and are added to the monitoring pool automatically - no manual intervention is needed.

- Live Guest Relocation will be used most often when patching z/VM and as a low-level failover. One could invoke the failover manually rather than utilize another tool for policy-based automated failover.
IBM Wave is designed to help automate and improve the productivity of many administrative tasks. Tests were run on a zEnterprise processor both with and without the IBM Wave interface**.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Manual Times in seconds</th>
<th>With IBM Wave Times in seconds</th>
<th>Reduction in time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clone a Guest Linux Server</td>
<td>576</td>
<td>29</td>
<td>95%</td>
</tr>
<tr>
<td>Activate/deactivate a guest</td>
<td>65</td>
<td>10</td>
<td>85%</td>
</tr>
<tr>
<td>Add a virtual switch</td>
<td>88</td>
<td>20</td>
<td>77%</td>
</tr>
<tr>
<td>Execute scripts for a guest</td>
<td>96</td>
<td>18</td>
<td>81%</td>
</tr>
<tr>
<td>Monitor z/VM</td>
<td>30</td>
<td>13</td>
<td>58%</td>
</tr>
<tr>
<td>Live guest migration</td>
<td>95</td>
<td>13</td>
<td>87%</td>
</tr>
</tbody>
</table>

*These are sample task timings conducted by the IBM Competitive Project Office. Manual test times assumed a base knowledge of z/VM and assume no additional scripting. Individual test results may vary.

**Tests used a zEnterprise 196.model 2817-H10 running z/VM 6.3 with 6 cores shared by LPARS in the test. Each z/VM has 128G of memory.
Enterprise Linux Server features IBM Wave for z/VM

Enterprise Linux Server includes IBM zEnterprise® hardware, hardware maintenance, IBM virtualization and management software components and software support & subscription.

- **Hardware options**
  - IBM zEnterprise server
  - 32 GB memory
  - Connectivity
  - S&S

- **Virtualization software**
  - IBM z/VM Version 6
  - z/VM basic features:
    - Dirmaint™, RACF®, Performance Toolkit for VM™, RSCS
  - **NEW! IBM Wave for z/VM included**
  - 3-5 years S&S
  - *Note:* Linux ordered from Red Hat or SUSE

**Enterprise Linux Server**
Includes IFLs, memory, I/O adapters, z/VM software including 3-to-5 years of S&S, and maintenance

**Solution Edition for Enterprise Linux**
Acquire incremental Linux CPUs (IFLs), memory, z/VM software and 3-5 years of subscription and support, and maintenance.

1 28-32 GB memory on zBC12, 24 GB memory per core up to 5 IFLs on z114.

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Complete Solution for administration and management of the z/VM and Linux on z Systems environment

IBM Infrastructure Suite

Linux on z Systems

OMEGAMON XE on z/VM and Linux
- Performance monitoring of z/VM and Linux guest

Tivoli Storage Manager
- File Level backup and recovery for Linux Virtual Machines

z/VM

Wave for z/VM
- Simple, intuitive, graphical z/VM management tool

Operations Manager for z/VM
- Facilitate automated operations, take action based on events

Backup and Restore Manager for z/VM
- Backup and restore full z/VM environment

Gain the Competitive Edge
Enterprise Cloud System (Pre-configured and integrated system)

- **Server:**
  - IBM zEnterprise® EC12 or IBM zEnterprise BC12 (zEC12, zBC12)

- **Storage:**
  - IBM DS8870 or Storwize® V7000

- **Software:**
  - z/VM® 6.3 with following features:
    - Directory Maintenance (DirMaint™) Feature
    - Resource Access Control Facility (RACF®)
    - Performance Toolkit for VM™ Feature
    - Single System Image (SSI) Feature –
      - (Requires ECKD DASD)
  - IBM Wave for z/VM

- **Cloud Management Suite:**
  - OMEGAMON® XE on z/VM and Linux
  - Tivoli Storage Manager
  - SmartCloud Orchestrator

- Operations Manager for z/VM
- Backup and Restore Manager for z/VM

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Top Reasons Why you Need IBM Wave

- Does your company need to simplify advanced virtualization functions? ✓
- Do you need to accelerate the productivity of less experienced staff? ✓
- Would you like the convenience of reporting capabilities without having to navigate to another product? ✓
- Would it be convenient to easily visualize configuration and status of virtual guests? ✓
- Do you ever need to limit authority to effect resource changes to certain staff? ✓
- Could you use automatic notifications to alert staff from performing certain operations during critical periods? ✓
- Would you like to be able to perform easy drag and drop connections, like connecting z/VM to a virtual network? ✓
- Can you group and filter virtual resources and manage them in a way that is meaningful to your users? ✓
- Would you like to perform complex tasks like LGR in seconds? ✓
- Would you like to simplify the capturing and cloning of virtual Linux guests in a few clicks? Would you like to be able to customize cloning and add scripts? ✓

Would you like to do all of this with one product?

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Summary - IBM Wave for z/VM can:

✓ Simplify the administrative and management of virtualized servers all from a single dashboard
✓ Reduce the time it takes to perform complex virtualization management tasks
✓ Extend the reach of existing skills to manage even the most complex tasks like live guest relocation
✓ Improve the quality and consistency of operations with a current and accurate view of your system using IBM Wave discovery
✓ Reduce risk of errors by delegating management scope to the appropriate teams
✓ Accelerate virtualization steps like virtual server cloning and provisioning to make the transformation to cloud easier

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IBM Wave for z/VM - Live Demo