IBM zEnterprise Unified Resource Manager Overview

The value for z/VM
Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

<table>
<thead>
<tr>
<th>Trademark</th>
<th>Description</th>
<th>Trademark</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX*</td>
<td>HiperSockets</td>
<td>POWER7</td>
<td>System z10</td>
</tr>
<tr>
<td>BladeCenter*</td>
<td>IBM*</td>
<td>PowerVM</td>
<td>zSeries*</td>
</tr>
<tr>
<td>DataPower*</td>
<td>IBM eServer</td>
<td>PowerVM</td>
<td>z/VM*</td>
</tr>
<tr>
<td>DB2*</td>
<td>IBM (logo)*</td>
<td>RACF*</td>
<td>z10 BC</td>
</tr>
<tr>
<td>FICON*</td>
<td>InfiniBand*</td>
<td>System x*</td>
<td>z10 EC</td>
</tr>
<tr>
<td>GDPS*</td>
<td>Parallel Sysplex*</td>
<td>System z*</td>
<td>zEnterprise</td>
</tr>
<tr>
<td>Geographically Dispersed Parallel Sysplex</td>
<td>POWER*</td>
<td>System z9*</td>
<td>z/OS*</td>
</tr>
</tbody>
</table>

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.
Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license there from.
Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.
InfiniBand is a trademark and service mark of the InfiniBand Trade Association.
Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.
UNIX is a registered trademark of The Open Group in the United States and other countries.
Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.
ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.
IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency, which is now part of the Office of Government Commerce.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:
Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprocessing in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.
IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.
All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.
This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.
All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.
Agenda

- System z10 HMC-Based z/VM Management
- zEnterprise HMC-Based z/VM Management
- New HMC Roles
- Unified Resource Manager
- Managing z/VM on zEnterprise
- Examples
- Performance Management
- Conclusion
System z10 HMC-Based z/VM Management

[Image of HMCCEC12: Hardware Management Console Workplace (Version 2.9.3)]

- Views
  - Groups
  - Exceptions
  - Active Tasks
  - Console Actions
  - Task List
  - Books
  - Help

- Groups Work Area
  - CPC Images
  - Defined CPCs
  - HMCCEC12
  - Undefined CPCs
  - Undefined Directors/Timers
  - Undefined Fiber Savers

- z/VM Virtual Machine Management
  - Activate
  - Deactivate
  - Grouping
  - z/VM Virtual Network Information
  - Choose z/VM Virtual Machines to Manage
  - Undefined z/VM Virtual Machines for Management
  - Monitor System Events

[Image of HMCCEC12: Wel, 53270-1 960.9, HMCCEC12: Har, Perform Support, Perform Support, Capture by Her]
IBM zEnterprise System – Best in Class Systems and Software Technologies

A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system: zEnterprise Unified Resource Manager

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides platform, hardware and workload management

Scale out to a trillion instructions per second:
IBM zEnterprise BladeCenter® Extension (zBX)

- Selected IBM POWER7® blades and IBM System x® Blades¹ for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network

The world’s fastest and most scalable system:
IBM zEnterprise™ 196 (z196)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

¹ All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Putting zEnterprise System to the task

*Use the smarter solution to improve your application design*

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
zEnterprise Ensemble

- A zEnterprise Node is a single zCEC with 0 to 4 zBX racks and up to two blade centers per rack
- A zEnterprise Ensemble is a collection of 1 to 8 zEnterprise Nodes managed as a single virtualized pool of server resources
- A zEnterprise node can be a member of a single ensemble
- An ensemble is the management scope for the Unified Resource Manager
- A primary / alternate pair of HMCs provides the management console for the ensemble
  - The alternate HMC takes over in case the primary fails
zEnterprise HMC-Based z/VM Management
HMC Connectivity
HMC Security Infrastructure

- Hardware Management Console (HMC) extended to support new management roles
  - Secure SSL based remote access (optional)
  - Full complement of certificate management capabilities
  - Complete user management suite
  - Full-function user definition
  - Highly flexible password rule definition
  - Centralized authentication using LDAP
  - Complete access controls for tasks and resources allowed for each user (i.e., User Roles)
  - Automatic replication of configuration data
  - Full-function embedded firewall
## Ensemble Management Users and Roles

- New task and resource roles enable isolation across management disciplines
- New predefined users EnsOperator and EnsAdmin

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensemble Administrator</td>
<td>Responsible for creating and managing the zGryphon ensemble</td>
</tr>
<tr>
<td></td>
<td>Create Ensemble, Add Member...</td>
</tr>
<tr>
<td>Virtual Network Administrator</td>
<td>Responsible for Managing Virtual Networks, Hosts, and MAC Prefixes</td>
</tr>
<tr>
<td></td>
<td>Manage Virtual Networks, Add Hosts to Virtual Networks, Create VLAN IDs...</td>
</tr>
<tr>
<td>Virtual Server Administrator</td>
<td>Responsible for managing virtual servers</td>
</tr>
<tr>
<td></td>
<td>New /Modify Virtual Server, Add Virtual Disk, Migrate...</td>
</tr>
<tr>
<td>Virtual Server Operator</td>
<td>Responsible for performing and scheduling virtual server activation/deactivation, mounting virtual media</td>
</tr>
<tr>
<td></td>
<td>Activate, Deactivate, Mount Virtual Media, Console session...</td>
</tr>
<tr>
<td>Storage Resource Administrator</td>
<td>Responsible for managing storage resources – Storage Access Lists, WWPNs, z/VM Storage Groups</td>
</tr>
<tr>
<td></td>
<td>Export WWPN, Import SAL, Add Storage Resources...</td>
</tr>
<tr>
<td>Workload Administrator</td>
<td>Responsible for managing workloads</td>
</tr>
<tr>
<td></td>
<td>New /Modify workload, Add / Remove Virtual Servers..</td>
</tr>
<tr>
<td>Performance Management Administrator</td>
<td>Responsible for managing performance policies</td>
</tr>
<tr>
<td></td>
<td>New /Modify performance policy, Import policy</td>
</tr>
<tr>
<td>Performance Management Operator</td>
<td>Responsible for performing and scheduling policy activations and creating threshold notifications</td>
</tr>
<tr>
<td></td>
<td>Activate, Export Policy, Monitor System Events</td>
</tr>
<tr>
<td>Energy Management Administrator</td>
<td>Responsible for managing power settings including power capping and power savings</td>
</tr>
<tr>
<td></td>
<td>Set Power Cap, Set Power Savings Mode, Set zBX Power Policy</td>
</tr>
</tbody>
</table>
zEnterprise Unified Resource Manager
Transforming the way resources are managed and deployed

What is it?
Unified Resource Manager provides **workload awareness** to optimize the system resources in accordance with understanding the policies assigned to that particular workload. Functions are grouped into two suites of tiered functionality that enable different levels of capability - Manage suite and Automate suite.

How is it different?
- **Heterogeneous management**: Total systems management across heterogeneous resources
- **Integration**: Single point of control, common skills for resources, reduced complexity of day to day operations
- **Monitoring**: New dashboard for CPU resources and energy management
- **Simplified installation**: Auto discovery and configuration of resources and workloads with single interface
- **Secure**: Improved network security with lower latency, less hops and less complexity. Improved control of access due to management of hypervisors as firmware
- **Service and support management**: Hardware problem detection, reporting and call home supported for virtual machines and blades
HMC

User Interface

SE

NPM Tower
EM Tower
PR/SM Tower
z/VM Tower
zBX Tower
HVM/VSM Tower

MOM

Adapters

PR/SM
z/VM
PHYP
XHYP

Ensemble Node

Ensemble

HOM

HOM

HPM for PR/SM

BFYCALL

PR/SM
z/OS
VSE
z/VM
Proxy DirMgr SMAPI
HPM MAP

PHYP
HPM IVM (VIOS)
AIX

XHYP
HPM, libvirt

Lx
Ag

Lx
Ag

Lx
Ag

Lx
Ag

© 2010 IBM Corporation
Synergy with z/VM

- Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
- zEnterprise introduces virtual server provisioning and management for Linux guests running on z/VM
  - Use the Unified Resource Manager to create z/VM virtual machines
  - Simplify the skill level needed to manage a Linux on z/VM environment
- Faster cores and a bigger system cache on the z196 let you do even more with less when running Linux on z/VM
- Integrated blades on zBX offer a new dimension for workload optimization
z/VM Enhancements for zEnterprise Unified Resource Manager
Complete virtual machine management from the HMC

- **Software**
  - z/VM 6.1 with applicable PTFs
    - z/VM Management Guest – HPM and MAP
    - z/VM SMAPI server
    - z/VM Directory Maintenance server (or equivalent)
    - INMN and IEDN virtual switch controllers
    - Control point for MAC assignment and VLAN access
  - Supported Linux SLES and RHEL distributions
    - Optional Guest Platform Management Provider
    - Legacy NIC can connect to IEDN or INMN via virtual switch
- INMN and IEDN access provided via new z/VM virtual switch types
  - Up-link can be virtual machine NIC (for Management Guest purposes)
  - Ensemble membership conveys Ensemble UUID and MAC prefix
  - Automatic connection to INMN
- SMAPI manages SYSTEM CONFIG
- z/VM is authoritative source of virtual machine state
  - State changes automatically reflected to Unified Resource Manager
z/VM Management Infrastructure

- SMAPI
- z/VM TCP/IP
- Manager (MAP+HPM)
- Linux Guest 1 Agent
- Linux Guest 2 Agent
- Directory Manager
- Virtual Switch DTCINMN
- Virtual Switch SW2
- Node Manager SE
- OSA-E OSM
- HMC

NIC 200 MAC 02500000005
NIC 100 MAC 02500000001
NIC 200 MAC 02500000002
NIC 300 MAC 02500000003
NIC 400 MAC 02500000004

Port 1
Port 2
Port 3
Port 65
Dev 500.P00 OSM - INMN
Use Cases

- New virtual server
- Virtual server details
- Create virtual network
- Associate virtual server with virtual network
New Virtual Server - R32:VM

Enter Name
Enter in a name and description for the virtual server.

Hypervisor name: VM
Hypervisor type: Image

Name: BuyerVM

Description:
zVM Virtual Server
Assign Processors
Assign the initial and maximum processors that the virtual server will have access to.

Processor type: Central Processor
Initial virtual processors: 1
Specify Memory

Specify the amount of dedicated memory that will be available for the virtual server. The memory amount must be specified in increments of 1 MB.

Initial memory: 1024 MB
### Add Network

Add the network adapters that the virtual server will use to access the networks.

<table>
<thead>
<tr>
<th>Select</th>
<th>ID</th>
<th>Network Name</th>
<th>Network Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total: 0</td>
</tr>
</tbody>
</table>

**Buttons:**
- Add
- Edit
- Remove

**Links:**
- Manage Virtual Networks
New Virtual Server - R32:VM

Add Storage
Add the storage drives that the virtual server will use to access the storage resources.

Select | Device | Name | Description | Resource Name | Mode | Size

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
|     |  Total: 0

Add | Edit | Remove

Manage Storage Resources
New Virtual Server - R32:VM

Specify Options
Choose the boot source for your virtual server.

- Privilege classes: *G*
- IPL boot device:
- IPL parameters:
- IPL load parameters:
Performance Management

Enable processor management for your virtual server to achieve the goals set in the active performance policy.

Ensemble processor management: Disabled

- Processor management
Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Status: Not Activated
Guest Platform Management Provider Status: Not Operating

Acceptable Status:
- Operating
- Communications not active
- Status Check
- Starting
- Not Operating
- Exceptions
- Migrating
- Stopping
### Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

<table>
<thead>
<tr>
<th>Processor type:</th>
<th>Central Processor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial virtual processors:</td>
<td>1</td>
</tr>
<tr>
<td>Maximum virtual processors:</td>
<td>1</td>
</tr>
<tr>
<td>Share mode:</td>
<td>Relative</td>
</tr>
<tr>
<td>Share limit:</td>
<td>None</td>
</tr>
<tr>
<td>Initial relative shares:</td>
<td>0</td>
</tr>
</tbody>
</table>
### Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

**Network**

<table>
<thead>
<tr>
<th>Network Adapters:</th>
<th>Select</th>
<th>ID</th>
<th>Network Name</th>
<th>Network Description</th>
<th>MAC Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total:</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Add**
- **Edit**
- **Remove**

- **Manage Virtual Networks**

**OK**  **Apply**  **Cancel**  **Help**
Ensemble processor management: Disabled

Processor management
Virtual Networks and Access Controls

Server A
  z/OS
VSwitch A
  OSX  OSA
  OSA Port 0
TOR A
  External Ports
  TOR (A) Port 0
  IEDN Physical Edge (System z side)
Internal Ports
Management Port
NVM configures specific VLANs here
Configure (allow) all VLANs here:

Server B
  Server C
  Server D
zVM VSwitch B

Server E
  Server F
  Server G
PowerVM VSwitch A
Blade A
Blade B

Appliance A
(Server Y)

Server A
  Server B
  Server C
  Server D
  Server E
  Server F
  Server G
  Server H

Internal Ports
Blade B
Port 2

External Ports
BPH Ports
SE

Network Access Control
Create Virtual Network
Associate Virtual Server With Virtual Network

![Virtual Server Properties](image1.png)

![Add Hosts To Virtual Network](image2.png)
Workload

- A Workload is a grouping mechanism and “management view” of virtual servers supporting a business application
- Provides the context within which associated platform resources are presented, monitored, reported, and managed
- Performance policy is associated with Workload
Workload Performance Policy

- Defines performance goals for virtual servers in a workload
  - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and managing platform resources used by virtual servers in a Workload
- Workload relationship to performance policy
  - Multiple performance policies associated with a workload
  - A single policy is active at a given time
  - Can dynamically change the active policy
    - Through the UI
    - On a time-based schedule
    - Example: Day shift / night shift policy
Workload Performance Policy…

- **Policy structure:**
  - Policy contains a set of service classes
  - Classification rules map each virtual server within the workload to a service class
  - A service class assigns a performance goal and importance

- **HMC** is console for policy creation and editing
  - Wizard for policy creation
  - Repository for policies under development and saved policies
  - Links to workload-based performance reporting
Managing Resources across z/VM Virtual Machines

- Manage CPU resources across z/VM virtual machines
  - Detect that a virtual machine is part of a workload not achieving its goals
  - Determine that virtual machine performance can be improved with additional resources
  - Project effect on all relevant Workloads of moving resources to virtual machine
  - If good trade-off based on policy, redistribute resources
IBM zEnterprise System:  
A revolutionary change has come to IT bringing a new dimension in computing

- Redefining IT frameworks to bring change to operational silos and extend System z governance to z/VM virtual machines and blades
- Driving business decisions based on insight rather than hindsight
- Improving agility to compete with consolidation and simplification
- Delivering consistent business controls across applications and platforms
- Focused on integration and collaboration to fuel business growth

1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.
Thank you