



F0

# z/VM Systems Management Fundamentals

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# Agenda

- Overview
  - Definition of “Systems Management”
  - Systems Management Disciplines
  
- Functional Options
  - z/VM Systems Management Related Interfaces
  - xCAT
  - OpenStack Enablement
  - IBM Wave for z/VM
  
- Cloud Strategy
  
- Product and Offering Survey, organized by Discipline

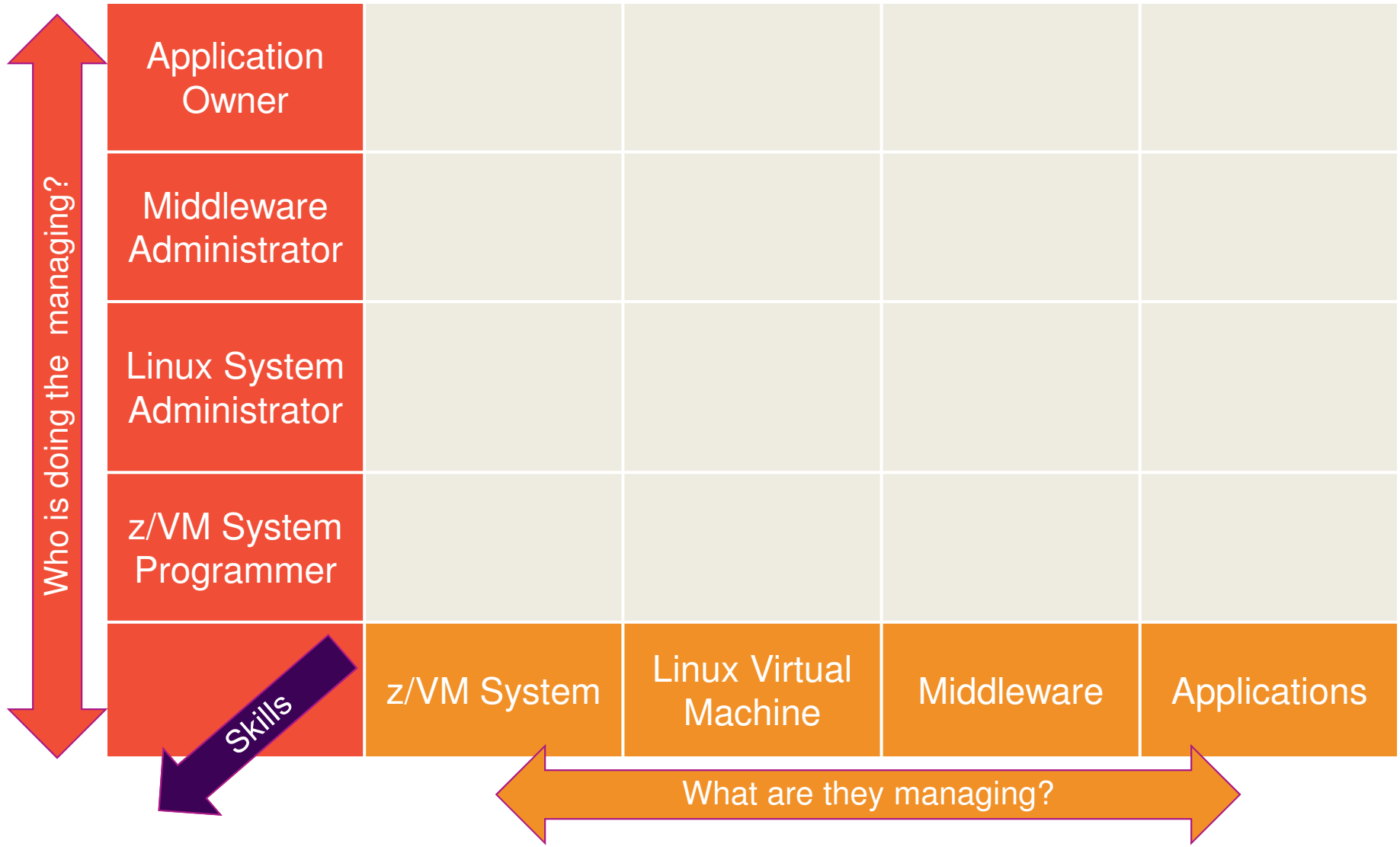


## Overview

## Definition of Systems Management

- Means different things to different people
  - What do you mean by “system”?
    - z/VM? Linux? Application?
  - What do you mean by “manage”?
    - Install? Configure? Change? Clone? Provision?
    - Software/Code Management?
    - Operational Monitoring or Performance Monitoring?
  
- “Any product or process that is not involved in actually using the system for the purpose it was purchased.”
  
- What it does **not** cover, at least in this presentation:
  - Initial installation & initial configuration of disks, memory, devices
  
- Systems Management needs may mature/expand over time.

# Three Dimensions of Systems Management



# Your Investment Portfolio



## Buy

- Solutions
- Integration
- Support



## Do It Yourself

- Develop Solutions
- Integrate Solutions
- On going support





# Disciplines of Systems Management

## Automation

- Scheduling and running common events and processes

## Monitoring

- Monitor and acting on events and conditions of the system

## Business Continuity

- Disaster Recovery and Backups/Restores

## Data Management

- Tape and storage management

## Accounting

- Charge back and billing; Inventory

## Security

- Enforcing permissions, tracking, and auditing.

## Performance

- Performance Management and Capacity Planning

## Provisioning

- Creating and changing the resources and configurations of virtual machines and perhaps guest systems

## Interface Layers

User Presentation

Wrapper and APIs

Automation

Monitoring

Business  
Continuity

Data  
Management

Accounting

Security

Performance

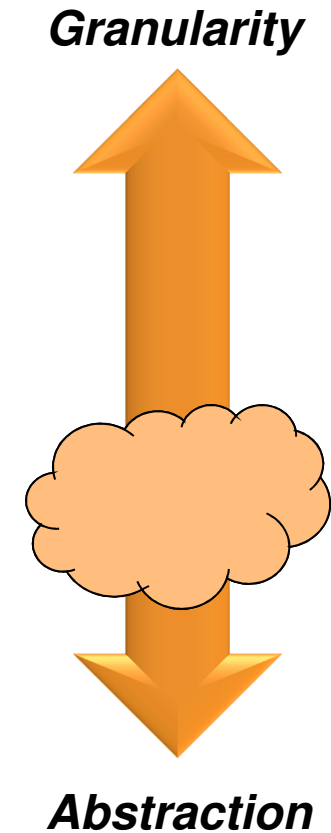
Provisioning



## Functional Options

# Systems Management Related APIs and Interfaces

- CP Exit Support
  
- CP System Services
  - \*ACCOUNT
  - \*MONITOR
  - \*RPI
  - \*VMEVENT
  
- Systems Management APIs (SMAPI)
  
- xCAT REST APIs
  
- OpenStack Enablement



# CP Exit Support

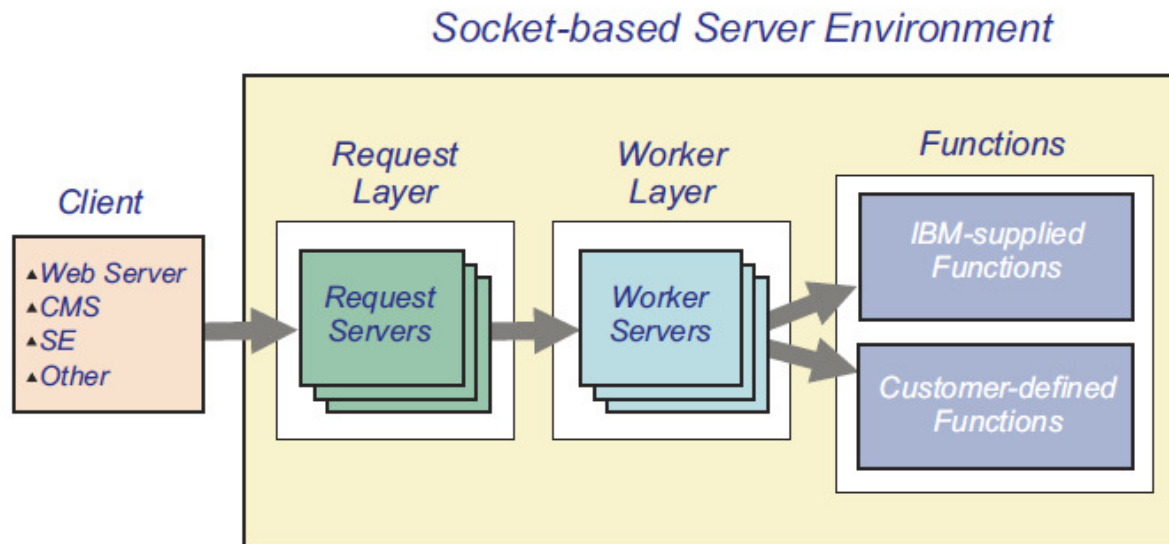
- CP Exit Support (aka “CP Exits”)
- Long History of customer and ISV extensions to the z/VM Hipervisor
- Typically used by ISVs and a small subset of customers with very specific modifications to the control program
- Can add or delete:
  - CP commands
  - Diagnose codes
  - Locally-developed CP message repositories
  - CP exit routines
- Dynamically loaded code
- 23 IBM defined CP Exit Points
  - Pre- and Post-processing Logon command
  - Shutdown command screening
  - Separator Page processing
  - Live Guest Relocation processing
- Defining and overriding commands
- z/VM CP Exit Customization SC24-6176

# CP System Services

- Allow programmatic interface with the z/VM Control Program
- IUCV (Inter User Communication Vehicle) connection to CP
- Most common used by various systems management tools and products:
  - **\*ACCOUNT**
    - Collects resource usage information for virtual machines and certain other audit like functions.
  - **\*MONITOR**
    - Collects thousands of data points about performance on a system, device, and virtual machine basis
    - Uses memory shared between CP and the virtual machine application to share the actual data
  - **\*RPI** – Access Verification System Service
    - Allows interaction between CP and an External Security Manager (ESM) such as Resource Access Control Facility (RACF)
  - **\*VMEVENT**
    - Allows notification to an application of significant system events, such as virtual machines logging on/off and relocation
- Most are documented in the z/VM CP Programming Services Manual SC24-6179
  - **\*MONITOR** is in z/VM Performance Manual SC24-6208

# z/VM Systems Management APIs

- Intended for use by ISVs and IBM program products for managing the z/VM System
- Socket-based server replaced Remote Procedure Call server in z/VM 5.3
  - RPC Server support dropped in z/VM 6.1
- Three types of API functions are supported for managing the z/VM system and virtual machines (images):
  - IBM-supplied directory manager functions
  - IBM-supplied non-directory manager functions
  - Customer-defined functions.



## Categories of SMAPI functions

- ABEND Dump Management
- Authorization
- Directory Manager Control
- Directory Manager Local Tag and Scan
- Directory Parsing
- Directory Update Subscription
- Disk Management
- Event Management
- Image Characteristics
- Image Connectivity
- Image CPUs
- Image Devices
- Image IPL Management
- Image Operations
- Image Volume Management
- List-Directed IPL
- Name List
- Profile Management
- Prototype Management
- Response Recovery
- Server
- Shared Memory Management
- Single System Image (SSI) Cluster Management
- System Configuration
- VMRM Configuration Update



## xCAT – Extreme Cloud Administration Toolkit

- Open Source tool to manage, provision, and monitor physical and virtual machines on all IBM architectures.
- Made available as a download and customer install in July 2012
- Integrated into the base of z/VM 6.3 in July 2013
- xCAT has four different interfaces
  - REST APIs (Representational State Transfer) – used by OpenStack Solutions
  - Browser based Graphical User Interface
  - Command Line Interface (CLI)
  - XML

## Where does xCAT fit in?

- It provides the tools you need to administer your cloud
  - Automate redundant steps, e.g. Linux installation
  - Manage virtual resources
  
- xCAT is not a cloud operating system
  - You still need to tell xCAT what to do
  - You still need a z/VM system administrator
  
- xCAT is a toolkit
  - Equivalent to virt-manager or virsh for KVM
  - Tool to manage, provision, and monitor physical and virtual machines on IBM System x®, Power Systems®, and IBM z Systems
  - Provides rudimentary cloud functionality
  
- Value
  - Low overhead and lightweight (download ~100 MB)
  - Open source (EPL)
  - Cross platform

## xCAT History

- Developed by IBM starting in 1999 to manage clusters of Linux and AIX systems.
- Released to the Open Source community under the Eclipse Public License
- Used to manage clusters such as
  - Roadrunner, the fastest computer in the world in 2008
  - Watson, the IBM machine that competed and won on Jeopardy
- Today xCAT can manage physical or virtual machines, such as: RHEL, CentOS, Fedora, SLES, AIX, Windows, VMWare, KVM, PowerVM, z/VM.

Source: [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main\\_Page](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main_Page)

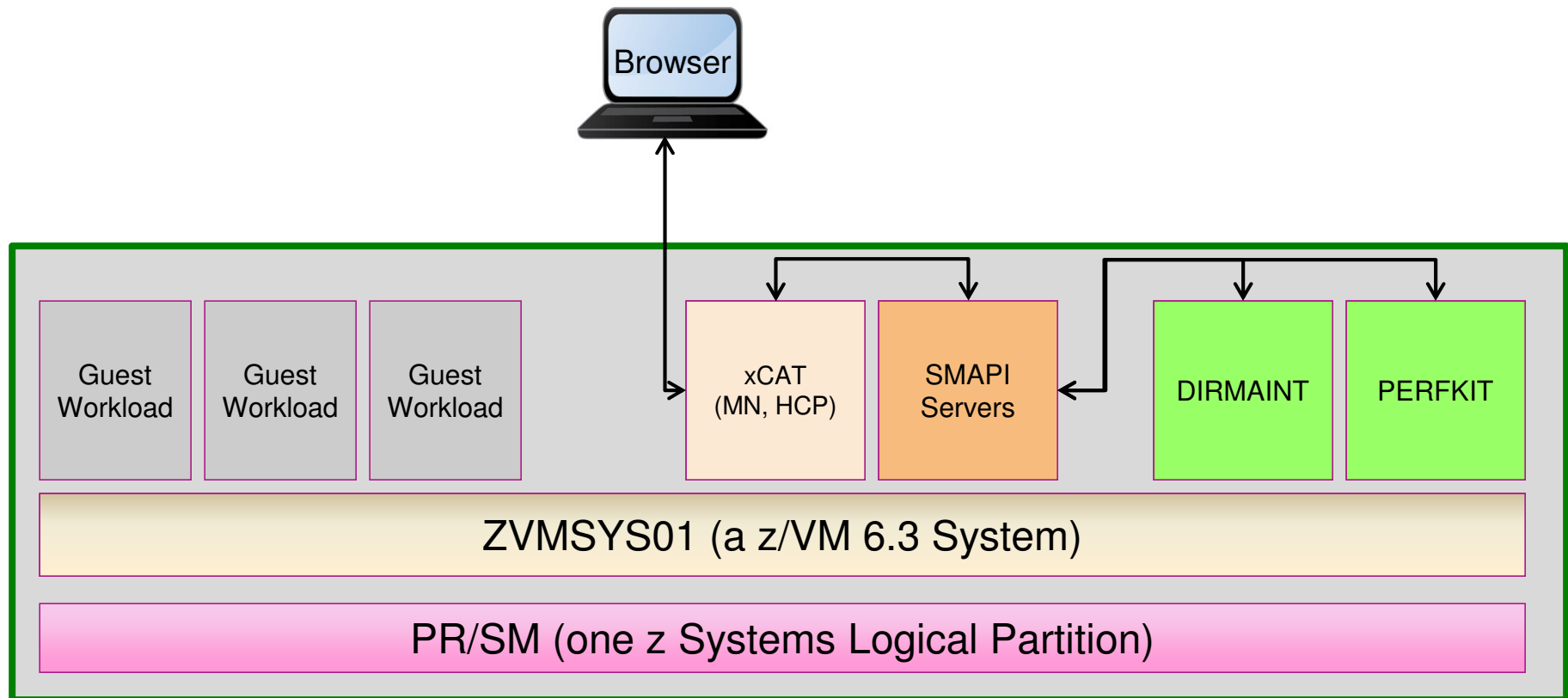
## Examples of Supported xCAT Features

- Automation
  - Power on/off virtual machine
  
- Provisioning virtual machine and host
  - Create/change/delete a virtual machine
  - Add/delete virtual network devices to a virtual machine
  - Provisioning diskless virtual machine using an NFS read-only root filesystem
  - Add/delete ECKD/SCSI disk to a virtual machine
  - Add/delete ECKD/SCSI disk to the system disk pool
  - Create/change/delete layer 2 or 3 QDIO Guest LAN or Vswitch
  - Cloning virtual machines
  - Plain installation of Linux via AutoYast or Kickstart

## Examples of Supported xCAT Features

- Accounting
  - Software and hardware inventory of a virtual machine
  
- Performance
  - System resource inventory (e.g. disks, networks)
  
- Business Continuity
  - Live Guest Relocation

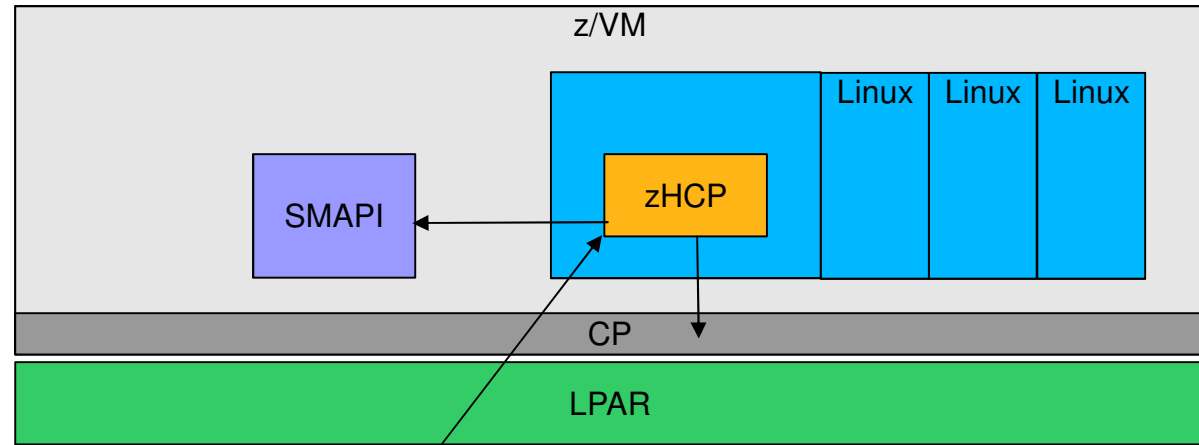
# z/VM 6.3 Pre-Installed Systems Management



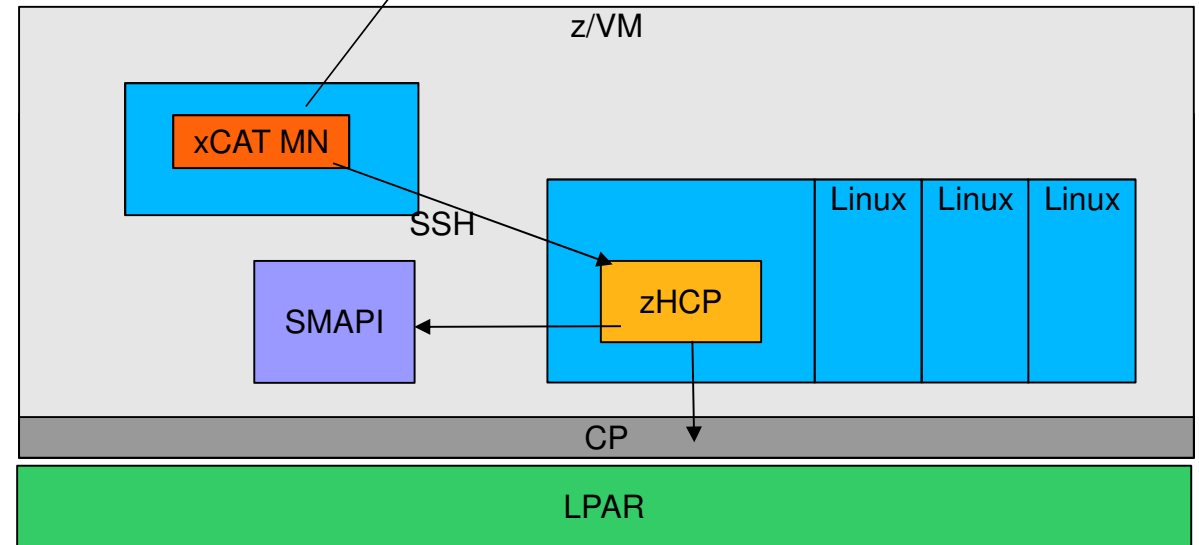
- Everything inside the z/VM LPAR is shipped with z/VM 6.3, up to and including the xCAT interfaces
- Versions of DirMaint and PerfKit are included free of charge with the SMAPI server, but these versions of the products only communicate with SMAPI, there is no way to interact with them directly.

# How xCAT Manages z/VM

**zHardware Control Point:**  
 Manages other VMs via Systems Management APIs and CP Commands. Each z/VM system needs to have a zHCP



**xCAT Maintenance Node:** Central management server. Only one MN is needed for multiple systems.



# xCAT Resources

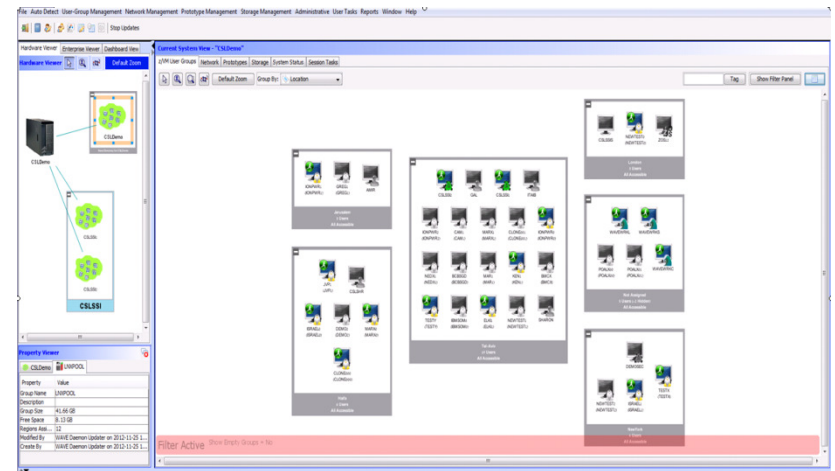
- xCAT wiki for z/VM – Information on using xCAT
  - [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main\\_Page](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main_Page)
  
- xCAT YouTube channel: Various Demonstrations
  - <http://www.youtube.com/user/xcatuser>
  
- xCAT user mailing list
  - [xcat-user@lists.sourceforge.net](mailto:xcat-user@lists.sourceforge.net)
  
- z/VM Home Page
  - <http://www.vm.ibm.com/sysman/>
  
- z/VM xCAT Maintenance
  - <http://www.vm.ibm.com/sysman/xcmntlvl.html>
  
- xCAT Downloadable References
  - [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Download\\_xCAT](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Download_xCAT)
  - [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=XCAT\\_Documentation](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=XCAT_Documentation)
  - <http://xcat.sourceforge.net/pdf/xCAT-UI-Tutorial.pdf>
  - [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=XCAT\\_zVM\\_Setup](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=XCAT_zVM_Setup)



# 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<sup>®</sup> 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<sup>®</sup> virtual servers**

# Extend the Reach of Skills with IBM Wave for z/VM

## Intelligent Visualization



- Shorten the learning curve needed to manage complex environments
- Organize and simplify management of z/VM and virtual Linux servers
- View servers and storage utilization graphically; understand the status of system resources with Intelligent icons
- Reduce unnecessary steps using highly customizable views
- Graphical or tabular displays with layered drill down

## Simplified Monitoring



- Monitor the status of z/VM systems through an innovative interface
- Monitor performance of CPU, paging devices, spool disks and more;
- Use agentless discovery to detect an accurate view of your environment
- Use advanced filters, tagging, layout and layer selection to make monitoring and management more meaningful
- Complements IBM OMEGAMON® XE used for in-depth performance monitoring

## Unified Management



- Manage your system from a single point of control
- Assign and delegate administrative access with role based assignments
- Provision, clone, and activate virtual resources . Define and control virtual network and storage devices
- Perform management tasks such as live guest relocation
- Annotate resources for additional policy based management
- Execute complex scripts with a single mouse click

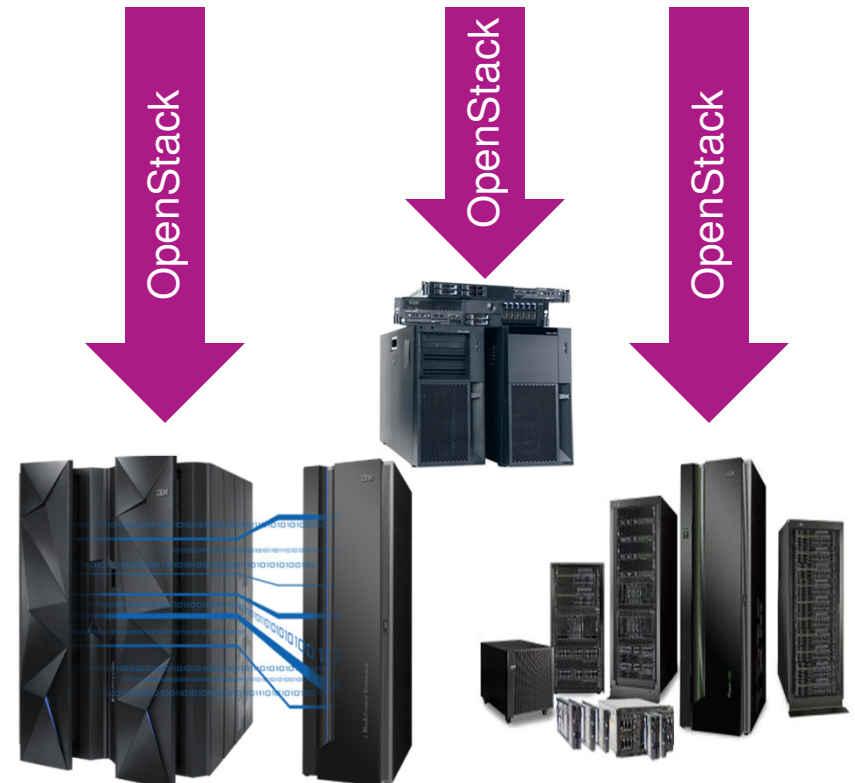
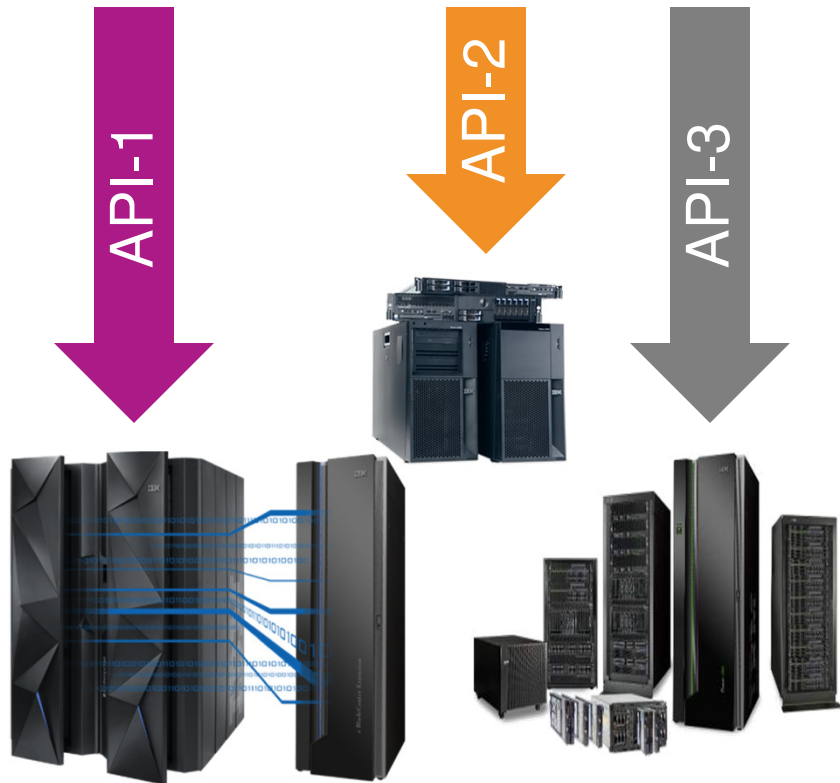

## IBM Wave for z/VM vs Operations Manager for z/VM

- IBM Wave for z/VM provides an interactive GUI interface for:
  - Provisioning of Linux guests
  - Basic performance information
  - Monitoring of virtual server resources
- Operations Manager for z/VM provides operational monitoring & automation
  - In the background
    - Monitoring of console messages for z/VM service machines and Linux guests
    - Monitoring “state” information for z/VM service machines and Linux guests
    - Monitoring spool and page space on the z/VM system
    - Automated responses to these monitors when they are triggered
      - Email
      - SNMP alerts
      - Integration with IBM Tivoli Netcool/OMNIBUS enterprise alert system
      - Actions that address the problem immediately in addition to or instead of alert notification
  - Interactive when needed
    - View and interact with live service machine and Linux guest consoles
    - View and manage spool files
- Complementary solutions
  - Use Operations Manager to monitor the IBM Wave service machines
  - Use Operations Manager to automatically initiate tasks in Wave via the Wave CLI

# A Different Better vs. A Common Good

Management Software

Management Software



# The OpenStack Food Chain

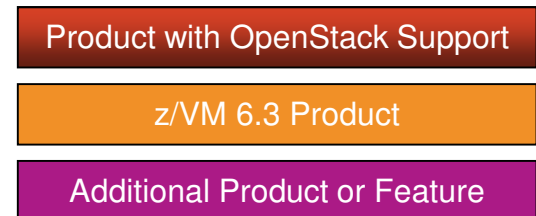


▪ **Top Half of the Solution:**

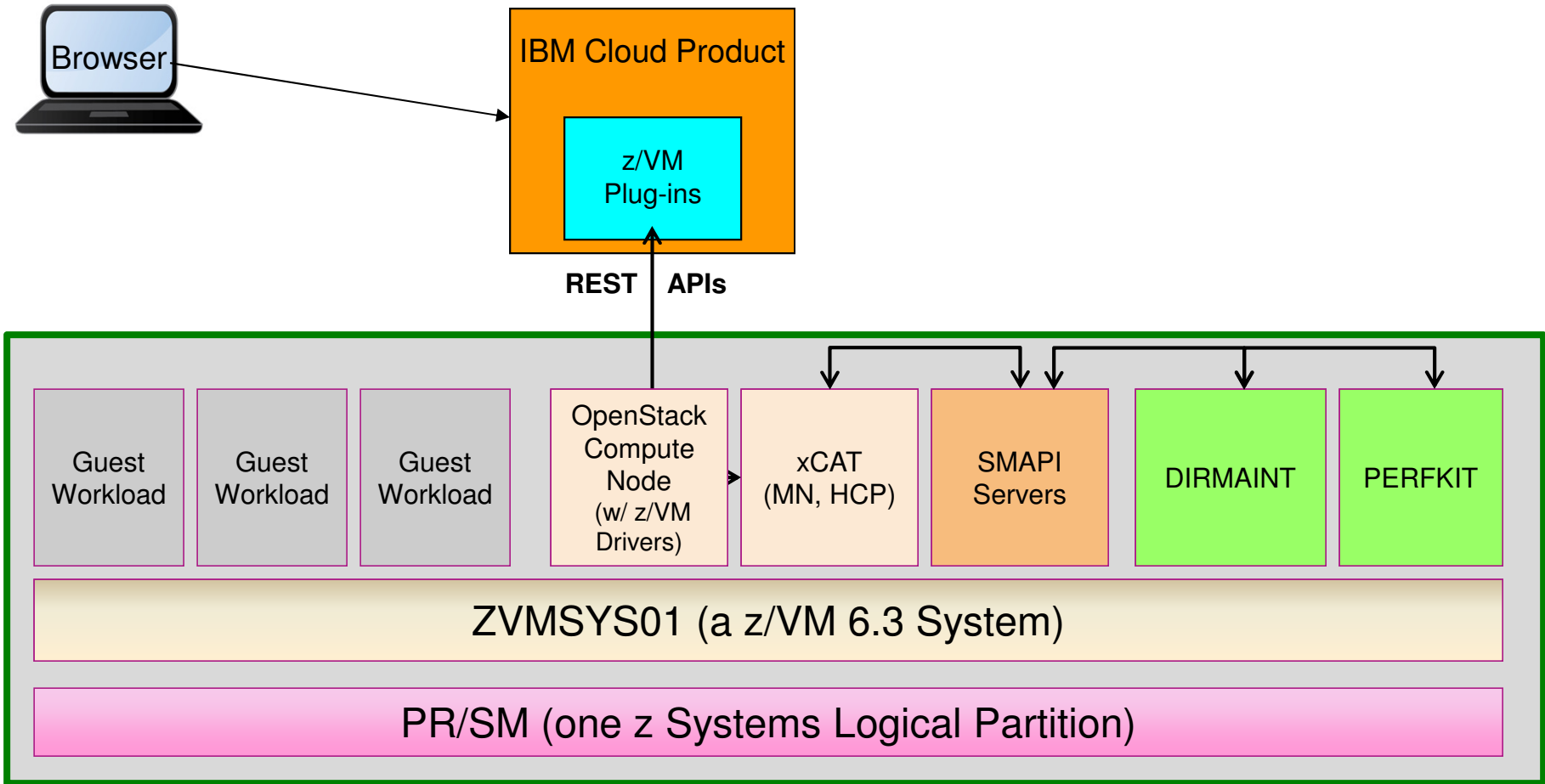
- An IBM SmartCloud Technology product or other vendor product will include the OpenStack support.
- Portions of that OpenStack support will know z/VM (i.e. code that connects and understands how to talk to z/VM).

▪ **Bottom Half of the Solution:**

- Rest APIs are used to communicate with the OpenStack code from the top half.
- The xCAT Appliance utilizes new and existing Systems Management APIs (SMAPI) to interact with the z/VM system
- SMAPI can interact with additional products or features (e.g. a directory manager).



# z/VM 6.3 Pre-Installed Systems Management



- Everything inside the z/VM LPAR is shipped with z/VM 6.3, up to and including the xCAT interfaces
- Versions of DirMaint and PerfKit are included free of charge with the SMAPI server, but these versions of the products only communicate with SMAPI, there is no way to interact with them directly.

# OpenStack

- Open Source project to provide Infrastructure as a Service.
- Started by NASA and Rackspace in 2010
- Now backed by IBM and many other corporations
- Consists of separate projects to handle different types of resources
- New releases every 6 months



Source: [http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main\\_Page](http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main_Page)

# OpenStack Community

More than 6000 people and 100 companies

Active online community through mailing lists, IRC, wiki

Bi-yearly design summits

Companies need to donate money AND people that ACTIVELY contribute

## Platinum Members



AT&T



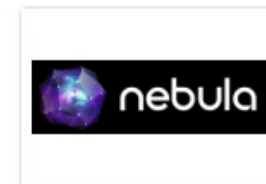
Canonical



HP



IBM



Nebula



Rackspace



Red Hat, Inc.



SUSE

and many more ...  
<http://www.OpenStack.org/foundation/companies/>



# OpenStack Release Names

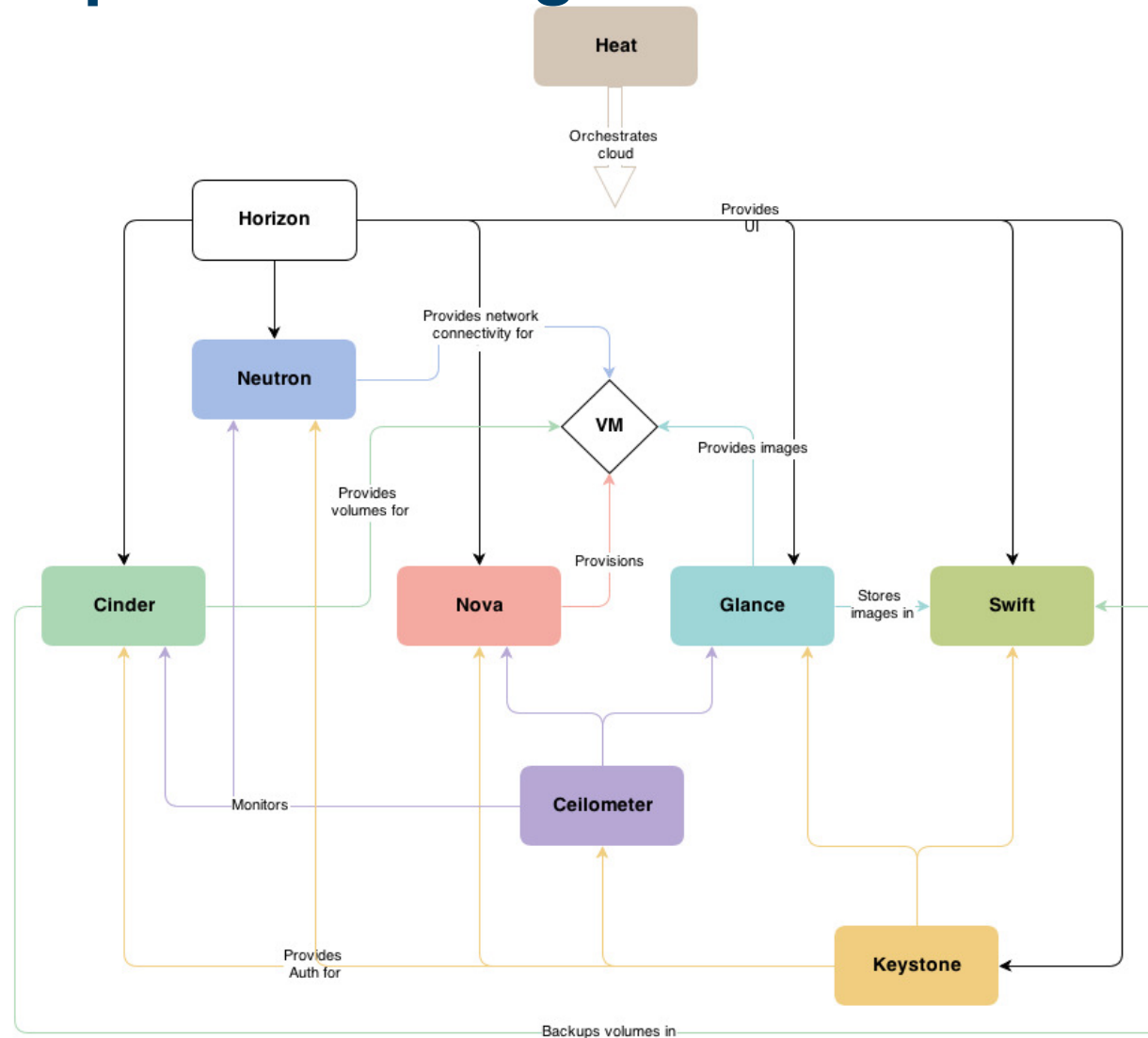
These codenames are chosen by popular vote. Codenames are cities or counties near where the corresponding OpenStack design summit took place, with some exceptions to the rule.

- **Austin:** The first design summit took place in Austin, TX
- **Bexar:** The second design summit took place in San Antonio, TX
- **Cactus:** Cactus is a city in Texas
- **Diablo:** Diablo is a city in the bay area near Santa Clara, CA
- **Essex:** Essex is a city near Boston, MA
- **Folsom:** Folsom is a city near San Francisco, CA
- **Grizzly:** Grizzly is an element of the state flag of California, summit is in San Diego, CA
- **Havana:** Havana is an unincorporated community in Oregon with design summit nearby
- **Icehouse:** Ice House is a street in Hong Kong
- **Juno:** Juno is a locality in Georgia
- **Kilo:** Short for “kilogram”, the last SI base unit tied to a reference artifact (stored in Sevres)

## Top Ten OpenStack Project Contributors

Grizzly April 2013		Havana September 2013		Icehouse April 2014		Juno September 2014	
Company	Commits	Company	Commits	Company	Commits	Company	Commits
Red Hat	1858	Red Hat	1858	Red Hat	3475	HP	3223
HP	1456	HP	1456	HP	2174	Red Hat	2859
Rackspace	1160	Rackspace	1160	IBM	1801	IBM	1407
IBM	972	IBM	972	Rackspace	1730	Mirantis	1371
VMware	362	Mirantis	362	Mirantis	1478	Rackspace	1280
Nebula	295	OpenStack Foundation	295	SUSE	985	*independent	898
eNovance	279	SUSE	279	OpenStack Foundation	716	SUSE	762
Mirantis	156	eNovance	156	eNovance	704	eNovance	414
Intel	147	VMware	147	*independent	686	B1 Systems	410
OpenStack Foundation	128	NEC	128	VMware	554	VMware	405

# OpenStack Programs

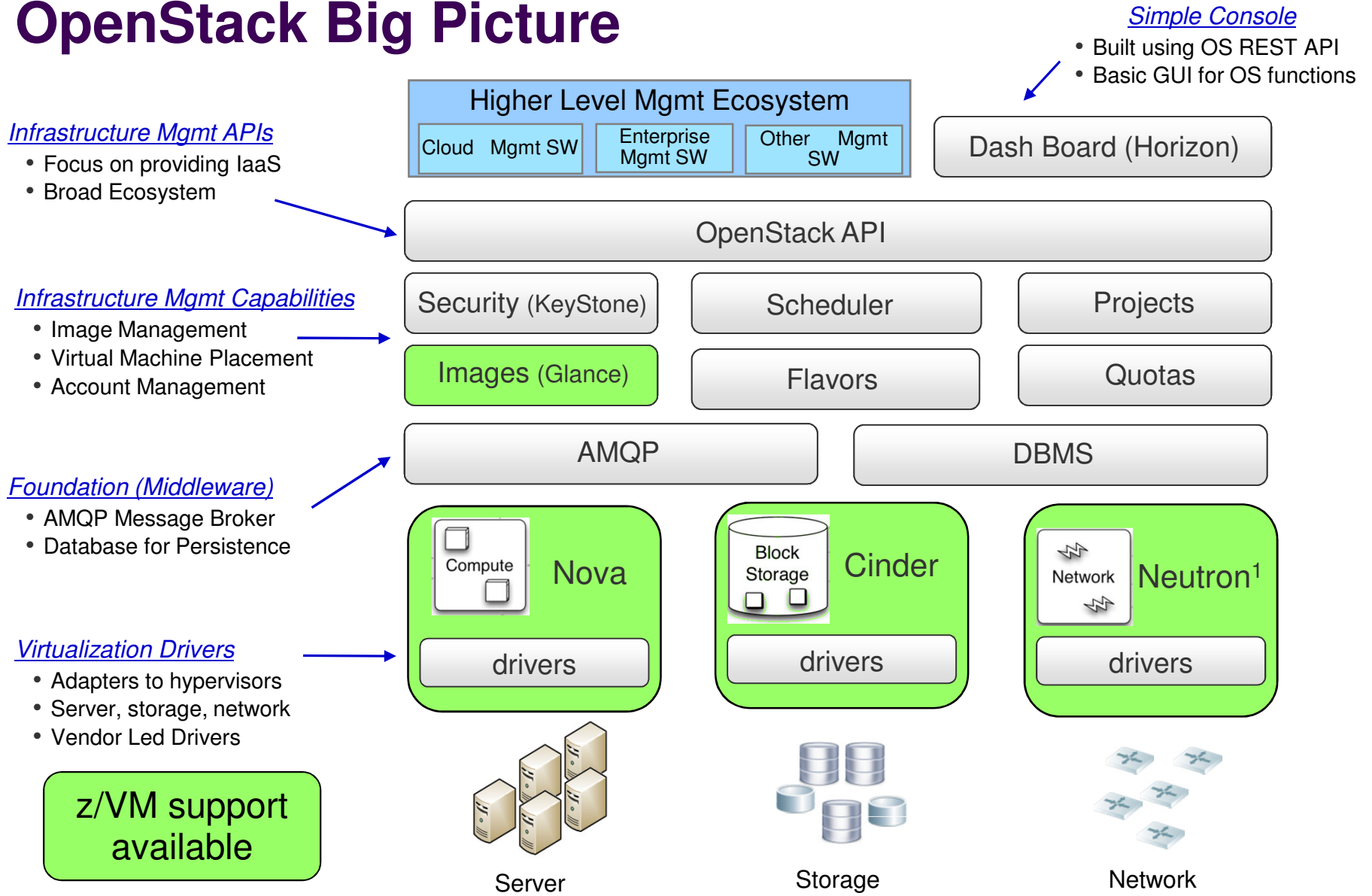


- Compute (Nova)**
- Block Storage (Cinder)**
- Network (Neutron)**  
Provision and manage virtual resources
- Dashboard (Horizon)**  
Self-service portal
- Image (Glance)**  
Catalog and manage server images
- Identity (Keystone)**  
Unified authentication and authorization
- Object Storage (Swift)**  
Petabytes of secure, reliable object storage
- Telemetry (Ceilometer)**  
Data collection
- Orchestration (Heat)**  
Engine to launch cloud applications based on templates
- Database Service (Trove)**  
Cloud Database-as-a-Service
- Data Processing (Sahara)**  
Data processing stack and management

## OpenStack Deliverables and z/VM

- OpenStack releases are every 6 months
  - Expect z/VM service and releases to open source outside the normal z/VM release cadence
- The framework for support of OpenStack communication is in base of z/VM 6.3
- Initial z/VM OpenStack enablement (part on the z/VM side) available as service in December 2013
- Original IBM cloud technology for z/VM was based on Havana level by incorporating code z/VM Development has released to open source.

# OpenStack Big Picture



## Examples of Supported z/VM OpenStack Features

- Provisioning virtual machines and host
  - Resize virtual machine (memory, CPU) [Nova]
  - Disk (Add SCSI disk to virtual machine) [Nova, Cinder]
  - Support for Open vSwitch [Neutron<sup>1</sup>]
  
- Automation
  - Start / Stop virtual machine [Nova]
  - Reboot Linux virtual machine [Nova]
  - Pause / Unpause virtual machine [Nova]
  - Capture / Deploy virtual machine [Nova, Glance]
  - Activate Image [Nova]
  
- Business Continuity
  - Live Guest Relocation [Nova]

<sup>1</sup> – Formerly known as Quantum.



## Cloud Strategy

# Virtualization and Cloud Portfolio for Linux on System z

<b>Virtualization</b> Infrastructure & Virtualization Management	<b>Entry Level Cloud</b> Standardization & Automation	<b>Advanced Cloud</b> Orchestration & Optimization
<p><b>Servers: z13, zEC12, zBC12</b></p> <ul style="list-style-type: none"> <li>• Massively scalable</li> <li>• Characterized by great economics / efficiencies</li> <li>• Highly secure / available</li> </ul> <p><b>z/VM 6.3</b></p> <ul style="list-style-type: none"> <li>• Support more virtual servers than any other platform in a single footprint</li> <li>• Integrated OpenStack support</li> </ul> <p><b>IBM Wave for z/VM</b></p> <ul style="list-style-type: none"> <li>• A graphical interface tool that simplifies the management and administration of z/VM and Linux environments</li> </ul> <p><i>Differentiation</i></p>	<div> </div> <p><b>Cloud Manager with OpenStack</b></p> <ul style="list-style-type: none"> <li>• A simple, entry level cloud management stack</li> <li>• Based on OpenStack</li> <li>• Formerly known as SmartCloud Entry</li> </ul> <p><i>Standardization</i></p>	<div> </div> <p><b>Cloud Orchestrator</b></p> <ul style="list-style-type: none"> <li>• Based on OpenStack</li> <li>• Builds on functionality of <b>Cloud Manager with OpenStack</b> and adds runbook automation and middleware pattern support for workload deployment</li> <li>• Formerly known as SmartCloud Orchestrator</li> </ul> <p><i>Service Lifecycle Management</i></p>



# IBM Cloud Manager with OpenStack

- Formerly offered as IBM SmartCloud Entry V3
  
- Benefits:
  - Full access to OpenStack APIs, backed with IBM support
  - Cloud management solution that is easy to use
  - Self service portal for workload provisioning and virtualized image management
  - Heterogeneous support for IBM PowerVM®, z/VM, IBM PowerKVM and x86, and more.
  - Deploy, resize and capture
  - Linux server backup and restore
  - Manage z/VM from z/VM or manage z/VM from other platforms
  
- Requires z/VM 6.3 with appropriate service
  - Based on OpenStack

## IBM Cloud Manager with OpenStack 4.1

- IBM Cloud Manager with OpenStack V4.1
  - Available: June 13, 2014
  - Based on Icehouse level of OpenStack
  - Manages “to z/VM” (i.e. needs server of z Systems)
  
- IBM Cloud Manager with OpenStack V4.1
  - Available: September 16, 2014
  - Based on Icehouse level of OpenStack
  - Manage z from z support added via “CMO appliance that ships with z/VM”

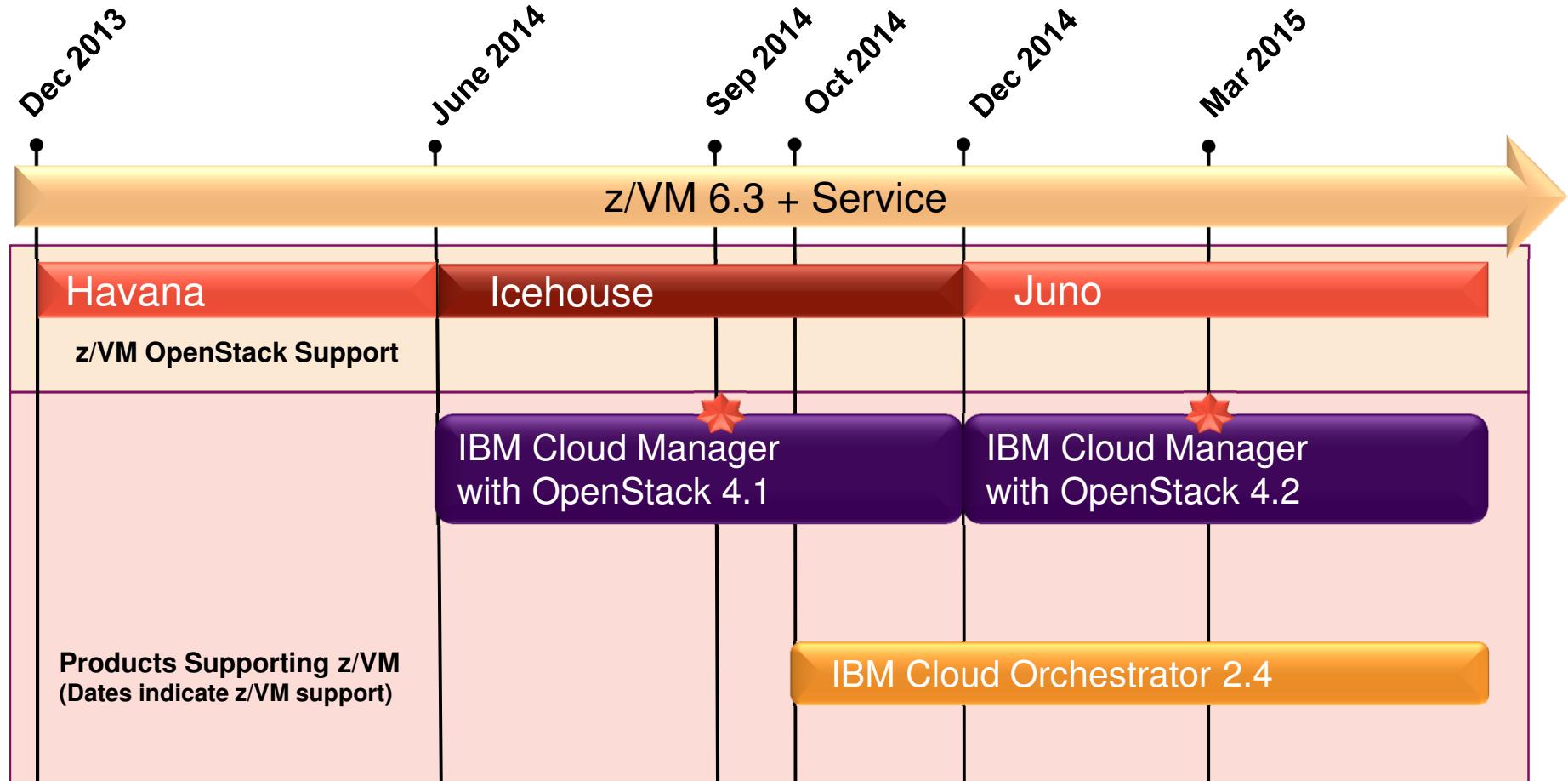
## IBM Cloud Manager with OpenStack 4.2

- IBM Cloud Manager with OpenStack V4.2
  - Available: December 12, 2014
  - Based on Juno level of OpenStack
  - Manage to z only (appliance not updated)
  
- IBM Cloud Manager with OpenStack V4.2
  - Announced: February 24, 2015
  - Available: March 13, 2015
  - Based on Juno level of OpenStack
  - Manage from z to anywhere via “updated CMO appliance”

## IBM Cloud Orchestrator V2.4

- SmartCloud Orchestrator V2.3 renamed to IBM Cloud Orchestrator V2.4
  - Based on OpenStack enablement in z/VM
  - Icehouse level of OpenStack
  
- Announced October 7, 2014: US Announcement Letter 214-348
  
- Available October 10, 2014
  
- Provides:
  - Self Service
  - Rich provisioning
  - Integration to Business Processes
  - Pattern management
  - “Managed To”

# z/VM & OpenStack Levels



- z/VM Appliance including CMO.

<http://www.vm.ibm.com/sysman/openstk.html>  
<http://www.vm.ibm.com/sysman/osmntlvl.html>

## IBM Infrastructure Suite for z/VM and Linux 1.1.0

- Announced and Available
  - Announced September 2, 2014
  - Available September 5, 2014
  - Announcement Letter ENUS214-350
  
- Includes 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 V1.3
  - IBM Wave for z/VM V1.1



## **Product Offerings (organized by Discipline)**

# Disciplines of Systems Management

## Automation

- Scheduling and running common events and processes

## Monitoring

- Monitor and acting on events and conditions of the system

## Business Continuity

- Disaster Recovery and Backups/Restores

## Data Management

- Tape and storage management

## Accounting

- Charge back and billing; Inventory

## Security

- Enforcing permissions, tracking, and auditing.

## Performance

- Performance Management and Capacity Planning

## Provisioning

- Creating and changing the resources and configurations of virtual machines and perhaps guest systems



## Automation

- Scheduling and running common events and processes

### ▪ **Operations Manager for z/VM**

- Priced Product
- Facilitates automated operations
- Monitor, view, and interact with consoles without logging on to service machines or Linux guests
- Take actions based on service machine console messages and other system events
- Schedule events for immediate execution or on a regular schedule
- Interaction with OMEGAMON XE

### ▪ **WAKEUP** Utility

- Part of z/VM
- Rudimentary function for basic scheduling

### ▪ **IBM Wave for z/VM**

### ▪ **ISV Solutions** exist

## Monitoring

- Monitor and acting on events and conditions of the system

### ▪ **Operations Manager for z/VM**

- Priced Product
- Facilitates automated operations
- Monitor, view, and interact with consoles without logging on to service machines or Linux guests
- Monitoring and Management of virtual machines, spool files, and error messages
- Take actions based on service machine console messages and other system events
- Schedule events for immediate execution or on a regular schedule
- Interaction with OMEGAMON XE

### ▪ **Programmable Operator (PROP)**

- Part of z/VM
- Rudimentary function for monitoring

### ▪ **ISV solutions** exist

## Business Continuity

### • Disaster Recovery and Backups/Restores

- **Backup and Restore Manager for z/VM**
  - Priced Product
  - Backup and restore file level data for CMS minidisks and Shared File System
  - Backup and restore images of Linux guests and/or z/VM volumes
    - Use Tivoli Storage Manager for file level backup and restore of Linux data
  - Compression
  - Exit available for encryption
  
- **GDPS® Offering**
  - Priced Offering
  
- **Live Guest Relocation**
  - Part of z/VM Single System Image priced feature
  - Address planned outages

## Data Management

- Tape and storage management

### ▪ Backup and Restore Manager for z/VM

- Priced Product
- Backup and restore file level data for CMS minidisks and Shared File System
- Backup and restore images of Linux guests and/or z/VM volumes
  - Use Tivoli Storage Manager for file level backup and restore of Linux data

### ▪ Tape Manager for z/VM

- Priced Product
- Manage tapes: retention, access control, data security erase
- Manage devices: share with other z/VM and non-z/VM systems
- Manage mount requests for ATL, VTS, and manual mount devices
  - Supports IBM, Oracle STK libraries, and EMC libraries
  - TS7700 needs firmware update is available as code level 8.21.0.165 (EC: M13120 / PN: 2727271 & 2727272 (DVD1&2.))

### ▪ Archive Manager for z/VM

- Priced Product
- Users and administrators manage disk space more efficiently and effectively
- Archive infrequently used or large files to tape or other disk

### ▪ Other Options

- Rudimentary with DDR or from z/OS

### ▪ ISV solutions exist

## Accounting

• Charge back and billing; Inventory

- CP System Service \*ACCOUNT – interface to accounting information (processor, I/O, memory, ... resources)
- **RETRIEVE** – VM utility that captures accounting records
- **ACCOUNT** – VM utility to produce reports from accounting records. Very simple.
- **ISV Solutions** exist for processing records.
- Do It Yourself
- **IBM Tivoli Usage and Accounting Manager (ITUAM)**
- Overlap with performance management
  - Some customers are using performance data for charge back

## Security

- Enforcing permissions, tracking, and auditing.

- CP System Service \*RPI – allows interaction with and ESM (External Security Manager)
- Base and extensions for
  - Virtual machine authentication
  - Virtual machine authorization
  - Auditing of violations
- **RACF for VM** is a priced feature that is pre-installed on the base system.
- **zSecure™ Manager for RACF z/VM**
  - Automate complex, time consuming z/VM security management tasks
  - Quickly identify and prevent problems in RACF
  - Create comprehensive audit trails
- **ISV Products** - External Security Managers (ESMs)

## Performance

### • Performance Management and Capacity Planning

- **Performance Toolkit for z/VM**
  - Priced feature of z/VM that is pre-installed
  - Basic realtime monitoring and report generation
- **OMEGAMON® XE on z/VM and Linux**
  - Priced Product
  - Performance monitoring of z/VM and Linux guests
  - Part of the OMEGAMON and IBM Tivoli Monitoring infrastructure, including Tivoli Enterprise Portal
  - Uses IBM Performance Toolkit for VM as its data source
  - Optionally uses Linux agent in virtual machines
- **IBM Wave for z/VM**
  - Very small subset based on Performance Toolkit data
- **IBM Tivoli Decision Support (TDS)**
  - Capacity Planning
- **ISV Solutions**
- **VM Resource Manager**
  - Part of z/VM product
  - Like Workload Manager, but less function and less effective

## Provisioning

- Creating and changing the resources and configurations of virtual machines and perhaps guest systems

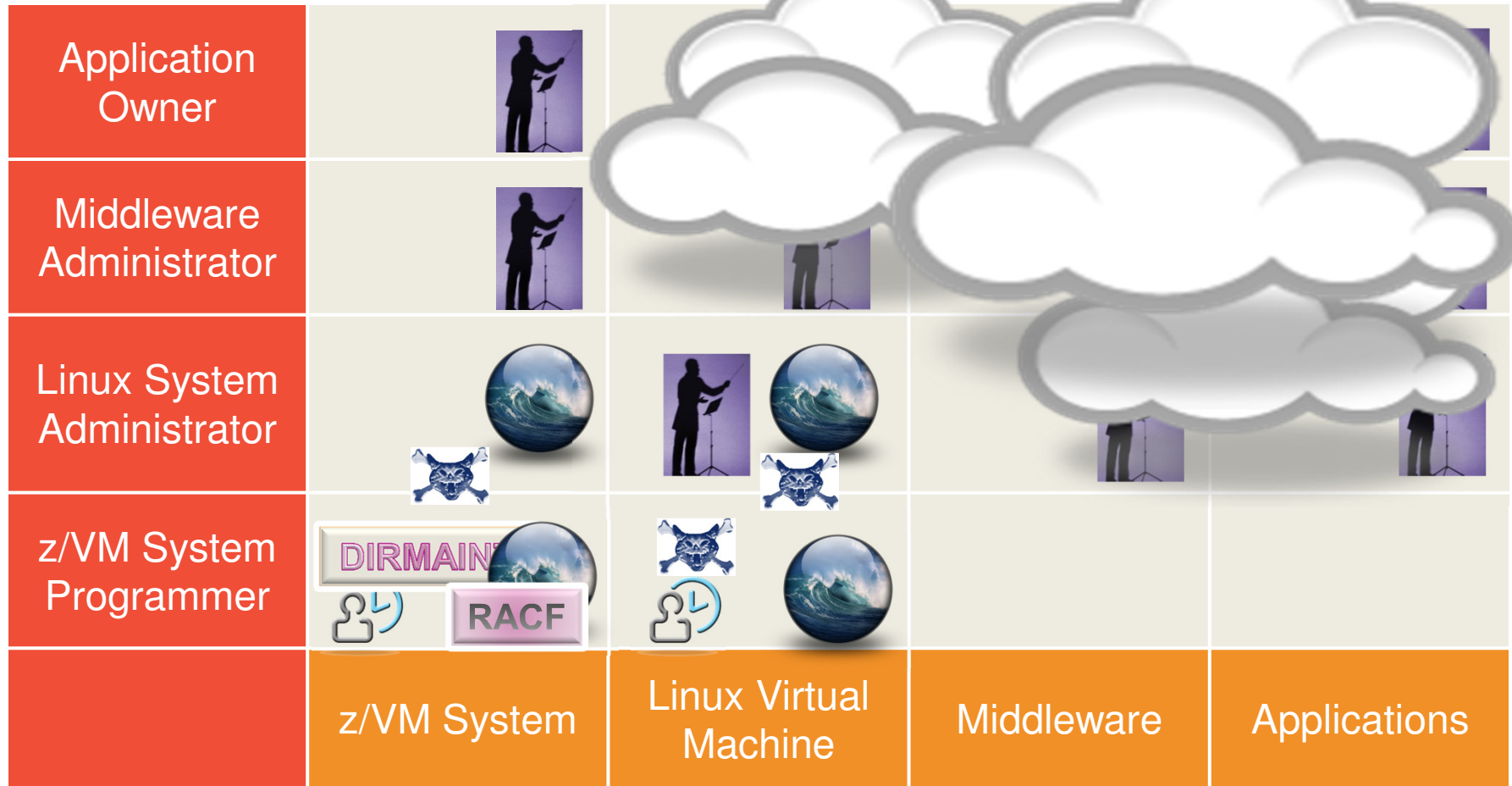
- **xCAT**
  - Integrated in base of z/VM 6.3
- **IBM Cloud Orchestrator**
- **IBM Cloud Manager with OpenStack**
- **IBM Wave for z/VM**
- **ISV Solutions**





**And in conclusion ...**

# Putting together the pieces



IBM Wave for z/VM

RACF for z/VM

Operations Manager

IBM DirMaint

IBM Cloud Products

xCAT

## Questions to Ask when Selecting Systems Management Software

- What Systems Management Solutions are already in place in my enterprise?
- What do I want to manage?
- Who will be using the management solution? What are their skills?
- Was it designed and created by people who have actually managed systems?
- Which Systems Management Discipline does it address?
  - Which ones are missing and how do I fill those gaps?
- Does the solution work well with other products?
  - Any side effects of manual management?
- What key features or capabilities of z/VM are critical to our success?  
Does the solution support those key features?

## Summary

- Systems Management is multi-faceted
  - What Systems and what Management?
  - Self Integrate vs. Product Solutions
  
- Must address all the disciplines to be enterprise-ready
  
- OpenStack Enablement is Strategic (z/VM 6.3)
  - IBM Cloud Manager with OpenStack
  - IBM Cloud Orchestrator
  
- Expect...
  - IBM to continue to enhance z/VM to support the ecosystem
  - changes outside of the standard cadence of z/VM releases
  - the need for multiple products to address various needs
  - new solutions from IBM and ISVs for challenges that arise
  
- <http://www.vm.ibm.com/sysman/>

# References

- z/VM Systems Management main page
  - <http://www.vm.ibm.com/sysman/>
- z/VM OpenStack Maintenance
  - <http://www.vm.ibm.com/sysman/osmntlvl.html>
- Full chart deck for this presentation
  - <http://www.vm.ibm.com/devpages/bitner/presentations/vmsysman.pdf>

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