SmarterComputing

Which z/VM Systems Management Approach is Best for You?

GSE 2014 – Session GS08

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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?

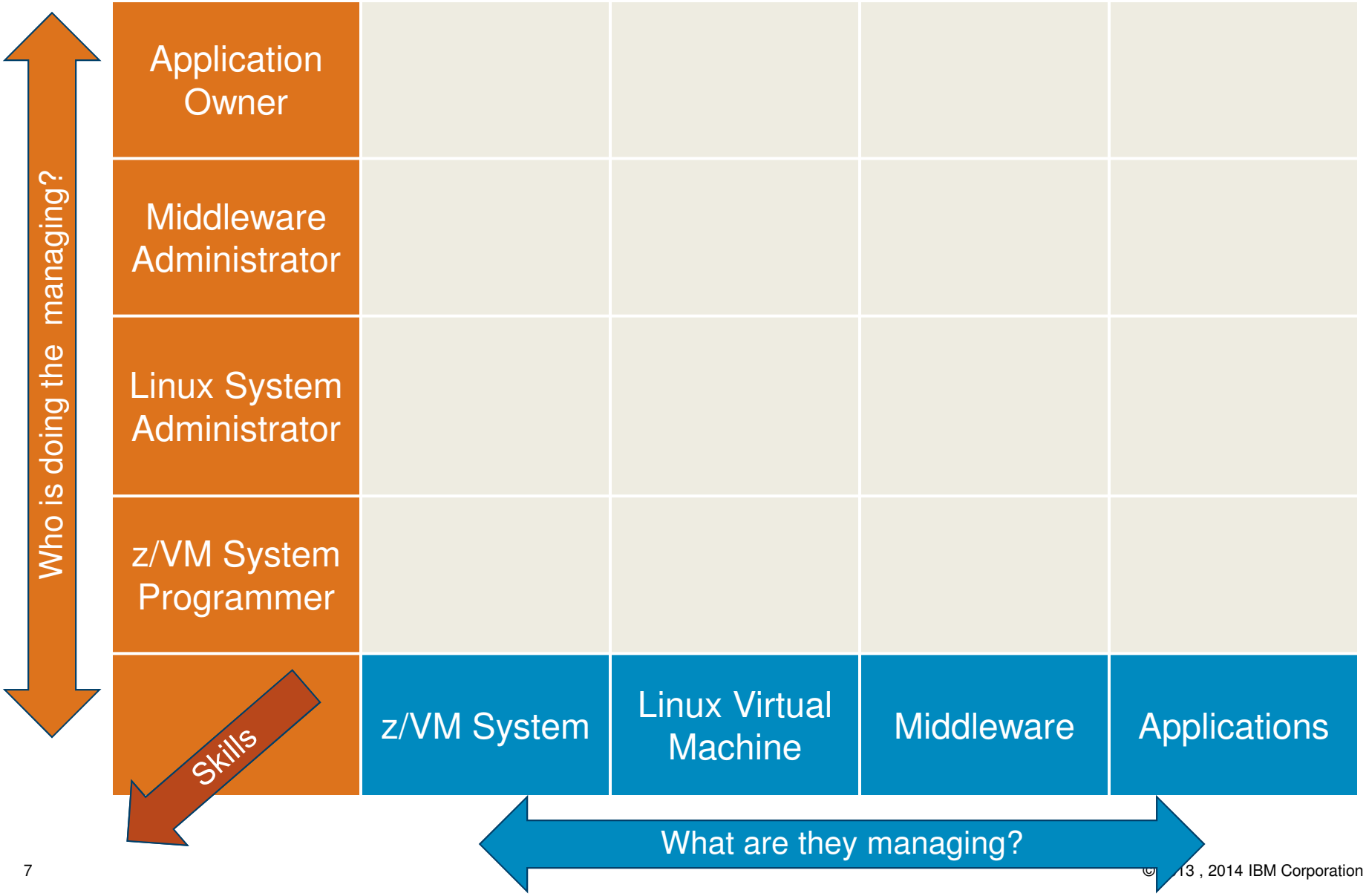
    Operational Monitoring or Performance Monitoring?

- “Any product or process that is not involved in actually using the system for the purpose it was purchased.”

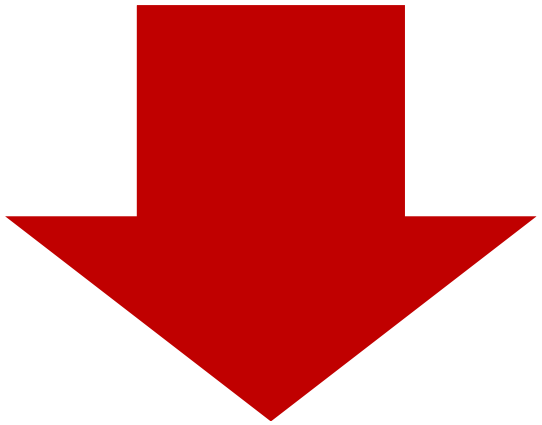
- What it does **not** cover, at least in this presentation:
  - Initial installation & initial configuration of disks, memory, devices

- Systems Management needs may mature/expand over time.

Three Dimensions of Systems Management



Your Investment Portfolio

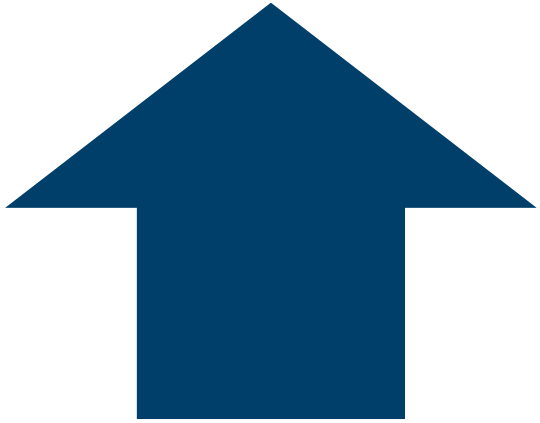


Buy

- Solutions
- Integration
- Support

Do It Yourself

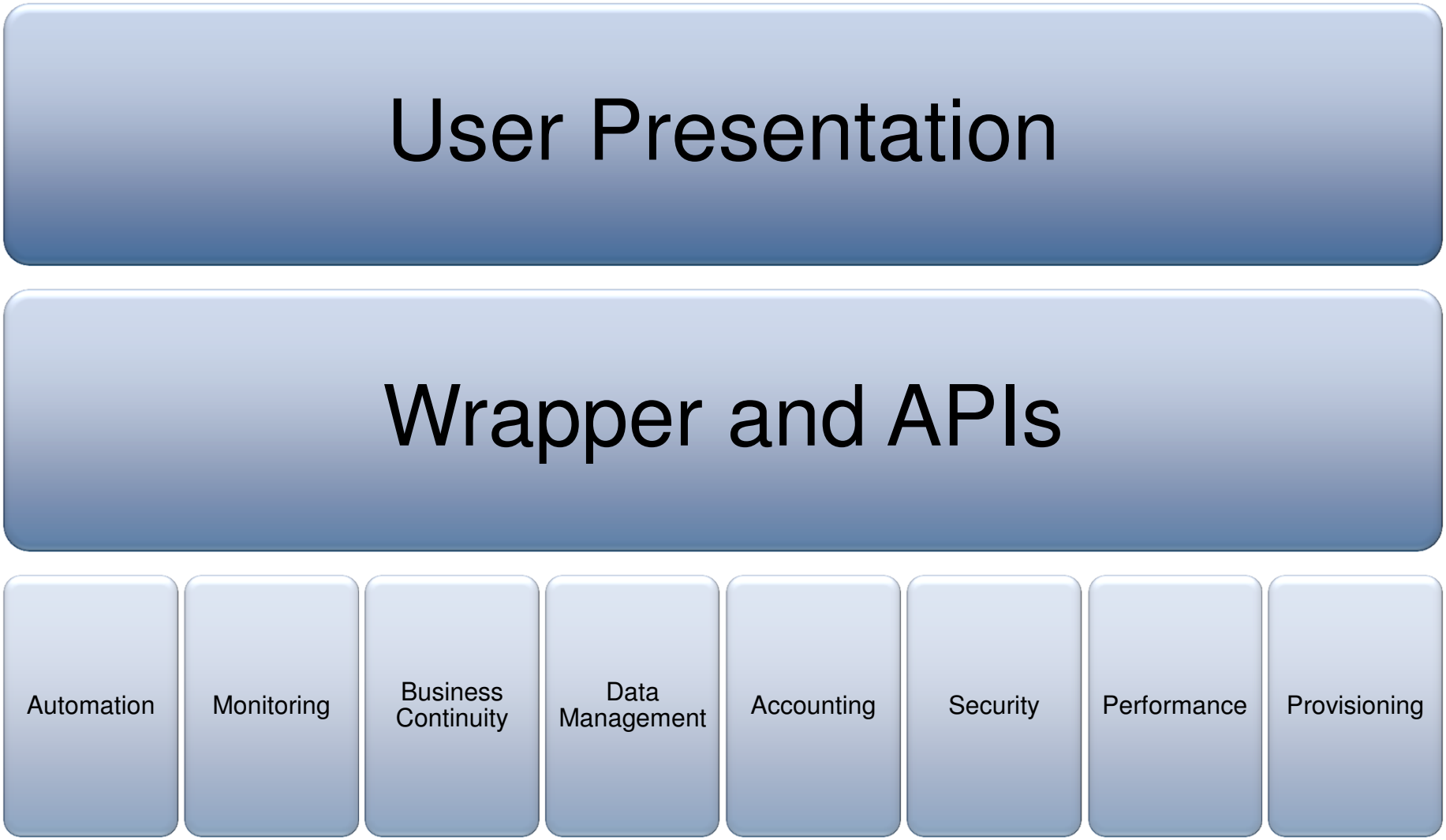
- Develop Solutions
- Integrate Solutions
- On going support



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

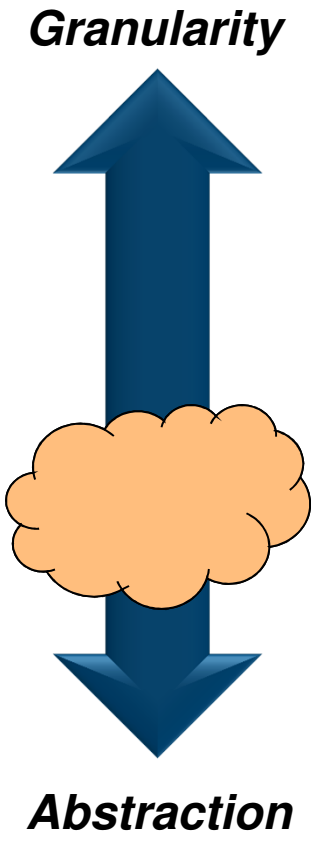
Interface Layers



Functional Options

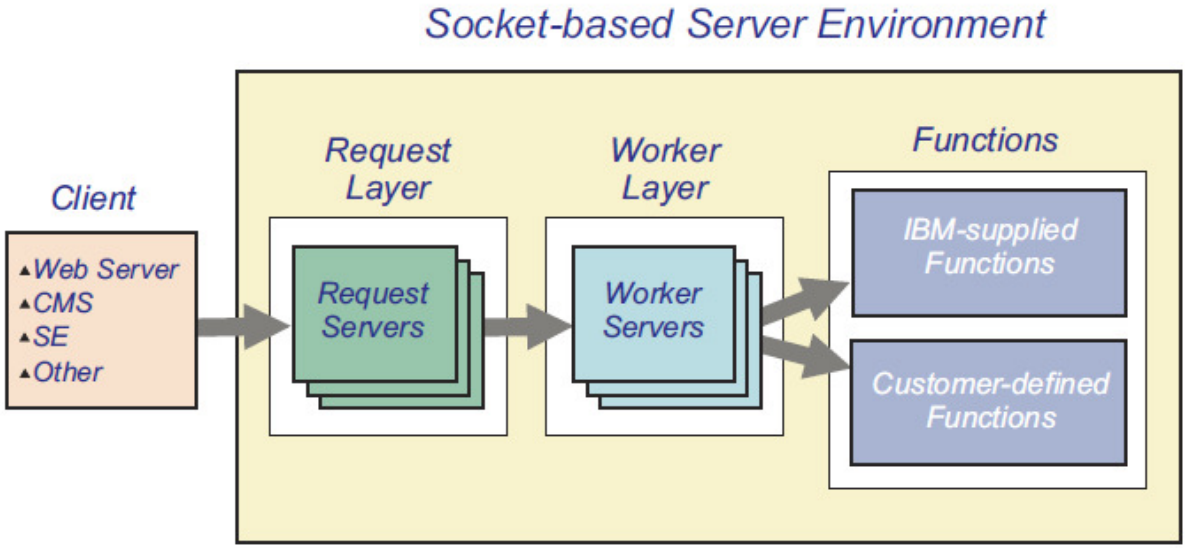
Systems Management Related APIs and Interfaces

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



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.



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)
    - Available via downloadable xCAT
    - Available with VM65460 in z/VM 6.3 integrated xCAT (PTF UM34206)
  - XML

Where does xCAT fit in?

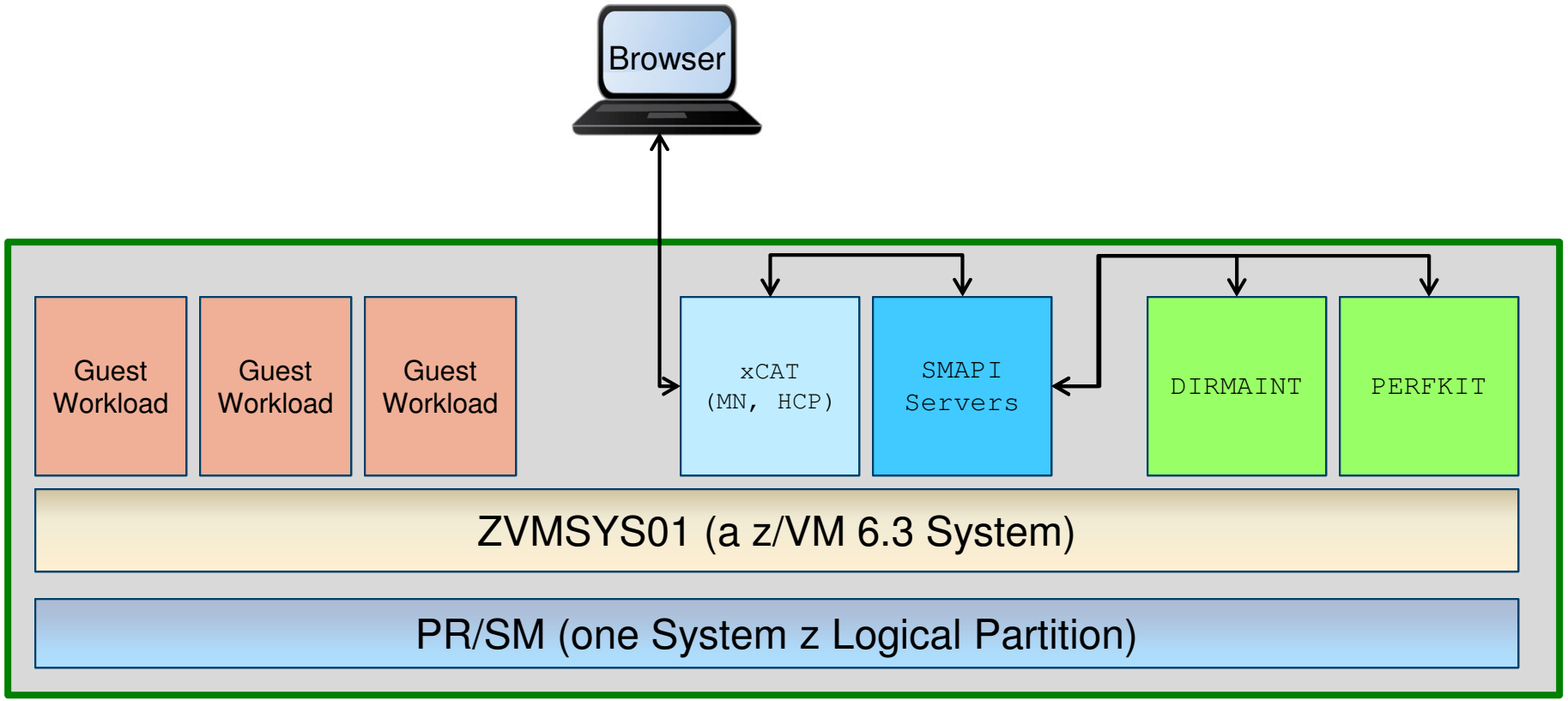
- It provides the tools you need to administer your cloud
  - Automate redundant steps, e.g. Linux installation
  - Manage virtual resources

- 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 System z
  - Provides rudimentary cloud functionality

- Value
  - Low overhead and lightweight (download ~100 MB)
  - Open source (EPL)
  - Cross platform

z/VM 6.3 Pre-Installed Systems Management

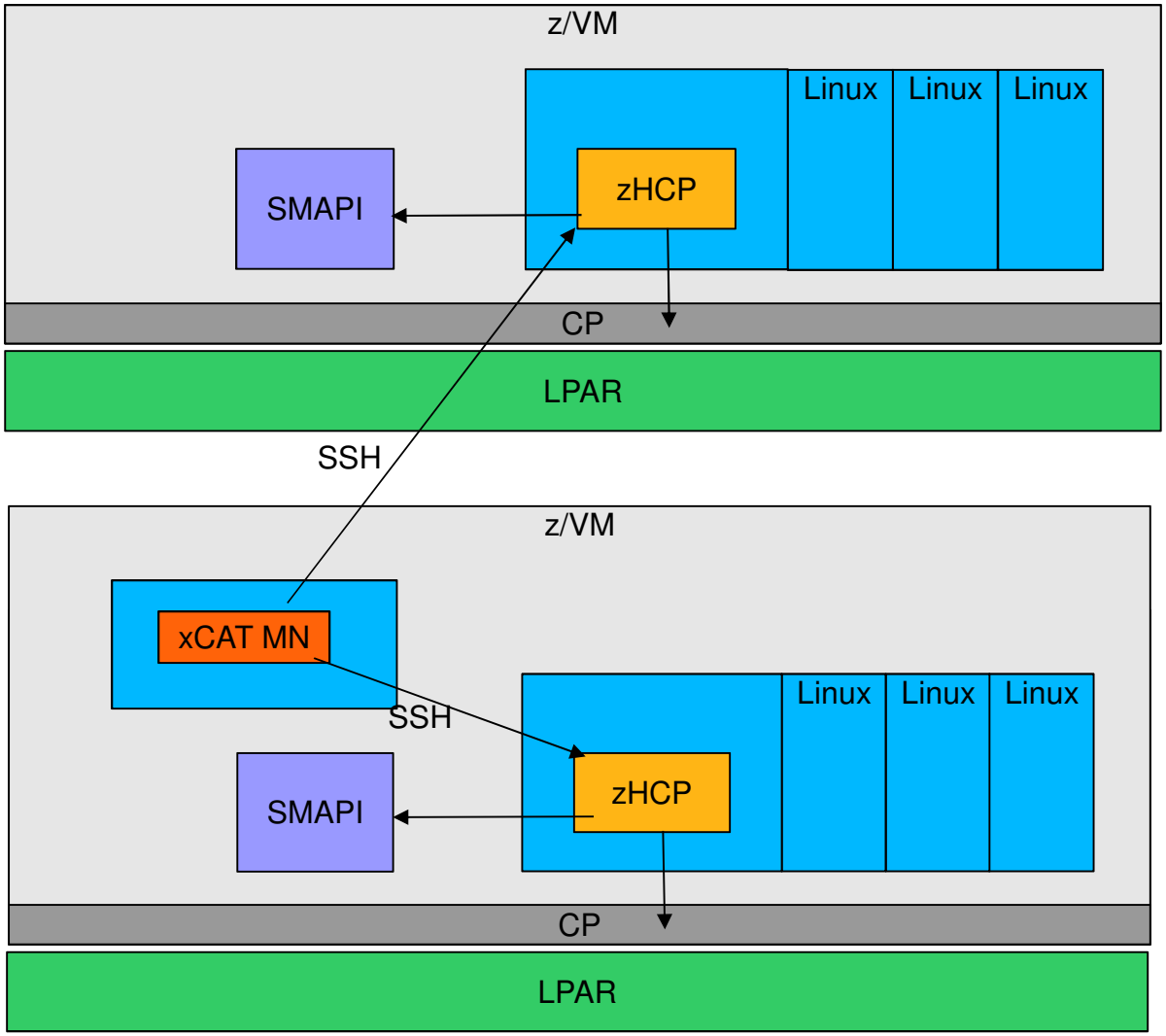


- Everything inside the z/VM LPAR is shipped with z/VM 6.3, up to and including the xCAT interfaces
- Versions of DirMaint and PerfKit are included free of charge with the SMAPI server, but these versions of the products only communicate with SMAPI, there is no way to interact with them directly.

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

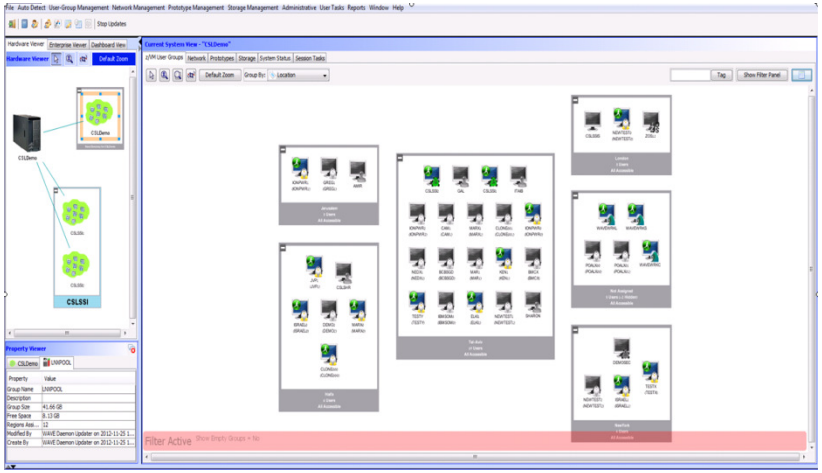
- xCAT wiki for z/VM – Information on using xCAT
  - http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main_Page
- xCAT YouTube channel: Various Demonstrations
  - http://www.youtube.com/user/xcatuser
- xCAT user mailing list
  - xcat-user@lists.sourceforge.net
- z/VM Home Page
  - http://www.vm.ibm.com/sysman/
- xCAT Downloadable References
  - http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Download_xCAT
  - 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

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

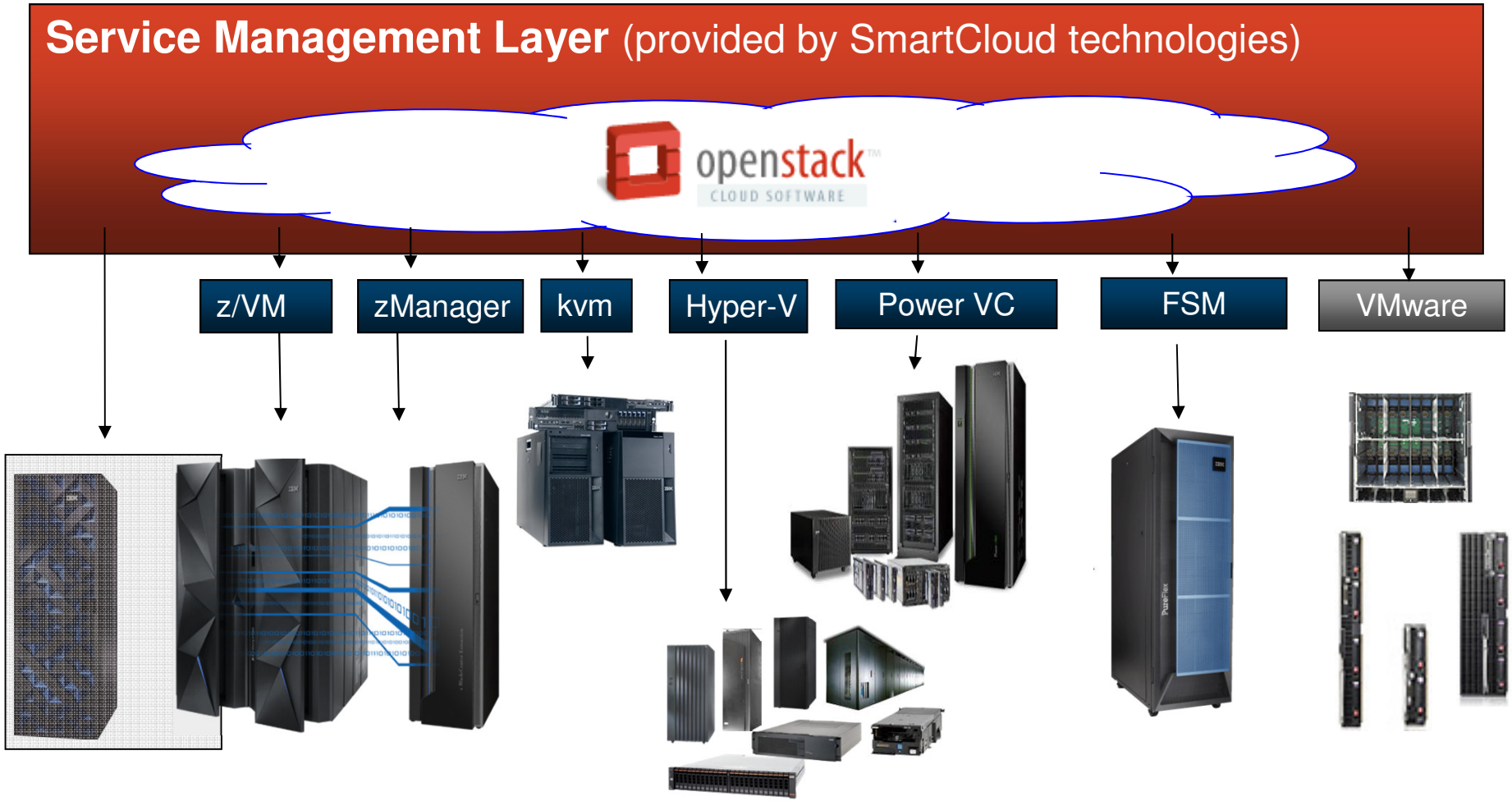


A simple, intuitive virtualization management tool providing management, provisioning, and automation for a z/VM environment supporting Linux® virtual servers

IBM Wave 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 notificat
  - 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

Hybrid computing model integrated and enabled for Cloud



Datawarehousing IBM DB2® Analytics Accelerator Solution

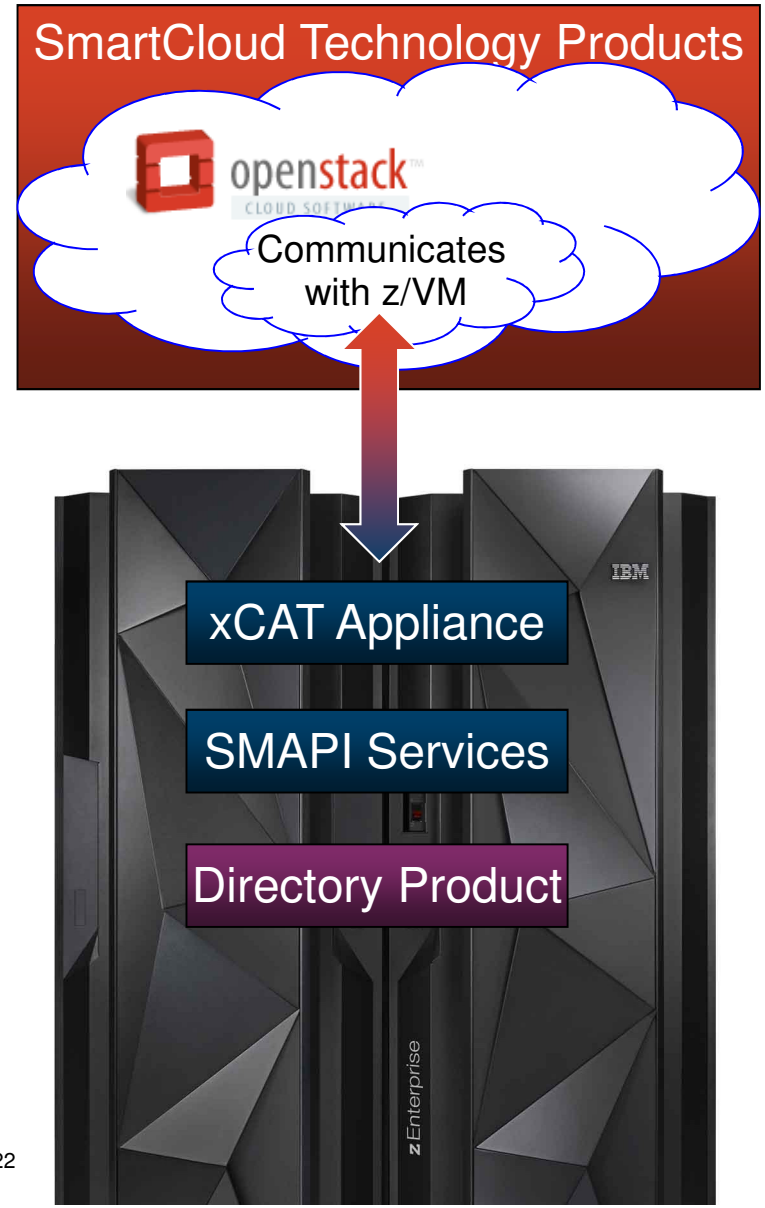
zManager for z/OS and IBM zEnterprise BladeCenter® Extension (zBX)

Systems Director for Power® IBM System x® and storage

FSM for Intel® and Power ITEs

Third party Managers and Servers

The OpenStack Food Chain



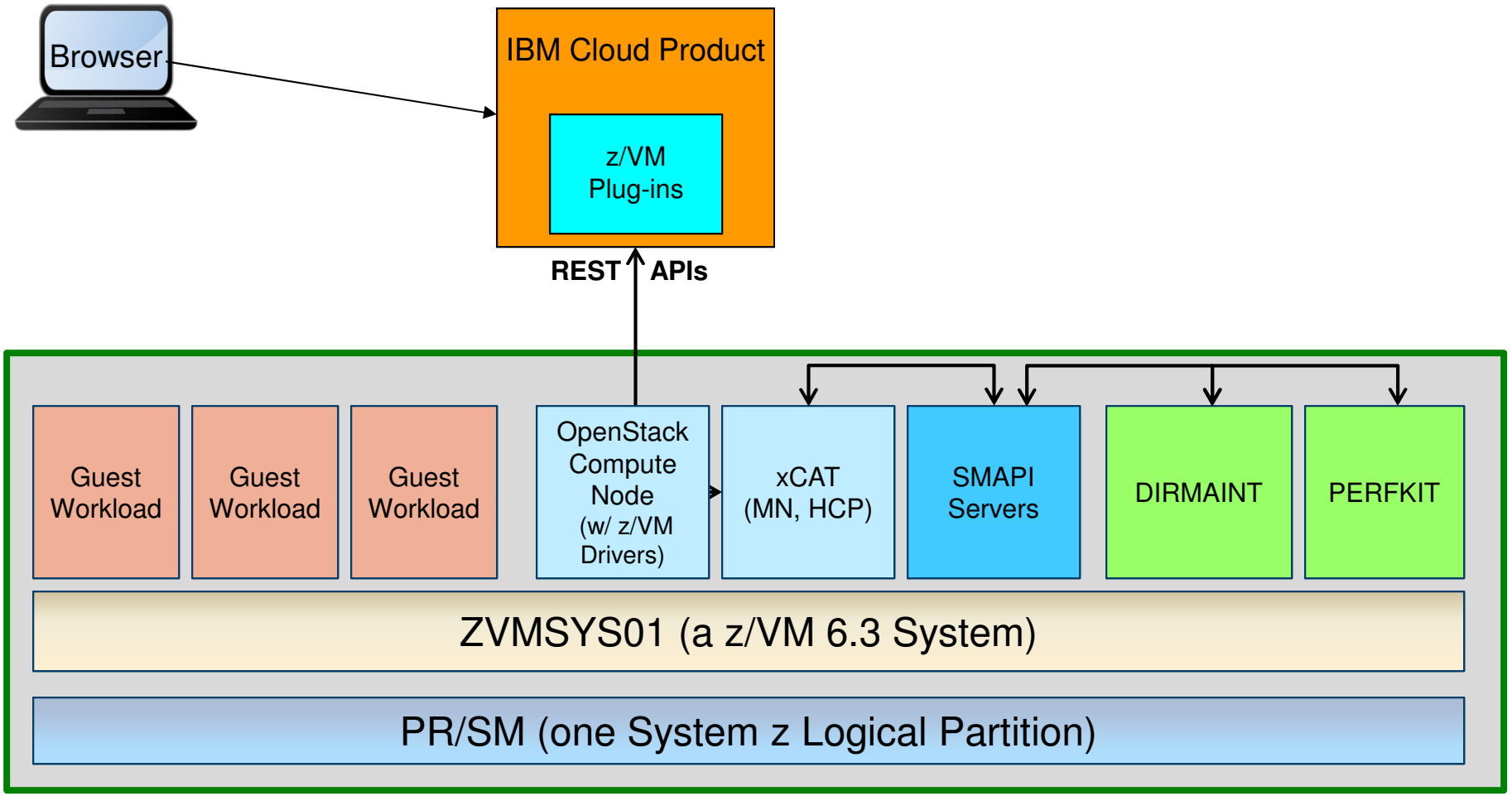
- **Top Half of the Solution:**
  - An IBM SmartCloud Technology product or other vendor product will include the OpenStack support.
  - Portions of that OpenStack support will know z/VM (i.e. code that connects and understands how to talk to z/VM).
- **Bottom Half of the Solution:**
  - Rest APIs are 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).

Product with OpenStack Support

z/VM 6.3 Product

Additional Product or Feature

z/VM 6.3 Pre-Installed Systems Management



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OpenStack

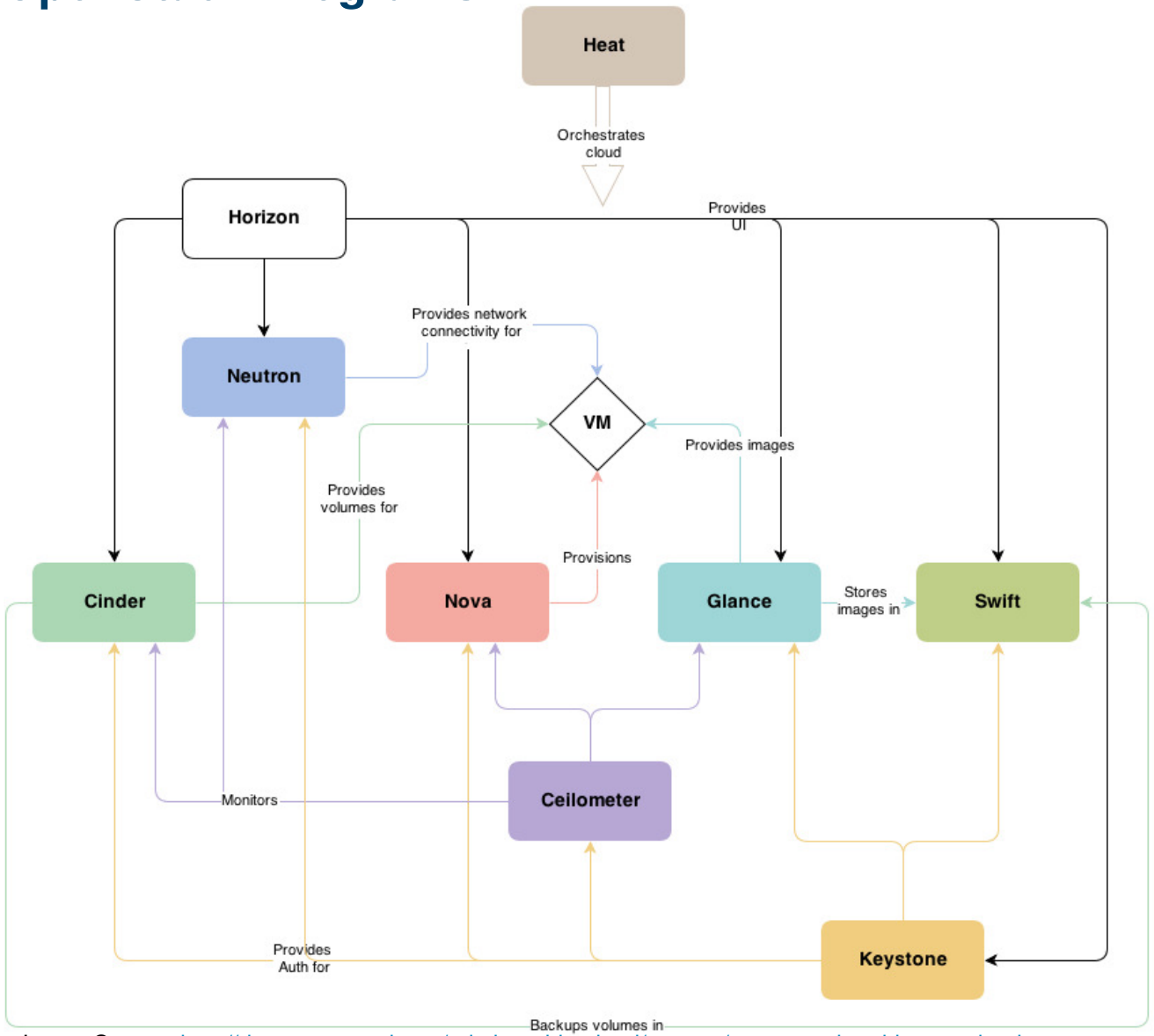
- Open Source project to provide Infrastructure as a Service.
- Started by NASA and Rackspace in 2010
- Now backed by IBM and many other corporations
- Consists of separate projects to handle different types of resources
- New releases every 6 months

Source: http://sourceforge.net/apps/mediawiki/xcat/index.php?title=Main_Page

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
  - design summit takes place in San Diego, CA
- **Havana:** Havana is an unincorporated community in Oregon
  - design summit takes place in Oregon
- **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)

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

Image Source: http://docs.openstack.org/admin-guide-cloud/content/conceptual-architecture.html

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.
- Current IBM cloud technology for z/VM is based on Icehouse level.
- Enablement of managing z from z available as service in October 2014.

OpenStack Big Picture

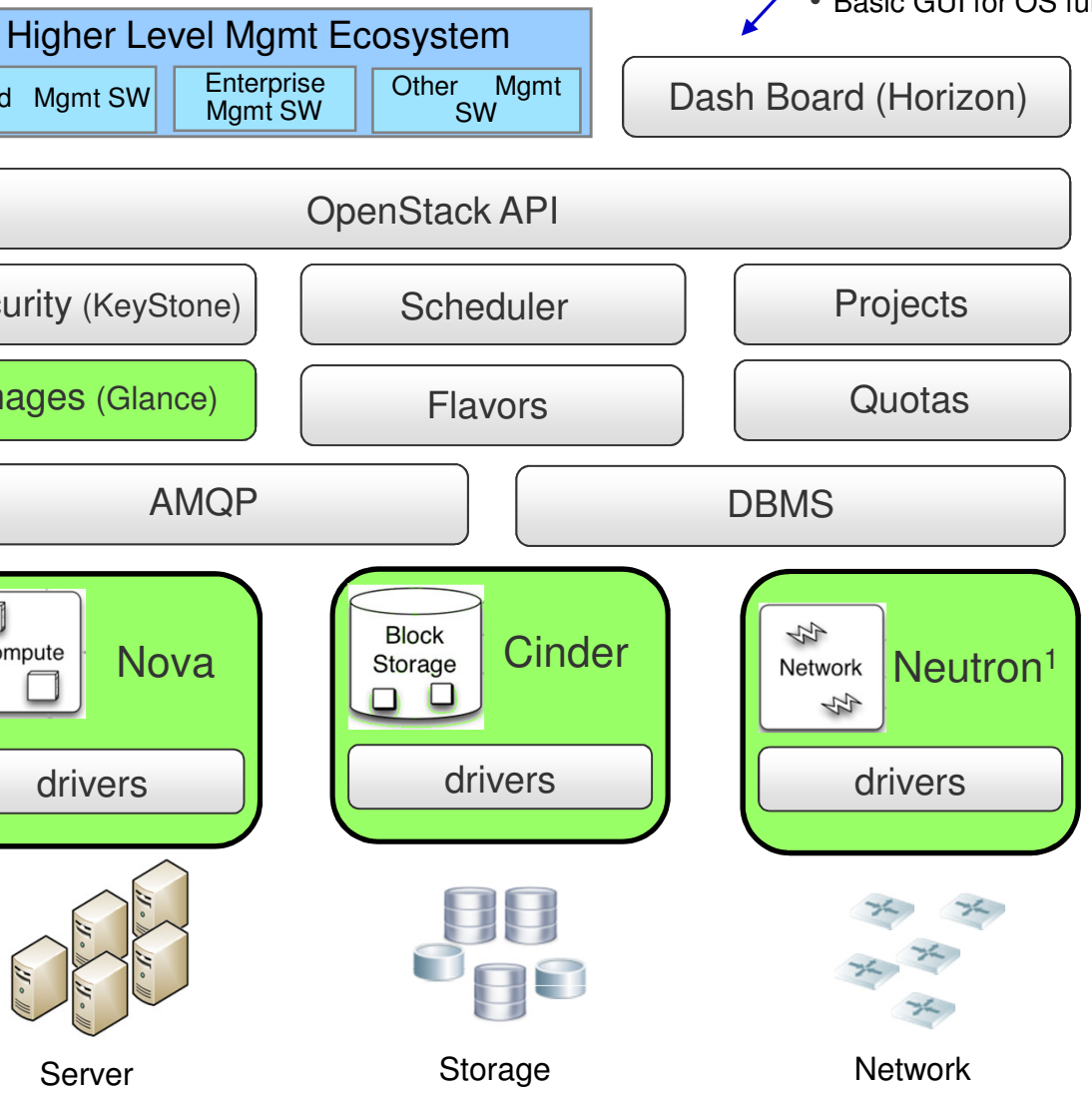
Simple Console
- Built using OS REST API
- Basic GUI for OS functions

Infrastructure Mgmt APIs
- Focus on providing IaaS
- Broad Ecosystem

Infrastructure Mgmt Capabilities
- Image Management
- Virtual Machine Placement
- Account Management

Foundation (Middleware)
- AMQP Message Broker
- Database for Persistence

Virtualization Drivers
- Adapters to hypervisors
- Server, storage, network
- Vendor Led Drivers



z/VM support available

[1] – Formerly known as Quantum.

Cloud Strategy

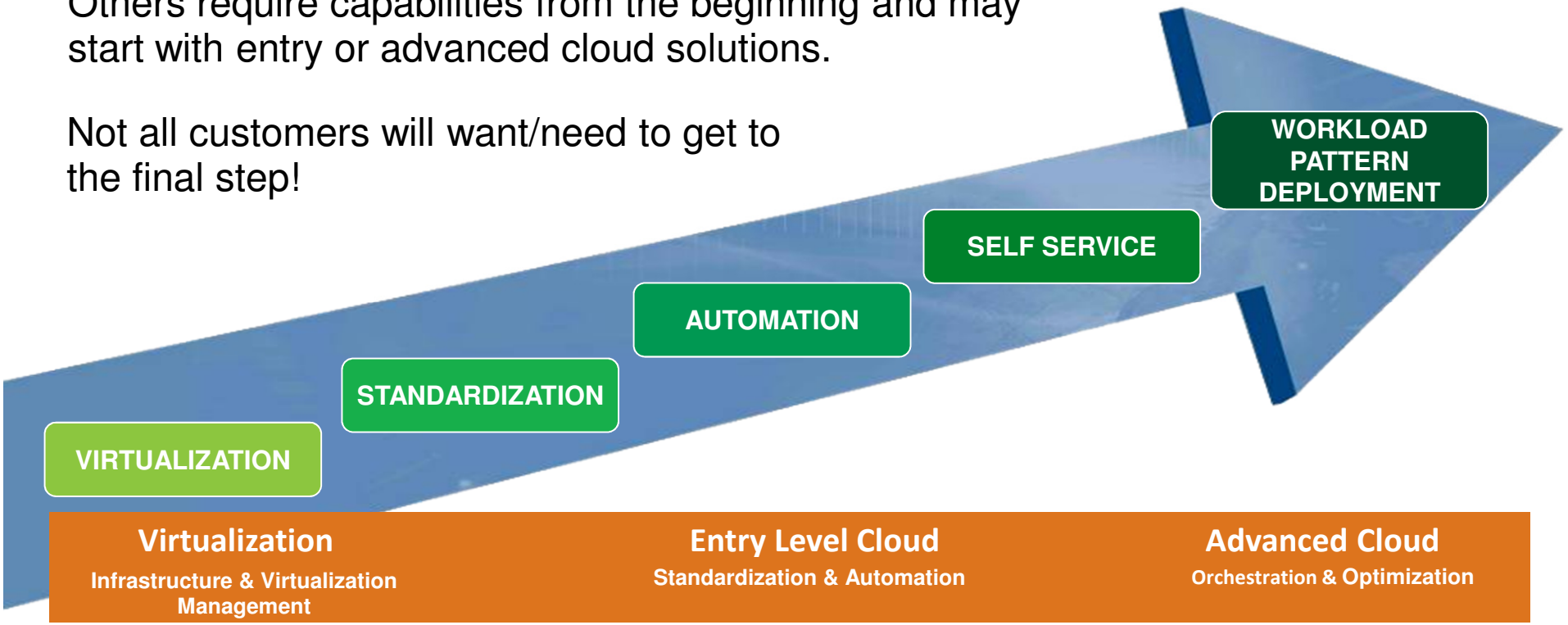
Cloud Computing - Based on Virtualization and Standardization

To position the various technologies in this space, we need to first understand that Cloud computing is a journey beginning with virtualization and consolidation of environments and ending with workload pattern-based deployment of IT services.

This is not always a step-wise progression. Some clients begin by optimizing their virtualization foundation for a workload, then gradually move to cloud.

Others require capabilities from the beginning and may start with entry or advanced cloud solutions.

Not all customers will want/need to get to the final step!



Virtualization and Cloud Portfolio for Linux on System z

Virtualization Infrastructure & Virtualization Management	Entry Level Cloud Standardization & Automation	Advanced Cloud Orchestration & Optimization

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 System z

- Enterprise Linux Server

IBM Wave for z/VM

- A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

Differentiation

xCAT

- Shipped with z/VM 6.3
- Allows customers to set up a rudimentary cloud environment, without acquiring any additional product
- Based on open source code
- No upgrade path to SmartCloud suite

IBM Cloud Manager with OpenStack

- A simple, entry level cloud management stack
- Based on OpenStack
- Formerly known as IBM SmartCloud Entry

Standardization

Cloud Ready for Linux on System z

- Image-based cloud service delivery with provisioning, monitoring, service catalog & service desk, storage management, and HA

SmartCloud Provisioning

- Adds middleware pattern support for workload deployment, building on SCE.

IBM Cloud Orchestrator

- Builds on functionality of SmartCloud Provisioning and adds runbook automation

Service Lifecycle Management

IBM Cloud Manager with OpenStack V4.1

- 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

- Dates:
  - Announced: May 19, 2014
  - Available: June 13, 2014
  - Manage z from z support announced: September 9, 2014
  - Available: October 13, 2014 (Check http://www.vm.ibm.com/sysman/osmntlvl.html)

IBM Cloud Management Suite for System z V1.1

- Benefits:
  - Quickly and easily provision a workload on System z
  - Self service portal running on distributed system
  - Monitor health of cloud environment
  - Linux server backup
  - Integration of various key management components

- Components include:
  - IBM Smart Cloud Orchestrator
  - OMEGAMON XE on z/VM and Linux
  - Tivoli Storage Manager Extended Edition

- Requires z/VM 6.3 with appropriate service

- Dates:
  - Announced February 25, 2014
  - Available March 14, 2014

Forget about it

IBM Cloud Orchestrator V2.4

Breaking News!

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

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 V1.2
  - 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 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

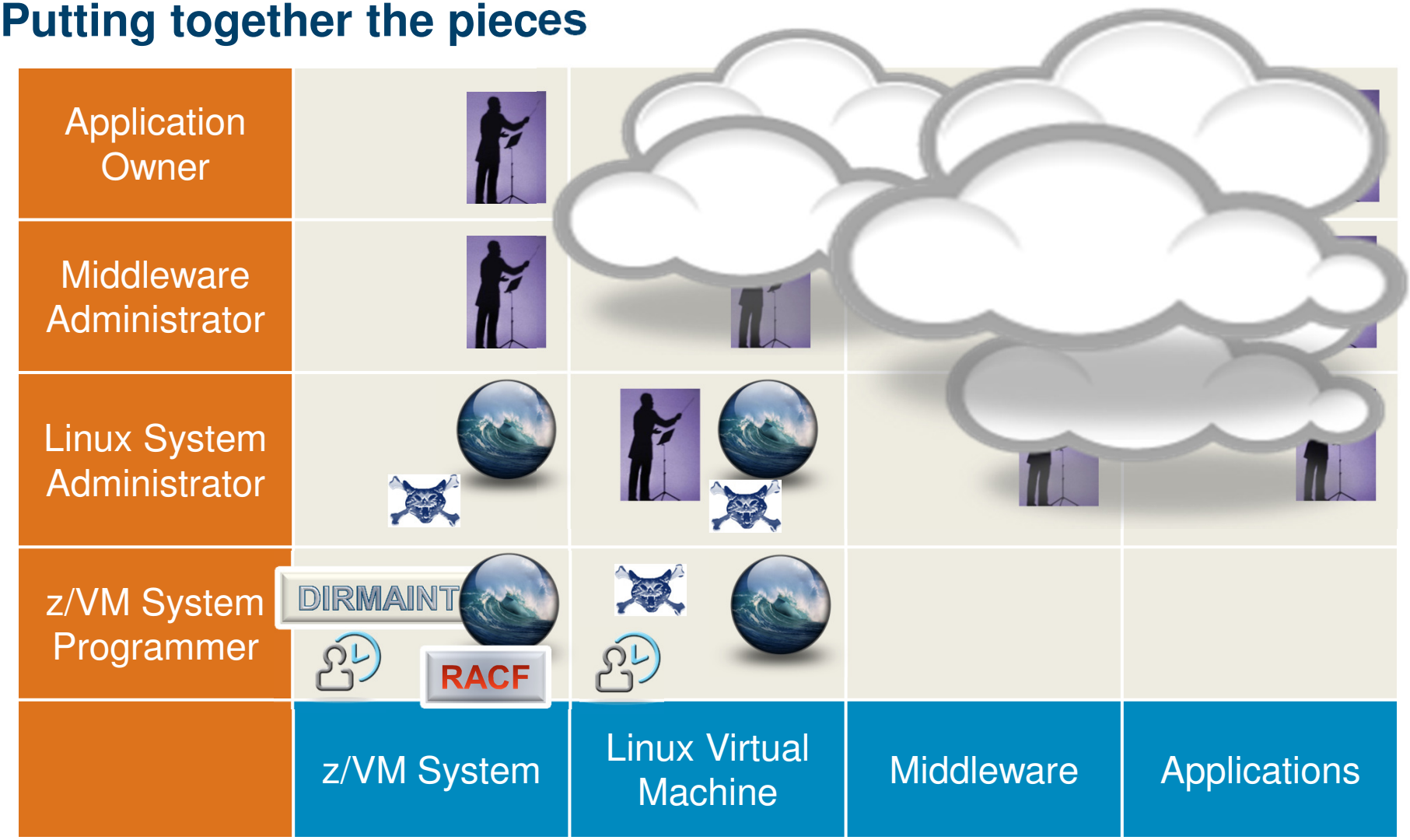
Provisioning

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

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

And in conclusion …

Putting together the pieces



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-facetted
  - What Systems?
  - What Management?
  - Self Integrate vs. Product Solutions
- Must address all the disciplines to be enterprise-ready
- OpenStack Enablement is Strategic
- Continue to enhance various capabilities of z/VM to support the ecosystem
- Expect changes outside of the standard cadence of z/VM releases
  - IBM Cloud Technology products
  - IBM Wave for z/VM
  - ISV solutions
  - z/VM SPEs to facilitate the above
- http://www.vm.ibm.com/sysman/