



Systems Management on z/VM

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What is Systems Management on z/VM?

- **Virtualization – 2 different definitions**
- **Make one system look like many systems**
 - Traditional z/VM definition
- **Make many systems look like one system**
 - Relatively new to z/VM
 - Integral to “cloud” computing
 - z/VM calls this “systems management”
- **z/VM enables, higher level tools exploit**
 - IBM Products
 - Vendor products
 - Open source projects

Basic components of z/VM Systems Management

- **Systems Management Application Interface (SMAPI)**
- **Built-in management appliances used by SMAPI**
 - Dirmaint – Directory management
 - VMRM – CPU/IO/Memory management
 - Performance Toolkit – performance analysis
- **Management infrastructure that uses SMAPI**
 - xCAT – cloud/cluster management
 - OpenStack – cloud infrastructure, IaaS
 - CMA – cloud management appliance
 - OpenStack + xCAT + z/VM optimizations

Systems Management Application Interface (SMAPI)

- **APIs to allow IBM and vendor tools access to:**
 - Management appliances
 - System configuration file
 - Running virtual machines
 - Hypervisor resources
 - Customer/Vendor defined APIs

System Resources Managed by SMAPI

- **Virtual machine definitions**
- **Running virtual machine active configurations**
- **Initiation and termination of virtual machines**
- **Resources shared among virtual machines**
 - Disk
 - Memory
 - Network
- **Hypervisor resources**
 - Disk
 - Network
 - Appliance managed resources

SMAPI provided by redundant cluster of servers

- **Resiliency**

- If one server crashes, others can take over
- Requests can be isolated from each other

- **Dynamic capacity**

- Servers can be added and deleted dynamically

- **Flexibility**

- Different application environments may be appropriate for different sorts of requests

Why all this infrastructure?

- **Systems Management is now integral to how our customers access z/VM**
- **The “systems management” definition of virtualization is now the dominant definition in the industry**
- **Result is hypervisor functionality, performance, resiliency, flexibility outside the hypervisor**

What's a Directory Manager?

- **Manages changes to the directory so that a coherent, consistent copy always exists**
- **IBM default directory manager is Dirmaint, but other vendor products exist and are supported**

Virtual Machine Resource Manager (VMRM)

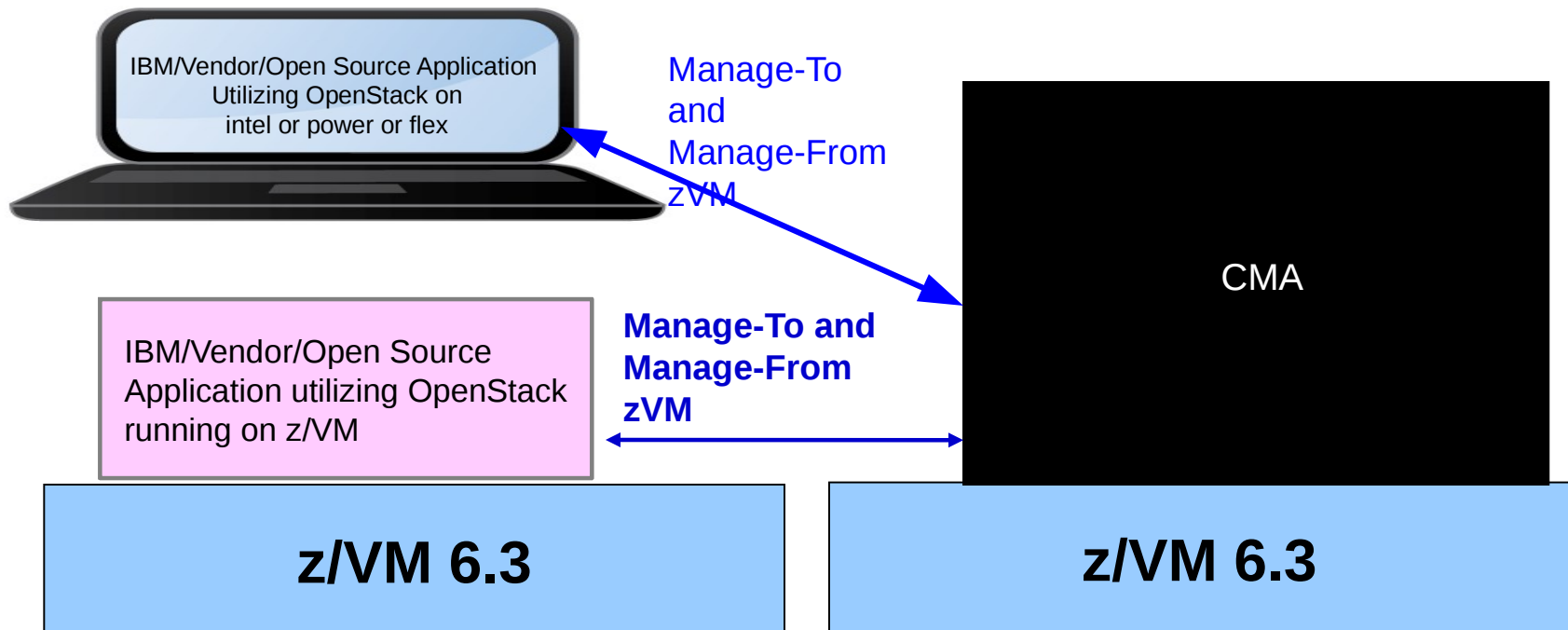
- **Allows groups of virtual machines to be defined**
- **Allows system resource goals to be defined**
 - CPU
 - Disk I/O
 - Virtual Memory
- **Allows goals to be associated with groups**
- **Utilizes z/VM monitor data to track achievement of goals**
- **Iteratively adjusts allocation of system resources**

Performance Toolkit

- **Monitors all aspects of hypervisor and virtual machine resource utilization**
 - Both sampling and continuous operation data
 - Resources monitored can be dynamically adjusted
- **Enables actions based on thresholds of resource utilization**
- **Enables analysis for both system performance tuning and debugging**

External View of z/VM Systems Management Stack

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xCAT

- ***Open Source (EPL), Stands for Extreme Cloud Administration Toolkit***
- ***Tool to manage, provision, and monitor physical and virtual machines on IBM systems***
- ***xCAT has four different interfaces:***
 - REST APIs – used by OpenStack plug-ins
 - Browser based GUI – used by z/VM systems administrator
 - CLI – used by z/VM system administrator and end user
 - XML – future use

OpenStack Infrastructure Management Software



Providing a ubiquitous infrastructure management platform

Simple Console

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

Infrastructure Mgmt APIs

- Focus on providing IaaS
- Broad Eco System

Infrastructure Mgmt Capabilities

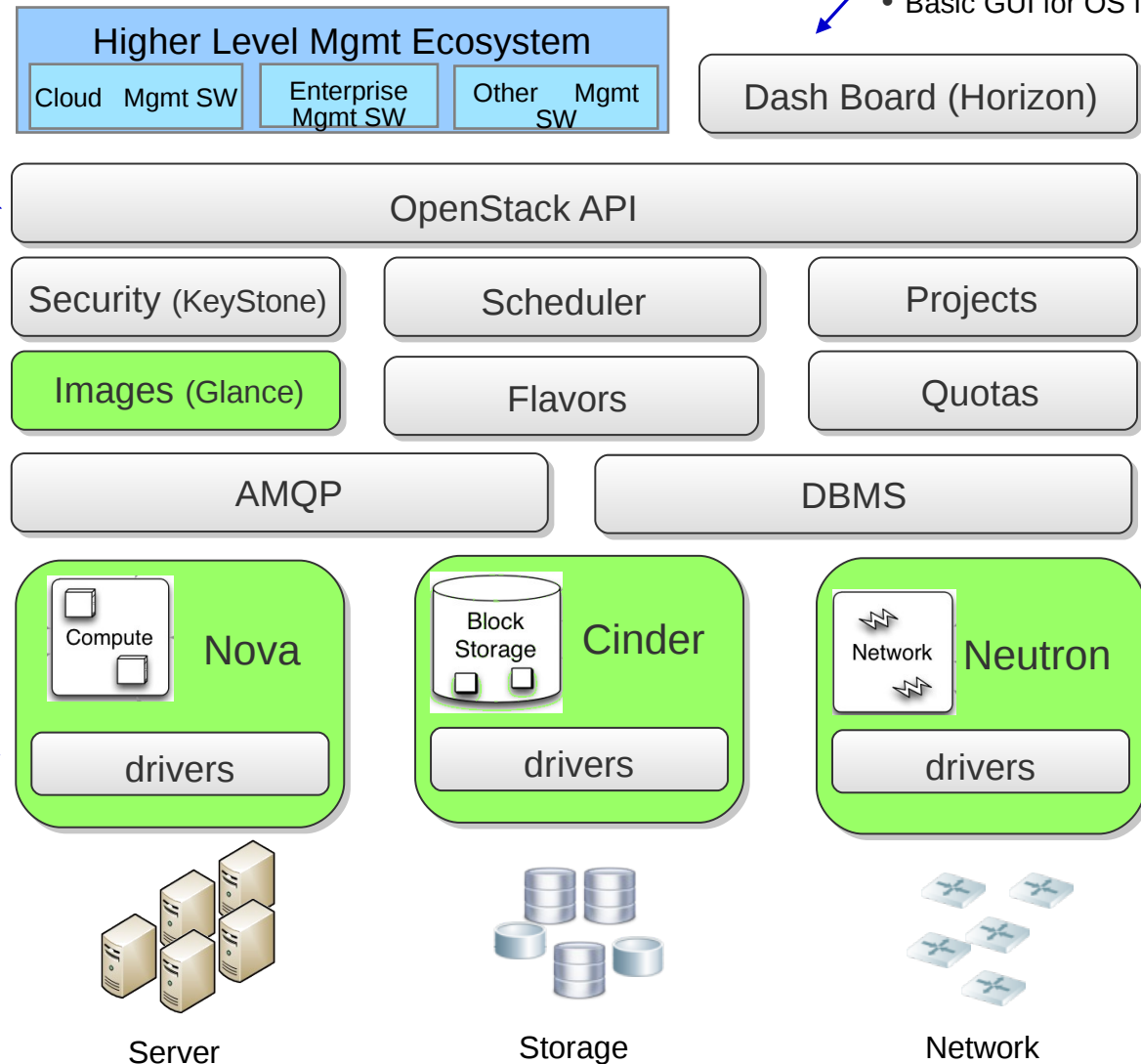
- Image Management
- Virtual Machine Placement
- Account Management

Foundation (Middleware)

- AMQP Message Broker
- Database for Persistence

Virtualization Drivers

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



z/VM Optimizations

■ **Discovery**

- Allows existing z/VM virtual machines to be imported into xCAT and OpenStack

■ **Alternative deploy**

- Allows the provisioning of a traditional z/VM virtual machine via OpenStack interfaces

■ **Exploitation of z hardware**

- Many aspects of z hardware are unique i.e. they are only available on z, not any other platform