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Virtual Machine Management based on CIM model

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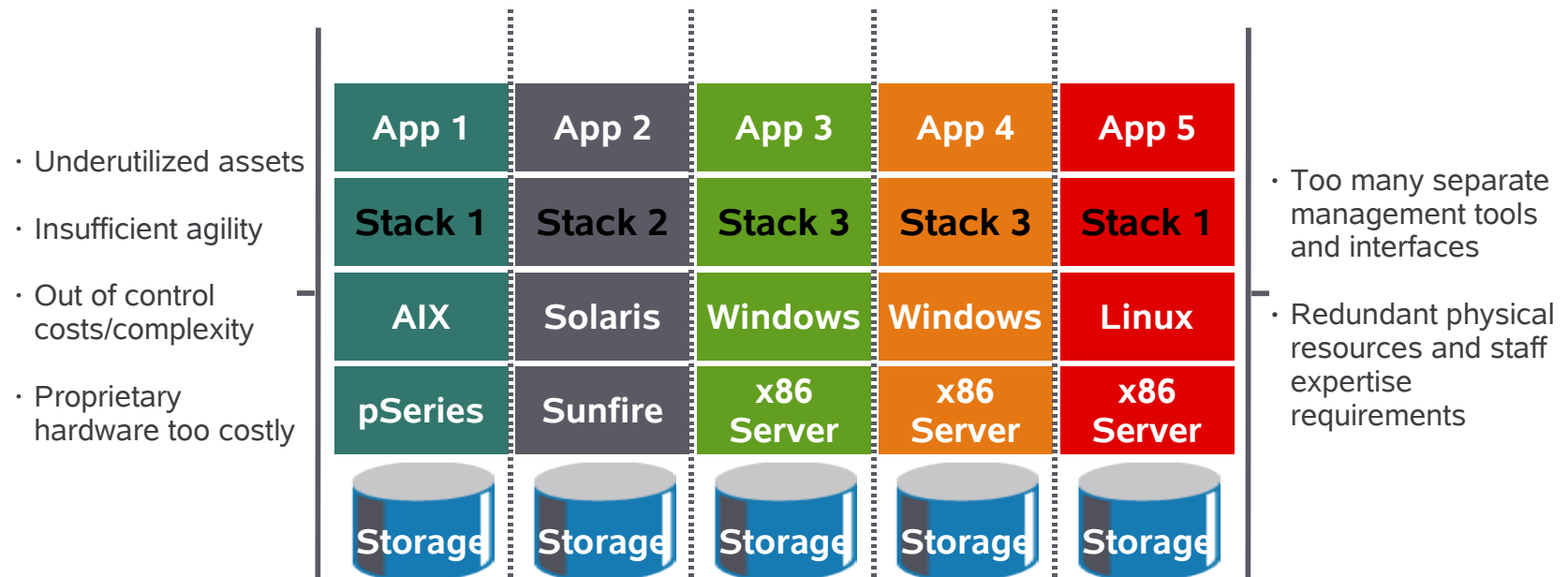
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Agenda

- Data Center yesterday, today and tomorrow
- The Novell Plan
- Virtual Machine Lifecycle Control
- VM Management components
- Demo
- Conclusions

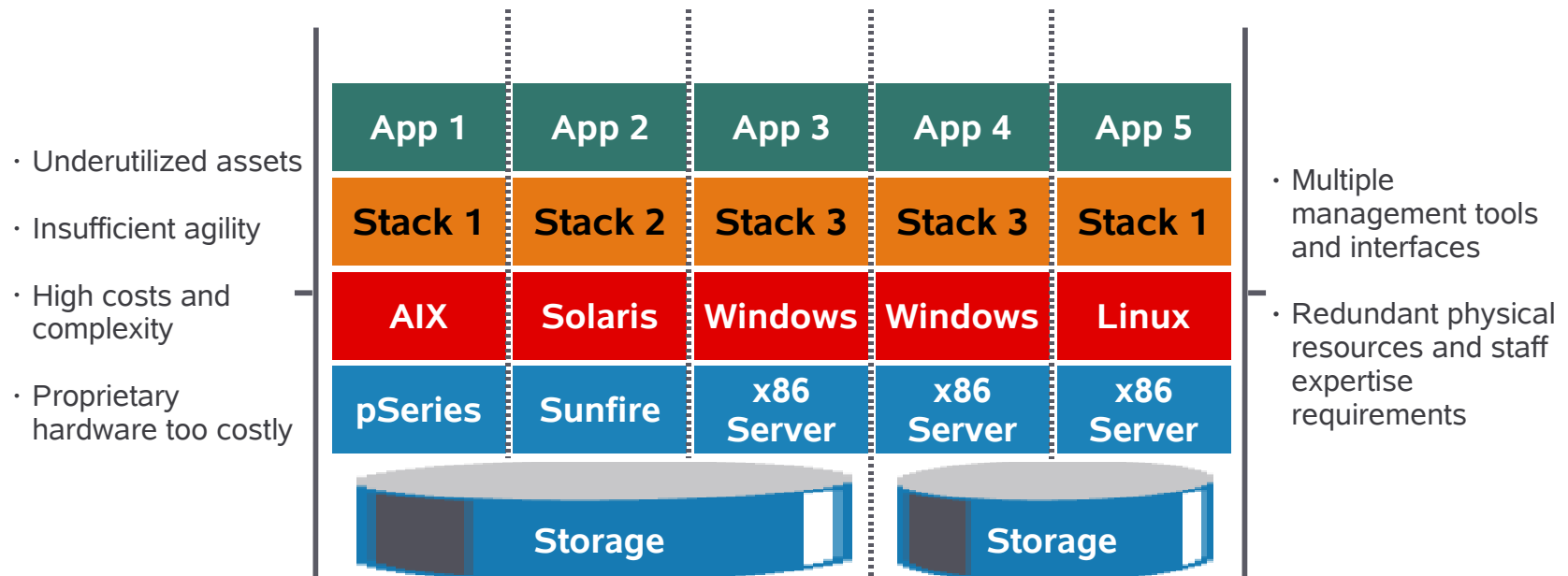
Yesterday's Data Center

- Completely isolated islands of computing
- OS and application stack specifically designed to match the physical hardware



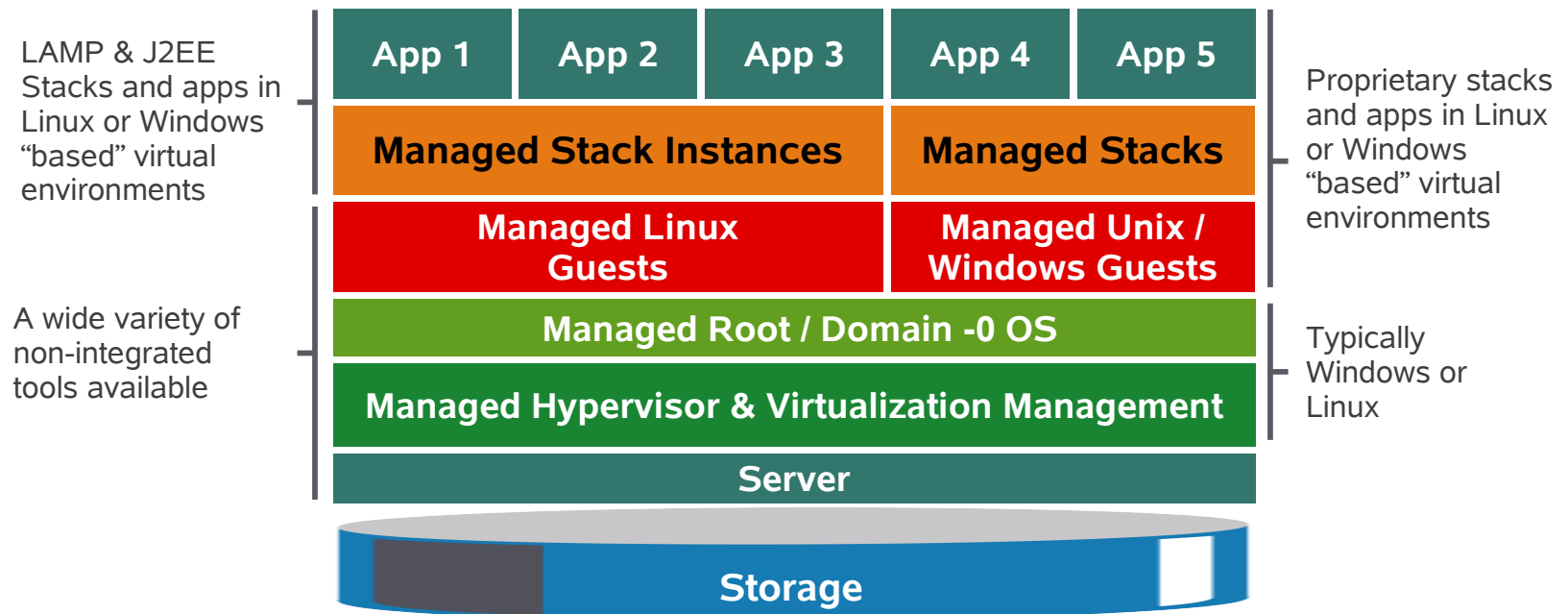
Today's Data Center

- Islands of computing created by not having confidence to run multiple apps on one OS, much less multiple OS's on one server
- The OS that controls the physical hardware is the OS required by the app



Tomorrow's Data Center

- Virtualization of compute and storage resources and tools to manage virtual workload will reduce cost and complexity for improved operations and better utilization of resources
- One OS operates the hardware and a few run as guests to meet requirements of various apps.



Virtualization Alone is NOT the Answer

*“**Virtualization** in and of itself is interesting, and it gives you server efficiency, but without some of the automated tools, it may actually increase your management burden.”*

- John Enck, Gartner

- Still have to manage the same amount of operating systems (if not more)
- Potential conflict between virtual machines
- Keeping pace with disruptive changes
 - Manual patching and maintenance
 - Tracking all the virtual images
- Tracking usage and licensing
- Staying in compliance

Automation is the Key

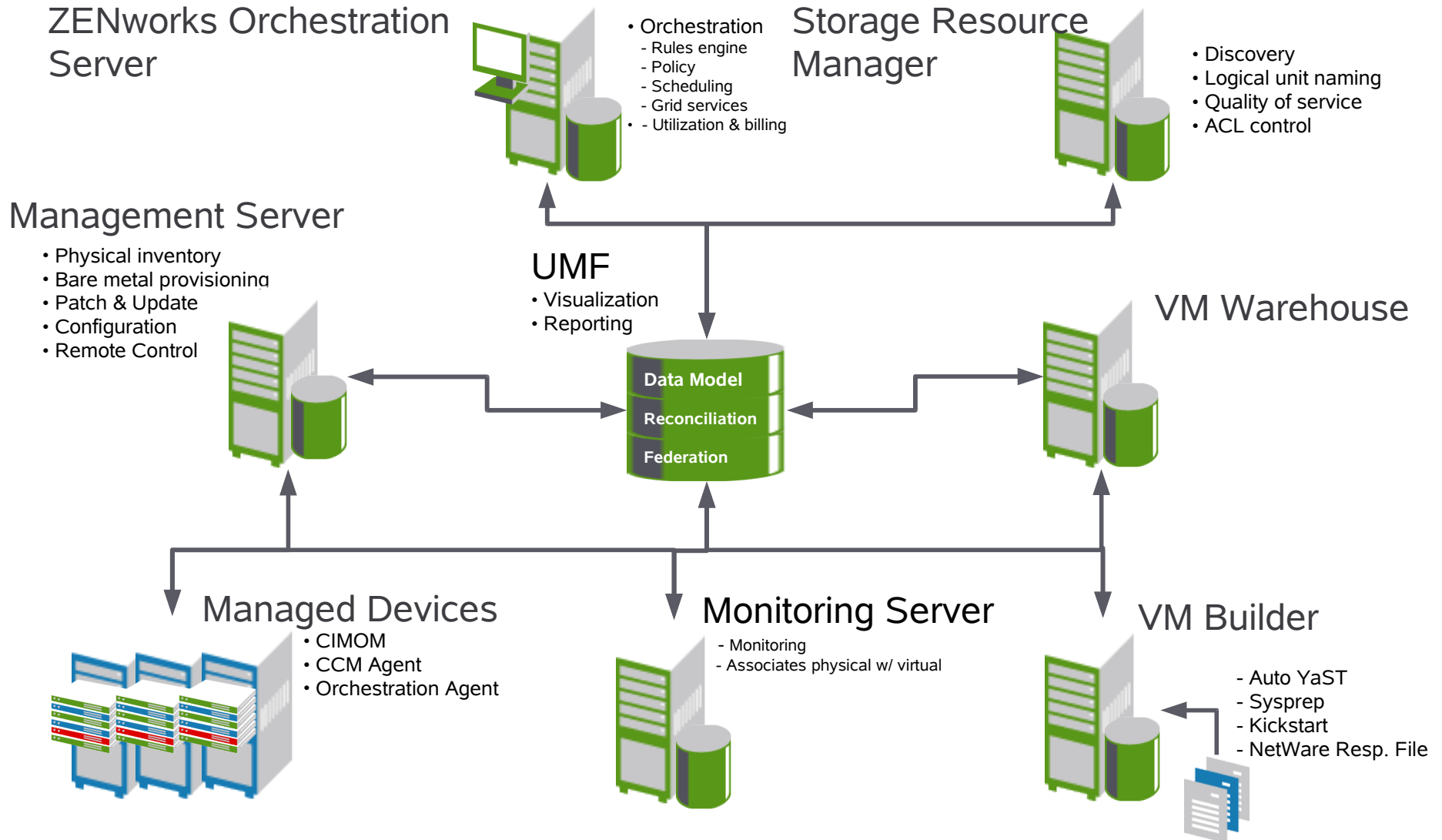
*"For virtualization to truly work in real-world applications, users must also focus strongly on **automation**, the policy-based administrative **tools used to deploy virtualized instances and manage them.**"*

- John Enck, Gartner

- Server Consolidation / Virtualization
- Business Continuity / Disaster Recovery
- Dynamically reallocate and provision workloads
- Align IT with your business processes

The Novell® Plan

Data Center Automation



Managed Device

Managed device components:

CIMOM

SVPC

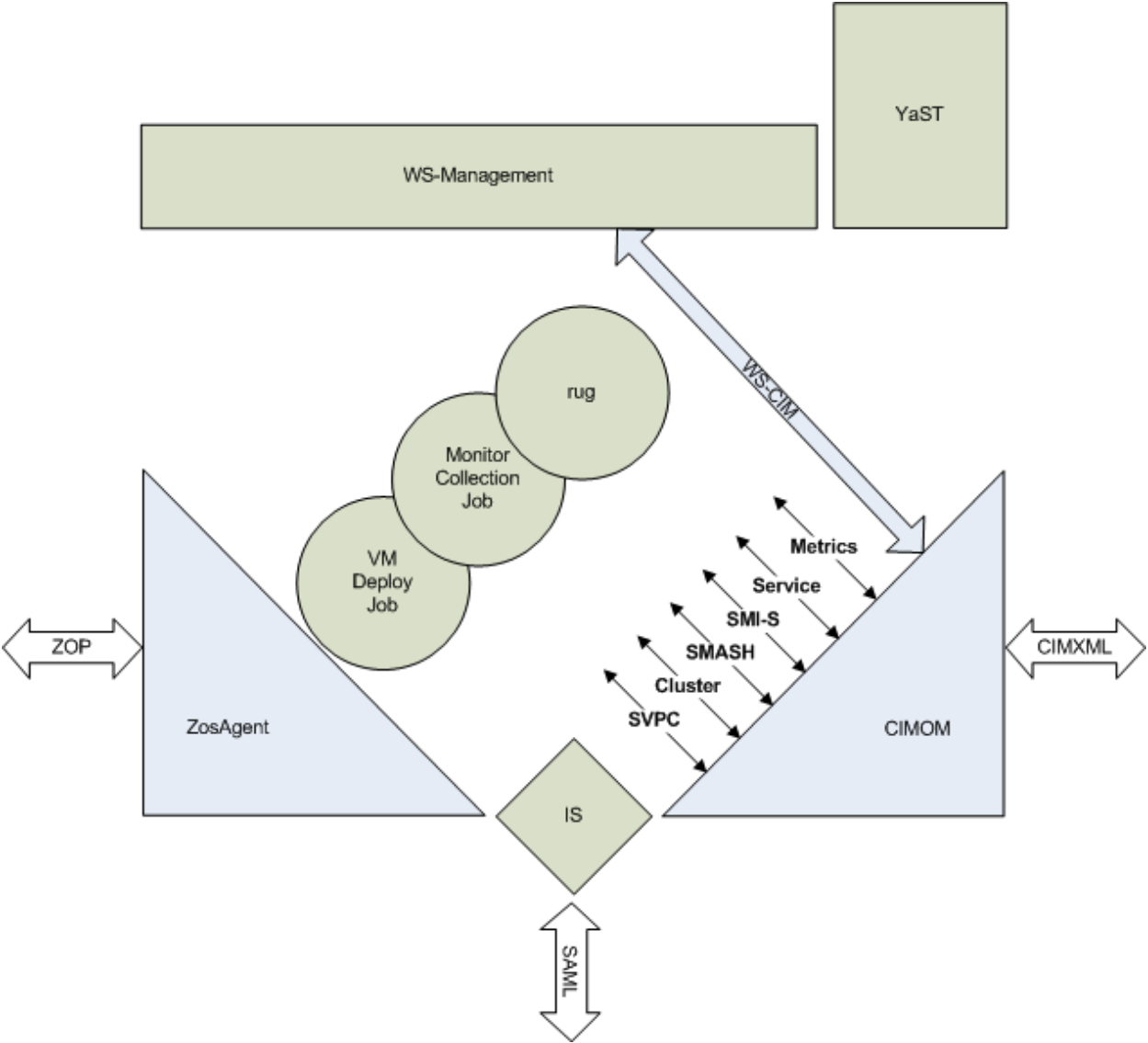
SMASH

SMI-S providers

Service management

CIM metrics

Zos Agent



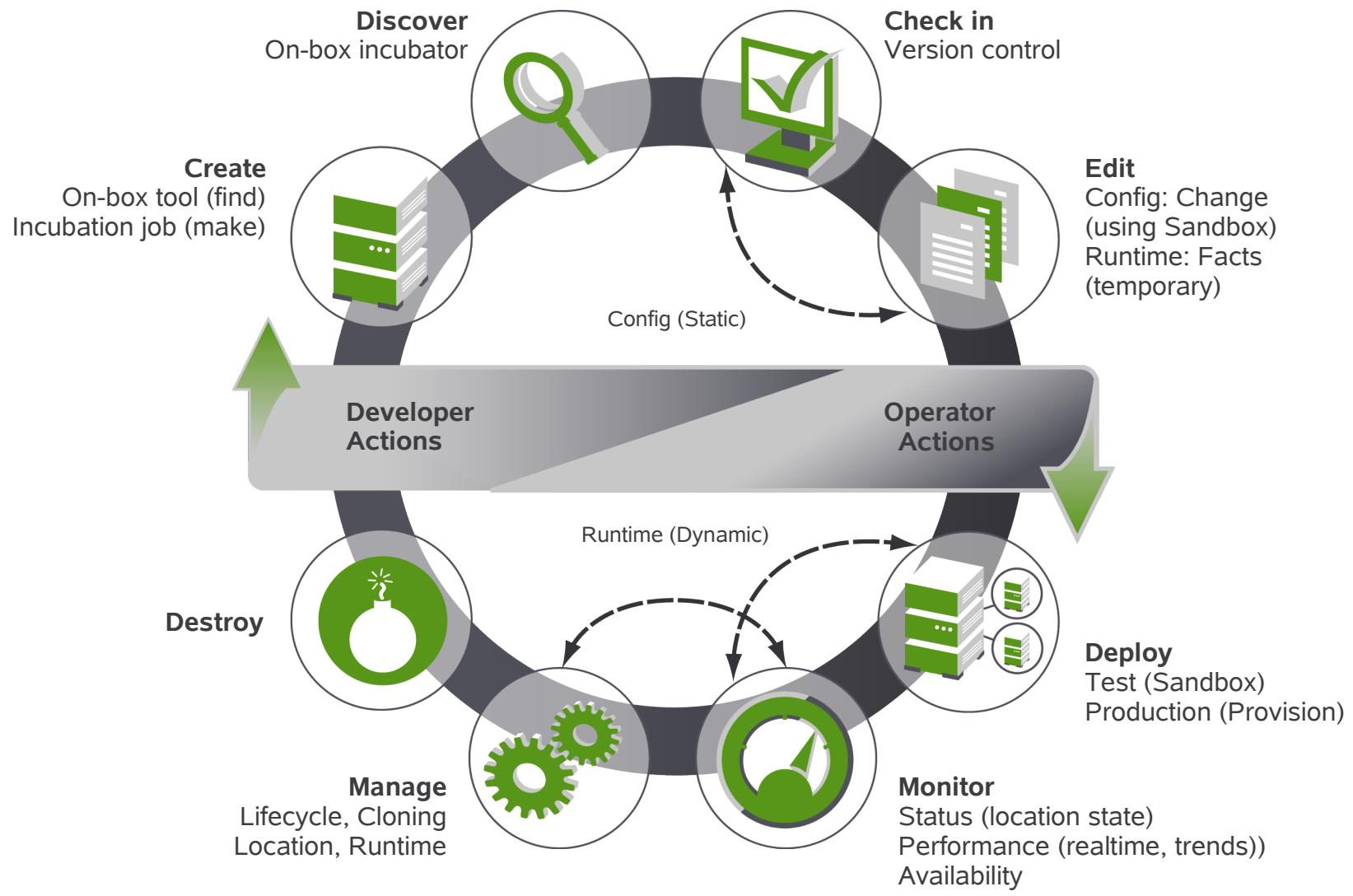


ZENworks® Virtual Machine Management

- Heterogeneous virtual machine management
 - VMware, Xen, Microsoft
 - Discovers target hosts for VM commissioning
 - Discovers off-line and online Vm's & templates
 - Deployment, re-deployment/rollback
 - Associates physical, virtual, and storage compute nodes
- Cluster-aware virtualization
 - Redundancy, high availability, disaster recovery
- Policy-based, dynamic workload deployment
 - Constraint based job assignment & rules execution
 - Deploys and moves workloads dynamically

Virtual Machine Lifecycle Control

VM Lifecycle



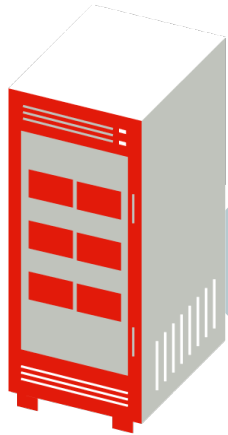


Management Components

- **ZENworks Orchestrator**
- **VM Builder**
- **VM Warehouse**
- **Monitoring Service**

ZENworks® Orchestrator

ZENworks Orchestrator



Resource Discovery

Workload Management

Dynamic Scheduling

VM Lifecycle Mgmt

Policy Management

Auditing/Accounting

Autonomic Availability

VM Lifecycle Control

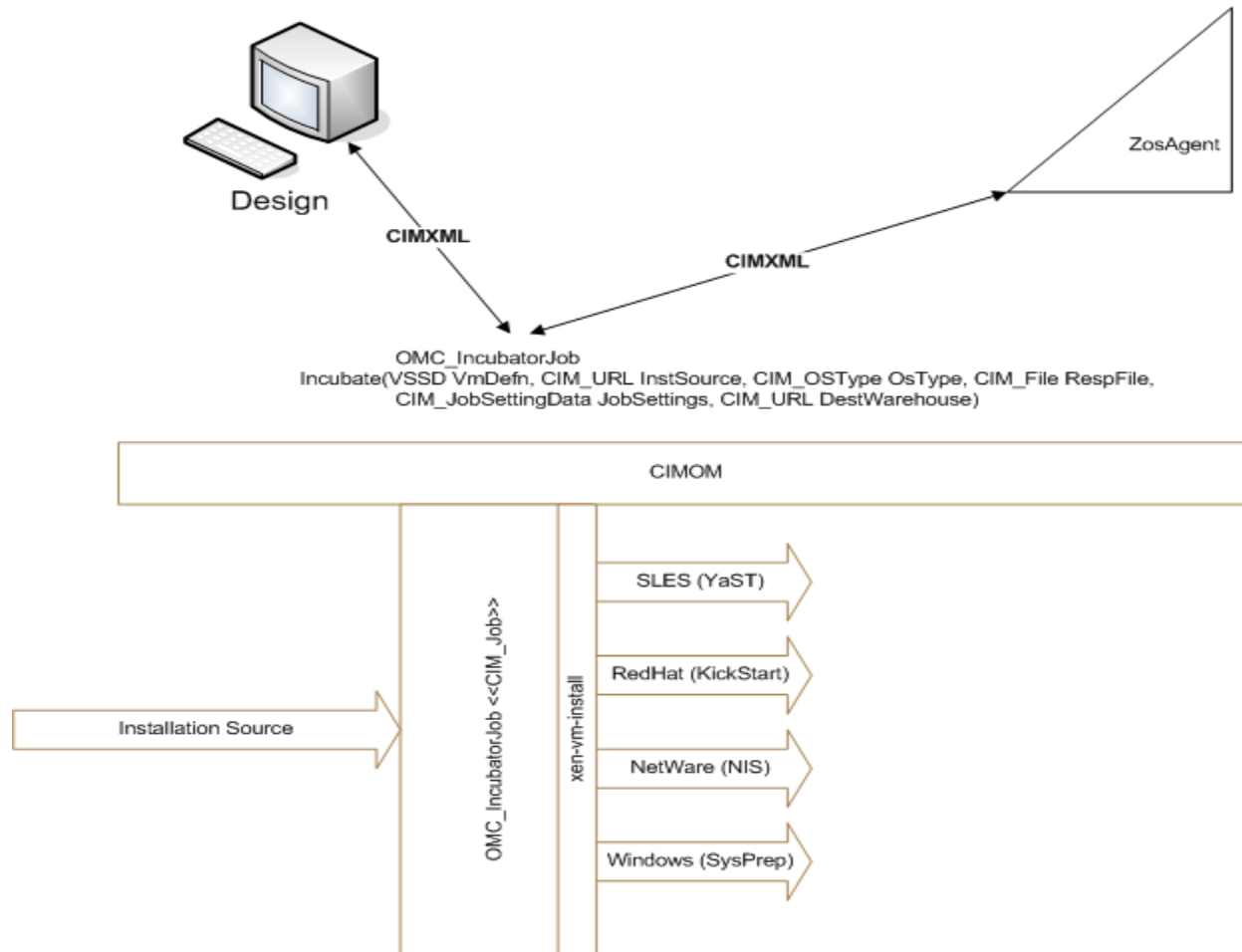
- System maintains library of VMs and images, hosts
 - Like physical resources VMs have ‘facts’ describing attributes
 - VMs can be grouped
- Actions can be performed on VMs:
 - Provision, Shutdown, Suspend, Create Template, Create VM, Create Template From Physical, Create VM From Physical, Clone VM, Clone Online VM, Clone Template, Destroy, Restart, Migrate, Check Status, Template to Instance, Instance to Template, Affiliate With Host, Make Standalone, Checkpoint, Restore, Delete, Cancel Action

VM Lifecycle Control (cont.)

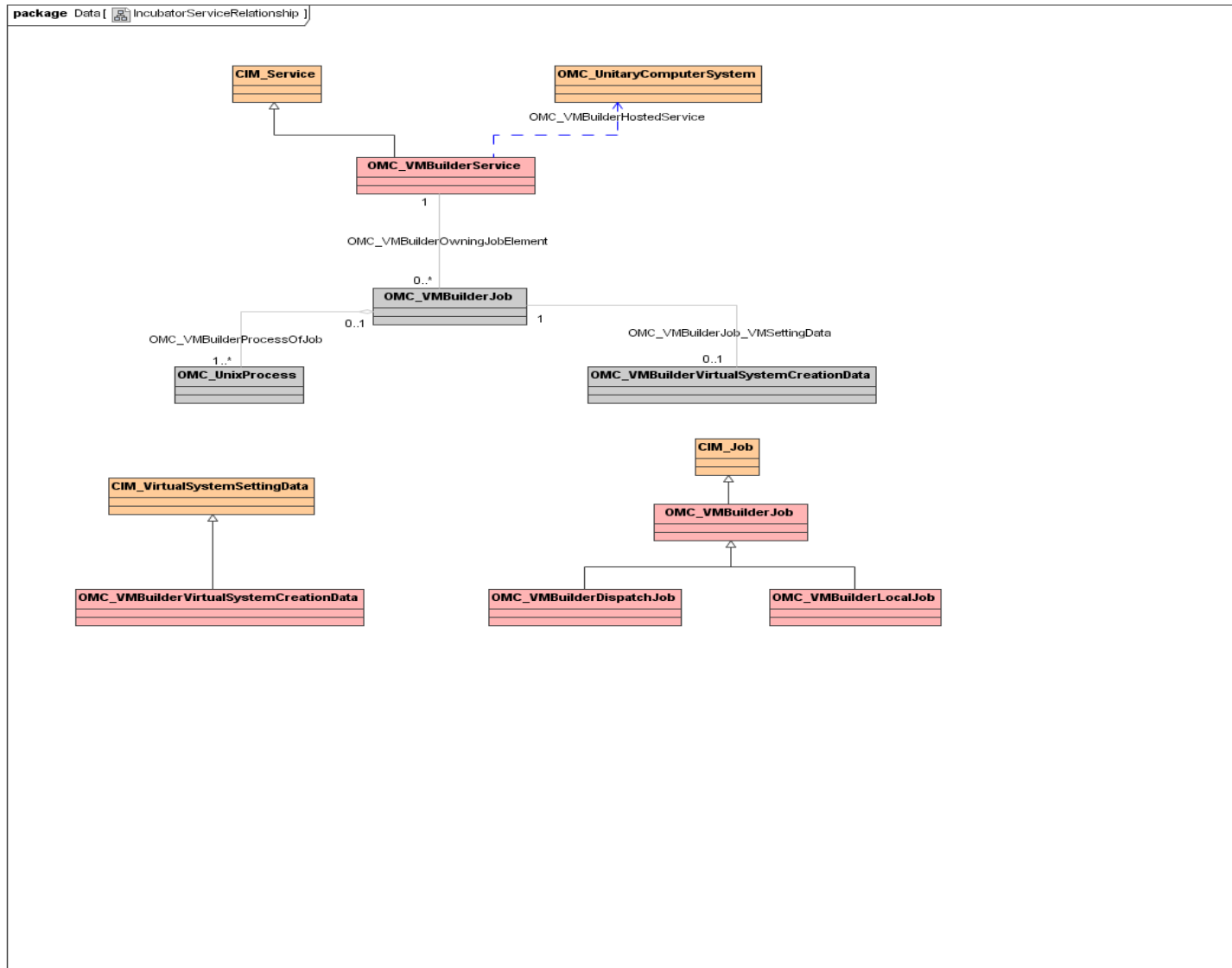
- VM lifecycle controlled by:
 - Programmatically
 - Manually (through mgmt. console)
 - Automatically on demand
 - A job makes request for unavailable resource... Suitable VM image is located, host is located, image is provisioned, instance is initially reserved for calling job, logic is invoked to make use of new resource
- VM host/instance selection/placement is similar to resource selection:
 - Governed by policies, priorities, queues and ranking
- Provisioning Adapters provide VM abstraction:
 - Special 'provisioning' jobs perform operations for each integration with different VM technologies

VM Builder

VM Builder Architecture



UML Diagram for VM Builder



VM Builder

- Open source project. Will be part of OMC
- Creates virtual machines and images
- GUI VM creation wizard collects inputs
- GUI calls CIMOM VM creation service with inputs
- VM creation service provider invokes `xen-vm-install.py`
- To create the VM "in place" on the same server as running the CIMOM hosted VM creation service.

VM Builder (cont.)

or

- The VM creation service provider could run a ZOS job to let ZOS decide the best server to run the job on (based on a job constraint, e.g CPU architecture), ZOS will then run a joblet on an appropriate server; and that joblet will call into the CIMOM on that chosen server, in order to request VM creation there.

VM Builder Operations

- **Create Job.** This operation used to start a virtual machine build job on a VM Builder enabled resource.
- **Cancel Job.** This operation allows to cancel any running VM Builder job by specifying the job ID. All VM configuration and disk image(s) will be removed. The CIM VMBuilderDispatch job object will remain and report a job state of canceled.
- **Detach Job.** This operation allows to remove knowledge of the VM Builder job without destroying the actual contents of the built VM. The CIM VMBuilderDispatch job object will be removed. However, the VM configuration and disk image(s) will remain on the node where the VM was built.
- **Delete Job.** This operation used to delete VM Builder job completely. All VM configuration and disk image(s) will be removed. The CIM VMBuilderDispatch job object will also be removed.

Virtual Machine Properties

Hardware Configuration

Description	
Name	VM Test
Version	0.1
Notes	Description of the Virtual Machine
Filename	VM Test.img
Operating System	SUSE Linux Enterprise Server
Architecture	Intel x86 32 bit

Configuration

Install from	ftp://suseinstall.novell.com/install/s
Extra	
Ethernet 1	Default Bridge
DHCP	false
IP Address	Default
Hostname	Default
Netmask	Default
Gateway	Default

Hardware

Memory	1059 - 5891 MB
Boot Disk Size	6 GB
Addl Disk 1	iscsi://172.16.1.137/scsi/SAN1.sc
DVD/CD-ROM 1	/dev/cdrom
Floppy 1	/dev/fd0
USB Controller1	Auto-detect
Sound Adapter	/dev/dsp
Mouse	Auto-detect

Processors

Physical Virtual Weight

Physical processors are used to auto-select qualifying data-center machines. Virtual Processors run optimally when physical machines have the same number or greater physical CPUs. Use Weight to specify the CPU sharing across multiple Virtual Machines.

Memory Size

Startup MB

Max MB

Startup memory is completely allocated when the Virtual Machine is booted. Memory allocation will grow as needed up to the specified maximum memory.

Display

Mode SDL

VNC VNC Viewer

Enabling VNC starts a VNC server within the Virtual Machine permitting remote administration. The VNC Viewer options displays a VNC viewer showing the host Virtual Machine.

< Back

Next >

Install...

Apply

Cancel

Status

Checked In



Monitor

- Control
- Test
- Production

Workspace Warehouse



- iFolder Defined
- MySQL on SLES 10 Installing
- MS Sharepoint on Wi... Running
- PeopleSoft on SLES ... Editing
- Oracle 10g on SLES ... Checked-out
- Test VM Installed**

Properties

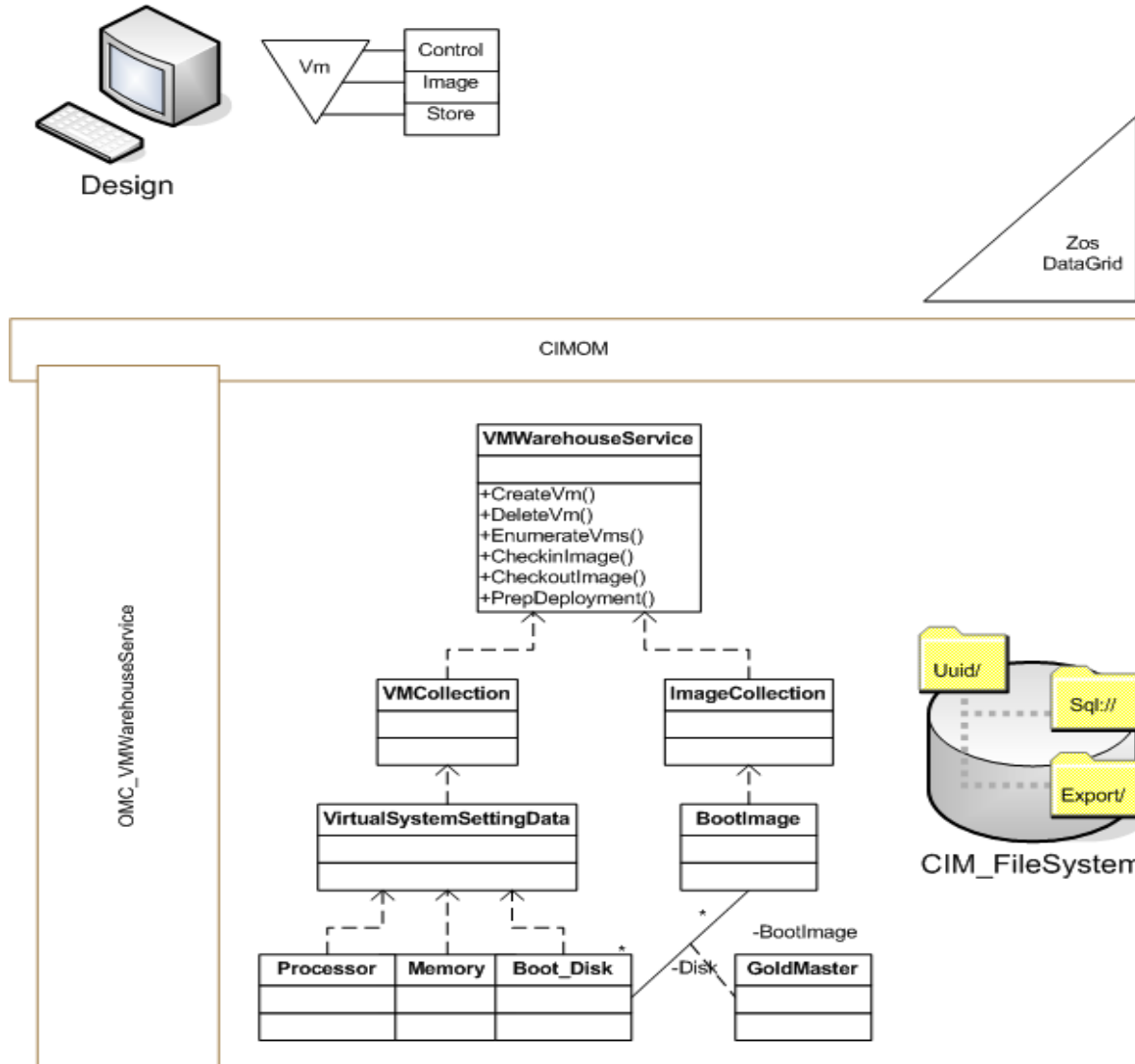
Property	Value
Name	Test VM
Description	Just trying out my first
Version	1.1
Filename	Test VM.img
Operating System	SLES 10 - 64
Architecture	Intel 64
Install Source	ftp://dist.provo.novell.c
OS Disk Size	2.5 GB
RAM Size	2048 - 4096 MB
# CPUs	4
Floppy	/dev/fd0
CD/DVD	/dev/cdrom

Warehouse Monitor - TestVM1 MySQL on SLES 10, v 4

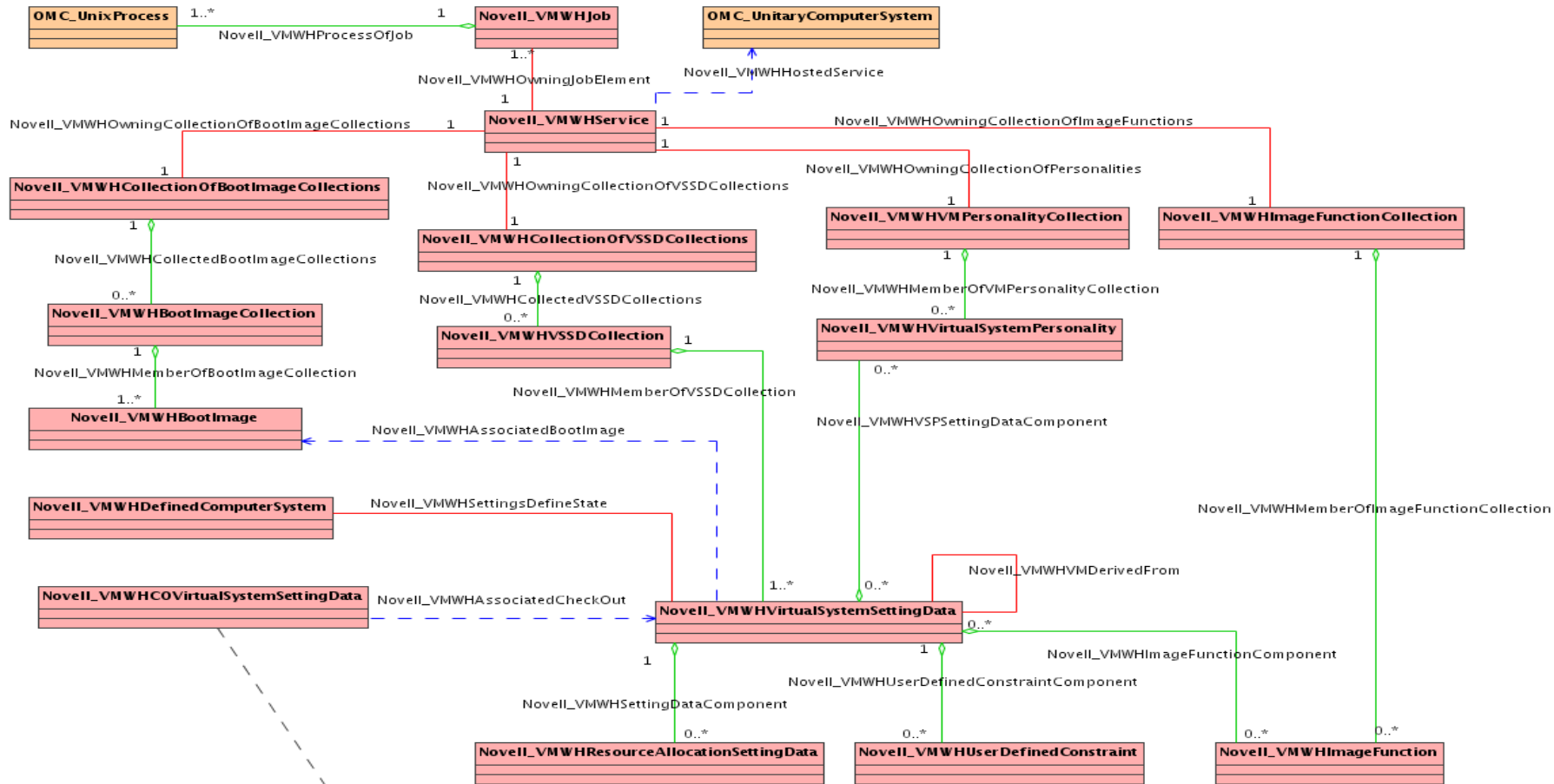


VM Warehouse

VM Warehouse Architecture

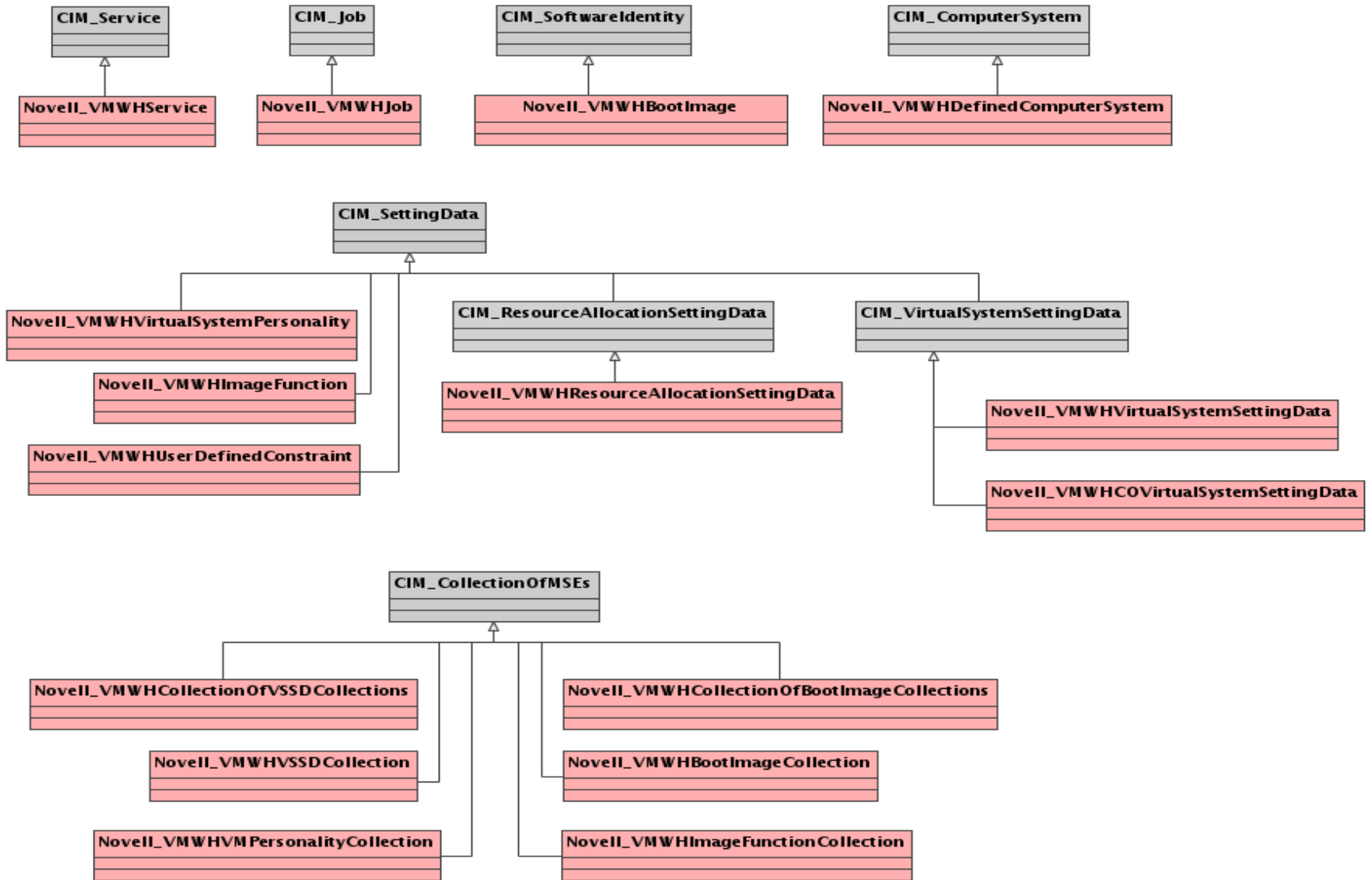


VM Warehouse Service Relationship



The `Novell_VMWHCOVirtualSystemSettingData` class represents a sandbox that is generated at checkout time. This "sandbox" can be manipulated by the user and checked-in to create a new version of the virtual machine. All the associations that relate to the `Novell_VMWHVirtualSystemSettingData` also relate to `Novell_VMWHCOVirtualSystemSettingData` except the `Novell_VMWHSettingsDefineState`, `Novell_VMWHMemberOfVSSDCollection` and `Novell_VMWHDerivedFrom` associations.

VM Warehouse Service Class Inheritance



VM Warehouse Operations

- Warehouse Operations:
 - **Import** : Add a new VM in the VM Repository
 - **Remote Import**: Imports a VM which has been previously built (e.g. via VM Builder) on remote machine
 - **Export** : Export the Gold Master version of the VM for deployment
 - **Check-out** : Check-out any version for modification.
 - **Check-in** : Check in a newly modified VM. Upon check-in the version is assigned.
 - **Commit** : Used by the ZOS to update any changed made by the ZOS server. Commit creates a new version of the VM
 - **Delete** : Delete any VM and all its version from the repository

VM Warehouse (cont.)

- **Set Gold Master** : By default, the first version imported into the warehouse is marked as the gold master. However, any version can be marked as gold master if the VM has more than one version in the warehouse.
- In addition to above function the VM repository provides the ability to manage the Repository Functions. Personality and User Defined Constraints.
 - **Repository Function** : add, edit, assign, delete
 - **Personality** : add, edit , assign, delete
 - **UDC** : add and delete

Virtual Machine Properties

Description

Description

Name VM Test

Version 0.1

Notes

Filename VM Testimg

Operating System SUSE Lin

Architecture Intel x86

Configuration

Install from

Extra

Ethernet 1 Default B

DHCP false

IP Address Default

Hostname Default

Netmask Default

Gateway Default

Hardware

Memory 1024 - 10

Boot Disk Size 6 GB

Add Disk 1 iscsi://172.16.1.137/scsi/SAN1.

DVD/CD-ROM 1 /dev/cdrom

Floppy 1 /dev/fd0

USB Controller1 Auto-detect

Sound Adapter /dev/dsp

Mouse Auto-detect

VM Name

VM Test

Version

0.1

Filename

VM Testimg

Notes

Description of the Virtual Machine's purpose

Select Virtual Machine

Virtual Machine Name	Description	Status
Virtual Machine 1	Description of VM 1 creation	Checked-in
Virtual Machine 1	Description of VM 1 edit	Gold master
Virtual Machine 1	Description of VM 1 edit	Checked-out
Virtual Machine 1	Description of VM 1 edit	Checked-in
Virtual Machine 2	Description of VM 2 creation	Checked-in
Virtual Machine 2	Description of VM 2 edit	Gold master
Virtual Machine 2	Description of VM 2 edit	Checked-out
Virtual Machine 2	Description of VM 2 edit	Checked-in

Share Image

Cancel

< Back

Next >

Install...

Apply

Cancel

Status

Checked In

intel x86 32 bit

with other VMs
in source, fill out
button.

Fully-virtualized



Monitor

- Control
- Test
- Production

Warehouse

Version	Description	Last Check-in	Status
1	Created the Web Server VM	8/10/2006	Checked In
2	Updated to latest SLES release	12/1/2006	Checked In
3	Added security patches	1/15/2007	Checked In
4	of Tomcat 5	1/24/2007	Testing

- Checkout
- Checkin
- Un-Checkout
- Set Gold Master**
- Delete

Workspace Warehouse

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OS Disk Size	2.5 GB
RAM Size	2048 - 4096 MB
# CPUs	4
Floppy	/dev/fd0
CD/DVD	/dev/cdrom

Gold Master: Shared Virtual Machine Images

Multiple Virtual Machines share this same image file. Please select any of the associated Virtual Machines you'd like to update to also use the new image file:

Virtual Machine Name	Description	Status
<input checked="" type="checkbox"/> Virtual Machine 1	Description of VM 1 creation	Checked-in

Update Selected **Cancel**



Monitoring Service

Based on Ganglia open source project
and CIM Statistical model



More on Monitoring

Using the CIM statistical model to
monitor your data

Brad Nicholes, Novell, Inc.



More on Storage Resource Manager

**Open Source implementations of
Storage Management**

Robert Wipfel, Novell, Inc.

Todd Singleton, IBM

Demo...

Conclusion

- Open Standards
- Model is Required
 - For Service Oriented Infrastructure
 - Relate Virtual Machines to other Resource Types
- Mixed Source Software
 - For the Next Generation Data Center