



oVirt Architecture

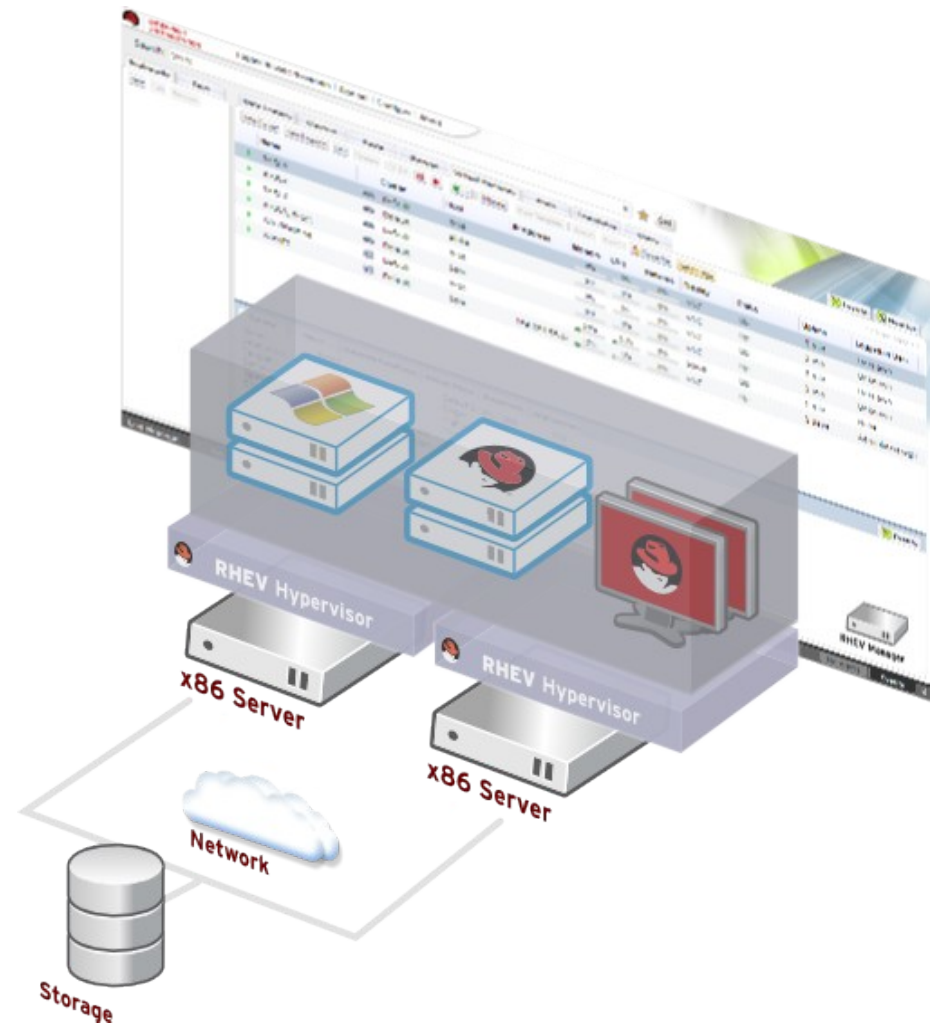
Itamar Heim
Director, RHEV-M Engineering, Red Hat

oVirt Engine



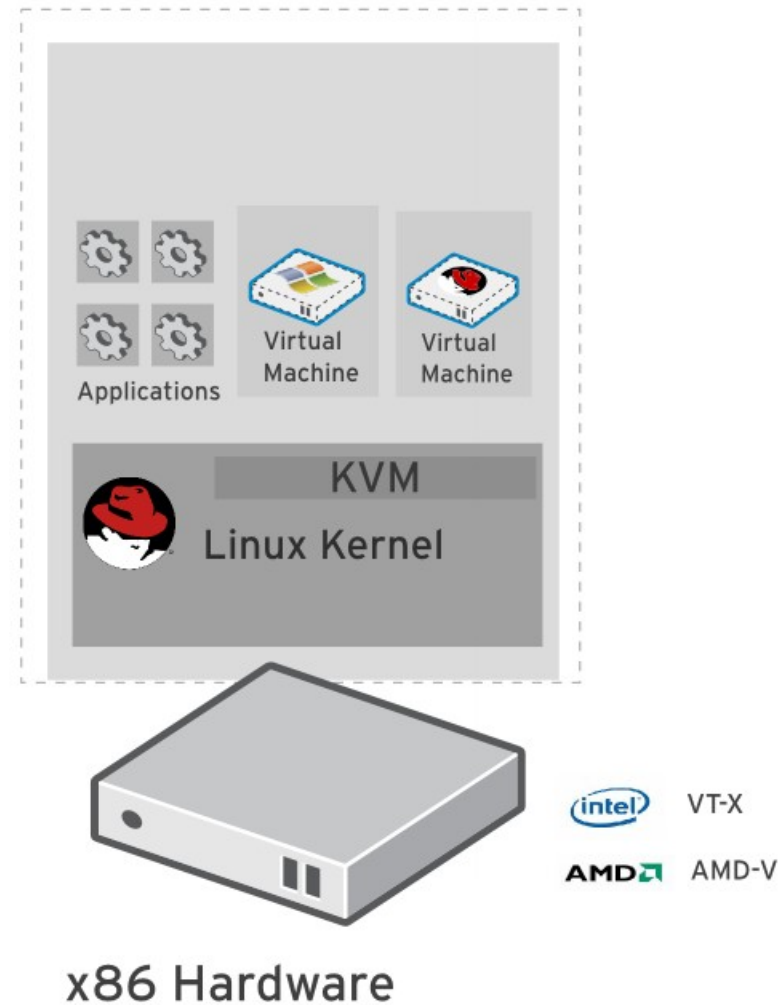
Large scale, centralized management for server and desktop virtualization

Based on leading performance, scalability and security infrastructure technologies



Kernel-based Virtual Machine (KVM)

- Included in Linux kernel since 2006
- Runs Linux, Windows and other operating system guests
- Advanced features
 - Live migration
 - Memory page sharing
 - Thin provisioning
 - PCI Pass-through
- KVM architecture provides high “feature-velocity” – leverages the power of Linux



Linux as a Hypervisor?

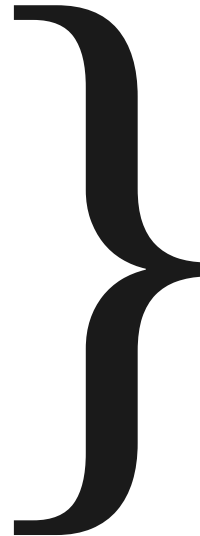


- What makes up a hypervisor ?
 - Hardware management
 - Device drivers
 - I/O Stack
 - Resource Management
 - Scheduling
 - Access Control
 - Power Management
 - Memory Manager
 - Device Model (emulation)
 - Virtual Machine Monitor

Linux as a Hypervisor?

- What makes up a hypervisor ?

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Operating System Kernel

Linux as a Hypervisor?

**How well does Linux perform as a hypervisor?
Isn't Linux a general purpose operating system?**

Linux is architected to scale from the smallest embedded systems through to the largest multi-socket servers

- From cell phones through to mainframes

KVM benefits from mature, time tested infrastructure

- Powerful, scalable memory manager
- Robust security infrastructure
- High performance network stack
- Versatile storage infrastructure – iSCSI, FC, NAS, multipath, etc
- Rich ecosystem of supported hardware systems

Linux as a Hypervisor?

**How well does Linux perform as a hypervisor?
Isn't Linux a general purpose operating system?**

Over the last 4 years features have been added to Linux to provide a better infrastructure for a hypervisor

- Scheduler enhancements
Improved scalability and reduced latency
- Enhancements to memory manager
Advanced features such as memory page sharing and compression
- Improvements to Block I/O subsystem
 - Better performance, automated alignment, etc

Red Hat Enterprise Virtualization Performance and Scalability



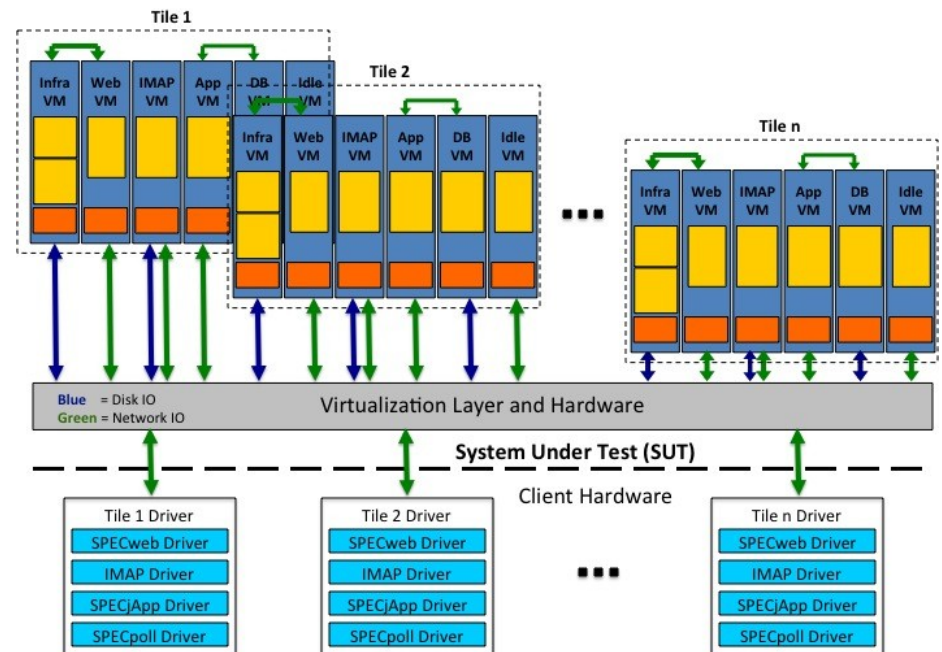
SPECvirt_sc2010

Vendor neutral virtualization benchmarks

Comprised of application specific benchmarks running inside “tiles”

Each tile runs 6 virtual machines

- Application Server
- Database Server
- Mail Server
- Web Server
- Infrastructure Server
- Idle Server



Each VM runs a benchmark, eg SpecWeb, SPECjAppServer, SPECmail and must meet specifi

Red Hat Enterprise Virtualization

Performance and Scalability



SPECvirt_sc2010

KVM leads the pack in 2, 4, 8 socket systems for SPECvirt
Including the largest benchmark results with over 400 Vms

Score : 7067 @ **432 VMs** (72 tiles)

Processor: Intel Xeon E7-4870 (80 cores, 8 chips, 10 cores/chip, 2 threads/core)

Memory: 2 TB (128 x 16 GB, Quad Rank x4 PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM)

http://www.spec.org/virt_sc2010/

Red Hat Enterprise Virtualization Competitive Landscape



Test Center Scorecard						
	Management	Performance	Reliability	Scalability	Installation	Overall Score
	25%	20%	20%	20%	15%	
Citrix XenServer 5.6.1	7	8	8	7	9	7.7 GOOD
	25%	20%	20%	20%	15%	
Microsoft Windows Server 2008 R2 Hyper-V	8	8	9	8	7	8.1 VERY GOOD
	25%	20%	20%	20%	15%	
Red Hat Enterprise Virtualization for Servers 2.2	8	8	8	9	9	8.4 VERY GOOD
	25%	20%	20%	20%	15%	
VMware vSphere 4.1	9	9	9	9	9	9.0 EXCELLENT

- InfoWorld “shootout” 2011
 - Independent analysis of leading virtualization platforms
 - After <18 months Red Hat has overtaken Citrix & Microsoft in performance and functionality

<http://bit.ly/virtshootout>

Security

oVirt inherits the security features of Linux

SELinux security policy infrastructure

Provides protection and isolation for virtual machines and host

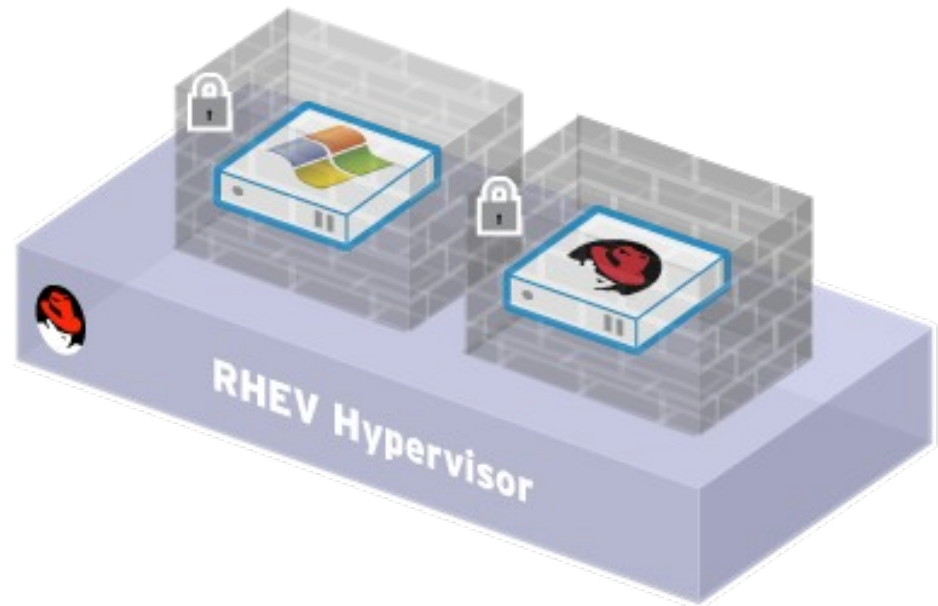
Compromised virtual machine cannot access other VMs or host

sVirt Project

Sub-project of NSA's SELinux community. Provides “hardened” hypervisors

Multilevel security. Isolate guests

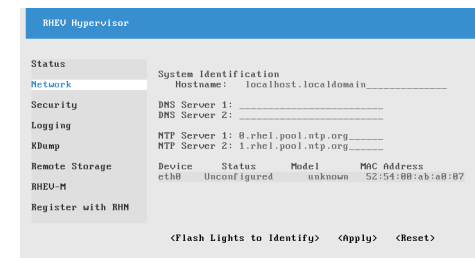
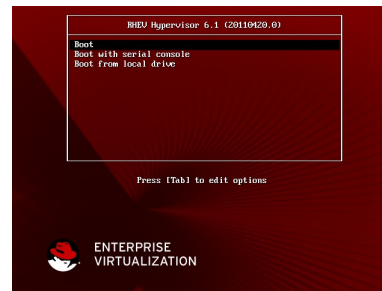
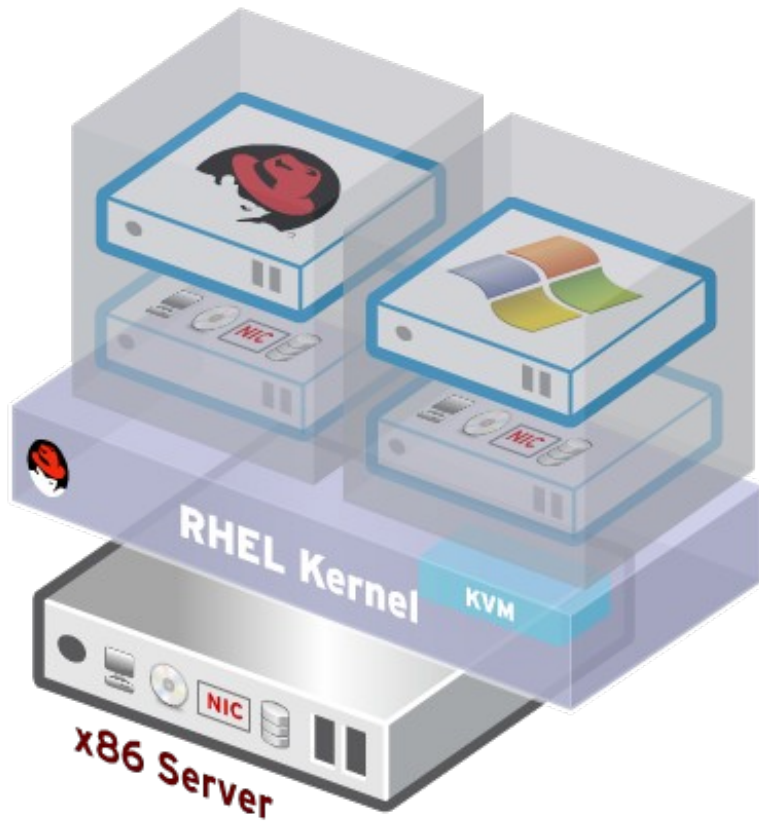
Contain any hypervisor breaches



oVirt Node



- Standalone hypervisor
 - Small footprint < 100MB
 - Customized 'spin' of Fedora + KVM
 - 'Just enough' Fedora to run virtual machines
 - Runs on all RHEL hardware with Intel VT/AMD-V CPUs
 - Easy to install, configure and upgrade
 - PXE boot, USB boot, CD or Hard drive



oVirt Node vs. Full Host

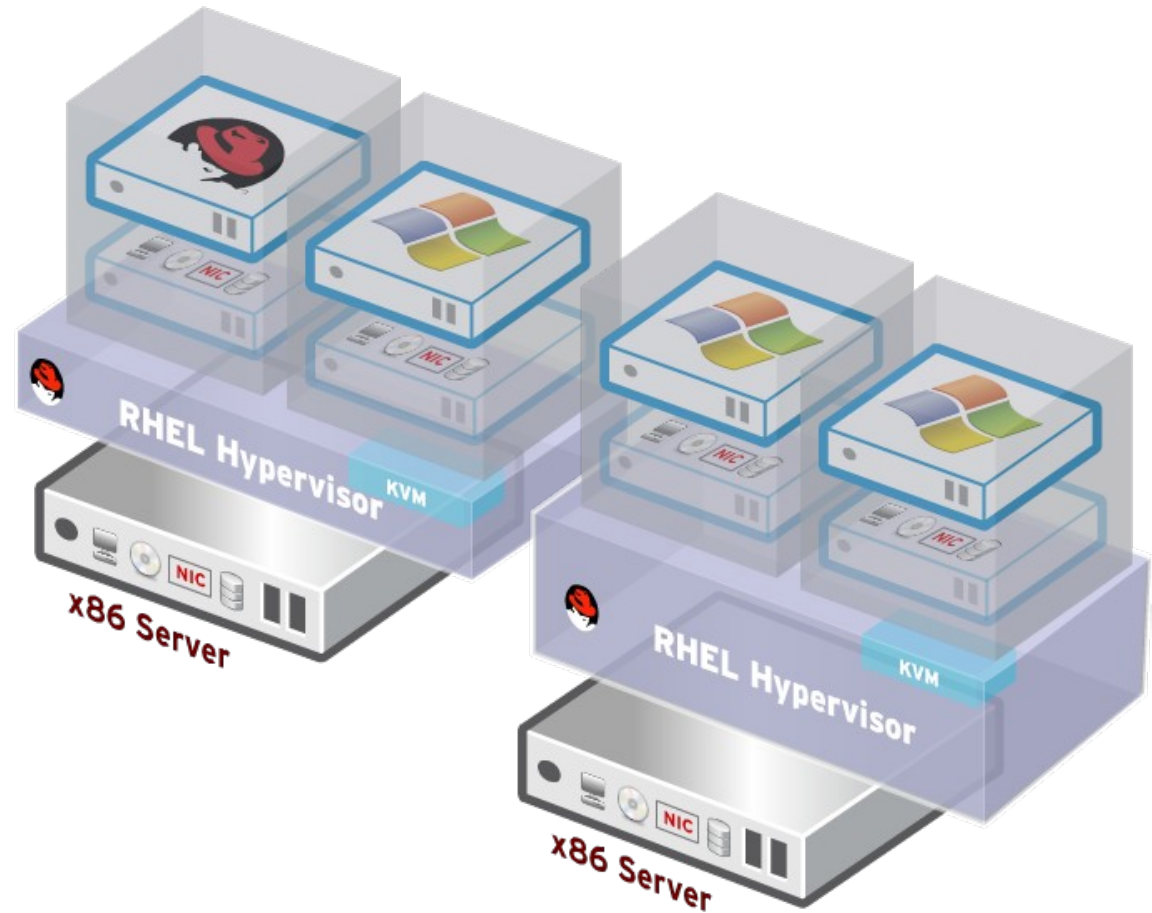


oVirt Node

- Less than 100 MB
- Pre-configured, no Linux skills needed.

Full Host

- Flexible
- Add monitoring agents, scripts etc. Leverage existing Fedora infrastructure.
- Hybrid mode capable



Ovirt Engine



ENTERPRISE VIRTUALIZATION

Logged in user: rhevadmin | Sign out | Configure | About | Guide

Search: Host:

Expand All Collapse All

Tree

- System
 - Default
 - Storage
 - ISO
 - Data
 - Clusters
 - Default
 - Hosts
 - alpha
 - beta
 - gamma

Bookmarks

Tags

Data Centers Clusters **Hosts** Storage Virtual Machines Pools Templates Users Even Monitor

New Edit Remove Activate Maintenance Approve Configure Local Storage Power Management Assign tags << Prev Next >>

Name	Host/IP	Cluster	Status	Load	Memory	CPU	Network	Spm Status
alpha	alpha.rhev.lab.e	Default	Up	1 VMs	13%	0%	0%	SPM
beta	beta.rhev.lab.er	Default	Up	1 VMs	12%	0%	0%	None
gamma	gamma.rhev.lab	Default	Up	0 VMs	3%	0%	0%	None

General Virtual Machines Network Interfaces Host Hooks Permissions Events

OS Version:	RHEL - 6Server - 6.1.0.1.el6	Active VMs:	1	Physical Memory:	26041 MB
Kernel Version:	2.6.32 - 128.el6.x86_64	Memory Page Sharing:	Active	Physical Memory - Free:	22921 MB
KVM Version:	0.12.1.2 - 2.153.el6	Automatic Large Pages:	Off	Swap Size:	24095 MB
VDSM Version:	2.3.0.57	Number of CPUs:	16	Swap Size - Free:	24095 MB
SPICE Version:	0.8.0 - 1.el6	CPU Name:	Intel Nehalem Family	Shared Memory:	0%
iSCSI Initiator Name:	iqn.1994-05.com.redhat:c66i	CPU Type:	Intel(R) Xeon(R) CPU		

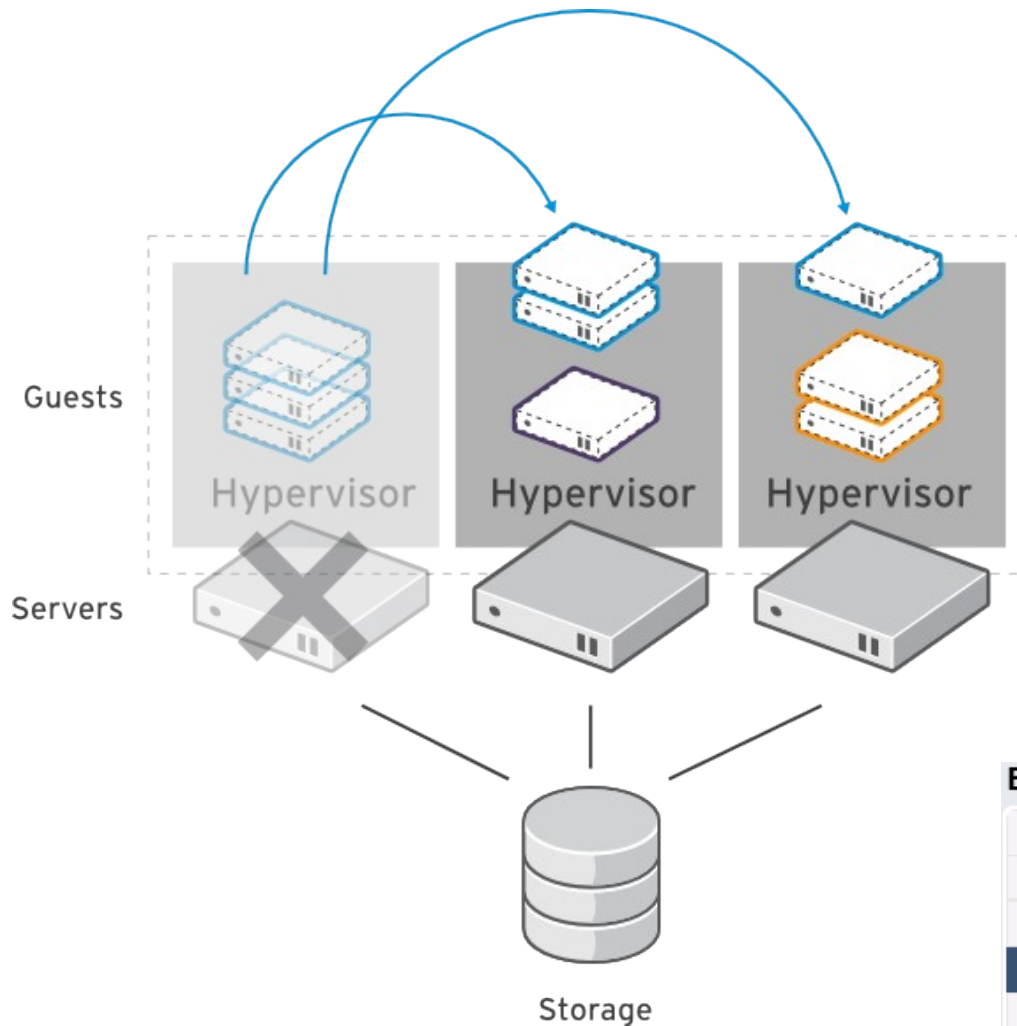
Last Message: 2011-Apr-15, 06:07 Interface nic1 (Red Hat VirtIO) was added to VM RHEL5. (User: rhevadmin)

Management Features

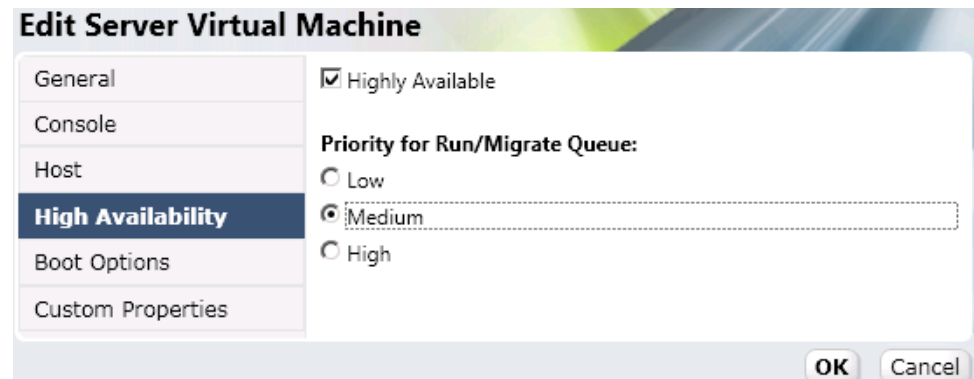


Feature	Description
High Availability	Restart guest VMs from failed hosts automatically on other hosts
Live Migration	Move running VM between hosts with zero downtime
System Scheduler	Continuously load balance VMs based on resource usage/policies
Power Saver	Concentrate virtual machines on fewer servers during off-peak hours
Maintenance Manager	No downtime for virtual machines during planned maintenance windows. Hypervisor patching
Image Management	Template based provisioning, thin provisioning and snapshots
Monitoring & Reporting	For all objects in system – VM guests, hosts, networking, storage etc.
OVF Import/Export	Import and export VMs and templates using OVF files
V2V	Convert VMs from VMware and RHEL/Xen to RHEV

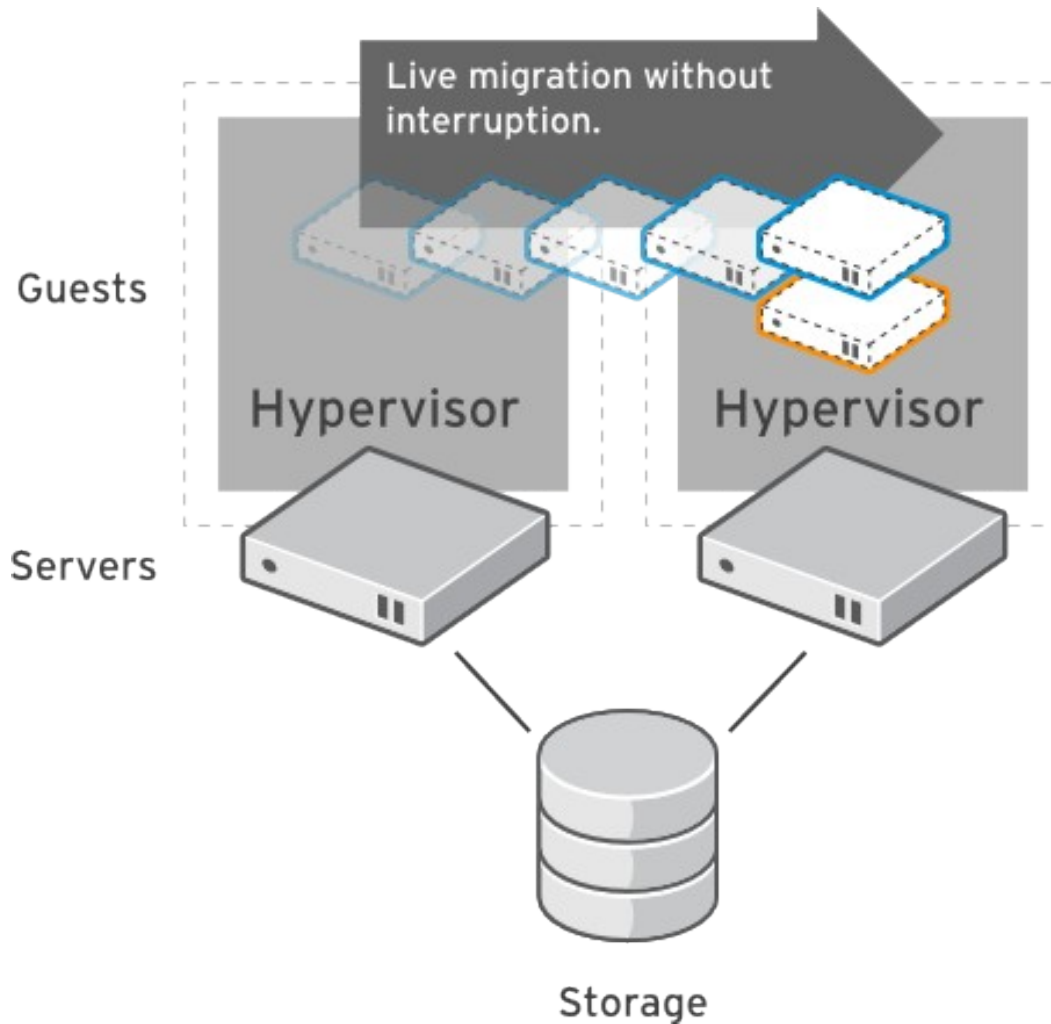
High Availability



- Build a highly available enterprise infrastructure
- Continually monitor host systems and virtual machines
- Automatically restart virtual machines in case of host failure
 - Restart virtual machine on another node in the cluster
- Use live migration to “fail-back” a VM to it's original host when the server is restored

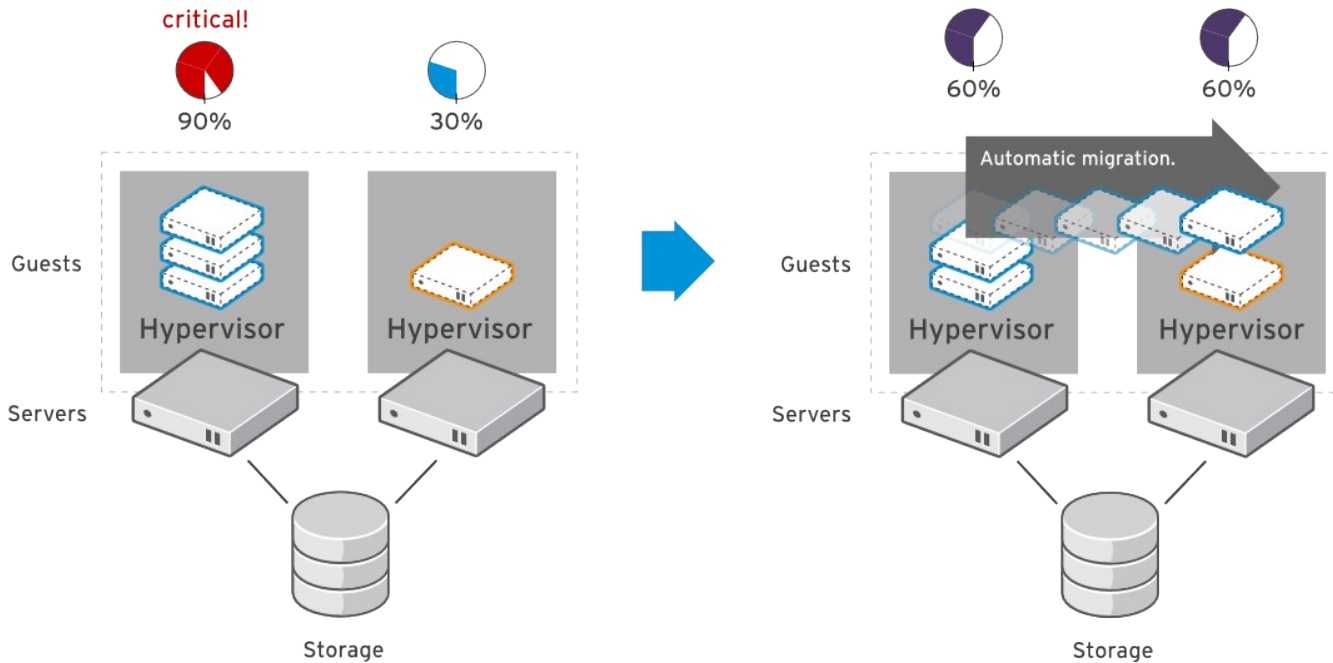


Live Migration



- Dynamically move virtual machines between hosts
 - No service interruption
 - Applications continue to run
- Migrate even I/O intensive workloads such as databases
- Perform hardware maintenance without application downtime
- Dynamically balance workloads between host systems

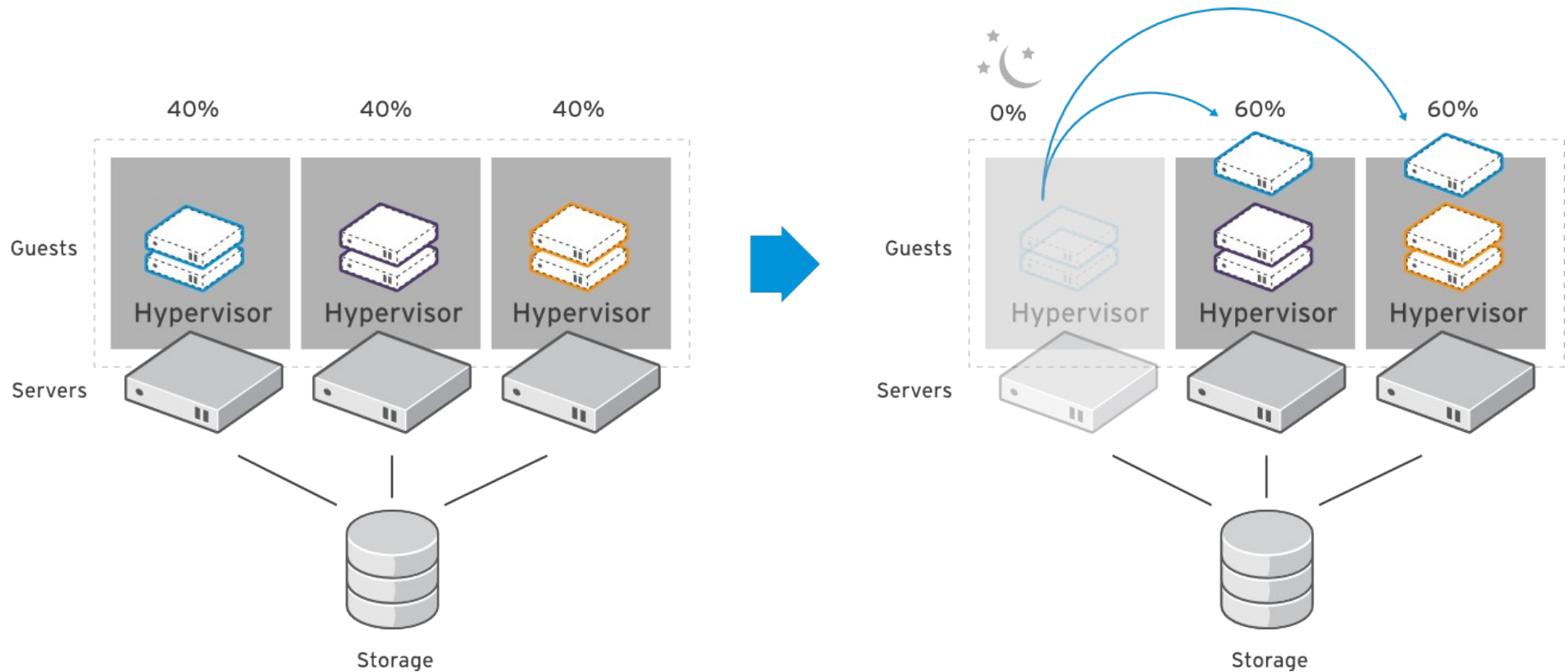
System Scheduler



- Dynamically balance workloads in the data center.
- Automatically live migrate virtual machines based on resources
- Define custom policies for distribution of virtual machines

Maintain consistent resource usage across the enterprise data center

Power Saver



Define policies to optimize workload on a fewer number of servers during “off-peak” hours

Management Features



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Virtual Desktop Infrastructure (VDI)



Centralized management,
security and policy enforcement

Virtual desktops with user
experience of a physical PC

Multiple monitors

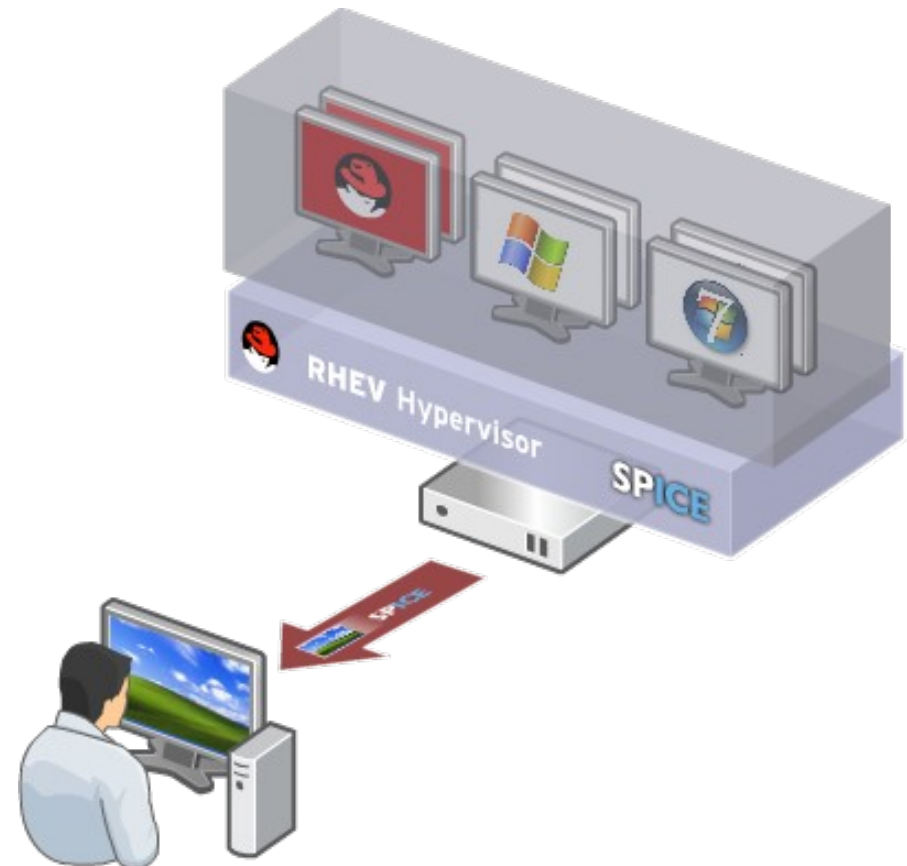
HD quality video

Bi-directional audio/video for
VoIP or video-conferencing

Smartcard support

USB support

Industry leading density of virtual
desktops/server



Red Hat Enterprise Virtualization

RHEV 3.0 Key Initiatives



- Move from proprietary to open technologies
- Remove dependency on Windows
(But maintain interoperability with Windows)
- Deliver new features and releases in parallel
- Build Open Source community project around open virtualization

History

- Qumranet
 - KVM
 - SPICE
 - **SolidICE --> RHEV-M C# --> RHEV-M Java --> oVirt**
- C# --> Java
 - using automatic conversion approach for core and UI[1]
- VDSM
- oVirt Node

[1] <http://lpeer.blogspot.com/2010/04/switching-from-c-to-java.html>

Things have changed

Things have evolved

There are a lot of good ideas

There is a lot to refactor/change/do

This is where we are

Let's get to work...

Admin Portal



ENTERPRISE VIRTUALIZATION | Logged in user: vdcadmin | Sign out | Configure | About | Guide

Search: Vms: [x] ★ GO

Expand All Collapse All

Tree: System

- dc-fc-23
 - Storage
 - EXPORT-IDAN
 - sd-fc-23-02
 - sd-fc-23-01
 - sd-iso-23
 - Clusters
 - cluster-fc-23-N
 - Hosts
 - white-vdsg
 - white-vdsh
- dc-iscsi-22
 - Storage
 - sd-iscsi-22-01
 - Clusters
 - cluster-iscsi-22
 - Hosts
 - white-vdsh
- dc-iscsi-23
 - Storage
 - sd-iscsi-23-01
 - sd-iscsi-23-02
 - sd-iso-23
 - Clusters
 - cluster-iscsi-23-N
 - Hosts
 - nari11
 - nari12
- dc-nfs-23
- Default

Data Centers Clusters Hosts Storage Virtual Machines Pools Templates Users

New Server New Desktop Edit Remove [stop] [power] [refresh] Migrate Make Template Export Move Guide Me Assign tags << Prev Next >>

Name	Cluster	Host	IP Address	Memory	CPU	Network	Display	Status	Uptime	Logged-in User
2k8r2-rhev22	cluster-iscsi-23-	nari12		0%	13%	0%	Spice	Up	2 h	vdcadmin
baz-xp-1	cluster-fc-23-N	white-vdsh		0%	6%	0%	Spice	Up	23 min	vdcadmin
fc-blk-1	cluster-fc-23-N			0%	0%	0%		Down		
iscsi-blk-1	cluster-iscsi-23-			0%	0%	0%		Down		
jboss-srv-1	cluster-fc-23-N	white-vdsh		0%	3%	0%	Spice	Up	2 h	
nfsvm	cluster-nfs-23-N			0%	0%	0%		Down		

General Network Interfaces Virtual Disks Snapshots Applications Permissions Events

Name:	baz-xp-1	Defined Memory:	2048 MB	Origin:	RHEV
Description:		Physical Memory Guaranteed:	2048 MB	Run On:	Any Host in Cluster
Template:	xp-sp3-wu	Number of CPU Cores:	1 (1 Sockets, 1 Cores per Socket)	Custom Properties:	Not-Configured
Operating System:	Windows XP	Number of Monitors:	1	Domain:	qa.lab.tlv.redhat.com
Default Display Type:	Spice	USB Policy:	Enabled	Time Zone:	GMT Standard Time
		Resides on Storage Domain:	sd-fc-23-02		

Last Message: [check] 2011-May-02, 12:53 User vdcadmin logged in. [12 Alerts] [Events]

User Portal



RHEVM User Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://ecohen.usersys.redhat.com:8080/UserPortal/com.redhat.rhevm.userportal.UserPortal/UserPortal.html

Most Visited Release Notes Fedora Project Red Hat Free Content

RHEVM User Portal

Red Hat Enterprise Virtualization
User: userportal1 | Sign out | Guide | About

Basic Extended

FirstVM1

Powering Up

Leb1

Machine is Ready

manPool-1

Machine is Down

FirstVM1
First VM

OS : WindowsXP
Defined Memory : 256MB
Num of Cores : 1 (1 Sockets, 1 Cores per Socket)

Drives:

Disk 1: <1GB / 1GB
Disk 2: <1GB / 1GB

Done

Power User Portal - VM's



RHEVM User Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://ecohen.usersys.redhat.com:8080/UserPortal/com.redhat.rhev.m.userportal.UserPortal/UserPortal.html

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RHEVM User Portal

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Basic Extended

New Server | New Desktop | Edit | Remove | Run Once | Change CD

VM's

Templates

Resources

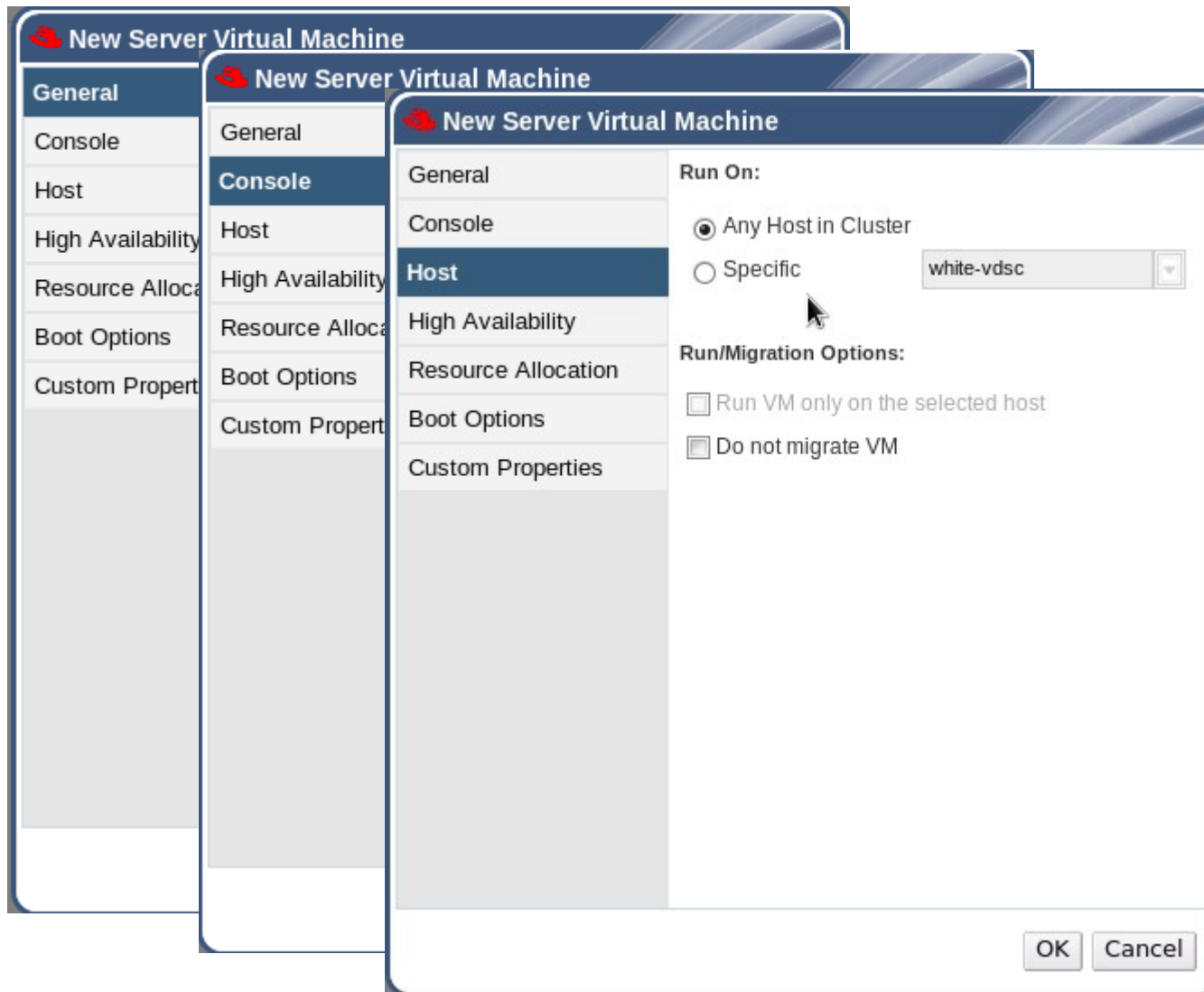
- Windows **FirstVM1 (First VM)** [Start] [Stop] [Pause] [Refresh] [Spice]
- LinuxPool **LinuxPool** [Start] [Stop] [Pause] [Refresh] [Spice]
- RealLinux **RealLinux** [Start] [Stop] [Pause] [Refresh] [Spice]
- RealWindows7 (A Real One) **RealWindows7 (A Real One)** [Start] [Stop] [Pause] [Refresh] [Spice]
- SawiPool **SawiPool** [Start] [Stop] [Pause] [Refresh] [Spice]
- SecondVM **SecondVM** [Start] [Stop] [Pause] [Refresh] [Spice]
- danny-vm111 **danny-vm111** [Start] [Stop] [Pause] [Refresh] [Spice]

General | Virtual Disks | Permissions | Applications

Name:	LinuxPool	Defined Memory:	256 MB	Run On:	Any Host in Cluster
Description:		Physical Memory Guaranteed:	256 MB		
Template:	LinuxTemplate	Number of CPU Cores:	1 (1 Sockets, 1 Cores per Socket)		
Operating System:	Red Hat Enterprise Linux 5.x	Number of Monitors:	1		
Default Display Type:	Spice	USB Policy:	Disabled		

Done

Add Virtual Machine



Power User Portal - Resources



RHEVM User Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://ecohen.usersys.redhat.com:8080/UserPortal/com.redhat.rhev.userportal.UserPortal/UserPortal.html

Most Visited Release Notes Fedora Project Red Hat Free Content

RHEVM User Portal

Red Hat Enterprise Virtualization
User: vdcadmin | Sign out | Guide | About

Basic Extended

- VM's
- Templates
- Resources

Virtual Machines:

8%

Defined VMs: 12
Running VMs: 1

vCPU's:

8%

Defined vCPUs: 12
Used vCPUs: 1

Memory:

4%

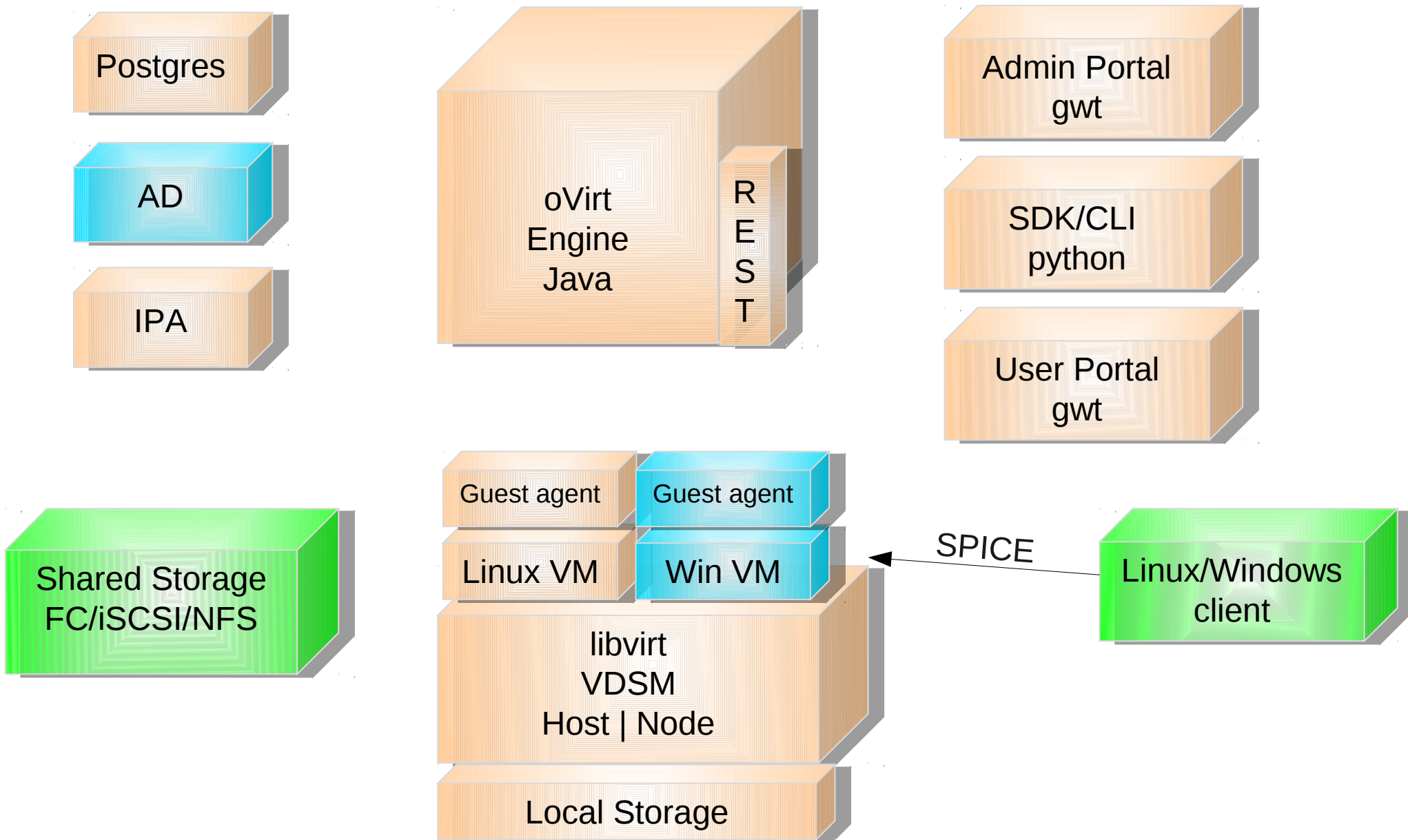
Defined Memory: 6GB
Memory Usage: 256MB

Storage:

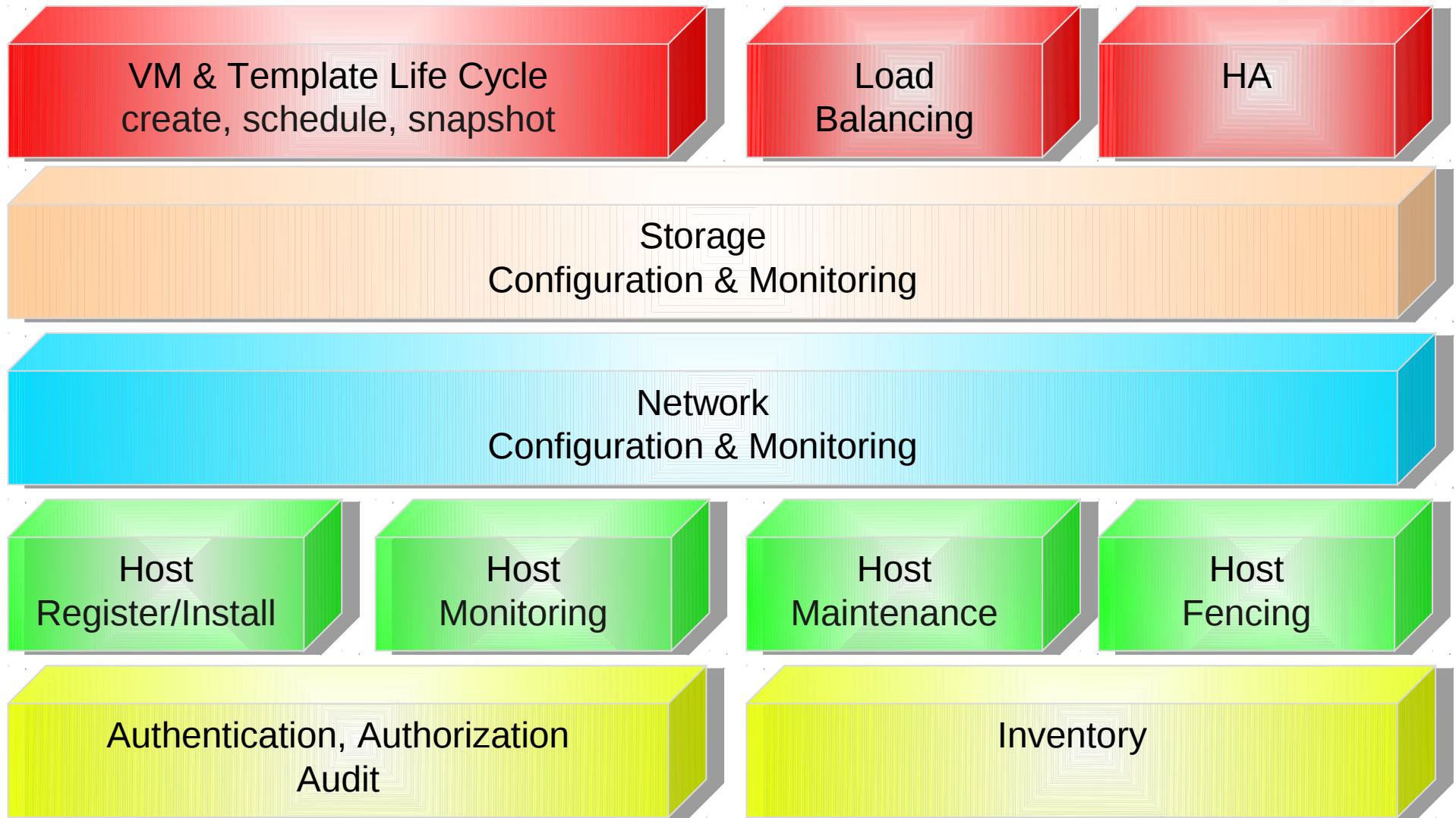
Total Size: 44GB
Number of Snapshots: 14
Total Size of Snapshots: 3GB

VmName	Disks	Size	Snapshots	Total Size of Snapshots
SecondVM	2	11GB	1	0
fromBlank	2	2GB	1	0
Disk1		1GB	1	0
Disk2		1GB	1	0
RealWindows7	1	15GB	2	6
Disk1		15GB	2	6
newdeskkk	0	0GB	0	0
desk-2-disks3	1	1GB	1	0
Disk1		1GB	1	0
RealLinux	1	10GB	1	1

oVirt High Level Architecture



Engine Core (Backend)



Authentication

- Builtin user `admin@internal`
- AD, IPA integration
 - Kerberos authentication
 - LDAP - user info, group membership
 - Multiple domains, trusts, etc.
 - Cached for searches, not for login
- Next
 - Open LDAP (patch ready)
 - Internal users (picketlink?)
 - Linux users?

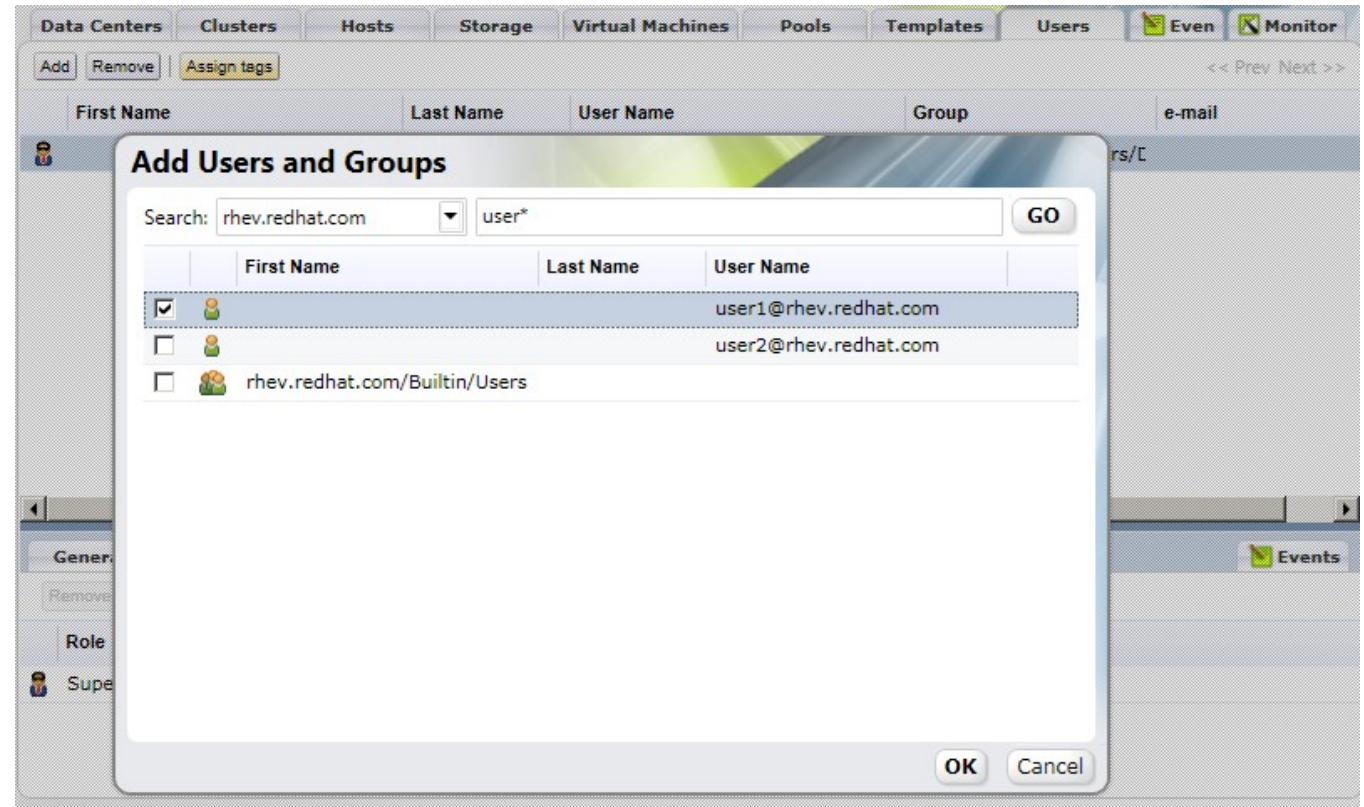
Multi Level Admin

- Users
- Groups
- Roles
- Permissions

Multi Level Admin



- **Users**
- **Groups**
- **Roles**
- **Permissions**



Multi Level Admin



- Users
- Groups
- **Roles**
- Permissions

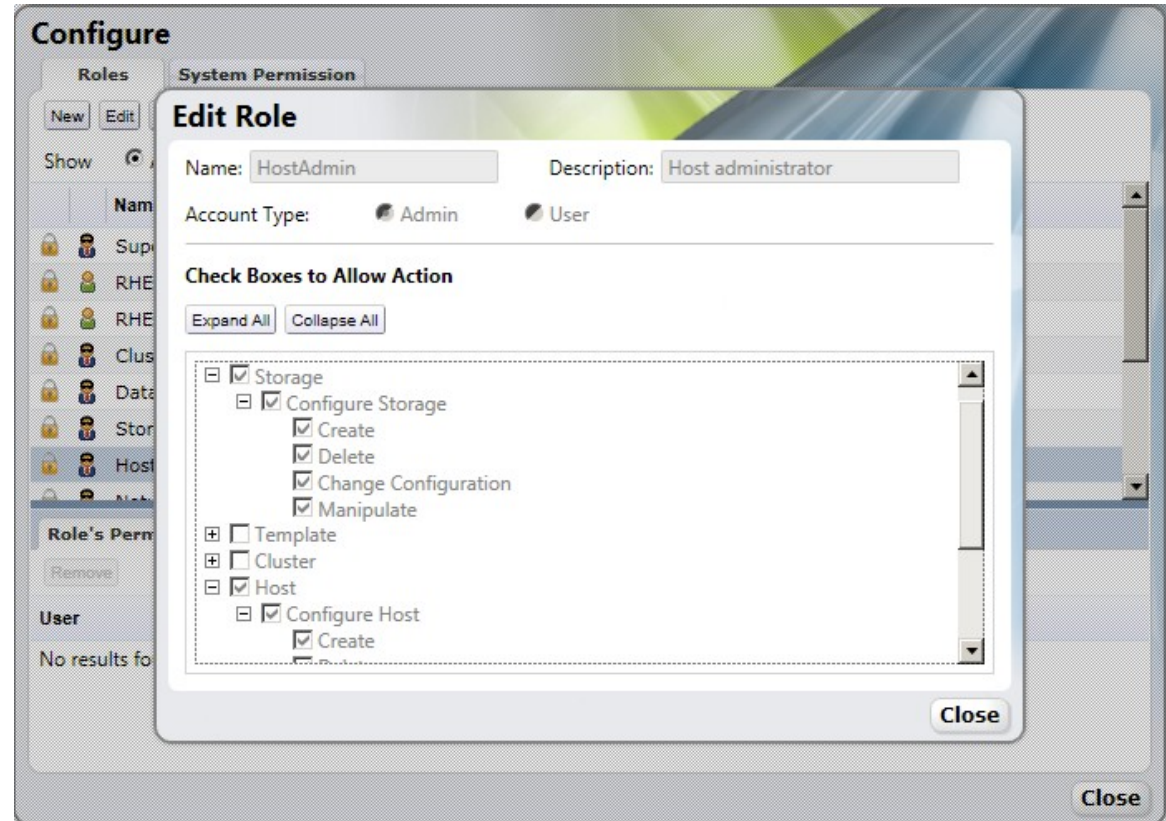
New Edit Clone Remove

Show All Users Administrator Role User Role

	Name	Description
	SuperUser	Roles management administrator
	RHEVMUser	RHEVM user
	RHEVMPowerUser	RHEVM power user
	ClusterAdmin	Cluster administrator
	DataCenterAdmin	Data Center administrator
	StorageAdmin	Storage administrator
	HostAdmin	Host administrator
	NetworkAdmin	Network administrator
	VmAdmin	Vm administrator
	VmPoolAdmin	Vm-Pool administrator
	TemplateAdmin	Template administrator
	TemplateUser	Template User

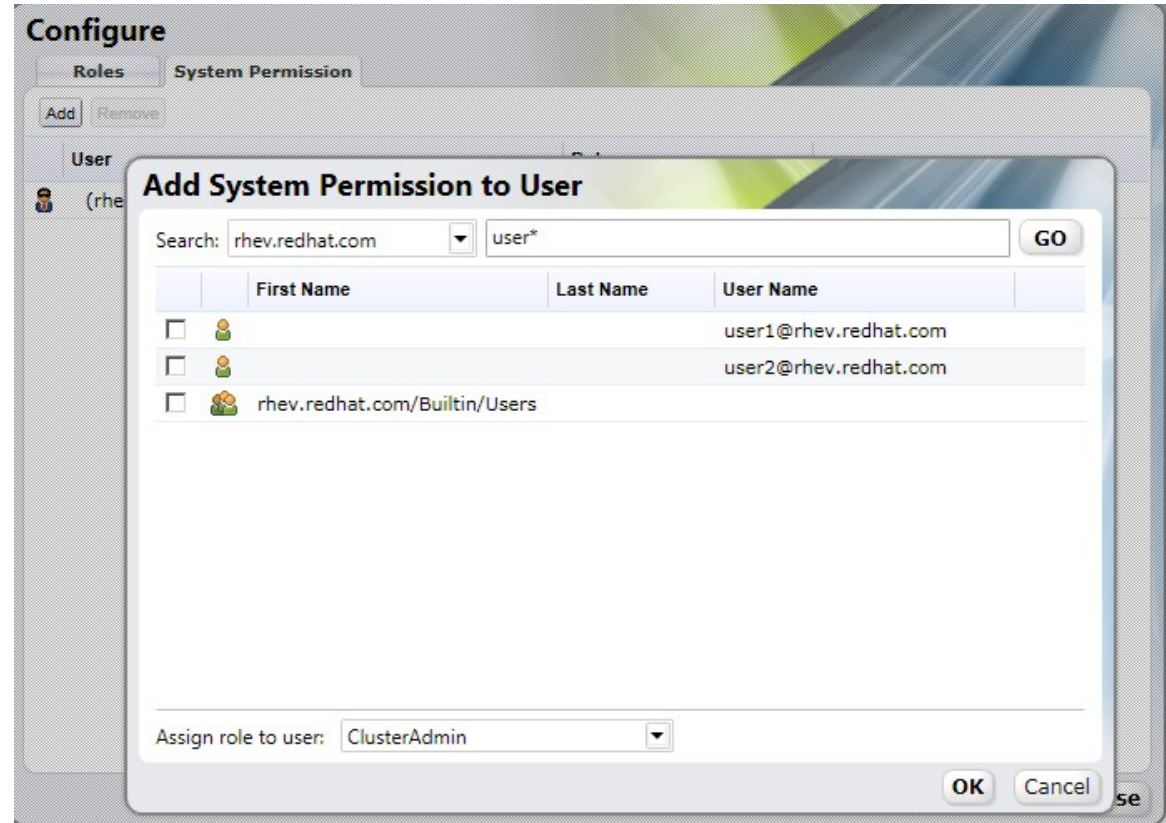
Multi Level Admin

- Users
- Groups
- **Roles**
- Permissions



Multi Level Admin

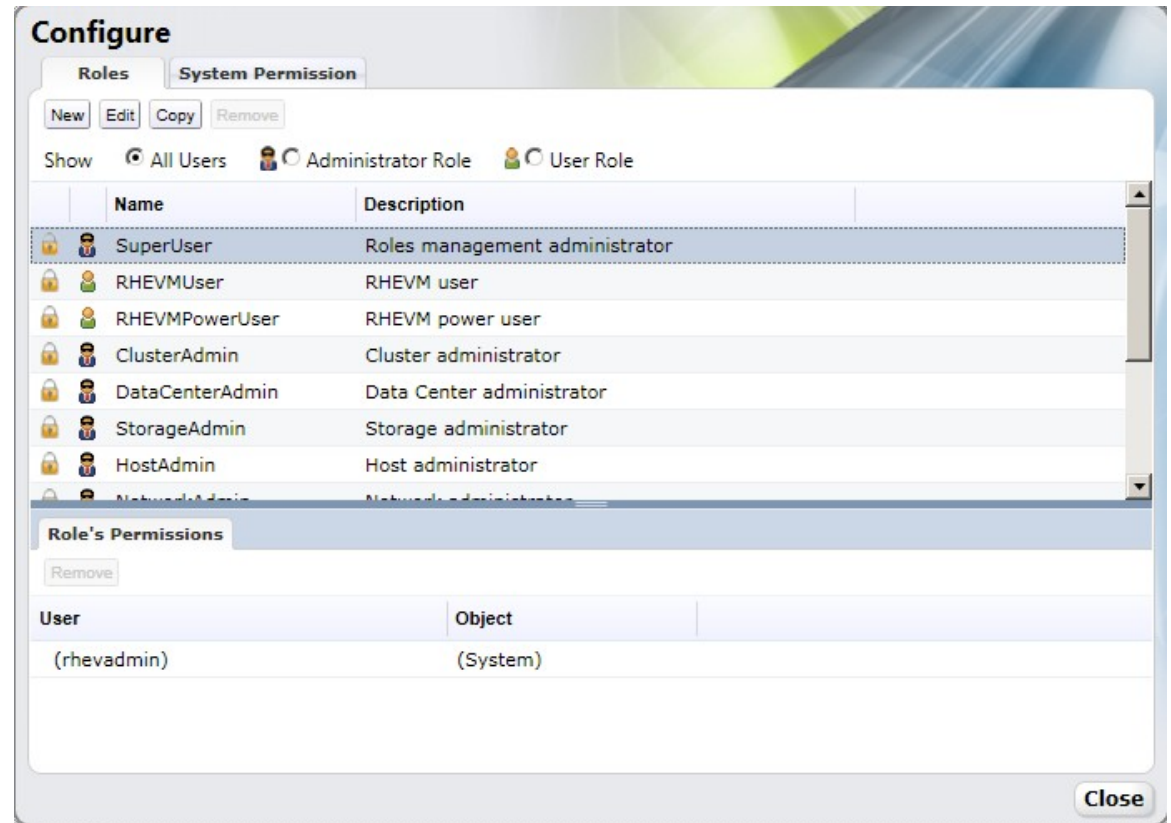
- Users
- Groups
- Roles
- **Permissions**



Multi Level Admin

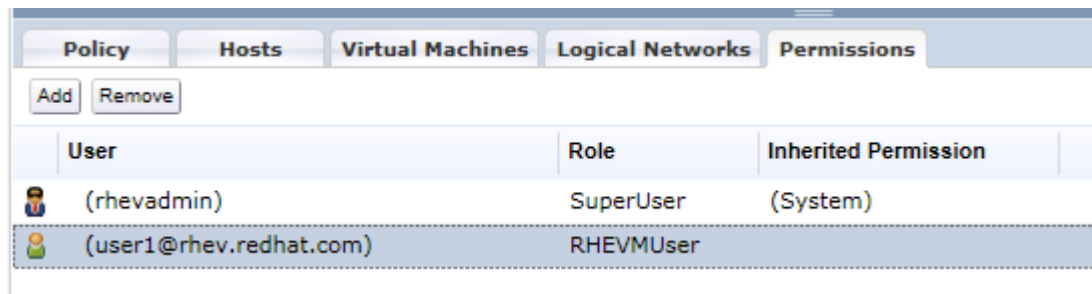




- Users
- Groups
- Roles
- **Permissions**



Multi Level Admin

- Users
- Groups
- Roles
- **Permissions**



User	Role	Inherited Permission
 (rhevadmin)	SuperUser	(System)
 (user1@rhev.redhat.com)	RHEVMUser	

Database

- Moved from SQL Server to Postgres
- JDBC based
- Next
 - Hibernate
 - Scheme upgrade management

REST API



- New RESTful API for integration with oVirt Engine
 - REST interface exposed for all API functions
 - Developed in upstream RHEV-M API project (before oVirt)

RHEVM-API Upstream Project



Community project to deliver RESTful API for RHEV 2.2



<https://fedorahosted.org/rhev-api/>

- Provides preview of 3.0 RESTful API
 - Draft implementation of new API
 - Runs on RHEL 2.2 wraps PowerShell
 - Allows early testing of API for customers and partners
 - 3.0 Implementation based on Java backend engine
 - Will be consolidated into oVirt

rhev-m-api - Trac - Mozilla Firefox

File Edit View History Bookmarks Tools Help

fedorahosted.org https://fedorahosted.org/rhev-m-api/

Search

fedora HOSTED
START A PROJECT. WATCH IT GROW.

Login Settings Help/Guide About Trac

Wiki Timeline Roadmap Browse Source View Tickets Search

Start Page Index by Title Index by Date Last Change

RHEV-M API Definition

This is an effort to define an official REST API for [RHEV-M](#).

See [here](#) for the API reference guide.

Download a [milestones](#) release and follow [this installation guide](#) to get started.

There are three parts to the project:

1. The [REST API definition](#) - Java interfaces defining the API methods and base classes defining the API's object model. These are annotated with JAX-WS and JAXB annotations.
2. A PowerShell wrapper implementation - a servlet implementing the API by wrapping the RHEV-M 2.2 PowerShell API.
3. A mock implementation - a servlet implementing the API using mocked-up resources. This allows one to experiment with the API without needing a RHEV-M installation.

It is planned that a future version of RHEV-M will implement the API without wrapping the existing PowerShell API.

REST API Reference

- [HTML](#)
- [Single Page HTML](#)
- [PDF](#)

Python API

In addition to remote access protocols like the REST "API", we are developing a reference API library for coding access. These may use the REST protocol or not as needed. The goal of the API library is to present the RHEV-M objects in a form that will be most comfortable for the developer in the target language. As much as is reasonable communications and API internals should be hidden.

- [Python API](#)

Disclaimers

The API definition is in its early stages. It may yet change substantially before being becoming the the official API.

The PowerShell wrapper is for experimentation only and not a supported Red Hat solution.

Get Involved

See our [Roadmap](#) and [issues list](#)

Done

RESTful Web Service

- Stands for Representational State Transfer
- Modeling entity actions around HTTP verbs
 - GET
 - PUT
 - POST
 - DELETE
- Still uses 'actions' for some state changes
- Self describes – entity navigation and actions

Welcome



```
Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.35.1.171/rhev-api
http://10.35.1.171/rhev-api
- <api>
  <link rel="capabilities" href="/rhev-api/capabilities"/>
  <link rel="clusters" href="/rhev-api/clusters"/>
  <link rel="clusters/search" href="/rhev-api/clusters?search={query}"/>
  <link rel="datacenters" href="/rhev-api/datacenters"/>
  <link rel="datacenters/search" href="/rhev-api/datacenters?search={query}"/>
  <link rel="events" href="/rhev-api/events"/>
  <link rel="events/search" href="/rhev-api/events?search={query}"/>
  <link rel="hosts" href="/rhev-api/hosts"/>
  <link rel="hosts/search" href="/rhev-api/hosts?search={query}"/>
  <link rel="networks" href="/rhev-api/networks"/>
  <link rel="roles" href="/rhev-api/roles"/>
  <link rel="storagedomains" href="/rhev-api/storagedomains"/>
  <link rel="storagedomains/search" href="/rhev-api/storagedomains?search={query}"/>
  <link rel="tags" href="/rhev-api/tags"/>
  <link rel="templates" href="/rhev-api/templates"/>
  <link rel="templates/search" href="/rhev-api/templates?search={query}"/>
  <link rel="users" href="/rhev-api/users"/>
  <link rel="groups" href="/rhev-api/groups"/>
  <link rel="domains" href="/rhev-api/domains"/>
  <link rel="vmpools" href="/rhev-api/vmpools"/>
  <link rel="vmpools/search" href="/rhev-api/vmpools?search={query}"/>
  <link rel="vms" href="/rhev-api/vms"/>
  <link rel="vms/search" href="/rhev-api/vms?search={query}"/>
  <system_version revision="428" build="0" minor="6" major="4"/>
- <summary>
  - <vms>
    <total>22</total>
    <active>5</active>
  </vms>
  - <hosts>
    <total>6</total>
    <active>5</active>
  </hosts>
  - <users>
    <total>2</total>
```

Hosts Collection



```
Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://10.35.1.171/rhev-api/hosts
http://10.35.1.1...rhev-api/hosts
- <hosts>
- <host id="15896dce-edd0-415c-a524-c9b02f278895" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895">
  <name>nari11</name>
  - <actions>
    <link rel="install" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/install"/>
    <link rel="activate" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/activate"/>
    <link rel="fence" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/fence"/>
    <link rel="deactivate" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/deactivate"/>
    <link rel="approve" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/approve"/>
    <link rel="iscsilogin" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/iscsilogin"/>
    <link rel="iscsidiscover" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/iscsidiscover"/>
    <link rel="commitnetconfig" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/commitnetconfig"/>
  </actions>
  <link rel="storage" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/storage"/>
  <link rel="nics" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/nics"/>
  <link rel="tags" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/tags"/>
  <link rel="permissions" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/permissions"/>
  <link rel="statistics" href="/rhev-api/hosts/15896dce-edd0-415c-a524-c9b02f278895/statistics"/>
  <address>nari11.eng.lab.tlv.redhat.com</address>
  <status>UP</status>
  <cluster id="4a5baf0e-7c6d-4d75-9aba-d60f3a188d0b" href="/rhev-api/clusters/4a5baf0e-7c6d-4d75-9aba-d60f3a188d0b"/>
  <port>54321</port>
  <storage_manager>>false</storage_manager>
- <power_management>
  <enabled>>false</enabled>
  <options/>
</power_management>
- <ksm>
  <enabled>>false</enabled>
</ksm>
- <transparent_hugepages>
  <enabled>>true</enabled>
</transparent_hugepages>
- <iscsi>
  <initiator>iqn.1994-05.com.redhat:a7afc41a35b0</initiator>
  <target/>
</iscsi>
</host>
Done
```

Host networks collection



Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://10.35.1.171/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics

http://10.35.1.1...b02f278895/nics

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
-<host_nics>
-<host_nic id="dbb39d06-3aef-468c-83e6-88eae0a3f346" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/dbb39d06-3aef-468c-83e6-88eae0a3f346">
  <name>eth0</name>
  -<actions>
    <link rel="attach" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/dbb39d06-3aef-468c-83e6-88eae0a3f346/attach"/>
    <link rel="detach" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/dbb39d06-3aef-468c-83e6-88eae0a3f346/detach"/>
  </actions>
  <link rel="statistics" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/dbb39d06-3aef-468c-83e6-88eae0a3f346/statistics"/>
  <host id="15896dce-edd0-415c-a524-c9b02f278895" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895"/>
  -<network>
    <name>rhev</name>
  </network>
  <mac address="78:E7:D1:E4:8E:92"/>
  <ip netmask="255.255.252.0" address="10.35.16.151"/>
</host_nic>
-<host_nic id="0d98b08c-9b42-45a4-a226-b7dd3f0854cf" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf">
  <name>eth1</name>
  -<actions>
    <link rel="attach" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/attach"/>
    <link rel="detach" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/detach"/>
  </actions>
  <link rel="statistics" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/statistics"/>
  <host id="15896dce-edd0-415c-a524-c9b02f278895" href="/rhev.../hosts/15896dce-edd0-415c-a524-c9b02f278895"/>
  <mac address="78:E7:D1:E4:8E:93"/>
  <ip netmask="" address=""/>
</host_nic>
</host_nics>
```

Done

Create a Virtual Machine from a Template



POST http://10.35.1.1/rhevapi/vms

```
<vm>
  <name>my_new_vm</name>
  <cluster id="99408929-82cf-4dc7-a532-9d998063fa95" />
  <template id="00000000-0000-0000-0000-000000000000" />
</vm>
```

```
curl -v -u "vdcadmin@qa.lab.tlv.redhat.com"
  -H "Content-type: application/xml"
  -d '<vm><name>my_new_vm</name><cluster id="99408929-82cf-4dc7-
    a532-9d998063fa95" /><template id="00000000-0000-0000-0000-
    000000000000"/></vm>'
  'http://10.35.1.1/rhevapi/vms'
```


Changing a property

```
PUT http://10.35.1.1/rhevapi/vms/2496a177-e7c8-4f82-bf3d-2d0f73444990
```

```
<vm>  
  <name>test_vm_new_name</name>  
</vm>
```

```
echo "<vm><name>test_vm_new_name1</name></vm>" > /tmp/upload.xml  
curl -v -u "vdcadmin@qa.lab.tlv.redhat.com"  
  -H "Content-type: application/xml"  
  -T /tmp/upload.xml  
'http://10.35.1.1/rhevapi/vms/2496a177-e7c8-4f82-bf3d-2d0f73444990'
```

Adding a Virtual Disk



POST

<http://10.35.1.1/rhev-api/vms/2496a177-e7c8-4f82-bf3d-2>

```
<disk>
  <storage_domain id="3e1c96f0-8667-4a80-9689-af1337395dea" href="/rhev-
api/storagedomains/3e1c96f0-8667-4a80-9689-af1337395dea" />
  <size>1073741824</size>
  <type>system</type>
  <interface>virtio</interface>
  <format>raw</format>
  <sparse>true</sparse>
  <bootable>true</bootable>
  <wipe_after_delete>false</wipe_after_delete>
  <propagate_errors>false</propagate_errors>
</disk>
```

- `curl -v -u "vdcadmin@qa.lab.tlv.redhat.com" -H "Content-type: application/xml" -d '<disk>...</disk>' http://...`

What Else?

- Data warehouse
- Reports (based on jasperforge.org)
- Tools
 - Notifications
 - Config
 - Iso uploader
 - Log collector

oVirt Data Warehouse

- ETL based on talendforge.org
- Periodic polling from operational DB
- Types of data
 - Config with version tracking
 - Statistics – aggregated hourly/daily
- API is view based

Talend Studio



The screenshot displays the Talend Studio interface for a job named "Job HistoryETL 3.0". The main workspace shows a job design with a "PreJob" section containing components like tPrejob_1, tRowGenerator_1, tFileDelete_1, tFileInputProperties_1, tLogRow_2, tContextLoad_1, and tContextLoad_1. The "Main" section includes tJavaFlex_1, tJavaFlex_2, tJavaFlex_3, tWaitForFile_1, tIterate_1, tRowGenerator_1, and tLogRow_1. The "PostJob" section contains tPostjob_1, tRollbackCloseOvirt, and tRollbackCloseSampleHistory. The interface includes a Repository pane on the left with "Business Models" and "Job Designs" sections. The bottom pane shows a "Designer Code" view with a table of errors, warnings, and infos.

Description	Resource
Errors (0 items)	
Warnings (0 items)	
Infos (0 items)	

oVirt Reports

- Jasper allows to import/export reports definitions
- Rich reporting engine
 - Report scheduling
 - Filters
 - Export to various formats
 - Report creation studio
- Next
 - Integrated in web admin

oVirt Reports



View Manage

Folders

- root
 - Organizations
 - oVirt Reports
 - Reports
 - Executive**
 - Inventory
 - Service Level
 - Trend
 - Resources
 - temp
 - Themes
 - default
 - ovirt-reports-them

Repository

Sort By: **Name** | Modified Date

Run Edit Open Copy Cut Paste Delete

Active Virtual Machines by OS (BR18) /organizations/ovirtreports/Reports/Executive/active_vms_by_os_br18	The report contains comparative measurements number of running virtual machines and OS usage in for a selected cluster and a selected virtual machine's type within the requested period.	Report	October 18
Cluster Capacity Vs Usage (BR19) /organizations/ovirtreports/Reports/Executive/cluster_capacity_vs_usage_br19	This report contains charts displaying host's resources usage measurements (CPU core; physical Memory) and charts displaying virtual machine's resources usage measurements (virtual machine's total vCPU; Virtual Memory size) for a selected cluster.	Report	October 18
Host OS Break Down (BR22) /organizations/ovirtreports/Reports/Executive/host_os_break_down_BR22	This report contains a table and a chart displaying the number of hosts for each OS version for a selected cluster within a requested period.	Report	October 18
Summary of Host Usage Resources (BR17) /organizations/ovirtreports/Reports/Executive/summary_of_host_usage_resources_br17	The report contains a scattered chart of CPU and memory usage data within a requested period and for a selected cluster.	Report	October 18

oVirt Reports

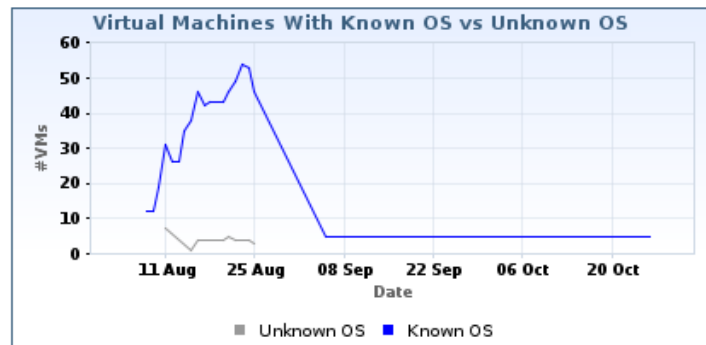
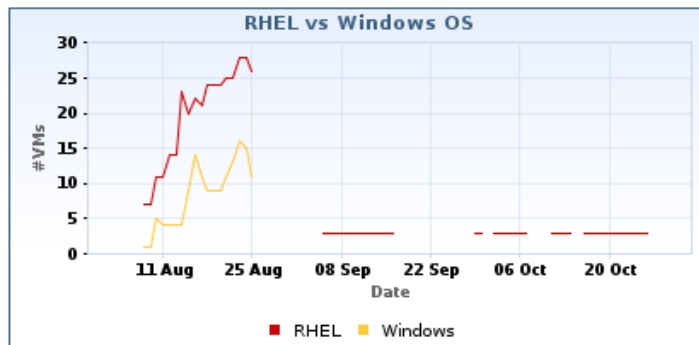
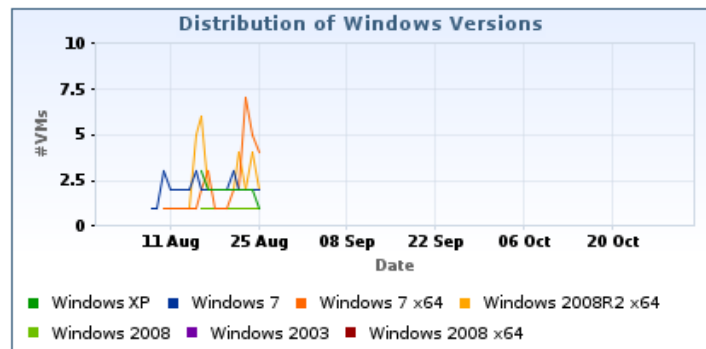
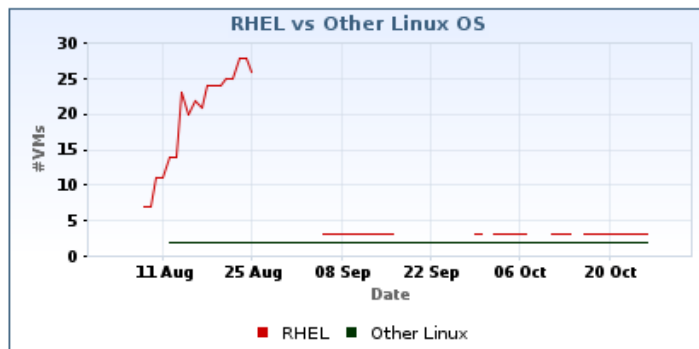


oVirt Reports

Oct 31, 2011

Active Virtual Machines by OS in Clusters of Data Center Default

Criteria: Datacenter: Default Date Range: 2011-08-01 - 2011-10-31 VM Type: All
 Cluster: All Period: Quarterly Show Deleted Virtual Machines: Yes



Input Controls

* Show Deleted Entities?: Yes

* Data Center: RHEVM-3

* Cluster: RHEVM-3

* VM Type: Server

* Period Range: Monthly

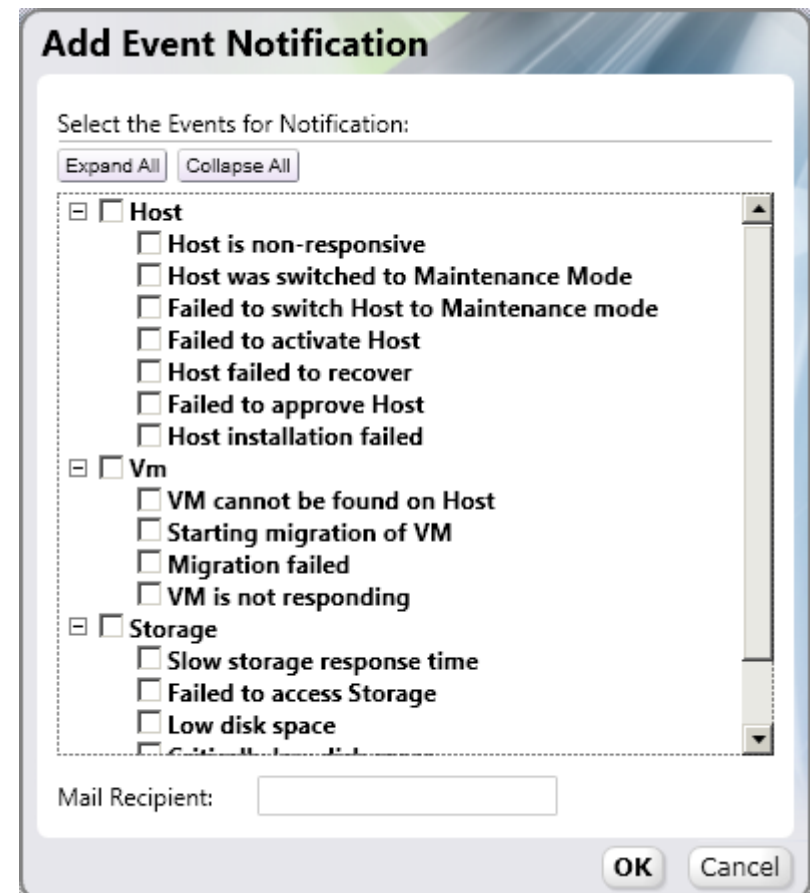
* Select Month: August 2011

* Start Date: 2011-08-01

* End Date: 2011-08-31

Notification Service

- oVirt allows registration to certain audit events
- The notification service sends emails per audit message to relevant users
- Also monitors engine itself



Configuration tool

- The configuration utility allows changing oVirt advanced configuration options
- Sample commands
 - `engine-config --list`
 - `engine-config --get <key_name>`
 - `engine-config -all`
 - `engine-config --set <key_name>=<value>`
- Special config for authentication domains:
`manage-domains`

ISO Uploader

- Iso uploader is a utility to upload iso files to the iso domain, to allow bootstrapping guests from them
- Admin can just copy the files to the iso domain
- Supports both scp and nfs based copies
- Integrates with the REST API to allow using storage domain name instead of specific NFS path

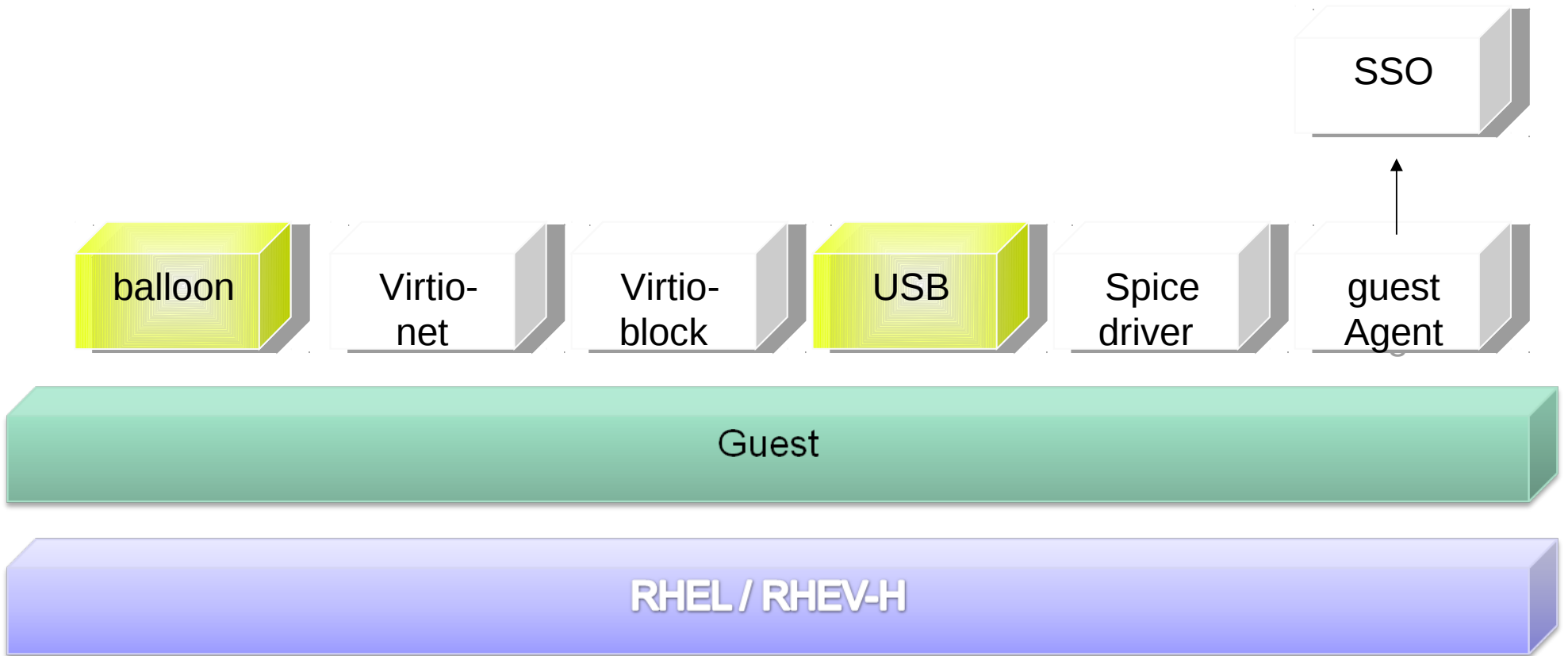
Log Collector

- The log collector utility helps collecting logs and configuration data for troubleshooting
- Written as a linux script launching sos plugins
- Collects the data from engine and nodes

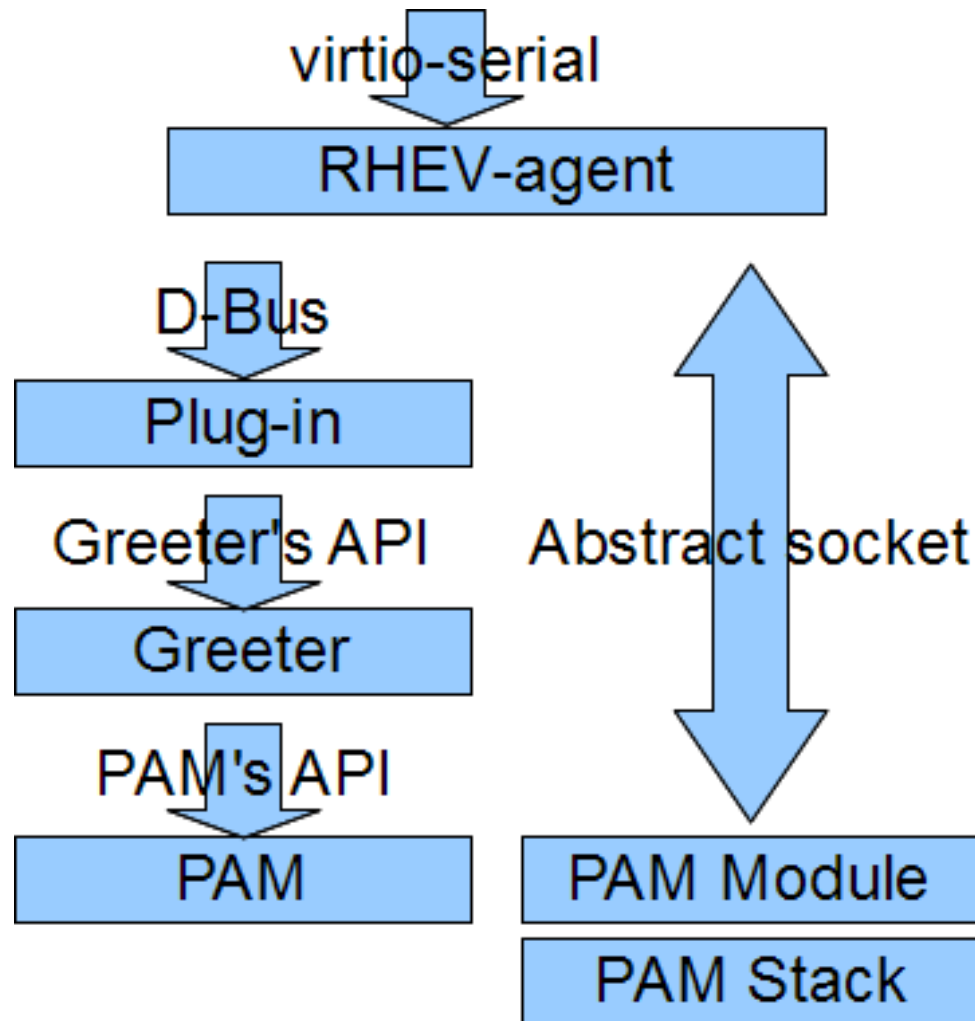
oVirt Guest Agent

- The guest agent provides additional information to oVirt Engine, such as guest memory usage, guest ip address, installed applications and sso.
- Python code, available for both linux and windows guests
- Communication is done over virtio-serial
- SSO for windows is based on a gina module for XP and a credential provider for windows 7
- SSO for RHEL 6 is based on a PAM module with support for both KDE and Gnome

Guest



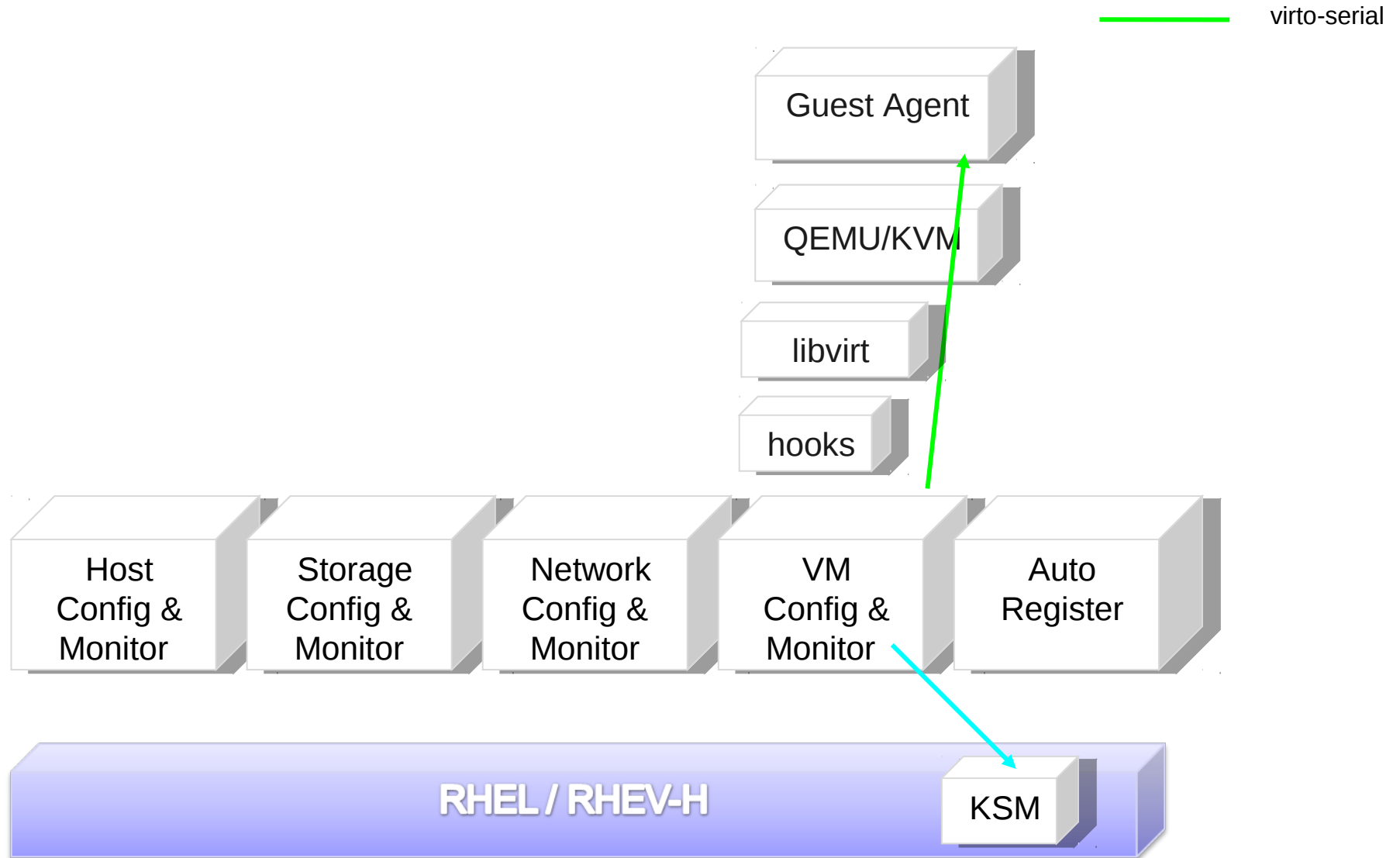
RHEV-M Guest Agent - SSO for RHEL



oVirt Host Agent - VDSM

- Covers all functionality required by oVirt Engine
- Configures host, networking and shared storage
- Uses libvirt for VM life cycle operations

oVirt Host Agent - VDSM



oVirt Storage

- VDSM manages a Storage Pool, comprised of Storage Domains
- **Storage Pool** - a VM repository that contains meta data about storage domains, storage tasks, VMs, locks, etc.
- **Storage Domain** - a disk image repository
- **Disk Image** - a collection of volumes (chain of snapshots)
- **Volume** - stored as files in NFS, and as Logical Volumes for FC/iScsi
- Thin provisioning for SAN supported (storage mailbox based)

Storage Pool Manager

The SPM runs on an arbitrary host (chosen by oVirt Engine)

oVirt Engine requires SPM to be running in order to add storage

If SPM host dies/disappears, RHEV-M causes SPM to start on a different host

oVirt Storage “Clustering”

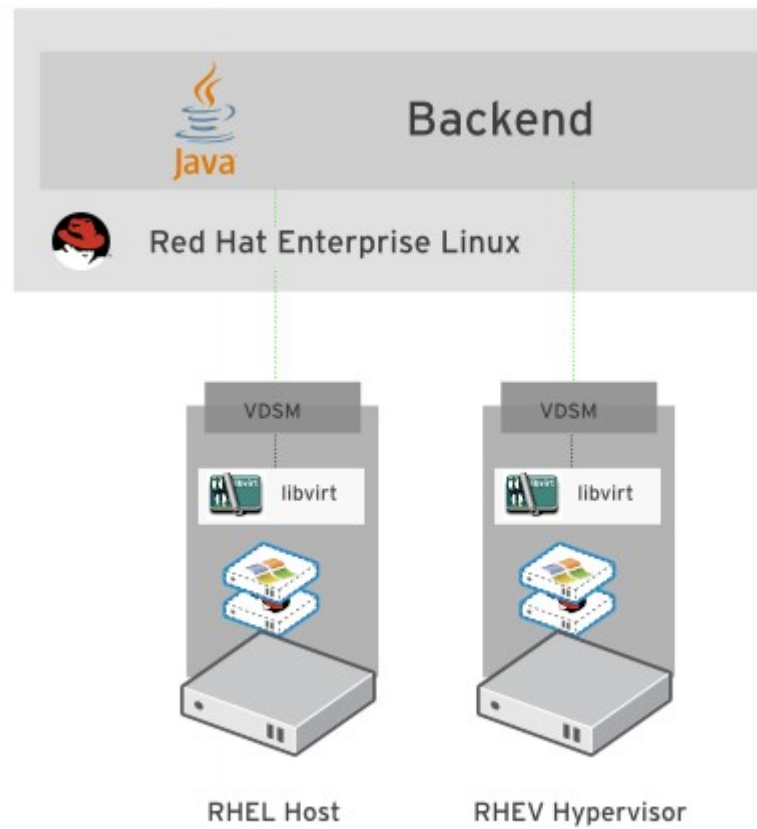
- A Storage Pool is implemented as a managed cluster
- Manager is oVirt Engine, running on a node external to the hosts using the storage pool
- Heartbeats and fencing are used in case of node failures
- Storage based leased locks used as another layer of protection
- Clustering wise - VMs are mostly single reader/writer - locks mostly needed to handle failures
- Can easily create a cluster of >100 nodes

Hooks

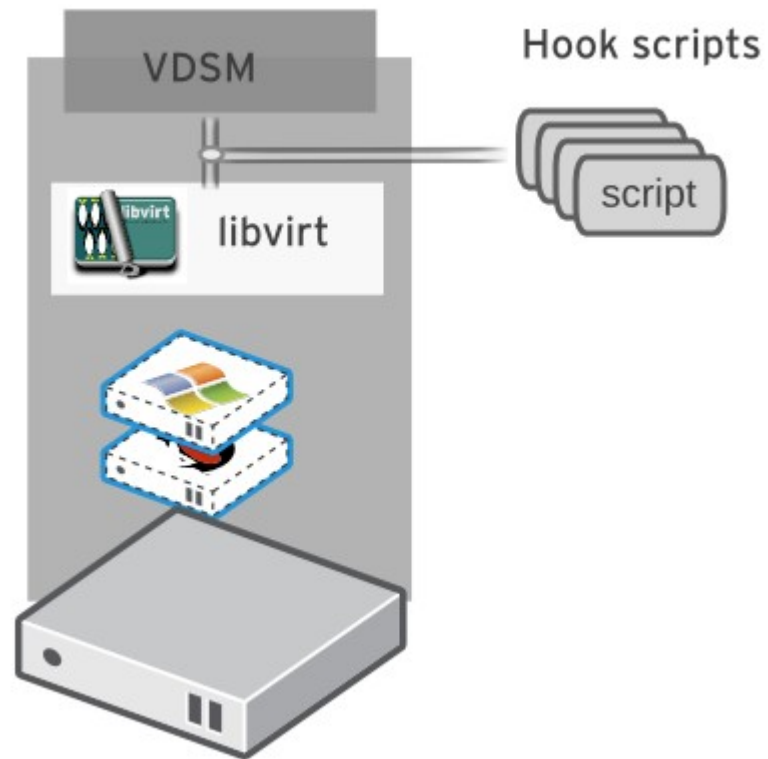


- “Hook” mechanism for customization
 - Allows administrator to define scripts to modify VM operation
 - eg. Add extra options such as CPU pinning, watchdog device, direct LUN access, etc
 - Allows oVirt to be extended for new KVM features before full integration is done
 - An easy way to test a new kvm/libvirt/linux feature

Hooks



Hooks

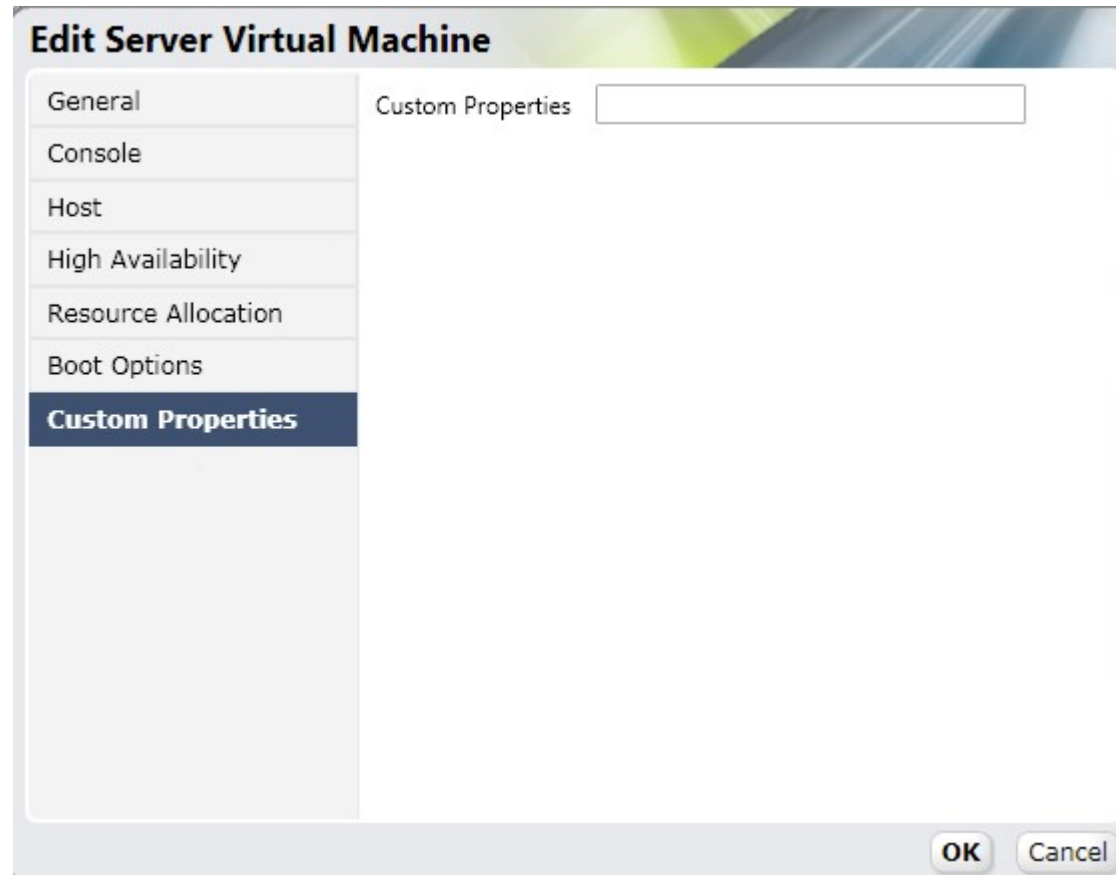


Hooks



- Hook scripts are called at specific VM lifecycle events
 - VDSM (management agent) Start
 - Before VM start
 - After VM start
 - Before VM migration in/out
 - After VM migration in/out
 - Before and After VM Pause
 - Before and After VM Continue
 - Before and After VM Hibernate
 - Before and After VM resume from hibernate
 - On VM stop
 - On VDSM Stop
- Hooks can modify a virtual machines XML definition before VM start
- Hooks can run system commands – eg. Apply firewall rule to VM

Hooks



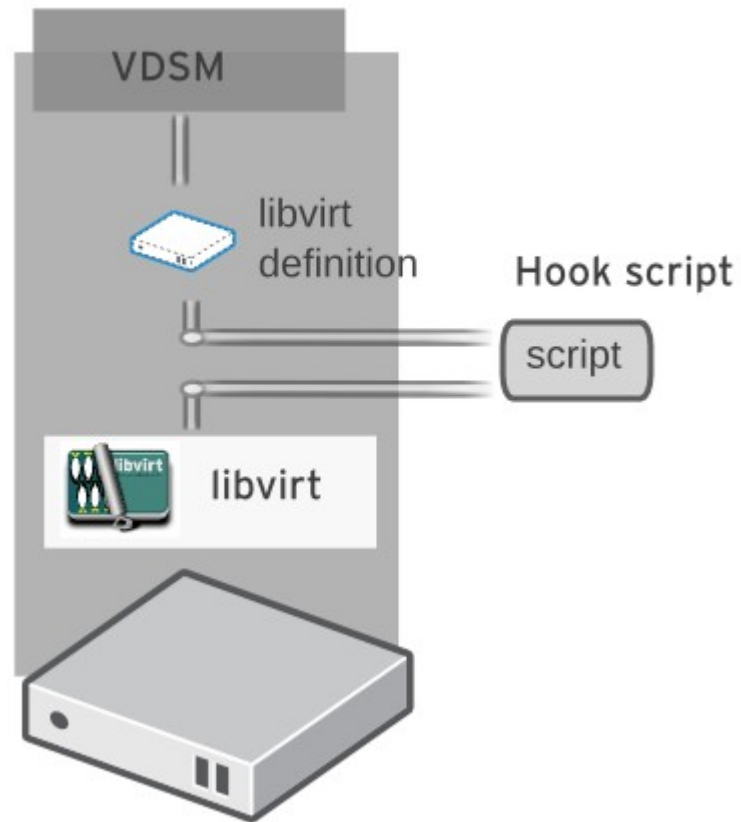
Hooks

Hooks installed in /usr/libexec/vdsm/hooks

```
[root@host1 ~]# cd /usr/libexec/vdsm/hooks/
[root@host1 hooks]# ls -l
total 68
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vdsm_stop
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_cont
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_dehibernate
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_destroy
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_hibernate
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_migrate_destination
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_migrate_source
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_pause
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 after_vm_start
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vdsm_start
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_cont
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_dehibernate
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_hibernate
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_migrate_destination
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_migrate_source
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_pause
drwxr-xr-x. 2 root root 4096 Apr 12 03:55 before_vm_start
[root@host1 hooks]#
```

General					Virtual Machines					Network Interfaces					Host Hooks					Permissions				
Event Name		Script Name		Property Name		Property Value																		
before_vm_start		10_faqemu		md5		2c352c04ecf994																		

Hooks



Hooks



```
1 #!/usr/bin/python
2
3 import os
4 import sys
5 import hooking
6 import traceback
7
8 '''
9 pincpu usages
10 =====
11 pincpu="0" (use the first cpu)
12 pincpu="1-4" (use cpus 1-4)
13 pincpu="^3" (dont use cpu 3)
14 pincpu="1-4,^3,6" (or all together)
15 '''
16
17 if os.environ.has_key('pincpu'):
18     try:
19         domxml = hooking.read_domxml()
20
21         vcpu = domxml.getElementsByTagName('vcpu')[0]
22
23         if not vcpu.hasAttribute('pincpu'):
24             sys.stderr.write('pincpu: pinning cpu to: %s\n' % os.environ['pincpu']);
25             vcpu.setAttribute('cpuset', os.environ['pincpu'])
26             hooking.write_domxml(domxml)
27         else:
28             sys.stderr.write('pincpu: cpuset attribute is present in vcpu, doing nothing\n')
29     except:
30         sys.stderr.write('pincpu: [unexpected error]: %s\n' % traceback.format_exc())
31         sys.exit(2)
```

```
<domain type='kvm'>
<name>win2k8r2</name>
  <uuid>aaa123ed-dce2-02ce-c90f-836e37cbaaa2</uuid>
  <memory>5242880</memory>
  <currentMemory>5242880</currentMemory>
  <vcpu cpuset='0'>1</vcpu>
```

Sample Hooks

- CPU pinning
- SR/IOV
- Smart card
- Direct LUN
- Hugepages
- Promiscuous mode network interface
- Cisco VN-Link
- Fileinject
- Floppy
- Hostusb
- Isolatedprivatevlan
- Numa
- Qos
- Scratchpad
- smbios

On the Horizon - Infra

- Engine – JBoss AS 7, modular lighter engine
- Engine – custom hooks
- Engine – vdsd communication protocol and transport
- API – non admin api
- Reports – integrated in web admin
- Code cleanups, refactoring, unitests, etc

On the Horizon - Features

- Live snapshots
- Live storage migration
- Quotas
- Hot plug
- Multiple storage domains
- Shared disks
- iScsi disk
- Shared file system support
- Storage array integration
- Qbg/Qbh
- virt-resize, pv-resize
- Progress bars
- Stable pci addresses
- Network types
- Backup API
- SLA
- SDM
- Many many more...

oVirt

THANK YOU !

<http://www.ovirt.org>