Virtualization Management the oVirt way

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Director, RHEV Engineering
Red Hat
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Agenda

- What is oVirt?
- Where did it come from?
- What does it do?
- Architecture
- Roadmap
- What's next?
What is oVirt?

Large scale, centralized management for server and desktop virtualization

Based on leading performance, scalability and security infrastructure technologies

Provide an open source alternative to vCenter/vSphere

Focus on KVM for best integration/performance

Focus on ease of use/deployment
### Virtualization Management - the oVirt way

#### How Does It Look?

**File** | **Edit** | **View** | **History** | **Bookmarks** | **Tools** | **Help**
---|---|---|---|---|---|---

**oVirt Enterprise Virtualization Engine Web Administration - Mozilla Firefox**

Logged in user: admin@internal | Configure | Guide | About | Sign Out

**Search:** Vms:

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**Virtual Machines**

<table>
<thead>
<tr>
<th>Name</th>
<th>Cluster</th>
<th>Host</th>
<th>IP Address</th>
<th>Memory</th>
<th>CPU</th>
<th>Network</th>
<th>Display</th>
<th>Status</th>
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<td>Spice</td>
<td>Failed</td>
<td>5 days</td>
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</tr>
</tbody>
</table>
Competitive Landscape

- InfoWorld “shootout” 2011
  - Independent analysis of leading virtualization platforms
  - 2nd place in management functionality

Goals of the oVirt project

- Build a community around all levels of the virtualization stack – hypervisor, manager, GUI, API, etc.
- To deliver both a cohesive complete stack and discretely reusable components for open virtualization management
- Provide a release of the project on a well defined schedule
- Focus on management of the KVM hypervisor, with exceptional guest support beyond Linux
- Provide a venue for user and developer communication and coordination
Governance

- Merit based, open governance model
- Built using the best concepts taken from Apache and Eclipse Foundations
- Governance split between board and projects
  - oVirt Board
  - Multiple projects under the oVirt brand
Governance (oVirt Board)

- Initial board
  - Red Hat, IBM, NetApp, Cisco, SUSE, Intel
  - A few domain leaders from sub-projects
  - Mentors
  - There is no limit to the number of board seats
  - Additional seats are voted based on merit
How to Start?

- Build from source
- Or, just install pre-packaged
  - `yum install ovirt-engine`
  - `./ovirt-setup`
- Add managed hosts
  - from engine
  - use ovirt-node registr/approve flow
Virtualization Management the oVirt way

Administration Console

Data Centers | Clusters | Hosts | Storage | Virtual Machines | Pools | Templates | Users | Events

New Server | New Desktop

Name | Cluster | Host | IP Address | Memory | CPU | Network | Display | Status | Uptime | Logged-in User
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---

kaka | intel-cluster | | | 0% | 0% | 0% | | Down | | |

myVm1 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm10 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm11 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm12 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm13 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm15 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm16 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm17 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm18 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Up | 1 day | |

myVm19 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | | Down | | |

myVm20 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | | Down | | |

myVm21 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | | Down | | |

myVm22 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | | Down | | |

myVm23 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | | Down | | |

myVm24 | intel-cluster | nttwds2.qa.lab.ibm.red | | 0% | 0% | 0% | Spice | Passed | 5 days | |

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<th>Status</th>
<th>Uptime</th>
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<td>Up</td>
<td>1 day</td>
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Add Host As Simple As
Power Management

New Host

- Name:
  - nolt-wds2.qa.lab.tlv.redhat.com
  - nolt-wds3.qa.lab.tlv.redhat.com
  - nolt-wds4.qa.lab.tlv.redhat.com

General

- Enable Power Management: [ ]

Power Management

- Address:
- User Name:
- Password:
- Type: bladecenter
- Port:
- Slot:
- Options:
  - Please use a comma-separated list of key=value or key
  - Secure: [ ]
  - Test:

OK | Cancel
Or Bonds
Without Scripts or Config Files
Extend with More LUNs as Needed
Even Windows via Sysprep
SPICE or VNC
Migratable or Not

Virtualization Management the oVirt way

File Edit View History Bookmarks Tools Help

File Edit View History Bookmarks Tools Help

Open Virtualization Manager

Search: Vms:

Virtual Machines

New Server New Desktop Edit Remove Run Once Migrate Edit Migrate Edit Template Pools Templates Users

New Server Virtual Machine

General
Windows Sysprep
Console

Host
High Availability
Resource Allocation
Boot Options
Custom Properties

Run On:

Any Host in Cluster ☐ Specific ☐

Host

Run/Migration Options:

☐ Run VM on the selected host (no migration allowed)

☐ Allow VM migration only upon Administrator specific request (system will not trigger automatic migration of this VM)

OK Cancel

System

Default
SCSI-RI-DC
Storage
Templates
Clusters
Intel-cluster
Hosts
notBvi2.qa.lab.redhat.com
notBvi2.qa.lab.redhat.com

VMs

HFS-RC-DC
Storage
Templates
Clusters

Bookmarks
Tags

Last Message: 2012-Jan-31 23:16:41 User admin@internal logged in.

Browser Firefox version 9 is currently not supported.
Highly Available?
Control Allocated Resources (Disk, Memory)
Boot Devices

Virtualization Management the oVirt way

Boot Devices

New Server Virtual Machine

Boot Sequence:
First Device
Second Device

Boot Options

Custom Properties
Advanced Options via Custom Properties

Virtualization Management the oVirt way
Assign Permissions to Objects by Roles

**System Permissions**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>UserRole</td>
<td>Standard User Role</td>
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<tr>
<td>PowerUserRole</td>
<td>User Role, allowed to create/manage Vms and Templates</td>
</tr>
<tr>
<td>UserVmManager</td>
<td>User Role, with permission for any operation on Vms</td>
</tr>
<tr>
<td>TemplateAdmin</td>
<td>Administrator Role, permission for all operations on a specific Template</td>
</tr>
<tr>
<td>UserTemplateBasedVm</td>
<td>User Role, with permissions only to use Templates</td>
</tr>
<tr>
<td>SuperUser</td>
<td>System Administrators with permission for all operations</td>
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<tr>
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<td>Administrator Role, permission for all the objects underneath a specific Cluster</td>
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<tr>
<td>VmPoolAdmin</td>
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Close
Define Your Own Roles
User Portal

Virtualization Management the oVirt way
## Management Features

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

Postgres
AD
IPA

Shared Storage
FC/iSCSI/NFS

Admin Portal
gwt
SDK/CLI
python
User Portal
gwt

Linux/Windows client

oVirt Engine
Java

Guest agent
Guest agent

Linux VM
Win VM

libvirt
VDSM
Host | Node

Local Storage

Virtualization Management the oVirt way
Virtualization Management the oVirt way

REST API

```xml
<api>
  <link rel="capabilities" href="/rhevm-api/capabilities"/>
  <link rel="clusters" href="/rhevm-api/clusters"/>
  <link rel="clusters/search" href="/rhevm-api/clusters?search={query}"/>
  <link rel="datacenters" href="/rhevm-api/datacenters"/>
  <link rel="datacenters/search" href="/rhevm-api/datacenters?search={query}"/>
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  <link rel="events/search" href="/rhevm-api/events?search={query}"/>
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  <link rel="groups" href="/rhevm-api/groups"/>
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  <link rel="vm pools" href="/rhevm-api/vmpools"/>
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  <link rel="vms" href="/rhevm-api/vms"/>
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</api>

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    <active>5</active>
  </hosts>
  <users>
    <total>2</total>
  </users>
</summary>

Done

36

Virtualization Management the oVirt way
Virtualization Management the oVirt way

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

```xml
<host_nics>
  <host_nic id="dbb39d06-3ae6-468c-83e6-88ea0a3f346" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/dbb39d06-3ae6-83e6-88ea0a3f346">  
    <name>eth0</name>
  </host_nic>
  <actions>
    <link rel="attach" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/dbb39d06-3ae6-468c-83e6-88ea0a3f346/attach"/>
    <link rel="detach" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/dbb39d06-3ae6-468c-83e6-88ea0a3f346/detach"/>
  </actions>
</host_nics>

<host id="15896dce-ed0-415c-a524-c9b02f778895" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895"/>

<network>
  <name>rhevm</name>
</network>

<host_nics>
  <host_nic id="0d98b08c-9b42-45a4-a226-b7dd3f0854cf" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf">  
    <name>eth1</name>
  </host_nic>
  <actions>
    <link rel="attach" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/attach"/>
    <link rel="detach" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/detach"/>
  </actions>
</host_nics>

<host id="15896dce-ed0-415c-a524-c9b02f778895" href="/rhevm/api.hosts/15896dce-ed0-415c-a524-c9b02f778895"/>

<network>
  <name>rhevm</name>
</network>
```

Virtualization Management the oVirt way
- Creating the proxy
- Listing all collections
- Listing collection's methods.
- Querying collection with oVirt search engine.
- Querying collection by custom constraint.
- Querying collection for specific resource.
- Accessing resource methods and properties.

```python
# create proxy
api = API(url='http://localhost:8080', username='user@domain', password='password')

# list all vms
api.vms

# query by name
vms = api.vms.list(query = 'name=python_vm')

# query by memory constraint
vms = api.vms.list(memory=1073741824)

# get by constraints
vm = api.vms.get(id = '02f04a4-9738-4731-83c4-293f3f734782')

# access resource methods
vm.start()
```
- Accessing resource properties and sub-collections.

- Accessing sub-collection methods.

- Querying sub-collection by custom constraint.

- Retrieving sub-collection resource.

- Accessing sub-collection resource properties and methods.

```python
vm.n

nics = vm.nics.list(interface='eth0')

nic = vm.nics.get(name='eth0')

nic.u
```
AVAILABLE COMMANDS

* action  execute an action on an object
* cd      change directory
* clear   clear the screen
* connect connect to a RHEV manager
* console open a console to a VM
* create  create a new object
* delete  delete an object
* disconnect disconnect from RHEV manager
* exit    quit this interactive terminal
* getkey  dump private ssh key
* help    show help
* list    list or search objects
* ping    test the connection
* pwd     print working directory
* save    save configuration variables
* set     set a configuration variable
* show    show one object
* status  show status
* update  update an object

(oVirt cli) > help connect

USAGE

    connect
    connect <url> <username> <password>

DESCRIPTION

Connect to a RHEV manager. This command has two forms. In the first form, no arguments are provided, and the connection details are read from their respective configuration variables (see 'show'). In the second form, the connection details are provided as arguments.

The arguments are:

* url       - The URL to connect to.
* username  - The user to connect as. Important: this needs to be in the user@domain format.
* password  - The password to use.
Data Warehouse based on Talend ETL
## oVirt Reports

### Repository

<table>
<thead>
<tr>
<th>Folders</th>
<th>Run</th>
<th>Edit</th>
<th>Open</th>
<th>Copy</th>
<th>Cut</th>
<th>Paste</th>
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</tr>
</tbody>
</table>

#### Active Virtual Machines by OS (BR18)
```
/organizations/ovirtreports/Reports/Executive/active_vms_by_os_br18
```
- The report contains comparative measurements of running virtual machines and OS usage numbers for a selected cluster and a selected virtual machine's type within the requested period.

#### Cluster Capacity Vs Usage (BR19)
```
/organizations/ovirtreports/Reports/Executive/clustercapacity_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.

#### 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.

#### 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 date within a requested period and for a selected cluster.
Notification Service

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

balloon  Virtio-net  Virtio-block  USB  Spice driver  guest Agent

Guest

RHEL / RHEV-H
oVirt Host Agent - VDSM

Virtualization Management the oVirt way
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

Virtualization Management the oVirt way
• 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
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
In the works (engine-devel@ovirt.org)

- Live snapshots
- Live storage migration
- Quotas
- Hot plug
- Multiple storage domains
- Shared disks
- iScsi disk
- Shared file system support
- Storage array integration
- Gluster support
- Qbg/Qbh
- virt-resize, pv-resize
- libguestfs integration
- Stable device addresses
- Network types
- Backup API
- SLA
- SDM
- Many many more...
How To Contribute or Download

• **Website and Repository:**
  - http://www.ovirt.org
  - http://www.ovirt.org/wiki
  - http://www.ovirt.org/project/subprojects/

• **Mailing lists:**
  - http://lists.ovirt.org/mailman/listinfo

• **IRC:**
  - #ovirt on OFTC
What's Next

- Next Version
  - Scheduled to be released later this week
- Next Workshop
  - Beijing – March 21\textsuperscript{st}
  - Hosted by IBM in their Campus
  - \url{http://www.ovirt.org/news-and-events/workshop/}
THANK YOU!

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