Virtualization Management the oVirt way

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Manager @ 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
How Does It Look?

<table>
<thead>
<tr>
<th>Name</th>
<th>Cluster</th>
<th>Host</th>
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<th>Memory</th>
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<th>Status</th>
<th>Uptime</th>
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## Competitive Landscape

**InfoWorld “shootout” 2011**

- Independent analysis of leading virtualization platforms
- 2nd place in management functionality

### Test Center Scorecard

<table>
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<tr>
<th></th>
<th>Management</th>
<th>Performance</th>
<th>Reliability</th>
<th>Scalability</th>
<th>Installation</th>
<th>Overall Score</th>
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<td>8</td>
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</table>

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
Virtualization Management the oVirt way

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
• All in one installation is available
### Virtualization Management - oVirt Way

#### Administration Console

#### Data Centers
- Default
- ISCSI RC-DC
- Storage
  - Templates
- Clusters
  - Default
  - int-cluster
- Hosts
  - node1业态2.qa.lab.red
  - node2业态2.qa.lab.red
- VMs
  - int-cluster

#### Virtual Machines

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<tr>
<th>Name</th>
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Add Host As Simple As
Or Bonds
Without Scripts or Config Files
Configure Storage Once for Entire Cluster
Extend with More LUNs as Needed
Add Servers or Desktops

Virtualization Management the oVirt way
Even Windows via Sysprep
## SPICE or VNC

The oVirt way

### New Server Virtual Machine

<table>
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<tr>
<th>General</th>
<th>Protocol</th>
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<th>Resource Allocation</th>
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<th>Custom Properties</th>
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### New Server Virtual Machine Details

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### Additional Information

- Protocol: SPICE or VNC
- USB Policy: Enabled
- Status: Up
- Uptime: 1 day

**Note:** Browser Firefox version 9 is currently not supported.
Migratable or Not

Virtualization Management the oVirt way

Migratable or Not
Highly Available?
Control Allocated Resources (Disk, Memory)
Virtualization Management the oVirt way

Boot Devices
Advanced Options via Custom Properties
Assign Permissions to Objects by Roles

Configure

System Permissions

Roles

New Edit Copy Remove

- UserRole: Standard User Role
- PowerUserRole: User Role, allowed to create/manage VMs and Templates
- UserVMManager: User Role, with permission for any operation on VMs
- TemplateAdmin: Administrator Role, permission for all operations on a specific Template
- UserTemplateBasedVM: User Role, with permissions only to use Templates
- SuperUser: System Administrators with permission for all operations
- ClusterAdmin: Administrator Role, permission for all the objects underneath a specific Cluster
- DataCenterAdmin: Administrator Role, permission for all the objects underneath a specific Data Center
- StorageAdmin: Administrator Role, permission for all operations on a specific Storage Domain
- HostAdmin: Administrator Role, permission for all operations on a specific Host
- NetworkAdmin: Administrator Role, permission for all operations on a specific Logical Network
- VmPoolAdmin: Administrator Role, permission for all operations on a specific VM Pool

Close
Define Your Own Roles
Virtualization Management the oVirt way

User Portal
Virtualization Management the oVirt way

Self Provisioning Portal
User Resource View

Virtual Machines:
- Defined VMs: 4
- Running VMs: 1

Virtual CPUs:
- Defined vCPUs: 4
- Used vCPUs: 1

Storage:
- Total Size: 70GB
- Number of Snapshots: 5
- Total Size of Snapshots: 15GB

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>Disks</th>
<th>Virtual Size</th>
<th>Actual Size</th>
<th>Snapshots</th>
</tr>
</thead>
<tbody>
<tr>
<td>vm1</td>
<td>1</td>
<td>10GB</td>
<td>1GB</td>
<td>1</td>
</tr>
<tr>
<td>Disk1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>myVm</td>
<td>2</td>
<td>50GB</td>
<td>30GB</td>
<td>1</td>
</tr>
<tr>
<td>Disk1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>repo</td>
<td>1</td>
<td>10GB</td>
<td>1GB</td>
<td>1</td>
</tr>
<tr>
<td>Disk1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disk2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>up-vm1</td>
<td>1</td>
<td>10GB</td>
<td>1GB</td>
<td>1</td>
</tr>
<tr>
<td>Disk1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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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
Virtualization Management the oVirt way

oVirt High Level Architecture

- Postgres
- AD
- IPA
- Shared Storage (FC/iSCSI/NFS)
- oVirt Engine (Java)
- REST
- Admin Portal (gwt)
- SDK/CLI (python)
- User Portal (gwt)
- Local Storage
- Guest agent
- Guest agent
- Linux VM
- Win VM
- libvirt
- VDSM
- Host | Node
- SPICE
- Linux/Windows client

Virtualization Management the oVirt way
Host networks collection

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="dbb39d06-3ae6-468c-83e6-88eae0a3f346" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/dbb39d06-3ae6-468c-83e6-88eae0a3f346">
    <name>eth0</name>
    <actions>
      <link rel="attach" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/dbb39d06-3ae6-468c-83e6-88eae0a3f346/attach"/>
      <link rel="detach" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/dbb39d06-3ae6-468c-83e6-88eae0a3f346/detach"/>
    </actions>
  </host_nic>
  <host_nic id="15896dce-eddd-415c-a524-c9b02f278895" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895">
    <name>rhevm</name>
    <network>
      <mac address="78:E7:D1:E4:8E:92"/>
      <ip netmask="255.255.255.0" address="10.35.16.151"/>
    </network>
  </host_nic>
  <host_nic id="0d98b08c-9b42-45a4-a226-b7dd3f0854cf" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf">
    <name>eth1</name>
    <actions>
      <link rel="attach" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/attach"/>
      <link rel="detach" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/detach"/>
    </actions>
    <link rel="statistics" href="/rhevm-api/hosts/15896dce-eddd-415c-a524-c9b02f278895/nics/0d98b08c-9b42-45a4-a226-b7dd3f0854cf/statistics"/>
  </host_nic>
</host_nics>
```
Python SDK

- 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 collections
api.vms

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

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

# get by constraints
vm = api.vms.get(id = '02f0f4a4-9738-4731-83c4-293f3f734782')
```

Virtualization Management the oVirt way
- 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

# accessing resource properties
name
nics

# accessing sub-collection methods
vm.nics.

# querying sub-collection by custom constraint
nics = vm.nics.list(interface='eth0')

# retrieving sub-collection resource
nic = vm.nics.get(name='eth0')

# accessing sub-collection resource properties and methods
nic.update()
```
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.
Virtualization Management the oVirt way

Data Warehouse based on Talend ETL
## oVirt Reports

The oVirt Reports page provides various virtualization management reports. Here are some of the reports listed:

<table>
<thead>
<tr>
<th>Report Name</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Virtual Machines by OS (BR19)</strong></td>
<td>The report contains comparative measurements of running virtual machines and OS usage in a selected cluster and a selected virtual machine's type within the requested period.</td>
<td>October 18</td>
</tr>
<tr>
<td><strong>Cluster Capacity Vs Usage (BR19)</strong></td>
<td>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.</td>
<td>October 18</td>
</tr>
<tr>
<td><strong>Host OS Break Down (BR22)</strong></td>
<td>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.</td>
<td>October 18</td>
</tr>
<tr>
<td><strong>Summary of Host Usage Resources (BR17)</strong></td>
<td>The report contains a scattered chart of CPU and memory usage date within a requested period and for a selected cluster.</td>
<td>October 18</td>
</tr>
</tbody>
</table>

Virtualization Management the oVirt way
Active Virtual Machines by OS in Clusters of Data Center Default

Criteria:
- Datacenter: Default
- Cluster: All

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

RHEL vs Other Linux OS

Distribution of Windows Versions

RHEL vs Windows OS

Virtual Machines With Known OS vs Unknown OS
Notification Service

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

Virtualization Management the oVirt way
oVirt Host Agent - VDSM

- Guest Agent
- QEMU/KVM
- libvirt
- hooks

- Host Config & Monitor
- Storage Config & Monitor
- Network Config & Monitor
- VM Config & Monitor
- Auto Register

RHEL / RHEV-H

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
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
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
- sbios
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 till the end of June

• Next Workshop
  • oVirt Workshop at LinuxCon Japan Yokohama, Japan : 9 June 2012
  • oVirt Workshop at LinuxCon North America San Diego, CA : 28 August 2012
  • oVirt Workshop at LinuxCon Europe (co-located with KVM Forum) Barcelona, Spain : 7-9 November 2012
  • oVirt Workshop at NetApp Headquarters (to be confirmed) Sunnyvale, California : 22-24 January 2013
  • oVirt Workshop at Intel Campus Shanghai, China : 20-21 March 2013, Hosted by IBM in their Campus

• http://www.ovirt.org/news-and-events/workshop/
THANK YOU!

http://www.ovirt.org
bazulay@redhat.com