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TECHNOLOGY AND APPLICATIONS FORUM  
FOR THE ORACLE COMMUNITY



*For the Complete Technology & Database Professional*

# Maximizing Your Virtualized Environment with Oracle VM

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SEPTEMBER 30 - OCTOBER 4, 2012, SAN FRANCISCO

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# Agenda

Before you start

Templates

IaaS

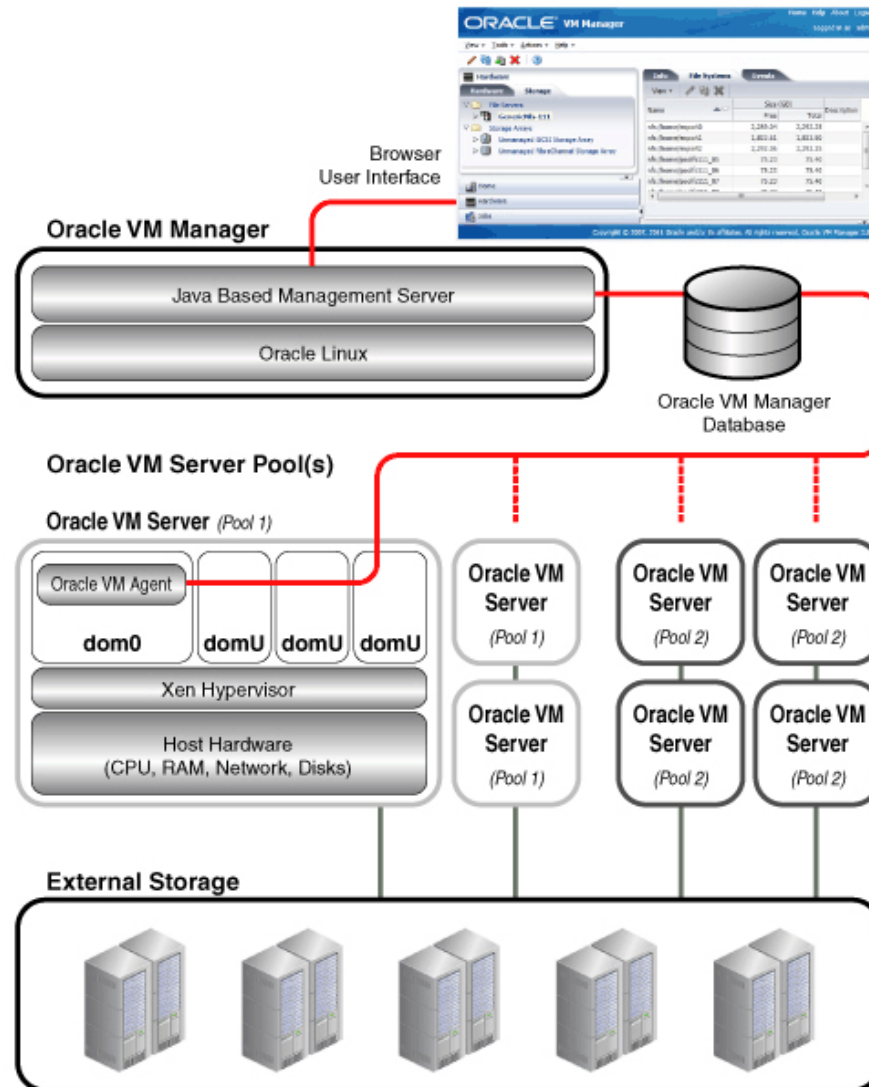
OVM Features

Enterprise Manager 12c

## Oracle VM Architecture

# Oracle VM Architecture

## Architectural Overview of OVM



# OVM Server Considerations



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## Oracle VM Server Considerations



# Oracle VM Server Considerations



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## Hardware

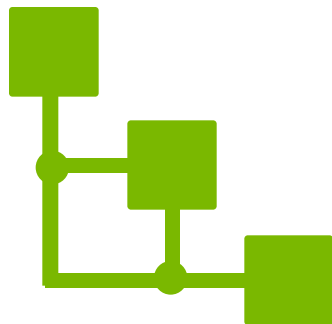
- Oracle VM Server x86\_64 only supports x86\_64 hardware
- CPU with hardware virtualization support is required. Feature needs to be enabled in BIOS
- Minimum memory to run OVM Server is 1GB, 2GB is recommended.
- Only one NIC interface is required for minimum installation.



# Oracle VM Server Considerations



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**Network**

- Static IP Address required for installation.
- Best Practices are to isolate each network.
- Up to 5 networks might be required.
  - Management Network
  - Public Network
  - Private Network
  - Storage Network
  - Heartbeat Network

# Oracle VM Server Considerations



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**Dom0**

- Oracle recommends dom0 memory be set using the following formula:

$502 + 0.0205 * \text{physical memory (MB)}$

Value is set in `/boot/grub/grub.conf`

<Snippet>

title Oracle VM Server-ovs (xen-4.1.2 2.6.39-200.1.1.el5uek)

root (hd0,0)

kernel /xen.gz **dom0\_mem=1875M**

- </Snippet>





# OVM Manager Considerations



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## Oracle VM Manager Considerations



# Oracle VM Manager Considerations



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## Hardware

- 1.5 GB of Memory, 4 GB of memory if using Oracle XE Database
- At least one 1.83 Ghz 64 bit Processor
- Hard disk space:
  - 5GB in /u01
  - 2GB in /tmp
- Swap Space: 2.1 GB



# Oracle VM Manager Considerations



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**Operating  
System**

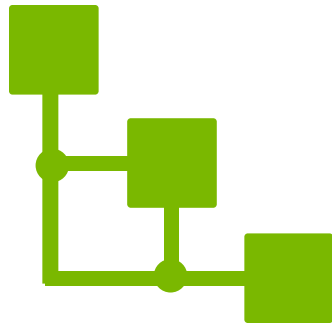
- RHEL/Oracle Linux 5.5 64 bit or later
- RHEL/Oracle Linux 6 64 bit or later



# Oracle VM Manager Considerations



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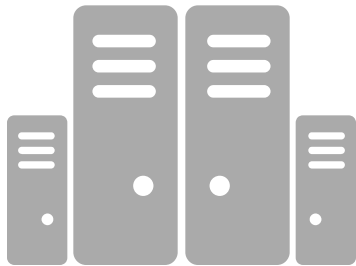
**Network**

- Host computer installing OVM Manager must have a pingable hostname
- If firewall enabled, require following ports to be opened:
  - 7001,7002,15901,54321,54322,8899,6900

# Oracle VM Manager Considerations



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**Database**

- Oracle XE (non-Production)
  - Requires environment to be setup for an Oracle XE database
    - Run createOracle.sh script to set environment
    - Packages: libaio,unzip,bc
- Oracle SE or EE (Production)
  - Oracle RAC recommended for High Availability

# Oracle VM Manager Considerations



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**Run as VM**

- Benefit to running Oracle VM Manager as a VM:
  - High Availability
  - No need of physical servers
- Things required to run OVM Manager as VM:
  - Regular installation of OVM Manager
  - Setup OVM environment
  - Install a VM, install OVM Manager with existing UUID

# OVM Features Overview



Distributed Resource  
Scheduling (DRS)

Distributed Power Management  
(DPM)

Backup/Restore Access to OCFS2  
Storage Repositories

Move OCFS2 Repos between  
Server Pools

OCFS2 1.8 Cluster Filesystem

LUN Resizing

Jumbo Frame Support

Move/Clone VM Templates

Hot add vCPUs

Create VM Templates

Multipath Boot from SAN

Anti-Affinity Support

Up to 160 CPUs & 2TB of RAM  
– per OVM Server

Maintain OVM Manager Identity

# Exploring Oracle VM Features

## Distributed Resource Scheduling (DRS)

- Optimizes virtual machine CPU resource utilization in a server pool.
  - Automatically moves virtual machines to another OVM Server within the pool if the threshold exceeds the existing server pool policy.
  - Thresholds can be set for both CPU and Network



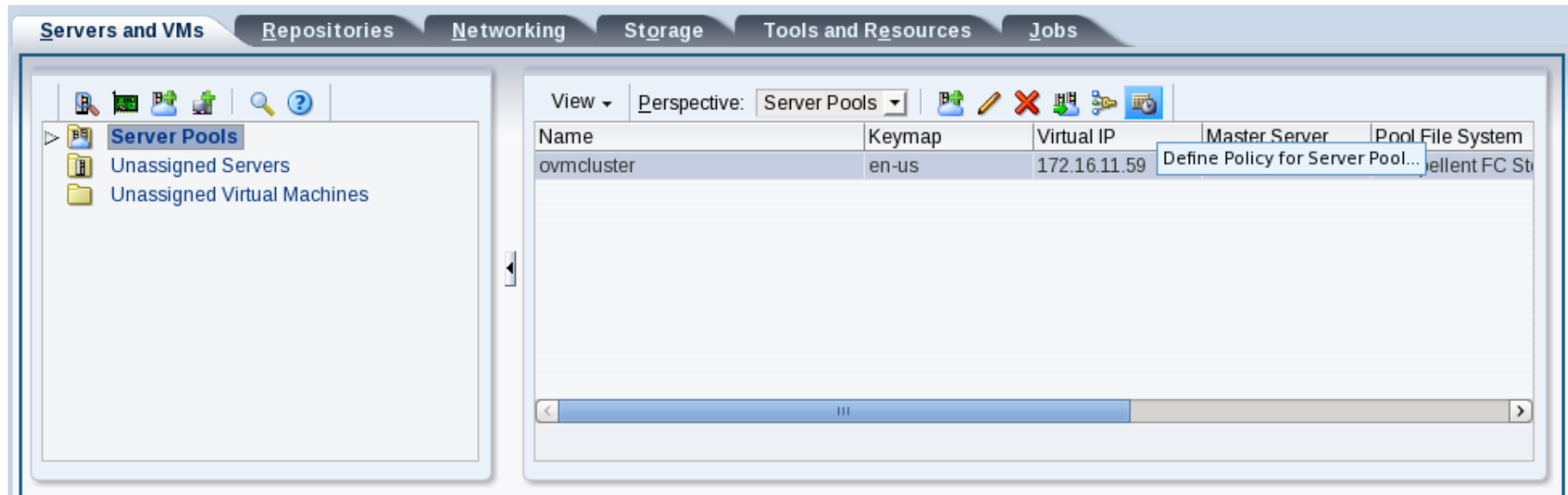
# Exploring Oracle VM Features



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## Via OVMM

- Servers and VMs tab -> click Server Pools -> highlight <serverpool> -> click Server policy icon



## Policy Control

- Policy Type – Distributed Resource Scheduling
- Time Period (Minutes) – Run job every X minutes.

# Exploring Oracle VM Features

## Server CPU

- Enable button – enables CPU utilization logging.
- Threshold (%) – Max CPU use before policy must go in effect

## Network

- Enable button – enables Network utilization logging.
- Threshold (%) – Max Network use before policy must go in effect

**Configure DRS/DPM**

**Configure Policy**

**Policy Control**

Policy Type: Distributed Resource Scheduler

Time Period (Minutes): 10

**Server CPU**

Enable: ☒

Threshold (%): 75

**Servers**

Available Servers

Selected Servers

ovs1  
ovs2

Cancel Next

# Exploring Oracle VM Features



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## Distributed Power Management (DPM)

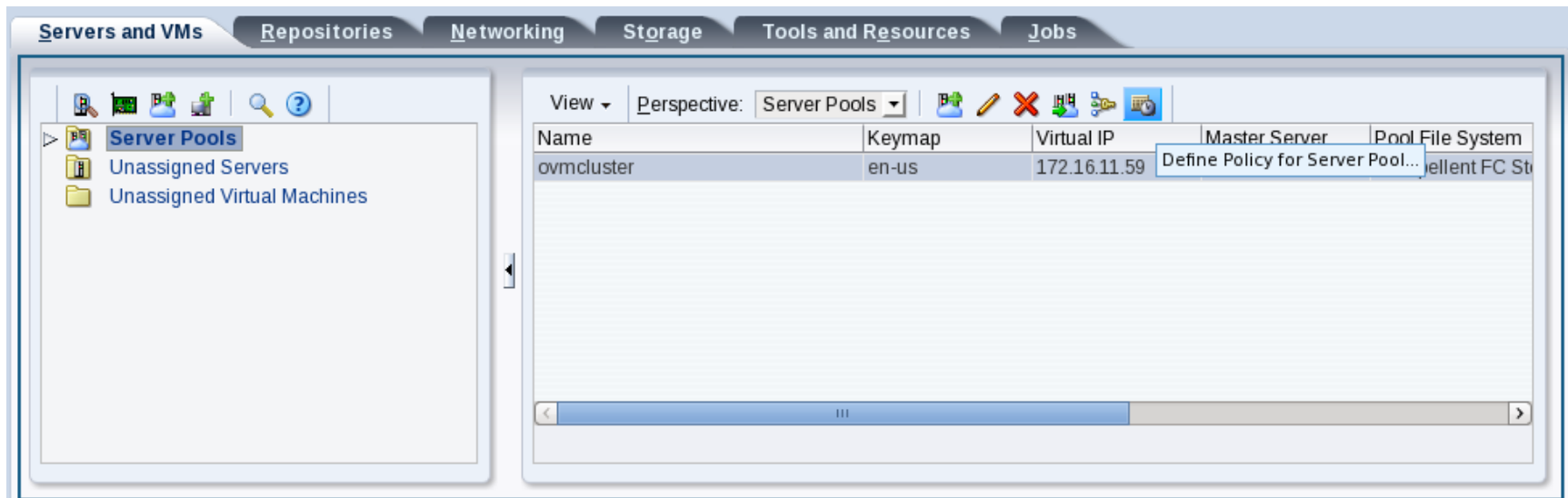
- Used to increase the consolidation ratio of VMs into least amount of OVM Servers required.
  - Goal is to keep only minimum number of necessary OVM Servers running.
  - If policy finds OVM Servers without VMs, it can shutdown OVM Servers to conserve power.



# Exploring Oracle VM Features

## Via OVMM

- Servers and VMs tab -> click Server Pools -> highlight <serverpool> -> click Server policy icon



## Policy Control

- Policy Type – Distributed Power Management
- Time Period (Minutes) – Run job every X minutes.

# Exploring Oracle VM Features

## Server CPU

- Enable button – enables CPU utilization logging.
- Threshold (%) – Max CPU use before policy must go in effect

## Network

- Enable button – enables Network utilization logging.
- Threshold (%) – Max Network use before policy must go in effect

# Exploring Oracle VM Features

## Cloning VM/VM Templates

- Two ways of cloning VMs and/or templates
  - Simple Clone
  - Advanced Clone
    - Uses Clone Customizer
- Two Types of clones:
  - Cold clone
  - Hot clone
- Three Cloning Methods
  - Thin Clone
  - Sparse Copy
  - Non-Sparse Copy

# Exploring Oracle VM Features

## Simple Clone

- Sets clone with same configuration information as the original source

## Adv Clone

- Allows user to modify configuration from the original source. Examples of things one can change
  - Storage Mappings
  - Network Mappings

## Cold Clone

- Clone created on a virtual machine with a stopped status. This form of cloning provides consistent virtual disk status.

## Hot Clone

- Clone created on a running virtual machine. This form of cloning does not provide consistent virtual disk status.

# Exploring Oracle VM Features

## Hot Clone

- Hot clone only available when using OCFS2, SAN required.
- When to use Hot clone?
  - Snapshot
  - Backup a VM
  - VM that requires 100% uptime

## Clone Methods

- Thin Cloning – clones virtual machine and only takes up actual disk space used and requires the OCFS2 filesystem. It is much faster than a sparse copy because it takes advantage of reflinking introduced in OCFS2 1.8. Reflinking creates a snapshot of a file and only modified blocks are reproduced.
- Sparse Copy – clones virtual machine and only takes up space actually used. It works with the OCFS2 file system and works with generic plugin.
- Non-Sparse Copy – clones virtual machine using full disk size even empty blocks.



# Exploring Oracle VM Features



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## Hot add vCPUs

- Ability to add/remove virtual CPUs to a running virtual machine
- Hot add virtual CPUs by editing an existing running VM and increasing the Processors count.

**NOTE:** Only can add vCPUs up to Max Processors.



# Exploring Oracle VM Features

## vCPUs

To access: Servers and VMs -> within the Management Pane right click on VM and select Edit.

**Edit Virtual Machine: ovmracnode.0**

**Configuration** | Networks | Disks | Boot Order

ID: 0004fb00000600007e90421fa15bdf4e

\* Name: ovmracnode.0

☐ Enable High Availability

Description: Import URLs:  
[http://172.16.0.100  
/ovm3templates  
/OVM\_OL6U2\_X86\_64\_11203  
RAC\_PVM-1of2.tgz,  
http://172.16.0.100  
/ovm3templates  
/OVM\_OL6U2\_X86\_64\_11203  
RAC\_PVM-2of2.tgz]

Operating System: None

Keymap: en-us (English, United States)

\* Domain Type: Xen PVM

Max. Memory (MB): 8192

Memory (MB): 8192

Max. Processors: 2

Processors: 2

Priority: 50

Processor Cap %: 100

Cancel OK

# Exploring Oracle VM Features



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## Backup Access to OCFS2 Storage Repositories

- Perform backups of your existing OCFS2 Storage Repository by enabling Repository exports within OVM Manager

- Via the Client IP/Hostname access the OCFS2 repo by:

```
mount -t nfs <ip/hostname>:<Repo Path> <mount destination>
```



# Exploring Oracle VM Features



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## Backup Access

- Server and VMs -> select an OVM Server -> select Repository Exports from Perspective dropdown box -> Create Repository Export

Options	Repository	Repository Path	File System
rw,async,no_root_squash	OVSRepo	/OVS/Repositories/0004fb00000300001d0b00	Compellent FC Stc

### + Create Repository Export

\* Client IP/Host Name:

\* Repository:

Options:



# Exploring Oracle VM Features



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## Anti-Affinity Support

- Anti Affinity groups ensure that specific virtual machines don't run on the same OVM server.

i.e. If one has an Oracle RAC deployment, one should ensure those Oracle RAC instances do not run on the same OVM Server.



# Exploring Oracle VM Features

## Anti-Affinity

- Servers and VMs -> Perspective field (management pane) drop down Anti Affinity Group
- Select the + to create a new Anti-Affinity Group

**Create Anti-Affinity Group**

\* Anti-Affinity Group Name: MyOracleRACAAGroup

Description:

Enter between 1 ar

Create Anti-Affinity Group

Select Virtual Machines

Select the virtual machines for the Anti-Affinity Group:

Available Virtual Machines:

OVM\_OL6U2\_x86\_64\_PVM:ol6u2fo  
OVMMManager  
Testclone

Selected Virtual Machines:

ovmracnode.0  
ovmracnode.1

Previous Cancel Finish

# Exploring Oracle VM Features



## Other OVM Features

- These are some of the other notable OVM features.

### Jumbo Frames

- MTU size of bonded interfaces can be set for 1GB NICs with 1500-9000 value
- MTU size of bonded interfaces can be set for 10GB NICs with 1500-64000

### LUN Resizing

- Requires Oracle Storage Connect with vendor specific plugin

### OVMM Identity

- Each installation of OVM Manager provides a unique identifier know as uuid. This uuid can be found at the About -> OVM Manager within GUI  
OR

`<OVMM_HOME>/ovm-manager-3/.config`

Invoke:

`./runInstaller.sh -uuid <uuid>`

# Exploring Oracle VM Features

## Multipath Boot from SAN

- Oracle VM can now be installed via SAN without requiring local storage

## OVM Servers

- Support up to 160 CPUs
- 2 TB of RAM per server

## Move Repositories

- One can now move an OCFS2 repository from one OVM Server pool to another Server pool via the GUI



## Oracle VM Templates & Assemblies

- Oracle VM Templates and Assemblies are pre-configured environments that include an operating system and possibly a pre-configured application.

# Exploring Oracle VM Features

## Download Templates

- Oracle template can be downloaded at <http://edelivery.oracle.com>

## What is in a template?

- Template consists of:
  - Virtual image (pre-loaded with OS)
  - Vm.cfg file – contains information about vCPUs, Network, Storage, etc

## How do I import and deploy a template?

# Deploying Oracle VM RAC Templates

## Deploying OVM RAC Templates

- Fastest and easiest way to deploy Oracle RAC environments.
- Available for test and production environments
- Website for latest OVM RAC Templates:

<http://www.oracle.com/technetwork/server-storage/vm/rac-template-11grel2-166623.html>

- Deploy using the DeployCluster Tool for OVM3

<http://www.oracle.com/technetwork/server-storage/vm/rac-template-11grel2-166623.html>

# Deploying Oracle VM RAC Templates

## Installation Prerequisite

- Download the OVM RAC templates and host them on a webserver/nfs share/ftp i.e. example of webserver <http://localhost/ovm3templates>  
Ensure that your OVM Manager can ping your webserver.
- DNS Server for public IPs, VIPs, SCAN

## Hardware Requirements

- Filesystem space consumption depends on sparse file support for /OVS Repository
  - Template requires 9.9GB of space for 64bit
  - Each RAC node image requires 9.9GB of space for 64 bit
  - Total under /OVS 29.7GB space required with sparse enabled
- Each RAC VM requires at least 2GB
- Each VM requires at least 1 vCPU
- 2 Network cards within each OVM Server
- 5 public IP addresses and 2 private IP (for a two node cluster)

# Deploying Oracle VM RAC Templates

## Description

- The templates allow building clusters of any number of nodes with an Oracle RAC 11g Release 2 (11.2.0.3.2) configuration. It includes:
- Oracle Clusterware and ASM (11.2.0.3.2)
- Oracle Database 11g Release 2 (11.2.0.3.2) patched to the latest recommended patches

## Template Details

- Oracle Linux 6 64bit, minimum packages
- Root password 'ovsroot'
- Oracle password 'oracle'
- sys/system password 'oracle'

\*All can be changed pre and post install.

# Deploying Oracle VM RAC Templates



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## Step 1: Import Template

- Select Repositories tab -> Reponame -> VM Templates -> Import Template

**Import VM Template**

Import VM Template to Repository: OVSRepo

\* Server: ovs1

\* VM Template URLs:

```
http://172.16.0.100/ovm3templates  
/OVM_OL6U2_X86_64_11203RAC_PVM-  
1of2.tgz  
http://172.16.0.100/ovm3templates  
/OVM_OL6U2_X86_64_11203RAC_PVM-  
2of2.tgz
```

Cancel OK

# Deploying Oracle VM RAC Templates



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## Step 2: Create or Identify Disks

- Production environments require 5 physical disks for the database. Each physical disk must be at least 1GB in size for a total of 5GB for the database.
- Create volumes on SAN
- Within OVM3.1  
Select Storage tab -> SAN Servers->click Refresh SAN Servers  
Volumes should now show under SAN Servers->Storage Array

The screenshot shows the Oracle VM Manager interface. The 'Storage' tab is selected. The left pane shows the tree structure with 'SAN Servers' expanded, showing 'Unmanaged iSCSI Storage Array' and 'Compellent FC Storage'. The right pane shows a table of physical disks.

Name	Event Severity	Size (GiB)	Server	Status	Shareable	Desc
OVSRepo	Normal	500.0	ovs1, ovs2		✓	
Heartbeat	Normal	15.0	ovs1, ovs2		✓	
ASM1	Normal	20.0	ovs1, ovs2		✓	
ASM2	Normal	20.0	ovs1, ovs2		✓	
ASM3	Normal	20.0	ovs1, ovs2		✓	
ASM4	Normal	20.0	ovs1, ovs2		✓	
ASM5	Normal	20.0	ovs1, ovs2		✓	



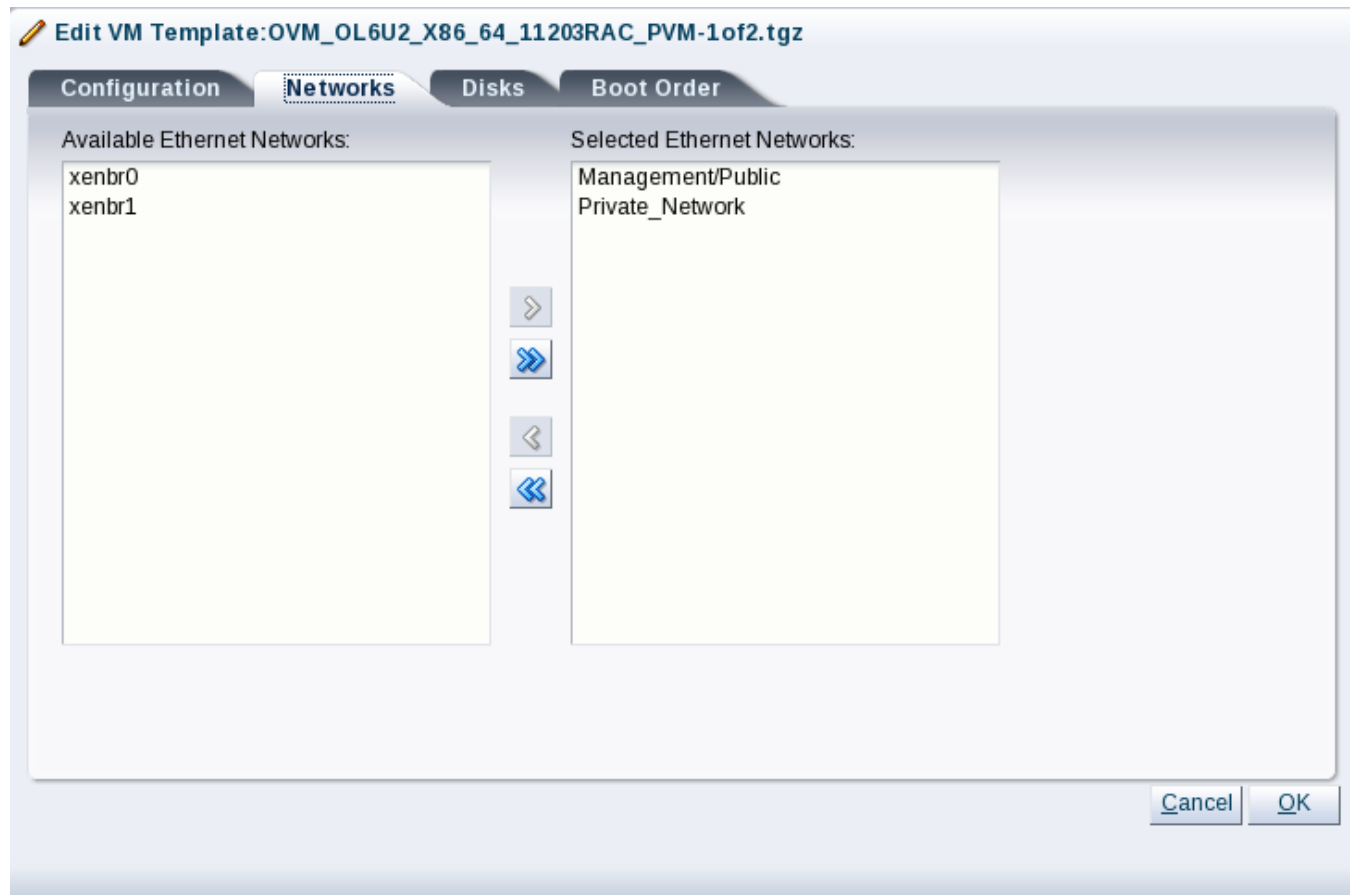
# Deploying Oracle VM RAC Templates



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## Step 3: Adjust Network Bridges

- Select Repositories tab ->RepoName->VM Templates->TemplateName ->Edit





# Deploying Oracle VM RAC Templates

## Step 4: Clone VMs from Template

- Select Repositories tab ->RepoName->VM Templates  
->TemplateName->Clone or Move Template

Clone or Move Template: OVM\_OL6U2\_X86\_64\_11203RAC\_PVM-1of2.tgz

Clone to a: ☒ Virtual Machine ☐ Template

Clone Count:

Clone Name:

\* Target Server Pool:

Description:

▼ **Advanced Clone Options**

\* Clone Customizer:

\* Target Repository:


# Deploying Oracle VM RAC Templates



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## Step 4: Clone VMs from Template

- Select Clone Type: Thin clone. This takes advantage of OCFS2 1.8 reflinking.
- Oracle recommends this type of cloning, however do not use this clone type for database files.

 **Create a Clone Customizer**

☐ Name and Description

☒ **Storage Mappings**

☐ Network Mappings

Disk	Clone Target Type	Clone Target	Clone Type
<input checked="" type="checkbox"/> System.img	Repository	OVSRepo	Thin Clone
<input checked="" type="checkbox"/> Oracle11203RAC_x86_64-x	Repository	OVSRepo	Thin Clone

Previous Cancel Next

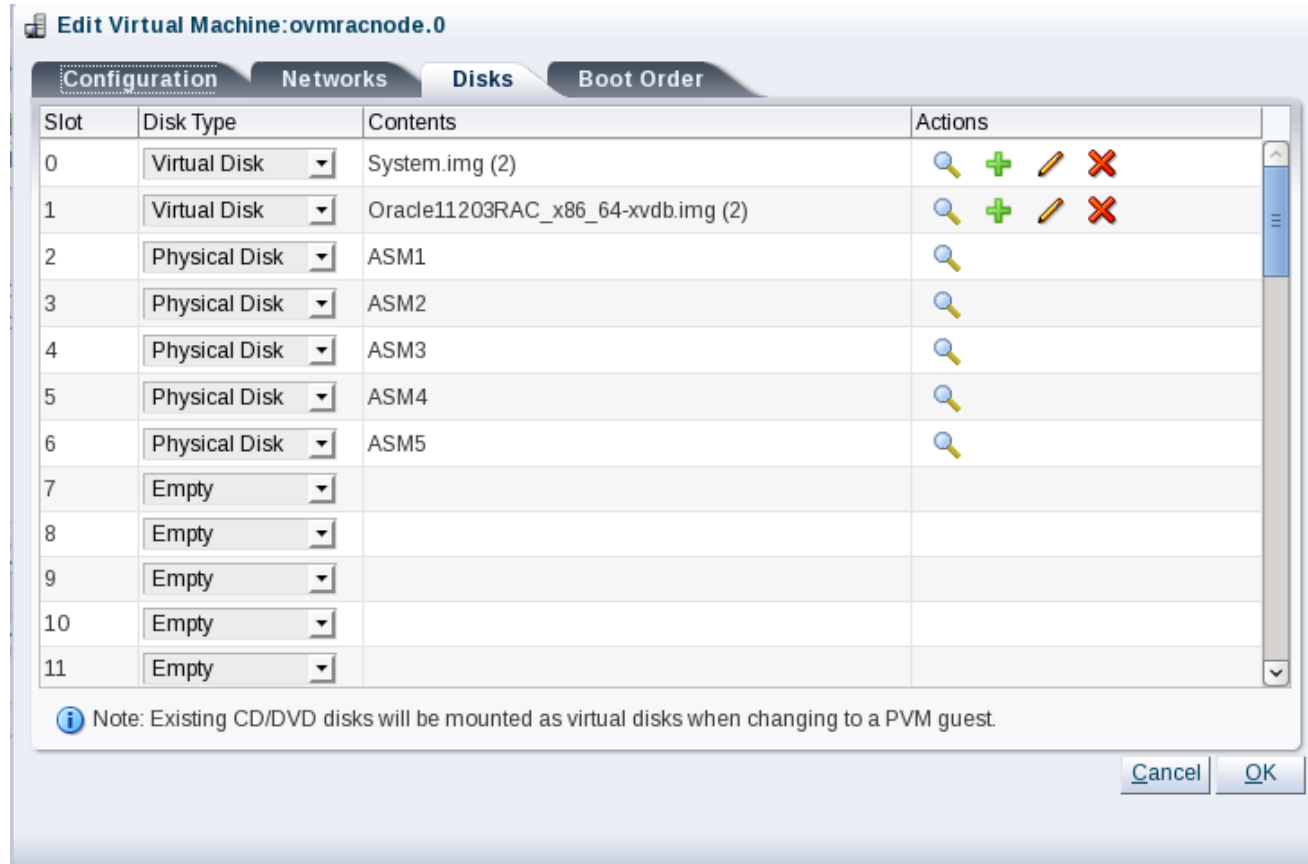
# Deploying Oracle VM RAC Templates



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## Step 5: Attach Disks

- Select Servers & VMs ->Server Pools->PoolName->ServerName->VMName->Edit->Disks...
- Select Disk type Physical Disk and select the appropriate disk.



# Deploying Oracle VM RAC Templates



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## Step 6: Download DeployCluster Tool

- On any server download the deploycluster tool software.
- `cd $somelocation`
- `unzip -q RACOVm-Deploycluster-tool.zip`
- `cd deploycluster`
- **Noteable files:**
  - **deploycluster.py** - Deploycluster tool – RUN THIS
  - **deploycluster.ini** - Options for deploycluster tool itself
  - **README.txt** - Details explanation of all flags/options
  - **utils** - Directory with useful files, e.g:
  - **netconfig\*.ini** - Sample netconfig.ini files
  - **netconfig.zip** - Updated netconfig (may be needed when deploying older templates)
  - **params-sample.ini** - Sample params.ini
  - **README.txt** - Backwards compatibility steps for Oracle VM2 users



# Deploying Oracle VM RAC Templates

## Step 7: Create netconfig.ini file

- Make a copy of the same netconfig-sample64.ini file found under <\$HOME>/deploycluster/utils/ and place it under the <\$HOME>/deploycluster directory
- Rename netconfig-sample64.ini to netconfig.ini
- Edit the netconfig.ini with the appropriate values for your particular environment.

Snippet of netconfig.ini

```
# Node specific information
NODE1=ovmracnode1
NODE1IP=172.16.11.67
NODE1PRIV=ovmracnode1-priv
NODE1PRIVIP=192.168.11.67
NODE1VIP=ovmracnode1-vip
NODE1VIPIP=172.16.11.68
.
.
.
```

# Deploying Oracle VM RAC Templates

## Step 8: Run deploycluster.py

- The deploycluster tool requires the following flags:
- -u (user) for the Manager)
- -p (password) for the Manager)
- -M (supply VM names separated by a comma)
- -N (netconfig.ini file name)
- Optional flags:
- -H (hostname if not running deploycluster on VM Manager)
- -D (dry run simulation of operations)
- -L (list the details for the specified VMs)
- -U (login URL for the manager i.e. tcps://localhost:54322)

- Example of running the tool from a non-OVM Manager server:

```
./deploycluster.py -u admin -p MyP123 -M racnode.0,racnode.1  
-N netconfig.ini -H ovmmanger
```

More info about deploycluster tool can be found here:

<http://www.oracle.com/technetwork/products/clusterware/overview/racovm-deploycluster-tool-1635519.pdf>

# Integrating Oracle VM + Enterprise Manager 12c



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**EM12c  
+  
OVM**

- What is Enterprise Manager 12c?
  - Oracle Enterprise Manager is a management product that allows customers to manage all aspects of Oracle traditional and cloud environments
- Why Oracle VM + EM12c?
  - With the integration of EM12c and Oracle VM, together one can take advantage of Oracle VM's virtualization feature sets and combine them with EM12c's cloud lifecycle management to provide customer's on demand services such as IaaS and DBaaS.
- Example of what one could do with EM12c + OVM + IaaS:
  - create self service roles and users
  - Allocate quota and privileges for those roles and users
  - Publish assemblies and templates
  - Configure metering and chargeback for your cloud environment





# Questions & Answers



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Questions or  
Feedback?







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**Colorado Convention Center**

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