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HOL9981
Best Practice for migrating to Oracle VM and Oracle Linux from VMware and Red Hat

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1 INTRODUCTION

1.1 LAB OBJECTIVE

This document details all actions that we will be run during Oracle OpenWorld 2013 session Hands On Lab HOL9981.

"In this lab, you will learn from our field experts on best practices of migrating both your VM and guest OS to an Oracle environment. This lab helps to simplify the migration process of moving an existing Oracle Database workload from VMware to Oracle VM. This lab also walks you through how to migrate your Red Hat guest to Oracle Linux by downloading the Unbreakable Kernel from the Oracle public Yum. The implementation of this lab helps to deploy an enterprise-proven infrastructure software layer at zero license cost to your virtualization or Linux environment."

This hands-on lab takes you through the best practices on how to migrate from product such as VMWare and Redhat to Oracle VM and Oracle Linux.
Oracle VM is a free license products and it's the only virtualization x86 software solution certified for all Oracle products.

This lab will show the "Open Virtualization Assembly" format, the free-of-charge service supplied by public-yum.oracle.com where, without a subscription, Oracle Linux and Oracle VM can be maintained.

During this lab, we will use a demo environment built on a single x86 laptop (using Oracle VM VirtualBox) and containing 2 virtual servers and one Oracle VM Server guest:

- Oracle VM Server
- Oracle VM Manager
- Oracle VM guest imported as an assembly

1.2 PREPARATION (DONE BEFORE LAB)

To save time and fit in the one hour slot of Oracle OpenWorld labs, some actions were made before the actual lab.

Here is a quick list of these actions:

- Install Oracle Linux 6.4 (64 bits) on all the laptops.
- Install Oracle VM VirtualBox 4.2.16 + extensions on all the laptops.
- Disable Oracle Virtualbox DHCP server (default enabled)
- Install Oracle Java JRE 7 update 25 on all the laptops. (needed to get Oracle VMs console)
- Install and configure an Oracle VM Manager 3.2.4 server in a VirtualBox virtual machine.
- Install and configure an Oracle VM Server 3.2.4 server in a VirtualBox virtual machine.
- Configure network and VNICs (Virtual Network Interface Cards).
- Create an Oracle VM repository based on the assembly size.
- Export from third party virtualization solution (like VMWare) a guest in “ova” format.
- Configure default HTTP server on Oracle VM Manager (port 80)
- Prepare an Oracle Yum server based on http://public-yum.oracle.com

Note: to run this lab at home of office

- Requirements:
  - Have an X86 machine with at least 16GB of RAM and 4 cores CPU.
  - Any X86 Operating System supported by Oracle VM VirtualBox is OK (Microsoft Windows, Most linux distributions, Oracle Solaris X86, Apple Mac OSX, …)
- Read appendix A

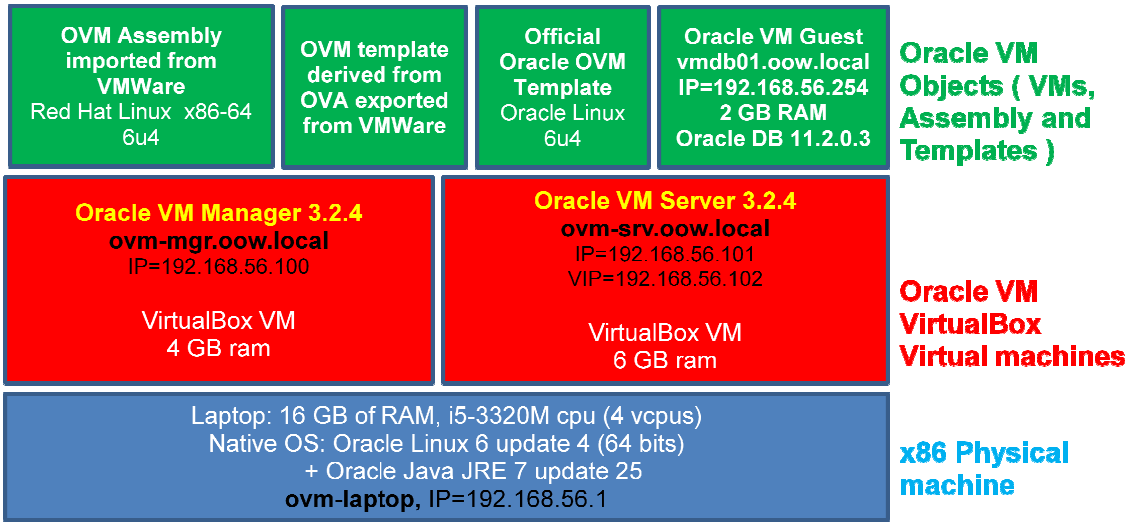
1.3 SUMMARY OF STEPS

In this lab, we will execute the following steps in Enterprise Manager Cloud Control 12c

1) Connect to Oracle VM Manager and become familiar with the product.
2) Verify that everything is ready to accommodate the lab.
3) Import the assembly with an Oracle Database on top, exported from VMWare.
4) Create an Oracle VM template based on the VMWare assembly.
5) Create a guest based on the Oracle VM template created.
6) Configure the guest and remove VMWare tools.
7) Switch from Redhat kernel to Oracle Linux Kernel (UEK) for free.
8) Transform the guest in an Oracle VM Template reusable (“Gold Image”).

1.4 GLOBAL PICTURE

The following picture shows all the components (VirtualBox and Oracle VM virtual machines) with their names and configuration (memory, IP address, …)



2 DETAILED INSTRUCTIONS

2.1 START THE 2 SERVERS (VIRTUALBOX VMS)

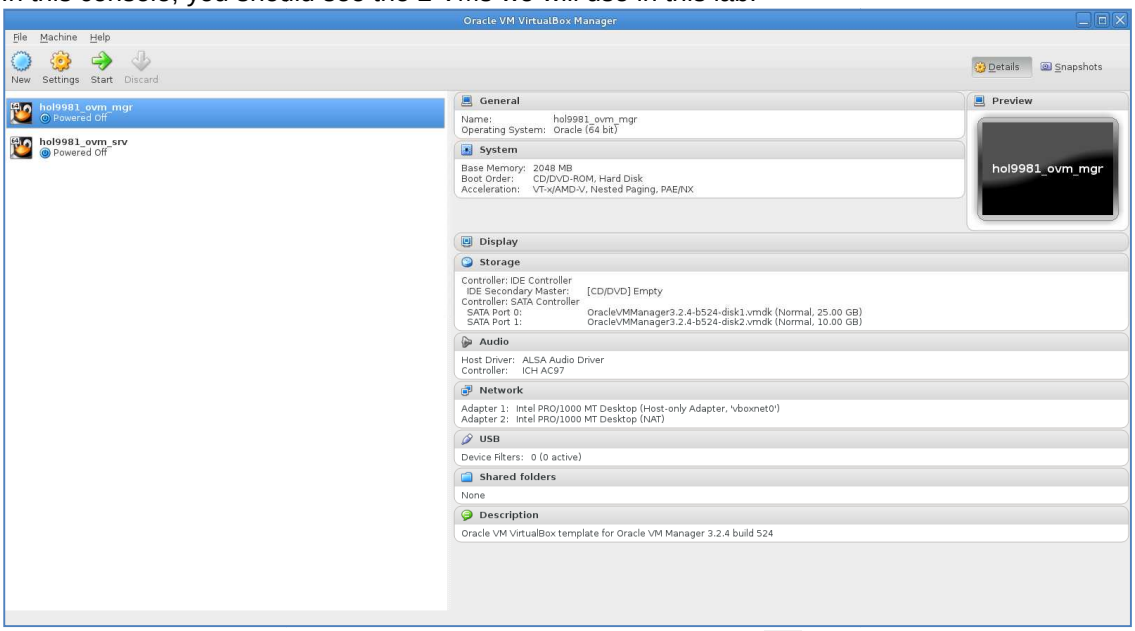
As previously explained, we will use Oracle VM VirtualBox to host the 2 servers (Oracle VM Server and Oracle VM Manager) on a single laptop.

Those 2 servers were pre-installed and preconfigured before this lab to same time. Thus, you just have to start them here.

IMPORTANT: Since the VMs startup can take time, we advise you to do this as soon as possible and then take time to read this documentation.

a) Start the Oracle VM VirtualBox console if not yet started by clicking on icon

b) In this console, you should see the 2 VMs we will use in this lab.



c) Select the VM called "**hol9981_ovm_mgr**" and click on the icon to start it

d) Select the VM called "**hol9981_ovm_srv**" and click on the icon to start it

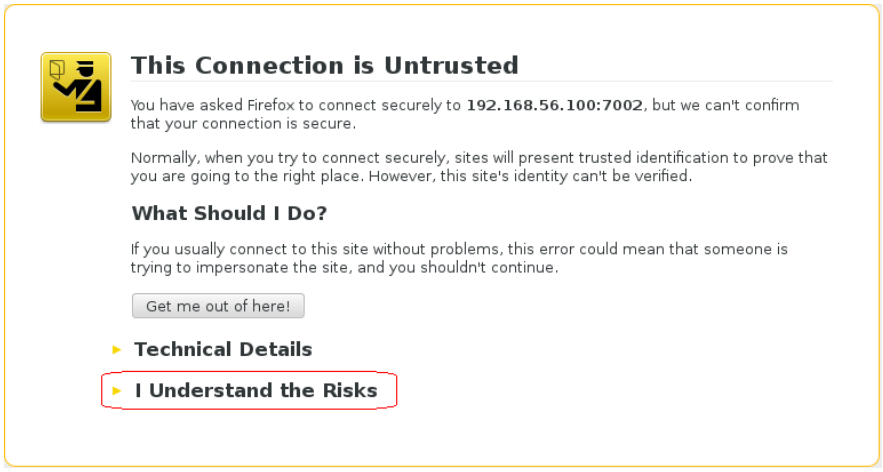
e) Wait for the 2 VMs to be ready
   - Wait for the prompt (desktop started) on "**hol9981_ovm_mgr**" VM console
   - When this prompt is displayed, all VMs are ready (since Oracle VM Manager is the longest to start)

2.2 CONNECT TO THE ORACLE VM MANAGER 3.2.4 CONSOLE

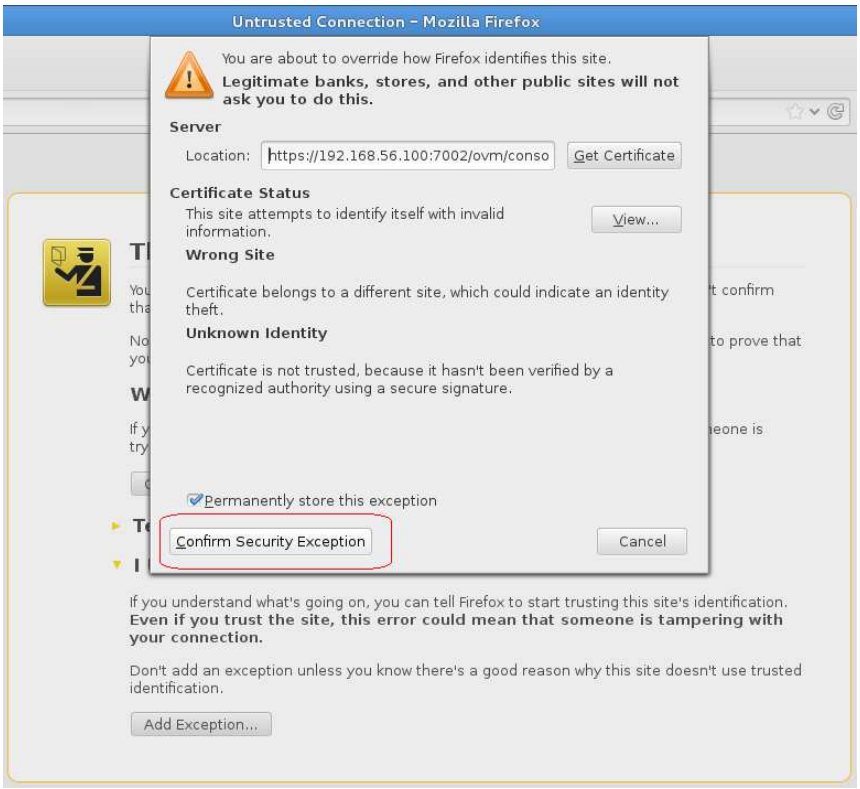
a) On your Linux physical desktop open a Firefox browser and connect to the **Oracle VM Manager 3.2.4** console using URL https://192.168.56.100:7002/ovm/console

In the case that you receive some warnings proceed as described in the following screens:

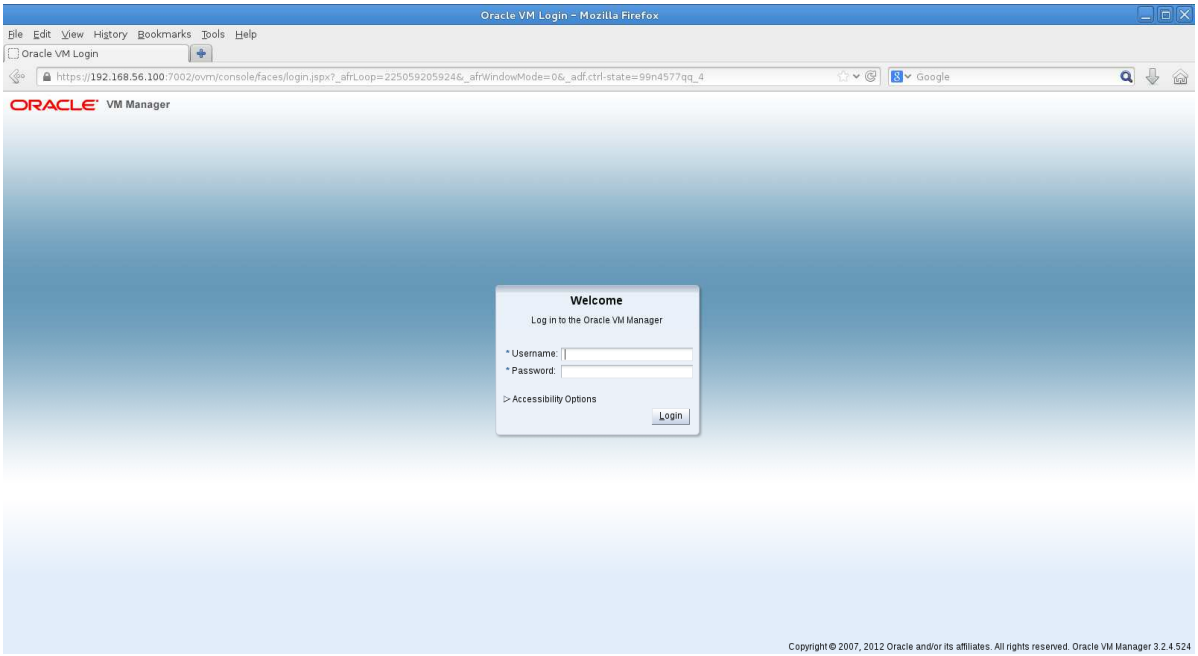
Click on "**I Understand the Risks**" and on "**Add exception**":



Finally click on "Confirm Security Exception":



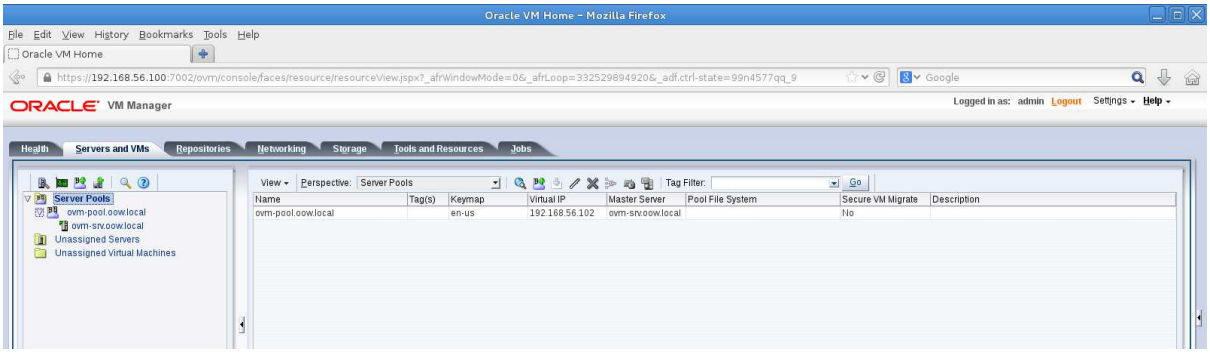
After security exception managed you should get the following login window:



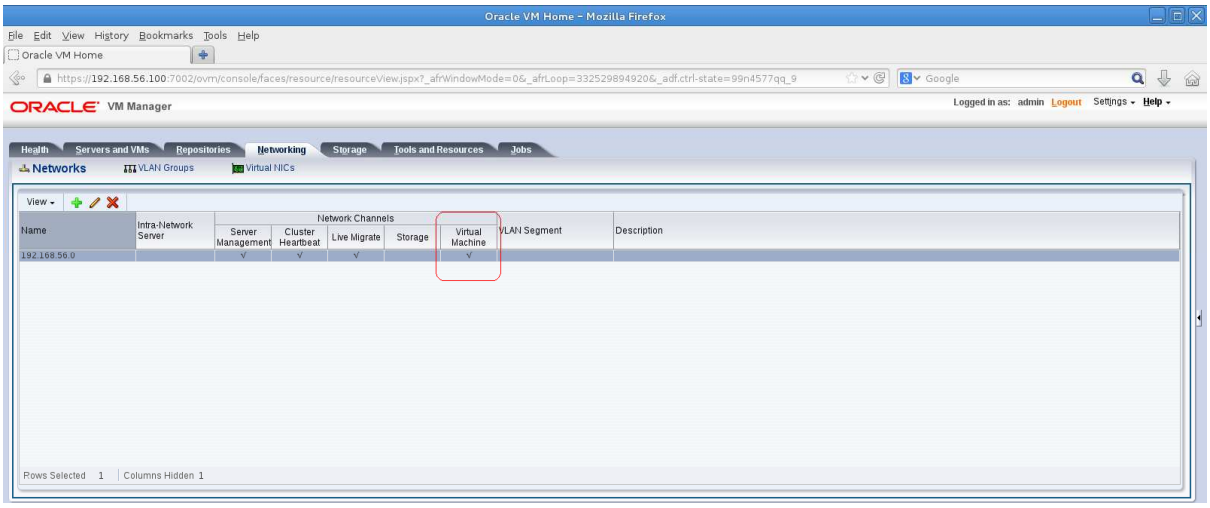
b) Log in using the following credentials:
   - o Login : **admin** (default Oracle VM Manager Administrator)
   - o Password : **Welcome1** (W is uppercase)

2.3 VERIFY ORACLE VM ENVIRONMENT CORRECTLY STARTED

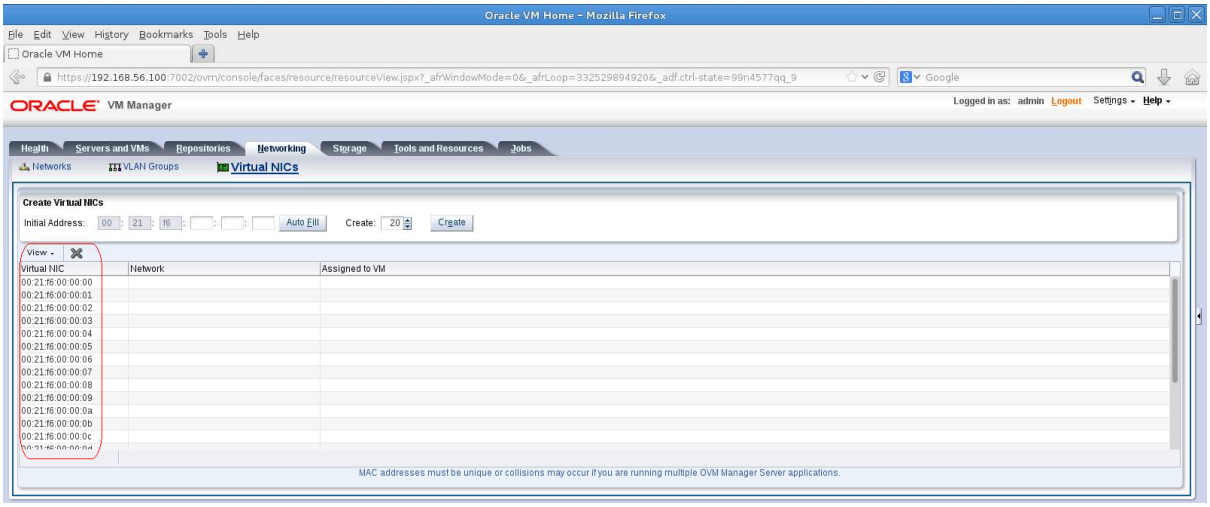
a) Once logged in the Oracle VM Manager console, go to the "**Servers and VMs**" tab and verify the status of Oracle VM pool and Server; everything should be as in this picture.



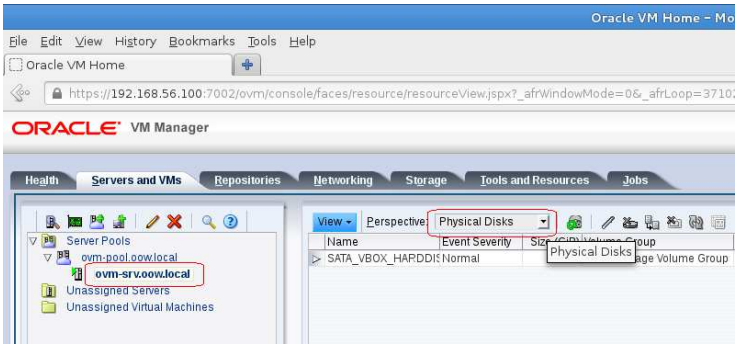
b) Click on "**Networking**" tab and verify that existing network is usable by guests



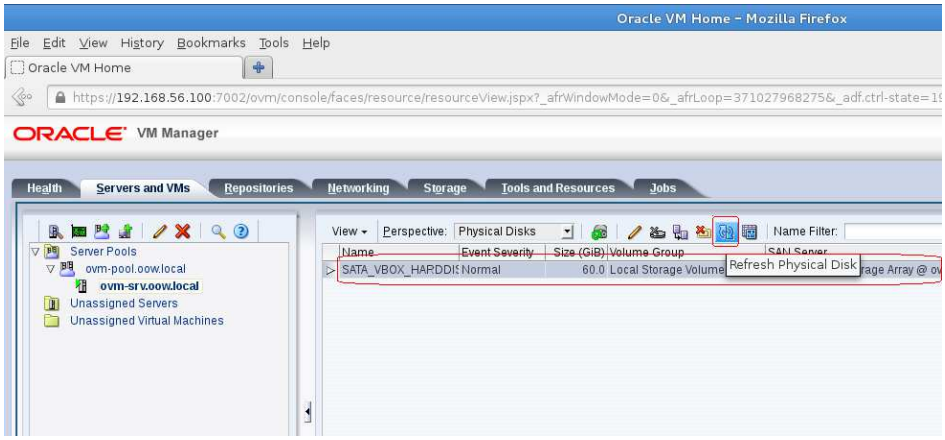
c) Click on "**Virtual NICs**" hyperlink (below "**Networking**") and verify that you have free Virtual-Nics MAC-Addresses; if you don't see "**Virtual NICs**" available, click on "**Auto Fill**" and "**Create**" to create new Virtual NICs.



d) Click on "**Servers and VMs**", expand pool named "**ovm-pool.oow.local**", click on the server named "**ovm-serv.oow.local**" and select perspective "**Physical Disks**" in the right-window.

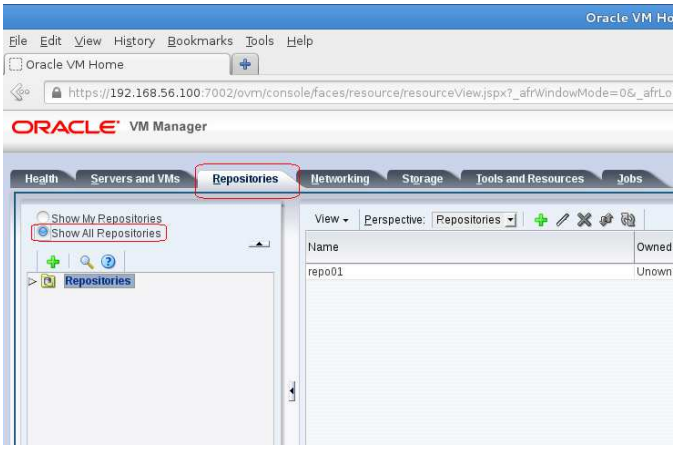


e) Select physical disk named "**SATA_VBOX_HARDDISK**" and click on button "**Refresh Physical Disk**".



f) Confirm the refresh of physical disk with "OK".

g) Click on “**Repositories**” and select radio button “**Show all repositories**”.

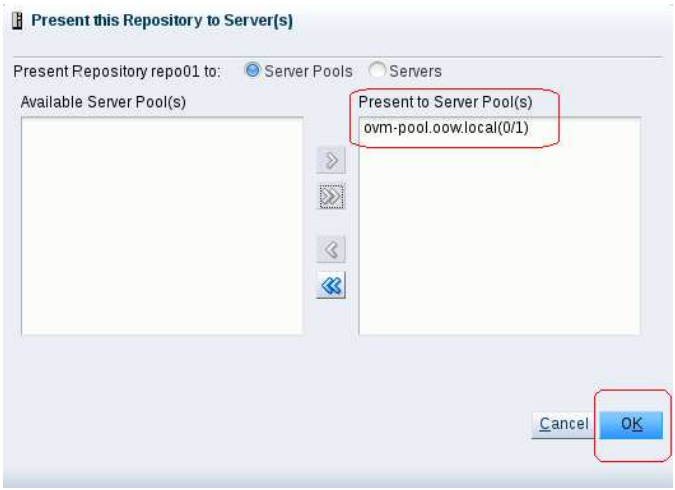


h) Expand “**Repositories**”, click on repository named “**repo01**” and click on “**Edit**” button.

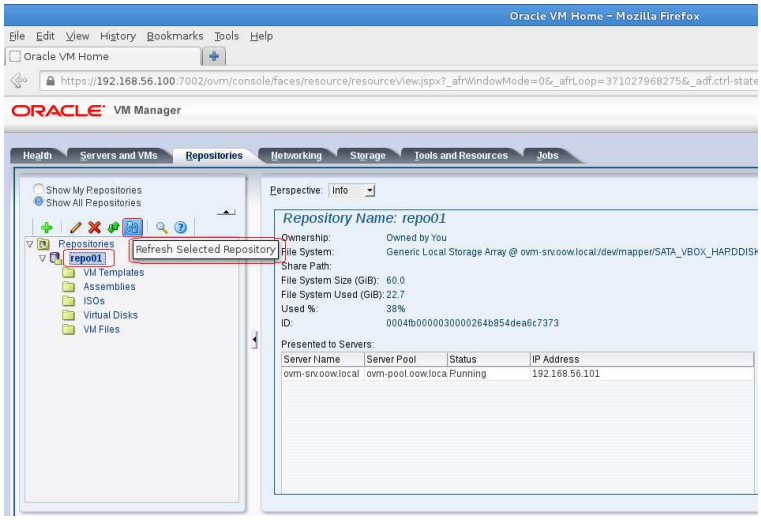
i) On the new window click on “**Take ownership**” and confirm with “**OK**”.

j) Re-select "**Repositories**" and then "**repo01**" selected click on button "**Present/Unpresent repository**".

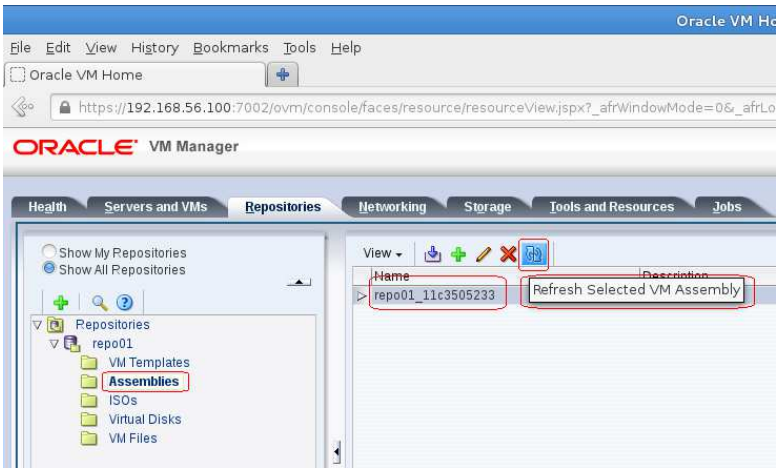
k) On the new window named "**Present this repository to server(s)**" move right the server-pool named "**ovm-pool.oow.local**" and confirm with "**OK**".



l) Select repository "**repo01**" and click on button "**Refresh Selected Repository**".



m) Click on folder "**Assemblies**", select the assembly named "**repo01_<code>**" and click on "**Refresh selected VM Assembly**".



2.4 IMPORT A TEST ASSEBLY

The scope of this chapter is to show how-to import a little assembly downloaded from official Oracle Site:

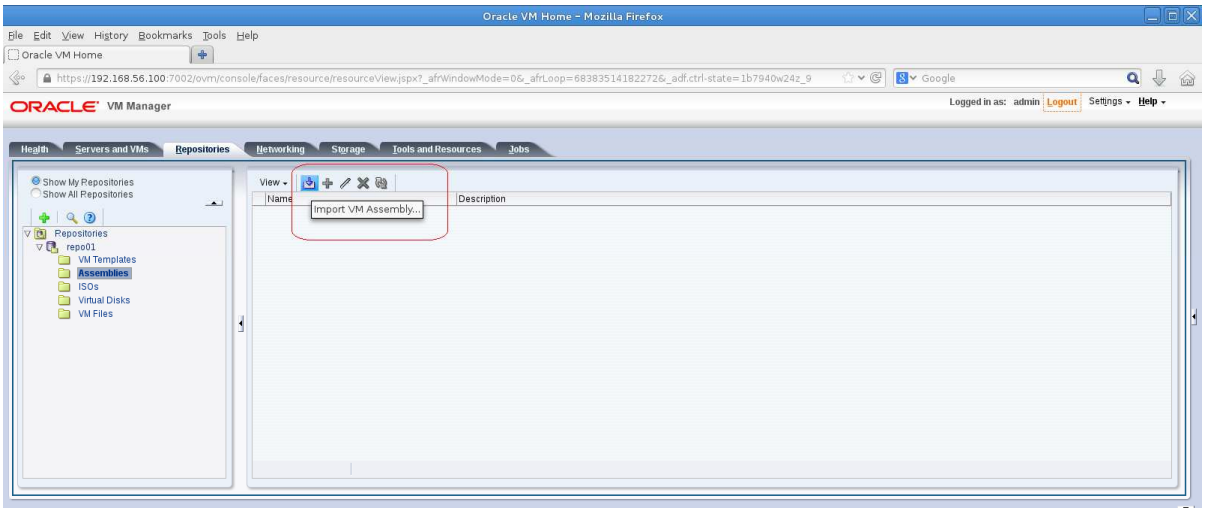
http://edelivery.oracle.com/linux

The assembly that will be imported is a small virtual-server and it's only for test purpose; in fact the assembly that will be used (a real server exported from VMWare with Oracle Database on board) in the rest of the lab is already placed into Oracle VM repository.
This decision has been taken due to long wait (about 15 minutes) to import the real-server.

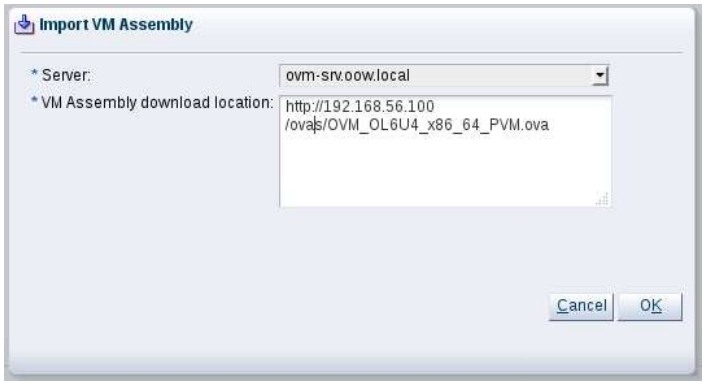
Reminder: Importing assemblies and/or templates on Oracle VM

Oracle VM Templates can be imported from an HTTP or FTP server. In our case, we will use an HTTP server previously configured on the Oracle VM Manager. The assembly file was copied on this HTTP server before the lab.

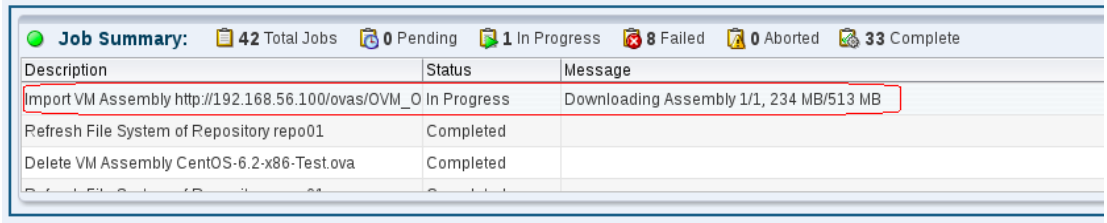
a) Click on "**Repositories**" tab, expand the repository "**repo01**" and select the "**Assemblies**" directory; after that click on the " " icon to proceed with the Assembly import.



b) Enter the following URL in the new window:
`http://192.168.56.100/ovas/OVM_OL6U4_x86_64_PVM.ova`



c) In the same window confirm with "**OK**" and, after that, follow the job progression in the "**Job Summary**" window.



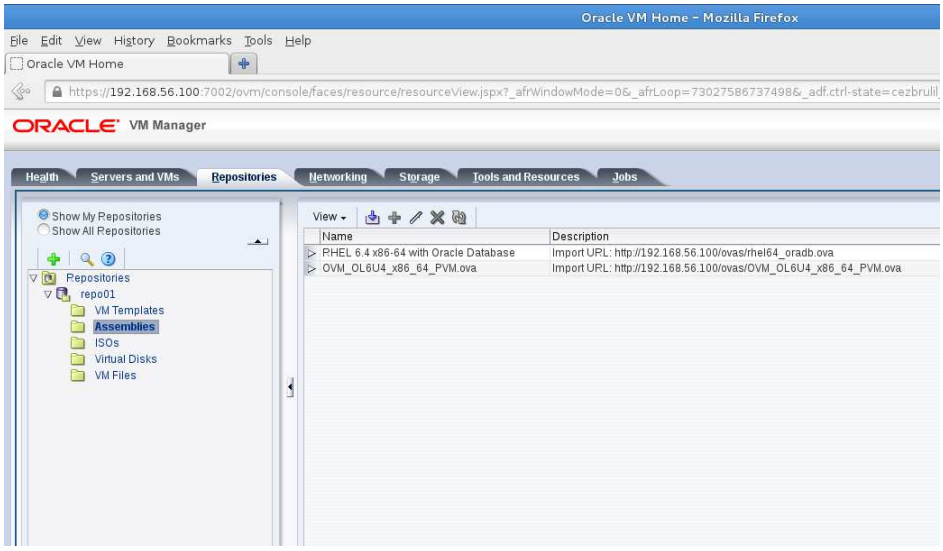
d) At the end of this section there will be two "Assemblies":

"**repo01_c11c2505233**"

Redhat Linux Assembly exported from a VMWare installation and already imported in Oracle VM.

"**OVM_OL6U4_X86_64_PVM**"

Oracle Linux Assembly directly downloaded from official edelivery Oracle site.



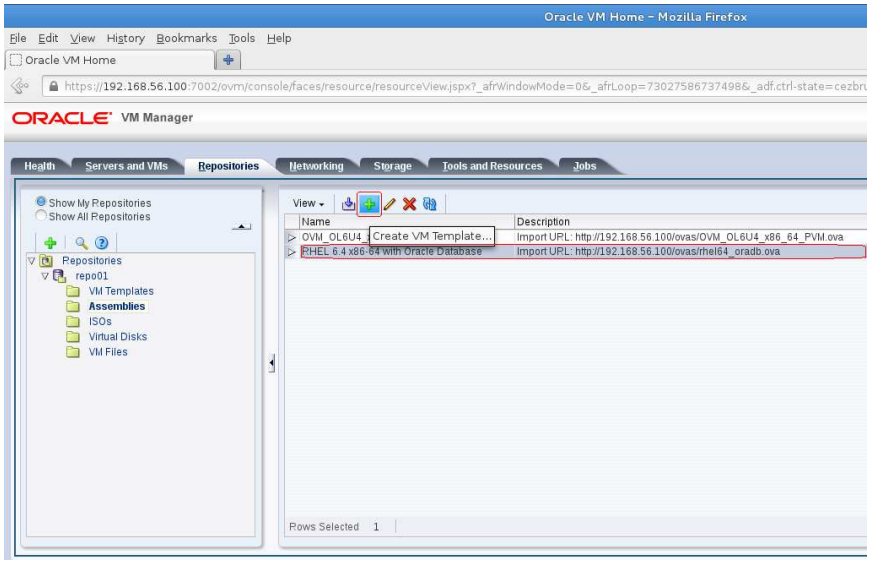
2.5 CREATE ORACLE VM TEMPLATE STARTING FROM AN ASSEMBLY

The scope of this chapter is to show how-to create an Oracle VM Template starting from an assembly Assemblies can be described as a template of a group of virtual machines, or a collection of multiple VM templates. In Oracle VM Manager, templates and assemblies appear in different folders of the storage repository, but their VM configuration files and disk images are stored in the same location as those of other virtual machines and templates.
The procedure to obtain a new virtual guest starting from an assembly is:

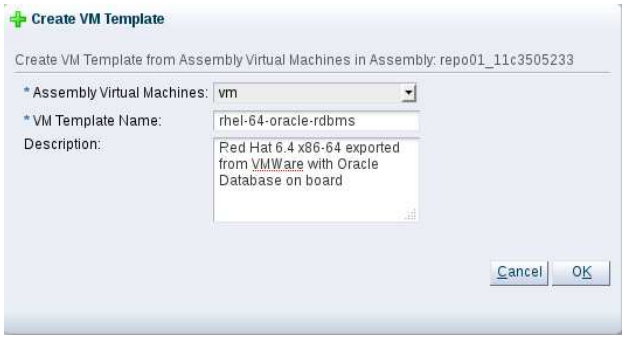
"Assembly" => "Template" => "New Guest(s)"

To create the Template based on "**RHEL 6.4 x86-64 with Oracle Database**" assembly proceed with these steps:

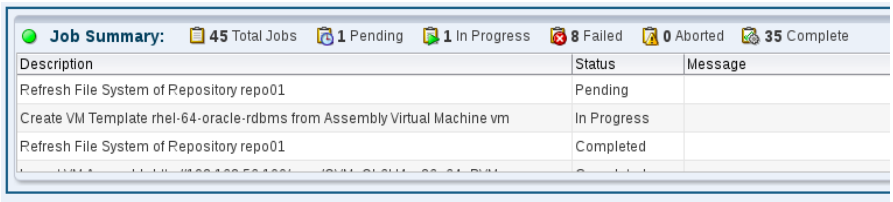
a) Click on "**Repositories**" tab, expand the repository "**repo01**" and select the "**Assemblies**" directory; after that click on "**repo01_c11c2505233**" row and select the "Add" button



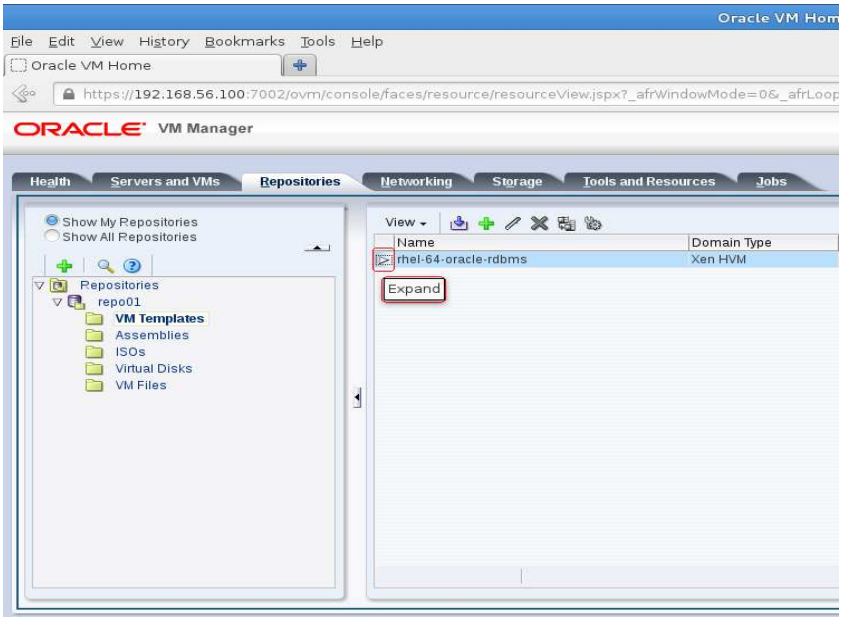
b) Enter the following details in the new window:
VM Template Name: "**rhel-64-oracle-rdbms**"
Description: "**Redhat 6.4 x86-64 exported from VMWare with Oracle Database on board**"



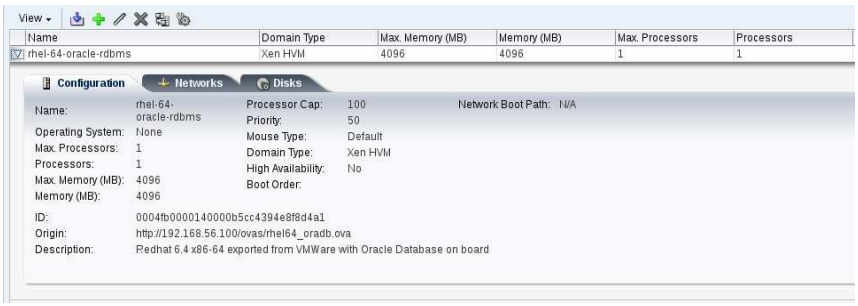
c) In the same window confirm with "**OK**" and, after that, follow the job progression in the "**Job Summary**" window.



d) When the jobs are completed verify that the template is correctly created and ready to use. Click on "**Repositories**" tab, expand the repository "**repo01**" and select the "**VM Templates**" directory; after that click on the template and expand it.



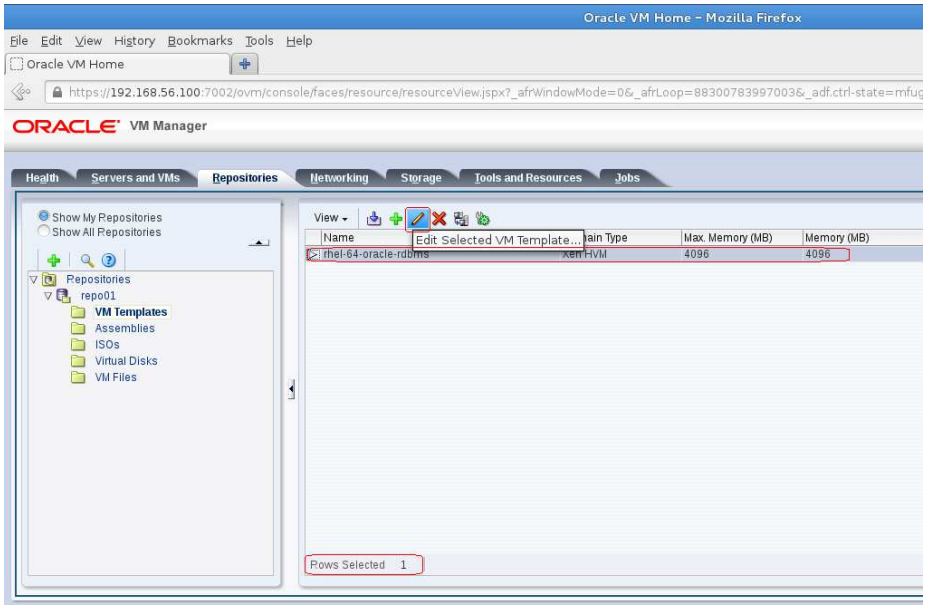
e) Oracle VM Template configuration should be like this one:



2.6 EDIT ORACLE VM TEMPLATE CREATED

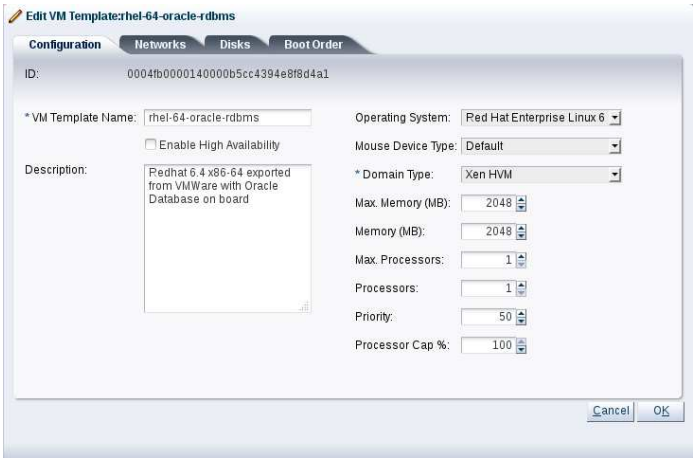
This template, derived from an assembly exported from VMWare, needs correct sizing and network configuration; so in this chapter shows how to edit an Oracle VM template.

a) Click on "**Repositories**" tab, expand the repository "**repo01**" and select the "**VM Templates**" directory; after that click on the template named "**rhel-64-oracle-rdbms**" row and select the "**Edit**" button



b) In the new windows enter the following details:

Section "**Configuration**"
Operating System: "**Red Hat Enterprise Linux 6**"
Domain Type: "**XEN PVM**"
Max. Memory(MB): "**2048**"
Memory(MB): "**2048**"



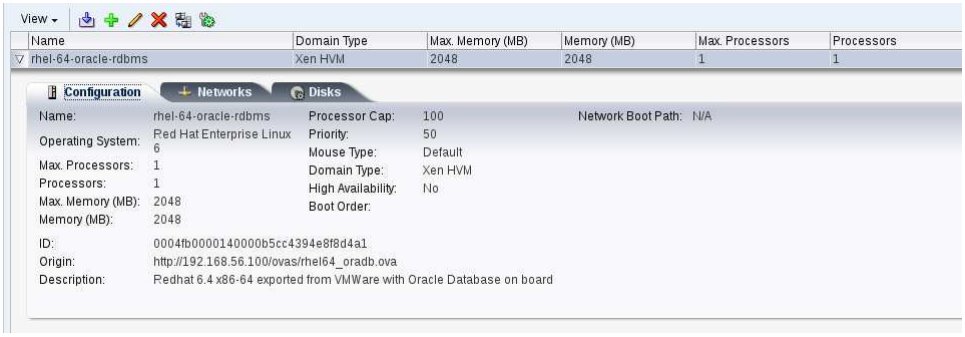
Section "**Networks**"

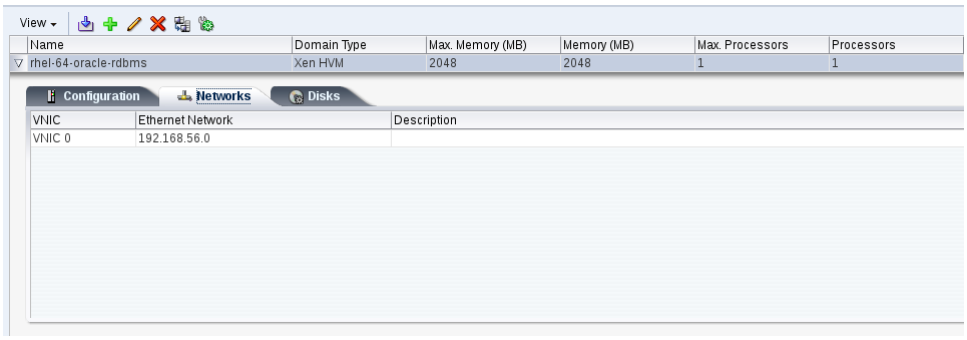
Selected Ethernet Networks: "192.168.56.0"

Nb: select network "192.168.56.0" and move it on the right with button or .

Section "**Disks**" and section "**Boot Order**" don't need any configuration change.

c) The configuration result of this configurations is shown in the picture below ("**Configuration**" and "**Networks**"):

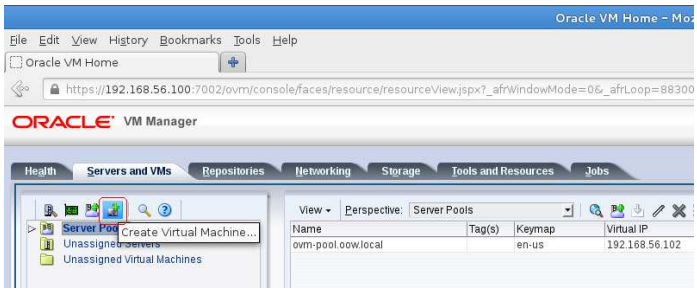




2.7 CREATE GUEST BASED ON ORACLE VM TEMPLATE

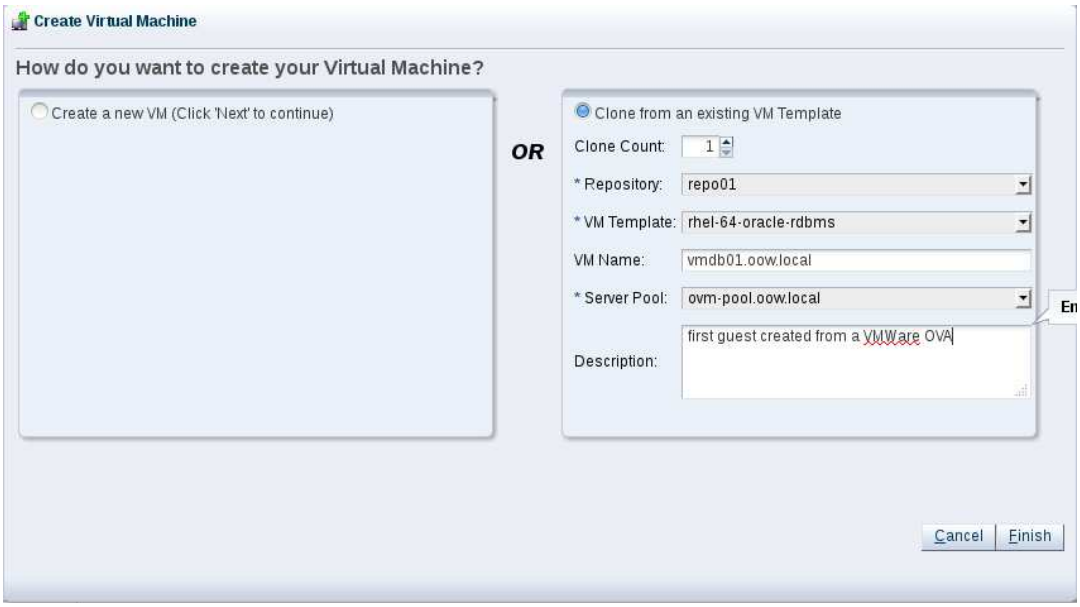
We will now create a “first” guest based on the template created just above.
This chapter will show how-to create a guest from an Oracle VM Template (in our case, Oracle VM Template has been derived from a virtual-machine exported from VMWare).

a) Click on “**Servers and VMs**” tab and select the button “**Create New Virtual Machine…**”



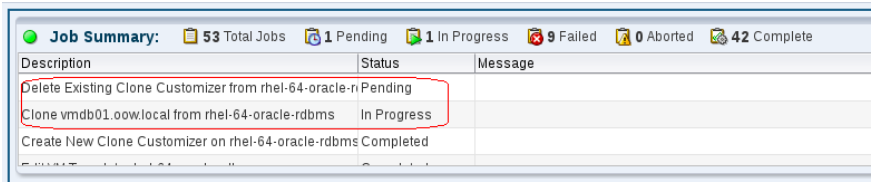
a) In the “**Create Virtual Machine**” window choose the option “Clone from an existing VM Template” and, after that, enter the following details:

- Clone count : **1**
- Repository : **repo01**
- VM Template : **rhel-64-oracle-rdbms**
- VM Name : **vmdb01.oow.local**
- Server Pool : **ovm-pool.oow.local**
- Description : **first guest created from a VMWare OVA**



and then click finish to confirm the guest creation.

b) Verify that creation jobs complete successfully.



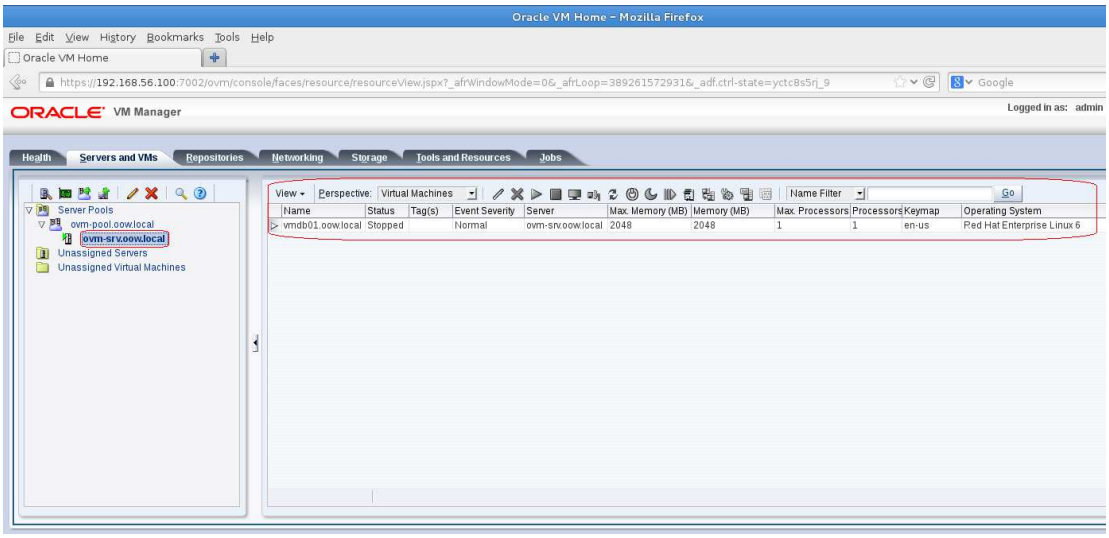
Note: Immediate VM creation on OCFS2
The VM creation should be almost immediate since the repository use OCFS2 filesystem and the reflink feature. This avoids to copy all blocks of the template files, but instead uses pointers to existing blocks in the new files.
(see details on the OCFS2 reflink feature on https://blogs.oracle.com/wim/entry/ocfs2_reflink)

2.8 VERIFY AND START ORACLE VM GUEST CREATED

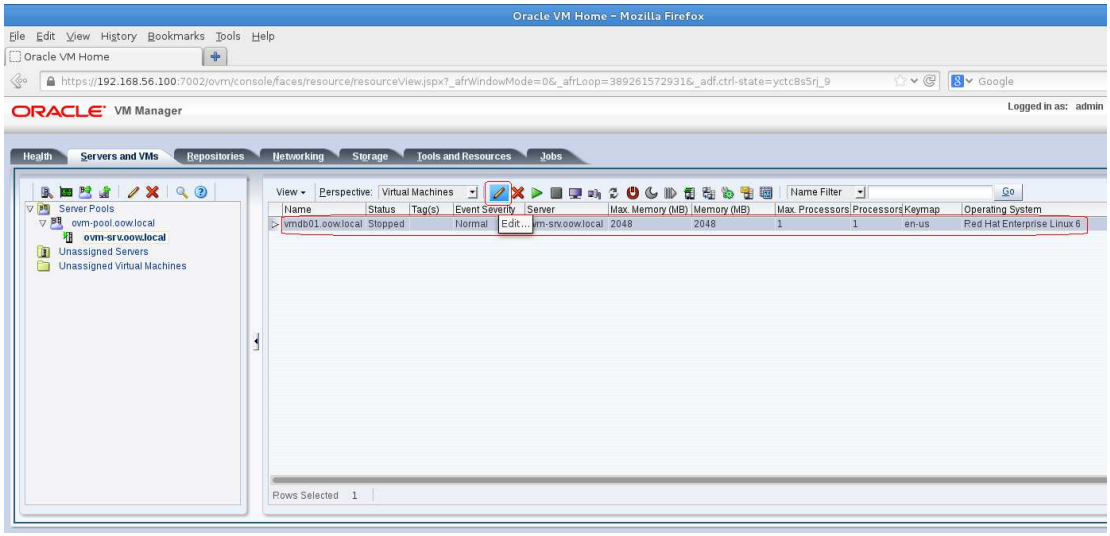
Our guest is ready but, before to start it, we need to verify that everything is accomplished. This chapter will show how-to edit a guest server, modify and start it.

a) Click on "**Servers & VMs**" tab, expand "**Server Pools**" and the pool named "**ovm-pool.oow.local**" with the button

a) Select the physical server (dom0) named "**ovm-srv.oow.local**" and, in the window on the right guest created will appear.



b) Select the guest named "vmdb01.oow.local" and click on the edit button



c) In the "**Edit Virtual Machine: vmdb01.oow.local**" window verify following details:

Section "**Configuration**"

Name:	"**vmdb01.oow.local**"
Operating System:	"**Red Hat Enterprise Linux 6**"
Domain Type:	"**XEN PVM**"
Max. Memory(MB):	"**2048**"
Memory(MB):	"**2048**"
Max. Processors:	"**1**"
Processors:	"**1**"
Priority:	"**50**"
Processor Cap %:	"**100**"

Section “**Networks**”

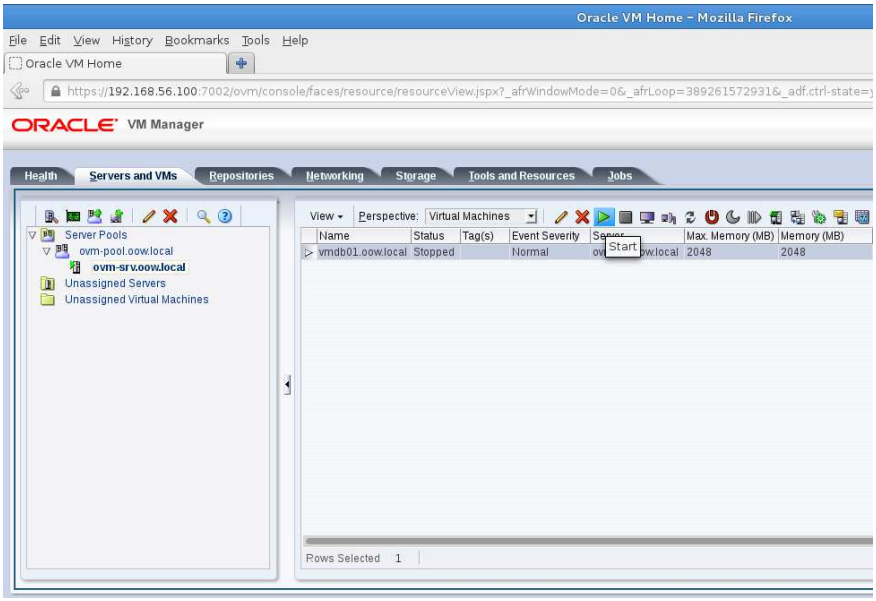
Network: “**192.168.56.0**”

Section “**Disks”**

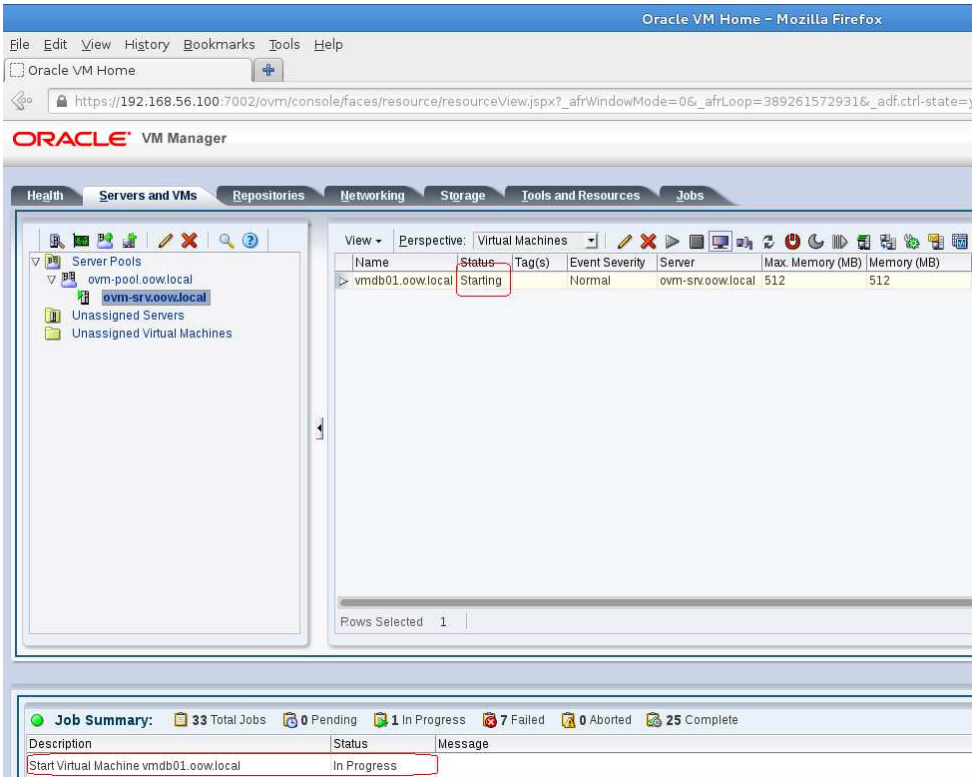
Slot 0 => Disk Type “**Virtual Disk**” (no changes)
Slot 1 => Disk Type “Empty” (modify from “**CD/DVD**” to “**Empty**”)

Confirm with “**OK**” changes applied.

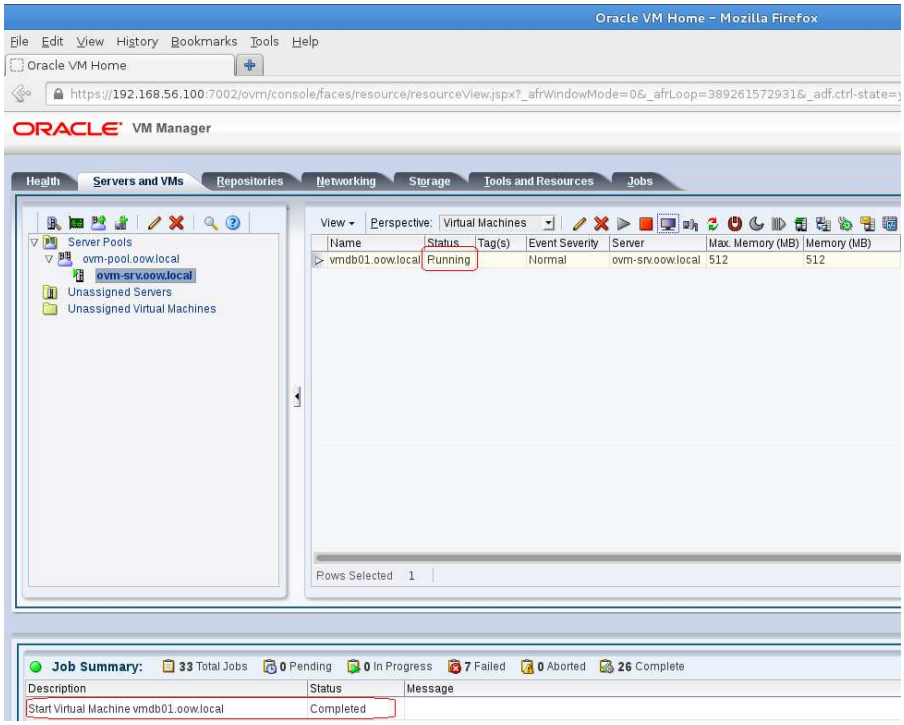
d) Start guest “**vmdb01.oow.local**” with the button



The guest will temporarily pass to the "**Starting**" state; you can also verify that the job completed successfully.
If we want we can also click on "**Job Details**" to see a detailed log of the start.



e) Verify that the job completed successfully; you can evaluate the result in "**Job Summary**" and also on the "**Guest informations**".

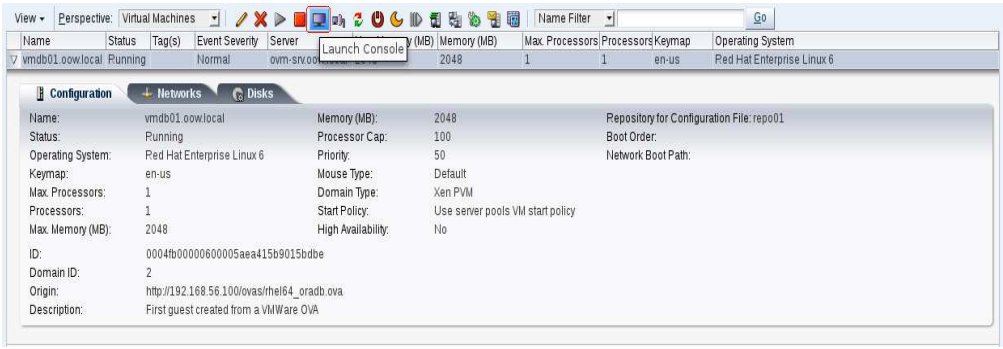

Oracle VM Home - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Oracle VM Home
https://192.168.56.100:7002/ovm/console/faces/resource/resourceView.jspx?_afrWindowMode=0&_afrLoop=389261572931&_adf.ctrl-state=
ORACLE VM Manager
Health
Servers and VMs
Repositories
Networking
Storage
Tools and Resources
Jobs
Server Pools
ovm-pool.oow.local
ovm-srv.oow.local
Unassigned Servers
Unassigned Virtual Machines
View
Perspective: Virtual Machines
Name
Status
Tag(s)
Event Severity
Server
Max. Memory (MB)
Memory (MB)
vmdb01.oow.local
Running
Normal
ovm-srv.oow.local
512
512
Rows Selected 1
Job Summary:
33 Total Jobs
0 Pending
0 In Progress
7 Failed
0 Aborted
26 Complete
Description
Status
Message
Start Virtual Machine vmdb01.oow.local
Completed

2.9 MANUALLY MODIFY GUEST CONFIGURATION

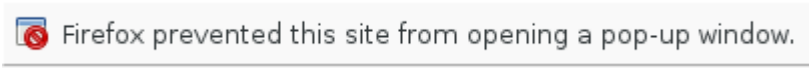
Obviously this guest machine needs some changes, first of all, the network configuration; default network configuration on VMWare is on network 192.168.93.0/24 while default VirtualBox network configuration is 192.168.56.0/24.

Guest “ovmdb01.oow.local” is not network reachable, so you have to connect to its console to modify network configuration; this chapter will show how-to open a guest console and modify its network configuration.

a) Select the guest named “vmdb01.oow.local” and click on the console button

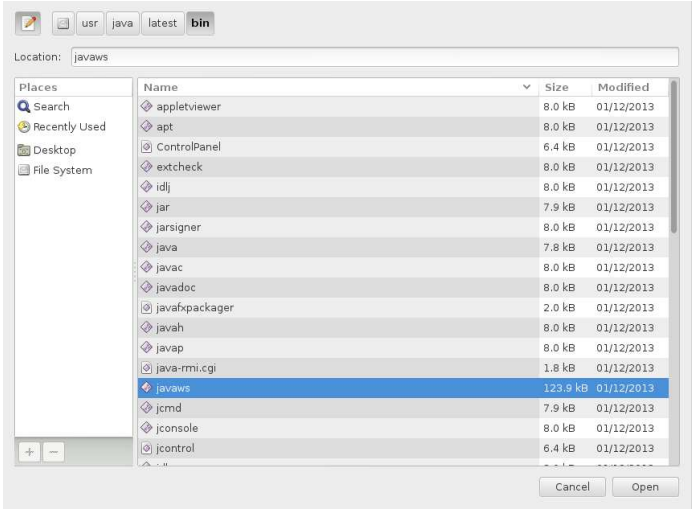


b) A “pop-up” blocker could appear (sort it out by allowing pop-ups to Oracle VM Manager)

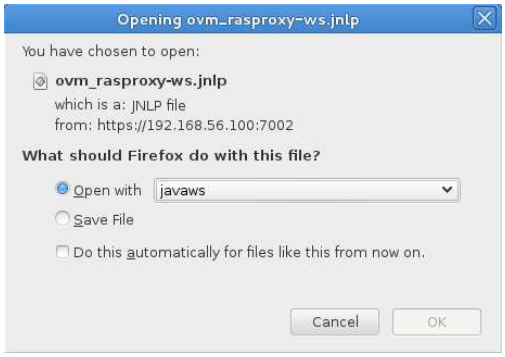


c) The browser will ask what to do with a file (ovm_rasproty-ws.jnlp); choose “Open with” and select:

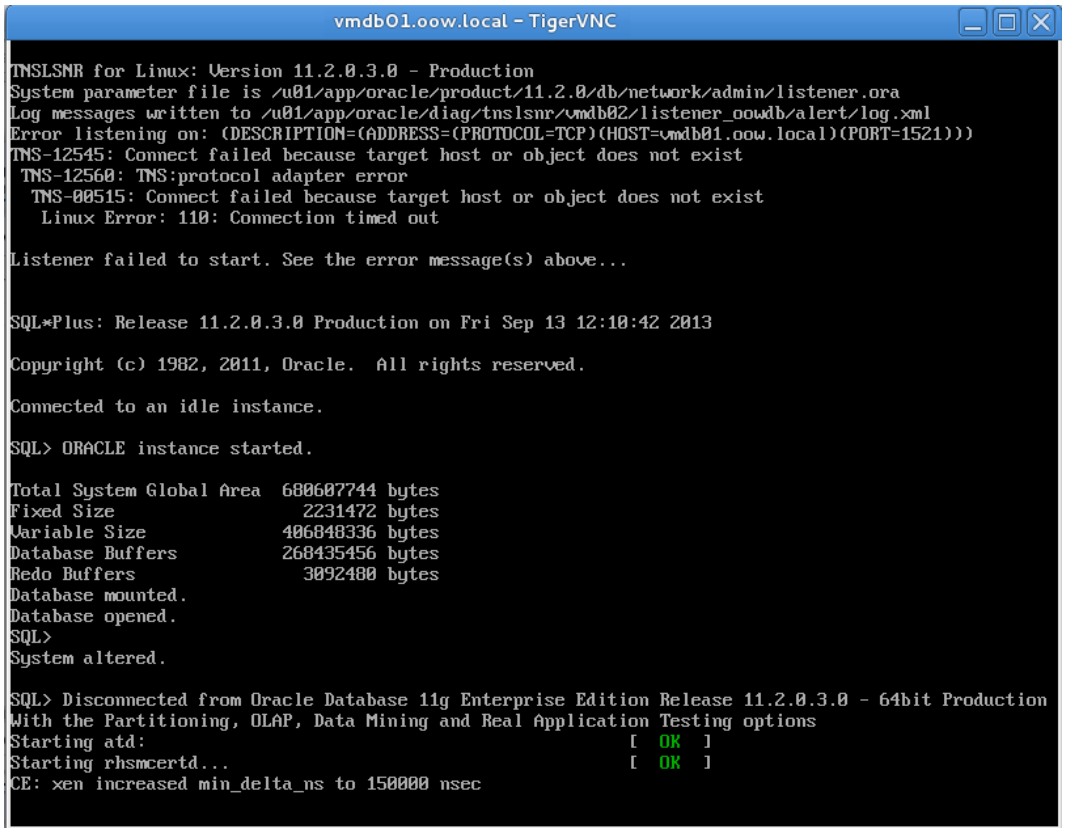
/usr/java/latest/bin/javaws (latest installed jre on your Linux laptop)



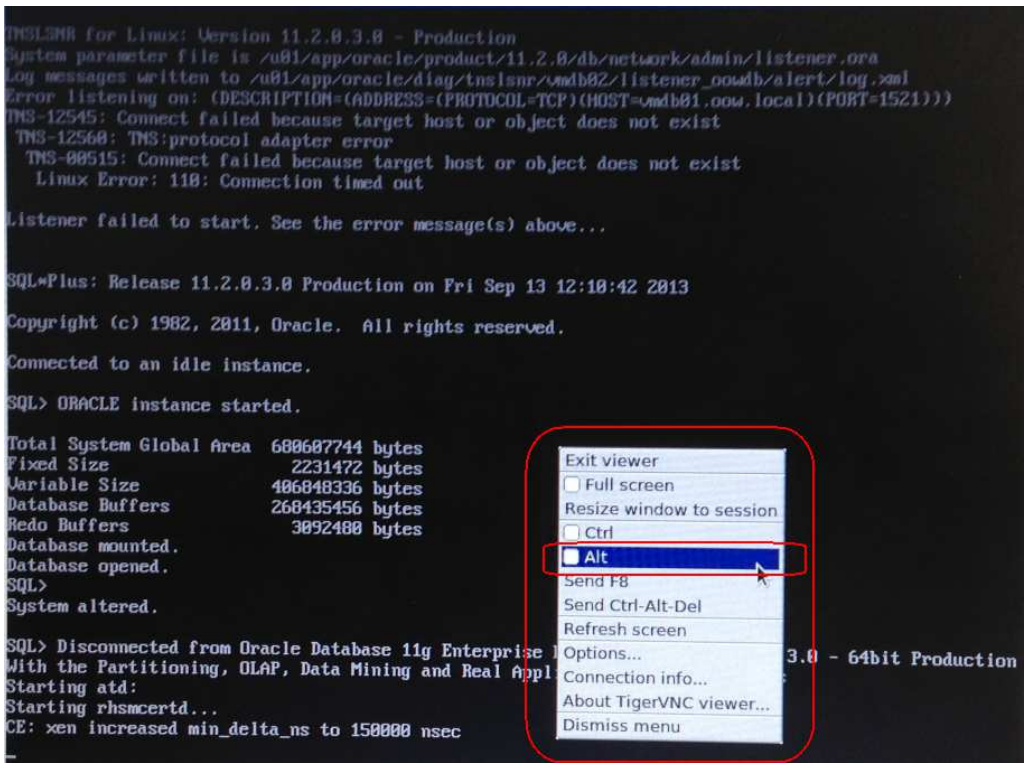
Click “OK” to confirm.



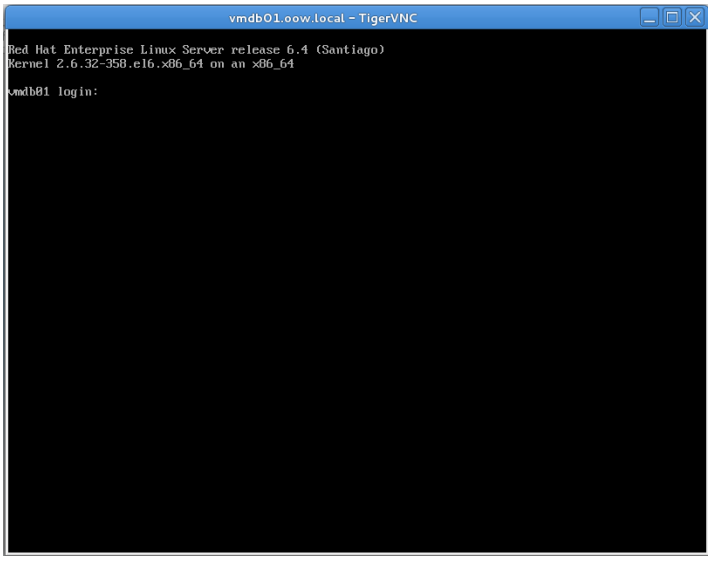
d) The console, with guest prompt login, will appear but without login prompt:



e) To obtain a login prompt, move your mouse arrow on the VNC console window, select (click) it, and press "**F8**" function button on your keyboard; a menu will appear and here, you will have to select "**ALT radio button**".



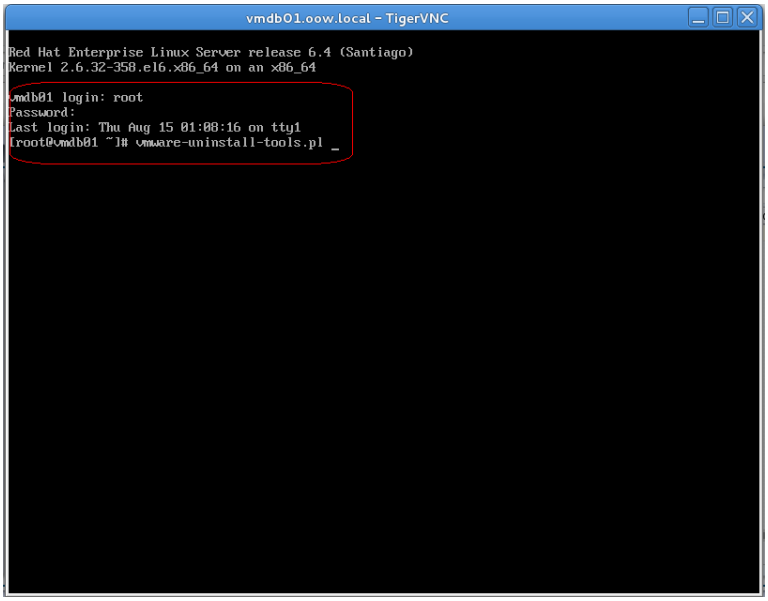
f) Now press "**F2**" function button to open "**Console Window number 2**" and you'll see the login prompt; at this point you have to deselect the "ALT" option: so click again "**F8**" and then **clear selection on** "**ALT radio button**".



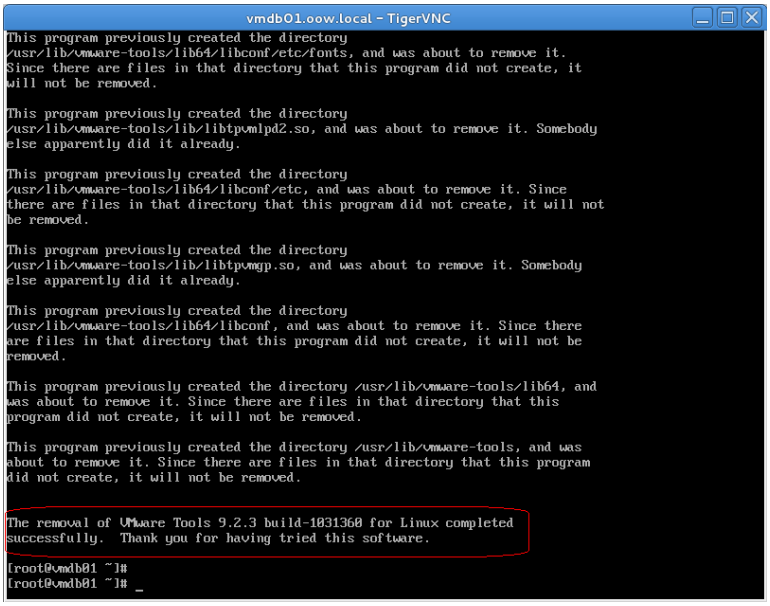
Login with:
User: "**root**"
Password: "**ovsroot**"

g) First step is to drop vmware-tools installation; to proceed with the removal execute:

vmware-uninstall-tools.pl

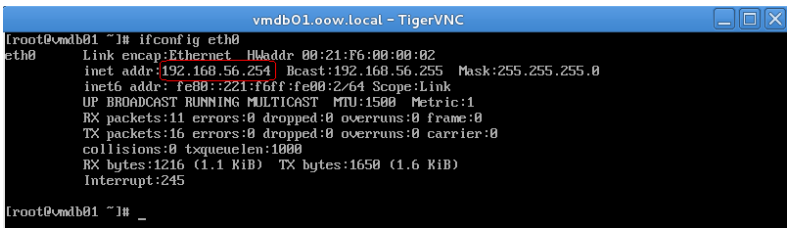


h) Verify that the removal result is like this one:



i) By Oracle VM Console verify guest ip address (taken by dhcp server installed on Oracle VM Manager):

ifconfig eth0



An alternative to see witch IP Address has been assigned to "**vmdb01.oow.local**" is:

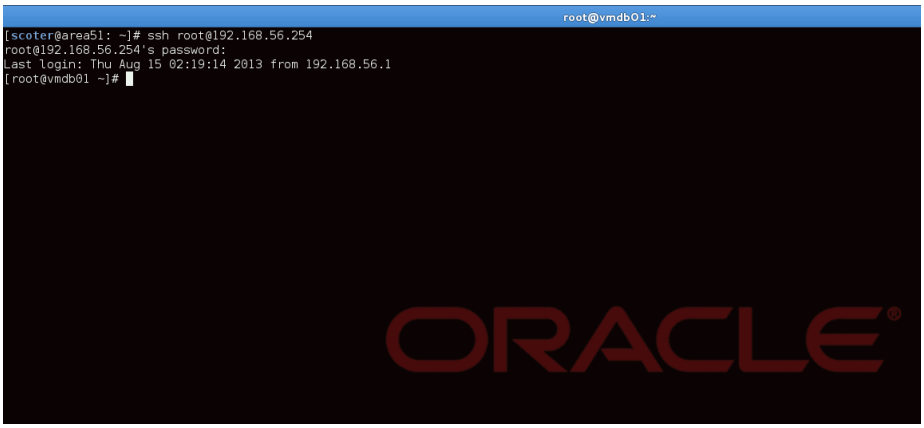
1. Connect to Oracle VM Manager "ovm-mgr.oow.local – 192.168.56.100" via ssh (ssh root@192.168.56.100) – root password is "ovsroot"
2. Execute the command : "tail -50 /var/log/messages |grep DHCPACK", example:

```
[root@ovm-mgr ~]# tail -50 /var/log/messages |grep DHCPACK
Aug 16 01:59:30 ovm-mgr dhcpd: DHCPACK on 192.168.56.254 to 00:21:f6:00:00:02
via eth0
```

j) Open a terminal on your Linux Laptop and connect to the guest with the IP address above:

```
# ssh root@<ip_address_obtained>
```

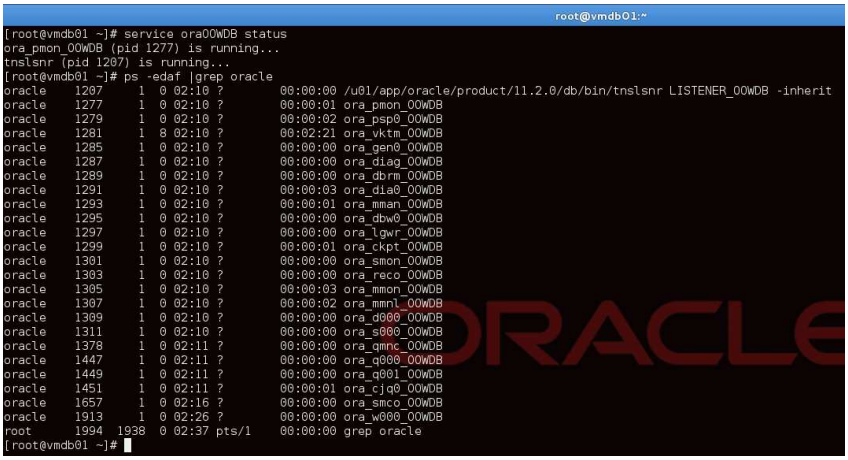
nb: guest root password is "**ovsroot**"



k) Verify "Oracle Database" and "Oracle Listener" status with the following commands:

```
# service oraOOWDB status
# ps –edaf |grep oracle
```

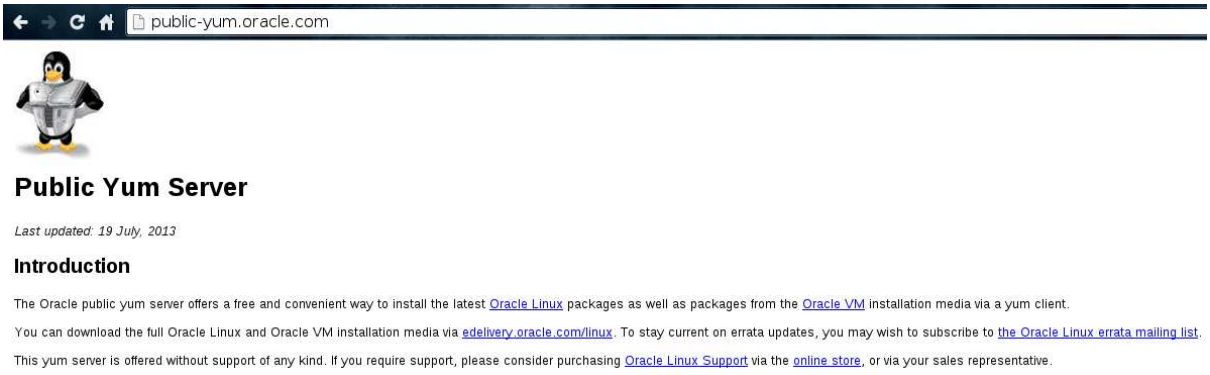
The output should be similar to this one:


root@vmdb01:~
[root@vmdb01 ~]# service ora0OWDB status
ora_pmon_0OWDB (pid 1277) is running...
tnslsnr (pid 1207) is running...
[root@vmdb01 ~]# ps -edaf |grep oracle
oracle 1207 1 0 02:10 ? 00:00:00 /u01/app/oracle/product/11.2.0/db/bin/tnslsnr LISTENER_0OWDB -inherit
oracle 1277 1 0 02:10 ? 00:00:01 ora_pmon_0OWDB
oracle 1279 1 0 02:10 ? 00:00:02 ora_psp0_0OWDB
oracle 1281 1 8 02:10 ? 00:02:21 ora_vktm_0OWDB
oracle 1285 1 0 02:10 ? 00:00:00 ora_gen0_0OWDB
oracle 1287 1 0 02:10 ? 00:00:00 ora_diag_0OWDB
oracle 1289 1 0 02:10 ? 00:00:00 ora_dbrm_0OWDB
oracle 1291 1 0 02:10 ? 00:00:03 ora_dia0_0OWDB
oracle 1293 1 0 02:10 ? 00:00:01 ora_mman_0OWDB
oracle 1295 1 0 02:10 ? 00:00:00 ora_dbw0_0OWDB
oracle 1297 1 0 02:10 ? 00:00:00 ora_lgwr_0OWDB
oracle 1299 1 0 02:10 ? 00:00:01 ora_ckpt_0OWDB
oracle 1301 1 0 02:10 ? 00:00:00 ora_smon_0OWDB
oracle 1303 1 0 02:10 ? 00:00:00 ora_reco_0OWDB
oracle 1305 1 0 02:10 ? 00:00:03 ora_mmon_0OWDB
oracle 1307 1 0 02:10 ? 00:00:02 ora_mmnl_0OWDB
oracle 1309 1 0 02:10 ? 00:00:00 ora_d000_0OWDB
oracle 1311 1 0 02:10 ? 00:00:00 ora_s000_0OWDB
oracle 1378 1 0 02:11 ? 00:00:00 ora_qmnc_0OWDB
oracle 1447 1 0 02:11 ? 00:00:00 ora_q000_0OWDB
oracle 1449 1 0 02:11 ? 00:00:00 ora_q001_0OWDB
oracle 1451 1 0 02:11 ? 00:00:01 ora_cjq0_0OWDB
oracle 1657 1 0 02:16 ? 00:00:00 ora_smco_0OWDB
oracle 1913 1 0 02:26 ? 00:00:00 ora_w000_0OWDB
root 1994 1938 0 02:37 pts/1 00:00:00 grep oracle
[root@vmdb01 ~]#

2.10 SWITCH FROM REDHAT TO ORACLE LINUX

One of the targets of this lab is to show Oracle Public Yum:

http://public-yum.oracle.com



Site reports:

The Oracle public yum server offers a free and convenient way to install the latest Oracle Linux packages as well as packages from the Oracle VM installation media via a yum client. You can download the full Oracle Linux and Oracle VM installation media via edelivery.oracle.com/linux. To stay current on errata updates, you may wish to subscribe to the Oracle Linux errata mailing list. This yum server is offered without support of any kind. If you require support, please consider purchasing Oracle Linux Support via the online store, or via your sales representative.

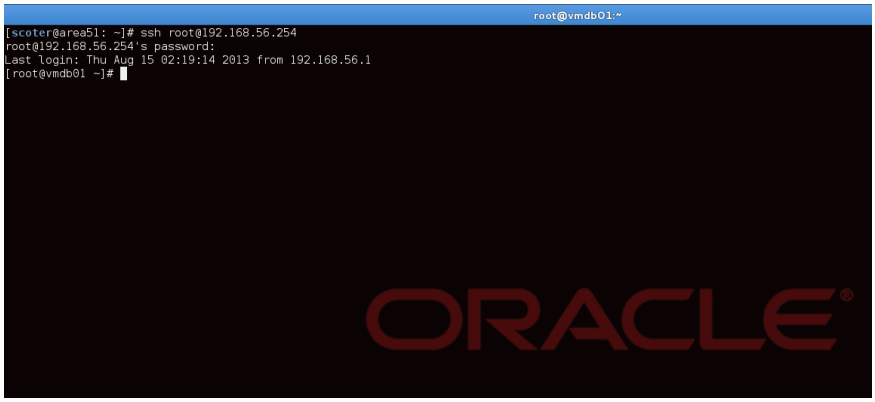
In this lab we replicated a local “Oracle Public Yum” to speed up switching process.
The role local “Oracle Public Yum” belongs to the server “ovm-mgr.oow.local – 192.168.56.100”.

a) Connect by a terminal (if not already connected) to your guest “vmdb01.oow.local”

b) Execute this command to copy yum configuration:

   # scp 192.168.56.100:/etc/yum.repos.d/myRepo.repo /etc/yum.repos.d/

   nb: root password requested from ovm-mgr.oow.local is “**ovsroot**”



c) First step is to pass the package "**redhat-release**" to "**oracle-release**".
To complete this step execute the following commands:

yumdownloader oraclelinux-release.x86_64 oraclelinux-release-notes.x86_64

```
root@vmdb01:~
[root@vmdb01 ~]# yumdownloader oraclelinux-release.x86_64 oraclelinux-release-notes.x86_64
Loaded plugins: product-id, refresh-packagekit
oraclelinux-release-6Server-4.0.4.x86_64.rpm
oraclelinux-release-notes-6Server-9.x86_64.rpm
[root@vmdb01 ~]#
```

rpm -Uhv --force oraclelinux-release*

```
root@vmdb01:~
[root@vmdb01 ~]# rpm -Uhv --force oraclelinux-release-*
warning: oraclelinux-release-6Server-4.0.4.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID ec551f03: NOKEY
Preparing...                ########################################### [100%]
   1:oraclelinux-release-not########################################### [ 50%]
   2:oraclelinux-release    ########################################### [100%]
[root@vmdb01 ~]#
```

d) Install "Oracle Linux Distribution" packages and Oracle Unbreakable Kernel with the following command:

yum install oracle-logos.noarch oracle-rdbms-server-11gR2-preinstall.x86_64 oracleasm-support.x86_64

nb: this command will replace Redhat logos, will install Oracle Linux Kernel (due to dependencies) and, latest but not least important, Oracle softwares preinstall packages such as:

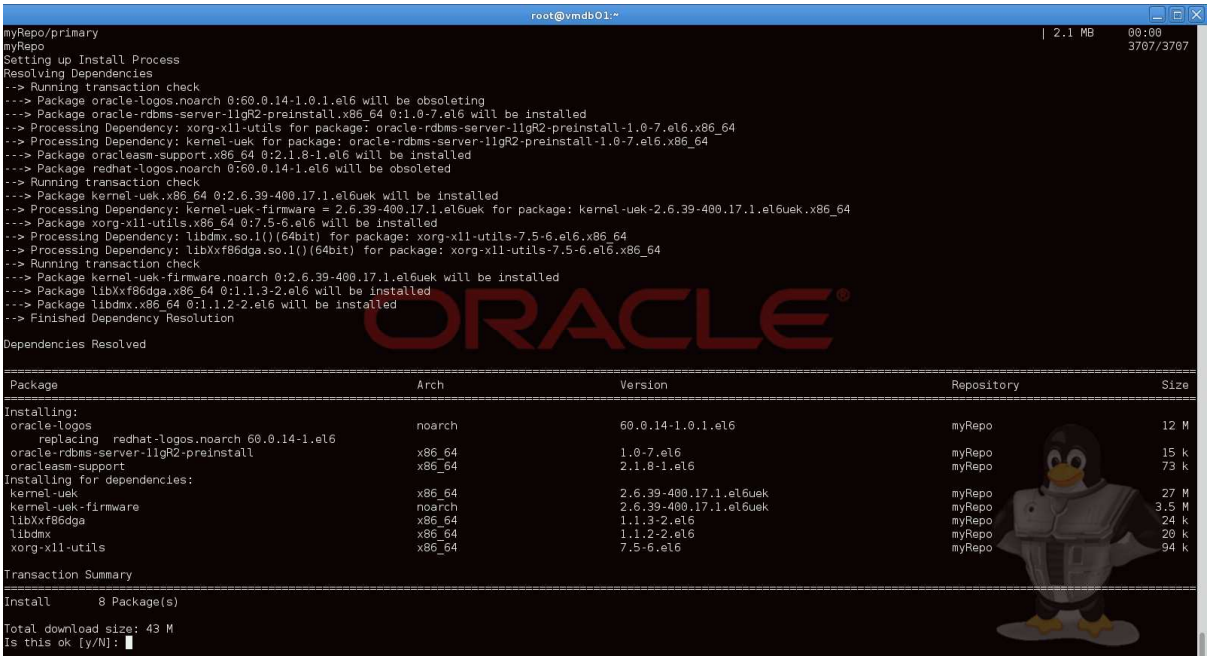
- oracle-rdbms-server-11GR2-preinstall
- oracle-em-agent-12cR1-preinstall

These pre-install packages are available for x86_64 only.
Specifically, these packages:

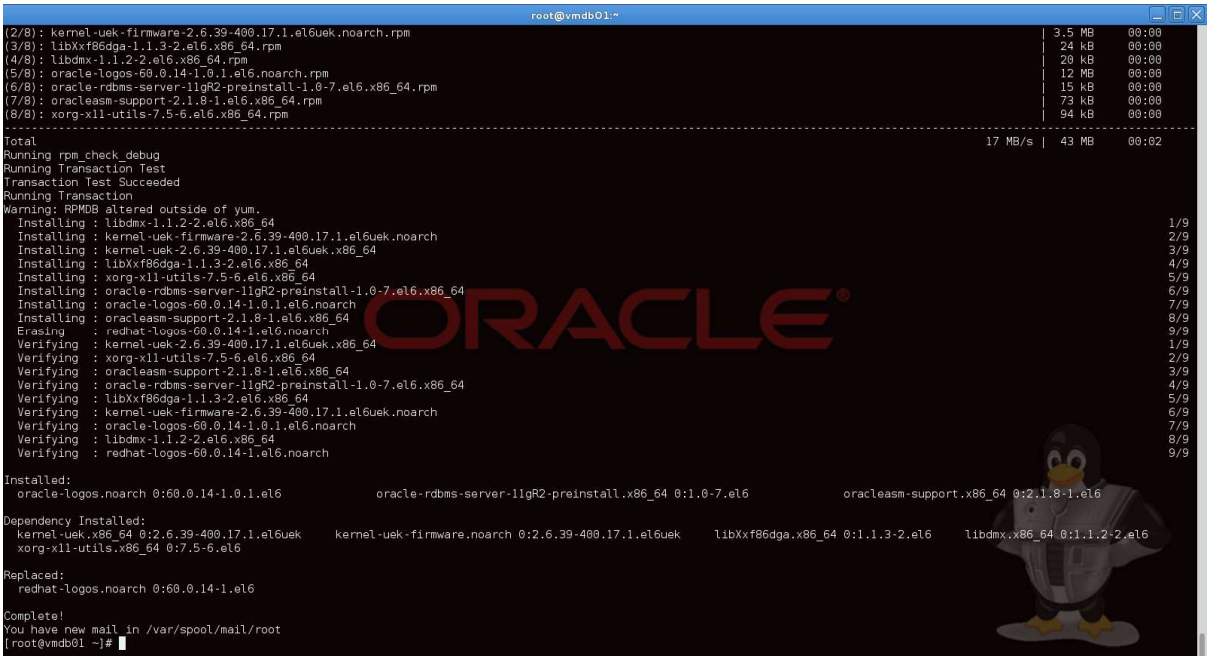
- *Causes the download and installation of various software packages and specific versions needed for database installation, with package dependencies resolved via yum*
- *Creates, if needed, the user oracle and the groups oinstall and dba, which are the defaults used during database installation*
- *Modifies kernel parameters in /etc/sysctl.conf to change settings for shared memory, semaphores, the maximum number of file descriptors, and so on*
- *Sets hard and soft shell resource limits in /etc/security/limits.conf, such as the number of open files, the number of processes, and stack size to the minimum required based on the Oracle Database 11g Release 2 Server installation requirements*
- *Sets numa=off in the kernel boot parameters for x86_64 machine*

These packages automates and prepare Oracle Linux to accommodate Oracle Enterprise software such as Database, Weblogic, Cloud Control, eBusiness Suite, ecc....

Yum will ask a confirmation to proceed with the install of packages; reply with “Y”:

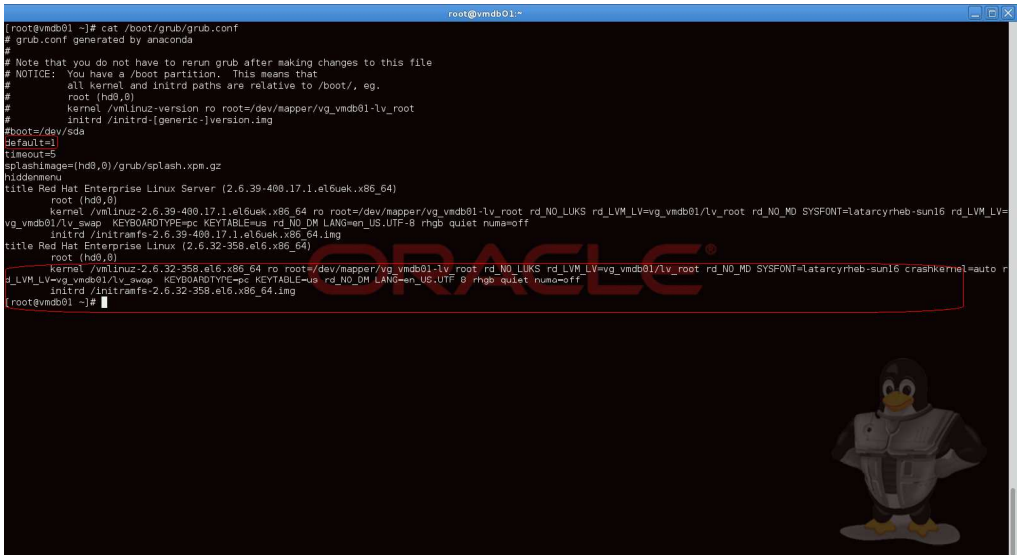


The install process will complete in 2/3 minutes as show below:



e) Verify “vmdb01.oow.local” grub configuration to assure that will boot with the new Oracle UEK Kernel.

You can verify your grub configuration with the command “**cat /boot/grub/grub.conf**”, example:



In this case the “**default kernel (1)**” is the old Red Hat kernel; so we have to modify the “**default**” value to “**0**”.
We would like also to see all boot steps and, so, we need to remove the “rhgb quiet” from the boot kernel command line.
As root, open the “**/boot/grub/grub.conf**” file and edit “default” value from “**1**” to “**0**” and remove the “rhgb quiet” where exists; to complete this task you can use an editor like “vi” or, if you don’t know this tool, execute the following command:

```
# sed -i s/default=1/default=0/ /boot/grub/grub.conf
# sed -i s/rhgb\ quiet// /boot/grub/grub.conf
```

After that, verify that “default” value is correctly set (value is 0).

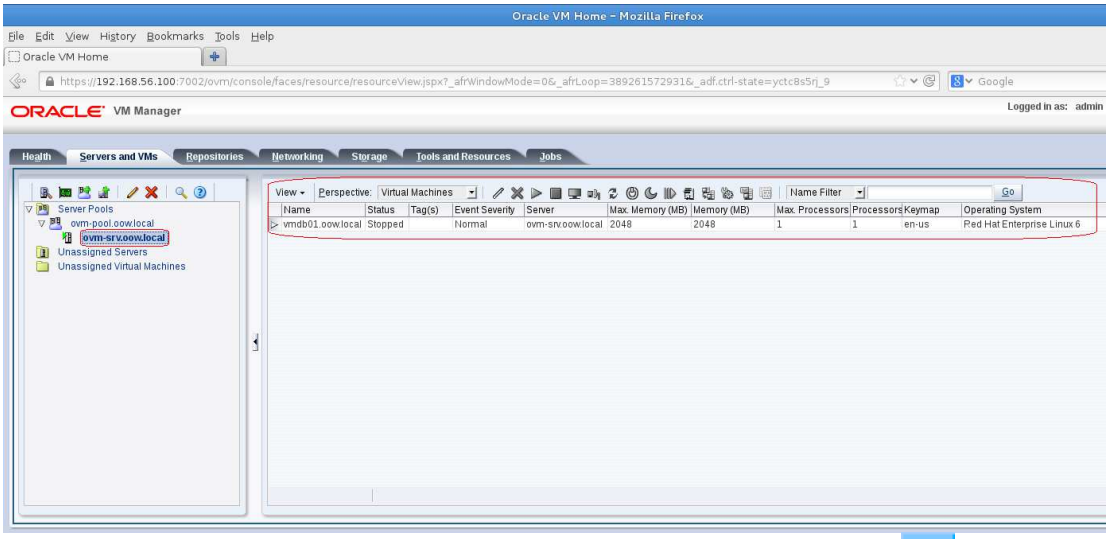
```
# cat /boot/grub/grub.conf
```

f) Disable linux services not needed:

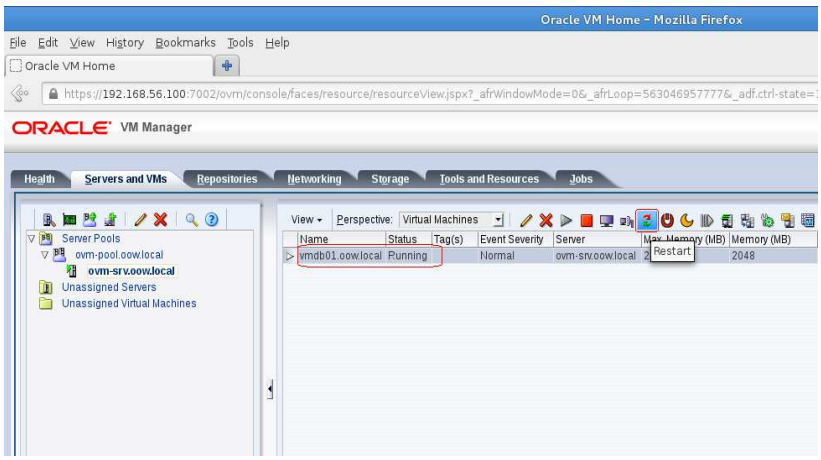
```
# chkconfig rhsmcertd off
# chkconfig rhnsd off
```

g) Reboot guest "**vmdb01.oow.local**" by Oracle VM Manager.
Click on "**Servers & VMs**" tab, expand "**Server Pools**" and the pool named "**ovm-pool.oow.local**" with the button

Select the physical server (dom0) named "**ovm-srv.oow.local**" and, in the window on the right guest running will appear.



Select the guest named "**vmdb01.oow.local**" and click on the restart button

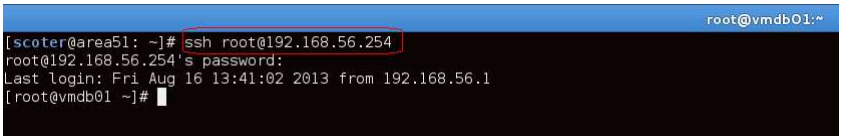


Confirm with "OK" the reboot of the guest.

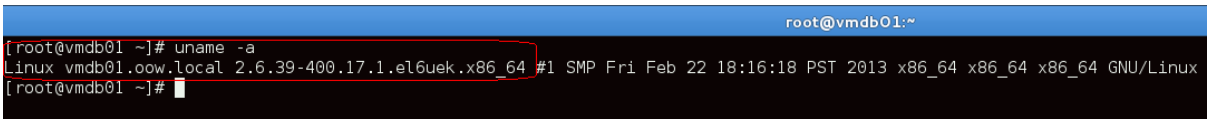
h) Wait for the guest reboot (you can follow its reboot by console opened before) and when reboot is completed reconnect by ssh and verify new Oracle Linux Kernel and parameters introduced by preinstall package "**oracle-rdbms-server-11GR2-preinstall**".

`# ssh root@<ip_address_of_guest>` (in this example is 192.168.56.254)

Login with:
Username: "**root**"
Password: "**ovsroot**"



`# uname -a` (to verify Oracle Kernel loaded)



`# cat /etc/sysctl.conf` (to verify Kernel parameters introduced by preinstall-rdbms package)

```
# oracle-rdbms-server-11gR2-preinstall setting for nofile soft limit is 1024
oracle   soft   nofile    1024

# oracle-rdbms-server-11gR2-preinstall setting for nofile hard limit is 65536
oracle   hard   nofile    65536

# oracle-rdbms-server-11gR2-preinstall setting for nproc soft limit is 2047
oracle   soft   nproc     2047

# oracle-rdbms-server-11gR2-preinstall setting for nproc hard limit is 16384
oracle   hard   nproc     16384

# oracle-rdbms-server-11gR2-preinstall setting for stack soft limit is 10240KB
oracle   soft   stack     10240

# oracle-rdbms-server-11gR2-preinstall setting for stack hard limit is 32768KB
oracle   hard   stack     32768
[root@vmdb01 ~]#
```

`# cat /etc/securty/limits.conf` (to verify settings for linux user “oracle” introduced by preinstall package)

```
#        - data - max data size (KB)
#        - fsize - maximum filesize (KB)
#        - memlock - max locked-in-memory address space (KB)
#        - nofile - max number of open files
#        - rss - max resident set size (KB)
#        - stack - max stack size (KB)
#        - cpu - max CPU time (MIN)
#        - nproc - max number of processes
#        - as - address space limit (KB)
#        - maxlogins - max number of logins for this user
#        - maxsyslogins - max number of logins on the system
#        - priority - the priority to run user process with
#        - locks - max number of file locks the user can hold
#        - sigpending - max number of pending signals
#        - msgqueue - max memory used by POSIX message queues (bytes)
#        - nice - max nice priority allowed to raise to values: [-20, 19]
#        - rtprio - max realtime priority
#<domain>      <type>  <item>         <value>

#*               soft    core            0
#*               hard    rss             10000
#@student        hard    nproc           20
#@faculty        soft    nproc           20
#@faculty        hard    nproc           50
#ftp             hard    nproc           0
#@student        -       maxlogins       4
# End of file

# oracle-rdbms-server-11gR2-preinstall setting for nofile soft limit is 1024
oracle   soft   nofile    1024

# oracle-rdbms-server-11gR2-preinstall setting for nofile hard limit is 65536
oracle   hard   nofile    65536

# oracle-rdbms-server-11gR2-preinstall setting for nproc soft limit is 2047
oracle   soft   nproc     2047

# oracle-rdbms-server-11gR2-preinstall setting for nproc hard limit is 16384
oracle   hard   nproc     16384

# oracle-rdbms-server-11gR2-preinstall setting for stack soft limit is 10240KB
oracle   soft   stack     10240

# oracle-rdbms-server-11gR2-preinstall setting for stack hard limit is 32768KB
oracle   hard   stack     32768
[root@vmdb01 ~]#
```

With these steps we obtained a fully supported and certified configuration for our Oracle Database; while on VMWare Oracle Database was only supported and not certified, with this kind of configuration:

Oracle VM => Oracle Linux => Oracle Database 11g Release 2

We obtained a fully certified “Oracle Database” with a cheaper virtualization solution.
You can obtain further details on MOS (My Oracle Support) note:

Support Position for Oracle Products Running on VMWare Virtualized Environments (Doc ID 249212.1)

Where the first statement reported is:
“Oracle has not certified any of its products on VMware virtualized environments.
…
…..”

2.11 CREATE OWN TEMPLATE STARTING FROM A GUEST

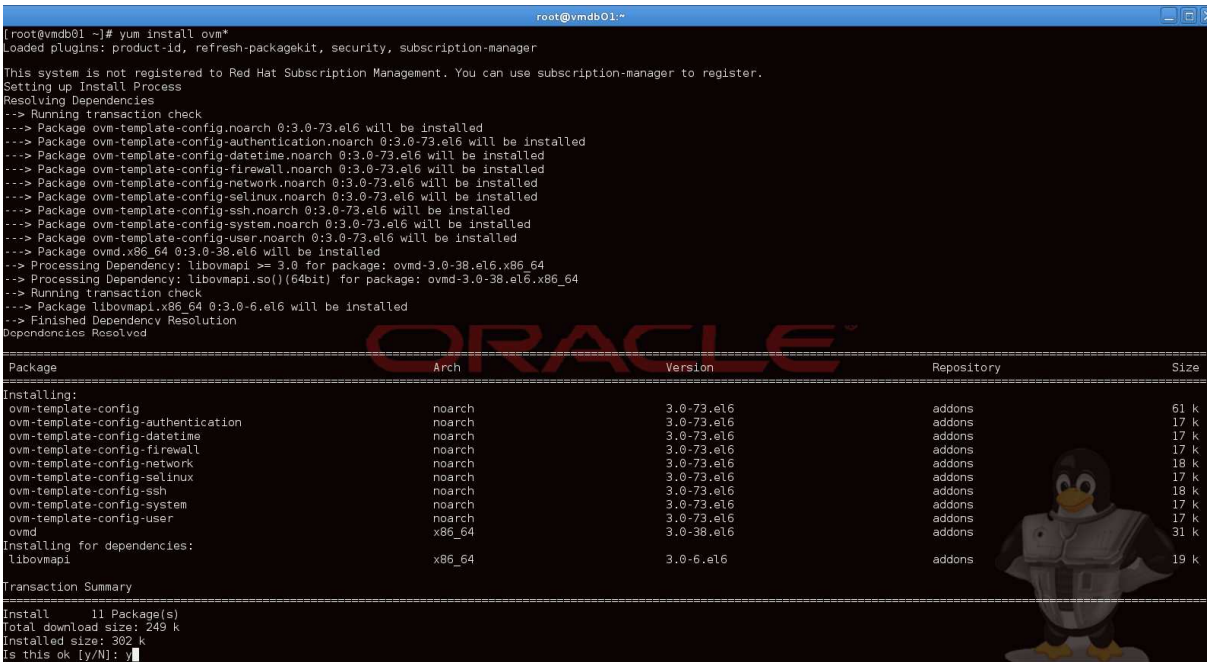
This chapter will describe steps on how to build an Oracle VM Template starting from an existing guest (in our case a guest created by a VMWare OVA).
An Oracle VM Template is a re-usable guest on which we will be able to create more guest automatically.

a) First step is to install RPMs that supply “Oracle VM APIs”; in this configuration you can complete this task with the command:

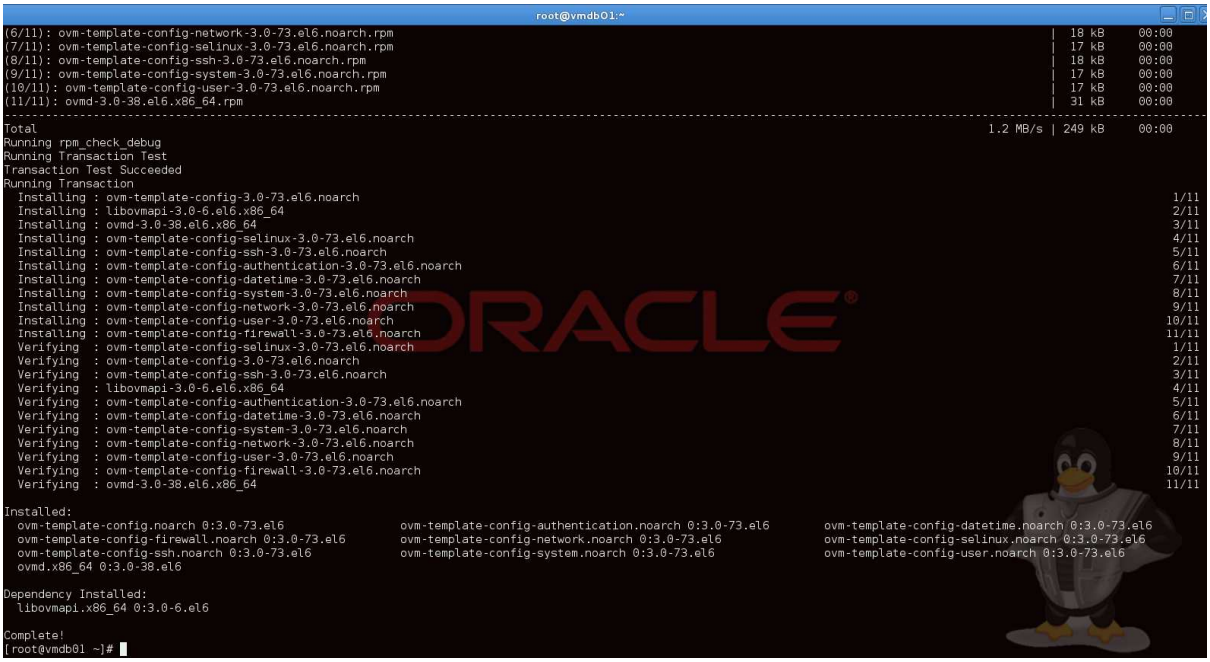
yum install ovm*

Main packages that will be installed are:

- ovm-template-config: Oracle VM Template configuration tool.
- ovmd: Oracle VM guest daemon
- libovmapi: Oracle VM APIs

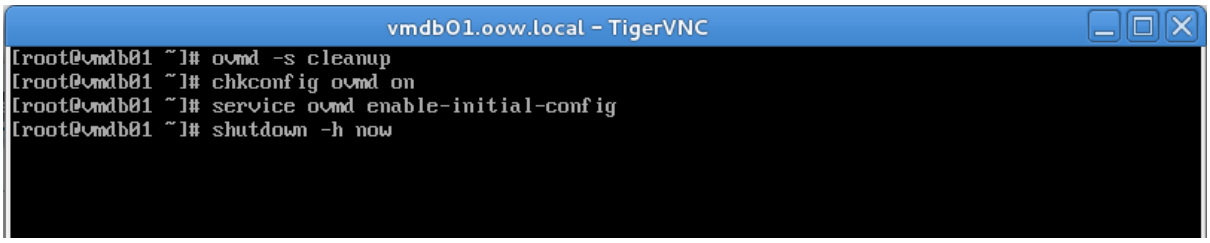


b) The task will complete in few seconds, and the result will be similar to this:

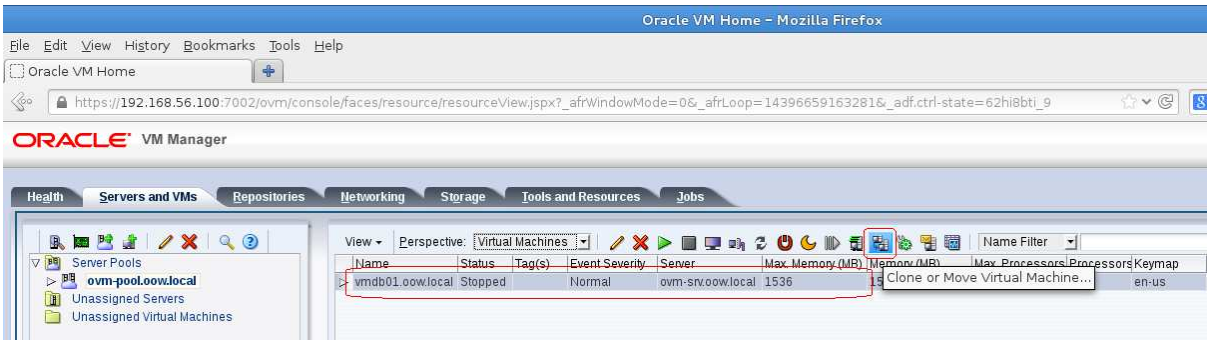


c) Connect to the guest console by Oracle VM Manager and prepare the guest to transform in an Oracle VM Template; once the console is opened execute the following commands:

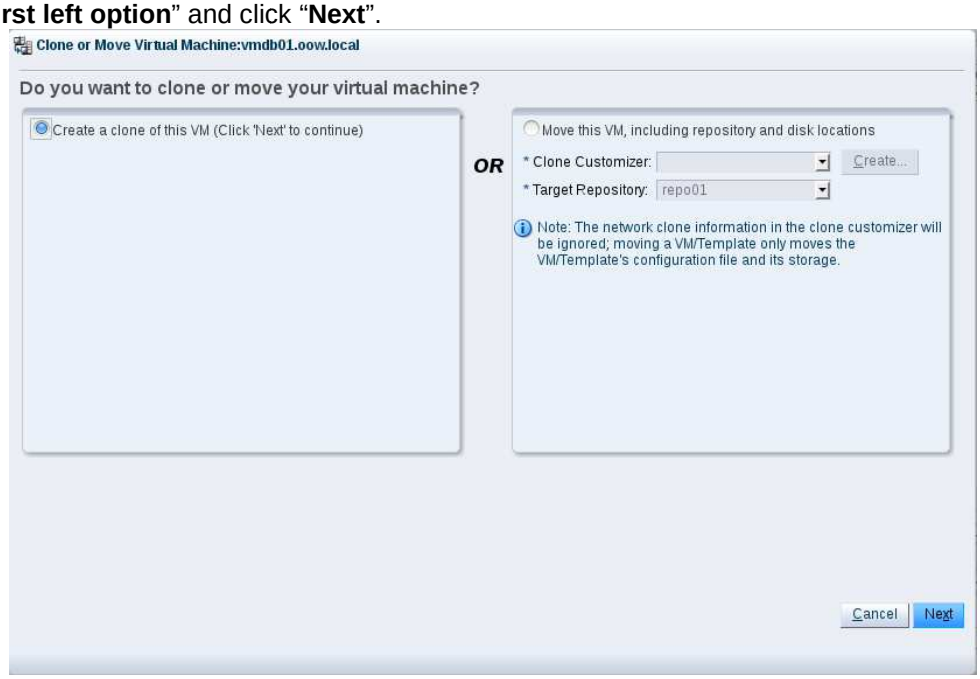
```
# ovmd -s cleanup
# chkconfig ovmd on
# service ovmd enable-initial-config
# shutdown –h now
```



d) Verify that your guest is stopped and, after that, clone it to a new Oracle VM Template. Connect to Oracle VM Manager, select "**Servers and VMs**" tab, select pool named "**ovm-pool.oow.local**" and select perspective "**Virtual Machines**".
Click on the guest "**vmdb01.oow.local**" and click on the button "**Clone or move Virtual Machine**".



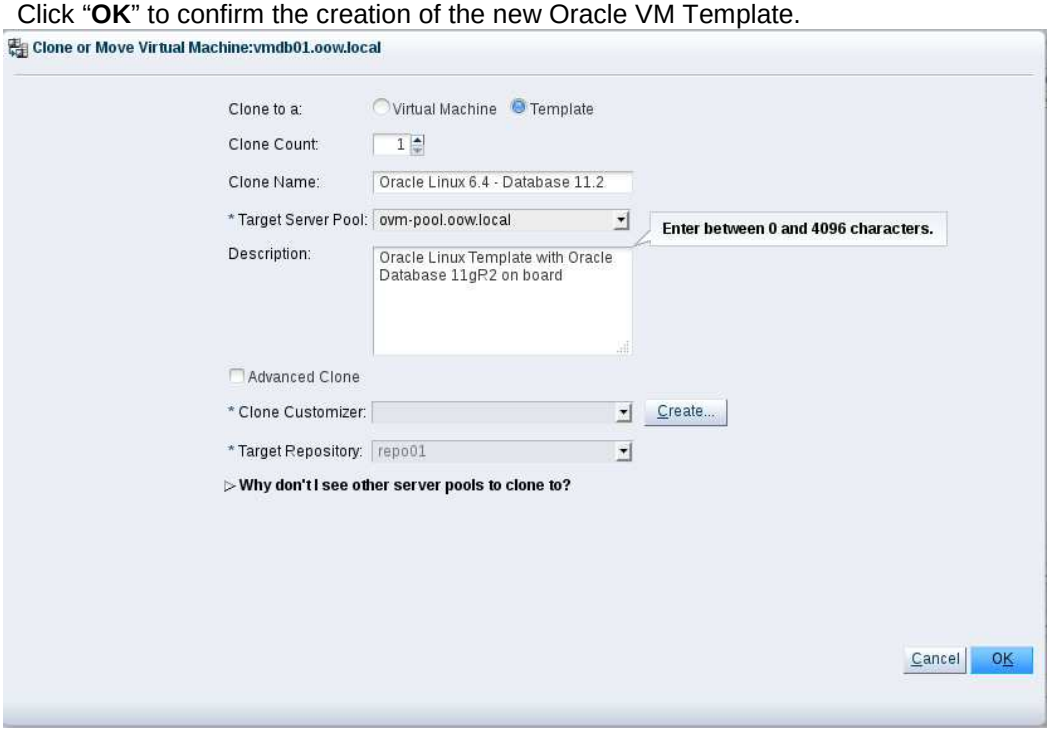
e) In the next windows named "**Clone or Move Virtual Machine: vmdb01.oow.local**" select the **first left option**" and click "**Next**".



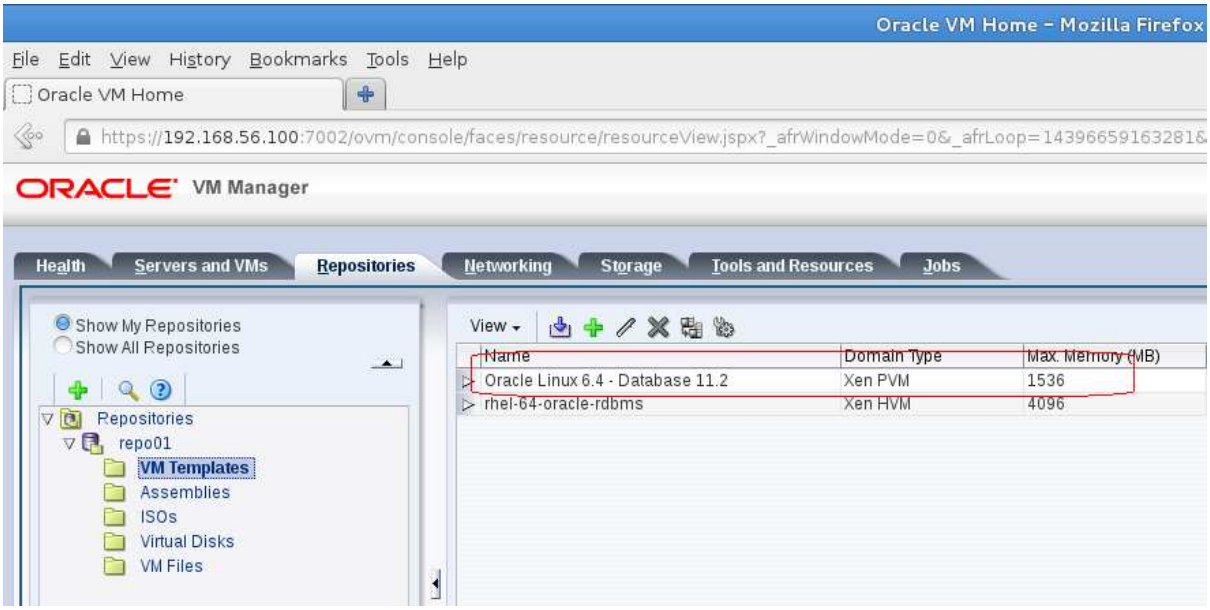
f) In the next step, enter the following details:

Clone to a: "**Template**"
Clone count: "**1**"
Clone name: "**Oracle Linux 6.4 – Oracle Database 11.2**"
Target Server pool: "**ovm-pool.oow.local**"
Description: "**Oracle Linux Template with Oracle 11.2 Database on board**"

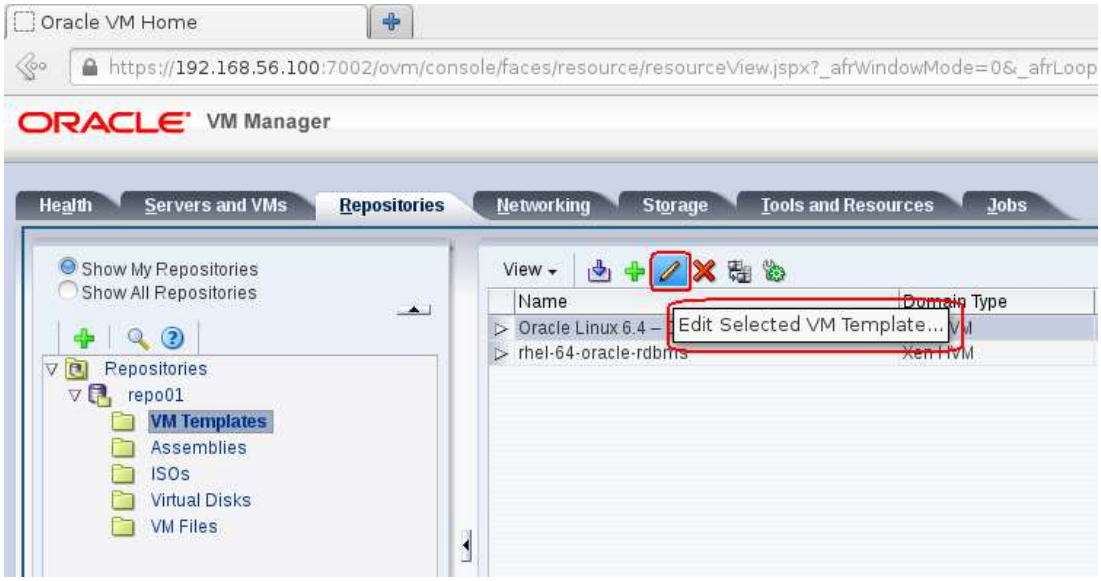
Click "**OK**" to confirm the creation of the new Oracle VM Template.



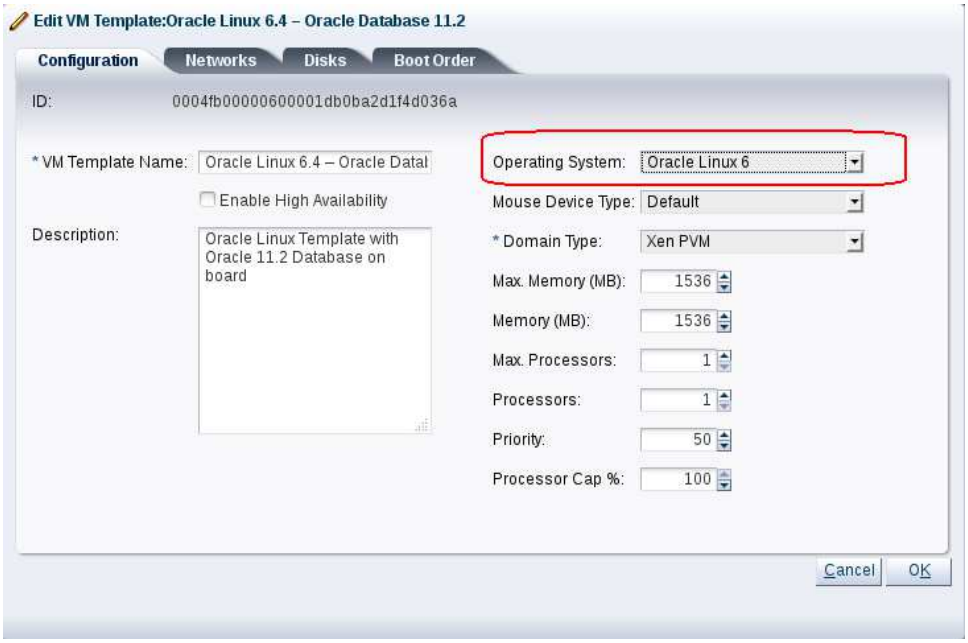
g) Verify the creation of your Oracle VM Template.
Click on "**Repositories**" tab, expand repository "**repo01**" and click on "**VM Templates**" folder .



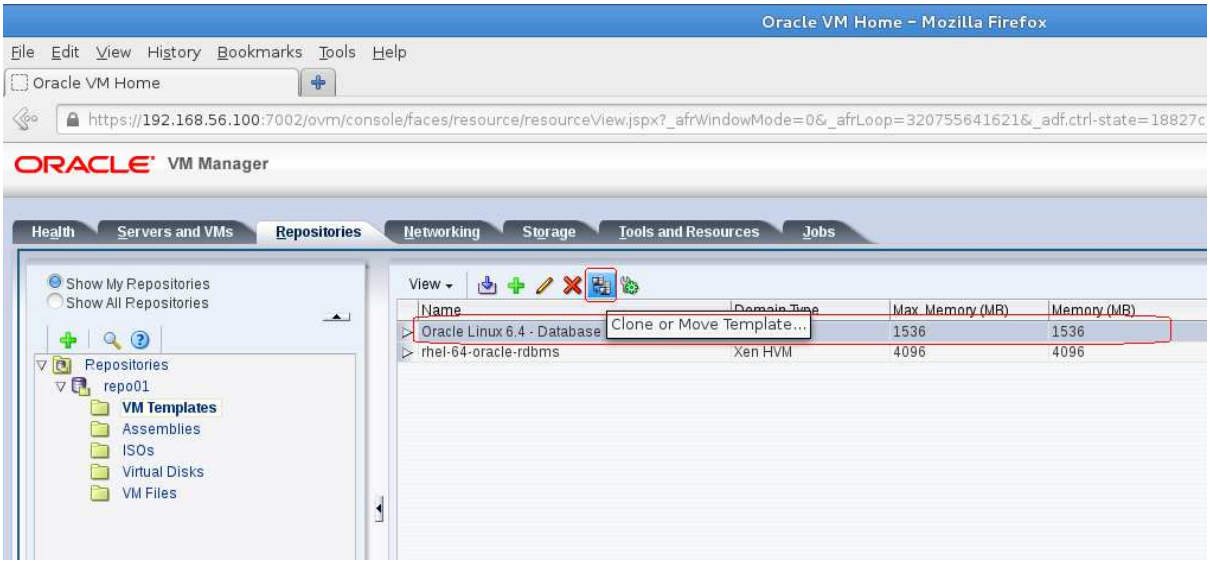
h) Select the the new Oracle VM Template named "**Oracle Linux 6.4 – Database 11.2**" and click on button "**Edit**"



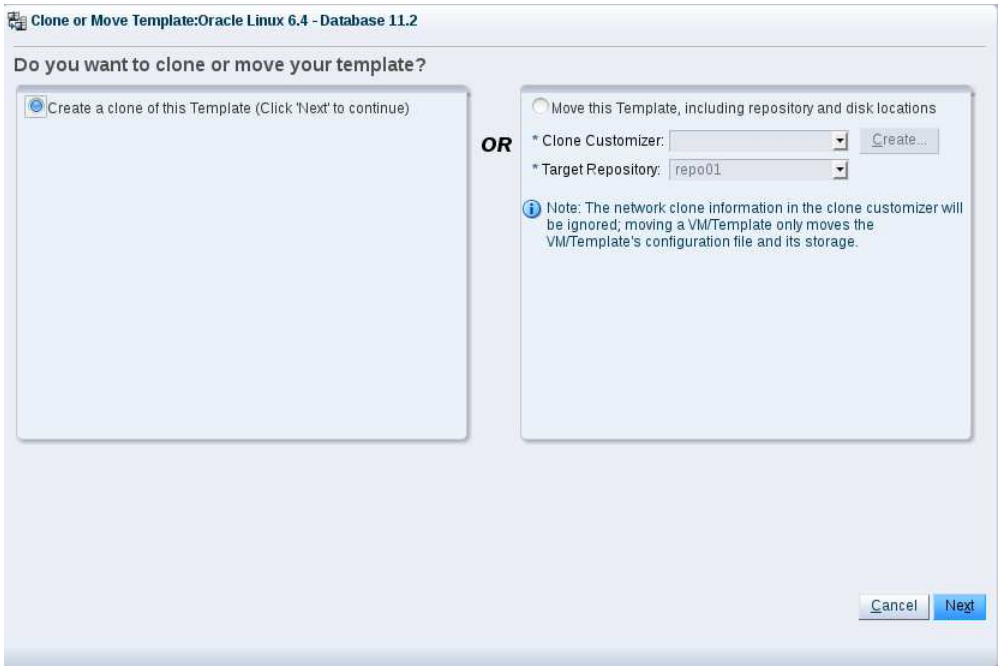
i) Change the "**Operating System**" from "**Red Hat Enterprise Linux 6**" to "**Oracle Linux 6**" and confirm wih "**OK**".



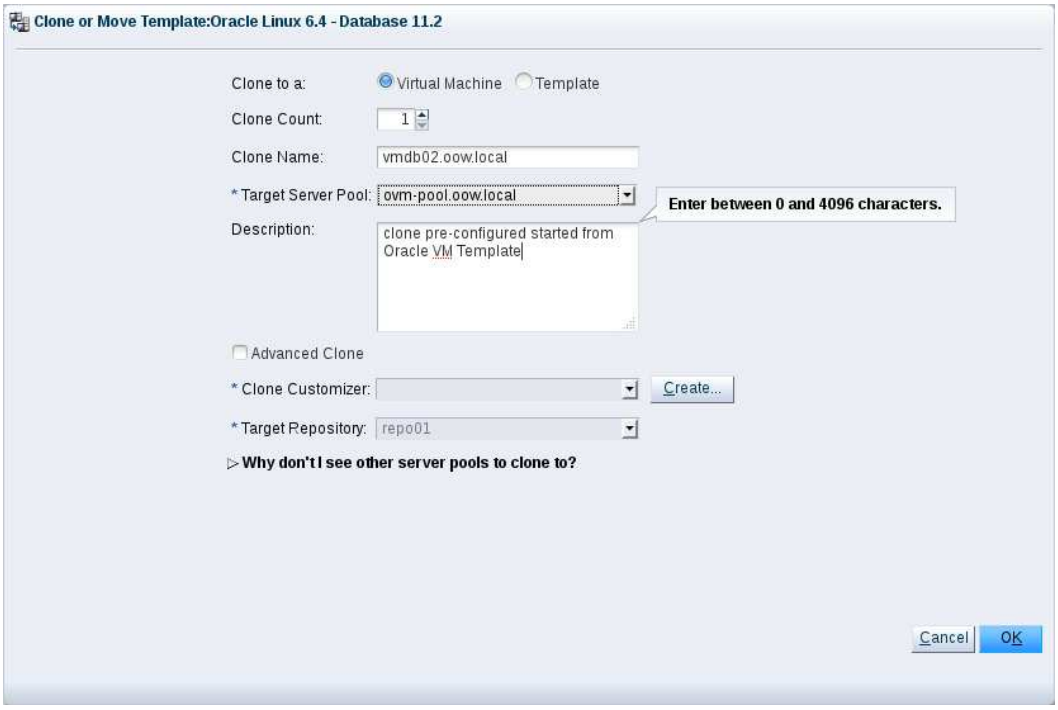
j) Create a new guest named “vmdb02” starting from the new Oracle Linux template. Select the the new Oracle VM Template named “**Oracle Linux 6.4 – Database 11.2**” and click on button “**Clone or Move Template**”



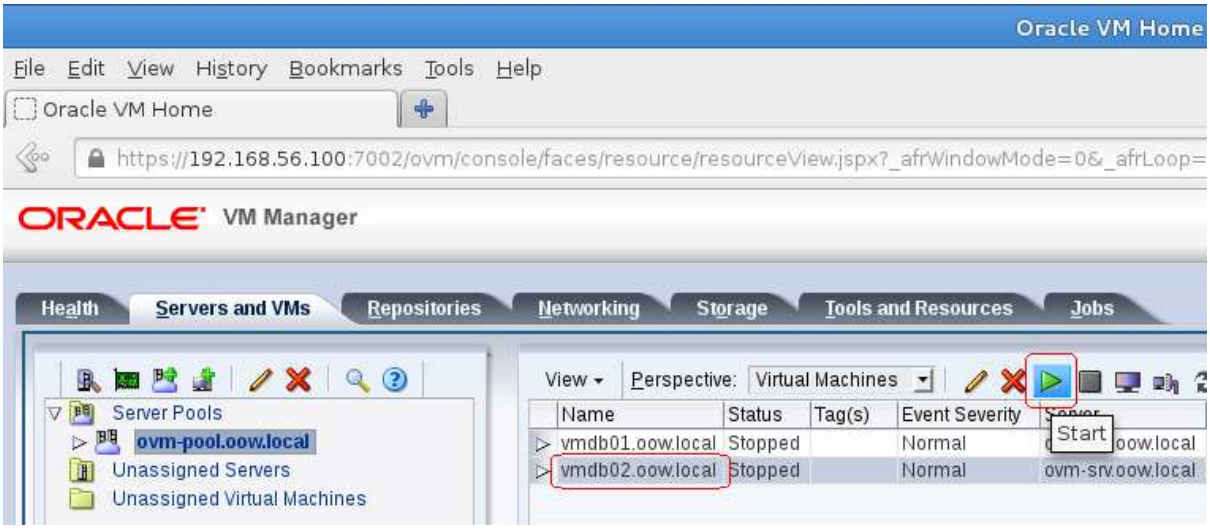
k) In the next window named “**Clone or Move Template: Oracle Linux 6.4 – Database 11.2**” select the option “**Create a clone of this Template**”



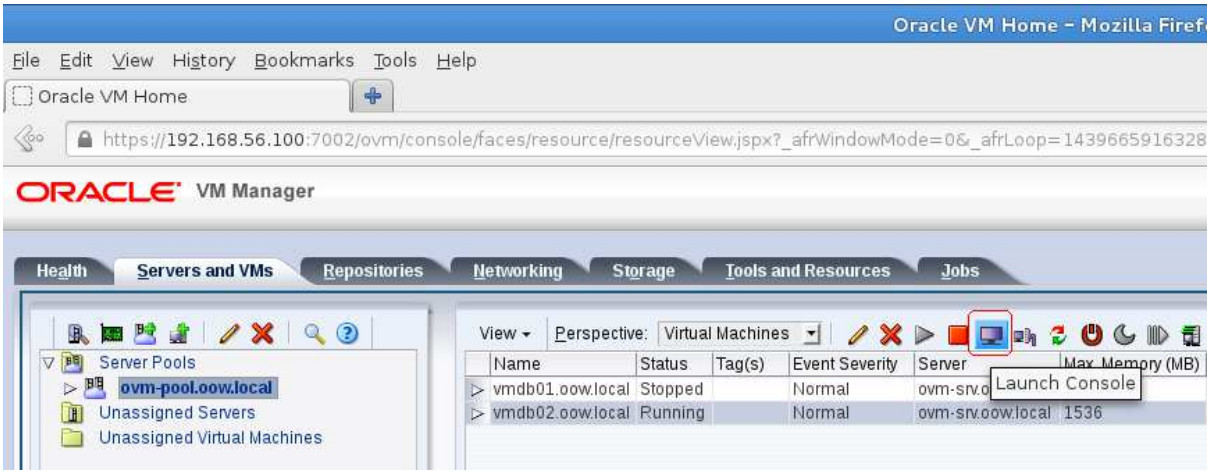
l) In the next step, enter the following details:
Clone to a: "**Virtual Machine**"
Clone count: "**1**"
Clone name: "**vmdb02.oow.local**"
Target Server pool: "**ovm-pool.oow.local**"
Description: "**clone pre-configured started from an Oracle VM Template**"
Click "**OK**" to confirm the creation of the new Oracle VM Guest.



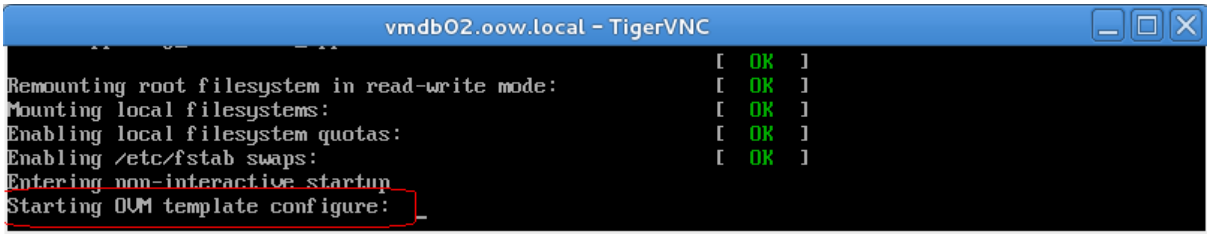
m) Start the new Oracle VM Guest "**vmdb02.oow.local**".
Select "**Servers and VMs**", expand pool name "**ovm-pool.oow.local**", select the guest named "**vmdb02.oow.local**" and click on button .



n) Open "**vmdb02.oow.local**" console by clicking on button.



o) One of first Oracle Linux services that you will see to start by console will be "**OVM Template configure**".



p) OVM Template configure will ask informations for new guest “vmdb02.oow.local”; enter the following details:

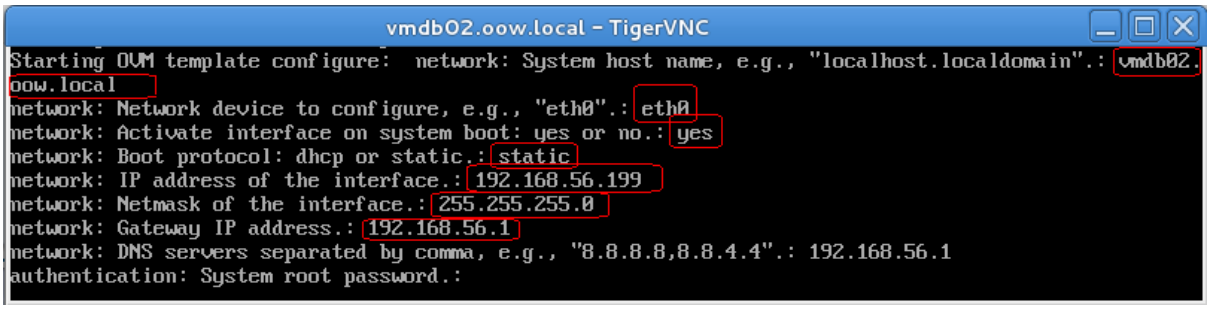
Category: NETWORK

System Hostname:	“**vmdb02.oow.local**”
Network device to configure:	“**eth0**”
Activate interface on system boot:	“**yes**”
Boot protocol: dhcp or static:	“**static**”
IP address of the interface:	“**192.168.56.199**”
Netmask of the interface:	“**255.255.255.0**”
Gateway IP address:	“**192.168.56.1**”
DNS servers separated by comma:	“**192.168.56.1**”

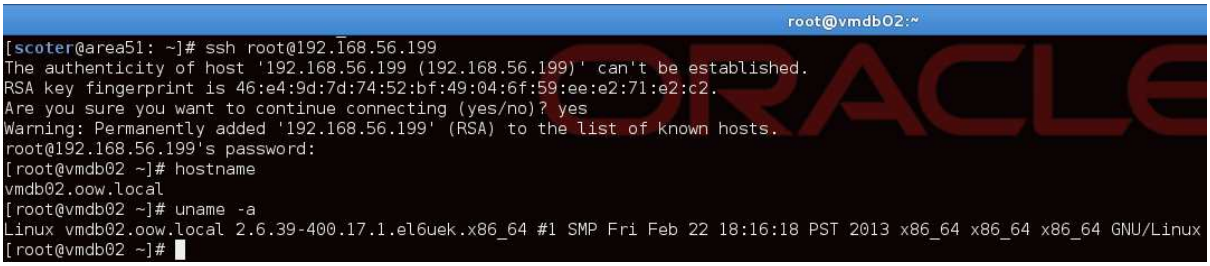
Category: AUTHENTICATION

System root password: “**<your_name>+<your_surname>+1>**” ***

*** = due to security policies we have to insert one long password with, at least, one number.



q) Open a terminal on your laptop and connect by ssh to your new guest (**IP 192.168.56.199**) Commands such as “**hostname**”, “**ifconfig**” and “**uname -a**” will show you new details.



Congratulations !

You have successfully imported a guest from VMWare to Oracle VM, switched from Red Hat to Oracle Linux, and created your first Oracle VM Template using Oracle VM Template configuration scripts.
You could now master your knowledge and create your own Oracle VM Template configuration scripts by following guide deployed by **Wim Coekaerts** on his Oracle blog :

https://blogs.oracle.com/wim/entry/oracle_vm_template_config_script

Migration approach followed by this lab is not the only one; other valid methods of migrations are based on official Oracle VM Templates like “Oracle VM Templates for Oracle Database”.

2.12 END OF LAB: LAB CLEANING

When you have finished this will, we would appreciate if you cloud stop the 3 VirtualBox virtual machines (Oracle VM Server, Oracle VM Manager and Oracle Enterprise Manager) to save time for the next labs taking place in this room.

To do that, execute the following actions for each VirtualBox virtual machine:

- Select a virtual machine in VirtualBox console
- Click on "**Show**"
- Click on **Machine**, **Close**, and then "**Power off the machine**"

We hope you enjoyed this hands on lab and your trip in San Francisco at Oracle OpenWorld 2013.

3 APPENDIX A: PREPARATION OF ENVIRONMENT

3.1 PURPOSE

This section explains how to prepare the environment to run this lab. It is useful if you want to run this lab at home or office.

The first step is to find an X86 machine (server, desktop or labtop) and install Oracle VM VirtualBox on it.

Then, there are 2 servers to install (2 VirtualBox virtual machines in fact):

- The Oracle VM Server
- The Oracle VM Manager

3.2 DOWNLOAD REQUIRED BINARIES

This section lists the required binaries and explains how to download them.

For your X86 machine:

1. **Oracle Java Runtime Environment (JRE) 7**
   Download the version for your OS from http://java.com/en/download/manual.jsp

2. **Oracle VM VirtualBox 4.2.x binaries** (4.2.16 during writing of this document)
   Download the version for your OS from https://www.virtualbox.org/wiki/Downloads
   Filename: For Oracle/Redhat Linux 6 64bits: **VirtualBox-4.2-4.2.16_86992_el6-1.x86_64.rpm** (size **69 MB**)
   For Microsoft Windows: **VirtualBox-4.2.16-86992-Win.exe** (size **95 MB**)
   For others…

3. **Oracle VM VirtualBox extension Pack 4.2.x**
   Download from https://www.virtualbox.org/wiki/Downloads (same file for all OSes)
   Direct link: http://download.virtualbox.org/virtualbox/4.2.16/Oracle_VM_VirtualBox_Extension_Pack-4.2.16-86992.vbox-extpack
   Filename: **Oracle_VM_VirtualBox_Extension_Pack-4.2.16-86992.vbox-extpack** (size **11 MB**)

For Oracle VM Server:

4. **VirtualBox template for Oracle VM Server 3.2.4**
   http://www.oracle.com/technetwork/server-storage/vm/template-1482544.html

   Filename: **Oracle VMServer.3.2.4-b525.ova** (size **249 MB**)

For Oracle VM Manager:

5. **VirtualBox template for Oracle VM Manager 3.2.4**
   http://www.oracle.com/technetwork/server-storage/vm/template-1482544.html

   Filename: **Oracle VMManager.3.2.4-b524.ova** (size **2.75 GB**)

6. **Oracle VM template for Oracle Linux 6 update 4 (PVM 64 bits)**
   Download for Oracle E-delivery Linux/Oracle VM platform (https://edelivery.oracle.com/OracleVM)

Look for “Oracle VM Templates for Oracle Enterprise Linux 6 Media Pack for x86_64 (64 bit)”

3.3 INSTALLATION OF ORACLE VM VIRTUALBOX

1. Find an x86 machine (desktop, laptop, server) matching the following prerequisites:
   - At least 16 GB of RAM
   - X86 64 bits CPU (Intel or AMD) with at least 4 cpus threads and with Virtualization Extensions (Intel VT or AMD-V)
   - OS supported by VirtualBox (Microsoft Windows, misc. Linux distributions, oracle Solaris 10 or 11, Apple Mac OSX)
   - 100 GB of disk space

2. Install the Oracle Java JRE on your OS (javaws binary needed to get the VNC console)

3. Install the Oracle VM VirtualBox 4.2.x binaries on your x86 machine

4. Start the Oracle VM VirtualBox console

5. If not already created, create an host only network in VirtualBox using the defaults IP information (IPv4 address 192.168.56.1 and Netmask 255.255.255.0 for your x86 machine). (go to File, Preferences, Network) and disable default Virtualbox DHCP Server.

6. Choose the folder you want to use to store the virtual machines files.
   (go to File, Preferences, General, Default Machine Folder)

7. Install the Oracle VM VirtualBox extension Pack
   (go to File, Preferences, Extensions)

3.4 INSTALLATION OF ORACLE VM SERVER

1. In the Oracle VM VirtualBox console, import the VM from the Oracle VM Server template
   - File
   - Import Appliance
   - Select the file **Oracle VMServer.3.2.4-b525.ova**
   - Next
   - Change the name of the Virtual System 1 from "**Oracle VM Server 3.2.4-b525**" to "**hol9981_ovm_srv"**
   - Import

2. Modify the settings of the virtual machine "**hol9981_ovm_srv**"
   - Set Amount of memory to **6144MB** (System)
   - Configure the network (Network, Adapter 1, Attached to Host only Adapter)
   - Configure storage by removing the second 20GB disk and by adding a new-one of 60GB.

3. Start the virtual machine "**hol9981_ovm_srv**"

4. Configure the virtual machine (in the VM console)
   - Configure network
     - IP address : **192.168.56.101**
     - Netmask : **255.255.255.0**
     - Gateway : **192.168.56.1**
     - DNS server : **192.168.56.1**
       (we will not use DNS, but we have to give an IP address here)
     - Hostname : **ovm-srv.oow.local**
   - Wait for the end of boot

5. Open a terminal on your Unix/Linux x86 machine and connect to the VM with ssh (you can use Putty on Microsoft Windows)
   `$ ssh root@192.168.56.101` (password is **ovsroot**)

6. Add the following lines to the /etc/hosts file

```
192.168.56.100      ovm-mgr.oow.local   ovm-mgr
192.168.56.199      vmdb02.oow.local    vmdb02
```

3.5 INSTALLATION OF ORACLE VM MANAGER

1. In the Oracle VM VirtualBox console, import the VM from the Oracle VM Manager template
   - File
   - Import Appliance
   - Select the file **Oracle VMManager.3.2.4-b524.ova**
   - Next
   - Change the name of the Virtual System 1 from "**Oracle VM Manager 3.2.4-b524**" to "**hol9981_ovm_mgr"**
   - Import

2. Modify the settings of the virtual machine "**hol9981_ovm_mgr**"
   - Configure the network (Network, Adapter 1, Attached to Host only Adapter)

3. Start the virtual machine "**hol9981_ovm_mgr**"

4. Configure the virtual machine (in the VM console)
   - Set root password to **ovsroot**
   - Configure network
     - IP address : **192.168.56.100**
     - Netmask : **255.255.255.0**
     - Gateway : **192.168.56.1**
     - DNS server : **192.168.56.1**
       (we will not use DNS, but we have to give an IP address here)
     - Hostname : **ovm-mgr.oow.local**
   - Wait for the end of boot

5. Open a terminal on your Unix/Linux x86 machine and connect to the VM with ssh (you can use Putty on Microsoft Windows)
   `$ ssh root@192.168.56.100` (password is **ovsroot**)

6. Add the following lines to the file /etc/hosts
```
192.168.56.101    ovm-srv.oow.local      ovm-srv
192.168.56.100    vmdb02.oow.local       vmdb02
```

7. Enable Apache "httpd daemon" on the manager (will be used to upload templates)

```
# service httpd start
# chkconfig httpd on
```

8. Configure directories that will support http daemon used for ovas files and yum server.

```
# mkdir –p /web/ovas
# mkdir –p /web/yum
# cd /var/www/html; ln –s /web/ovas .; ln –s /web/yum .
```

9. Copy "ova" exported from VMWare into the new directory created.

```
[root@ovm-mgr ovas]# ls -l
total 10179152
-rwxr-xr-x 1 ovm ovm  513034240 Aug 13 14:33 OVM_OL6U4_x86_64_PVM.ova
-rwxr-xr-x 1 ovm ovm 9900220416 Aug 19 13:02 rhel64_oradb.ova
[root@ovm-mgr ovas]# pwd
/web/ovas
```

10. Prepare a yum repository for Oracle Linux 6 based on http://public-yum.oracle.com. (Oracle VM Manager guest will need internet access so you have to temporary modify your network connection).

    Download public-yum repo file to install new packages.

```
# cd /etc/yum.repos.d
# wget https://public-yum.oracle.com/public-yum-el5.repo
```

    Install tools needed to build-up your local yum repository.

```
# yum install yum-utils createrepo
```

    Download public yum repo file for Oracle Linux 6 (target release Oracle VM Red Hat Guest in this lab and remove Oracle Linux 5 repo file (used to install packages above).

```
# rm –f /etc/yum.repos.d/public-yum-el5.repo
# cd /etc/yum.repos.d
# wget https://public-yum.oracle.com/public-yum-ol6.repo
```

    Create the local repository on Oracle VM Manager machine.
    (nb: it will take many hours depending on your internet connection bandwith because it will download about 27GB; if you haven't so much time, see alternative option below).

```
# /usr/bin/reposync --repoid=ol6_latest --repoid=ol6_UEK_latest –repoid=ol6_addons -p
/web/yum
# /usr/bin/createrepo /web/yum/ol6_latest/getPackage/
# /usr/bin/createrepo /web/yum/ol6_UEK_latest/getPackage/
# /usr/bin/createrepo /web/yum/ol6_addons/getPackage/
```

    **** : an alternative option is to use directly http://public-yum.oracle.com in this lab; to implement this alternative you will need to have internet access and, at the same time, configure your Oracle VM Manager guest to reach external sites.*

    Prepare file ".repo" to use on your future Oracle VM Guest (with Oracle Linux 6 x86-64):

```
[local_ol6_latest]
name=Oracle Linux $releasever Latest ($basearch)
baseurl=http://192.168.56.100/yum/OracleLinux/OL6/latest/$basearch/
gpgkey=http://192.168.56.100/RPM-GPG-KEY-oracle-ol6
gpgcheck=0
enabled=1

[local_ol6_UEK_latest]
name=Latest Unbreakable Enterprise Kernel for Oracle Linux $releasever ($basearch)
baseurl=http://192.168.56.100/yum/OracleLinux/OL6/UEK/latest/$basearch/
gpgkey=http://192.168.56.100/RPM-GPG-KEY-oracle-ol6
gpgcheck=0
enabled=1
```

11. Install and implement "DHCP Server" on Oracle VM Manager; we need this function to supply IPs on the guest that will be created on our Oracle VM Server.

```
# wget http://public-yum.oracle.com/repo/OracleLinux/OL5/9/base/x86_64/dhcp-3.0.5-
31.el5_8.1.x86_64.rpm
```

    Here an example of dhcpd.conf to implement (/etc/dhcpd.conf):

```
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.sample
#
ddns-update-style interim;
```

```
ignore client-updates;
subnet 192.168.56.0 netmask 255.255.255.0 {

        option routers                  192.168.56.1;
        option subnet-mask              255.255.255.0;
        option nis-domain               "oow.local";
        option domain-name              "oow.local";
        option domain-name-servers      192.168.56.1;
        range dynamic-bootp 192.168.56.250 192.168.56.254;
        default-lease-time 86400;
        max-lease-time 86400;
}
```

```
# chkconfig dhcpd on
# service dhcpd start
```

3.6 EXPORT VMWARE GUEST IN OVA FORMAT

In this lab we created more than one guest and an Oracle VM Template starting from a guest exported from VMWare.
To proceed with an export of a guesto into an “OVA” format there are more than one method.
Method used in this lab is in text-mode with the tool named “ovftool”.
Syntax used on this tool is like:

```
# ovftool /app/vmware/RH_Linux_6_x86-64/rhel_6_64-bit.vmx /app/rhel.ova
```

Guest exported for this lab was:

OS: Red Hat Enterprise Linux 6.4 x86-64
vCPUs: 2
vRAM: 8192 MB
Disks: one disk of 30gb
Applications: Oracle Database Enterprise Edition 11.2.0.3

If you are going to export a Microsoft Windows guest from VMWare you could encontuer a known problem: “**BSOD** (*blue screen of desktop*) on the first run of your guest on Oracle VM).
To sort out this problem you have two options to follow before export the guest:

a) Connect to your Windows guest and extract “Driver.cab” files already present on Microsoft Windows distribution.

extract_ide_drivers_from_cab.reg

b) Install Oracle VM PV Drivers for Microsoft Windows.

Download Oracle VM PV Drivers for Microsoft Windows at:

Oracle Software Delivery Cloud

Reference:
Oracle VM Windows Paravirtual (PV) Drivers for Microsoft Windows Guests (XP/Vista/7/2003/2008/2008 R2) 3.0.1 - 32-bit/64-bit (signed by Microsoft for the Windows Logo Program for Windows 2008, Windows 2008 R2, Windows 2003 and Windows 7)

4 REFERENCES

4.1 ORACLE VM DOCUMENTATION

http://www.oracle.com/technetwork/server-storage/vm/documentation/index.html

Release 3.2.1

Oracle VM Release 3.2.1 Documentation

The Oracle VM Release 3.2.1 documentation set includes information on Release 3.2.1, which is the initial release of Oracle VM Release 3.2. This documentation set should also be used for any future 3.2.*x* releases. Use this documentation set in addition to any README files included with the 3.2.*x* patch updates.

Oracle VM Release 3.2.*x* patch updates can be downloaded from http://www.oracle.com/technetwork/server-storage/vm/downloads/index.html.

Oracle VM Release Notes for 3.2.1	HTML	PDF	ePub
Oracle VM Installation and Upgrade Guide for Release 3.2.1	HTML	PDF	ePub
Oracle VM Getting Started Guide for Release 3.2.1	HTML	PDF	ePub
Oracle VM User's Guide for Release 3.2.1	HTML	PDF	ePub
Oracle VM Paravirtual Drivers Installation Guide for Microsoft Windows for Release 3.2.1	HTML	PDF	ePub
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