Virtualizing Oracle E-Business Suite through Oracle VM

Kai Yu
Dell Inc.

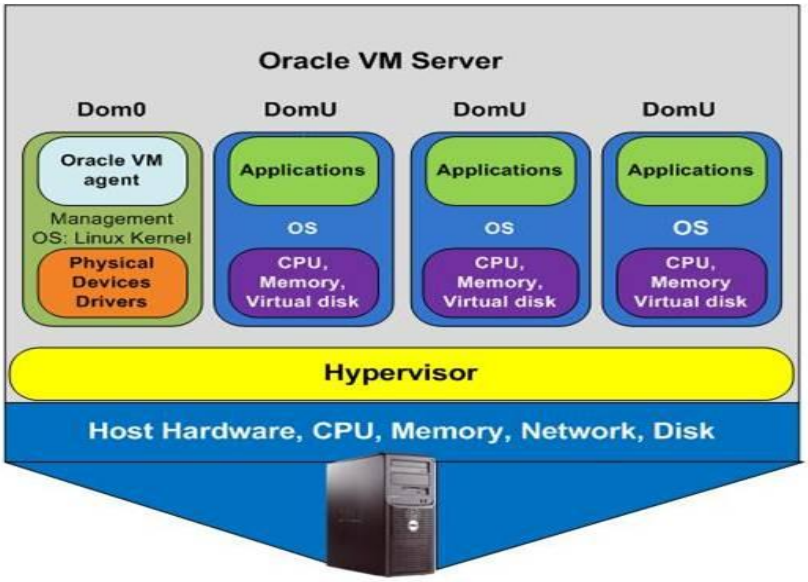
Abstract: Oracle VM provides the server virtualization that not only enables high availability and scalability, also simplifies and standardizes the deployment for Oracle E-Business Suite. To leverage Oracle VM, the existing Oracle E-Business systems on physical servers need to be migrated the VMs and a new development needs to start on the VMs. This article will examine a method to virtualize Oracle E-Business Suite through such an migration and also show how to create and use the VM templates of customers' own project specific Oracle E-Business systems for the on-going project. The article will also explore how to leverage the benefits of Oracle VM such as high availability and scalability and server partitioning for Oracle E-Business suite R12.1 infrastructures.

Introduction to Oracle VM Technology

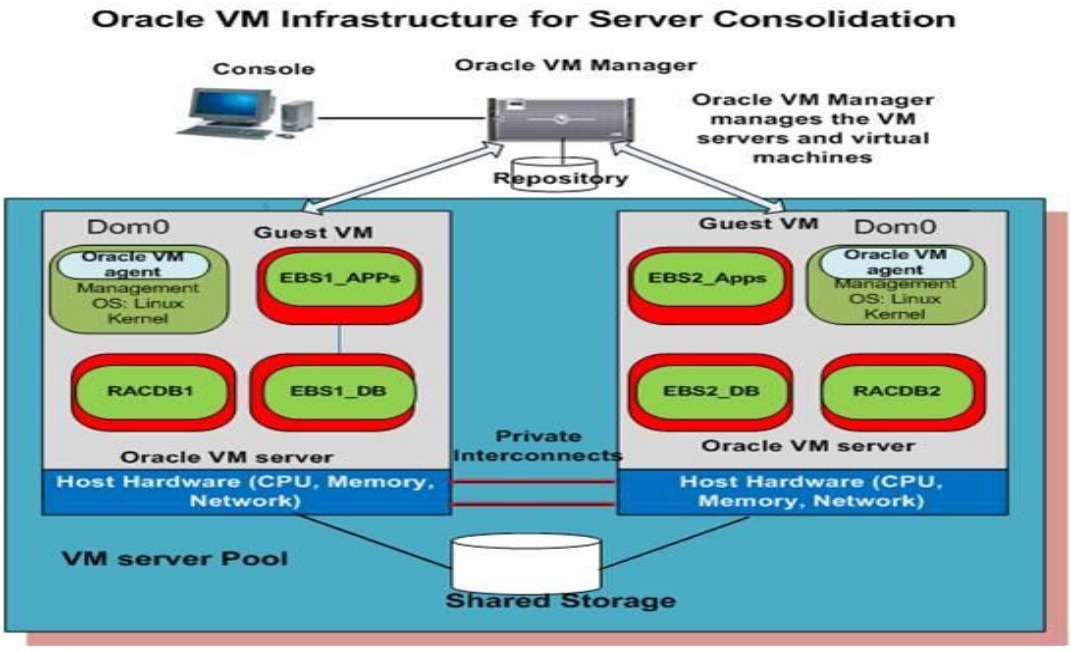
Oracle VM components

The Oracle VM environment includes the following components:

- Oracle VM Server: A virtualization environment that provides a lightweight, server-based platform for running virtual machines. It is based on an updated version of the underlying Xen Hypervisor technology. The Oracle VM software is installed on a bare metal x86 server. It includes a Linux kernel running as dom0 with support to manage one or more domU virtual machines. Dom0 is the management domain that handles the physical device's IO, networking, and etc. Dom0 also runs the VM agents that connect to the VM manager.
- VM (Virtual Machine): Guest Operating System with applications running on domU.
- Virtual CPUs and Virtual Memory are signed for each guest VM All network and storage IOs of guest VMs go through Dom0.



- Virtual Server Pool: An autonomous region of VM servers that collects all of the resources of VM servers. All the VM servers with one virtual server pool need to access the shared storage.
- VM (Virtual Machine): Guest Operating System with applications running on domU.
- Oracle VM Manager: provides a user interface that can be used to manage Oracle VM servers, virtual machines, and resources. VM manager can be configured independently, or combined with Oracle Enterprise Manager to manage the virtual infrastructure. The following diagram illustrates the Oracle VM server components, Oracle virtual machines and Oracle VM manager.



If the High Availability option is enabled with the VM server pool and virtual machines, the virtual machine (VM) can be failed over to an available VM server in the VM server pool if the VM server running the VM fails. All the VM servers in the VM server pool share the storage. The shared storage is configured based on OCFS2 or NFS-based for VM Repository.

VM Repository /OVS is configured in the shared storage so that all the VM servers have the access to. All the guest VM images are stored in the VM repository

The VM repository for Oracle VM 2.2 has the repository root: /OVS and the following directories under the repository root:

running_pool stores all VM images
seed_pool stires all the VM templates
shared_disk stores disks that can be shared by multiple VMs. This is specifically used for configuring Oracle RAC database on multiple VMs

The repository root of Oracle VM 3.x has been changed to something like :
/OVS/Repositories/0004fb0000030000d5029e7ba6a1b194 with the following directories under the root:

Assemblies: Virtual Assemblies
ISOs: ISO images
Templates : Virtual Machine Templates
VirtualDisks: Virtual disks
VirtualMachines: Virtual Machines images

Guest VM Creation

An Oracle virtual machine can be created as Paravirtualized VM guest and Hard Virtualized guest. Paravirtualized VM is supported for those virtualization aware OS such as Linux that the source code of the operating system is modified to support virtualization. In many cases paravirtualzation may have a better IO performance . Hardware virtualized VM is for those "unmodified OS" such as Windows OS that uses the binary translation for virtualization. In this whitepaper, we will use paravirtualized VM running Oracle Enterprise Linux 5. A guest VM can be created a number of ways thought VM manager :

. Using a virtual machine template
. Using installation media
. Importing a virtual machine

This paper we focus on the VM creation through a VM template.

Virtualizing Oracle EBS with Oracle VM

Benefits of virtualizing Oracle EBS with Oracle VM

It is widely known that virtualization has been accepted as an efficient way to increase IT flexibility and help IT services align better with changing business needs. It not only provided capabilities for server consolidation and partitions, but also high availabilities and scalabilities for applications. With the flexibility of a virtualized IT infrastructure, new applications can be rapidly deployed, capacity be easily scaled, and IT resources be quickly redirected. The result is that IT can bring greater value to the business, making virtualization an obvious win from a business perspective.

1. Server consolidation and partitions

Before the virtualization, each application has a series of physical servers and most of the environments don't share the servers. The result is many of the servers in idle state or minimal usage and resources on the servers are wasted. Virtualization provides server consolidation and resources on the servers get efficiently utilized while the well planned partitioning make it possible that each EBS instances can be set up with a fixed and limited resources to share the physical hardware but no interference with other instances.

1. High availability and scalability

Business continuity is so important in today's business and any interruption to the applications means business loss. Virtualization composes of Virtual machines based on a set of physical servers which provided high availability to the databases and applications. The database instances and applications can be easily fail over to or restarted on another VM if one goes down. Meanwhile adding or removing VMs is another advantage of virtualization to scale up or down of the databases and applications based on changing business requirements.

2. Fast deployment and standardization

Traditionally building and configuring a new E-Business Suite System is a complicate process. It requires applying the pre-req patches on the OS level before the installation of the E-Business Suite System, then installation starts on the database tier and all the configuration information is entered, after the installation on the database tier is complete and database and listener are brought up, the apps tier installation can be done and configuration for the entire E-Business Suite system can be complete. In addition, patches and version upgrades need to be applied to the base versions. This process usually takes many hours or even days. With the Oracle E-Business Suite on OVM template, this process is simplified and takes much less time. The Oracle E-Business Suite on OVM templates not only reduce deployment time, but also prevent errors or mistakes for installation and configuration as the templates are pre-built, pre-configured, and ready to use software with the OS which can standardizes the deployments and makes the management and maintenance of E-Business Suite Systems much easier resulting in cost-savings for IT resources.

3. Backup and recovery solution

The capability of building new OVM template for the Oracle E-Business Suite systems extended the traditional separate backups for OS, databases, and applications to bundle the OS with the database and application. This makes the recovery process more reliable, faster, and completeness.

4. Fast and simplified cloning process

Cloning is one of the major DBA tasks for Oracle E-Business Suite system support and projects. Traditionally the cloning process can be very complicate and time consuming. If one clones an existing Oracle E-Business Suite system to the newly built servers, one must make sure the pre-requisite is met on the new servers; post clone tasks can be tedious and lengthy. With the capability of building new OVM template for the Oracle E-Business Suite systems, the cloning process is much faster and simplified as the OVM template includes the OS and post clone processes are handled by the OVM template script. The cloning process itself essentially a matter of the VM image file copy. Once we restart the VM, the embedded reconfiguration scripts with the VM can reconfigure itself to add the EBS instance specific configuration and form the complete ready-to-run Oracle E-Business suite instance.

Certification of Oracle E-Business Suite on Oracle VM

Oracle VM has been fully certified with Oracle E-Business Suite systems for more than 2 years and it's the only virtualization solution certified and supported by Oracle. Here's a list of certified EBS releases and platforms quoted from Oracle **[ID 464754.1]**:

- Oracle Applications 11.5.10 CU2 or later with 11i.ATG_PF.H.RUP5 (Patch 5473858) or later for Linux x86
- Oracle E-Business Suite 12.0.2 (RUP2) or later (including 12.1) for Linux x86
- Oracle E-Business Suite Release 12.0.4 or later (including 12.1) is certified with 64-bit Oracle Linux 5 and 64-bit Red Hat Enterprise Linux (RHEL) 5 on x86-64 with Oracle VM.
- Oracle E-Business Suite Release 12.0.3 (RUP3) or later (including 12.1) is certified with 64-bit Oracle Linux 4 and 64-bit Red Hat Enterprise Linux (RHEL) 4 on x86-64 with Oracle VM.
- Oracle E-Business Suite Release 12 (12.0.4 or higher and 12.1.1 or higher) is certified on Windows Server 2003 (32-bit) running as a guest on Oracle VM using Windows PV driver version 1.0.8 or higher.
- Oracle Applications Release 12 (12.1.1 or higher) on Windows Server 2008 (32-bit) running as a guest on Oracle VM using Windows PV driver version 1.0.8 or higher.
- For more information please refer to My Oracle Support Note 465915.1

The following major configurations are not tested and certified with Oracle E-Business Suite on Oracle VM:

- DMZ
- RAC Database
- Shared APPL_TOP on Apps tier

Oracle VM Templates for Oracle E-Business Suite

An Oracle VM template is a virtual machine (VM) or group of VMs containing the OS and Oracle software which is pre-built, pre-installed, and pre-configured. Oracle VM templates can be downloaded from Oracle E-delivery and deployed to a VM instance. There is no installation required and system is ready to use after the deployment and VM restart. In addition, Oracle also has the virtualization kit which is used to create customized templates. In the terms of Oracle E-Business Suite systems, templates can be created based on an existing E-Business installed on a VM or migrated from a physical server. The customized templates are very useful for creating the "golden copy" and rapid cloning for E-Business projects.

An Oracle VM template is a virtual machine , a group of virtual machines that contain a full pre-built and pre-configured software stack and are ready to use. These templates can be imported into the Oracle VM environment and used to deploy the Oracle virtual machine (VM). The Oracle VM deployed with the template will have the full pre-built and preconfigured software stack and is ready to function. This VM template deployment method eliminate the step of the installing an configuration of the entire stack from Operating system to complex applications software.

The Oracle VM templates are built with some generic default value of configuration parameters such as host name, instance name and IP address. When these template are used to deploy the specific Oracle VM machine instance, these generic parameters will be populated with the instance specific values such as virtual machine hostname, IP address, application instance name and the system specific IP address. Oracle EBS VM templates are built using this idea. Each Oracle EBS template consists of two VM template: Apps template for Application tier and Database VM template for Database tier. The Apps template is the full pre-built and pre-configured Oracle EBS applications tier which includes Oracle Enterprise Linux and Oracle E-BBs applications stack, and the database template is the full pre-built and pre-configured Oracle EBS database tier which include Oracle Enterprise Linux and Oracle EBS database software and the database files. As the part of the deployment process of Oracle EBB Virtual machine using these templates, the OS and applications and the database will be reconfigured at the boot time of the virtual machines. This reconfiguration process will prompt the administrator to provide the value of instance specific parameters such as hostname, host IP address and the applications instance name.

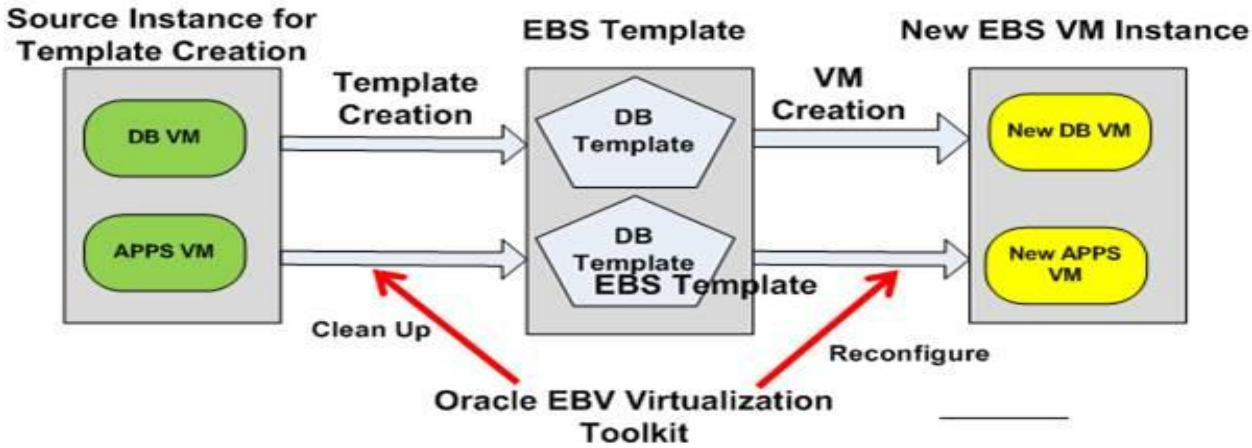
Oracle has built and published the both Apps tier template and Database tier template in Oracle E-Delivery site: It has both 64 bit version and 32 bit version VM templates. For this whitepaper, we will use the 64 bit version: Oracle VM template for Oracle E-Business suite Release 12.1.1 Version Medial Pack V1 for x86 (64 bit). This media has two parts:

- Oracle E-Business suite Release 12.1 Application Tier VM Template for x86_64
- Oracle E-Business suite Release 12.1 Demo Database Tier VM Template for x86_64

Metalink note 97768.1 Oracle VM Template Developer Guide for Oracle E-Business Suite explained how these template was built.

Oracle E-Business Virtualization Toolkit

As Oracle EBS VM templates are designed to be deployed more multiple times to create multiple Oracle EBS virtual machines. All these Oracle EBS virtual machines should have the instance specific and host specific configuration such as hostname, pool number, IP address, and instance name, database name. Therefore, even the Oracle VM templates are designed to include the preconfigured self-contained software stack, these instances specific configuration cannot be pre-configured in the VM templates as they are different for each deployment. Then how we can add these instance specific configuration to the Oracle EBS VMs? The solution is to allow the EBS VM templates only have the place holders for these instance specific configurations without the specific values, then allow these configuration to be added into the Oracle EBS VMs through a self reconfiguration process during the first time when the VM restarts after the deployment. This is the basic idea of the Oracle E-Business suite virtualization toolkit.



The Oracle EBS toolkit works in two ways:

1. A reconfiguration process kicks off in the first time when Oracle EBS VMs start after the creation of Oracle VMs through the VM templates. It prompts the administrator to provide the following instance specific configuration and these configurations to self configure the VM OS and the Apps tier or DB Tier.
    a. OS configuration: hostnames , network configuration IP, Default gateway, etc.
    b. Oracle EBS instance configuration: instance name, database name, DATA_TOP, RDBMS_HOME, APPL_TOP, system port pool number.

   The underneath implementation of the reconfiguration process is to call the Oracle EBS rapid colon utility.
2. The cleanup process: An Oracle EBS VM template is created from an Oracle EBS instance running on Oracle virtual machines. Before the virtual machine is used to create an Oracle EBS template, the cleanup process cleans up the instance specific configuration mentioned in previous session so that the VM template will only have the place holder for these instance specific parameters. And a reconfiguration flag is reset in the VM template so that next time when the virtual machines created from this VM template starts, the reconfiguration process will automatically start up.

How to leverage Oracle VM for Oracle EBS Environment

Oracle VM solution can bring the great benefits for Oracle E-Business suite implementation. One of the issues involved with an Oracle E-Business implementation project is that we need so many development environments and Oracle APPs and DBAs spend a significant time in building the environments by fresh installation or cloning from other environment. Oracle VM can provide the solution to consolidate this environment into virtual machines that can share in the physical hardware. The Oracle VM template based development can much simplify the creation of the new development and testing environment by simply create Oracle EBS virtual machines from an prebuilt Oracle EBs templates.

There are two ways to build the Oracle EBS virtual machines:

- Build the Oracle virtual machines, then fresh install Oracle E-Business suite on the VMs.
- Build from the existing Oracle EBS VM templates

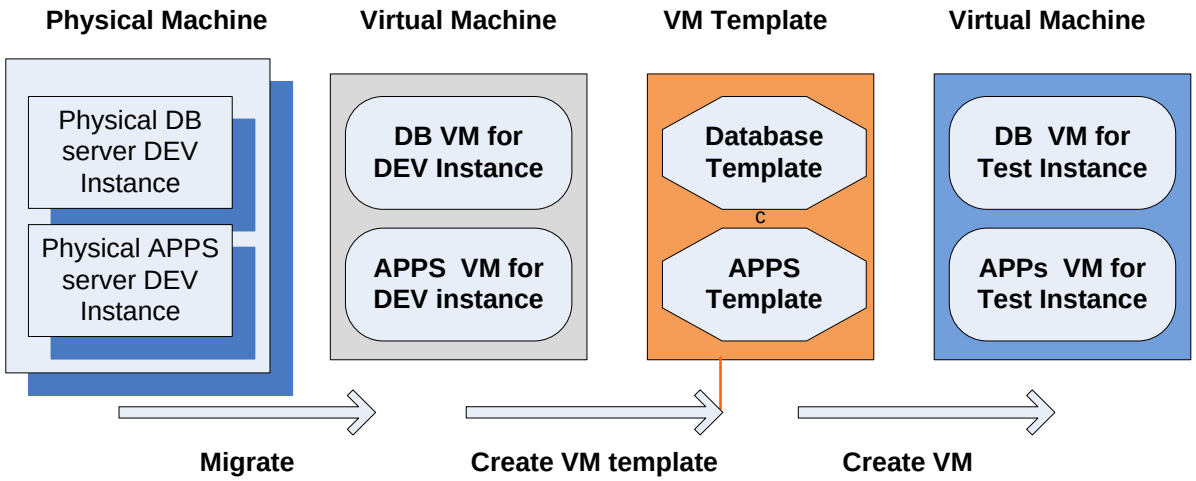
In the first method, the fresh installed Oracle E-Business only can bring us either vision instance or an instance that has no customer data and customer configuration. Usually this method is only used when we initially start the Oracle E-Business project. For the second method , we need an existing Oracle EBS VM template Although we can use the Oracle EBS VM templates downloaded from Oracle E-delivery, these templates are built for the vision instance, which is for the demo purpose and doesn't have the customer data and configuration. We need to have a way to create the Oracle EBS VM template from customer's existing Oracle EBS instances which mostly like are running on the physical hosts.

The process to virtualize Oracle EBS Environment

The goal of this paper is to create a streamline process that customers can use to virtualize their Oracle EBS environment on Oracle VM. The virtualization process has to achieve the following design requirements:

- The entire Oracle EBS environment including the configuration and database need to be migrated from the physical machines to the Oracle virtual machines.
- The Oracle EBS virtual machines can be used to create the Oracle EBS VM templates.
- The Oracle EBS VM templates can be used to deploy new Oracle EBS VMs.

This means this process will migrate all the Oracle EBS configuration, setup, business data, customization, etc to the virtualization environment. After the migration, the exact same Oracle EBS instance will be running on the Oracle virtual machines. Then new Oracle virtual machines can used to create the new Oracle VM template. This new Oracle VM template should be different from the Oracle EBS vision instance VM template as it is the custom built and has the customer's own business data and setup and customization. The Oracle VMs built from these new VM templates are the clone of the Oracle EBS instance on physical environment. The follow diagram shows the virtualization process workflow.



We can leverage the Oracle E-Business suite templates for virtualization process as the Oracle EBS templates from Oracle include the following components t

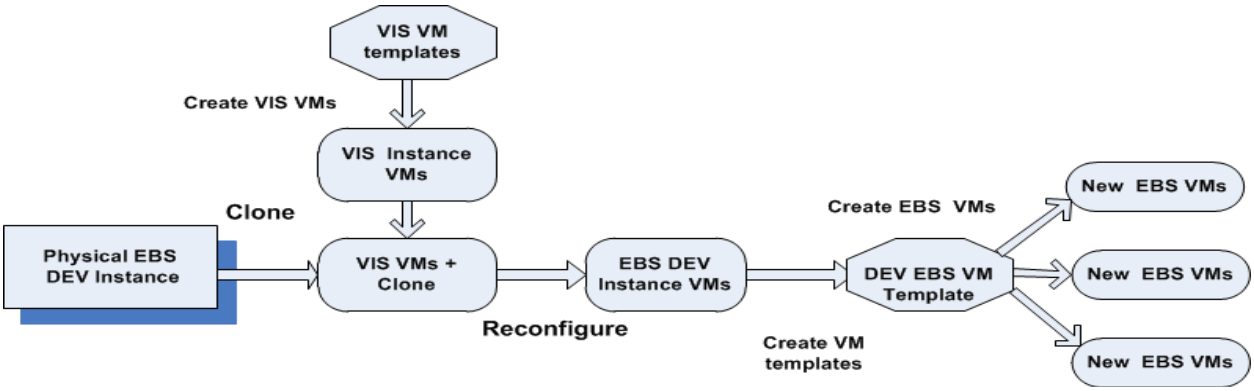
- OS configuration for Oracle EBS (APPS and DB)
- Include Oracle E-Business Visualization Toolkit

Our virtualization process strategy is to combine the EBS VM templates with clone of EBS instance from the physical environment:

- OS configuration + EBS VM toolkit from VM template
- Business data, customization and setups from physical system.

Migration Process Design: The migration process consists of the following steps :

- Starting with downloaded Oracle EBS VIS VM Templates
- Build Oracle EBS VMs from the EBS VIS VM templates
- Replacing APPS and DB with the cloned copy from DEV(physical)
- Reconfigure and forms Oracle EBS DEV Instance VMs
- Create the new DEV VM templetes
- Create new EBS VMs from the DEV VM templat



Oracle EBS on Oracle VM POC Project

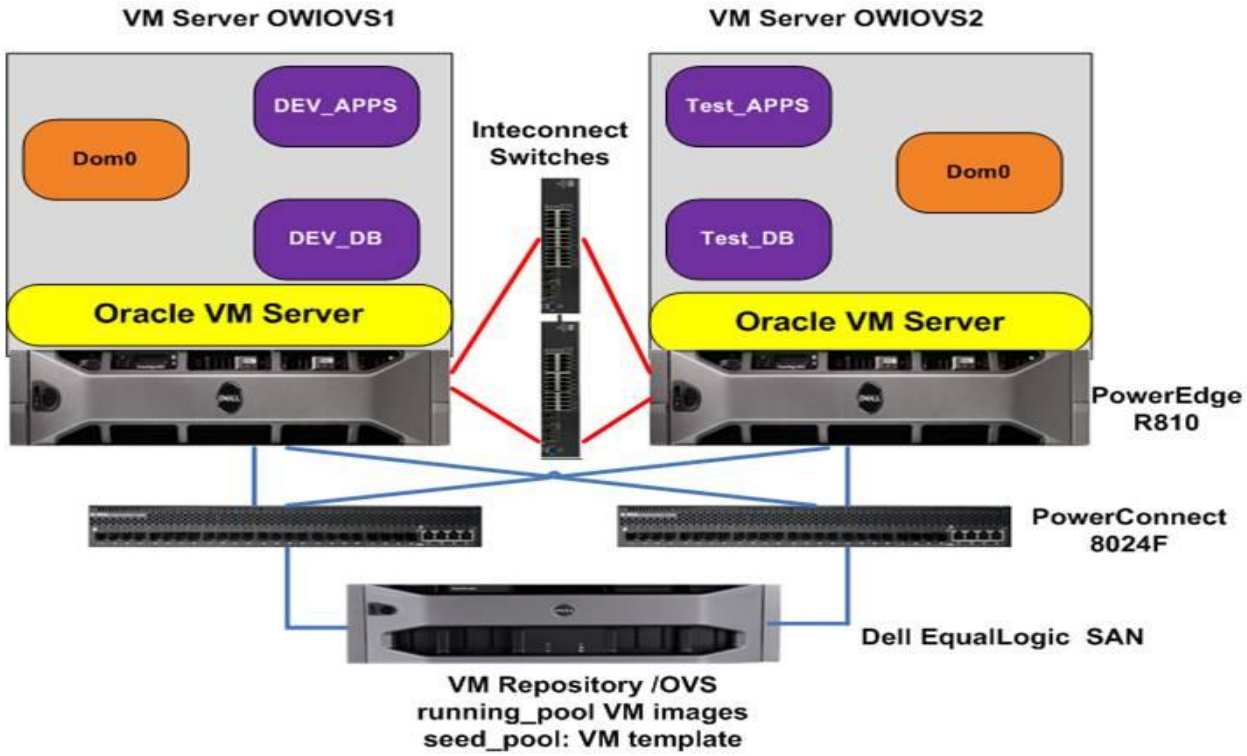
We have worked on a joint proof of concept project between Dell Oracle solutions engineering and Dell IT Oracle Applications team on development of method of virtualizing the Oracle EBS suite on Oracle Virtual Machines. The requirements are very similar to those that were mentioned in previous sessions:

1. Migrate the entire Oracle EBs 12.1 development instance including Apps tier and database from the physical servers to Oracle VM environment. The instances have the business database, applications setup and customization.
2. Create the Oracle EBS VM templates for the Oracle EBS instances on the physical machines.
3. Being able to deploy additional Oracle EBS VMs using the Oracle EBS VM templates.

Servers and shared storage infrastructure of the POC project

For this POC project, the underline infrastructure consists of the physical environment and virtual environment. The physical environment is the Oracle Applications development instance DEV running Oracle E-Business Suite 12.1.1 x86-64 bit running on two servers

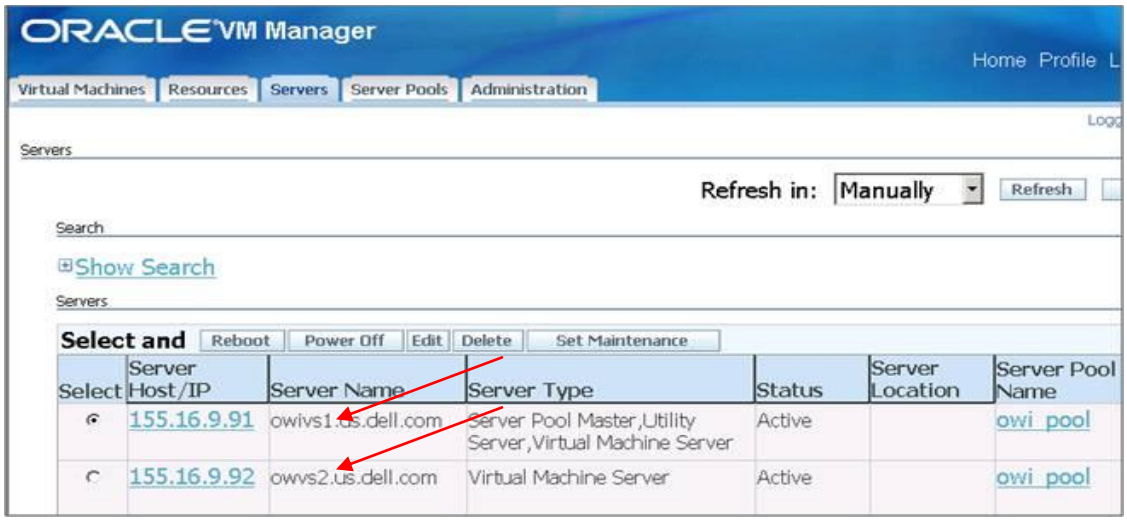
APPs tier: Dell PE 2950 running Oracle Enterprise Linux 5U3
Database Tier: Dell PE 6950, Oracle Enterprise Linux 5U
The Virtual Infrastructure is based on Oracle VM servers running on:
Oracle VM servers: 2 x Dell PowerEdge R810
Shared SAN storage: Dell EqualLogic PS6510 Storage , allocated 2TB for VM repository
VM Manager: 1 Dell PE2950 running VM Manager 2.2



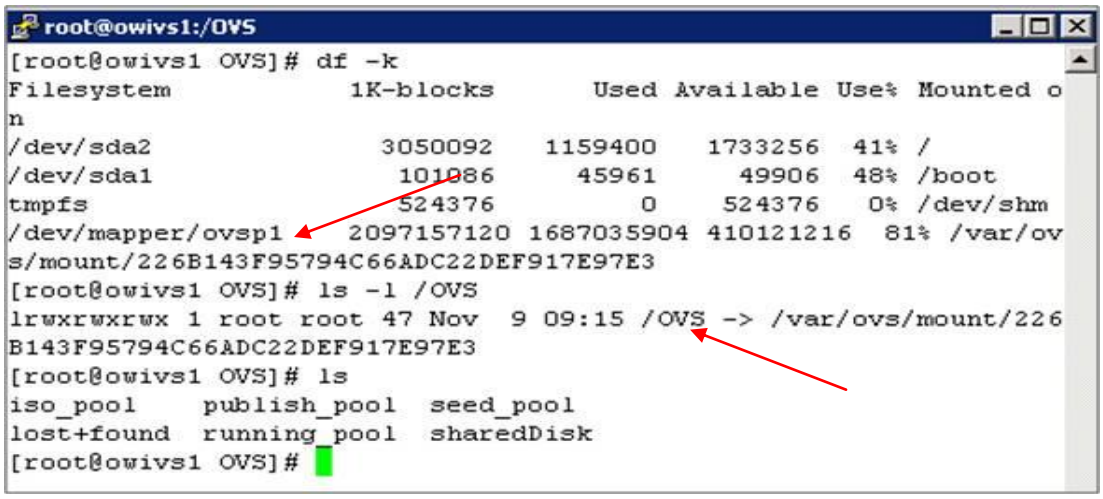
The diagram above shows the virtual infrastructure:
To implement this infrastructure, as the prerequisite for the migration POC project, the following tasks need to be completed:

- Establish the physical hardware connections as shown in the diagram above. Two R810 servers were connected to EualLogic storage PS6550 through two Ethernet switches.
- Two dual interconnect switches are connected between two R810 servers

- Installed and configured Oracle VM 2.2 on two R810 servers: OWIOVS1 and OWIOVS2
- Installed Oracle VM manager on second server (PE2950) and connect to the two Oracle VM servers OwiOVS1 and OWIOVS2 as showed as follow:



- Establish the shared storage access from two OVS servers and created the OVS repository /OVS mounted in volume /dev/mapper/ovsp1 as follow:



Virtualization Process Design

With the implementation of Oracle VM infrastructure, we can start designing the process of virtualizing the Oracle EBS instance DEV from physical machines to virtual machines. Based on the requirement of the POC project, the entire virtualization process consists of the following three steps:

1. Migration: to migrate the Oracle EBS instance DEV from physical machines to Oracle VM.
2. VM Template Creation: to create Oracle EBS VM template based on the Oracle VM migrated on step1.
3. New Oracle EBS VM creation: to create new Oracle EBS instance based on the VM template created on step2.

The following session will examine the each phrase of the virtualization process:

Migration of Oracle EBS instance from physical machines to virtual machines

As mentioned in the previous session, the migration process will achieve the following design requirements:

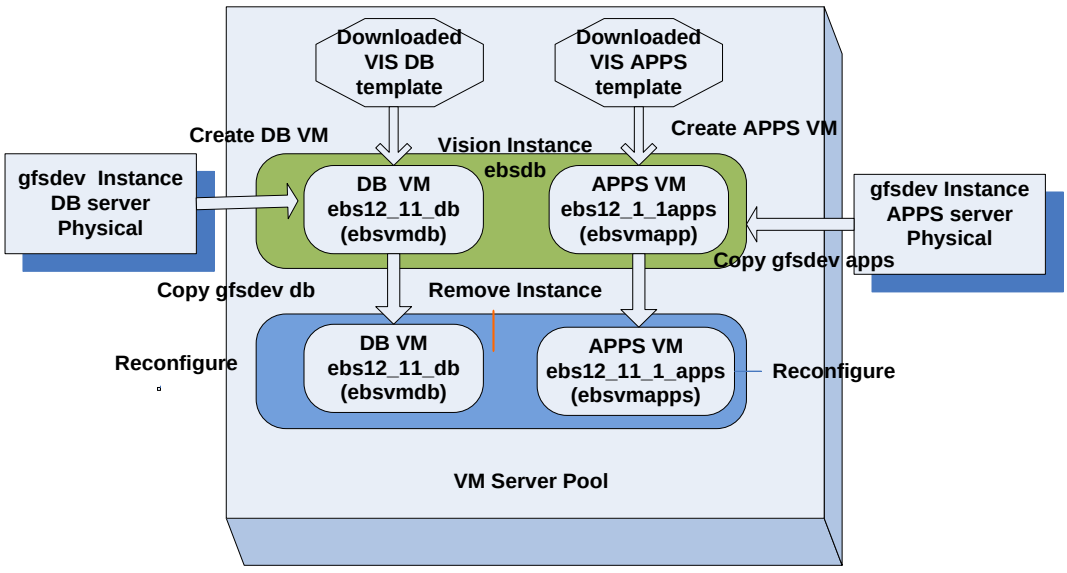
- Migrate the entire Oracle EBS environment including the configuration and database from the physical machines to the Oracle virtual machines
- The migrated Oracle EBS virtual machine should have Oracle E-Business Virtualization Toolkit so that we can use it to build the VM templates.

To meet the first requirement, the migration process will have to clone the Apps tier application file systems and the database file systems and database files from Oracle EBS instance DEV on physical servers.
In order to meet the second requirement, we need to closely look at the Oracle EBS VM template from downloadable from Oracle E-delivery. Although this template only has the vision instance and is not very practical to be used directly in the customer environment. But the VM template from Oracle does provide some very important components that we can leverage for the migration process:

- Completed configuration of Linux OS and all the prerequisites for Oracle EBS installation in APPS tier and Database node.
- Oracle E-Business Visualization Toolkit. As we mentioned earlier, this toolkit is essential for building the Oracle EBS template and create Oracle EBS VM using the template.

As shown in the following diagram, the migration process will start with the Oracle EBS VM template downloaded from Oracle. The migration process consists of three steps:

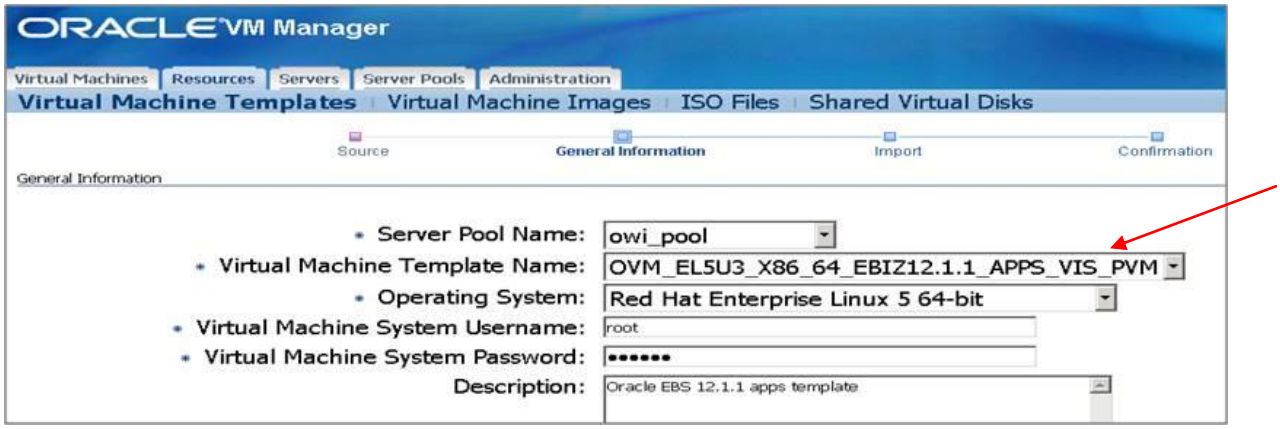
- Use the Oracle EBS template from Oracle to build the Oracle EBS vision instance Apps tier VM and DB tier VM.
- Clone the Apps tier file systems from the DEV instance gfsdev on the physical server to the Apps tier VM ebsvmapp, and clone the Database tier file system and database files from DEV instance gfsdev on the physical server to the DB tier VM ebsvmdb
- Reconfigure Apps tier VM ebsvmapp and the the DB tier VM ebsvmdb with the cloned copy EBS instance from physical server.



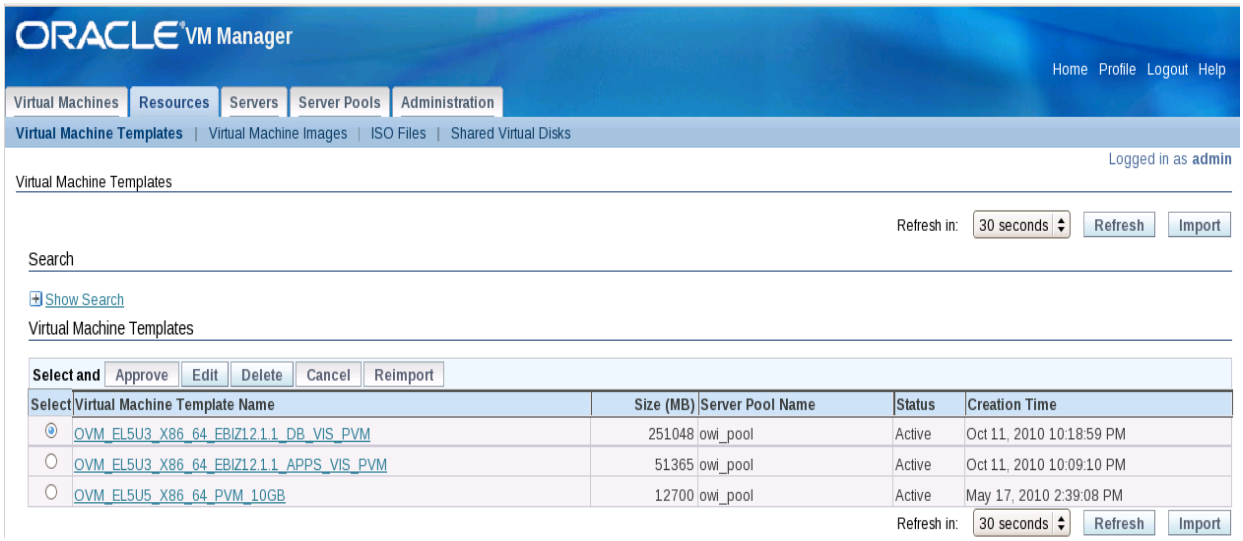
Step1: Create Vision Instance VMs from Oracle EBS Vision Instance Template

The Oracle EBS vision instance VM templates were downloaded from Oracle E-delivery site and and imported into the VM manager:

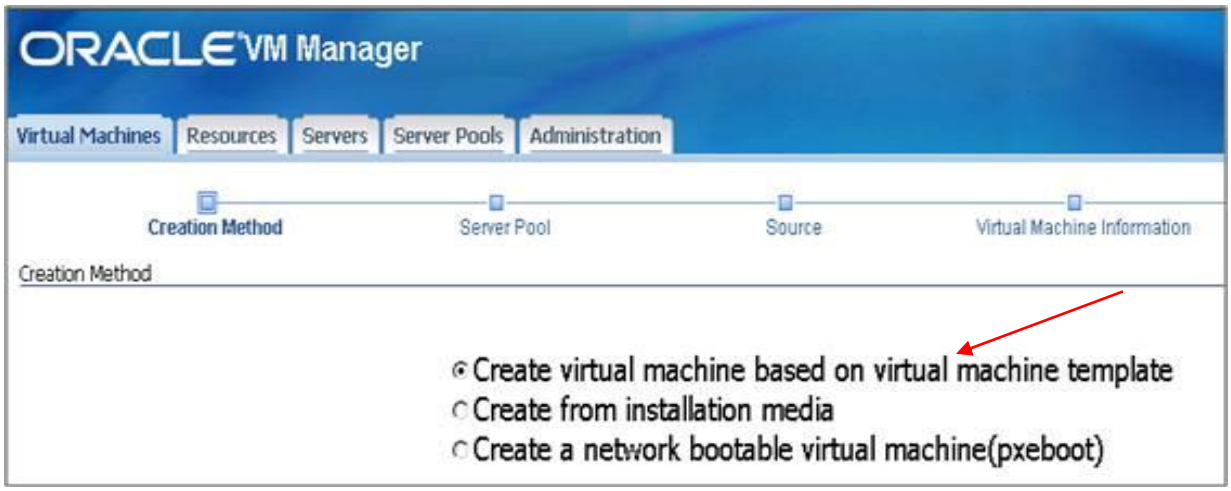
OVM_EL5U3_X86_64_EBIZ12.1.1_APPs_VIS_VM
OVM_EL5U3-x86_64-EBIZ12.1.1_DB_VIS_VM



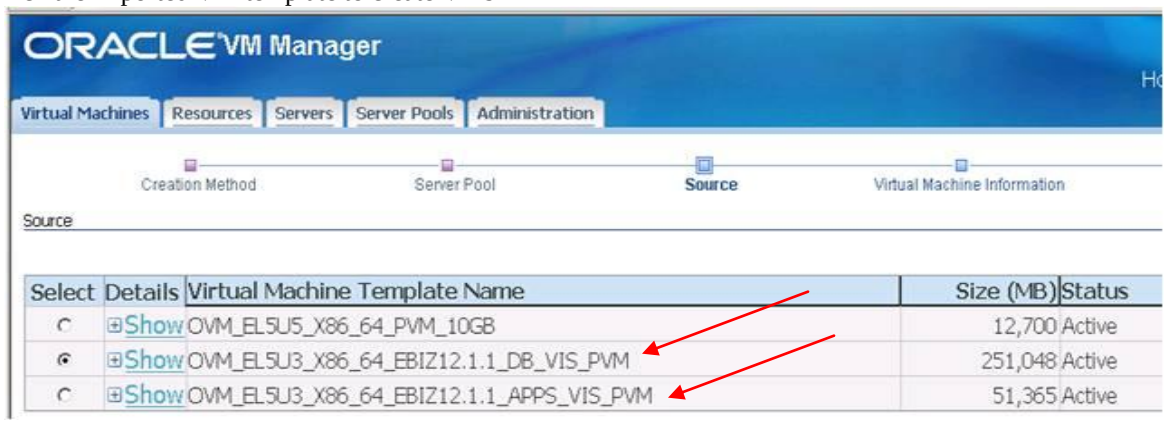
Both Apps tier VM template and DB tier Vm template are imported into VM manager.



Create VMs using two templates

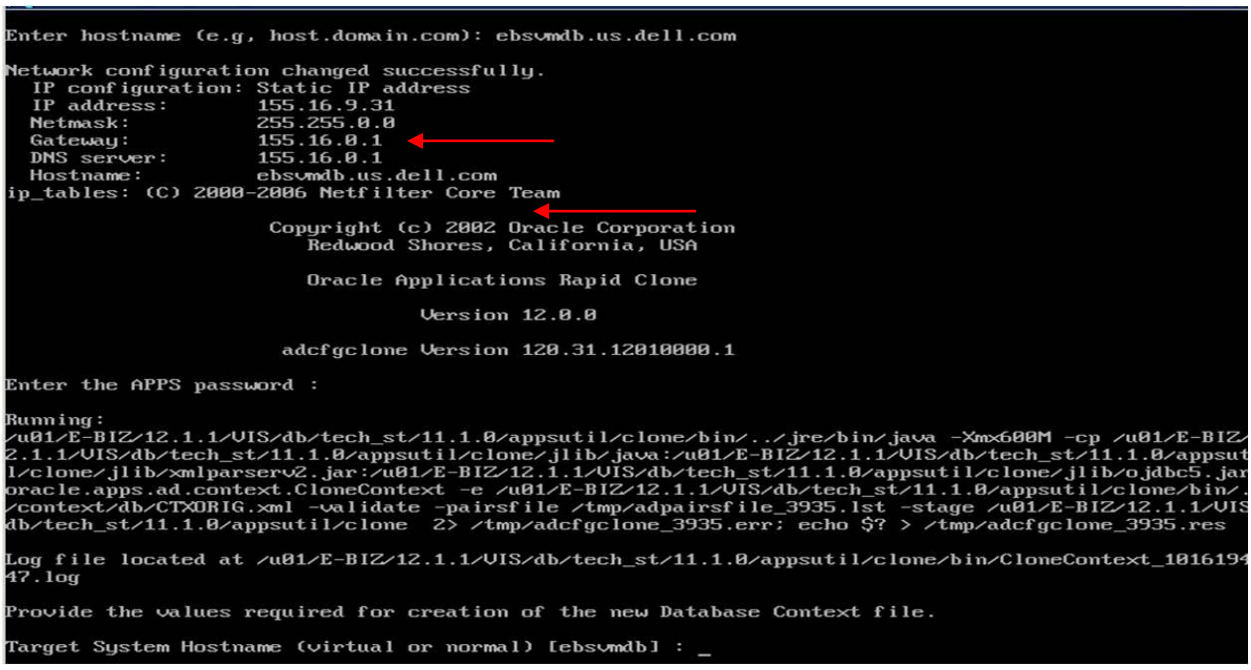


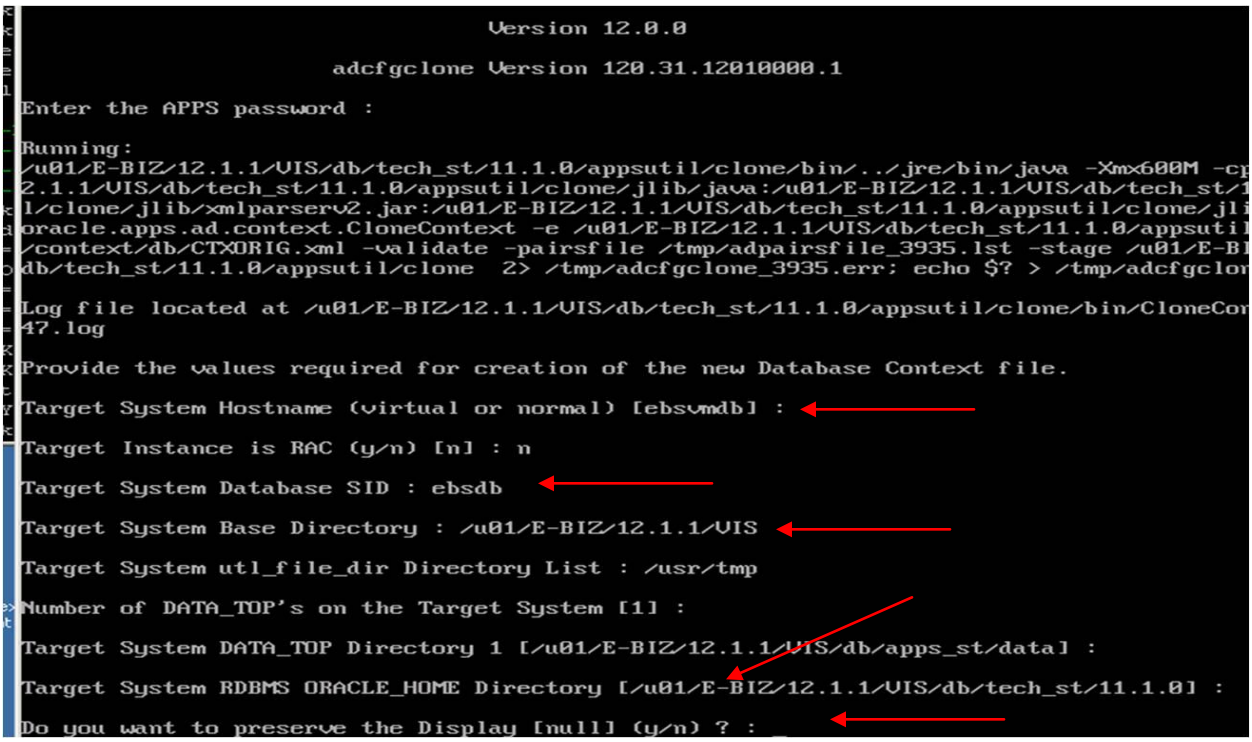
Pick the imported VM template to create VMs

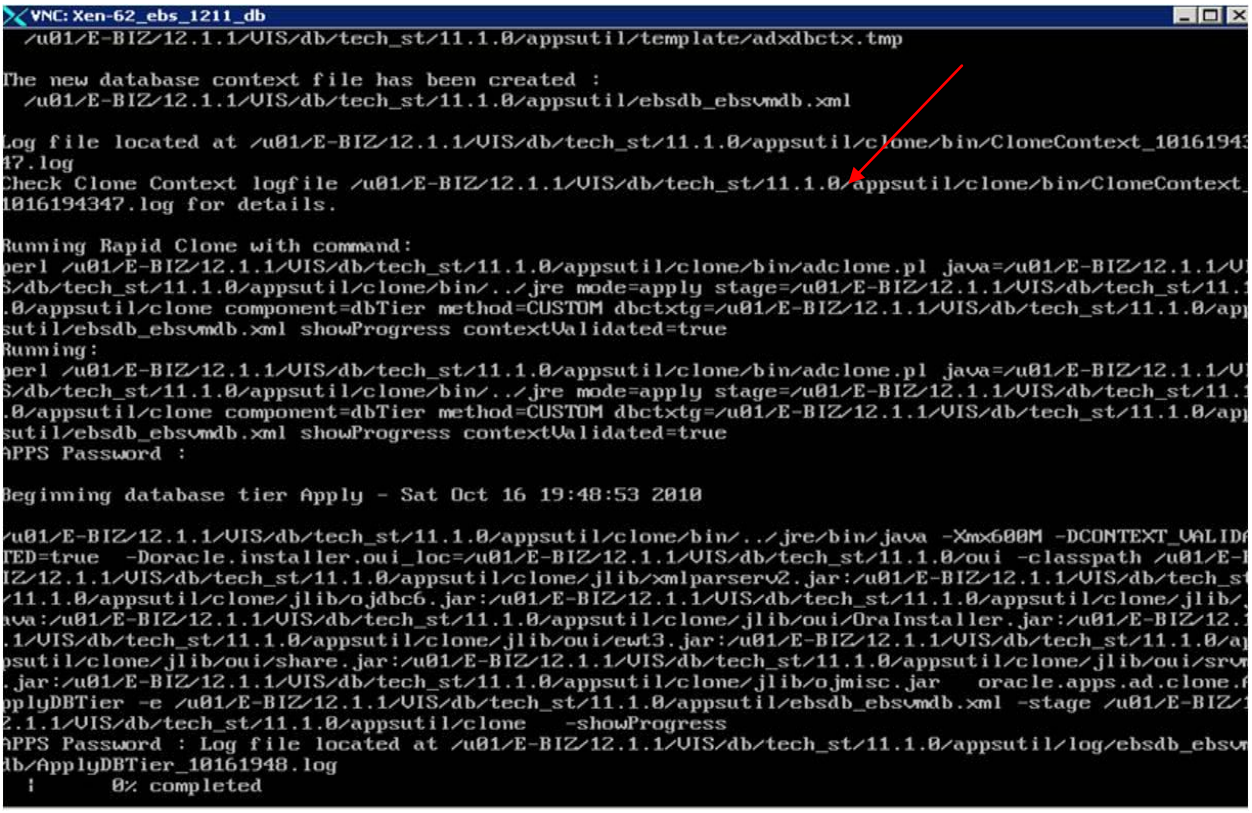


Once these two VM were created, we started up two VMs. The DB VM (ebsvmdb) needed to be started first.

First time we logged in to the DB through the VM console in the VM manager, we can see that the DB VM started to reconfiguring itself by calling the ebiz_1211_ereconfig.sh scrip, a part of Oracle virtualization toolkit embedded in the VM template . In the background, this script will call Oracle EBS R12 Rapid clone script: adclone.pl
The reconfiguration process is prompting the administrator to enter the instance specific configuration such as the network configuration, instance name , DB name and so on. The following screen shot shows the process:







Then we started up the APPS tier VM (ebsvmapp) to reconfigure itself:

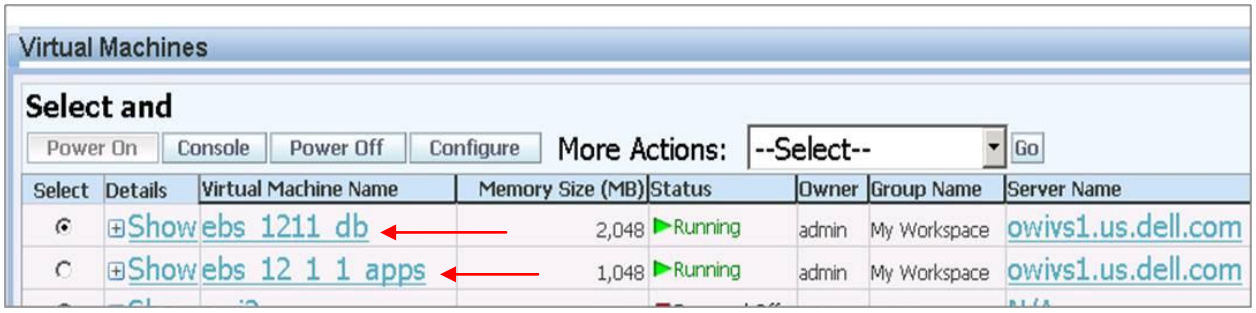
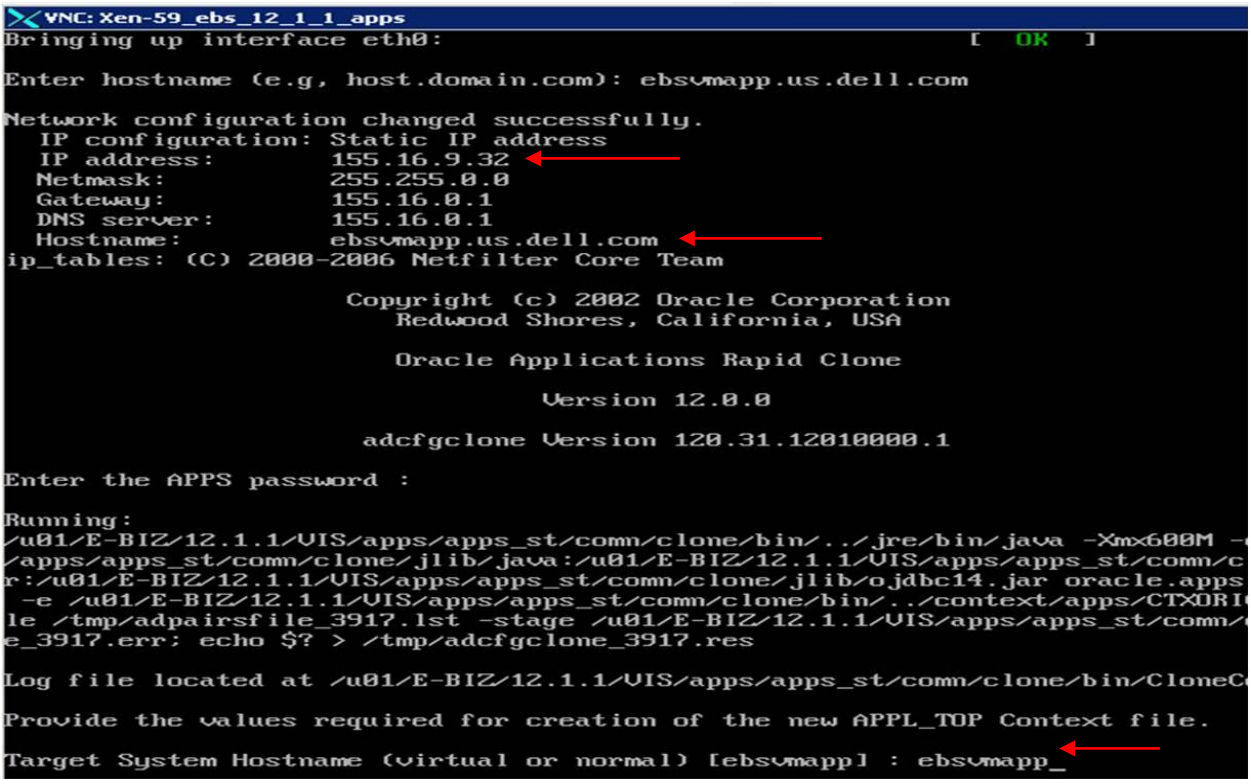
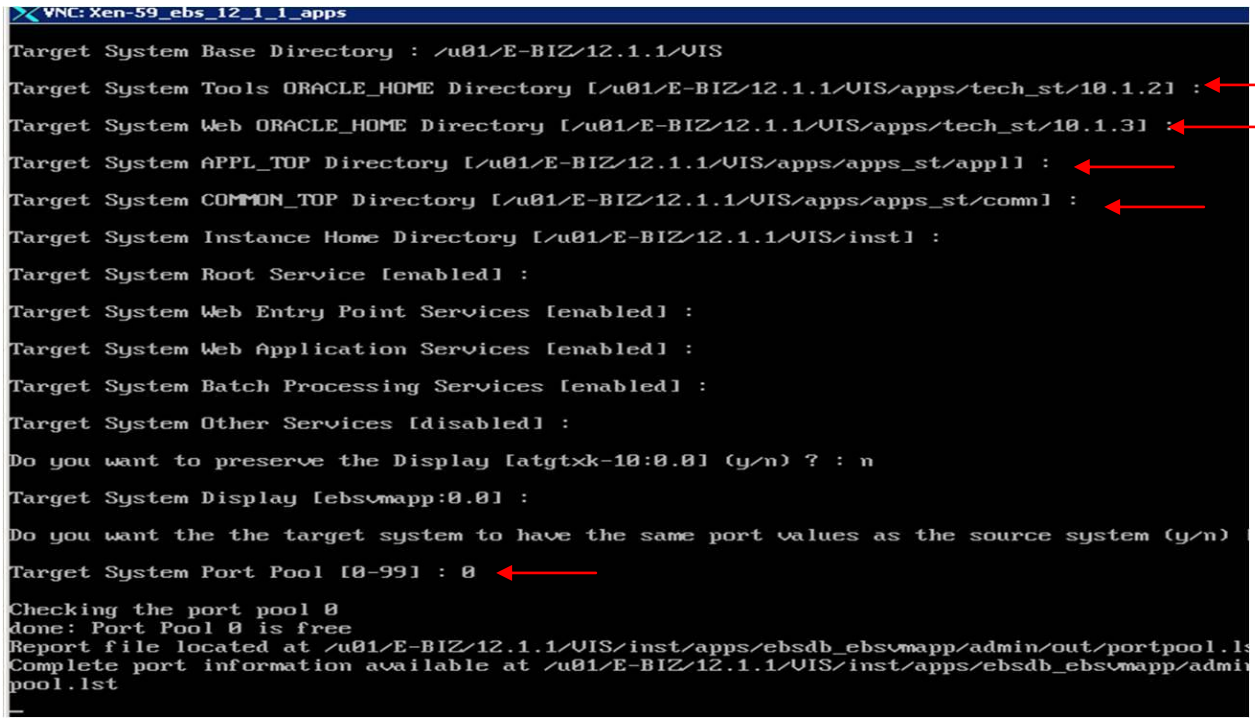
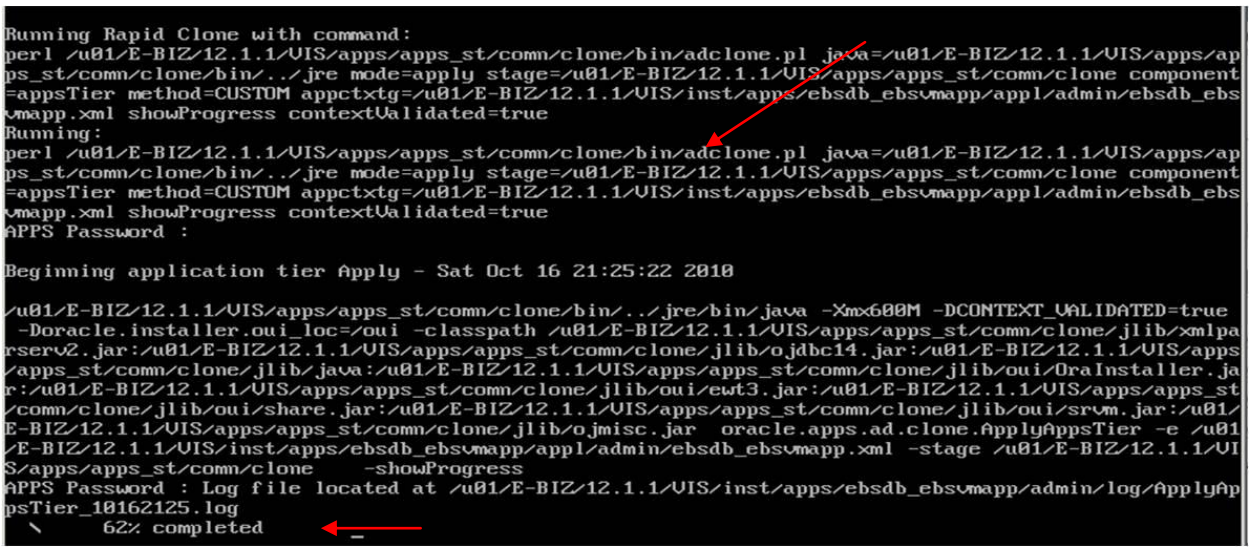


Figure : startup Apps tier VM (VM name :ebs12_1_1_apps) (hostname: ebsvmapps):

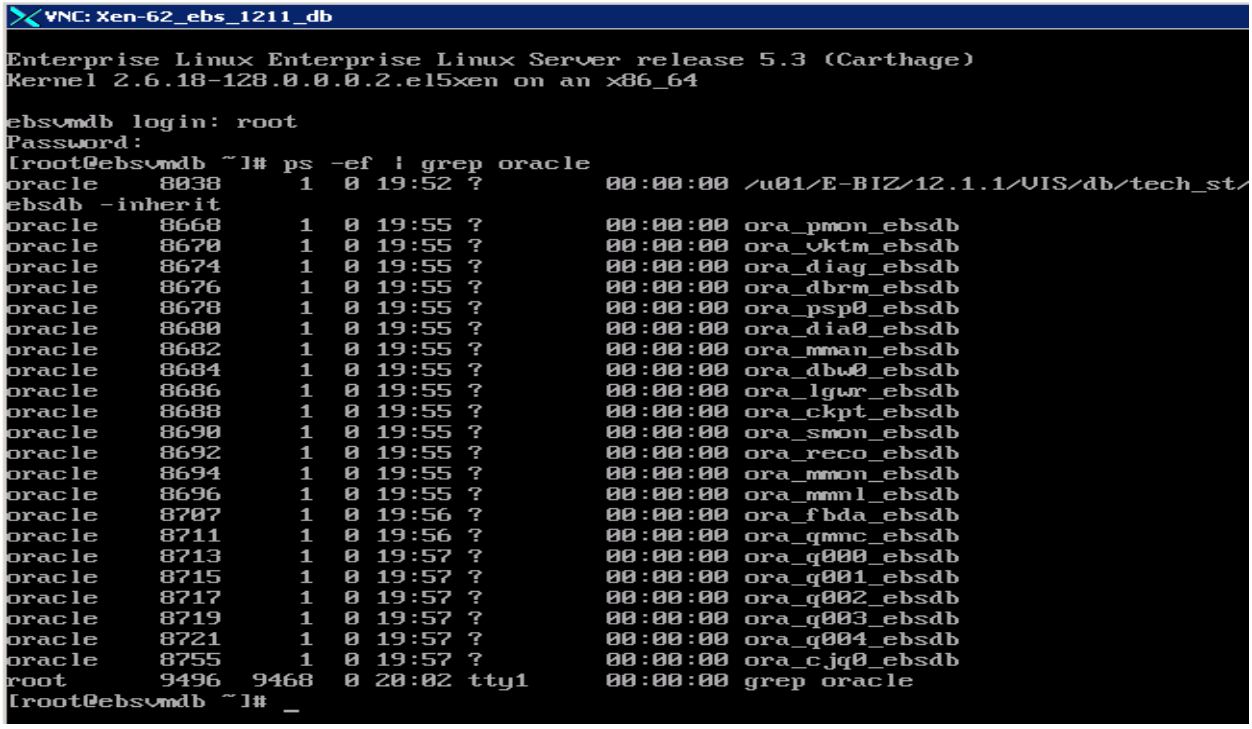
Automatic reconfiguring APPS VM by calling rapid clone adclone.pl utility







Database instance ebsdb running on DB tier server VM:



After we got both Apps tier VM and DB tier VM up, we can startup Oracle E-Business 12.1.1 Vision Instance on ebsvmapp. Now we have the EBS 12.1.1 Vision instance running on the VMs.
Oracle EBS 12.1.2 Vision instance configuration based on VM:
Apps Tier: VM name: ebs_1211_apps Hostname: ebsvmapp.us.dell.com, IP: 155.16.9.32
DB Tier: VM name: ebs_1211_db, hostname: ebsvmdb.us.dell.com, IP: 155.16.9.31
Database name: ebsdb

Step 2: ***Clone APPS and DB from DEV Instance. This includes:***

1. Before we cloned the apps tier and DB tier, ran the preclone scripts on the Apps tier node and DB tier node of the physical servers:
   adpreclone on gfsdevapps (APPS server)
   adpreclone on gfsdevdb (DB server)
2. Copy Apps tier and DB tier from physical machine to VMs:
   . Copy the following from gfsdevapps to ebsvmapps
   /u01/oracle/gfsd/ →/u01/E-BIZ/12.1.1/VIS
   . Copy the following the database files and Oracle Database software from gfsdevdb to ebsvmdb
   /u01/oracle/gfsd/db →/u01/E-BIZ/12.1.1/VIS/db

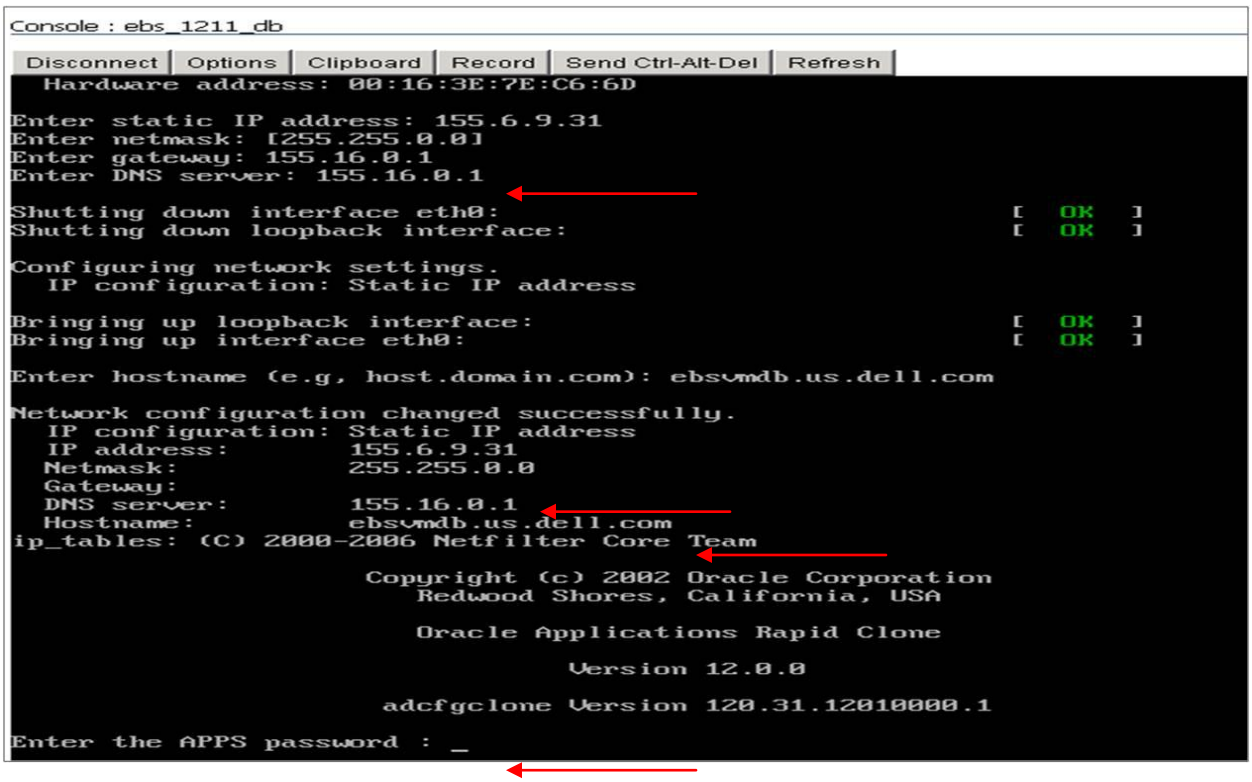
Step 3: Reconfigure the VMs to adapt the cloned EBS instance

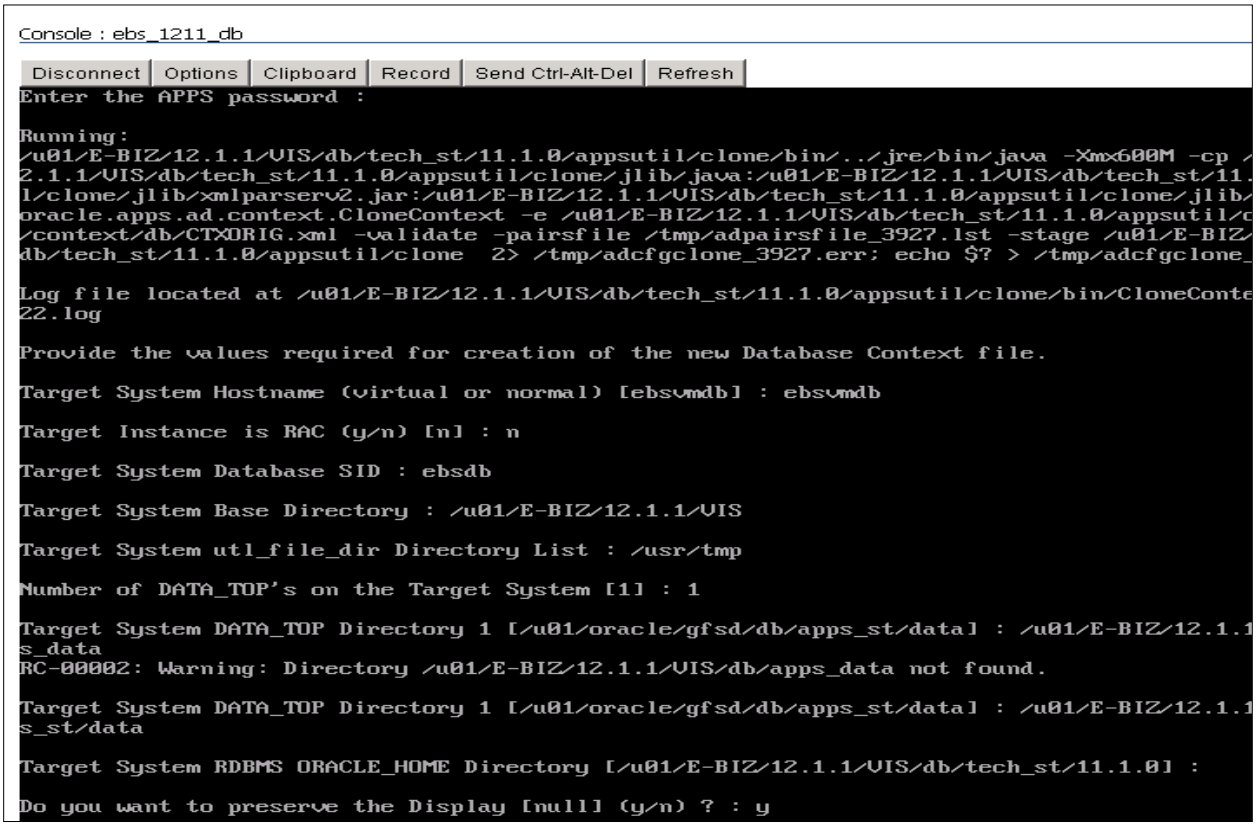
In this step, we need to accomplish four tasks:

1. cleanup to remove instance specific configuration from vision instance by running this on both Apps tier VM ebsvmapps and DB tier ebsvmdb
   /usr/sbin/oraclevm-template –cleanup t
2. Setup for automatic reconfiguration by running this on Apps tier VM ebsvmapps and DB tier ebsvmdb:
   /usr/sbin/oraclevm-template –enable:

This set a flag to run automatic reconfiguration next time when the VM startup

3: Reconfigure the DB tier by rebooting the DB VM ebs_1211_db (hostname: ebsvmdb)
The automatic reconfiguration process will kick off and run the DB reconfiguration script:
ebiz_1211_reconfig.sh. This script runs the rapid clone adclone.pl dbtier . The following screen shots shows the interactive reconfiguration process.

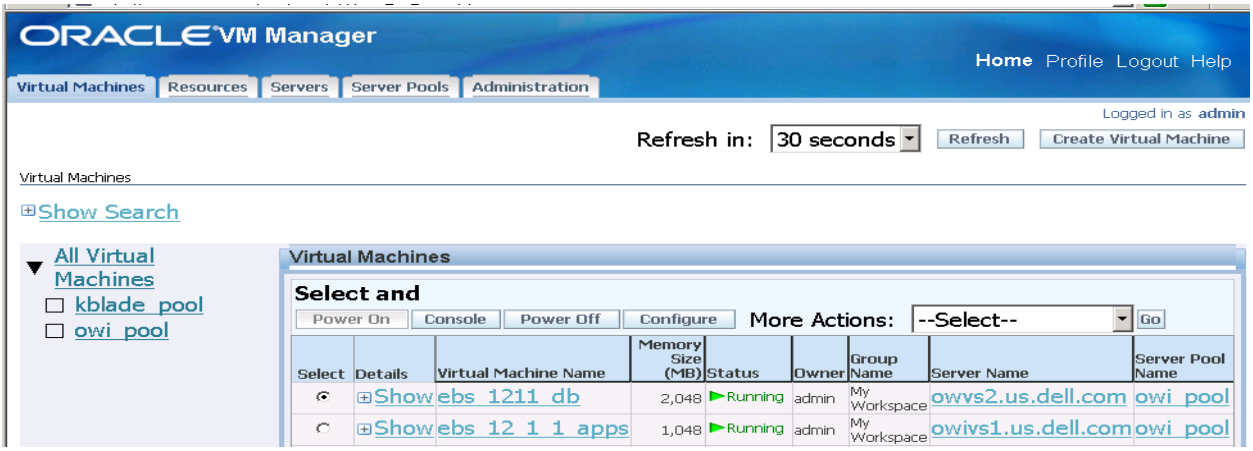




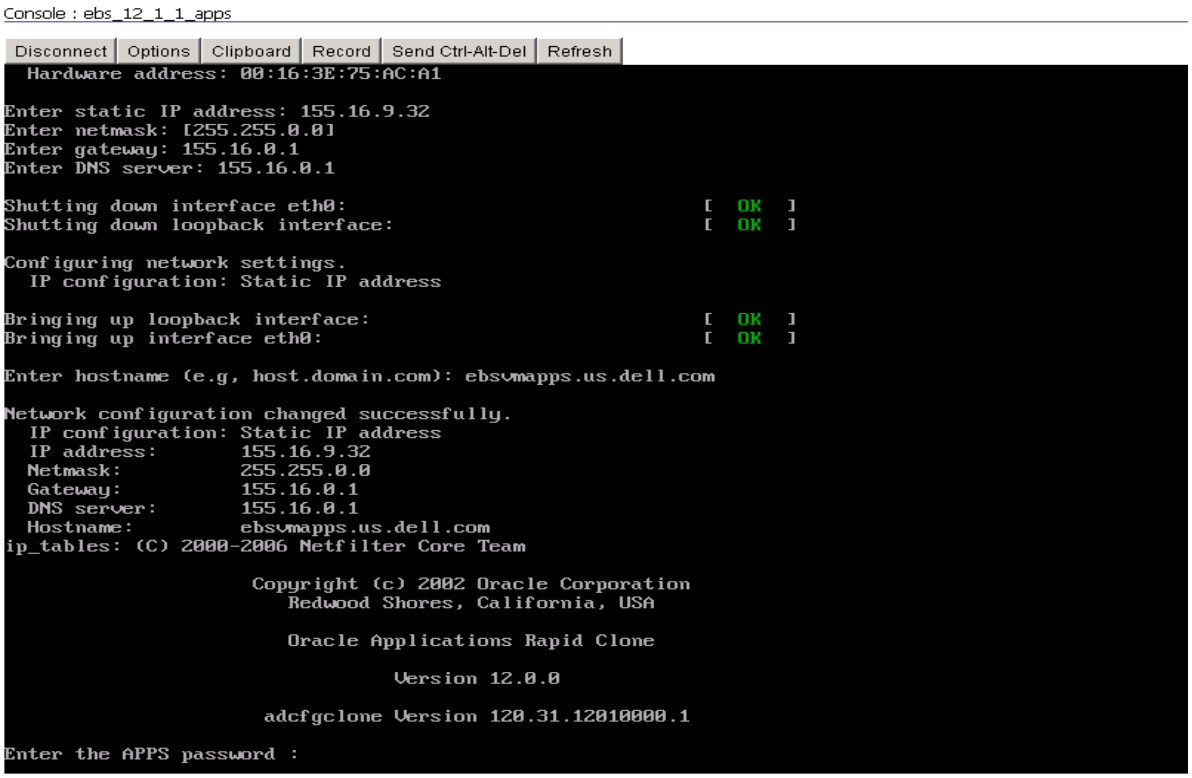
```
Beginning application tier Apply - Wed Nov 10 08:48:04 2010

/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/../jre/bin/java -Xmx600M -DCONTEXT_VALIDATED=true
 -Doracle.installer.oui_loc=/oui -classpath /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/xmlpa
rserv2.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/ojdbc14.jar:/u01/E-BIZ/12.1.1/VIS/apps
/apps_st/comn/clone/jlib/java:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/OraInstaller.ja
r:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/ewt3.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st
/comn/clone/jlib/oui/share.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/srvm.jar:/u01/
E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/ojmisc.jar  oracle.apps.ad.clone.ApplyAppsTier -e /u01
/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/appl/admin/ebsdb_ebsvmapps.xml -stage /u01/E-BIZ/12.1.1/
VIS/apps/apps_st/comn/clone    -showProgress
APPS Password : Log file located at /u01/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/admin/log/ApplyA
ppsTier_11100848.log
  \     67% completed
```

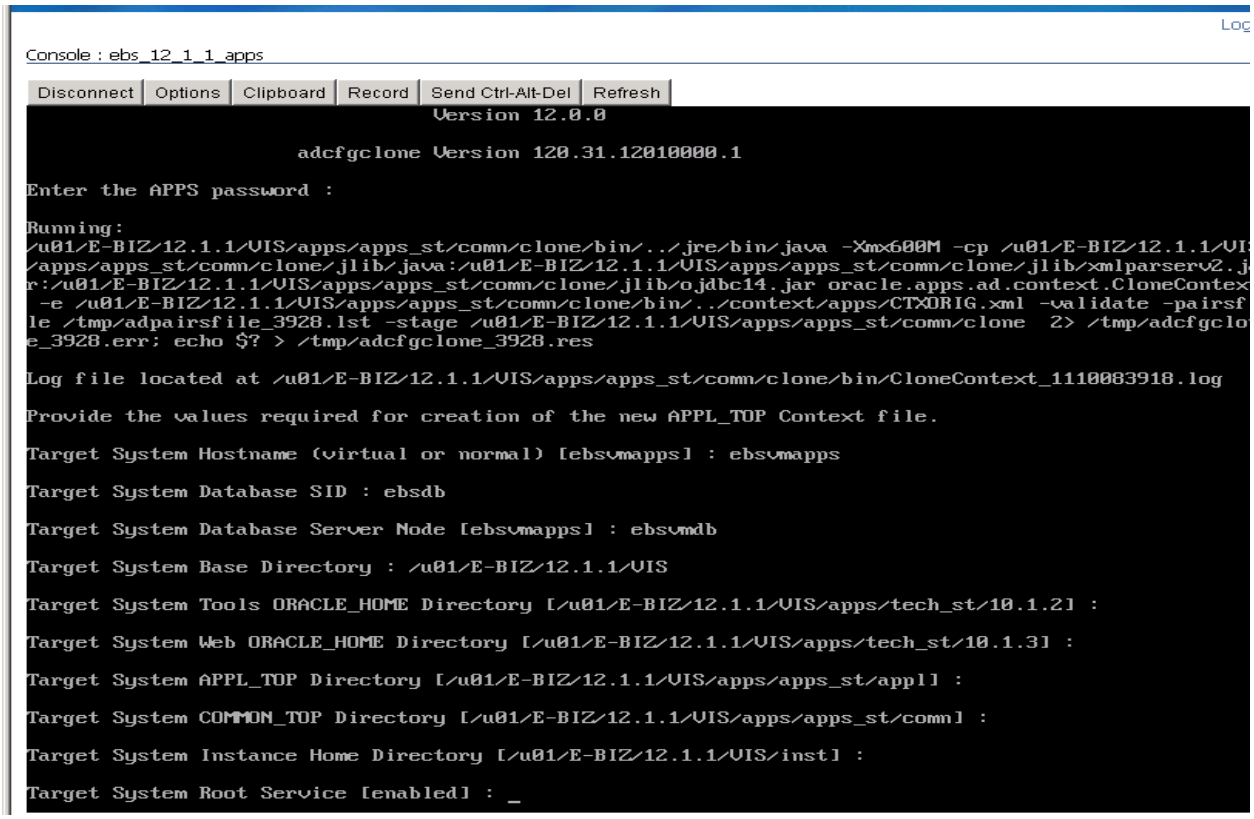
4: Reconfigure the APPs tier by starting the Apps Tier VM ebs_1211_apps (hostname: ebsvmapp)

Startup the APPs tier VM (VM name, ebs_1211_apps, Linux OS hostname: ebsapps.us.dell.com)



Login to ebs_12_11_apps VM console . the automatic reconfiguration process will kick off and run the reconfiguration script: ebiz_1211_reconfig.sh. This script runs the rapid clone adclone.pl appstier . The following screen shots shows the interactive reconfiguration process to reconfigure the APPs tier OS and Applications:



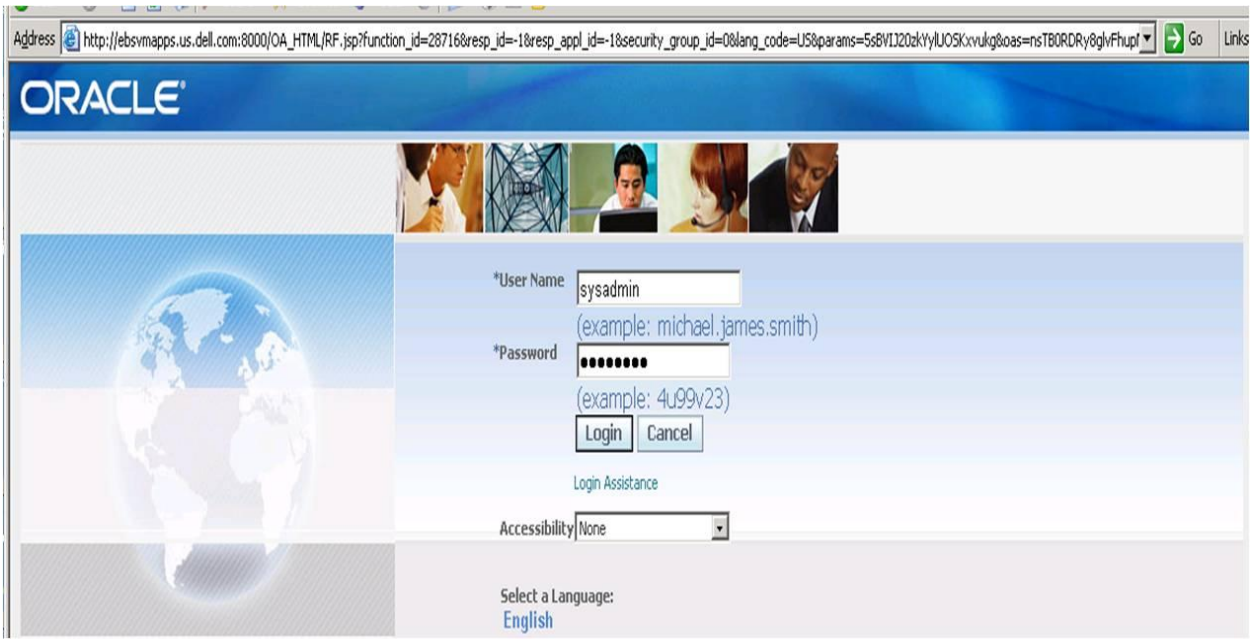


Console : ebs_12_1_1_apps

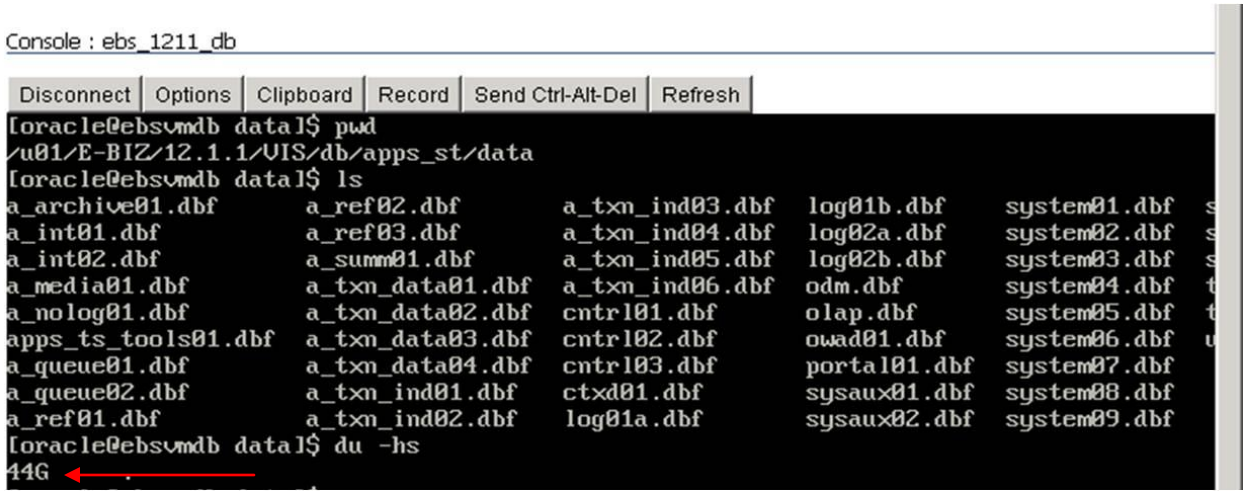
Disconnect | Options | Clipboard | Record | Send Ctrl-Alt-Del | Refresh

```
Creating the new APPL_TOP Context file from :
  /u01/E-BIZ/12.1.1/VIS/apps/apps_st/appl/ad/12.0.0/admin/template/adxmlctx.tmp

The new APPL_TOP context file has been created :
  /u01/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/appl/admin/ebsdb_ebsvmapps.xml

Log file located at /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/CloneContext_1110083918.log
Check Clone Context logfile /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/CloneContext_111008391
8.log for details.

Running Rapid Clone with command:
perl /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/adclone.pl java=/u01/E-BIZ/12.1.1/VIS/apps/ap
ps_st/comn/clone/bin/../jre mode=apply stage=/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone component
=appsTier method=CUSTOM appctxtg=/u01/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/appl/admin/ebsdb_eb
svmapps.xml showProgress contextValidated=true
Running:
perl /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/adclone.pl java=/u01/E-BIZ/12.1.1/VIS/apps/ap
ps_st/comn/clone/bin/../jre mode=apply stage=/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone component
=appsTier method=CUSTOM appctxtg=/u01/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/appl/admin/ebsdb_eb
svmapps.xml showProgress contextValidated=true
APPS Password :

Beginning application tier Apply - Wed Nov 10 08:48:04 2010

/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/bin/../jre/bin/java -Xmx600M -DCONTEXT_VALIDATED=true
 -Doracle.installer.oui_loc=/oui -classpath /u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/xmlpa
rserv2.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/ojdbc14.jar:/u01/E-BIZ/12.1.1/VIS/apps
/apps_st/comn/clone/jlib/java:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/OraInstaller.ja
r:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/ewt3.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st
/comn/clone/jlib/oui/share.jar:/u01/E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/oui/srvm.jar:/u01/
E-BIZ/12.1.1/VIS/apps/apps_st/comn/clone/jlib/ojmisc.jar  oracle.apps.ad.clone.ApplyAppsTier -e /u01
/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/appl/admin/ebsdb_ebsvmapps.xml -stage /u01/E-BIZ/12.1.1/
VIS/apps/apps_st/comn/clone     -showProgress
APPS Password : Log file located at /u01/E-BIZ/12.1.1/VIS/inst/apps/ebsdb_ebsvmapps/admin/log/ApplyA
ppsTier_11100848.log
  /       1% completed
```

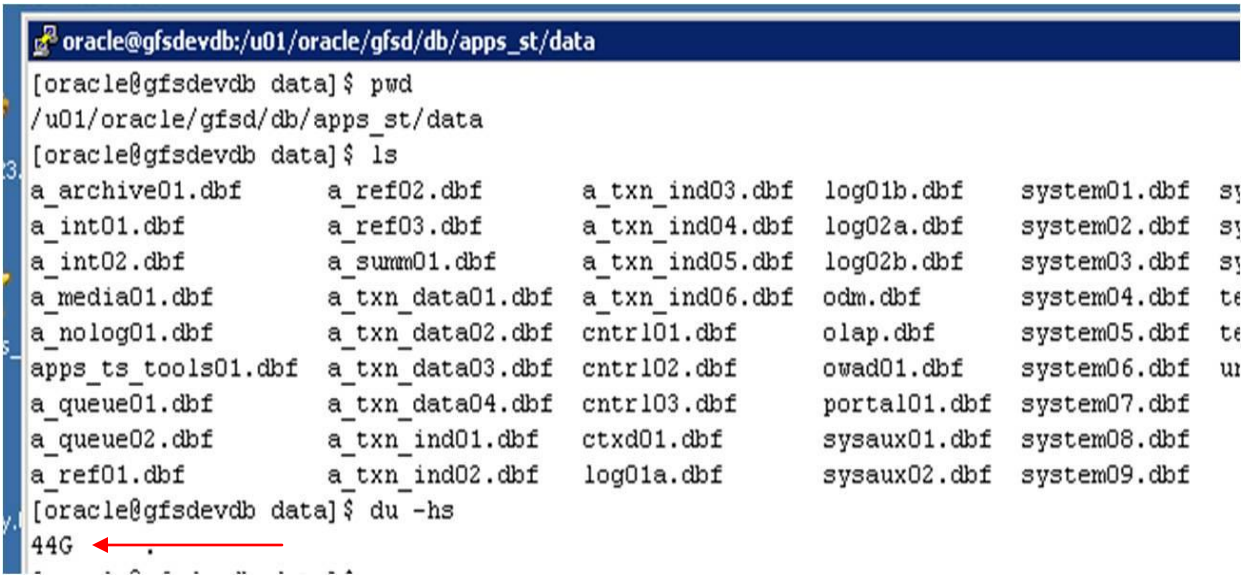
Then we startup new EBS instance: ebsvm on VMs(host:ebsvmapps)
Oracle EBS 12.1.2 clone instance configuration based on VM:
Apps Tier: VM name: ebs_1211_apps, Hostname: ebsvmapps.us.dell.com, IP: 155.16.9.32
DB Tier: VM name: ebs_1211_db, hostname: ebsvmdb.us.dell.com, IP: 155.16.9.31
Database name: ebsdb



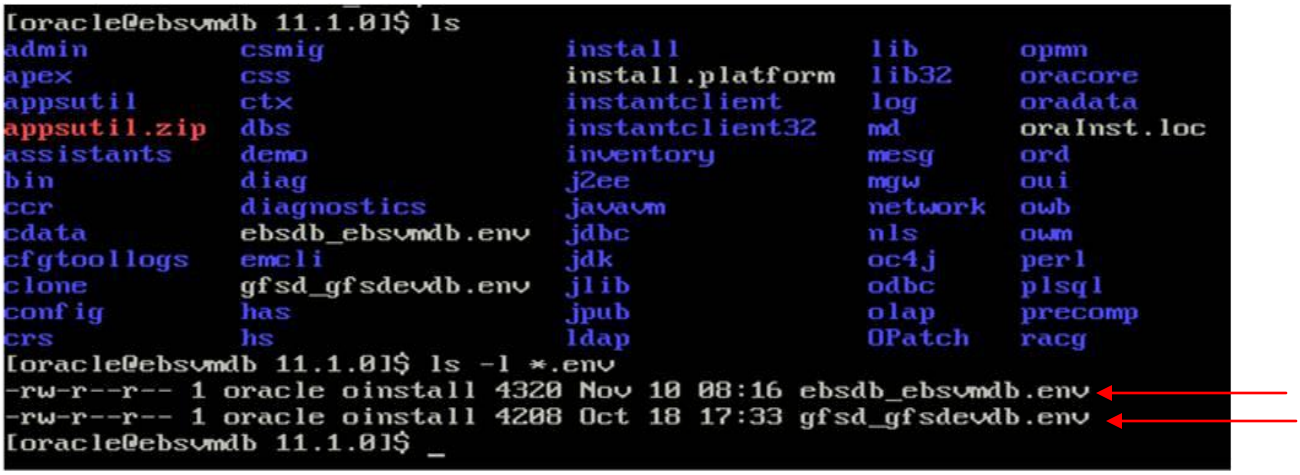
Let's review the Oracle EBS database on the VM and its original database on physical server: the ebsvmdb on virtual machine ebs_12_11_db(OS hostname: ebsvmdev)

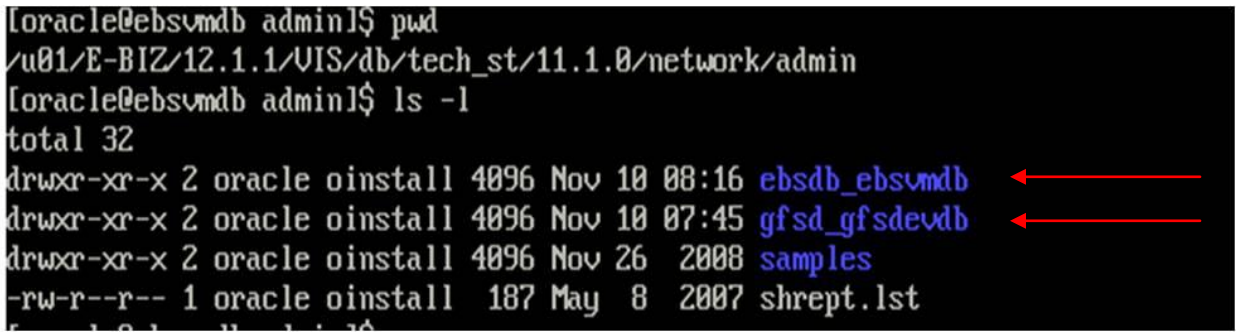


is the clone of the it's original database on the physical server gfsdevdb



In the Oracle home, it still keeps two environment files:
gfsd_gfsdevdb,env is copy from the physical server gfsdevdb with the database instance name gfsd
ebsdb_ebsvmdb.env is generated nby the adclone utility for new instance on VM host ebsvmdb with the database instance name: ebsdb



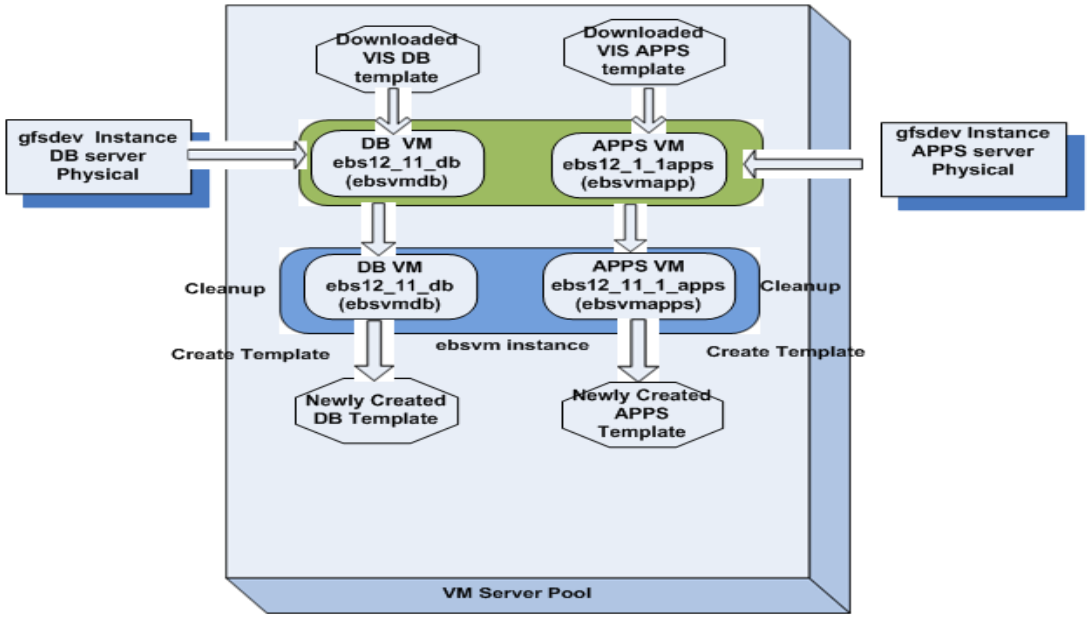


The screen shot above show s under the network admin director of the ORACLE_HOME there are two directories named after the Oracle EBS instance context name in format:<instancename>_<hostname>:
Original EBS instance gfsd on physical host gfsdevdb : gfsd_gfsdevdb
Cloned and reconfigured EBS instance ebddb on virtual host ebsvmdb: ebsdb_ebdvmdb

The two context names above show new EBS Instance ebsvm = gfsdev copy + Rapid Clone
The two new VM hosts ebsvmdb and ebsvmapps VMs also have the virtualization kit scripts
: /usr/sbin/oraclevm-template ,
/u01/ ebiz_1211_reconfig.sh

Create a New EBS Template

Once we successfully completed the migration process, we have the copy of the DEV instance running on Oracle VMs. And this copy not only has everything the original EBS instance DEV has, including the business data, customization and setups, these two VMs ebs12_11_db and ebs12_11_apps also have the Oracle EBS virtualization toolkits that can be used to create the new EBS VM template. The following diagram shows the VM template creation.



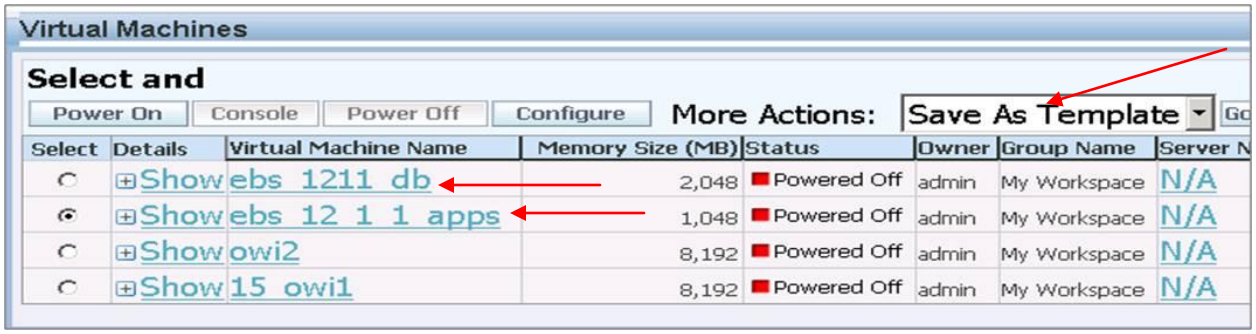
Cleanup Instance specific configuration and set reconfiguration flag

Before we can use the new EBS VMs ebs12_11_db and ebs12_1_apps to create the new Oracle VM template, we need to cleanup the instance specific configuration such as instance name, DB name, IP address, pool number and set reconfigure flag to enable the automatic reconfiguration.
We performed the following steps on both VM hosts :

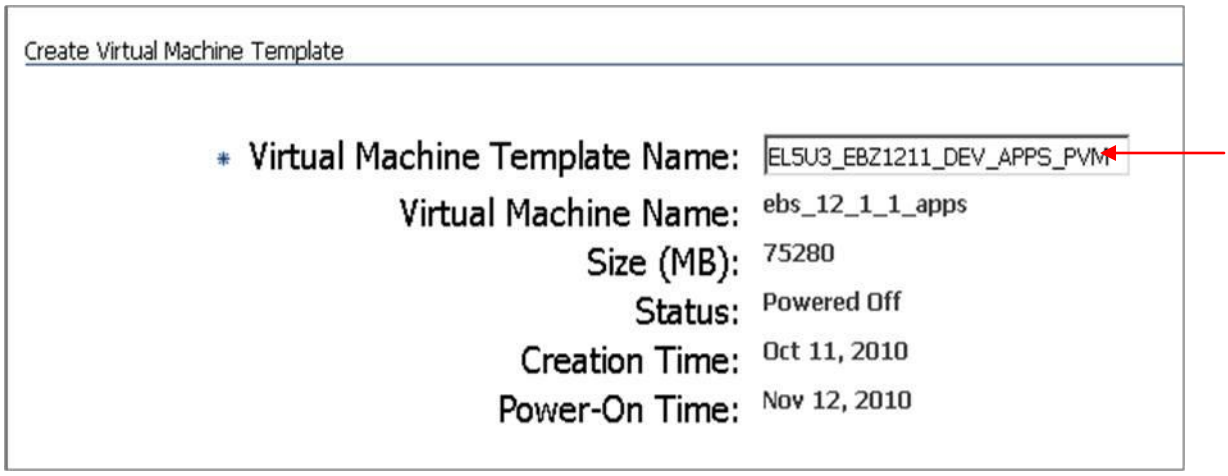
a. *Shutdown the database on DB tier and applications on APPS tier.*
b. *Run the following cleanup command on both VM hosts:*
   /usr/sbin/oraclevm-template –cleanup
   /usr/sbin/oraclevm-template –enable

Create VM templates based on the new EBS VMs

To create a VM template based on this two Oracle EBs VMs, we first shutdown both APPS tier VM ebs12_11_db and DB tier VM ebs12_1_apps VM . From Oracle VM manager, select the VM and take action "Save As Template" to create the responding VM templates as shown in following diagram:



Create APPS Template EL5U3_EBX1211_DEV_APPS_PVM using ens_12_1_1_apps VM



Do the similar step to create VM template EL5U3_EBS1211_DEV_DB_PVM using VM ebs_1211_db.

After successfully creating these two new VM template, there two set of Oracle EBS VM templates on the registered in VM Manager template list:

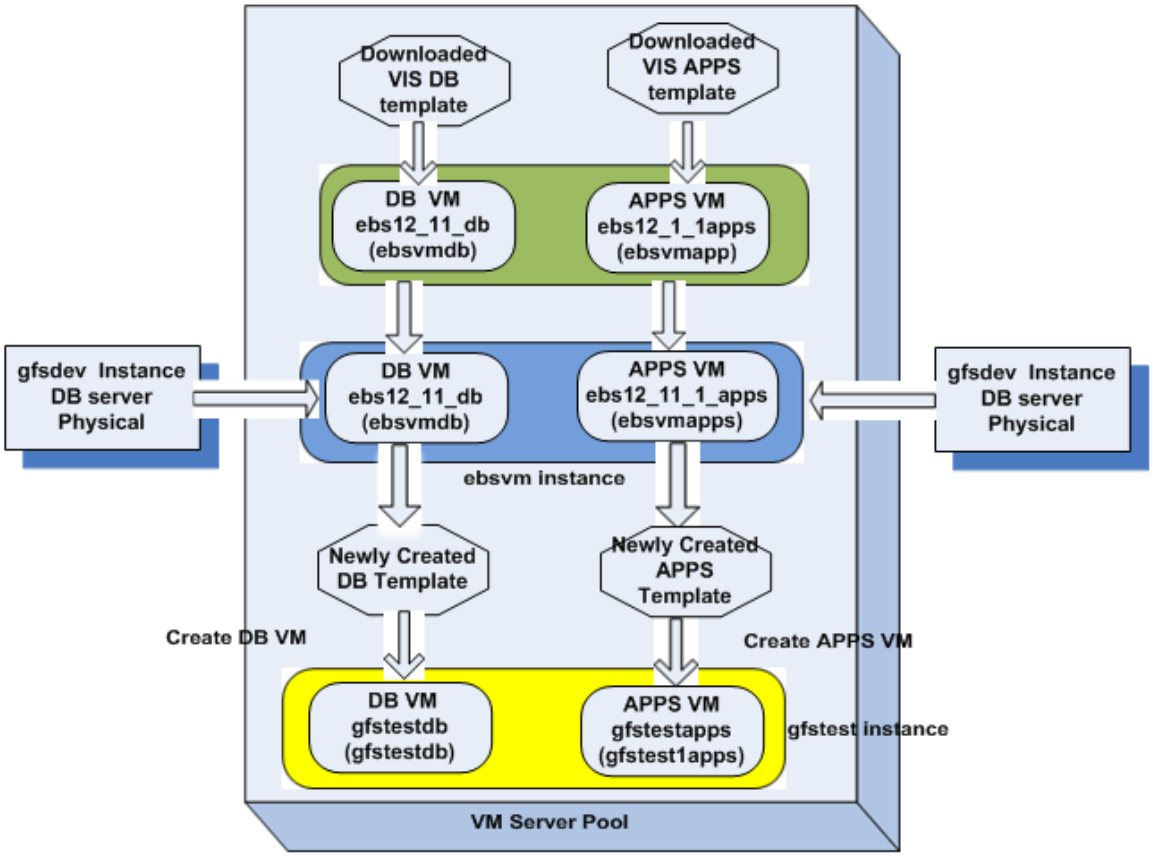
EBS Vision instance VM templates download from Oracle:
OVM_EL5U3_X86_64_EBIZ12.1.1_DB_VIS_PVM 251,048 MB
OVM_EL5U3_X86_64_EBIZ12.1.1_APPS_VIS_PVM 51,365 MB
Newly created EBS DEV instance VM templates from this POC project:
EL5U3_EBS1211_DEV_DB_PVM 155,280 MB
EL5U3_EBX1211_DEV_APPS_PVM 75,280MB

Previous

Virtual Machine Template Name	Size (MB)	Status	Creation Tim
EL5U3_EBZ1211_DEV_APPS_PVM	75,280	Active	Nov 12, 2010
OVM_EL5U5_X86_64_PVM_10GB	12,700	Active	May 17, 2010
EL5U3_EBZ1211_DEV_DB_PVM	155,280	Active	Nov 12, 2010
OVM_EL5U3_X86_64_EBIZ12.1.1_DB_VIS_PVM	251,048	Active	Oct 11, 2010
OVM_EL5U3_X86_64_EBIZ12.1.1_APPS_VIS_PVM	51,365	Active	Oct 11, 2010

Create New EBS VM from the VM Template

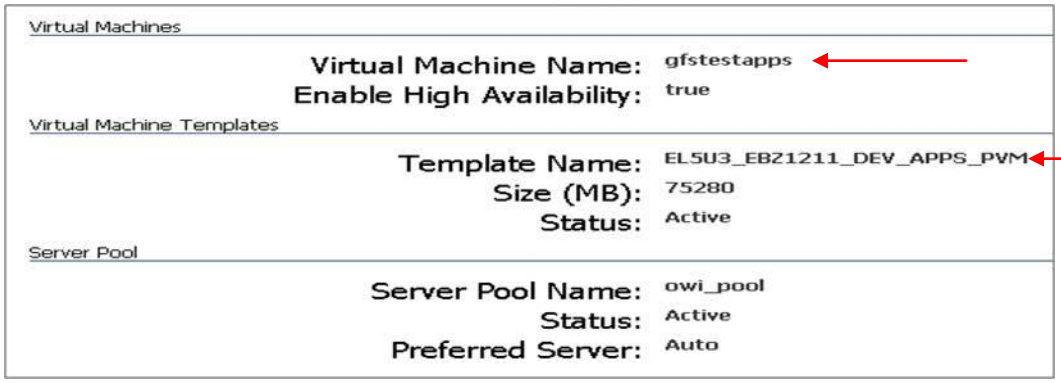
The last step of the virtualization process is to use the templates created in last step to create new Oracle EBS instance. The following diagram shows the last piece of the puzzle.



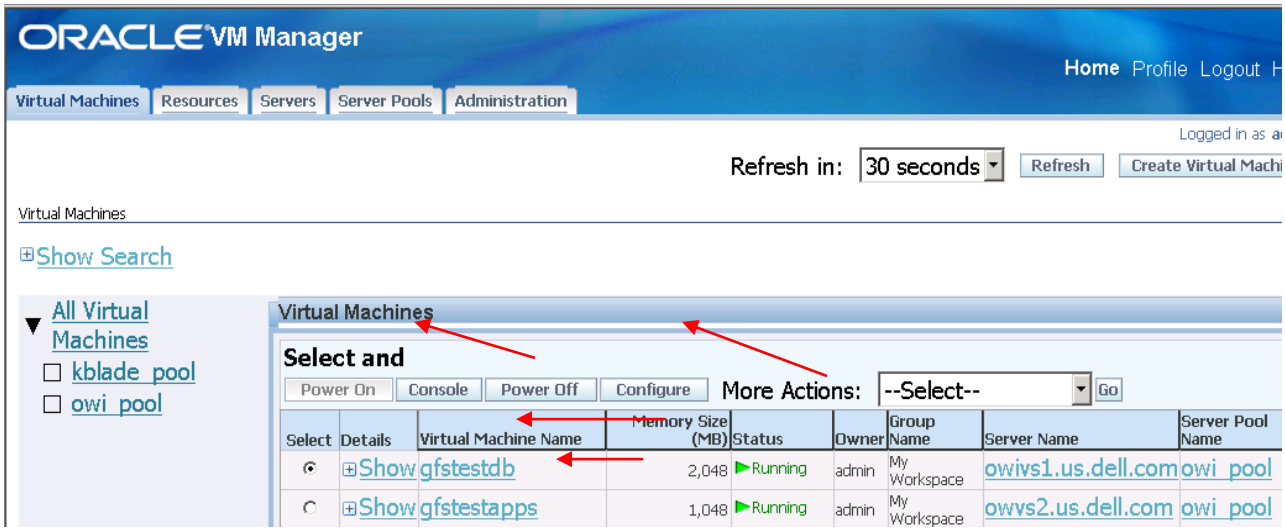
Create gfstestdb VM and gfstestapps VM

Oracle VM creation is same as the first step that we created the Vision instance from the Vision instance VM template. The difference is there we used the VM template that we created by ourself, not the vision instance template downloaded from Oracle E-delivery website.
The following screen shot shows we created the new DB tier VM gfstestdb using our own DB tier VM template EL5U3_EBX1211_DEV_DB_PVM:

In the similar way, Apps Tier VM gfstestapps was created from the new Apps tier VM template EL5U3_EBS1211_DEV_APPS_PVM.



Startup both VMs after the creation:



Reconfigure the VMs

Login to the new VMs through the VM manager console, the reconfiguration process was started automatically to prompt the instance specific configuration in the similar way as we did when we created vision instance VMs using the downloaded VM template.

,

Console : gfstestdb

Disconnect | Options | Clipboard | Record | Send Ctrl-Alt-Del | Refresh

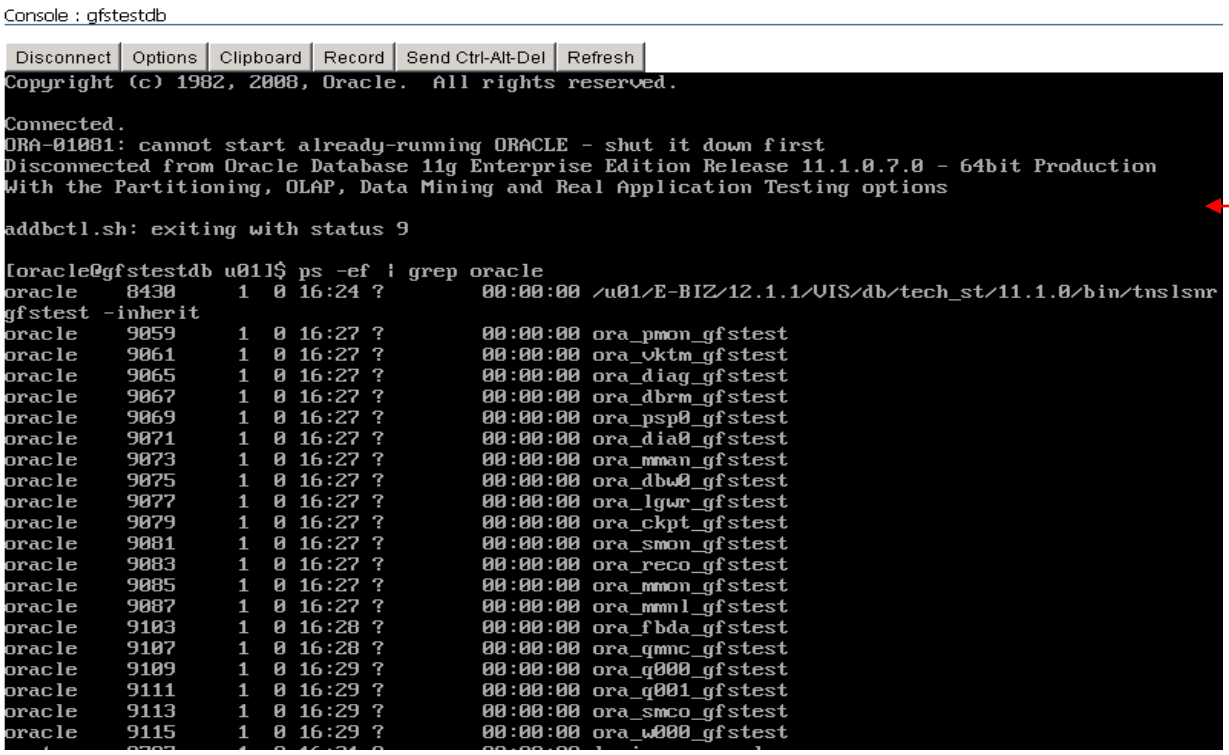
```
Enter static IP address: 155.16.9.34
Enter netmask: [255.255.0.0]
Enter gateway: 155.16.0.1
Enter DNS server: 155.16.0.1

Shutting down interface eth0:                              [  OK  ]
Shutting down loopback interface:                          [  OK  ]

Configuring network settings.
   IP configuration: Static IP address

Bringing up loopback interface:                            [  OK  ]
Bringing up interface eth0:                                [  OK  ]
Bringing up interface eth0_bak:                            [  OK  ]

Enter hostname (e.g, host.domain.com): gfstestdb.us.dell.com

Network configuration changed successfully.
   IP configuration: Static IP address
   IP address:       155.16.9.34
   Netmask:          255.255.0.0
   Gateway:          155.16.0.1
   DNS server:       155.16.0.1
   Hostname:         gfstestdb.us.dell.com
ip_tables: (C) 2000-2006 Netfilter Core Team

                      Copyright (c) 2002 Oracle Corporation
                         Redwood Shores, California, USA

                         Oracle Applications Rapid Clone

                                   Version 12.0.0

                       adcfgclone Version 120.31.12010000.1

Enter the APPS password :
```

Console : gfstestdb

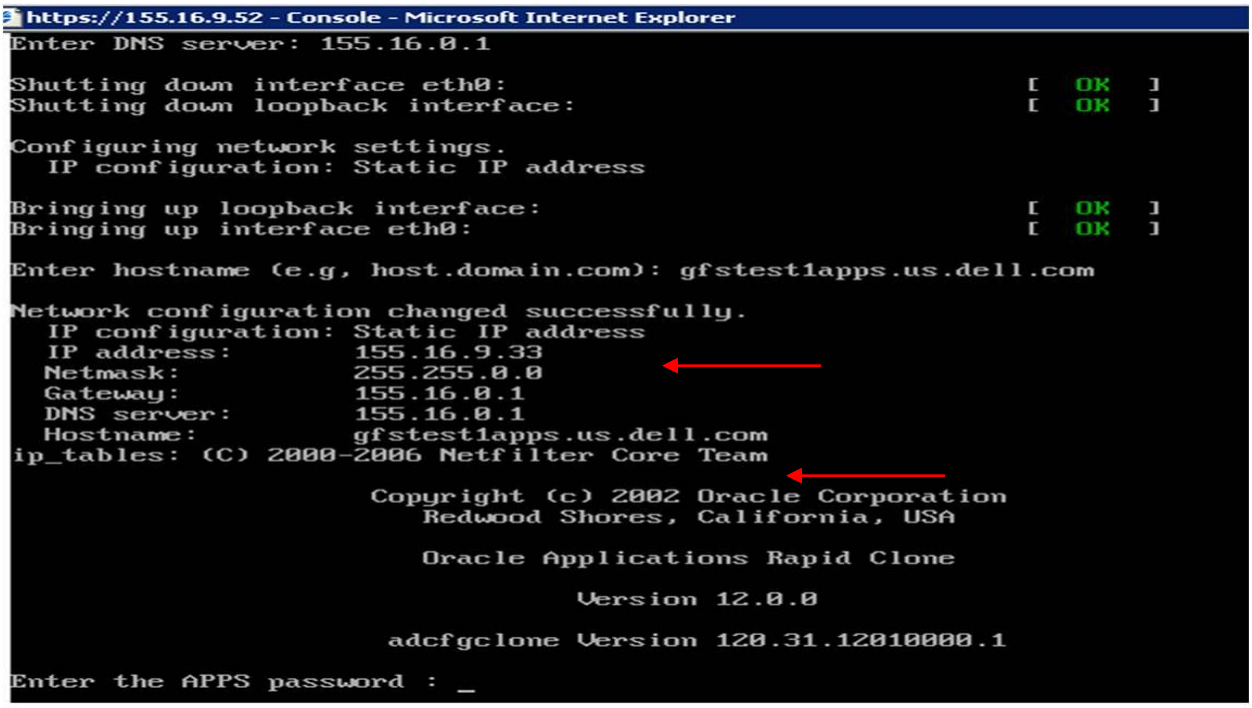
Disconnect | Options | Clipboard | Record | Send Ctrl-Alt-Del | Refresh

```
                    adcfgclone Version 120.31.12010000.1

Enter the APPS password :

Running:
/u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0/appsutil/clone/bin/../jre/bin/java -Xmx600M -cp /u01/E-BIZ/1
2.1.1/VIS/db/tech_st/11.1.0/appsutil/clone/jlib/java:/u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0/appsuti
l/clone/jlib/xmlparserv2.jar:/u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0/appsutil/clone/jlib/ojdbc5.jar
oracle.apps.ad.context.CloneContext -e /u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0/appsutil/clone/bin/..
/context/db/CTXORIG.xml -validate -pairsfile /tmp/adpairsfile_4104.lst -stage /u01/E-BIZ/12.1.1/VIS/
db/tech_st/11.1.0/appsutil/clone  2> /tmp/adcfgclone_4104.err; echo $? > /tmp/adcfgclone_4104.res

Log file located at /u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0/appsutil/clone/bin/CloneContext_11121421
22.log

Provide the values required for creation of the new Database Context file.

Target System Hostname (virtual or normal) [gfstestdb] :

Target Instance is RAC (y/n) [n] : n

Target System Database SID : gfstest

Target System Base Directory : /u01/E-BIZ/12.1.1/VIS

Target System utl_file_dir Directory List : /usr/tmp

Number of DATA_TOP's on the Target System [1] : 1

Target System DATA_TOP Directory 1 [/u01/oracle/gfsd/db/apps_st/data] : /u01/E-BIZ/12.1.1/VIS/db/app
s_st/data

Target System RDBMS ORACLE_HOME Directory [/u01/E-BIZ/12.1.1/VIS/db/tech_st/11.1.0] :

Do you want to preserve the Display [null] (y/n) ? : y

Do you want the the target system to have the same port values as the source system (y/n) [y] ? : y
```

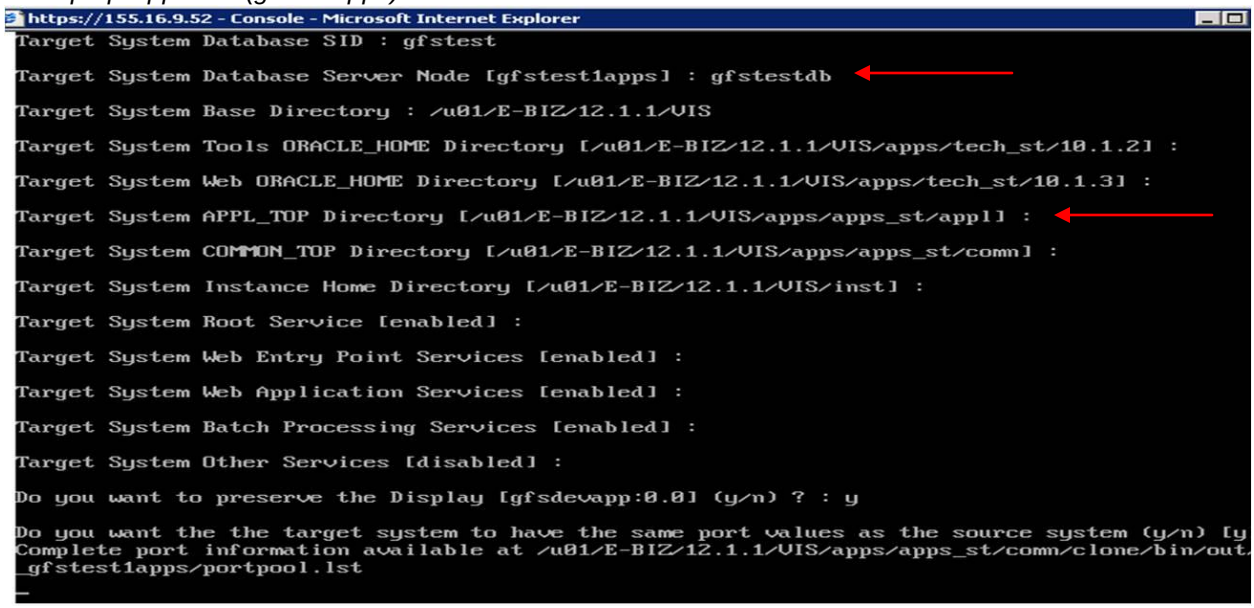
Startup the EBS database gfstest on the DB tier VM and see the database process:



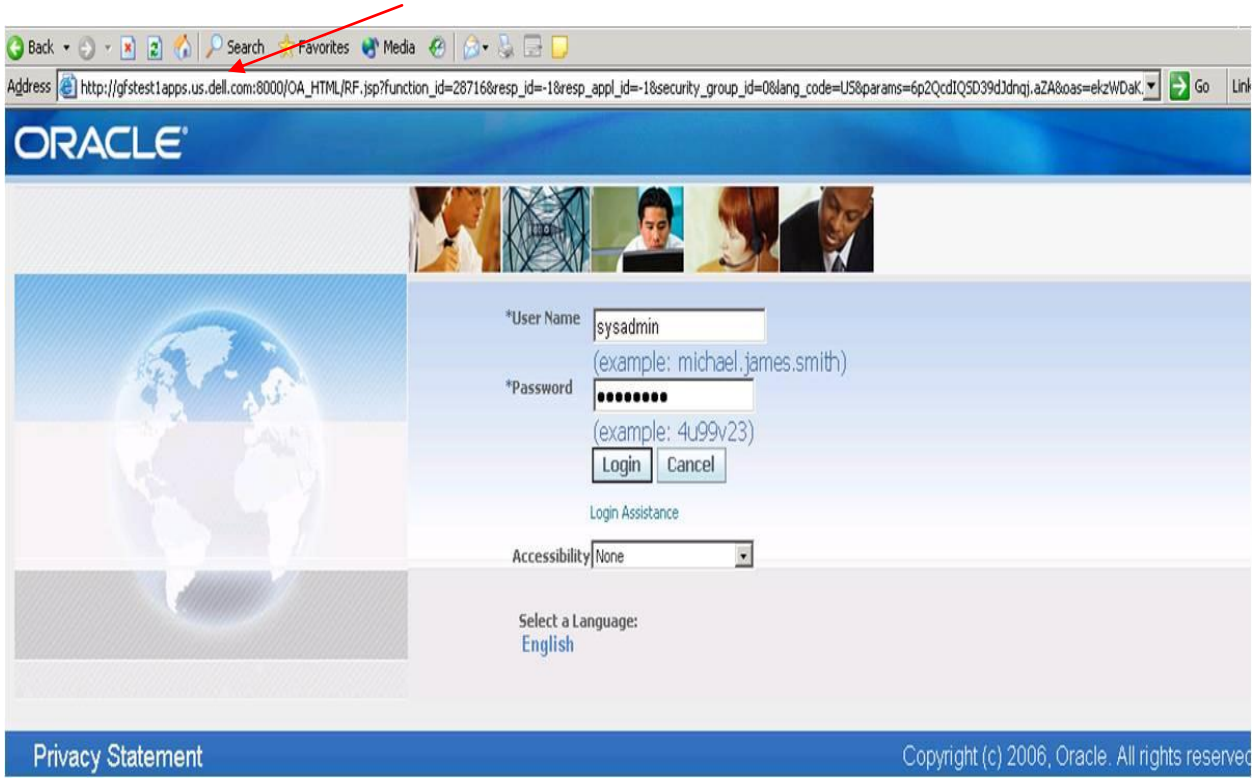
Login into APPs VM (gfstest1apps) OS through the VM manager console and start up the automatic reconfiguration process

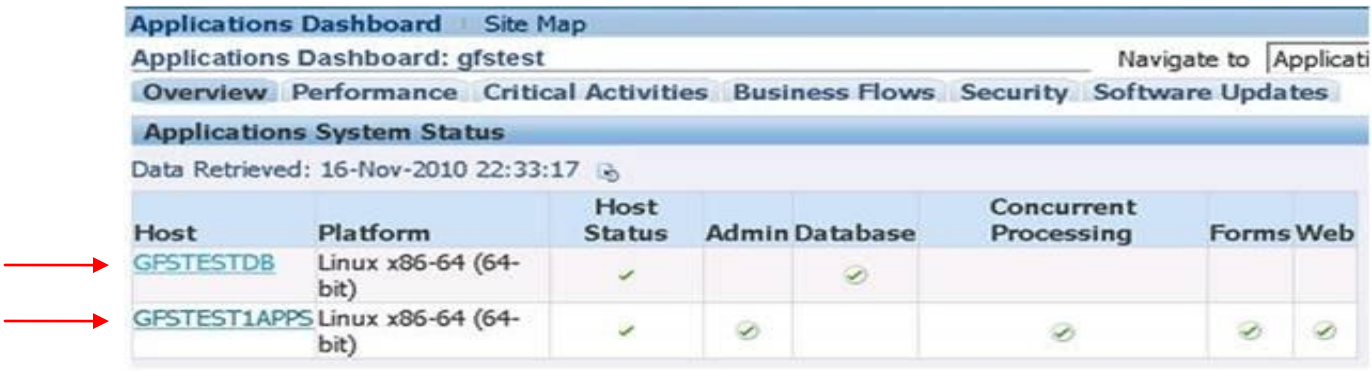


Startup up Apps VM (gfstestapps)



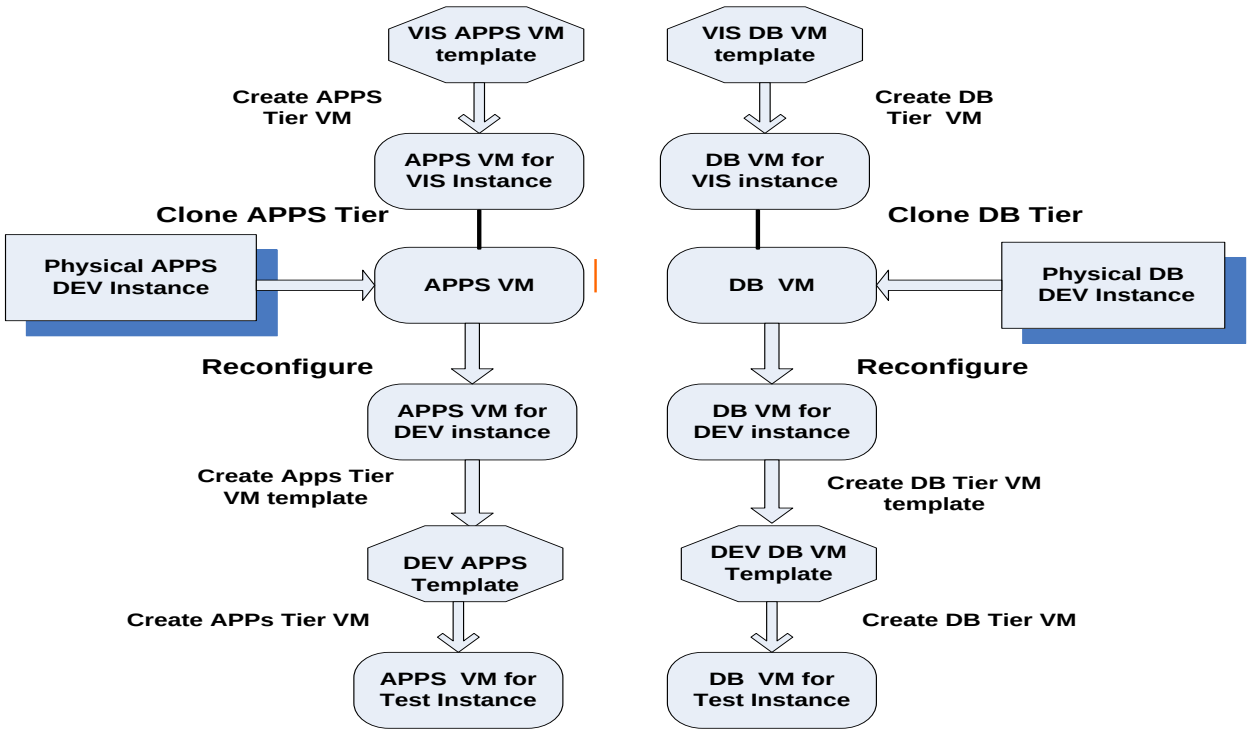
Run autoconfig: oracle@gfstest1apps scripts]$ ./adautocfg.sh and start up the Oracle EBS apps processes,
Login to the new Oracle EBS instance running gfstest on the new VMs gfstestdb and gfstestapps
New Oracle E-Business Suite Instance Deployed from the Template





Summary of the virtualization process

In the entire Oracle E-Business Suite virtualization process can be described in the following diagram: It started with combining the Vision Instance VM template and the physical DEV instance to migrate the DEV instance to VMs, then created the DEV instance VM template, and then used the DEV instance VM template to create new EBS VMs.



Oracle EBS High Availability on VM

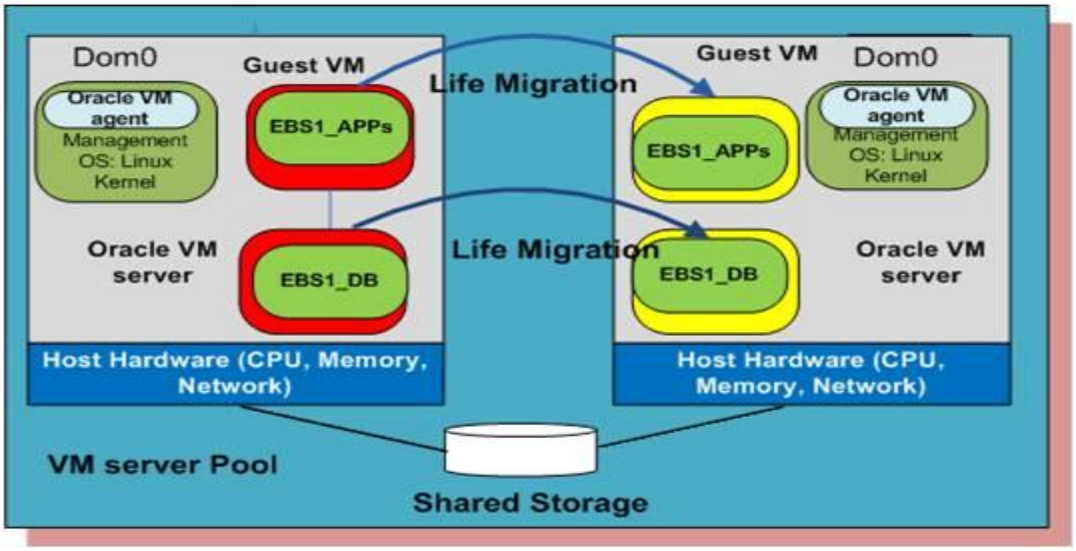
One of the great benefits of running Oracle E-Business suite on Oracle VM virtualization environment is the high availability provided by the virtualized infrastructure. As Oracle VM virtualization provides the virtual machines for the applications which can be independent from an individual physical machine, the Oracle E-Business Suite application alone with the underneath Oracle VM can be moved around the physical machines with minimal or zero downtime. Depending on the unplanned or planned move, Oracle VM provides two ways to facilitate the move

of virtual machines from one Oracle VM server running on a physical machine to another Oracle VM server running on a different physical machine:

Live migration: This option allows us to migrate the Oracle E-Business suite to alone with the Oracle VM (OVM) OS from one physical machine to another physical machine without any downtime. This capability is extremely useful if the administrators need to do some maintenance on a physical machine as the applications can be migrated to a new physical machine without bring down the Oracle E-business suite instance. This can eliminates the planned downtime due to the maintenance.
Fail over: this option will allow the Oracle E-Business suite with the Oracle VM to automatically failover to another physical machine in case the physical machine that the OVM of the applications is running. The following session will explore some testing of these two High Availability options.

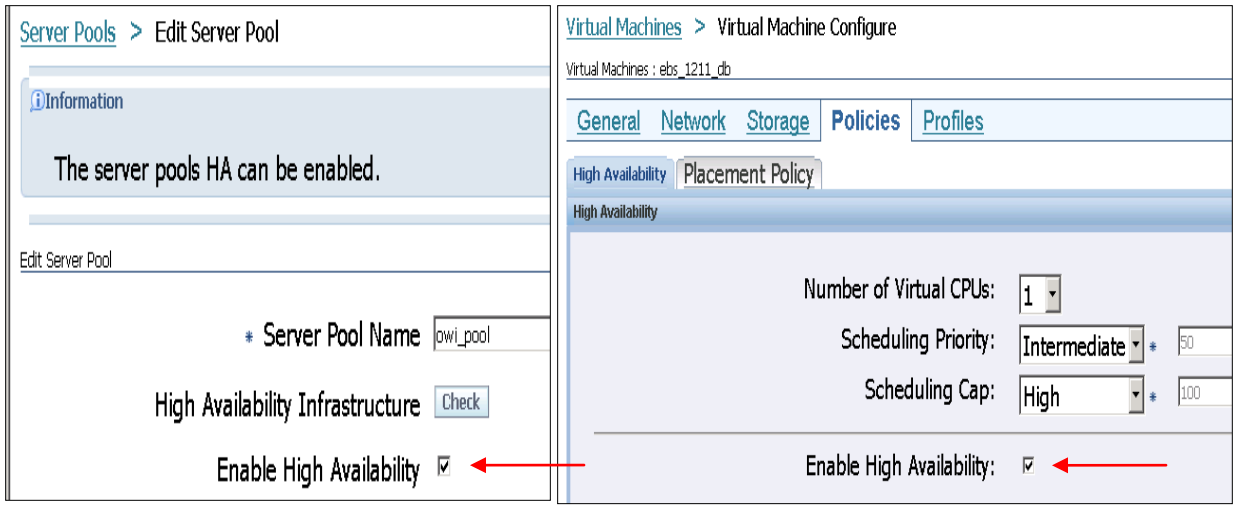
Live Migration

The following diagram shows the test of live migration: Oracle VM sever on left has two Oracle guest VMs: one runs Apps tier , another runs the Database tier. We will test how we can migrate the guest VMs with the Oracle E-business suite applications migrate to the Oracle VM server on the right while keeping the Oracle E-Business Applications instance online.

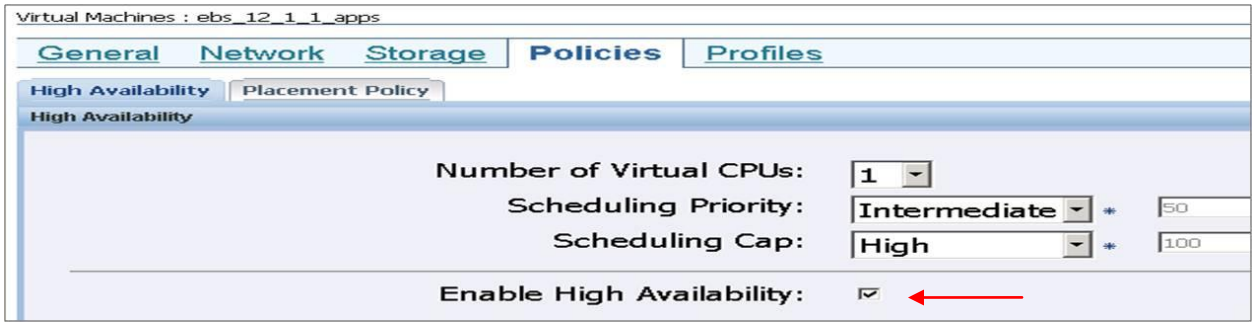


Before we enable this life migration capability, we need to enable the HA on both VM server pool level and each VM. The following diagrams show how to enable them:

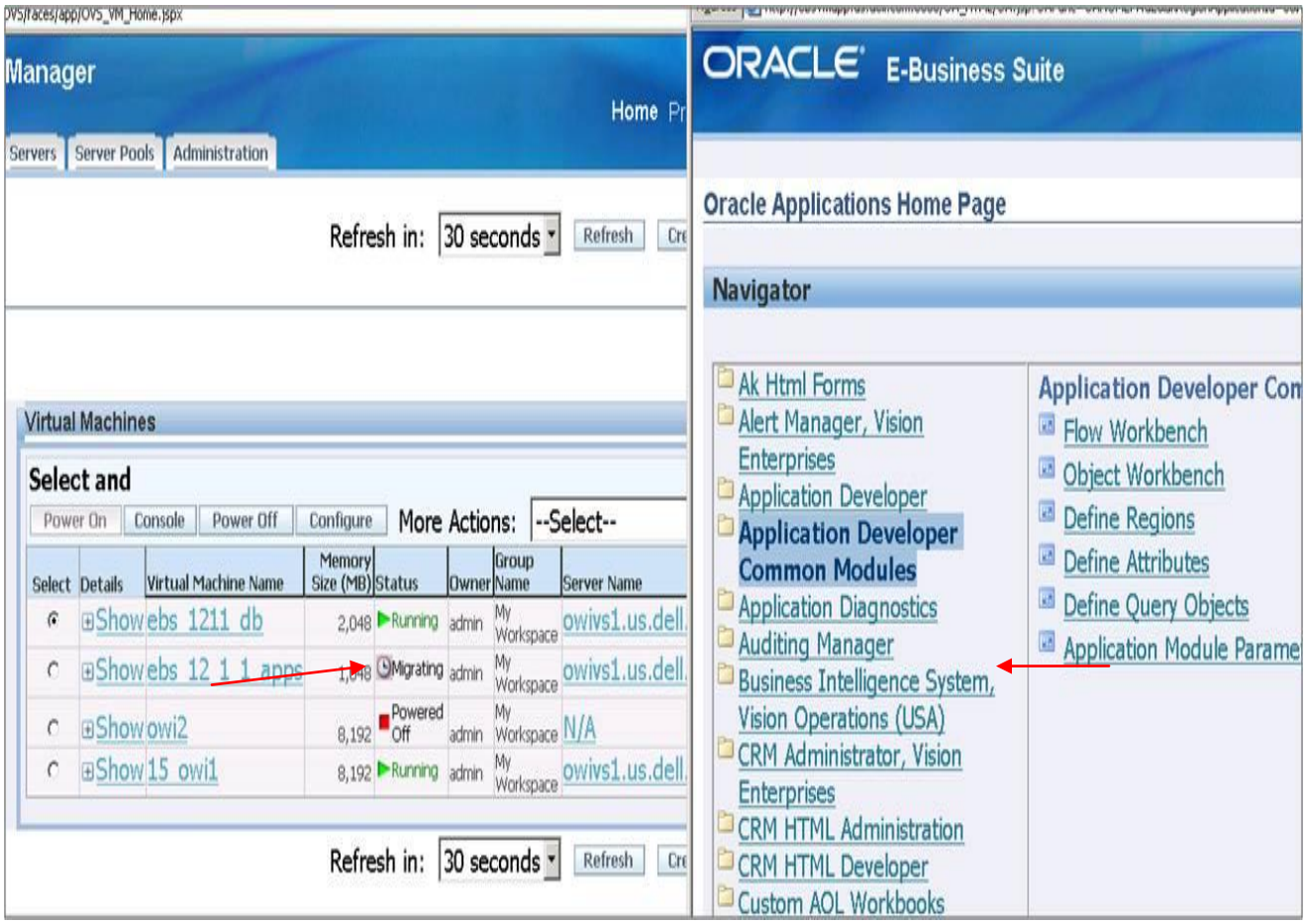
Enable HA on VM server pool *Enable HA on DB tier VM server*



Enable HA on Apps tier VM server:

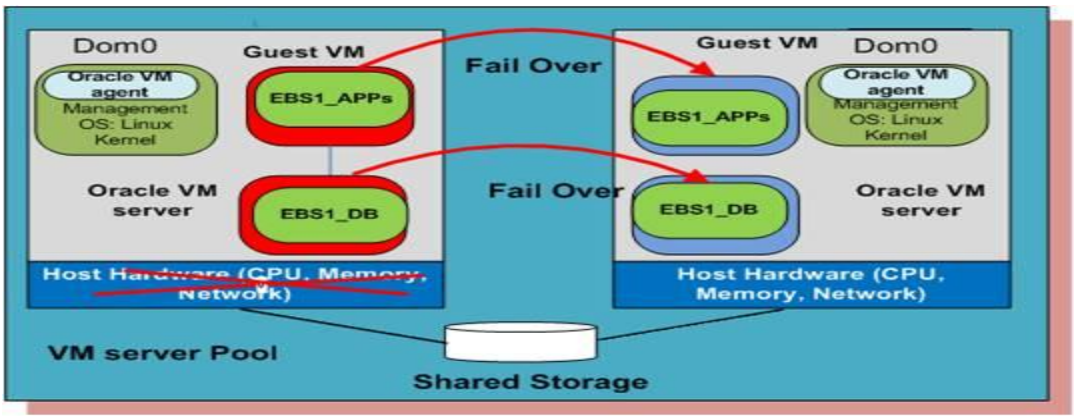


*Show the live migration **to** migrate VMs to another VM server in the same VM server pool with no downtime for the Oracle E-Business Suite applications. The left screen shot shows the appsTier VM Ebs12_1_1_apps is migrating, where the right screen shot shows that the end user still can use the Oracle E-Business applications running on the VM.*

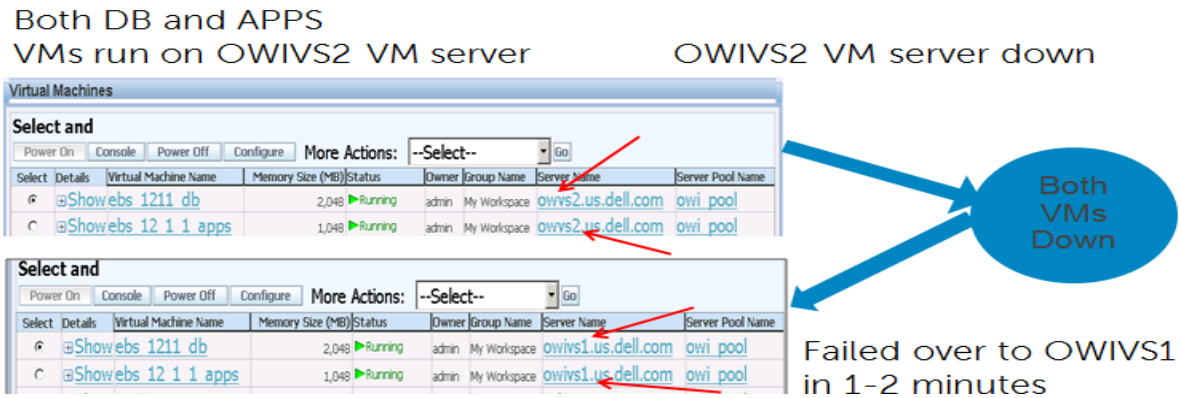


Failed Over Test

The following diagram shows the test of failover of the Oracle E-Business suite VMs: In case the Oracle VM sever on left fails , the two Oracle VMs EBS1_Apps and EBS2_DB have to move to the another VM server to restart .



Initially Both DB Tier VM and APPS tier VM run on OWIVS2 VM server, when the OVS server OWIVS2 VM server wend down, the both VMs went down then got restarted in OWIOVS1 VM server in less than two minutes.



Summary and Acknowledgement

In this paper, we have examined the entire process to virtualize the Oracle E-Business Suite. The process includes the step to migrate the Oracle E-Business suite Apps tier and DB tier from physical machines to Oracle virtual machine, them how to build the Oracle E-Business suite template from these Oracle VMs. The last step of the process also include the step to build the new Oracle EBS VMs using this template. To show one of the benefit of running Oracle E-Business suite in Oracle VM environment, we also examines the high availability options: live migration and failover. From the very beginning of the project, we were very lucky to have the great support and advise from Oracle EBS on Oracle VM Team chief architect and engineer Ivo Dujmovic and Noby Joseph in Oracle Corporation. Their help is greatly appreciated.

References

1. *Five-part series from Ivo Dujmovic:E-Business Suite 12.1.1 Templates for Oracle VM Now Available*
2. *Oracle VM Templates for E-Business Suite: Deployment Guide.*
3. *Oracle VM – Creating & Maintaining a Highly Available Environment for Guest VMs, An Oracle Technical*
4. *Creating and Using Oracle VM Templates: The Fastest Way to Deploy Any Enterprise Software*
5. *An Oracle Technical White Paper, February 2009*
6. *E-Business Suite 12.1.1 Templates for Oracle VM Now Available, By Ivo Dujmovic, December, 2009*
7. *E-Business Suite 12.1.3 Templates for Oracle VM Now Available, By Ivo Dujmovic, November, 2010*