



Migrating an Oracle VM Environment Across Heterogeneous Storage Arrays

A Dell and Oracle solution for migrating an Oracle VM environment from EqualLogic to Compellent storage

Dell Storage Engineering
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Engineering: Chidambara Shashikiran (Dell) and Omar Ahmad (Oracle)

Additional contributors: James Jordan (Dell Solution Center) and Gregory King (Oracle)

Feedback

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1 Introduction

Migration of any virtualization platform from one storage platform to another is always a challenging task. Oracle VM provides extensive features which help customers migrate the VM environment across storage platforms. This paper presents key steps and procedures for migrating an Oracle VM environment from Dell EqualLogic storage arrays to a Dell Compellent SAN. The migration solution discussed in this whitepaper is validated and approved jointly by Dell and Oracle engineering teams.

The paper illustrates migration of a storage repository, server pool file system, Virtual machines (VMs) and all related resources such as VM templates and ISOs. The tested solution demonstrates moving from an EqualLogic PS Series PS6110XS array to a Compellent SC 40 array, but the same procedure can be used for migration from any EqualLogic PS Series array to a Compellent SC array.

This whitepaper illustrates the migration of an Oracle VM environment from Dell EqualLogic to Dell Compellent storage platform using iSCSI protocol. Additionally, the generic steps and procedure described in this white paper can be used for migration of an Oracle VM environment across any storage platform.

1.1 Audience

This paper is intended for system administrators, database administrators and storage architects who are managing Oracle VM environments and also those who are interested in migration of an Oracle VM environment across heterogeneous storage platforms.

1.2 Terminology

The following terms are used throughout this document:

Domain: A configurable set of resources such as memory, CPU, network and disk devices.

Dom0: The management domain that has complete access to all the hardware resources within the physical server. Each VM hosted on the server is completely managed by these domains.

DomU: A guest VM started by the Oracle VM server that is completely managed by Dom0 of the VM server.

Server pool: A Logical group of one or more Oracle VM servers. This presents a unified view of the storage and server resources for the hosted VMs.

Non-Sparse Copy: A "non-sparse copy" clone is a disk image file of a physical disk, which uses the space equivalent to the full specified disk size, including empty blocks.

Sparse Copy: A "sparse copy" clone is a disk image file of a physical disk, which uses only the amount of space actually in use; not the full specified disk size.



Oracle Cluster File System 2 (OCFS2): An open-source clustered file system developed by Oracle. Clusterware applications can leverage OCFS2 to achieve optimal performance and high availability.

SAN Headquarters (SAN HQ): A Dell product that monitors one or more PS Series groups. The tool is a client/server application that runs on a Microsoft Windows system and uses simple network management protocol (SNMP) to query the groups. Much like a flight data recorder on an aircraft, SAN HQ collects data over time and stores it on the server for later retrieval and analysis. Client systems connect to the server to format and display the data in the SAN HQ GUI.



2 Product overview

Oracle VM combined with Dell storage arrays provide the best solution for customers looking to virtualize their Oracle Database deployments because:

- Oracle VM is a scalable x86 server virtualization platform designed from the ground up for excellent manageability and ease-of-use.
- Dell storage arrays compliment this by optimizing and balancing performance and capacity needs of a demanding virtualized Oracle Database environment.
- Oracle VM is a virtualization platform that is fully supported and certified by Oracle.

This section provides an overview of the key components that were used for the Oracle VM on Dell Storage migration solution.

2.1 Oracle VM overview

Oracle VM is an application-driven server virtualization platform designed to for rapid deployment of enterprise applications. Oracle VM supports both Oracle and non-Oracle workloads. For x86 platforms, Oracle VM consists of two key components:

Oracle VM Server: Oracle VM Server incorporates an open source Xen hypervisor component, which has been customized and optimized to integrate into the larger, Oracle-developed virtualization server. Oracle VM Server 3 is installed on 64-bit x86 servers and supports 32-bit and 64-bit guest operating systems such as Linux, Solaris, and Windows. Oracle VM Server includes Oracle VM Agent to communicate with Oracle VM Manager for management and configuration.

Oracle VM Manager: A single user-friendly interface for administration of servers and VMs. This helps in management and control of the entire virtualization environment. It is an Oracle Fusion Middleware application, based on the Oracle WebLogic Server application. Beginning with the 3.2 release, Oracle VM Manager bundles MySQL Database Enterprise Edition as the management repository.

Each of the above key components include many supporting agents and processes that work in concert to provide a cohesive product for managing your Oracle VM servers and guests.

Refer to the Oracle VM documentation for more details at <http://www.oracle.com/technetwork/server-storage/vm/documentation/index.html>.



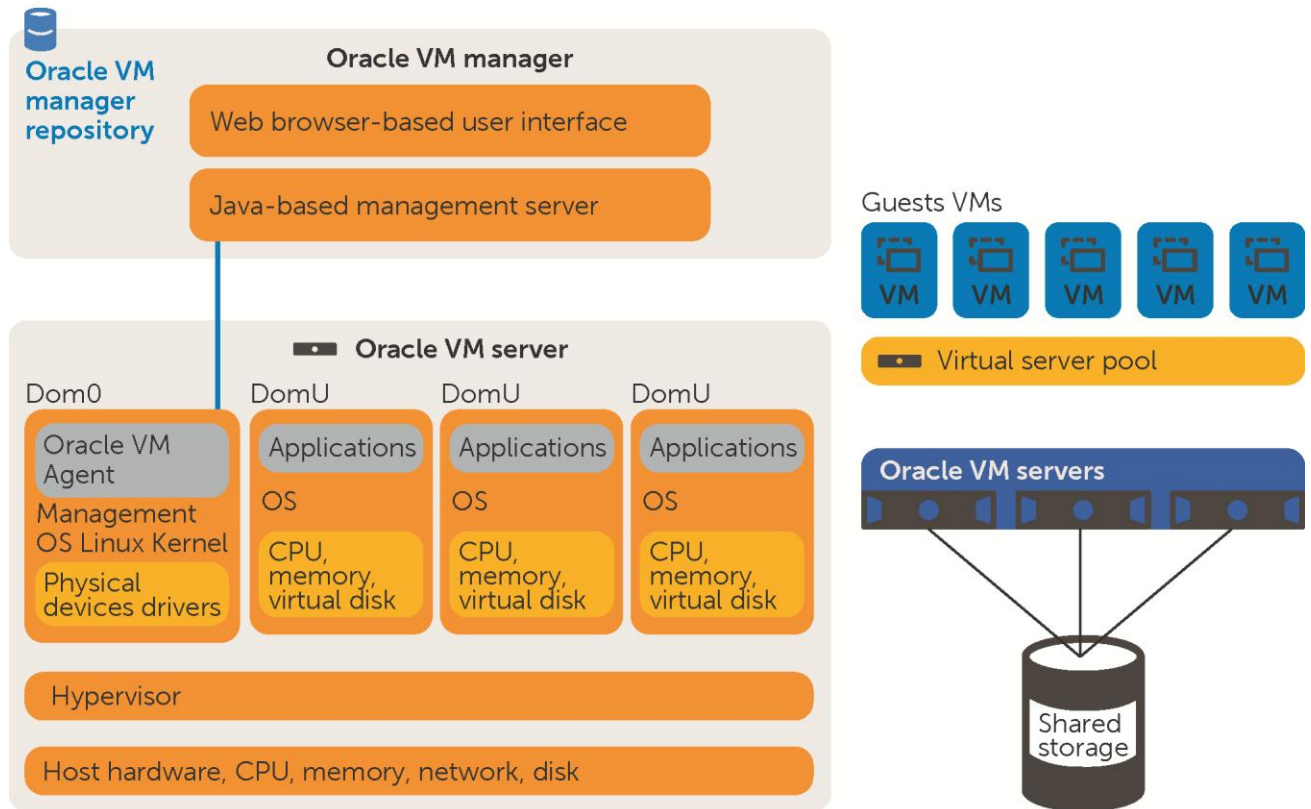


Figure 1 Oracle VM technology overview

Oracle VM server is installed directly on the server hardware. Each Oracle VM server is comprised of a hypervisor and privileged domain (Dom0) that allows running multiple VMs. Multiple Oracle VM servers are grouped into server pools. This allows High Availability (HA) to be configured, which ensures that there are no disruptions to the VMs.

The Oracle VM agent processes VM management requests and provides event notifications and configuration data to Oracle VM Manager. The Oracle VM Manager is used to manage Oracle VM servers and guests, but it is important to note that all cluster functionality and integrity is maintained even in the event that the Oracle VM Manager is not running or becomes unavailable for any reason. Also, all Oracle VM servers and guests continue to function without interruption while the Oracle VM Manager is unavailable for whatever reason.

2.2 Dell EqualLogic PS Series storage arrays

Built on an advanced, peer storage architecture, EqualLogic storage simplifies the deployment and administration of consolidated storage environments, enabling:

- Perpetual self-optimization with automated load balancing across disks, RAID sets, connections, cache and controllers
- Efficient enterprise scalability for both performance and capacity without fork-lift upgrades

- Powerful, intelligent and simplified management
- Improved productivity and streamlined IT infrastructure through unified block and file storage capabilities

2.3 Dell Compellent Storage arrays

Dell Compellent brings a highly virtualized storage solution with automated data management features, including tiering and thin provisioning, for enterprise and cloud computing environments as part of the Fluid Data technology. Compellent Fluid Data technology combines a powerful data movement engine, intelligent software and modular hardware.

The Fluid Data architecture provides block-level intelligence to automatically place data on the right storage tier to optimize performance and maximize cost savings. Compellent's open, future-ready design integrates seamlessly with applications and infrastructure, enabling you to scale on a single platform and add capabilities without forklift upgrades.

2.4 Dell PowerEdge R820 servers

A high-performance 4-socket, 2U rack server, the Dell PowerEdge R820 is designed for dense virtualization and scalable database applications.

Designed to excel at running a wide range of applications and virtualization environments for both mid-size and large enterprises, the Dell PowerEdge R820 rack server is a compute-intensive performance platform with highly scalable memory (up to 1.5TB). With four Intel Xeon E5 processors and the ability to support dual RAID controllers, the R820 can readily handle very demanding, mission critical workloads, like Enterprise Resource Planning (ERP), data warehousing, e-commerce, Virtual Desktop Infrastructure (VDI), databases, and data node High Performance Computing (HPC).



3 Test solution infrastructure

The Dell EqualLogic and Compellent storage arrays are used as shared storage in this Oracle VM migration solution. Refer to Sections 2.2 and 2.3 for a brief overview of the Dell storage arrays used as part of this Oracle VM migration solution. Two Dell PowerEdge R820 servers were used as Oracle VM servers to validate the Oracle VM migration solution. Refer to Section 2.4 for a brief overview of these servers.

A Dell EqualLogic PS series array and a Dell Compellent SC series array were both connected to the same Oracle VM servers to facilitate ease of storage migration. Initially, the Dell EqualLogic PS series array contained the storage repository and pool file system which were then migrated to the Compellent array using the steps in Section 4.

Please refer to Appendix A for details on the hardware and software components used for validating the solution.

3.1 Physical system configuration

The following diagram shows the logical test configuration used for validating the Oracle VM solution.

The test configuration in the following diagram shows the EqualLogic PS6110 series storage array and the Compellent SC series array as the backend SAN.



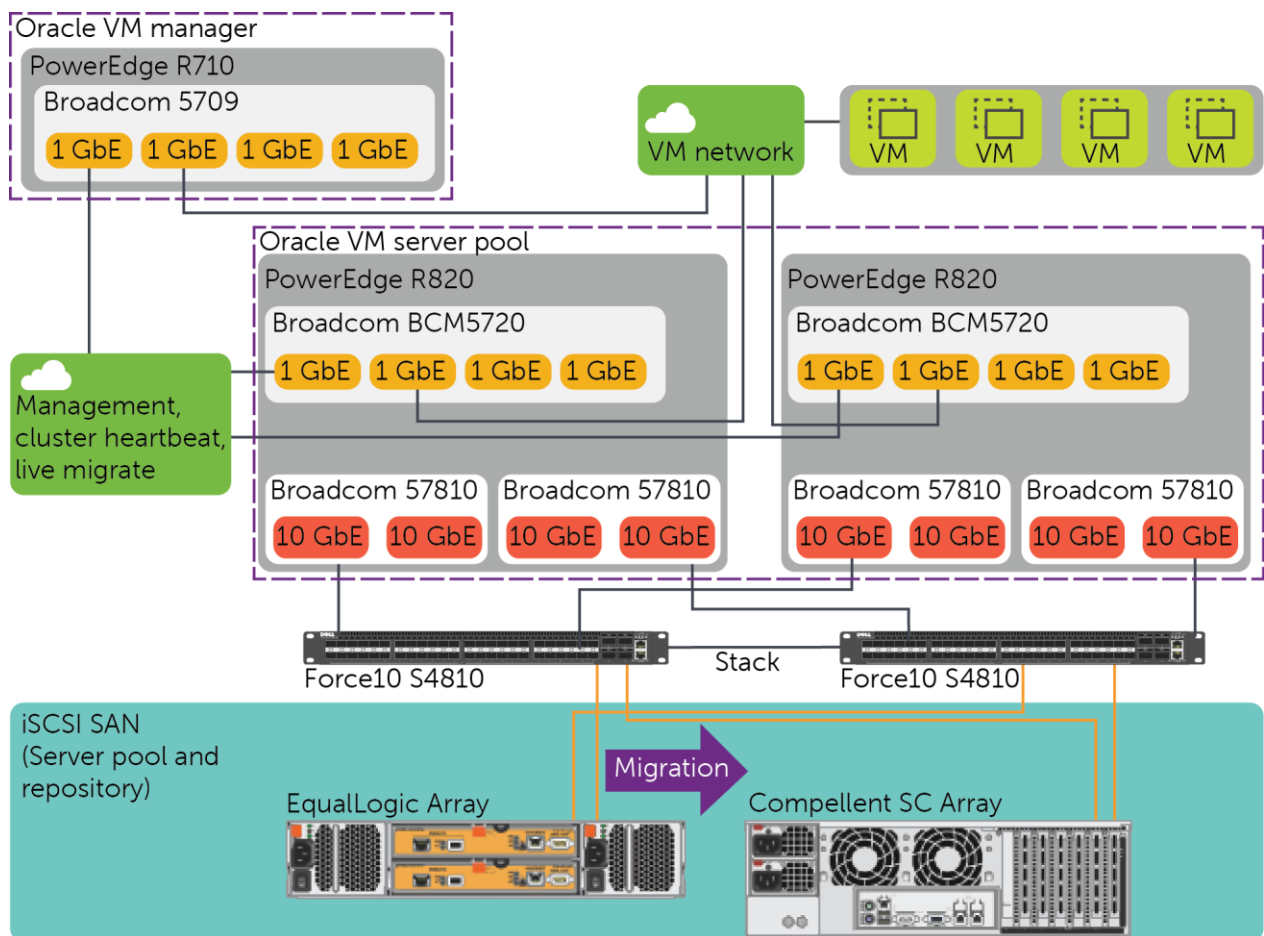


Figure 2 Oracle VM test configuration showing LAN and iSCSI SAN connectivity

3.2 Server configuration

Two Dell PowerEdge R820 servers were configured as Oracle VM servers and were added to the single server pool. Each of these servers had two 10 GbE connections for SAN connectivity. Although not an Oracle VM best practice, a single 1 GbE network was used for management, cluster heartbeat and live migration. A single 1 GbE network was sufficient because there was no live migration of VMs and a very limited number of VMs to be managed in this test configuration. A dedicated 1 GbE connection was used for the VM network on these two servers.

A Dell PowerEdge R710 server running Oracle Linux 6.4 was used to host the Oracle VM Manager.

3.3 Storage configuration

The backend shared storage configuration is one of the key factors for deploying an Oracle VM solution. In addition to the volumes needed for hosting the database and applications, a minimum of two shared storage volumes are required for Oracle VM deployment. The additional volumes required for setting up an Oracle VM environment are for the server pool file system and the storage repository.

Server pool file system volume: A dedicated volume with minimal capacity of around 12 GB is required for a cluster heartbeat, configuration and other cluster management operations. This volume will be formatted as an OCFS2 shared file system during the creation of the server pools.

Storage repository volume: A larger dedicated volume is required to store the Oracle VM guest virtual disk images and all other storage resources such as ISOs and VM templates.

The storage volumes/LUNs with the capacity shown below were created on both the EqualLogic and Compellent storage arrays.

Table 1 Shared storage for OVM deployment

| Storage volumes/LUNs for OVM | |
|---------------------------------|---|
| Server pool file system (12 GB) | Clustered file system required for Oracle VM Clustering |
| Storage repository (512 GB) | Contains Oracle VM guest configuration files, virtual disks used by the guests, as well as guest resources such as assemblies, ISOs and templates needed to build Oracle VM guests (VMs). |



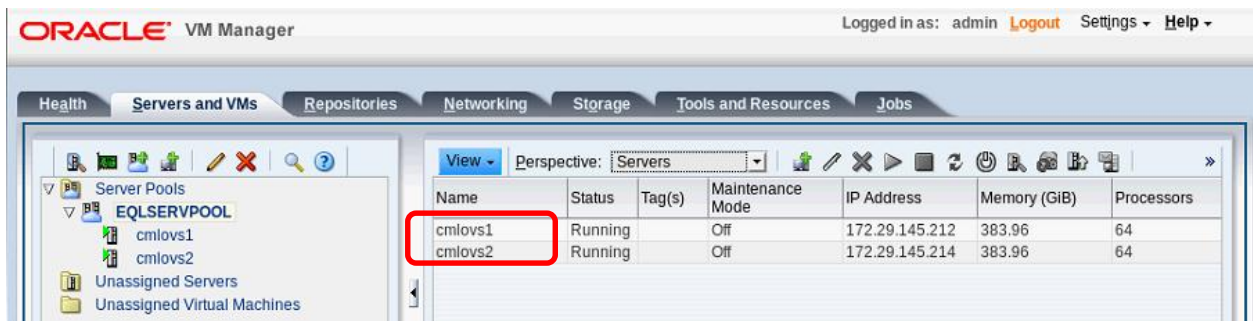
4 Oracle VM migration across heterogeneous storage

This section presents an overview of the steps involved in migrating the Oracle VM storage repository and server pool file system across different storage systems. Migration of these key components is very critical and needs careful planning while migrating an Oracle VM environment from one storage system to another.

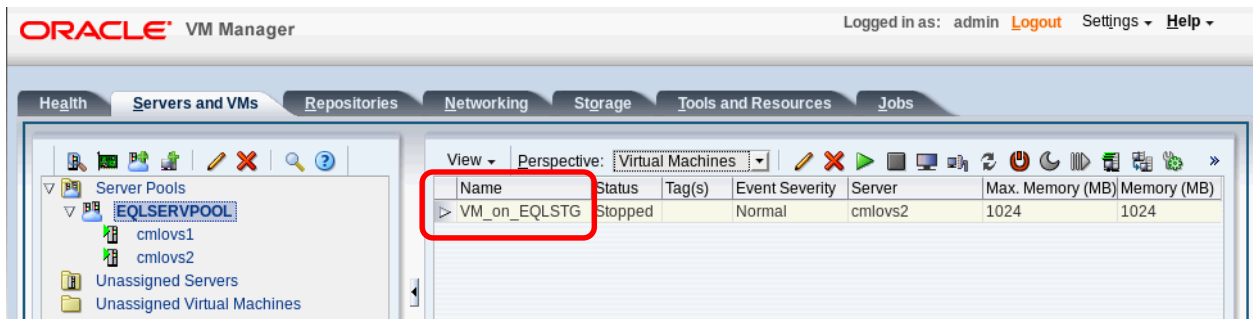
Section 4.1 describes the configuration details of the Oracle VM setup. Section 4.2 explains migration of storage repositories and Section 4.3 focuses on migration of server pool file system between different storage systems.

4.1 Oracle VM environment

- The key components, the Storage repositories and the server pool file system, are presented to Oracle VM servers using shared SAN storage.
- Both the EqualLogic and Compellent storage arrays were configured using iSCSI technology.
- Two storage LUNs for the storage repository and the server pool file system as explained in Section 3.3 were created on the Compellent array.
- The Oracle VM environment using EqualLogic consisted of two servers in a single server pool named EQLSERVPOOL as shown below.



- A single VM, VM_on_EQLSTG, was hosted on EQLSERVPOOL using the EqualLogic storage repository as shown below.



- This VM was migrated to the Compellent storage repository using the steps in Section 4.2, and both Oracle VM servers were migrated to new server pool hosted on Compellent storage as explained in Section 4.3.

4.2 Migrating storage repositories and VM guest resources

A storage repository defines where Oracle VM resources may reside. Resources include VM configuration files, templates for VM creation, VM assemblies, ISO files (DVD image files), shared and unshared virtual disks, and so on.

All Oracle VM guest resources are stored in a storage repository. The Oracle VM guest resources are categorized as:

VM templates: Reusable VM templates used to create multiple VMs. The VM Templates folder found under each storage repository contains only the VM configuration file (vm.cfg) for each template.

Assemblies: Template containing a configuration of multiple VMs with their virtual disks and the inter-connectivity between them.

ISO files: DVD/CD image files used to create VMs from scratch using the installation media.

Virtual disks: Virtual disks associated with Oracle VM templates are contained in the same Virtual Disks folder along with the virtual disks associated with each Oracle VM guest.

The following sections cover the steps to migrate virtual disks and VM files between storage repositories. The same exact procedure should be used to migrate VM templates as well.

The ISO files can be moved between repositories using the **Clone ISO** option. More details on how to clone ISO resources can be found at: http://docs.oracle.com/cd/E35328_01/E35332/html/vmusg-repo.html#vmusg-repo-iso

4.2.1 Target storage repository creation

This section describes the procedure for creating a storage repository on the destination storage (Compellent).

1. Create a new storage repository on the Compellent array and assign it to the existing EqualLogic server pool as shown below.



Create a Data Repository

Repository Information

* Repository Name: CMLSTGREPO

* Repository Location: ☐ Network File Server ☒ Physical Disk

* Server Pool: EQLSERVPOOL

* Physical Disk: CML_DataFS

Description:

Cancel Next

2. Present the storage repository to both servers which are part of the EqualLogic server pool, EQLSERVPOOL, as shown below.

Create a Data Repository

Present to Servers

Available Server(s)

Present to Server(s)

cmlovs1
cmlovs2

Previous Cancel Finish

3. Now, the new storage repository using Compellent has been created and presented to both servers on the EqualLogic server pool as shown in the figure below. Both the storage repositories are still presented to EQLSERVPOOL.



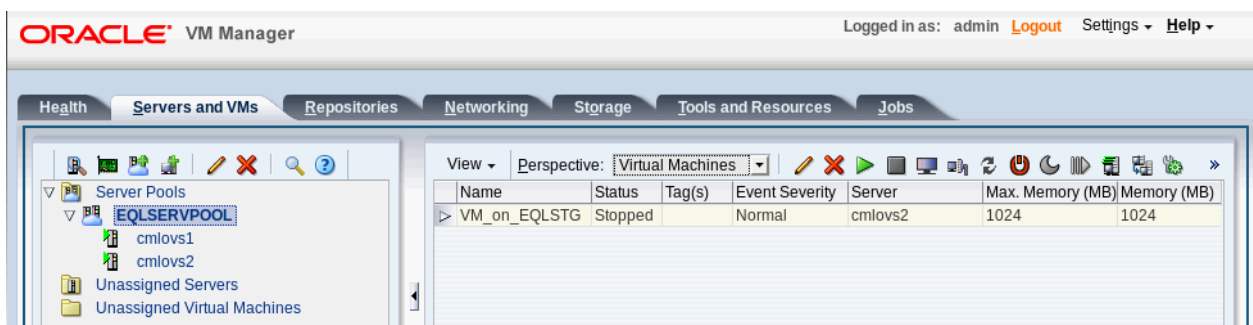
4.2.2 Migrating VMs to new storage repository

This section documents the steps to migrate a VM across different storage repositories. Two storage repositories from EqualLogic and Compellent are presented to the Oracle VM servers and then a VM is migrated from the EqualLogic to the Compellent storage repository.

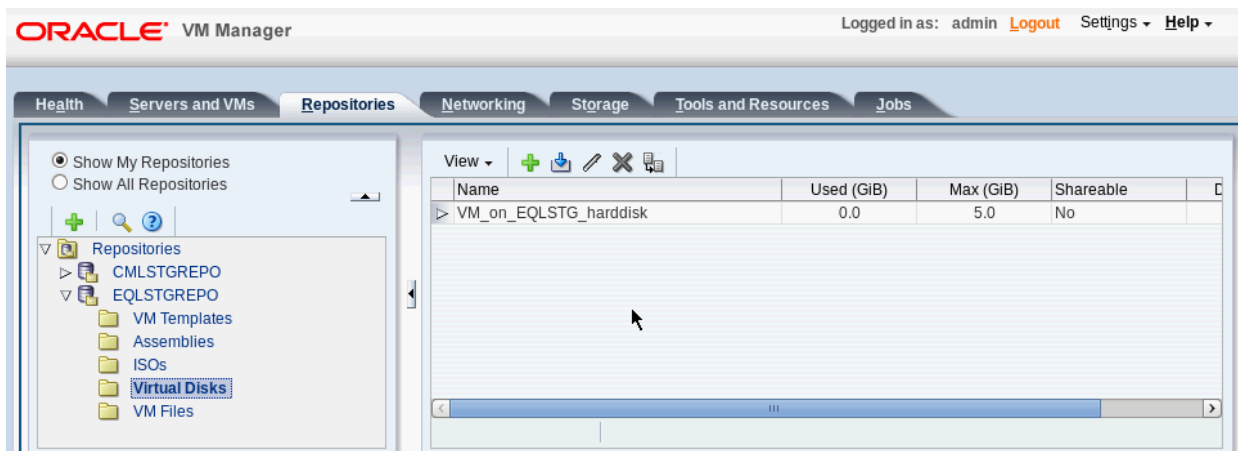
EQLSTGREPO is the storage repository presented by EqualLogic storage and CMLSTGREPO is presented by Compellent storage as shown below in the Oracle VM manager GUI.



Initially a VM, VM_on_EQLSTG, is hosted on EQLSERVPOOL.

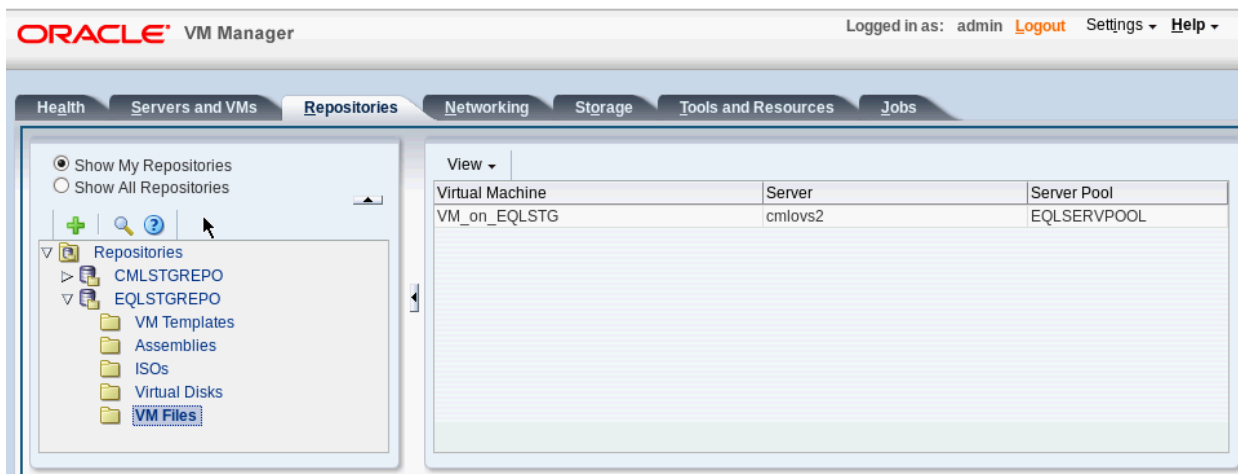


The hard disk for this VM is currently on the EQLSTGREPO storage repository presented by EqualLogic storage as shown below.

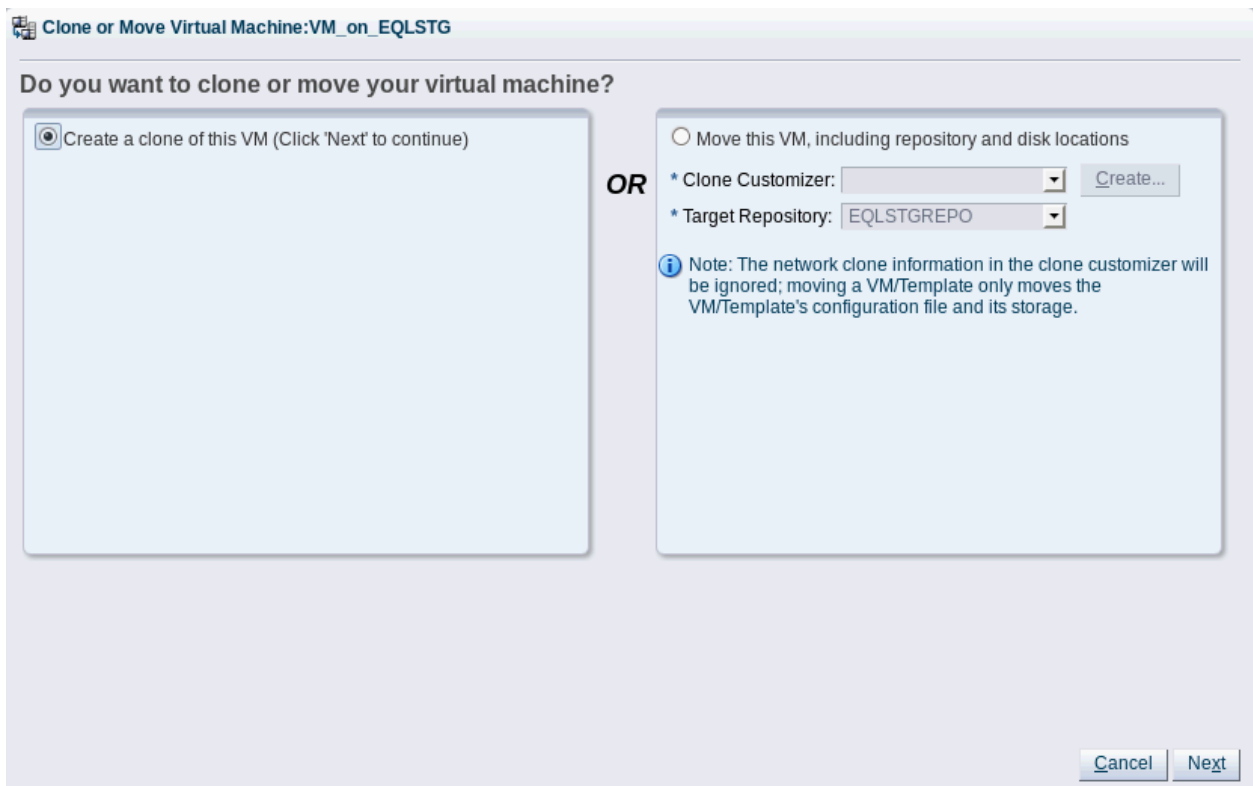


The associated VM configuration file for the VM is also currently residing on the EqualLogic storage repository.

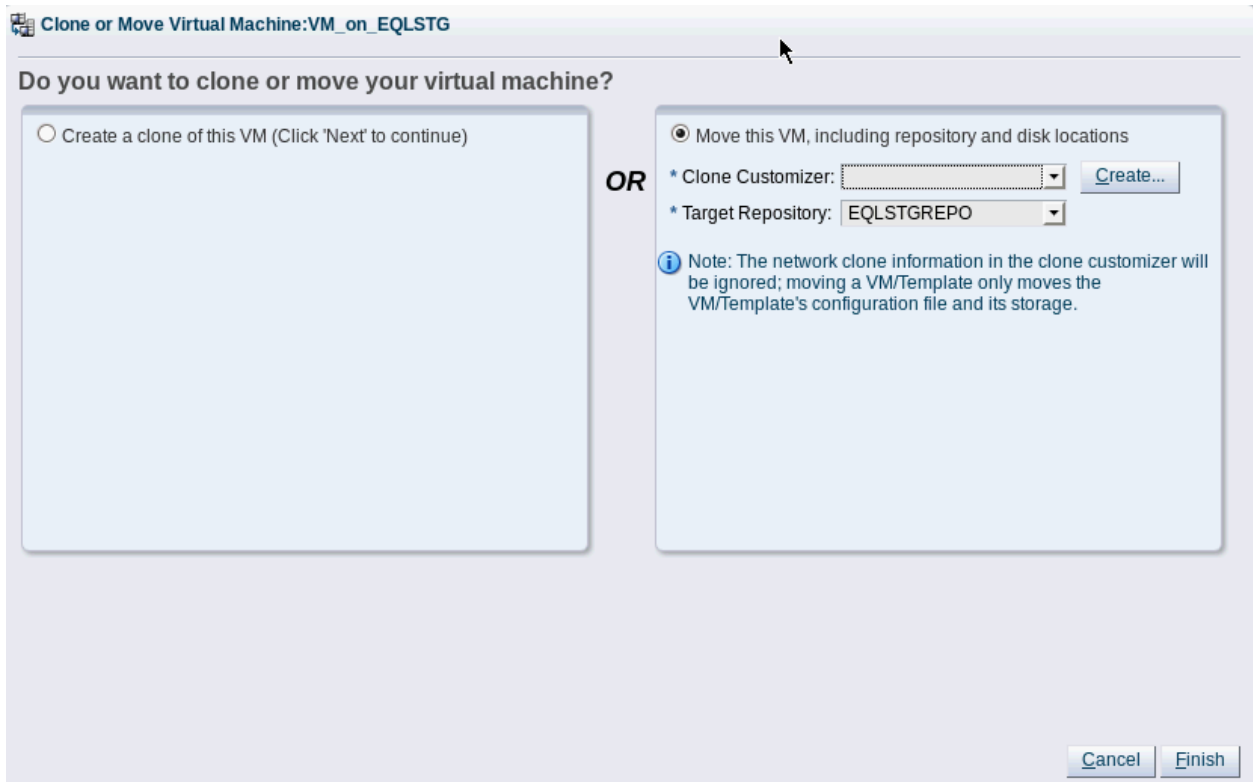
Use the instructions below to migrate a VM across different storage repositories.



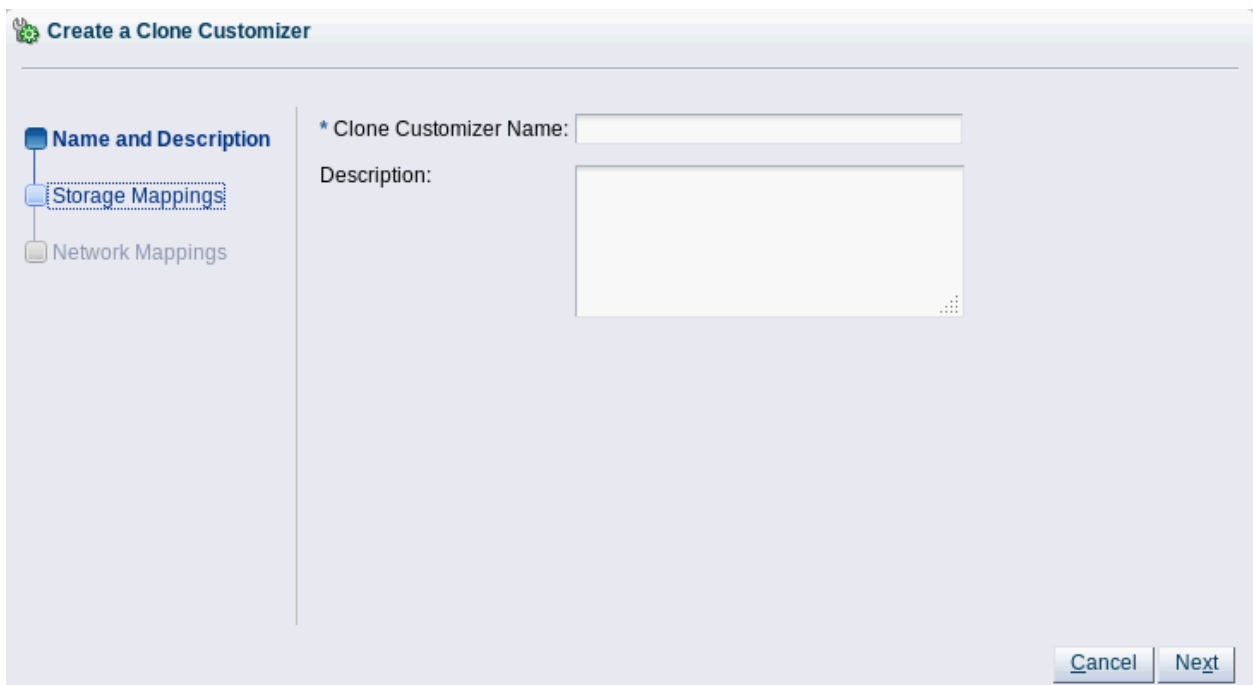
1. To migrate this VM (VM hard disk and its associated VM configuration file) to the Compellent storage repository, click on the **Clone or Move virtual machine** icon from Oracle VM manager. Using the Clone or Move Virtual Machine option ensures that the VM configuration file is also moved along with the virtual hard disk to the Compellent storage repository.



2. Select the option **Move this VM, including repository and disk locations**.



3. Click on **Create** to create a clone customizer. This allows you to specify where you want to move the virtual disks associated with the Oracle VM guest.



4. Provide a name for the clone customizer, and click **Next**.

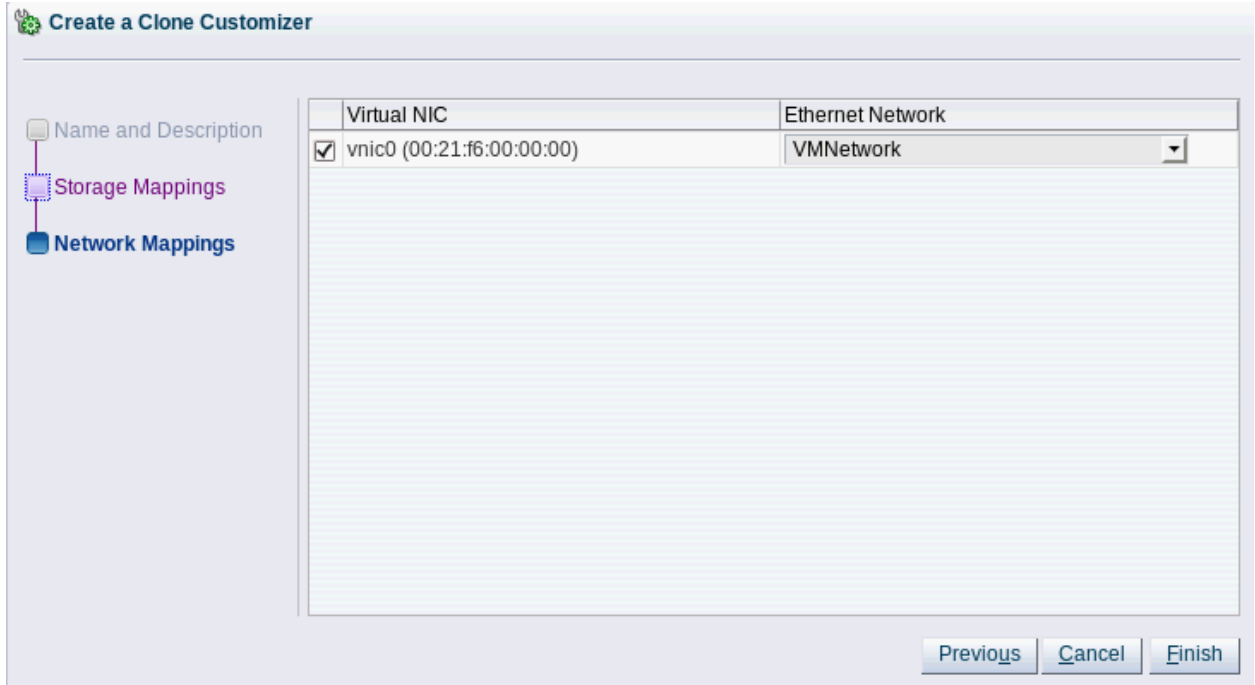
The screenshot shows the 'Create a Clone Customizer' wizard with the 'Name and Description' step selected. The left sidebar contains 'Name and Description', 'Storage Mappings', and 'Network Mappings'. The main area has a text field for '* Clone Customizer Name:' containing 'move_vm_eq_l_to_cml' and a larger text area for 'Description:'. At the bottom right are 'Cancel' and 'Next' buttons.

5. Set **Clone Target Type** to **Repository**. Change the **Clone Target** to **CMLSTGREPO**, which is the new storage repository created on the Compellent storage. Set **Clone Type** to **Sparse Copy** so that only changed blocks are copied. Click **Next** to proceed.

The screenshot shows the 'Create a Clone Customizer' wizard with the 'Storage Mappings' step selected. The left sidebar contains 'Name and Description', 'Storage Mappings', and 'Network Mappings'. The main area features a table with columns: Disk, Clone Target Type, Clone Target, and Clone Type. The first row is checked and contains 'VM_on_EQLISTG_harddisk', 'Repository', 'CMLSTGREPO', and 'Sparse Copy'. Below the table is a large empty area for additional mappings. At the bottom right are 'Previous', 'Cancel', and 'Next' buttons.

| Disk | Clone Target Type | Clone Target | Clone Type |
|--|-------------------|--------------|-------------|
| <input checked="" type="checkbox"/> VM_on_EQLISTG_harddisk | Repository | CMLSTGREPO | Sparse Copy |

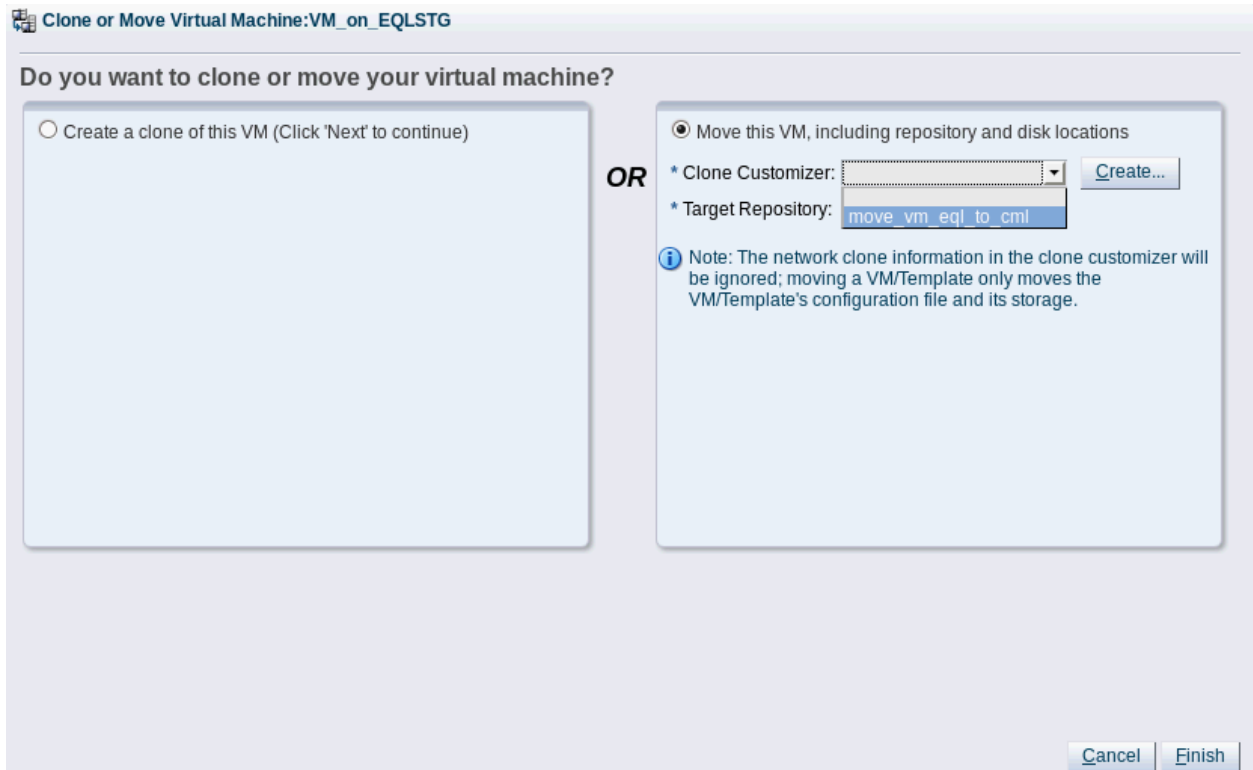
6. Do not modify the network configuration. Then click **Finish**.



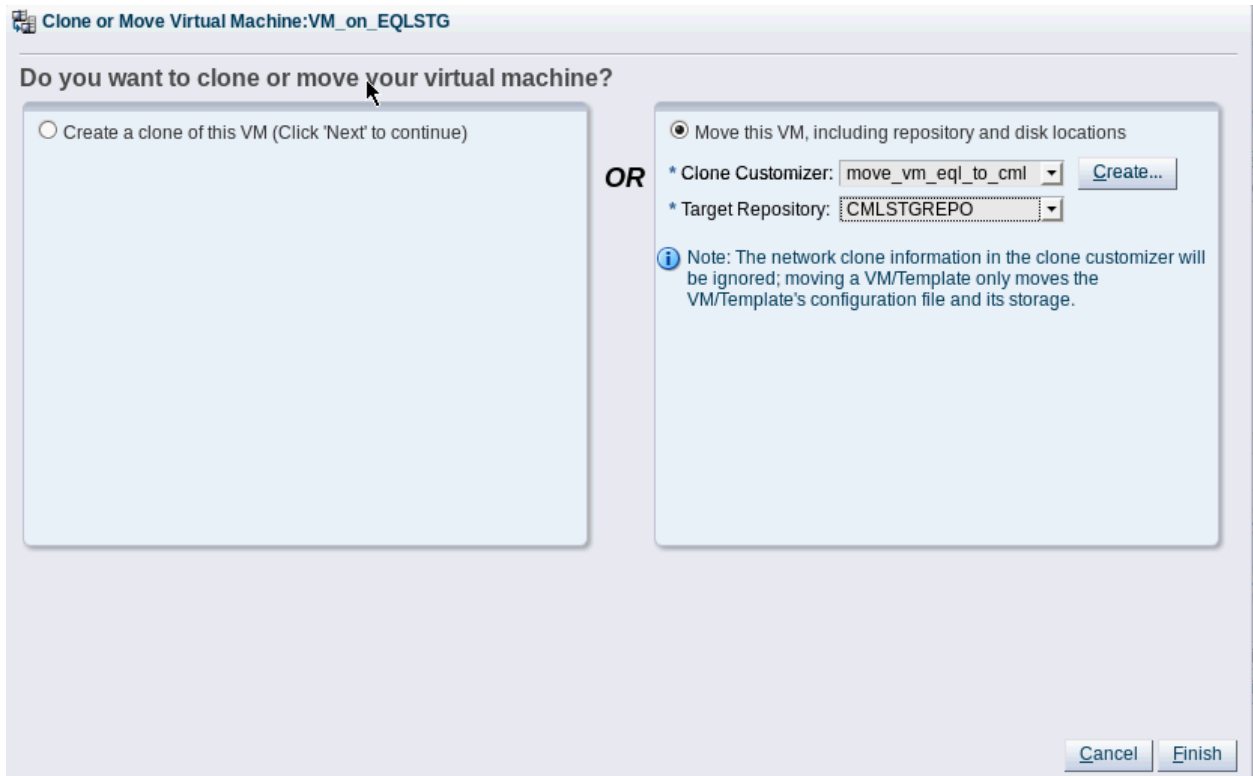
The screenshot shows the 'Create a Clone Customizer' window. On the left, there is a sidebar with three options: 'Name and Description' (selected), 'Storage Mappings', and 'Network Mappings'. The main area displays a table with two columns: 'Virtual NIC' and 'Ethernet Network'. The first row shows 'vnic0 (00:21:f6:00:00:00)' selected with a checkmark, and 'VMNetwork' is selected in the dropdown menu. At the bottom right, there are three buttons: 'Previous', 'Cancel', and 'Finish'.

| Virtual NIC | Ethernet Network |
|---|------------------|
| <input checked="" type="checkbox"/> vnic0 (00:21:f6:00:00:00) | VMNetwork |

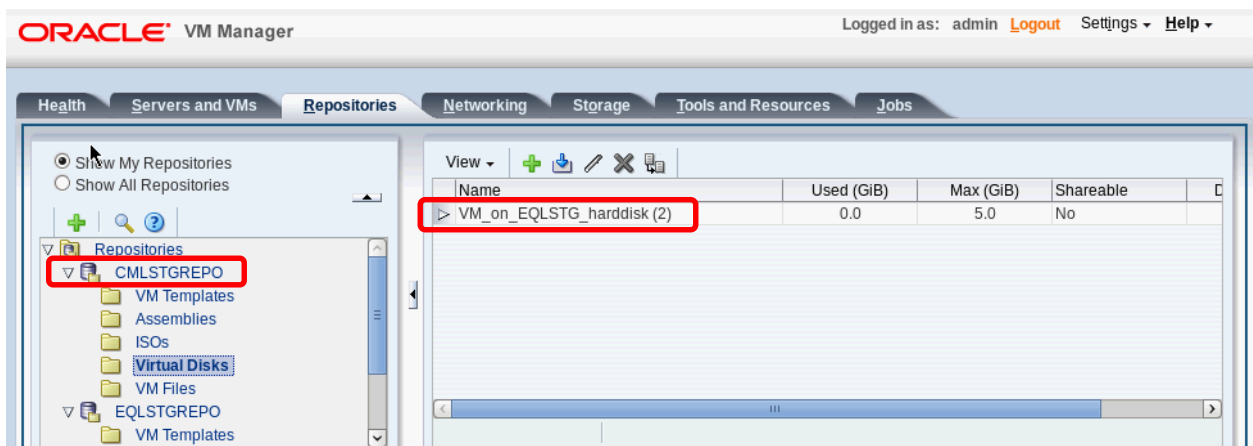
7. Select the newly created clone customizer from the list item as shown below.



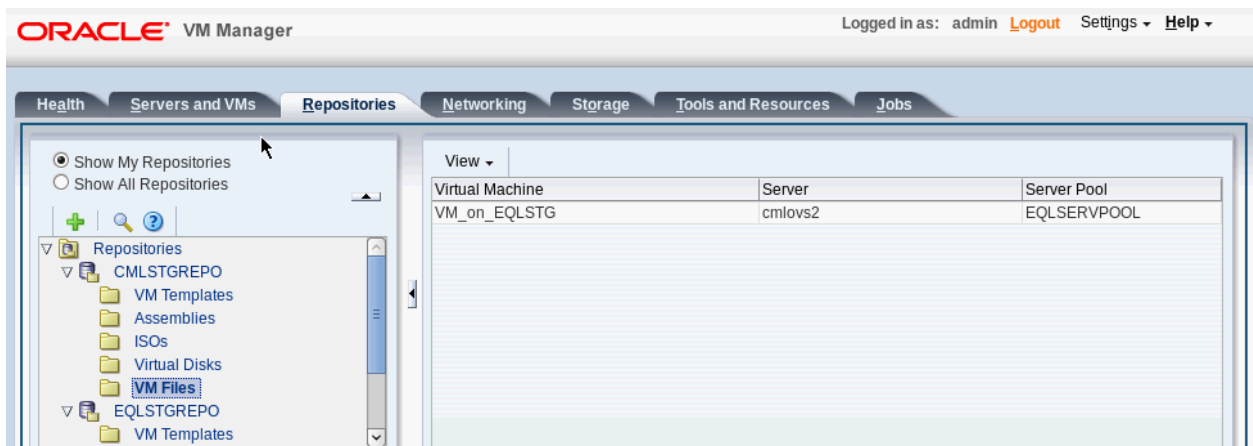
8. Change the target repository to **CMLSTGREPO**. This allows you to specify where you want to move the VM configuration file (vm.cfg) associated with the Oracle VM guest.



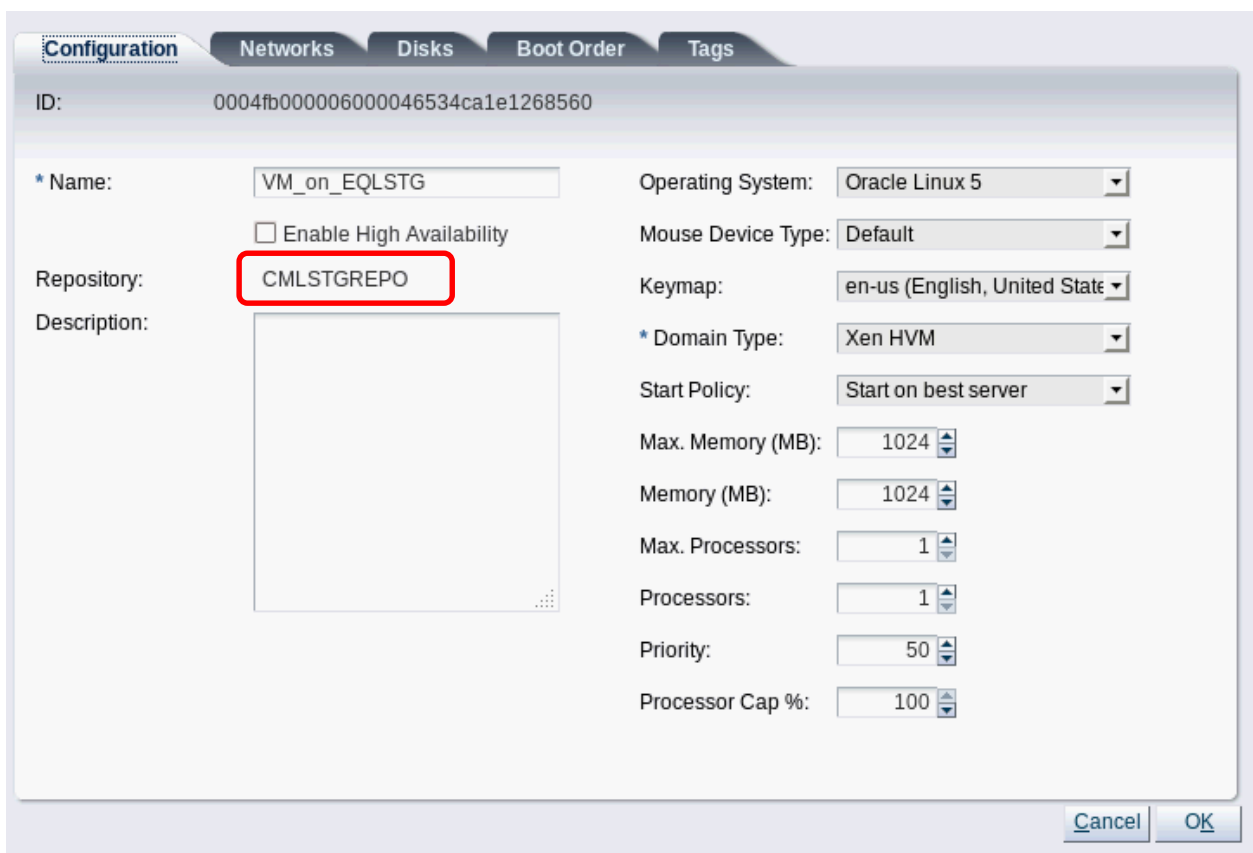
- Click on **Finish** and the VM will migrate to the new storage repository hosted on Compellent. The following figure shows the virtual disk of the VM moved under the Compellent storage repository.



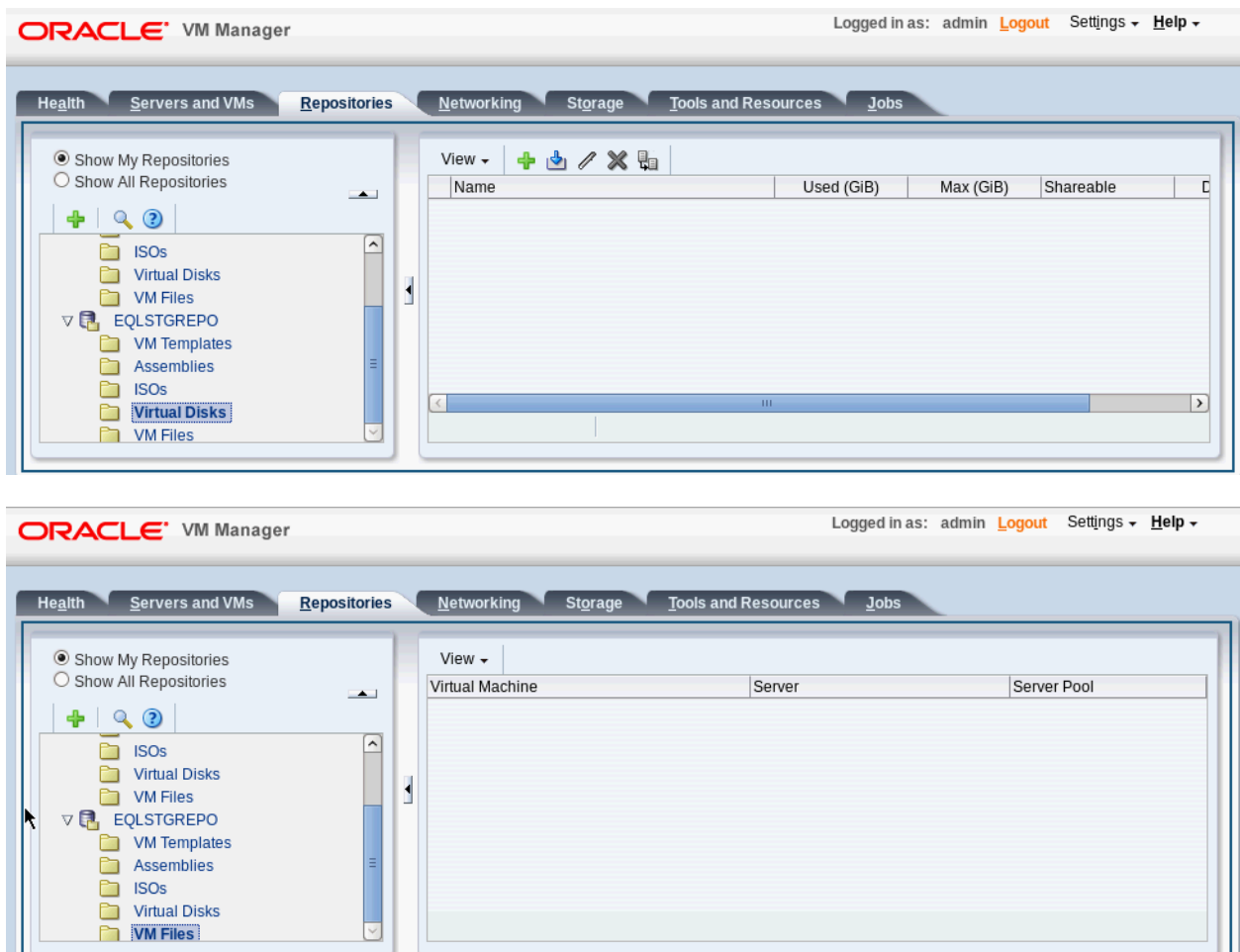
The virtual machine configuration file is also moved to the Compellent storage repository as shown below.



The VM properties show that the hard disk is hosted on CMLSTGREPO (Compellent storage repository), as shown below.



The VM hard disk and its associated VM configuration file no longer exist on the EQLSTGREPO (EqualLogic storage repository), as shown in the figures below.



4.3 Migrating to the new pool file system on the Compellent storage

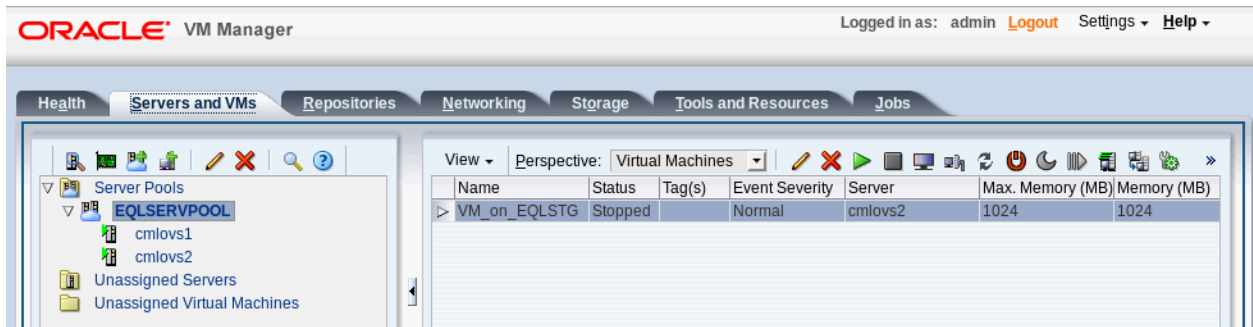
At this point, the entire contents of the EqualLogic storage repository has been migrated to the Compellent storage as described in Section 4.2.2. This section describes how to migrate to the new pool file system presented from the Compellent array.

In this scenario, the Oracle VM environment is currently using the pool file system presented from the EqualLogic array. This needs to be changed to the new server pool using the LUN being presented from the Compellent array. Oracle VM currently has no means to change the pool file system for an existing server pool.

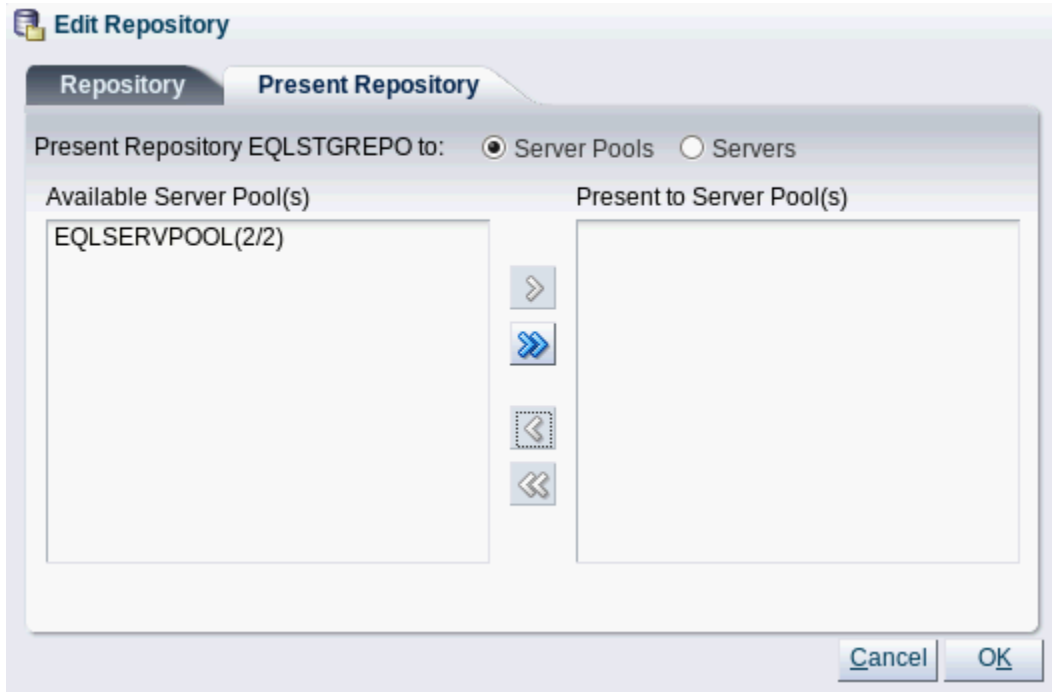
To change to the new pool file system, a new server pool using the new pool file system must be created and then the existing Oracle VM servers must be migrated to the new server pool. The step-by-step procedure is described below.

These steps use a single server pool named EQLSERVPOOL, consisting of two Oracle VM servers, and hosted on EqualLogic storage with a VM named VM_on_EQLSTG that is hosted on this pool. Before

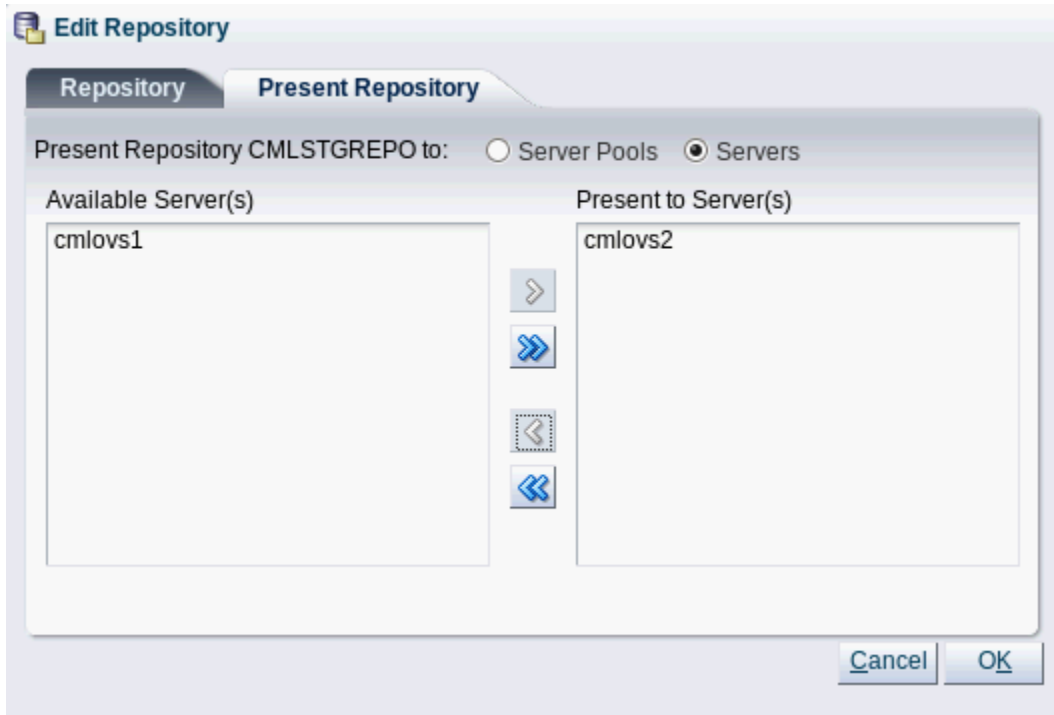
beginning the procedure, create a new server pool using the LUN presented on Compellent. Then, follow the steps below:



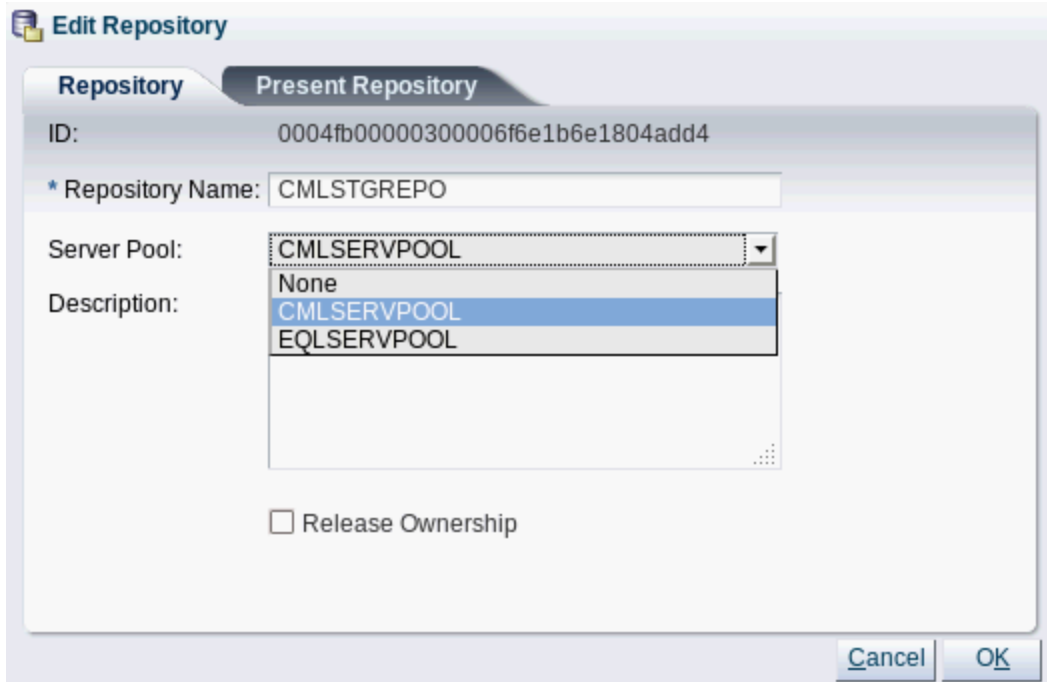
1. Click on the **Repositories** tab. Select **EQLSTGREPO** and un-present this storage repository from EQLSERVPOOL by removing the EQLSERVPOOL from the presented server pools as shown below. Do not present any servers to this newly created server pool at this time.



2. Click on the Compellent Storage Repository CMLSTGREPO and, then select **Edit the Repository**. Select the **Present Repository** tab and click on **Servers** to view the list of servers presented to the Compellent repository.
3. Now click on **Servers** under the Compellent storage repository tab CMLSTGREPO. Un-present only one server from the repository (server: CMLOVS1).



4. At this point, only one server (cmlovs2) is presented to the Compellent storage repository and no servers are presented to the EqualLogic storage repository. The next step is to present the CMLSTGREPO to the newly created server pool. Currently it is still presented to the EQLSERVPOOL. Click on the **Repository** tab and select **CMLSTGREPO**. Edit the storage repository CMLSTGREPO and select "CMLSERVPOOL" as the server pool from the list as shown below. This presents the storage repository to CMLSERVPOOL.



Edit Repository

Repository | **Present Repository**

ID: 0004fb00000300006f6e1b6e1804add4

* Repository Name: CMLSTGREPO

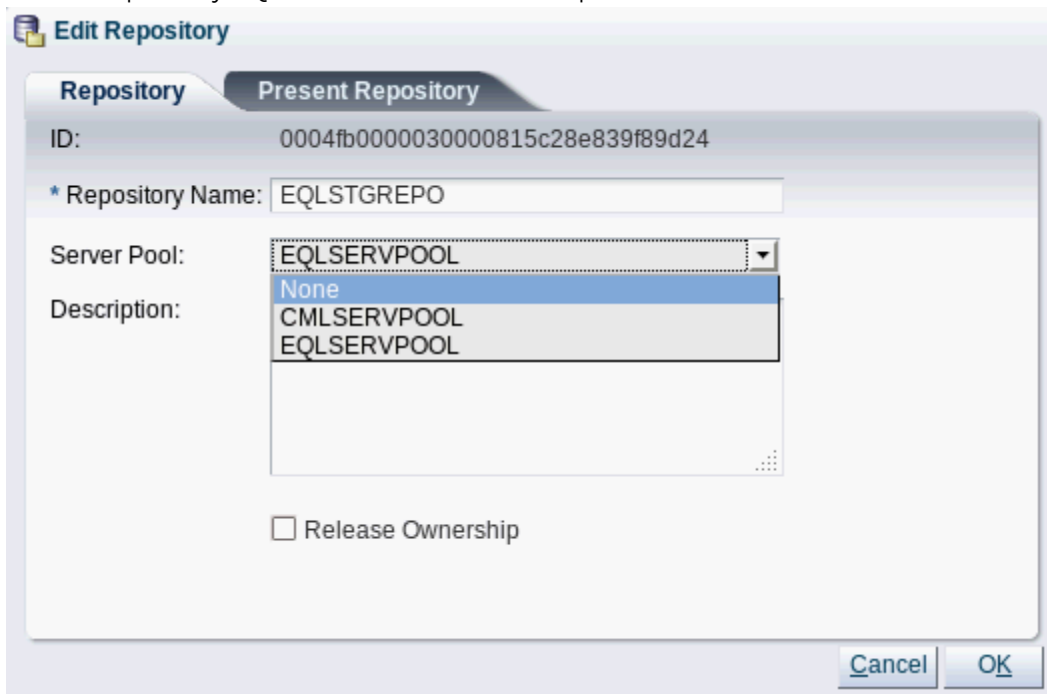
Server Pool: CMLSERVPOOL

Description: CMLSERVPOOL
EQLSERVPOOL

☐ Release Ownership

Cancel OK

- Now unrepresent the EqualLogic storage repository from server pool. Edit the EqualLogic storage repository EQLSTGREPO. Select server pool as "None".



Edit Repository

Repository | **Present Repository**

ID: 0004fb0000030000815c28e839f89d24

* Repository Name: EQLSTGREPO

Server Pool: EQLSERVPOOL

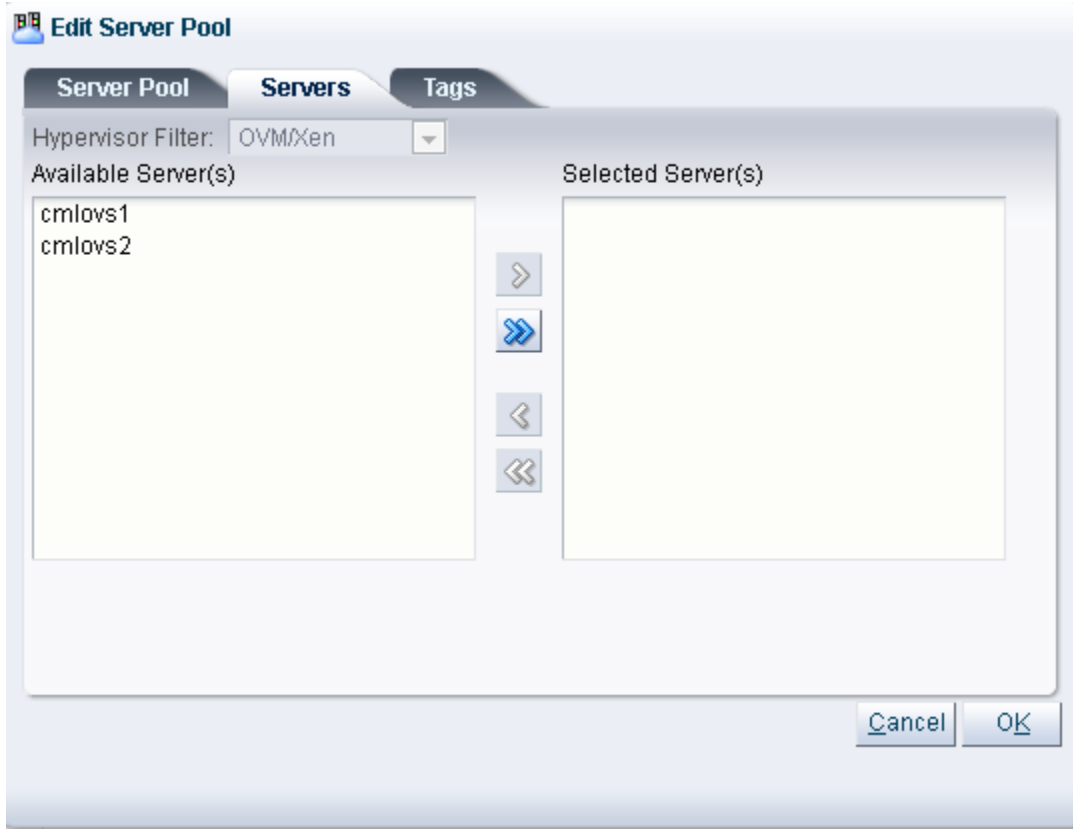
Description: None
CMLSERVPOOL
EQLSERVPOOL

☐ Release Ownership

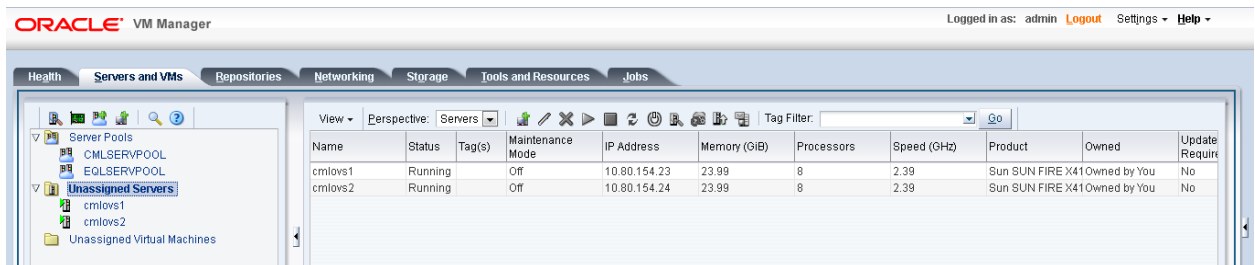
Cancel OK

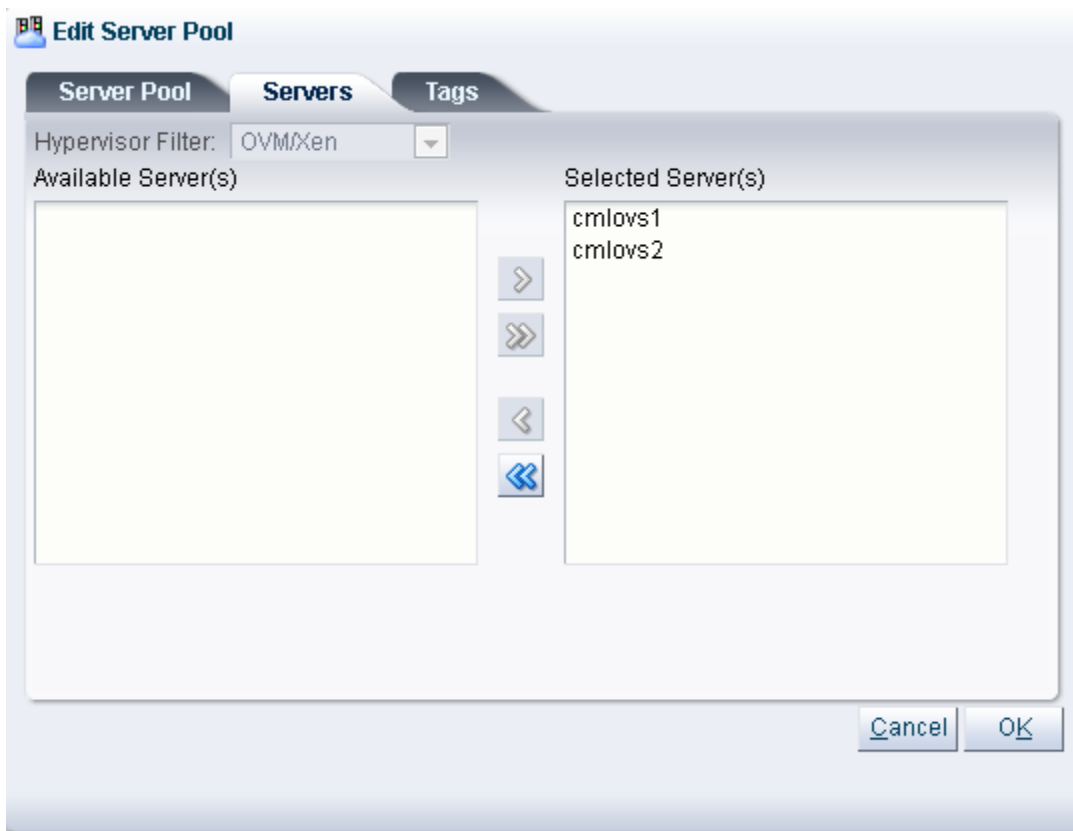
- Once the EQLSTGREPO is unrepresented from EqualLogic server pool, the servers which were part of the EqualLogic server pool can be removed. Click on **Servers and VMs**.

7. Edit the EqualLogic server pool. Click on **Servers**. Use the arrow buttons to remove both servers cmlovs1 and cmlovs2 from this server pool. Select **OK**.



8. Both servers cmlovs1 and cmlovs2 server are moved under "**Unassigned Servers**" folder. Now you can add both servers cmlovs1 and cmlovs2 to the Compellent server pool CMLSERVPOOL.





9. The two Oracle VM servers cmlovs1 and cmlovs2 are now part of the new server pool CMLSERVPOOL.
10. At this point CMLSTGREPO not presented to any server pool as shown below.

Edit Repository

Repository **Present Repository**

ID: 0004fb0000030000b52fc6bd9f715300

* Repository Name: CMLSTGREPO

Server Pool: None

Description:

☐ Release Ownership

Cancel OK

11. Now present the Compellent storage repository CMLSTGREPO to the newly created server pool CMLSERVPOOL on Compellent storage. Select **CMLSERVPOOL** from the **Server Pool** list.

Edit Repository

Repository **Present Repository**

ID: 0004fb0000030000b52fc6bd9f715300

* Repository Name: CMLSTGREPO

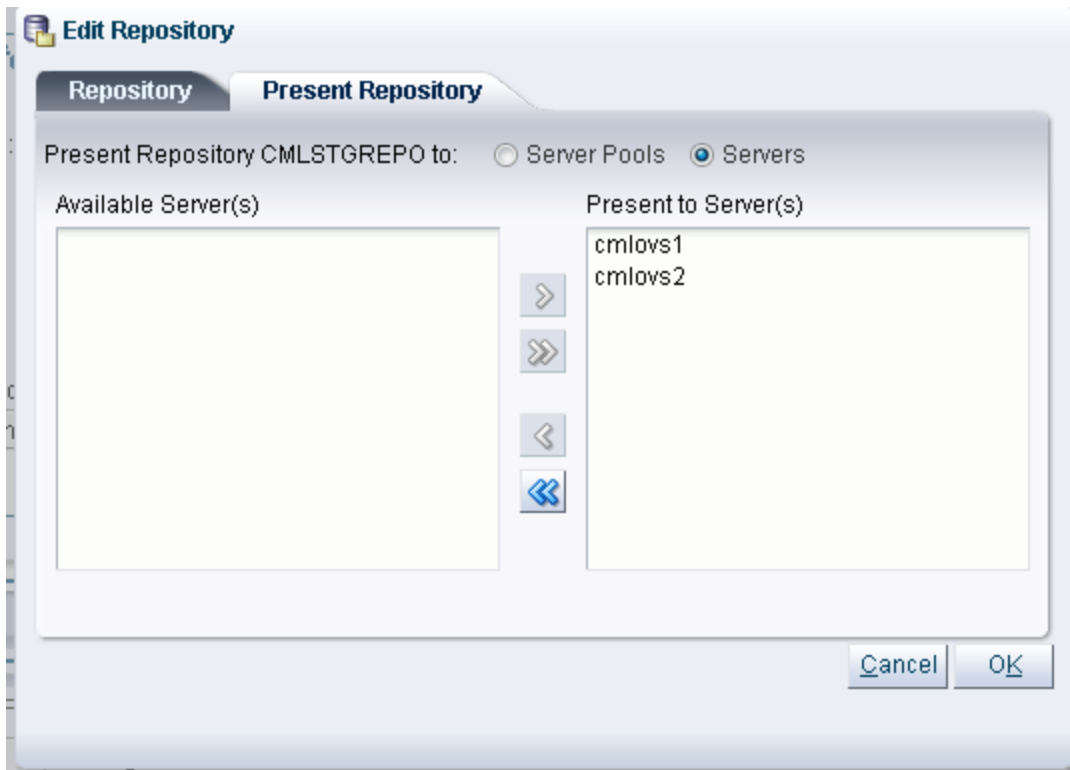
Server Pool: CMLSERVPOOL

Description:

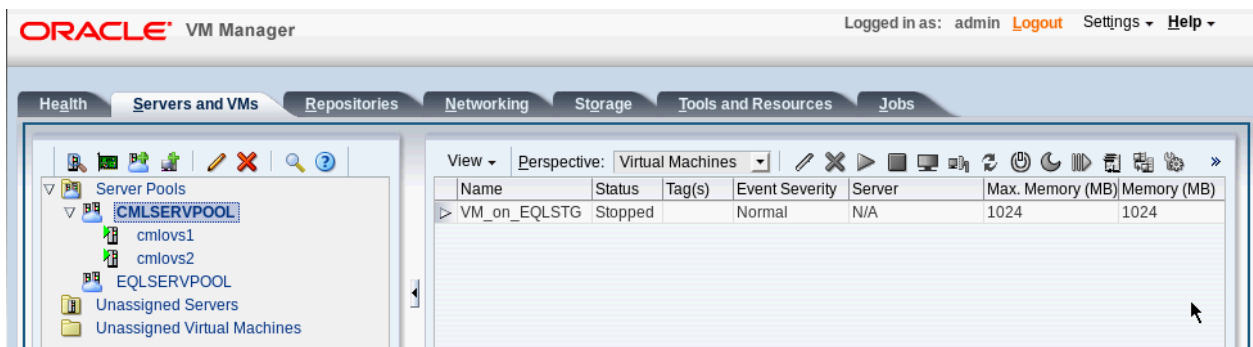
☐ Release Ownership

Cancel OK

12. Edit the Compellent storage repository and present both Oracle VM servers to this storage repository.



13. At this point, the migration of Oracle VM servers to the new server pool is complete and the VM which was on EQL storage (VM_on_EQLSTG) is currently on server pool CMLSERVPOOL as shown in the following diagram.



The EQLSERVPOOL is empty and can be removed at this point. Similarly, EQLSTGREPO is completely empty and can be removed at this point. All the content from EQL storage repository has been already migrated to CML storage repository. More information on procedure for deleting storage repositories are available at http://docs.oracle.com/cd/E35328_01/E35332/html/index.html.

4.4 Troubleshooting

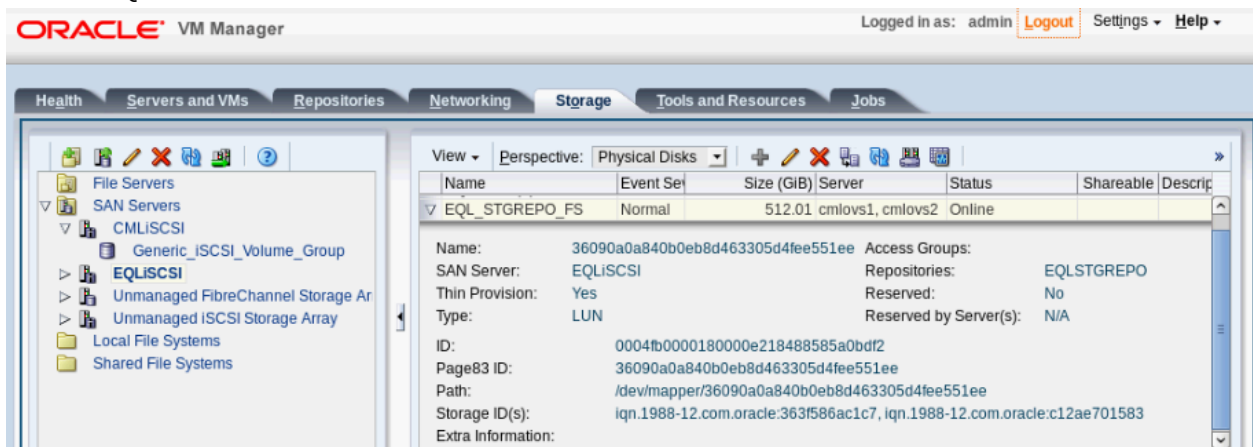
4.4.1 Storage disks assigned for storage repository not accessible

The storage repository is typically a larger sized shared storage disk where Oracle VM resources such as VM hard disks, templates, ISOs and other image files are stored. If there are any issues in the Oracle VM configuration like network delay or outage while creating the storage repositories, then the storage repository creation job will timeout. When you try to create the storage repository again after fixing the issues, you may not see the shared physical disk on Oracle VM manager which you used previously for creating the storage repository.

When the storage repository creation times out, the OCFS2 shared file system which is being created may not be released back to the system, and as a result, Oracle VM manager thinks that there is already a file system associated with that specific physical disk. This causes that particular physical disk to not be listed when creating the new storage repository.

The following procedure can be used to delete the partially created file system and release the shared disks back to Oracle VM manager so that new repositories can be created. In this example, the file system associated with shared disk **EQL_STGREPO_FS** is deleted and the same disk is released back to Oracle VM manager for creating new storage repository.

1. Log in to Oracle VM manager and identify the `/dev/mapper` path for the physical disk **EQL_STGREPO_FS** to be deleted.



2. As you can see, the device **/dev/mapper/ 36090a0a840b0eb8d463305d4fee551ee** is associated with this shared physical disk. Also note down the ID of the device **0004fb0000180000e218488585a0bdf2**. Login to all Oracle VM servers and execute the command as shown below on the selected `/dev/mapper` devices. Make sure that this command is executed on all Oracle VM servers.

```
[root@cmlovs1 ~]# dd if=/dev/zero
of=/dev/mapper/36090a0a840b0eb8d463305d4fee551ee bs=4K count=4
4+0 records in
```

```
4+0 records out
16384 bytes (16 kB) copied, 0.0175653 seconds, 933 kB/s
```

3. Login to Oracle VM manager using the root login and execute the command as shown below. Provide the Oracle VM manager password when prompted.

```
[root@ovmmgr ~]# ssh -l admin -p 10000 localhost
admin@localhost's password:
OVM>
```

4. Enter the command `list PhysicalDisk` to list all the shared physical disks presented to Oracle VM servers.

```
OVM> list PhysicalDisk
Command: list PhysicalDisk
Status: Success
Time: 2014-05-07 06:58:01,962 CDT
Data:
  id:0004fb0000180000622ba73619b87181
name:1Dell_Internal_Dual_SD_0123456789AB
  id:0004fb000018000067bb8d6f78140950  name:EQLLOGIC (1)
  id:0004fb0000180000e218488585a0bdf2  name:EQL_STGREPO_FS
  id:0004fb00001800007565daf0bfbe51e9  name:CML_PoolFS
  id:0004fb000018000093dbf138017f090e  name:CML_DataFS
  id:0004fb00001800000c6119b744f62267  name:COMPELNT (3)
  id:0004fb0000180000f98213dc70a36e9c  name:COMPELNT (4)
  id:0004fb000018000040c3329bda48439d  name:COMPELNT (5)
  id:0004fb000018000017a5515b9185cbc2  name:COMPELNT (6)
  id:0004fb0000180000165a5c3dfeffc8ed  name:ovm-cml-repos-1tb
```

5. Enter the command `list FileSystem` to list all the file systems created.

```
OVM> list FileSystem
Command: list FileSystem
Status: Success
Time: 2014-05-07 06:45:49,665 CDT
Data:
  id:0004fb00000500009d655378b9b550b9  name:fs_EQLSTGREPO
  id:0004fb0000050000d5811170cccaf10  name:fs_CMLSTGREPO
```

6. Delete the physical disk and file system associated with this shared physical disk using the commands as shown below.

```
OVM> delete FileSystem id=0004fb00000500009d655378b9b550b9
OVM> delete PhysicalDisk id=0004fb0000180000e218488585a0bdf2
```

7. After this, the SAN storage needs to be refreshed so that the physical disk is discovered again by Oracle VM manager. Now this physical disk can be used again to create a new storage repository.



4.4.2 Java exception on Oracle VM Manager

When multiple operations are performed on Oracle VM manager continuously, Java exceptions indicating an illegal operation may be triggered. When you see these exceptions, refresh the Oracle VM repository database using the command as shown below.

1. Login as "root" on Oracle VM manager. It is highly recommended to keep a backup of the database before executing the refresh. The following command can be used to take a backup of the database.

```
[root@ovmmgr bin]#./ovm_upgrade.sh --export --workpath=< Directory
where XML files for database are stored> --dbuser=ovs --dbpass=<OVM
data repository database password> --dbhost=localhost --
dbport=<Database port, Default: 1521> --dbsid=<OVM database SID,
Default: ORCL>
```

2. Enter the following command to refresh the repository database.

```
[root@ovmmgr bin]# pwd
/u01/app/oracle/ovm-manager-3/ovm_upgrade/bin

[root@ovmmgr bin]#./ovm_upgrade.sh --fixup --dbuser=ovs --
dbpass=password --dbhost=localhost --dbport=1521 --dbsid=ovm -
dbtype=< OracleDB|MySQL, Default: OracleDB>
```



5 Best practice recommendations

5.1 Oracle VM migration between repositories

The VM configuration files should not be directly copied from one storage repository to another, because the universally unique identifiers (UUIDs) within the Oracle VM environment may be duplicated, which can cause issues. It is recommended to use the Oracle VM manage tool **Clone or Move virtual machine** to move a VM from one storage repository to another.

Only non-running VMs can be moved between storage repositories.

5.2 Oracle VM Cluster timeout

The default value for **Timeout for Cluster** is 120 seconds. It is recommended to increase this timeout value to at least 300 seconds so that Oracle VM servers remain in communication with VMs when the heartbeat communication between nodes is delayed.



6 Conclusion

Many customers may need to migrate their Oracle VM environment from one storage platform to another due to factors such as scaling infrastructure and consolidation.

The key challenge when migrating an Oracle VM environment across different storage arrays is migrating the contents of the storage repository and server pools. This white paper demonstrated the step-by-step procedure for migrating an Oracle VM environment between different storage arrays. The migration solution discussed in this whitepaper is validated and approved jointly by Dell and Oracle engineering teams.

Dell and Oracle have partnered to deliver end-to-end solutions that integrate data and processes across organizations of various sizes. This new migration solution continues a long history of joint support and cooperative engineering that has resulted in a stable and pervasive portfolio of database implementation guidance, automation, and optimization making both Dell and Oracle a forerunner in database solutions.

All the best practices and recommendations provided in this white paper serve as a proof-point of a robust Oracle database hardware and software solution that is specifically integrated and optimized for running on Dell's servers, storage and on Oracle VM.

With the new worldwide alliance between Dell and Oracle, you can expect more innovations, updates to systems management integration, and improving the manageability and enterprise class performance of the overall solution.



A Solution components

This section contains an overview of the configurations used for the testing described in this document.

Table 2 Test configuration hardware components

| Solution Configuration - Hardware Components: | | Description |
|---|---|---|
| Oracle VM servers | <ul style="list-style-type: none">2 x Dell PowerEdge R820 servers:<ul style="list-style-type: none">Broadcom 5719 Quad port 1Gig NICBroadcom 57810 Dual port 10Gig NIC | Two R820 servers, part of the Oracle VM server pool. 1 x 1Gb NIC (B5720) used for Management, Cluster heartbeat and Live migration. 1 x 1Gb NIC (B5720) used for VM to VM communication. 2 x 10Gb NICs (B57810) used for iSCSI SAN connectivity. |
| Oracle VM Manager | <ul style="list-style-type: none">1 Dell PowerEdge R810 server:<ul style="list-style-type: none">Broadcom 5709 Quad port 1Gig NIC | Centralized management application for controlling the entire OVM stack including OVM servers, storage resources and guest VMs. |
| Infra Management | <ul style="list-style-type: none">1 Dell PowerEdge R810 server:<ul style="list-style-type: none">Broadcom 5709 Quad port 1Gig NIC | Management server for the entire infrastructure. EQL Manager and SAN HQ |
| Network | <ul style="list-style-type: none">2 x Dell Force10 S4810 switchesFirmware: 9.1.0.0 | Two switches stacked together for iSCSI SAN connectivity. |
| Storage | <ul style="list-style-type: none">1 x Dell EqualLogic PS6110XS:<ul style="list-style-type: none">7x 400GB SSDs & 17 x 600GB 10K SASFirmware: 6.2.1RAID 10 | Backend storage for Oracle database volumes. |
| | <ul style="list-style-type: none">1 x Dell EqualLogic PS6110E:<ul style="list-style-type: none">24 x 2TB SATAFirmware: 6.2.1RAID 50 | Backend storage for server pool file system and storage repository (OVM guest hard disk, ISOs, Templates, and others). |



Table 3 Test Configuration - Software Components

| Test Configuration - Software Components | |
|--|--|
| Oracle VM Servers | <ul style="list-style-type: none"> • 2 x Oracle VM server 3.2.6 • Server pool file system and storage repository presented from PS6110E. • Native multipathing. |
| Oracle VM Manager | <ul style="list-style-type: none"> • Oracle Linux 6.4 • Oracle 11.2.0.4 Enterprise Edition – Management repository |
| Oracle VM guest machines | 1 x Oracle VM guest machine <ul style="list-style-type: none"> • Oracle Enterprise Linux 6.4 VM hard disk presented through OVM server. |
| Monitoring Tools | <ul style="list-style-type: none"> • EqualLogic SAN Headquarters version 2.6.0 |



Additional resources

Support.dell.com is focused on meeting your needs with proven services and support.

DellTechCenter.com is an IT Community where you can connect with Dell Customers and Dell employees for the purpose of sharing knowledge, best practices, and information about Dell products and your installations.

Referenced or recommended Dell publications:

- Dell EqualLogic Configuration Guide:
<http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19852516/download.aspx>

Referenced or recommended Oracle publications:

- Oracle VM general information:
<http://www.oracle.com/technetwork/server-storage/vm/overview/index.html>
- Oracle VM 3.2.1 Documentation:
http://docs.oracle.com/cd/E35328_01/index.html

For EqualLogic best practices white papers, reference architectures, and sizing guidelines for enterprise applications and SANs, refer to Storage Infrastructure and Solutions Team Publications at:

- <http://dell.to/sM4hJT>

