Setting Up Cisco Prime LMS for High Availability, Live Migration, and Storage VMotion Using VMware

This chapter explains setting up LMS for High Availability (HA), Live migration, and, Storage VMotion using the VMware vSphere solution.

VMware High Availability (HA) is the solution used for HA, and VMware VMotion is used for live migration (it includes Storage VMotion).

This section explains:

- Overview of VMware High Availability
- Overview of VMware VMotion and Storage VMotion
- Cloning a Virtual Machine Using VMware

Overview of VMware High Availability

VMware High Availability (HA) is a simple and cost-effective solution which ensures high levels of availability during a planned or unplanned downtime.

With VMware HA, you can:

- Provide higher availability independent of hardware, operating system, and applications.
- Eliminate planned downtime for common maintenance operations.
- Provide automatic restart in cases of failure.

VMware HA uses multiple ESX or ESXi hosts configured as a cluster to provide rapid recovery from outages and high availability for applications running in virtual machines. You must create a cluster, populate it with hosts, and configure VMware HA settings before failover protection can be established.

After you finish the initial setup of the host, download and install the vSphere Client. The vSphere Client is a Windows program that you can use to configure the host and to operate its virtual machines. It enables you to connect to an ESX or ESXi host and to a vCenter Server system. Connect to the host and add your virtual machine by importing a virtual appliance.
Overview of VMware High Availability

VMware HA protects application availability in two ways:

- It protects against a server failure by automatically restarting the virtual machines on other hosts within the cluster.
- It protects against application failure by continuously monitoring a virtual machine and resetting it in the event that a failure is detected.

This section explains:

- VMware vSphere Components for Setting Up High Availability
- Prerequisites for Implementing High Availability
- Setting up High Availability using VMware HA
- Creating a VMware HA Cluster

VMware vSphere Components for Setting Up High Availability

The following VMware vSphere components are used in the LMS HA solution:

- VMware ESX or ESXi
  Virtualization layer run on physical servers that abstracts processor, memory, storage, and resources into multiple virtual machines. Two versions of ESX are available: VMware ESX 4.0 and VMware ESXi 4.0.
- VMware vCenter Server
  Central point for configuring, provisioning, and managing virtualized IT environments.
- VMware vSphere Client
  Program that you can use to configure the host and to operate its virtual machines. It enables you to connect to an ESX or ESXi host and to a vCenter Server system. vSphere Client acts as an interface that allows users to connect remotely to vCenter Server or ESX or ESXi from any Windows PC.

Prerequisites for Implementing High Availability

The prerequisites for implementing HA in LMS 4.1 using VMware HA are grouped into:

- VMware ESX servers Requirements
- VMware vCenter Server Requirements
- VMware HA Cluster Requirements
- Shared Storage Requirements
- Other Requirements
Overview of VMware High Availability

VMware ESX servers Requirements
- Ensure that each ESX or ESXi host meets the minimum hardware requirements supported by ESX or ESXi 4.0 and vSphere Client.
- The ESX or ESXi servers must:
  - Have access to all the networks.
  - Have compatible CPUs.

VMware vCenter Server Requirements
- Ensure that the VMware vCenter Server must:
  - Be installed on a Windows machine with a proper license.
  - Have network access to the ESX or ESXi host, vSphere Client, and Internet access.
  - Meet the vCenter Server hardware requirements.

VMware HA Cluster Requirements
- The virtual machine must not be:
  - Connected to a CD-ROM or floppy drive, that is using an ISO or floppy image, stored on a drive that is local to the host server.
  - Bound to any physical CPUs.
- All virtual machines and their configuration files must reside on shared storage accessible to both source and target ESX hosts.
- The vSphere Client must be installed on a Windows machine that has network access to the ESX or ESXi host, vCenter Server, and Internet access.

Shared Storage Requirements
Shared storage is typically on a storage area network (SAN), but can also be implemented using iSCSI and NAS shared storage.

Other Requirements
- For a successful HA in LMS 4.1, all redundant network connections must be in the same subnet.
- Ensure a successful failover before you install LMS 4.1.

Note
For more details, see the VMware vSphere 4.0 documentation.
### Setting up High Availability using VMware HA

This section lists the steps to setup HA for LMS 4.1 using VMware HA:

1. Install ESX or ESXi 4.0 in two or more servers.
2. Install vCenter Server 4.0 in any server with a proper license.
3. Install vSphere Client in client server and connect to vCenter Server.
4. Create a cluster and add ESX or ESXi hosts to it. See Creating a VMware HA Cluster for more information.
5. Configure the shared storage which is accessible to all the hosts in the cluster.
6. Create a virtual machine and select a datastore as shared storage disk.
7. Configure VMware HA settings for the cluster created.
8. Ensure that sufficient resource is available in the cluster.
9. Ensure that there are no errors or alert messages (select Cluster > Summary page) in the vSphere Client.
10. Install LMS 4.1 in the virtual machine created in the shared storage.

#### Creating a VMware HA Cluster

You must create a cluster, populate it with hosts, and configure VMware HA settings before failover protection can be established. To create a VMware HA cluster using vSphere Client:

**Step 1** Select the Hosts & Clusters view in vSphere Client.

**Step 2** Right-click the Datacenter in the Inventory tree and click New Cluster.

**Step 3** Complete the New Cluster wizard. Do not enable VMware HA (or DRS) at this time.

**Step 4** Click Finish to close the wizard and create an empty cluster.

**Step 5** Based on your plan for the resources and networking architecture of the cluster, use the vSphere Client to add hosts to the cluster.

**Step 6** Right-click the cluster and click Edit Settings to modify the VMware HA (and other) settings for the cluster.

**Step 7** On the Cluster Features page, select Turn On VMware HA.

**Step 8** Configure the VMware HA settings for your cluster.

- Host Monitoring Status
- Admission Control
- Virtual Machine Options
- VM Monitoring

**Step 9** Click OK to close the cluster's Settings dialog box.

A configured VMware HA cluster, populated with hosts, is created.
For more details on VMware HA settings, see the VMware vSphere 4.0 documentation.

### Overview of VMware VMotion and Storage VMotion

Migration is the process of moving a virtual machine from one host or storage location to another. VMware VMotion allows you to dynamically move workloads to different physical servers or to different underlying storage without service interruption.

VMware Storage VMotion lets you relocate virtual machine disk files between shared storage locations while maintaining continuous service availability and complete transaction integrity.

Migration with VMotion allows working processes in a virtual machine to continue throughout a migration. The entire state of the virtual machine is moved to the new host, while the associated virtual disk remains in the same location on storage that is shared between the two hosts. After the virtual machine state is migrated to the alternate host, the virtual machine runs on the new host.

When you migrate a virtual machine with VMotion, the new host for the virtual machine must meet compatibility requirements in order for the migration to proceed.

Migration with VMotion happens in three stages:

1. When the migration with VMotion is requested, vCenter Server verifies that the existing virtual machine is in a stable state with its current host.
2. The virtual machine state information (memory, registers, and network connections) is copied to the target host.
3. The virtual machine resumes its activities on the new host.

If any error occurs during migration, the virtual machines revert to their original states and locations.

Migration of a suspended virtual machine and migration with VMotion can be referred to as hot migration, because they allow migration of a virtual machine without powering it off.

This section explains:
- VMware vSphere Components for Migration
- Prerequisites for Migration Using VMotion
- VMware vSphere Components for Migration
- Migrating LMS 4.1 Using VMware VMotion
Overview of VMware VMotion and Storage VMotion

VMware vSphere Components for Migration

The following VMware vSphere components are used for live migration of LMS 4.1:

- VMware ESX or ESXi
  Virtualization layer run on physical servers that abstracts processor, memory, storage, and resources into multiple virtual machines. Two versions of ESX are available: VMware ESX 4.0 and VMware ESXi 4.0.

- VMware vCenter Server
  Central point for configuring, provisioning, and managing virtualized IT environments.

- VMware vSphere Client
  Program that you can use to configure the host and to operate its virtual machines. It enables you to connect to an ESX or ESXi host and to a vCenter Server system. vSphere Client acts as an interface that allows users to connect remotely to vCenter Server or ESX or ESXi from any Windows PC.

- VMware VMotion
  VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero down time, continuous service availability, and complete transaction integrity.

- Storage array
  Shared storage disks where the migrated disk files will be stored

Prerequisites for Migration Using VMotion

This section explains the prerequisites for migration using VMware VMotion. The prerequisites are grouped into:

- Ensure that all the hosts and the servers meet the hardware and software requirements.
- Each host must:
  - Be correctly licensed for VMotion
  - Use one dedicated Ethernet adapter for the service console (on ESX hosts).
  - Use one dedicated Gigabit Ethernet adapter for VMotion.
- The ESX or ESXi server(s) must:
  - Be connected using a Gigabit Ethernet or a faster network.
  - Have access to the same physical networks.
  - Have compatible CPUs
  - Have access to all the shared storages
- Ensure that the VMware vCenter Server must:
  - Be installed on a Windows machine with a proper license.
  - Have network access to the ESX or ESXi host, vSphere Client, and Internet access.
  - Meet the vCenter Server hardware requirements.
- The migrating virtual machine must be on storage accessible to both the source and target hosts.
• The virtual machine (VM) must not be:
  - Connected to a CD-ROM or floppy drive, that is using an ISO or floppy image, stored on a drive that is local to the host server.
  - Bound to any physical CPUs.
  - Clustered with another VM using a cluster service like the Microsoft Cluster Service (MSCS).
• Ensure that virtual machines have access to the same subnets on source and destination hosts.
• Ensure that the network labels used for virtual machine port groups are consistent across hosts.
  During a migration with VMotion, vCenter Server assigns virtual machines to port groups based on matching network labels.
• Shared storage requirements:
  Shared storage is typically on a storage area network (SAN), but can also be implemented using iSCSI and NAS shared storage.

Note
For more details, see the VMware vSphere 4.0 documentation.

Migrating LMS 4.1 Using VMware VMotion

This section lists the steps to migrate LMS 4.1 using VMware VMotion:

1. Install ESX or ESXi 4.0 in two or more servers.
2. Install vCenter Server 4.0 in any server with a proper license.
3. Install the vSphere Client.
4. Create a cluster and add all the ESX or ESXi hosts to it. For Storage VMotion, add the ESX server to this cluster.
5. Ensure that shared storage is accessible to both source and target ESX or ESXi hosts.
6. Configure VMotion in vSphere 4.0.
7. On each host, configure a VMkernel port group for VMotion.
8. Create a virtual machine and select a datastore as storage disk.
9. Ensure that migration is successful before installing LMS 4.1.
10. Ensure that sufficient resource is available on the target ESX or ESXi host.
11. Install LMS 4.1 in any virtual machine in the cluster.
12. Migrate the virtual machine from one host to another. See Migrating a Virtual Machine with VMotion for more information.
13. Migrate the virtual machine from one storage to another. See Migrating a Virtual Machine with Storage VMotion for more information.
Migrating a Virtual Machine with VMotion

To migrate a powered-on virtual machine from one host to another using VMotion technology:

Step 1  Display the virtual machine you want to migrate in the inventory.

Step 2  Right-click on the virtual machine, and select **Migrate** from the pop-up menu.

Step 3  Select **Change host** and click **Next**.

Step 4  Select a destination host for the virtual machine.

   If there is a compatibility problem it appears in the Compatibility panel. Fix the problem, or select another host or cluster.

Step 5  Select a resource pool and click **Next**.

Step 6  Select the migration priority level and click **Next**.

Step 7  Review the page and click **Finish**.

   A task is created that begins the virtual machine migration process.

Migrating a Virtual Machine with Storage VMotion

To migrate a powered-on virtual machine from one storage to another using VMotion technology:

Step 1  Display the virtual machine you want to migrate in the inventory.

Step 2  Right-click on the virtual machine, and select **Migrate** from the pop-up menu.

Step 3  Select **Change Datastore** and click **Next**.

Step 4  Choose the storage to which the virtual machine has to be migrated.

   If there is a compatibility problem it appears in the Compatibility panel. Fix the problem and then proceed with migration.

Step 5  Choose the format to store the virtual machine after migration. By default, it will use the same format type using which the virtual machine was created.

Step 6  Review the page and click **Finish**.

   A task is created that begins the virtual machine migration process. Once the task is completed, the virtual machine is migrated to the expected storage. You can confirm by checking the Summary tab of that the virtual machine using the VMware infrastructure or Vcenter server client.
Cloning a Virtual Machine Using VMware

A clone is a copy of an existing virtual machine. The existing virtual machine is called the parent of the clone. When the cloning operation is complete, the clone is a separate virtual machine.

- Changes made to a clone do not affect the parent virtual machine.
- Changes made to the parent virtual machine do not appear in a clone.
- A clone's MAC address and UUID are different from those of the parent virtual machine.

This section contains:

- Advantages of Clones
- Types of Clones
- Types of Clones

Advantages of Clones

Installing a guest operating system and applications can be time consuming. With clones, you can make many copies of a virtual machine from a single installation and configuration process. Clones are useful when you must deploy many identical virtual machines to a group.

Types of Clones

There are two types of clones:

- Full Clones
  A full clone is an independent copy of a virtual machine that does not share virtual disks with the parent virtual machine after the cloning operation. It does not access or maintain an ongoing connection to the parent virtual machine and is separate from the parent virtual machine.
  Full clones perform better than linked clones. However, full clones take longer to create than linked clones.

- Linked Clones
  A linked clone is a copy of a virtual machine that shares virtual disks with the parent virtual machine in an ongoing manner. This conserves disk space, and allows multiple virtual machines to use the same software installation.
  A linked clone is made from a snapshot of the parent. All files available on the parent at the moment of the snapshot continue to remain available to the linked clone. Ongoing changes to the virtual disk of the parent do not affect the linked clone, and changes to the disk of the linked clone do not affect the parent. A linked clone must access the parent. Without access to the parent, a linked clone is disabled.

Supported Methods of Cloning

The following methods of Cloning are supported:

- Cloning a New Virtual Machine from a Parent Virtual Machine
- Cloning Parent VM to Template and Deploying Template to New VM
Cloning a New Virtual Machine from a Parent Virtual Machine

This section explains how to clone to new Virtual Machine (VM) from a parent VM and contains the following sections:

- Prerequisites
- Cloning a New Virtual Machine
- Setting Up LMS in the Clone Virtual Machine
- Known Problems

Prerequisites

This section explains the prerequisites for cloning to new VM from a parent VM:

- Install vCenter Server 4.0 in any server with a proper license.
- Install vSphere Client in client server and connect to vCenter Server.
- Install ESX 4.0 in a machine.
- Create a Datacenter and add the ESX host to it.
- Configure the shared storage which is accessible to the host.
- Create a virtual machine and select a datastore as shared storage disk.
- Install LMS in the virtual machine.

Cloning a New Virtual Machine

This section explains how to clone to new VM from a parent VM:

1. Launch the vSphere client and locate the created virtual machine.
2. Select the option, **Clone to New Virtual Machine** in the Summary tab.
3. Enter a name for the new virtual machine (clone), select the Inventory Location and click **Next**.
4. Select the host on which the new VM should run and click **Next**.
5. Select the datastore in which the virtual machine files should be stored and click **Next**.
6. Select **Same format as source** option and click **Next**.
7. Select **Do not customize** option and click **Next**.
8. Verify the settings and choose to Power on the virtual machine after creation.
9. Click **Finish** to start the cloning process.

You can view the progress of the cloning process can be seen from **Recent Tasks** option or from the **Tasks & Events** tab of the ESX host.

**Note**

After each step, check the Compatibility panel for any compatibility problem. Fix the problem and then proceed with migration.
Setting Up LMS in the Clone Virtual Machine

This section explains how to configure LMS to run in the Clone Virtual Machine:

1. Configure the IP address (Control Panel > Network and Sharing Center > Manage Network Connections > Properties > Internet Protocol Version 4) of the clone.

2. Change the hostname of the clone VM (Control Panel > System > Advanced System Settings > Computer Name).

3. Reboot the server for the new host name to come to effect.

4. Run the hostnamechange.pl script of LMS so that it uses the new host name:
   a. Stop daemons using the command `net stop crmdmgtd`.
   b. Run the command `NMSROOT\bin\perl NMSROOT\bin\hostnamechange.pl` The script will prompt you to reboot the server.

5. After you reboot the server, all processes will run in the clone.

Known Problems

- System defined pollers will be moved to Instance Not Found state after you run the hostnamechange.pl script.

As a workaround, launch the dbreader and execute the following queries:

- Insert into Poller_Group_Details values (6,(select id from Group_Master_Table where group_name like '%PMC Groups/Port Groups/Link Ports'))
- Insert into Poller_Group_Details values (7,(select id from Group_Master_Table where group_name like '%PMC Groups/Port Groups/Link Ports'))
- Insert into Poller_Group_Details values (8,(select id from Group_Master_Table where group_name like '%PMC Groups/Port Groups/Link Ports'))
- Insert into Poller_Group_Details values (4,(select id from Group_Master_Table where group_name like '%System Defined Groups'))
- Insert into Poller_Group_Details values (5,(select id from Group_Master_Table where group_name like '%System Defined Groups'))
- Restart UPMProcess to bring the pollers to Active state

Important Notes

- User Id – dba and Database Name – upm
- Command to stop UPMProcess: `pdterm UPMProcess`
- Command to start UPMProcess: `pdexec UPMProcess`
Cloning Parent VM to Template and Deploying Template to New VM

Before you clone a parent VM to template and deploy the template to a new VM, ensure you read the Prerequisites.

This sections contains:
- Cloning Parent VM to Template
- Deploying Template to New VM

After you clone a parent VM to a template and deploy the template to a new VM, to setup LMS in the VM, see Setting Up LMS in the Clone Virtual Machine.

The known problems after you setup LMS in the VM are listed in Known Problems.

Cloning Parent VM to Template

This section explains how to clone the parent VM to a template:

1. Launch the vSphere client and locate the parent VM.
2. Right click on the parent VM > Template > Clone to Template.
3. Enter a name for the template, select the Inventory Location and click Next.
4. Select the host in which the template should be stored and click Next.
5. Select the datastore in which the template files should be stored and click Next.
6. Select Same format as source option and click Next.
7. Select Do not customize option and click Next.
8. Verify the settings and click Finish

You can view the progress of template creation process from the Recent Tasks option or from the Tasks & Events tab of the ESX host.

Note: After each step, check the Compatibility panel for any compatibility problem. Fix the problem and then proceed with migration.

To deploy this template to a new VM, see Deploying Template to New VM.

Deploying Template to New VM

This section explains how to deploy the template, which was cloned from the parent VM, to a new VM:

1. Launch the vSphere client and locate the host in which the template is stored.
2. Right click on the template and select Deploy virtual Machine from this template or select Deploy to a new Virtual Machine from the Getting Started tab.
3. Enter a name for the new virtual machine (clone), select the Inventory Location and click Next.
4. Select the host on which the new VM should run and click Next.
5. Select the datastore in which the virtual machine files should be stored and click Next.
6. Select Same format as source option and click Next.
7. Select Do not customize option and click Next.
8. Verify the settings and choose to Power on the virtual machine after creation.
9. Click **Finish** to start the cloning process.

You can view the progress of the cloning process can be seen from **Recent Tasks** option or from the **Tasks & Events** tab of the ESX host.

**Note**

After each step, check the Compatibility panel for any compatibility problem. Fix the problem and then proceed with migration.