

**VMware vSphere:
Install, Configure, Manage**
Lab Manual
ESXi 6.5 and vCenter Server 6.5



VMware® Education Services
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**VMware vSphere:
Install, Configure, Manage**

ESXi 6.5 and vCenter Server 6.5

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Lab Manual

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CONTENTS

| | |
|---|-----|
| <i>Lab 1</i> Installing ESXi | 1 |
| <i>Lab 2</i> Configuring ESXi Hosts | 5 |
| <i>Lab 3</i> Deploying and Configuring a Virtual Machine | 9 |
| <i>Lab 4</i> Working with vCenter Server | 15 |
| <i>Lab 5</i> Navigating the vSphere Clients | 23 |
| <i>Lab 6</i> Creating Folders in vCenter Server Appliance | 27 |
| <i>Lab 7</i> Using Standard Switches | 29 |
| <i>Lab 8</i> Accessing iSCSI Storage | 33 |
| <i>Lab 9</i> Managing VMFS Datastores | 37 |
| <i>Lab 10</i> Accessing NFS Storage | 43 |
| <i>Lab 11</i> Using Templates and Clones | 45 |
| <i>Lab 12</i> Modifying Virtual Machines | 55 |
| <i>Lab 13</i> Migrating Virtual Machines | 63 |
| <i>Lab 14</i> Managing Virtual Machines | 71 |
| <i>Lab 15</i> Managing Resource Pools | 83 |
| <i>Lab 16</i> Managing vApps | 89 |
| <i>Lab 17</i> Monitoring Virtual Machine Performance | 95 |
| <i>Lab 18</i> Using Alarms | 101 |
| <i>Lab 19</i> Using vSphere HA | 109 |
| <i>Lab 20</i> Implementing a vSphere DRS Cluster | 121 |
| <i>Lab 21</i> Using vSphere Update Manager | 133 |
| <i>Answer Key</i> | 139 |

Lab 1 Installing ESXi

Objective: Install ESXi on a VM using your student desktop

In this lab, you perform the following tasks:

1. Access Your Student Desktop
2. Install ESXi

Task 1: Access Your Student Desktop

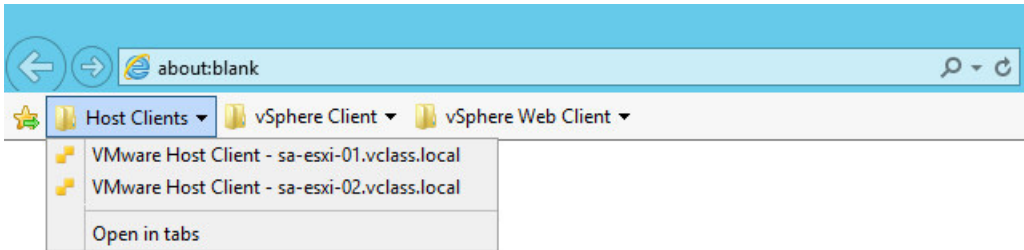
The system assigned to you serves as an end-user terminal. You access and manage the lab environment from the student desktop.

1. Connect to the lab environment using Remote Desktop Connection.
2. Log in to your student desktop using the login name **administrator** and the standard lab password.
3. When a blue banner on the right side of your desktop prompts you with `Do you want to find PCs, devices and content on this network, and automatically connect to devices like printers and TVs?`, click **Yes**.

Task 2: Install ESXi

You install VMware ESXi™ on a virtual machine. This nested ESXi host operates in the same way as a physical host but uses different user interfaces for the installation. You use the VMware Host Client™ to configure and manage the nested ESXi host.

1. From the taskbar, open your Internet Explorer Web browser. From the favorites menu, select **Host Clients > VMware Host Client - sa-esxi-01.vclass.local** to connect to your first ESXi host.



2. When a Security Warning window appears, select **Continue to this website (not recommended)**.
3. In the **User name** text box, enter **root**.
4. In the **Password** text box, enter the standard lab password and click **Log in**.
5. In the Navigator pane on the left, select **Virtual Machines**.
6. In the center pane, right-click **esxi-host-vm** and select **Edit settings**.
7. Locate **CD/DVD Drive 1** and click the triangle to expand the view.
8. From the drop-down menu, select **Datastore ISO file**.
9. In the left pane of Datastore browser, select **Local1-2**.
10. In the middle pane, select **VMware-VMvisor-Installer-6.5.0-x86_64.iso** and click **Select**.
11. Ensure that the **Connect at power on** check box is selected and collapse the CD/DVD configuration.
12. Click **Save**.
13. Right-click **esxi-host-vm** and select **Power > Power On**.
14. Right-click **esxi-host-vm** and select **Console > Open console in new tab**.

NOTE

Whenever the screen appears frozen, it is due to inactivity timeout. Press Ctrl+Alt to release the pointer. Right-click the **Console** tab and select **Refresh (F5)**.

15. On the Welcome to the VMware ESXi 6.5.0 Installation page, press Enter.
16. On the Accept the End-User License Agreement page, press F11 to accept and continue.
17. On the Select a Disk to Install or Upgrade page, ensure that the local disk is selected and press Enter.
18. On the Please select a keyboard layout page, ensure your setup language is selected and press Enter.
19. On the Enter a root password page, enter the standard lab password in the **Password** and **Confirm password** text boxes and press Enter.
20. When the `Error(s)/Warning(s) Found During System Scan` message appears, press Enter to accept that the system does not support hardware virtualization.
21. Press F11 to confirm the installation.

The installation might take a few minutes. A progress bar shows the completion status of the installation. You might need to refresh the screen by right-clicking the virtual machine's console tab in Internet Explorer and selecting **Refresh (F5)**.

22. When the `Installation Complete` message appears, press Enter to reboot the system.
23. Monitor the reboot process until the DCUI reappears and then leave your screen open for the next lab task.

***Lab 2* Configuring ESXi Hosts**

Objective: Configure an ESXi host

In this lab, you perform the following tasks:

1. Examine the Options in the DCUI
2. Configure the Management Network
3. Enable SSH
4. View System Logs
5. Clean Up for the Next Lab

Task 1: Examine the Options in the DCUI

In VMware Host Client, you connect to the host Direct Console User Interface (DCUI) and view and modify the nested ESXi host configuration.

1. In the **Console** tab of the host where the DCUI is opened, press F2 to customize the system or view the logs.



NOTE

The console may have timed out due to inactivity since the previous lab. If so, press Ctrl + Alt to release your cursor and right-click the **Console** tab and select **Refresh (F5)** from the drop-down menu.

2. In the Authentication Required dialog box, ensure that root appears in the **Login Name** text box.
3. Press Tab to enter the standard lab password in the **Password** text box.
4. On the System Customization screen, ensure that the **Configure Password** option is selected and press Enter to change the nested host password.



5. Enter the standard lab password in the **Old Password** text box.
6. Enter the standard lab password in lower case in the **New Password** and **Confirm Password** text boxes and press Enter.

Task 2: Configure the Management Network

In order to manage your host remotely, you must configure the ESXi host management network interface. This interface will be used by VMware Host Client and VMware vCenter Server® to access the host.

1. Use the down arrow to select **Configure Management Network**.
In the right pane, you can see that the IP address is acquired from DHCP server.
2. Press Enter.
3. Press the down arrow to go to **IPv4 Configuration** and press Enter to change it.
4. Press the down arrow to go to **Set static IPv4 address and network configuration** and press the space bar to select it.
5. Press Enter to save the acquired DHCP IP address as the static IP address.
6. On the Configure Management Network page, use the down arrow to navigate to **DNS Configuration** and press Enter.
7. If **Use the following DNS server addresses and hostname** is not already selected, press the down arrow to go to the option and press the space bar to select it.
8. In the **Hostname** text box, enter `esxi-host-vm` and press Enter to save your changes.
9. Press Esc.
10. When prompted by the `Configure Management Network: Confirm` message, press Y to accept the changes.

Task 3: Enable SSH

You enable SSH so that you can run commands or scripts on your ESXi host in a secure fashion. By default, the SSH service is disabled. An open SSH port may pose a potential security risk. You should enable it only as needed and disable it after the required task is completed.

1. On the System Customization page, use the down arrow to select **Troubleshooting Options** and press Enter.
2. On the Troubleshooting Options page, use the down arrow to select **Enable SSH** and press Enter.

The option changes from **Enable SSH** to **Disable SSH**.

In the right pane, you should see `SSH is Enabled`.

3. Press Esc to return to the main options page.

Task 4: View System Logs

You view system logs for diagnostic purposes.

1. Use the down arrow to select **View System Logs** and press Enter.
2. Press 1 to display the host's Syslog.
3. Press the down arrow or the space bar to scroll through the Syslog content.
4. When you finish viewing the log, press Q to quit.
5. Press Esc to return to the main page.

Task 5: Clean Up for the Next Lab

As you performed this lab in a nested ESXi host that is not used in subsequent labs, you shut it down and delete it from inventory. Subsequent host-related labs use hosts in the deployed lab environment.

1. On the main page, press F12 to shut down or restart the host.
The Authentication Required page appears.
2. Accept the default login name, enter the changed root password for the nested host to confirm the shutdown, and press Enter.

NOTE

The root password for the nested host is the standard lab password changed to all lowercase in task 1.

3. On the Shut down/Restart options page, press F2 to shut down the nested ESXi host virtual machine.
4. After the progress bar at the bottom shows complete, close your console tab and return to the VMware Host Client.
5. If you have been logged out due to inactivity, log in again with the user name root and the standard lab password.
6. In VMware Host Client, select **Virtual Machines** in the left pane.
7. In the right pane, right-click **esxi-host-vm** and select **Delete**.
8. On the Delete VM page, click **Delete**.
9. Leave VMware Host Client open for the next lab.

Lab 3 Deploying and Configuring a Virtual Machine

Objective: Create and prepare a virtual machine for use

In this lab, you perform the following tasks:

1. Create a Virtual Machine
2. Install a Guest Operating System and Disable Windows Updates
3. Install VMware Tools
4. Install Files

Task 1: Create a Virtual Machine

You create a virtual machine based on specific requirements, such as a particular operating system or hardware configuration. In this task, you create one virtual machine on each ESXi host.

1. If your VMware Host Client is not active, connect to it.
 - a. Double-click the Internet Explorer icon from the taskbar of your student desktop.
 - b. In the favorites menu, select **Host Clients > VMware Host Client - sa-esxi-01.vclass.local**.

NOTE

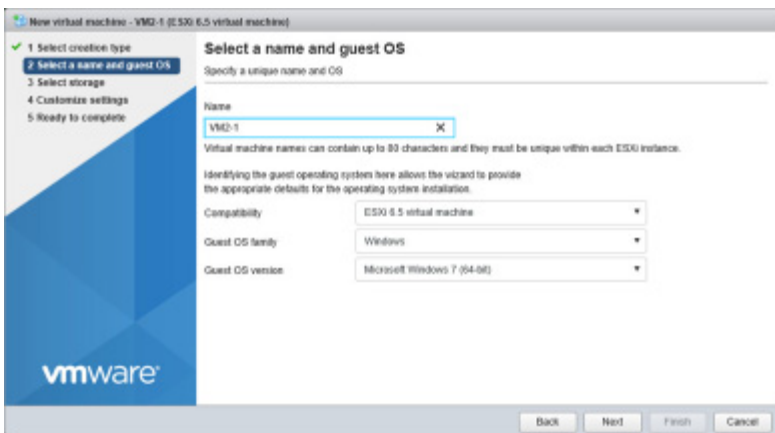
When you repeat this task for the second host, select **Host Clients > VMware Host Client - sa-esxi-02.vclass.local**.

2. Log in using root as the host user name and the standard lab password.
3. In the Navigator pane, select **Host**.
4. In the right pane, click **Create/Register VM** to start the New Virtual Machine wizard.

5. On the Select creation type page, ensure that **create a new virtual machine** is selected and click **Next**.
6. On the Select a name and guest OS page, name your virtual machine VM#-1 where # is the number of the host you are installing on.

For example, the first virtual machine on the first ESXi host is named VM1-1. The first virtual machine on the second ESXi host is named VM2-1.

7. For Compatibility, select **ESXi 6.5 virtual machine**.
8. For Guest OS Family, select **Windows**.
9. For Version, select **Microsoft Windows 7 (64-bit)** as the Guest operating system version and click **Next**.



10. On the Select storage page, select the **datastore 1** local datastore and click **Next**.
11. On the Customize settings page, enter **1** for **CPU**, enter **1024 MB** for **Memory**, and enter **12 GB** for **Hard Disk 1**.
12. Locate CD/DVD Drive 1 and select **Datastore ISO file** from the drop-down menu.
13. In the Datastore browser window, browse to **Local01-2** (for ESXi host sa-esxi-01.vclass.local) or **Local02-2** (for ESXi host sa-esxi-02.vclass.local) and the guest operating system ISO image **en_windows_7_professional_with_sp1_vl_build_x86_dvd_u_677791.iso**.
14. Click **Select**.
15. On the Customize Settings page, click the triangle next to **CD/DVD Drive 1**.
16. Confirm that the **Connect at power on** check box is selected and click **Next**.
17. On the Ready to Complete page, review the information and click **Finish**.

18. In the Navigator pane, verify that the virtual machine number count is 1.
19. In the Navigator pane, select **Virtual Machines** and verify that your newly created virtual machine appears in the right pane.
20. Click the virtual machine name in the right pane.
21. Expand the General Information pane, Hardware Configuration pane, and Resource Consumption pane to review the current settings.
22. In the Hardware Configuration pane, expand **Hard disk 1** and record the information.
 - Backing _____
 - Capacity _____
 - Thin provisioned _____
23. Repeat task 1 to create a virtual machine on your second ESXi host (sa-esxi-02.vclass.local) and name the virtual machine VM2-1.

Task 2: Install a Guest Operating System and Disable Windows Updates

After creating a virtual machine, you install an operating system. You also configure your virtual machine to not check for Windows updates as it consumes virtual machine resources.

1. If your Internet Explorer Web browser is not active, open it from the taskbar in the student desktop.
2. In VMware Host Client for sa-esxi-01.vclass.local, verify that virtual machine VM1-1 is selected in the Navigator pane.

NOTE

When you repeat this task for the second host (sa-esxi-02.vclass.local), verify that virtual machine VM2-1 is selected in the Navigator pane.

3. Right-click the virtual machine and select **Power > Power on**.
4. Right-click the virtual machine and select **Console > Open console in new tab** to monitor the installation progress.
5. If activity in the console becomes unresponsive, refresh the display by right-clicking the **Console** tab and selecting **Refresh (F5)**.

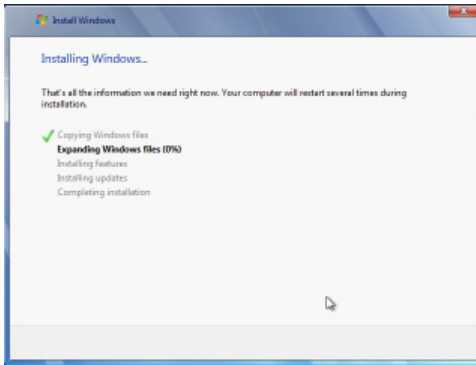
NOTE

You can press Ctrl+Alt at any time to release the pointer from the virtual machine console. You can use the space bar to select check boxes or click buttons.

6. When the Install Windows wizard appears, review the default settings and click **Next**.

7. Click **Install now**.
8. Select the **I accept the license terms** check box and click **Next**.
9. On the Installation type page, select **Custom (Advanced)**.
10. Verify that **Disk 0 Unallocated Space** is selected and click **Next**.

The Windows installation process may take 8 to 10 minutes.



11. On the Set Up Windows page, enter **admin** as the user name and your virtual machine name (VM#-1 where # is your host number) as the computer name.
12. Click **Next**.
13. In the **Type a Password (recommended)** text box, enter the standard lab password.
14. In the **Retype your password** text box, enter the password again.
15. In the **Type a password hint (required)** text box, enter **standard** and click **Next**.
16. On the Help protect your computer and improve Windows automatically page, select **Ask me later**.
17. In the time and date settings page, select your time zone from the drop-down menu and click **Next**.
18. For the computer's location, select **Work Network**.
Your virtual machine restarts and the virtual machine desktop is displayed.
19. Click the **VMware Host Client** tab.
20. In the Navigator pane, right-click your virtual machine and select **Edit Settings**.
21. From the **CD/DVD Drive 1** drop-down menu, select **Host device**.
22. Expand the **CD/DVD Drive 1** view and deselect the **Connect at power on** check box.

23. Click **Save**.
24. Right-click the virtual machine and select **Console > Open console in new tab** to open a console into the virtual machine.
25. Select **Start > Control Panel > System and Security > Windows Updates > Change Settings**.
26. Select **Never Check for updates (not recommended)** from the drop-down menu.
27. Repeat task 2 for the VM2-1 virtual machine on your second ESXi host and leave the **VMware Host Client** tab open for the next task.

Task 3: Install VMware Tools

After installing an operating system on your virtual machines, you install VMware Tools™ in each of the virtual machines created starting with the first virtual machine VM1-1 on the first ESXi host sa-esxi-01.vclass.local.

1. In VMware Host Client, right-click your VM name in the Navigator pane and select **Guest OS > Install VMware Tools**.
2. Return to the VM console tab and refresh the browser tab until the AutoPlay window appears.

To refresh the virtual machine console, press Ctrl+ Alt to release your cursor and then right-click the tab and select **Refresh (F5)** from the drop-down menu.

You might have to refresh more than once.
3. In the AutoPlay window, click **Run Setup64.exe**.
4. When A User Account Control warning appears, click **Yes**.
5. On the Welcome to the installation wizard for VMware Tools page, click **Next**.
6. On the Choose Setup Type page, click **Typical** and click **Next**.
7. On the Ready to Install VMware Tools page, click **Install**.
8. When the installation is completed, click **Finish**.
9. When the Windows request to restart message appears, select **Yes** to proceed.
10. After the login page appears in the VM console, log in with the user name admin and the standard lab password. Leave the window open for the next task.
11. Repeat the task for your **VM2-1** virtual machine on your second ESXi host **sa-esxi-02.vclass.local**.

Task 4: Install Files

You mount an ISO image to the virtual machine's CD/DVD drive so that the files can be copied to the virtual machine desktop for use in later labs.

1. In the VMware Host Client for your first host, right-click your first virtual machine **VM1-1** and select **Edit Settings**.
2. Expand **CD/DVD Drive 1** by clicking the triangle next to it.
3. Select **Datastore ISO file** from the drop-down menu.
4. For the CD/DVD Media setting, click **Browse** and navigate to `Local01-2` for your first host `sa-esxi-01.vclass.local`. When repeating this task for your second host, navigate to `Local02-2`.
5. Select **ClassFiles-vSphere.iso** and click **Select**.
6. On the Edit settings page, click **Save**.
7. Return to the VM console tab and log in as admin with the standard lab password.
8. If the CD/DVD drive does not open automatically, click **Start** and select **Computer**.
9. Right-click **DVD drive (D:) CDROM** and select **Open** to open the ISO image.
10. Copy the `cpubusy` VBScript Script file (not the `cpubusy.pl` file) and the `iometer` application files from the DVD drive (D:) to the virtual machine's desktop for use in later labs.
 - a. Press Ctrl+click to select the files.
 - b. Press Ctrl to select **cpubusy.vbs** and **iometer .exe** together, right-click and select **Copy**.
 - c. Right-click on your virtual machine's desktop and select **Paste** from the drop-down menu.
11. Return to VMware Host Client and disconnect the virtual machine from `Classfiles-vSphere.iso` on the CD/DVD drive.
 - a. In VMware Host Client, right-click the virtual machine in the inventory pane and select **Edit Settings**.
 - b. In the Hardware list, locate **CD/DVD Drive 1**.
 - c. From the drop-down menu, select **Host device**.
 - d. Deselect the **Connect** check box next to **CD/DVD Drive 1**.
 - e. Click **Save**.
12. Repeat task 4 for virtual machine VM2-1 on your second ESXi host `sa-esxi-02.vclass.local`.

Lab 4 Working with vCenter Server

Objective: Install and use vCenter Server Appliance

In this lab, you perform the following tasks:

1. Deploy vCenter Server Appliance
2. Access and Configure vCenter Server Appliance
3. Add Your ESXi Hosts to the vCenter Server Inventory
4. Configure the ESXi Hosts as NTP Clients
5. Back Up vCenter Server Appliance
6. Complete the vCenter Server Appliance Deployment

The Internet Explorer Web browser is recommended for all Web-based labs in this course.

Task 1: Deploy vCenter Server Appliance

You deploy a VMware vCenter® Server Appliance™ on a your first ESXi host.

1. On your student desktop, navigate to the `Class Materials and Licenses` folder and double-click to open it.
2. Double-click the **Class Files** subfolder.
3. Double-click the **VMware-VCSA-all-6.5.0.iso** file.
4. Double-click the **vcsa-ui-installer** folder.
5. Double-click the **win32** folder.
6. Locate and double-click the **installer.exe** application.
7. On the vCenter Server Appliance 6.5 Installer page, click **Install**.

8. On the Install-Stage 1: Deploy appliance page, select the **I accept the terms of the license agreement** check box and click **Next**.
9. On the Select deployment type page, ensure that **vCenter Server with an Embedded Platform Services Controller** is selected and click **Next**.
10. On the Appliance deployment target page, enter your first ESXi host name **sa-esxi-01.vclass.local** in the **ESXi host or vCenter Server name** text box.
11. In the HTTPS port text box, enter **443**.
12. In the User name text box, enter **root**.
13. In the **Password** text box, enter the standard lab password and click **Next**.
14. On the Certificate Warning page, click **Yes**.
15. On the Set up appliance VM page, enter **172.20.10.194** in the **VM name** text box.
16. Enter the standard lab password in the **Root password** and **Confirm root password** text boxes and click **Next**.
17. On the Select deployment size page, accept the default **Tiny** and click **Next**.
18. On the Select datastore page, select **Local01-2** as the deployment datastore.
19. Select the **Enable Thin Disk Mode** check box and click **Next**.
20. On the Configure network settings page, select **VM Network** from the **Network** drop-down menu.
21. From the **IP version** drop-down menu, select **IPv4**.
22. From the **IP assignment** drop-down menu, select **static**.
23. In the **System name** text box, enter **172.20.10.194**.
24. In the **IP address** text box, enter **172.20.10.194**.
25. In the **Subnet mask or prefix length** text box, enter **255.255.255.0**.
26. In the **Default gateway** text box, enter **172.20.10.10**.
27. In the **DNS servers** text box, enter **172.20.10.10** and click **Next**.
28. Click **Finish**.

The Deploying the appliance status bar shows the deployment progress. This deployment might take 15 to 20 minutes to complete.

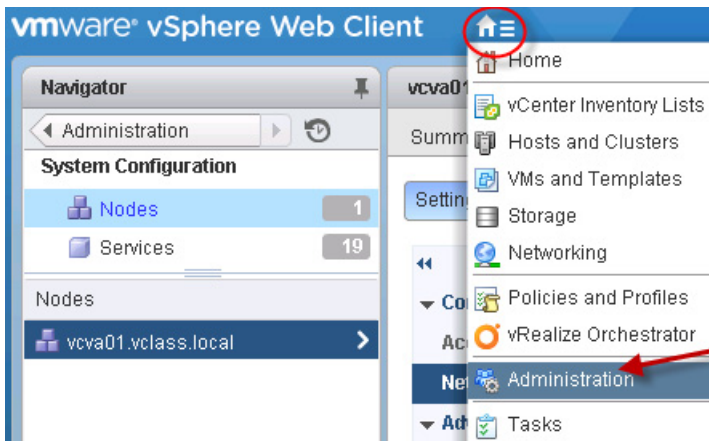
NOTE

While the deployment is in progress, you can proceed to the subsequent tasks and return to complete the deployment in task 6.

Task 2: Access and Configure vCenter Server Appliance

You license both vCenter Server and ESXi hosts, edit the SSO configuration, create a data center object, and add your ESXi hosts to the inventory.

1. In your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar and select **vSphere Web Client - sa-vcva-01.vclass.local**.
2. When the Website Security page opens, click **Continue to this website (not recommended)**.
3. Log in to vCenter Server using `administrator@vsphere.local` as the user name and the standard lab password.
4. In vSphere Web Client, click the **Home** icon and select **Administration**.



5. In the Navigator pane, select **Licenses**.
6. In the Content pane, click the **Licenses** tab.
7. Click the **Create New Licenses** icon (the green plus sign).
8. On the Enter license keys page, in the **License keys** text box, enter the vCenter Server and vSphere Enterprise Plus license keys (on separate lines) provided by your instructor.
9. Verify that both licenses are listed correctly in the text box and click **Next**.
10. On the Edit license names page, enter **VMware vCenter Server** and **VMware ESXi** in the appropriate License name fields.
11. Click **Next**.
12. On the Ready to complete page, click **Finish**.
13. In the content pane, click the **Assets** tab.

14. Right-click **sa-vcsa-01.vclass.local** and select **Assign License**.

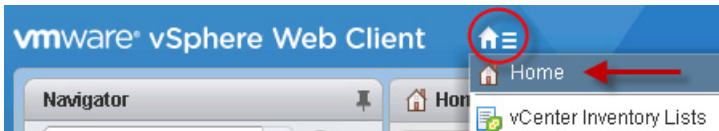
At the bottom of the Assign License screen, you will a message stating `Some features will become unavailable`.

15. Select the vCenter Server license and click **OK**.
16. Point to **Home** and select **Administration > Single Sign-On > Configuration**.
17. On the **Policies** tab, ensure that **Password Policy** is select and click **Edit**.
18. In the **Maximum lifetime** text box, enter **0** for password never expires.
19. Click **OK** to save.

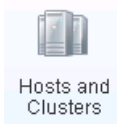
NOTE

Setting the password to never expire is not recommended for production environments. This setting is used for lab purposes only.

20. Point to **Home** and select **Home**.



21. In the center pane, click **Hosts and Clusters**.



22. In the Navigator pane, right-click **sa-vcsa-01.vclass.local** and select **New Datacenter**.
23. In the **Datacenter name** text box, accept the default name **Datacenter** and click **OK**.

In the Navigator pane, you should see that the new data center object is listed under vCenter Server Appliance.

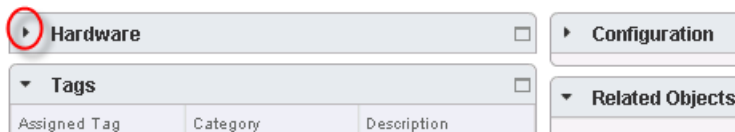
Task 3: Add Your ESXi Hosts to the vCenter Server Inventory

You add ESXi hosts to the vCenter Server inventory.

1. In the Navigator pane, right-click **Datacenter** and select **Add Host**.

The Add Host wizard appears.

2. On the Name and location page, enter **sa-esxi-01.vclass.local** and click **Next**. When repeating the task for your second host, enter **sa-esxi-02.vclass.local**.
3. On the Connection settings page, enter **root** as the user name and the standard lab password and click **Next**.
4. If you see a security alert stating that the certificate store of vCenter Server cannot verify the certificate, click **Yes** to proceed.
5. On the Host summary page, review the information and click **Next**.
6. On the Assign license page, click the VMware ESXi license key and click **Next**.
7. On the Lockdown mode page, accept the default **Disabled** and click **Next**.
8. On the VM location page, leave the default and click **Next**.
9. On the Ready to complete page, review the information and click **Finish**.
10. In the Recent Tasks pane, monitor the progress of the task.
11. Repeat steps 1 through 10 to add sa-esxi-02.vclass.local to the inventory.
12. In the Navigator pane, select your first ESXi host and click the **Summary** tab.
This tab displays information for the ESXi host, such as CPU, memory, storage, NICs, and virtual machines.
13. Click the arrow next to the Hardware pane to view the hardware details of the ESXi host.



Task 4: Configure the ESXi Hosts as NTP Clients

You configure the ESXi hosts to use Network Time Protocol (NTP) to maintain accurate time and date.

1. Select **sa-esxi-01.vclass.local** in the inventory and click the **Configure** tab. When repeating steps for your second host, select **sa-esxi-02.vclass.local**.
2. Under System in the middle pane, select **Time Configuration** and view the current settings.
3. Click **Edit**.
4. Click **Use Network Time Protocol (Enable NTP client)**.
5. From the **NTP Service Startup Policy** drop-down menu, select **Start and stop with host**.
6. In the **NTP Servers** text box, ensure that 172.20.10.10 is entered.

7. Under NTP Service Status, click **Start**.
8. Click **OK**.
9. In the Time Configuration pane, verify that the NTP client appears as Enabled and that the NTP service status appears as Running.
10. Repeat steps 1 through 9 to configure your second ESXi host.

Task 5: Back Up vCenter Server Appliance

You back up your vCenter Server appliance by connecting to the vCenter Server Appliance with a Web browser using Management port 5480.

1. Open a new Internet Explorer tab and enter `https://sa-vcsa-01.vclass.local:5480` in the address bar to access your vCenter Server Management port.
2. When the Security Warning appears, click **Continue to this website (not recommended)**.
3. Log in with root as the user name and the standard lab password and click **Login**.
4. On the Summary page, click **Backup** on the upper-right corner of the screen.
5. On the Enter backup details page, select **FTP** from the **Protocol** drop-down menu.
6. In the **Location** text box, enter `172.20.10.10/VC-Backup`.
7. In the **User name** text box, enter `ftp-admin`.
8. In the **Password** text box, enter the standard lab password and click **Next**.
9. On the Select parts to backup page, click **Next**.
10. On the Ready to complete page, click **Finish**.
11. When the vCenter Server backup progress bar appears, close the vCenter Server Appliance Management UI browser tab.

Task 6: Complete the vCenter Server Appliance Deployment

You return to the vCenter Server Appliance deployment to complete the final steps and clean up for the next lab.

1. Return to the vCenter Server Appliance deployment screen and click **Continue**.
2. On the Introduction page of stage 2, click **Next**.
3. On the Appliance configuration page, enter `172.20.10.10` in the **NTP servers** text box and click **Next**.
4. On the SSO configuration page, enter `vsphere.local` in the **SSO domain name** text box.
5. In the **SSO password** and **Confirm password** text boxes, enter the standard lab password.
6. In the **Site name** text box, enter `site-a` and click **Next**.
7. On the Configure CEIP page, deselect the **Join the VMware Customer Experience Improvement Program** check box and click **Next**.
8. On the Ready to complete page, click **Finish**.

9. When you are prompted with the warning message `You will not be able to pause or stop the install from completing once it's started`. Click **OK** to continue or **Cancel** to stop, click **OK**.

The installation might take about 20 minutes to complete.

10. When the progress bar shows that the installation is complete, click **Close**.
If your browser is open, it will automatically open a new browser tab.
11. When a certificate warning appears, click **Continue to this website (Not recommended)**.
12. Close the **Getting Started** tab.
13. Log in to `sa-esxi-01.vclass.local` with `root` as user name and the standard lab password.
14. In the navigator pane, select **Virtual Machines**.
15. In the right pane, right-click your newly deployed vCenter Server Appliance and select **Power > Power off**.
16. When prompted with the warning messaging about powering off the virtual machine, click **Yes** to continue.
17. When vCenter Server Appliance is powered off, right-click it in the Navigator pane and select **Delete**.
18. When prompted with the `Are you sure` message, click **Delete**.

Lab 5 Navigating the vSphere Clients

Objective: Become familiar with vSphere Client and vSphere Web Client

In this lab, you perform the following tasks:

1. Navigate vSphere Client
2. Navigate vSphere Web Client

Task 1: Navigate vSphere Client

In VMware vSphere® Client™, you navigate through the objects in the navigation tree and view the configuration settings to become familiar with the UI layout.

1. In your Internet Explorer Web browser, click **vSphere Client** on the favorite bar and select **vSphere Client - sa-vcsa-01.vclass.local**.

NOTE

The URL for the vCenter Server Appliance Home page is `https://vCenter_Server_Appliance_FQDN/ui`.

2. When the Security Warning appears, click **Continue to this website (not recommended)**.
3. On the VMware vCenter Single Sign-on page, enter `administrator@vsphere.local` as the user name and the standard lab password and click **Login**.
4. In the navigation pane on the left, click the **Hosts and Clusters** icon.
5. In the navigation pane, click the arrow next to each object to expand the view completely.
6. In the navigation pane, select `sa-esxi-01.vclass.local`.

7. In the right pane, click the **Summary** tab and record the information.
 - Hypervisor _____
 - Logical Processors _____
 - NICs _____
8. In the right pane, expand the Hardware and Configuration panes to review the information.
9. In the navigation pane, select the vCenter Server Appliance name to return to the top of the navigation tree.
10. In the **Search** text box on the top, enter **datastore**.
11. When the datastores appear under the search box, click **datastore 1**.
12. In the **Summary** tab, review the datastore details in the Details pane.
13. Close the **vSphere Client** tab.

Task 2: Navigate vSphere Web Client

VMware vSphere® Web Client provides another way to monitor and manage your vCenter Server inventory. You navigate through vSphere Web Client to become familiar with the UI layout.

1. In the favorites menu of your Internet Explorer Web browser, select **vSphere Web Client > vSphere Web Client - sa-vcsa-01.vclass.local**.

NOTE

The URL for the vSphere Web Client Home page is `https://vCenter_Server_Appliance_FQDN/vsphere-client`.

2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. On the VMware vCenter Single Sign-on page, enter **administrator@vsphere.local** as the user name and the standard lab password and click **Login**.
4. On the vSphere Web Client Home page, click **Hosts and Clusters**.
5. Click **sa-esxi-01.vclass.local** in the navigation pane.
6. In the center pane, under the **Summary** tab, expand the Hardware and Configuration panes to review the information.
7. In the navigation pane, select **sa-vcsa-01.vclass.local** to return to the top of the navigation tree.
8. In the **Search** text box, enter **datastore**.
9. When the datastores appear under the search box, select **datastore 1**.
10. In the **Summary** tab, review the datastore details in the Details pane.

11. Click the vSphere Web Client **Home** icon and select **Home**.

The vSphere Web Client displays two panes to the right of the window: Work In Progress and Alarms. You can adjust these panes to provide more space for the content area.

12. In the Alarms pane, click the pin icon.

The Alarms pane shrinks to a side tab to the right.

13. In the Work In Progress pane, click the pin icon to shrink it to a side tab.

NOTE

Whenever needed, you can click the side tabs to reopen the panes and click the pin icons to repin them.

14. To restore the default layout of the user interface, click your logged in user name and select **Layout Settings**.

15. In the Layout Settings window and click **Reset to default layout**.

16. On the vSphere Web Client Home page, click **Hosts and Clusters** and select **sa-vcasa-01.vclass.local** in the navigation pane.

17. In the content pane, review the information shown under the **Getting Started** tab, which provides general information about the object that you selected in the navigation pane.

18. If you are familiar with vCenter Server fundamentals and know how to navigate among the objects, click **Help** above the content pane and select **Hide All Getting Started Pages**.

The **Getting Started** tab no longer appears.

19. In vSphere Web Client, click the **Home** icon and select **Home** from the drop-down menu.

20. Leave vSphere Web Client open for the next lab.

Lab 6 Creating Folders in vCenter Server Appliance

Objective: Create folders in vCenter Server Appliance

In this lab, you perform the following tasks:

1. Create a Host and Cluster Folder
2. Create Virtual Machine and Template Folders

Task 1: Create a Host and Cluster Folder

You create a folder to group hosts and clusters of the same type together.

1. If your Internet Explorer browser is not open from the previous lab, click it in your taskbar on the student desktop to open it.
2. In your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
3. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
4. Log in using `administrator@vsphere.local` as the user name and the standard lab password.
5. On the vSphere Web Client Home page, click **Hosts and Clusters**.
6. In the left pane, click the arrow to expand the vCenter Server inventory.
7. Right-click **Datacenter** and select **New Folder > New Host and Cluster Folder**.
8. In the **Enter a name for the folder** text box, enter **Lab Servers** and click **OK**.
9. Drag both ESXi hosts to the `Lab Servers` folder.
10. In the Recent Tasks pane, monitor the Move Entities tasks until they are completed.
11. Click the **Home** icon and select **Home**.

Task 2: Create Virtual Machine and Template Folders

You use folders to group virtual machines of the same type.

1. On the vSphere Web Client Home page, click **VMs and Templates**.
2. Right-click the data center and select **New Folder > New VM and Template Folder**.
3. In the **Enter a name for the folder** text box, enter **LabVMs** and click **OK**.
4. In the left pane, expand the **Datacenter** inventory object.
5. Drag both virtual machines to the **LabVMs** folder.
6. Expand the **LabVMs** folder to verify that both virtual machines are in the folder.
7. Right-click **Datacenter** and select **New Folder > New VM and Template Folder** to create a second virtual machine folder.
8. In the **Enter a name for the folder** text box, enter **Templates** and click **OK**.
9. Click the **Host and Clusters** icon.
10. Select the **Datacenter** inventory object.

The **Lab Servers** folder that you created in this lab appears in the left pane.

11. Right-click the folder and notice the menu commands in the drop-down menu.
12. Click the **VMs and Templates** icon.
13. Select the **Datacenter** inventory object.

The **LabVMs** folder that you created in this lab appears in the left pane.

14. Right-click the folder and notice the menu commands in the drop-down menu.

Q1. What is the difference between the menu commands in the drop-down menus of the LabVMs folder and the Lab Servers folder?

15. Leave vSphere Web Client open for the next lab.

Lab 7 Using Standard Switches

Objective: Create a standard switch and a port group

In this lab, you perform the following tasks:

1. View the Standard Switch Configuration
2. Create a Standard Switch with a Virtual Machine Port Group
3. Attach Your Virtual Machines to the New Virtual Machine Port Group

Task 1: View the Standard Switch Configuration

You view the VMware vSphere® standard switch settings to ensure proper configuration of the default switch.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in with `administrator@vsphere.local` as the user name and the standard lab password.
4. On the Home page, click **Hosts and Clusters**.
5. In the navigation pane, click the arrows to expand the inventory view.
6. Select `sa-esxi-01.vclass.local`, click the **Configure** tab, and select **Virtual switches** in the middle pane.

7. In the Virtual switches pane, select the displayed virtual switch,

Q1. What is the name of the default standard switch?

Q2. Which physical adapter is the default standard switch connected to?

Q3. Which network is your virtual machine connected to?

Q4. Which networks are connected to the default standard switch?

Task 2: Create a Standard Switch with a Virtual Machine Port Group

You create a virtual machine port group on a standard switch, which handles network traffic at the host level in your vSphere environment.

1. In the Hosts and Clusters navigator pane, select **sa-esxi-01.vclass.local** and click the **Configure** tab. When repeating this task for your second ESXi host, select **sa-esxi-02.vclass.local**.
2. Select **Networking > Virtual Switches** in the center pane and click **Add host networking**.

The Add Networking wizard appears



3. On the Select connection type page, click **Virtual Machine Port Group for a Standard Switch** and click **Next**.
4. On the Select target device page, click **New standard switch** and click **Next**.
5. On the Create a Standard Switch page, click the **Add adapters** icon (the green plus sign).
6. Select **vmnic3** for the virtual switch of the Production network and click **OK**.
7. Review the information for the new active adapter and click **Next**.
8. On the Connection settings page, enter **Production** in the **Network label** text box and click **Next**.

9. On the Ready to complete page, verify that the information is accurate and click **Finish**.
10. In the Virtual switches pane, select **vSwitch1**.

You may need to click and pull downwards the 3 bar display adjustment below the list to display the newly created switch.

The Production port group appears.

11. Repeat task 2 for your second ESXi host sa-esxi-02.vclass.local.

Task 3: Attach Your Virtual Machines to the New Virtual Machine Port Group

You attach the virtual machine to the virtual switch port group so that the virtual machine can communicate with other networked devices.

1. In vSphere Web Client, click the **Home** icon and select **VMs and Templates**.
2. In the left pane, click the arrows to expand the view of your data center and folders.
3. In the `LabVMs` folder, right-click **VM1-1** and select **Edit Settings**. When repeating this task for your first virtual machine on your second host, right-click **VM2-1**.
4. Click the arrow next to **Network adapter 1** to expand the view.
5. From the drop-down menu, select **Production**.
6. Verify that the **Connected** and **Connect At Power On** check boxes are selected.
7. Click **OK** to close the Edit Settings window.
8. Renew the virtual machine's IP address.
 - a. In the navigation pane, right-click your virtual machine and select **Open Console**.
 - b. When prompted with the Open Console window, accept the default **Web Console** and click **Continue**.
 - c. When the website security certificate page opens, click **Continue to this website (not recommended)**.
 - d. Log in to the virtual machine using the standard lab password.
 - e. Click **Start**.
 - f. In the **Search programs and files** text box, enter `cmd` to open a Command Prompt window and press Enter.
 - g. At the command prompt, run the `ipconfig /release` command.
 - h. Run the `ipconfig /renew` command.
 - i. Record the virtual machine's IP address and the default gateway. _____, _____

9. At the virtual machine's command prompt, ping the ControlCenter 172.20.10.10 to verify the virtual machine is connected to the network.
Your ping should be successful. If it is not successful, ask your instructor for help.
10. Repeat Task 3 for your VM2-1 virtual machine.
11. Leave vSphere Web Client and the virtual machine console tab open for the next lab.

Lab 8 Accessing iSCSI Storage

Objective: Configure access to an iSCSI datastore

In this lab, you perform the following tasks:

1. Add a VMkernel Port Group to a Standard Switch
2. Configure the iSCSI Software Adapter and Connect It to the Storage

Task 1: Add a VMkernel Port Group to a Standard Switch

You use VMkernel interfaces to provide network connectivity for your hosts and to handle other types of traffic, such as VMware vSphere® vMotion® traffic, storage traffic, and VMware vSphere® Fault Tolerance traffic.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and the standard lab password.
4. On the vSphere Web Client Home page, click **Hosts and Clusters**.
5. In the left pane, click the arrows to expand the data center and folders.
6. Select **sa-esxi-01.vclass.local**. When repeating this task for your second host select **sa-esxi-02.vclass.local**.
7. Click the **Configure** tab and select **Networking > VMkernel adapters**.
8. Click the **Add host networking** icon.
The Add Networking wizard starts.
9. On the Select connection type page, click **VMkernel Network Adapter** and click **Next**.

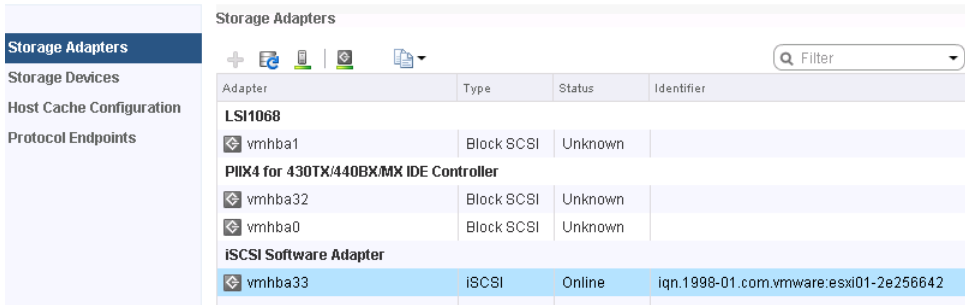
10. On the Select target device page, click **Select an existing standard switch**.
11. Click **Browse** and select **vSwitch0**.
12. Click **OK**.
13. Click **Next**.
14. On the Port properties page, enter **IP Storage** in the **Network label** text box and click **Next**.
15. On the IPv4 settings page, click **Use static IPv4 settings**.
16. In the **VMkernel port IPv4 address** text box, enter **172.20.10.61** for the first host and **172.20.10.62** for the second host.
17. Enter **255.255.255.0** in the **Subnet mask** text box for both hosts.
18. Verify that the **VMkernel default gateway** is set to 172.20.10.10.
19. Click **Next**.
20. On the Ready to complete page, click **Finish**.
21. Repeat steps 6 through 20 for your second ESXi host sa-esxi-02.vclass.local.

Task 2: Configure the iSCSI Software Adapter and Connect It to the Storage

You use the built-in software iSCSI adapter on the ESXi host to directly connect to a remote iSCSI target on the IP network.

1. In the inventory, select your first ESXi host **sa-esxi-01.vclass.local** and click the **Configure** tab. When repeating the task for your second host select **sa-esxi-02.vclass.local**.
2. Select **Storage > Storage Adapters**.
3. Click the **Add new storage adapter** icon (the green plus sign).
4. Select **Software iSCSI adapter**.
5. When the Add Software iSCSI Adapter message appears, click **OK**.

- In the Storage Adapters list, scroll down and select the newly created iSCSI software adapter.



- In the Adapter Details pane, click the **Properties** tab.
- Verify that the adapter status is Enabled.
- Click **Edit** next to General.
- Ensure that the name shown in the **iSCSI Name** text box matches **iqn.1998-01.com.vmware:sa-esxi-01-#####** for your first ESXi host and **iqn.1998-02.com.vmware:sa-esxi-02-#####** for the second ESXi host.
The numbers at the end of the iSCSI name have #s to represent characters that might change.
- Click **OK**.
- In the Adapter Details pane, click the **Network Port Binding** tab.
- Click the **Add** icon (the green plus sign).
- Select the **IP Storage** check box and click **OK**.
- In the Adapter Details pane, click the **Targets** tab.
- Click **Dynamic Discovery** and click **Add**.
- On the Add Send Target Server page, enter **172.20.10.10** for the iSCSI server name in the **iSCSI Server** text box and click **OK**.
- Monitor the Recent Tasks pane and wait for the task to complete.
- Click the **Rescan all storage adapters** icon.



- When the rescan storage message appears, click **OK** and wait for the task to complete.
- Repeat steps 1 through 20 for your second ESXi host sa-esxi-02.vclass.local.

22. In the Adapter Details pane, click the **Devices** tab.
23. Verify that one or more LUNs appear and record the values.
 - LUN number _____
 - Capacity _____
 - Operational state _____
 - Hardware Acceleration _____

The LUNs are hosted by an iSCSI provider and are used to create datastores in later labs.

24. Compare the results for both hosts.
25. Leave vSphere Web Client open for the next lab.

Lab 9 Managing VMFS Datastores

Objective: Create and manage VMFS datastores

In this lab, you perform the following tasks:

1. Rename a VMFS Datastore
2. Create VMFS Datastores for the ESXi Host
3. Expand a VMFS Datastore to Consume Unused Space on a LUN
4. Remove a VMFS Datastore
5. Extend a VMFS Datastore
6. Create a second Shared VMFS Datastore Using iSCSI

Task 1: Rename a VMFS Datastore

You rename your VMware vSphere® VMFS datastore.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` for the user name and the standard lab password.
4. In the left pane of the vSphere Web Client Home page, click **Storage**.
5. In the left pane, expand the vCenter Server instance and the Datacenter inventory object.
6. In the left pane, right-click your local datastore for your first ESXi host named **datastore 1** and select **Rename**.

7. Enter **Local01-1** and click **OK**.

NOTE

In the datastore name Local0#-#, the first # represents the host ID. The second # represents the datastore number.

8. In the left pane, right-click your local datastore for your second ESXi host named **datastore 1(1)** and select **Rename**.
9. Enter **Local102-1** and click **OK**.
10. In the Navigator pane, verify that the new datastore names appear in the storage inventory.

Task 2: Create VMFS Datastores for the ESXi Host

You set up VMFS datastores on iSCSI-based storage devices to be used as repositories by virtual machines.

1. On the vSphere Web Client Home page, click **Hosts and Clusters**.
2. In the left pane, click the arrows to expand the data center and folders.
3. Right-click **Datacenter** and select **Storage > New Datastore** to start the New Datastore wizard.
4. On the Location page, click **Next**.
5. On the Type page, ensure that **VMFS** is selected and click **Next**.
6. On the Name and device selection page, enter **vmfs-2** in the **Datastore name** text box.
7. In the **Select a host to view its accessible disks/LUNs** drop-down menu, select your first host name **sa-esxi-01.vclass.local**.

A LUN list appears.

8. In the LUN list, select **LUN 2** and click **Next**.
9. On the VMFS version page, select **VMFS 6** and click **Next**.
10. On the Partition configuration page, move the **Datastore Size** slider to reduce the LUN size by 3 GB, or enter the desired number on the line next to the slider and click **Next**.

For example, if the current disk size is 10 GB, change the size to 7 GB.

This setting is in preparation for task 3 in which you expand the VMFS datastore to its full size.

11. On the Ready to complete page, review the information and click **Finish**.
12. Right-click **Datacenter** in the inventory and select **Storage > New Datastore**.
13. On the Location page, click **Next**.
14. On the Type page, ensure that **VMFS** is selected and click **Next**.

- On the Name and device selection page, enter **VMFS-3** in the **Datastore name** text box.
- In the **Select a host to view its accessible disks/LUNs** drop-down menu, select your second host name.

A LUN list appears.

- In the LUN list, select **LUN 3** and click **Next**.
- On the VMFS version page, select **VMFS 6** and click **Next**.
- On the Partition configuration page, accept the default (full capacity) and click **Next**.
- On the Ready to complete page, review the information and click **Finish**.
- Monitor the progress in the Recent Tasks pane until the task is completed.
- In the Navigator pane, click the **Storage** icon.



- Verify that your two VMFS-2 and VMFS-3 datastores are listed in the datastore inventory.
- In the datastore inventory, click **VMFS-2** datastore.
- Click the **Summary** tab and record the value for storage capacity. _____

Task 3: Expand a VMFS Datastore to Consume Unused Space on a LUN

You dynamically increase the capacity of a VMFS datastore when more space is required by virtual machines.

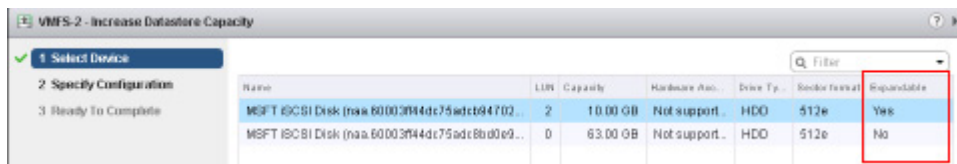
- In the left pane, click the **Storage** icon and click the arrows to expand the **Datacenter** inventory object.
- Right-click **VMFS-2** datastore and select **Increase Datastore Capacity**.

The Increase Datastore Capacity wizard starts.

- On the Select Device page, select **LUN 2**.

Yes should appear in the Expandable column of LUN 2.

You should see an entry similar to the screenshot.



4. Click **Next**.
5. On the Specify Configuration page, select Use “**Free Space 3.00 GB**” to expand the datastore from the **Partition configuration** drop-down menu and click **Next**.
The free space listed in the drop-down menu might be different in your lab environment.
6. On the Ready to Complete page, review the information and click **Finish**.
7. When the task is completed, select the **VMFS-2** datastore in the left pane.
8. Click the **Summary** tab.
9. Verify that the datastore size is increased to the maximum capacity, minus the space required for system overhead.
The new capacity should be 9.75 GB.

Task 4: Remove a VMFS Datastore

You can delete any type of VMFS datastore, including the copies that you mounted without resignaturing. When you delete a datastore, it is destroyed and removed from all hosts.

1. In the Navigator pane, ensure that the **Datastore** tab is clicked and expand the vCenter Server instance and the **Datacenter** inventory object.
2. Right-click the **VMFS-3** datastore and select **Delete Datastore**.
3. When the Confirm Delete Datastore message appears, click **Yes** and wait for the task to be completed.
4. Click the **Refresh** icon in the vSphere Web Client and verify that the datastore is removed from the inventory.

Task 5: Extend a VMFS Datastore

You extend the capacity of a VMFS datastore when extra storage space is needed. This task uses a second LUN to extend the size of a datastore based on the first LUN.

1. In vSphere Web Client, click the **Home** icon and select **Storage**.
2. In the left Navigator pane, select the first **VMFS-2** datastore.
3. Click the **Configure** tab.
4. Ensure that **General** is selected and click **Increase**.
The Increase Datastore Capacity wizard starts.
5. On the Select Device page, select **LUN 3** and click **Next**.
6. On the Specify Configuration page, select **Use all available partitions** from the **Partition Configuration** drop-down menu and click **Next**.

- On the Ready to Complete page, review the information and click **Finish**.
- When the task completes, refresh the page and select **Device Backing** in the middle pane and verify that two extents appear in the Extent Name pane.

The Extent Name pane should show both of your assigned LUN IDs.

You might need to adjust the size of the Extent Name pane to view all the extent names.

The screenshot shows the two extents listed in the Extent Name pane and the slider to adjust the size of the pane.

| Extent Name (Device name:Partition number) | Capacity |
|--|----------|
| MSFT iSCSI Disk (naa.60003ff44dc75adcb9470258de1db3ab) : 1 | 10.00 GB |
| MSFT iSCSI Disk (naa.60003ff44dc75adc91cf151e2b7ecae0) : 1 | 10.00 GB |

2 items Copy ▾

Device Details



- Click the **Summary** tab.
- Record the new value for Total Capacity in the **Summary** tab. _____
The value should differ from the value recorded in task 3, step 9.
- In the navigator pane, click the **Storage** tab, click the **Hosts** tab in middle pane, and notice that two hosts are connected, indicating that this new datastore is shared between your two ESXi hosts.
- Right-click your **VMFS-2** datastore in the inventory and select **Rename**.
- In the **Enter the new name** text box, enter **Shared-VMFS**.
- Click **OK**.

Task 6: Create a second Shared VMFS Datastore Using iSCSI

You use an iSCSI shared LUN to create a VMFS 6 file system.

- On the vSphere Web Client Home page, click the Home icon and select **Hosts and Clusters**.
- In the left pane, click the arrows to expand the data center and folders.
- Right-click **Datacenter** and select **Storage > New Datastore**.
The New Datastore wizard starts.
- On the Location page, click **Next**.
- On the Type page, ensure that VMFS is selected and click **Next**.

6. On the Name and device selection page, enter **Shared-iSCSI-Datastore** in the **Datastore name** text box.
7. In the “Select a host to view its accessible disks/LUNs” drop-down menu, select your first ESXi host name.
A LUN list appears.
8. In the newly displayed LUN list, select **MSFT iSCSI Disk** (Capacity 63 GB) and click **Next**.
9. On the VMFS version page, select **VMFS 6** and click **Next**.
10. On the Partition configuration page, select **Use all available partition** from the **Partition Configuration** drop-down menu and click **Next**.
11. On the Ready to complete page, review the information and click **Finish**.
12. Leave vSphere Web Client open for the next lab.

Lab 10 Accessing NFS Storage

Objective: Configure access to an NFS datastore

In this lab, you perform the following tasks:

1. Configure Access to NFS Datastores
2. View NFS Storage Information

Task 1: Configure Access to NFS Datastores

You mount an NFS share to your ESXi hosts and use it as a datastore.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click the **Storage** icon in the Navigator pane.
5. Right-click the datacenter and select **Storage > New Datastore**.
The New Datastore wizard starts.
6. On the Location page, click **Next**.
7. On the Type page, select **NFS** and click **Next**.
8. On the **Select NFS version** page, select **NFS 3** and click **Next**.
9. On the Name and configuration page, enter **NFS-Data** in the **Datastore name** text box.
10. In the **Folder** text box, enter **/NFS-Data** as the folder name.
11. In the **Server** text box, enter **172.20.10.10** as the NFS server name and click **Next**.

12. On the Host accessibility page, select both ESXi hosts and click **Next**.
13. On the Ready to complete page, review the information and click **Finish**.
14. Verify that your NFS datastore is listed in the inventory.

Task 2: View NFS Storage Information

You view the information about your NFS storage and the contents in the NFS datastore.

1. In the left pane, select your **NFS-Data** datastore.
2. In the center pane, click the **Summary** tab.
3. In the content pane, record the following information.
 - The datastore type _____
 - The capacity of the datastore _____
 - The free space of the datastore _____
 - The used space of the datastore _____
4. Leave vSphere Web Client open for the next lab.

Lab 11 Using Templates and Clones

Objective: Deploy a new virtual machine from a template and clone a virtual machine

In this lab, you perform the following tasks:

1. Create a Virtual Machine Template
2. Create Customization Specifications
3. Deploy a Virtual Machine from a Template
4. Create a Content Library
5. Clone a VM Template to a Template in a Content Library
6. Deploy a Virtual Machine from a VM Template in the Content Library
7. Clone a Powered-On Virtual Machine

Task 1: Create a Virtual Machine Template

You create a template to securely preserve a virtual machine configuration and easily deploy new virtual machines from the template.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorites bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and the standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates**.
5. In the inventory, expand **Datacenter** and **LabVMs** folder.

6. If the **VM1-1** virtual machine is powered on, right-click the virtual machine and select **Power > Shut Down Guest OS**.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

7. Click **Yes** to confirm and wait for the virtual machine to power off completely.
8. Right-click the **VM1-1** virtual machine and select **Template > Convert to Template**.
9. Click **Yes** to confirm the conversion.
10. Right-click the **VM1-1** virtual machine template and select **Move To**.
11. Select **VM Folders > Templates** folder and click **OK**.
12. Expand the **Templates** folder, right-click the **VM1-1** virtual machine template, and select **Rename**.
13. Enter **vm-Template** and click **OK**.

Task 2: Create Customization Specifications

You save the guest operating system settings in a customization specification file, which is applied when you clone virtual machines or deploy virtual machines from templates.

1. Go to the vSphere Web Client Home page.
2. In the Navigator pane, select **Policies and Profiles**.
3. Under Policies and Profiles, click **Customization Specification Manager** and click the **Create a new specification** icon.



The New VM Guest Customization Spec wizard appears.

4. On the Specify Properties page, verify that **Windows** is selected from the **Target VM Operating System** drop-down menu.
5. In the **Customization Spec Name** text box, enter **vm-CustomSpec** and click **Next**.
6. On the Set Registration Information page, enter **VMware Student** in the **Name** text box and enter **VMware** in the **Organization** text box.
7. Click **Next**.
8. On the Set Computer Name page, click **Use the virtual machine name** and click **Next**.

9. On the Enter Windows License page, leave the **product key** text box blank, leave other settings at their defaults, and click **Next**.
10. On the Set Administrator Password page, enter the standard lab password and confirm it.
11. On the Time Zone page, select the **(GMT-08:00) Pacific Time (US & Canada)** time zone from the **Time Zone** drop-down menu and click **Next**.
12. On the Run Once page, click **Next**.
13. On the Configure Network page, verify that **Use standard network settings for the guest operating system, including enabling DHCP on all network interfaces** is clicked and click **Next**.
14. On the Set Workgroup or Domain page, verify that **Workgroup** is clicked and that the text box shows **WORKGROUP**.
15. Click **Next**.
16. On the Set Operating System Options page, verify that the **Generate New Security ID (SID)** check box is selected and click **Next**.
17. On the Ready to complete page, review the information and click **Finish**.
18. In the Customization Specification Manager pane, verify that VM-CustomSpec is listed.

Task 3: Deploy a Virtual Machine from a Template

Using templates, you rapidly deploy and provision new virtual machines and easily customize the guest operating systems.

1. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
2. In the left pane, expand the data center and folders until all the virtual machines are visible.
3. Right-click **VM-Template** and select **New VM from this Template**.

The Deploy From Template wizard starts.

4. On the Select a name and folder page, enter **vm1-2**.
5. In the Select a location for the virtual machine pane, expand the inventory tree, select the **LabVMs** folder, and click **Next**.
6. On the Select a compute resource page, expand the **Lab Servers** folder and select **sa-esxi-01.vclass.local**.

The Compatibility pane displays the Compatibility checks succeeded message.

7. Click **Next**.

8. On the Select storage page, select **Shared-iSCSI-Datastore** from the list.
The Compatibility pane displays the `Compatibility checks succeeded` message.
9. Click **Next**.
10. On the Select clone options page, select the **Customize the operating system** and the **Power on virtual machine after creation** check boxes and click **Next**.
11. On the Customize guest OS page, select **VM-CustomSpec** and click **Next**.
12. On the Ready to complete page, review the information and click **Finish**.
13. Repeat steps 3 through 12 to create another virtual machine on your second host named **sa-esxi-02.vclass.local** and name it **vm2-2**.

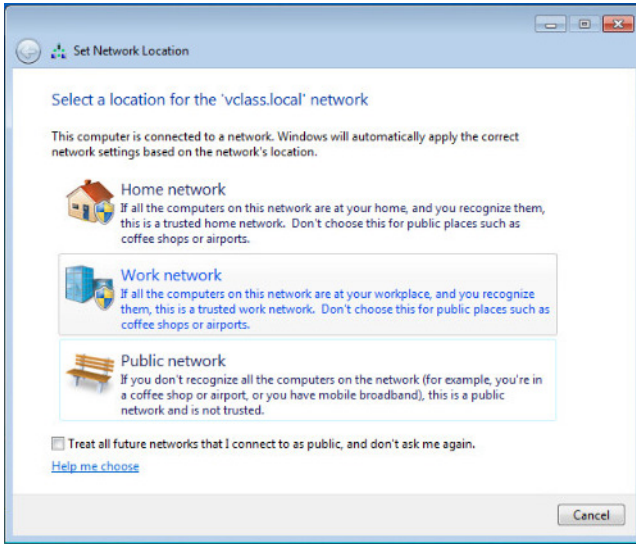
NOTE

If the `Compatibility alarm - No guest heartbeats are being received` message appears, ignore it. It does not affect a successful migration.

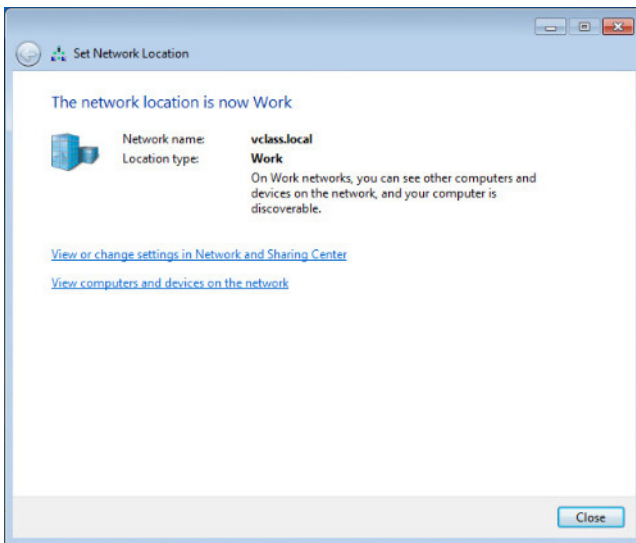
14. In the Recent Tasks pane, monitor the progress of the two template deployment tasks and wait for their completion.
15. Open a console for each of the newly created virtual machines.
 - a. In the left pane of vSphere Web Client, right-click the virtual machine and select **Open Console**.

When the virtual machine console opens, you might see the Windows setup process continuing. It automatically reboots a few times to complete the process.
 - b. Log in as admin with the standard lab password.

- c. When the Set Network Location window opens, click **Work network**.

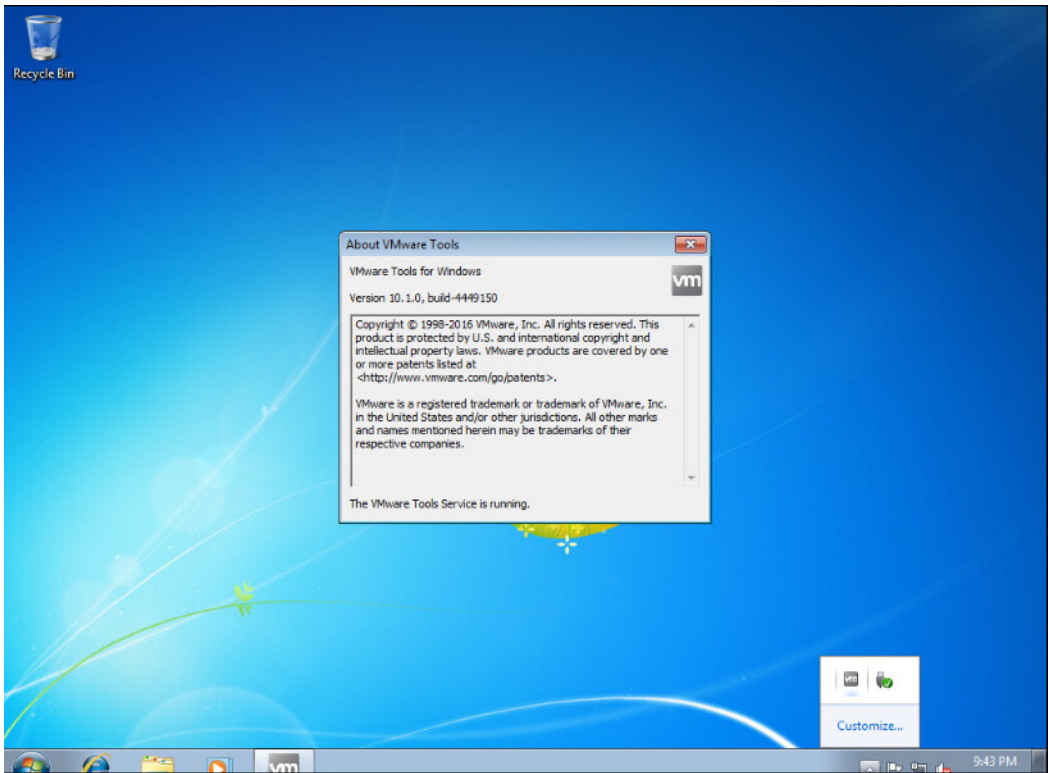


- d. Click **Close**.



- e. Verify that VMware Tools is installed by navigating to the Windows system tray at the lower-right corner to show hidden icons, and double-click the **VMware Tools** icon.

- f. Ensure that VMware Tools for Windows is running.



- g. Close the virtual machine console.

16. In vSphere Web Client, select each virtual machines individually in the Navigator pane, and click the **Refresh** icon in order for the **Summary** tab data to be updated.

Task 4: Create a Content Library

You create a content library in vSphere Web Client and populate it with templates, which you can use to deploy virtual machines or vApps in your virtual environment.

1. Navigate to the vSphere Web Client Home page.
2. In the Navigator pane, click **Content Libraries**.
3. In the center pane, click the **Create a new content library** icon under the **Objects** tab.
4. On the Name and location page, enter **vm_Library** in the **Name** text box and click **Next**.

5. In the Configure content library page, select **Local content library**, select the **Publish externally** check box, and click **Next**.
6. In the Add storage page, select **Select a datastore** and select **Shared-iSCSI-Datastore** and click **Next**.
7. On the Ready to complete page, review the information and click **Finish**.
8. Wait for this task to finish before you go to the next task.

Task 5: Clone a VM Template to a Template in a Content Library

You clone virtual machines or VM templates from the vCenter Server inventory to templates in the content library and use them later to provision virtual machines on a cluster or a host. You can also clone a virtual machine or VM template to update an existing template in the library.

1. Navigate to the vSphere Web Client Home page, and click **VMs and Templates**.
2. Expand the view of the data center and all folders.
3. Right-click **VM-Template** and select **Clone to Library**.
4. For **Clone as**, verify that **New template** is selected.
5. Under the **Filter** tab, click **VM_Library**.
6. In the template name text box, enter **VM-TemplateLib**.
7. Click **OK** and wait for the task to finish before you go to the next task.

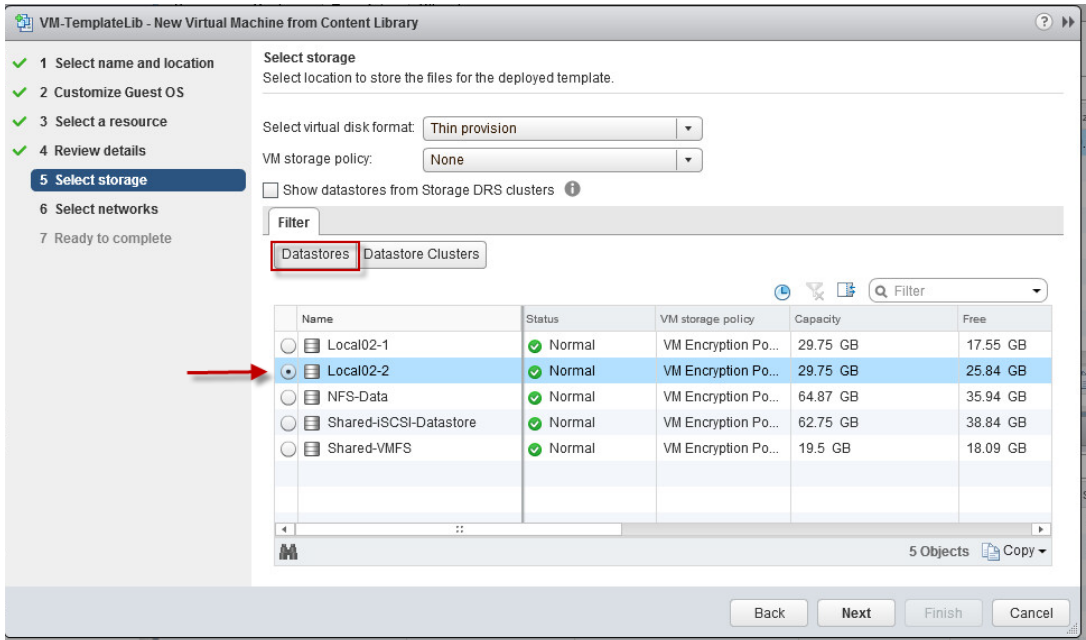
This process takes about five minutes.

Task 6: Deploy a Virtual Machine from a VM Template in the Content Library

You use a VM template from a content library to deploy a virtual machine to a host or a cluster in your vSphere inventory. You can also apply a customization specification to the virtual machine.

1. Navigate to the vSphere Web Client Home page and click **Content Libraries**.
2. In the navigator pane, select **VM_Library**.
3. Click the **Templates** tab.
4. Right-click **VM-TemplateLib** and select **New VM from This Template**.
5. On the Select name and location page, enter **VM-FromLib** in the **Name** text box.
6. Ensure that the **Browse** tab is clicked and expand the view of Datacenter.
7. Select the **LabVMs** folder.
8. Select the **Customize VM Options - Customize the operation system** check box and click **Next**.

9. On the Customize guest OS page, select **VM-CustomSpec** and click **Next**.
10. On the Select a resource page, expand the **Lab Servers** folder, select **sa-esxi-02.vclass.local** host, and click **Next**.
11. On the Review details page, verify the template details and click **Next**.
12. On the Select storage page, select **Thin Provision** from the **Select virtual disk format** drop-down menu.
13. Under **Datastores** tab in the **Filter** tab, ensure that **Local02-2** is clicked.



14. Click **Next**.
15. On the Select networks page, ensure that **Production** appears in the **Destination Network** field and click **Next**.
16. On the Ready to complete page, review the information and click **Finish**.
17. In the Recent Tasks pane, monitor the progress of the template deployment task and wait for completion.
This task takes about five minutes.
18. In vSphere Web Client, click the **Home** icon and select **VMs and Templates**.
19. In the left pane, right-click **VM-FromLib** and select **Power > Power On**.

20. Open a console for the VM-FromLib virtual machine.
 - a. In the left pane of vSphere Web Client, right-click the **VM-FromLib** virtual machine and select **Open Console**.

When the virtual machine console opens, you might see the Windows setup process continuing. It automatically reboots a few times to complete the process.
 - b. Log in as admin with the standard lab password.
 - c. When the Set Network Location window opens, click **Work network**.
 - d. Click **Close**.
 - e. Verify that VMware Tools is installed by navigating to the Windows system tray at the lower-right corner to show hidden icons and double-click the **VMware Tools** icon.
 - f. Verify that VMware Tools for Windows is running.
21. Close the virtual machine console.
22. Navigate to the vSphere Web Client Home page.
23. Click **Content Libraries**.
24. Right-click the **VM_Library** content library in the Navigator pane and select **Delete**.
25. In the Delete library confirmation dialog box, click **Yes**.

Task 7: Clone a Powered-On Virtual Machine

You clone a virtual machine to create a new virtual machine with the same virtual hardware, installed software, configuration, and other properties. The original virtual machine can be powered on, off, or suspended.

1. On the vSphere Web Client Home page, click **VMs and Templates**.
2. In the inventory, expand the **Datacenter** and **LabVMs** folders.
3. If the **VM2-1** virtual machine is not powered on, right-click the virtual machine and select **Power > Power on**.
4. Right-click the **VM2-1** virtual machine and select **Clone > Clone to Virtual Machine**.

The Clone Existing Virtual Machine wizard starts.
5. On the Select a name and folder page, enter **Hot-Clone** in the **Enter a name for the virtual machine** text box.
6. For the Select a location for the virtual machine setting, expand **Datacenter** and select **LabVMs**.
7. Click **Next**.

8. On the Select a compute resource page, select **Datacenter > Lab Servers > sa-esxi-02.vclass.local** and click **Next**.
9. On the Select storage page, select **Shared-iSCSI-Datastore** and click **Next**.
10. On the Select clone options page, select the **Customize the operating system** and the **Power on virtual machine after creation** check boxes.
11. Click **Next**.
12. On the Customize guest OS page, select **VM-CustomSpec** and click **Next**.
13. On the Ready to complete page, review the information and click **Finish**.
14. Monitor the progress of the task in the Recent Tasks pane.

NOTE

If a host memory usage warning appears in the left pane, click **Reset To Green**.

15. Open a console for the Hot-Clone virtual machine.
 - a. In the left pane of vSphere Web Client, right-click the Hot-Clone virtual machine and select **Open Console**.

When the virtual machine console opens, you might see the Windows setup process continuing. It automatically reboots a few times to complete the process.
 - b. Log in as admin with the standard lab password.
 - c. Wait until the VM desktop and the Set Network Location page appear.
 - d. When the Set Network Location window opens, click **Work network**.
 - e. Click **Close**.
 - f. Verify that VMware Tools is installed by navigating to the Windows system tray at the lower-right corner to show hidden icons and double-click the **VMware Tools** icon.
 - g. Verify that VMware Tools for Windows is running.
16. Close the virtual machine console.
17. Leave vSphere Web Client open for the next lab.

Lab 12 Modifying Virtual Machines

Objective: Modify a virtual machine's hardware and add a raw LUN to a virtual machine

In this lab, you perform the following tasks:

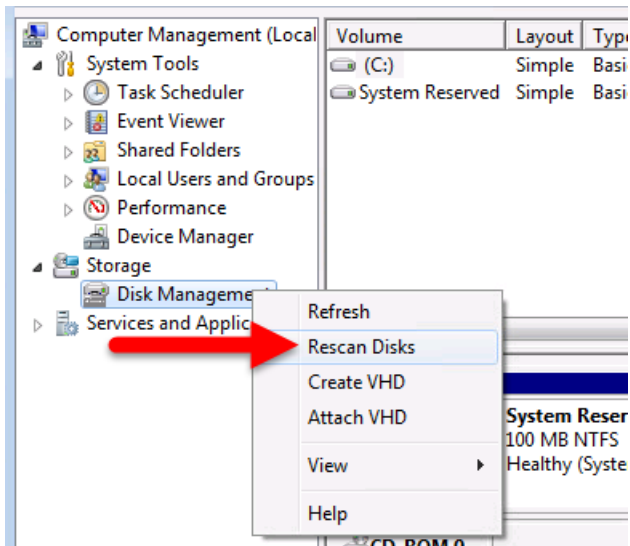
1. Increase the Size of a VMDK File
2. Adjust Memory Allocation on a Virtual Machine
3. Rename a Virtual Machine in the vCenter Server Inventory
4. Add and Remove a Raw LUN on a Virtual Machine

Task 1: Increase the Size of a VMDK File

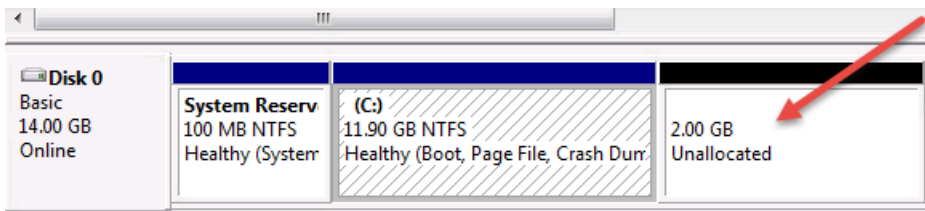
You increase the size of the virtual machine disk (VMDK) and configure the guest operating system to detect the additional space.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates**.
5. In the left pane, expand the datacenter and folders.
6. Right-click your **Hot-Clone** virtual machine in the inventory and select **Edit Settings**.
7. On the **Virtual Hardware** tab, record the size (GB) of Hard Disk 1. _____
8. In the **Hard disk 1** text box, increase the disk size by 2 GB and click **OK**.
9. Right-click the **Hot-Clone** virtual machine and select **Open Console**.

10. If the Security Warning appears, click **Continue to this website (not recommended)**.
11. If necessary, enter the standard lab password.
12. Configure the Hot-Clone virtual machine's guest operating system to detect and extend the increased disk space.
 - a. Click **Start**.
 - b. Right-click on the **Computer** icon and choose **Manage**.
 - c. In the left pane, select **Disk Management**.
 - d. Right-click **Disk Management** and select **Rescan Disks**.



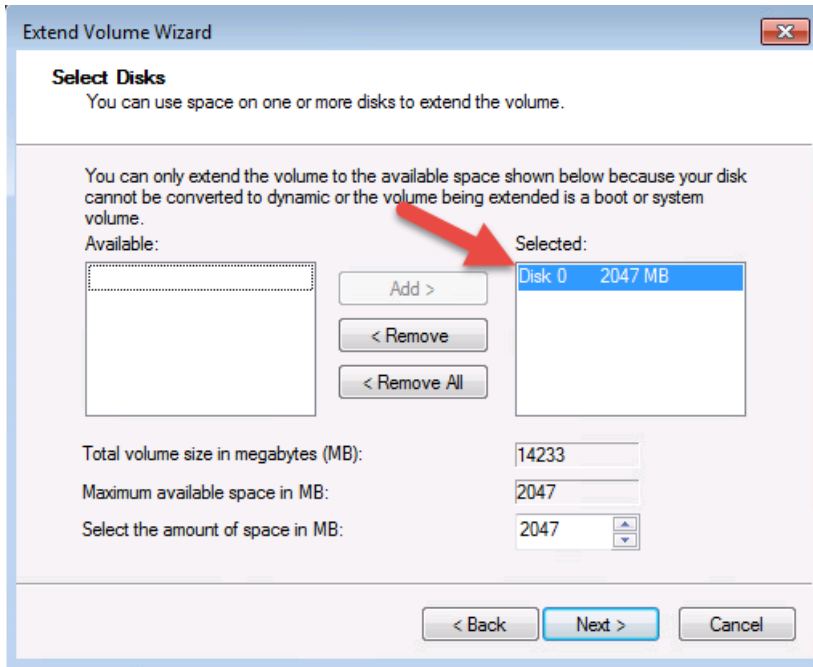
- e. In the lower-right pane, verify that the 2 GB unallocated disk space is discovered.



- f. Right-click the C: drive and select **Extend Volume**.

The Extend Volume wizard starts.

- g. Click **Next**.
- h. On the Select Disks page, verify that **Disk 0** is selected in the Selected pane and click **Next**.



- i. On the Completing the Extend Volume Wizard page, review the information and click **Finish**.
13. In the Disk Management window, verify that the local C: drive (Disk 0) is extended.
 14. Record the value for the total size of the C: drive. _____
 15. Compare the value with that you recorded in step 7.
 16. Close the Computer Management window.
 17. Close the virtual machine console.

Task 2: Adjust Memory Allocation on a Virtual Machine

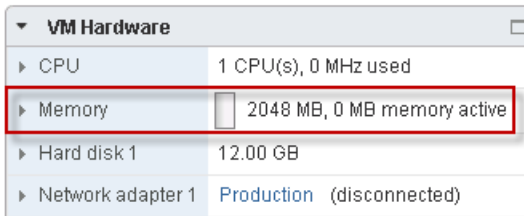
You add, change, or configure virtual machine memory resources or options to enhance virtual machine performance.

1. In the inventory, right-click the **Hot-Clone** virtual machine and select **Power > Shut Down Guest OS**.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

2. Click **Yes** to confirm the shutdown.
3. After the Hot-Clone virtual machine is shut down, right-click it and select **Edit Settings**.
4. On the **Virtual Hardware** tab, enter **2048** in the **Memory** text box and verify that **MB** is selected from the drop-down menu.
5. Click **OK**.
6. Click the virtual machine's **Summary** tab and expand the view of the **VM Hardware** pane to verify that the memory has been increased.



Task 3: Rename a Virtual Machine in the vCenter Server Inventory

You rename an existing virtual machine in the vCenter Server Appliance inventory.

1. Right-click the **Hot-Clone** virtual machine in the inventory and select **Rename**.
2. In the **Enter the new name** text box, enter **vm2-3**.
3. Click **OK**.
4. Select **VM2-3** virtual machine from the inventory and click the **Datastores** tab.

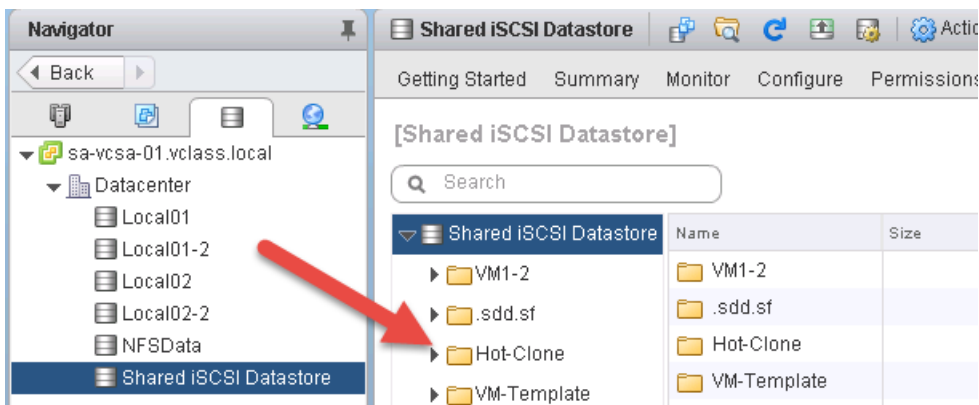
5. Right-click **Shared-iSCSI-Datastore** and select **Browse Files**.

Q1. What is the name of the VM2-3 virtual machine's folder?

NOTE

When you change the name of a virtual machine, you change the name used to identify the virtual machine in the vSphere Web Client inventory, not the name of the virtual machine's folder or files on the datastore.

The screenshot shows the name of the virtual machine's folder.

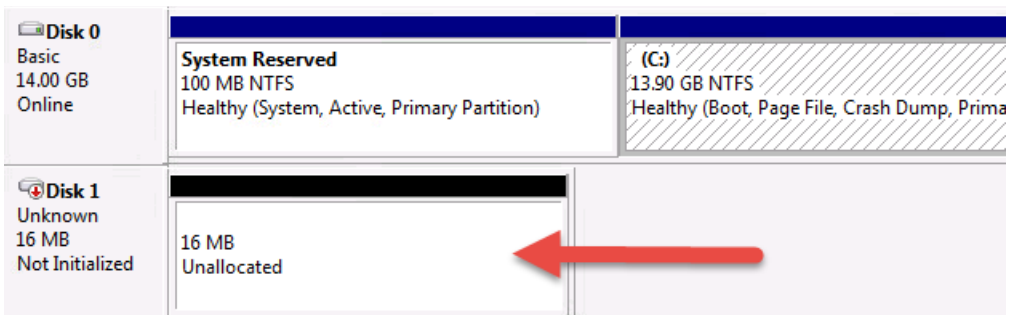


Task 4: Add and Remove a Raw LUN on a Virtual Machine

You use raw device mapping (RDM) to enable a virtual machine to access a logical unit number (LUN) directly.

1. In the vSphere Web Client Navigator pane, click the **VMs and Templates** icon.
2. Right-click the **VM2-3** virtual machine and select **Edit Settings**.
3. On the **Virtual Hardware** tab, select **RDM Disk** from the **New device** drop-down menu and click **Add**.
4. In the Select Target LUN dialog box, select 1 and click **OK**.
5. Click the arrow next to **New Hard disk** to expand the view.
6. In the **Location** drop-down menu, verify that **Store with the virtual machine** is selected.
7. From the **Compatibility Mode** drop-down menu, select **Virtual** and click **OK**.

8. Verify that the guest operating system can see the new disk.
 - a. In the left pane, right-click the **VM2-3** virtual machine and select **Power > Power On**.
 - b. Right-click the **VM2-3** virtual machine and select **Open console**
 - c. If the Security Warning appears, click Continue to this website (not recommended).
 - d. Log in as admin with the standard lab password.
 - e. Click **Start**.
 - f. Right-click the **Computer** icon and choose **Manage**.
 - g. In the left pane, select **Disk Management**.
 - h. When the Initialize Disk wizard starts, click **Cancel**.
 - i. Verify that Disk 1 is listed.



NOTE

Disk 1 is the RDM. You can now use the guest operating system utilities to format the drive. In this lab, you do not format the drive.

- j. Close the Computer Management window.
9. Close the virtual machine console.
10. Remove the RDM hard disk from the VM2-3 virtual machine.
 - a. Right-click the **VM2-3** virtual machine and select **Power > Shut Down Guest OS**.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

- b. Click **Yes** to confirm the shutdown and wait for the virtual machine to power off.
- c. Right-click the **VM2-3** virtual machine and click **Edit Settings**.

- d. Under the **Virtual Hardware** tab, point to **Hard disk 2**.
- e. Click the x icon that appears at the right side of the row for Hard disk 2.



- f. Select the **Delete files from datastore** check box and click **OK**.
11. Leave vSphere Web Client open for the next lab.

Lab 13 Migrating Virtual Machines

Objective: Use vSphere vMotion and vSphere Storage vMotion to migrate virtual machines

In this lab, you perform the following tasks:

1. Migrate Virtual Machine Files from the Local Storage to the Shared Storage
2. Create a Virtual Switch and a VMkernel Port Group for vSphere vMotion Migration
3. Perform a vSphere vMotion Migration of a Virtual Machine on a Shared Datastore
4. Perform a Compute Resource and Storage Migration

Task 1: Migrate Virtual Machine Files from the Local Storage to the Shared Storage

With VMware vSphere® Storage vMotion®, you can migrate a virtual machine's disk files from one datastore to another while the virtual machine is running.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
5. If the VM2-1 virtual machine is not powered on, right-click the **VM2-1** virtual machine and select **Power > Power On**.
6. Select the **VM2-1** virtual machine in the inventory and click the **Summary** tab.

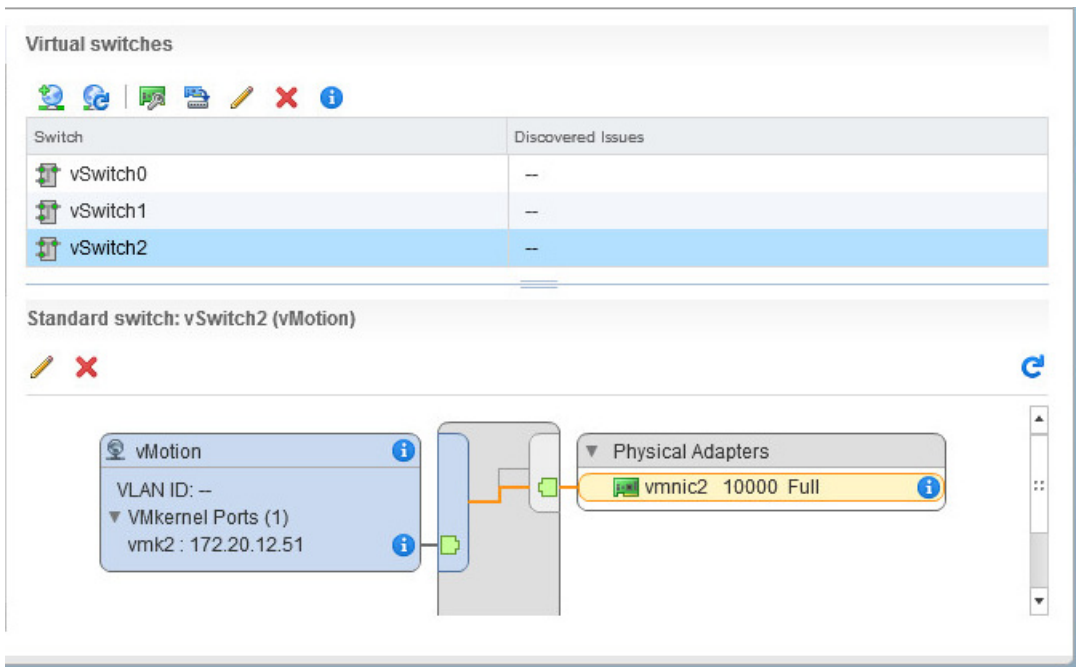
7. Expand the Related Objects pane and record the name of the storage on which the VM2-1 virtual machine resides. _____
8. In the inventory, right-click the **VM2-1** virtual machine and select **Migrate**.
The Migrate wizard starts.
9. On the Select the migration type page, click **Change storage only** and click **Next**.
10. On the Select storage page, select **Shared-iSCSI-Datastore** as the destination storage for the virtual machine files.
In the Compatibility pane, the `Compatibility checks succeeded` message appears.
11. If the compatibility checks fail, troubleshoot the problem based on the message in the Compatibility pane.
12. Click **Next**.
13. On the Ready to complete page, review the information and click **Finish**.
14. Monitor the Recent Tasks pane and wait for the virtual machine files relocation process to complete.
This task takes a few minutes.
15. Repeat steps 6 through 7 to verify that the VM2-1 virtual machine is on the new datastore, which is the Shared-iSCSI-Datastore.

Task 2: Create a Virtual Switch and a VMkernel Port Group for vSphere vMotion Migration

You create a VMkernel port group virtual switch to move virtual machines from one host to another while maintaining continuous service availability.

1. In the left pane of vSphere Web Client, click the **Hosts and Clusters** tab.
2. Select the host **sa-esxi-01.vclass.local** in the inventory.
3. Click the **Configure** tab.
4. Select **Virtual switches** under Networking in the middle pane.
5. Click the **Add Host Networking** icon.
The Add Networking wizard starts.
6. On the Select connection type page, click **VMkernel Network Adapter** and click **Next**.
7. On the Select target device page, click **New standard switch** and click **Next**.
8. On the Create a Standard Switch page, click the green + sign to add a physical adapter to the switch.

9. Select vmnic2 as the vmnic for the vSphere vMotion network and click **OK**.
10. Review the information shown and click **Next**.
11. On the Port properties page for connection settings, enter **vMotion** in the **Network label** text box.
12. Select the **vMotion** check box, and click **Next**.
13. On the IPv4 settings page, click **Use static IPv4 settings**.
14. Enter **172.20.12.51** in the **IPv4 address** text box for sa-esxi-01.
15. Enter **255.255.255.0** in the **Subnet mask** text box for the vMotion VMkernel port IPv4.
16. Click **Next**.
17. On the Ready to complete page, review the information and click **Finish**.
18. In the Virtual Switches pane, verify that the new virtual switch for vSphere vMotion migration is listed.

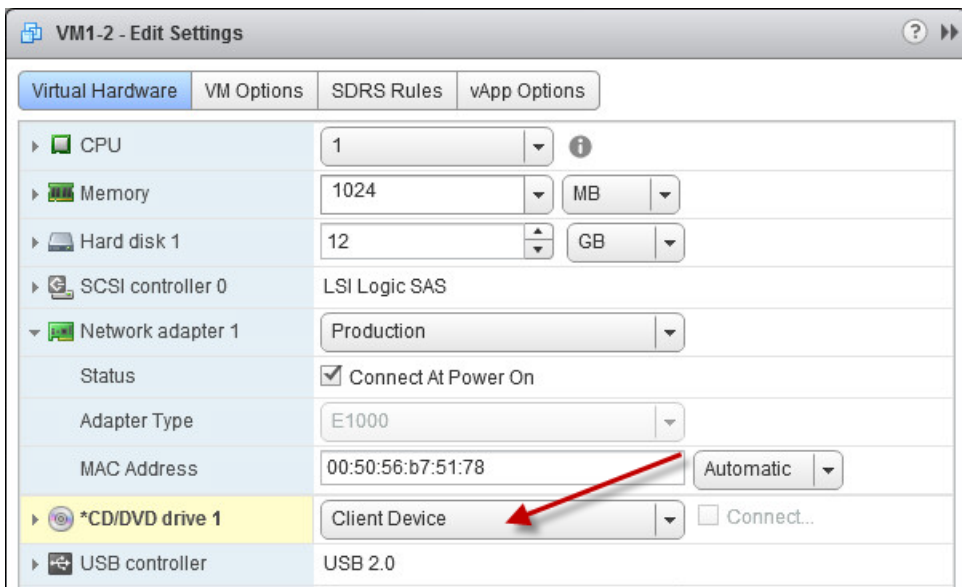


19. Repeat task 2 for sa-esxi-02.vclass.local using the vMotion VMkernel port IPv4 address for sa-esxi-02 as 172.20.12.52. All other steps remain same.

Task 3: Perform a vSphere vMotion Migration of a Virtual Machine on a Shared Datastore

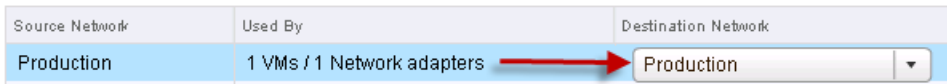
You perform live migration of virtual machines residing on a shared storage that is accessible to both the source and the target ESXi hosts.

1. In the vSphere Web Client Navigator pane, click the **Hosts and Clusters** tab and expand the view of the inventory.
2. Click the arrow next to **sa-esxi-01.vclass.local** to expand the view.
3. Right-click the **VM1-2** virtual machine and select **Edit Settings**.
4. On the **Virtual Hardware** tab, select **Client Device** from the **CD/DVD drive 1** drop-down menu if it is not already selected.



5. Click the arrow next to **Network adapter 1** to expand the view.
6. Verify that **Production** is selected from the drop-down menu.
7. Ensure that the **Connect At Power On** check box is selected.
8. Click **OK**.
9. Repeat steps 3 through 8 for all the virtual machines.
10. If the **VM1-2** virtual machine is powered-off, right-click the virtual machine and select **Power > Power On**.

11. Right-click the **VM1-2** virtual machine and select **Open Console**.
12. Log in with the user name admin and the standard lab password.
13. Click the **Start** menu.
14. In the search box, enter **cmd** and press Enter to open a Command Prompt window.
15. When the Command Prompt window opens, enter the **ipconfig** command and record the virtual machine's default gateway IP address. _____
16. Enter **ping -t default_gateway_IP_address** on the command line and press Enter start a continuous ping.
17. Leave the virtual machine console open and return to vSphere Web Client.
18. Migrate the VM1-2 virtual machine from host sa-esxi-01.vclass.local to host sa-esxi-02.vclass.local.
 - a. In the vSphere Web Client inventory, right-click the **VM1-2** virtual machine and select **Migrate**.
 - b. On the Select the migration type page, click **Change compute resource only** and click **Next**.
 - c. On the Select a compute resource page, click **sa-esxi-02.vclass.local**.
sa-esxi-02.vclass.local is the destination host to which you migrate the VM1-2 virtual machine. The migration requirements are validated. If the validation does not succeed, you receive warning or error messages. You cannot continue with the migration until the errors are resolved.
 - d. Click **Next**.
 - e. On the Select networks page, ensure that **Production** is selected from the **Destination Network** drop-down menu and click **Next**.



- f. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** clicked and click **Next**.
- g. On the Ready to complete page, review the information and click **Finish**.
19. If VM1-2 virtual machine console is disconnected, reopen the console.
20. Return to the VM1-2 virtual machine console and monitor that no pings are dropped during the migration.
21. Press Ctrl+C to stop the ping

22. Close the `C:\Windows\system32\cmd.exe` console.
23. Close the VM1-2 virtual machine console.
24. If your VM2-2 virtual machine is not powered on, right-click **VM2-2** and select **Power > Power On**.
25. Select **VM2-2** from the left pane and click the **Summary** tab.
26. Ensure that VM2-2 is on host `sa-esxi-02.vclass.local`.
27. In the left pane, drag the **VM2-2** virtual machine from `sa-esxi-02.vclass.local` to `sa-esxi-01.vclass.local`.
The Migrate wizard appears.
28. On the Select the migration type page, click **Change compute resource only** and click **Next**.
29. On the Select a compute resource page, ensure that `sa-esxi-01.vclass.local` is selected and click **Next**.
30. On the Select network page, ensure that **Production** is selected from the **Destination Network** drop-down menu and click **Next**.
31. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** clicked and click **Next**.
32. On the Ready to complete page, review the information and click **Finish**.
33. When the migration tasks are completed, view the inventory pane to verify that VM1-2 is under `sa-esxi-02.vclass.local` and VM2-2 is under `sa-esxi-01.vclass.local`.

Task 4: Perform a Compute Resource and Storage Migration

You perform a compute resource and storage migration.

You can migrate virtual machines not only to a different host but also to a different datastore across storage accessibility boundaries.

1. In the inventory, right-click the **VM-FromLib** virtual machine and select **Migrate**.
2. On the Select the migration type page, click **Change both compute resource and storage**.
3. Accept the **Select compute resource first** default setting and click **Next**.
4. On the Select compute resource page, expand **Datacenter** and select **Lab Servers > sa-esxi-01.vclass.local**.

NOTE

If the **Compatibility alarm - No guest heartbeats are being received message** appears, ignore it. It does not affect a successful migration.

5. Click **Next**.
6. On the Select storage page, select **Local01-2** and click **Next**.
7. On the Select network page, ensure that **Production** is selected from the **Destination Network** drop-down menu and click **Next**.
8. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** clicked and click **Next**.
9. On the Ready to complete page, review the information and click **Finish**.
10. In the Recent Tasks pane, monitor the progress of the virtual machine migration.
This process takes approximately five minutes.
11. When the migration task is completed, view the inventory pane to verify that the VM-FromLib virtual machine is listed under your sa-esxi-01.vclass.local ESXi host in the inventory.
12. Right-click **VM-FromLib** and select **Power > Shut Down Guest OS**.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

13. Click **Yes** to confirm the shutdown.
14. After you complete this lab, notify your instructor.

Lab 14 Managing Virtual Machines

Objective: Perform virtual machine management tasks

In this lab, you perform the following tasks:

1. Unregister a Virtual Machine from the vCenter Server Appliance Inventory
2. Register a Virtual Machine in the vCenter Server Appliance Inventory
3. Unregister and Delete Virtual Machines from the Datastore
4. Take Snapshots of a Virtual Machine
5. Revert the Virtual Machine to a Snapshot
6. Delete an Individual Snapshot
7. Delete All Snapshots

Task 1: Unregister a Virtual Machine from the vCenter Server Appliance Inventory

You unregister a virtual machine from the vCenter Server Appliance inventory. Unregistering does not delete the virtual machine from the datastore.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
5. Select the **VM2-3** virtual machine and click the **Datastores** tab.

6. Record the VMware vSphere® VMFS datastore name where the **VM2-3** virtual machine resides. _____
7. If the VM2-3 virtual machine is powered on, right-click **VM2-3**, select **Power > Shut Down Guest OS**, and click **Yes** to confirm the shutdown.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

8. Right-click **VM2-3** and select **Remove from Inventory**.

CAUTION

Do not select **Delete from Disk**. This operation is not recoverable in your lab environment.

9. Click **Yes** to confirm the removal.
10. Click the **Refresh** icon in vSphere Web Client.
11. Verify that the VM2-3 virtual machine no longer appears in the inventory.
12. In the Navigator pane, click the **Storage** icon and expand the view.
13. Right-click the datastore name that you recorded in step 6 and select **Browse Files**.
14. View the folders.

Q1. Does a folder named VM2-3 exist?

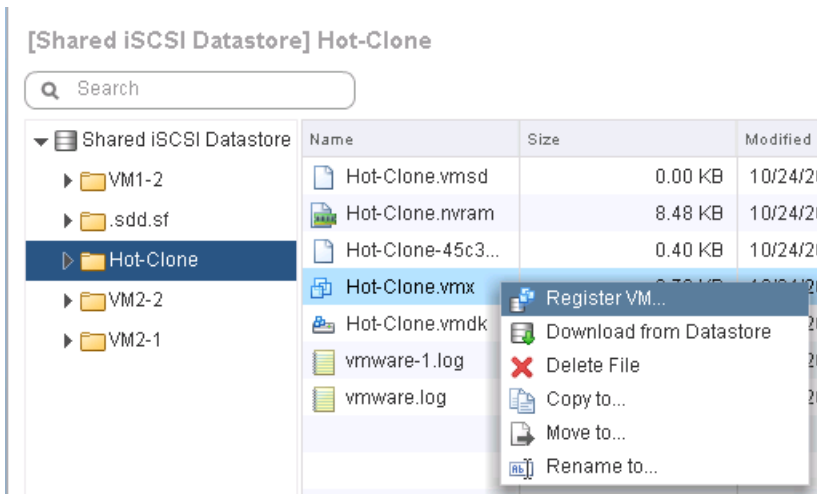
15. Click the **Hot-Clone** folder to view the virtual machine files.

Task 2: Register a Virtual Machine in the vCenter Server Appliance Inventory

If you removed a virtual machine from the vCenter Server Appliance inventory but did not remove it from the managed host's datastore, you can return it to the inventory by registering it with the vCenter Server Appliance.

1. In the list of virtual machine files in the right pane, right-click the **Hot-Clone.vmx** file and select **Register VM**.

The screenshot shows an example of selecting of Register VM.



The Register Virtual Machine wizard starts.

2. On the Name and Location page, enter **vm2-3**.
3. In the Select inventory location pane, expand **Datacenter**, select the **LabVMs** folder, and click **Next**.
4. On the Host/Cluster page, expand the **Lab Servers** folder under Datacenter.
5. Select **sa-esxi-01.vclass.local** and click **Next**.
6. On the Ready to Complete page, review the information and click **Finish**.
7. In the Navigator pane, click the **VMs and Templates** icon and verify that the VM2-3 virtual machine is in the **LabVMs** folder.

Task 3: Unregister and Delete Virtual Machines from the Datastore

You can remove a virtual machine from the vCenter Server Appliance inventory and delete all associated virtual machine files from the datastore, including the configuration file and the virtual disk files.

1. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
2. Select the **VM2-3** virtual machine from the inventory and click the **Datastores** tab.
3. Record the VMFS datastore name on which the VM2-3 virtual machine resides. _____
4. Right-click the **VM2-3** virtual machine from the inventory, select **Delete from Disk**, and click **Yes** to confirm the deletion.
5. Verify that the VM2-3 virtual machine no longer appears in the inventory.
6. In the Navigator pane, click the **Storage** icon and expand the inventory view.
7. In the Navigator pane, right-click the datastore that you recorded in step 3 and select **Browse Files**.
8. Verify that the folder and files from which the VM2-3 virtual machine was registered no longer exist.
9. In the Navigator pane, click the **VMs and Templates** icon.
10. Right-click the **VM-FromLib** virtual machine, select **Delete from Disk**, and click **Yes** to confirm the deletion.

Task 4: Take Snapshots of a Virtual Machine

You take a snapshot to preserve the state and the data of a virtual machine at the time the snapshot is taken. You use snapshots when you must revert to the same virtual machine state.

1. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
2. In the left pane, right-click the **VM1-2** virtual machine and select **Open Console**.
3. Login as admin with the standard lab password.
4. From the desktop, drag the **IOMETER** file to the **Recycle Bin**.
5. Right-click the **Recycle Bin** icon and select **Empty Recycle Bin** to delete the **IOMETER** file permanently.
6. Click **Yes** to confirm the file deletion and leave the virtual machine console open.

- In vSphere Web Client, right-click the **VM1-2** virtual machine and select **Snapshots > Take Snapshot**.

The Take VM Snapshot wizard appears.

- Configure the snapshot.

| Option | Action |
|---|---------------------------------|
| Name | Enter Without iometer . |
| Description | Enter Deleted iometer . |
| Snapshot the virtual machine's memory | Deselect the check box. |
| Quiesce guest file system (Needs VMware Tools installed) | Leave the check box deselected. |

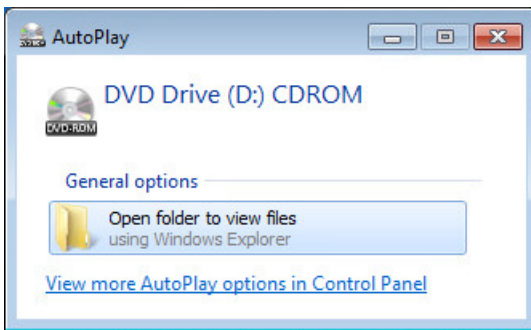
- Click **OK** and monitor the task in the Recent Tasks pane.
- Return to the virtual machine console and drag the **CPUBUSY** file to the **Recycle Bin**.
- Right-click the **Recycle Bin** icon and select **Empty Recycle Bin** to delete the **CPUBUSY** file permanently.
- Click **Yes** to confirm the file deletion and leave the virtual machine console open.
- Return to vSphere Web Client.
- In the inventory pane, right-click the **VM1-2** virtual machine and select **Snapshots > Take Snapshot** take another snapshot.
- Configure the snapshot.

| Option | Action |
|---|---|
| Name | Enter Without iometer or cpubusy . |
| Description | Enter Deleted cpubusy . |
| Snapshot the virtual machine's memory | Deselect the check box. |
| Quiesce guest file system (Needs VMware Tools installed) | Leave the check box deselected. |

- Click **OK** and monitor the task in the Recent Tasks pane.

17. Connect the `ClassFiles-vSphere.iso` file on the CD/DVD drive to the **VM1-2** virtual machine.
 - a. Right-click the **VM1-2** virtual machine and select **Edit Settings**.
 - b. On the **Virtual Hardware** tab, select **Datastore ISO File** from the **CD/DVD drive 1** drop-down menu.
 - c. In the left pane, select **Local02-2/**.
 - d. In the middle pane, select the **Classfiles-vSphere.iso** file.
 - e. Click **OK**.
 - f. Select the **Connected** check box on the CD/DVD drive 1 row.
 - g. Click **OK** to close the Edit Settings dialog box.
18. Return to the **VM1-2** virtual machine console.

The DVD drive AutoPlay window should appear.



19. If the D: drive does not open automatically, open Windows Explorer and go to the D: drive.
20. Click **Open folder to view files**.
21. Copy the `CPUBUSY` file from the D: drive to the virtual machine's desktop.
22. Disconnect the CD/DVD drive from VM1-2 virtual machine.
 - a. From vSphere Web Client, right-click the **VM1-2** virtual machine and select **Edit Settings**.
 - b. On the Virtual Hardware tab, click the arrow next to **CD/DVD drive 1** to expand the view.
 - c. Select **Client Device** from the drop-down menu and click **OK**.
23. Right-click the **VM1-2** virtual machine and select **Snapshots > Take Snapshot** to take another snapshot.

- Configure the snapshot.

| Option | Action |
|---|---------------------------------|
| Name | Enter With cpubusy . |
| Description | Enter Added cpubusy . |
| Snapshot the virtual machine's memory | Leave the check box selected. |
| Quiesce guest file system (Needs VMware Tools installed) | Leave the check box deselected. |

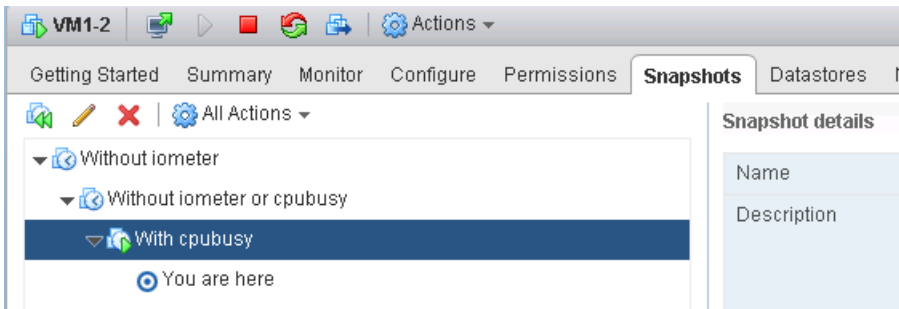
- Click **OK**.

- Monitor the task in the Recent Tasks pane and wait for completion.

This task takes slightly longer than previous snapshots because the guest memory is also being saved.

- Right-click the **VM1-2** virtual machine and select **Snapshots > Manage Snapshots**.

You should see three snapshots. The difference in icons is due to whether the **Snapshot the virtual machine's memory** check box was selected when the snapshot was taken.



- Leave the **Snapshots** tab open.
- Close the VM1-2 virtual machine console.

Task 5: Revert the Virtual Machine to a Snapshot

You revert a virtual machine to the state it had at the time when the selected snapshot was taken.

1. On the **Snapshots** tab, select the **Without iometer or cpubusy** snapshot, click **All Actions**, and select **Revert to**.
2. Click **Yes** to confirm the revert.

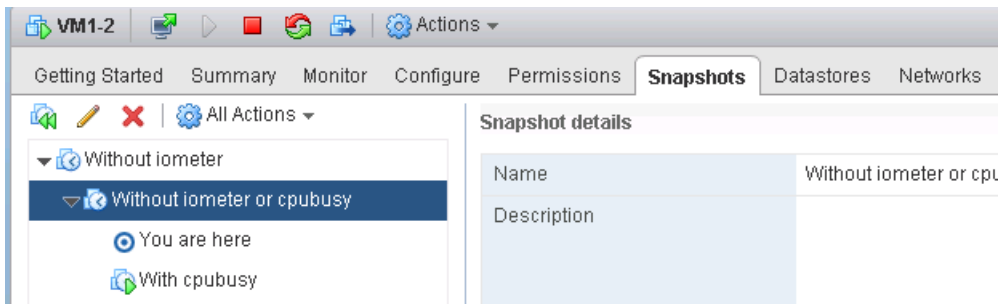
Q1. Did the virtual machine power off and why?

3. Right-click the **VM1-2** virtual machine in the inventory and select **Power > Power On**.
4. Right-click **VM1-2** in the Navigator pane and select **Open Console**.
Wait for the boot process to complete.
5. Log in as admin with the standard lab password.

Q2. Is either IOMETER or CPUBUSY on the desktop?

6. Close the VM1-2 virtual machine console.
7. In vSphere Web Client, right-click the **VM1-2** virtual machine and select **Snapshots > Manage Snapshots**.

The You Are Here pointer should be below the snapshot named Without iometer or cpubusy.



8. On the **Snapshots** tab, select the **With cpubusy** snapshot, click **All Actions**, and select **Revert to**.

9. Leave the **Suspend this virtual machine when reverting to selected snapshot** check box deselected and click **Yes** to confirm the revert operation.

Q3. Did the virtual machine power off, and what is the reason?

10. Open a console for the VM1-2 virtual machine.

Q4. Is CPUBUSY on the desktop?

Q5. Is IOMETER on the desktop?

Task 6: Delete an Individual Snapshot

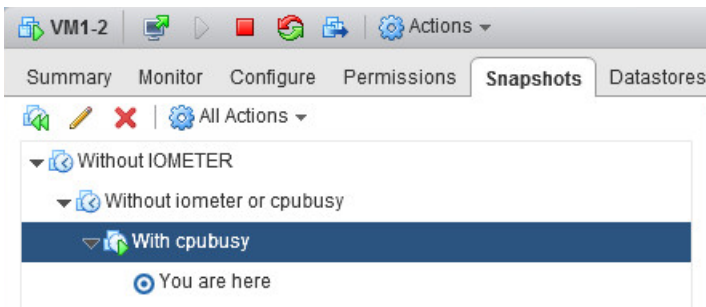
You can remove a snapshot from the Snapshots tab. The snapshot files are consolidated and written to the parent snapshot disk.

1. Return to vSphere Web Client, ensure that **VM1-2** is selected in the Navigator pane, and verify that the **Snapshots** tab is open.

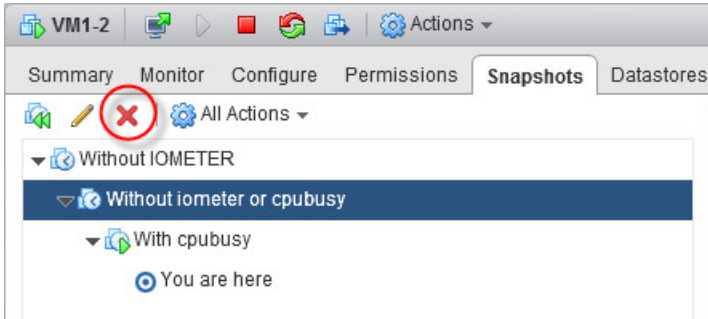
The **You are here** pointer should be below the snapshot named `With cpubusy`.

NOTE

Refresh the screen if the **You are here** pointer is not below the snapshot.



2. Select the **Without iometer or cpubusy** snapshot and click the delete icon.



3. Click **Yes** to confirm the deletion.

Q1. Did the virtual machine power off?

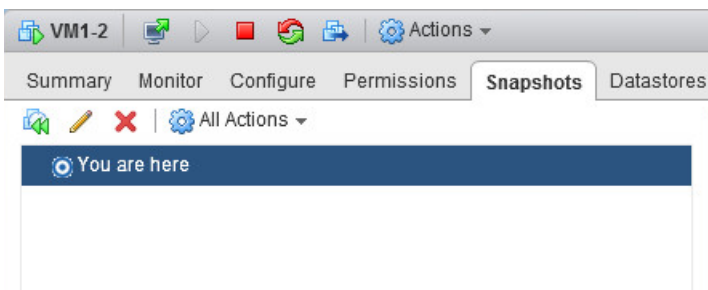
Q2. In the virtual machine console, is the CPUBUSY file on the desktop?

Task 7: Delete All Snapshots

You can use the Delete All function to delete all the snapshots of a virtual machine.

1. Under VMs and Templates in vSphere Web Client, right-click the **VM1-2** virtual machine in the Navigator pane and select **Snapshots > Delete All Snapshots**.
2. Click **Yes** to confirm that you want to delete all the remaining snapshots.

Only the You are here pointer should appear on the snapshots tab.



Q1. Were all the remaining snapshots deleted from the Snapshots tab?

3. Return to the **VM1-2** virtual machine console.

Q2. Is CPUBUSY on the desktop, and why?

4. Close the **VM1-2** virtual machine console.

5. Leave vSphere Web Client open for the next lab.

Lab 15 Managing Resource Pools

Objective: Create and use resource pools on an ESXi host using vCenter Server

In this lab, you perform the following tasks:

1. Create CPU Contention
2. Create Resource Pools
3. Verify Resource Pool Functionality

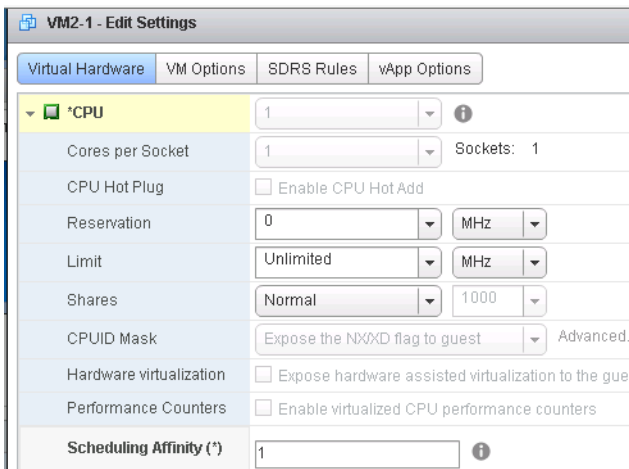
Task 1: Create CPU Contention

You use a tool to create CPU contention in your lab environment for testing. You force the virtual machines to compete for and share the limited logical CPU resources on the ESXi host, which might lead to performance degradation.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and the standard lab password.
4. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
5. Ensure that the VM2-1 and VM2-2 virtual machines are powered on.

6. Verify that VM2-1 and VM2-2 are running on the sa-esxi-02.vclass.local.
7. If necessary, migrate the virtual machines to sa-esxi-02.vclass.local.
8. Start the CPUBUSY script on both virtual machines.
 - a. Open a console for the VM2-1 virtual machines.
 - b. Log in as admin with the standard password.
 - c. On the desktop, right-click CPUBUSY and select **Open with Command Prompt**.
 This script runs continuously. It stabilizes in 1 to 2 minutes. This script repeatedly does floating-point computations. The script displays the duration (wall-clock time) of a computation. For example: `I did three million sines in # seconds.`
 You can use the number of seconds reported as a performance estimate. The program should run at about the same rate in each virtual machine.
 - d. Repeat steps a through c on the VM2-2 virtual machine.
9. In vSphere Web Client, right-click the **VM2-1** virtual machine in the inventory and select **Edit Settings**.
10. On the **Virtual Hardware** tab, click the arrow next to **CPU** to expand the view.
11. In the **Scheduling Affinity** text box, enter **1**.

This affinity setting forces the VM2-1 virtual machine to run on only one processor (processor 1).



12. Click **OK**.

CAUTION

CPU affinity is used mainly to create CPU contention for training purposes. Use of this feature in a production environment is strongly discouraged.

13. Repeat steps 9 through 12 for the VM2-2 virtual machine.
14. Allow the `CPUBUSY` script to run for a minute or two.

Task 2: Create Resource Pools

You use resource pools to delegate control over resources of the host or a cluster and to compartmentalize all resources in a cluster.

1. In the Hosts and Clusters view in vSphere Web Client, right-click **sa-esxi-02.vclass.local** in the inventory and select **New Resource Pool**.

NOTE

If a host memory usage warning appears in the left pane, click **Reset To Green**.

2. Assign properties to the resource pool.

| Option | Action |
|--------------------|--|
| Name | Enter Fin-Test . |
| CPU Shares | Select Low from the drop-down menu. |
| All other settings | Leave the default settings. |

3. Click **OK**.
4. Right-click **sa-esxi-02.vclass.local** in the inventory and select **New Resource Pool**.
5. Assign properties to the resource pool.

| Option | Action |
|--------------------|---|
| Name | Enter Fin-Prod . |
| CPU Shares | Select High from the drop-down menu. |
| All other settings | Leave the default settings. |

6. Click **OK**.

Task 3: Verify Resource Pool Functionality

You assign virtual machines to resource pools with different resource settings to monitor and compare the performance differences.

1. In the Hosts and Clusters view in vSphere Web Client, select the **Fin-Test** resource pool in the Navigator pane and click the **Summary** tab.
2. In the Resource Settings pane, click the arrow next to CPU to expand the view.

Q1. What is the number of shares for this resource pool?

3. Select **Fin-Prod** in the inventory and click the **Summary** tab.
4. View the Resource Settings pane.

Q2. What is the number of shares for this resource pool?

5. Drag the **VM2-1** virtual machine to the **Fin-Prod** resource pool.
6. Drag the **VM2-2** virtual machine to the **Fin-Test** resource pool.
7. Navigate to each virtual machine console to monitor the results of the `CPUBUSY` script.

If you are logged out of the console due to inactivity, log in again with user name as admin and the standard lab password.

Q3. What is the difference in performance between the two virtual machines?

8. In vSphere Web Client, change the CPU shares of the `Fin-Test` resource pool from **Low** to **Normal**.
 - a. In the Hosts and Clusters view, right-click the **Fin-Test** resource pool in the inventory and click **Settings**.
 - b. Ensure that **CPU Resources** is selected and click **Edit**.
 - c. Select **Normal** from the **Shares** drop-down menu and click **OK**.
9. In each virtual machine console, allow the script to run for a few seconds and compare the performance of the `CPUBUSY` script on each virtual machine.

When contention occurs, you see a difference in performance between the virtual machines.

10. In each virtual machine console, press Ctrl+C in the Command Prompt window to stop the CPUBUSY script.
11. Repeat step 8 to change CPU shares for the `Fin-Prod` resource pool from High to Normal.
12. Close the VM2-1 and VM202 consoles.
13. Leave vSphere Web Client open for the next lab.

Lab 16 Managing vApps

Objective: Perform vApp management tasks

In this lab, you perform the following tasks:

1. Create a vApp
2. Power On a vApp
3. Remove a vApp

Task 1: Create a vApp

You use VMware vSphere® vApp™ as a container that holds a group of virtual machines. You perform resource controls and manage the virtual machines inside the vApp as a single object.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
5. Right-click the **VM2-1** virtual machine, select **Power > Shut Down Guest OS**, and click **Yes** to confirm the shutdown.

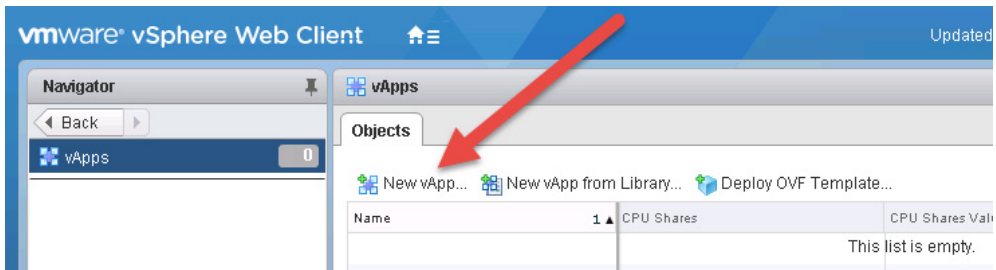
NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

- Right-click the **VM2-2** virtual machine, select **Power > Shut Down Guest OS**, and click **Yes** to confirm the shutdown.

Wait until both virtual machines are completely powered off.

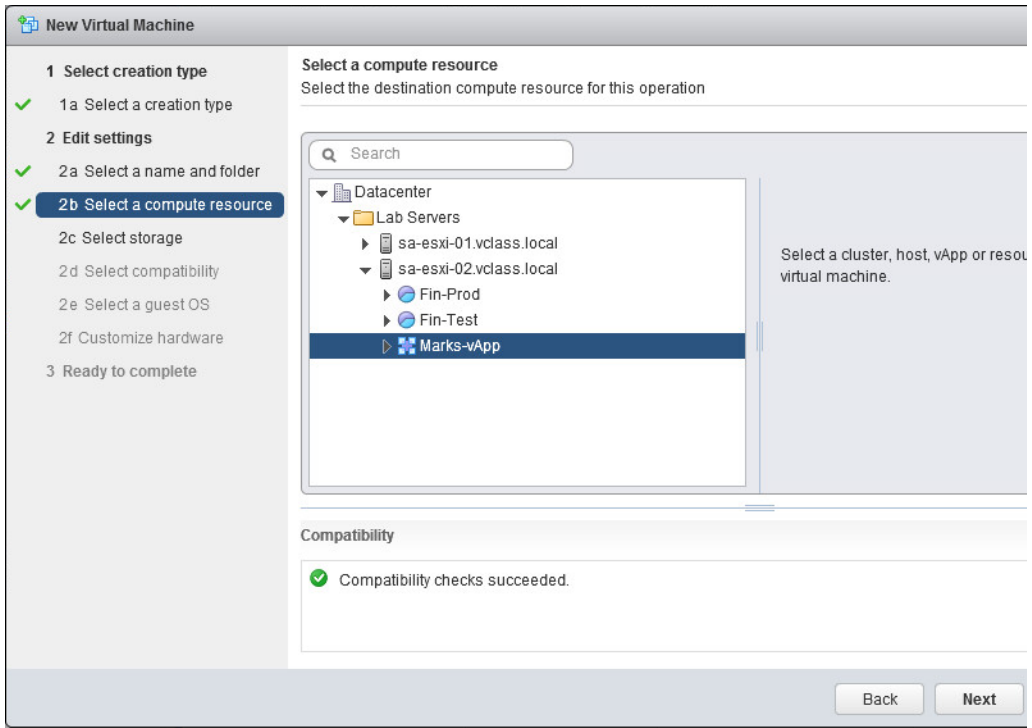
- Go to the vSphere Web Client Home page and select **Global Inventory Lists**
- Select **vApps** from the Navigator pane.
- Click the **Create a New vApp** icon.



The New vApp wizard starts.

- On the Select a creation type page, select **Create a new vApp** and click **Next**.
- On the Select destination page, expand **Datacenter** and the **Lab Servers** folder.
- Select **sa-esxi-02.vclass.local** and click **Next**.
- On the Select a name and location page, enter **your_name-vApp** in the **vApp name** text box.
- In the Select a folder or datacenter pane, select the **LabVMs** folder and click **Next**.
- On the Resource allocation page, leave the default settings and click **Next**.
- On the Ready to complete page, review the information and click **Finish**.
- Go to the vSphere Web Client Home page and click the **Hosts and Clusters** icon.
- Expand the inventory view and verify that **your_name-vApp** is listed under **sa-esxi-02.vclass.local**
- Create blank payload virtual machines to be used in this lab.
 - In the left pane, right-click **your_name-vApp** and select **New Virtual Machine > New Virtual Machine**.
 - On the Select a creation type page, ensure that **Create a new virtual machine** is selected and click **Next**.
 - On the Select a name and folder page, enter **your_name-App01** in the **Name** text box.

- d. In the Select a location for the virtual machine pane, expand **Datacenter**, select the **LabVMs** folder, and click **Next**.
- e. On the Select a compute resource page, expand the **Lab Servers** folder and expand **sa-esxi-02.vclass.local**.
- f. Select **your_name-vApp** and click **Next**.



- g. On the Select storage page, select **Shared-iSCSI-Datastore** and click **Next**.
- h. On the Select compatibility page, accept the defaults and click **Next**.
- i. On the Select a guest OS page, accept the defaults and click **Next**.
- j. Configure the virtual machine with new values.
 - Memory 256 MB
 - New hard disk 100 MB

CAUTION

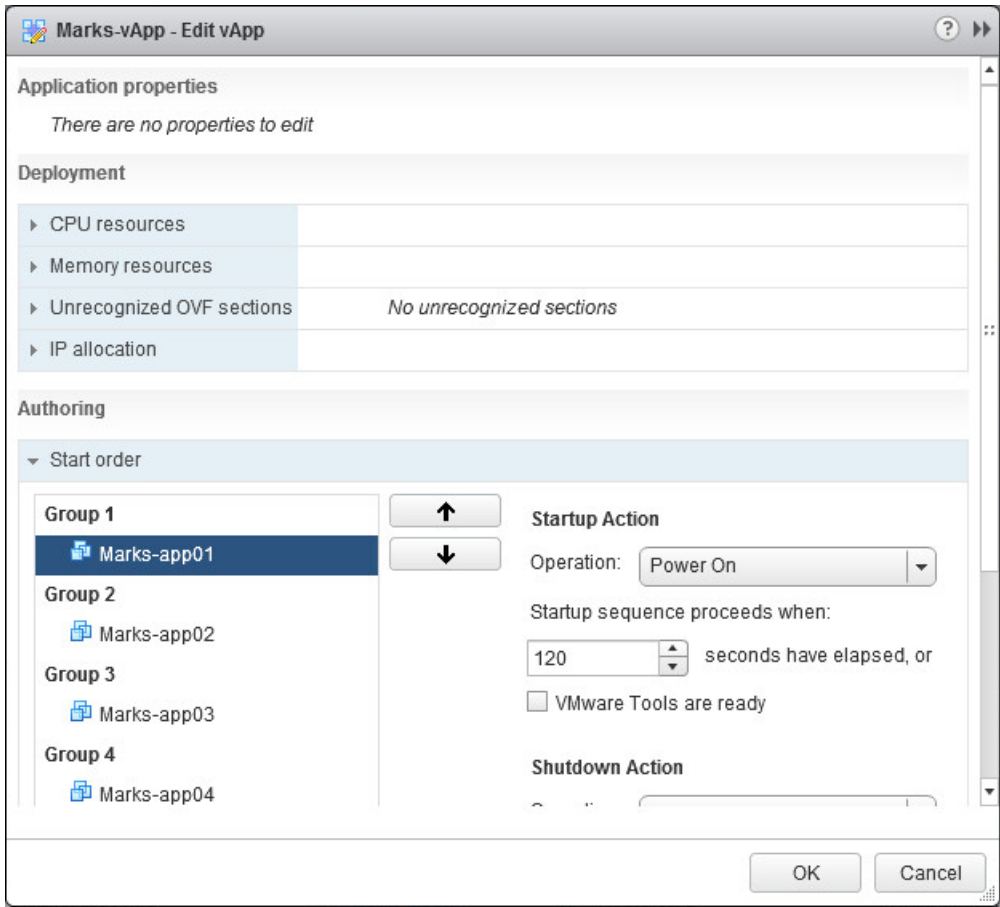
Ensure that **MB** is selected from the drop-down menu.

- k. Click **Next**.
 - l. Click **Finish**.
20. After the virtual machine completes deployment, create three clones of the virtual machine named *your_name-App02*, *your_name-App03*, and *your_name-App04*.
- a. In the Navigator pane, click the arrow to expand ***your_name-vApp***.
 - b. Right-click the ***your_name-App01*** virtual machine and select **Clone > Clone to Virtual Machine**.
 - c. On the Select a name and folder page, enter ***your_name-App##*** in the **Name** text box.
The **##** represents the numbers 02, 03, or 04, depending on which iteration of the clone sequence you are performing.
 - d. In the Select a location for the virtual machine pane, select the **LabVMs** folder and click **Next**.
 - e. On the Select a compute resource page, expand the **Lab Servers** folder and expand **sa-esxi-02.vclass.local**.
 - f. Select ***your_name-vApp*** and click **Next**.
 - g. On the Select storage page, select **Shared-iSCSI-Datastore** and click **Next**.
 - h. On the Select clone options page, leave the check boxes deselected (default option) and click **Next**.
 - i. On the Ready to complete page, click **Finish**.
 - j. Repeat steps a through i until you have a total of four virtual machines named *your_name-App-01*, *your_name-App-02*, *your_name-App-03*, and *your_name-App04*.
21. In the Navigator pane, select ***your_name-vApp***, click the **VMs** tab in the content pane, and click **Virtual Machines**.

Q1. Do you see four virtual machines in the Virtual Machines list in the content pane?

22. Right-click ***your_name-vApp*** in the Navigator pane and select **Edit Settings**.

23. Click the arrow next to **Start order** to expand the view.



24. Select the ***your_name-App01*** virtual machine and click the down arrow twice to place the virtual machine in Group 2.

The *your_name-App02* virtual machine is now in Group 1.

25. Select the ***your_name-App04*** virtual machine and click the up arrow once to place the virtual machine in Group 3.

The *your_name-App03* and *your_name-App04* virtual machines are in Group 3.

26. Select the ***your_name-App02*** virtual machine, change the value in the **Startup sequence proceeds when** text box from 120 to 20 (seconds), and press Enter.

You must press Enter after changing the time delay for the virtual machine. Otherwise, the time resets to its previous value.

27. Select the *your_name-App01* virtual machine, change the value in the **Startup sequence proceeds when** text box from 120 to 20 (seconds), and press Enter.
28. Click **OK**.

Task 2: Power On a vApp

You can power on, power off, or clone a vApp.

1. Right-click *your_name-vApp* in the inventory and select **Power > Power On**.
2. Monitor the tasks in the Recent Tasks pane.

Q1. Do the virtual machines power on at the same time? If not, what is the order?

Task 3: Remove a vApp

You can completely remove a vApp from the vCenter Server Appliance inventory as well as from the disk.

CAUTION

When working in a production environment, if you want to remove the vApp but keep the virtual machines, you must move the virtual machines out of the vApp before deleting the vApp. Otherwise, the virtual machines will be deleted along with the vApp as in this task.

1. In the Navigator pane, click the **Hosts and Clusters** icon.
2. Right-click *your_name-vApp* in the inventory and select **Power > Shut Down**.

NOTE

If your **Shut Down Guest OS** option is dimmed, refresh the vSphere Web Client screen and try again.

3. Click **Yes** to confirm the shutdown.
4. Expand the view of *your_name-vApp* in the inventory.
5. After all four virtual machines are powered off, right-click *your_name-vApp* in the Navigator pane and select **Delete from Disk**.
6. Click **Yes** to confirm the deletion.
7. Leave vSphere Web Client open for the next lab.

Lab 17 Monitoring Virtual Machine Performance

Objective: Use the system monitoring tools to reflect the CPU workload

In this lab, you perform the following tasks:

1. Create CPU Workload
2. Use Performance Charts to Monitor CPU Utilization
3. Undo Changes Made to the Virtual Machines

Task 1: Create CPU Workload

You run the `CPUBUSY` script in each virtual machine to create heavy CPU workload in your lab environment for testing.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
5. If not already powered on, power on VM2-1 and VM2-2 virtual machines.
6. Open consoles of VM2-1 and VM2-2.
7. If you are logged out due to inactivity, log in as admin with the standard password.
8. On each virtual machine desktop, right-click the `CPUBUSY` script file and select **Open with Command Prompt**.

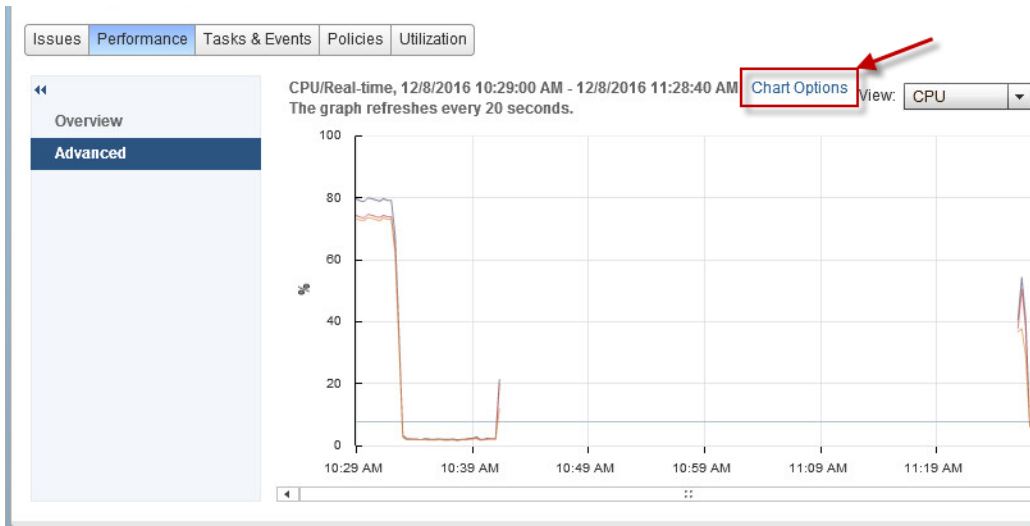
Task 2: Use Performance Charts to Monitor CPU Utilization

You use the performance charts to monitor the CPU, memory, disk, network, and storage metrics.

1. In vSphere Web Client, select the **VM2-1** virtual machine in the inventory.
2. Click the **Monitor** tab and click **Performance**.
3. Select **Advanced** in the middle pane.

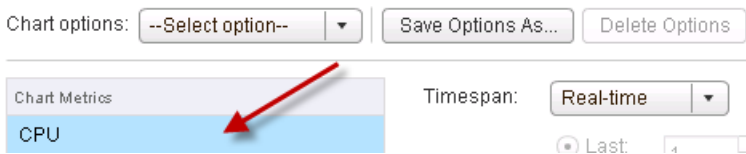
The real-time CPU usage graph appears.

4. Click the **Chart Options** link.



The Chart Options dialog box appears.

5. In the Chart Metrics pane, verify that **CPU** is selected.



6. In the **Timespan** drop-down menu, verify that **Real-time** is selected.

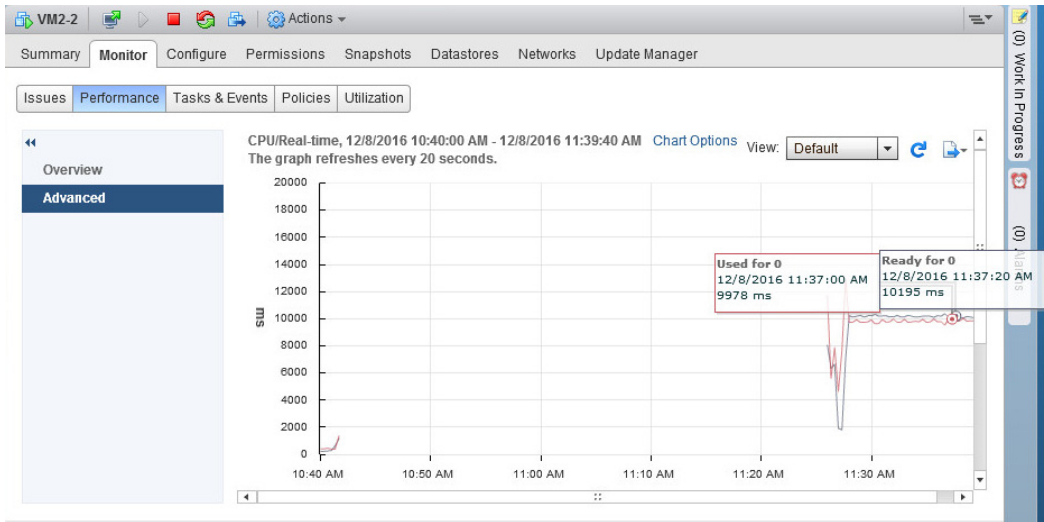
- In the Select object for this chart pane on the right, deselect the **VM2-1** virtual machine check box.

Select object for this chart:

| Target Objects | |
|-------------------------------------|-------|
| <input checked="" type="checkbox"/> | 0 |
| <input type="checkbox"/> | VM2-1 |
| | |
| | |
| | |

- In the Select counters for this chart pane, click **None** to deselect all counters.
- In the same pane*, select the **Ready** and **Used** check boxes and click **OK**.
The CPU/Real-time chart for the VM2-1 virtual machine appears.
- Open a new tab in your Internet Explorer Web browser and click the **vSphere Web Client** shortcut.
- If the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
You are not required to re-enter your connection credentials.
- In the new vSphere Web Client window, click **Hosts and Clusters** and expand the view.
- Select the **VM2-2** virtual machine in the Navigator pane.
- Repeat steps 2 through 9 to configure the CPU Performance graph for the VM2-2 virtual machine.

15. In the Web browser window for each virtual machine, point to the end of the line graph to view the current CPU ready value.



16. Record the current CPU ready value for each virtual machine and leave the Performance Chart windows open.
- VM2-1 _____
 - VM2-2 _____
17. In each virtual machine console, press Ctrl+C in the Command Prompt window to stop the CPUBUSY script.

CAUTION

This script must be stopped in each virtual machine. If the script is left running, the next lab is affected.

18. In the vSphere Web Client browser window for each virtual machine, point to the end of the line graph to view the current CPU ready value.
19. Wait for the chart to be updated and compare the CPU ready value with what you recorded in step 16.

Performance charts update every 20 seconds.

Q1. Did the CPU ready value change? If it did, what is the reason for the change?

Task 3: Undo Changes Made to the Virtual Machines

You revert the configuration changes made to each virtual machine.

1. Close the second vSphere Web Client tab and the two virtual machine consoles.
2. In the first vSphere Web Client, remove the scheduling affinity value on the **VM2-1** virtual machine.
 - a. Right-click the **VM2-1** virtual machine in the inventory and select **Edit Settings**.
 - b. On the **Virtual Hardware** tab, click the arrow next to **CPU** to expand the view.
 - c. In the **Scheduling Affinity** text box, delete the value 1 and click **OK**.
3. Repeat step 2 to remove the scheduling affinity value on the VM2-2 virtual machine.
4. Power off the VM2-1 and VM2-2 virtual machines
5. Leave vSphere Web Client open for the next lab.

Lab 18 Using Alarms

Objective: Use the vCenter Server Appliance alarm feature

In this lab, you perform the following tasks:

1. Create a Virtual Machine Alarm to Monitor a Condition
2. Create a Virtual Machine Alarm to Monitor an Event
3. Trigger Virtual Machine Alarms and Acknowledge the Alarms
4. Disable Virtual Machine Alarms

Task 1: Create a Virtual Machine Alarm to Monitor a Condition

You create and use alarms to respond to selected events, conditions, and states that occur with objects in the inventory.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. Log in using administrator@vsphere.local as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.

5. Right-click the **VM2-1** virtual machine in the inventory and select **Alarms > New Alarm Definition**.

The New Alarm Definition wizard starts.

NOTE

Because you are creating an alarm for the VM2-1 virtual machine, this alarm monitors only that virtual machine. If you set the alarm on an object higher in the vCenter Server inventory, the alarm applies to multiple virtual machines. For example, if you create an alarm on the vCenter Server Appliance object itself, the alarm applies to all virtual machines.

6. On the General page, enter **VM CPU Usage - *your_name*** in the **Alarm name** text box and click **Next**.
7. On the Triggers page, click the green plus sign (+) to add trigger conditions.

| Option | Action |
|---------------------------|--|
| Trigger | Select VM CPU Usage . |
| Operator | Select is above . |
| Warning Condition | Double-click the current value and enter 50 (percentage). |
| Condition Length | Double-click the current value and select for 30 sec from the drop-down menu. |
| Critical Condition | Double-click the current value and enter 75 (percentage). |
| Condition Length | Leave the default setting, 5 minutes. |

The screenshot shows the results of adding the trigger conditions.

New Alarm Definition

Trigger if **ANY** of the following conditions are satisfied:

+ X

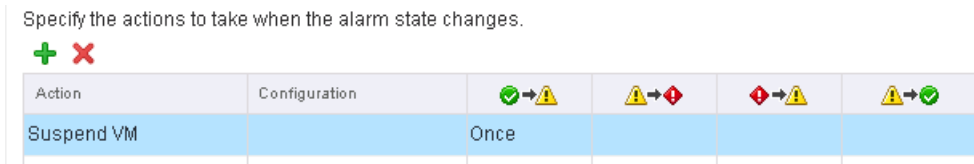
| Trigger | Operator | Warning Condition | Critical Condition |
|--------------|----------|---------------------|--------------------|
| VM CPU Usage | is above | 50 % for 30 seconds | 75 % for 5 minutes |
| | | | |
| | | | |
| | | | |
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Back Next Finish Cancel

8. Click **Next**.

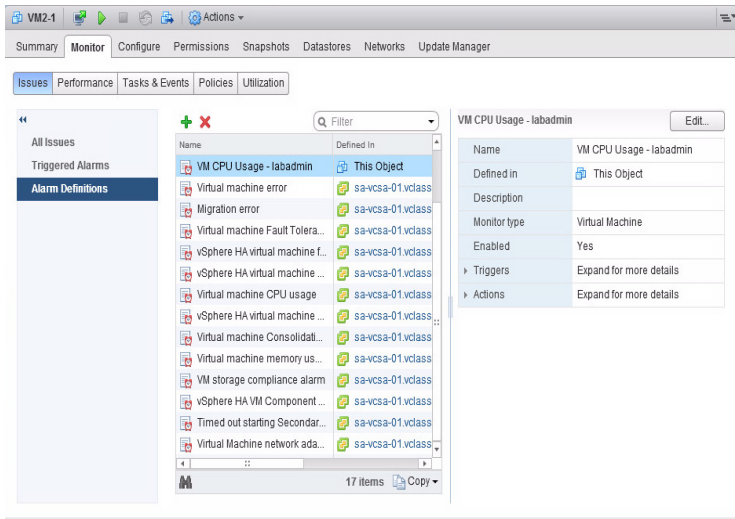
- On the Actions page, click the green plus sign (+) to configure the action settings.

| Option | Action |
|------------------------|---|
| Action | Select Suspend VM from the drop-down menu. |
| Configuration | Leave blank. |
| Green to Yellow | Select Once from the drop-down menu. |
| Yellow to Red | Change the setting from Once to no value in the drop-down menu. |
| Red to Yellow | Leave blank. |
| Yellow to Green | Leave blank. |



- Click **Finish**.
- Select the **VM2-1** virtual machine in the inventory and click the **Monitor** tab.
- Under the **Monitor** tab, click the **Issues** tab and select **Alarm Definitions**.

- Verify that the VM CPU Usage - *your_name* alarm appears in the alarm list for the VM2-1 virtual machine.



Task 2: Create a Virtual Machine Alarm to Monitor an Event

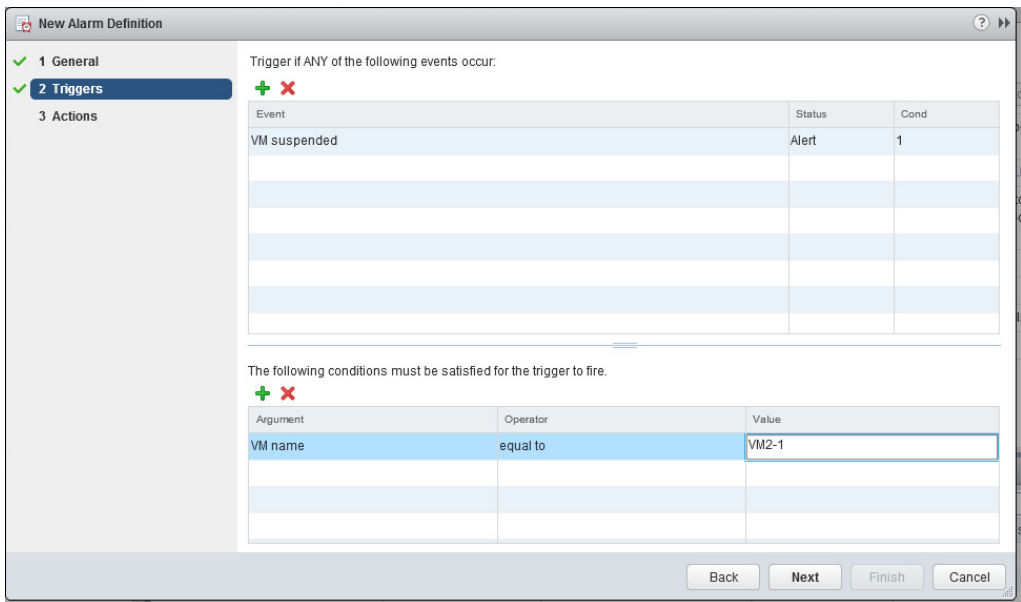
You set up general alarm settings, alarm triggers, trigger reporting, and alarm actions to monitor and react to a specified event.

- In the Navigator pane, click the **Hosts and Clusters** icon and select **Datacenter**.
- Under the **Monitor** tab, click **Issues** and select **Alarm Definitions**.
- Click the green plus sign to add an alarm for the data center.
The New Alarm Definition wizard starts.
- On the General page, configure the alarm settings.

| Option | Action |
|--------------------------|---|
| Alarm name | Enter VM Suspended - <i>your_name</i> . |
| Monitor | Leave the default setting Virtual Machines . |
| Monitor for | Click specific event occurring on this object . For example, VM Power On. |
| Enable this alarm | Leave the check box selected. |

5. Click **Next**.
6. On the Triggers page, click the green plus sign on the top pane named Trigger if ANY of the following events occur.
7. Select **VM suspended** from the **Event** drop-down menu.
8. The following conditions must be satisfied for the trigger to fire pane, click the green plus sign to specify the conditions under which the alarm triggers.

| Option | Action |
|-----------------|--|
| Argument | Select VM name from the drop-down menu. |
| Operator | Leave equal to selected. |
| Value | Enter the virtual machine name vm2-1 . The name is case-sensitive. |



9. Click **Next**.
10. On the Actions page, leave the default settings and click **Finish**.
11. Verify that the VM Suspended - *your_name* alarm appears in the alarm list for the data center.

Task 3: Trigger Virtual Machine Alarms and Acknowledge the Alarms

You acknowledge an alarm to discontinue it and inform others that you are taking ownership of the issue. Your acknowledged alarms are visible in the system. The alarms are neither cleared nor reset.

1. Power on the VM2-1 virtual machine and verify that it is running on sa-esxi-02.vclass.local.
2. Select the **VM2-1** virtual machine in the inventory, click the **Monitor** tab, and click **Issues**.
3. Select **Triggered Alarms**.

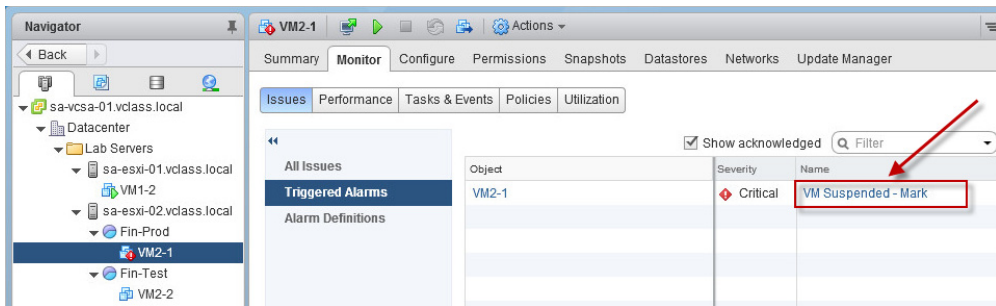
The triggered alarms appear in this pane.

4. In the inventory, select the **VM2-1** virtual machine.
5. Open a console for the VM2-1 virtual machines and log in to the virtual machine.
6. Right-click **CPUBUSY** and select **Open with Command Prompt**.

This action starts one instance of the `CPUBUSY` script.

7. Wait at least 30 seconds before the alarm is triggered and the virtual machine is suspended.
8. In vSphere Web Client, refresh the Triggered Alarms pane and verify that the VM Suspended - *your_name* alarm is triggered.

An entry for this alarm should appear in the Triggered Alarms list.



9. Right-click the **VM Suspended - *your_name*** alarm and select **Reset to Green**.
10. Under the **Monitor** tab, click **Tasks & Events** and select **Events** in the middle pane.

The description Manually cleared alarm 'VM Suspended - *your_name*' from Red should appear in the list.

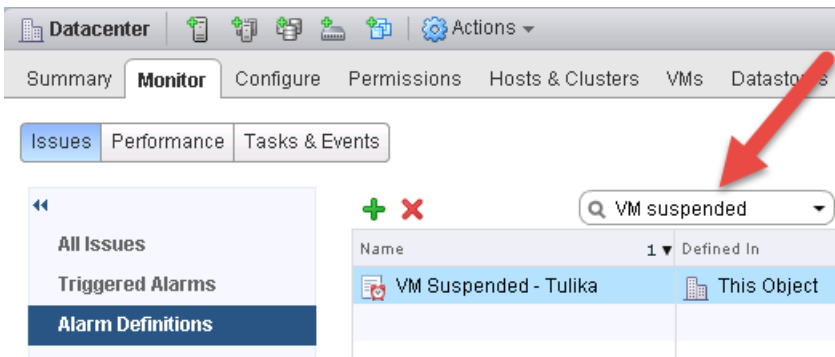
11. Right-click the suspended **VM2-1** virtual machine in the inventory and select **Power > Power On**.
12. Open the VM2-1 virtual machine console and press Ctrl+C at the command prompt to stop the `CPUBUSY` script.

13. Close the VM2-1 virtual machine console.
14. In vSphere Web Client, power off the **VM2-1** virtual machine and click **Yes** to confirm the power-off operation
15. In the inventory, verify that the red alert icon is removed from the VM2-1 virtual machine.

Task 4: Disable Virtual Machine Alarms

You disable system built-in alarms or the alarms that you defined for specific objects.

1. Disable the VM CPU Usage - *your_name* alarm.
 - a. In the Hosts and Clusters view, select the **VM2-1** virtual machine in the inventory.
 - b. Under the **Monitor** tab, click **Issues** and select **Alarm Definitions** in the middle pane.
 - c. Select the **VM CPU Usage - *your_name*** alarm in the list.
The VM CPU Usage - *your_name* pane appears in the right pane.
 - d. Click **Edit**.
 - e. On the General page, deselect the **Enable this alarm** check box and click **Finish**.
2. Disable the VM Suspended - *your_name* alarm.
 - a. Select the **Datacenter** object in the inventory.
 - b. Under the **Monitor** tab, click **Issues** and select **Alarm Definitions** in the middle pane.
 - c. Enter **vm suspended** in the search box.



- d. Right-click the **VM Suspended - *your_name*** alarm in the list and select **Edit**.
- e. On the General page, deselect the **Enable this alarm** check box and click **Finish**.
3. Leave vSphere Web Client open for the next lab.

Lab 19 Using vSphere HA

Objective: Use vSphere HA functionality

In this lab, you perform the following tasks:

1. Create a Cluster Enabled for vSphere HA
2. Add Your ESXi Host to the Cluster
3. Test vSphere HA Functionality
4. View the vSphere HA Cluster Resource Usage
5. Manage vSphere HA Slot Size
6. Configure a vSphere HA Cluster with Strict Admission Control
7. Prepare for the Next Lab

Task 1: Create a Cluster Enabled for vSphere HA

You create a VMware vSphere® High Availability cluster to group multiple ESXi hosts together, to achieve higher levels of virtual machine availability than each ESXi host can provide individually.

1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the `There is a problem with this website's security certificate` warning message appears, click **Continue to this website (not recommended)**.
3. Log in using `administrator@vsphere.local` as the user name and the standard lab password.
4. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
5. Right-click the **Datacenter** object in the Navigator pane and select **New Cluster**.

The New Cluster dialog box appears.

6. Configure the new cluster.

| Option | Action |
|-------------------|--------------------------------------|
| Name | Enter Lab Cluster . |
| DRS | Leave the check box deselected. |
| vSphere HA | Select the Turn on check box. |

7. Leave the default settings for the other options and click **OK**.
8. In the Recent Tasks pane, monitor the progress as the cluster is created.

Task 2: Add Your ESXi Host to the Cluster

You plan the resources and networking architecture of your cluster, add hosts to it, and specify the vSphere HA settings.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Drag both ESXi hosts to the **Lab Cluster** inventory object.
3. If a warning is displayed, click **Yes**.

Your existing resource pools are collapsed into the cluster root resource pool.

4. Monitor the Recent Tasks pane and wait for the Configuring vSphere HA task to complete.
If the tasks do not appear in the Recent tasks pane, you can find them in the Task Console.
5. Select **Lab Cluster** in the inventory and click the **Monitor** tab.
6. Click **vSphere HA** and select **Summary** in the middle pane.
The vSphere HA summary information appears.
7. Record the name of the master host. _____

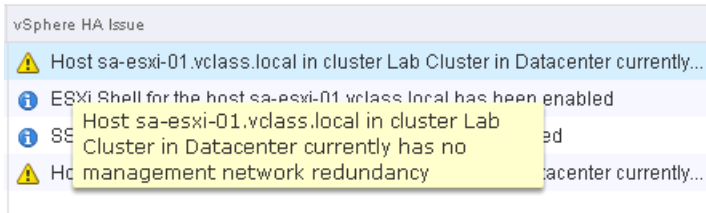
Q1. Does the number of protected virtual machines match the number of powered-on virtual machines in the cluster?

8. Select **Heartbeat** in the middle pane.

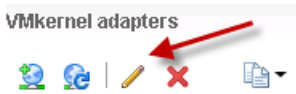
Q2. How many datastores are used to monitor heartbeat?

9. Select **Configuration Issues** in the middle pane and review the errors that are displayed.

At this point, each ESXi host has a single management network port for redundancy. vSphere HA still works if an ESXi host is configured with one management network port, but a second management network port is necessary for redundancy.



10. Select the **sa-esxi-01.vclass.local** in the inventory and click the **Configure** tab.
11. In the middle pane, select **VMkernel adapters** under Networking.
12. Select the **vMotion** VMkernel adapter.
13. Click the **Edit Settings** icon.



14. On the Port properties page, ensure that the **vMotion** check box is selected and select the **Management** check box.
15. Click **OK**.
16. Right-click **sa-esxi-01.vclass.local** in the Navigator pane and select **Reconfigure for vSphere HA**.

NOTE

You might need to refresh vSphere Web Client to eliminate any obsolete alarm icons.

17. Repeat step 10 through step 16 for **sa-esxi-02.vclass.local**.
18. Select **Lab Cluster** in the inventory and click the **Monitor** tab.
19. Click **Issues** and select **All Issues** from the middle pane.

Q3. Are the previous management configuration issues still displayed?

Task 3: Test vSphere HA Functionality

You set up vSphere HA to monitor the cluster environment and detect hardware failures. When an ESXi host outage is detected, vSphere HA automatically restarts virtual machines on other ESXi hosts in the cluster.

1. In the inventory, select the master ESXi host that you recorded in task 2, step 7.
2. Click the **VMs** tab and ensure that **Virtual Machines** is clicked.
3. If none of the virtual machines on the host are powered on, power on any one virtual machine.
4. Record the name of one or more powered-on virtual machines on the master host. _____
5. Simulate a host failure by rebooting one of the hosts in the cluster.

IMPORTANT

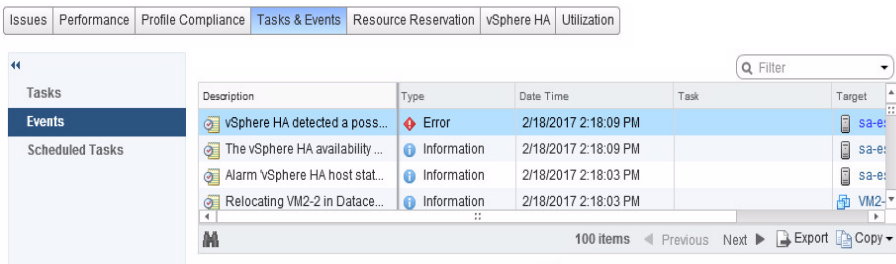
Make sure you reboot the system, and not shut down the system.

- a. Right-click the master ESXi host and select **Power > Reboot**.
A warning message appears stating that you chose to reboot the host, which is not in maintenance mode.
 - b. Enter **Testing vSphere HA** as the reason for rebooting and click **OK**.
6. In the inventory, select **Lab Cluster**, click the **Monitor** tab.
 7. Click **Tasks & Events** and select **Events** in the middle pane.

The cluster entries are sorted by time. Notice the entries that appear when the host failure was detected.

The initial messages from the hosts might show failures. These messages indicate that the virtual machines on the downed host have failed. The virtual machines take 1 to 2 minutes to successfully restart on the new host.

The screenshot shows an example of a list of vSphere HA recent events in the cluster.



8. In the inventory, select the ESXi host that is not rebooting.

9. Click the **VMs** tab.

Q1. Do you see the virtual machines that were running on the original master ESXi host, which you recorded earlier?

10. Select **Lab Cluster** in the inventory and click the **Monitor** tab.

11. Click **vSphere HA**.

12. Select **Summary** in the middle pane.

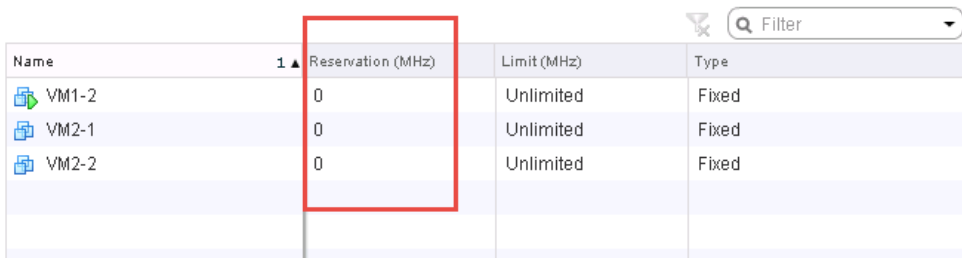
Q2. Has the master host changed?

13. Monitor the original master ESXi host in the Navigator pane until it is fully running again.

Task 4: View the vSphere HA Cluster Resource Usage

You examine the CPU, memory, and storage I/O resource usage information of the cluster.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click **Resource Reservation**.
3. Select **CPU** from the middle pane and record the information for the cluster.
 - Total Reservation Capacity (GHz) _____
 - Used Reservation (GHz) _____
 - Available Reservation (GHz) _____
4. In the virtual machines pane, verify that the CPU reservation is not set on the virtual machines. The Reservation column shows 0 (MHz).



| Name | 1 ▲ | Reservation (MHz) | Limit (MHz) | Type |
|-------|-----|-------------------|-------------|-------|
| VM1-2 | | 0 | Unlimited | Fixed |
| VM2-1 | | 0 | Unlimited | Fixed |
| VM2-2 | | 0 | Unlimited | Fixed |

5. Select **Memory** in the middle pane and record the information for the cluster.
 - Total Reservation Capacity (GB) _____
 - Used Reservation (GB) _____
 - Available Reservation (GB) _____
6. In the virtual machines pane, verify that the memory reservation is not set on the virtual machines.

The Reservation column shows 0 (MB).

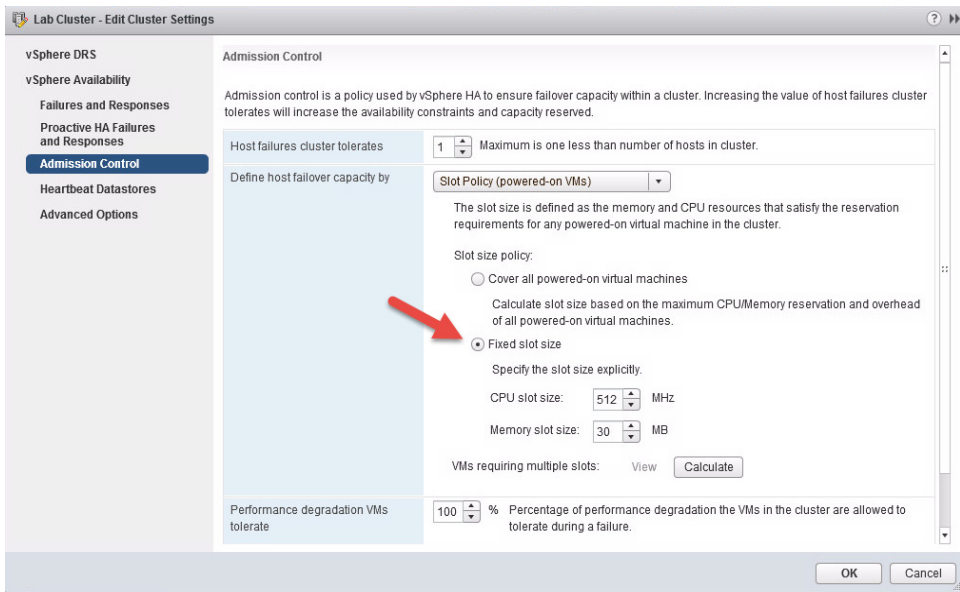
Task 5: Manage vSphere HA Slot Size

You configure admission control to ensure that sufficient resources are available in a cluster to provide failover protection and to ensure that the virtual machine resource reservations are respected.

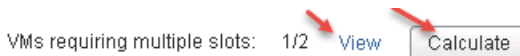
1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Right-click **Lab Cluster** and select **Settings**.
3. In the middle pane, select **vSphere Availability** under Services and click **Edit**.
4. In the navigation pane, select **Admission Control**.
5. In the Define host failover capacity by pane, select **Slot Policy (powered-on VMs)** and click **OK**.
6. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click **vSphere HA**.
7. Select **Summary** in the middle pane.
8. Scroll down to the Advanced Runtime Info pane and record the slot information for this cluster.
 - Slot size: CPU _____ (MHz), Memory _____ (MB)
 - Total slots in cluster _____
 - Used slots _____
 - Available slots _____
 - Failover slots _____
9. In the Navigator pane, click the **VMs and Templates** tab and expand the view.
10. If the VM2-2 virtual machine is powered off, power it on.

11. Set the CPU reservation on the VM2-2 virtual machine.
 - a. Right-click the **VM2-2** virtual machine and select **Edit Settings**.
 - b. Click the arrow next to **CPU** to expand the view.
 - c. In the **Reservation** text box, enter **512** (MHz) and click **OK**.
12. In the Navigator pane, click the **Hosts and Clusters** icon.
13. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click **vSphere HA**.
14. Select **Summary** in the middle pane.
15. View slot information for this cluster.
 - a. In the Advanced Runtime Info pane, verify that the slot size for CPU changed from the value recorded in step 8.
 - b. Record the information shown in the **Slot size** text box.
Slot size: CPU _____ (MHz), Memory _____ (MB)
16. Use the vSphere HA slot size policy to enforce a slot size.
 - a. Right-click **Lab Cluster** in the inventory and select **Settings**.
 - b. Select **vSphere Availability** in the middle pane and click **Edit**.
 - c. Select **Admission Control** in the left pane.

- d. Under Define host failover capacity, click **Fixed slot size** in the right pane.



- e. In the **CPU slot size** text box, enter **300** (MHz) to change the CPU slot size.
- f. Click **Calculate** next to VMs requiring multiple slots and click the **View** link.
The VMs Requiring Multiple Slots window appears.



- g. Record the Required Slots value for the VM2-2 virtual machine. _____

Because the CPU slot size has a fixed value of 300 MHz, the VM2-2 virtual machine with the 512 MHz CPU reservation uses two slots to power on.

- h. Click **Close** and click **OK** to exit the Edit Cluster Settings window.

17. View the slot information for this cluster.

- a. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click **vSphere HA**.

- b. Select **Summary** in the middle pane.

- c. In the Advanced Runtime Info pane, record the information shown in the **Slot size** text box and compare with the values recorded earlier.

Slot size: CPU _____ (MHz), Memory _____ (MB)

18. Remove the vSphere HA fixed slot size setting.
 - a. Right-click **Lab Cluster** in the inventory and select **Settings**.
 - b. Select **vSphere Availability** in the middle pane and click **Edit**.
 - c. Select **Admission Control** in the navigation pane.
 - d. Under **Define host failover capacity by**, click **Cover all powered-on virtual machines** for the slot size policy.
 - e. Click **OK**.
19. Remove the CPU reservation on the **VM2-2** virtual machine.
 - a. Right-click the **VM2-2** virtual machine in the inventory and select **Edit Settings**.
 - b. Click the arrow next to **CPU** to expand the view.
 - c. Enter **0** (MHz) in the **Reservation** text box and click **OK**.

Task 6: Configure a vSphere HA Cluster with Strict Admission Control

You use admission control to impose constraints on resource usage and ensure that sufficient resources are available in a cluster to provide failover protection. Any actions violating the constraints are not permitted.

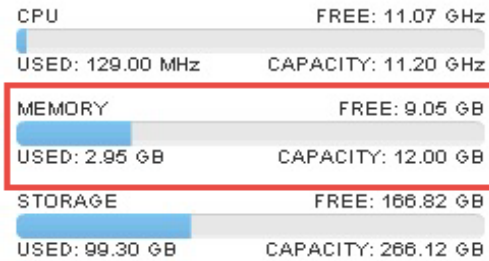
In the previous task, when you configured the cluster under Define host failover capacity, you configured vSphere HA to calculate slots. vSphere HA calculated the space for a virtual machine to run based on the largest CPU and memory reservation across all powered-on virtual machines in the cluster. This feature is called strict admission control.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Shut down all virtual machines and wait for the process to complete.
Wait another minute for the system to release the memory.
3. Select **Cluster** in the inventory and click the **Summary** tab.

4. Record the memory information for this cluster.

- Capacity (total) _____
- Used _____
- Free _____

Your view should be similar to the screenshot.



Q1. Why is the free memory value for the cluster less than the total memory capacity value?

5. Click the **Monitor** tab, click **Resource Reservation**, and select **Memory** in the middle pane.
6. Assign a 300 MB memory reservation to VM2-1 virtual machine.
 - a. In the lower pane, right-click the **VM2-1** virtual machine and select **Edit Resource Settings**.
 - b. Click the arrow next to **Memory** to expand the view.
 - c. Enter **300 (MB)** in the **Reservation** text box and click **OK**.
 - d. Repeat steps a through c to set the memory reservation on the VM1-2 virtual machine.
7. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click **vSphere HA**.
8. Select **Summary** in the middle pane.
9. In the Advanced Runtime Info pane, record the value shown in the **Total slots in cluster** text box. _____

Q2. Why does vSphere Web Client report N/A as the value?

10. Right-click the **VM2-1** virtual machine in the inventory and select **Power > Power On**.
11. Return to the Advanced Runtime Info pane of Lab Cluster and click **Refresh** in the lower-right corner of the pane.
12. View the effect that powering on this virtual machine has on your cluster.

Q3. How many total slots in the cluster, used slots, available slots, and failover slots do you see?

NOTE

The Advanced Runtime Info pane might display a smaller number of available slots in the cluster than you expect.

Slot size is calculated using the largest reservations plus the memory overhead of any powered on virtual machines in the cluster. However, vSphere HA admission control considers only the resources on a host that are available for virtual machines. This amount is less than the total amount of physical resources on the host, because there is some overhead.

13. Record the slot size values that appear.

CPU (MHz) _____, Memory (MB) _____

Q4. How is the memory slot size calculated?

14. In the inventory, right-click the **VM2-2** virtual machine and select **Power > Power On**.
15. Return to the Advanced Runtime Info pane of Lab Cluster and click **Refresh**.
16. View the slot information.

Q5. How many slots are available and what is the reason?

17. Right-click the **VM1-2** virtual machine in the inventory and select **Power > Power On**.
18. Monitor the Recent tasks pane.

Q6. Is your virtual machine allowed to power on, and what is the reason?

Q7. If a cluster has N total slots, can you power on N virtual machines?

Task 7: Prepare for the Next Lab

You remove the memory reservations on virtual machines and disable admission control when they are no longer needed.

1. Remove the memory reservation on each of the virtual machines.
 - a. Right-click the **VM2-1** virtual machine and select **Edit Resource Settings**.
 - b. In the Memory section, enter **0 (MB)** in the **Reservation** text box and click **OK**.
 - c. Repeat steps a and b to remove the memory reservation on the VM1-2 virtual machine.
2. Right-click the **Lab Servers** folder in the inventory and select **Remove from Inventory**.
3. Click **Yes** to confirm the operation.
4. Edit the settings of the cluster to allow the number of running virtual machines to exceed the failover capacity of the cluster.
 - a. In the inventory, right-click **Lab Cluster** and select **Settings**.
 - b. In the right pane, select **vSphere Availability** and click **Edit**.
 - c. In the left pane, click **Admission Control**.
 - d. From the **Define host failover capacity by** drop-down menu, select **Disabled**.
 - e. Click **OK** to commit your changes.
5. Leave vSphere Web Client open for the next lab.

Lab 20 Implementing a vSphere DRS Cluster

Objective: Implement a vSphere DRS cluster

In this lab, you perform the following tasks:

1. Create a Load Imbalance
2. Create a vSphere DRS Cluster
3. Verify Proper vSphere DRS Cluster Functionality
4. Create, Test, and Disable a VM-VM Affinity Rule
5. Create, Test, and Disable an Anti-Affinity Rule
6. Create, Test, and Disable a VM-Host Affinity Rule

Task 1: Create a Load Imbalance

You create a load imbalance across the ESXi hosts in the lab cluster to test how VMware vSphere® Distributed Resource Scheduler™ works.

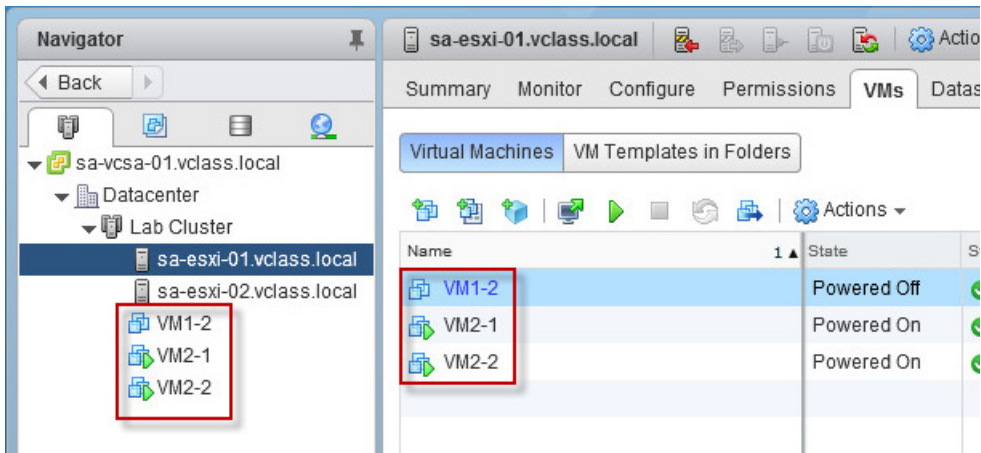
1. If vSphere Web Client is not active, open your Internet Explorer Web browser, click **vSphere Web Client** on the favorite bar, and select **vSphere Web Client - sa-vcsa-01.vclass.local**.
2. When the *There is a problem with this website's security certificate* warning message appears, click **Continue to this website (not recommended)**.
3. Log in using administrator@vsphere.local as the user name and standard lab password.
4. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.

- If all virtual machines are not running on a single host, migrate them to a single host.
For this lab, we moved our virtual machines to sa-esxi-01.vclass.local.

IMPORTANT

Change compute resource only when migrating VMs.

- Verify that all VMs are on sa-esxi-01.vclass.local.
 - Select **sa-esxi-01.vclass.local** in the Navigator pane, click the **VMs** tab, and click **Virtual Machines**.
 - Compare the list of VMs shown in the list to the VMs shown in the Navigator pane.



- Ensure that all VMs are powered on.
- Start the `CPUBUSY` script on each of the virtual machines.
 - In the left pane, right-click a virtual machine and select **Open Console**.
 - Log in to the virtual machine as `admin` with the standard lab password.
 - Right-click the `CPUBUSY` script on each virtual machine's desktop and select **Open with Command Prompt**.

The number of running `CPUBUSY` instances required to cause vSphere DRS to migrate virtual machines to another host will vary, depending on the resource capacity of the lab infrastructure.

Task 2: Create a vSphere DRS Cluster

You create a vSphere DRS cluster to balance the computing capacity among all ESXi hosts and associated virtual machines without service interruption.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Right-click **Lab Cluster** in the inventory and select **Settings**.
3. Select **vSphere DRS** from the middle pane.
4. Click **Edit**.
5. Select the **Turn On vSphere DRS** check box.
6. Select **Manual** from the **DRS Automation** drop-down menu.
7. Click the arrow next to DRS Automation to expand the view and move the **Migration Threshold** slider to **Aggressive**, which is to the right of the slider.
8. Leave other settings at their defaults and click **OK**.

Task 3: Verify Proper vSphere DRS Cluster Functionality

You can run vSphere DRS in either manual, partially automated or fully automated modes. In manual mode, you review the recommendations for optimal virtual machine placement provided by vSphere DRS and decide whether to make the changes.

1. Select **Lab Cluster** from the inventory, click the **Monitor** tab, and click **vSphere DRS**.

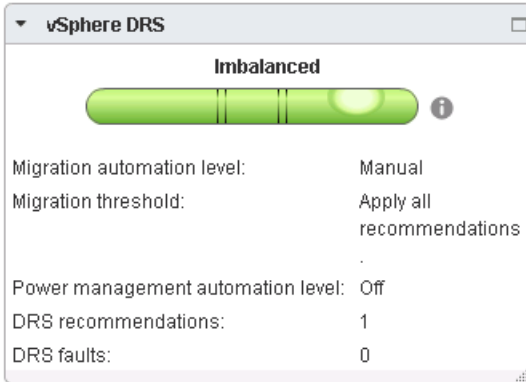
If you do not see the expected buttons, refresh the vSphere Web Client view.

2. Click **Run DRS Now**.

Clicking the button forces vSphere DRS to immediately evaluate the cluster and provide recommendations instead of waiting the standard 5 minutes before generating recommendations.

3. Click the **Summary** tab and click the arrow next to vSphere DRS to expand the pane.

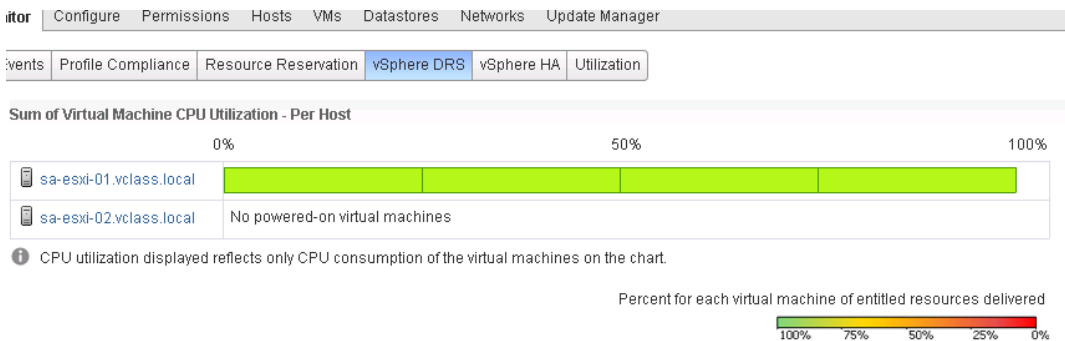
The screenshot shows the expanded view of the vSphere DRS pane.



Q1. Does the gauge show that the load is imbalanced?



4. Click the **Monitor** tab, click **vSphere DRS**, and select **CPU Utilization**.
5. In the Sum of Virtual Machine CPU Utilization - Per Host pane, view the CPU consumption on each ESXi host and click each of the colored boxes to view the CPU consumption of each virtual machine.

The screenshot shows the CPU utilization information of the ESXi host and the virtual machine.



6. Select **Recommendations** in the middle pane and view the vSphere DRS recommendations. The screenshot shows a sample recommendation made by vSphere DRS to migrate a virtual machine from one host to another host.

DRS Recommendations

| Apply | Priority | Recommendation | Reason |
|-------------------------------------|----------|---|---------------------------|
| <input checked="" type="checkbox"/> | 4 |  Migrate VM2-1 from sa-esxi-01.vclass.local to sa-esxi-02.vclass.local | Balance average CPU loads |
| <input checked="" type="checkbox"/> | 2 |  Migrate VM1-2 from sa-esxi-01.vclass.local to sa-esxi-02.vclass.local | Balance average CPU loads |

7. Click **Apply Recommendations**.

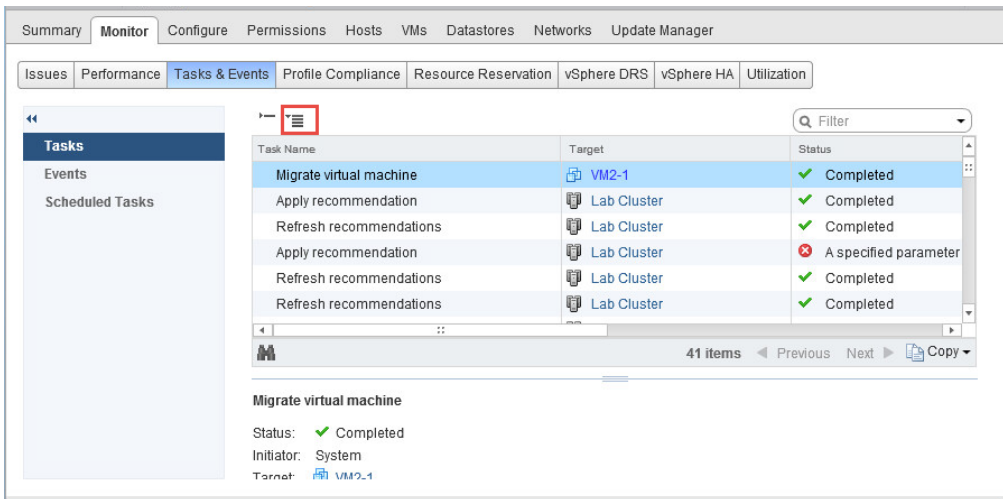
If your recommendations have expired, click **Run DRS Now** to generate new recommendations and apply them.

If new recommendations do not appear, click **Run DRS Now** again and then click **Apply Recommendations** again.

8. Click the **Monitor** tab and click **Tasks & Events**.

9. Select **Tasks** in the middle pane.

10. Click the **Expand All** icon.



The screenshot shows the vSphere Monitor interface. The 'Monitor' tab is active, and the 'Tasks & Events' sub-tab is selected. The left-hand pane shows 'Tasks' expanded. The main area displays a table of tasks:

| Task Name | Target | Status |
|-------------------------|-------------|-----------------------|
| Migrate virtual machine | VM2-1 | Completed |
| Apply recommendation | Lab Cluster | Completed |
| Refresh recommendations | Lab Cluster | Completed |
| Apply recommendation | Lab Cluster | A specified parameter |
| Refresh recommendations | Lab Cluster | Completed |
| Refresh recommendations | Lab Cluster | Completed |

Below the table, the details for the 'Migrate virtual machine' task are shown:

- Status: ✔ Completed
- Initiator: System
- Target: VM2-1

11. Monitor the Migrate virtual machine task until completion.

- Click **vSphere DRS** and click **Run DRS Now** to force vSphere DRS to evaluate the cluster status.

Q2. Is any recommendation shown?

- Click the **Summary** tab and view the vSphere DRS pane.

Q3. Does the gauge show that the load is balanced?

- Click the **Monitor** tab and click the **vSphere DRS** tab.

- Select **CPU Utilization**.

The virtual machines should spread across the two ESXi hosts. You can refresh the screen to see the result.

- In each virtual machine console, press Ctrl+C to stop the `CPUBUSY` script and close the console.

Task 4: Create, Test, and Disable a VM-VM Affinity Rule

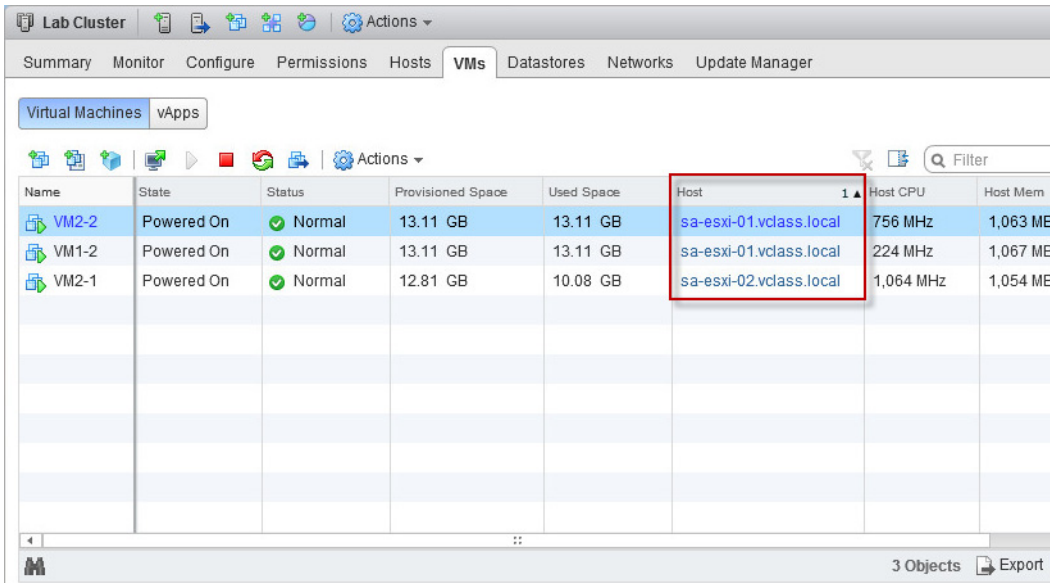
You use VM-VM affinity rules to specify whether the selected individual virtual machines should run on the same host or be kept on separate hosts.

- Select **Lab Cluster** in the inventory and click the **VMs** tab.
- Point to the gray row of column names, right-click the row, and select **Show/Hide Columns**.
- Select the **Host** check box from the list and click **OK**.

The Host column appears in the table.

You can drag the **Host** column to the left so that it is easily visible.

- Based on the information in the Name and Host columns, verify that all the virtual machines are not running on a single ESXi hosts.



The screenshot shows the vSphere Web Client interface for a 'Lab Cluster'. The 'VMs' tab is selected, displaying a table of virtual machines. The table has columns for Name, State, Status, Provisioned Space, Used Space, Host, Host CPU, and Host Mem. Three VMs are listed: VM2-2, VM1-2, and VM2-1. VM2-2 and VM2-1 are on 'sa-esxi-02.vclass.local', while VM1-2 is on 'sa-esxi-01.vclass.local'. The 'Host' column for VM2-2 and VM2-1 is highlighted with a red box.

| Name | State | Status | Provisioned Space | Used Space | Host | Host CPU | Host Mem |
|-------|------------|--------|-------------------|------------|-------------------------|-----------|----------|
| VM2-2 | Powered On | Normal | 13.11 GB | 13.11 GB | sa-esxi-01.vclass.local | 756 MHz | 1,063 ME |
| VM1-2 | Powered On | Normal | 13.11 GB | 13.11 GB | sa-esxi-01.vclass.local | 224 MHz | 1,067 ME |
| VM2-1 | Powered On | Normal | 12.81 GB | 10.08 GB | sa-esxi-02.vclass.local | 1,064 MHz | 1,054 ME |

- If the **VM2-1** and **VM2-2** virtual machines are running on the same ESXi host, migrate the **VM2-2** virtual machine to the other ESXi host.

Having virtual machines reside on two different ESXi hosts is necessary to test the validity of the VM/Host rule that you create in later steps. If you have one virtual machine on each ESXi host in the cluster, no action is necessary.

- Right-click **Lab Cluster** in the inventory and select **Settings**.
- Select **VM/Host Rules** in the middle pane.
- In the VM/Host Rules pane, click **Add**.

The Create VM/Host Rule dialog box appears.

- Configure the options for the VM/Host rule.
 - In the **Name** text box, enter **Colocate-VM2-VMs**.
 - Leave the **Enable rule** check box selected.
 - From the **Type** drop-down menu, select **Keep Virtual Machines Together**.
 - Click **Add** to add members.
 - Select the check boxes for the VM2-# virtual machines and click **OK**.

10. Click **OK** to close the Create VM/Host Rules dialog box.
11. Click the **Monitor** tab and click **vSphere DRS**.
12. Select **Recommendations** and click **Run DRS Now**.


Q1. Do you see any recommendations, and why?







DRS Recommendations

| Apply | Priority | Recommendation | Reason |
|-------------------------------------|----------|---|---------------------|
| <input checked="" type="checkbox"/> | 1 |  Migrate VM2-2 from sa-esxi-01.vclass.local to sa-esxi-02.vclass.local | Apply affinity rule |

13. Click **Apply Recommendations** and wait for the virtual machine migration to complete.
The virtual machines associated with your affinity rule should be migrated to one of the two hosts in the vSphere DRS cluster.
14. Click the **Monitor** tab and click **Tasks & Events** to view the progress of the virtual machine migration and wait for its completion.
15. Click the **VMs** tab.
16. Click the **Host** column heading to sort the virtual machines by the ESXi host on which they reside.

The VM2-# virtual machines should be running on the same ESXi host. Your screen might slightly differ from the screenshot. However, as long as the two VM2-# virtual machines reside on the same host, your affinity rule is working correctly.



| Name | State | Host | Status | Provisioned ... | Used Space |
|---|------------|-------------------------|--|-----------------|------------|
|  VM2-1 | Powered On | sa-esxi-02.vclass.local |  Normal | 12.36 GB | 11.26 GB |
|  VM1-2 | Powered On | sa-esxi-01.vclass.local |  Normal | 13.11 GB | 13.11 GB |
|  VM2-2 | Powered On | sa-esxi-02.vclass.local |  Normal | 13.11 GB | 11.96 GB |

17. Select **Lab Cluster** in the inventory and click the **Configure** tab.
18. Select **VM/Host Rules** in the left pane.

19. In the VM/Host Rules pane, select your affinity rule and click **Edit** above the rule.
20. Deselect the **Enable rule** check box and click **OK**.

Task 5: Create, Test, and Disable an Anti-Affinity Rule

You create a vSphere DRS anti-affinity rule to force the specified virtual machines to be kept on separate hosts.

1. In the VM/Host Rules pane, click **Add**.
2. Configure the options for this VM/Host rule.
 - a. In the **Name** text box, enter **Separate-VM2-VMs**.
 - b. Keep the **Enable rule** check box selected.
 - c. From the **Type** drop-down menu, select **Separate Virtual Machines**.
 - d. Click **Add**.
 - e. Select the check boxes for the **VM2-#** virtual machines that you own and click **OK**.
3. Click **OK** to close the Create VM/Host Rules dialog box.
4. Click the **Monitor** tab and click **vSphere DRS**.
5. Select **Recommendations** and click **Run DRS Now**.

A recommendation to separate your virtual machines should appear. The recommendation is marked as priority 1 as a result of your vSphere DRS rules.

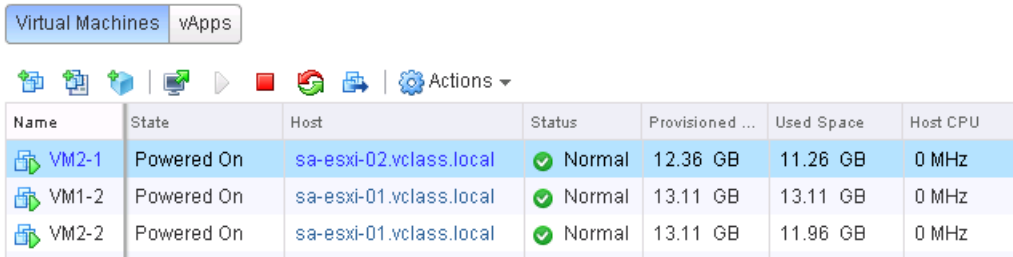
DRS Recommendations

| Apply | Priority | Recommendation | Reason |
|-------------------------------------|----------|---|--------------------------|
| <input checked="" type="checkbox"/> | 1 |  Migrate VM2-2 from sa-esxi-02.vclass.local to sa-esxi-01.vclass.local | Apply anti-affinity rule |

6. Click **Apply Recommendations** and wait for the virtual machine migration to complete before you proceed to the next step.
7. Click the **Monitor** tab and click **Tasks & Events** to view the progress of the virtual machine migration and wait for its completion.
8. Click the **VMs** tab.

- View the information shown in the Host column.

As a result of your anti-affinity rule, you should see that the virtual machines associated with your anti-affinity rule are placed on two different ESXi hosts.



| Name | State | Host | Status | Provisioned ... | Used Space | Host CPU |
|-------|------------|-------------------------|--------|-----------------|------------|----------|
| VM2-1 | Powered On | sa-esxi-02.vclass.local | Normal | 12.36 GB | 11.26 GB | 0 MHz |
| VM1-2 | Powered On | sa-esxi-01.vclass.local | Normal | 13.11 GB | 13.11 GB | 0 MHz |
| VM2-2 | Powered On | sa-esxi-01.vclass.local | Normal | 13.11 GB | 11.96 GB | 0 MHz |

- Select **Lab Cluster** in the Navigator pane and click the **Configure** tab.
- Select **VM/Host Rules** in the middle pane.
- In the VM/Host Rules pane, select the **Separate-VM2-VMs** rule.
- Click **Delete** above the pane and click **Yes** to confirm the deletion.

Task 6: Create, Test, and Disable a VM-Host Affinity Rule

You use VM-Host affinity rules to specify whether the members of a selected virtual machine vSphere DRS group can run on the members of a specific host vSphere DRS group.

- In the middle pane, select **VM/Host Groups**.
- In the VM/Host Groups pane, click **Add**.
- When the Create VM/Host Group dialog box appears, configure the options.
 - In the **Name** text box, enter **VM2-VMs**.
 - Verify that **VM Group** is selected from the **Type** drop-down menu.
 - Click **Add**.
 - Select the check boxes for both of your VM2-# virtual machines.
 - Click **OK**.
 - Click **OK** to close the dialog box.
- In the VM/Host Groups pane, click **Add**.

5. When the Create VM/Host Group dialog box appears, configure the options.
 - a. In the **Name** text box, enter **VM2-Host**.
 - b. From the **Type** drop-down menu, select **Host Group**.
 - c. Click **Add**.
 - d. Select the check box for **sa-esxi-02.vclass.local** and click **OK**.
 - e. Click **OK** to close the dialog box.
6. Select **VM/Host Rules** in the middle pane.
7. In the VM/Host Rules pane, click **Add**.
8. When the Create VM/Host Rules dialog box appears, configure the options.
 - a. In the **Name** text box, enter **Run-only-on-host2**.
 - b. Keep the **Enable rule** check box selected.
 - c. From the **Type** drop-down menu, select **Virtual Machines to Hosts**.
 - d. From the **VM Group** drop-down menu, select **VM2-VMs**.
 - e. Select **Must run on hosts in group** from the drop-down menu.
 - f. From the **Host Group** drop-down menu, select **VM2-Host**.
 - g. Click **OK** to close the dialog box.
9. Click the **Monitor** tab and click **vSphere DRS**.
10. Select **Recommendations** in the middle pane and click **Run DRS Now**.

Q1. What recommendations did vSphere DRS make and why?

11. If there are recommendations, click **Apply Recommendations**.
12. Click the **Monitor** tab and click **Tasks & Events** to view the progress of the virtual machine migration and wait for its completion.

The VM2-# virtual machines are migrated as necessary so that they both reside on the second ESXi host

13. Click the **VMs** tab.
14. Click the **Host** column heading to sort the virtual machines by the ESXi host on which they reside.

Your VM2-# virtual machines that were running on sa-esxi-01.vclass.local are migrated to sa-esxi-02.vclass.local

15. Right-click one of **VM2-#** virtual machines in the inventory and select **Migrate**. The Migrate wizard starts.
16. On the Select the migration type page, click **Change computer resource only** and click **Next**.
17. On the Select a compute resource page, click **Clusters** and click **Lab Cluster**.

In the Compatibility pane, you might notice the message `Virtual machine 'VM2-#' on host 'sa-esxi-0#.vclass.local' would violate a virtual machine - host affinity rule.`

This issue is due to a conflict of the rules that you created and your migration attempt.

18. Click **Cancel** to cancel the migration.
19. Select **Lab Cluster** in the inventory and click the **Configure** tab.
20. Select **VM/Host Rules** in the left pane.
21. In the VM/Host Rules pane, select your **Run-only-on-host2** rule and click **Edit** above the rule.
22. Deselect the **Enable rule** check box and click **OK**.
23. Leave vSphere Web Client open for the next lab.

Lab 21 Using vSphere Update Manager

Objective: Install, configure, and use vSphere Update Manager

In this lab, you perform the following tasks:

1. Modify the Cluster Settings
2. Configure vSphere Update Manager
3. Create a Patch Baseline
4. Attach a Baseline and Scan for Updates
5. Stage the Patches onto the ESXi Host
6. Remediate the ESXi Host

Task 1: Modify the Cluster Settings

You enable vSphere DRS in fully automated mode so that vSphere DRS determines the best possible distribution of virtual machines among your ESXi hosts and automatically performs the migration.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the Navigator pane.
2. Right-click **Lab Cluster** in the inventory and select **Settings**.
3. Select **vSphere DRS** and click **Edit**.

The Edit Cluster Settings dialog box appears.

4. On the vSphere DRS page, select **Fully Automated** from the **DRS Automation** drop-down menu.
This operation enables vSphere DRS to migrate virtual machines as necessary without asking permission from an administrator.

5. Click **OK**.
6. In the left side of the Edit Cluster Settings window, select **vSphere Availability** and click the arrow next to Admission Control to expand the view.
7. Verify that **Disabled** is selected from the **Define Host Failover By** drop-down menu.
8. If not already selected, select **Lab Cluster** in the inventory.
9. Click the **Monitor** tab and click the **Resource Reservation** tab.
10. Select **CPU** and observe the Reservation (MHz) column to verify that no CPU reservations are assigned to virtual machines.
11. Select **Memory** and observe the Reservation (MB) column to verify that no memory reservations are assigned to virtual machines.

CAUTION

Removing CPU and memory reservations is necessary in this lab environment for training purposes. In a production environment, you might not need to remove them.

Task 2: Configure vSphere Update Manager

You can import patches and extensions manually by using an offline bundle or you can use a shared repository or the Internet as the download source for patches and extensions.

1. On the vSphere Web Client Home page, click **Update Manager** under **Operations and Policies**.
2. Select **sa-vcsa-01.vclass.local** in the left pane.
3. Click the **Manage** tab.
4. In the middle pane, select **Download Settings**.
5. In the Download Settings pane, click **Import Patches**.

The screenshot shows the vSphere Web Client interface for the host 'sa-vcsa-01.vclass.local'. The 'Manage' tab is selected, and the 'Download Settings' page is displayed. The 'Download Sources' section is active, showing a table of download sources. A red arrow points to the 'Import Patches...' button in the top right corner of the 'Download Sources' section.

| Download Source | Ena... | Connectivity ... | Update Type | Component | Description |
|-----------------------|--------|------------------|-------------|-----------|--------------|
| https://hostupdate... | Yes | Connected | VMware | Host | Download ... |

- Click **Browse**, navigate to the Desktop\Class Materials and Licenses\Class Files folder, select the **ESXi650-201701001.zip** file, and click **Open**.
- Wait until the patch bundle has been uploaded and then click **Next**.
- If a security warning appears, select the **Install this certificate and do not display any security warnings** check box and click **Ignore**.
- When the import operation is completed, click **Finish**.

Task 3: Create a Patch Baseline

You create a baseline to specify the requirements that should be met by vSphere objects such as virtual machines, ESXi hosts, or virtual appliances. Your patch baseline contains a collection of patches, extensions, or upgrades.

- Click the **Host Baselines** tab.
- Click **New Baseline**.

The New Baseline wizard starts.

- On the Baseline Name and Type page, enter **ESXi Host Update** in the **Name** text box.
- In the **Description** text box, enter **Patch for ESXi Host 6.5** and click **Next**.
- On the Patch Options page, click **Fixed** and click **Next**.
- On the Patches page, click the **Release Date** column to sort in ascending order with the oldest release date on top.

Patches

These are all patches in the repository. Select the ones to include in the fixed baseline.

All (0) Selected Objects

| <input type="checkbox"/> | Patch Name | Product | Release Date | 1 ▲ Type |
|--------------------------|-------------------------------------|-------------------------------|----------------------|----------|
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-07_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-06_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-08_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |
| <input type="checkbox"/> | esxi60-offln-01-update-dflt-bsl-... | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Update |
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-05_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-01_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |
| <input type="checkbox"/> | esxi60-offln-01-dflt-bsl-02_1.0 | embeddedEsx 6.*, embeddedE... | 12/1/2009 4:00:00 PM | Patch |

- Select the first five patches from the list.
- Click **Next**.
- On the Ready to Complete page, click **Finish**.

Task 4: Attach a Baseline and Scan for Updates

You use scanning to evaluate a set of hosts, virtual machines, or virtual appliances against the patches, extensions, and upgrades that are included in the attached baselines and baseline groups.

1. At the top-right corner of the **Baselines** tab, click **Go to compliance view** and verify that no baselines are listed.
2. Expand the inventory in the navigation pane, select **sa-esxi-02.vclass.local**, and click the **Update Manager** tab in the center pane.
3. Click **Attach Baseline**.

The Attach Baseline or Baseline Group dialog box appears.

4. Select the **ESXi Host Update** check box and click **OK**.
5. Click **Scan for Updates...**
6. In the Scan for Updates window, verify that the **Patches and Extensions** and **Upgrades** check boxes are both selected and click **OK**.
7. Monitor the Recent Tasks pane and wait for the scan to complete.
8. Select the **ESXi Host Update** baseline in the Baseline list. In the center bottom pane, verify that the ESXi host is listed as noncompliant.

Task 5: Stage the Patches onto the ESXi Host

You stage patches and extensions onto the ESXi hosts so that they are available locally when the remediation process takes place. This speeds up remediation.

1. In vSphere Web Client, if not already selected, select **sa-esxi-02.vclass.local** in the inventory pane.
2. In the middle pane, click **Stage Patches**.
The Stage wizard starts.
3. On the Baseline page, select the **ESXi Host Update** baseline and click **Next**.
4. On the Hosts page, select the second ESXi host and click **Next**.
5. On the Patch and Extension page, accept the default settings and click **Next**.
6. On the Ready to Complete page, review the information and click **Finish**.
7. Monitor the Recent Tasks pane for the staging tasks to complete.

Task 6: Remediate the ESXi Host

You temporarily disable cluster features such as VMware vSphere® Distributed Power Management™ in the cluster and apply the patches to the ESXi host.

1. In the vSphere Web Client, if not already selected, select **sa-esxi-02.vclass.local** in the inventory pane.
2. In the middle pane, click **Remediate**.
The Remediate wizard starts.
3. On the Select Baselines page, select the **ESXi Host Update** baseline and click **Next**.
4. On the Select Target objects page, select **sa-esxi-02.vclass.local** and click **Next**.
5. On the Patches and Extensions page, leave the default settings and click **Next**.
6. On the Advanced Options page, select the **Schedule this action to run later** check box.
7. Enter **Remediate Second ESXi Host in Lab Cluster** in the **Task Name** text box
8. For **Remediation Time**, enter time 3 minutes from the current time and leave other settings at their defaults.
9. Click **Next**.
10. On the Host Remediation Options page, select the **Disable any removeable media devices connected to the virtual machines on the host** check box and leave other settings at their defaults.
11. Click **Next**.
12. On the Cluster Remediation Options page, deselect the **Disable Distributed Power Management (DPM) if it is enabled for any of the selected clusters** check box and click **Next**.
13. On the Ready to Complete page, review the information and click **Finish**.
14. Monitor the Recent Tasks pane.

Q1. Was the ESXi host patched successfully?

15. Close vSphere Web Client.

Answer Key

Lab 6: Creating Folders in vCenter Server Appliance

Task 2: Create Virtual Machine and Template Folders28

1. The Lab Servers folder has menu commands related to host actions whereas the LabVMs folder has menu commands related to virtual machines.

Lab 7: Using Standard Switches

Task 1: View the Standard Switch Configuration29

1. The default virtual switch is named vSwitch0. machine is connected to the VM Network port group.
2. The default switch is connected to the physical adapter vmnic0.
3. vSwitch0 contains a virtual machine port group named VM Network. Your virtual
4. VM Network and Management Network are connected to the default standard switch.

Lab 12: Modifying Virtual Machines

Task 3: Rename a Virtual Machine in the vCenter Server Inventory58

1. The folder name for the VM2-3 virtual machine is Hot-Clone, which is the original name of this virtual machine.

Lab 14: Managing Virtual Machines

Task 1: Unregister a Virtual Machine from the vCenter Server Appliance Inventory71

1. No, a folder named VM2-3 does not exist. When the virtual machine was first created, it and its folder were named Hot-Clone. When the virtual machine was renamed to VM2-3, its folder was not renamed.

Task 5: Revert the Virtual Machine to a Snapshot78

1. Yes, because the memory state was not preserved.
2. No. You removed these files before creating the snapshot named Without iometer or cpubusy.

- 3. No, because the memory state was preserved.
- 4. Yes.
- 5. No.

Task 6: Delete an Individual Snapshot79

- 1. No. the virtual machine's current state. Deleting the snapshot simply removed the ability to return to that snapshot's point in time.
- 2. Yes. The CPUBUSY file is still on the desktop because deleting the snapshot did not change

Task 7: Delete All Snapshots80

- 1. Yes. and then removed. An option to revert to those earlier points in time is no longer available.
- 2. Yes. The current state of the virtual machine was not altered. Snapshots were consolidated

Lab 15: Managing Resource Pools

Task 3: Verify Resource Pool Functionality86

- 1. 2,000 has. So, the virtual machine in the Fin-Test resource pool receives only one-fourth of the CPU cycles of the logical CPU to which the virtual machines are pinned.
- 2. 8,000
- 3. The Fin-Test resource pool, and thus the virtual machine in it, has only one-fourth of the CPU shares that the Fin-Prod resource pool

Lab 16: Managing vApps

Task 1: Create a vApp89

- 1. Yes. You can see the virtual machines that your_name-vApp contains.

Task 2: Power On a vApp94

- 1. No, they power on in the following order: App01, followed by your_name-App04 and your_name-App02 followed by your_name-your_name-App04 which power on together.

Lab 17: Monitoring Virtual Machine Performance

Task 2: Use Performance Charts to Monitor CPU Utilization96

- 1. Yes. Once the scripts have been stopped, the CPU Ready value will decrease significantly because there is no longer any CPU contention.

Lab 19: Using vSphere HA

Task 2: Add Your ESXi Host to the Cluster110

- 1. Yes, if both hosts are added to the cluster and there are no errors on the cluster, the number of protected VMs will equal the number of powered-on VMs.
- 2. Two datastores. Both the datastores are shared by all of the hosts in the cluster, therefore they are automatically selected for heartbeating.
- 3. The management network error messages disappeared

Task 3: Test vSphere HA Functionality 112

- 1. Yes, the virtual machines previously running on the original master ESXi host are running on the remaining host in the cluster.
- 2. Yes. The slave host is elected as the new master host.

Task 6: Configure a vSphere HA Cluster with Strict Admission Control 117

- 1. Less memory is available because of the overhead needed to run the VMkernel. The VMkernel is holding back memory for its own use.
- 2. The vSphere Web Client reports N/A for the total number of slots because no virtual machines are powered on yet. The slot size calculation considers only virtual machines that are powered on.
- 3. You should see sixteen total slots in the cluster: one used slot, one available slots, and multiple failover slots. If this is not what you see, refresh the vSphere Web Client after 2 minutes, and the numbers should update.
- 4. Unlike the CPU slot size calculation, which is based solely on the largest CPU reservation, the calculation for memory slot size is based on the largest memory reservation, plus memory overhead.
- 5. Zero slots are available. Only two slots were available, the rest were marked as failover slots. Now that two virtual machines have been powered on, each using one of the available slots, there are no more slots available.
- 6. The virtual machine is not allowed to power on, because the cluster has no available slots. The error message in the Recent Tasks pane shows “Insufficient resource to satisfy configured failover level for vSphere HA.”
- 7. No. Of those N total slots, some will be failover slots. The number of virtual machines that you can run is necessarily less than the number of slots. For example, in a two-host cluster that tolerates the failure of one host, only N/2 slots are available.

Lab 20: Implementing a vSphere DRS Cluster

Task 3: Verify Proper vSphere DRS Cluster Functionality 123

- 1. Yes, because all the virtual machines are running on a single host and the running CPUBUSY instances create a large CPU load.
- 2. No, because all recommendations are applied.
- 3. It depends on your lab environment. Even if the cluster is still imbalanced, it is more balanced than it was before the recommendations were applied. vSphere DRS improved the resource allocation for the virtual machines in the cluster.

Task 4: Create, Test, and Disable a VM-VM Affinity Rule. 126

- 1. Yes. vSphere DRS recommends that one virtual machine be migrated to the other host so that both of your virtual machines can be kept together on the same host. This recommendation is based on the vSphere DRS affinity rule that you created.
Note that the recommendation has been assigned priority 1 because it is attempting to fix a broken affinity rule. Therefore, even if DRS was configured to Conservative, this recommendation would appear

Task 6: Create, Test, and Disable a VM-Host Affinity Rule. 130

- 1. vSphere DRS recommends that one of your VM2-# virtual machine be migrated to a different host due to the violation of your VM/Host affinity rule. The other VM2-# virtual machine is already running on the second host.

Lab 21: Using vSphere Update Manager

Task 6: Remediate the ESXi Host.....137

1. Yes.