VMware vSphere: Install, Configure, Manage

Lab Manual

ESXi 6 and vCenter Server 6

VMware® Education Services
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VMware vSphere:
Install, Configure, Manage
ESXi 6 and vCenter Server 6
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Lab Manual

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Lab 1
Installing vSphere Client

Objective: Access the student desktop and install vSphere Client

In this lab, you will perform the following tasks:

1. Access Your Student Desktop System
2. Install vSphere Client

Task 1: Access Your Student Desktop System

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

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- Student desktop login name
- Student desktop password

1. On your computer, start a remote connection application, such as Remote Desktop Connection on Windows machines, to connect to the lab environment.

   Your instructor will provide details about how to access your student desktop system in the lab.

2. Log in to your student desktop with the login name and password.

Task 2: Install vSphere Client

You install VMware vSphere® Client™ on your assigned student desktop. You use the vSphere Client to configure and manage hosts and their virtual machines.

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- Location of the installation software
- Setup language
- ESXi host name
- ESXi host login user name
- ESXi host login password

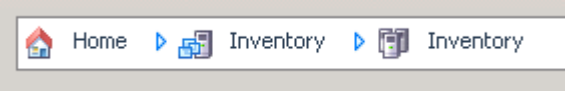
1. Go to the location of the installation software.
2. Double-click **autorun.exe**.

   The VMware vCenter Installer window appears.
3. In the left pane, select **vSphere Client** under VMware vCenter Desktop Client.
4. Click **Install** to start the installation wizard.

   The installation program is extracted and the vSphere Client installation wizard starts.
5. Select the setup language and click **OK**.
6. Click **Next** on the welcome page.
7. On the End User License Agreement page, click **I accept the terms in the license agreement** and click **Next**.
8. On the Destination Folder page, keep the default setting and click **Next**.
9. On the Ready to Install the Program page, click **Install**.
10. On the Installation Completed page, click **Finish**.

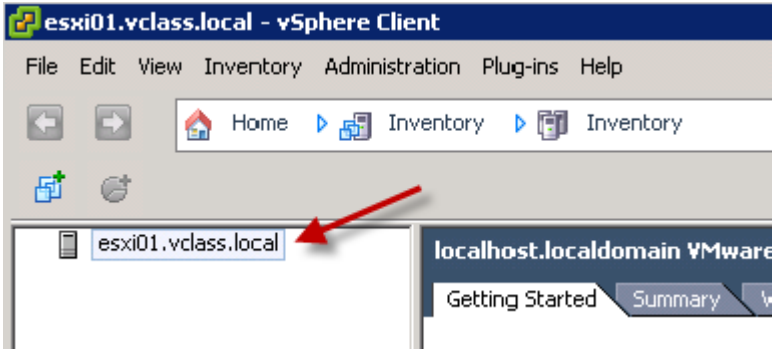
    You should see the vSphere Client icon on your student desktop.

11. Click **Exit** to close the VMware vCenter Installer window and close the folder containing the installation software.
12. Log in to your ESXi host from the vSphere Client.
    a. Double-click the vSphere Client icon on your student desktop.
    b. In the **IP address/Name** text box, enter your assigned ESXi host name or IP address.
    c. In the **User name** text box, enter the ESXi host login user name.
    d. In the **Password** text box, enter the ESXi host login password and click **Login**.
    e. When a Security Warning window appears, select the **Install this certificate and do not display any security warnings for "*ESXi_host_name*"** check box to prevent this warning from being displayed in the future.
    f. Click **Ignore** to proceed with the connection.
    g. If a security warning appears stating that installing a new certificate will replace the existing trusted certificate, click **Yes** to proceed.
13. If the VMware Evaluation Notice dialog box appears stating that your evaluation license will expire within # days, click **OK**.
14. In the navigation bar at the top of the vSphere Client, verify that the path is **Home** > **Inventory** > **Inventory**.



15. Verify that your ESXi host is listed as the root in the inventory pane.

    Your view should be similar to the screenshot.



16. Leave the vSphere Client open for the next lab.

Lab 2
Configuring ESXi Hosts

Objective: Configure an ESXi host

In this lab, you will perform the following tasks:

1. Examine the ESXi Host Hardware Configuration
2. Configure the DNS and Routing Information for an ESXi Host
3. Configure an ESXi Host to Use Directory Services

Task 1: Examine the ESXi Host Hardware Configuration

In VMware vSphere® Client™, you view the health of the VMware ESXi™ host hardware, including the processor and memory information.

Students should perform the steps in this task individually.

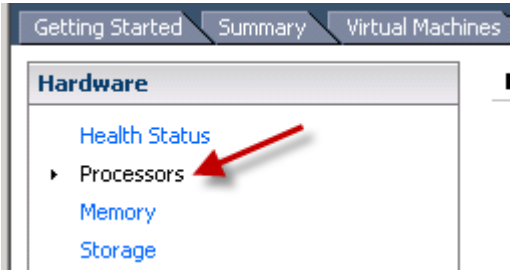
Use the following information from the class configuration handout:

- ESXi host name
- ESXi host login user name
- ESXi host login password

1. If the vSphere Client is not active, double-click the vSphere Client icon on your student desktop, connect to your assigned ESXi host, and log in.
2. In the vSphere Client, select the ESXi host in the inventory pane and click the **Configuration** tab in the pane on the right.

   The Hardware Health Status view appears.

3. In the **Sensor** list, click the plus sign (+) next to **VMware, Inc. VMware Virtual Platform** and its descendants to expand the view.
4. In the Status column, verify that all the component status appear as normal.
5. In the **Hardware** list, select **Processors**.



6. View the model, processor speed, processor sockets, and other information about the ESXi host's processors.
7. In the **Hardware** list, select **Memory**.
8. View the total physical memory, the memory used by the system, and the memory available for use by virtual machines.

Task 2: Configure the DNS and Routing Information for an ESXi Host

You verify the DNS and routing information for the ESXi host.

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- ESXi host identification name
- ESXi host identification domain
- Preferred DNS server
- VMkernel default gateway

1. In the vSphere Client, select your ESXi host in the inventory pane and click the **Configuration** tab.
2. In the **Software** list, select **DNS and Routing**.
3. Click the **Properties** link in the upper-right corner.

   The DNS and Routing Configuration dialog box appears.

4. Click the **DNS Configuration** tab and configure the parameters.

Option	Action
Name	Enter your ESXi host identification name, for example, esxi01 or esxi02.
Domain	Enter your ESXi host identification domain name.
Preferred DNS server	Verify that the assigned DNS IP address is accurate.
Look for hosts in the following domains	Leave as the default.

5. Click the **Routing** tab.
6. Verify that the IP address in the **Default gateway** text box is accurate and click **OK**.

Task 3: Configure an ESXi Host to Use Directory Services

You configure the ESXi host to use a directory service, such as Active Directory, to manage users.

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- Directory services domain
- Domain administrator name
- Domain administrator password

1. In the vSphere Client, select your ESXi host in the inventory pane and click the **Configuration** tab.
2. In the **Software** list, click **Authentication Services**.
3. Click the **Properties** link.

   The Directory Services Configuration dialog box opens.
4. From the **Select Directory Service Type** drop-down menu, select **Active Directory**.
5. In the **Domain** text box, enter the directory services domain name and click **Join Domain**.
6. Enter the domain administrator user name and password and click **Join Domain**.

   The window displays Local Authentication until you click **OK**.
7. Click **OK**.

8. Verify that the information in the Authentication Services Settings pane is accurate.
9. Leave the vSphere Client open for the next lab.

Lab 3
Working with Virtual Machines

Objective: Create and prepare virtual machines for use

In this lab, you will perform the following tasks:

1. Create a Virtual Machine
2. Install a Guest Operating System in a Virtual Machine
3. Identify the Virtual Machine's Disk Format and View Storage Metrics
4. Install VMware Tools on a Virtual Machine Installed with a Windows OS
5. Prepare Your Virtual Machine for Upcoming Labs

Task 1: Create a Virtual Machine

You can create a virtual machine based on certain requirements, such as a particular operating system or hardware configuration.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- ESXi host name
- ESXi host login user name
- ESXi host login password
- Virtual machine datastore
- Guest operating system version
- Student ISO image folder
- Guest operating system ISO image name

1. In the VMware vSphere® Client™, verify that the VMware ESXi™ host in the inventory pane is selected.
2. Right-click the ESXi host and select **New Virtual Machine**.

   The Create New Virtual Machine wizard appears.
3. On the Configuration page, click **Custom** and click **Next**.
4. On the Name and Location page, name the virtual machine with your first name, followed by the number of your assigned ESXi host and a sequence number, starting with 1.

   For example, Mike has ESXi02, so his virtual machine is named Mike02-1.
5. Click **Next**.
6. On the Storage page, select the name of the virtual machine's datastore and click **Next**.
7. On the Virtual Machine Version page, click **Virtual Machine Version: 10** and click **Next**.

   NOTE

   For lab practice purposes, you do not select hardware version 11. You upgrade the virtual machine hardware to a higher version in a later lab.
8. On the Guest Operating System page, click **Windows**.
9. From the **Version** drop-down menu, select the guest operating system and click **Next**.
10. On the CPUs page, keep the default settings and click **Next**.
11. On the Memory page, enter `1` (1 GB) in the **Memory Size** text box and click **Next**.
12. On the Network page, keep the default settings and click **Next**.
13. On the SCSI Controller page, keep the default settings and click **Next**.
14. On the Select a Disk page, click the **Create a new virtual disk** button and click **Next**.
15. On the Create a Disk page, enter `11` GB in the **Disk Size** text box and click **Thin Provision**.
16. For Location, verify that **Store with the virtual machine** is clicked and click **Next**.
17. On the Advanced Options page, keep the default settings and click **Next**.
18. On the Ready to Complete page, review the information, select the **Edit the virtual machine settings before completion** check box, and click **Continue**.
19. When the Virtual Machine Properties dialog box opens, select **New CD/DVD (adding)**.
20. Click **Datastore ISO File** and click **Browse**.
21. In the Browse Datastore window, navigate to the student ISO image folder.
22. Select the guest operating system ISO image and click **OK**.

23. In the Virtual Machine Properties dialog box, select the **Connect at power on** check box and click **Finish**.
24. Verify that the newly created virtual machine appears under your ESXi host in the inventory pane.
25. Select the virtual machine and click the **Summary** tab.
26. View the Resources pane and record the following information.
    - Provisioned Storage _____
    - Not-shared Storage _____
    - Used Storage _____

Task 2: Install a Guest Operating System in a Virtual Machine

After creating a virtual machine, you must install an operating system in it.

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- Guest operating system for the virtual machine
- Virtual machine Administrator password

1. In the vSphere Client, verify that the virtual machine is selected in the inventory pane.
2. Right-click the virtual machine and select **Power > Power On**.
3. Right-click the virtual machine and select **Open Console** to monitor the installation progress.

   NOTE

   You can press Ctrl+Alt keyboard at any time to release the pointer from the virtual machine console.
4. If the mouse is not responsive in the console, use keyboard shortcuts to complete the installation.

   To determine the keyboard shortcut, note the underlined letter for the action needed. For example, the keyboard shortcut for **Next** is Alt+N.

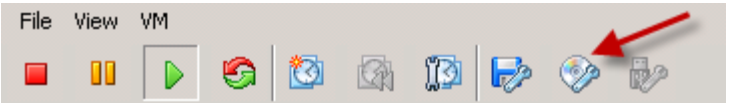
   You can use the Tab and arrow keys to move between items in a window when you need to enter information or select items from a list.

   You can use the spacebar to select check boxes or click buttons.
5. When the Install Windows dialog box appears, review the default settings for the **Language to install**, **Time and currency format**, and **Keyboard or input method** drop-down menus.
6. Click **Next** or press ALT N.

7. Click **Install now** or press ALT I.
8. Use the arrow keys to select the guest operating system for the virtual machine and click **Next** or press ALT N.
9. Select the **I accept the license terms** check box, or press or press ALT A.
10. Click **Next** or press ALT N.
11. For the type of installation, **Custom (advanced)** is selected, press Enter.
12. Verify that **Disk 0 Unallocated Space** is selected and click **Next** or press ALT N.

    The Windows installation process starts. This process takes 8 to 10 minutes.
13. When the message instructing you to change the password appears, click **OK** or press Enter.

    You might need to use the Tab key to reselect **OK** in order for pressing Enter to take effect.
14. Enter the virtual machine Administrator password, press Tab, and reenter the password.
15. Click the right arrow button or press Tab to select the button and press Enter
16. When the password change confirmation appears, click **OK** or press Enter.
17. When the virtual machine's Initial Configuration Tasks window opens, select the **Do not show this window at logon** check box or press Alt+D and click **Close** or press Alt+C.
18. When the Server Manager window opens, close it.
19. After the installation is complete, click the **Connect/disconnect the CD/DVD devices of the virtual machine** icon in the icon bar of the virtual machine console.



    Press Ctrl+Alt to release the pointer from the console.
20. Select **CD/DVD drive 1** > **Disconnect from datastore image**.
21. When the Disconnect Device message appears, click **Yes** to confirm the disconnection.
22. Leave the virtual machine console open.

Task 3: Identify the Virtual Machine's Disk Format and View Storage Metrics

You identify the virtual machine disk format and view storage metrics.

Students should perform the steps in this task individually.

1. In the vSphere Client, right-click your virtual machine in the inventory pane and select **Edit Settings**.
2. If the Restricted Virtual Machine Settings warning message appears, select the **Do not show this message again** check box and click **OK**.
3. On the **Hardware** tab, select **Hard disk 1** in the left pane.
4. Review the information shown in the Disk Provisioning pane and identify the VMDK type.

   Q1. What type of disk is provisioned?

5. Click **Cancel** to close the Virtual Machines Properties dialog box.
6. Click the virtual machine's **Summary** tab.
7. Under the Resources pane, click the **Refresh Storage Usage** link to update the Provisioned Storage and Used Storage metrics.
8. Record the updated information.
   - Provisioned Storage _____
   - Not-shared Storage _____
   - Used Storage _____
9. Compare the values that you recorded in step 8 with the values listed in task 1, step 26.

   The values should be different. Although a virtual disk is configured for the virtual machine, the storage space consumed by the VMDK file is lower than the total allocated disk space. The used storage space increases dynamically as the virtual machine is used because the disk is thin provisioned.

Task 4: Install VMware Tools on a Virtual Machine Installed with a Windows OS

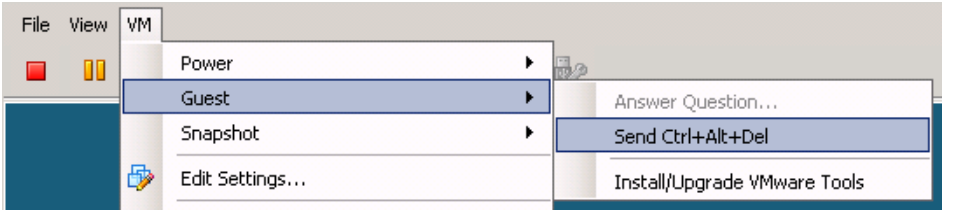
You install VMware Tools™ to enhance the performance of the virtual machine's guest operating system and improve management of the virtual machine.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine Administrator password

1. Return to the virtual machine console.
2. If you were logged out of the virtual machine, log in to the guest operating system.
   a. In the menu bar of the virtual machine console, select **VM** > **Guest** > **Send Ctrl+Alt+Del**.



   b. Enter the Administrator password and click the arrow or press Enter.
3. Install VMware Tools in the Windows guest operating system.
   a. In the menu bar of the virtual machine console, click **VM** and select **Guest** > **Install/ Upgrade VMware Tools**.
   b. When the Install VMware Tools message appears, read it and click **OK**.

      The AutoPlay window appears in a few seconds.
   c. Click **Run setup.exe**.

      The VMware Tools installation wizard appears.
   d. On the Welcome to the installation wizard for VMware Tools page, click **Next**.
   e. On the Choose Setup Type page, click **Typical** and click **Next**.
   f. On the Ready to Install VMware Tools page, click **Install**.
4. When the VMware Tools setup wizard is completed, click **Finish**.
5. When you are prompted to restart the virtual machine, click **Yes**.

6. When the virtual machine displays the login screen, log in.
   a. On the menu bar of the virtual machine console, click **VM** and select **Guest** > **Send Ctrl+Alt+Del**.
   b. Enter the Administrator password and click the arrow or press Enter.
7. Verify that VMware Tools is installed on your virtual machine.

   After the system displays the desktop, you should see a VMware Tools icon in the lower-right corner of the virtual machine's desktop. The icon might take a few seconds to appear.

8. Leave the virtual machine console open.

Task 5: Prepare Your Virtual Machine for Upcoming Labs

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

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- Student ISO image folder

1. In the virtual machine console, connect `ClassFiles-vSphere.iso` to your virtual machine's CD/DVD drive.
   a. In the icon bar of the virtual machine console, click the **Connect/disconnect the CD/DVD devices of the virtual machine** icon.
   b. Select **CD/DVD Drive 1** > **Connect to ISO image on a datastore**.
   c. Select the student ISO image folder.
   d. Select **ClassFiles-vSphere.iso** and click **OK**.
2. If the CD/DVD drive does not open automatically, click **Start** and select **Computer**.
3. Open the CD/DVD drive (D:).

4. Copy the `cpubusy` VBScript file and `iometer` application file from the CD/DVD drive (D:) to the virtual machine's C:\ for use in later labs.
   a. Using the Ctrl key and mouse, select both files.
   b. On the Windows Explorer menu bar, click **Edit** and select **Copy to Folder**.
   c. In the **Copy Items** list, select **Local Disk (C:)** and click **Copy**.
5. Disconnect the virtual machine from `Classfiles-vSphere.iso` on the CD/DVD drive.
   a. In the vSphere Client, right-click the virtual machine in the inventory pane and select **Edit Settings**.
   b. In the **Hardware** list, select **CD/DVD Drive 1**.
   c. In the Device Details pane, deselect the **Connected** and **Connect at Power On** check boxes.
   d. Click **OK**.
6. To avoid future unnecessary logins, disable the screen saver on your virtual machine.
   a. From the virtual machine's desktop, select **Start > Control Panel**.
   b. Double-click **Personalization**.
   c. Click **Screen Saver**.
   d. From the **Screen saver** drop-down menu, select **(None)** and click **OK**.
   e. Close the Control Panel window.
7. Close your virtual machine console and the vSphere Client.

Lab 4
Working with vCenter Server

Objective: Configure vCenter Server Appliance for first use

In this lab, you will perform the following tasks:

1. Access vCenter Server Appliance
2. Install vCenter Server Appliance and Host License Keys
3. Create a Data Center Object
4. Add Your ESXi Host to the vCenter Server Inventory
5. Configure Your ESXi Host as an NTP Client

The Mozilla Firefox Web browser is recommended for all Web-based labs in this course.

Task 1: Access vCenter Server Appliance

You use VMware vSphere® Web Client to connect to VMware vCenter Server™ Appliance™, which is preinstalled in your lab environment.

Both students perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Preferred DNS server

1. On your student desktop, double-click the **Mozilla Firefox** shortcut.
2. In the Firefox window, click the **vSphere Web Client** shortcut on the shortcut toolbar.
3. If you receive a message warning you of the untrusted connection, click **I understand the Risks**, click **Add Exception**, and click **Confirm Security Exception** to add vCenter Server Appliance as a trusted location.
4. Use the link at the bottom of the vSphere Web Client login page to install the Client Integration Plug-In.
   a. In the Firefox Web browser, click the **Download Client Integration Plugin** link.
   b. On the Opening VMware-ClientIntegrationPlugin-6.0.0.exe window, click **Save File**.
   c. When for the download is complete, close the Firefox Web browser.
   d. On the task bar, click **Start** and select **Computer**.
   e. In the left pane, select **Downloads**.
   f. In the right pane, double-click **VMware-ClientIntegrationPlugin-6.0.0.exe**.
   g. In the Open File - Security Warning window, click the **Run** button.
   h. In the Welcome window, click **Next**.
   i. In the End-User License Agreement window, accept the license agreement and click **Next**.
   j. In the Destination Folder window, click **Next**.
   k. Click **Install**.
   l. Click **Finish**.
   m. Close the Downloads window.

5. Install the VMware Remote Console plug-in from the `LabFiles` folder.
   a. On the desktop, double-click the **LabFiles** folder.
   b. In the LabFiles window, double-click the **VMware-VMRC-7.0.1-2508353.msi** file.
   c. In the VMware Remote Console Setup welcome window, click **Next**.
   d. On the End-User License Agreement window, accept the license agreement and click **Next**.
   e. On the Destination Folder window, accept the defaults and click **Next**.
   f. On the User Experience Settings window, accept the defaults and click **Next**.
   g. On the Ready to install window, click **Install**.
   h. After the install is complete, click **Finish** and close the **LabFiles** window.
6. On your student desktop, double-click the **Mozilla Firefox** shortcut.
7. On the Firefox shortcut bar, click the **vSphere Web Client** shortcut.
8. If you receive message warning you of the untrusted connection, click **I understand the Risks**, click **Add Exception** and click **Confirm Security Exception** to add vCenter Server Appliance as a trusted location.
9. If the Allow *vCenter_Server_Appliance _name* to run plug-ins dialog box appears, click **Allow and Remember** for Adobe Flash and VMware Remote Console and click **OK**.
10. In the Launch Application pop-up window, select the **Remember my choice** check box and click **OK**.
11. On the VMware vCenter Single Sign-On page, enter the vCenter Single Sign-On user name and password and click **Login**.

    The vSphere Web Client Home page appears.
12. In the Navigator pane, select **Administration** > **System Configuration** > **Nodes**.

    The vCenter Server Appliance object appears in the Navigator pane.
13. Select vCenter Server Appliance and click the **Manage** tab.
14. Click **Settings**.
15. If the view is collapsed, click the arrow next to **Common** to expand the view.
16. Select **Networking** and click **Edit**.
17. Click the arrow next to **DNS** to expand the view of DNS configuration settings.
18. Click **Enter settings manually** and verify that the values in the **Hostname** and **Preferred DNS server** text boxes match the values in the class configuration handout.
19. Click **OK**.

Task 2: Install vCenter Server Appliance and Host License Keys

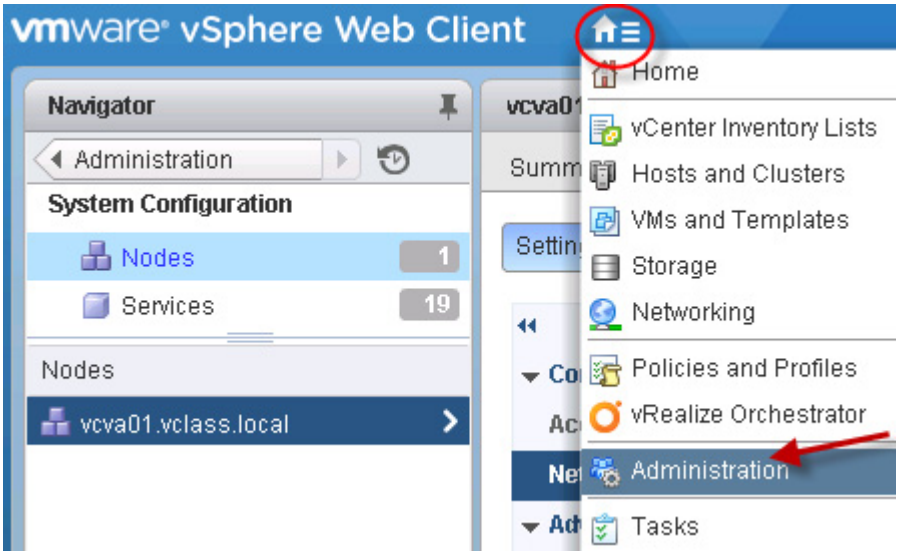
You install license keys in vCenter Server Appliance to unlock the advanced features of VMware vSphere® 6.

Perform this task as a team. Student B should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server license key
- vSphere 6 Enterprise Plus license key

1. In the vSphere Web Client, click the **Home** icon on the blue bar and select **Administration**.



2. In the Navigator pane, select **Licenses** and click the **Licenses** tab in the content pane.
3. Click the **Create New Licenses** icon (the green plus sign).
4. On the Enter license keys page, enter the VMware vCenter Server and vSphere 6 Enterprise Plus license keys in the **License keys** text box.
5. Verify that two licenses are listed in the text box and click **Next**.
6. On the Edit license names page, enter **`VMware vCenter Server`** in the VMware vCenter Server 6 license name text box.
7. Enter **`VMware vSphere`** in the VMware vSphere 6 license name text box and click **Next**.
8. On the Ready to complete page, click **Finish**.

9. License vCenter Server.
   a. In the center pane, click the **Assets** tab.
   b. Right-click the vCenter Server Appliance instance and select **Assign License**.
   c. In the Assign License window, select the VMware vCenter Server license and click **OK**.

Task 3: Create a Data Center Object

You create a fully functional virtual data center, which contains all your inventory objects, including VMware ESXi™ hosts, virtual machines, and datastores.

Perform this task as a team. Student A should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name

1. In the vSphere Web Client, click the **Home** icon and select **Home**.

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

3. In the Navigator pane, right-click your vCenter Server Appliance name and select **New Datacenter**.
4. In the **Datacenter name** text box, enter `Training` and click **OK**.

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

Task 4: Add Your ESXi Host to the vCenter Server Inventory

To create a vSphere virtual environment and use vSphere features, you add ESXi hosts to the vCenter Server inventory.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- ESXi host name (FQDN)
- ESXi host login user name
- ESXi host login password

1. In the vSphere Web Client, click the **Home** icon and select **Home**.
2. On the vSphere Web Client Home page, select **Hosts and Clusters**.
3. In the Navigator pane, right-click **Training** and select **Add Host**.

   The Add Host wizard appears.
4. On the Name and location page, enter the fully qualified domain name (FQDN) of your ESXi host and click **Next**.
5. On the Connection settings page, enter your ESXi host login user name and password and click **Next**.
6. If you see a security alert stating that the certificate store of vCenter Server cannot verify the certificate, click **Yes** to proceed.
7. On the Host summary page, review the information and click **Next**.
8. On the Assign license page, click the button for your VMware vSphere license key and click **Next**.
9. On the Lockdown mode page, leave **Disabled** clicked and click **Next**.
10. On the VM location page, leave the **Training** data center object selected and click **Next**.
11. On the Ready to complete page, review the information and click **Finish**.
12. In the vSphere Web Client Recent Tasks pane, monitor the progress of the task.
13. In the Navigator pane, click the arrow next to **Training** to expand the view.

14. In the Navigator pane, select your ESXi host and click the **Summary** tab to view the information, such as its CPU, memory, storage, NICs, and virtual machines.
15. Click the arrow next to the Hardware pane to view the hardware details of the ESXi host.

Task 5: Configure Your ESXi Host as an NTP Client

Students should perform the steps in this task individually.

Use the following information from the class configuration handout:

- NTP server

1. In the vSphere Web Client, select your ESXi host in the inventory, click the **Manage** tab, and click the **Settings** tab.
2. In the middle pane, select **Time Configuration** under System and view the current settings.
3. In the Time Configuration pane, verify that the NTP client (your ESXi host) appears as disabled, the NTP service status appears as stopped, and no NTP server is defined.
4. Click **Edit**.

   The Edit Time Configuration dialog box appears.
5. Click **Use Network Time Protocol (Enable NTP client)**.
6. From the **NTP Service Startup Policy** drop-down menu, select **Start and stop with host**.
7. In the **NTP Servers** text box, enter the IP address of your NTP server.
8. Under NTP Service Status, click **Start**.
9. Click **OK**.
10. In the Time Configuration pane, verify that the NTP client appears as enabled and that the NTP service status appears as running.
11. Close the vSphere Web Client.

Lab 5
Using vSphere Web Client

Objective: Navigate and customize vSphere Web Client

In this lab, you will perform the following tasks:

1. Navigate vSphere Web Client
2. Pin and Unpin Panes
3. Hide the Getting Started Tabs
4. Upgrade the Virtual Machine's Hardware

Task 1: Navigate vSphere Web Client

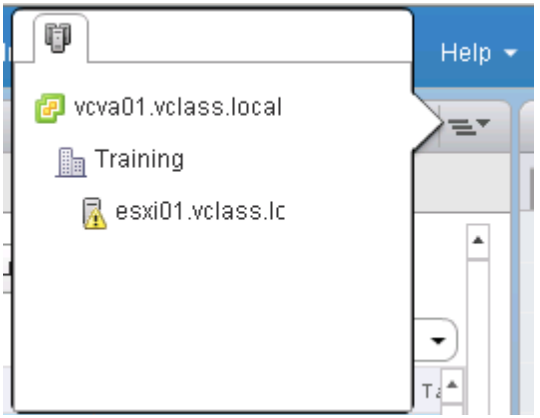
In VMware vSphere® Web Client, you navigate through the objects in the navigation tree and view the configuration settings.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Virtual machine's local datastore
- ESXi host name

1. Open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client.
2. If you receive a message warning you of the untrusted connection, click **I understand the Risks**, click **Add Exception**, and click **Confirm Security Exception** to add vCenter Server Appliance as a trusted location.
3. On the VMware vCenter Single Sign-on page, enter the user name and password and click **Login**.
4. Click **Hosts and Clusters**.
5. In the Navigator pane, click the arrow next to each object to expand the view completely.
6. In the Navigator pane, select your VMware ESXi™ host.
7. In the center pane, click the quick navigation menu.



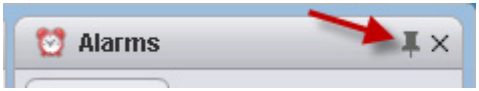
8. Select the vCenter Server Appliance name to return to the top of the navigation tree.
9. In the **Search** text box, enter **`datastore`**.
10. When the datastores appear under the search box, click your assigned local datastore for your virtual machine.
11. Click the **Summary** tab and review the datastore details.
12. Click the **Home** icon and select **Home** to return to the vSphere Web Client Home page.

Task 2: Pin and Unpin Panes

You can adjust the vSphere Web Client panes to provide more space for the content area.

Students perform the steps in this task individually.

1. In the vSphere Web Client, notice the two panes to the right of the window.
2. In the Alarms pane, click the pin icon.



   The Alarms pane shrinks to a side tab at the side of the window.
3. In the Work In Progress pane, click the pin icon to shrink it to a side tab.

   You can click the side tab to reopen the pane and click the pin icon to repin it.
4. If you need to restore a previous layout of the user interface, click your logged-in user name and select **Layout Settings** > **Reset to default layout**.

Task 3: Hide the Getting Started Tabs

You can hide the Getting Started tabs if you understand the vCenter Server fundamentals and know how to navigate amongst the objects.

Students perform the steps in this task individually.

1. On the vSphere Web Client Home page, click **Help** above the content pane and select **Hide All Getting Started Pages** from the drop-down menu.
2. In the Navigator pane, select your ESXi host.
3. Record the first tab that you see in the content pane. _____
4. Select **Help** > **Show All Getting Started Pages** to restore the tab.
5. In the vSphere Web Client, click the **Home** icon and select **Home**.

Task 4: Upgrade the Virtual Machine's Hardware

You upgrade the virtual machine's hardware to the latest supported version, which determines the operating system functions and virtual machine operations.

Students perform the steps in this task individually.

1. On the vSphere Web Client home page, click **Hosts and Clusters.**
2. In the Navigator pane, expand the vCenter Server instance, the **Training** data center object, and your ESXi host object.
3. Right-click the ***your_name*##-1** virtual machine and select **Power** > **Shut Down Guest OS**.
4. Click **Yes** to confirm the shutdown.
5. Click the ***your_name*##-1** virtual machine's **Summary** tab.
6. Find the compatibility value for the virtual machine and record the hardware version.

   _____
7. Right-click the ***your_name*##-1** virtual machine and select **Edit Settings**.
8. Click the arrow next to **Upgrade** to expand the view.
9. Select the **Schedule VM Compatibility Upgrade** check box.
10. From the **Compatible with (*)** drop-down menu, verify that **ESXi 6.0 and later** is selected.
11. Click **OK**.
12. Right-click the ***your_name*##-1** virtual machine and select **Power** > **Power on**.
13. Click the ***your_name*##-1** virtual machine's **Summary** tab.
14. Compare the compatibility value with the value recorded in step 6.

    The compatibility value should read "ESXi 6.0 and later (VM version 11)" as the virtual machine's hardware is upgraded.
15. Leave the vSphere Web Client open for the next lab.

Lab 6

Creating Folders in vCenter Server Appliance

Objective: Create vCenter Server inventory objects

In this lab, you will 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 use folders to group hosts and clusters of the same type for easier management.

Perform this task as a team. Student B should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters**.

3. In the left pane, click the arrow to expand the vCenter Server inventory.
4. Right-click **Training** and select **New Folder** > **New Host and Cluster Folder**.
5. Enter **`Lab Servers`** as the folder name and click **OK**.
6. Drag both the VMware ESXi™ hosts to the **Lab Servers** folder.
7. In the Recent Tasks pane, monitor the Move Entities tasks until they complete.
8. In the vSphere Web Client, 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 for easier management.

Perform this task as a team. Student A should perform the steps in this task.

1. On the vSphere Web Client Home page, click **VMs and Templates**.
2. Right-click the **Training** data center and select **New Folder** > **New VM and Template Folder**.
3. Enter **`LabVMs`** as the folder name and click **OK**.
4. In the left pane, click the arrow to expand the **Training** data center.
5. Drag both virtual machines into the **LabVMs** folder.
6. Expand the **LabVMs** folder to verify that both virtual machines are in the folder.
7. Right-click **Training** and select **New Folder** > **New VM and Template Folder** to create a second virtual machine folder.
8. Enter **`Templates`** as the folder name and click **OK**.
9. Click the **Home** icon and select **vCenter inventory Lists**.
10. In the left pane, select **Datacenters**.
11. In the left pane, double-click **Training** and click **Top level objects**.

    The three folders that you create in this lab appear in the left pane.
12. Right-click each of the three folders.

    Q1. How do the menus differ between the Lab Servers folder and the LabVM folder?

13. Leave the 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 will 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 Machine to the New Virtual Machine Port Group

Task 1: View the Standard Switch Configuration

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- ESXi host name

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and login.
2. On the vSphere Web Client Home page, click **Hosts and Clusters**.

3. Select **Training > Lab Servers >** ***your_ESXi_host***.
4. Click the **Manage** tab and click the **Networking** tab.
5. Select **Virtual Switches**.

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 port group to configure a NIC port on a standard switch, which handles network traffic at the host level in your vSphere environment.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vmnic for the virtual switch of the Production network

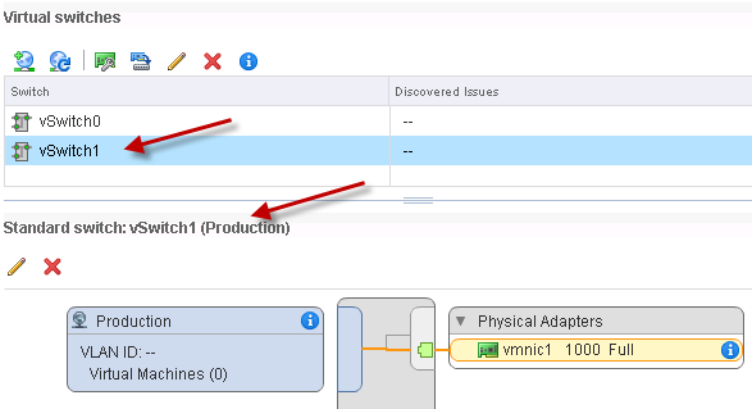
1. In the Virtual switches pane, click the **Add host networking** icon.

The Add Networking wizard appears.

2. On the Select connection type page, click **Virtual Machine Port Group for a Standard Switch** and click **Next**.
3. On the Select target device page, click **New standard switch** and click **Next**.

4. On the Create a Standard Switch page, click the **Add Adapters** icon (the green plus sign).
5. Select **vmnic1** and click **OK**.
6. Review the information for the new active adapter and click **Next**.
7. On the Connection Settings page, enter **`Production`** in the **Network label** text box and click **Next**.
8. On the Ready to complete page, verify that the information is accurate and click **Finish**.
9. In the Virtual switches pane, select **vSwitch1**.
10. Verify that the Production port group appears.

    The screenshot shows the new standard switch and the network label.



Task 3: Attach Your Virtual Machine 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password

1. In the vSphere Web Client, click the **Home** icon and select **VMs and Templates**.
2. In the left pane, click the arrows to expand the data center and folders.
3. Select **Training** > **LabVMs**.
4. Right-click your virtual machine and select **Edit Settings**.

5. Click the arrow next to **Network Adapter 1** to expand the view.
6. From the drop-down menu, select **Production**.
7. Verify that the **Connected** and the **Connect at power on** check boxes are selected.
8. Click **OK** to close the Edit Settings window.
9. Renew the virtual machine's IP address.
   a. In the left pane, select your virtual machine.
   b. In the center pane, click **Launch Remote Console**.

      NOTE

      Your Web browser must be configured to allow pop-ups.

   c. In the Launch Application window, select the **Remember my choice for vmrc links** check box and click **OK**.
   d. In the Invalid Security Certificate window, select the **Always trust this host with this certificate** check box and click **Connect Anyway**.
   e. If you are prompted to log in due to an expired session ticket, enter the VMware vCenter™ Single Sign-On™ user name and password and click **OK**.
   f. Click in the console window and move the pointer to display the login window.
   g. Click **Send Ctrl+Alt+Del** in the top-left corner of the virtual machine console.
   h. Log in with the virtual machine administrator password.
   i. Select **Start > Run**.
   j. In the Start Search text box, enter **`cmd`** to open a Command Prompt window.
   k. At the command prompt, enter **`ipconfig /release`**.
   l. Enter **`ipconfig /renew`**.
   m. Record the virtual machine's IP address and the default gateway. _____
10. At the virtual machine's command prompt, ping the ControlCenter (172.20.10.10) to verify the virtual machine's network connectivity.

    Your ping should be successful.
11. If the ping is not successful, repeat the steps in task 2 and in this task to verify that your configuration is accurate.
12. Leave the vSphere Web Client and virtual machine console open for the next lab.

Lab 8
Using vSphere Distributed Switches

Objective: Create and configure a distributed switch

In this lab, you will perform the following tasks:

1. Create a Distributed Switch
2. Add the ESXi Hosts to the New Distributed Switch
3. Examine Your Distributed Switch Configuration
4. Migrate the Virtual Machines to a Distributed Switch Port Group
5. Prepare for the Next Lab

Task 1: Create a Distributed Switch

You create a distributed switch that functions as a single virtual switch across all associated hosts in your VMware vSphere® environment.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance_name* /vsphere-client and log in.
2. In the vSphere Web Client, click the **Home** icon and select **Networking**.
3. Click the arrow next to Training to expand the view.
4. Right-click **Training** and select **Distributed Switch** > **New Distributed Switch**.
5. On the Name and location page, enter ***your_name*-dvs** in the **Name** text box and click **Next**.
6. On the Select version page, leave **Distributed switch: 6.0.0** selected and click **Next**.
7. On the Edit settings page, configure the distributed switch parameters.

Option	Action
Number of uplinks	Enter **1.**
Network I/O Control	Leave **Enabled** selected.
Default port group	Leave the check box selected.
Port group name	Enter ***your_name*-pg-Production** in the text box.

8. Click **Next**.
9. On the Ready to complete page, review the configuration settings and click **Finish**.

   The *your_name*-dvs distributed switch should be listed in the Navigator pane.

Task 2: Add the ESXi Hosts to the New Distributed Switch

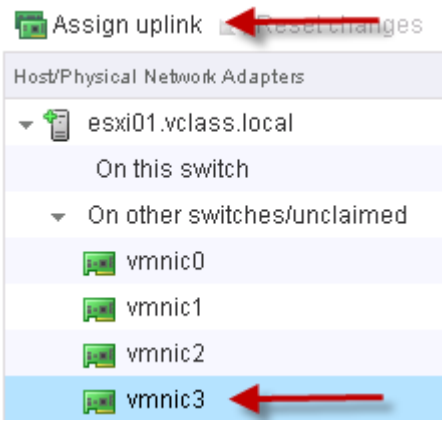
You add VMware ESXi™ hosts and physical adapters to the distributed switch, which acts as a central interface to configure, monitor, and administer the virtual machine switching for your data center.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vmnic for the distributed switch
- ESXi host name

1. In the Navigator pane, right-click the ***your_name*-dvs** distributed switch and select **Add and Manage Hosts**.
2. On the Select task page, leave **Add hosts** clicked and click **Next**.
3. On the Select hosts page, click **New Hosts** (the green plus sign).
4. Select your assigned ESXi host check box and click **OK**.
5. Click **Next**.
6. On the Select network adapter tasks page, deselect the **Manage VMkernel adapters** check box and leave the **Manage physical adapters** check box selected.
7. Click **Next**.
8. On the Manage physical network adapters page, select the vmnic specified in the class configuration handout for the distributed switch and click **Assign uplink**.



9. Select **Uplink 1** and click **OK**.

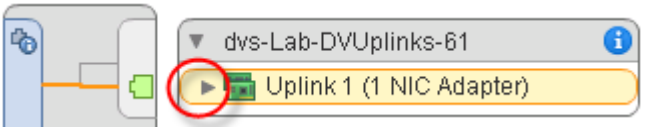
10. Click **Next**.
11. On the Analyze impact page, verify that the status is No impact and click **Next**.
12. On the Ready to complete page, review your settings and click **Finish**.

Task 3: Examine Your Distributed Switch Configuration

You examine the configuration of the distributed switch uplink, which is bound to the associated physical interfaces on the ESXi hosts. You also examine other distributed switch features, including the maximum transmission unit (MTU) value, VLAN capabilities, LACP aggregation groups, NetFlow, and VMware vSphere® Network I/O Control.

Students perform the steps in this task individually.

1. In the Networking inventory tree, select the ***your_name*-dvs** distributed switch and click the arrow next to it to expand the view.
2. In the middle pane, click the **Manage** tab, click the **Settings** tab, and select **Topology**.
3. In the distributed switch topology diagram, click the arrow next to **Uplink 1** to expand the view.



4. Verify that your ESXi host's vmnic interface for the distributed switch is attached.
5. In the middle pane, click the **Properties** link on the left and verify the settings.
   - Network I/O Control is enabled.
   - Number of uplinks is 1.
   - The MTU size is 1500 bytes.
   - The Cisco Discovery Protocol is implemented.
6. Click each additional configuration link and verify the settings.
   - LACP LAG is not defined.
   - Private VLAN is not defined.
   - NetFlow collector is not defined.
   - Port mirroring is not configured.
   - Health check is not enabled.
7. In the Networking inventory tree, select the ***your_name*-pg-Production** port group.

8. Click the **Manage** tab and click the **Settings** tab.
9. Click the **Properties** link and verify the settings.
    - Static port binding is implemented.
    - Elastic port allocation is implemented.
    - Nine ports are defined.

Task 4: Migrate the Virtual Machines to a Distributed Switch Port Group

You move the virtual machine from the current standard switch on the ESXi host to the port group on the distributed switch.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password
- ControlCenter IP address

1. In the Navigator pane, right-click the ***your_name*-dvs** distributed switch and select **Migrate VM to Another Network**.

    The Migrate Virtual Machine Networking wizard starts.
2. Migrate the virtual machine from the Production network on the standard switch to the *your_name*-pg-Production network on the distributed switch.
    a. On the Select source and destination networks page, for the Source network, leave **Specific network** clicked, click **Browse**, select **Production**, and click **OK**.
    b. For the Destination network, click **Browse**, select the ***your_name*-pg-Production** port group, and click **OK**.
    c. Click **Next**.
    d. On the Select VMs to migrate page, select your virtual machine check box and click **Next**.
    e. On the Ready to complete page, review the settings and click **Finish**.
3. In the Recent Tasks pane, monitor the status of the migration task to completion.
4. In the Navigator pane, select ***your_name*-dvs**, click the **Related objects** tab, and click the **Hosts** tab.
5. Verify that your ESXi host is connected to the distributed switch.

    Your ESXi host's state should be Connected.

6. Click the **Virtual Machines** tab and verify that your virtual machine is listed.

   This demonstrates that your virtual machine resides on the new distributed switch.

7. Click the **Distributed Port Groups** tab and verify that *your_name*-pg-Production is listed.

8. Click the **Uplink Port Groups** tab and verify that an uplink port group is created for the distributed virtual switch.

9. Verify that the virtual machine has full network connectivity.

   a. If your virtual machine's console is not already open, log in to it and open a Command Prompt window.

   b. At the virtual machine's command prompt, ping the ControlCenter's IP address to verify the virtual machine's network connectivity.

      Your ping should be successful.

10. If the ping is not successful, enter the **`ipconfig /release`** and **`ipconfig /renew`** commands to ensure that your virtual machine has a valid DHCP-assigned IP address.

11. Close the Command Prompt window and close the virtual machine console.

Task 5: Prepare for the Next Lab

To prepare for subsequent labs, you migrate the virtual machine from the distributed switch back to the standard switch.

Students perform the steps in this task individually.

1. In the vSphere Web Client Navigator pane, right-click the ***your_name*-dvs** distributed switch and select **Migrate VM to Another Network**.

2. Migrate the virtual machines.

   a. For the Source network on the Select source and destination networks page, leave **Specific network** clicked, click **Browse**, select ***your_name*-pg-Production**, and click **OK**.

   b. For the Destination network, click **Browse**, select the **Production** port group, and click **OK**.

   c. Click **Next**.

   d. On the Select VMs to migrate page, select your virtual machine check box and click **Next**.

   e. On the Ready to complete page, review the settings and click **Finish**.

3. In the Navigator pane, select **Production** and click the **Related Objects** tab.

4. Click **Virtual Machines** and verify that your virtual machine is listed.

   Your virtual machine is migrated back to the standard switch on the Production network.

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

Lab 9
Accessing iSCSI Storage

Objective: Configure access to an iSCSI datastore

In this lab, you will 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- VMkernel port IPv4 address
- VMkernel port IPv4 subnet mask
- VMkernel default gateway for IPv4

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance_name*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters**.
3. In the left pane, click the arrows to expand the data center and folders.
4. Select ***your_ESXi_host***.
5. Click the **Manage** tab and click **Networking**.
6. Select **Virtual Switches** and select **vSwitch0** from the list of virtual switches.
7. Click the **Add host networking** icon (the left-most icon).

   The Add Networking wizard starts.
8. On the Select Connection Type page, click **VMkernel Network Adapter** and click **Next**.
9. On the Select target device page, click **Select an existing standard switch** and verify that **vSwitch0** appears in the text box.
10. If **vSwitch0** does not appear in the text box, click **Browse** and select **vSwitch0**.
11. Click **Next**.
12. On the Port properties page, enter `IP Storage` in the **Network Label** text box and click **Next**.
13. On the IPv4 settings page, click **Use static IPv4 settings** and enter the VMkernel port IPv4 address and subnet mask.
14. Verify that the VMkernel default gateway for IPv4 matches the one in the class configuration handout.
15. Click **Next**.
16. On the Ready to complete page, click **Finish**.

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

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

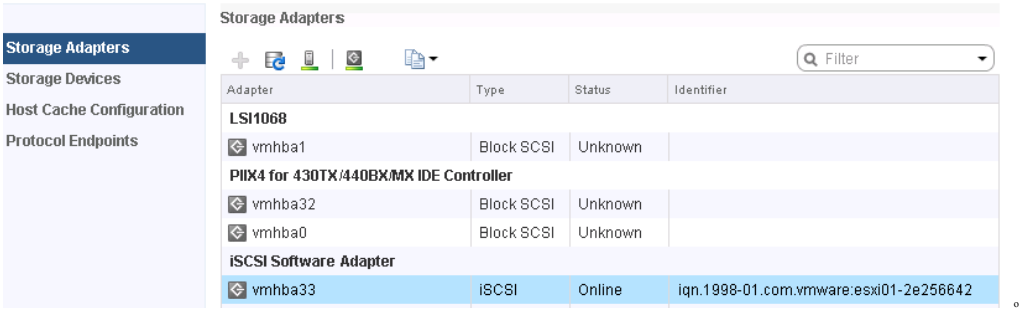
Students perform the steps in this task individually.

Use the following information from the class configuration handout:

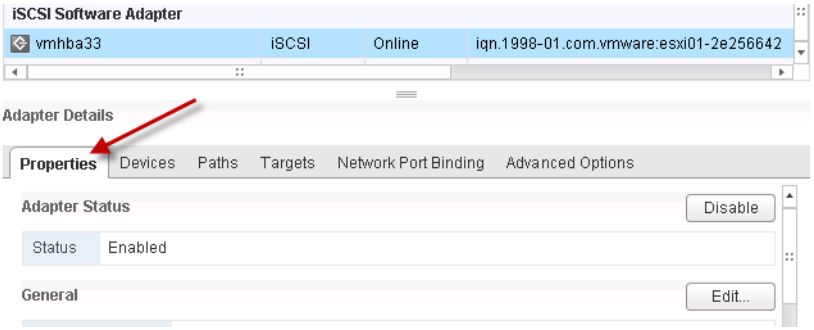
- iSCSI name
- iSCSI server name

1. In the inventory, select your ESXi host, click the **Manage** tab, and click the **Storage** tab.
2. Select **Storage Adapters** and click the **Add new storage adapter** icon.

   The Add new storage adapter icon is a green plus symbol.
3. Select **Software iSCSI adapter**.
4. When the Add Software iSCSI Adapter message appears, click **OK**.
5. In the **Storage Adapters** list, select the newly created iSCSI software adapter.



6. In the Adapter Details pane, click the **Properties** tab.



7. Verify that the adapter status is Enabled.
8. Click **Edit** next to General.
9. In the Adapter Details pane, click the **Network Port Binding** tab.
10. Click the **Add** icon (the green plus sign).
11. Select the **IP Storage** check box and click **OK**.
12. In the Adapter Details pane, click the **Targets** tab.
13. Click **Dynamic Discovery** and click **Add**.
14. On the Add Send Target Server page, enter the iSCSI server name or IP address in the **iSCSI Server** text box and click **OK**.

    The name or IP address that you enter is for the iSCSI target device.
15. Monitor the Recent Tasks pane and wait for the task to complete.
16. Click the **Rescan all storage adapters** icon.

17. When the rescan storage message appears, accept the default settings, click **OK**, and wait for the task to complete.
18. In the Adapter Details pane, click the **Paths** tab.
19. Verify that six LUNs are found and record the following values:
    - Runtime Name _____
    - Target _____
    - LUN _____
    - Status _____

    The LUNs are hosted by an iSCSI provider and are used to create datastores in later labs.
20. Leave the vSphere Web Client open for the next lab.

Lab 10
Accessing NFS Storage

Objective: Configure access to an NFS datastore

In this lab, you will 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 VMware ESXi™ host and use it as a datastore.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- NFS folder name
- NFS server host name

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Storage**.
3. Select **Training** from the inventory.
4. Click the **Related Objects** tab and click the **Datastores** tab.

5. In the Datastores pane, click the **Create a new datastore** icon (the left-most icon).

   The New Datastore wizard starts.

6. On the Location page, verify that the Training data center is listed and click **Next**.
7. On the Type page, click **NFS** and click **Next**.
8. On the Select NFS version page, keep the default setting (NFS 3) and click **Next**.
9. On the Name and configuration page, configure the datastore name, the folder, and the NFS server.

Option	Action
Datastore name	Enter ***your_name*-NFS**. For example, Mike-NFS.
Folder	Enter the NFS folder name.
Server	Enter the NFS server host name or IP address.

10. Click **Next**.
11. On the Host accessibility page, select your ESXi host check box and click **Next**.
12. On the Ready to complete page, review the information and click **Finish**.
13. Click the **Refresh** icon in the vSphere Web Client and 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.

Students perform the steps in this task individually.

1. In the left pane, expand the view of the Training data center and select the ***your_name*-NFS** datastore.
2. Click the **Manage** tab and click **Settings**.
3. In the center pane, select **General** and click **Refresh**.
4. Review the NFS storage properties and capacity information shown.

5. Select **Connectivity with Hosts**.
6. Verify that your ESXi host name is listed, datastore connectivity is connected, and access mode is read-write.
7. Leave the vSphere Web Client open for the next lab.

Lab 11
Managing VMFS Datastores

Objective: Create and manage VMFS datastores

In this lab, you will perform the following tasks:

1. Change the Name of 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

Task 1: Change the Name of a VMFS Datastore

You can change the name of a VMware vSphere® VMFS datastore.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Local datastore name

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Storage**.
3. In the left pane, expand the vCenter Server instance and the **Training** data center.
4. In the left pane, right-click your local datastore name and select **Rename**.
5. Enter **`Local-ESXi##`** and click **OK**.

   ## is the number of your VMware ESXi™ host.
6. In the Navigator pane, verify that the new datastore name appears 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- ESXi host name
- First assigned LUN ID
- Second assigned LUN ID

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. In the left pane, select your ESXi host name.
4. Right-click the ESXi host and select **Storage** > **New Datastore**.

   The New Datastore wizard starts.

5. On the Type page, click **VMFS** and click **Next**.
6. On the Name and device selection page, enter **`PrivateVMFS-##`** in the **Datastore name** text box.

   ## is your first assigned LUN ID.

   For example, if your first assigned LUN is LUN 3, the datastore name is PrivateVMFS-03.
7. From the list, select the iSCSI disk with your first assigned LUN ID and click **Next**.
8. On the Partition configuration page, adjust the **Datastore Size** slider to reduce the LUN size by about 3 GB and click **Next**.

   For example, if the current disk size is 20 GB, change the size to about 17 GB.

   NOTE

   This setting is in preparation for task 3, in which you expand the VMFS datastore to its full size.
9. On the Ready to complete page, review the information and click **Finish**.
10. Right-click your ESXi host in the inventory and select **Storage** > **New Datastore**.
11. On the Type page, leave **VMFS** clicked and click **Next**.
12. On the Name and device selection page, enter **`PrivateVMFS-##`** in the **Datastore name** text box.

    ## is your second assigned LUN ID.
13. Select the iSCSI disk with your second assigned LUN ID from the list and click **Next**.
14. On the Partition configuration page, keep the default settings and click **Next**.
15. On the Ready to complete page, review the information and click **Finish**.
16. Monitor the progress in the Recent Tasks pane and wait for the task to complete.
17. In the Navigator pane, click the **Storage** tab.

18. Select **Training**, click the **Related Objects** tab, and click the **Datastores** tab.
19. Verify that your two PrivateVMFS-## datastores are listed in the datastore inventory.
20. In the datastore inventory, click your first **PrivateVMFS-##** datastore.
21. 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 can dynamically increase the capacity of a VMFS datastore when more space is required by virtual machines.

Students perform the steps in this task individually.

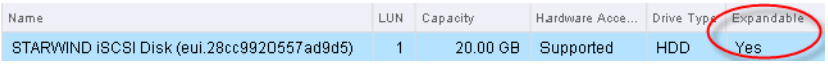
Use the following information from the class configuration handout:

- First assigned LUN ID

1. In the left pane, click the **Storage** tab and click the arrows to expand the data center.
2. Right-click the **PrivateVMFS-##** datastore and click **Increase Datastore Capacity**.

   The Increase Datastore Capacity wizard starts.
3. On the Select Device page, select your first assigned LUN.

   The Expandable column of your first assigned LUN should show Yes.



4. Click **Next**.
5. Click **Next**.
6. On the Specify Configuration page, select **Use Free Space 3 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.
7. On the Ready to Complete page, review the information and click **Finish**.
8. When the task is completed, select the **PrivateVMFS-##** datastore in the left pane.
9. In the center pane, click the **Summary** tab.
10. Verify that the datastore size is increased to the maximum capacity, minus space for system overhead.

    The new capacity should be 22 GB.

Task 4: Remove a VMFS Datastore

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Second assigned LUN ID

1. In the left pane, click the **Storage** tab and expand the vCenter Server instance and the **Training** data center.
2. Right-click the **PrivateVMFS-##** datastore and select **Delete Datastore**.

   ## is the second LUN ID that is assigned to you.
3. When the Confirm Delete Datastore message appears, click **Yes** and wait for the task to complete.
4. Click the **Refresh** icon in the vSphere Web Client and verify that the datastore was removed from the inventory.

Task 5: Extend a VMFS Datastore

You can dynamically increase 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- First assigned LUN ID
- Second assigned LUN ID

1. In the inventory, select the **PrivateVMFS-##** datastore.

   ## is the first LUN ID assigned to you.
2. Click the **Manage** tab and click the **Settings** tab.
3. Verify that **General** is selected and click **Increase**.

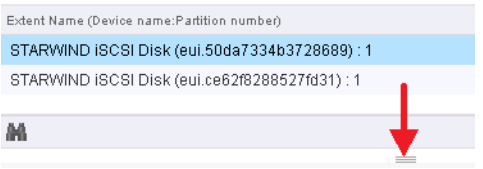
   The Increase Datastore Capacity wizard starts.
4. On the Select Device page, select your second assigned LUN and click **Next**.
5. On the Specify Configuration page, select **Use all available partitions** from the **Partition Configuration** drop-down menu and click **Next**.
6. On the Ready to Complete page, review the information and click **Finish**.

7. When the task completes, select **Device Backing** 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 Extend Name pane for the full view of all extent names.

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



8. Click the **Summary** tab.
9. Record the new value for Total Capacity on the **Summary** tab. _____

   The value should differ from the value recorded in task 2, step 21.
10. Right-click your first **PrivateVMFS-##** datastore in the inventory and select **Rename**.
11. In the **Enter the new name** text box, enter **`VMFS-##`**.

    ## is your assigned ESXi host number.
12. Click **OK**.
13. Leave the vSphere Web Client open for the next lab.

Lab 12
Using Templates and Clones

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

In this lab, you will perform the following tasks:

1. Create a Virtual Machine Template
2. Create Customization Specifications
3. Deploy a Virtual Machine from a Template
4. Clone a Powered-On Virtual Machine

Task 1: Create a Virtual Machine Template

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates**.
3. In the inventory, expand **Training** and **LabVMs**.
4. Right-click the ***your_name*##-1** virtual machine and select **Power** > **Shut Down Guest OS**.
5. Click **Yes** to confirm and wait for the virtual machine to power off.
6. Right-click the ***your_name*##-1** virtual machine and select **Template** > **Convert to Template**.
7. Click **Yes** to confirm the conversion.
8. Right-click the ***your_name*##-1** virtual machine template and select **Move To**.
9. Select **VM Folders** > **Templates** and click **OK**.
10. Expand the **Templates** folder, right-click the ***your_name*##-1** virtual machine template, and click **Rename**.
11. Enter ***your_name*-Template** and click **OK**.

Task 2: Create Customization Specifications

You can 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password
- Time zone

1. Go to the vSphere Web Client Home page.
2. In the Navigator pane, select **Policies and Profiles**.
3. Select **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 ***your_name*-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 virtual machine administrator password and confirm it.
11. Leave the **Automatically logon as Administrator** check box deselected and click **Next**.
12. On the Time Zone page, select the time zone from the **Time Zone** drop-down menu and click **Next**.
13. On the Run Once page, click **Next**.

14. 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**.
15. On the Set Workgroup or Domain page, verify that **Workgroup** is clicked and that the text box shows **WORKGROUP**.
16. Click **Next**.
17. On the Set Operating System Options page, verify that the **Generate New Security ID (SID)** check box is selected and click **Next**.
18. On the Ready to complete page, review the information and click **Finish**.
19. In the Customization Specification Manager pane, verify that *your_name*-CustomSpec is listed.

Task 3: Deploy a Virtual Machine from a Template

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Shared VMFS datastore for virtual machines

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 virtual machines are visible.
3. Right-click ***your_name*-Template** and select **New VM from this Template**.

   The Deploy From Template wizard starts.
4. On the Select a name and folder page, enter **`Your_name##-2`**.

   ## is your assigned ESXi host number.

   For example, if Mike's ESXi host is named ESXi02, the name of this virtual machine is Mike02-2.
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 view of the `Lab servers` folder and select your ESXi host.

   The Compatibility pane should read "Compatibility checks succeeded."
7. Click **Next**.

8. On the Select storage page, select the shared VMFS datastore for virtual machines from the list.

   The Compatibility pane should read “Compatibility checks succeeded.”

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 ***your_name*-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 and name it *your_name*##-3.

    ## is your assigned ESXi host number.

14. In the Recent Tasks pane, monitor the progress of the template deployment task and wait for completion.
15. Open a remote console for each of your virtual machines.
    a. In the left pane, select a virtual machine.
    b. In the center pane, click **Launch Remote Console**.
    c. If necessary, click **Connect Anyway** on the Invalid Security Certificate window.
16. Wait until the virtual machine has completed its system preparation
17. Click the **Ctrl+Alt+Del** icon and log in with the virtual machine administrator password.
18. Verify that VMware Tools™ is installed and that the `cpubusy` and `iometer` files are in the root of the C: drive on each virtual machine.
19. Close the virtual machine consoles.

Task 4: Clone a Powered-On Virtual Machine

You can 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Local VMFS datastore for virtual machines

1. Right-click the ***your_name*##-2** virtual machine and select **Clone** > **Clone to Virtual Machine**.

   The Clone Existing Virtual Machine wizard starts.

2. On the Select a name and folder page, enter **`Hot-Clone##`** in the **Enter a name for the virtual machine** text box.

   ## is the number of your ESXi host.

   For example, Mike has an ESXi host named ESXi01. The name of this virtual machine is Hot-Clone01.

3. Under Select a location for the virtual machine, select **Training** > **LabVMs** and click **Next**.
4. On the Select a compute resource page, select **Training** > **Lab Servers** > ***your_ESXi_host*** and click **Next**.
5. On the Select storage page, select the local datastore for this virtual machine and click **Next**.
6. On the Select clone options page, select the **Customize the operating system** and the **Power on virtual machine after creation** check boxes.
7. Click **Next**.
8. On the Customize guest OS page, select ***your_name*-CustomSpec** and click **Next**.
9. Review the information and click **Finish**.
10. Monitor the progress of the task in the Recent Tasks pane.
11. Leave the vSphere Web Client open for the next lab.

Lab 13
Modifying Virtual Machines

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

In this lab, you will 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
5. Expand a Thin-Provisioned Virtual Disk

Task 1: Increase the Size of a VMDK File

You can increase the size of a virtual machine's local disk and configure the guest operating system to detect the additional space.

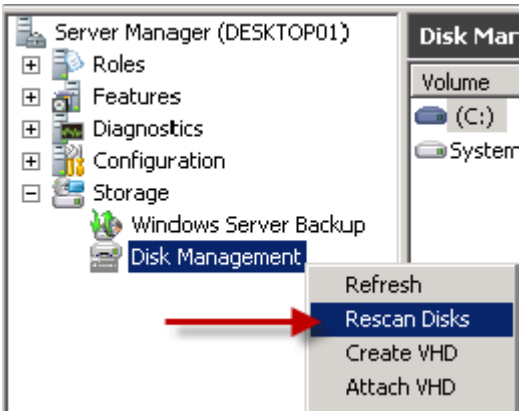
Students perform the steps in this task individually.

Use the following information from the class configuration handout:

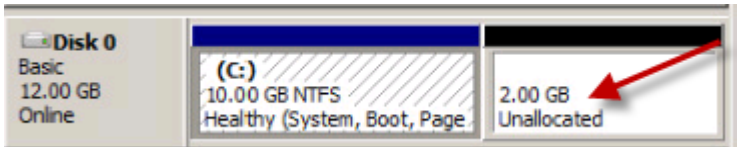
- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Virtual machine administrator password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates**.
3. In the left pane, expand the data center and folders.
4. Right-click your **Hot-Clone##** virtual machine in the inventory and select **Edit Settings**.
5. On the **Virtual Hardware** tab, record the size (GB) of hard disk 1. _____
6. In the **Hard disk 1** text box, enter `12` (12 GB) to increase the disk size and click **OK**.
7. Configure the Hot-Clone## virtual machine's guest operating system to detect and extend the increased disk space.
   a. In the left pane, select your **Hot-Clone##** virtual machine.
   b. In the center pane, click **Launch Remote Console** and log in.
   c. Click the **Server Manager** icon on the task bar.

   d. In the left pane, select **Storage** and click the plus sign to expand the view.
   e. In the left pane, select **Disk Management**.
   f. Right-click **Disk Management** and select **Rescan Disks**



g. In the lower-right pane, verify that the 1 GB unallocated disk space is discovered.

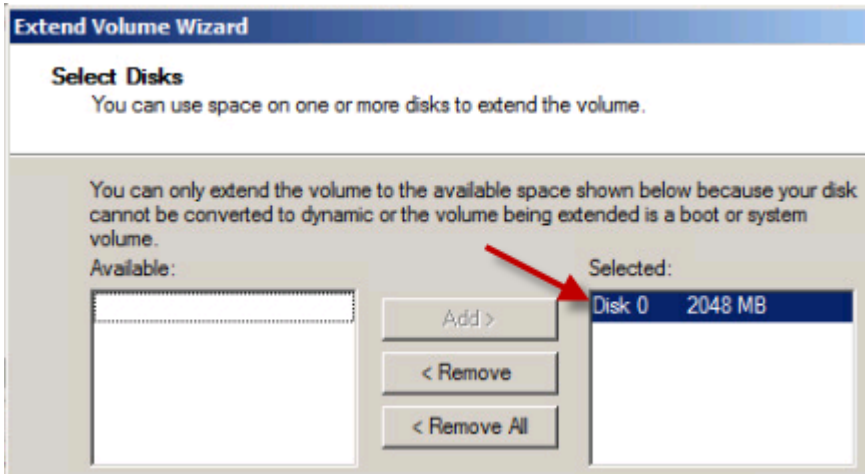


h. Right-click the C: drive and select **Extend Volume**.

The Extend Volume wizard starts.

i. Click **Next**.

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



k. On the Completing the Extend Volume Wizard page, review the information and click **Finish**.

8. In the Server Manager Disk Management window, verify that the local C: drive (Disk 0) is extended and close the Server Manager window.

9. On the Hot-Clone## virtual machine's desktop, click the **Start** menu and select **Computer** to verify that the C: drive is extended.

a. Record the value for the total size of the C: drive. _____

b. Compare the value with that you recorded in task 1 step 5.

Q1. Has the size of the local hard disk (C: drive) increased?

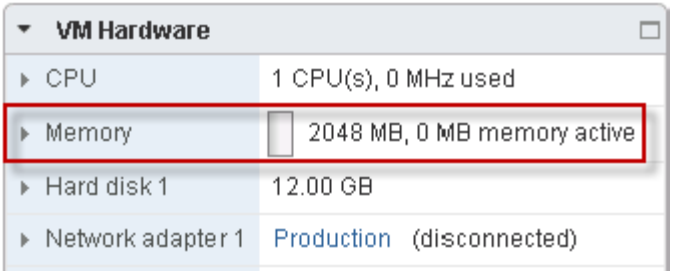
c. Close the virtual machine console.

Task 2: Adjust Memory Allocation on a Virtual Machine

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

Students perform the steps in this task individually.

1. Right-click the **Hot-Clone##** virtual machine in the inventory and select **Power > Shut Down Guest OS**.
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 can assign a new name to an existing virtual machine in the VMware vCenter Server™ Appliance™ inventory.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine local datastore

1. Right-click the **Hot-Clone##** virtual machine in the inventory and select **Rename**.
2. In the **Enter the new name** text box, enter ***`your_name##-4`***.

   ## is the number of your assigned VMware ESXi™ host.

   For example, if Mike has a host named ESXi02, the name of his virtual machine is Mike02-4.

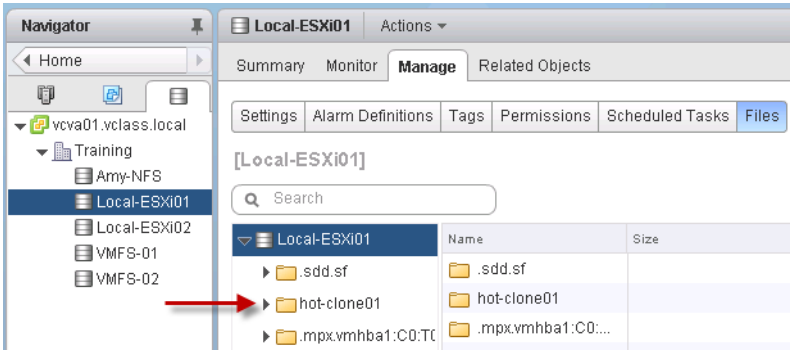
3. Click **OK**.
4. Select the ***your_name*##-4** virtual machine from the inventory, click the **Related Objects** tab, and click the **Datastores** tab.
5. Right-click the ***your_name*##-4** virtual machine's local datastore and select **Browse Files**.

Q1. What is the name of the your_name##-4 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.

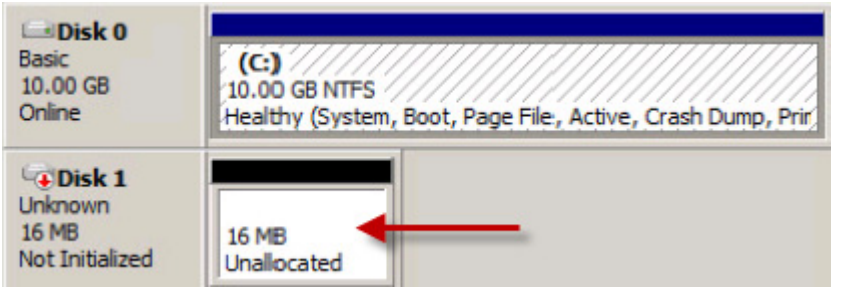
Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Raw LUN ID
- Virtual machine administrator password

1. In the vSphere Web Client Navigator pane, click the **VMs and Templates** tab.
2. Right-click the ***your_name*##-2** 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 the raw LUN ID and click **OK**.
5. Click the arrow next to New Hard disk to expand the view.
6. From the **Location** drop-down menu, select **Store with the virtual machine**.
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, select the ***your_name##-2*** virtual machine.
   b. In the center pane, click **Launch Remote Console** and log in.
   c. Click **Start** and select **Administrative Tools** > **Computer Management**.
   d. Click **Disk Management**.
   e. When the Initialize Disk wizard starts, click **Cancel**.
   f. 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.

   g. Close the Computer Management window.
9. Close the virtual machine console.
10. Remove the RDM hard disk from the *your_name*##-2 virtual machine.
    a. Right-click the ***your_name##-2*** virtual machine and select **Power** > **Shut Down Guest OS**.
    b. Wait for the virtual machine to power off.
    c. Right-click the ***your_name##-2*** virtual machine and click **Edit Settings**.

d. On the **Virtual Hardware** tab, point to **Hard disk 2**.

e. Click the **x** button that appears at the right side of the row for Hard disk 2.

f. Select the **Delete files from datastore** check box to remove the disk and click **OK**.

Task 5: Expand a Thin-Provisioned Virtual Disk

If you created a virtual disk in the thin format, you can convert it to a virtual disk in thick provision eager-zeroed format.

Students perform the steps in this task individually.

1. On the vSphere Web Client Home page, click **Hosts and Clusters**.
2. In the inventory, select **Training** > **Lab Servers** > ***your_ESXi_host***.
3. Click the **Related Objects** tab and click the **Virtual Machines** tab.
4. Record the Provisioned Space and Used Space values for the *your_name*##-3 virtual machine.
   - Provisioned Space _____
   - Used Space _____
5. In the inventory, expand the data center and folder, and select ***your_name*##-3** and click the **Summary** tab.
6. In the VM Hardware pane, click the arrow next to Hard disk 1 and record the information.
   - Capacity _____
   - Location _____
7. Right-click ***your_name*##-3** and select **Power** > **Shut Down Guest OS**.
8. Click **Yes** to confirm the shutdown.
9. Wait for the virtual machine to complete the shutdown.
10. Inflate the thin-provisioned virtual disk of the *your_name*##-3 virtual machine.
    a. In the Navigator pane, click the **Storage** tab.
    b. In the left pane, expand **Training**.
    c. Right-click the datastore recorded in step 6 and select **Browse Files**.
    d. Click the arrow to expand the ***your_name*##-3** virtual machine folder.
    e. Right-click the ***your_name*##-3.vmdk** file and select **Inflate**.

11. Monitor the Recent Tasks pane and wait for the operation to complete.

    This task might take 10 to 15 minutes to complete.

12. In the Navigator pane, click the **Hosts and Clusters** tab and expand the view of the inventory.
13. Right-click the ***your_name*##-3** virtual machine and select **Power** > **Power On**.
14. In the inventory, select your ESXi host, click the **Related Objects** tab, and click the **Virtual Machines** tab.
15. Record the Used Space and Provisioned Space values and compare them with the values that you recorded in step 4.
    - Provisioned Space _____
    - Used Space _____

    In the Used Space column, you should see a new value that equals the Provisioned Space value.
16. Leave the vSphere Web Client open for the next lab.

Lab 14

Migrating Virtual Machines

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

In this lab, you will 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 Cross-Host vSphere Storage vMotion Migration to a Local Datastore
5. Prepare for the Next Lab

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.

Students perform the steps in this task individually.

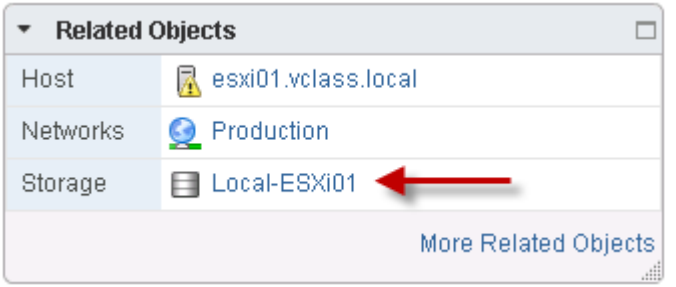
NOTE

Both students log in to the VMware vCenter Server™ Appliance™ simultaneously because some of these tasks require cooperation. Communicate with your lab partner.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Shared datastore

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the vCenter Server Appliance home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
3. Right-click the ***your_name*##-4** virtual machine and select **Power** > **Power On**.
4. Select the ***your_name*##-4** virtual machine in the inventory and click the **Summary** tab.
5. Scroll down to the Related Objects pane and record the name of the storage on which the *your_name*##-4 virtual machine resides. _____



6. In the inventory, right-click the ***your_name*##-4** virtual machine and select **Migrate**.

   The Migrate wizard starts.

7. On the Select the migration type page, click **Change storage only** and click **Next**.
8. On the Select storage page, select the shared datastore as the destination storage for the virtual machine files.

   Your Compatibility pane should show "Compatibility checks succeeded."
9. If the compatibility checks fail, troubleshoot the problem based on the message in the Compatibility pane.
10. Click **Next**.
11. On the Ready to complete page, review the information and click **Finish**.
12. Monitor the Recent Tasks pane and wait for the virtual machine relocation process to complete.

    This task takes a few minutes.
13. Repeat steps 4 through 5 to verify that the *your_name*##-4 virtual machine is on the new datastore (the shared 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vmnic for the vSphere vMotion network
- vSphere vMotion IP IPv4 address/subnet mask

1. In the left pane, click the **Hosts and Clusters** tab.
2. Select your VMware ESXi™ host in the inventory, click the **Manage** tab, and click the **Networking** tab.
3. Select **Virtual switches** and click the **Add Host Networking** icon.

   The Add Networking wizard starts.
4. On the Select connection type page, click **VMkernel Network Adapter** and click **Next**.
5. On the Select target device page, click **New standard switch** and click **Next**.
6. On the Create a Standard Switch page, click the green + sign to add a physical adapter to the switch.
7. Select the vmnic for the vSphere vMotion network and click **OK**.

8. Review the information shown and click **Next**.
9. On the Port properties page for connection settings, enter **`vMotion`** in the **Network label** text box, select the **vMotion traffic** check box, and click **Next**.
10. On the IPv4 settings page, click **Use static IPv4 settings**.
11. Enter the IPv4 address and the subnet mask information and click **Next**.
12. On the Ready to complete page, review the information and click **Finish**.
13. In the Virtual switches pane, verify that the new virtual switch for VMware vSphere® vMotion® migration is listed.

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

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password
- Your partner's ESXi host

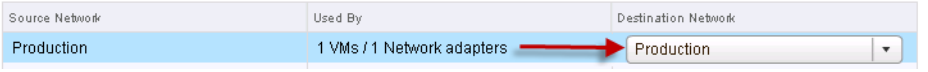
1. In the vSphere Web Client Navigator pane, click the **Hosts and Clusters** tab and expand the view of the inventory.
2. Click the arrow next to your ESXi host to expand the view.
3. Verify that all of your virtual machines are powered on.
4. If any virtual machines are powered off, power them on.
5. Right-click the ***your_name*##-3** virtual machine and select **Edit Settings**.

6. On the **Virtual Hardware** tab, select **Client Device** from the **CD/DVD drive 1** drop-down menu.

7. Click the arrow next to Network adapter 1 to expand the view.
8. Verify that **Production** is selected from the drop-down menu and that the **Connected** and **Connect At Power On** check boxes are selected.
9. Click **OK**.
10. Repeat steps 5 through 9 for your two other virtual machines.
11. In the left pane, select the ***your_name*##-3** virtual machine.
12. In the center pane, click **Launch Remote Console** and log in.
13. On the task bar, select **Start** > **Run**.
14. In the **Open** text box, enter **`cmd`** and click **OK**.
15. In the Command Prompt window, enter the **`ipconfig`** command and record the virtual machine's default gateway IP address. _____
16. Enter the **`ping -t`** ***`default_gateway`*** command to start a continuous ping.
17. Leave the virtual machine console open and return to the vSphere Web Client.

18. Migrate the *your_name##*-3 virtual machine to your partner's ESXi host.
    a. Verify that your lab partner completed task 2.
    b. In the vSphere Web Client inventory, right-click the ***your_name##-3*** virtual machine and select **Migrate**.
    c. On the Select the migration type page, click **Change compute resource only** and click **Next**.
    d. On the Select a compute resource page, click the button for your partner's ESXi host.

       Your partner's host is the destination host to which you migrate the *your_name##*-3 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.
    e. Click **Next**.
    f. On the Select network page, select **Production** from the list and click **Next**.



    g. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** clicked and click **Next**.
    h. On the Ready to complete page, review the information and click **Finish**.
19. Return to the *your_name##*-3 virtual machine console and monitor that no pings are dropped during the migration.
20. Press Ctrl+C to stop the ping and close the *your_name##*-3 virtual machine console.
21. In the left pane, drag the ***your_name##-4*** virtual machine to your partner's ESXi host.
22. When the migration tasks complete, view the inventory pane to verify that the *your_name##*-3 and the *your_name##*-4 virtual machines are on your partner's host and that the *your_name##-2* virtual machine is on your host.

Task 4: Perform a Cross-Host vSphere Storage vMotion Migration to a Local Datastore

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Your partner's ESXi host
- Local datastore of your partner's ESXi host

1. In the inventory, right-click the ***your_name*##-2** virtual machine and select **Migrate**.
2. On the Select the migration type page, click **Change both compute resource and storage** and click **Next**.
3. On the Select compute resource page, select **Training** > **Lab Servers** > ***your_partner's_ESXi_host***.

   Your partner's ESXi host is the destination host to which you migrate the *your_name*##-2 virtual machine.
4. Click **Next**.
5. On the Select storage page, select the local datastore of your partner's ESXi host and click **Next**.
6. On the Select network page, select **Production** and click **Next**.
7. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** clicked and click **Next**.
8. On the Ready to complete page, review the information and click **Finish**.
9. In the Recent Tasks pane, monitor the progress of the virtual machine migration.
10. When the migration task completes, view the inventory pane to verify that the *your_name*##-2 virtual machine is listed under your partner's ESXi host in the inventory.

Task 5: Prepare for the Next Lab

You migrate all your virtual machines back to your assigned host.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Your ESXi host
- Shared datastore

1. Migrate all of your virtual machines back to your own ESXi host.
   a. In the inventory, right-click one of your virtual machines and select **Migrate**.
   b. On the Select the migration type page, click **Change both compute resource and storage** and click **Next**.
   c. On the Select compute resource page, select **Training** > **Lab Servers** > ***your ESXi host*** and click **Next**.
   d. On the Select storage page, select your shared storage and click **Next**.
   e. On the Select network page, select **Production** 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**.
2. In the Recent Tasks pane, monitor the progress of the virtual machine migration and wait for the completion.
3. In the inventory, verify that all your virtual machines appear under your ESXi host.
4. Leave the vSphere Web Client open for the next lab.

Lab 15
Managing Virtual Machines

Objective: Perform virtual machine management tasks

In this lab, you will 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 a Virtual Machine from the Disk
4. Take Snapshots of a Virtual Machine
5. Revert to a Snapshot
6. Delete an Individual Snapshot
7. Use the Delete All Function in the Snapshot Manager

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

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the vCenter Server Appliance home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
3. Select the ***your_name*##-4** virtual machine and click the **Summary** tab.
4. View the Related Object pane and record the VMware vSphere® VMFS datastore name where the *your_name*##-4 virtual machine resides. _____
5. Right-click the ***your_name*##-4** virtual machine and select **Power** > **Shut Down Guest OS**.
6. Click **Yes** to confirm the shutdown.
7. After the *your_name*##-4 virtual machine is shut down, right-click it and select **Remove from Inventory**.

   CAUTION

   Do not select **Delete from Disk**. This operation is not recoverable.
8. Click **Yes** to confirm the removal.
9. Click the **Refresh** icon in vSphere Web Client.
10. Verify that the *your_name*##-4 virtual machine no longer appears in the inventory.
11. In the Navigator pane, click the **Storage** tab and expand the view.
12. Right-click the ***your_name*##-4** virtual machine's VMFS datastore and select **Browse Files**.

    You recorded the VMFS datastore name in step 4.
13. View the folders.

    Q1. Does a folder named your_name##-4 exist?

14. Open the ***your_name*##-4** folder to view the virtual machine files.

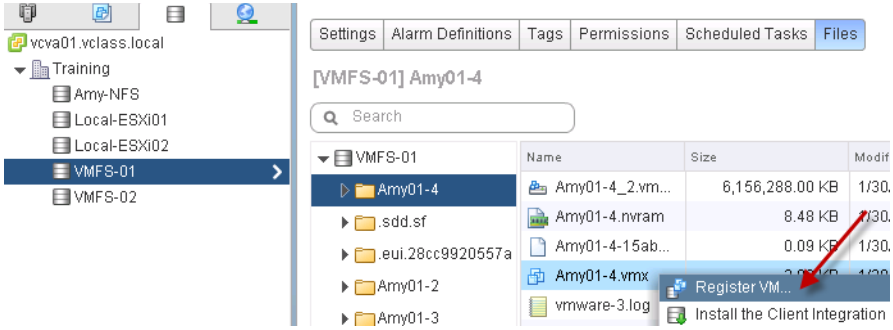
Task 2: Register a Virtual Machine in the vCenter Server Appliance Inventory

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.

Students perform the steps in this task individually.

1. In the list of virtual machine files in the right pane, right-click the ***yourname*##-4.vmx** file and select **Register VM**.

   The screenshot shows an example selecting of **Register VM**.



   The Register Virtual Machine wizard starts.

2. On the Name and Location page, enter ***your_name*##-5**.

   ## is the number of your ESXi host.

3. In the Select inventory location pane, select the **LabVMs** folder and click **Next**.

4. On the Host/Cluster page, select your ESXi host and click **Next**.

5. On the Ready to Complete page, review the information and click **Finish**.

6. In the Navigator pane, click the **VMs and Templates** tab and verify that the *your_name*##-5 virtual machine is in the `LabVMs` folder.

Task 3: Unregister and Delete a Virtual Machine from the Disk

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.

Students perform the steps in this task individually.

1. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
2. Select the ***your_name*##-5** virtual machine and click the **Summary** tab.
3. View the Related Object pane and record the VMFS datastore name on which the *your_name*##-5 virtual machine resides. _____
4. Right-click the ***your_name*##-5** virtual machine, select **Delete from Disk**, and click **Yes** to confirm the deletion.
5. Verify that the *your_name*##-5 virtual machine no longer appears in the inventory.
6. In the Navigator pane, click the **Storage** tab and expand the inventory view.
7. Right-click the VMFS datastore name and select **Browse Files**.

   You recorded the VMFS datastore name in step 3.
8. Verify that the folder and files from which the *your_name*##-5 virtual machine was registered no longer exist.

   The folder has the original virtual machine name: `your_name##-4`.

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 repeatedly to the same virtual machine state but do not want to create multiple virtual machines.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password
- Third-party software ISO image location

1. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
2. In the left pane, select the ***your_name*##-3** virtual machine.
3. In the center pane, click **Launch Remote Console** on the **Summary** tab.

4. If necessary, log in as the virtual machine administrator and enter the password.
5. On the task bar, click **Start** and select **Run**.
6. In the **Open** text box, enter `C:\` and click **OK**.
7. Resize the window as needed so that the files in C:\ and the Recycle Bin are visible.
8. Drag the **iometer** file to the **Recycle Bin**.
9. To completely remove the `iometer` file, right-click the **Recycle Bin** icon and select **Empty Recycle Bin**.
10. Click **Yes** to confirm the file deletion and leave the virtual machine console open.
11. In the vSphere Web Client, right-click the ***your_name*##-3** virtual machine and select **Snapshots > Take Snapshot**.

    The Take VM Snapshot wizard starts.
12. Configure the snapshot.

Option	Value
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.

13. Click **OK** and monitor the task in the Recent Tasks pane.
14. Return to the virtual machine console and drag the **cpubusy** file to the **Recycle Bin**.
15. To completely remove the `cpubusy` file, right-click the **Recycle Bin** icon and select **Empty Recycle Bin**.
16. Click **Yes** to confirm the file deletion and leave the virtual machine console open.
17. Return to the vSphere Web Client.
18. In the inventory pane, right-click the ***your_name*##-3** virtual machine and select **Snapshots** > **Take Snapshot** take another snapshot.

19. Configure the snapshot.

Option	Value
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.

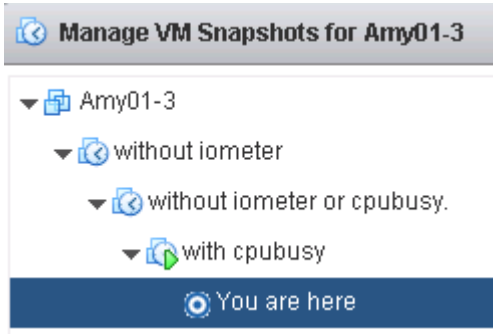
20. Click **OK** and monitor the task in the Recent Tasks pane.
21. Connect the `ClassFiles-vSphere.iso` file on the CD/DVD drive to the *your_name*##-3 virtual machine.
    a. Right-click the ***your_name*##-3** virtual machine and select **Edit Settings**.
    b. On the **Virtual Hardware** tab, select **Datastore ISO File** from the **CD/DVD drive 1** drop-down menu.
    c. Select the **Classfiles-vSphere.iso** file and click **OK**.
    d. Select the **Connected** check box.
    e. Click **OK** to close the Edit Settings dialog box.
22. Return to the *your_name*##-3 virtual machine console.
23. If the D: drive does not open automatically, open Windows Explorer and go to the D: drive.
24. Copy the `cpubusy` file from the D: drive to the virtual machine's desktop.
25. Disconnect the CD/DVD drive from *your_name*##-3 virtual machine.
    a. From the vSphere Web Client, right-click the ***your_name*##-3** 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**.
26. Right-click the ***your_name*##-3** virtual machine and take another snapshot by select **Snapshots > Take Snapshot** to take another snapshot.

27. 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.

28. Click **OK**.
29. Monitor the task in the Recent Tasks pane and wait for completion.
30. Right-click the ***your_name*##-3** 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.



31. Leave the Snapshot Manager open.
32. Close the *your_name*##-3 virtual machine console.

Task 5: Revert to a Snapshot

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

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Virtual machine administrator password

1. Verify that the *your_name*##-3 virtual machine is powered on.
2. In the Snapshot Manager, select the **Without iometer or cpubusy** snapshot and click **Revert to**.
3. Click **Yes** to confirm the reversion.
4. Click **Close** to close the Snapshot Manager.

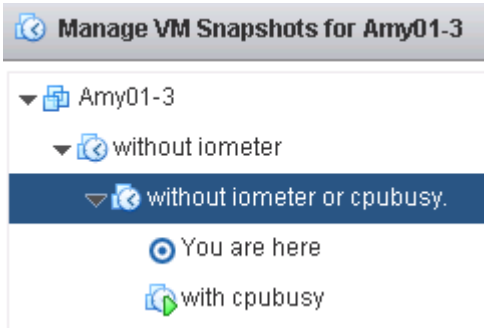
   Q1. Did the virtual machine power off, and what is the reason?

5. Right-click the ***your_name*##-3** virtual machine in the inventory and select **Power** > **Power On**.
6. Launch a remote console to the *your_name*##-3 virtual machine and wait for the boot process to finish.
7. If necessary, log in as the administrator with the password.

   Q2. Is either iometer or cpubusy on the local disk (C:)?

8. Close the *your_name*##-3 virtual machine console.
9. In the vSphere Web Client, right-click the ***your_name*##-3** virtual machine and select **Snapshots** > **Manage Snapshots**.

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



10. In the Snapshot Manager, select the **With cpubusy** snapshot and click **Revert to**.
11. Click **Yes** to confirm the reversion.
12. Click **Close** to close the Snapshot Manager.

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

13. Open a remote console for the *your_name*##-3 virtual machine.

    Q4. Is cpubusy on the desktop?

    Q5. Is iometer on the desktop?

14. Minimize the *your_name*##-3 virtual machine console.

Task 6: Delete an Individual Snapshot

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

Students perform the steps in this task individually.

1. Right-click the ***your_name*##-3** virtual machine and select **Snapshots** > **Manage Snapshots**.

   The You Are Here pointer should be below the snapshot named With cpubusy.
2. In the Snapshot Manager, select the **Without iometer or cpubusy** snapshot and click **Delete**.
3. Click **Yes** to confirm the deletion.
4. Click **Close** to close the Snapshot Manager.

   Q1. Did the virtual machine power off?

   Q2. Is cpubusy on the desktop?

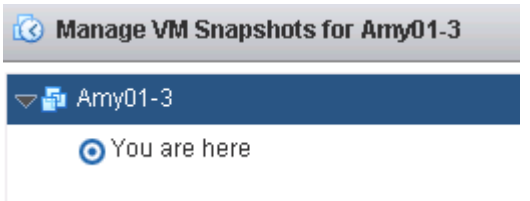
Task 7: Use the Delete All Function in the Snapshot Manager

You can use the Delete All function to commit all the intermediate snapshots before the current state.

Students perform the steps in this task individually.

1. In the vSphere Web Client, right-click the ***your_name*##-3** virtual machine and select **Snapshots** > **Manage Snapshots**.
2. Click **Delete All** and click **Yes** to confirm that you want to delete all the remaining snapshots.

   The You Are Here pointer should be below the *your_name*##-3 virtual machine.



Q1. Were all the remaining snapshots deleted from the Snapshot Manager?

3. Click **Close** to close the Snapshot Manager.
4. Return to the *your_name*##-3 virtual machine console.

Q2. Is cpubusy on the desktop, and why?

5. Close the *your_name*##-3 virtual machine console.
6. Leave the vSphere Web Client open for the next lab.

Lab 16
Managing vApps

Objective: Perform vApp management tasks

In this lab, you will perform the following tasks:

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

Task 1: Create a vApp

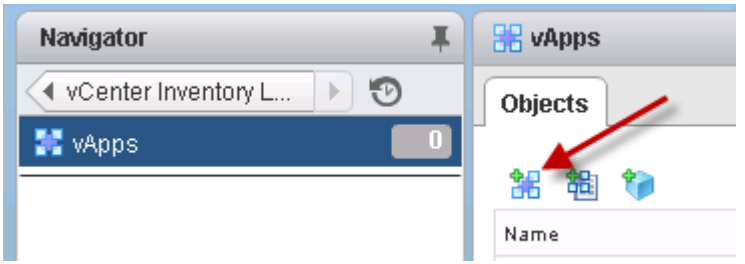
You use VMware vSphere® vApp™ as a container that holds a group of virtual machines. You perform resource controls and manage the virtual machines inside the vApp as a single object.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
3. Right-click the ***your_name*##-2** virtual machine and select **Power** > **Shut Down Guest OS**.
4. Click **Yes** to confirm the shutdown.
5. Repeat steps 3 and 4 to shut down the *your_name*##-3 virtual machine.
6. Wait until both virtual machines are completely powered off.
7. Go to the vSphere Web Client Home page and select **vCenter Inventory Lists** > **vApps** from the Navigator pane.
8. Click the **Create a New vApp** icon.



The New vApp wizard starts.

9. On the Select a creation type page, select **Create a new vApp** and click **Next**.
10. On the Select destination page, select your VMware ESXi™ host and click **Next**.

11. On the Select a name and location page, enter ***your_name*-vApp** in the **vApp name** text box, select the **LabVMs** folder, and click **Next**.
12. On the Resource allocation page, leave the default settings and click **Next**.
13. On the Ready to complete page, review the information and click **Finish**.
14. Go to the vSphere Web Client Home page and click the **Hosts and Clusters** icon.
15. Expand the inventory view and verify that *your_name*-vApp is listed under your ESXi host.
16. Create four blank payload virtual machines to use in this lab.
    a. In the left pane, right-click ***your_name*-vApp** and select **New Virtual Machine** > **New Virtual Machine**.
    b. On the Select a creation type page, click **Next**.
    c. On the Select a name and folder page, enter ***your_name*-App01** in the name text box, select the **LabVMs** folder, and click **Next**.
    d. On the Select a compute resource page, select the ***your_name*-vApp** and click **Next**.
    e. On the Select storage page, select your shared storage and click **Next**.
    f. On the Select compatibility page, accept the defaults and click **Next**.
    g. On the Select a guest OS page, accept the defaults and click **Next**.
    h. Configure the virtual machine with the following changes.
        - Memory 256 MB
        - New hard disk 100 MB
    i. Click **Next**.
    j. Click **Finish**.
17. After the virtual machine completes deployment, create three clones of the virtual machine named *your_name*-App02 through *your_name*-App04.
    a. In the left pane, click the arrow to expand the *your_name*-vApp.
    b. Right-click the *your_name*-**App02** 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, select the **LabVMs** folder, and click **Next**.

       The ## represents the numbers 02, 03, or 04, depending on which iteration of the clone sequence you are performing.
    d. On the Select a compute resource page, select the ***your_name*-vApp** and click **Next**.

e. On the Select storage page, select your shared storage and click **Next**.

f. On the Select storage page, accept the defaults and click **Next**.

g. On the Ready to complete page, click **Finish**.

h. Repeat steps a through g until you have a total of four virtual machines named *your_name*-App-01 through *your_name*-App04.

18. In the inventory, select ***your_name*-vApp**, click the **Related objects** tab, and click the **Virtual Machines** tab.

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

19. Right-click ***your_name*-vApp** and select **Edit Settings**.

20. Click the arrow next to Start Order to expand the view.

21. Select the ***your_name-App*01** 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.

22. Select the ***your_name-App*04** 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 now in group 3.

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

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

    You must press Enter each time that you change the time delay for each virtual machine. Otherwise, the time resets to its previous value.

25. Click **OK**.

Task 2: Power On a vApp

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

Students perform the steps in this task individually.

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?

Task 3: Remove a vApp

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

When working in a production setting, you must remove your virtual machines as described in the task because deleting a vApp from the disk also deletes all virtual machines in the vApp.

Students perform the steps in this task individually.

1. In the Navigator pane, click the **Hosts and Clusters** tab.
2. Right-click ***your_name*-vApp** in the inventory and select **Power** > **Shut Down**.
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 no longer powered on, right-click ***your_name*-vApp** and select **Delete from Disk**.
6. Click **Yes** to confirm the deletion.
7. Leave the vSphere Web Client open for the next lab.

Lab 17
Managing Resource Pools

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

In this lab, you will 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 VMware ESXi™ host, which might lead to performance degradation.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Virtual machine administrator password

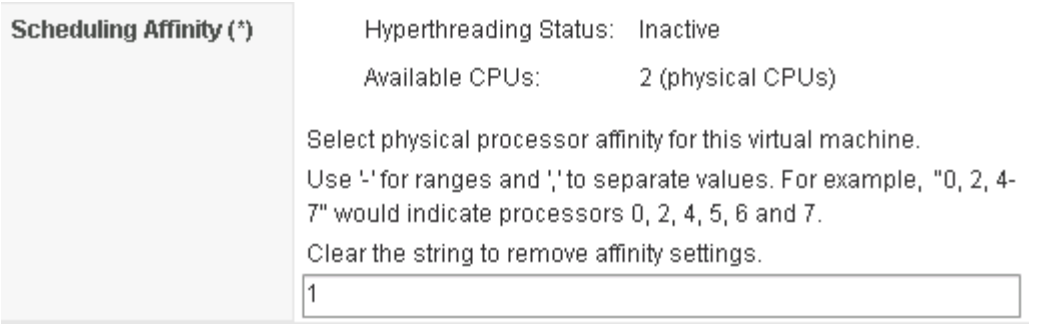
1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
3. Power on the *your_name*##-2 and *your_name*##-3 virtual machines and verify that they are running on your host.
4. Start the `cpubusy` script on both virtual machines.
   a. Open a remote console for the *your_name*##-2 virtual machines and log in.
   b. Close the Server Manager window.
   c. On the desktop, right-click the **cpubusy.vbs** script and select **Open with Command Prompt**.

      This script runs continuously. It will stabilize 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 2 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 *your_name*##-3 virtual machine.
5. In the vSphere Web Client, right-click the ***your_name*##-2** virtual machine in the inventory and select **Edit Settings**.
6. On the **Virtual Hardware** tab, click the arrow next to CPU to expand the view.
7. In the **Scheduling Affinity** text box, enter `1`.

   This affinity setting forces the *your_name*##-2 virtual machine to run on only one processor (processor 1).



8. 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.

9. Right-click the ***your_name*##-3** virtual machine in the inventory and select **Edit Settings**.
10. Repeat steps 6 through 8 for the *your_name*##-3 virtual machine.
11. 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.

Students perform the steps in this task individually.

1. In the vSphere Web Client, right-click your ESXi host in the inventory and select **New Resource Pool**.
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 your ESXi host 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.

Students perform the steps in this task individually.

1. In the vSphere Web client, select the **Fin-Test** resource pool in the inventory 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 ***your_name*##-2** virtual machine to the **Fin-Prod** resource pool.
6. Drag the ***your_name*##-3** virtual machine to the **Fin-Test** resource pool.
7. In each virtual machine consoles, monitor the results of the `cpubusy` script.

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

8. Change the CPU shares of the Fin-Test resource pool from **Low** to **Normal**.
   a. In the vSphere Web Client, right-click the **Fin-Test** resource pool in the inventory and click **Settings**.
   b. Verify 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 both virtual machine consoles, press Ctrl+C to stop the `cpubusy.vbs` script.
11. Repeat step 8 to change CPU shares for the Fin-Prod resource pool from **High** to **Normal**.
12. Leave the vSphere Web Client open for the next lab.

Lab 18
Monitoring Virtual Machine Performance

Objective: Demonstrate that system-monitoring tools reflect CPU workload

In this lab, you will 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Virtual machine administrator password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **VMs and Templates** and expand the view of the inventory.
3. Open remote consoles and, if necessary, log in to the *your_name*##-2 and *your_name*##-3 virtual machines.
4. On each virtual machine, right-click the **cpubusy** script file and select **Open with Command Prompt**.

   On *your_name*##-2, the `cpubusy` script is in the `C:\` directory. On *your_name*##-3, the `cpubusy` script is on the desktop.

Task 2: Use Performance Charts to Monitor CPU Utilization

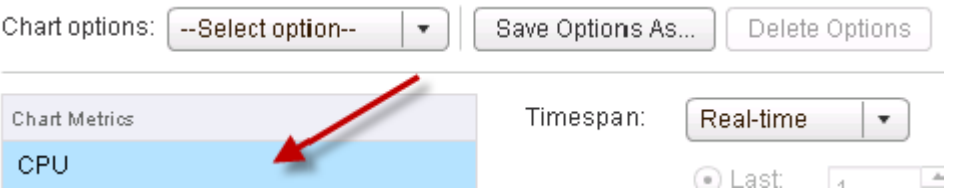
You use the performance charts to monitor CPU, memory, disk, network, and storage metrics.

Students perform the steps in this task individually.

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

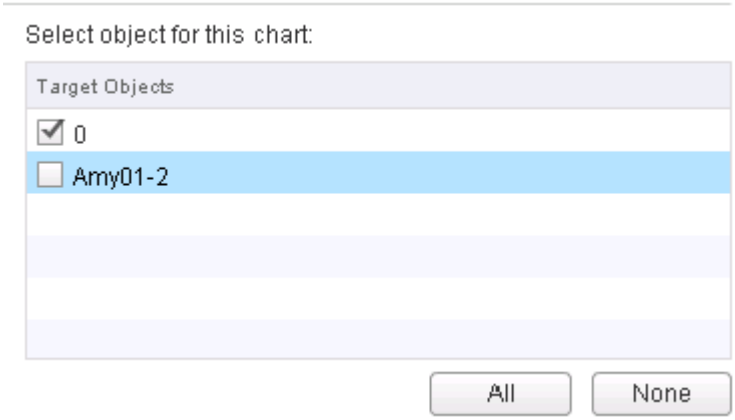
   The real-time CPU usage graph appears.
4. Click the **Chart Options** link.

   The Chart Options dialog box appears.
5. In the Chart Metrics pane, verify that CPU is selected.



6. Verify that **Real-time** is selected from the **Timespan** drop-down menu.

7. In the Target Objects pane on the right, deselect the ***your_name*##-2** virtual machine check box.



8. In the Select counters for this chart pane, click **None** to deselect all counters.
9. In the same pane, select the **Ready** and **Used** check boxes and click **OK**.

   The CPU/Real-time chart for the *your_name*##-2 virtual machine appears.
10. Open a new tab in your Web browser and click the **vSphere Web Client** shortcut.

    You are not required to reenter your connection credentials.
11. In the new vSphere Web Client, click **Hosts and Clusters** and expand the view.
12. Select the ***your_name*##-3** virtual machine in the inventory.
13. Repeat steps 2 through 9 to configure the CPU Performance graph for the *your_name*##-3 virtual machine.
14. In the Web browser window for each virtual machine, point to the end of the line graph to view the current CPU ready value.
15. Record the current CPU ready value for each virtual machine.
    - *your_name*##-2 _____
    - *your_name*##-3 _____

    Leave the Performance Chart windows open.

16. In each virtual machine console, press Ctrl+C in the Command Prompt window to stop the `cpubusy.vbs` script.

    CAUTION

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

17. In the Web browser window for each virtual machine, point to the end of the line graph to view the current CPU ready value.
18. Wait for the chart to be updated.

    Performance charts update every 20 seconds.

    Q1. Did the CPU ready value change and, 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.

Students perform the steps in this task individually.

1. Close the second vSphere Web Client tab and the two virtual machine consoles.
2. Remove the scheduling affinity value on the *your_name*##-2 virtual machine.
   a. Right-click the ***your_name*##-2** 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 *your_name*##-3 virtual machine.
4. Leave the vSphere Web Client open for the next lab.

Lab 19
Using Alarms

Objective: Demonstrate the vCenter Server Appliance alarm feature

In this lab, you will 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
3. Right-click the ***your_name*##-2** virtual machine in the inventory and select **Alarms > New Alarm Definition**.

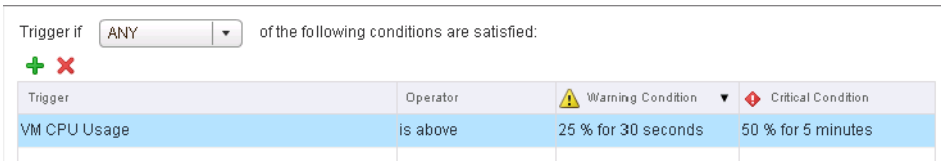
   The New Alarm Definition wizard starts.

   NOTE

   Because you are creating an alarm for the *your_name*##-2 virtual machine, this alarm monitors only that virtual machine. If you set the alarm on an object higher in the VMware 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.
4. On the General page, enter **`VM CPU Usage - your_name`** in the **Alarm name** text box and click **Next**.
5. On the Triggers page, click the green plus sign (+) to add trigger conditions.

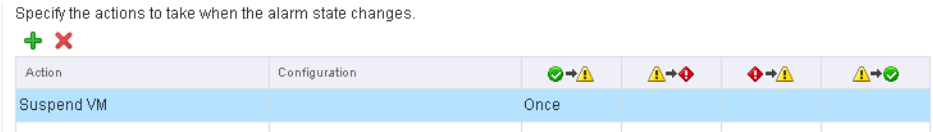
Option	Action
Trigger	Select **VM CPU Usage**.
Operator	Select **Is above**.
Warning Condition	Double-click the current value and enter **`25`** (percentage).
Condition Length	Double-click the current value and select **for 30 sec** from the drop-down menu.
Critical Condition	Double-click the current value and select **50** (percentage) from the drop-down menu.
Condition Length	Leave the default setting (5 minutes).

The screenshot shows the results of adding the trigger conditions.



6. Click **Next**.
7. 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.



8. Click **Finish**.
9. Select the ***your_name*##-2** virtual machine in the inventory, click the **Manage** tab, and click the **Alarm Definitions** tab.
10. Verify that the VM CPU Usage - *your_name* alarm appears in the alarm list for the *your_name*##-2 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.

1. In the Navigator pane, click the **Hosts and Clusters** icon and select **Training**.
2. Click the **Manage** tab and click the **Alarm Definitions** tab.
3. Click the green plus sign to add an alarm for the Training data center.

   The New Alarm Definition wizard starts.

4. On the General page, configure the alarm settings.

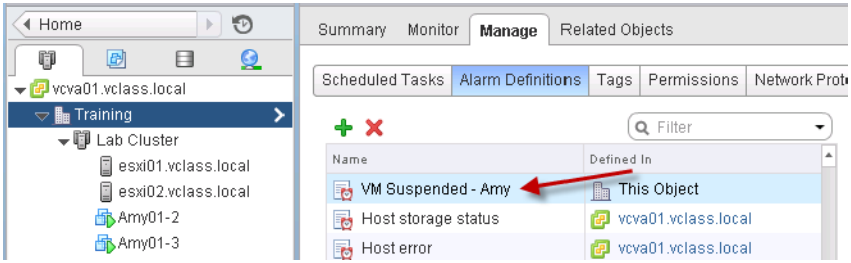
Option	Action
Alarm name	Enter **`VM Suspended - your_name`**.
Monitor	Leave the default setting: **Virtual Machines**.
Monitor for	Click **specific event occurring on this object, for example VM Power On**.
Enable this alarm	Leave the check box selected.

5. Click **Next**.
6. On the Triggers page, click the plus sign to set trigger conditions in the Trigger if ANY of the following events occur pane.
7. Select **VM suspended** from the **Event** drop-down menu.
8. In the 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 **`your_name##-2`**. 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 Training 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 still visible in the system. The alarms are neither cleared or reset.

Students perform the steps in this task individually.

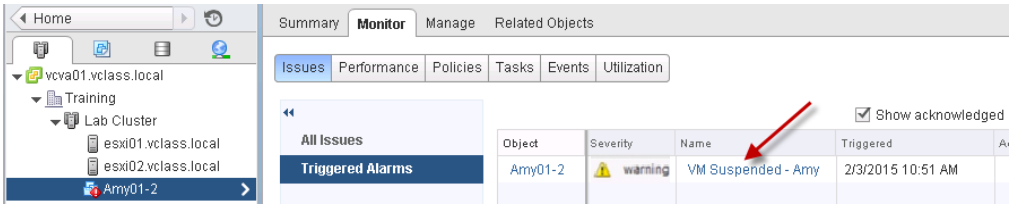
1. Select the ***your_name*##-2** virtual machine in the inventory, click the **Monitor** tab, and click the **Issues** tab.
2. Select **Triggered Alarms**.

   When triggered, alarms appear in this pane.
3. In the inventory, select the ***your_name*##-2** virtual machine.
4. In the center pane, click **Launch Remote Console** and, if necessary, log in to the virtual machine.
5. In the `C:\` directory, right-click **cpubusy** and select **Open with Command Prompt**.

   This action starts one instance of the `cpubusy.vbs` script.
6. Wait at least 30 seconds before the alarm is triggered and the virtual machine is suspended.

7. In the 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.



8. Right-click the **VM Suspended - *your_name*** alarm and select **Reset to Green**.
9. Click the **Events** tab.

   The description "Manually cleared alarm 'VM Suspended - *your_name*' from Red" should appear.
10. Right-click the suspended ***your_name*##-2** virtual machine in the inventory and select **Power On**.
11. In the *your_name*##-2 virtual machine console, press Ctrl+C at the command prompt to stop the `cpubusy.vbs` script.
12. Close the *your_name*##-2 virtual machine console.
13. In the inventory, verify that the red alert icon is removed from the *your_name*##-2 virtual machine.

Task 4: Disable Virtual Machine Alarms

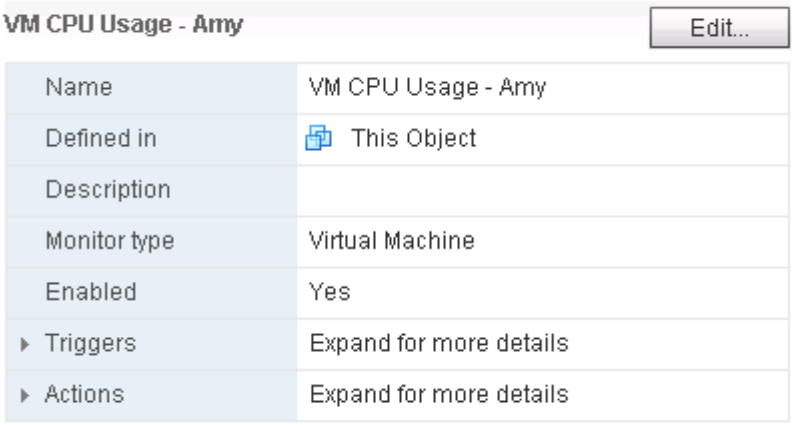
You can disable system built-in alarms or the alarms that you defined for specific objects.

Students perform the steps in this task individually.

1. Disable the VM CPU Usage - *your_name* alarm.
   a. Select the ***your_name*##-2** virtual machine in the inventory.
   b. Click the **Manage** tab and click the **Alarms Definitions** tab.

c. Select the **VM CPU Usage - *your_name*** alarm in the list.

The VM CPU Usage - *your_name* pane appears on the right.



d. Click **Edit**.

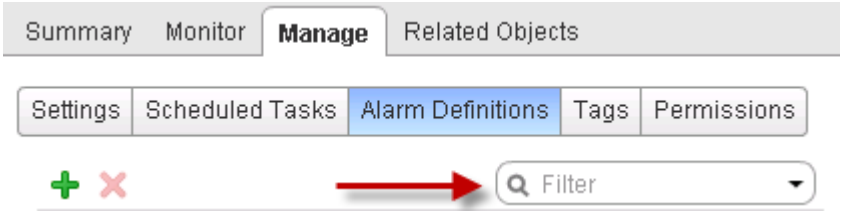
e. On the General page, deselect the **Enable this alarm** check box and click **Finish**.

2. Disable the VM Suspended - *your_name* alarm.

a. Select the **Training** data center in the inventory.

b. Click the **Manage** tab and click the **Alarms Definitions** tab.

c. Enter **`VM suspended`** in the filter 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 the vSphere Web Client open for the next lab.

Lab 20

(Optional) Using vRealize Operations Manager

Objective: Navigate the vRealize Operations Manager GUI

1. Log In to the vRealize Operations Manager GUI
2. Navigate Dashboards and Icons
3. View the Inventory Tree and Find Objects
4. Create a CPU Report
5. View Health and Alerts of Your Environment
6. Troubleshoot a Cluster Alert
7. Troubleshoot a Virtual Machine Alert
8. View Badge Information for Analysis
9. Use a Heat Map to Identify CPU Contention
10. Create a Custom Heat Map

In this lab, you run the historical view mode in VMware vRealize™ Operations Manager.™ You use the captured data that was collected for you from a live instance of vRealize Operations Manager. You play back the data to complete the tasks in this lab.

Task 1: Log In to the vRealize Operations Manager GUI

You log in to the vRealize Operations Manager user interface to monitor your environment, troubleshoot system health issues, assess capacity risk, and identify ways to optimize infrastructure use.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vRealize Operations Manager name
- vRealize Operations Manager user name
- vRealize Operations Manager password

1. On your assigned student desktop, open a Web browser and click the **vROPS** shortcut.
2. If your Web browser prompts you to allow this URL as a security exception, confirm the security exception.
   a. Click the **I Understand the Risks** link.
   b. Click **Add Exception**.
   c. In the Add Security Exception dialog box, click **Confirm Security Exception**.
3. Log in to the product user interface.
   a. Leave **Local Users** selected from the **Authentication Source** drop-down menu.
   b. In the **User name** text box, enter your vRealize Operations Manager user name.
   c. In the **Password** text box, enter the vRealize Operations Manager password.
   d. Click **Login**.

Task 2: Navigate Dashboards and Icons

You navigate the home page to get familiar with the user interface. Knowing how to use the prebuilt dashboards and icons enables you to view data quickly and conveniently.

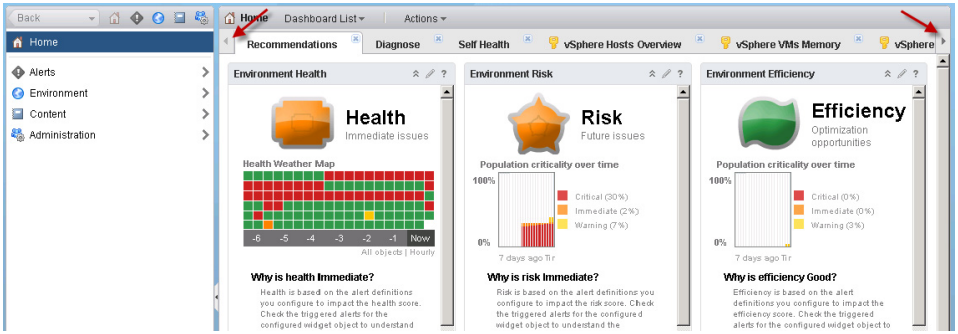
Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Student cluster

1. On the vRealize Operations Manager home page, click the tabs to view the prebuilt dashboards.

   You can use the right and left arrows in the tabs bar to access all tabs.



2. View information in the Diagnose dashboard.
   a. Click the **Diagnose** tab.

      Several widgets appear in the dashboard, but most of these widgets do not initially display anything.

   b. In the Objects widget, select the first object in the list.
   c. Verify that the rest of the widgets are populated with data.

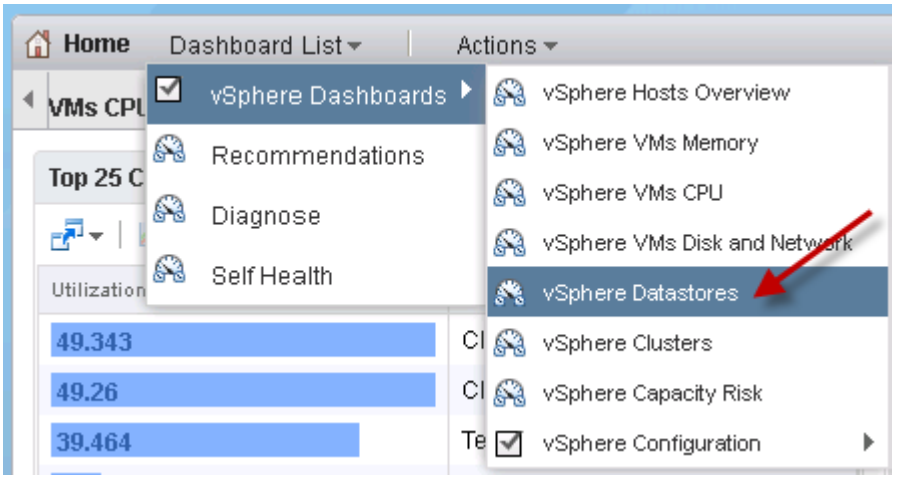
      Widgets are often configured to interact with one another. Selecting an object in one widget populates other widgets with data for the selected object.

3. View information in the vSphere Clusters dashboard.
   a. Click the **vSphere Clusters** tab.
   b. Find the widget that shows the top 25 clusters by memory usage and select your assigned student cluster.

      By selecting the cluster, a sparkline chart appears in the Select Above for Mem Usage (%) History widget.

4. Close and reopen the vSphere Datastores dashboard.

   a. From the **Dashboard List** drop-down menu, select **vSphere Dashboards** > **vSphere Datastores** to view the information.

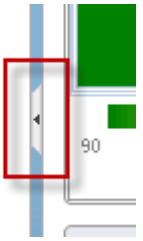


   b. Close the vSphere Datastores dashboard by clicking the X on the tab.

   c. Reopen the vSphere Datastores dashboard by selecting **vSphere Dashboards** > **vSphere Datastores** in the **Dashboard List** list.

5. Enlarge the center pane.

   a. Collapse the navigation pane by clicking the left triangle between the navigation pane and the center pane.



   The center pane is expanded.

   b. Reopen the navigation pane by clicking the triangle again.

6. In the toolbar, click the **Content** icon.

   You use visual cues extensively in the vRealize Operations Manager user interface. You access all the vRealize Operations Manager content through the content page.

7. In the navigation pane, select **Icons**.
8. Click the **Object Type Icons** tab.

   The **Object Type Icons** tab lists the icon names that are used throughout the user interface.

9. Page through to view the entire list.

Task 3: View the Inventory Tree and Find Objects

You use inventory trees to view the parent-child relationships between objects. The relationship information is useful when you troubleshoot system issues and identify causes.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- ESXi host name

1. Click the **Environment** icon in the toolbar.

2. In the navigation pane, view the categories in the Inventory Trees section.
3. Select **vSphere Hosts and Clusters**.
4. Click the arrow next to vSphere World, VC01, Training A, and Team Cluster to expand the hierarchy.
5. Select your host from the VMware ESXi™ host inventory tree and click the **Environment** tab.
6. Click the **Map** tab.

   This map graphically demonstrates the relationships between your ESXi host and other related objects.

7. Click the back arrow in the toolbar to return to Environment.

8. Select **All Objects**.
9. Click the arrow next to vCenter Adapter to expand the view.

   The objects are organized by object type, such as cluster, host, virtual machine, and datastore.
10. In the search box at the top-right corner, enter **`vclass`** and select your ESXi host name from the list.

    Search is especially useful when if you have a large number of objects in the inventory and you need to look at a specific object.
11. In the Navigation pane, double-click **vSphere Hosts and Clusters** and view the inventory tree for your ESXi host.

    Q1. What is the parent-child relationship of your ESXi host in this inventory tree?

12. Search for "Team Cluster" in the inventory tree.
    a. In the search box at the top-right corner, enter **`clus`**.

       The user interface searches for any object that contains the string "clus" and lists them.

    b. Select **Team Cluster** from the list.
13. Click the **Details** tab and click the **Views** tab.
14. Display the view named Cluster Capacity Risk Forecast.
    a. In the **Quick filter** text box, enter **`cluster`**.
    b. Select **Cluster Capacity Risk Forecast** in the list.

       You might need to adjust the column width to see the column's full title.

       Q2. How many running hosts are in your cluster?

       Q3. How many running virtual machines are in your cluster?

Task 4: Create a CPU Report

You create a report that shows CPU usage and provisioning details for a cluster, as well as hosts and virtual machines in the cluster.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Student cluster

1. Use the search box to search for your assigned student cluster.
2. Click the **Reports** tab and click the **Report Templates** tab.
3. Click the **Add** icon (green plus sign).
4. When the new report template wizard starts, click the **Collapse** link in the right pane to expand the center pane.
5. On the Name and Description page, enter ***your_name*-Cluster# CPU Report** in the **Name** text box,

   For example, Mike with cluster A would name the report Mike-ClusterA CPU Report.
6. In the **Description** text box, enter **CPU information by cluster, hosts, and virtual machines**.
7. In the left pane, select **Views**.
8. Drag the following lists into the preview pane and view the data shown.
   - Cluster CPU Diagnose List
   - Host CPU Diagnose List
   - Virtual Machine CPU Diagnose List

   You can use the **Search views** box at the top or the paging buttons at the bottom to find each view.
9. In the left pane, select **Formats** and verify that the **PDF** and **CSV** check boxes are selected.
10. In the left pane, select **Layout Options** and select the **Cover Page**, **Table of contents**, and **Footer** check boxes.
11. Click **Save**.
12. Verify that *your_name*-Cluster# CPU Report appears in the report template list.
13. Select ***your_name*-Cluster# CPU Report** and click the **Run Template** icon.

14. Click the **Generated Reports** tab and monitor the Status column of the report generation task until completion.
15. In the Download column, click the **PDF** icon.
16. Click **Open with Firefox (default)** and click **OK**.

    Your report appears on a new tab of your browser.
17. View the content of the report and close it.

Task 5: View Health and Alerts of Your Environment

You use alerts as the starting point for troubleshooting all issues in your environment. You view top health alerts in the Recommendations dashboard to identify the most important resource performance issues.

Students perform the steps in this task individually.

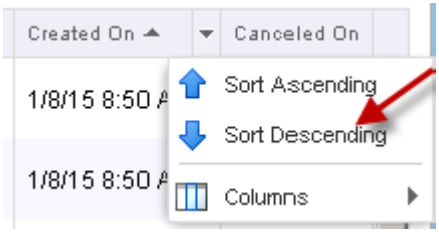
1. On the vRealize Operations Manager navigation toolbar, click the **Home** icon.
2. On the vRealize Operations Manager home page, click the **Recommendations** tab to view the Recommendations dashboard.
3. In the Top Health Alerts For Descendants pane, view the alerts that were triggered.

   Several alerts should appear, including cluster, host, and virtual machine alerts.
4. Click the **Alerts** icon in the toolbar.

   By default, the Alerts page shows all health, risk, and efficiency alerts and their badges.
5. In the navigation pane, select **Health** to view only health-related alerts.

6. Click the **Created On** column drop-down menu to select **Sort Descending**.

   All health alerts are sorted in descending order by creation dates.



Task 6: Troubleshoot a Cluster Alert

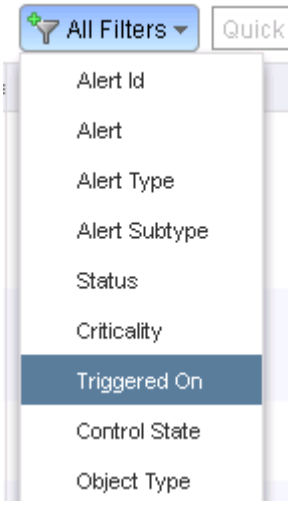
You use alerts to view and troubleshoot issues of objects at every level of your environment, from individual virtual machines and disk drives to the entire cluster or data center.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Student cluster

1. On the Health Alerts page, find the alert that was triggered on your assigned student cluster.
   a. From the **All Filters** drop-down menu, select **Triggered On**.



   b. In the **Triggered On** text box, enter the name of your student cluster and click **OK**.

      The alerts for your assigned student cluster appear in the list.

2. Verify that the following alert has been triggered on your vSphere cluster: "Cluster has many Virtual Machines that have memory contention (Custom for Training)"

   This alert was created for the lab exercises and is not part of the prebuilt alert definitions that are provided by the vCenter adapter.

3. Click the **Cluster has many Virtual Machines that have memory contention (Custom for Training)** link.

   The alert's **Summary** tab appears.

4. On the **Summary** tab, view the alert's description, recommendations, and symptoms that cause the issue.

   Symptoms are listed under the heading "What Is Causing The Issue?"

   Q1. By looking at the symptoms, which of the following virtual machine conditions is causing the issue: memory compression, ballooning, swapping, or some combination of these conditions?

5. Click the **Impacted Object Symptoms** tab.

   This tab shows other symptoms that were triggered for your cluster.

   These symptoms might or might not affect the alert that you are responding to.

6. Click the **Relationships** tab.

   One of the hosts has no health issues: the color is green. The other host has critical issues: the color is red.

   Q2. What is the name of the host with the critical issues?

   Q3. How many alerts were triggered on this host?

7. Return to the **Summary** tab.

   NOTE

   For purposes of this lab, do not try to fix any of the problems.

   Q4. What are the recommendations?

8. Remain on the **Summary** tab.

Task 7: Troubleshoot a Virtual Machine Alert

You use alerts to identify, analyze, and solve problems related to your virtual machines.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Web server virtual machine

1. Click the **Home** icon in the toolbar to go to the vRealize Operations Manager home page.

   The Recommendations dashboard appears.

2. In the Top Health Alerts For Descendants pane, click the **Virtual machine has memory contention due to memory compression, ballooning or swapping** virtual machine memory alert.

   A list of virtual machines with this alert is displayed.

3. Next to your assigned Web server virtual machine, click the **View Details** link and view the information shown on the **Summary** tab.

   Q1. What are the symptoms causing this problem?

4. Click the triangle to expand the **Virtual Machine is using swap** symptom.

   A chart appears for the Memory|Swapped (KB) metric.

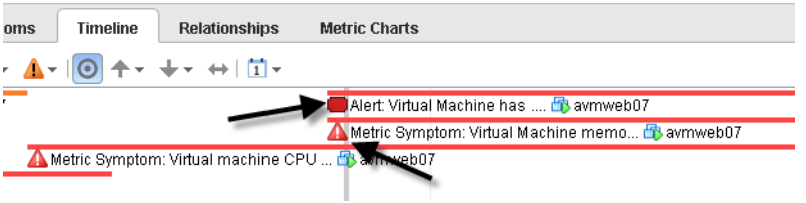
5. Click the **Impacted Objects Symptoms** tab.

   This tab shows other symptoms that were triggered for your seventh Web server virtual machine.

   These symptoms might or might not affect the alert that you are responding to.

   Q2. Besides memory-related problems, what other problems is this virtual machine experiencing?

6. Click the **Timeline** tab.
   a. View the alerts and symptoms that were triggered for your Web server virtual machine.
   b. Point to an alert icon or symptom icon to view the tooltip, which contains details about the alert or symptom.



7. Click the **Relationships** tab.

Q3. What is the health condition of this virtual machine's children?

8. Click the **Metric Charts** tab.
   a. In the metric hierarchy, find the Memory|Usage (%) metric.
   b. Double-click **Usage (%)** to view the chart for this metric.
   c. In the toolbar, click the **Show Data Values** icon.

   d. Point to the data points (blue dots) in the chart to view the data values and view the orange dots for the high/low data points.

Task 8: View Badge Information for Analysis

You monitor workloads, anomalies, and faults, which can be contributing factors of an object's overall health.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Web server virtual machine

1. Verify that your screen resolution is set to 1280x1024 or higher to maximize the visual reference area.
2. In the navigation pane, click your assigned Web server virtual machine.

   The virtual machine's **Summary** tab appears in the center pane.
3. View analytic information for your Web server virtual machine.
   a. Click the **Analysis** tab and click the **Workload** tab.

      Q1. Which resource is used the most by this workload?

   b. Click the **Anomalies** tab.

      Q2. Is this virtual machine experiencing abnormal behavior?

   c. Click the **Faults** tab.

      Q3. Is this virtual machine experiencing any faults?

4. Examine the virtual machine's alert details.
   a. Click the **Summary** tab.
   b. In the health column, click the **Virtual machine has memory contention due to memory compression, ballooning or swapping** link.

      The alert's **Summary** tab appears.
   c. View the recommendations.

      NOTE

      For purposes of this lab, do not try to fix any of the problems.

      Q4. Which recommendations are provided to you?

Task 9: Use a Heat Map to Identify CPU Contention

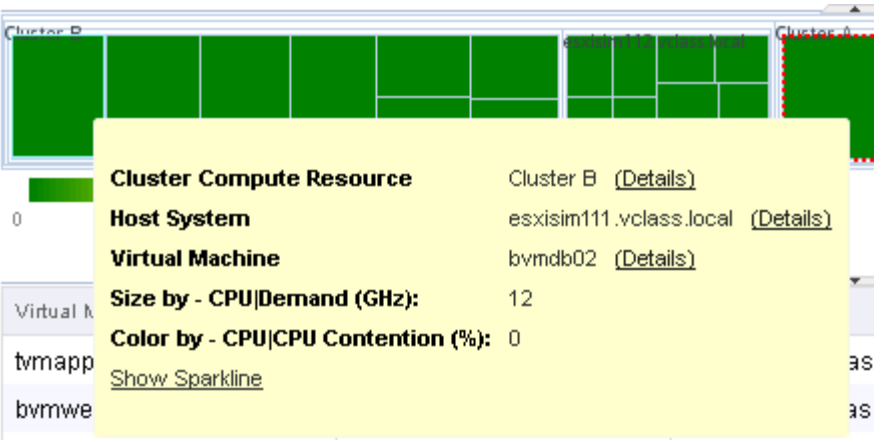
You use the built-in heat maps in vRealize Operations Manager to graphically display selected metrics, and easily locate trouble areas for objects in your virtual environment.

Students perform the steps in this task individually.

1. Click the **Home** icon in the toolbar and select **Environment**.
2. In the center pane, click **vSphere World**.
3. Click the **Details** tab and click the **Heatmaps** tab.
4. Select the **Which VMs Currently Have The Highest CPU Demand and Contention?** heat map.

   This heat map groups virtual machines first by cluster and then by host.
5. Identify the object types in your assigned vSphere cluster group.
   a. Point to a few boxes in your vSphere cluster group.
   b. View the information in the tooltip that is displayed for each virtual machine.

      A tooltip that contains information about the object appears. The third line identifies the object that is represented by the colored box.



Q1. What object types are in your student cluster grouping?

6. Find the cluster group that contains orange and yellow boxes and point to one of the orange boxes.

   Boxes in this heat map are colored by CPU contention. The orange boxes represent the virtual machines with high CPU contention.

   Q2. Which three virtual machines have the highest CPU contention?

   Q3. What cluster are these virtual machines members of?

7. Point to the box of the virtual machine that has the highest CPU contention.

   Q4. What is the CPU Demand (GHz) for the virtual machine that has the highest CPU contention?

8. In the tooltip, click the **Details** link next to the virtual machine name and click the **Summary** tab to view the information specific to this virtual machine.
9. Return to the **Heatmaps** tab for the vSphere World object.
   a. Click the back button to return to the vSphere World object details.

   b. Click the **Details** tab and click the **Heatmaps** tab.
10. Leave the vRealize Operations Manager open for the next task.

Task 10: Create a Custom Heat Map

You create a heat map to compare the performance of selected metrics across the virtual infrastructure in real time.

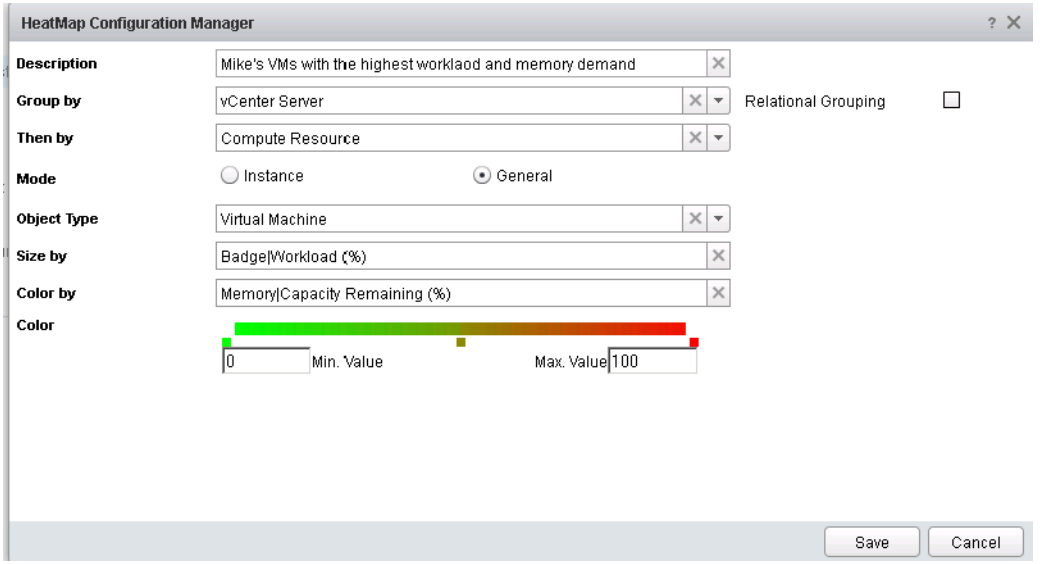
Students perform the steps in this task individually.

1. Verify that you are on the vSphere World heatmap page.
2. If you are not on the vSphere World heatmap page, select **Environment** from the navigation pane on the home page, click **vSphere World** in the center pane, click the **Details** tab, and click the **Heatmaps** tab.
3. Click the **Add new configuration** icon (green plus sign).

4. In the **Description** text box, enter ***`your_mame`*** **`VMs with the highest workload and memory demand`**.

   If you and your lab partner have the same first name, you should append a unique number to the end of the user name.

5. From the **Group by** drop-down menu, select **vCenter Adapter** > **vCenter Server**.
6. From the **Then by** drop-down menu, select **vCenter Adapter** > **Cluster Compute Resource**.
7. For the mode setting, verify that the **General** button is clicked.
8. From the **Object Type** drop-down menu, select **vCenter Adapter** > **Virtual Machine**.
9. From the **Size by** drop-down menu, select **Badge**, expand the view, and double-click **Workload (%)**.
10. From the **Color by** drop-down menu, select **Memory**, expand the view, and double-click **Capacity Remaining (%)**.
11. In the **Min. Value** text box, enter `0`.
12. In the **Max. Value** text box, enter `100`.



13. Click **Save**.
14. Verify that your custom heat map is listed and select it to view the updated heat map.
15. Close the vRealize Operations Manager window.
16. Leave the vSphere Web Client open for the next lab.

Lab 21
Using vSphere HA

Objective: Demonstrate vSphere HA functionality

In this lab, you will perform the following tasks:

1. Create a Cluster Enabled for vSphere HA
2. Add Your ESXi Host to a 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 Upcoming Labs

Task 1: Create a Cluster Enabled for vSphere HA

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

Perform this task as a team. Student A should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
3. Right-click the **Training** data center and select **New Cluster**.

   The New Cluster dialog box appears.
4. Configure the new cluster.

Option	Action
Name	Enter **`Lab Cluster`**.
DRS	Leave the check box deselected.
vSphere HA	Select the **Turn on** check box. If the view of vSphere HA options does not expand automatically, click the arrow next to vSphere HA to expand the view.
Policy	Click **Percentage of cluster resources reserved as failover spare capacity**.

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

Task 2: Add Your ESXi Host to a Cluster

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

Students perform the steps in this task individually.

1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Select **Lab Servers** > ***your_ESXi_host***.
3. Drag your ESXi host to the **Lab Cluster** inventory object.

   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, click the **Monitor** tab, and click the **vSphere HA** tab.

   The vSphere HA summary information appears.
6. Notice the name of the master host and record the name of the other host (the slave host).

   _____
7. Review the content and record the slave host. _____

   It might take a few minutes for the vSphere Web Client to fully update.

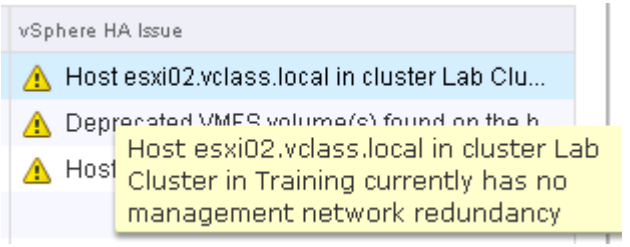
   Q1. Does the number of protected virtual machines match the number of virtual machines in the cluster?

8. Select **Heartbeat**.

   Q2. How many datastores are used for heartbeating?

9. Select **Configuration Issues** and review the errors that are listed.

   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 your ESXi host in the inventory, click the **Manage** tab, and click the **Networking** tab.
11. Select **VMKernel Adapters** and select the **vMotion** VMkernel adapter.
12. Click the **Edit Settings** icon.

13. On the Port properties page, select the **Management Traffic** check box and click **OK**.
14. Right-click your ESXi host and select **Reconfigure for vSphere HA**.
15. Select **Lab Cluster** in the inventory.

Q3. Did the previous management configuration error disappear?

Task 3: Test vSphere HA Functionality

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

Do this task as a team. Student A should perform the steps in this task.

1. In the inventory, select the master ESXi host that you recorded in task 2, step 7.
2. Click the **Related Objects** tab and click the **Virtual Machines** tab.
3. Record the name of one or more powered-on virtual machines on the master host. _____

4. Simulate a host failure by rebooting one of the hosts in the cluster.

   You must reboot the system, 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.

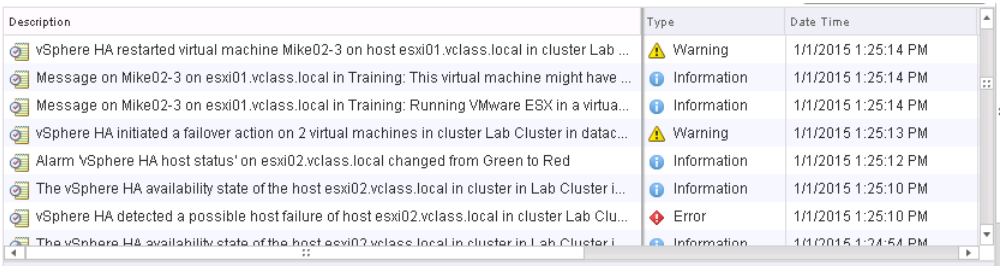
   b. Enter **`Testing vSphere HA`** as the reason for rebooting and click **OK**.

5. In the inventory, select **Lab Cluster**, click the **Monitor** tab, and click the **Events** tab.

   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 migrate to the new host.

   The screenshot shows a list of recent events in the cluster.



Description	Type	Date Time
vSphere HA restarted virtual machine Mike02-3 on host esxi01.vclass.local in cluster Lab ...	Warning	1/1/2015 1:25:14 PM
Message on Mike02-3 on esxi01.vclass.local in Training: This virtual machine might have ...	Information	1/1/2015 1:25:14 PM
Message on Mike02-3 on esxi01.vclass.local in Training: Running VMware ESX in a virtua...	Information	1/1/2015 1:25:14 PM
vSphere HA initiated a failover action on 2 virtual machines in cluster Lab Cluster in datac...	Warning	1/1/2015 1:25:13 PM
Alarm 'vSphere HA host status' on esxi02.vclass.local changed from Green to Red	Information	1/1/2015 1:25:12 PM
The vSphere HA availability state of the host esxi02.vclass.local in cluster in Lab Cluster i...	Information	1/1/2015 1:25:10 PM
vSphere HA detected a possible host failure of host esxi02.vclass.local in cluster Lab Clu...	Error	1/1/2015 1:25:10 PM
The vSphere HA availability state of the host esxi02.vclass.local in cluster in Lab Cluster i...	Information	1/1/2015 1:24:54 PM

6. In the inventory, select the ESXi host that is not rebooting.
7. Click the **Related Objects** tab and click the **Virtual Machines** tab.

   Q1. Do you see the virtual machines that were running on the original master ESXi host, which you recorded in task 3, step 3?

8. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click the **Sphere HA** tab.
9. Monitor the original master ESXi host inventory until it is fully running again.
10. Select **Summary** in the middle pane.

    Q2. Has the master host changed?

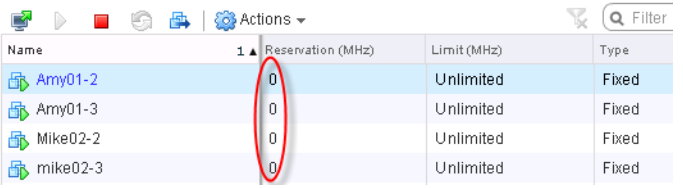
Task 4: View the vSphere HA Cluster Resource Usage

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

Do this task as a team. Student B should do the steps in this task.

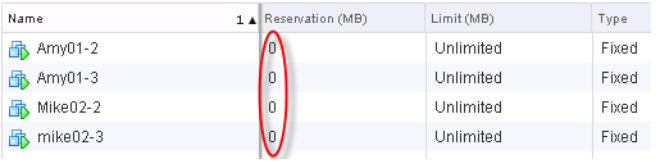
1. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
2. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click the **Resource Reservation** tab.
3. Select **CPU** and record the information for the cluster.
   - Total Reservation 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).



5. Select **Memory** and record the information for the cluster.
   - Total Reservation Capacity (GB) _____
   - Used Reservation (GB) _____
   - Available Reservation (GB) _____
6. In the virtual machines pane below, 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.

Perform this task as a team. Student A should perform the steps in this task.

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. Select **vSphere HA** and click **Edit**.
4. Click the arrow next to Admission Control to expand the view.
5. Click **Define failover capacity by static number of hosts** and click **OK**.
6. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click the **vSphere HA** tab.
7. Select **Summary** in the middle pane.
8. View the slot information of the cluster.
   a. In the Advanced Runtime Info pane, 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. Set the CPU reservation on the *your_name*##-3 virtual machine.
    a. Right-click the ***your_name*##-3** 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**.
11. In the Navigator pane, click the **Hosts and Clusters** tab.
12. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click the **vSphere HA** tab.
13. Select **Summary** in the middle pane.

14. 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)

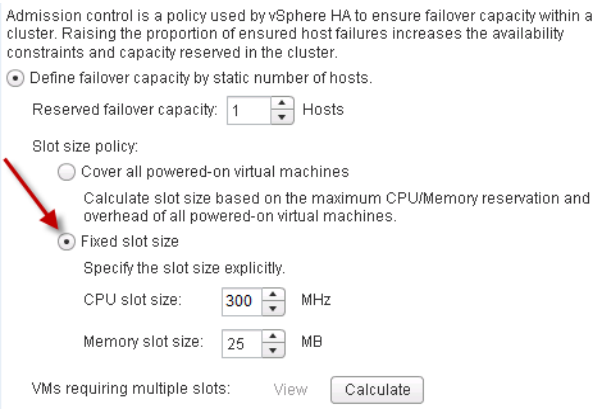
15. Use the vSphere HA slot size policy to enforce a slot size.

    a. Right-click **Lab Cluster** in the inventory and select **Settings**.

    b. Select **vSphere HA** and click **Edit**.

    c. Click the arrow next to Admission Control to expand the view.

    d. Under Define failover capacity by static number of hosts, click **Fixed slot size** for the slot size policy.



    e. In the **CPU slot size** text box, enter `300` 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 *your_name*##-3 virtual machine. _____

    Because the CPU slot size has a fixed value of 300 MHz, the *your_name*##-3 virtual machine with the 512 MHz CPU reservation will use two slots to power on.

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

16. View the slot information for this cluster.
    a. Select **Lab Cluster** in the inventory, click the **Monitor tab**, and click the **vSphere HA** tab.
    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 in step 14.

       Slot size: CPU _____ (MHz), Memory _____ (MB)
17. Remove the vSphere HA fixed slot size setting.
    a. Right-click **Lab Cluster** in the inventory and select **Settings**.
    b. Select **vSphere HA** and click **Edit**.
    c. Click the arrow next to Admission Control to expand the view.
    d. Under Define failover capacity by static number of hosts, click **Cover all powered-on virtual machines** for the slot size policy.
    e. Click **OK**.
18. Remove the CPU reservation on the *your_name*##-3 virtual machine.
    a. Right-click the ***your_name*##-3** 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 to ensure that sufficient resources are available in a cluster to provide failover protection. Any actions violating the constraints are not permitted.

In task 5, when you configured the cluster under Define failover capacity by static number of hosts, you instructed 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 virtual machines in the cluster. In this task, you learn how strict admission control works.

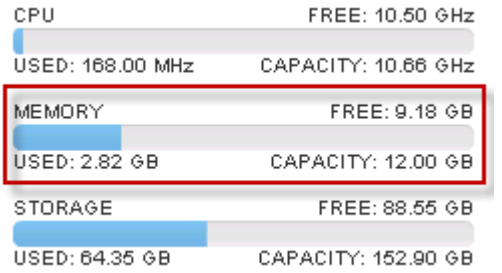
Perform this task as a team. Student B should perform the steps in this task.

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 compete.

   Wait another minute for the system to release the memory.

3. Select **Lab 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 the **Resource Reservation** tab, and select **Memory**.
6. Assign a 768 MB memory reservation to each of the *your_name*##-2 virtual machines.
   a. Right-click the ***student_A_name*##-2** virtual machine listed on the **Resource Allocation** tab and select **Edit Resource Settings**.
   b. Click the arrow next to Memory to expand the view.
   c. Enter `768` (MB) in the **Reservation** text box and click **OK**.
   d. Repeat steps a through c to set the memory reservation on the *student_B_name*##-2 virtual machine.
7. Select **Lab Cluster** in the inventory, click the **Monitor** tab, and click the **vSphere HA** tab.
8. Select **Summary** in the middle pane.

9. Record the value shown in the **Total slots in cluster** text box in the Advanced Runtime Info pane. _____

Q2. Why does the vSphere Web Client report that value?

10. Right-click the ***student_A_name*##-2** virtual machine 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?

Q4. Why is the value for failover slots half the number of total slots?

13. Record the slot size values that appear.

CPU (MHz) _____, Memory (MB) _____

Q5. How is the memory slot size calculated?

14. In the inventory, right-click each of ***your_name*##-3** virtual machines and select **Power On**.

You should have two virtual machines powered on and one virtual machine powered off.

15. Return to the Advanced Runtime Info pane of Lab Cluster and click **Refresh**.
16. View the slot information.

Q6. How many slots are available and what is the reason?

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

Q7. Is your virtual machine allowed to power on, and what is the reason?

Q8. If a cluster has N total slots, can you power on N virtual machines?

Task 7: Prepare for Upcoming Labs

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

Perform this task as a team. Student A should perform the steps in this task.

1. Remove the memory reservation on each of the *your_name*##-2 virtual machines.
   a. Right-click the ***student_A_name*##-2** virtual machine listed on the **Resource Reservation** tab 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 *student_B_name*##-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 HA** and click **Edit**.
   c. Expand **Admission Control** and click the **Do not reserve failover capacity** button.
   d. Click **OK** to commit your changes.
5. Leave the vSphere Web Client open for the next lab.

Lab 22
Implementing a vSphere DRS Cluster

Objective: Implement a vSphere DRS cluster

In this lab, you will 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 VMware ESXi™ hosts in the lab cluster to test how VMware vSphere® Distributed Resource Scheduler™ works.

Perform this task as a team. Student B should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Virtual machine administrator password

1. If VMware vSphere® Web Client is not active, open a Web browser and connect to the VMware vCenter Server™ Appliance™ home page at https://*vCenter_Server_Appliance*/vsphere-client and log in.
2. On the vSphere Web Client Home page, click **Hosts and Clusters** and expand the view of the inventory.
3. If all four virtual machines are not running on the same host, migrate them to the same host.
4. Power on the virtual machines that are powered off.
5. Start an instance of `cpubusy.vbs` on each of the virtual machines.
   a. In the left pane, select a virtual machine.
   b. In the center pane, click **Launch Remote Console** on the **Summary** tab.
   c. Log in to the virtual machine as the administrator with the password.
   d. Right-click the **cpubusy.vbs** script on each virtual machine's desktop and select **Open with Command Prompt**.

      The number of running `cpubusy.vbs` instances necessary 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.

Perform this task as a team. Student A should perform the steps in this task.

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** and click **Edit**.
4. Select the **Turn on vSphere DRS** check box.
5. Select **Manual** from the **vSphere DRS Automation** drop-down menu.
6. Click the arrow next to vSphere DRS Automation to expand the view and move the **Migration Threshold** slider to **Aggressive** on the right.
7. Leave other settings at their defaults and click **OK**.

Task 3: Verify Proper vSphere DRS Cluster Functionality

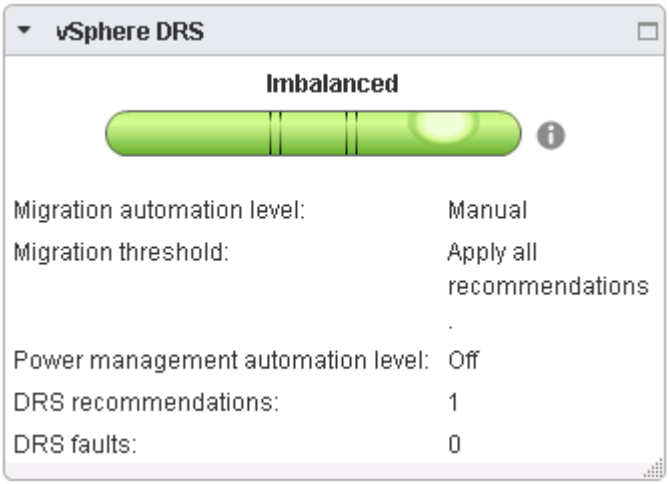
You can run vSphere DRS in either automatic mode or manual mode. In manual mode, you review the recommendations for optimal virtual machine placement provided by vSphere DRS and decide whether to make the changes.

Perform this task as a team. Student B should perform the steps in this task.

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

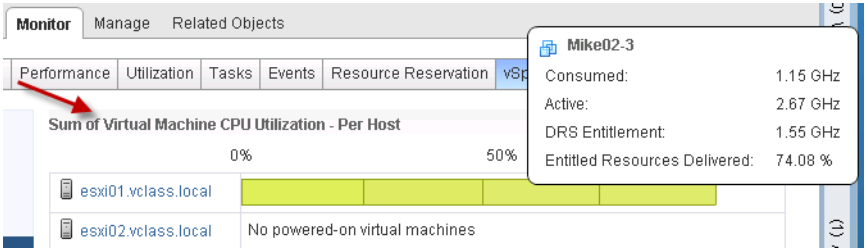


Q1. Does the gauge show that the load is imbalanced?

4. Click the **Monitor** tab, click the **vSphere DRS** tab, 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.

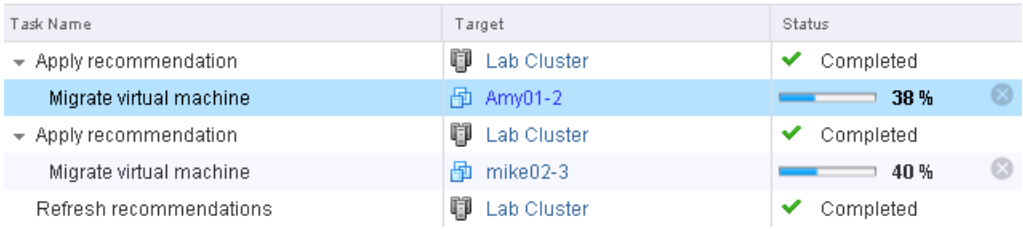


6. Select **Recommendations** in the middle pane and view the vSphere DRS recommendations.

   The screenshot shows a recommendation made by vSphere DRS to migrate a virtual machine from one host to another host.

7. Click **Apply Recommendations**.
8. If your recommendations have expired, click **Run DRS Now** to generate new recommendations and apply them.
9. If new recommendations do not appear, click **Run DRS Now** again.
10. Click the **Monitor** tab and click the **Tasks** tab.
11. Click the **Expand All** icon.

12. Monitor the Migrate virtual machine subtask under Apply recommendation until completion.



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

    Q2. Is any recommendation shown?

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

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

15. Click the **Monitor** tab and click the **vSphere DRS** tab.
16. Select **CPU Utilization**.

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

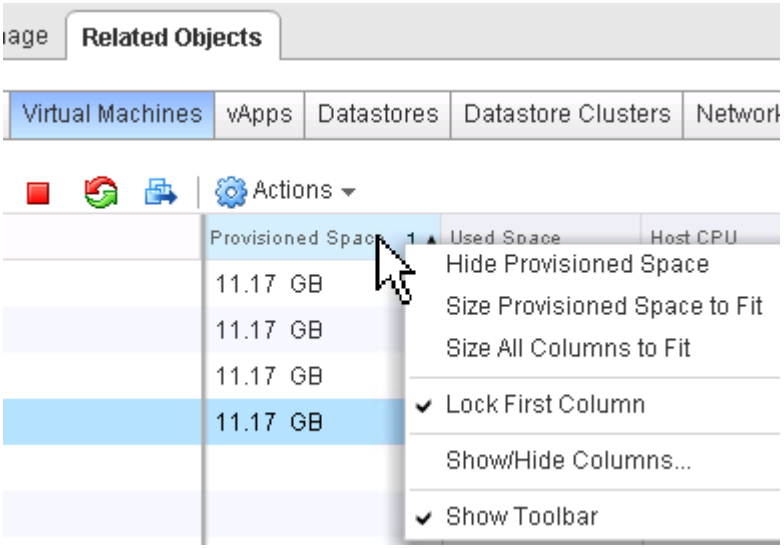
17. In each virtual machine console, press Ctrl+C to stop the `cpubusy.vbs` script and close the console.

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.

Students perform the steps in this task individually.

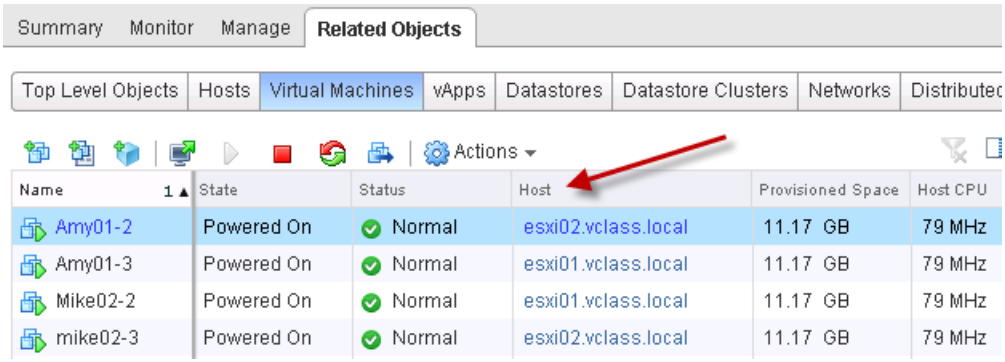
1. Select **Lab Cluster** in the inventory, click the **Related Objects** tab, and click the **Virtual Machines** tab.
2. Point to the gray row of column names, right-click the row, and select **Show/Hide Columns**.



3. Select the **Host** check box from the list and click **OK**.

   The Host column appears in the table.

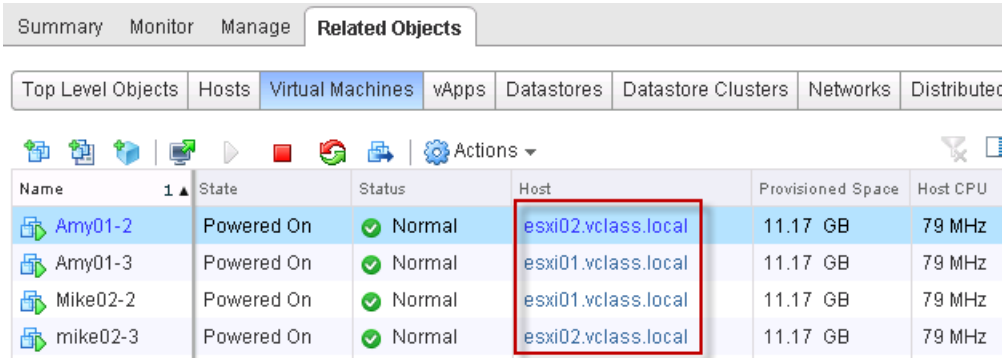
   You can drag the **Host** column to the left so that it is easily visible.



4. Based on the information in the Name and Host columns, verify that the two virtual machines that you own are running on different ESXi hosts.

5. If the virtual machines that you own are running on the same ESXi host, migrate the *your_name*##-3 virtual machine to the other ESXi host.

   Having your two virtual machines reside on two different ESXi hosts is necessary to test the validity of the VM/Host rule that you create in step 9. If you have one virtual machine on each ESXi host in the cluster, no action is necessary.



6. Right-click **Lab Cluster** in the inventory and select **Settings**.

7. Select **VM/Host Rules** in the middle pane.

8. In the VM/Host Rules pane, click **Add**.

   The Create VM/Host Rule dialog box appears.

9. Configure the options for the VM/Host rule.
   a. In the **Name** text box, enter **`Colocate-`*`your_name`*`-VMs`**.
   b. Leave the **Enable rule** check box selected.
   c. From the **Type** drop-down menu, select **Keep Virtual Machines Together**.
   d. Click **Add** to add members.
   e. Select the check boxes for the virtual machines that you own and click **OK**.
10. Click **OK** to close the Create VM/Host Rules dialog box.
11. Click the **Monitor** tab and click the **vSphere DRS** tab.
12. Select **Recommendations** and click **Run vSphere DRS Now**.

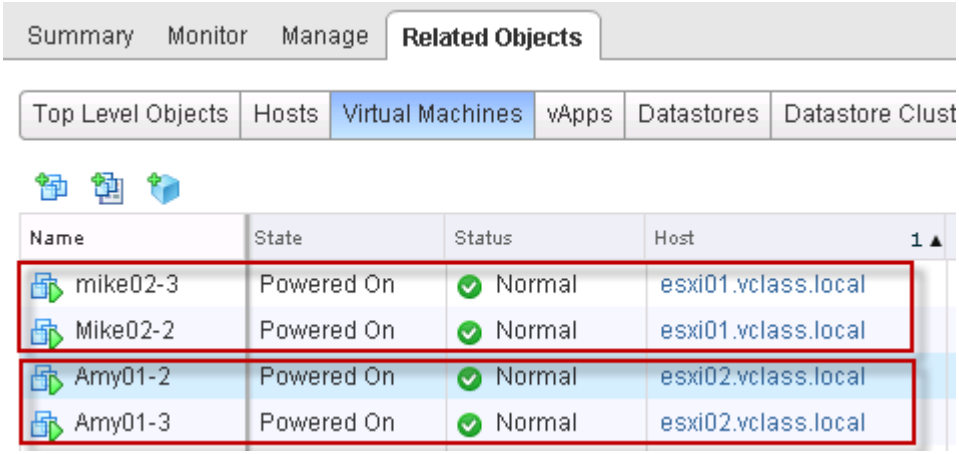
    Q1. Do you see any recommendations, and why?

13. If you are ahead of your lab partner, wait for your partner to reach this point of the lab.
14. (Student A) 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.
15. Click the **Related Objects** tab and click the **Virtual Machines** tab.

16. Click the **Host** column heading to sort the virtual machines by the ESXi host on which they reside.

    The virtual machines that you own should be running on the same ESXi host.



17. Right-click **Lab Cluster** in the inventory and select **Settings**.
18. Select **VM/Host Rules** in the middle 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

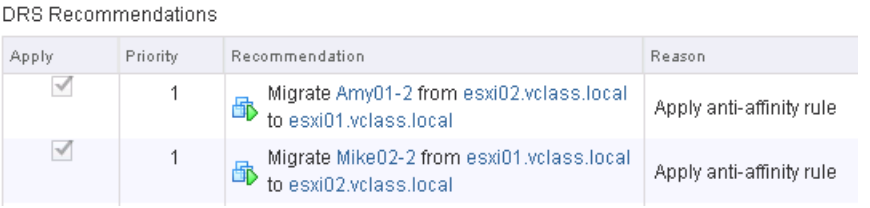
You create a vSphere DRS anti-affinity rule to force the specified virtual machines to be kept on separate hosts.

Students perform the steps in this task individually.

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

4. Configure the options for this VM/Host rule.
   a. In the **Name** text box, enter **`Separate-`*`your_name`*`-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 virtual machines that you own and click **OK**.
5. Click **OK** to close the Create VM/Host Rules dialog box.
6. Click the **Monitor** tab and click the **vSphere DRS** tab.
7. If you receive a message stating that a vSphere DRS rule will be disabled due to a conflict, click **OK**.
8. Select **Recommendations** and click **Run vSphere 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.

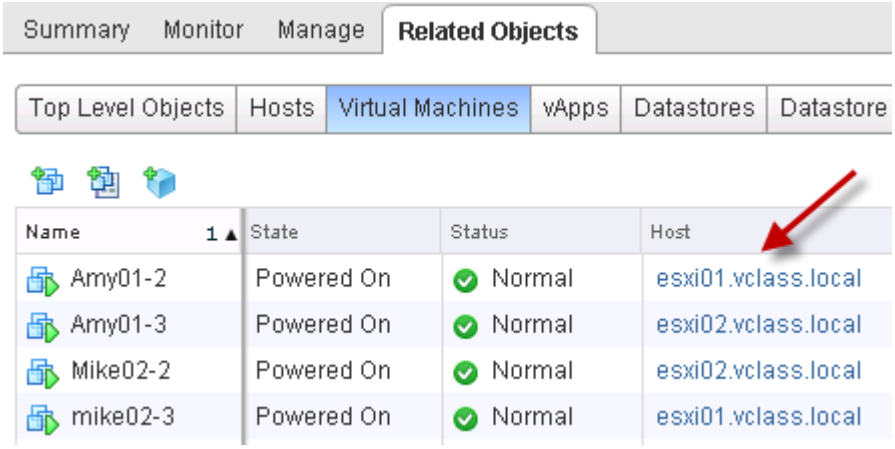

DRS Recommendations

Apply	Priority	Recommendation	Reason
☑	1	Migrate Amy01-2 from esxi02.vclass.local to esxi01.vclass.local	Apply anti-affinity rule
☑	1	Migrate Mike02-2 from esxi01.vclass.local to esxi02.vclass.local	Apply anti-affinity rule

9. If you are ahead of your lab partner, wait for your partner to reach this point in the lab.
10. (Student B) Click **Apply Recommendations** and wait for the virtual machine migration to complete.
11. Click the **Related Objects** tab and click the **Virtual Machines** tab.

12. 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.



13. Right-click the **Lab Cluster** inventory object and select **Settings**.
14. Select **VM/Host Rules** in the middle pane.
15. In the VM/Host Rules pane, select the **Separate-*your_name*-VMs** rule.
16. Click **Delete** 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.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- Partner ESXi host

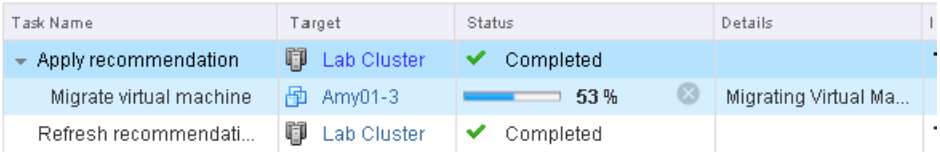
1. Right-click **Lab Cluster** in the inventory and select **Settings**.
2. Select **VM/Host Groups** in the middle pane.
3. In the VM/Host Groups pane, click **Add**.

4. When the Create VM/Host Group dialog box appears, configure the options.
   a. In the **Name** text box, enter ***your_name*-VMs**.
   b. Verify that **VM Group** is selected from the **Type** drop-down menu.
   c. Click **Add**.
   d. Select the check boxes for both of your named virtual machines.
   e. Click **OK**.
   f. Click **OK** to close the dialog box.
5. In the VM/Host Groups pane, click **Add**.
6. When the Create VM/Host Group dialog box appears, configure the options.
   a. In the **Name** text box, enter ***your_name*-Host**.
   b. From the **Type** drop-down menu, select **Host Group**.
   c. Click **Add**.
   d. Select the check box for your own ESXi host and click **OK**.
   e. Click **OK** to close the dialog box.
7. Select **VM/Host Rules** in the middle pane.
8. In the VM/Host Rules pane, click **Add**.
9. When the Create VM/Host Rules dialog box appears, configure the options.
   a. In the **Name** text box, enter **Run-only-on-host##**.

      ## is your assigned ESXi host number.
   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 ***your_name*-VMs**.
   e. Select **Must run on hosts in group** from the drop-down menu.
   f. From the **Host Group** drop-down menu, select ***your_name*-Host**.
   g. Click **OK** to close the dialog box.
10. Click the **Monitor** tab and click the **vSphere DRS** tab.
11. Select **Recommendations** and click **Run DRS Now**.

Q1. What recommendations did vSphere DRS make and why?

12. If you are ahead of your lab partner, wait for your partner to reach this point in the lab.
13. (Student A) Click **Apply Recommendations**.
14. Click the **Monitor** tab and click the **Tasks** tab to view the progress of the virtual machine migration and wait for completion.



The virtual machines with VM/Host affinity rules applied to them are migrated to another ESXi host in the cluster.

15. Click the **Related Objects** tab and click the **Virtual Machines** tab.
16. Click the **Host** column heading to sort the virtual machines by the ESXi host on which they reside.

    Your virtual machines that were running on your partner's ESXi host are migrated to your own ESXi host.

17. Right-click one of your virtual machines in the inventory and select **Migrate**.

    The Migrate wizard starts.

18. On the Select the migration type page, click **Change computer resource only** and click **Next**.
19. On the Select a compute resource page, click **Clusters** and click **Lab Cluster**.

    Q2. What do you see in the Compatibility pane?

20. Click **Cancel** to cancel the migration.
21. Right-click **Lab Cluster** in the inventory and select **Settings**.
22. Select **VM/Host Rules** in the middle pane.
23. In the VM/Host Rules pane, select your **Run-only-on-host##** rule and click **Edit** above the rule.
24. Deselect the **Enable rule** check box and click **OK**.
25. Leave the vSphere Web Client open for the next lab.

Lab 23
Using vSphere Update Manager

Objective: Install, configure, and use vSphere Update Manager

In this lab, you will perform the following tasks:

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

Task 1: Install the vSphere Update Manager Server

You use VMware vSphere® Update Manager™ to automate patch management and eliminate manual tracking and patching of VMware vSphere® hosts and virtual machines. You first install the vSphere Update Manager server component.

Perform this task as a team. Student A should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Location of installation software
- Setup language

1. Go to the folder that contains the vSphere Update Manager installation software.
2. Double-click **autorun.exe**.

   The VMware vCenter Installer window opens.
3. Under vSphere Update Manager, select **Server**.
4. Select the **Use Microsoft SQL Server 2012 Express as the embedded database** check box and click **Install**.

   The "Please wait while Microsoft SQL Server 2012 Setup processes the current operation" message appears. The SQL Server setup files are installed. Completing the Microsoft SQL server 2012 Express SP2 installation takes about 10 to 20 minutes.
5. When the VMware vSphere Update Manager - InstallShield wizard starts, select the language for the installation and click **OK**.
6. On the welcome page, click **Next**.
7. On the License Agreement page, review the information, click **I accept the terms in the license agreement**, and click **Next**.
8. On the Support Information page, deselect the **Download updates from default sources immediately after installation** check box and click **Next**
9. On the vCenter Server information page, enter the VMware vCenter Server™ Appliance™ IP address or host name, enter the VMware vCenter™ Single Sign-On™ user name and password, leave the default HTTP port setting, and click **Next**.
10. On the VMware vSphere Update Manager Port Settings page, leave the default settings and click **Next**.

11. On the Destination Folder page, leave the default settings and click **Next**.
12. When the warning message appears informing you of the limited free space on the selected drive, click **OK** to proceed.
13. On the Ready to Install the Program page, click **Install**.

    This installation might take several minutes.
14. When the InstallShield Wizard Completed page appears, click **Finish**.
15. Close the VMware vCenter Installer.

Task 2: Install vSphere Update Manager

You install vSphere Update Manager on the student desktop to perform patch and version management of the vSphere inventory objects. vSphere Update Manager installs as a plug-in to VMware vSphere® Client™, which is already installed on the student desktop.

Students perform the steps in this task individually.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- Location of installation software
- Setup language

1. In the VMware-VIMSetup-all-6.0.0-2562643 window, double-click **UpdateManager**.
2. In the updateManager window, double-click **VMware-UMClient.exe**.
3. When the VMware vSphere Client - InstallShield dialog box appears, select the setup language and click **OK**.

   The installation wizard starts.
4. On the welcome page, click **Next**.
5. On the End User License Agreement page, review the information, click **I agree to the terms in the license agreement**, and click **Next**.
6. On the Destination Folder page, leave the default setting and click **Next**.
7. On the Ready to Install the Program page, review the information and click **Install**.
8. On the Installation Completed page, click **Finish**.
9. Close the Windows Explorer window.

10. On the VMware vSphere® Web Client Home page, click **Hosts and Clusters** and click the **Monitor** tab.

    The **Update Manager** tab should appear. The vSphere Update Manager Web Client plug-in is automatically enabled in the vSphere Web Client after you install the vSphere Update Manager server. The vSphere Update Manager Web Client plug-in appears as the **Update Manager** tab under the **Monitor** tab in the vSphere Web Client.

11. If the **Update Manager** tab does not appear, close and reopen the vSphere Web Client to load the plug-in.

Task 3: Modify the Cluster Settings

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

Perform this task as a team. Student B should perform the steps in this task.

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, verify that **Fully Automated** is selected 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. Select **vSphere HA** and click the arrow next to Admission Control to expand the view.
6. Verify that **Do not reserve failover capacity** is not clicked and click **OK**.
7. Select **Lab Cluster** in the inventory.
8. Click the **Monitor** tab and click the **Resource Reservation** tab.
9. Select **CPU** and observe the Reservation (MHz) column to verify that no CPU reservations are assigned to virtual machines.
10. Select **Memory** and observe the Reservation (MB) column to verify that no memory reservations are assigned to virtual machines.

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

Task 4: 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.

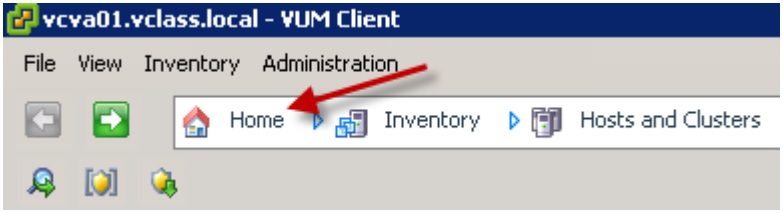
Perform this task as a team. Student A should perform the steps in this task.

Use the following information from the class configuration handout:

- vCenter Server Appliance name
- vCenter Single Sign-On user name
- vCenter Single Sign-On password
- ESXi host patch bundle

1. On your assigned student desktop, click the **VMware vSphere Client** icon.
2. Enter the VMware vCenter Server™ Appliance™ IP address or host name, enter the VMware vCenter™ Single Sign-On™ user name and password, and click **Login**.
3. When the security warning appears, select the **Install this certificate and do not display any security warnings** check box and click **Ignore**.

   The vSphere Client opens.
4. Select **Home**.



5. Click the **Update Manager** icon.
6. Click the **Configuration** tab.
7. In the Settings pane, select **Download Settings**.
8. In the Download Settings pane, click the **Import Patches** link.

9. Click **Browse**, navigate to the **LabFiles** folder on the desktop, select the ESXi patch bundle ZIP file, and click **Open**.
10. Click **Next**.
11. When the security warning appears, select the **Install this certificate and do not display any security warnings** check box and click **Ignore**.
12. When the import operation completes, click **Finish**.

Task 5: 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.

Perform this task as a team. Student B should perform the steps this task.

1. In the vSphere Client, click the **Baselines and Groups** tab.
2. Click the **Create** link above the Baselines pane on the left.

   The New Baseline wizard starts.
3. On the Baseline Name and Type page, enter **`ESXi Host Update`** in the **Name** text box.
4. In the **Description** text box, enter **`Patch for ESXi Host 6.0`** and click **Next**.
5. On the Patch Options page, click **Fixed** and click **Next**.
6. On the Patches page, select each patch and click the down arrow under the horizontal scroll bar.

   The patches are added to the Fixed Patches to Add pane.
7. Click **Next**.
8. On the Ready to Complete page, click **Finish**.

Task 6: 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.

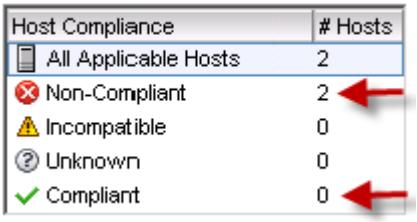
Perform this task as a team. Student A should perform the steps in this task.

1. In the vSphere Client, click the **Baselines and Groups** tab.
2. At the top-right corner of the **Baselines and Groups** tab, click the **Compliance View** link.

3. Select **Lab Cluster** in the inventory and click the **Update Manager** tab.
4. Click the **Attach** link in the upper-right corner.

   The Attach Baseline or Group dialog box appears.

5. Select the **Critical Host Patches** check box and click **Attach**.
6. Click the **Scan** link.
7. In the Confirm Scan window, verify that the **Patches and Extensions** and **Upgrades** check boxes are both selected and click **Scan**.
8. Monitor the Recent Tasks pane and wait for the scan to complete.
9. View the Host Compliance pane, which indicates that the ESXi hosts are noncompliant.



Task 7: Stage the Patches onto the ESXi Hosts

You use staging patches and extensions to speed up the remediation process because the patches and extensions are already available locally on your hosts.

Students perform the steps in this task individually.

IMPORTANT

Both team members must complete this task before going to task 8.

1. In the All Groups and Independent Baselines pane, select your ESXi host.

   NOTE

   You should not select the ESXi hosts from the inventory pane on the left.

2. Click **Stage**.

   The Stage wizard starts.

3. On the Baseline Selection page, accept the default settings and click **Next**.
4. On the Patch and Extension Exclusion page, accept the default settings and click **Next**.
5. On the Ready to Complete page, review the information and click **Finish**.
6. Monitor the Recent Tasks pane for the staging tasks to complete.
7. On the task bar, click **vSphere Web Client**.
8. Select **Lab Cluster** in the inventory and click the **Monitor** tab.
9. On the monitor tab, click **Update Manager**.
10. In the center pane, select **Critical Host Patches** from the **Attached Baselines** list
11. In the center pane, notice that both ESXi hosts appear on the **Non-Compliant** tab.

Task 8: Remediate the ESXi Hosts

You temporarily disable cluster features such as VMware vSphere® Distributed Power Management™ and VMware vSphere® High Availability admission control and apply the patches to the ESXi hosts.

Perform this task as a team. Student B should perform the steps in this task.

1. On the task bar, click the vSphere Client window.
2. In the lower-right corner of the vSphere Client, click **Remediate**.

   The Remediate wizard starts.

3. On the Remediation Selection page, leave the default settings and click **Next**.

4. On the Patches and Extensions page, leave the default settings and click **Next**.
5. On the Schedule page, enter `Remediate ESXi Hosts in Lab Cluster` in the **Task Name** text box and leave other settings at their defaults.
6. Click **Next**.
7. 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.
8. Click **Next**.
9. 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**.
10. On the Ready to Complete page, review the information and click **Finish**.
11. Monitor the Recent Tasks pane.

Q1. Was the ESXi host placed into maintenance mode by the remediation process?

Q2. Were the virtual machines migrated to the other node in the cluster?

Q3. Was the patch installed on the ESXi host in maintenance mode?

Q4. Was the patched ESXi host rebooted?

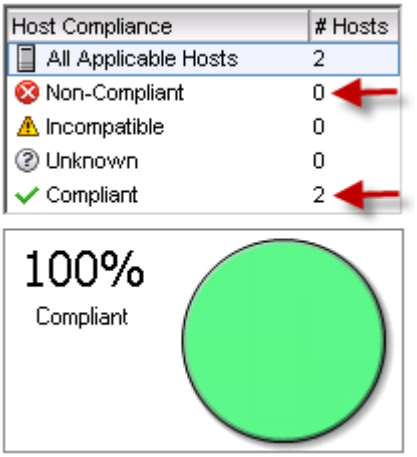
Q5. Did the patched ESXi host exit maintenance mode?

Q6. Were the virtual machines that migrated to the other ESXi host present in the cluster?

Q7. Were both of the ESXi hosts patched successfully?

12. On the task bar, click **vSphere Web Client**.
13. Monitor the Recent tasks pane until the Remediate Entity task completes.
14. Click the **Refresh** icon of the vSphere Web Client.
15. In the center pane, select **Critical Host Patches** and click the **Compliant** tab.
16. Notice that both hosts appear on the **Compliant** tab.
17. On the task bar, click the vSphere Client window.

    After the hosts complete a reboot, the hosts show 100 percent compliance when remediation completes.



18. Close the vSphere Client.
19. Close the vSphere Web Client.

Answer Key

Lab 3: Working with Virtual Machines

1. Thin provision

Lab 6: Creating Folders in vCenter Server Appliance

1. The Lab Servers folder has menu commands related to host actions. The LabVM and Templates folders have menu commands related to virtual machines.

Lab 7: Using Standard Switches

1. The default virtual switch is named vSwitch0.

2. The default switch is connected to the physical adapter vmnic0.

3. vSwitch0 contains a virtual machine port group named VM Network. Your virtual machine is connected to VM Network.

4. VM Network and Management Network

Lab 13: Modifying Virtual Machines

1. Yes.

1. The folder's name for the your_name##-4 virtual machine is Hot-Clone##, which is the original name of this virtual machine.

Lab 15: Managing Virtual Machines

1. Yes, a folder named your_name##-4 exists. When the virtual machine was first created, it and its folder were named Hot-Clone##. When the virtual machine was renamed to your_name##-4, its folder was not renamed. Only when the virtual machine was migrated to a new datastore was the folder automatically renamed to your_name##-4.

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.

1. No.

2. Yes.

1. Yes.

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

Lab 16: Managing vApps

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

1. No. The your_name-App02 virtual machine powers on first. About 20 seconds later, the your_name-App01 virtual machine powers on. About 20 seconds after that, the your_name-App03 and your_name-App04 virtual machines power on.

Lab 17: Managing Resource Pools

1. 2,000

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 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.

Lab 18: Monitoring Virtual Machine Performance

1. Yes. The CPU ready value should decrease significantly because the CPU contention that was created by running the cpubusy.vbs script is removed.

Lab 20: (Optional) Using vRealize Operations Manager

1. The ESXi host is a child of Team Cluster and a parent to several datastores and virtual machines.
2. Two hosts
3. Two virtual machines

1. Virtual machines are being swapped.
2. In cluster A, host esxisim102.vclass.local experience issues. In cluster B, host esxisim112.vclass.local experience issues.
3. One alert was triggered on the host. You can determine the number of triggered alerts by the number that appears in the upper-right corner of the host icon.
4. Two recommendations are given. You can add more hosts to the cluster to increase memory capacity. Or you can use vSphere vMotion to migrate some virtual machines off the host or cluster. You make a decision based on your specific situation.

1. The virtual machine is using swap.
2. The virtual machine CPU demand is at critical level.
3. This virtual machine has one child, a datastore object. For student A, the datastore is DS2. For student B, the datastore is DS4. The health of the DS2 and DS4 datastores is good.

1. Workload is highest by memory.
2. Yes, the virtual machine is experiencing some anomalies.
3. No.
4. Recommendations: (1) Add memory reservations to this virtual machine to prevent ballooning and swapping, and (2) use vSphere vMotion to migrate this virtual machine to a different host or cluster.

1. The object type is Virtual Machine.
2. B_Linux202, A_Linux101, A_Linux100, and A_Linus102 virtual machines have the highest CPU contention.
3. Team Cluster
4. 1 GHz

Lab 21: Using vSphere HA

1. Yes, if both hosts are added to the cluster and all virtual machines on the hosts are powered on.

2. Both shared datastores appear in the heartbeat because both have live virtual machines.

3. Yes, the error management error message disappeared.

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 backup host was elected as the new master host.

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 six total slots in the cluster: one used slot, two available slots, and three failover slots. If this is not what you see, refresh the vSphere Web Client after 2 minutes, and the numbers should update.

4. The value is half the number of total slots because you must reserve half of the slots to be able to tolerate the failure of one host in the cluster.

5. 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.

6. Zero slots are available because you have used all the available slots. Of all of the slots that were originally available, half are reserved for failover.

7. 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.”

8. 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

Lab 22: Implementing a vSphere DRS Cluster

1. Yes, because all the virtual machines are running on a single host and the running cpubusy.vbs 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.

1. Yes. vSphere DRS recommends that one of your 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.

1. vSphere DRS recommends that you virtual machine be migrated to a different host due to the violation of your VM/Host affinity rule. If no recommendations are made, the virtual machine might already be on the correct host.
2. You receive the error message “Virtual machine 'your_name##-#' on host 'host_name' would violate a virtual machines - host affinity rule.”

Lab 23: Using vSphere Update Manager

1. Yes.
2. Yes, all powered-on virtual machines were migrated. Any powered-off virtual machine was not migrated.
3. Yes.
4. Yes.
5. Yes.
6. Yes.
7. Yes.