VMware vSphere:
Install, Configure, Manage

ESXi 8 and vCenter Server 8

Contents

Lab 1 Accessing the vSphere Client and VMware Host Client

Objective and Tasks

You access and manage the lab environment from the student desktop.

1. Access the Student VM Desktop

2. Log In to an ESXi Host with VMware Host Client

3. Log In to vCenter Server with the vSphere Client

Task 1: Access the Student Desktop

You access and manage the lab environment from the student desktop.

1. Connect to the lab environment using VMware WorkStation interface.

2. Log in to the student desktop by entering **`MyLearn\administrator`** as the user name and **`Form@tiOn`** as the password.

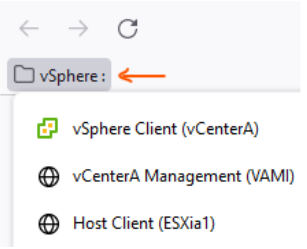
Task 2: Log In to an ESXi Host with VMware Host Client

You log in to the ESXiR1.Mylearn.local ESXi host as user **root** to familiarize yourself with the VMware Host Client UI.

1. From the student desktop, log in to ESXiR1 as **root** using VMware Host Client.

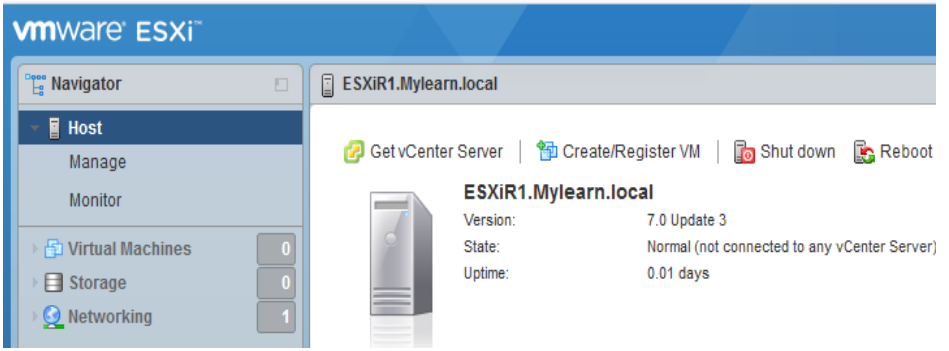
   a. Click the **Firefox** icon on the taskbar of your student desktop.

   b. From the bookmarks toolbar, select **vSphere : > Host Client (ESXiR1)**.



c. To log in, enter **`root`** for the user name and **`Form@ti0n`** for the password.

VMware Host Client opens with **Host** selected in the left pane.



2. Explore the user interface by clicking objects in the Navigator pane and viewing information about them in the right pane.

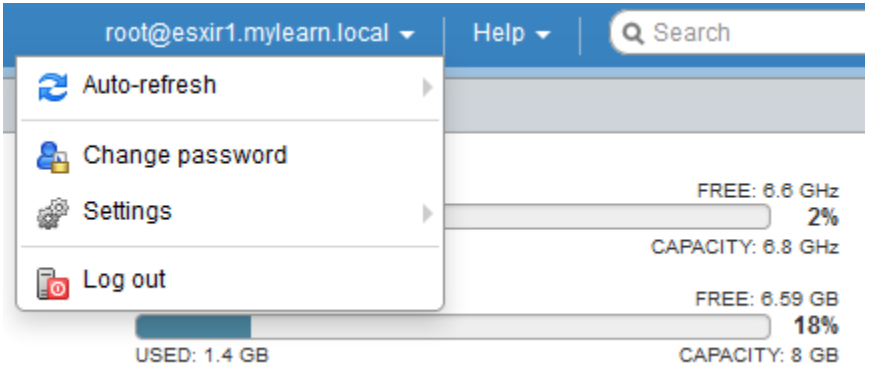
   Q1. How many CPUs and how much memory does this ESXi host have?

   Q2. Is the NTP service running on this host?

   Q3. How many virtual machines are on this host?

   Q4. What are the guest operating system types for the virtual machines on this host?

3. Log out of VMware Host Client.



Task 3: Log In to vCenter Server with the vSphere Client

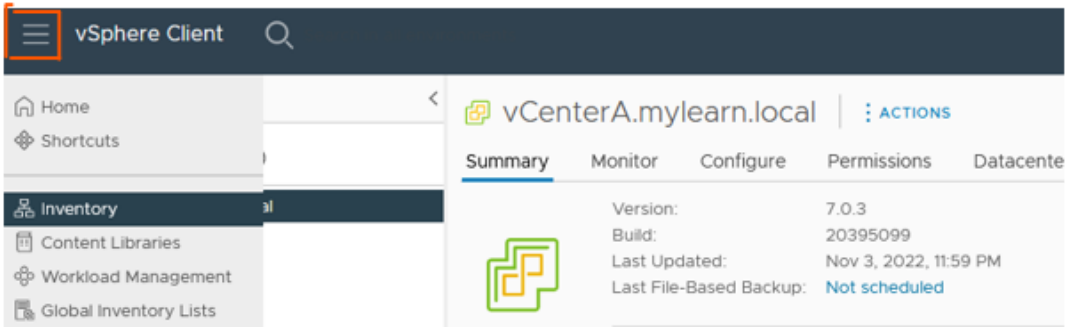
Using the vSphere Client, you log in to the VCenterA.Mylearn.local vCenter Server system and view information to familiarize yourself with the UI layout.

1. From your student desktop , log in to VCenterA.Mylearn.local as administrator@vsphere.local using the vSphere Client.

   a. From the bookmarks toolbar, select **vSphere : > vSphere Client (VCenterA)**.

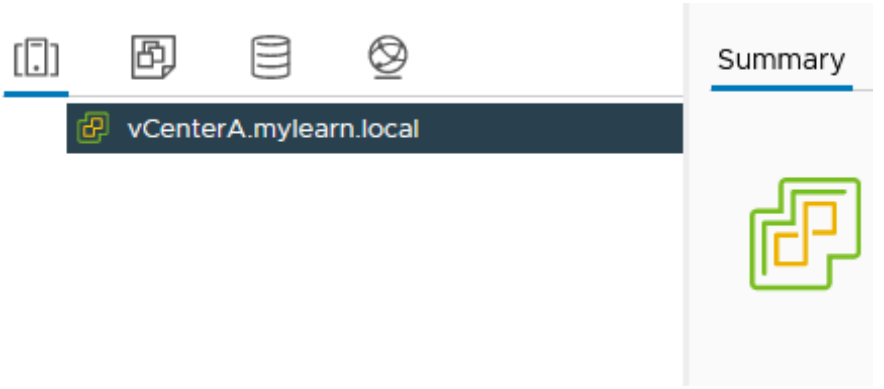
   b. Log in by entering **`administrator@vsphere.local`** as the user name and **`Form@ti0n`** as the password.

2. From the main menu , select **Iventory > Hosts and Clusters**.



3. View the navigation pane.

   The navigation pane lists the vCenter Server inventory for VCenterA.Mylearn.local .



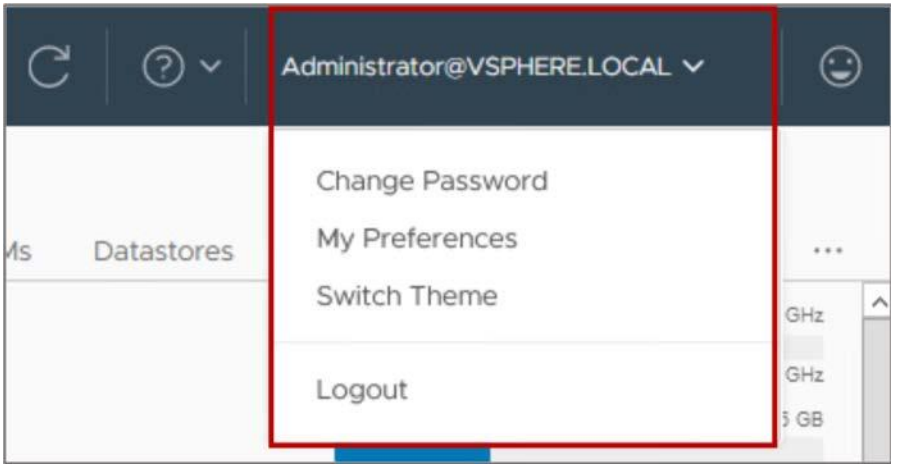
4. View the items in the inventory.

   You might have to expand the items in the inventory to view all the objects.

   Q1. Do you see the ESXiR1.Mylearn.local host?

5. Log out of the vSphere Client.

   The logout function is in the **Administrator@VSPHERE.LOCAL** drop-down menu at the top-right corner of the window.



Lab 2 Configuring an ESXi Host

Objective and Tasks

Configure ESXi host Using VMware Host Client:

1. Add an ESXi Host to Active Directory
2. Log In to the ESXi Host as an Active Directory User
3. Enable the SSH and vSphere ESXi Shell Services

Task 1: Add an ESXi Host to Active Directory

Configure the **ESXiR1.Mylearn.local** to use Active Directory for managing users.

1. From your student desktop , log in to ESXiR1 as root using VMware Host Client.
   a. Click the **Firefox** icon on the taskbar of your student desktop.
   b. From the bookmarks toolbar, select **vSphere : > Host Client (ESXiR1)**.
   c. Log in by entering **`root`** for the user name and **`Form@ti0n`** for the password.
2. In the Navigator pane, select **Manage**.
3. In the right pane, click **Security & users**.
4. Click **Authentication** and click **Join domain**.

   The Join domain window opens.
5. In the **Domain name** text box, enter **`Mylearn.local`** .
6. Leave the **Use authentication proxy** check box unselected.
7. In the **User name** text box, enter **`administrator`**.
8. In the **Password** text box, enter **`Form@ti0n`**
9. Click **Join domain**.
10. Verify that Active directory is enabled on ESXiR1 and that this host has joined the Mylearn.local domain.

Task 2: Log In to the ESXi Host as an Active Directory User

You verify that you can log in to ESXiR1.Mylearn.local as the Active Directory user esxadmin@Mylearn.local .

esxadmin@Mylearn.local is a preconfigured user account that is a member of the ESX Admins domain group.

1. Log out of VMware Host Client.
2. To log back in, enter **esxadmin** for the user name and **Form@ti0n** for the password.
3. Verify that you successfully logged in as this user.

   By default, any user that is a member of the ESX Admins domain group has full administrative access to ESXi hosts that join the domain.

Task 3: Enable the SSH and vSphere ESXi Shell Services

You start the SSH and vSphere ESXi Shell services on ESXiR1.Mylearn.local so that you can remotely access the ESXi host command line.
Enable these services only if you must access the command line to troubleshoot problems. When you finish troubleshooting, disable these services.

1. In the Navigator pane, select **Manage**.
2. In the right pane, click the **Services** tab.
3. Scroll down the list of services to find the vSphere ESXi Shell and SSH services.

   vSphere ESXi Shell is the Tech Support Mode (TSM) service, and SSH is the TSM-SSH service. Both of these services are stopped.
4. Select **TSM** and click **Start**.
5. Select **TSM-SSH** and click **Start**.
6. Verify that the TSM and TSM-SSH services have a status of Running.
7. Log out of VMware Host Client.

Lab 3 Creating a Virtual Machine

Objective and Tasks

Create and delete a virtual machine using the VMware Host Client:

1. Create a Virtual Machine
2. Delete the Virtual Machine

Task 1: Create a Virtual Machine

You create a virtual machine using the VMware Host Client.

1. From your student desktop , log in to ESXiR1 as root using the Host Client.
   a. Click the **Firefox** icon from the taskbar of your student desktop.
   b. From the bookmarks toolbar, select **vSphere :** > **Host Client (ESXiR1)**.
   c. Log in by entering **`root`** for the user name and **`Form@ti0n`** for the password.
2. Ensure that **Host** is selected in the Navigator pane.
3. In the right pane, click **Create/Register VM**.
4. On the Select creation type page, verify that **Create a new virtual machine** is selected and click **Next**.
5. On the Select a name and guest OS page, configure settings for your virtual machine :

Name	Enter	Empty-Win.
Compatibility	Select	ESXi 7.0 virtual machine from the drop-down menu.
Guest OS family	Select	Windows from the drop-down menu.
Guest OS version	Select	Microsoft Windows 10 (64-bit) from the dropdown menu.

Click Next.

6. On the Select storage page, select the **ICM-Datastore** datastore and click **Next**.
7. On the Customize settings page, configure virtual hardware settings.
   a. Configure CPU, memory, and storage.

CPU	Select 1 from the drop-down menu.
Memory	Enter 1024 MB.
Hard Disk 1	Enter 12 GB.

b. Find CD/DVD Drive 1 and select **Datastore ISO file** from the drop-down menu.

The Datastore browser window opens.

c. In the Datastore browser window, select **ICM-Datastore**.

d. From ICM-Datastore, click the **ISO** folder and select the Windows operating system ISO image.

f. Click the arrow next to CD/DVD Drive 1.

g. Verify that the **Connect at power on** check box is selected and click **Next**.

8. On the Ready to complete page, review the information and click **Finish**.

9. In the Navigator pane, select **Virtual Machines** and verify that your newly created VM appears in the right pane.

10. Click the **Empty-Win** virtual machine name in the right pane.

    You must click the name of the VM, not just the row, to view information about the VM.

11. Review the settings under General Information, Hardware Configuration, and Resource Consumption.

12. In the Hardware Configuration pane, expand **Hard disk 1** and record the configuration information.

    - Backing _____
    - Capacity _____
    - Thin provisioned _____

    In a production environment, the next step is to install an operating system in the new VM. However, to save class and lab time, you do not install the guest operating system.

Task 2: Delete the Virtual Machine

You delete the virtual machine that you created to familiarize yourself with the process of removing a VM from disk.

1. In the Navigator pane, right-click the **Empty-Win** virtual machine and select **Delete**.

2. Click **Delete** to confirm deleting Empty-Win.
3. Verify that the Empty-Win VM does not appear in the Navigator pane and the right pane.

   You might have to refresh the screen.

Lab 4 Installing VMware Tools

Objective and Tasks

install VMware Tools into an existing Windows VM using VMware Host Client to:

1. Power On and Open a Console to the VM
2. Install VMware Tools

Task 1: Power On and Open a Console to the VM

To install VMware Tools, you must first power on and open a console to the Tools-Win VM.

1. From your student desktop , log in to ESXiR1 as root using VMware Host Client.
   a. Click the **Firefox** icon from the taskbar of your student desktop.
   b. From the bookmarks toolbar, select **vSphere :** > **Host Client (ESXiR1)**.
   c. To log in, enter **`root`** for the user name and **`Form@ti0n`** for the password.
2. Select **Virtual Machines** in the Navigator pane.
3. In the right pane, right-click the **Tools-Win** virtual machine and select **Power** > **Power on**.
4. When the Tools-Win virtual machine icon shows that the VM is powered on, right-click **Tools-Win** and select **Console** > **Open console in new tab**.
5. Verify that the VM starts successfully and that you are automatically logged in to Tools-Win as MyLearn\administrator.

Task 2: Install VMware Tools

You install VMware Tools in the Tools-WinVM to improve the overall performance of this VM.

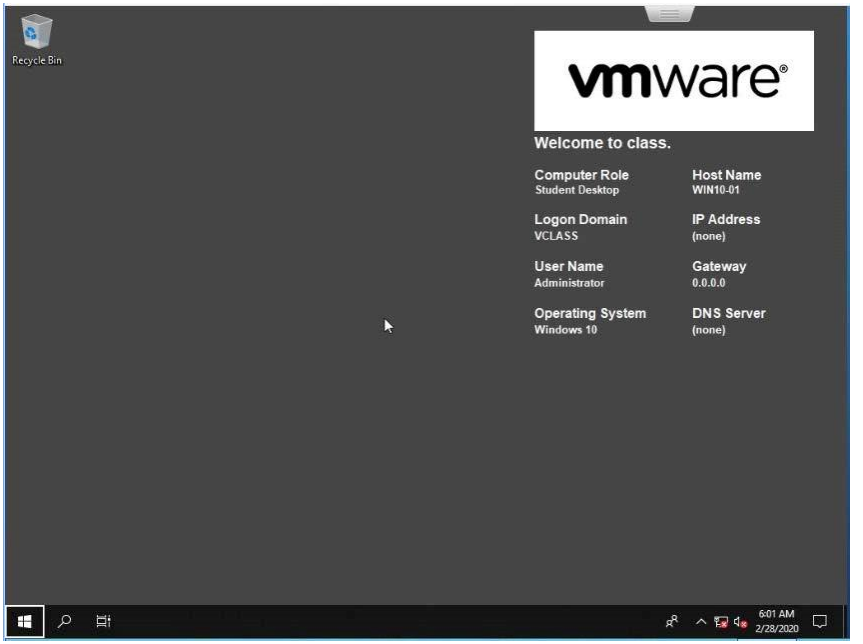
1. Return to the VMware Host Client window.
2. In the right pane, right-click **Tools-Win** and select **Guest OS** > **Install VMware Tools**.

The VMware Tools ISO image is mounted on the CD/DVD drive of the Tools-WinVM.

3. Select the **Tools-Win Console** tab.

4. Right-click the **Tools-Win Console** tab and select **Reload Tab** from the drop-down menu.

5. Click anywhere in the console window and press the Tab key to select the Windows **Start** icon in the lower left corner of the Tools-Win desktop.



6. After the Windows **Start** icon is selected, press Enter.

   The Windows **Start** menu opens.

7. Enter **D : ** and press Enter.

   VMware Tools Setup opens.

8. Install VMware Tools.

   a. On the Welcome to the installation wizard for VMware Tools page, press Enter to select **Next**.

   b. On the Choose Setup Type page, verify that **Typical** is selected.

   c. Press Tab twice to select **Next** and press Enter.

   d. On the Ready to Install VMware Tools page, press Enter to select **Install**.

e. When the installation is complete, press Enter to select **Finish**.

A window opens requesting that you restart the system.

f. Press Enter to select **Yes** to restart the system.

g. Wait for the operating system to reboot.

After the reboot is complete, you are automatically logged in as MyLearn\administrator.

9. Verify that VMware Tools is installed in the VM.

a. Using your mouse, navigate to the Windows system tray in the lower right to show hidden icons.

b. Double-click the VMware Tools icon.

The window shows the version of VMware Tools and indicates that the VMware Tools service is running.

10. Verify that mouse performance is acceptable.

a. Right-click the Windows **Start** icon and select **File Explorer**.

b. Navigate the folders to verify that mouse performance is acceptable.

11. Close the **Tools-Win** VM console tab.

12. Power off the Tools-WinVM.

a. In the right pane of VMware Host Client, right-click **Tools-Win** and select **Power** > **Power off**.

b. Click **Yes** to confirm the shutdown.

c. Verify that the Tools-Win VM icon indicates that the VM is powered off.

Lab 5 Adding Virtual Hardware

Objective and Tasks

Use VMware Host Client to examine a virtual machine's configuration and add virtual hardware to the virtual machine:

1. Examine a Virtual Machine's Configuration
2. Add Virtual Hard Disks to the Virtual Machine
3. Compare Thin-Provisioned and Thick-Provisioned Disks

Task 1: Examine a Virtual Machine's Configuration

You use VMware Host Client to examine a VM's configuration.
Viewing a VM's configuration is useful for general VM maintenance and troubleshooting purposes.

1. From your student desktop, log in to ESXiR1 as root using VMware Host Client.
   a. Click the **Firefox** icon from the taskbar of your student desktop.
   b. From the bookmarks toolbar, select **vSphere :** > **Host Client (ESXiR1)**.
   c. To log in, enter **`root`** for the user name and **`Form@ti0n`** for the password.
2. In the Navigator pane, click **Virtual Machines**.
3. Power on the Photon-Hw VM.
   a. In the right pane, right-click **Photon-Hw** and select **Power** > **Power on**.
4. In the right pane, click the **Photon-Hw** link.
5. Minimize the Recent tasks pane by clicking the **Minimize** icon in the top-right corner of the Recent tasks pane.
6. Review the Hardware Configuration pane for the virtual machine.

   Q1. What size is the VM's hard disk 1?

Q2. Is Hard disk 1 a thin-provisioned or thick-provisioned disk?

7. Review the Resource Consumption pane for the virtual machine.

   Q3. How much storage space is used by this VM?

8. Review the General Information pane for the virtual machine.

   Q4. Is VMware Tools installed and running?

Task 2: Add Virtual Hard Disks to the Virtual Machine

To familiarize yourself with the process of adding virtual hardware, you add two virtual hard disks to the VM. You configure one hard disk as thin-provisioned and the other as thickprovisioned.

1. In the Navigator pane, right-click **Photon-Hw** and select **Edit settings**.

   The Edit settings dialog box opens.

2. Click **Add hard disk** and select **New standard hard disk**.

3. For the new hard disk, change the disk size and disk provisioning type.

   a. Change the size of the new hard disk to 1 GB.

   b. Expand New Hard disk and click **Thin provisioned**.

4. Minimize **New Hard disk**.

5. Click **Add hard disk** and select **New standard hard disk**.

6. Expand the second new hard disk, change the disk size and disk provisioning type.

   a. Change the size of the new hard disk to 1 GB.

   b. Click **Thick provisioned, eagerly zeroed**.

7. Click **Save**.

8. In the Hardware Configuration pane, verify that Hard disk 2 is a 1 GB, thin-provisioned disk, and that Hard disk 3 is a 1 GB, thick-provisioned disk.

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Task 3: Compare Thin-Provisioned and Thick-Provisioned Disks

You view and compare thin-provisioned and thick-provisioned virtual disk files. Being aware of the differences between these two disk types is useful for planning your storage needs and also for troubleshooting storage problems.

1. In the Hardware Configuration pane, view the details for Hard disk 2 and Hard disk 3.

   Q1. What is the name of the virtual disk file for Hard disk 2?

   Q2. What is the name of the virtual disk file for Hard disk 3?

   Q3. On what datastore are Hard disk 2 and Hard disk 3 located?

2. Verify the size of the Hard disk 2 and Hard disk 3 virtual disk files.

   a. In the Navigator pane, click **Storage**.

      The **Datastores** tab appears in the right pane and ICM-Datastore appears in the list.

   b. Highlight the ICM-Datastore row and click **Datastore browser**.

   c. In the Datastore browser window, select the **Photon-Hw** folder and select **PhotonHw_1.vmdk.**

      Q4. What is the size of Photon-Hw_1.vmdk?

   d. In the Datastore browser window, select **Photon-Hw_2.vmdk.**

      Q5. What is the size of Photon-Hw_2.vmdk?

      The thin-provisioned disk uses only as much datastore space as the disk needs, in this case, 0 bytes. The thick-provisioned disk has all its space (1 GB) allocated during creation.

3. Click **Close** to close the Datastore browser window.

4. Shut down the Photon-Hw VM.

   a. Select **Photon-Hw** in the Navigator pane and in the right pane, click **Shut down**.

   b. Verify that Photon-Hw is powered off.

5. Log out of VMware Host Client.

Lab 6 Adding vSphere Licenses

Objective and Tasks

Use the vSphere Client to add vSphere licenses to vCenter Server and assign a license to vCenter Server:

1. Add vSphere Licenses to vCenter Server

2. Assign a License to the vCenter Server Instance

Task 1: Add vSphere Licenses to vCenter Server

You add vSphere licenses to vCenter Server.

1. Use the vSphere Client to log in to the VCENTERA vCenter Server system as the administrator.
   a. In the bookmarks toolbar in Firefox, select **vSphere : > vSphere Client (SAVCSA-01)**.
   b. At the login prompt, enter **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. Navigate to the License pane.
   a. In the vSphere Client, from the main **Menu** , select **Administration**.
   b. In the navigation pane, select **Licenses**.
   c. The Licenses pane opens to the right.
3. Add the vCenter Server and vSphere Enterprise Plus license keys that are provided by your instructor.
   a. In the right pane, click **Add New Licenses**.
   b. On the Enter license keys page, enter the vCenter Server and vSphere Enterprise Plus license keys from your instructor in the **License keys** text box.

      You must enter the license keys on separate lines.

   c. Verify that both licenses are listed correctly in the text box and click **NEXT**.

d. On the Edit license names page, enter **`vCenter`** and **`ESXi`** in the appropriate **License name** text boxes.

e. Click **NEXT**.

f. On the Ready to complete page, click **FINISH**.

4. Verify that the licenses that you added appear in the list.

Task 2: Assign a License to the vCenter Server Instance

You assign a standard license to the VCenterA.Mylearn.local vCenter Server instance.

1. In the Licenses pane, select the **Assets** tab.

   The vCenter Server systems are listed.

2. Select the **VCenterA.Mylearn.local** check box and click **Assign License**.

3. Under Assign License, select the **vCenter** license.

4. Click **OK**.

5. Verify that VCenterA.Mylearn.local has a valid license.

Lab 7 Creating and Managing the vCenter Server Inventory

Objective and Tasks

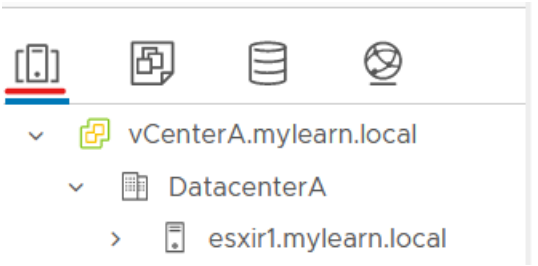
Use the vSphere Client to create and configure objects in the vCenter Server inventory:

1. Create a Data Center Object
2. Add ESXi Hosts to the Inventory
3. View Information About the ESXi Hosts
4. Configure the ESXi Hosts as NTP Clients
5. Create a Folder for the ESXi Hosts
6. Create Folders for VMs and VM Templates

Task 1: Create a Data Center Object

You create a data center object named DatacenterA to organize the hosts and VMs in the environment.

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main **Menu** , select **Inventory > Hosts and Clusters**.



3. In the navigation pane, right-click **VCenterA.Mylearn.local** and select **New Datacenter**.

   The New Datacenter dialog box opens.

4. In the **Name** text box, enter **`DatacenterA`** and click **OK**.

5. Verify that DatacenterA appears in the navigation pane.

Task 2: Add ESXi Hosts to the Inventory

You add the ESXiR1.Mylearn.local and ESXiR2.Mylearn.local ESXi hosts to the vCenter Server inventory.

1. In the navigation pane, right-click **DatacenterA** and select **Add Host**.

   The Add Host wizard opens.

2. On the Name and location page, enter **`ESXiR1.Mylearn.local`** and click **NEXT**.

3. On the Connection settings page, enter **`root`** as the user name and **`Form@ti0n`** as the password and click **NEXT**.

   a. If you see a security alert that the certificate store of vCenter Server cannot verify the certificate, click **YES** to proceed.

4. On the Host summary page, review the information and click **NEXT**.

5. On the Assign license page, click the **ESXi** license key and click **NEXT**.

6. On the Lockdown mode page, leave the default as **Disabled** and click **NEXT**.

7. On the VM location page, click **NEXT**.

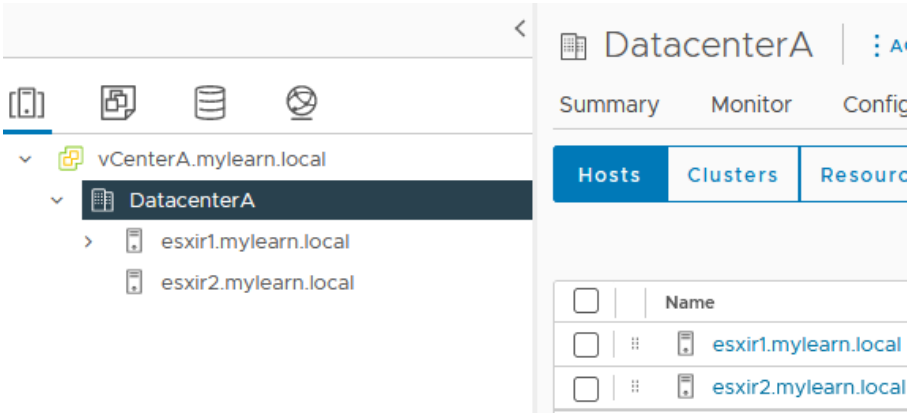
8. On the Ready to complete page, review the information and click **FINISH**.

9. Expand the Recent Tasks pane by clicking the arrows in the bottom-right corner of the window and monitor the progress of the task.

10. Repeat steps 1 through 9 to add ESXiR2.Mylearn.local to the vCenter Server inventory.

    For step 2, you enter **`ESXiR2.Mylearn.local`** on the Name and location page.

11. Verify that ESXiR1.Mylearn.local and ESXiR2.Mylearn.local appear in the navigation pane under DatacenterA.



Task 3: View Information About the ESXi Hosts

You view information about the ESXi host, including information about CPU, memory, storage, NICs, and virtual machines. Knowing where to look in the UI for this information is useful for monitoring and troubleshooting purposes.

1. In the navigation pane, select **ESXiR1.Mylearn.local** .
2. In the right pane, click the **Summary** tab.
3. Expand the Hardware pane and view the hardware details of the ESXi host.

Q1. How many CPUs does this ESXi host have?

Q2. How much memory does this ESXi host have?

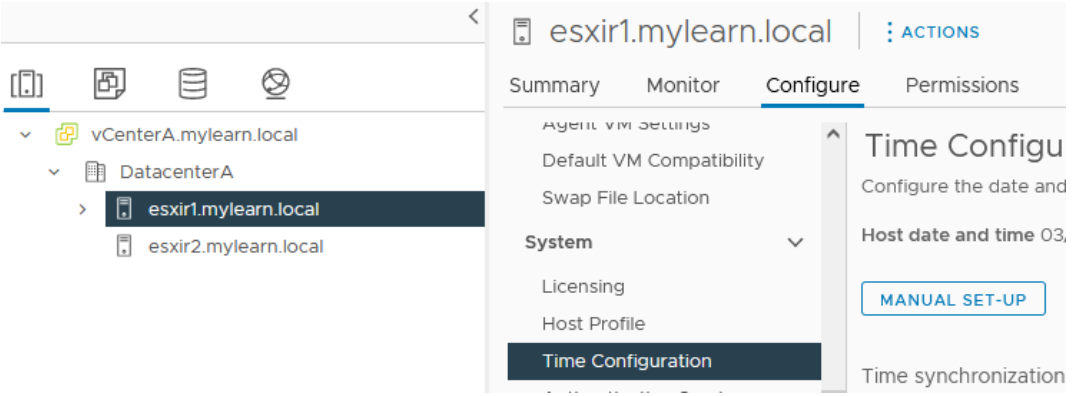
Q3. How many networks is this ESXi host connected to?

Task 4: Configure the ESXi Hosts as NTP Clients

You configure the ESXiR1.Mylearn.local and ESXiR2.Mylearn.local ESXi hosts to use Network Time Protocol (NTP) so they can maintain the accurate time and date.

1. In the navigation pane, select **ESXiR1.Mylearn.local** and click the **Configure** tab in the right pane.

2. In the right pane under System, select **Time Configuration**.



3. Next to Network Time Protocol, click **EDIT**.

   The Edit Network Time Protocol dialog box opens.

4. Select the **Enable** check box.

5. In the **NTP Servers** text box, enter `10.10.10.10`.

6. Next to NTP Service Status, select the **Start NTP Service** check box.

7. From the **NTP Service Startup Policy** drop-down menu, select **Start and stop with host**.

8. Click **OK**.

9. In the Network Time Protocol pane, verify that the NTP client is Enabled and that the NTP service status is Running.

10. Repeat steps 1 through 9 to configure ESXiR2.Mylearn.local as an NTP client.

Task 5: Create a Folder for the ESXi Hosts

You create a folder named `Lab Servers` to group the ESXiR1.Mylearn.local and ESXIR2.Mylearn.local ESXi hosts together.

1. In the navigation pane, right-click **DatacenterA** and select **New Folder** > **New Host and Cluster Folder**.

2. In the **Enter a name for the folder** text box, enter **`Lab Servers`** and click **OK**.

3. Verify that the `Lab Servers` folder appears in the navigation pane.

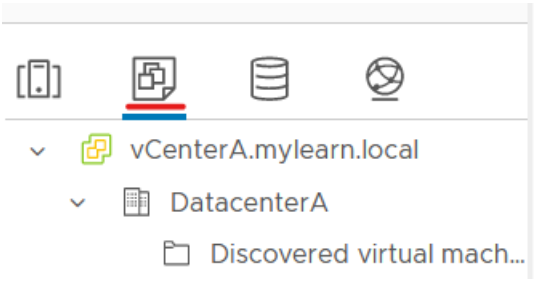
4. Drag **ESXiR1.Mylearn.local** and **ESXiR2.Mylearn.local** into the `Lab Servers` folder.

5. Verify that both hosts appear under the `Lab Servers` folder.

Task 6: Create Folders for VMs and VM Templates

You create a folder named Lab VMs and you create a folder named Lab Templates. You observe the differences in the menu commands between folders.

1. From the main **Menu** , select **Inventor** > **VMs and Templates**.



2. Create a folder for the VMs and move VMs into the folder.
   a. Right-click **DatacenterA** and select **New Folder** > **New VM and Template Folder**.
   b. In the **Enter a name for the folder** text box, enter **`Lab VMs`** and click **OK**.
   c. In the navigation pane, expand **DatacenterA**.
   d. Drag the **Lunix-02**, **Lunix-04**, and **Lunix-06** virtual machines to the `Lab VMs` folder.
   e. Verify that all three virtual machines appear under the `Lab VMs` folder.
3. Create a folder for VM templates.
   a. Right-click **DatacenterA** and select **New Folder** > **New VM and Template Folder.**
   b. In the **Enter a name for the folder** text box, enter **`Lab Templates`** and click **OK**.
   c. Verify that the `Lab Templates` folder appears in the navigation pane.
4. Compare the actions that you can perform on the `Lab VMs` folder and the `Lab Servers` folder.

a. Right-click the `Lab VMs` folder and review the menu commands in the drop-down menu.

b. Click the **Host and Clusters** icon in the navigation pane.

c. Right-click the `Lab Servers` folder and review the menu commands in the dropdown menu.

Q1. What is the difference between the menu commands for the Lab VMs folder and the Lab Servers folder?

Lab 8 Lab 5 Adding an Identity Source

Objective and Tasks

Add Mylearn.local as an LDAP identity source:

1. Add Mylearn.local as an LDAP Identity Source

Task 1: Add Mylearn.local as an LDAP Identity Source

You add the Mylearn.local domain as an LDAP identity source. You use this identity source to enable users to log in with their domain credentials.

1. Using the vSphere Client, log in to sa-vcsa-01.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Administration**.
3. In the navigation pane under **Single Sign On**, select **Configuration**.
4. In the right pane, verify that **Identity Sources** is selected.

   The vsphere.local and LocalOS domains appear as identity sources.
5. Click **ADD**.

   The Add Identity Source dialog box opens.
6. From the **Identity Source Type** drop-down menu, select **Active Directory over LDAP**.
7. In the **Identity source name** text box, enter **`LDAPS-Mylearn`**.

8. In the **Base distinguished name for users** text box, enter **`dc=Mylearn,dc=local`**.
9. In the **Base distinguished name for groups** text box, enter **`dc=Mylearn,dc=local`**.
10. In the **Domain name** text box, enter **`Mylearn.local`**.
11. Leave the **Domain alias** text box blank.
12. In the **Username** text box, enter **`administrator@Mylearn.local`**.
13. In the **Password** text box, enter **`Form@ti0n`**
14. In the **Primary server URL** text box, enter **`ldaps://dc.Mylearn.local:636`**.
15. Next to **Certificates (for LDAPS)**, click **BROWSE**.
16. On the student01 Desktop, select **cert.pem** and click **Open**.
17. Click **ADD**.

Verify that Mylearn.local is added as an identity source.

Lab 9 Users, Groups, and Permissions

Objective and Tasks

Assign roles and permissions so that an Active Directory user can perform functions in vCenter Server:

1. View Active Directory Users
2. Assign Object Permission to an Active Directory User
3. Assign Root-Level Global Permission to an Active Directory User
4. Log In as an Active Directory User
5. Use an Active Directory User to Create a Virtual Machine

Task 1: View Active Directory Users

You view the list of Active Directory users to verify that the Administrator single sign-on account exists.

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the **Main Menu**, select **Administration**.

3. Under Single Sign-On in the navigation pane, select **Users and Groups**.

   By default, the list of users for the LocalOS domain appears in the right pane.

4. In the Users pane, select **Mylearn.local** from the **Domain** drop-down menu.

5. Verify that the Administrator user name appears in the list.

Task 2: Assign Object Permission to an Active Directory User

You assign permission at the vCenter Server level to the administrator@Mylearn.local user.

This permission propagates to the child objects of vCenter Server.

1. From the **Main Menu**, select **Hosts and Clusters**.

2. In the navigation pane, select **VCenterA.Mylearn.local** .

3. In the right pane, click **Permissions**.

4. Click the **Add Permission** icon (the plus sign).

   The Add Permission window opens.

5. Configure the permission settings.

   a. From the **Domain** drop-down menu, select **Mylearn.local** .

   b. In the **User/Group** search box, enter **esxadmin** and select **Administrator** from the list.

   c. Leave the role as Administrator.

   d. Select the **Propagate to children** check box.

   e. Click **OK**.

6. Verify that MyLearn\administrator appears in the list, is assigned the Administrator role, and is defined in the vCenter Server object and its children.

Task 3: Assign Root-Level Global Permission to an Active Directory User

You grant global permission to administrator@Mylearn.local to administer content libraries.

Content libraries are located directly under the global root object. By assigning the Content Library Administrator role to administrator@Mylearn.local at the global root, this user has administrator rights for all content libraries.

1. From the **Main Menu**, select **Administration**.

2. In the navigation pane under Access Control, select **Global Permissions**.
3. In the Global Permissions pane, click the **Add Permission** icon (the plus sign).

   The Add Permission window opens.
4. Configure the permission settings.
   a. From the **Domain** drop-down menu, select **Mylearn.local** .
   b. In the **User/Group** search box, enter **esxadmin** and select **Administrator** from the list.
   c. From the **Role** drop-down menu, select **Content library administrator (sample)**.
   d. Select the **Propagate to children** check box.
   e. Click **OK**.
5. Verify that Mylearn.local \administrator appears in the list, is assigned the Content Library Administrator (sample) role, and is assigned global permission.

Task 4: Log In as an Active Directory User

You log in to the vSphere Client as administrator@Mylearn.local and verify that the login is successful.

1. Log out of the vSphere Client.
2. On the vSphere Client login screen, enter **administrator@Mylearn.local** as the user name and **Form@tiOn** as the password.
3. Verify that you are logged in to the vSphere Client as administrator@Mylearn.local .

Task 5: Use an Active Directory User to Create a Virtual Machine

You create a virtual machine to show how an Active Directory user can perform administrative tasks.

1. In the vSphere Client from the navigation pane, select **VMs and Templates**.
2. Create a VM named Test VM in the Lab VMs folder.
   a. In the navigation pane, expand **DatacenterA**.
   b. Right-click **Lab VMs** and select **New Virtual Machine**.

      The New Virtual Machine wizard opens.

c. On the Select a creation type page, select **Create a new virtual machine** and click **NEXT**.

d. On the Select a name and folder page, enter **VM2Test** in the **Virtual machine name** text box.

e. Verify that **Lab VMs** is selected and click **NEXT**.

f. On the Select a compute resource page, expand the **Lab Servers** folder, select **ESXiR1.Mylearn.local** , and click **NEXT**.

g. On the Select storage page, select **ICM-Datastore** and click **NEXT**.

h. On the Select compatibility page, leave **ESXi 7.0 and later** selected and click **NEXT**.

i. On the Select a guest OS page, select **Linux** from the **Guest OS Family** drop-down menu.

j. Select **VMware Photon OS (64-bit)** from the **Guest OS Version** drop-down menu and click **NEXT**.

k. On the Customize hardware page, expand the New Hard disk pane and select **Thin Provision** from the **Disk Provisioning** drop-down menu.

l. Click **NEXT**.

m. On the Ready to complete page, click **FINISH**.

n. Expand the Lab VMs folder in the navigation pane and verify that Test VM appears under this folder.

3. Delete Test VM.

   a. In the navigation pane, right-click **VM2Test** and select **Delete from Disk**.

   b. Click **YES** to confirm the deletion.

   c. Verify that Test VM does not appear under the Lab VMs folder.

4. Log out of the vSphere Client.

Lab 10 Using Standard Switches

Objective and Tasks

Create a standard switch and a port group for virtual machines:

1. View the Standard Switch Configuration

2. Create a Standard Switch with a Virtual Machine Port Group

3. Attach Virtual Machines to the Virtual Machine Port Group

Task 1: View the Standard Switch Configuration

You view the vSphere standard switch settings to confirm the proper configuration of the default switch.

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.

2. From the **Main Menu**, select **Iventory > Hosts and Clusters**.

3. Select **ESXiR1.Mylearn.local** in the navigation pane and click the **Configure** tab in the right pane.

4. Under Networking, select **Virtual switches**.

5. Review the information about the vSwitch0 standard switch that is provided in the Virtual switches pane.

   Q1. Which physical adapter is vSwitch0 connected to?

   Q2. Which port groups are connected to vSwitch0?

   Q3. Which virtual machines and templates are connected to the VM Network port group?

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

You create a standard switch and a virtual machine port group on the standard switch to handle network traffic at the host level in your vSphere environment.

1. Select **ESXiR1.Mylearn.local** in the navigation pane and click **ADD NETWORKING** in the right pane.

   The Add Networking wizard opens.

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 **vmnic3** 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, review the information and click **FINISH**.
9. In the Virtual switches pane, minimize the vSwitch0 pane and expand the vSwitch1 pane.
10. Verify that the Production port group is on vSwitch1 and that vmnic3 is the physical adapter.
11. Repeat steps 1 through 10 to create vSwitch1 and the Production port group on ESXiR2.Mylearn.local .

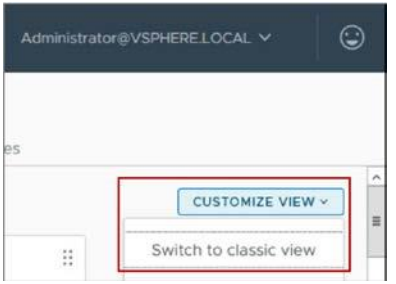
Task 3: Attach Virtual Machines to the Virtual Machine Port Group

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

1. In the navigation pane, Select **VMs and Templates** .
2. In the navigation pane, expand the **Lab VMs** folder.
3. Connect the Lunix-02 VM to the Production port group.
    a. In the navigation pane, select the **Lunix-02** virtual machine.
    b. Right-click the virtual machine and select **Edit Settings**.
    c. In the Edit Settings window, find **Network adapter 1**.
    d. Click the downward arrow next to VM Network and click **Browse**.
    e. In the Select Network window, select **Production** and click **OK**.
    f. Expand **Network adapter 1** and verify that the **Connect At Power On** check box is selected.
    g. Click **OK** to close the Edit Settings window.
4. In the right pane, click the **Summary** tab.
5. View the VM Hardware pane and verify that the Production port group is listed.

    The Production port group has a status of disconnected because the VM is powered off.
6. Power on the Lunix-02 VM.
    a. In the navigation pane, right-click **Lunix-02** and select **Power** > **Power On**.
7. In Lunix-02's **Summary** tab, verify that you are in the classic view of the vSphere Client.

a. If you see the **CUSTOMIZE VIEW** drop-down menu in the **Summary** tab, then select **Switch to classic view** from the drop-down menu.



8. In Lunix-02's **Summary** tab, click the **Launch Web Console** link.

9. Wait for the boot process to complete.

   The Lunix-02 VM is configured to automatically log you in as MyLearn\administrator.

10. Renew the virtual machine's IP address.

    a. In the VM's console, right-click the Windows **Start** icon and select **Run**.

    b. In the Run dialog box, enter **`cmd`** and click **OK** to open a Command Prompt window.

    c. At the command prompt, enter **`ipconfig /release`** to release the VM's current IP address.

    d. Enter **`ipconfig /renew`** to give the VM a new IP address.

    e. View the command's output and record the IPv4 address and the default gateway:

- IPv4 address of the virtual machine _____
- Default gateway of the virtual machine _____

11. At the command prompt, enter **`ping 10.10.40.10`** to verify that the virtual machine is connected to the Production network.

    This command pings the Production network's default gateway. Your ping should be successful. If it is not successful, ask your instructor for help.

12. Close the Lunix-02 VM's console tab.
13. Repeat steps 3 through 10 on the Lunix-04 VM.
14.

Lab 11 Accessing iSCSI Storage

Objective and Tasks

Configure access to an iSCSI datastore:

1. View an Existing ESXi Host iSCSI Configuration
2. Add a VMkernel Port Group to a Standard Switch
3. Add the iSCSI Software Adapter to an ESXi Host
4. Connect the iSCSI Software Adapters to Storage

Task 1: View an Existing ESXi Host iSCSI Configuration

You familiarize yourself with the existing VMkernel and iSCSI software adapter configuration on ESXiR1.Mylearn.local .

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the **Main Menu**, select **Hosts and Clusters**.
3. In the navigation pane, select **ESXiR1.Mylearn.local** and select the **Configure** tab in the right pane.
4. In the right pane under Storage, select **Storage Adapters**.
5. In the Storage Adapters pane, verify the status of the existing iSCSI software adapter.

a. Select the iSCSI software adapter (vmhba65).

b. Verify that Online appears in the Status column.

6. Review the properties of the iSCSI software adapter.

   a. In the Storage Adapters pane, select the **Properties** tab.

   b. Review the storage adapter properties.

      - Adapter status
      - Adapter name
      - Adapter iSCSI name
      - Authentication method

7. Select the **Devices** tab and review the information in the Datastore column.

8. Verify that the following LUNs appear in the list.

   - LUN 2 (11 GB)
   - LUN 5 (130 GB)
   - LUN 6 (7 GB)

   These LUNs should have a status of Not Consumed in the Datastore column.

   The LUNs are hosted by an iSCSI provider and can be used to create datastores.

9. Select the **Dynamic Discovery** tab and record the iSCSI Server IP address.

   _____

10. Review and record information about the network port binding configuration.

    a. Select the **Network Port Binding** tab.

    b. In the Port Group column, select the **IP Storage (vSwitch0)** check box.

    c. Click **View Details**.

       The Details for vmk1 window opens.

    d. Review the details in each tab for vmk1.

    e. In the **VMkernel Adapter** > **IP Settings** tab, record the IPv4 address for vmk1.

       _____

    f. Click **CLOSE**.

Task 2: Add a VMkernel Port Group to a Standard Switch

You configure a VMkernel port group on vSwitch0 on ESXiR2.Mylearn.local to be used for IP storage traffic.

1. In the navigation pane, select **ESXiR2.Mylearn.local** .
2. On the **Configure** tab, select **VMkernel adapters** under Networking.
3. Click the **Add Networking** icon.

   The Add Networking wizard opens.
4. On the Select connection type page, verify that **VMkernel Network Adapter** is selected and click **NEXT**.
5. On the Select target device page, click **Select an existing standard switch**.
6. Click **BROWSE** and select **vSwitch0**.
7. Click **OK**.
8. Click **NEXT**.
9. On the Port properties page, enter `IP Storage` in the **Network label** text box and click **NEXT**.
10. On the IPv4 settings page, configure the IPv4 settings.
    a. Click **Use static IPv4 settings**.
    b. In the **IPv4 address** text box, enter `10.10.10.62`.
    c. In the **Subnet mask** text box, enter `255.255.255.0`.
    d. Verify that the default gateway and DNS server address are set to **10.10.10.10**.
    e. Click **NEXT**.
11. On the Ready to complete page, click **FINISH**.
12. Verify that vmk1, labeled IP Storage, appears in the VMkernel adapters list.

Task 3: Add the iSCSI Software Adapter to an ESXi Host

You add the iSCSI software adapter to ESXiR2.Mylearn.local so that you can access the iSCSI server.

1. In the navigation pane, verify that **ESXiR2.Mylearn.local** is selected.
2. On the **Configure** tab under Storage, select **Storage** Adapters.
3. Click **Add Software Adapter**.

The Add Software Adapter window opens.

4. Confirm that **Add software iSCSI adapter** is selected and click **OK**.
5. In the Storage Adapters list, select the newly created iSCSI software adapter.
6. Select the **Properties** tab.
7. Verify that the adapter status appears as Enabled.
8. Verify that the iSCSI name matches iqn.1998-01.com.vmware:ESXiR2-########.

   The # symbol represents characters that might change.

Task 4: Connect the iSCSI Software Adapters to Storage

You configure the iSCSI adapter on ESXiR2.Mylearn.local to connect directly to a remote iSCSI target on the IP network.

1. In the Storage Adapters pane, select the **Dynamic Discovery** tab and click **Add**.
2. In the Add Send Target Server window, enter `10.10.10.5` in the **iSCSI Server** text box and click **OK**.

   A warning appears stating that because of recent configuration changes, a rescan of vmhba65 is recommended. Do not rescan yet.
3. In the Storage Adapters pane, click the **Network Port Binding** tab.
4. Click **Add**.
5. Select the **IP Storage (vSwitch0)** check box and click **OK**.

   A warning appears stating that because of recent configuration changes, a rescan of vmhba65 is recommended.
6. Click **Rescan Storage**.

   The Rescan Storage window scans for new storage devices and new VMFS volumes by default.
7. Click **OK**.
8. Monitor the Recent Tasks pane and wait for the rescan tasks to finish.
9. In the Storage Adapter pane, select the **Devices** tab.
10. Verify that the following LUNs appear in the list.
    - LUN 2 (11 GB)

- LUN 5 (130 GB)
- LUN 6 (7 GB)

These LUNs should have a status of Not Consumed in the Datastore column.

The LUNs are hosted by an iSCSI provider and can be used to create datastores.

Lab 12 Managing VMFS Datastores

Objective and Tasks

Create and manage VMFS datastores:

1. Create VMFS Datastores for the ESXi Host
2. Expand a VMFS Datastore to Consume Unused Space on a LUN
3. Remove a VMFS Datastore
4. Extend a VMFS Datastore
5. Create a Second VMFS Datastore

Task 1: Create VMFS Datastores for the ESXi Host

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

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the **Main Menu**, select **Storage**.
3. Create a VMFS datastore called VMFS-2 on the specified LUN on ESXiR1.Mylearn.local .
   a. In the navigation pane, right-click **DatacenterA** and select **Storage > New Datastore**.

      The New Datastore wizard opens.

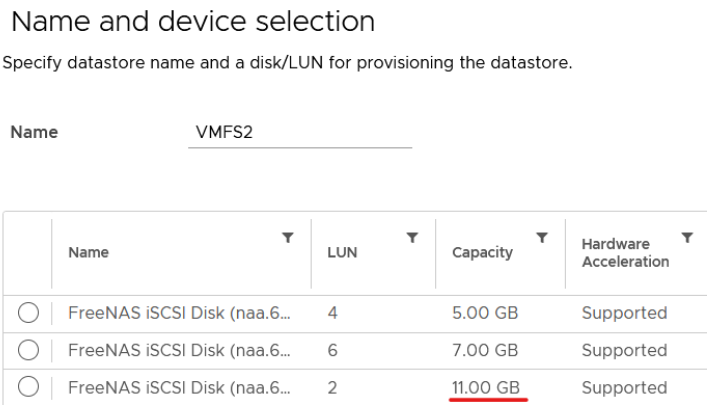
   b. On the Type page, verify that **VMFS** is selected and click **NEXT**.

   c. On the Name and device selection page, enter **`VMFS2`** in the **Datastore name** text box.

   d. From the **Select a host to view its accessible disks/LUNs** drop-down menu, select **ESXiR1.Mylearn.local** .

      A LUN list appears.

   e. In the LUN list, select **LUN 2** (11 GB in size).



f. Click **NEXT**.

g. On the VMFS version page, accept **VMFS 6** and click **NEXT**.

h. On the Partition configuration page, move the **Datastore Size** slider to reduce the datastore size by 3 GB and click **NEXT**.

   For example, if the datastore size is 11 GB, change the size to 8 GB.

i. On the Ready to complete page, review the information and click **FINISH**.

4. In the navigation pane, verify that the VMFS-2 datastore appears under DatacenterA.

5. In the navigation pane, select **VMFS2**.

6. In the right pane, select the **Summary** tab and record the value for storage capacity.

   _____

7. Create a VMFS datastore called VMFS-3 on the specified LUN on ESXiR2.Mylearn.local .

   a. Right-click **DatacenterA** and select **Storage > New Datastore**.

   b. On the Type page, verify that **VMFS** is selected and click **NEXT**.

   c. On the Name and device selection page, enter **VMFS3** in the **Datastore name** text box.

   d. From the **Select a host to view its accessible disks/LUNs** drop-down menu, select **ESXiR2.Mylearn.local** .

      A LUN list appears.

   e. In the LUN list, select **LUN 6** (7 GB in size) and click **NEXT**.

f. On the VMFS version page, accept **VMFS 6** and click **NEXT**.

g. On the Partition configuration page, accept the default (**Use all available partitions**) and click **NEXT**.

h. On the Ready to complete page, review the information and click **FINISH**.

8. Verify that the VMFS-3 datastore appears under DatacenterA.

Task 2: Expand a VMFS Datastore to Consume Unused Space on a LUN

You dynamically increase the capacity of the VMFS-2 datastore when more space is required by virtual machines.

1. In the navigation pane, right-click the **VMFS2** datastore and select **Increase Datastore Capacity**.

   The Increase Datastore Capacity wizard opens.

2. On the Select Device page, select **LUN 2** (11 GB in size).

3. Scroll the window to the right and verify that Yes appears in the Expandable column.

4. Click **NEXT**.

5. On the Specify Configuration page, accept **Use "Free Space 3 GB" to expand the datastore** 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 is completed, select the **VMFS2** datastore in the navigation pane.

8. On the **Summary** tab, verify that the datastore size is increased to the maximum capacity.

9. Record the total storage capacity. _____

Task 3: Remove a VMFS Datastore

You delete a VMFS datastore to free up storage space for other purposes. The datastore is destroyed and removed from all hosts.

1. In the navigation pane, right-click the **VMFS3** datastore and select **Delete Datastore**.

2. Click **YES** to confirm deleting the datastore.

3. Monitor the Recent Tasks pane and wait for the task to finish.

4. Verify that the VMFS3 datastore is removed from the navigation pane.

Task 4: Extend a VMFS Datastore

You extend the capacity of a VMFS datastore when extra storage space is needed. You use a second LUN to extend the size of a datastore based on the first LUN. You also rename the VMFS datastore to make the name more descriptive.

1. Extend the capacity of the VMFS-2 datastore.
    a. In the navigation pane, select **VMFS2**.
    b. Select the **Configure** tab in the right pane.
    c. Select **General** and next to Capacity, click **INCREASE**.

       The Increase Datastore Capacity wizard opens.
    d. On the Select Device page, select **LUN 6** (7 GB) and click **NEXT**.
    e. On the Specify Configuration page, select **Use all available partitions** from the **Partition Configuration** drop-down menu.
    f. Click **NEXT**.
    g. On the Ready to complete page, review the information and click **FINISH**.
    h. Monitor the Recent Tasks pane and when the task finishes, refresh the page.
2. Verify that the size of the **VMFS2** datastore is increased.
    a. Select **Device Backing** in the right pane.
    b. Verify that two extent names appear in the Device Backing pane.
    c. Click the **Summary** tab.
    d. Record the new value for the total storage capacity. _____
    e. Verify that the recorded value is larger than the final value in task 2, step 8.
3. Click the **Hosts** tab in the right pane.

   ESXiR1.Mylearn.local and ESXiR2.Mylearn.local are in the list, indicating that this new datastore is shared between your two ESXi hosts.
4. Rename the VMFS-2 datastore to Shared-VMFS.
    a. In the navigation pane, right-click **VMFS2** and select **Rename**.
    b. In the **Enter the new name** text box, enter **`SharedVMFS`**.

c. Click **OK**.

d. Verify that the datastore is renamed to Shared-VMFS.

Task 5: Create a Second VMFS Datastore

You use an iSCSI-shared LUN to create another VMFS datastore.

1. In the navigation pane, right-click **DatacenterA** and select **Storage > New Datastore**.

   The New Datastore wizard starts.

2. On the Type page, verify that VMFS is selected and click **NEXT**.

3. On the Name and device selection page, enter **`iSCSIDatastore`** in the **Datastore name** text box.

4. From the **Select a host to view its accessible disks/LUNs** drop-down menu, select **ESXiR1.Mylearn.local** .

   A LUN list appears.

5. From the LUN list, select **LUN 5** (130 GB in size) and click **NEXT**.

6. On the VMFS version page, accept **VMFS 6** and click **NEXT**.

7. On the Partition Configuration page, accept **Use all available partitions** and click **NEXT**.

8. On the Ready to complete page, review the information and click **FINISH**.

9. In the navigation pane, verify that **iSCSIDatastore** appears under DatacenterA.

10. Select **iSCSIDatastore** and in the right pane, click the **Configure** tab.

11. In the **Configure** tab, select **Connectivity and Multipathing**.

12. Verify that ESXiR1.Mylearn.local and ESXiR2.Mylearn.local are connected to the datastore.

Lab 13 Accessing NFS Storage

Objective and Tasks

Create an NFS datastore and record its storage information:

1. Configure Access to an NFS Datastore

2. View NFS Storage Information

Task 1: Configure Access to an NFS Datastore

You mount an NFS share to your ESXi hosts and use it as a datastore. 1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.

2. From the **Main Menu**, select **Storage**.
3. Create an NFS datastore called NFS-Datastore.
    a. Right-click **DatacenterA** and select **Storage > New Datastore**.

        The New Datastore wizard starts.

    b. On the Type page, click **NFS** and click **NEXT**.
    c. On the **Select NFS version** page, click **NFS 4.1** and click **NEXT**.
    d. On the Name and configuration page, enter **`NFSDatastore`** in the **Datastore name** text box.
    e. Enter **`/NFSData`** in the **Folder** text box.
    f. Enter **`10.10.10.5`** in the **Server** text box.
    g. Click the **Add server** icon (the green plus sign) to add the server.

        Clicking the plus sign adds **10.10.10.5** to the box that appears below.

    h. Click **NEXT**.
    i. On the Configure Kerberos authentication page, accept the default and click **NEXT**.
    j. On the Host accessibility page, select both the ESXi hosts and click **NEXT.**
    k. On the Ready to complete page, verify the NFS settings and click **FINISH**.
4. Verify that the NFS datastore is listed in the navigation pane under DatacenterA.

Task 2: View NFS Storage Information

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

1. In the navigation pane, select **NFSDatastore**.
2. Click the **Summary** tab in the right pane.
3. Review the information about the NFS datastore.
    - Datastore type
    - Capacity of the datastore
    - Free space of the datastore
    - Used space of the datastore

Lab 14 Creating Templates and Deploying VMs

Objective and Tasks

Create a VM template, create a customization specification, and deploy VMs from a template:

1. Create a Virtual Machine Template
2. Create Customization Specifications
3. Deploy Virtual Machines from a Template

Task 1: Create a Virtual Machine Template

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

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory**, and click the **VMs and Templates** icon.
3. Convert the Linux-Template virtual machine to a template.
   a. In the navigation pane, look at Linux-Template's icon.

      The icon indicates that Linux-Template is a virtual machine.

   b. Right-click **Linux-Template** and select **Template > Convert to Template**.
   c. Click **YES** to confirm the conversion.
   d. In the navigation pane, verify that the icon for Linux-Template changed.

      The icon indicates that Linux-Template is a template.
4. Move Linux-Template to the Lab Templates folder.
   a. Right-click **Linux-Template** and select **Move to folder**.
   b. Select **Lab Templates** in the Move to folder window and click **OK**.
5. Verify that Linux-Template appears in the Lab Templates folder.

Task 2: Create Customization Specifications

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

1. From the main menu, select **Policies and Profiles**.
2. In the left pane, select **VM Customization Specifications**.
3. In the right pane, click **NEW** to create a custom specification for the Linux guest OS.

   The New VM Customization Specification wizard opens.
4. On the Name and target OS page, configure the specification name and target guest OS.
   a. Enter **`Linux-Spec`** in the **Name** text box.
   b. Verify that **vCenterA.Mylearn.local** is selected from the **vCenter Server** drop-down menu.
   c. Click **Linux** as the **Target guest OS**.

d. Click **NEXT**.

5. On the Computer name page, specify the computer name and the domain name.
   a. Leave **Use the virtual machine name** selected.
   b. Enter **`Mylearn.local`** in the **Domain name** text box.
   c. Click **NEXT**.
6. On the Time zone page, configure the area and location.
   a. Select **US** from the **Area** drop-down menu.
   b. Select **Pacific** from the **Location** list.
   c. Click **NEXT**.
7. On the Customization script page, click **NEXT**.
8. On the Network page, select **Manually select custom settings**, select **NIC1** and click **NEXT**.
9. On the DNS settings page, configure the DNS server and DNS search path.
   a. Enter **`10.10.10.10`** in the **Primary DNS server** text box.
   b. Enter **`Mylearn.local`** in the **DNS Search Paths** text box and click **ADD**. c. Click **NEXT**.
10. On the Ready to complete page, review the information and click **FINISH**.
11. Verify that Linux-Spec appears in the list.

Task 3: Deploy Virtual Machines from a Template

You use a template to deploy and provision new virtual machines and customize their guest operating systems.

1. From the main menu, select **Inventory**, and click the **VMs and Templates** icon.
2. Deploy a VM from Linux-Template to ESXiR1.Mylearn.local .
   a. In the navigation pane, expand the **Lab Templates** folder.
   b. Right-click **Linux-Template** and select **New VM from This Template**.

      The Deploy From Template wizard opens.
   c. On the Select a name and folder page, enter **`Linux-11`** in the **Virtual machine name** text box.
   d. Expand **ICM-Datacenter** and select **Lab VMs**.
   e. Click **NEXT**.

f. On the Select a compute resource page, expand **ICM-Datacenter > Lab Servers** and select **ESXiR1.Mylearn.local** .

g. Click **NEXT**.

h. On the Select storage page, select **iSCSIDatastore** from the list.

i. In the **Select virtual disk format** drop-down menu, leave **Same format as source** selected.

The format of the source virtual disk is Thin Provision.

j. Click **NEXT**.

k. 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**.

l. On the Customize guest OS page, click **Linux-Spec** and click **NEXT**.

m. On the Ready to complete page, review the information and click **FINISH**.

3. Deploy another VM from Linux-Template, name the VM Linux-12, and place the VM on saesxi-02.Mylearn.local.

a. In the navigation pane, right-click **Linux-Template** and select **New VM from This Template**.

The Deploy From Template wizard opens.

b. On the Select a name and folder page, enter **`Linux-12`** in the **Virtual machine name** text box.

c. Expand **ICM-Datacenter** and select **Lab VMs**.

d. Click **NEXT**.

e. On the Select a compute resource page, expand **ICM-Datacenter > Lab Servers** and select **ESXiR2.Mylearn.local** .

f. Click **NEXT**.

g. On the Select storage page, select **iSCSIDatastore** from the list and click **NEXT**.

h. 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**.

i. On the Customize guest OS page, click **Linux-Spec** and click **NEXT**.

j. On the Ready to complete page, review the information and click **FINISH**.

4. In the Recent Tasks pane, monitor the progress of the two virtual machine cloning tasks and wait for their completion.

5. When the tasks are complete, verify that Linux-11 and Linux 12 appear in the navigation pane and are powered on.

6. In each VM's **Summary** tab, view the Related Objects pane and verify that the VM is located on the correct ESXi host.

   Linux-11 is on ESXiR1.Mylearn.local and Linux-12 is on ESXiR2.Mylearn.local .

7. In each VM's **Summary** tab, locate where IP addresses are displayed in the Virtual Machine Details pane.
8. Wait a few minutes and verify that the DNS name and IPv4 address are assigned.
9. After you have verified that the DNS name and IPv4 address are set for each VM, shut down Linux-11 and Linux-12.
   a. Right-click **Linux-11** and select **Power** > **Shut Down Guest OS**.
   b. Click **YES** to confirm the shutdown.
   c. Repeat steps a and b for Linux-12.

Lab 15 Using Local Content Libraries

Objective and Tasks

Create a local content library to clone and deploy virtual machines:

1. Create a Local Content Library
2. Create an OVF Template in the Content Library
3. Create a VM Template in the Content Library
4. View the Content Library Templates
5. Deploy a VM from a Template in the Content Library

Task 1: Create a Local Content Library

In the vSphere Client, you create a local content library on sa-vcsa-01.Mylearn.local. Content libraries are used to store templates and deploy virtual machines in the vCenter inventory.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Content Libraries**.

   The Content Libraries pane appears.
3. In the right pane, click **CREATE**.

   The New Content Library wizard opens.
4. On the Name and location page, enter **`SA-Local-Library`** in the **Name** text box and click **NEXT**.
5. On the Configure content library page, verify that **Local content library** is selected and click **NEXT**.
6. On the Apply security policy page, click **NEXT**.
7. On the Add storage page, select **iSCSIDatastore**, and click **NEXT**.
8. On the Ready to complete page, review the information and click **FINISH**.
9. Verify that SA-Local-Library appears in the list.

Task 2: Create an OVF Template in the Content Library

You create an OVF template in the content library by cloning a VM template located in the vCenter inventory to a template in the content library. You use the content library templates to provision virtual machines on a cluster or host.

1. From the main menu, select **Inventory**, and click the **VMs and Templates** icon.
2. In the navigation pane, expand **ICM-Datacenter > Lab Templates**.
3. Right-click **Linux-Template** and select **Clone to Library**.

   The Clone to Template in Library window appears.
4. Next to **Clone as**, leave **New template** selected.
5. Click **SA-Local-Library**.
6. Enter **`Linux-OVF-LibTemplate`** in the **Template name** text box and click **OK**.
7. While you are waiting for this task to complete, you can continue on to the next task.

Task 3: Create a VM Template in the Content Library

You create a VM template in the content library by cloning a virtual machine to a template in the library. During the process, you can choose what type of template to create: VM template or OVF template. You choose VM template.

1. From the main menu, select **Inventory**, and click the **VMs and Templates** icon.
2. Right-click the **Photon-Base** VM and select **Clone > Clone as Template to Library**.

   The Clone Virtual Machine to Template window appears.
3. On the Basic information, provide template information.
   a. From the **Template type** drop-down menu, leave **VM Template** selected.
   b. In the **Name** text box, enter **`Photon-LibTemplate`**.
   c. For the folder to locate the template, expand **ICM-Datacenter**, select **Lab Templates** and click **NEXT**.
4. On the Location page, click **SA-Local-Library** and click **NEXT**.
5. On the Select a compute resource page, expand **Lab Servers**, select **ESXiR2.Mylearn.local** and click **NEXT**.
6. On the Select storage page, click **iSCSIDatastore** and click **NEXT**.
7. On the Ready to complete page, click **FINISH**.
8. In the Recent Tasks pane, monitor the tasks to completion.

Task 4: View the Content Library Templates

You view the VM template and OVF template in SA-Local-Library. You also view the VM template in the vCenter inventory.

1. From the main menu, select **Content Libraries**.
2. In the left pane, click **SA-Local-Library**.
3. In the right pane, click the **Templates** tab.

   The VM Templates pane appears.
4. Verify that Photon-LibTemplate appears in the list.
5. Click **OVF & OVA Templates** and verify that Linux-OVF-LibTemplate appears in the list.

   Q1. Why does Linux-OVF-LibTemplate appear under **OVF & OVA Templates** and not under **VM Templates**?

6. From the main menu, select **Inventory** and click the **VMs and Templates** icon.
7. Verify that Photon-LibTemplate appears in the Lab Templates folder.
8. Verify that Linux-OVF-LibTemplate does not appear in the Lab Templates folder.

    Q2. Why is Photon-LibTemplate in the vCenter inventory, but Linux-OVFLibTemplate is not?

Task 5: Deploy a VM from a Template in the Content Library

You use Linux-OVF-LibTemplate, located in the content library, to deploy a virtual machine to a host in your vCenter inventory.

1. In the navigation pane, right-click **ICM-Datacenter** and select **New Virtual Machine**.

    The New Virtual Machine wizard appears.

2. On the Select a creation type page, select **Deploy from template** and click **NEXT**.

    The Content Library pane appears.

3. On the Select a template page, click **Linux-OVF-LibTemplate** and click **NEXT**.
4. On the Select name and folder page, specify the following information:
    a. Enter **`Linux-13`** in the **Virtual machine name** text box.
    b. Expand **ICM-Datacenter** and select **Lab VMs** for the virtual machine location.
    c. Select the **Customize the operating system** check box at the bottom and click **NEXT**.
5. On the Customize guest OS page, click **Linux-Spec** and click **NEXT**.
6. On the Select a compute resource page, expand **Lab Servers**, select **ESXiR2.Mylearn.local** and click **NEXT**.
7. On the Review details page, click **NEXT**.
8. On the Select storage page, specify the following information:
    a. Click **iSCSIDatastore**.
    b. Select **Thin Provision** from the **Select virtual disk format** drop-down list. c. Click **NEXT**.
9. On the Select networks page, leave **Production**selected in the **Destination Network** drop-down list and click **NEXT**.
10. On the Ready to complete page, click **FINISH**.
11. In the Recent Tasks pane, monitor the progress of the template deployment tasks and wait for its completion.
12. In the navigation pane, verify that Linux-13 appears in the Lab VMs folder.

Lab 16 Using Subscribed Content Libraries

Objective and Tasks

Publish a local content library and create a second library that subscribes to it:

1. Publish a Local Content Library
2. Create a Subscribed Content Library
3. Create a Subscription for VM Templates
4. Deploy a VM from the Subscribed Content Library

Task 1: Publish a Local Content Library

You publish the SA-Local-Library content library so that other content libraries can subscribe to it.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Content Libraries**.
3. In the left pane, select **SA-Local-Library**.
4. In the right pane, click **ACTIONS** and select **Edit Settings**.
5. In the Edit Settings window, publish the local library.
   a. Select the **Enable publishing** check box.
   b. Select the **Enable user authentication for access to this content library** check box.
   c. Enter **`Form@ti0n`** in the **Password** and **Confirm Password** text boxes. d. Click **OK**.
6. Click the **Summary** tab and scroll down until you see the Publication pane.
7. Verify that SA-Local-Library is published externally and is password protected.
8. In the Publication pane, click **COPY LINK** to copy the Subscription URL in the Publication panel to the clipboard.

   You will paste the Subscription URL in the New Content Library wizard in the next task.

Task 2: Create a Subscribed Content Library

You configure a content library named SA-Subscribed-Library that is subscribed to SA-LocalLibrary.

NOTE

In a production environment, you typically create the subscribed content library in a different vCenter instance from the published library. However for lab purposes, the published library and the subscribed library are located in the same vCenter instance.

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1. From the main menu, select **Content Libraries**.
2. In the right pane, click **CREATE**.

   The New Content Library wizard appears.
3. On the Name and location page, name the content library and verify the vCenter Server location.

a. Enter **SA-Subscribed-Library** in the **Name** text box.

b. Verify that **vCenterA.Mylearn.local** is selected in the **vCenter Server** drop-down menu. c.

Click **NEXT**.

4. On the Configure content library page, configure the subscribed content library settings:

a. Click **Subscribed content library**.

b. Right-click the **Subscription URL** text box and select **Paste** to paste the URL that you copied in step 1.

The subscription URL appears in the text box.
If copy and pasting does not work, you must enter the URL manually.

c. Select the **Enable authentication** check box.

d. Enter **Form@ti0n** in the **Password** text box.

e. Under **Download content**, click **when needed** and click **NEXT.**

5. On the Add storage page, click **ICM-Datastore** and click **NEXT**.

6. On the Ready to complete page, review the information and click **FINISH**.

7. Verify that SA-Subscribed-Library appears in the content library list.

8. View the contents of the SA-Subscribed-Library.

a. In the left pane, select **SA-Subscribed-Library**.

b. Click the **Templates** tab.

c. Click **OVF & OVA Templates** and verify that Linux-OVF-LibTemplate appears in the list.

This template is the same template that is in SA-Local-Library, the source content library.

d. Verify that the Stored Locally column indicates No and that the Size column indicates 0 bytes.

SA-Subscribed-Library is configured to download library content only when needed. As a result, only the template's metadata has been synchronized. The actual template was not synchronized with SA-Subscribed-Library because it is not yet needed.

e. Click **VM Templates**.

Even though SA-Local-Library has the VM template named Photon-LibTemplate, the subscribed library does not see it yet. You must create a subscription in order to access the VM Templates.

Task 3: Create a Subscription for VM Templates

You create a subscription for VM Templates in SA-Local-Library (the library that is publishing content) so that VM templates synchronize with SA-Subscribed-Library (the library that is subscribed to the local content library).

1. From the main menu, select **Content Libraries**.
2. In the left pane, click **SA-Local-Library**.
3. In the right pane, click the **Subscriptions** tab.
4. Create a subscription for the subscriber library.
    a. Click the **ACTIONS** drop-down menu and select **New Subscription**.

        The Create Subscription wizard appears.

    b. On the Select subscription type page, leave **Create a new subscription to an existing Subscriber library** selected and click **NEXT**.

    c. On the Configure Subscription page, click **SA-Subscribed-Library** and click **NEXT**.

    d. On the Select folder page, select **Lab Templates** and click **NEXT**.

    e. On the Select compute resource page, select **ESXiR2.Mylearn.local** and click **NEXT**.

    f. On the Select network page, select **Production**and click **NEXT**.

    g. On the Review page, view the information and click **FINISH**.
5. Verify that the subscription appears in the list.
6. Publish the subscription so that all VM templates in SA-Local-Library will be published to SASubscribed-Library.
    a. In the right pane, select the **SA-Subscribed-Library** check box.

    b. Click **PUBLISH**.

    c. In the Publish Library dialog box, click **PUBLISH**.
7. View the templates in the SA-Subscribed-Library.
    a. From the main menu, select **Content Libraries**.

    b. In the left pane, click **SA-Subscribed-Library**.

    c. In the right pane, click the **Templates** tab.

    d. In the VM Templates pane, verify that Photon-LibTemplate now appears in the list.

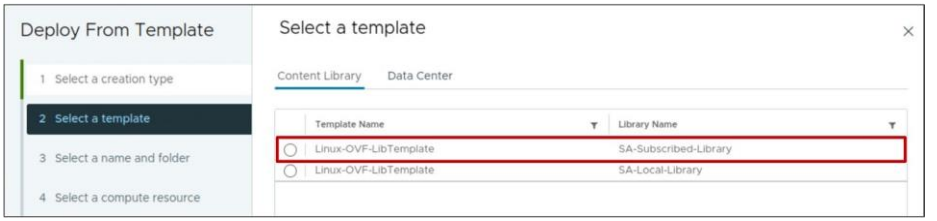
The Stored Locally column indicates No and the Size column indicates 0 bytes because SA-Subscribed-Library is configured to download library content only when needed.

Task 4: Deploy a VM from the Subscribed Content Library

You use the vSphere Client to deploy a new VM from Linux-OVF-LibTemplate that is available in the content library SA-Subscribed-Library.

1. From the main menu, select **Inventory** and click the **VMs and Templates** icon.
2. In the navigation pane, right click **Lab VMs** and select **New Virtual Machine**.

   The New Virtual Machine wizard appears.
3. On the Select a creation type page, select **Deploy from template** and click **NEXT**.
4. On the Select a template page, click **Linux-OVF-LibTemplate** located in **SA-SubscribedLibrary**.



5. Click **NEXT**.
6. On the Select a name and folder page, specify VM settings.
   a. Enter **`Linux-20`** in the **Virtual machine name** text box.
   b. Select **Lab VMs** for the virtual machine location.
   c. At the bottom of the page, select the **Customize the operating system** check box. d. Click **NEXT**.
7. On the Customize guest OS page, select **Linux-Spec** and click **NEXT**.
8. On the Select a compute resource page, expand **Lab Servers**, select **ESXiR2.Mylearn.local** and click **NEXT**.
9. On the Review details page, click **NEXT**.
10. On the Select storage page, provide storage information.
    a. Click **iSCSIDatastore**.
    b. From the **Select virtual disk format** drop-down menu, select **Thin Provision** and click **NEXT**.
11. On the Select networks page, leave **Production**selected in the **Destination Network** drop-down menu and click **NEXT**.

12. On the Ready to complete page, review the information and click **FINISH**.
13. Monitor the Recent Tasks pane and wait for the deployment tasks to complete.
14. Verify that Linux-20 appears in the navigation pane in the Lab VMs folder.
15. View information about Linux-OVF-LibTemplate in SA-Subscribed-Library.
    a. From the main menu, select **Content Libraries**.
    b. In the left pane, select **SA-Subscribed-Library**.
    c. In the right pane under the **Templates** tab, click **OVF & OVA Templates**.
    d. Verify that the Stored Locally column now indicates Yes and that the Size column indicates a size greater than 0 bytes.

       Since the template was needed in SA-Subscribed-Library to deploy a VM, it was synchronized with SA-Subscribed-Library.

Lab 17 Modifying Virtual Machines

Objective and Tasks

Modify a VM's memory size, increase a VM's storage size, and rename a VM:

1. Adjust Memory Allocation on a Powered-On Virtual Machine
2. Increase the Size of a Virtual Disk
3. Configure the Guest OS to Recognize the Additional Disk Space
4. Rename a Virtual Machine in the vCenter Inventory

Task 1: Adjust Memory Allocation on a Powered-On Virtual Machine

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

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory**, and click the **VMs and Templates** icon.
3. In the navigation pane, right-click **Linux-06** and select **Power** > **Power On**.
4. In Linux-06's **Summary** tab, view the Capacity and Usage pane and record the amount (GB) of memory allocated. _____
5. In the navigation pane, right-click **Linux-06** and select **Edit Settings**.

   The Edit Settings window appears.
6. Expand **Memory** and locate Memory Hot Plug.

   The memory hot plug function is active for Linux-06. Therefore, you can add memory to Linux-06 while it is powered on.
7. In the **Memory** text box, enter **2** to change the amount of memory to 2 GB.
8. Click **OK**.
9. View the Capacity and Usage pane and verify that the value for memory allocated has increased to 2 GB.

Task 2: Increase the Size of a Virtual Disk

You increase the size of the virtual machine's virtual disk.

1. In the navigation pane, right-click **Linux-06** and select **Edit Settings**.
2. On the **Virtual Hardware** tab, record the size (GB) of Hard Disk 1. _____
3. In the **Hard disk 1** text box, increase the disk size by 2 GB and click **OK**.
4. View the VM Hardware pane in Linux-06's **Summary** tab and verify that Hard disk 1 shows the correct disk size.
5. In the navigation pane, right-click **Linux-06** and select **Power** > **Restart Guest OS**.
6. Click **YES** to confirm the restart.

   For the Ubuntu Linux guest OS to view the additional disk space, you must restart the guest OS. The guest OS determines whether a reboot is required.

Task 3: Configure the Guest OS to Recognize the Additional Disk Space

You configure the Ubuntu Linux guest OS in the Linux-06 VM to detect the additional space that has been added to virtual hard disk 1.

You do this by resizing the extended partition using the Disks app, then you resize the file system located in the partition.

1. On the **Summary** tab for Linux-06, click **LAUNCH WEB CONSOLE**.

   After the VM has rebooted, you are automatically logged in to Linux-06 as the user localadmin.

2. Start the Disks app.

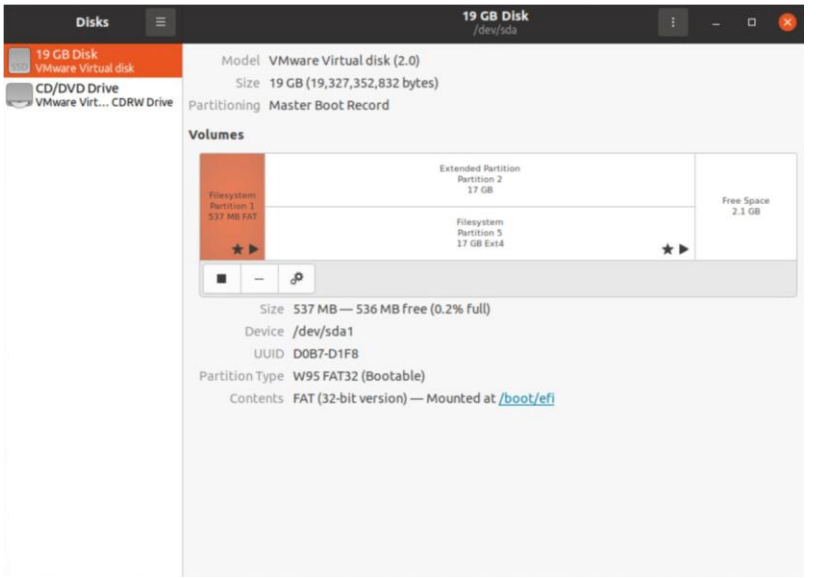
   a. On the Linux desktop, click the **Show Applications** icon located on the lower left side of the window.

   b. In the search box, enter **`disks`**.

   c. Click the **Disks** icon.

   The Disks app window appears.



3. Increase the size of the disk partition.

a. Select the Extended Partition (Partition 2).

b. Click the settings (gears) icon.

c. Select **Resize**.

d. In the Resize Volume dialog box, drag the slider all the way to the right.

e. Click **Resize**.

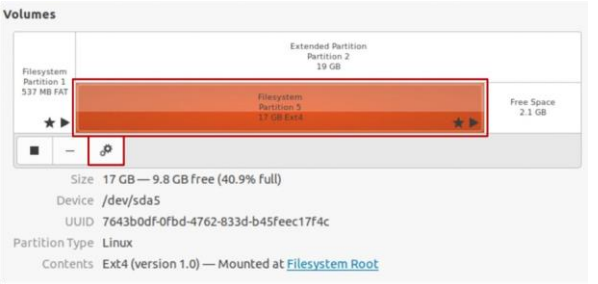
You are prompted to enter the password for the user localadmin.

f. Enter **`Form@tiOn`** at the password prompt and click **Authenticate**.

g. Verify that Partition 2 is extended.

4. Increase the size of the file system.

a. Select the file system located on Partition 5.



b. Click the settings (gears) icon and select **Resize**.

c. In the Resize Volume dialog box, drag the slider all the way to the right.

d. Click **Resize**.

e. Verify that the file system is extended.

5. Close the Disks app window.

6. Close the Linux-06 console tab.

Task 4: Rename a Virtual Machine in the vCenter Inventory

You rename an existing virtual machine in the vCenter inventory.

1. Return to the vSphere Client.
2. In the navigation pane, right-click **Linux-06** and select **Rename**.
3. In the **Enter the new name** text box, enter **`Linux-New`**.
4. Click **OK**.
5. In the navigation pane, select **Linux-New**.
6. In the right pane, select the **Datastores** tab.

   ICM-Datastore appears in the list. This datastore is where the Linux-New VM's files are located.
7. Right-click **ICM-Datastore** and select **Browse Files**.

   Q1. In the list of folders, do you see Linux-06 or Linux-New?
8. In the navigation pane, click the **VMs and Templates** icon.
9. Rename Linux-New back to Linux-06.
10. Verify that Linux-06 appears in the navigation pane.
11. Shut down Linux-06.
    a. In the navigation pane, right-click **Linux-06** and select **Power** > **Shut Down Guest OS**.
    b. Click **YES** to confirm the shutdown.

Lab 18 vSphere vMotion Migrations

Objective and Tasks

Configure vSphere vMotion networking and migrate virtual machines using vSphere vMotion:

1. Configure vSphere vMotion Networking on ESXiR1.Mylearn.local
2. Configure vSphere vMotion Networking on ESXiR2.Mylearn.local
3. Prepare Virtual Machines for vSphere vMotion Migration
4. Migrate Virtual Machines Using vSphere vMotion

Task 1: Configure vSphere vMotion Networking on ESXIR1.Mylearn.local

You create a virtual switch and a VMkernel port group on ESXiR1.Mylearn.local that can be used to move virtual machines from one host to another while maintaining continuous service availability.

1. Using the vSphere Client, log in to VCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the **Main Menu**, select **Hosts and Clusters**.
3. In the navigation pane, expand **DatacenterA > Lab Servers** and select **sa-esxi-01.Mylearn.local** .
4. In the right pane, select the **Configure** tab.
5. Under Networking, select **Virtual switches**.
6. Click **ADD NETWORKING**.

   The Add Networking wizard opens.
7. On the Select connection type page, click **VMkernel Network Adapter** and click **NEXT**.

   On the Select target device page, click **New standard switch** and click **NEXT**.
9. On the Create a Standard Switch page, click the green plus sign to add a physical adapter to the switch.
10. Select **vmnic2** for the vSphere vMotion network and click **OK**.
11. Review the information and click **NEXT**.

12. On the Port properties page, enter **vMotion** in the **Network label** text box.
13. Select the **vMotion** check box and click **NEXT**.
14. On the IPv4 settings page, configure the IP address.
    a. Click **Use static IPv4 settings**.
    b. Enter **10.10.20.21** in the **IPv4 address** text box.
    c. Enter **255.255.255.0** in the **Subnet mask** text box.
    d. Click **NEXT**.
15. On the Ready to complete page, review the information and click **FINISH**.
16. In the Virtual switches pane, verify that the vSwitch2 virtual switch is listed and that vSwitch2 contains the vMotion VMkernel port.

Task 2: Configure vSphere vMotion Networking on ESXIR2.Mylearn.local

You create a virtual switch and a VMkernel port group on ESXiR2.Mylearn.local that is used for vSphere vMotion migrations.

1. In the navigation pane, expand **DatacenterA > Lab Servers** and select **ESXiR2.Mylearn.local** .
2. In the right pane, select the **Configure** tab.
3. Under Networking, select **Virtual switches**.
4. Click **ADD NETWORKING**.

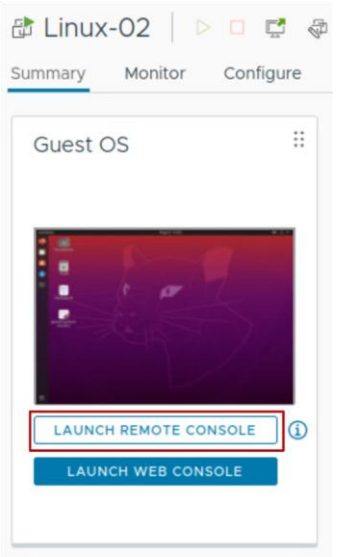
   The Add Networking wizard opens.
5. On the Select connection type page, click **VMkernel Network Adapter** and click **NEXT**.
6. On the Select target device page, click **New standard switch** and click **NEXT**.
7. On the Create a Standard Switch page, click the green plus sign to add a physical adapter to the switch.
8. Select **vmnic2** for the vSphere vMotion network and click **OK**.
9. Review the information and click **NEXT**.
10. On the Port properties page, enter **vMotion** in the **Network label** text box.
11. Select the **vMotion** check box and click **NEXT**.

12. On the IPv4 settings page, configure the IP address.
    a. Click **Use static IPv4 settings**.
    b. Enter `10.10.20.22` in the **IPv4 address** text box.
    c. Enter `255.255.255.0` in the **Subnet mask** text box.
    d. Click **NEXT**.
13. On the Ready to complete page, review the information and click **FINISH**.
14. In the Virtual switches pane, verify that the vSwitch2 virtual switch is listed and that vSwitch2 contains the vMotion VMkernel port.

Task 3: Prepare Virtual Machines for vSphere vMotion Migration

Using vSphere vMotion, you prepare virtual machines for hot migration between hosts.

1. In the navigation pane, click the **VMs and Templates** icon.
2. Power on the Linux-02 and Linux-04 VMs.
3. Verify that Linux-02 and Linux-04 are connected to the Productionnetwork.
    a. Select **Linux-02** in the navigation pane.
    b. Click the **Summary** tab in the right pane.
    c. View the VM Hardware pane and verify that network adapter 1 is connected to the pgSA-Production network.
    d. Repeat steps a through c on Linux-04.
4. Open the remote console to Linux-02.
    a. In the navigation pane, select **Linux-02**.
    b. In Linux-02's **Summary** tab, click **LAUNCH REMOTE CONSOLE**.

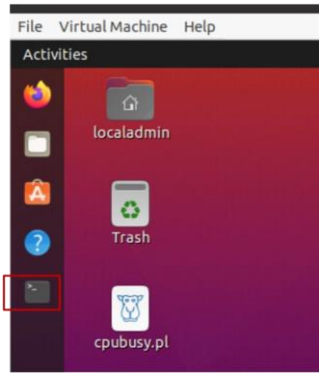


A window appears asking you to allow this site to open the vmrc link with VMware Remote Console.

c. Select the **Always allow https://vCenterA.Mylearn.local to open vmrc links** check box and click **Open Link**.

The VMware Remote Console window to Linux-02 opens.

5. Click the **Terminal** icon, located on the left side, to open the Linux terminal window.



6. At the command prompt, enter **`ip route`** and record the default gateway IP address. _____

7. Enter **`ping <default_gateway_IP_address>`** at the command prompt.

   Example: `ping 10.10.40.10`

   The `ping` command runs continuously, pinging the default gateway IP address. The `ping` command is used here to simulate an application workload.

8. Leave the `ping` command running in the Linux-02 remote console.

Task 4: Migrate Virtual Machines Using vSphere vMotion

You perform hot migrations of virtual machines residing on a shared datastore that is accessible to both the source and the target ESXi hosts.

1. Leave the Linux-02 console open and return to the vSphere Client.
2. Migrate the Linux-02 virtual machine from host ESXiR1.Mylearn.local to host sa-esxi02.Mylearn.local.
   a. In the navigation pane, right-click **Linux-02** and select **Migrate**.

      The Migrate wizard opens.

   b. On the Select a migration type page, click the **VM origin** link in the top right corner.

      The pop up window conveniently shows you the host on which the VM is running (saesxi-01.Mylearn.local), the networks the VM is connected to, and the datastore on which the VM's files are located.

      The **VM origin** link appears on every page in this wizard.

   c. Leave **Change compute resource only** selected and click **NEXT**.

   d. On the Select a compute resource page, click **ESXiR2.Mylearn.local** .

      The ESXiR2.Mylearn.local host is the destination host to which you migrate the Linux02 virtual machine. The migration requirements are validated. If the validation does not succeed, warning or error messages appear in the Compatibility pane. If errors appear, you cannot continue with the migration until the errors are resolved.

   e. Click **NEXT**.

   f. On the Select networks page, leave **Production**selected in the **Destination Network** drop-down menu and click **NEXT**.

g. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** selected and click **NEXT**.

h. On the Ready to complete page, review the information and click **FINISH**.

3. Monitor the Recent Tasks pane and verify that the Relocate virtual machine task started.

4. Return to the Linux-02 remote console and monitor to verify that no pings are dropped during the migration.

   You might notice the console go blank for a few seconds, then continue to display pings.

5. Switch between the Recent Tasks pane and the Linux-02 console and monitor the migration progress.

6. When the migration is complete, return to the Linux-02 console and close the Terminal window to stop the `ping` command.

7. Close the Linux-02 remote console window.

8. In the navigation pane, click the **Hosts and Clusters** icon.

9. Verify that Linux-02 is located on ESXiR2.Mylearn.local .

10. In the navigation pane, select **Linux-04** and in the **Summary** tab, view the Related Objects pane.

    Linux-04 is running on ESXiR1.Mylearn.local .

11. Migrate the Linux-04 virtual machine from host ESXiR1.Mylearn.local to host sa-esxi-02.Mylearn.local.

    The Hosts and Clusters view is displayed in the navigation pane.

    a. In the navigation pane, drag **Linux-04** from ESXiR1.Mylearn.local to sa-esxi-02.Mylearn.local.

       The Migrate wizard opens.

    b. On the Select a migration type page, click **Change compute resource only** and click **NEXT**.

    c. On the Select a compute resource page, verify that **ESXiR2.Mylearn.local** is selected and click **NEXT**.

    d. On the Select networks page, leave **Production**selected from the **Destination Network** drop-down menu and click **NEXT**.

    e. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** selected and click **NEXT**.

    f. On the Ready to complete page, review the information and click **FINISH**.

12. Monitor the Recent Tasks pane and wait for the Relocate virtual machine task to finish.

13. In the navigation pane, verify that Linux-04 appears under ESXiR2.Mylearn.local .
14. Shut down Linux-02 and Linux-04.
    a. Right-click **Linux-02** and select **Power** > **Shut Down Guest OS**.
    b. Click **YES** to confirm the shutdown.
    c. Repeat steps a and b for Linux-04.

Lab 19 vSphere Storage vMotion Migrations

Objective and Tasks

Use vSphere Storage vMotion to migrate virtual machines:

1. Migrate Virtual Machine Files from One Datastore to Another
2. Migrate Both the Compute Resource and Storage of a Virtual Machine

Task 1: Migrate Virtual Machine Files from One Datastore to Another

With vSphere Storage vMotion, you migrate the files of a virtual machine from one datastore to another while the virtual machine is running.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory** and click the **VMs and Templates** icon.
3. Power on the Linux-11 VM.
4. Locate the Related Objects pane on Linux-11's **Summary** tab.
5. Verify that Linux-11 is located on iSCSIDatastore.
6. In the navigation pane, right-click **Linux-11** and select Migrate.

   The Migrate wizard opens.
7. On the Select a migration type page, click the **VM origin** link in the top right corner.

   This link provides you with the datastore on which the VM is located.
8. On the Select a migration type page, click **Change storage only** and click **NEXT**.
9. On the Select storage page, select **ICM-Datastore** as the destination storage.
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 Relocate virtual machine task to finish.

    This task takes a couple minutes to finish.
13. In the Related Objects pane on the **Summary** tab, verify that Linux-11 is on ICM-Datastore.

Task 2: Migrate Both the Compute Resource and Storage of a Virtual Machine

You migrate Linux-11 to a different ESXi host and a different datastore.

1. In the navigation pane, select **Linux-11**.
2. In the Related Objects pane on the **Summary** tab, verify that Linux-11 is on ESXiR1.Mylearn.local and ICM-Datastore.
3. Migrate the Linux-11 VM to host ESXiR2.Mylearn.local and datastore iSCSIDatastore.
   a. In the navigation pane, right-click **Linux-11** and select **Migrate**.
   b. On the Select a migration type page, click **Change both compute resource and storage** and click **NEXT**.

c. On the Select compute resource page, expand **ICM-Datacenter** > **Lab Servers**, select **ESXiR2.Mylearn.local** and click **NEXT**.

d. On the Select storage page, click **iSCSIDatastore** and click **NEXT**.

e. On the Select networks page, keep **Production**selected in the **Destination Network** drop-down menu and click **NEXT**.

f. On the Select vMotion priority page, leave **Schedule vMotion with high priority (recommended)** selected and click **NEXT**.

g. On the Ready to complete page, review the information and click **FINISH**.

4. In the Recent Tasks pane, monitor the progress of the virtual machine migration.

   This task takes a couple minutes to finish.

5. Verify that the Linux-11 virtual machine migrated successfully.

   a. In the Related Objects pane on Linux-11's **Summary** tab, verify that the host is sa-esxi-02.Mylearn.local and that the datastore is iSCSIDatastore.

6. Shut down the Linux-11 VM.

   a. In the navigation pane, right-click **Linux-11** and select **Power** > **Shut Down Guest OS**.

   b. Click **YES** to confirm the shutdown.

Lab 20 Working with Snapshots

Objective and Tasks

Take VM snapshots, revert a VM to a different snapshot, and delete snapshots:

1. Take Snapshots of a Virtual Machine
2. Add Files and Take Another Snapshot of a Virtual Machine
3. Revert the Virtual Machine to a Snapshot
4. Delete a Snapshot
5. Delete All Snapshots

Task 1: Take Snapshots of a Virtual Machine

You take a snapshot to preserve the state and the data of a virtual machine at the time that the snapshot is taken.

You use snapshots when you must revert to a previous virtual machine state.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory** and click the **VMs and Templates** icon.
3. Power on the Linux-02 VM.
4. Open the Linux-02 VM web console.
   a. On Linux-02's **Summary** tab, click the **LAUNCH WEB CONSOLE** link.
   b. If the localadmin user account is locked, enter **`Form@ti0n`** for the password.

      The `cpubusy.pl` file and `gnome-system-monitor` shortcut are located on the desktop.
5. Return to the vSphere Client. 6. Take a snapshot of Linux-02.
   a. In the navigation pane, right-click **Linux-02** and select **Snapshots** > **Take Snapshot**.

      The Take Snapshot window opens.
   b. In the **Name** text box, enter **`With cpubusy and gnome`**.
   c. Deselect the **Include virtual machine's memory** check box.
   d. Click **CREATE**.
7. Monitor the Recent Tasks pane and wait for the task to complete.
8. Delete `cpubusy.pl` and `gnome-system-monitor` from the Linux-02 desktop.
   a. Return to the **Linux-02** console tab.
   b. On the desktop, drag **cpubusy.pl** and **gnome-system-monitor** to the Trash bin on the desktop.
9. Return to the vSphere Client.
10. Take another snapshot of Linux-02.
    a. In the navigation pane, right-click **Linux-02** and select **Snapshots** > **Take Snapshot**.

       The Take Snapshot window opens.
    b. In the **Name** text box, enter **`Without cpubusy and gnome`**.

c. Deselect the **Include virtual machine's memory** check box.

d. Click **CREATE**.

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

Task 2: Add Files and Take Another Snapshot of a Virtual Machine

You add a file to Linux-02 and create another snapshot of the virtual machine.

This snapshot contains a file from which you can see how a virtual machine changes when you revert to different snapshots in subsequent tasks. Each snapshot contains different files on the desktop so that you can see changes when you revert to them in subsequent tasks.

1. Restore `cpubusy.pl` from the Trash bin to the Linux-02 desktop.
    a. Return to the **Linux-02** console tab.
    b. Double-click the Trash bin icon on the desktop.
    c. Select **cpubusy.pl** and click **Restore**.
    d. Close the Trash bin window.
    e. Verify that `cpubusy.pl` appears on the desktop.
2. Take a snapshot of Linux-02.
    a. Return to the vSphere Client.
    b. Right-click **Linux-02** and select **Snapshots** > **Take Snapshot**.
    c. Enter **`With cpubusy`** in the **Name** text box.
    d. Enter **`Restored cpubusy to the desktop`** in the **Description** text box.
    e. Leave the **Include virtual machine's memory** check box selected.
    f. Click **CREATE**.
3. Monitor the task in the Recent Tasks pane and wait for the task to complete.

    The task takes slightly longer than the previous snapshots because the guest memory is also saved.
4. Close the **Linux-02** console tab.

Task 3: Revert the Virtual Machine to a Snapshot

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

1. In the navigation pane, right-click **Linux-02** and select **Snapshots** > **Manage Snapshots**.

    The **Snapshots** tab appears in the right pane.

    You should see three snapshots. The difference in icons is because you selected the **Include virtual machine's memory** check box when you took the snapshot.

2. In the **Snapshots** tab, view the snapshots tree.

   Q1. Which snapshots include the VM's memory?
   Q2. Where is the You are here pointer located?

3. Select the **Without cpubusy and gnome** snapshot and click **REVERT**.
4. Click **REVERT** to confirm the revert operation.

   Q3. Where is the You are here pointer located now?

5. View the navigation pane.

   Q4. Did the Linux-02 virtual machine power off and why?

6. Power on **Linux-02**.
7. Open the Linux-02 VM web console.

   Wait for the boot process to finish. When it finishes, you are logged in as localadmin.

   Q5. Is either cpubusy.pl or gnome-system-monitor on the desktop?

8. Close the **Linux-02** console tab.
9. In the vSphere Client navigation pane, select **Linux-02** and click the **Snapshots** tab in the right pane.

   The You Are Here pointer appears under the snapshot called Without cpubusy and gnome.

10. Select the **With cpubusy** snapshot and click **REVERT**.
11. Click **REVERT** to confirm the revert operation.
12. Monitor the Recent Tasks pane and wait for the task to complete.

    When the task is finished, the You Are Here pointer appears under the snapshot called With cpubusy.

13. View the navigation pane.

    Q6. Did the virtual machine power off? Why or why not?

14. Open the Linux-02 VM web console.

    Q7. Is cpubusy.pl on the desktop?

    Q8. Is gnome-system-monitor on the desktop?

Task 4: Delete a Snapshot

You delete an individual snapshot and observe the behavior of the VM.

1. Return to the vSphere Client.
2. In the right pane, click the **Snapshots** tab.

   The You are here pointer appears under the With cpubusy snapshot.
3. Select the **Without cpubusy and gnome** snapshot and click **DELETE**.
4. Click **DELETE** to confirm the deletion.

   The Without cpubusy and gnome snapshot disappears.

   Q1. Did the virtual machine power off?

   Q2. In the virtual machine console, is cpubusy.pl on the desktop?

Task 5: Delete All Snapshots

You use the Delete All function to delete all the snapshots of the Linux-02 VM.

1. Return to the vSphere Client.
2. In the **Snapshots** tab in the right pane, click **DELETE ALL**.
3. Click DELETE ALL to confirm that you want to delete all the remaining snapshots.

   The message `No snapshot available` appears in the **Snapshots** tab.

   Q1. Are all the remaining snapshots deleted from the snapshots tree?

   4. Return to the Linux-02 console tab.

   Q2. Is cpubusy.pl on the desktop. If so, why?
5. Close the **Linux-02** console tab.
6. Shut down Linux-02.

5.

Lab 21 Controlling VM Resources

Objective and Tasks

Observe the behavior of VMs with different CPU share values:

1. Create CPU Contention
2. Verify the CPU Share Functionality

Task 1: Create CPU Contention

You create CPU contention between the Linux-02 and Linux-04 virtual machines for testing your lab environment. You use CPU scheduling affinity to force both VMs to be scheduled on the same logical CPU, and you run the `cpubusy.pl` script on both VMs to generate CPU activity. By creating contention, you force the VMs to compete for and share the limited logical CPU resources on the ESXi host. This approach might lead to performance degradation.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory** and click the **Hosts and Clusters** icon.
3. Verify that the Linux-02 and Linux-04 VMs are shut down.
4. Verify that Linux-02 and Linux-04 are located on the ESXiR2.Mylearn.local host.
    a. In the navigation pane, select **ESXiR2.Mylearn.local** .
    b. In the right pane, click the **VMs** tab.
    c. Verify that Linux-02 and Linux-04 appear in the list.
5. If Linux-02 or Linux-04 is not on ESXiR2.Mylearn.local , migrate the VM to sa-esxi02.Mylearn.local.
    a. In the navigation pane, right-click the VM and select **Migrate**.
    b. On the Select a migration type page, click **Change compute resource only** and click **NEXT**.
    c. On the Select a compute resource page, select **ESXiR2.Mylearn.local** and click **NEXT**.
    d. On the Select networks page, leave the default and click **NEXT**.
    e. On the Ready to complete page, click **FINISH**.

6. Configure Linux-02 and Linux-04 to run only on logical CPU 0.
    a. In the navigation pane, right-click **Linux-02** and select **Edit Settings**.
    b. On the **Virtual Hardware** tab, expand the CPU pane.
    c. In the **Scheduling Affinity** text box, enter `0`.

       This setting forces Linux-02 to run only on logical CPU 0.
    d. Click **OK**.

IMPORTANT

CPU scheduling affinity is used in this lab to create CPU contention for training purposes only. VMware strongly discourages the use of this feature in a production environment.

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    e. Repeat steps a through d on the Linux-04 VM.
7. Power on Linux-02 and Linux-04.
8. Verify that Linux-02 and Linux-04 each has a CPU shares value of Normal.
    a. In the navigation pane, select **Linux-02** and click the **Monitor** tab in the right pane.
    b. Select **Utilization** in the right pane.
    c. View the Virtual Machine CPU pane and verify that the Shares value is Normal (1000).
    d. Repeat steps a through c on Linux-04.
9. Open remote consoles to Linux-02 and Linux-04 and wait for the VMs to boot up completely.
    a. In the virtual machine's **Summary** tab, click **LAUNCH REMOTE CONSOLE**.

10. Start the `cpubusy.pl` script from the command line on Linux-02 and Linux-04.
    a. From the list of icons on the left, click the **Terminal** icon to open the Linux command prompt.
    b. Enter **`cd Desktop`** to go to the `Desktop` folder.

5.

c. Enter **`./cpubusy.pl`** to start the `cpubusy` script.

This script runs continuously. It stabilizes within 1 or 2 minutes. The script repeatedly performs floating-point computations. The script displays the duration (wall-clock time) of a computation, for example, `I did three million sines in 1 seconds!`

d. Repeat step a through c for Linux-04.

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.

11. After 1 or 2 minutes, verify that the duration of computation value (in seconds) is similar between Linux-02 and Linux-04.

Q1. Why are the values similar?

Task 2: Verify the CPU Share Functionality

You verify that VMs receive the correct CPU allocation during contention. CPU allocation is based on the number of shares given to the VM.

1. Return to the vSphere Client.
2. Change the number of CPU shares for Linux-02 to High.
   a. In the navigation pane, right-click **Linux-02** and select **Edit Settings**.
   b. On the **Virtual Hardware** tab, expand the CPU pane.
   c. From the **Shares** drop-down menu, select **High**.

      When set to High, the VM is allocated 2000 shares.
   d. Click **OK**.
3. Change the number of CPU shares for Linux-04 to Low.
   a. In the navigation pane, right-click **Linux-04** and select **Edit Settings**.
   b. On the **Virtual Hardware** tab, expand the CPU pane.
   c. From the **Shares** drop-down menu, select **Low**.

      When set to Low, the VM is allocated 500 shares.
   d. Click **OK**.
4. Verify that CPU shares are set to High for Linux-02 and Low for Linux-04.
   a. Select **Linux-02** and click the **Monitor** tab.
   b. Select **Utilization** and verify that the Shares value is High (2000).
   c. Repeat steps a through b for Linux-04 and verify that the Shares value is Low (500).
5. Return to each VM console and monitor the results of the `cpubusy` script.

   Q1. What is the difference in performance between Linux-02 and Linux-04?
6. Close the terminal window in each VM console to stop the `cpubusy` script.

   The script must be stopped in each virtual machine. If the script is left running, the performance of other labs might be affected.
7. Close the **Linux-02** and **Linux-04** console windows.
8. Shut down the **Linux-02** and **Linux-04** VMs.

5.
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9. Remove CPU scheduling affinity from Linux-02 and Linux-04.

   You cannot modify the scheduling affinity until the VMs are powered off. Verify that the VMs are powered off before proceeding.

   a. In the navigation pane, right-click **Linux-02** and select **Edit Settings**.

   b. On the **Virtual Hardware** tab, expand the CPU pane.

   c. Remove 0 from the **Scheduling Affinity** text box.

      The text box must be blank.

   d. Click **OK**.

   e. Repeat steps a through d on the Linux-04 VM.

Lab 22 Implementing vSphere DRS Clusters

Objective and Tasks

Create a vSphere DRS cluster, use Cluster Quickstart to perform the basic configuration, and verify proper vSphere DRS functionality:

1. Create a Cluster That Is Configured for vSphere DRS
2. Verify vSphere vMotion Configuration on the ESXi Hosts
3. Add ESXi Hosts to the Cluster
4. Modify vSphere DRS Settings
5. Power On VMs and Review vSphere DRS Recommendations
6. Review vSphere DRS Recommendations When the Cluster Is Imbalanced

Task 1: Create a Cluster That Is Configured for vSphere DRS

You create a vSphere cluster and you use Cluster Quickstart to activate the vSphere DRS service. vSphere DRS ensures that the resource requirements for the virtual machines in the cluster are satisfied.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory** and click the **Hosts and Clusters** icon.
3. In the navigation pane, right-click **ICM-Datacenter** and select **New Cluster**.

   The New Cluster dialog box opens.
4. Configure the new cluster.
   a. In the **Name** text box, enter **`ClusterA`**.
   b. Leave vSphere DRS deactivated.

      You will use Cluster Quickstart to activate the vSphere DRS service.
   c. Deselect the **Manage all hosts in the cluster with a single image** check box.

      You will manage your hosts with images in another lab.
   d. Click **NEXT**.
   e. On the Review page, click **FINISH**.

5.

f. If a window appears asking you to share feedback on vSAN, select the **Don't show me this again** check box and click **CLOSE**.

5. Verify that the ClusterA cluster appears in the navigation pane.

   In the right pane, the Cluster Quickstart pane appears.

6. Use Cluster Quickstart to activate the vSphere DRS service.

   a. In the Cluster basics pane, click **EDIT**.

      The Edit Cluster Settings dialog box appears.

   b. Click the **vSphere DRS** toggle button to on.

   c. Click **OK**.

7. Verify that vSphere DRS is listed in the Cluster basics pane.

Task 2: Verify vSphere vMotion Configuration on the ESXi Hosts

You verify that a VMkernel port is configured for vSphere vMotion on ESXiR1.Mylearn.local and ESXiR2.Mylearn.local . vSphere vMotion is used by vSphere DRS to move VMs among the hosts in the cluster.

1. In the navigation pane, select **ESXiR1.Mylearn.local** and click the **Configure** tab.
2. In the right pane under **Networking**, select **VMkernel adapters**.
3. Verify that the vMotion VMkernel port has vMotion as an enabled service.
4. Repeat steps 1 through 3 for ESXiR2.Mylearn.local .

Task 3: Add ESXi Hosts to the Cluster

You use Cluster Quickstart to add ESXi hosts to the ClusterA cluster.

1. If there are VMs running on ESXiR1.Mylearn.local or ESXiR2.Mylearn.local , shut the VMs down.

   The Cluster Quickstart wizard places the hosts in maintenance mode as it adds them to the cluster. A host cannot enter maintenance mode if VMs are running on the host. So, you must shut down or suspend the VMs before proceeding.

   a. In the navigation pane, select **ICM-Datacenter**.

   b. In the right pane, select the **VMs** tab.

   c. Select the check boxes of all VMs that are powered on.

   d. Right-click any one of the powered-on VMs and select **Power** > **Shut Down Guest OS**.

   e. Click **YES** to confirm shutting down the selected VMs.

   f. Wait for the VMs to shut down and power off.

2. In the navigation pane, select the **ClusterA** cluster.

   The Cluster Quickstart pane is shown in the right pane.

3. In the Add hosts pane, click **ADD**.

   The Add hosts dialog box opens.

4. Click the **Existing hosts (0 from 2)** tab.

5. Select the **ESXiR1.Mylearn.local** and **ESXiR2.Mylearn.local** check boxes, and click **NEXT**.

6. On the Host summary page, review the information and click **NEXT**.

7. On the Review page, click **FINISH**.

8. Monitor the Recent Tasks pane and wait for the tasks to complete.

9. In the navigation pane, expand **ClusterA** and verify that ESXiR1.Mylearn.local and ESXiR2.Mylearn.local are located in the cluster.

   The hosts are in maintenance mode.

10. Take both hosts out of maintenance mode.

    a. Right-click each host and select **Maintenance Mode** > **Exit Maintenance Mode**.

    b. Verify that each host has exited maintenance mode by the change in their icon.

5.

Task 4: Modify vSphere DRS Settings

You use Cluster Quickstart to modify the automation level and migration threshold settings for testing purposes.

1. In the navigation pane, select **ClusterA**.

   The Cluster Quickstart pane appears.

2. In the Configure cluster pane, click **CONFIGURE**.

   The Configure cluster wizard appears.

3. On the Distributed switches page, select the **Configure networking settings later** check box and click **NEXT**.

4. On the Advanced options page, select **Manual** from the **Automation level** drop-down menu.

   In Manual mode, vSphere DRS presents you with VM placement recommendations that you can choose from.

5. Select **5** from the **Migration threshold** drop-down menu.

   Level 5 sets the migration threshold to aggressive.

6. Click **NEXT**.

7. On the Review page, click **FINISH**.

8. Verify that the vSphere DRS settings are set correctly.

   a. Click the cluster's **Summary** tab.

   b. Locate the vSphere DRS pane and click **VIEW DRS SETTINGS**.

   c. Verify that the migration automation level is Manual.

   d. Since you selected level 5 for the migration threshold, verify that recommendations from priority 1 through 5 will be applied.

Task 5: Power On VMs and Review vSphere DRS Recommendations

You can run vSphere DRS in either manual, partially automated, or fully automated modes. In manual mode, you review the recommendations for optimal VM placement provided by vSphere DRS when you power on a VM.

1. Power on Linux-02, Linux-04 and Linux-06 and choose vSphere DRS recommendations to place each VM on ESXiR1.Mylearn.local .

   a. In the navigation pane, right-click **Linux-02** and select **Power** > **Power On**.

The Power On Recommendations window opens. vSphere DRS provides you with one or more recommendations for placing the VM when it is powered on.

b. Select the recommendation that places Linux-02 on ESXiR1.Mylearn.local and click **OK**.

c. Repeat steps a and b for Linux-04 and Linux-06, making sure to place the VMs on saesxi-01.Mylearn.local.

2. Verify that Linux-02, Linux-04 and Linux-06 are on ESXiR1.Mylearn.local .

a. In the navigation pane, select **ESXiR1.Mylearn.local** .

b. In the right pane, click the **VMs** tab and verify that Linux-02, Linux-04 and Linux-06 are listed and powered on.

Notice that a vSphere Cluster Service VM (vCLS) is also listed and powered on. The vSphere Cluster Services manager automatically deploys this VM when vSphere DRS is activated.

3. Select **ClusterA** in the navigation pane and click the **Summary** tab.

4. View the vSphere DRS pane and view the VM DRS Scores.

You might have to click the **Refresh** icon at the top of the window to see updated scores.

Q1. What do the VM DRS scores tell you?

Task 6: Review vSphere DRS Recommendations When the Cluster Is Imbalanced

You use the cpubusy script to create a load imbalance in the cluster and observe how vSphere DRS works. vSphere DRS provides recommendations for VM placement to ensure that the VMs have the resources that they require.

1. Open the web consoles for Linux-02 and Linux-04.

a. In the virtual machine's **Summary** tab, click **LAUNCH WEB CONSOLE**.

2. Start the `cpubusy.pl` script on Linux-02 and Linux-04.

a. From the list of icons on the left, click the **Terminal** icon to open the Linux command prompt.

b. Enter **`cd Desktop`** to go to the `Desktop` folder.

c. Enter **`./cpubusy.pl`** to start the `cpubusy` script.

This script runs continuously. The script repeatedly performs floating-point computations. The script displays the duration (wall-clock time) of a computation, for example, `I did three million sines in 1 seconds!`

d. Repeat step a through c for Linux-04.

Let the scripts run for a couple of minutes.

5.

3. View vSphere DRS scores for the VMs.
    a. Return to the vSphere Client.
    b. In the navigation pane, select **ClusterA**.
    c. In the **Summary** tab, view the VM DRS Score information in the vSphere DRS pane.
    d. Click the **Monitor** tab and under **vSphere DRS**, select **VM DRS Score**.

        Q1. What do the scores tell you?

4. View vSphere DRS recommendations.
    a. In the **Monitor** tab under **vSphere DRS**, select **Recommendations**.
    b. Click **RUN DRS NOW**.
    c. Review the recommendations and their reasons.
5. Apply all the recommendations.
    a. Click **SELECT ALL**.
    b. Click **APPLY RECOMMENDATIONS**.
6. Monitor the Recent Tasks pane and wait for the migration tasks to complete.
7. Return to the cluster's **Summary** tab and observe any changes to the DRS scores.

    You might have to wait a couple minutes for score changes to occur.

        Q2. Did the vSphere DRS scores improve?

8. Stop the cpubusy scripts in the Linux-02 and Linux-04 consoles.
    a. Close the terminal window in each VM console to stop the cpubusy script.
9. Close the Linux-02 and Linux-04 consoles.
10. Return to the vSphere Client and shut down the Linux-02, Linux-04 and Linux-06 VMs.

Lab 23 Configuring vSphere HA

Objective and Tasks

Configure vSphere HA and test its functionality:

1. Configure vSphere HA in a Cluster
2. View Information About the vSphere HA Cluster
3. Configure Network Management Redundancy
4. Test the vSphere HA Functionality
5. View the vSphere HA Cluster Resource Usage
6. Configure the Percentage of Resource Degradation to Tolerate

5.

Task 1: Configure vSphere HA in a Cluster

You configure vSphere HA on the ClusterA cluster to achieve higher levels of virtual machine availability than each ESXi host can provide individually.

1. Using the vSphere Client, log in to vCenterA.Mylearn.local by entering **`administrator@vsphere.local`** for the user name and **`Form@ti0n`** for the password.
2. From the main menu, select **Inventory** and click the **Hosts and Clusters** icon.
3. Power on the Linux-02 and Linux-04 VMs.

   vSphere DRS presents you with VM placement recommendations. a.

   Choose the first recommendation and click **OK**.
4. Select **ClusterA** and click the **Configure** tab in the right pane.
5. Under **Services**, select **vSphere Availability** and click the first **EDIT** button to the right of vSphere HA.

   The Edit Cluster Settings dialog box opens.
6. Click the **vSphere HA** toggle button to on and click **OK**.
7. Monitor the Recent Tasks pane and wait for the vSphere HA configuration tasks to complete.

   This might take a couple minutes.
8. View the **Configure** tab and verify that vSphere HA is turned on.

Task 2: View Information About the vSphere HA Cluster

You view status and configuration information about the ClusterA cluster. You notice that the ESXi hosts in the cluster have only one management VMkernel adapter.

1. In the right pane, click the **Monitor** tab.
2. Under **vSphere HA**, select **Summary**.

   The vSphere HA summary information appears.
3. Record the name of the primary host. _____

   a. If a primary host is not listed, click the **Refresh** icon at the top of the window.

   vSphere HA might still be in the initialization process.
4. Record the number of Protected virtual machines. _____
5. Click the **VMs** tab in the right pane.

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

If both hosts are added to the cluster and no errors occur on the cluster, the number of protected VMs equals the number of powered-on VMs. The number of protected VMs includes the vSphere Cluster Service VMs.

6. Click the **Monitor** tab.
7. Under **vSphere HA**, select **Heartbeat**.

Q2. How many datastores are used to monitor heartbeat?

8. Under **vSphere HA**, select **Configuration Issues** and review errors or warnings that are displayed.

You should see a warning message that ESXiR2.Mylearn.local has no management network redundancy. Currently, ESXiR2.Mylearn.local has a single management VMkernel adapter. Also, the Management network has only one physical adapter, vmnic0. vSphere HA still works with only one VMkernel adapter or one physical adapter in the Management network. But a second management VMkernel adapter, or physical adapter, is necessary for management network redundancy.

Configuring management network redundancy is also a best practice.

Q3. Why is there no warning message for ESXiR1.Mylearn.local ?

Task 3: Configure Network Management Redundancy

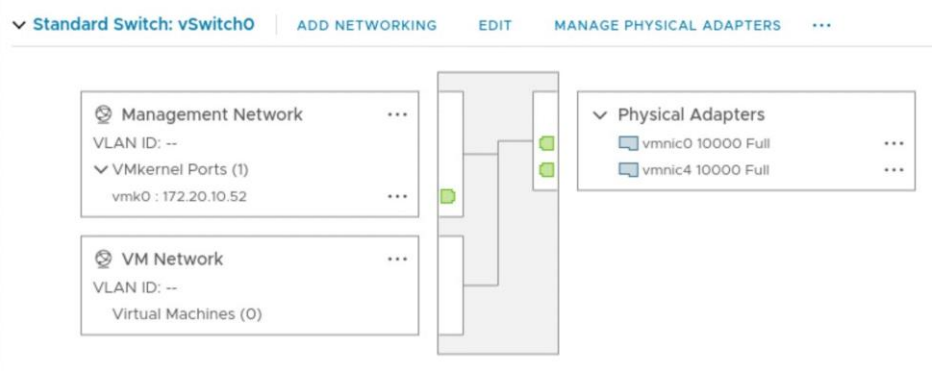
You configure network management redundancy by adding a second physical adapter (vmnic) to the Management Network port group. Adding a second vmnic creates redundancy and removes the single point of failure.

1. In the navigation pane, select **ESXiR2.Mylearn.local** .
2. In the right pane, click the **Configure** tab and under **Networking**, select **Virtual switches**.
3. Collapse **dvs-Lab** and expand **vSwitch0**.
4. To the right of vSwitch0, click **MANAGE PHYSICAL ADAPTERS**.
5. Select **vmnic4** and move it down until it appears under Standby adapters.

5.

6. Click **OK**.

7. Verify that vSwitch0 has two physical adapters, vmnic0 and vmnic4.



8. In the navigation pane, right-click **ESXiR2.Mylearn.local** and select **Reconfigure for vSphere HA**.

   Wait for the reconfiguration task to complete.

9. Verify that no configuration issues are listed for vSphere HA.

   a. In the navigation pane, select **ClusterA**.

   b. In the **Monitor** tab, select **Configuration Issues** under **vSphere HA**.

   c. Click the **Refresh** icon at the top of the window.

   d. Verify that the management network redundancy warning for ESXiR2.Mylearn.local goes away.

Task 4: Test the vSphere HA Functionality

You set up vSphere HA to monitor the cluster environment and detect hardware failures.

When an ESXi host outage is detected, vSphere HA automatically restarts the virtual machines on the other ESXi hosts in the cluster.

1. In the navigation pane, select **ClusterA** and click the **Monitor** tab.
2. Under **vSphere HA**, select **Summary** and record the name of the primary host. **_____**
3. Verify that the primary host contains one or more powered-on virtual machines.
   a. Select the primary host in the navigation pane.
   b. In the right pane, click the **VMs** tab and verify that **Virtual Machines** is selected.
   c. If all the virtual machines are powered off on the primary host, power on at least one of the virtual machines.
4. Record the name of one or more powered-on virtual machines on the primary host.

   _____
5. Simulate a host failure by rebooting the primary host in the cluster.

   IMPORTANT

   Ensure that you reboot the system. Do not shut down the system.

   ---

   a. In the navigation pane, right-click the primary ESXi host and select **Power** > **Reboot**.

      A warning message appears stating that you chose to reboot the host, which is not in maintenance mode.

   b. Enter **`Testing vSphere HA`** as the reason for rebooting and click **OK**.
6. View the events that occur while the vSphere HA cluster recovers from the host failure.
   a. Select **ClusterA** in the navigation pane and click the **Monitor** tab in the right pane.
   b. Under **Tasks and Events**, select **Events**.

      The cluster entries are sorted by time. Note the entries that appear when the host failure was detected.
   c. In the navigation pane, select the host that you rebooted and click the **VMs** tab in the right pane.

5.

Q1. Do you see the virtual machines that were running on this host (the original primary host) and whose names you recorded earlier?

d. In the navigation pane, select **ClusterA**.

e. In the right pane, click the **Monitor** tab.

f. In the right pane under **vSphere HA**, select **Summary**.

Q2. Has the primary host changed?

7. Monitor the original primary ESXi host in the navigation pane until it is fully running again.

It takes a few minutes for the original primary host to become fully running.

Task 5: View the vSphere HA Cluster Resource Usage

You examine the CPU and memory resource usage information of the ClusterA cluster.

1. In the navigation pane, select **ClusterA** and click the **Monitor** tab in the right pane.
2. Examine CPU reservation information for the cluster.
    a. In the right pane under **Resource Allocation**, select **CPU**.
    b. Record information for the cluster.
        - Used Reservation by other _____
        - Available Reservation _____
        - Total Reservation Capacity _____
    c. Verify that the CPU reservation is not set on the virtual machines.

        The Reservation column shows 0 (MHz).
3. Examine memory reservation information for the cluster.
    a. Under **Resource Allocation**, select **Memory** and record the information for the cluster.
        - Used Reservation by other _____
        - Available Reservation _____
        - Total Reservation Capacity _____
    b. Verify that the memory reservation is not set on the virtual machines.

        The Reservation column shows 0 (MB).

Task 6: Configure the Percentage of Resource Degradation to Tolerate

In your vSphere HA cluster, you specify the percentage of resource degradation to tolerate and you verify that a message appears when the reduction threshold is met. vSphere DRS must be activated to use this admission control option.

1. Verify that vSphere DRS is activated on ClusterA.
    a. In the right pane, select the **Configure** tab.
    b. vSphere DRS should be turned on. The automation level is set to Manual.
2. For vSphere HA, configure the percentage of resource degradation to tolerate.
    a. In the right pane under **Services**, select **vSphere Availability**.
    b. Click the first **EDIT** button, next to vSphere HA.

5.

The Edit Cluster Settings window appears.

c. Click the **Admission Control** tab.

d. In the **Performance degradation VMs tolerate** text box, enter `0`.

If you reduce the threshold to 0%, a warning is generated when cluster usage exceeds the available cluster capacity.

e. Click **OK**.

3. Generate CPU activity by starting the cpubusy script on some VMs and powering on other VMs.

a. In the navigation pane, select **Linux-04** and in the right pane, click the **Summary** tab.

b. Click **LAUNCH WEB CONSOLE** to open the VM console.

c. From the list of icons on the left, click the **Terminal** icon to open the Linux command prompt.

d. Enter **`cd Desktop`** to go to the `Desktop` folder.

e. Enter **`./cpubusy.pl`** to start the `cpubusy` script.

Let the script run for a couple of minutes.

f. Repeat step a through e for Linux-02.

g. Power on the Linux-11 and Linux-12 VMs, making sure that you place them on the same host as Linux-02 and Linux-04.

4. Verify that a message appears about the configured failover resources in the ICM-Compute01 cluster.

a. In the navigation pane, select **ClusterA** and click the **Summary** tab in the right pane.

You should see an informational message that says `Running VMs utilization cannot satisfy the configured failover resources on the cluster ClusterA in ICM-Datacenter.`

You might have to wait a few minutes for the message to appear.

5. Close the Linux-02 and Linux-04 consoles.

6. Shut down any VMs that you powered on.

7. In the vSphere Client, click the **Refresh** icon at the top of the window.

8. Verify that the message about the configured failover resources no longer appears in the cluster's **Summary** tab.

Lab 24 Using vSphere Lifecycle Manager

Objective and Tasks

Update ESXi hosts using vSphere Lifecycle Manager:

1. Create a Cluster and Select an Image
2. Add ESXi Hosts to the Cluster
3. Check for Host Compliance
4. Remediate Noncompliant Hosts

5.

Task 1: Create a Cluster and Select an Image

You create a vSphere cluster, and you enable vSphere Lifecycle Manager to manage the hosts in the cluster with an image.

1. From the main menu, select **Inventory** and click the **Hosts and Clusters** icon.
2. In the navigation pane, right-click **ICM-Datacenter** and select **New Cluster**.

   The New Cluster wizard appears.
3. On the Basics page, enter information about the cluster.
   a. Enter **ClusterB** in the **Name** text box.
   b. Keep the vSphere DRS, vSphere HA, and vSAN services turned off.
   c. Leave the **Manage all hosts in the cluster with a single image** check box selected. d. Click **NEXT**.
4. On the Image page, select **8.0 GA - 20513097**. from the **ESXi Version** drop-down menu and click **NEXT**.
5. On the Review page, review the information and click **FINISH**.
6. In the Recent Tasks pane, monitor the progress as the cluster is created.
7. Verify that ClusterB appears in the navigation pane.

   In the right pane, the Cluster Quickstart pane appears.
8. Verify that **Lifecycle Management (Manage all hosts with one image)** is the only selected service in the Cluster basics pane.

Task 2: Add ESXi Hosts to the Cluster

You remove ESXiR1.Mylearn.local and ESXiR2.Mylearn.local from the ClusterA cluster and add them to the ClusterB cluster.

You also add a third ESXi host, ESXiR3.Mylearn.local , to the cluster. This host uses vSphere version 7.0.

1. Verify that all VMs are shut down on ESXiR1.Mylearn.local and ESXiR2.Mylearn.local .

   IMPORTANT

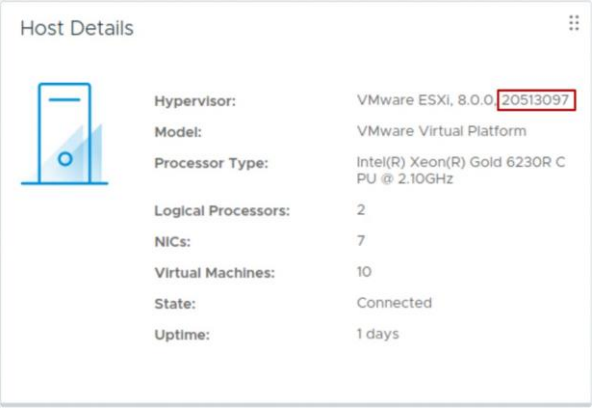
   Do not shut down the vCLS VMs. Shut down all the VMs you used in the labs.

   You must shut down your VMs on ESXiR1.Mylearn.local and ESXiR2.Mylearn.local because you place these hosts in maintenance mode.

2. Record the ESXi build number for ESXiR1.Mylearn.local and ESXiR2.Mylearn.local .

   a. Select the ESXi host and click the **Summary** tab.

   b. In the Host Details pane, view the Hypervisor information and record the ESXi build number for ESXiR1.Mylearn.local and ESXiR2.Mylearn.local . _____ The build number must be the same for both the hosts.



3. Place ESXiR1.Mylearn.local in maintenance mode.

   a. In the navigation pane, right-click **ESXiR1.Mylearn.local** and select **Maintenance Mode** > **Enter Maintenance Mode**.

   b. Deselect the **Move powered-off and suspended virtual machines to other hosts in the cluster** check box and click **OK**.

      A warning message might appear stating that one or more powered on VMs are on sa- esxi-01.Mylearn.local. The vCLS VMs are powered on, but do not shut down these VMs. The vSphere Cluster Services manager shuts down these VMs for you.

   c. Click **OK** to confirm placing the host in maintenance mode.

   d. Verify that ESXiR1.Mylearn.local is in maintenance mode.

4. Place ESXiR2.Mylearn.local in maintenance mode.

   a. In the navigation pane, right-click **ESXiR2.Mylearn.local** and select **Maintenance Mode** > **Enter Maintenance Mode**.

   b. Deselect the **Move powered-off and suspended virtual machines to other hosts in the cluster** check box and click **OK**.

      A warning message might appear stating that one or more powered on VMs are on sa- esxi-02.Mylearn.local. The vCLS VMs are powered on, but do not shut down these VMs.

5.

The vSphere Cluster Services manager shuts down these VMs for you. c. Click

OK.

d. In the navigation pane, select **ESXiR2.Mylearn.local** and click the **VMs** tab in the right pane.

The vSphere Cluster Service VMs are running on this host.

The Recent Tasks pane shows that the Enter maintenance mode task has started. Other tasks will power off the vSphere Cluster Service VMs. After these VMs are powered off, the Enter maintenance mode task is complete.

The entire process takes a couple minutes.

e. Verify that ESXiR2.Mylearn.local is in maintenance mode.

5. In the navigation pane, drag **ESXiR1.Mylearn.local** and **ESXiR2.Mylearn.local** to the ICMCompute-02 cluster.

6. Verify that ESXiR1.Mylearn.local and ESXiR2.Mylearn.local are in the ClusterB cluster.

These hosts are still in maintenance mode.

7. Take ESXiR1.Mylearn.local and ESXiR2.Mylearn.local out of maintenance mode.

a. In the navigation pane, right-click **ESXiR1.Mylearn.local** and select **Maintenance Mode** > **Exit Maintenance Mode**.

b. Right-click **ESXiR2.Mylearn.local** and select **Maintenance Mode** > **Exit Maintenance Mode**.

8. Power on the Linux-02 and Linux-04 VMs.

You power on these VMs to demonstrate that vSphere Lifecycle Manager can update the ESXi hosts when the VMs are powered on.

9. Add the ESXiR3.Mylearn.local host to the ClusterB cluster.

a. In the navigation pane, right-click **ClusterB** and select **Add Hosts**.

The Add hosts wizard appears.

b. In the **New hosts (0)** tab, enter **sa-esxi-03.Mylearn.local** in the **IP address or FQDN** text box.

c. Enter **`root`** in the **Username** text box and **`Form@ti0n`** in the **Password** text box. d.

Click **NEXT**.

e. On the Host Summary page, click **NEXT**.

f. On the Import Image page, keep the default and click **NEXT**.

g. On the Review page, click **FINISH**.

10. Verify that sa-esxi-03.Mylearn.local is added to the ClusterB cluster.

    This host is in maintenance mode.

11. Right-click **sa-esxi-03.Mylearn.local** and select **Maintenance Mode** > **Exit Maintenance Mode**.

12. Select **sa-esxi-03.Mylearn.local** and view its **Summary** tab.

13. In the Host Details pane, view the Hypervisor information and record the ESXi build number for ESXiR3.Mylearn.local . _____ The host is installed with vSphere 7.0.3.

Task 3: Check for Host Compliance

You check the hosts for compliance and determine why they are out of compliance.

1. In the navigation pane, select **ClusterB** and click the **Updates** tab in the right pane.

2. In the Image Compliance pane, click **CHECK COMPLIANCE**.

3. Monitor the Recent Tasks pane and wait for the task to complete.

4. View the Image Compliance pane and read any warning and information messages.

   All the hosts are out of compliance.

5. In the Image Compliance pane, click each ESXi host and determine why the host is out of compliance.

   ESXiR1.Mylearn.local and ESXiR2.Mylearn.local have the vmware-fdm VMware Installation Bundle, which is missing from the image. You can ignore the warning because the vmwarefdm VIB is the vSphere HA agent that is installed on the host when you turn on vSphere HA.

   sa-esxi-03.Mylearn.local is out of compliance because the host version differs from the image version. sa-esxi-03.Mylearn.local uses version 7.0 U3g and the image version is 8.0 GA.

5.

Task 4: Remediate Noncompliant Hosts

You remediate the noncompliant hosts to bring them to compliance with the defined cluster image.

1. In the Image Compliance pane, click **RUN PRE-CHECK** to ensure that the ClusterB cluster is ready to remediate.
2. Monitor the Recent Tasks pane and wait for the tasks to complete.
3. Verify that `No pre-check issues found` appears in the Image Compliance pane.
4. In the Image Compliance pane, click **REMEDIATE ALL** to remediate the hosts in the cluster.

   The Review Remediation Impact window appears.
5. Select the different titles in the left pane to view information.

   The **I accept the terms of the end user license agreement** check box at the bottom of the window is selected for you.
6. Click **START REMEDIATION**.
7. Monitor the Recent Tasks pane to view the status of the individual tasks that are started during the remediation.
8. Monitor the remediation from the Image Compliance pane.

   The host is rebooted as part of the remediation. When the host comes back online, a second compliance check automatically runs.

   The remediation process takes about 10 to 15 minutes to complete.
9. When the remediation is complete, verify that the Image Compliance pane shows that all hosts in the cluster are compliant.

Answer Key

Lab 1 Accessing the Lab Environment

Q1. How many CPUs and how much memory does this ESXi host have?

A1. This ESXi host has 2 CPUs and 16 GB of memory.

Q2. Is the NTP service running on this ESXi host?

A2. No, the NTP Daemon is stopped.

Q3. How many virtual machines are on this host?

A3. Six.

Q4. What are the guest operating system types for the virtual machines on this host?

A4. Ubuntu Linux (64-bit) and VMware Photon OS (64-bit).

Q1. Do you see the host (ESXiR1.Mylearn.local) that you logged in the previous task?

A1. No. The ESXiR1.Mylearn.local ESXi host that you connected using VMware Host Client is not yet added to the vCenter inventory.

Lab 4 Creating and Managing the vCenter Inventory

Q1. How many logical processors (CPUs) does the ESXi host have?

A1. Two CPUs.

Q2. How much memory is installed on the ESXi host?

A2. 16 GB.

Q3. How many networks is this ESXi host connected to?

A3. One network.

Lab 7 Creating Standard Switches

Q1. Which physical adapters are connected to vSwitch0?

A1. vmnic0, vmnic4, vmnic5, and vmnic6

Q2. Which port groups are connected to vSwitch0?

A2. IP Storage 1, IP Storage 2, Management Network, and VM Network

Q3. Which virtual machines and templates are connected to the VM Network port group?

5.

A3. Photon-Base, Photon-HW, Linux-Template, Linux-02, Linux-04, and Linux-06. Lab 9 Accessing iSCSI Storage

Q1. How many port groups are listed and what are their names?

A1. Two port groups, IP Storage 1 and IP Storage 2

Lab 12 Creating and Removing a Virtual Machine

Q1. In the VM Hardware pane, on which datastore is the VM located?

A1. The VM's hard disk and its configuration files are located on iSCSIDatastore.

Q2. In the Related Objects pane, why are two datastores listed under Storage?

A2. ICM-Datastore holds the ISO image that the VM has mounted. iSCSIDatastore holds the VM's virtual disk and configuration files.

Lab 14 Adding Virtual Hardware

Q1. What size is the VM's hard disk 1?

A1. 5 GB.

Q2. Is Hard disk 1 a thin-provisioned or thick-provisioned disk?

A2. Thin-provisioned disk.

Q3. How much storage space is used by this VM?

A3. A little over 2 GB.

Q4. Is VMware Tools installed and running?

A4. Yes. It takes approximately two minutes to report that VMware Tools is running.

Q1. What is the name of the 1 GB, thin-provisioned disk file?

A1. Photon-HW_1.vmdk

Q2. What is the name of the 1 GB, thick-provision, eager-zeroed disk file?

A2. Photon-HW_2.vmdk

Q3. On what datastore are the hard disks located?

A3. ICM-Datastore

Q4. What is the size of Photon-HW_1.vmdk?

A4. 0 Bytes

Q5. What is the size of Photon-HW_2.vmdk?

A5. 1,048,576 KB (1 GB)

Lab 15 Modifying Virtual Machines

Q1. In the list of folders, do you see Linux-06 or Linux-New?

A1. Linux-06.

A1. When you change the name of a virtual machine, the names of the folder and files on the datastore are not updated.

Lab 17 Using Local Content Libraries

Q1. Why does Linux-OVF-LibTemplate appear under **OVF & OVA Templates** and not under **VM Templates**?

A1. Because you cloned a VM template instead of cloning a VM. When you clone a VM template to a template in the content library, the library template is an OVF template.

Q2. Why is Photon-LibTemplate in the vCenter inventory, but Linux-OVF-LibTemplate is not?

A2. Photon-LibTemplate is a VM Template. VM templates appear in the vCenter inventory, whereas OVF templates do not.

Lab 19 Versioning VM Templates in Content Libraries

Q1. Which content library manages this template?

A1. SA-Local-Library

Lab 22 Working with Snapshots

Q1. Which snapshots include the VM's memory?

A1. The With cpubusy snapshot includes the VM's memory, indicated by the snapshot icon.

Q2. Where is the You are here pointer located?

A2. The You are here pointer is under the snapshot called With cpubusy.

Q3. Where is the You are here pointer located now?

A3. The You are here pointer is under the snapshot called Without cpubusy and gnome.

Q4. Did the Linux-02 virtual machine power off and why?

A4. Yes. The virtual machine powered off because the memory state was not preserved.

Q5. Is either cpubusy.pl or gnome-system-monitor on the desktop?

A5. No. These files were deleted before creating the snapshot called Without cpubusy and gnome.

Q6. Did the virtual machine power off? Why or why not?

A6. No. The virtual machine did not power off because the memory state was preserved.

Q7. Is cpubusy.pl on the desktop?

A7. Yes.

Q8. Is gnome-system-monitor on the desktop?

A8. No.

5.

Q1. Did the virtual machine power off?

A1. No.

Q2. In the virtual machine console, is cpubusy.pl on the desktop?

A2. Yes. The cpubusy.pl file is still on the desktop because deleting the snapshot does not change the virtual machine's current state. Deleting the snapshot removes the ability to return to that snapshot's point in time.

Q1. Are all the remaining snapshots deleted from the snapshots tree?

A1. Yes.

Q2. Is cpubusy.pl on the desktop. If so, why?

A2. Yes. The current state of the virtual machine is not altered. Snapshots are consolidated and then removed. The option to revert to those earlier points in time is no longer available.

Lab 23 Controlling VM Resources

Q1. Why are the values similar?

A1. The values are similar because the CPU share allocation of Linux-02 and Linux-04 gives them equal share of the CPU on which they are both running.

Q1. What is the difference in performance between Linux-02 and Linux-04?

A1. Linux-04 has only one-fourth of the CPU shares that Linux-02 has. Linux-04 receives one-fourth of the CPU cycles of the logical CPU to which the virtual machines are pinned.

Lab 24 Implementing vSphere DRS Clusters

Q1. What do the VM DRS scores tell you?

A1. Answers vary depending on when you view the pane.

Q1. What do the scores tell you?

A1. Answers vary depending on the activity in the cluster.

Q2. Did the vSphere DRS scores improve?

A2. Yes. By applying the recommendations, vSphere DRS migrated one or more VMs to balance the cluster's load and satisfy each VM's resource requirements. You might not see a cluster DRS score of greater than 80%, but you should see a better score.

Lab 25 Configuring vSphere HA

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

A1. Yes.

Q2. How many datastores are used to monitor heartbeat?

A2. Two datastores. Because both datastores are shared by all the hosts in the cluster, the datastores are automatically selected for heartbeating.

Q3. Why is there no warning message for ESXiR1.Mylearn.local ?

A3. Because the Management Network port group on ESXiR1.Mylearn.local contains more than one physical adapter.

Q1. Do you see the virtual machines that were running on this host (the original primary host) and whose names you recorded earlier?

A1. No. You might have to refresh the screen. The virtual machines previously running on this host are running on the remaining host in the cluster.

Q2. Has the primary host changed?

A2. Yes. The secondary host is elected as the new primary host.