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Lab Guidance

Note: It may take more than 90 minutes to complete this lab. You should expect to only finish 2-3 of the modules during your time. The modules are independent of each other so you can start at the beginning of any module and proceed from there. You can use the Table of Contents to access any module of your choosing.

The Table of Contents can be accessed in the upper right-hand corner of the Lab Manual.

You are about to embark on a hands-on journey to learn about Advanced Topics in vSphere with Operations Management. This lab will walk you through step-by-step, so basic vSphere with Operations Management experience is not necessary, but it is helpful. If you would like to learn the basics, VMware recommends also taking our lab titled "HOL-1911-02-SDC - Getting Started with vSphere with Operations Manager."

Explore five advanced modules that dive deeper into the exciting capabilities of vSphere with Operations Management. A wide range of topics is covered, including Content Library, Distributed Switches, Auto Deploy, vRealize Operations, and more! vSphere with Operations Management adds new architecture options that can improve availability and manageability. See how advancements in storage and networking capabilities leave the competition generations behind!

The lab is divided into 5 Modules which can be taken in any order:

Lab Module List:

- **Module 1 - Advanced Storage Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.

- **Module 2 - Advanced Networking Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.

- **Module 3 - Advanced vMotion Features** (15 minutes) (Advanced) Introduced in vSphere 6.0, cross vCenter vMotion has created many new possibilities for workload mobility. In this module, you'll learn about the requirements for cross vCenter vMotion and use it to migrate a virtual machine between two vCenter Servers.

- **Module 4 - Creating and Managing a Content Library** (30 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps,
VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

- **Module 5 - Host Lifecycle Management** (45 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

Lab Captain:

- **Modules 1 - 5 - Dwayne Callahan, Senior Solutions Engineer, USA**

This lab manual can be downloaded from the Hands-on Labs Document site found here:

http://docs.hol.vmware.com

This lab may be available in other languages. To set your language preference and have a localized manual deployed with your lab, you may utilize this document to help guide you through the process:


**Location of the Main Console**

1. The area in the RED box contains the Main Console. The Lab Manual is on the tab to the Right of the Main Console.
2. A particular lab may have additional consoles found on separate tabs in the upper left. You will be directed to open another specific console if needed.

3. Your lab starts with 90 minutes on the timer. The lab can not be saved. All your work must be done during the lab session. But you can click the **EXTEND** to increase your time. If you are at a VMware event, you can extend your lab time twice, for up to 30 minutes. Each click gives you an additional 15 minutes. Outside of VMware events, you can extend your lab time up to 9 hours and 30 minutes. Each click gives you an additional hour.

**Alternate Methods of Keyboard Data Entry**

During this module, you will input text into the Main Console. Besides directly typing it in, there are two very helpful methods of entering data which make it easier to enter complex data.

**Click and Drag Lab Manual Content Into Console Active Window**

You can also click and drag text and Command Line Interface (CLI) commands directly from the Lab Manual into the active window in the Main Console.

**Accessing the Online International Keyboard**

You can also use the Online International Keyboard found in the Main Console.
1. Click on the Keyboard Icon found on the Windows Quick Launch Task Bar.

**Click once in active console window**

![Image of keyboard and console window]

In this example, you will use the Online Keyboard to enter the "@" sign used in email addresses. The "@" sign is Shift-2 on US keyboard layouts.

1. Click once in the active console window.
2. Click on the **Shift** key.

**Click on the @ key**

![Image of keyboard and console window]

1. Click on the "@ key".

Notice the @ sign entered in the active console window.
Activation Prompt or Watermark

When you first start your lab, you may notice a watermark on the desktop indicating that Windows is not activated.

One of the major benefits of virtualization is that virtual machines can be moved and run on any platform. The Hands-on Labs utilizes this benefit and we are able to run the labs out of multiple datacenters. However, these datacenters may not have identical processors, which triggers a Microsoft activation check through the Internet.

Rest assured, VMware and the Hands-on Labs are in full compliance with Microsoft licensing requirements. The lab that you are using is a self-contained pod and does not have full access to the Internet, which is required for Windows to verify the activation. Without full access to the Internet, this automated process fails and you see this watermark.

This cosmetic issue has no effect on your lab.

Look at the lower right portion of the screen
Please check to see that your lab is finished all the startup routines and is ready for you to start. If you see anything other than "Ready", please wait a few minutes. If after 5 minutes your lab has not changed to "Ready", please ask for assistance.
Module 1 - Advanced Storage Features (30 minutes)
Introduction

This Module contains the following lessons:

- Lesson 1: Storage Policy-Based Management and Control - In this lesson, you will be creating storage policies and deploying a virtual machine that uses one of those policies.
Storage Policy-Based Management and Control

VMware vSphere Storage Policy-Based Management is a key part of implementing Software Defined Storage, which in term is essential to a Software Defined Datacenter. Storage IO Control is one of the tools you have to help enable and build the policies that will allow you to automate common storage management tasks. Storage IO control monitors the end to end latency of your datastores. When the latency is higher than a configured value, this is seen as latency. Storage IO Control then uses the rules and policies you define to throttle back low priority VMs that may be using excessive IO. This allows you to make sure that high priority VMs that need access to storage will get it.

In practice, Storage IO control works in the same way as Resource Shares do for memory and compute. Turning on Storage IO Control without adjusting the shares means all your VMs will have equal access to storage. VMs that have a higher share value will get greater access to the storage. As with Resource shares, these SIOC shares are proportional. For example, a VM that has 1000 shares will get access to storage twice as often as VM with 500 shares, but half as often as one with 2000 shares.

This module will cover some new policy-based management integration with Storage IO Control. Through this integration, you can define IO limits, reservations, and shares as part of your storage policies and apply them to your virtual machines.

In this lesson, you will go through some of the key screens for these new functionalities and become familiar with these new capabilities.

You will create three storage policies and then configure a VM to use a policy.

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.
Log into vCenter

1. Click on the RegionA folder in the Bookmark toolbar.
2. Click on RegionA vSphere Client (HTML) link in the bookmark toolbar.
3. Check the Use Windows session authentication checkbox.
4. Click the Login button.
Gain screen space in Chrome by zooming out

1. Select the **Options** menu in Chrome.
2. Click the '-' button to zoom out to 90%

Note that this will provide more viewing space while still allowing you to read the text. This is necessary because of the lower than normal resolution we must use in the lab environment to support various devices and to accommodate large-scale events.
Navigate VM Storage Policies

1. Click on **Menu** Icon
2. Click on **Policies and Profiles**

Navigate VM Storage Policies

1. Click on **VM Storage Policies** on the left navigation panel
2. Click on the **Create VM Storage Policy** icon on the top of the middle navigation panel
In this task, you will create a storage policy for Storage IO Control. You will be repeating these steps to create three storage policies named:

- Preferred IO - For VMs that will have more access to storage
- Standard IO - For standard VMs
- Restricted IO - Low priority VMs or VMs that tend to take a lot of IO, but run less important services

1. Select **vcsa-01a.corp.local** in the vCenter Server drop-down box.
Create VM Storage Policies

1. Type a name of Preferred IO and a description of your choosing
2. Click Next.
The next screen explains how rules are applied to VMs.

1. Check the **Enable host based rules** option.
2. Click **Next** to continue.
Create VM Storage Policies

1. Click the **Storage I/O Control** tab to display the option for storage based I/O control.
2. Select the **Use storage policy component** option.
3. Select the **High IO shares allocation** option in the drop-down menu. These common rules are generic and apply across all kinds of storage, and are not dependant on a specific datastore. These rules are generally provided by VMware, but additional rules are offered by third-party I/O filters.
4. Then click **Next** to continue.
1. This screen shows you the datastores in your environment that are compatible with the policy you have created. Because we only used common rules and not any specific rule-sets, all the storage we have is compatible. Click **Next**
Create the New VM Storage Policy

1. Review the settings that will be associated with this policy. Make special note of the **IOPs shares** that you see for each policy. These are the shares values that will control how access to storage this policy will allow.
2. Click **Finish**.

Create Standard IO and Restricted IO
1. Repeat the process to create a new policy "Standard IO" with the "Normal IO shares allocation" component, and note the different value for IOPs shares.
2. Repeat the process to create a new policy "Restricted IO" with the "Low IO shares allocation" component, and note the different value for IOPs shares.
3. Verify that you have created the three policies.

**Provision a Virtual Machine with "Standard IO" Policy**

![vSphere Client Menu](image)

Use the policies that were created:

1. Click on the **Menu** Icon on top of the page
2. Click on **VMs and Templates**
Provision a Virtual Machine with "Standard IO" Policy

We will now deploy a VM from the Template Library using the Standard IO Policy

1. Expand navigation tree under **vcsa-01a.corp.local** and **RegionA01** by clicking triangles on the left.
2. Right Click on **RegionA01**
3. Click on **New Virtual Machine**

This will bring up a window to select a template from vCenter's Content Library
Deploy From Template - Select a creation type

1. Select **Deploy from template**
2. Click **Next**
Select a template

1. Select **Content Library** as the source location for the new VM.
2. Select the **Tiny-Linux-core.ovf** template.
3. Click **Next**
Select a name and folder

1. Name the VM  **sioc-001**
2. Select the **RegionA01** cluster
3. Click **Next**
1. Expand the **RegionA01-COMP01** cluster by clicking on the arrow next to **RegionA01-COMP01**
2. Select **esx-01a.corp.local**
3. Click **Next**
1. This screen allows you to examine some of the details for the template. This is a very basic template, created just for the lab, so there isn't much information present. Click **Next**
1. Under **Select virtual disk format**: choose **Thin provision**
2. In the Select **VM storage policy**: drop-down you will see the different policies you just created. Select the **Standard IO** policy.
3. Leave **RegionA01-ISCSI-COMP01** selected under **Datastores**
4. Click **Next**
Select networks

1. Make sure the destination network is **VM-RegionA01-vDS-COMP**
2. Click **Next**
1. On the Summary Screen click **Finish**.
Storage Policies

The vm may take a few minutes to complete its deployment, please wait for the deployment to be completed before progressing.

1. Right click on the sioc-001 VM
2. Hover over VM Policies
3. Click on Edit VM Storage Policies...
Examine the Storage Policies for SIOC-001

Because storage policies can be defined at a disk level, they allow you to define different storage policies for each disk a VM has. The sioc-001 VM only has one disk in the lab. If the sioc-001 VM had multiple disks, you could choose a different policy for each disk, as this screen capture shows. You also see a VM Home folder, or namespace listed. This is a special area for holding VM configuration files, such as memory snapshots, .vmx files, .log files, and others. You may want a different set of policies for this namespace because it can be inefficient to perform certain tasks like caching for the data stored here.

1. Move the slider to the right to enable "per disk" management of storage policies.

2. If you click on the drop-down arrow next to the storage policies per disk, you will see the other policies you created.

3. Click **Cancel** to close this window without making changes.
Lab Cleanup

1. Right-click on the vApp and select "Edit Settings..."
2. Choose "Delete from Disk"
1. Right click the **sioc-001** VM
2. Click **Delete from Disk**

![Confirm Delete pop-up](image)

1. On the **Confirm Delete** pop-up, click the **Yes** button.
Conclusion

In this module, you were able to create three storage policies with different settings and apply one of those policies to a newly created VM. These policies are the foundation for Storage Policy-based Management and Control, which is a key way to reduce your operations overhead when managing storage.

You've finished Module 1

Congratulations on completing Module 1.

If you are looking for additional information on storage, VSAN, or Storage-Policy Based Management, try one of these:

- HOL-1908-01-HCI: vSAN v6.6 - Getting Started
- HOL-1927-01-HCI: VMware Storage - Virtual Volumes and Storage Policy Based Management
- Click on this link for a playlist of videos that describe many of the enhancements and new features in vSphere 6.7: VMware vSphere 6.7 YouTube videos.
- You may also explore VMware vSphere 6.7 What's New Video which will step you through a number of the new features in vSphere 6.7 so you can explore them at your pace.

Proceed to any module below which interests you most.

- **Module 2 - Advanced Networking Features** (30 minutes) (Advanced) VMware vSphere networking can be simple to deploy and manage. There are also advanced capabilities that enable the flexibility and performance that some customers require. In this module learn about both the vSphere Standard Switch and the vSphere Distributed Switch and what features each provides to a vSphere environment.
- **Module 3 - Cross vCenter vMotion** (30 minutes) (Advanced) Introduced in vSphere 6.0, cross vCenter vMotion has created many new possibilities for workload mobility. In this module, you'll learn about the requirements for cross vCenter vMotion and use it to migrate a virtual machine between two vCenter Servers.
• **Module 4 - Creating and Managing Content Library** (30 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

• **Module 5 - Host Lifecycle Management** (30 minutes) (Advanced) Explore the new Auto Deploy and Image Builder graphical user interface (GUI) and see how stateless compute infrastructure can save time deploying, patching, and upgrading hosts.

**How to End Lab**

If this is the last module you would like to take in this lab, you may end your lab by clicking on the **END** button.
Module 2 - Advanced Networking Features (30 minutes)
Introduction

This Module contains the following lessons:

• Lesson 1: vSphere Standard Switch (vSS, vSwitch) vs vSphere Distributed Switch (vDS, dvSwitch) - This lesson will explain the differences between the vSphere Standard Switch and the vSphere Distributed Switch.
• Lesson 2: Introduction to NSX - In this lesson, you will get a brief overview of VMware NSX and see a list of labs that will get you well on your way to using NSX.
**vSphere Standard Switch (vSS, vSwitch) vs vSphere Distributed Switch (vDS, dvSwitch)**

There are two types of virtual switches in vSphere, vNetwork Standard Switch (vSS) and vNetwork Distributed Switch (vDS).

There are three ways to license the vNetwork Distributed Switch (vDS):

- NSX
- Enterprise Plus
- Remote Office Branch Office Advanced

**vSphere Standard Switch (vSS, vSwitch)**

The configuration of each vSwitch resides on the specific ESXi/ESX host. Administrators have to manually maintain consistency of the vSS configuration across all ESXi/ESX hosts to ensure that they can perform operations such as vMotion.

vSS are configured on each ESXi/ESX host independently.

**vSphere Distributed Switch (vDS, dvSwitch)**

The configuration of vDS is centralized to vCenter Server. The ESXi hosts that belong to a vDS do not need further configuration to be compliant.

Distributed switches provide similar functionality to vSwitches. A dvPortgroup is a set of dvPorts. The dvSwitch equivalent of portgroups is a set of ports in a vSwitch. Configuration is inherited from dvSwitch to dvPortgroup, just as from vSwitch to Portgroup.

Virtual machines, Service Console interfaces (vswif), and VMKernel interfaces can be connected to dvPortgroups just as they could be connected to portgroups in vSwitches.

Administrative rights are required to create these virtual adapters on each ESXi/ESX host dvSwitch in vCenter Server:

- Service Console and VMKernel interfaces
- Physical NICs and their assignment to dvSwitch Uplink groups
Comparing vSphere Standard Switch with vSphere Distributed Switch

These features are available with both types of virtual switches:

- Can forward L2 frames
- Can segment traffic into VLANs
- Can use and understand 802.1q VLAN encapsulation
- Can have more than one uplink (NIC Teaming)
- Can have traffic shaping for the outbound (TX) traffic

These features are available only with a Distributed Switch (vDS, dvSwitch):

- Can shape inbound (RX) traffic
- Has a central unified management interface through vCenter Server
- Supports Private VLANs (PVLANs)
- Provides potential customization of Data and Control Planes
- Increased visibility of inter-virtual machine traffic through Netflow.
- Improved monitoring through port mirroring (dvMirror).
- Support for LLDP (Link Layer Discovery Protocol), a vendor-neutral protocol.
- The enhanced link aggregation feature provides choice in hashing algorithms and also increases the limit on number of link aggregation groups.
- Additional port security is enabled through traffic filtering support.
- Improved single-root I/O virtualization (SR-IOV) support and 40GB NIC support.
- Network IO Control – Support for per virtual machine Distributed vSwitch bandwidth reservations to guarantee isolation and enforce limits on bandwidth.
- Multicast Snooping - Supports IGMP snooping for IPv4 packet and MLD snooping for IPv6 packets in VDS. Improves performance and scale with multicast traffic.
- Multiple TCP/IP Stack for vMotion - Allows vMotion traffic a dedicated networking stack. Simplifies IP address management with a dedicated default gateway for vMotion traffic.
Video: VMware vSphere Distributed Switch (3:13)

Here is a short video on the benefits on the vNetwork Distributed Switch
Introduction to NSX

VMware NSX Data Center is the network virtualization platform for the Software-Defined Data Center (SDDC), delivering networking and security entirely in software, abstracted from the underlying physical infrastructure.

NSX Data Center enables the Virtual Cloud Network, providing pervasive, end-to-end connectivity for your apps and data, wherever they are.

Please proceed to the next step for a video introduction to VMware NSX Data Center.

**Video: Introduction to VMware NSX Data Center (2:59)**

Logical networks decouple virtual machine connectivity and network services from the physical network, giving cloud providers and enterprises the flexibility to place or migrate virtual machines anywhere in the data center while still supporting layer-2 / layer-3 connectivity and layer 4-7 network services.

Below are some great labs that will dive into NSX and its features and use cases

**HOL-1903-01-NET - Getting Started with VMware NSX** - VMware NSX is the platform for Network Virtualization. You will gain hands-on experience with Logical Switching, Distributed Logical Routing, Dynamic Routing, Distributed Firewall and Logical Network Services.

**HOL-1903-02-NET - VMware NSX: Distributed Firewall with Micro-Segmentation** - In this lab, we will explore use cases around VMware NSX and Micro-Segmentation, including more in-depth reviews of the Distributed Firewall and Service Composer UI.
HOL-1903-02-NET - VMware NSX Operations & Visibility - In this lab, we will explore use case topics around Operations and Visibility in VMware NSX. You will gain hands-on experience with NSX tools such as Traceflow, CentralCLI, Flow Monitoring, and Application Rule Manager and End Point Monitoring.

HOL-1905-01-SDC - Site Recovery Manager - Data Center Migration and Disaster Recovery - Learn how to minimize risk and reduce downtime for your applications and services with Site Recovery Manager (SRM) and NSX.

HOL-1920-01-EMT - Introduction to VMware Integrated OpenStack - Learn how to deploy a production-grade implementation of OpenStack with VMware Integrated OpenStack (VIO) on vSphere.

HOL-1925-02-NET - VMware NSX Advanced Consumption - This lab covers advanced NSX topics and builds on the basics learned in the "Getting Started with VMware NSX (HOL-1903-01-NET)" lab.

HOL-1903-01-NET - vRealize Network Insight - Getting Started - This lab explores the functionality of vRealize Network Insight (vRNI) Discover how vRNI helps with micro-segmentation, compliance, optimizing network performance across networks, ensuring health and availability of NSX, and management of AWS networking.

HOL-1926-01-NET - VMware NSX-T: Introduction to NSX-T - This lab explores VMware NSX-T, our multi-hypervisor platform for building developers clouds and hosting next-gen apps.

HOL-1922-01-NET - Securing Native Workloads in AWS using VMware NSX - In this lab, we will explore how VMware's NSXaaS on Public Clouds (AWS) provides micro-segmentation to native instances running in AWS.
Conclusion

This module explained the various ways that you can enable networking features and functions in a virtual environment. This ranged from the simple with the vSphere Standard Switch, to the full-featured vSphere Distributed Switch, and then to the Enterprise-Grade NSX.

You've finished Module 2

Congratulations on completing Module 2.

If you are looking for additional information on networking, try one of these:

- HOL-1903-01-NET: Getting Started with VMware NSX - This is a great lab to start learning about NSX and should be your launching point into that solution.
- Make sure you review the other NSX labs listed in Lesson 2 for additional information on NSX.
- Click on this link for a playlist of videos that describe many of the enhancements and new features in vSphere 6.7: VMware vSphere 6.7 Youtube videos.
- You may also explore VMware vSphere 6.7 What's New Video which will step you through a number of the new features in vSphere 6.7 so you can explore them at your pace.

Proceed to any module below which interests you most.

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- **Module 3 - Advanced vMotion Features** (15 minutes) (Advanced) Introduced in vSphere 6.0, cross vCenter vMotion has created many new possibilities for workload mobility. In this module, you'll learn about the requirements for cross vCenter vMotion and use it to migrate a virtual machine between two vCenter Servers.
• **Module 4 - Creating and Managing a Content Library** (30 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

• **Module 5 - Host Lifecycle Management** (45 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

**How to End Lab**

If this is the last module you would like to take in this lab, you may end your lab by clicking on the **END** button.
Module 3 - Advanced vMotion Features (15 minutes)
Introduction

This Module contains the following lessons:

- Lesson 1: Migrating Virtual Machines from vCenter to vCenter - You will learn about and perform a Cross vCenter vMotion. You will see how easy and seamless this procedure is.
Migrating Virtual Machines from vCenter to vCenter

Cross vCenter vMotion

The use of Cross vCenter vMotion (x-vC-vMotion) allows for migration of VM's between vCenters that are in the same or different datacenters. This feature allows administrators to easily move VM's between vCenters without downtime. The vCenters can be in the same data center or another data center with no more than 150 milliseconds of latency between the datacenters.

Requirements for Migration Between vCenter Server Instances

- The source and destination vCenter Server instances and ESXi hosts must be 6.0 or later.
- The cross vCenter Server and long distance vMotion features require an Enterprise Plus license. For more information, see: https://www.vmware.com/products/vsphere.html#compare
- Both vCenter Server instances must be time-synchronized with each other for correct vCenter Single Sign-On token verification.
- For migration of compute resources only, both vCenter Server instances must be connected to the shared virtual machine storage.
- When using the vSphere Web Client, both vCenter Server instances must be in Enhanced Linked Mode and must be in the same vCenter Single Sign-On domain so that the source vCenter Server can authenticate to the destination vCenter Server.

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.
**Login to vCenter Server**

1. Click on the **RegionA** folder in the Bookmark toolbar.
2. Click on **RegionA vSphere Client (HTML)** link in the bookmark toolbar.
3. Check the **Use Windows session authentication** checkbox.
4. Click the **Login** button.

Log into RegionA vCenter

1. Click on the **RegionA** folder in the Bookmark toolbar.
2. Click on **RegionA vSphere Client (HTML)** link in the bookmark toolbar.
3. Check the **Use Windows session authentication** checkbox.
4. Click the **Login** button.
Gain screen space in Chrome by zooming out

1. Select the **Options** menu in Chrome.
2. Click the '-' button to zoom out to 90%

Note that this will provide more viewing space while still allowing you to read the text. This is necessary because of the lower than normal resolution we must use in the lab environment to support various devices and to accommodate large-scale events.
Navigate to Hosts and Clusters

1. Click on the **Menu** icon
2. Select **Hosts and Clusters**
Make sure the VM to be Migrated is Running

As you work through this lab, you will notice there are two vCenters you see. You will vMotion a running VM between these two vCenters as part of this lab. If it is not already running, start the "core-01a" VM by performing the following steps:

1. Expand the navigation tree in the left pane exposing all of the virtual machines, and check to see if the **core-01a** is running (it will have a green arrow on the icon if it is). If it is running, skip the rest of the steps below. If it is not running, please go through the steps below.
2. Right click **core-01a**.
3. Hover over **Power**.
4. Select **Power On**.
Start the Migration Wizard

1. Right click **core-01a**.
2. Select **Migrate...** from the context menu that appears.

This will start the migration wizard where we can select where we want to place our VM. Also note that the list of VMs you see may vary based on which other labs you have done. Also, note that this is the same option you would use if you were performing a vMotion with a vCenter or cluster. You use the same regardless of what your vMotion destination is.
Select a migration type

1. Select **Change both compute resource and storage** option.
2. Click **Next**
Select a compute resource

1. Expand the tree under vcsa-01b.corp.local, RegionB01, and RegionB01-COMP01
2. Select host esx-01b.corp.local
3. **NOTE:** The wizard will check the compatibility of the host to verify that it meets a set of requirements to migrate. Additional information on what is being checked can be found in the [VMware vSphere 6.7 Documentation Center](https://www.vmware.com/support/pubs/vsphere67-doc.html).
4. Click **Next**
Select storage

1. Select the storage **RegionB01-iSCSI01-COMP01**
2. Click **Next**

The vMotion will migrate the VM to a new datastore that is available on the new host. This allows VM's to be moved between clusters, vCenters, or datacenters that do not have shared storage.
Select folder

1. Select RegionB01
2. Click Next
1. Select the **VM-RegionB01-vDS-COMP** network.
2. Click **Next**

This will change the port group the VM is associated with. There are no changes within the VM to the IP or network configuration. Your network must be setup in a way that allows the VM to move to this new port group without these changes. Network Virtualization is a way to extend the layer 2 network across Layer 3 boundaries. Please see the NSX Labs “HOL-1903-01-NET Getting Started with VMware NSX” and “HOL-1925-02-NET VMware NSX Multi-Site and SRM in an Active-Standby Setup” for more information.

Note that depending on which other modules you may have done, you may see an additional screen in the wizard asking you to set a vMotion Priority. If you see this screen, leave the default settings and click **Next**.
Ready to complete

1. Review the settings that vCenter will use to perform the vMotions, and click Finish.

Watch Progress in Recent Tasks

We can view the progress of the operation in the Recent Tasks pane at the bottom of the screen.

Note that if you do not see the Recent Tasks pane, you may need to expand it by clicking on Recent Tasks on the right side of the screen.
Migration Complete

That's all there is to it. In the left navigation pane you can now see the **core-01a** VM has been moved to the **RegionB01-COMP01** Cluster, which is in the **vcsa-01b.corp.local** vCenter. As with any other vMotion, this is done with no downtime. The ability to vMotion VMs between hosts, clusters, vCenters, and virtual switches give you even greater flexibility than you had before when managing your workloads.

**Note:** If you plan on continuing and taking other modules in this lab, please use the same process to vMotion the VM back to the RegionA vCenter. Use the following information to assist with this:

- Compute Resource: esx-02a.corp.local
- Storage: RegionA01-SCSI01-COMP01
- Folder: RegionA01
- Network: ESXi-RegionA01-vDS-COMP

**Conclusion**

Migrating VM's between vCenters is a very simple process. Cross vCenter vMotion allows an Administrator to easily move workloads between vCenters that are in the same data center or different data centers without down time. This reduces the amount of time spent during migrations and consolidations. Storage is also migrated allowing for migrations between different types of storage and removing the need for storage replication and downtime. The network must be available on both ends of the migration to prevent the VM from losing its network connection. This can be done through Layer 2 stretching or Network Virtualization.
Conclusion

In this module, you learned the requirements for Cross vCenter vMotion and performed one yourself. This feature opens a number of opportunities to organize your VMs as you need to without giving up the flexibility that vMotion brings you.

You've finished Module 3

Congratulations on completing Module 3.

If you are looking for additional information on cross vCenter vMotion, try one of these:

- To learn more about NSX, please start with the lab: HOL-1903-01-NET: VMware NSX - Getting Started.
- Click on this link for a playlist of videos that describe many of the enhancements and new features in vSphere 6.7: VMware vSphere 6.7 Youtube videos.
- You may also explore VMware vSphere 6.7 What's New Video which will step you through a number of the new features in vSphere 6.7 so you can explore them at your pace.

Proceed to any module below which interests you most.

- **Module 1 - Advanced Storage Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 2 - Advanced Networking Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 4 - Creating and Managing a Content Library** (30 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.
- **Module 5 - Host Lifecycle Management** (45 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.
How to End Lab

If this is the last module you would like to take in this lab, you may end your lab by clicking on the **END** button.
Module 4 - Creating and Managing the Content Library (30 minutes)
Introduction

This Module contains the following lessons:

- **Lesson 1: Mount an ISO from Content Library** - In this lesson, you will learn what a Content Library is, and then you will create one. You will then use the content library to share a template and an ISO image.
- **Lesson 2: Subscribe to Content Library from another vCenter** - A content library's true value shines when used across vCenters. This lesson will show you how to do that.
Create, Add Content and Deploy Content From a Content Library

Content libraries are container objects for VM templates, vApp templates, and other types of files. vSphere administrators can use the templates in the library to deploy virtual machines and vApps in the vSphere inventory. Sharing templates and files across multiple vCenter Server instances in same or different locations brings out consistency, compliance, efficiency, and automation in deploying workloads at scale.

You create and manage a content library from a single vCenter Server instance, but you can share the library items to other vCenter Server instances if HTTP(S) traffic is allowed between them.

If a published and a subscribed library belong to vCenter Server systems that are in the same vCenter Single Sign-On domain, and both the libraries use datastores as backing storage, you can take advantage of optimized transfer speed for synchronization between these libraries. The transfer speed optimization is made possible if the libraries can store their contents to datastores managed by ESXi hosts that are directly connected to each other. Therefore the synchronization between the libraries is handled by a direct ESXi host to ESXi host transfer. If the datastores have VMware vSphere Storage APIs - Array Integration (VAAI) enabled, the library content synchronization between the published and the subscribed library is further optimized. In this case the contents are synchronized by a direct datastore to datastore transfer.

Each VM template, vApp template, or other type of file in a library is a library item. An item can contain a single file or multiple files. In the case of VM and vApp templates, each item contains multiple files. For example, because an OVF template is a set of multiple files, when you upload an OVF template to the library, you actually upload all the files associated with the template (.ovf, .vmdk, and .mf), but in the vSphere Web Client you see listing only of the .ovf file in the content library.

You can create two types of libraries: local or subscribed library.

**Local Libraries**

You use a local library to store items in a single vCenter Server instance. You can publish the local library so that users from other vCenter Server systems can subscribe to it. When you publish a content library externally, you can configure a password for authentication.

VM templates and vApp templates are stored as OVF file formats in the content library. You can also upload other file types, such as ISO images, text files, and so on, in a content library.

**Subscribed Libraries**
You subscribe to a published library by creating a subscribed library. You can create the subscribed library in the same vCenter Server instance where the published library is, or in a different vCenter Server system. In the Create Library wizard you have the option to download all the contents of the published library immediately after the subscribed library is created, or to download only metadata for the items from the published library and later to download the full content of only the items you intend to use.

To ensure the contents of a subscribed library are up-to-date, the subscribed library automatically synchronizes to the source published library on regular intervals. You can also manually synchronize subscribed libraries.

You can use the option to download content from the source published library immediately or only when needed to manage your storage space.

Synchronization of a subscribed library that is set with the option to download all the contents of the published library immediately, synchronizes both the item metadata and the item contents. During the synchronization the library items that are new for the subscribed library are fully downloaded to the storage location of the subscribed library.

Synchronization of a subscribed library that is set with the option to download contents only when needed synchronizes only the metadata for the library items from the published library, and does not download the contents of the items. This saves storage space. If you need to use a library item you need to synchronize that item. After you are done using the item, you can delete the item contents to free space on the storage. For subscribed libraries that are set with the option to download contents only when needed, synchronizing the subscribed library downloads only the metadata of all the items in the source published library, while synchronizing a library item downloads the full content of that item to your storage.

If you use a subscribed library, you can only utilize the content, but cannot contribute with content. Only the administrator of the published library can manage the templates and files.

**Log In To The vSphere Web Client**

1. Click on the **Chrome Icon** on the Windows Quick Launch Task Bar.
Login to vCenter

Log into RegionA vCenter

1. Click on the **RegionA** folder in the Bookmark toolbar.
2. Click on **RegionA vSphere Client (HTML)** link in the bookmark toolbar.
3. Check the **Use Windows session authentication** checkbox.
4. Click the **Login** button.
Gain screen space in Chrome by zooming out

1. Select the Options menu in Chrome.
2. Click the '-' button to zoom out to 90%

This will provide more viewing space while still allowing you to read the text.

Create A New Content Library
Navigate To The Content Libraries Page

1. Click the **Menu** icon
2. Click **Content Libraries**

Create Content Library

1. Click the "+" icon just under the Content Libraries Title to create a new Content Library

This will launch the "New Content Library" wizard.
1. Give the Content Library a name. Name: Shared Library
2. Enter a note for the content library. Notes: Shared Content Library
3. Select a location for the content library. vCenter Server: vcsa-01a.corp.local
4. Click Next
Configure Content Library

1. Leave the default of **Local content library** for now
2. Click **Next**
Add storage

New Content Library

Add storage
Select a storage location for the library contents. Use a file system backing for published content libraries to store the uploaded OVF packages. Use a datastore backing for local and subscribed content libraries to store content optimized for cloning.

1. Select the RegionA01-iSCSI01-COMP01 datastore.
2. Click Next
Ready to complete

New Content Library

1. Review the content library settings
2. Click Finish

Add Content To The Content Library

We have created a new Content Library that is accessible in the Site A vCenter. Next we will add some content to our newly created Content Library.
There are two types of items that can be added to the library, Templates and other files. Items can be uploaded either by URL or from the local file system. Virtual Machines can also be cloned into a template.

1. Navigate to VMs and Templates by hovering over the Menu Icon at the top of the screen
2. Select VMs and Templates from the menu
Clone VM to Library

1. Expand the `vcsa-01a.corp.local` vCenter Server and `RegionA01` Datacenter
2. Right-click the `core-01a` vm
3. Hover over `Clone option`
4. Click `Clone to Template in Library...`
Clone the VM

This will clone the "core-01a" virtual machine to a template on the Shared Content Library. We now have a template that can be deployed over and over again.

1. Select the **Shared Library** that we just created.
2. Append **Master** to the template name
3. Click **OK**
Navigate back to Content Libraries

Content Libraries can handle additional files other than VM Templates. Many organizations also use ISO files to start the build of a virtual machine. We will now upload an ISO file.

1. Click the **Menu** icon
2. Click **Content Libraries**

Select the content library

1. Click our newly-created **Shared Library** from the list of Libraries
Launch the Import Item wizard

1. Select the **Other Types** tab.
2. Click the **Actions** drop down menu.

Under the **Actions** menu...

1. Click the **Import item** option
Import Library Item

1. Select **Local file**
2. Click the **UPLOAD FILE** button
Select ISO

1. Navigate to the "C:\labFiles\HOL-1911\ISO" folder.
2. Select the `linux-micro.iso` file.
3. Click Open
Confirm ISO File

1. Verify that the linux-micro.iso file has been selected.
2. Click IMPORT

View .ISO File In The Content Library Inventory

1. You can see the .iso file in the Content Library inventory now
View VM Template In The Content Library Inventory

You can also view the core-01a_Master VM template you created earlier in this lab.

1. Click the **Template** tab
2. The **core-01a_Master** template should now be in the Content Library inventory.

Create A Virtual Machine From the Content Library

Now that we have added some content to the Content Library, let's use the content.

Navigate To Hosts and Clusters View

1. Click the **Menu** icon at the top of the screen
2. Select **Hosts and Clusters** from the drop down.
Launch The VM Creation Wizard

1. Expand the vcsa-01a.corp.local vCenter Server, RegionA01 Datacenter and the RegionA01-Comp01 Cluster.
2. Right-click the esx-01a.corp.local host.
3. Click New Virtual Machine.
Create a New Virtual Machine from Content Library

Deploy From Template

1. Select a creation type
   - Create a new virtual machine
   - Deploy from template
   - Clone an existing virtual machine
   - Clone virtual machine to template
   - Clone template to template
   - Convert template to virtual machine

This option guides you through the process of creating a virtual machine from a template. A template is a golden image of a virtual machine that lets you easily create ready-for-use virtual machines. You must have a template to proceed with this option.

2. Proceed to the next step.
1. Select the **Deploy from template** option
2. Click **Next**

---

### Deploy From Template

1. Select the template we created previously, **core-01a_Master** (notice that it is in the Content Library that we created).
2. Click **Next**
1. Type **Core-7.1** for the name of the VM.
2. Select the **RegionA01** Datacenter for the location.
3. Note that in vSphere 6.7 you now have the option to customize VMs deployed from a template in the Content Library. For now, leave this checkbox clear.
4. Click **Next**
Select a compute resource

1. Select the **esx-01a.corp.local** host.
2. Click **Next**
1. Review the template details
2. Click Next
1. Select **Thin provision** from the drop-down.
2. Select the **RegionA01-ISCSI01-COMP01** datastore.
3. Click **Next**
Select Networks

1. Select the **VM-RegionA01-vDS-COMP** destination network from the drop-down.
2. Select **Next**
Review the New Virtual Machine

1. Review the configuration data for the VM.
2. Click **Finish**
Power On the Virtual Machine

The Virtual Machine may take a minute to create. Once complete continue on.

1. Select the **Core-7.1** virtual machine that we just created.
2. Click the **Actions** menu
3. Hover over the **Power** menu option to expand the power options.
4. Click the **Power On** option
Mount An ISO On The VM

Now we will mount the .iso file that we uploaded earlier into the Content Library to our new VM.

Let the virtual machine start and then continue on.

1. Click the Actions menu
2. Click Edit Settings...
1. Locate the **CD/DVD drive 1** and click the drop down menu where **Client Device** is current select.
2. In the drop down menu select the **Content Library ISO File** option.

This will launch the **Choose an ISO image to mount** wizard.
Choose an ISO image to mount

1. Select **linux-micro.iso** file from the Shared Library (the Content Library that we created).
2. Click **OK**
1. Ensure the box is check for **Connected** to ensure the ISO is mounted to the vm.
2. Click **OK**

The .iso has been mounted from our Content Library to the VM.

**Lesson Conclusion**

We were able to create a new local content library where Templates, ISOs and other files can be stored. Content libraries provide a central repository for all of your necessary files. We then cloned a VM to our new Content Library and we uploaded an .iso image to our Content Library.
Continue to the next lesson to learn how to share and subscribe to this content with other vCenter Servers.
Subscribe to Content Library from another vCenter

Now that we have created a library in the vcsa-01a.corp.local vCenter Server we need a way to share the library content with our other vCenter Server. vSphere Content Libraries provide a mechanism to consistently share templates, ISOs and files between vCenter Servers.

Navigate To The Content Library Page

1. Click the **Menu** icon
2. Click **Content Libraries**

Select the Shared Library
In the previous lesson, we created a Content Library called “Shared Library” on the vcsa-01a.corp.local vCenter Server. We will configure that Content Library to be shared.

1. Click the **Shared Library** that was created in the previous lesson

**Access The Configuration Settings**

1. Click the **Actions** icon
2. Click **Edit Settings...**

**Publish Content Library**

1. Check the **Publish this content library externally** checkbox
2. Now that we have enable publishing, vCenter has generated a URL to access this Content Library. Click the **COPY LINK** button, this will store the URL in the clipboard for use in a later step.
3. Click **OK**
Note: If required, you can also enable authentication to access the content library. In this lab we will leave this option turned off.

Return To The Content Libraries Page

1. Click the **Menu** icon.
2. Click **Content Libraries** to return to the main Content Libraries page.

Create a new Content Library On The Other vCenter Server

Now we will create a new Content Library on the vcsa-01b.corp.local vCenter Server and have it subscribe to the Content Library that we created on the vcsa-01a.corp.local vCenter Server.
1. Click the "+" icon just under the Content Libraries Title to create a new Content Library.

This will launch the "New Content Library" wizard

**New Content Library Wizard**

1. Type in the name for the new Content Library: **Shared Library B**
2. Select the **vcsa-01b.corp.local** host from the drop down to specify that you want this Content Library created on that vCenter Server.
3. Click **Next**
Instead of creating a local Content Library, we want to subscribe to the library that we created on the other vCenter Server.

By selecting the option to download the content immediately the Content Library will fully sync any time there is a change to the source. By selecting "Download library content only when needed" will only download the content at the time it is selected to be used. The second option would reduce the amount of space that needed on the second vCenter Server but a user would have to wait for the content to be synchronized when they needed the content.

1. Click **Subscribed content library**.
2. Click in the URL box and paste the link that you copied in the previous step using the Ctrl-v key combination. It should have the same format as what is in the screen shot but the hex string will be different. (Note that you can use the onscreen keyboard if you have trouble with the Ctrl-v key combination on an external keyboard)
3. Click **Download all library content immediately**
4. Click **Next**
Add storage

1. Select the RegionB01-ISCSI01-COMP01 datastore as the location for the Content Library.
2. Click Next
Ready to complete

New Content Library

<table>
<thead>
<tr>
<th>1 Name and location</th>
<th>2 Configure content library</th>
<th>3 Add storage</th>
</tr>
</thead>
</table>

Ready to complete

Review content library settings.

Name: Shared Library B
Notes:
vCenter Server: vcsa-01b.corp.local
Type: Subscribed Content Library
Subscription URL: https://vcssa-01a.corp.local:443/cls/lib/b0fd886b-d85a-42de-a636-8832f473f485/lib.json
Storage: RegionB01:ISC/S01-COMP01

1. Click Finish

View The Shared Library

1. Click on the new Shared Library B library.
2. Select Templates and Other Types tabs to see the content that we placed in the Shared Library on the other vCenter Server.
3. Notice that the content is stored locally on this vCenter Server because of the option we chose when creating the Content Library.

The content is now synchronized and is available in the Region B vCenter Server.

**Lesson Conclusion**

vSphere Content Libraries provide a way to easily store templates, ISOs and other files to a datastore. Shared library's content can be synced between a source vCenter and subscriber vCenters.
Conclusion

The Content Library is a great way to share content across multiple vCenters. This module introduced the Content Library and showed you how to populate it with ISO images and templates. You then used those resources to create a VM, and then shared those resources to a second vCenter.

You've finished Module 4

Congratulations on completing Module 4.

If you are looking for additional information on Creating & Managing Content Library, try one of these:

- For more information on some of the basic administration tasks covered in this module, please see Lab 1911-02-SDC: Getting Started with vSphere with Operations Management, Module 5
- Click on this link for a playlist of videos that describe many of the enhancements and new features in vSphere 6.7: VMware vSphere 6.7 Youtube videos.
- You may also explore VMware vSphere 6.7 What's New Video which will step you through a number of the new features in vSphere 6.7 so you can explore them at your pace.

Proceed to any module below which interests you most.

- **Module 1 - Advanced Storage Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 2 - Advanced Networking Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 3 - Advanced vMotion Features** (15 minutes) (Advanced) Introduced in vSphere 6.0, cross vCenter vMotion has created many new possibilities for workload mobility. In this module, you'll learn about the requirements for cross vCenter vMotion and use it to migrate a virtual machine between two vCenter Servers.
- **Module 5 - Host Lifecycle Management** (45 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps, VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.
How to End Lab

If this is the last module you would like to take in this lab, you may end your lab by clicking on the END button.
Module 5 - Host Lifecycle Management (45 minutes)
Introduction

This Module contains the following lessons:

- Lesson 1: Getting Started with Update Manager - This lesson will outline how to use vSphere Update Manager to update an ESXi host.
- Lesson 2: New Graphical User Interface (GUI) - Deploying a host - While Autodeploy is not new, there is a new GUI to manage it. This lesson will introduce you to that GUI, and show you how to deploy a host using Autodeploy.
- Lesson 3: Updating an ESXi image for production - This lesson builds on the previous one and shows you how to upgrade a host that was deployed using Autodeploy.
- Lesson 4: Non-Deployed Hosts - This lesson will show you how to use Autodeploy to deploy a host without creating a deploy rule.
- Lesson 5: Host Profile Configuration - This lesson will walk you through how to use Host Profiles to manage your hosts and maintain a consistent configuration.
Getting Started with Update Manager

VMware vSphere Update Manager is a tool that simplifies and centralizes automated patch and version management for VMware vSphere and offers support for VMware ESX hosts, virtual machines, and virtual appliances.

With Update Manager, you can perform the following tasks:

1. Upgrade and Patch ESXi hosts.
2. Upgrade virtual machine hardware, VMware Tools, and Virtual Appliances.

vSphere Update Manager is installed and running by default in the vCenter Server Appliance. Each vCenter Appliance will have a single vSphere Update Manager paired with it.

Open Chrome Browser from Windows Quick Launch Task Bar

1. Click on the Chrome Icon on the Windows Quick Launch Task Bar.
Log into the vSphere Web Client

Using the Chrome web browser, navigate to the URL for the Web client. For this lab, you can use the shortcut in the address bar.

1. Click the RegionA bookmark folder
2. Click on bookmark for RegionA vSphere Client (HTML)
3. Check the Use Windows session authentication box
4. Click Login

Alternatively, you could use these credentials

1. User name: corp\Administrator
2. Password: VMware1!

Please Note: All of the user credentials used in this lab are listed in the README.TXT file on the desktop.
Gain screen space in Chrome by zooming out

The lab desktop is limited to 1280x800 screen resolution. It might be helpful to zoom out the browser for better readability.

1. Select the **Options** menu in Chrome.
2. Click the '-' button to zoom out to 90%

This will provide more viewing space while still allowing you to read the text.
Navigate to Update Manager

![Image of vSphere Client interface highlighting the menu and update manager options]

Navigate to the Update Manager interface

1. Click the **Menu** icon
2. Click **Update Manager**

Select vcsa-01b.corp.local

![Image of Update Manager interface with vcsa-01b.corp.local selected]

We are going to create a baseline on the vcsa-01b vCenter Server.

1. Ensure `vcsa-01b.corp.local` is selected in the host drop down menu.
Baselines and Baseline Groups

Baselines can be upgrade, extension, or patch baselines. Baselines contain a collection of one or more patches, extensions, or upgrades.

Baseline groups are assembled from existing baselines, and might contain one upgrade baseline per type of upgrade baseline, and one or more patch and extension baselines. When you scan hosts, virtual machines, and virtual appliances, you evaluate them against baselines and baseline groups to determine their level of compliance.

By default, Update Manager contains two predefined dynamic patch baselines.

- **Critical Host Patches** - Checks ESXi hosts for compliance with all critical patches
- **Non-Critical Host Patches** - Checks ESXi hosts for compliance with all optional patches

We are going to create a new baseline, which we will then use to scan a vSphere host so that we can make sure that it has the latest patches.

1. Select the Baselines tab.
2. Click the **New** icon
3. Click **New Baseline**
New Baseline

1. Type the name **HOL Host Baseline** and a description of the baseline.
2. Under description type **Host Baseline**.
3. Use the scrollbar to the right to access the rest of this screen

Baseline Definition (con't)

1. Select the **Patch** radio button
2. Click **Next** to continue.
This screen gives the baseline the ability to continually update itself based on the criteria you select. You can use these options to narrow the scope of the patches added to this baseline (selecting embeddedExi 6.5.0 would limit this baseline to only those patches relevant to ESXi 6.5).

Some areas you can refine the baseline patches to are:

- Vendor
- Product
- Severity (Critical, Important, Moderate, Low)
- Category (Security, BugFix, Enhancement, Other)

1. For our example, we will leave the default setting to automatically update the baseline as new patches become available. We will also leave the default Criteria settings of Any for all options.
2. Click Next
Select Patches Manually

From this screen you have the ability to manually select patches for the baseline to include. Since we have selected the option to have this baseline automatically updated, this screen will appear without patches to select. If you disable the automatic option in the previous screen, you would now be presented with a listing of all patches available which you could manually select to include in this baseline.

1. Click Next

Ready to complete

Review the settings of the patch baseline you created before finishing the wizard.

1. Click Finish to complete the Patch Baseline
Next, we are going to attach the baseline we just created to a host. This makes sure that scanning and remediation happens for the host.

1. Click on the **Menu** Icon
2. Select **Hosts and Clusters**

### Attach the Patch Baseline to a Host

1. In the left pane, select the host to which you want to attach the baseline.
2. In the right pane, click on **Updates**.
3. In the Updates pane, click on **Attach**.
4. Confirm the attachment and click **OK**.

This process ensures that the host will be scanned and remediated according to the baseline requirements.
1. Expand **vcsa-01b.corp.local** vCenter Server --> **RegionB01** Datacenter --> **RegionB01-COMP01** Cluster
2. Click on the **esx-02b.corp.local** Host
3. Select the **Updates** tab.
4. Click on **Attach**

**Select the Baseline**

In the new window that opens,

1. Click on **HOL Host Baseline** - this is the new Baseline that we just created
2. Click on **OK** to continue
Verify the Baseline is Attached

Before we scan the host for compliance against our new baseline, let's verify the new baseline is attached and see what the current status of its compliance is.

1. Verify **HOL Host Baseline** is listed in the **Attached Baselines**
2. Notice that the current status indicates **Unknown**, this is a normal status when you attach a new baseline. Update Manager has not yet scanned this host and compared its current state to the baseline state.

In the next step, we will scan the host and see if it is in compliance with the attached baseline.
Scan the Host

We will now scan this host to see if it is compliant with the baseline.

1. Click the **CHECK COMPLIANCE** button
2. You may receive a message in a blue bar at the top of your screen indicating a refresh is needed, click the **Refresh** link to update the screen. After you click Refresh, you can safely close the message window with the "X"
3. Notice the new status of this host. It is now "Compliant". This indicates that the host meets the patch criteria selected in this baseline.

Had this host been missing any patches identified in the baseline criteria, the status would have shown "**Not Compliant**" indicating the host is missing a patch identified in the baseline, you could then remediate this host using the **Remediate** option on this screen.
vSphere Update Manager can also be used to update the VMware tools on a virtual machine. The following video outlines the process.
Hands-on Labs Interactive Simulation: Deploying a Host using Autodeploy Graphical User Interface (GUI)

Let’s take a look at vSphere Auto Deploy.

**Auto Deploy**

Auto Deploy has been configured through a Command Line Interface in the past. These features have been added to the vCenter Web Client in the latest version of vSphere.

With the vSphere Auto Deploy ESXi feature, you can provision and reprovision large numbers of ESXi hosts efficiently with vCenter Server.

When you provision hosts by using Auto Deploy, vCenter Server loads the ESXi image directly into the host memory. Auto Deploy does not store the ESXi state on the host disk.

vCenter Server makes ESXi updates and patches available for download in the form of an image profile. Optionally, the host configuration is provided in the form of a host profile.
The first time you provision a host by using Auto Deploy, the host PXE boots and establishes contact with the Auto Deploy server, which streams the image profile and any host profile to the host. The host starts using the image profile, and Auto Deploy assigns the host to the appropriate vCenter Server system.

When you restart the host, the Auto Deploy server continues to provision the host with the appropriate image and host profile. To provision the host with a different image profile, you must change the rule that specifies the image profile, and perform a test and repair compliance operation. To propagate changes to all hosts that the rule specifies, change the rule and perform the test and repair operation. The ability to propagate changes to multiple hosts makes Auto Deploy an efficient way to provision and reprovision large numbers of hosts, and to enforce compliance to a master ESXi image.

This environment has already been configured with the DHCP settings and TFTP server. We will not cover the configuration of these components in the simulation.

This portion of the lab is presented as a Hands-on Labs - Interactive Simulation. This simulation will enable you to navigate the software interface as if you are interacting with a live environment.

The following simulation will go through each stage to deploy ESXi using the Autodeploy GUI.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the "Return to the lab" link or close the windows to continue with this lab.
Hands-on Labs Interactive Simulation: Updating an ESXi image for Production

The Updating a Host using Autodeploy process consists of three stages:

- Stage 1: Create the Software Depot
- Stage 2: Create a Rule to Deploy ESXi to a Host
- Stage 3: Activate the Rule

This portion of the lab is presented as a Hands-on Labs - Interactive Simulation. This simulation will enable you to navigate the software interface as if you are interacting with a live environment.

This simulation will go through each stage to Update an ESXi host.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the "Return to the lab" link or close the windows to continue with this lab.
Hands-on Labs Interactive Simulation: Deploying Software to a Specific Host

The Deploying Software to a Specific Host process consists of two stages:

- Stage 1: Remove the Host Rule
- Stage 2: Deploy ESXi to a Non-Inventory Host

This portion of the lab is presented as a Hands-on Labs - Interactive Simulation. This simulation will enable you to navigate the software interface as if you are interacting with a live environment.

This simulation will go through each stage to Update an ESXi host.

1. Click here to open the interactive simulation. It will open in a new browser window or tab.
2. When finished, click the "Return to the lab" link or close the windows to continue with this lab.
Host Profile Configuration

Auto Deploy provides a great way to quickly deploy a consistent software version to all the hosts but there is more needed to configure an ESXi host than just the initial hypervisor deployment. There are many configuration options that must be set on each host. These many options can lead to inconsistencies that cause problems if not configured in an automated way across the environment. For instance, a vSwitch with different names can keep vMotion from working or a misconfigured log server could prevent logs from being collected. These inconsistencies can be minimized with the use of Host Profiles.

Prepare the Lab Environment For The Lesson

1. Click on the Menu icon.
2. Click on Hosts and Clusters.
Expand the Hierarchy

1. Expand out the `vcsa-01b.corp.local` vCenter so you can see the VMs.

Shut Down VMs

In order to simplify the host’s entrance into maintenance mode, we will be powering down all the running VMs within this cluster. DRS is enabled in this cluster but is set to partially automated, powering down the VMs will simplify the rest of the processes in this module.
1. Right Click on **app-01b**
2. Hover your pointer over the **Power** option.
3. Click **Power Off** in the submenu.
4. Click **Yes** on the **Confirm Power Off** pop up (not pictured)

**Repeat steps 1 - 4 for all remaining VMs in the cluster that are currently powered on.**

### Extract And Save A Host Profile

We are going to extract the profile of an existing host and save it. We will use the new Host Profile to check the same host to see if it is in compliance with the profile and of course it will be in compliance since we will have just extracted the profile from that host. Next, we will change a setting and again check the host and find that it is no longer in compliance with the Host Profile because of the changed setting. We will then use the remediation feature of Host Profiles to bring the host back into compliance with the profile.
Extract The Host Profile

1. Right-click **esx-01b.corp.local**
2. Hover your pointer over the **Host Profiles** option
3. Click **Extract Host Profile**...
Host Profile Wizard

1. Enter the Name `RegionB Host Profile` for the profile.
2. Click OK

Attach the Host Profile to The Host

We have extracted the profile of an existing host and saved it. Now we will use the new Host Profile to check the same host to see if it is in compliance with the profile and of course it will be in compliance since we will have just extracted the profile from that host.
Navigate to Attach Host Profile

1. Right click **esx-01b.corp.local**
2. Hover your pointer over the **Host Profiles** option
3. Click **Attach Host Profile**...
Select the Host Profile

1. Select the host profile that you just created, "RegionB Host Profile".
2. Click OK

Check the Host Against the Host Profile

We have attached the Host Profile that we created to the original host. Since the profile was created from this host and no configuration changes have been made, the host should be in compliance with the Host Profile. Let's verify.

Return to the Web Client Home Page

1. Click on the vSphere Client banner at the top left of the screen to return to the Home page.
Navigate to Host Profiles

1. Click on **Host Profiles**.

Select The Host Profile

1. Click on the blue link for the Host Profile we created in the previous steps.
Check Host Compliance With The Host Profile

1. Click on the Monitor tab
2. Click on the checkbox to the left of the esx-01b.corp.local host.
3. Click the Check Compliance button.
4. Wait and verify that the host is in compliance with the Host profile. It will take a couple of minutes to run the verification. You can monitor the progress of the compliance check in the Recent Tasks pane.

Change a Host Setting

Now we will change a setting on the host (the NTP Server address) in order to make the host configuration differ from the Host Profile.

Select the Host

Now that we have created a host profile, we are going to make a change to the ESXi host so that it becomes out of compliance with that profile.

1. Click on the blue hyperlink for esx-01b.corp.local
Navigate to the NTP Server Configuration

1. Click on the **Configure** tab.
2. Scroll down until you see **Time Configuration**
3. Click on **Time Configuration**
4. Click on the **Edit...** button
Change the NTP Server Configuration

1. Change the IP address of the NTP Server to 192.168.100.199.
2. Click the OK button.

The NTP Server setting for the host is now different from the Host Profile.

Re-Check Host Compliance Against the Host Profile

Now that we have made a configuration change on the host, we will check compliance against the Host Profile again. This time, we will expect the status not to be compliant.

Return to the Web Client Home Page

1. Click on the vSphere Client banner at the top left of the screen to return to the Home window.
Navigate to Host Profiles

1. Click on **Host Profiles**.

Select The Host Profile

1. Click on the blue hyperlink for the Host Profile we created in the previous steps.
Check Compliance With The Host Profile

1. Select the checkbox to the left of the esx-01b.corp.local host.
2. Click the Check Compliance button.
3. After a couple of minutes, as expected, the host will no longer show as compliant.

Host is Out of Compliance

1. Click anywhere on the line for the host esx-01b.corp.local to select it. Try to avoid clicking on a name just click a blank space on the line for the host entry. In this line, you will notice that the host is no longer compliant with the host profile.
2. In the detail window, you can see specifically which setting or settings are not compliant and how they differ from the policy.

We can also remediate the host (bring it back into compliance) from here, but before we do that, the host will have to be placed in Maintenance Mode. At the beginning of this
lesson, we powered off all of the VMs, normally, you would evacuate the host of running VMs prior to putting it into Maintenance Mode.

## Remediate the Host

Now that we have created a Host Profile, made a change to the host configuration to force it out of compliance with the Host Profile and then verified that the host is no longer compliant, we can remediate the host to bring it back into compliance with the Host Profile.

## Put the Host in Maintenance Mode

Before we can remediate the host, it must be put into Maintenance Mode.

1. Click on **Hosts**.
2. Right-Click on the **esx-01b.corp.local** host
3. Hover the pointer over **Maintenance Mode**
4. Click **Enter Maintenance Mode**
5. Click **OK** on the confirm Maintenance Mode pop-up (Not Pictured)
Some parameters will need to be verified in the host customization prior to performing a Host Profiles remediation if those parameters were not part of the extracted information when the Host Profile was created. In this case, we need to verify the hostname was extracted as part of the profile.

1. Right-Click the host `esx-01b.corp.local`
2. Hover your pointer over **Host Profiles**
3. Click **Edit Host Customizations**...
1. Scroll down until you see the "Name for this host" parameter.
2. Verify `esx-01b` appears in the "Value" field for this host property.
3. Click OK.

The validation of the customizations may take a few seconds.
Start the Pre-Check Remediation

Part of the host profile remediation process is to perform a "Pre-Check". Similar to an actual remediation, this process will compare the host's current settings against the host profile, but it differs in that it will not make any changes, it will only display what would need to be changed in order to ensure host compliance.

1. Right-Click the host esx-01b.corp.local
2. Hover your pointer over Host Profiles
3. Click Remediate...
Pre-Check Remediation

Remediate - esx-01b.corp.local

esx-01b.corp.local
Cluster: RegionB01-COMP01
Customizations Required: No
State: Connected
Compliance Status: Not Compliant at 06/13/2018, 5:53:42 PM

1. Click the PRE-CHECK REMEDIATION button.

Verify Remediation Changes

In this step, we can now review the differences between the host's settings and the profile settings. Earlier in this lab, we modified the time server settings, we now see that one of the listed items (step 4) that requires a change is the time server setting.

1. Wait for the Pre-check to complete
2. You may need to scroll down the window in order to view the State/Tasks panel
3. Click the carrot symbol to expand the State/Tasks results
4. Review the changes that will be applied by a Host Profile Remediation.

Remediate the Host

Now we will remediate the host and apply the changes identified by the Pre-check.

1. Right click the host esx-01b.corp.local
2. Hover your pointer over Host Profiles
3. Click Remediate...
Remediate the Host (con't)

1. Deselect the option to reboot the host after host profile application.
2. Click the REMEDIATE button.

Verify Compliance Status

The remediation may take a few minutes, continue to monitor the Host Profile Compliance status.

1. The status should change to Compliant
Navigate to the Host Summary

Now that the host is compliant with the Host Profile we can verify the NTP settings have been changed back to the original settings defined within the profile.

1. Click on the blue `esx-01b.corp.local` hyperlink to navigate to the summary for the host.

Verify The NTP Server Address

1. Notice that the NTP Server for the host has been changed back to 192.168.100.1 - the value that was stored in the Host Profile.

In this lesson, we examined how to extract a host profile from a host, check to see if that host(s) are compliant with that profile, and then remediate those hosts so that they are compliant. Host profiles can be combined with Autodeploy to provide a powerful set of tools to make managing ESXi hosts easy.
Conclusion

This module introduced two ways to manage the lifecycle of an ESXi Host. First, it introduced you to Update Manage, a great tool for patching and updating hosts that have ESXi installed locally. Then you learned about Autodeploy, which allows you to easily and quickly deploy and update hosts without having to go through the install process. Finally, you explored Host Profiles that allow you to manage the configuration of your ESXi hosts.

You've finished Module 5

Congratulations on completing Module 5.

If you are looking for additional information on Host lifecycle management, try one of these:

- Learn about VMware Cloud Foundation, which makes management of the host lifecycle in conjunction with NSX and VSAN much easier by taking Lab HOL-1944-01-SLN: Modernize Infrastructure - VMware Cloud Foundation.
- Click on this link for a playlist of videos that describe many of the enhancements and new features in vSphere 6.7: [VMware vSphere 6.7 Youtube videos](#).
- You may also explore [VMware vSphere 6.7 What's New Video](#) which will step you through a number of the new features in vSphere 6.7 so you can explore them at your pace.

Proceed to any module below which interests you most.

- **Module 1 - Advanced Storage Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 2 - Advanced Networking Features** (30 minutes) (Advanced) Storage in vSphere isn't just limited to VMFS and NFS. Learn how new software-defined storage technologies such as Virtual SAN and Virtual Volumes deliver storage policy-based management of virtual machines as well as streamline storage management.
- **Module 3 - Advanced vMotion Features** (15 minutes) (Advanced) Introduced in vSphere 6.0, cross vCenter vMotion has created many new possibilities for workload mobility. In this module, you'll learn about the requirements for cross vCenter vMotion and use it to migrate a virtual machine between two vCenter Servers.
- **Module 4 - Creating and Managing a Content Library** (30 minutes) (Advanced) Content Library is another feature introduced in vSphere 6.0. In this module, you'll learn how to leverage Content Library to centrally manage vApps,
VM templates, cd images, and scripts. You'll also learn about some of the new capabilities for Content Library in the latest version of vSphere.

**How to End Lab**

If this is the last module you would like to take in this lab, you may end your lab by clicking on the **END** button.
Conclusion

Thank you for participating in the VMware Hands-on Labs. Be sure to visit http://hol.vmware.com/ to continue your lab experience online.

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