

# Chapter 7

Working with VMware vSphere

Starting in the early 2000s, VMware was the first company to offer commercial virtualization software and has been the leader in developing and marketing innovative and advanced virtualization features ever since. Today, vSphere with its ESXi Hypervisor is the foundation of VMware's data center virtualization products.

In Chapter 4 you learned the basics about virtual switches and had the opportunity to download and install the free version of vSphere as well as work with the VMware Host Client. In this chapter you will continue to build on your vSphere knowledge and skills by installing a second ESXi host and then using the ESXi Host Client to configure the virtual storage to create, configure, and manage a virtual machine environment. You will also learn how to setup a Windows Server 2019

In VMware Companion Book II you will plan and implement a multi-host vSphere environment using the licensed version of vCenter Server along with the vSphere Web client.

In activity 4-3 you setup a SAN storage area using iSCSI on your Windows Server 2019 virtual machine. In this case, the Windows Server 2019 will be the target and the vSphere host will be the Initiator using the IP\_address you specified. In this chapter you will setup your vSphere host as the initiator using the Initiator IP\_address you supplied.

In the following activities you will install a second vSphere Host, configure the management network, create a local datastore, and then create a virtual machine and install Windows 10. You will then create a NAS storage area on your Windows Server 2019 system and use it to share the virtual machine between the two hosts. In the last activity you will get a chance to setup an iSCSI initiator to connect to the SAN storage area you setup in Activity 4-3. At the end of this chapter, you will have free vSphere virtualized data center that you can use for future learning.



## Activity 7-1: Installing a second Universal AeroSpace ESXi Server

**Time Required:** 5 minutes

**Objectives:** Test the ESXi7 host client from your desktop computer.

**Requirements:** Completion of Chapter 4 Activities.

**Description:** Universal AeroSpace is satisfied with the initial host you installed in the previous chapter. However, to be able to implement advanced features of vSphere such as load balancing and fault tolerance requires multiple ESXi hosts managed through vCenter server. In this activity you will install a second ESXi 7 host in the Universal AeroSpace virtual data center.

1. If necessary, start VMware Workstation Player.
2. Click the **Create a New Virtual Machine** option to display the “Welcome to the New Virtual Machine Wizard” window.
3. If necessary, click the **Installer disk image file (iso)** option and then click the **Browse** button.
4. Navigate to the folder where you stored the ESXi server installation file downloaded in Activity 4-1 and select the ESXi iso file.
5. Click **Next** to display the “Name the Virtual Machine” window. Type “UAS-Host2” as the default server name.
6. Click the **Browse** button and navigate to your virtual machines folder. Click the **Make New Folder** button and create a folder name UAS-Host2 and click **OK**. Verify your entries and click **Next**.
7. In the Specify Disk Capacity window, leave the default 142 GB and then click the **Store virtual disk as a single file** option and click **Next**.
8. Verify that the **Power on this virtual machine after creation** option is checked and then click **Finish** to start the installation process and wait for the installation to complete.



If you see the “Removable Devices” dialog box, you may click the **Do not show this hint again** option and then click **OK**.

9. Click anywhere in the ESXi VM window to transfer the keyboard control to the ESXi host. A message will be displayed informing you to press **Ctrl+Alt** key sequence to return the keyboard to your local computer.
10. Press **Enter** to continue and display the license agreement.
11. Press **F11** to accept the license agreement and start the scanning process to find a local disk drive.
12. When you see the “Select a Disk to Install or Upgrade” window, press **Enter** to accept the local disk drive selected by the scanning process and continue.
13. Choose your keyboard layout, or press **Enter** to accept the US Default keyboard and continue.
14. In the “Enter a root password” window, enter a password you want to use for the “root” user twice.



Record the password you use. (If you used “Password1!” for UAS-Host1, you may want to consider using “Password2!” for Host 2)

15. After entering the password twice, press **Enter** to complete the scanning process.



If you receive a “CPU\_Support” warning message, note the message and press **Enter** to continue.

16. When you see the “Confirm Install” message box, press **F11** to continue the installation.



This process may take a few minutes, so you may wish to take a quick stretch.

17. When the installation process finishes, the “Installation Complete” dialog box will be displayed. Perform the following steps to disconnect your virtual DVD drive from the ISO file.
  - a. Press **Ctrl+Alt** to return control of the keyboard to the Windows desktop.
  - b. Click the **Player** menu, point to **Manage**, and click the **Virtual Machine Settings...** option.
  - c. Click the **CD/DVD** setting and then change the connection to the **Use physical drive** option and click **OK**.
  - d. Click in the virtual machine window to return mouse and keyboard control to the ESXi virtual machine.
18. Press **Enter** to reboot the ESXi host. When the ESXi Host restarts, press the Ctrl+Alt key combination and then click the “**I Finished Installing**” button at the bottom of the Player window.
19. Click in the ESXi host window and then shut down the ESXi host by pressing **F12** to display the “Authentication Required” dialog box. Log in with your “root” username and password and then press the **F2** key to properly shut down the host. After the host powers down, close any dialog boxes. You can now continue with the next activity.



## Activity 7-2: Adding a Management Network Adapter and Disk Drive

**Time Required:** 10 minutes

**Objectives:** Configure your ESXi hypervisor to use the management network.

**Requirements:** Completion of Activity 7-1.

**Description:** Now that you have installed your second ESXi Hypervisor, your next task will be to set up the management network for the new host and add a data store for use by virtual machines. In this activity you will add a second NAT network adapter to your UAS-Host2 virtual machine and additional storage for both hosts.

1. The first thing to do is decide where you wish to store virtual disks for all your virtual machines. You will need to have 250 - 300 GB free on the drive you choose. Next use Windows Explorer to create a folder such as “VMDisks” (you can use any name you choose) on the drive you plan to use.
2. Add a NAT adapter and virtual hard disk to your UAS-Host2.
  - a. Start a copy of VMware Workstation Player, click to select your **UAS-Host2** virtual machine, and click the **Edit virtual machine settings** link.
  - b. Click the **Add** button, select **Network Adapter**, and click **Finish**
  - c. If necessary, click to select the **NAT** option.
  - d. Click the **Add** option again, verify that **Hard Disk** is selected, and then click **Next**.
  - e. Verify that the **SCSI (Recommended)** option is selected and then click **Next**.
  - f. Verify that the **Create a new virtual disk** option is selected and then click **Next**.
  - g. Leave the Maximum size at the default (142 GB) and then click the **Store virtual disk as a single file** option and click **Next**.
  - h. When you see the “Specify Disk File” window, click **Browse** and locate the drive and directory you created for the virtual disk drive in step 1 and click **Save**.



Record the default disk file name and location.

- i. Click **Finish** to create the virtual disk and return to the Virtual Machine Settings window.
  - j. Click **OK** to close the Virtual Machine Settings window.
3. Add a 2<sup>nd</sup> virtual hard disk to your UAS-Host1 virtual machine.
    - a. Click to select your **UAS-Host1** virtual machine and click the **Edit virtual machine settings** link.
    - b. Verify that UAS-vHost1-xxx has two NAT network adapters (see Activity 4-7).
    - c. Click the **Add** option, verify that **Hard Disk** is selected, and then click **Next**.
    - d. Verify that the **SCSI (Recommended)** option is selected and then click **Next**.
    - e. Verify that the **Create a new virtual disk** option is selected and then click **Next**.
    - f. Leave the Maximum size at the default (142 GB) and then click the **Store virtual disk as a single file** option and click **Next** to display the “Specify Disk File” window.
    - g. Click **Browse** and select the drive and directory you used in step 2.
    - h. Click **Finish** to create the virtual disk and return to the Virtual Machine Settings window.
    - i. Click **OK** to return to the VMware Workstation Player home screen.

You can leave VMware Workstation Player open for the next activity.



## Activity 7-3: Configuring the UAS-Host2 Management Network

**Time Required:** 10 minutes

**Objectives:** Configure your ESXi hypervisor to use the management network.

**Requirements:** Completion of Activity 7-1.

**Description:** Now that you have installed your second for the new host, in this activity you will configure the management network of UAS-vHost2 to use the new adapter.

1. If necessary, start a copy of VMware Workstation Player.
2. Start your UAS-vHost2 virtual machine. After the ESXi host boots, click in the guest window, press **F2**, and log on using your “root” user account and password. The System Customization menu will be displayed.
3. Use the down arrow key to select the **Configure Management Network** option and press **Enter**.
4. With Network Adapters selected, press **Enter** a second time to display the available network adapters.



Note that you can place check marks in multiple adapters to provide fault tolerance and load balancing.

5. Press the **spacebar** to remove the check mark from the vmnic0. Select the network adapter you added in activity 7-2 and then press the **spacebar** to toggle the NIC as selected.
6. Press **Enter** to save your changes and return to the Configure Management Network menu.
7. Scroll down to select **IPv4 Configuration** and press **Enter** to display an IPv4 Configuration dialog box.
8. Use the down arrow to select the **Set static IPv4 address and network configuration** option and then press the **Spacebar**.
9. Use the down arrow to select the **IPv4 address**, then press the **right arrow key**, press **Backspace** key to delete the last octet of the address and then enter **142**. Press **Enter** to save your settings and return to the Configure Management Network menu.



Record the IPv4 address information for future reference.

10. Press **Esc** to close the “Configure Management Network” menu and display the “Confirmation” dialog box. Press the **Y** key to apply the changes.
11. Use the “down-arrow” to select the **Restart Management Network** option and press **Enter**. When you see the “Confirm message” box, press **F11** to restart the management network.
12. After the network restarts, press the **Enter** key to return to the “Customization” menu and then press the **Esc** key to close the “System Customization” menu.
13. Press **Ctrl+Alt** to return control to your Windows 10 workstation.
14. Open a command prompt (click Start button and enter CMD in the text box and press Enter) window and enter the command: Ping ip\_address (where ip\_address is the address you recorded in step 9). You should get a Reply message showing that your desktop can now communicate with your second ESXi host.

You can leave your virtual machines running and your browser open for the next activity.



## Activity 7-4: Working with Virtual Switches

**Time Required:** 15 minutes

**Objectives:** Use the ESXi Host Client to setup the virtual switch structure for your host computers.

**Requirements:** Completion of Activity 7-3.

**Description:** Now that you have configured the management network on both your ESXi hosts, in this activity you will use the Host Console to create a new switch and then configure the switches to remove virtual machine traffic from the Management switch and configure the virtual machine port groups on a new virtual machine switch.

1. If necessary, start both your ESXi host computers on separate VMware Workstation Player instances.



You will need to start a separate instance of VMware Workstation Player for each virtual machine.

2. If necessary, open a Web browser.
3. Enter the IP\_address of your UAS-vHost1 virtual machine in the URL field.
4. Depending on your browser, you may get a “not private” message. If so, click the option to proceed to the ip\_address indicated.
5. Log in as “root” using the password you entered back in Activity 4-4 to display the VMware ESXi host page as shown previously in Activity 4-4.
6. Click the **Networking** link from the left-hand pane and notice that VM Network and the Management ports are both using vSwitch0. For security and performance, we will remove the VM Network from this switch and put it on a new switch.
7. Right-click the VM Network port group and then click **Remove**. When you see the confirmation message box, click the **Remove** button. Now vSwitch0 should contain only the Management Network port group.
8. Perform the following process to create a new standard switch for virtual machine data and communications.
  - a. **Right-click the Networking** link from the left-hand Navigator pane to display a pull-down menu.
  - b. Click **Add standard vSwitch** option to display the “Add standard virtual switch” window.
  - c. Enter “VM vSwitch” in the vSwitch Name field and click **Add**.
  - d. Click the **Virtual Switches** tab and notice that the new switch has been added.
  - e. Click the **Port Groups** tab and then click the **Add port group** option from the menu bar to display the “Add port group – New port group” window.
  - f. Enter “VM Network” in the Name field and then click the **pull-down arrow to the right of the Virtual Switch** field and click to select your new **VM vSwitch**.
  - g. Click the **Add** button to add the port group to the new switch and return to the Port groups tab. Both the VM Network and Management Network port groups should be shown.
  - h. Click the **Virtual Switches** tab and verify that both your switches are displayed.
  - i. Congratulations, you have now completed configuring the port groups on UAS-Host1.
9. Open a new tab on your browser and repeat step 8 to add a new VM vSwitch on UAS-vHost2. To make it easier to move VMs between host, use the same switch and port names on UAS-Host 1 as you did for UAS-Host2.



Giving the switches and port groups the same name on UAS-vHost2 will make it easier to migrate VMs between hosts. If the switch and port names are different between the host, the virtual machine network will have to be re-configure before running on the other host.

After adding the new switch and port group configuration to both your ESXi hosts, you can close the browser window and continue with the activities.





## Activity 7-5: Working with Network Security Policies

**Time Required:** 10 minutes

**Objectives:** Use the VMware Host Client to view and configure network policies.

**Requirements:** Completion of Activity 7-4.

**Description:** To help manage and secure network traffic, management at Universal AeroSpace would like you to set up the following policies on both of the ESXi hosts:

- Reject Promiscuous Mode and all MAC address changes and forged transmits on all network switches.
- Document NIC teaming and Traffic Shaping options on the Management switch.
- Add a port group to the virtual machine switch that has the promiscuous mode. This port group will be used to connect an Intruder Detection network monitor application.

1. If necessary, start each of your ESXi hosts on separate VMware Workstation Players.
2. If necessary, start your browser and open the VMware Host Client for UAS-Host1 and login as the “root” user.
3. Click on the **Networking** link under the Navigator pane to display the “Port groups” tab.
4. Click the **Management Network** port group to display the Management Network window shown below in Figure 7-2.

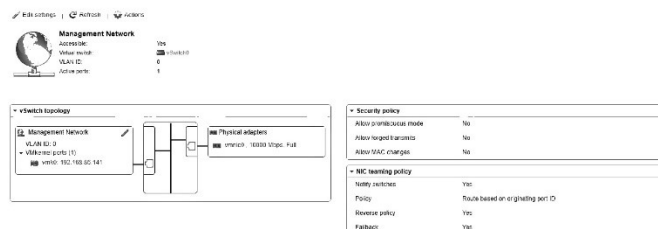


FIGURE 7-2

5. Click the **Edit Settings** button to display the “Edit port group” window.
6. Click to expand the Security options and change the policies to **Reject Promiscuous Mode, Reject the MAC Address Changes, and Reject Forged Transmits**.
7. Click to expand **Traffic Shaping** options. These options can be used to adjust network performance by setting the amount of bandwidth this network port will use.
8. Click **Save** to save your changes return to the “Management Network” window.
9. Perform the following procedure to add a Promiscuous port group to your switch.
  - a. Click the **Networking** link under the Navigator pane to display the “Port groups” tab window.
  - b. Click the **Add port group** link to display the “Add port group” window as shown previously in Activity 7-4.
  - c. Enter “Promiscuous port” in the Name field and select the “VM vSwitch” in the Virtual switch field.
  - d. Click to expand the **Security** options.
  - e. Click the **Accept** button to the right of “Promiscuous mode”.
  - f. Click **Add** to add the Promiscuous port group to the Port groups window.



You can now run Intruder Detection software on a virtual machine connected to this port. You will see how this can be done in a later activity.

10. Repeat steps 2-10 to configure the switches on your UAS-Host2 server.

This completes Activity 7-5. You can now proceed to create a virtual machine in Activity 7-6, or if you need a break, close your VMware Host Client and properly shut down your ESXi virtual machines.



## Activity 7-6: Creating a Virtual Machine for Windows

**Time Required:** 15 minutes

**Objectives:** Use the VMware Host Client to view and configure network policies.

**Requirements:** Completion of Activity 7-5.

**Description:** In this activity you will use your VMware Host Client to create a new datastore on a local drive for virtual machines. You will next create a new Windows 10 virtual machine on your UAS-vHost1 server's new datastore.

1. If you shut down your system after the previous activity, perform the steps below to restart the necessary virtual machines.
  - a. Log on to your desktop computer and start VMware Workstation Player.
  - b. Start your UAS-Host server.
  - c. Open your Web browser and enter the ip\_address of your UAS-vHost1 ESXi host.
  - d. Log in to your server using your "root" username and password.
2. From the opening Inventory window, click the **Storage** link, click Datastores tab, and notice there is only one datastore named "datastore1".



Record the default type along with the Capacity and Provisioned values. The Capacity of datastore1 is reserved for the ESXi Operating System. The remaining size of the drive is reserved for system usage.

3. Perform the following procedure to create a new datastore for virtual machine usage.
  - a. Click on the **New datastore** option to start the new datastore wizard.
  - b. Verify that "Create new VMFS datastore" is selected and click **Next**.
  - c. Enter "VM Datastore" (or whatever name you like) in the Name field.
  - d. Verify that your Local VMware Disk is selected (this is the disk you create in Activity 7-2) and then click **Next** to display the "Select partitioning" options screen.
  - e. Click the "down arrow" to the right of "Use full disk" and click **Custom** from the pull-down menu.
  - f. **Double-click** the left-hand "Before" partition and then use the pointer bar to allocate at least 60 GB to the new datastore.
  - g. After selecting the custom size, click **Next** to display the "Ready to complete" window. Validate the information and then click **Finish** to create the new "VM Datastore" datastore. After a couple minutes, your VM Datastore will appear on the Storage window. You now have created a datastore for your virtual machines.
4. Click the **Virtual Machines** link in the Navigate pane to open the "Virtual Machines" window and then perform the following procedure to create a new Windows 10 virtual machine.
  - a. Click the **Create/Register VM** option from the menu line to start the new virtual machine wizard.
  - b. Verify that the "Create a new virtual machine" option is selected and click **Next**.
  - c. In the Name text box enter "UASWorkstation-1"
  - d. Use the pull-down menu in the Guest OS family field to select **Windows** as the Guest OS family.
  - e. Use the pull-down menu in the Guest OS version field to select Microsoft Windows 10 (64-bit).
  - f. Click the **(i)** link to the right of the "Enable Windows Virtualization Based Security" and record what this option will do. To keep thing simple, at this time we will not enable Windows Virtualization Based Security on this VM.
  - g. Click **Next** to display the "Select storage" window.
  - h. Select the "VM Datastore" you created click **Next** to display the "Customize settings" window.
  - i. Click to expand **Hard Disk 1** and verify the storage size fields.
  - j. In the "Disk Provisioning" line, click to select the **Thin provisioned** option.

- k. Scroll down and expand **Network Adapter 1**.
  - l. Click the down arrow to the right of “Network Adapter 1” and then click to select the **VM Network** port group. Notice you could also select the Promiscuous port group if installing a Intruder Detection system.
  - m. View the other settings and then click **Next** to display the “Ready to complete” window.
  - n. Verify your settings and then click **Finish** to create the Windows virtual machine.
5. The UASWorkstation-1 should now appear in the Virtual Machines window.

This completes Activity 7-6. You can stay logged into the UAS-vHost1 host for the next activity.



## Activity 7-7: Installing a Windows 10 Guest Operating System

**Time Required:** 15 minutes

**Objectives:** Use the VMware Host Client to install the Windows 10 OS on the virtual machine created in Activity 7-6.

**Requirements:** Completion of Activity 7-6.

**Description:** In this activity you will use your Host Client to install Windows 10 on a virtual machine.



If your VMware Host Client is still running from the previous activity, you can skip steps 1 and 2 and start with step 3.

1. If necessary, log on to your desktop computer and start VMware Workstation Player and then run your UAS-vHost1-xxx server.
2. After the ESXi host is up and running, open your Web browser and enter the ip\_address of your UAS-vHost1 ESXi host.4. Login to your server using your “root” username and password.
3. In this step you will upload a copy of the Windows 10 ISO file to you’re the VM Datastore you created in Activity 7-6.
  - a. Click on the Storage link from Navigator pane.
  - b. Click to select the VM Datastore.
  - c. Click the Datastore tab and click Create directory.
  - d. Enter the directory name “ISO images” and click **Create Directory**. The ISO images directory should now appear in the Datastore browser window.
  - e. Click on the **new ISO Images** folder and then click the **Upload** option.
  - f. Navigate to the folder containing your Windows.iso file. **Click to select the Windows.iso** file and then click **Open**. Wait while the ISO file is uploaded to the ISO Images folder.
4. Perform the following steps to connect the new virtual machine’s CD drive to the “Windows.iso” image file.
  - a. Click the **Virtual Machines** option from the Navigator window.
  - b. Click to select the “UASWorkstation-1” virtual machine you created in Activity 7-6.
  - c. Click the **Actions** option from the menu bar and then click on the **Edit Settings** option from the pull-down list.
  - d. Click to **expand the CD/DVD Drive** settings as shown below in Figure 7-3.

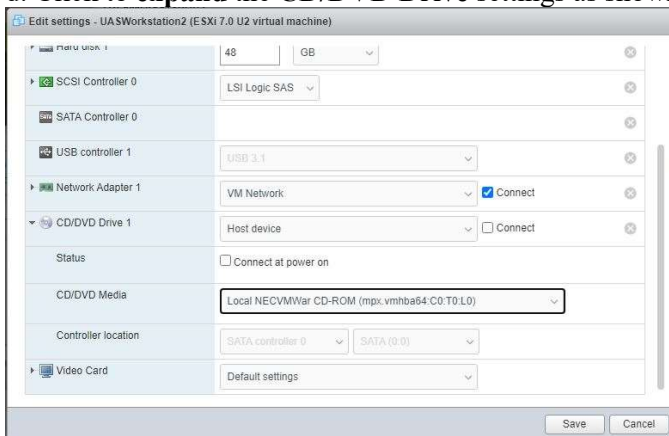
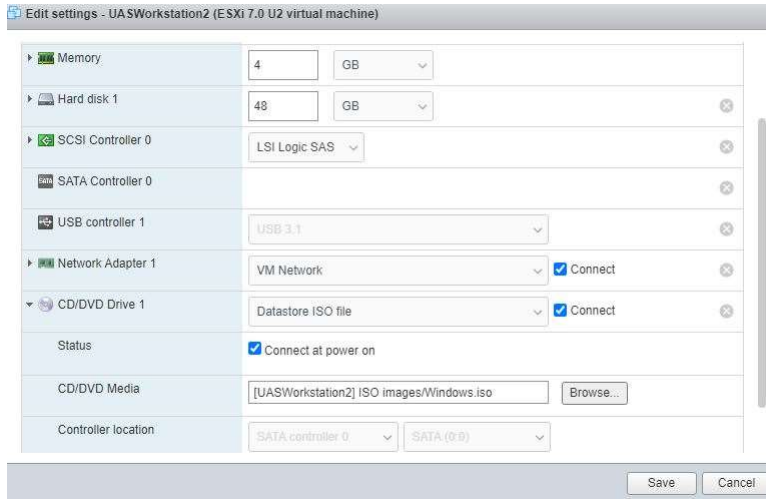


FIGURE 7-3

- e. Click the “down-arrow” to the right of the **Host device** setting and select the **Datastore ISO** file option from the pull-down list.
- f. Click the **Browse** button to the right of the CD/DVD media field, navigate to the ISO Images folder you created in the previous step, click to select the “Windows.iso” file you uploaded.
- g. Click the **Connect at power on** option to display a window similar to the one shown in Figure 7-4 (your directory names may be different).



**FIGURE 7-4**

5. Next you must get your virtual machine to boot from the “Windows.iso” file in order to start the installation by following the steps below:
  - a. Scroll up and click the **VM Options** tab from the Edit Settings window.
  - b. Click to **expand** the **Boot Options** settings.
  - c. Scroll down and **click the check box** next to the “The next time this virtual machine boots, force into the BIOS setup screen”.
  - d. Click **Save** to save your changes.
6. Install Windows on your virtual machine by following the steps below:
  - a. Click the **Power on** option from the virtual machine’s menu bar to start the VM in the BIOS setup screen.
  - b. Click in the **VM thumb nail** to open a window for the virtual machine.
  - c. Click in the virtual machine BIOS window to turn control of keyboard over to the VM.
  - d. Use the “down-arrow” to select the **Enter setup** option and press **Enter**.
  - e. Press **Enter** to select “Configure boot options”.
  - f. Use the “down-arrow” to select the “Change boot order” option and press **Enter**.
  - g. Press **Enter** again to display a list of devices.
  - h. Use the “down-arrow” to select the “EFI VMware Virtual SATA CDROM” device and then use the “+” key to move it to the top of the boot sequence.
  - i. Press **Enter** to save your changes.
  - j. Use the “down-arrow” to select the “Commit changes and exit” option and then press **Enter**.
  - k. Use the “down-arrow” to select **Exit the Boot Maintenance Manager** option and press **Enter**. (you must now act quickly).
    - l. Use the “down-arrow” to select the “Reset the system” option and press **Enter**.
    - j. When you see the virtual machine reboot, quickly press any key to boot from the “Windows.iso” file and start the Windows 10 installation wizard.
7. Perform a standard Windows 10 installation using the following parameters:

- In the Activate Windows screen, leave the product key field blank and click I don't have a product key option.
- Select Windows 10 Pro
- Select the Custom: Install Windows only (advanced) option
- Select Drive 0 Unallocated Space.
- Wait for installation to take place (this will take a while, so a good time to take a little break)
- Select your region, keyboard type and layout.
- Select setup for personal use
- Select Offline account and then click Limited Experience
- Enter Admin as the user name.
- Enter a password such as "Passwor1!" (The same as your ESXi host)



Record your 3 security questions and answers.

- Turn off (select No) for all the privacy settings
  - Select Not now for Cortana help
  - Wait several minutes - good break time...
  - Windows 10 desktop is displayed at end of installation.
8. Do a Power reset and then log in using the Admin password to test your installation.
  9. Use the Windows 10 Power options to "Shut down" your Windows 10 virtual machine.
  10. Close the Virtual Machine window to return to the Host client screen.

You may leave the VMware Host Client open for the next activity.



## Activity 7-8: Viewing Virtual Machine Settings and install VMware Tools

**Time Required:** 10 minutes

**Objectives:** Use the VMware Host Client to view the setting for the Windows 10 virtual machine. You will then start the Windows 10 VM and install VMware Tools.

**Requirements:** Completion of Activity 7-7.

**Description:** In this activity you will use your Host Client to view settings on a virtual machine.



If your VMware Host Client is still running from the previous activity, you can skip steps 1 and 2 and start with step 3.

1. If necessary, log on to your desktop computer and start VMware Workstation Player and then run your UAS-vHost1-xxx server.
2. After the ESXi host is up and running, open your Web browser and enter the ip\_address of your UAS-vHost1 ESXi host.4. Login to your server using your “root” username and password.
3. If necessary, **expand** the Virtual Machines list and then click on your UASWorkstation-1 to display the “Hardware Configuration” information and verify that the CD/DVD device is still connected to the Windows ISO file and record the size of Hard disk 1.
4. Click **Network adapter 1** and notice the MAC address.
5. Scroll down and view other Hardware information. Notice that many setting cannot be changed from this screen.
6. Follow the steps below to edit virtual machine settings.
  - a. Scroll to the top of the UASWorkstation1 summary window. And click the **Edit** option from the menu line to open the “Edit Settings” tab and review the settings.
  - b. Scroll down and click to expand CD/DVD Drive 1.
  - c. Click the “down-arrow” to the right of “Datastore ISO” file and then click **Host** device.
  - d. Scroll to the top of the Edit Settings screen and click the **VM Options** tab. This is the tab you used in Activity 7-8 to boot the VM to BIOS. Notice that you can also use this tab to change the name of your Virtual Machine.
  - e. Click to **expand VMware Tools** and review the options. You will install VMware tools in step 7.
  - g. Click **Save** to save your changes and return to the Virtual Machine summary window. Notice that the CD/DVD device has been changed.
7. Follow the steps below to install VMware tools (requires completion of Activity 7-8).
  - a. Start your UASWorkstation-1 virtual machine, click to expand the console screen, and login using the Admin password.
  - b. Click **Actions** from the top-right of the console screen window.
  - c. Point at **Guest OS** and click **Install VMware Tools** from the Guest OS pull-down menu. This will connect VMware Tools installation files to the virtual CD/DVD device.
  - d. On the UASWorkstation-1 virtual machine, open File Explorer, expand This PC, and double-click on DVD Drive (D:) VMware Tools to start the VMware Tools wizard.
  - e. Click **Yes** to allow changes to your device and start the installation process. Click **Next** when you see the Welcome screen.
  - f. Verify the Typical setup type is selected and click Next.
  - g. Click the **Install** button and wait for the installation to complete, it will take a few minutes.
  - h. After the installation is complete, click **Finish** and then click **Yes** to restart the VM.



8. Login to the Windows 10 workstation and then use Power option of Windows to “Shut down” the virtual machine and close the workstation desktop window and return to the VMware Host Client.
  - j. In the General Information pane, notice that that is shows the installation of VMware Tools is complete.



You now have a clean version of Windows 10 workstation with VMTools. Later you will learn how you can use this virtual machine to clone addition workstations relatively quickly.

This ends the activities from chapter 7 of the Hands-on Virtual Computing textbook.