This document describes the procedures for installing and upgrading W-ClearPass Policy Manager 6.6 on a Virtual Machine. Information is provided for both ESXi® and Hyper-V™ installations.

This Tech Note includes the following sections:

ESXi Installations

This section describes how to install or upgrade W-ClearPass on a VMware ESXi virtual machine, including:

ESXi Installation Process Overview

The process of installing W-ClearPass on a VMware ESXi virtual machine is done in four stages:

1. W-ClearPass 6.6 VMware software packages are distributed as Zip files. Download the software image from the **Download Software > ClearPass > Policy Manager > Current Release > ESXi** folder on the Support site (http://download.dell-pcw.com) and unzip it to a folder on your server to extract the files.

2. Follow the steps in the OVF wizard to deploy the OVF files, but do not power on yet.

3. Add a new hard disk, based on the requirements for your type of VM. See "Recommended ESXi Server Specifications" on page 1 for more information.

4. Power on and configure the VM.

Instructions for these procedures are provided in "Installing W-ClearPass Policy Manager on an ESXi Virtual Machine" on page 3.

> **NOTE**: Review the release notes for the current release before you upgrade W-ClearPass Policy Manager.

> **NOTE**: Cloning a virtual machine to facilitate a W-ClearPass deployment is not recommended or supported.

Recommended ESXi Server Specifications

Please carefully review all VA requirements, including functional IOP ratings, and verify that your system meets these requirements. These recommendations supersede earlier requirements that were published for W-ClearPass Policy Manager 6.x installations.

Virtual appliance recommendations are adjusted to align with the requirements for W-ClearPass hardware appliances. If you do not have the VA resources to support a full workload, then you should consider ordering the W-ClearPass Policy Manager hardware appliance.

Be sure that your system meets the recommended specifications required for the Policy Manager Virtual Appliance. The W-ClearPass VMware ships with a 20 GB hard disk volume. This must be supplemented with additional storage/hard disk through VMware settings by adding a new hard disk. The additional space required depends on the W-ClearPass virtual appliance version.

To ensure scalability, dedicate or reserve the processing and memory to the W-ClearPass VM instance. You must also ensure that the disk subsystem can maintain the IOP's throughput as detailed below. Most virtualized environments use a shared disk subsystem assuming that each application will have bursts of I/O without a sustained high I/O throughput. W-ClearPass Policy Manager requires a continuous sustained high data I/O rate.

NOTE

If you do not add a new hard disk to the VM before it is powered on, it will continue to restart with kernel panics.

An ESXi version can be morphed to a larger version by using the morph-vm command. For more information, see the **Command Line Interface > System Commands** section in the *W-ClearPass Policy Manager 6.6 User Guide*.

Supported ESXi Versions

The following VMware versions are supported. VMware Player is not supported.

- VMware ESXi 5.0, 5.1, 5.5, 6.0, or higher

CP-SW-EVAL (Evaluation OVF)

- 2 Virtual CPUs
- 4 GB RAM
- 80 GB disk space

CP-VA-500 (500 Virtual Appliance OVF)

- 8 Virtual CPUs
    - Underlying CPU is recommended to have a PassMark® of 3000 or higher
- 8 GB RAM
- Disk space:
    - 500 GB disk space required for existing deployments (upgrading from 6.3.6, 6.4.7, or 6.5.x)
    - 1000 GB disk
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 75

CP-VA-5K (5K Virtual Appliance OVF)

- 8 Virtual CPUs
    - Underlying CPU is recommended to have a PassMark® of 9600 or higher
- 8 GB RAM
- Disk space:
    - 500 GB disk space required for existing deployments (upgrading from 6.3.6, 6.4.7, or 6.5.x)

- 1000 GB disk
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 105

CP-VA-25K (25K Virtual Appliance OVF)

- 24 Virtual CPUs
  - Underlying CPUs are recommended to have a [PassMark]®️ of 9900 or higher
- 64 GB RAM
- Disk space:
  - 1000 GB disk space required for existing deployments (upgrading from 6.3.6, 6.4.7, or 6.5.x)
  - 1800 GB disk
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 350

Installing W-ClearPass Policy Manager on an ESXi Virtual Machine

After you download and unzip the W-ClearPass 6.6 VMware ESXi software package Zip files, follow the instructions in this section to deploy the W-ClearPass files, add a new hard disk, and power on and configure the VM:

- "Deploy W-ClearPass Policy Manager Image on a VMware ESXi Server" on page 3
- "Add a Hard Disk to the Virtual Machine" on page 5
- "Power On and Configure the VM" on page 9

Deploy W-ClearPass Policy Manager Image on a VMware ESXi Server

The illustrations in this section use a CP-VA-500 virtual appliance as an example. Refer to "Recommended ESXi Server Specifications" on page 1 for the appropriate requirements for your appliance.

1. Start the VMware vSphere client and connect to your ESXi server.
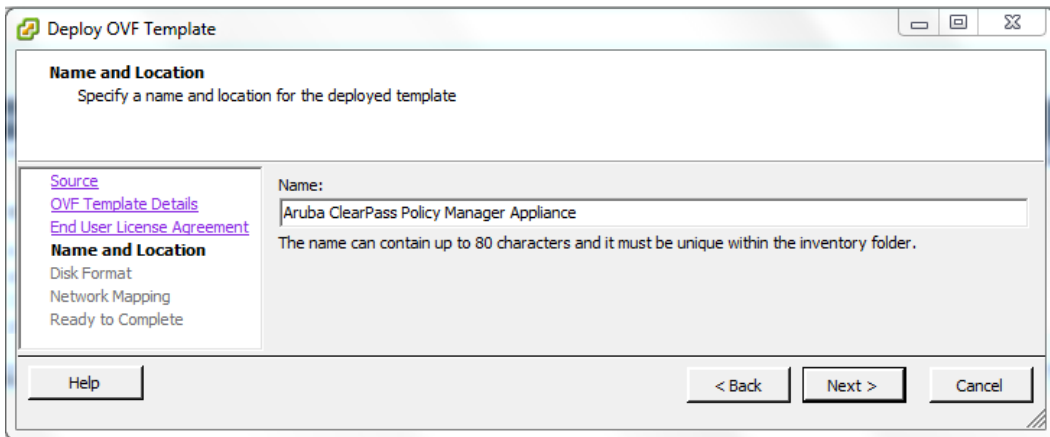2. Select **File > Deploy OVF template**.

3. Select the .ovf file from the folder where the W-ClearPass Policy Manager Zip file was extracted. The Deploy OVF wizard opens with the OVF Template Details page displayed. (OVF, or Open Virtualization Format, is a standard for distributing virtual appliances or software to virtual machines)

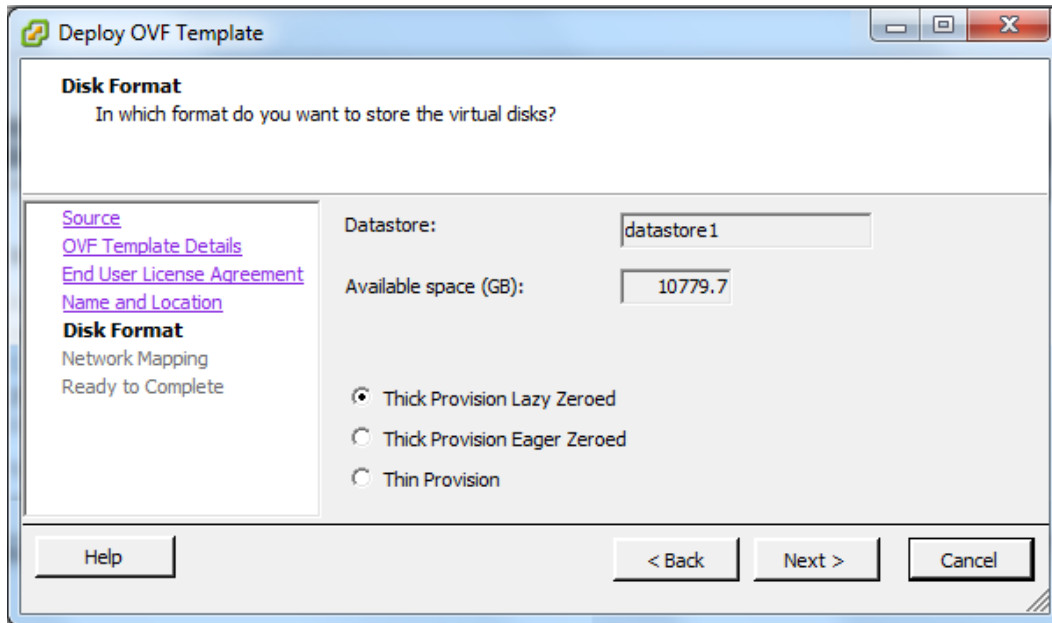**Figure 1** *Deploy OVF Template Wizard, OVF Template Details*
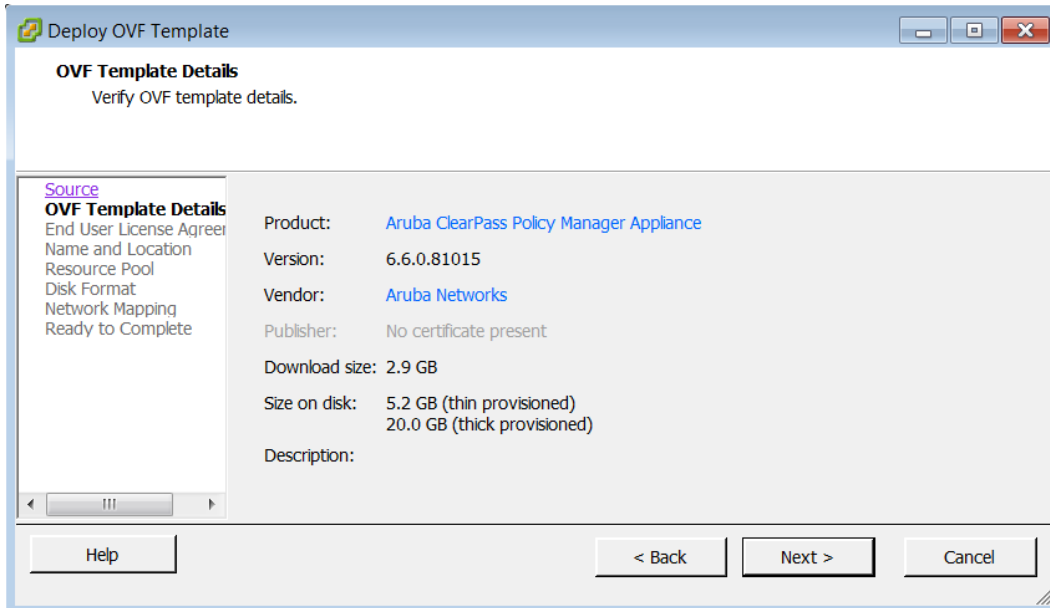
4. Click **Next**.

5. On the **End User License Agreement** page, click **Accept**, and then click **Next**.

6. On the **Name and Location** page, the **Name** is set by default to Aruba ClearPass Policy Manager Appliance. You can change it as you wish, and then click **Next**.

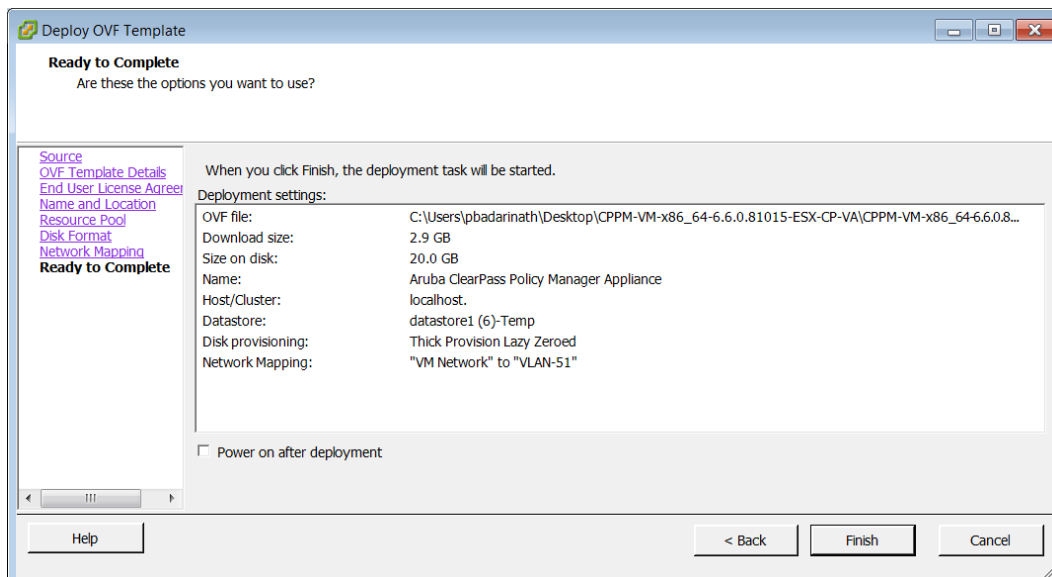**Figure 2** *Deploy OVF Template Wizard, Name and Location*

7. On the **Disk Format** page, leave the default option of **Thick Provision Lazy Zeroed**, and then click **Next**.

Figure 3 *Deploy OVF Template Wizard, Disk Format*

8. On the **Ready to Complete** page, do not select the "Power on after deployment" check box. Just click **Finish**.

Figure 4 *Deploy OVF Template Wizard, Ready to Complete*

You will need to reconfigure the VM settings by adding a hard disk before you power on.

Add a Hard Disk to the Virtual Machine

For disk size requirements for the different W-ClearPass models, see "Recommended ESXi Server Specifications" on page 1.

1. On the vSphere client, navigate to the deployed virtual machine, right-click on it, and select **Edit Settings**.

Figure 5 *vSphere Client, Edit Settings*

2. Click **Add** to add another hard disk.

Figure 6 *Virtual Machine Properties, Add Hard Disk*

3. On the **Device Type** page of the Add Hardware wizard, select **Hard Disk**, and then click **Next**.
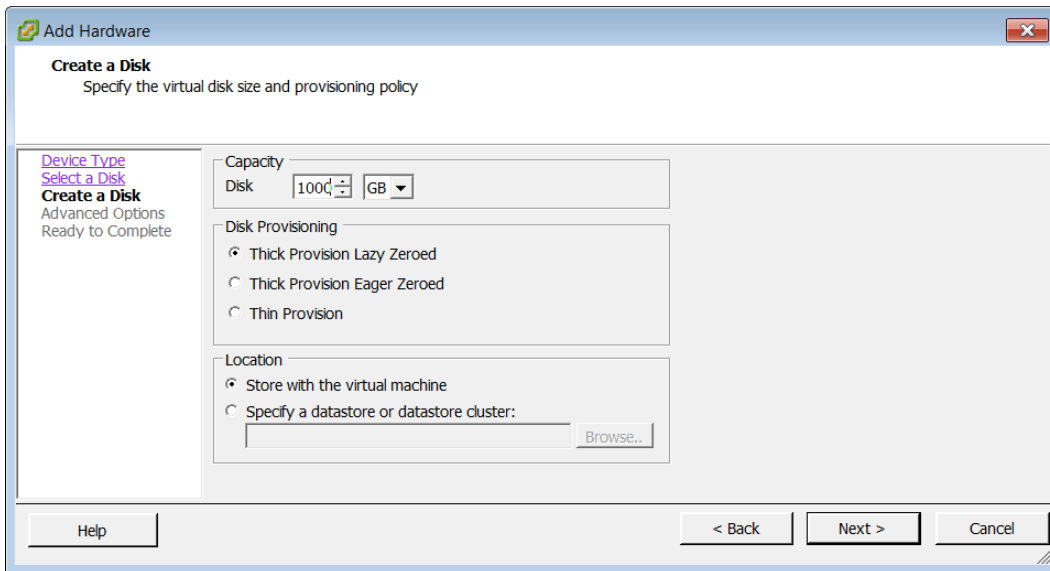
Figure 7 *Add Hardware Wizard, Device Type*
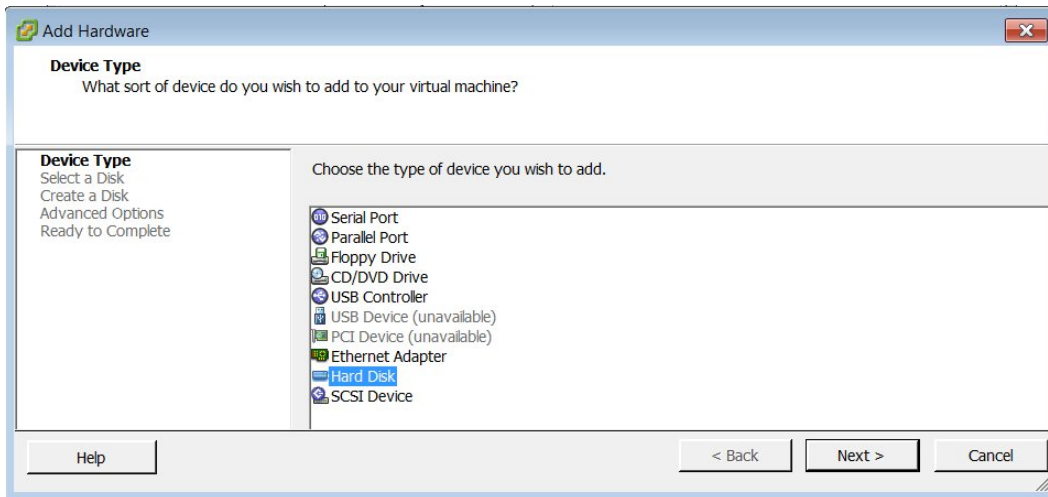
4. On the **Select a Disk** page, select **Create a new virtual disk**, and then click **Next**.

Figure 8 *Add Hardware Wizard, Select a Disk*
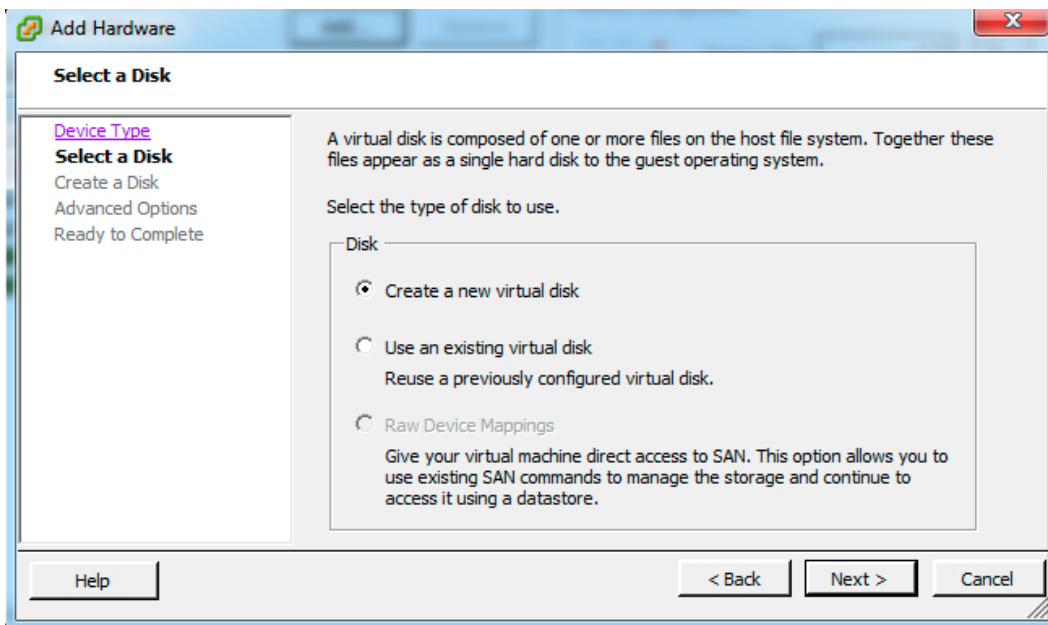
5. On the **Create a Disk** page, set the **Disk Size** to the correct requirements for your virtual appliance version. See "Recommended ESXi Server Specifications" on page 1.

Figure 9 *Add Hardware Wizard, Create a Disk*

6. Leave the default settings on the **Advanced Options** page (the Virtual Device Node should be SCSI(0:1)), and then click **Next**.

Figure 10 *Add Hardware Wizard, Advanced Options*
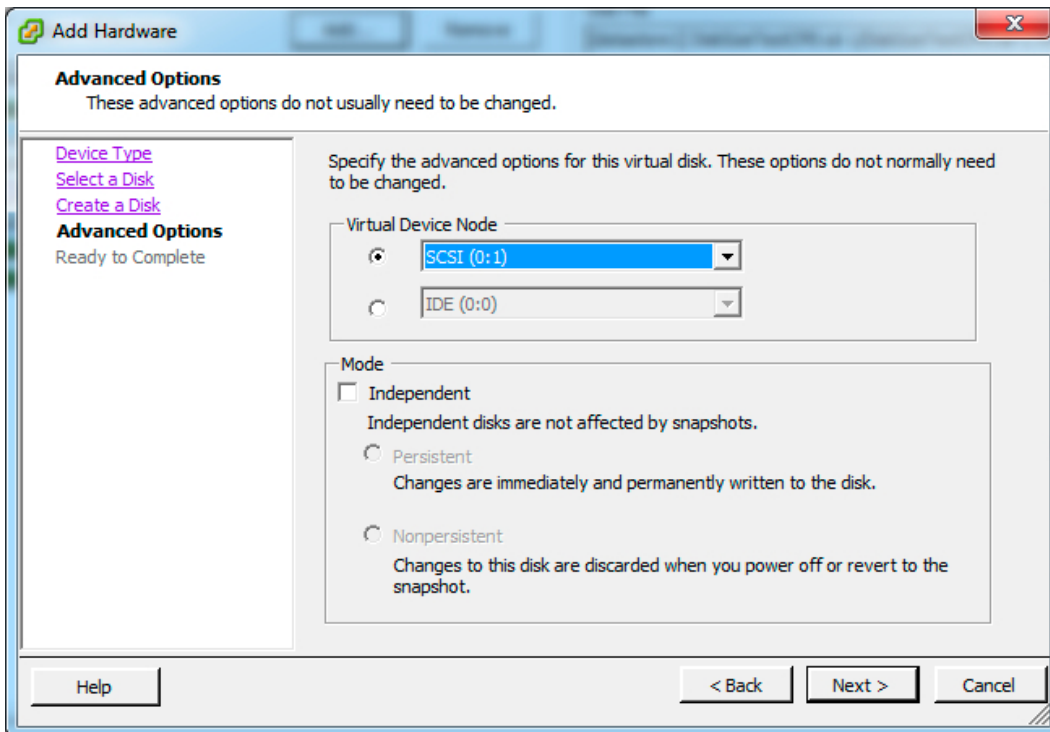
7. The **Ready to Complete** page displays the disk details for verification. If the disk size matches the requirements described in "Recommended ESXi Server Specifications" on page 1 and the disk provisioning setting is **Thick Provision Lazy Zeroed**, click **Finish**.
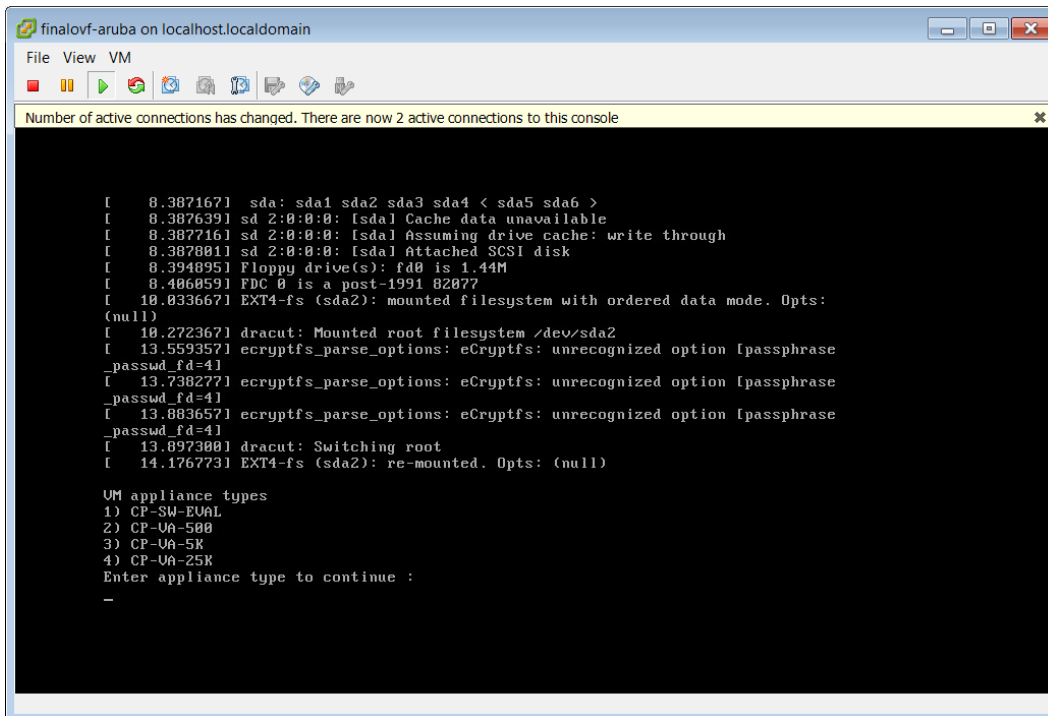
Figure 11 *Add Hardware Wizard, Ready to Complete*
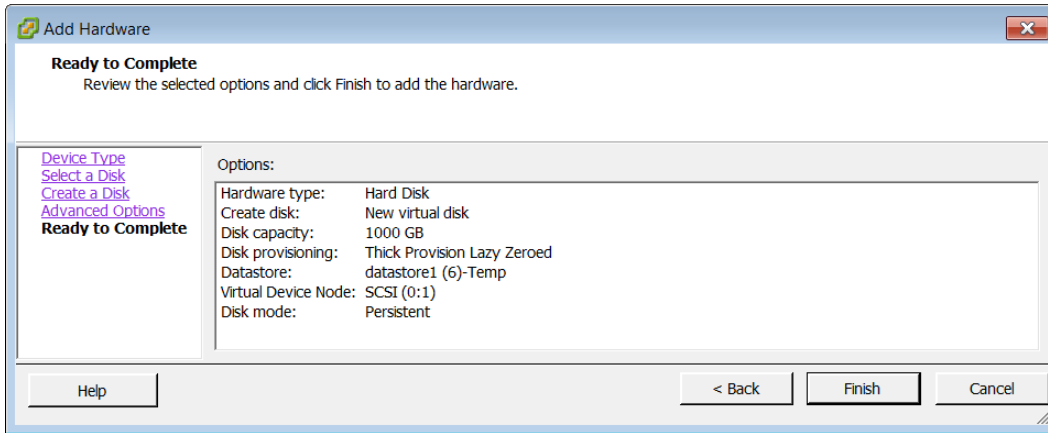

Power On and Configure the VM

1. Power on the virtual machine. You should see the following in the vSphere client:

Figure 12 *"Enter appliance type to continue"*

2. Enter the number for the appropriate appliance type (do not enter the appliance model itself). Options include:

- **1) CP-SW-EVAL**

- **2) CP-VA-500**

- **3) CP-VA-5K**

- **4) CP-VA-25K**

3. So, for example, to install a CP-VA-500, you would enter the number **2**.

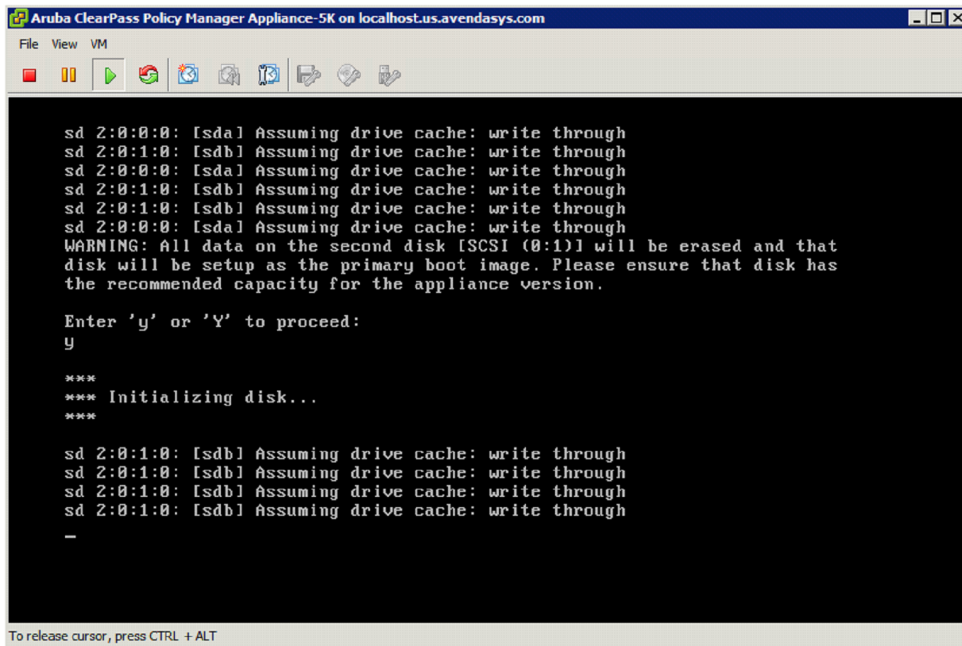**Figure 13** *Number Entered to Indicate Appliance Option*
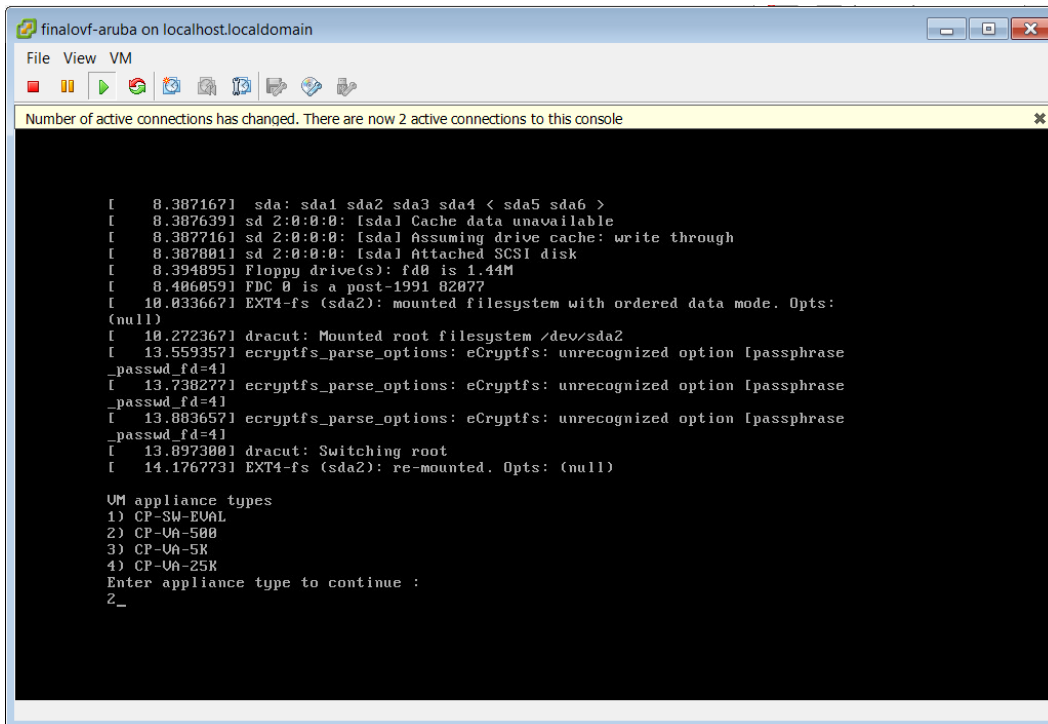
4. The system requirements are displayed for the appliance model you entered, along with your current
    system configuration. Compare these to make sure your system meets the new system requirements. For
    more information, see "Recommended ESXi Server Specifications" on page 1.

Figure 14 *System Requirements Comparison, and "Enter 'y' or 'Y' to proceed"*
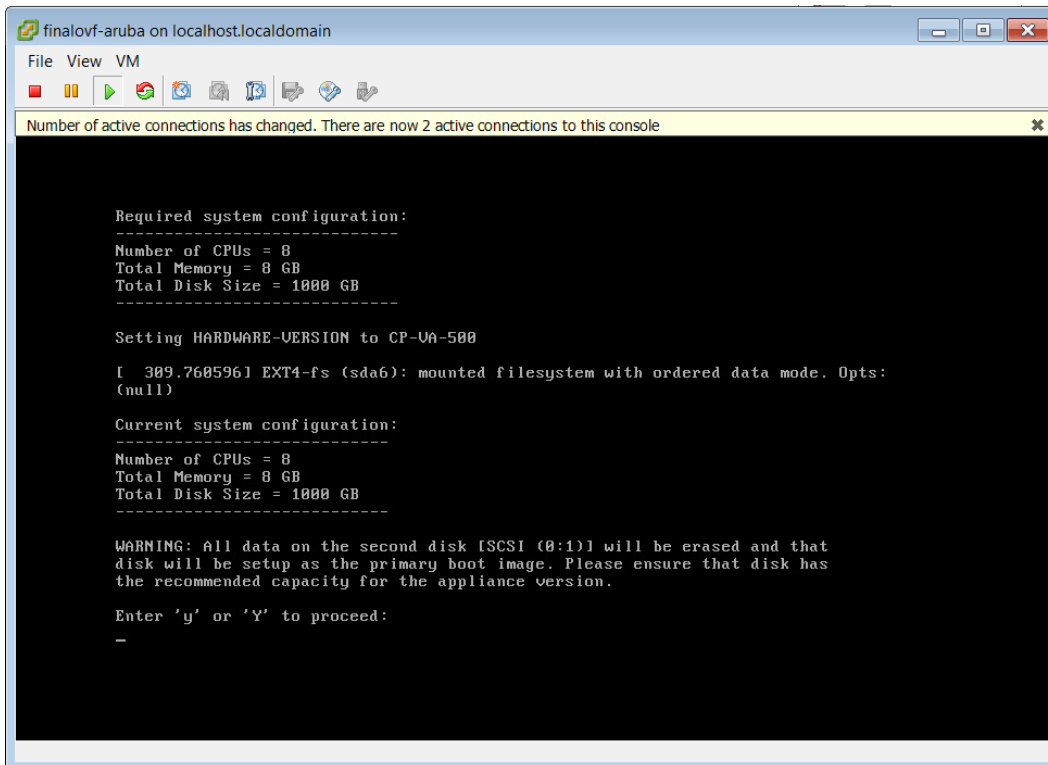
5. When you have verified that your system meets the new requirements, press **y**. The W-ClearPass 6.6.0 setup and installation begins. You should see the following information, and W-ClearPass will reboot at least once:

Figure 15 *Initializing Disk*

Figure 16 *"First boot setup DONE"*

After that reboot the W-ClearPass VM is configured, and will power on and boot up within a couple of minutes. The whole process from Deploying the OVF image to the final startup screen should take between 30 and 40 minutes.

6. After the W-ClearPass VM launches correctly, you should see the following banner displayed:

Figure 17 *Banner*

7. When you see the banner, you can log in by following the instructions in the *W-ClearPass Policy Manager 6.6.0 Getting Started Guide*.

Morphing ESXi to a Higher Model Virtual Appliance

The illustrations in this section use the example of morphing a CP-VA-500 virtual appliance to a CP-VA-25K. Adjust your own configuration as needed.

Perform the following steps when morphing an ESXi virtual appliance to a higher model virtual appliance:

1. Power off the W-ClearPass VMware instance.

2. In VMware, open the W-ClearPass virtual machine properties.

3. Add a new hard disk to the virtual machine. The **Virtual Device Node** should be **SCSI(0:2)**.

    Review the VMware disk requirements first. These are described in "Recommended ESXi Server Specifications" on page 1.

Never remove SCSI 0:0

Figure 18 *Add Hardware, Advanced Options, Virtual Device Node*
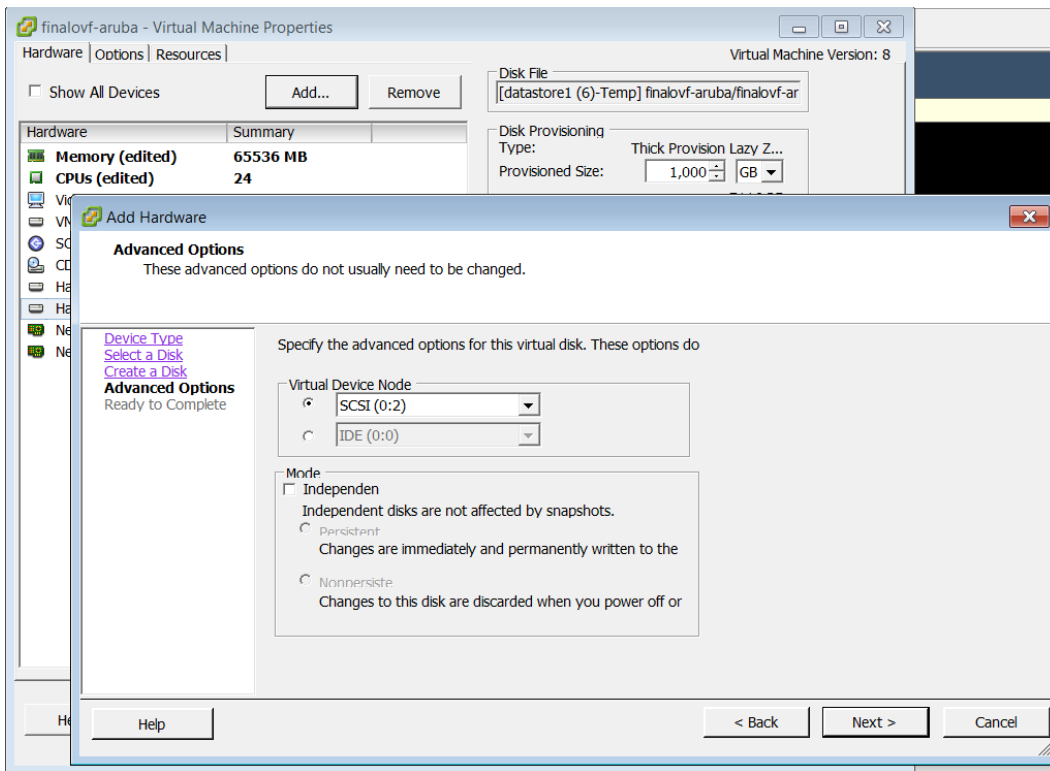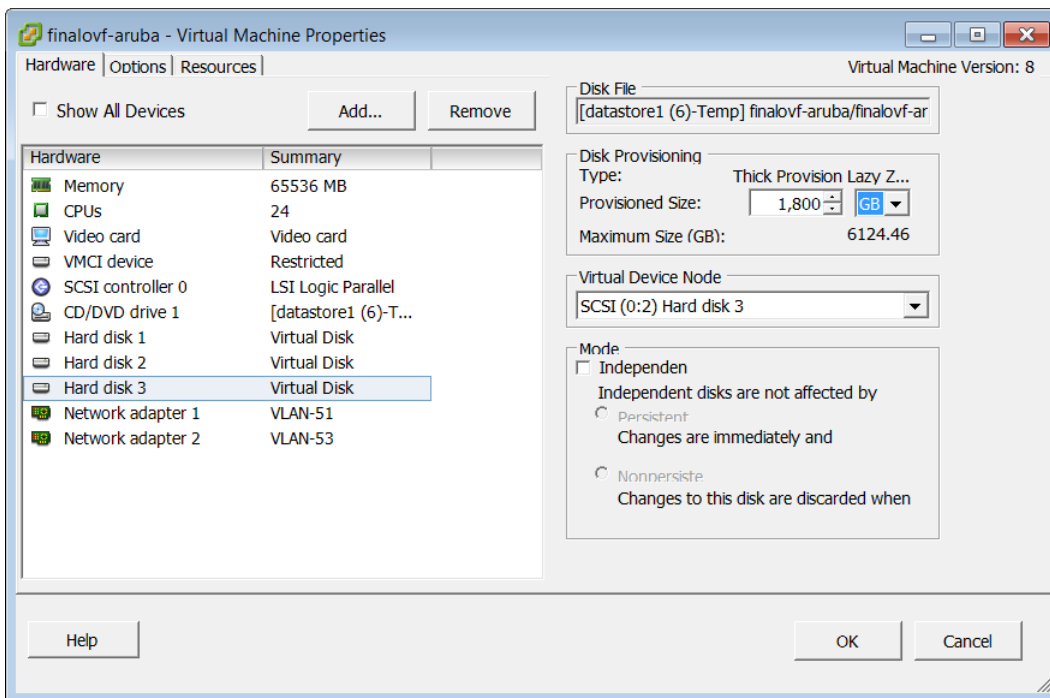

Figure 19 *New Hard Disk in Devices List*

4. Power on the W-ClearPass Policy Manager instance.
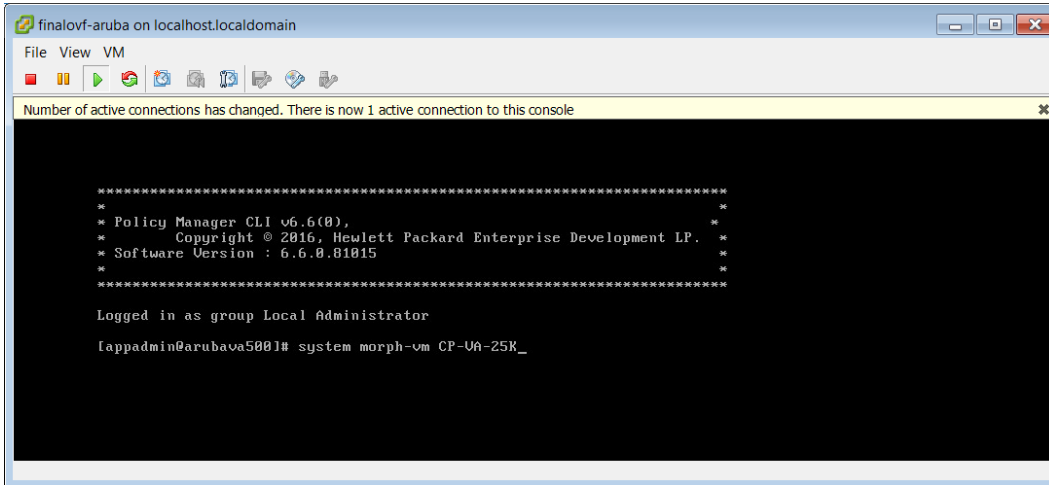
5. In the example we're using, the information shows that you are now in a CP-VA-500 virtual appliance and about to morph to a CP-VA-25K.

Figure 20 *"Press "y" or "Y" to proceed"*
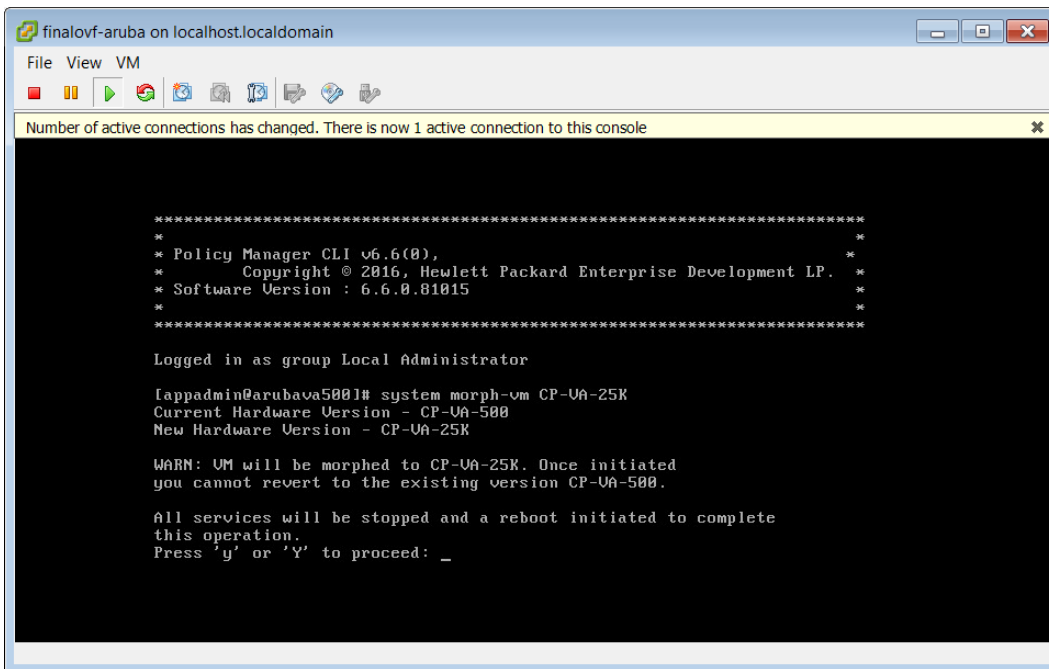
6. Press **y**. The setup and installation begins.

Figure 21
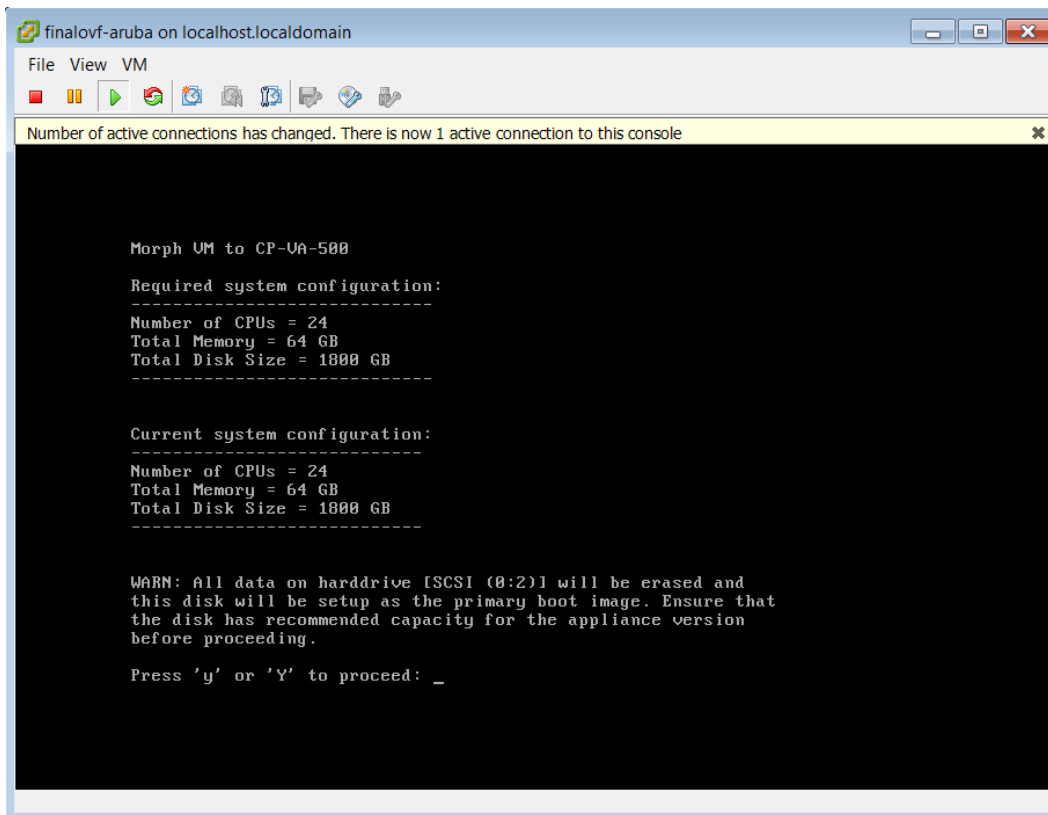
7. The system requirements are displayed for the appliance model you entered, along with your current system configuration. Compare these to make sure your system meets the new system requirements. For more information, see "Recommended ESXi Server Specifications" on page 1.

8. When you have verified that your system meets the new requirements, press **y**. The W-ClearPass 6.6.0 setup and installation begins.

Manually Upgrading an ESXi Installation

This section describes how to perform a manual upgrade of a VMware ESXi virtual machine. This procedure is recommended only if you experience problems when taking snapshots of a virtual machine on an ESXi version 5.x or 6.x.

By default, W-ClearPass 6.6 comes with VMware Tools version 9.4.10.37835 installed in it. If you are going to perform a manual VMware Tools upgrade, you must first verify that a version of W-ClearPass is already installed.

To manually upgrade a VMware installation:

1. Power on the virtual machine and verify that W-ClearPass is installed on it. In the vSphere client, right-click on the VM instance and select **Guest > Install/Upgrade VMware Tools**.

Figure 22 *Select the Virtual Machine Instance*
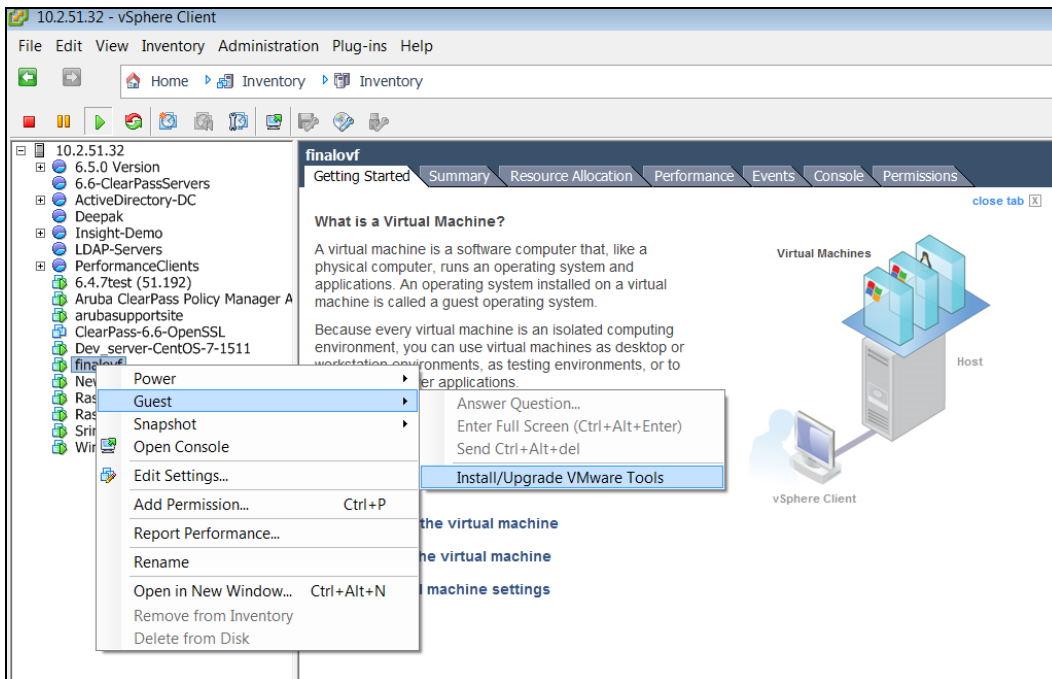
2. Select **Automatic Tools Upgrade**. This option ensures that the VM instance is upgraded to the highest supported stable version for the respective version of ESXi server it is hosted on.

Figure 23 *Automatic Tool Upgrade Option*
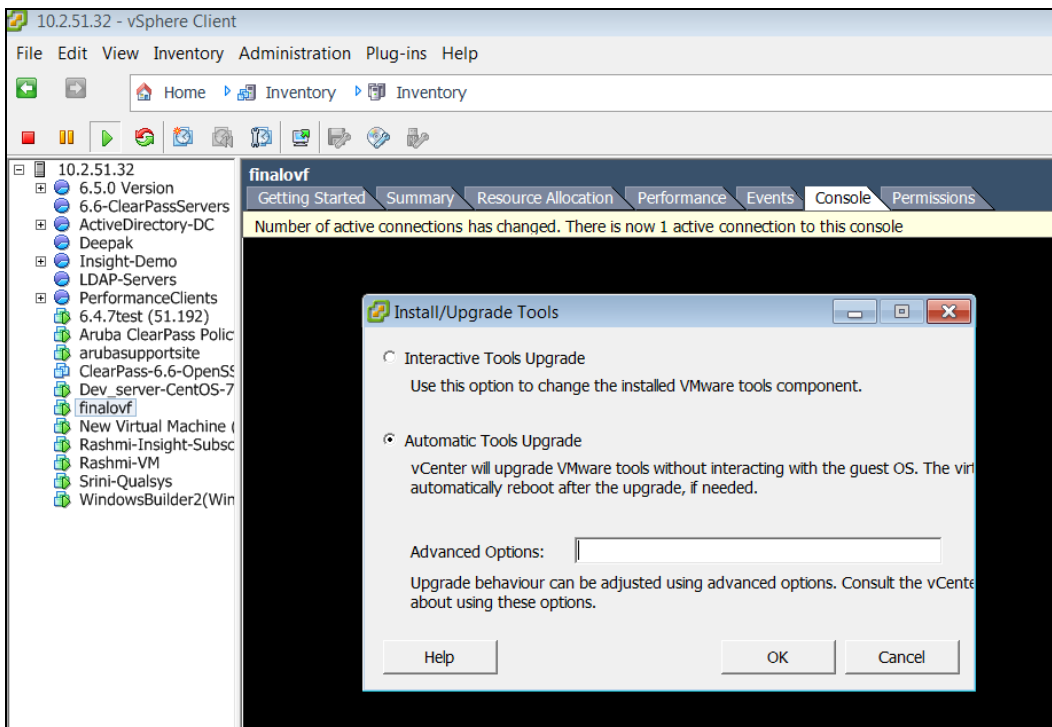
3. Click **OK**.

4. The console displays a message that the VMware Tools upgrade has been initiated and is in progress. The process takes approximately five minutes to complete.

⚠️ **CAUTION**   Do not make any configuration changes to either W-ClearPass or the vSphere client while the upgrade is in progress.

Hyper-V Installations

This section describes how to install W-ClearPass on a Microsoft Hyper-V virtual machine, including:

-
-
-
-
-

Hyper-V Installation Process Overview

The process of installing W-ClearPass on a Microsoft Hyper-V virtual machine is done in four stages:

1. W-ClearPass 6.6 Hyper-V software packages are distributed as Zip files. Download the software image from the **Download Software > ClearPass > Policy Manager > Current Release > Hyper-V** folder on the Support site (http://download.dell-pcw.com) and unzip it to a folder on your server to extract the files.

2. Import the virtual machine and choose the import type.

3. Add the hard disk and configure the format, type, and size, based on the requirement for your VM.

4. Power on and configure the VM.

Instructions for these procedures are provided in "Installing W-ClearPass Policy Manager on a Hyper-V Virtual Machine" on page 18.

> Cloning a virtual machine to facilitate a W-ClearPass deployment is not recommended or supported.

Recommended Hyper-V Server Specifications

Please carefully review all VA requirements, including functional IOP ratings, and verify that your system meets these requirements. These recommendations supersede earlier requirements that were published for W-ClearPass Policy Manager 6.x installations.

Virtual appliance recommendations are adjusted to align with the requirements for W-ClearPass hardware appliances. If you do not have the VA resources to support a full workload, then you should consider ordering the W-ClearPass Policy Manager hardware appliance.

Be sure that your system meets the recommended specifications required for the Policy Manager Virtual Appliance. The W-ClearPass VM ships with a 20 GB hard disk volume. This must be supplemented with additional storage/hard disk through Hyper-V settings by adding a new hard disk. The additional space required depends on the W-ClearPass virtual appliance version.

To ensure scalability, dedicate or reserve the processing and memory to the W-ClearPass VM instance. You must also ensure that the disk subsystem can maintain the IOP's throughput as detailed below. Most virtualized environments use a shared disk subsystem assuming that each application will have bursts of I/O without a sustained high I/O throughput. W-ClearPass Policy Manager requires a continuous sustained high data I/O rate.

> If you do not add a new hard disk to the VM before it is powered on, it will continue to restart with kernel panics.

To morph a Hyper-V version to a larger version by using the morph-vm command, see "Morphing a Hyper-V Version" on page 28.

Supported Hyper-V Versions

The following Microsoft Hyper-V versions are supported:

- Microsoft Hyper-V Server 2012 R2
- Hyper-V on Microsoft Windows Server 2012 R2

CP-SW-EVAL (Evaluation VHDX)

- 2 Virtual CPUs
- 4 GB RAM
- 80 GB disk space

CP-VA-500 (500 Virtual Appliance VHDX)

- 8 Virtual CPUs
  - Underlying CPU is recommended to have a [PassMark](#)® of 3000 or higher
- 8 GB RAM
- Disk space:
  - 500 GB disk space required for existing deployments (upgrading from 6.5.x)
  - 1000 GB disk space recommended for new deployments
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 75

CP-VA-5K (5K Virtual Appliance VHDX)

- 8 Virtual CPUs
  - Underlying is recommended to have a [PassMark](#)® of 9600 or higher
- 8 GB RAM
- Disk space:
  - 1000 GB disk
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 105

CP-VA-25K (25K Virtual Appliance VHDX)

- 24 Virtual CPUs
  - Underlying CPUs are recommended to have a [PassMark](#)® of 9900 or higher
- 64 GB RAM
- Disk space:
  - 1800 GB disk
- 2 Gigabit virtual switched ports
- Functional IOP rating for a 40-60 read/write profile for 4K random read/write = 350

Installing W-ClearPass Policy Manager on a Hyper-V Virtual Machine

After you download and unzip the W-ClearPass 6.6 Hyper-V software package Zip files, follow the instructions in this section to deploy the W-ClearPass files, add a new hard disk, and power on and configure the VM:

Import the Virtual Machine

1. Download and unzip the Hyper-V package from the **Download Software > ClearPass > Policy Manager > Current Release > Hyper-V** folder on the Support site (http://download.dell-pcw.com) .

2. From Hyper-V Manager, right-click to select the **Hyper-V server** and select the **Import Virtual Machine** option. The **Import Virtual Machine** window opens.

3. In the **Locate Folder** step, browse to the folder you unzipped in step 1, and then click **Next**.

Figure 24 *Import Virtual Machine Window, Locate Folder*
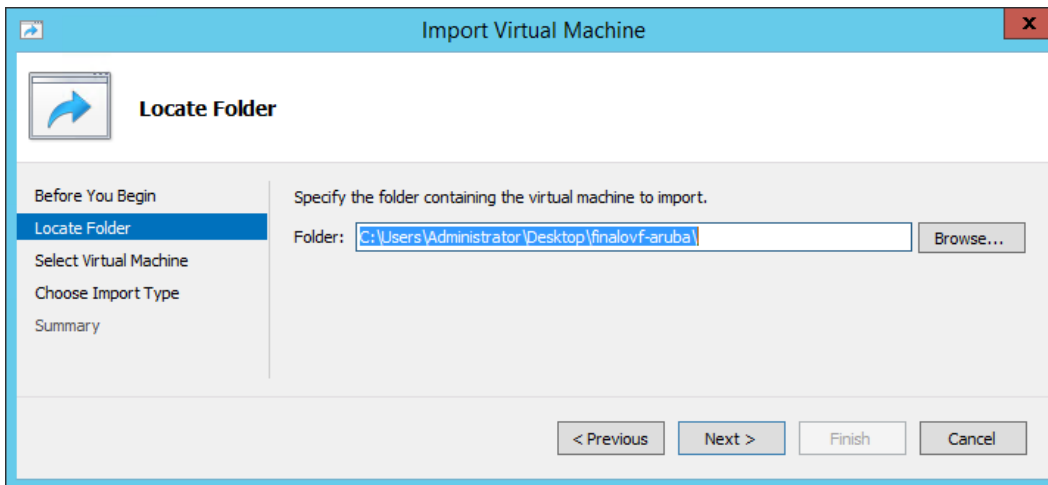
4. In the **Select Virtual Machine** step, click **Next**.
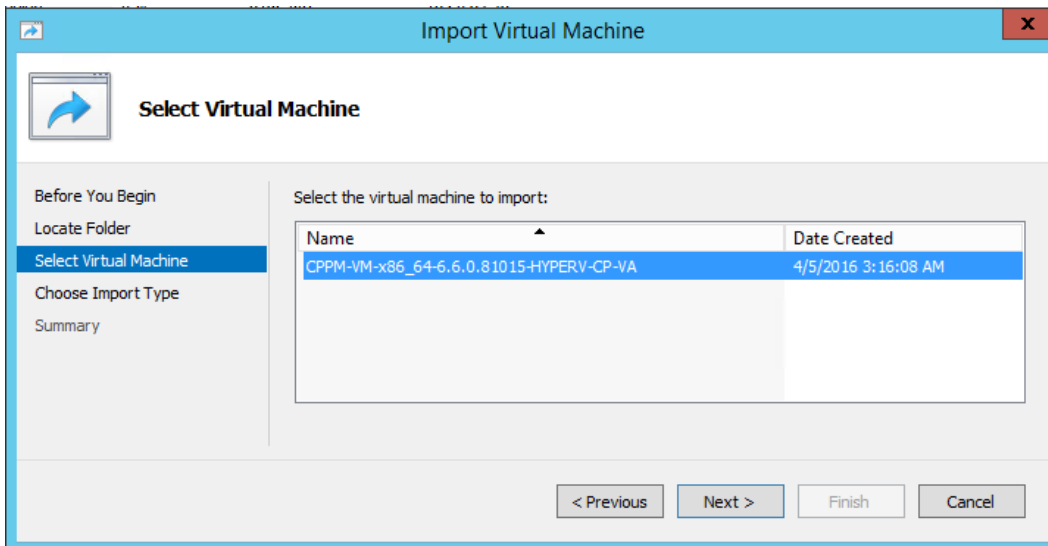
5. In the **Choose Import Type** step, select **Copy the virtual machine**.

Figure 25 *Import Virtual Machine Window, Choose Import Type*
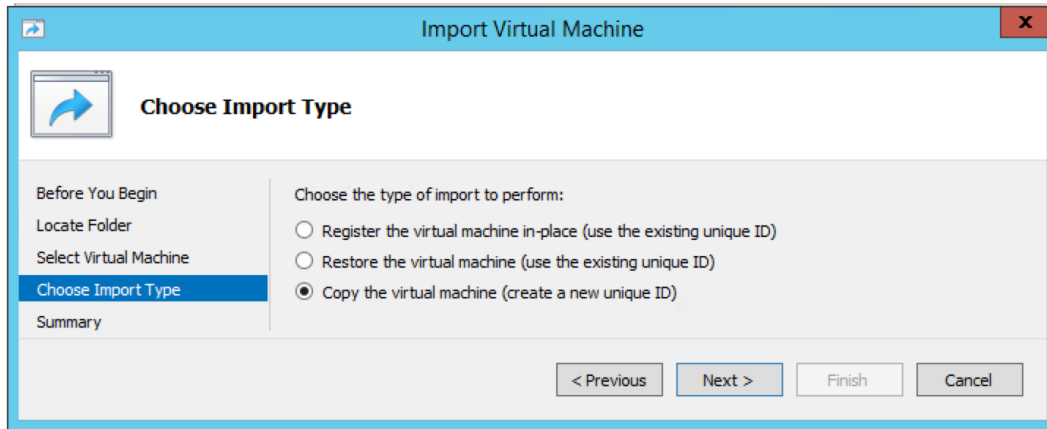
6. After it is imported, select the VM, right click, and choose properties. The **Settings** configuration window opens, where you will add the hard disk.

Add a Hard Disk to the Hyper-V Virtual Machine

1. Select the **SCSI Controller** option.

Figure 26 *Hyper-V Settings, SCSI Controller Option*
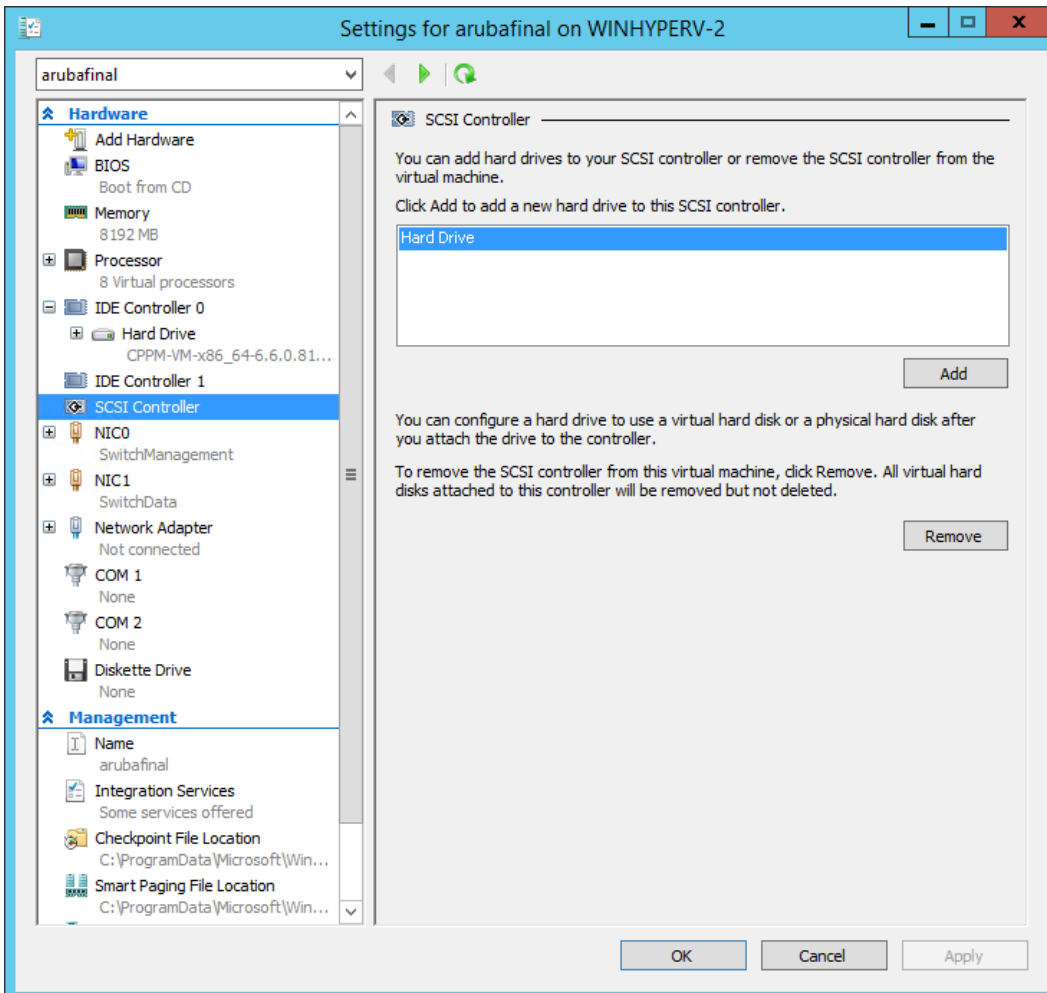
2. Add a hard drive and verify the following values:

- Controller = **SCSI Controller**

- Location = **1**

Figure 27 *Hyper-V Settings, Adding Hard Drive*
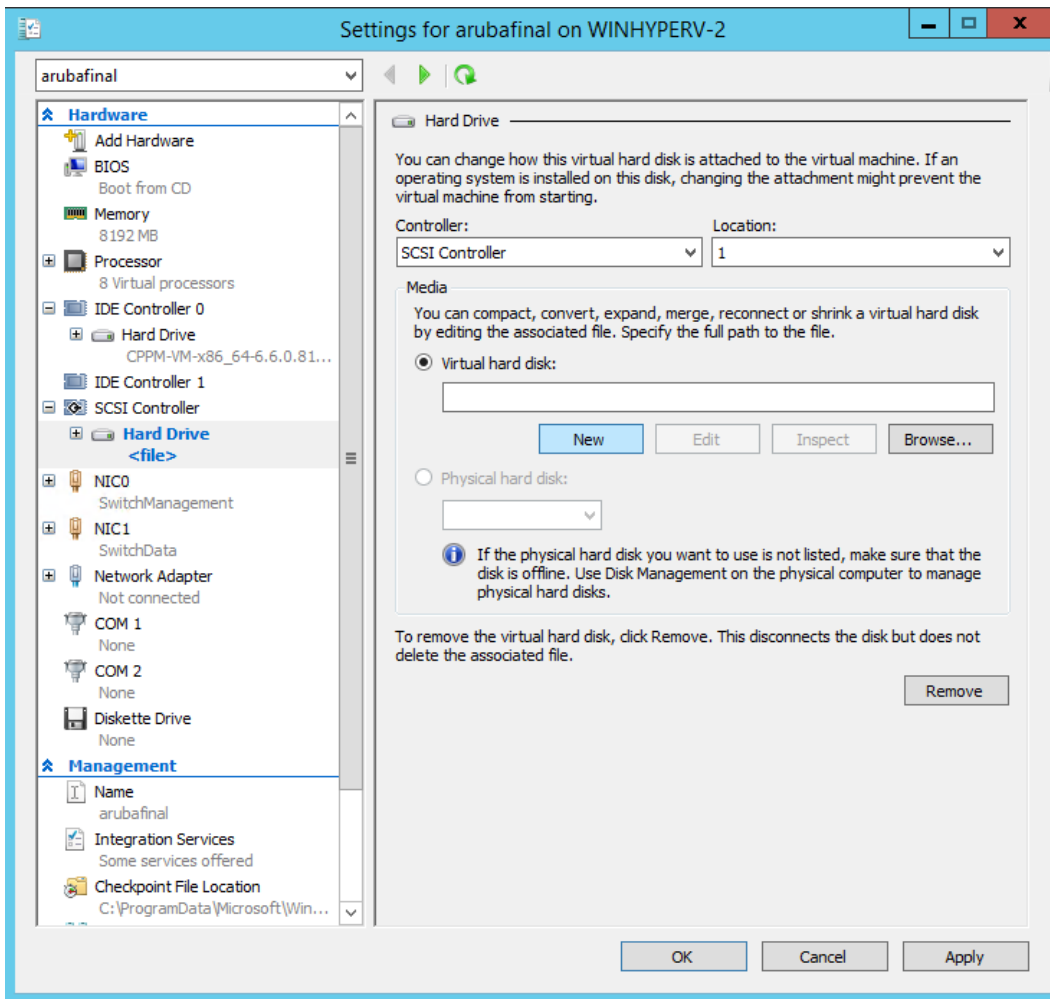
3. Click **New** below the Virtual Hard Disk option. The **New Virtual Hard Disk** wizard opens.

Figure 28 *New Virtual Hard Disk Wizard, Before You Begin*
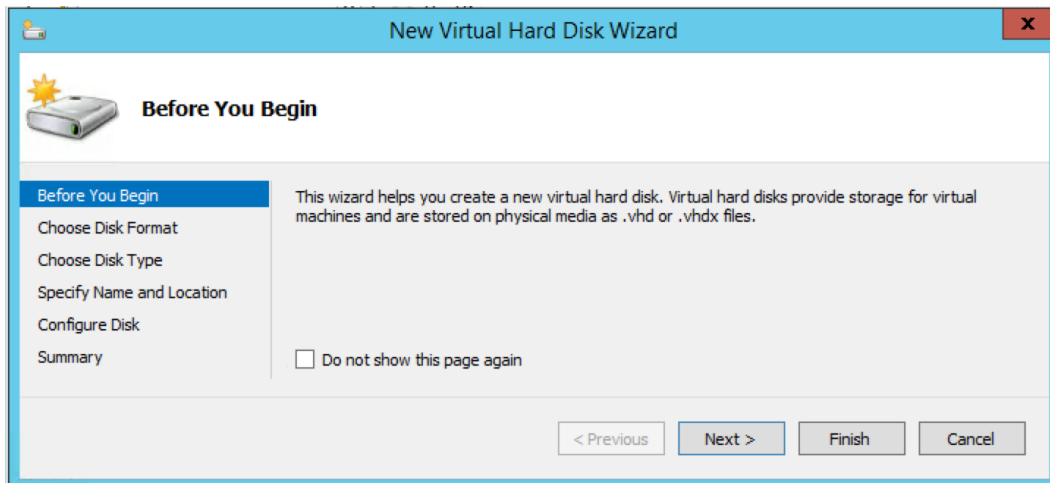
4. Select the following options while creating the disk:

- Disk Format: **VHDX**

Figure 29 *New Virtual Hard Disk Wizard, Choose Disk Format*

- Disk Type: **Fixed**

Figure 30 *New Virtual Hard Disk Wizard, Choose Disk Type*
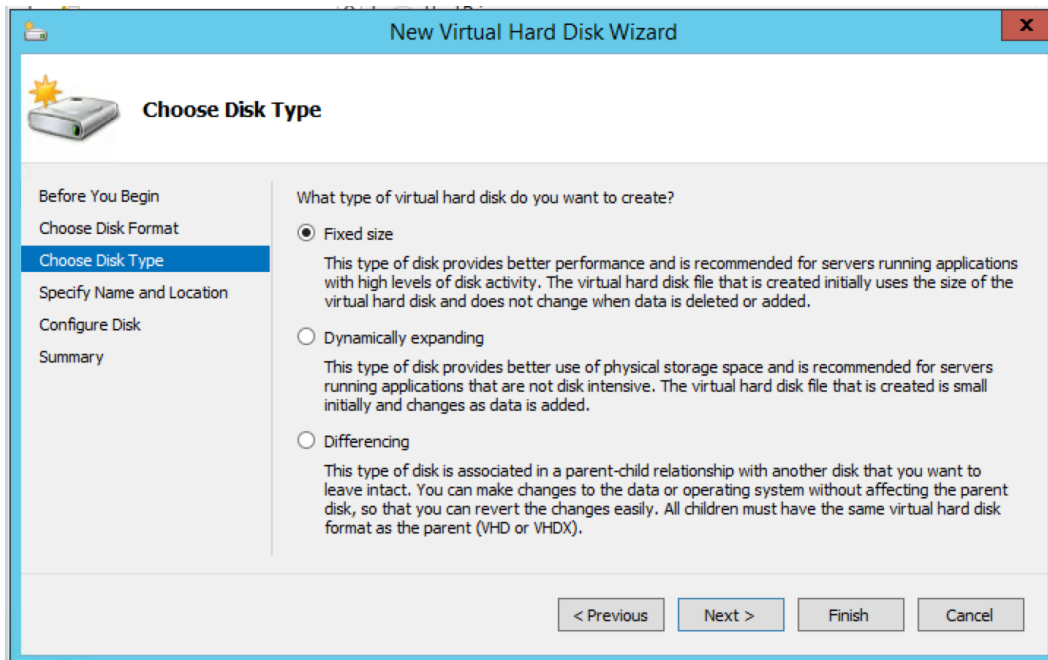
- Disk Size:
  - EVAL = **80 GB**
  - 500 = **1000 GB**
  - 5K = **1000 GB**
  - 25K = **1800 GB**

Using a CP-VA-500 VHDX as an example, the following images show the name and location, disk configuration, and summary steps. For more information about the correct requirements for your virtual appliance version, see "Recommended Hyper-V Server Specifications" on page 17.

Figure 31 *New Virtual Hard Disk Wizard, Specify Name and Location*
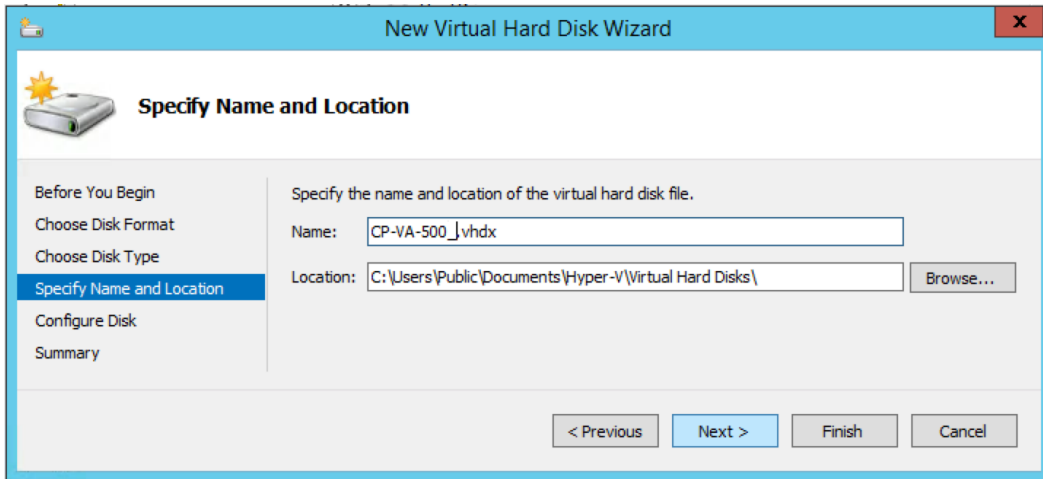
Figure 32 *New Virtual Hard Disk Wizard, Configure Disk*
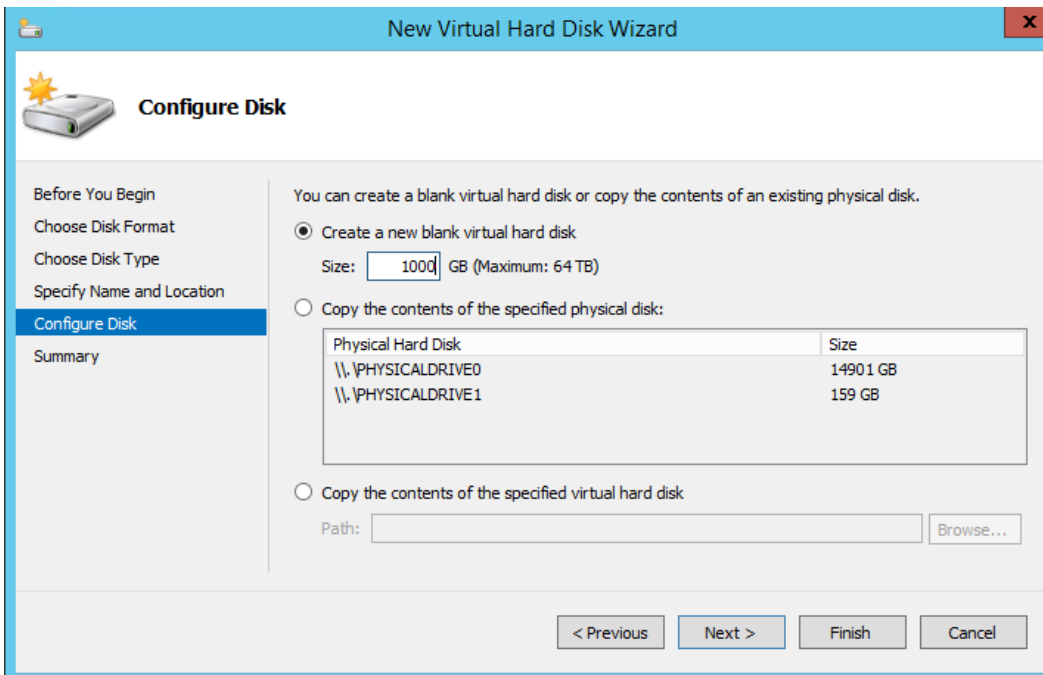
Figure 33 *New Virtual Hard Disk Wizard, Summary*
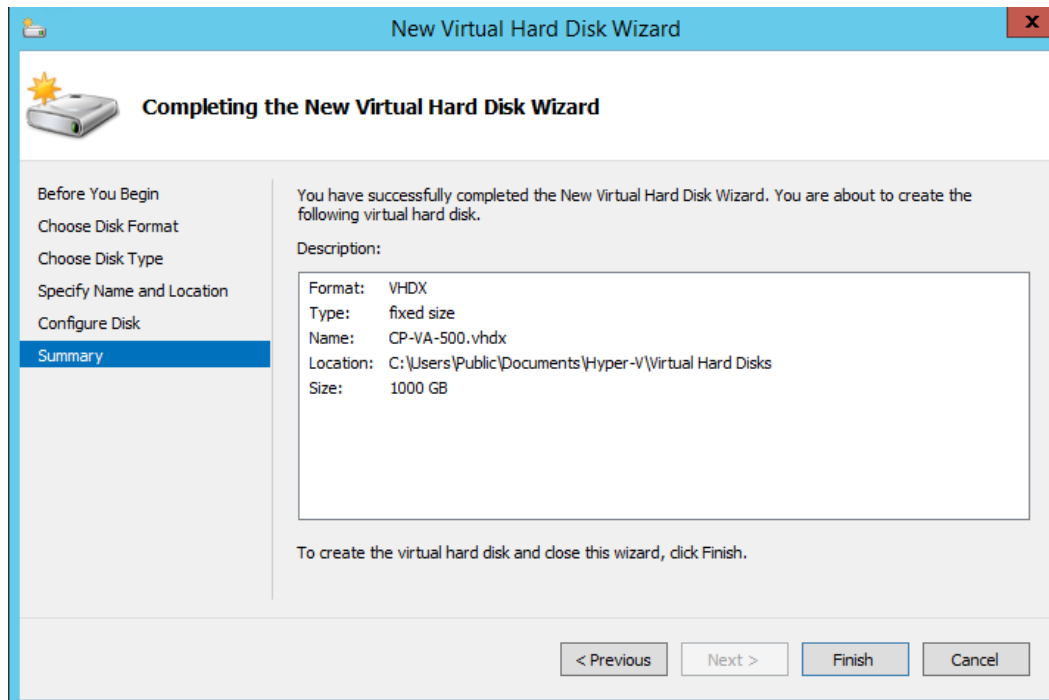
5. Click **Apply** in the main window, and then click **OK**.

Power On and Configure the VM

1. Power on the virtual machine. You should see the following:
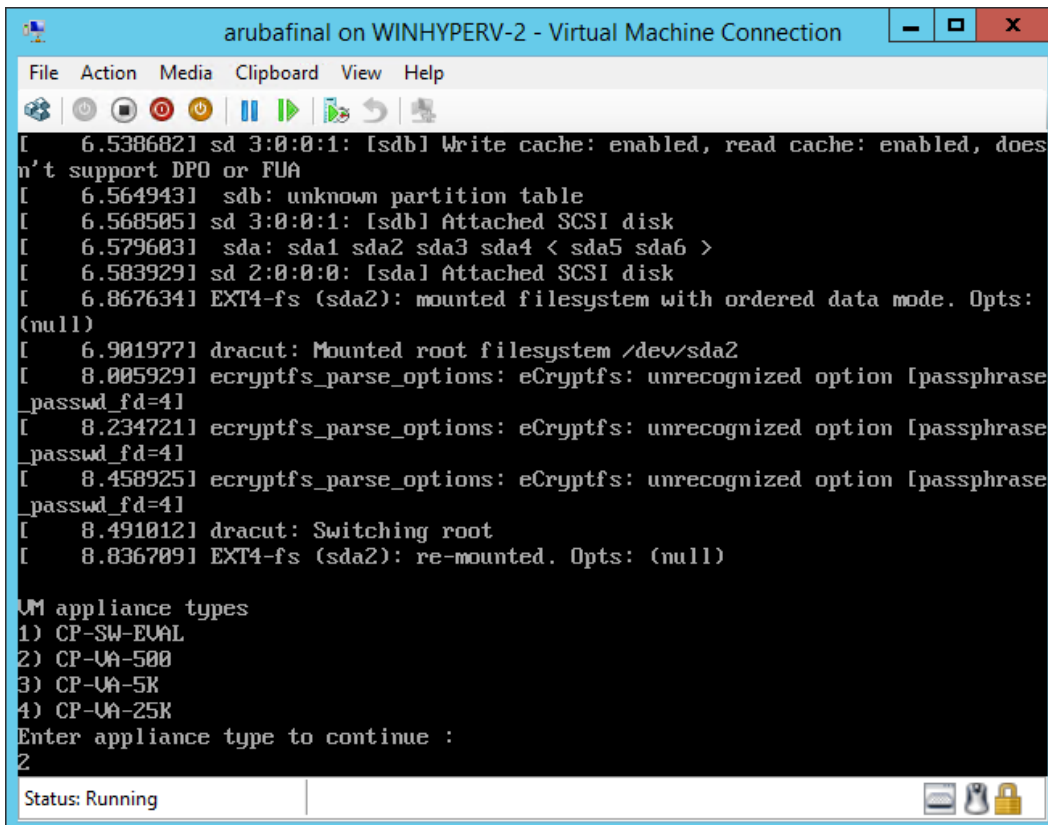
Figure 34 *"Enter appliance type to continue"*
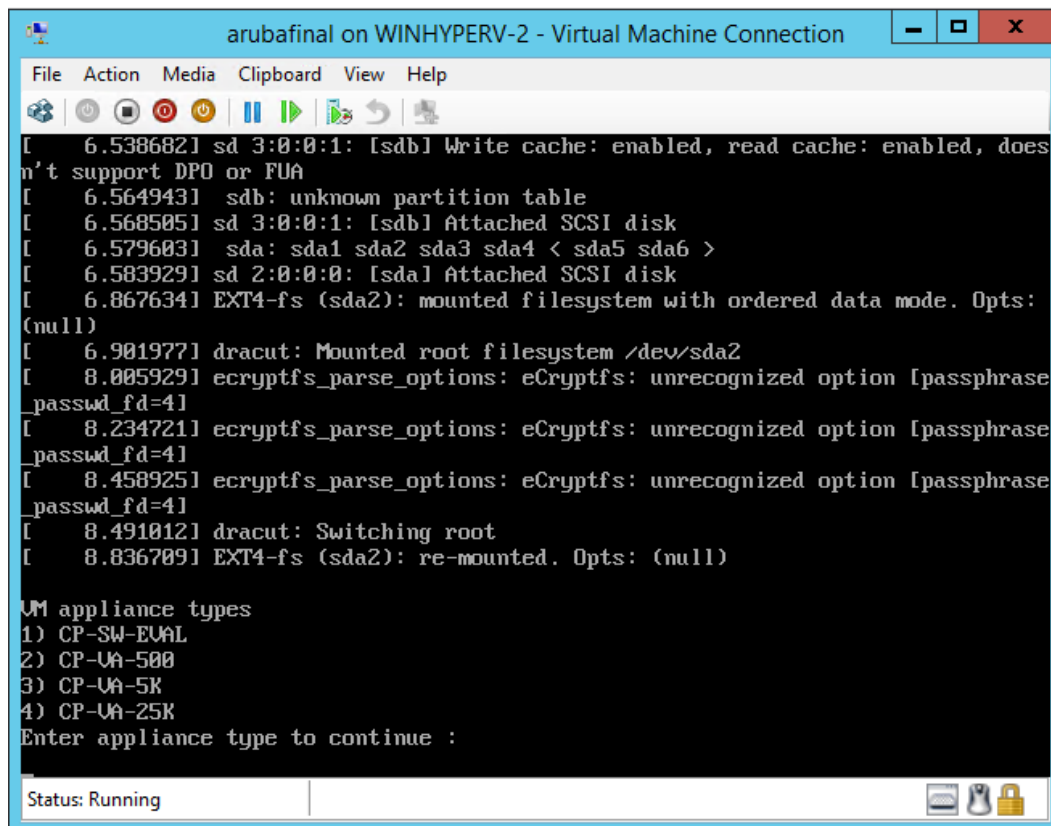
2. Enter the number for the appropriate appliance type (do not enter the appliance model itself). Options include:

- **1) CP-SW-EVAL**
- **2) CP-VA-500**
- **3) CP-VA-5K**
- **4) CP-VA-25K**

So, for example, to install a CP-VA-500, you would enter the number **2**.

Figure 35 *Number Entered to Indicate Appliance Option*

3. The system requirements are displayed for the appliance model you entered, along with your current system configuration. Compare these to make sure your system meets the new system requirements. For more information, see "Recommended Hyper-V Server Specifications" on page 17.

Figure 36 *"Enter 'y' or 'Y' to proceed"*


```
                arubafinal on WINHYPERV-2 - Virtual Machine Connection   [_][□][x]

File  Action  Media  Clipboard  View  Help

Required system configuration:
---------------------------
Number of CPUs = 8
Total Memory = 8 GB
Total Disk Size = 1000 GB
---------------------------

Setting HARDWARE-VERSION to CP-VA-500

[   90.423998] EXT4-fs (sda6): mounted filesystem with ordered data mode. Opts:
(null)

Current system configuration:
---------------------------
Number of CPUs = 8
Total Memory = 8 GB
Total Disk Size = 1000 GB
---------------------------

WARNING: All data on the second disk [SCSI (0:1)] will be erased and that
disk will be setup as the primary boot image. Please ensure that disk has
the recommended capacity for the appliance version.

Enter 'y' or 'Y' to proceed:

Status: Running                                                    ▭ 🔧 🔒
```

4. When you have verified that your system meets the new requirements, press **y**. The W-ClearPass 6.6.0 setup and installation begins. You should see the following information, and W-ClearPass will reboot at least once.

Figure 37 *Initializing Disk*


```
                  arubafinal on WINHYPERV-2 - Virtual Machine Connection       ─  □   x

 File  Action  Media  Clipboard  View  Help

Number of CPUs = 8
Total Memory = 8 GB
Total Disk Size = 1000 GB
--------------------------

WARNING: All data on the second disk [SCSI (0:1)] will be erased and that
disk will be setup as the primary boot image. Please ensure that disk has
the recommended capacity for the appliance version.

Enter 'y' or 'Y' to proceed:
y
[  284.479497] EXT4-fs (sda1): mounted filesystem with ordered data mode. Opts:
(null)


***
*** Initializing disk...
***


Setting up partitions on /dev/sdb...

[  284.691427]  sdb:
[  284.698446]  sdb: sdb1
[  284.717785]  sdb: sdb1 sdb2

Status: Running
```

5. After that reboot the W-ClearPass VM is configured, and will power on and boot up within a couple of minutes. The whole process from Deploying the VHDX image to the final startup screen should take between 30 and 40 minutes.

6. After the W-ClearPass VM launches correctly, you should see the following banner:

Figure 38 *Banner*
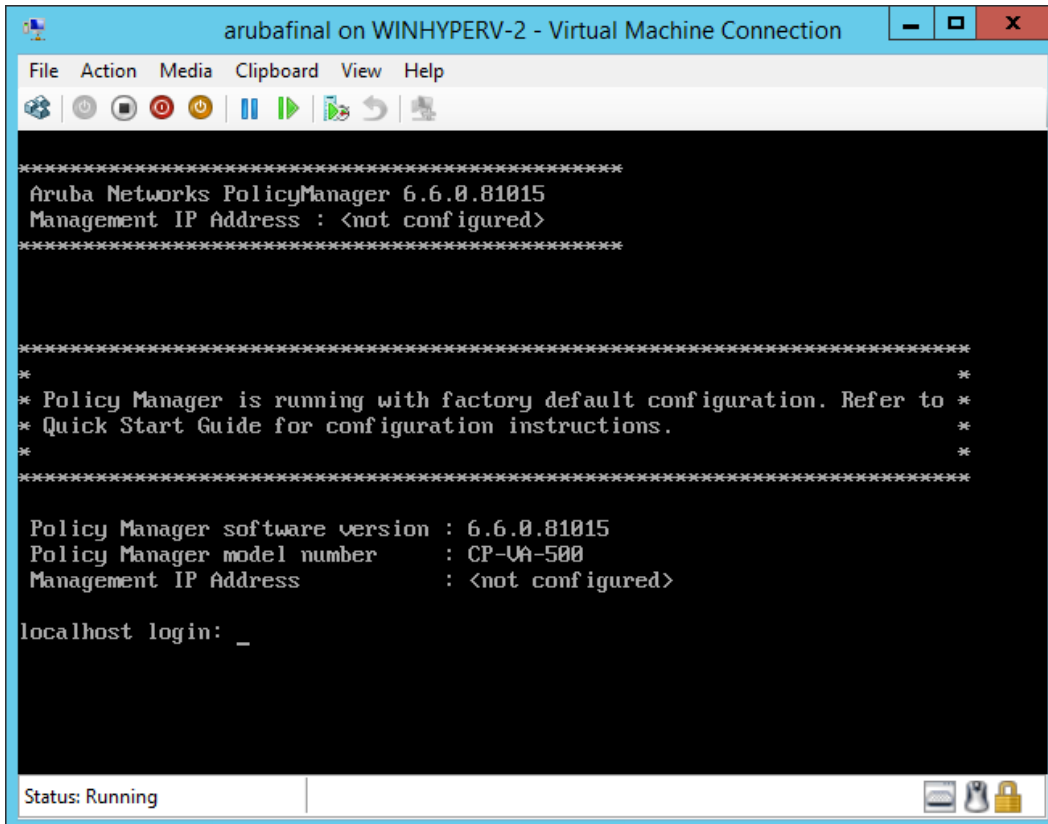
7. When you see the banner, you can log in by following the instructions in the *W-ClearPass Policy Manager 6.6.0 Getting Started Guide*.

Morphing a Hyper-V Version

A Hyper-V virtual machine can be morphed to a higher-value virtual appliance by using the morph-vm command as follows:

1. Power off the VM.

2. Open **Settings** and make the following modifications:

   a. Modify the **RAM** and **CPU** to match the recommended system requirements for the larger VM (see "Recommended Hyper-V Server Specifications" on page 17).

Figure 39 *Hardware, RAM Settings*
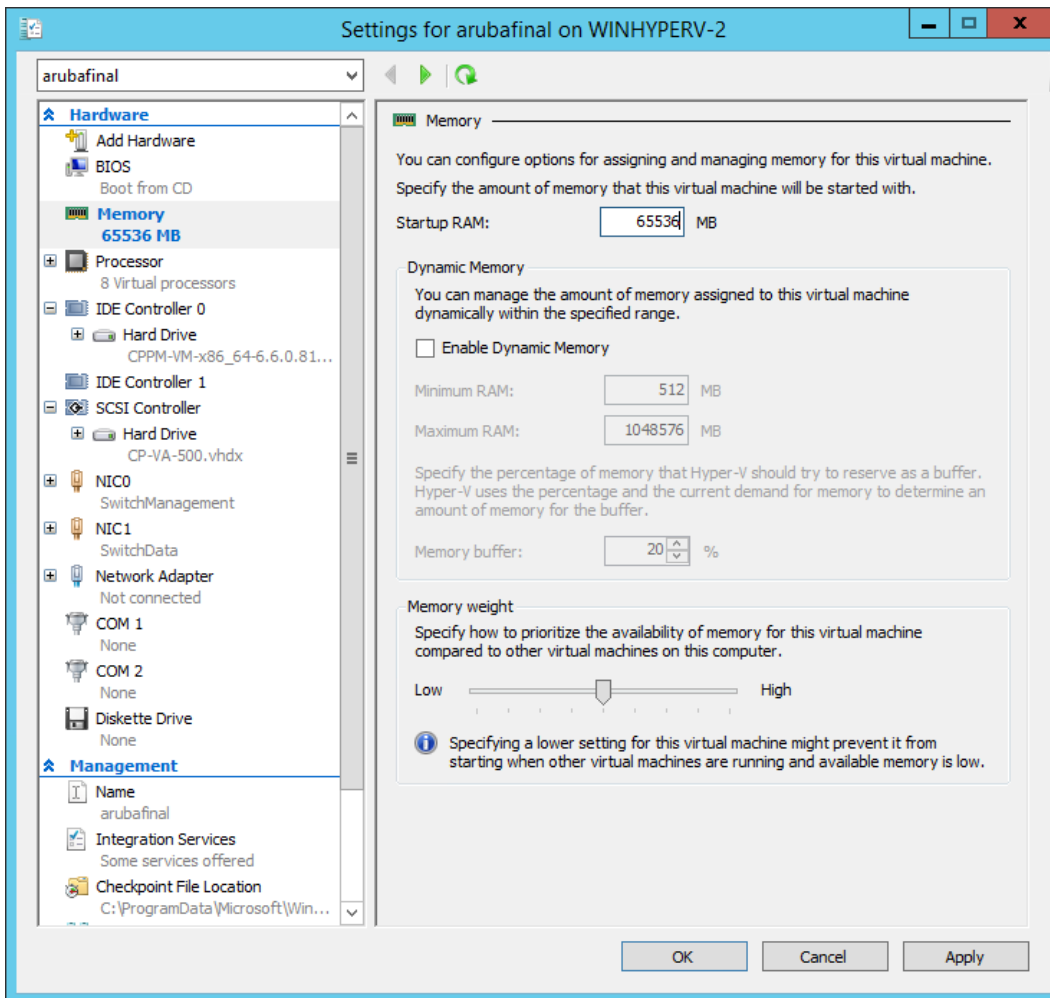
Figure 40 *Hardware, CPU Settings*
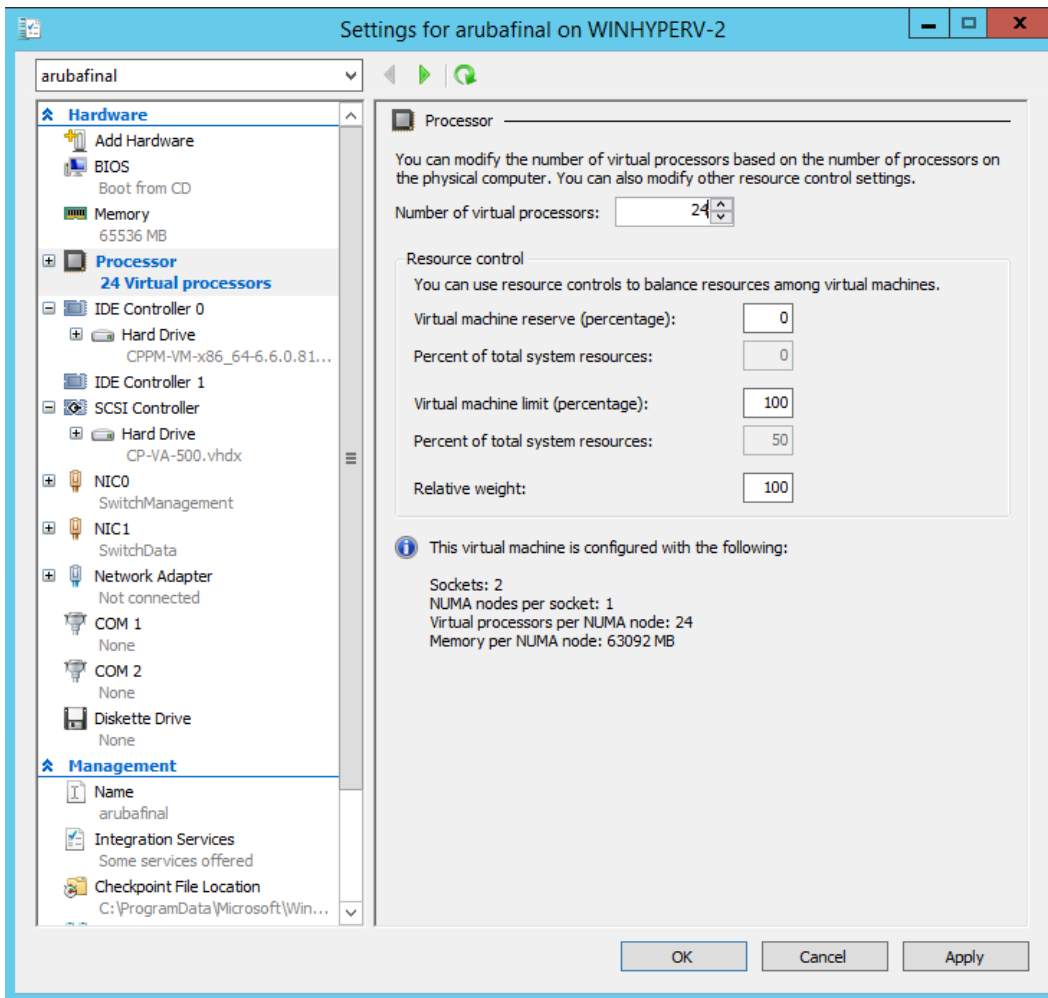
b. Add an additional disk with the recommended disk size for the larger VM:

    (1) Select **SCSI(0:2) Controller**.

    (2) Select the **Hard Drive** option and then click **Add**.

    (3) In the next screen, specify the following values:
        Controller = **SCSI(0:2) Controller 1**
        Location = 2

    (4) In the **Media** section, click **New**.

Figure 41 *Hardware, Controller Settings*
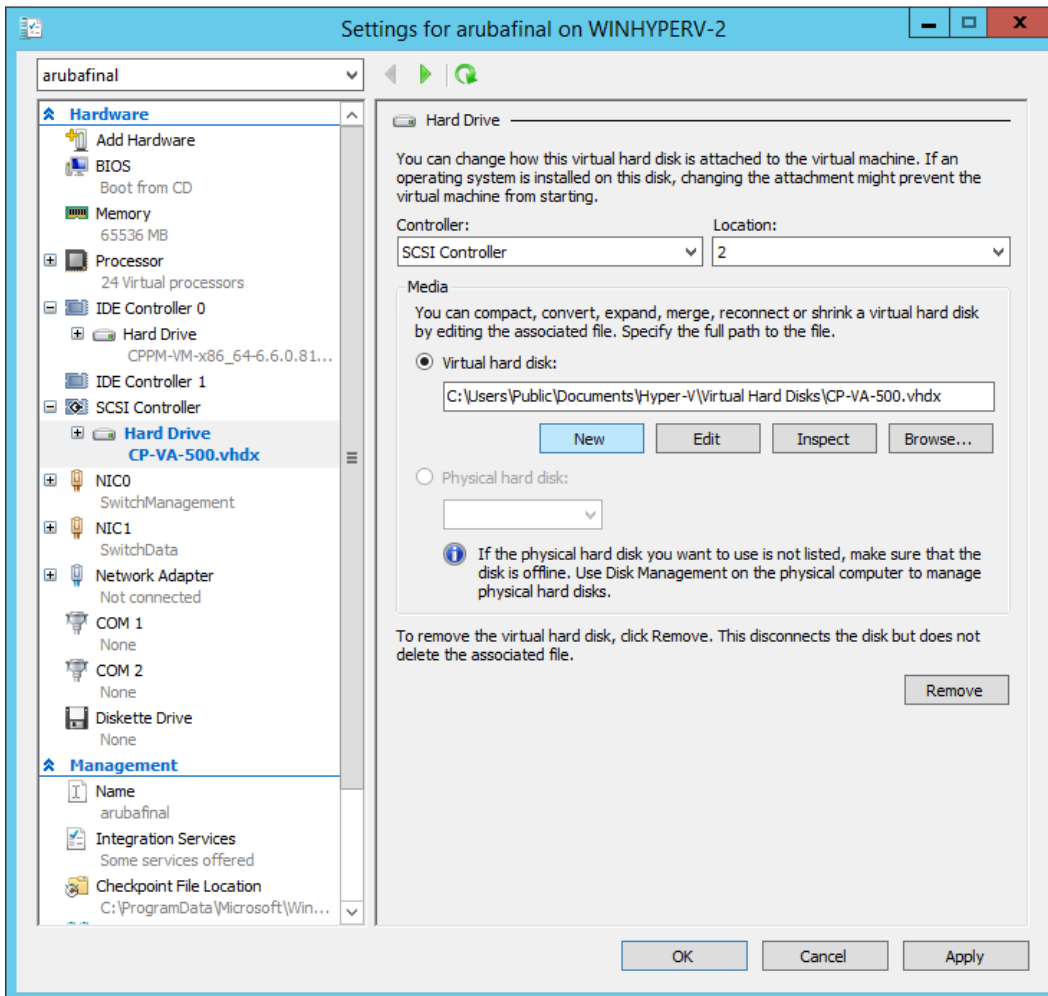
(5) Add a new **VHDX** hard disk of **Fixed size**, and size equivalent to the requirements for the larger VM disk size.

Figure 42 *Choose Disk Type and Size*
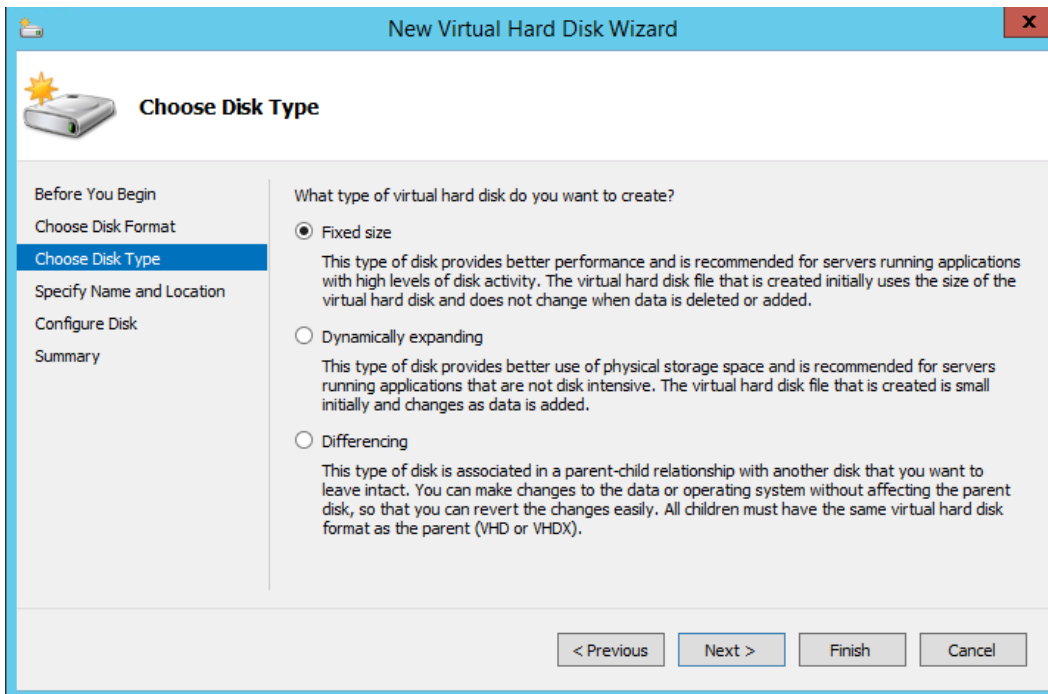
(6) Specify the name and location.

Figure 43 *Specify Name and Location*
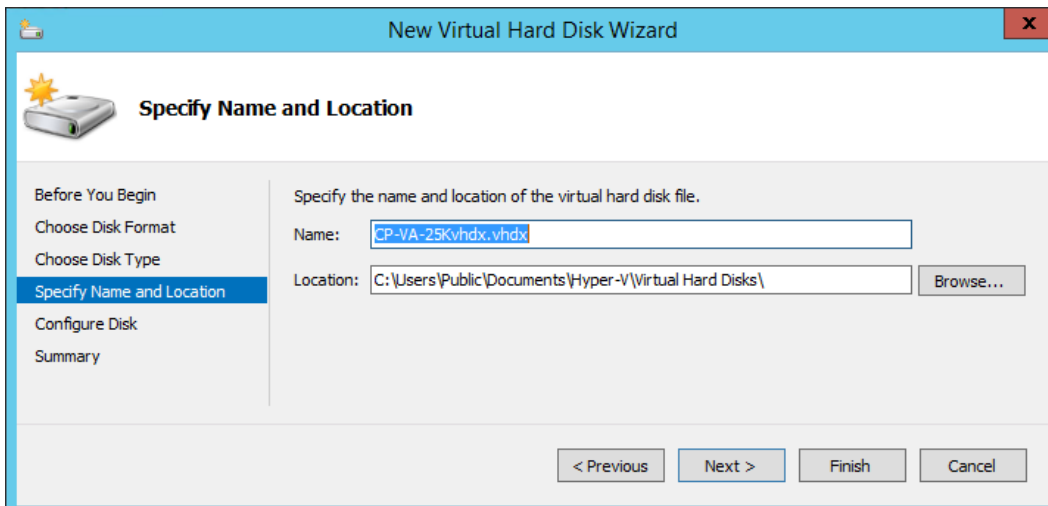
(7) Configure the disk size and click **Finish**.

Figure 44 *Configure Disk Size*
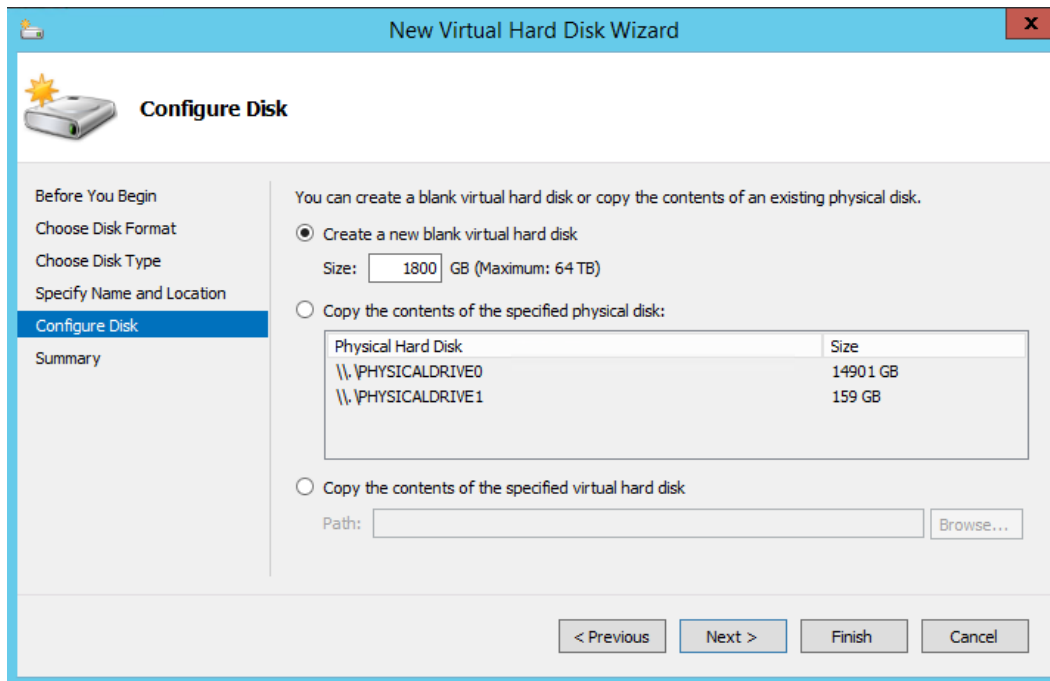
3. After adding the hard disk, power on the original VM and, using SSH, log in to it as `appadmin`.
4. Run the command '`system morph-vm <CP-VA-25K>` and follow the prompts.

Figure 45 *System Morph-VM Command*
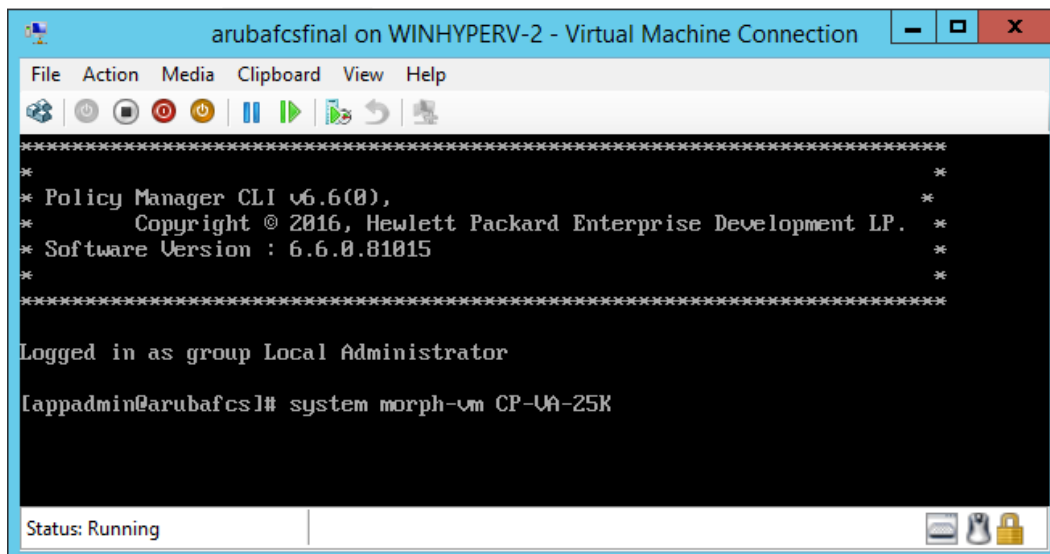
5. The existing hardware version and the new hardware version are displayed, along with a warning that you cannot revert to the existing version after the morphing process is started. When you are ready to proceed, press **y**.

Figure 46 *Version Comparison and Warning*


```
***********************************************************************
*                                                                     *
* Policy Manager CLI v6.6(0),                                         *
*          Copyright © 2016, Hewlett Packard Enterprise Development LP. *
* Software Version : 6.6.0.81015                                      *
*                                                                     *
***********************************************************************

Logged in as group Local Administrator

[appadmin@arubafcs]# system morph-vm CP-VA-25K
Current Hardware Version - CP-VA-500
New Hardware Version - CP-VA-25K

WARN: VM will be morphed to CP-VA-25K. Once initiated
you cannot revert to the existing version CP-VA-500.

All services will be stopped and a reboot initiated to complete
this operation.
Press 'y' or 'Y' to proceed: _
```

Status: Running

6. The system requirements are displayed for the appliance model you entered, along with your current system configuration. Compare these to make sure your system meets the new system requirements. For more information, see "Recommended Hyper-V Server Specifications" on page 17.

Figure 47


```
Morph VM to CP-VA-500

Required system configuration:
---------------------------
Number of CPUs = 24
Total Memory = 64 GB
Total Disk Size = 1800 GB
---------------------------


Current system configuration:
---------------------------
Number of CPUs = 24
Total Memory = 64 GB
Total Disk Size = 1800 GB
---------------------------


WARN: All data on harddrive [SCSI (0:2)] will be erased and
this disk will be setup as the primary boot image. Ensure that
the disk has recommended capacity for the appliance version
before proceeding.

Press 'y' or 'Y' to proceed: _
```
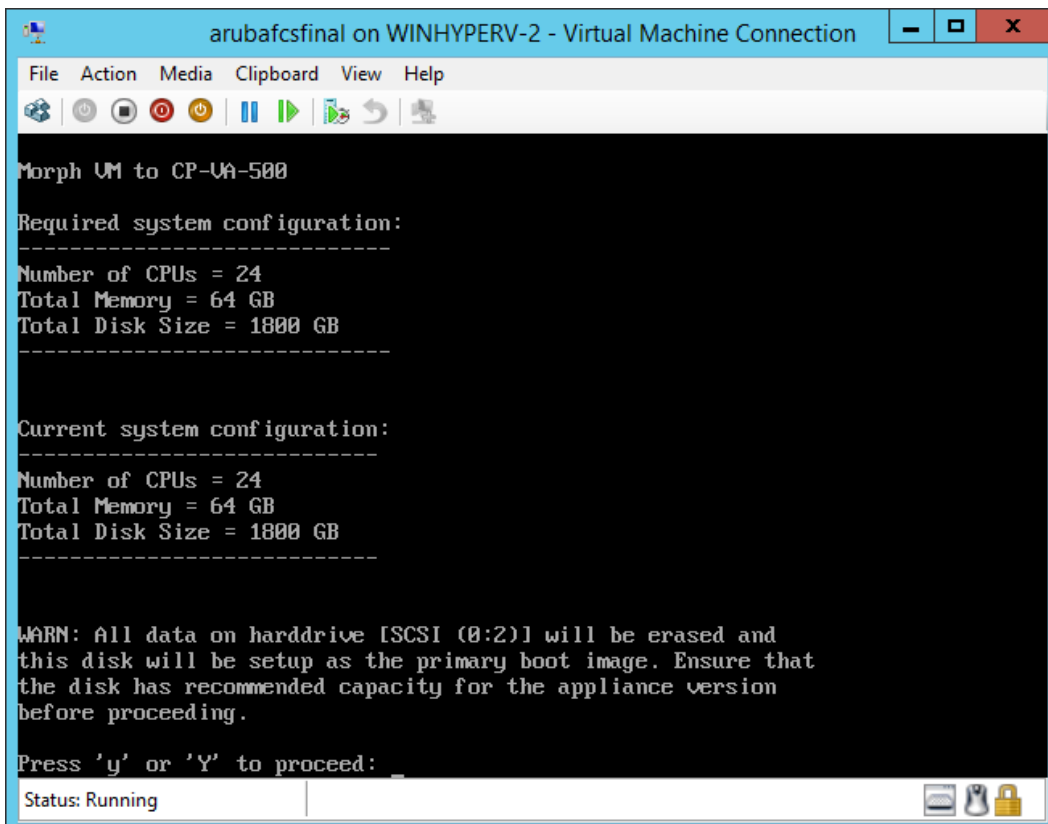
Status: Running

When you have verified that your system meets the new requirements, press **y**. The W-ClearPass 6.6.0 setup and installation begins.

Caveats, Hyper-V

This section describes caveats to be aware of with Hyper-V.

Low Network Performance on Hyper-V Due to NIC Cards

In lab conditions, we noticed that the network latency increases and throughput decreases due to certain features in the NIC not working as expected. This affects network throughput to any OS installed on a Hyper-V server.

In W-ClearPass, we have noticed the following symptoms when the server is handling authentications:

- Drastic increase in network latency to external servers

- Increase in RADIUS timeout packets

- Increase in RADIUS end-to-end processing of authentication requests

If you notice these symptoms with your W-ClearPass server running on Hyper-V, please consult with the NIC vendor about compatibility issues with the Microsoft Hyper-V platform, or update to the latest driver version which might resolve network throughput problems.

Figure 48 *System Monitor, RADIUS Timeout Packets Count*

Figure 49 *System Monitor, Time for Full RADIUS Request Processing and Total RADIUS Request Count*