



Install ISE on a VMware Virtual Machine

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Supported VMware Versions

Cisco ISE supports the following VMware servers and clients:

- VMware version 8 (default) for ESXi 5.x
- VMware version 11 (default) for ESXi 6.x

Support for VMware vMotion

Cisco ISE supports the VMware vMotion feature that allows you to migrate live virtual machine (VM) instances (running any persona) between hosts. For the VMware vMotion feature to be functional, the following conditions must be met:

- Shared storage—The storage for the VM must reside on a storage area network (SAN), and the SAN must be accessible by all the VMware hosts that can host the VM being moved.
- VMFS volume sharing—The VMware host must use shared virtual machine file system (VMFS) volumes.
- Gigabit Ethernet interconnectivity—The SAN and the VMware hosts must be interconnected with Gigabit Ethernet links.

- Processor compatibility—A compatible set of processors must be used. Processors must be from the same vendor and processor family for vMotion compatibility.

Support for Open Virtualization Format

Cisco ISE supports the Open Virtualization Format (OVF) and offers OVA templates that you can use to install and deploy Cisco ISE on virtual machines (VMs). The following OVA templates are available:

- ISE-2.0.xxx.xxx-eval.ova—Use this template if you are evaluating Cisco ISE and the evaluation license would support up to 100 endpoints.
- ISE-2.0.xxx.xxx-virtual-SNS3415.ova—Use this template if your VMware appliance specification is comparable with an SNS-3415 appliance.
- ISE-2.0.xxx.xxx-virtual-SNS3495.ova—Use this template if your VMware appliance specification is comparable with an SNS-3495 appliance.

The following table provides OVA template reservations.

OVA Template	Memory	CPU
Virtual Eval OVA	4 GB RAM (no reservation) Note For evaluating guest access and basic access policy flows, a minimum of 4 GB RAM is required. For evaluating advanced features such as pxGrid, internal CA, and SXP, we suggest that you configure your VM to have 16 GB RAM after deploying the Eval OVA.	2300 MHz (no reservation)
Virtual SNS-3415 OVA	16 GB RAM	8000 MHz
Virtual SNS-3495 OVA	32 GB RAM	16000 MHz

Virtual Machine Requirements

To achieve performance and scalability comparable to the Cisco ISE hardware appliance, the VMware virtual machine should be allocated system resources equivalent to the Cisco SNS 3415 and 3495 appliances.

Table 1: VMware System Requirements

Requirement Type	Specifications
CPU	<ul style="list-style-type: none"> • Evaluation: <ul style="list-style-type: none"> ◦ Clock Speed: 2.0 GHz or faster ◦ Number of Cores: 2 CPU cores • Production: <ul style="list-style-type: none"> ◦ Clock Speed: 2.0 GHz or faster ◦ Number of Cores: 4 (Small) to 8 (Large) CPU cores <p>Cisco ISE supports Hyperthreading. You can install ISE on VMware hosts that have the Hyperthreading option enabled or disabled.</p> <p>Note Even though Hyperthreading might improve overall VM performance, it does not change the supported scaling limits per VM appliance. Additionally, you must still allocate CPU resources based on the required number of physical cores, not the number of logical processors.</p> <p>Note Refer to OVA Template Reservations table for CPU Reservations.</p>
Memory	<ul style="list-style-type: none"> • Evaluation: <ul style="list-style-type: none"> ◦ Basic—4 GB (for evaluating guest access and basic access policy flows) ◦ Advanced—16 GB (for evaluating advanced features such as pxGrid, internal CA, and SXP) • Production: <ul style="list-style-type: none"> ◦ Small—16 GB ◦ Large—32 GB <p>Note Refer to OVA Template Reservations table for Memory Reservations.</p>

Requirement Type	Specifications
Hard Disks	<ul style="list-style-type: none"> • Evaluation: <ul style="list-style-type: none"> ◦ Minimum (only for lab testing; supports about 20 endpoints) —100 GB ◦ Recommended—200 GB • Production: <ul style="list-style-type: none"> ◦ 200 GB to 2 TB of disk storage (size depends on deployment and tasks). ◦ We recommend that your VM host server uses hard disks with a minimum speed of 10,000 RPM. <p>Note When you create the Virtual Machine for Cisco ISE, use a single virtual disk that meets the storage requirement. If you use more than one virtual disk to meet the disk space requirement, the installer may not recognize all the disk space.</p>
Storage and File System	<p>The storage system for the Cisco ISE virtual appliance requires a minimum write performance of 50 MB per second and a read performance of 300 MB per second. Deploy a storage system that meets these performance criteria and is supported by VMware server.</p> <p>Cisco ISE provides a number of methods to verify if your storage system meets these minimum requirements before, during, and after Cisco ISE installation. See Virtual Machine Resource and Performance Checks, on page 7 for more information.</p> <p>We recommend the VMFS file system because it is most extensively tested, but other file systems, transports, and media can also be deployed provided they meet the above requirements.</p>
Disk Controller	<p>Paravirtual (default for RHEL 6 64-bit) or LSI Logic Parallel</p> <p>For best performance and redundancy, a caching RAID controller is recommended. Controller options such as RAID 10 (also known as 1+0) can offer higher overall write performance and redundancy than RAID 5, for example. Additionally, battery-backed controller cache can significantly improve write operations.</p>

Requirement Type	Specifications
NIC	<p>1 GB NIC interface required (two or more NICs are recommended). Cisco ISE supports E1000 and VMXNET3 adapters.</p> <p>Note We recommend that you select E1000 to ensure correct adapter order by default. If you choose VMXNET3, you might have to remap the ESXi adapter to synchronize it with the ISE adapter order.</p>
VMware Virtual Hardware Version/Hypervisor	VMware Virtual Machine Hardware Version 8 or higher on ESXi 5.x and 6.x

Virtual Machine Appliance Size Recommendations

Disk Space Requirements

The following table lists the Cisco ISE disk-space allocation recommended for running a virtual machine in a production deployment.


Note

Disk size of 2 TB or greater is currently not supported. Ensure that the maximum disk size is less than 2 TB.

Table 2: Recommended Disk Space for Virtual Machines

ISE Persona	Minimum Disk Space for Evaluation	Minimum Disk Space for Production	Recommended Disk Space for Production Note Additional disk space is required to store local debug logs, staging files, and to handle log data during upgrade, when the Primary Administration Node temporarily becomes a Monitoring node.	Maximum Disk Space
Standalone ISE	200 GB	600 GB	600 GB to 2 TB	2 TB

ISE Persona	Minimum Disk Space for Evaluation	Minimum Disk Space for Production	Recommended Disk Space for Production Note Additional disk space is required to store local debug logs, staging files, and to handle log data during upgrade, when the Primary Administration Node temporarily becomes a Monitoring node.	Maximum Disk Space
Distributed ISE—Administration only	200 GB	250 GB	250 to 300 GB	2 TB
Distributed ISE—Monitoring only	200 GB	600 GB	600 GB to 2 TB	2 TB
Distributed ISE—Policy Service only	200 GB	200 GB	200 GB	2 TB
Distributed ISE—pxGrid only	200 GB	200 GB	200 GB	2 TB
Distributed ISE—Administration and Monitoring (and optionally pxGrid)	200 GB	600 GB	600 GB to 2 TB	2 TB
Distributed ISE—Administration, Monitoring, and Policy Service (and optionally pxGrid)	200 GB	600 GB	600 GB to 2 TB	2 TB

Disk Space Guidelines

Keep the following guidelines in mind when deciding the disk space for Cisco ISE:

- You can allocate only up to 2 TB of disk space for a Cisco ISE VM.
- Cisco ISE must be installed on a single disk in virtual machine.
- Disk allocation varies based on logging retention requirements. On any node that has the Monitoring persona enabled, 30 percent of the VM disk space is allocated for log storage. A deployment with 25,000 endpoints generates approximately 1 GB of logs per day.

For example, if you have a Monitoring node with 600-GB VM disk space, 180 GB is allocated for log storage. If 100,000 endpoints connect to this network every day, it generates approximately 4 GB of logs per day. In this case, you can store 38 days of logs in the Monitoring node, after which you must transfer the old data to a repository and purge it from the Monitoring database.

For extra log storage, you can increase the VM disk space. For every 100 GB of disk space that you add, you get 30 GB more for log storage. Depending on your requirements, you can increase the VM disk size up to a maximum of 2 TB of log storage.

If you increase the disk size of your virtual machine after initial installation, then you must perform a fresh installation of Cisco ISE on your virtual machine to properly detect and utilize the full disk allocation.

The following table lists the number of days that logs can be retained on your Monitoring node based on the allocated disk space and the number of endpoints that connect to your network. The numbers are based on having log suppression and anomalous client detection enabled.

Table 3: Days that Logs can be Stored in a Monitoring Node

No. of Endpoints	200 GB	600 GB	1024 GB	2048 GB
10,000	126	378	645	1,289
20,000	63	189	323	645
30,000	42	126	215	430
40,000	32	95	162	323
50,000	26	76	129	258
100,000	13	38	65	129
150,000	9	26	43	86
200,000	7	19	33	65
250,000	6	16	26	52

Virtual Machine Resource and Performance Checks

Before installing Cisco ISE on a virtual machine, the installer performs hardware integrity checks by comparing the available hardware resources on the virtual machine with the recommended specifications.

During a VM resource check, the installer checks for the hard disk space, number of CPU cores allocated to the VM, CPU clock speed, and RAM allocated to the VM. If the VM resources do not meet the basic evaluation specifications, the installation aborts. This resource check is applicable only for ISO-based installations.

When you run the Setup program, a VM performance check is done, where the installer checks for disk I/O performance. If the disk I/O performance does not meet the recommended specifications, a warning appears on screen, but it allows you to continue with the installation. This performance verification check is applicable for both ISO-based and OVA (VMware) installations.

The VM performance check is done periodically (every hour) and the results are averaged for a day. If the disk I/O performance does not meet the recommended specification, an alarm is generated.

The VM performance check can also be done on demand from the Cisco ISE CLI using the **show tech-support** command.

The VM resource and performance checks can be run independent of Cisco ISE installation. You can perform this test from the Cisco ISE boot menu.

On Demand Virtual Machine Performance Check Using the Show Tech Support Command

You can run the **show tech-support** command from the CLI to check the VM performance at any point of time. The output of this command will be similar to the following:

```
ise-vm123/admin# show tech | begin "disk IO perf"
Measuring disk IO performance
*****
Average I/O bandwidth writing to disk device: 48 MB/second
Average I/O bandwidth reading from disk device: 193 MB/second
WARNING: VM I/O PERFORMANCE TESTS FAILED!
WARNING: The bandwidth writing to disk must be at least 50 MB/second,
WARNING: and bandwidth reading from disk must be at least 300 MB/second.
WARNING: This VM should not be used for production use until disk
WARNING: performance issue is addressed.
Disk I/O bandwidth filesystem test, writing 300 MB to /opt:
314572800 bytes (315 MB) copied, 7.81502 s, 40.3 MB/s
Disk I/O bandwidth filesystem read test, reading 300 MB from /opt:
314572800 bytes (315 MB) copied, 0.416897 s, 755 MB/s
```

Virtual Machine Resource Check from the Cisco ISE Boot Menu

You can check for virtual machine resources independent of Cisco ISE installation from the boot menu.

The CLI transcript appears as follows:

```
Welcome to the Cisco Identity Services Engine Installer
Cisco ISE Version: 2.0.0.205
```

Available boot options:

```
[1] Cisco ISE Installation (Keyboard/Monitor)
[2] Cisco ISE Installation (Serial Console)
[3] System Utilities (Keyboard/Monitor)
[4] System Utilities (Serial Console)
<Enter> Boot existing OS from hard disk.
```

Enter boot option and press <Enter>.

From the CLI boot menu, enter **3** or **4** to go to the System Utilities menu.

```
Cisco ISE System Utilities Menu
```

Available System Utilities:

```
[1] Recover administrator password
[2] Virtual Machine Resource Check
[3] System Erase
[4] Install Media Check
[q] Exit and reload
```

Enter option and press <Enter>

Enter **2** to check for VM resources. The output will be similar to the following:

```
*****  
***** Virtual Machine host detected..  
***** Hard disk(s) total size detected: 322 Gigabyte  
***** Physical RAM size detected: 40443664 Kbytes  
***** Number of network interfaces detected: 1  
***** Number of CPU cores: 2  
***** CPU Mhz: 2300.00  
***** Verifying CPU requirement..  
***** Verifying RAM requirement..  
***** Writing disk partition table...
```

Obtain the Cisco ISE Evaluation Software

To obtain the Cisco ISE evaluation software (R-ISE-EVAL-K9=), contact your Cisco Account Team or your Authorized Cisco Channel Partner.

To migrate a Cisco ISE configuration from an evaluation system to a fully licensed production system, you need to complete the following tasks:

- Back up the configuration of the evaluation version.
- Ensure that your production VM has the required amount of disk space. See [Deployment Size and Scaling Recommendations](#) for details.
- Install a production deployment license.
- Restore the configuration to the production system.



Note

For evaluation, the minimum allocation requirements for a hard disk on a VM is 200 GB. When you move the VM to a production environment that supports a larger number of users, be sure to reconfigure the Cisco ISE installation to the recommended minimum disk size or higher (up to the allowed maximum of 2 TB).

Before You Begin

For evaluation purposes, Cisco ISE can be installed on any supported VMs that complies with the VM requirements. When evaluating Cisco ISE, you can configure less disk space in the VM, but you must allocate a minimum disk space of 200 GB.

Step 1

Go to <http://www.cisco.com/go/ise>. You must already have valid Cisco.com login credentials to access this link.

Step 2

Click **Download Software for this Product**.

The software image comes with a 90-days evaluation license already installed, so you can begin evaluating all Cisco ISE services when the installation and initial configuration are complete.

Install Cisco ISE on Virtual Machines

You can install Cisco ISE on VMs in any one of the following ways. We recommend that you download and deploy Cisco ISE OVA templates.

- [Deploy Cisco ISE on Virtual Machines Using OVA Templates](#) , on page 10
- [Install Cisco ISE on Virtual Machines Using the ISO File](#), on page 11
- [Clone a Cisco ISE Virtual Machine](#), on page 17

Deploy Cisco ISE on Virtual Machines Using OVA Templates

You can use OVA templates to install and deploy Cisco ISE software on a virtual machine. Download the OVA template from Cisco.com.

Before You Begin

You can use OVA templates to install and deploy Cisco ISE software on a virtual machine



Note

The ISE OVA templates are not compatible with VMware web client for vCenter 6.5. As a workaround, use the VMware OVF tool to import the OVA templates.

You must reimage Cisco ISE from ISO if the virtual hard disk is resized after importing the OVA, as Cisco ISE does not support resizing hard disk and file systems after installation.

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|----------------|---|
| Step 1 | Open VMware vSphere client. |
| Step 2 | Log in to VMware host. |
| Step 3 | Choose File > Deploy OVF Template from the VMware vSphere Client. |
| Step 4 | Click Browse to select the OVA template, and click Next . |
| Step 5 | Confirm the details in the OVF Template Details page, and click Next . |
| Step 6 | Enter a name for the virtual machine in the Name and Location page to uniquely identify it, and click Next . |
| Step 7 | Choose a data store to host the OVA. |
| Step 8 | Click the Thick Provision radio button in the Disk Format page, and click Next .
Cisco ISE supports both thick and thin provisioning. However, we recommend that you choose thick provisioning for better performance, especially for Monitoring nodes. If you choose thin provisioning, operations such as upgrade, backup and restore, and debug logging that require more disk space might be impacted during initial disk expansion. |
| Step 9 | Verify the information in the Ready to Complete page. Check the Power on after deployment check box. |
| Step 10 | Click Finish . |
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Related Topics

[Virtual Machine Requirements](#)

[Virtual Machine Appliance Size Recommendations](#), on page 5
[Support for Open Virtualization Format](#), on page 2

Install Cisco ISE on Virtual Machines Using the ISO File

To install Cisco ISE on a VM using the ISO file:

Before You Begin

- Ensure that you read and allocate VM resources according to the requirements specified in this chapter.
- Ensure that you have read the [Prerequisites for Configuring a VMware ESXi Server](#), on page 11 section.
- Download the Cisco ISE ISO image from Cisco.com.

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|---------------|--|
| Step 1 | Configure a VMware server. See Configure a VMware Server , on page 13. |
| Step 2 | Configure a VMware system to boot from a software DVD. See Configure a VMware System to Boot From a Cisco ISE Software DVD , on page 15. |
| Step 3 | Install Cisco ISE software on the VM. See Cisco ISE Setup Program Parameters |
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Related Topics

[Virtual Machine Requirements](#)
[Virtual Machine Appliance Size Recommendations](#), on page 5
[Cisco ISE ISO Installation on Virtual Machine Fails](#), on page 17

Prerequisites for Configuring a VMware ESXi Server

Review the following configuration prerequisites listed in this section before you attempt to configure a VMWare ESXi server:

- Remember to log in to the ESXi server as a user with administrative privileges (root user).
- Cisco ISE is a 64-bit system. Before you install a 64-bit system, ensure that Virtualization Technology (VT) is enabled on the ESXi server. You must also ensure that your guest operating system type is set to Red Hat Enterprise Linux 6 (64-bit).
- For Red Hat Enterprise Linux 6, the default NIC type is VMXNET3 Adapter. You can add up to four NICs for your Cisco ISE virtual machine, but ensure that you choose the same Adapter for all the NICs. Cisco ISE supports the E1000 Adapter.



Note

If you choose the default network driver (VMXNET3) as the Network Adapter, check the physical adapter mappings. Ensure that you map the Cisco ISE GigabitEthernet 0 interface to the 4th interface (NIC 4) in ESXi server. If you choose the E1000 Adapter, by default, the ESXi adapters and Cisco ISE adapters are mapped correctly.

- Ensure that you allocate the recommended amount of disk space on the VMware virtual machine. See the [Disk Space Requirements](#), on page 5 section for more information.
- If you have not created a VMware virtual machine file system (VMFS), you must create one to support the Cisco ISE virtual appliance. The VMFS is set for each of the storage volumes configured on the VMware host. For VMFS5, the 1-MB block size supports up to 2 TB virtual disk size.

Virtualization Technology Check

If you have an ESXi server installed already, you can check if VT is enabled on it without rebooting the machine. To do this, use the **esxcfg-info** command. Here is an example:

```
~ # esxcfg-info |grep "HV Support"
|----HV Support.....3
|----World Command Line.....grep HV Support
```

If HV Support has a value of 3, then VT is enabled on the ESXi server and you can proceed with the installation.

If HV Support has a value of 2, then VT is supported, but not enabled on the ESXi server. You must edit the BIOS settings and enable VT on the server.

Enable Virtualization Technology on an ESXi Server

You can reuse the same hardware that you used for hosting a previous version of Cisco ISE virtual machine. However, before you install the latest release, you must enable Virtualization Technology (VT) on the ESXi server.

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| Step 1 | Reboot the appliance. |
| Step 2 | Press F2 to enter setup. |
| Step 3 | Choose Advanced > Processor Configuration . |
| Step 4 | Select Intel(R) VT and enable it. |
| Step 5 | Press F10 to save your changes and exit. |
-

Configure VMware Server Interfaces for the Cisco ISE Profiler Service

Configure VMware server interfaces to support the collection of Switch Port Analyzer (SPAN) or mirrored traffic to a dedicated probe interface for the Cisco ISE Profiler Service.

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|---------------|--|
| Step 1 | Choose Configuration > Networking > Properties > VMNetwork (the name of your VMware server instance) VMswitch0 (one of your VMware ESXi server interfaces) Properties Security . |
| Step 2 | In the Policy Exceptions pane on the Security tab, check the Promiscuous Mode check box. |
| Step 3 | In the Promiscuous Mode drop-down list, choose Accept and click OK .
Repeat the same steps on the other VMware ESXi server interface used for profiler data collection of SPAN or mirrored traffic. |
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Connect to the VMware Server Using the Serial Console

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- Step 1** Power down the particular VMware server (for example ISE-120).
- Step 2** Right-click the VMware server and choose **Edit**.
- Step 3** Click **Add** on the Hardware tab.
- Step 4** Choose **Serial Port** and click **Next**.
- Step 5** In the Serial Port Output area, click the **Use physical serial port on the host** or the **Connect via Network** radio button and click **Next**.
- If you choose the Connect via Network option, you must open the firewall ports over the ESXi server.
 - If you select the Use physical serial port on the host, choose the port. You may choose one of the following two options:
 - `/dev/ttyS0` (In the DOS or Windows operating system, this will appear as COM1).
 - `/dev/ttyS1` (In the DOS or Windows operating system, this will appear as COM2).
- Step 6** Click **Next**.
- Step 7** In the Device Status area, check the appropriate check box. The default is Connected.
- Step 8** Click **OK** to connect to the VMware server.
-

Configure a VMware Server

Before You Begin

Ensure that you have read the details in the [Prerequisites for Configuring a VMware ESXi Server](#), on page 11 section.

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- Step 1** Log in to the ESXi server.
- Step 2** In the VMware vSphere Client, in the left pane, right-click your host container and choose **New Virtual Machine**.
- Step 3** In the Configuration dialog box, choose **Custom** for the VMware configuration and click **Next**.
- Step 4** Enter a name for the VMware system and click **Next**.
- Tip** Tip Use the hostname that you want to use for your VMware host.

- Step 5** Choose a datastore that has the recommended amount of space available and click **Next**.
- Step 6** (Optional) If your VM host or cluster supports more than one VMware virtual machine version, choose a Virtual Machine version such as Virtual Machine Version 7, and click **Next**.
- Step 7** Choose **Linux** and **Red Hat Enterprise Linux 6 (64-bit)** from the Version drop-down list.
- Step 8** Choose **2** from the Number of virtual sockets and the Number of cores per virtual socket drop-down list. Total number of cores should be 4.
(Optional; appears in some versions of ESXi server. If you see only the Number of virtual processors, choose **4**).
- Step 9** Choose the amount of memory and click **Next**.
- Step 10** Choose the **E1000** NIC driver from the Adapter drop-down list and click **Next**.
The SCSI controller dialog box appears.
- Step 11** Choose **Paravirtual** as the SCSI controller and click **Next**.
- Step 12** Choose **Create a new virtual disk** and click **Next**.
- Step 13** In the Disk Provisioning dialog box, click **Thick Provision** radio button, and click **Next** to continue.
Cisco ISE supports both thick and thin provisioning. However, we recommend that you choose thick provisioning for better performance, especially for Monitoring nodes. If you choose thin provisioning, operations such as upgrade, backup and restore, and debug logging that require more disk space might be impacted during initial disk expansion.
- Step 14** Uncheck the **Support clustering features such as Fault Tolerance** check box.
- Step 15** Choose the advanced options, and click **Next**.
- Step 16** Verify the configuration details, such as Name, Guest OS, CPUs, Memory, and Disk Size of the newly created VMware system. You must see the following values:
- Guest OS—Red Hat Enterprise Linux 6 (64-bit)
 - CPUs—4
 - Memory—16 GB or 16384 MB
 - Disk Size—200 GB to 2 TB based on the recommendations for VMware disk space
- For the Cisco ISE installation to be successful on a virtual machine, ensure that you adhere to the recommendations given in this document.
- Step 17** Click **Finish**.
The VMware system is now installed.
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What to Do Next

To activate the newly created VMware system, right-click VM in the left pane of your VMware client user interface and choose **Power > Power On**.

Increase Virtual Machine Power On Boot Delay Configuration

On a VMware virtual machine, the boot delay by default is set to 0. You can change this boot delay to help you choose the boot options (while resetting the Administrator password, for example).

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|---------------|--|
| Step 1 | From the VSphere client, right click the VM and choose Edit Settings . |
| Step 2 | Click the Options tab. |
| Step 3 | Choose Advanced > Boot Options . |
| Step 4 | From the Power on Boot Delay area, select the time in milliseconds to delay the boot operation. |
| Step 5 | Check the check box in the Force BIOS Setup area to enter into the BIOS setup screen when the VM boots the next time. |
| Step 6 | Click OK to save your changes. |
-

Configure a VMware System to Boot From a Cisco ISE Software DVD

After configuring the VMware system, you are ready to install the Cisco ISE software. To install the Cisco ISE software from a DVD, you need to configure the VMware system to boot from it. This requires the VMware system to be configured with a virtual DVD drive.

Before You Begin

You must download the Cisco ISE ISO, burn the ISO image on a DVD, and use it to install Cisco ISE on the virtual machine.

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|---------------|---|
| Step 1 | In the VMware client, highlight the newly created VMware system and choose Edit Virtual Machine Settings . |
| Step 2 | In the Virtual Machine Properties dialog box, choose CD/DVD Drive 1 . |
| Step 3 | Click the Host Device radio button and choose the DVD host device from the drop-down list. |
| Step 4 | Choose the Connect at Power On option and click OK to save your settings.
You can now use the DVD drive of the VMware ESXi server to install the Cisco ISE software. |
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What to Do Next

After you complete this task, click the **Console** tab in the VMware client user interface, right-click VM in the left pane, choose **Power**, and choose **Reset** to restart the VMware system.

Install Cisco ISE Software on a VMware System

Before You Begin

- After installation, if you do not install a permanent license, Cisco ISE automatically installs a 90-day evaluation license that supports a maximum of 100 endpoints.

- Download the Cisco ISE software from the Cisco Software Download Site at <http://www.cisco.com/en/US/products/ps11640/index.html> and burn it on a DVD. You will be required to provide your Cisco.com credentials.

-
- Step 1** Log in to the VMware client.
- Step 2** For the virtual machine to enter the BIOS setup mode, right click the VM and click **Edit Settings**.
- Step 3** Click the **Options** tab.
- Step 4** Select **Boot Options** and configure the following option:
- In the Force BIOS Setup area, check the check box to enter the BIOS setup screen when the virtual machine boots.
- Step 5** Click **OK**.
- Step 6** Ensure that the Coordinated Universal Time (UTC) and the correct boot order is set in BIOS:
- If the virtual machine is turned on, turn the system off.
 - Turn on the virtual machine.
The system enters the BIOS setup mode.
 - In the Main BIOS menu, using the arrow keys, navigate to the Date and Time field and press **Enter**.
 - Enter the UTC/Greenwich Mean Time (GMT) time zone.
This time zone setting ensures that the reports, logs, and posture-agent log files from the various nodes in your deployment are always synchronized with regard to the time stamps.
 - Using the arrow keys, navigate to the Boot menu and press **Enter**.
 - Using the arrow keys, select CD-ROM Drive and press + to move the CD-ROM drive up the order.
 - Using the arrow keys, navigate to the Exit menu and choose **Exit Saving Changes**.
 - Choose **Yes** to save the changes and exit.
- Step 7** Insert the Cisco ISE software DVD into the VMware ESXi host CD/DVD drive and turn on the virtual machine. When the DVD boots, the console displays:

```
Welcome to the Cisco Identity Services Engine Installer
Cisco ISE Version: 1.4.0.205
```

Available boot options:

```
[1] Cisco ISE Installation (Keyboard/Monitor)
[2] Cisco ISE Installation (Serial Console)
[3] System Utilities (Keyboard/Monitor)
[4] System Utilities (Serial Console)
<Enter> Boot existing OS from hard disk.
```

Enter boot option and press <Enter>.

```
boot: 1
Loading vmlinuz.....
Loading initrd.img.....ready.
Initializing cgroup subsys cpuset
Initializing cgroup subsys cpu
Linux version 2.6.32-431.el6.x86_64 (mockbuild@x86-023.build.eng.bos.redhat.com) (gcc version 4.4.7
20120313 (Red Hat 4.4.7-4) (GCC) ) #1 SMP Sun Nov 10 22:19:54 EST 2013
```

- Step 8** At the system prompt:

- Enter 1 to install Cisco ISE using a keyboard and a monitor.
- Enter 2 to install Cisco ISE using a serial console. This option requires that you have a serial console set up on your virtual machine. Refer to the [VMware vSphere Documentation](#) for information on how to create a console.

The installer starts the installation of the Cisco ISE software on the VMware system. Allow 20 minutes for the installation process to complete. When the installation process finishes, the virtual machine reboots automatically. When the VM reboots, the console displays:

Type 'setup' to configure your appliance
localhost:

Step 9

At the system prompt, type **setup** and press **Enter**.

The Setup Wizard appears and guides you through the initial configuration.

Cisco ISE ISO Installation on Virtual Machine Fails

If a fresh installation of Cisco ISE on a virtual machine fails, and you have the default network driver (VMXNET3) chosen as the Network Adapter, check the physical adapter mappings. Ensure that you map the Cisco ISE GigabitEthernet 0 interface to the 4th interface (NIC 4) in ESXi. The workaround is to use the E1000 driver as the Network Adapter.

Clone a Cisco ISE Virtual Machine

You can clone a Cisco ISE VMware virtual machine (VM) to create an exact replica of a Cisco ISE node. For example, in a distributed deployment with multiple Policy Service nodes (PSNs), VM cloning helps you deploy the PSNs quickly and effectively. You do not have to install and configure the PSNs individually.

You can also clone a Cisco ISE VM using a template.

**Note**

For cloning, you need VMware vCenter. Cloning must be done before you run the Setup program.

Before You Begin

- Ensure that you shut down the Cisco ISE VM that you are going to clone. In the vSphere client, right-click the Cisco ISE VM that you are about to clone and choose **Power** > **Shut Down Guest**.
- Ensure that you change the IP Address and Hostname of the cloned machine before you power it on and connect it to the network.

Step 1

Log in to the ESXi server as a user with administrative privileges (root user).
VMware vCenter is required to perform this step.

Step 2

Right-click the Cisco ISE VM you want to clone, and click **Clone**.

Step 3

Enter a name for the new machine that you are creating in the Name and Location dialog box and click **Next**.
This is not the hostname of the new Cisco ISE VM that you are creating, but a descriptive name for your reference.

- Step 4** Select a Host or Cluster on which you want to run the new Cisco ISE VM and click **Next**.
- Step 5** Select a datastore for the new Cisco ISE VM that you are creating and click **Next**.
This datastore could be the local datastore on the ESXi server or a remote storage. Ensure that the datastore has enough disk space.
- Step 6** Click the **Same format as source** radio button in the Disk Format dialog box and click **Next**.
This option copies the same format that is used in the Cisco ISE VM that you are cloning this new machine from.
- Step 7** Click the **Do not customize** radio button in the Guest Customization dialog box and click **Next**.
- Step 8** Click **Finish**.

What to Do Next

- [Change the IP Address and Hostname of a Cloned Virtual Machine](#)
- [Connect a Cloned Cisco Virtual Machine to the Network](#)

Related Topics

[Virtual Machine Requirements](#)

[Virtual Machine Appliance Size Recommendations](#), on page 5

Clone a Cisco ISE Virtual Machine Using a Template

If you are using vCenter, then you can use a VMware template to clone a Cisco ISE virtual machine (VM). You can clone the Cisco ISE node to a template and use that template to create multiple new Cisco ISE nodes. Cloning a virtual machine using a template is a two-step process:

Before You Begin



Note

For cloning, you need VMware vCenter. Cloning must be done before you run the Setup program.

- Step 1** [Create a Virtual Machine Template](#), on page 18
- Step 2** [Deploy a Virtual Machine Template](#), on page 19

Create a Virtual Machine Template

Before You Begin

- Ensure that you shut down the Cisco ISE VM that you are going to clone. In the vSphere client, right-click the Cisco ISE VM that you are about to clone and choose **Power > Shut Down Guest**.

- We recommend that you create a template from a Cisco ISE VM that you have just installed and not run the setup program on. You can then run the setup program on each of the individual Cisco ISE nodes that you have created and configure IP address and hostnames individually.

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- Step 1** Log in to the ESXi server as a user with administrative privileges (root user). VMware vCenter is required to perform this step.
- Step 2** Right-click the Cisco ISE VM that you want to clone and choose **Clone > Clone to Template**.
- Step 3** Enter a name for the template, choose a location to save the template in the Name and Location dialog box, and click **Next**.
- Step 4** Choose the ESXi host that you want to store the template on and click **Next**.
- Step 5** Choose the datastore that you want to use to store the template and click **Next**. Ensure that this datastore has the required amount of disk space.
- Step 6** Click the **Same format as source** radio button in the Disk Format dialog box and click **Next**. The Ready to Complete dialog box appears.
- Step 7** Click **Finish**.
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Deploy a Virtual Machine Template

After you create a virtual machine template, you can deploy it on other virtual machines (VMs).

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- Step 1** Right-click the Cisco ISE VM template that you have created and choose **Deploy Virtual Machine from this template**.
- Step 2** Enter a name for the new Cisco ISE node, choose a location for the node in the Name and Location dialog box, and click **Next**.
- Step 3** Choose the ESXi host where you want to store the new Cisco ISE node and click **Next**.
- Step 4** Choose the datastore that you want to use for the new Cisco ISE node and click **Next**. Ensure that this datastore has the required amount of disk space.
- Step 5** Click the **Same format as source** radio button in the Disk Format dialog box and click **Next**.
- Step 6** Click the **Do not customize** radio button in the Guest Customization dialog box. The Ready to Complete dialog box appears.
- Step 7** Check the **Edit Virtual Hardware** check box and click **Continue**. The Virtual Machine Properties page appears.
- Step 8** Choose **Network adapter**, uncheck the **Connected** and **Connect at power on** check boxes, and click **OK**.
- Step 9** Click **Finish**.
You can now power on this Cisco ISE node, configure the IP address and hostname, and connect it to the network.
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What to Do Next

- [Change the IP Address and Hostname of a Cloned Virtual Machine](#)
- [Connect a Cloned Cisco Virtual Machine to the Network](#)

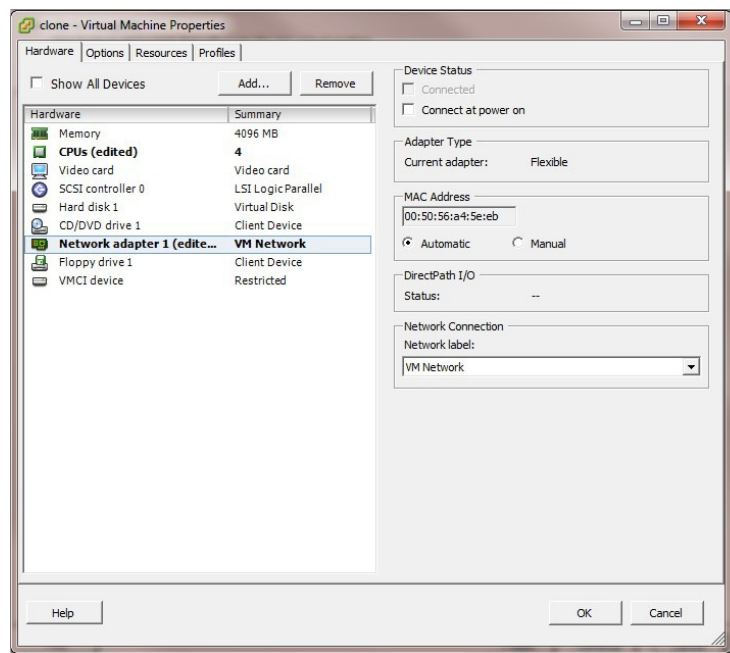
Change the IP Address and Hostname of a Cloned Virtual Machine

After you clone a Cisco ISE virtual machine (VM), you have to power it on and change the IP address and hostname.

Before You Begin

- Ensure that the Cisco ISE node is in the standalone state.
- Ensure that the network adapter on the newly cloned Cisco ISE VM is not connected when you power on the machine. Uncheck the **Connected** and **Connect at power on** check boxes. Otherwise, if this node comes up, it will have the same IP address as the source machine from which it was cloned.

Figure 1: Disconnecting the Network Adapter



- Ensure that you have the IP address and hostname that you are going to configure for the newly cloned VM as soon as you power on the machine. This IP address and hostname entry should be in the DNS server. You cannot use "localhost" as the hostname for a node.
- Ensure that you have certificates for the Cisco ISE nodes based on the new IP address or hostname.

Procedure

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- Step 1** Right-click the newly cloned Cisco ISE VM and choose **Power > Power On**.
- Step 2** Select the newly cloned Cisco ISE VM and click the **Console** tab.
- Step 3** Enter the following commands on the Cisco ISE CLI:
- ```
configure terminal
hostname hostname
```
- The hostname is the new hostname that you are going to configure. The Cisco ISE services are restarted.
- Step 4** Enter the following commands:
- ```
interface gigabit 0
ip address ip_address netmask
```
- The ip_address is the address that corresponds to the hostname that you entered in step 3 and netmask is the subnet mask of the ip_address. The system will prompt you to restart the Cisco ISE services. Refer to the *Cisco Identity Services Engine CLI Reference Guide*, for the ip address and hostname commands.
- Step 5** Enter **Y** to restart Cisco ISE services.
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Connect a Cloned Cisco Virtual Machine to the Network

After you power on and change the ip address and hostname, you must connect the Cisco ISE node to the network.

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- Step 1** Right-click the newly cloned Cisco ISE virtual machine (VM) and click **Edit Settings**.
- Step 2** Click **Network adapter** in the Virtual Machine Properties dialog box.
- Step 3** In the Device Status area, check the **Connected** and **Connect at power on** check boxes.
- Step 4** Click **OK**.
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Migrate Cisco ISE VM from Evaluation to Production

After evaluating the Cisco ISE release, you can migrate the from an evaluation system to a fully licensed production system.

Before You Begin

- When you move the VMware server to a production environment that supports a larger number of users, be sure to reconfigure the Cisco ISE installation to the recommended minimum disk size or higher (up to the allowed maximum of 2 TB).

- Please note that you cannot migrate data to a production VM from a VM created with less than 200 GB of disk space. You can only migrate data from VMs created with 200 GB or more disk space to a production environment.

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- | | |
|---------------|---|
| Step 1 | Back up the configuration of the evaluation version. |
| Step 2 | Ensure that your production VM has the required amount of disk space. |
| Step 3 | Install a production deployment license. |
| Step 4 | Restore the configuration to the production system. |
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