

iStorage Server: High-Availability iSCSI SAN for VMWare ESX / ESXi Server

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KernSafe Technologies, Inc.

www.kernsafe.com

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Overview

iStorage Server is a network based storage virtualization software powered by KernSafe Technologies, Inc. Being a powerful, full-featured and software-only iSCSI Target SAN solution, that can quickly convert existing Windows computer into IP SAN. Storage media of iSCSI Target can include existing storage devices such as the entire hard disks or partitions, CD-RWs, tapes and USB storage devices, as well as disk image file or CD image files including ISO9660(.iso), .bin, .mdf, .cdi, .b5i, .nrg, .ccd, .sub, .img, .raw and other image file formats. Furthermore, iStorage Server also supports a lot of features such as: VHD (Virtual Hard Disk) target, snapshots, STPI, RAID-1 and failover, these features are very important and popular in storage industry world and make iStorage Server is suitable for any size of business.

VMware ESX and VMware ESXi are “bare-metal” hypervisors, meaning they install directly on top of the physical server and partition it into multiple virtual machines that can run simultaneously, sharing the physical resources of the underlying server. Each virtual machine represents a complete system, with processors, memory, networking, storage and BIOS, and can run an unmodified operating system and applications.

The functionality and performance of VMware ESX and ESXi are the same; the difference between the two hypervisors resides in their architecture and operational management. VMware ESXi is the latest hypervisor architecture from VMware. It has an ultra thin footprint with no reliance on a general-purpose OS, setting a new bar for security and reliability. The small footprint and hardware-like reliability of VMware ESXi enable it to also be available preinstalled on industry standard x86 servers.

High availability is the implementation of technology so that if a component fails, another can take over for it. By using highly available platforms, the downtime for a system can be reduced, and, in many cases, it can be reduced to a short enough time that the users of the system do not see the failure.

After iStorage Server 2.0, it supports server side mirroring, synchronous replication and failover which allows user to create a high-availability iSCSI SAN for ESX Server. This article demonstrates how High availability works under VMware ESX Server. We need two targets which has the same size on two servers, in this document, we used server1 192.168.0.195 and server2 192.168.0.111.

Install ESX Server

You need a server running ESX Server. ESX Server must first be installed on to a suitable machine that will be used to create the virtual environment. For learning how to obtain or install VMware ESX Server, please contact the VMware supplier.

Configuring on iStorage Server1

Choose the Authentication Mechanism

Decide which authentication mechanisms you would want to use: **Anonymous**, **CHAP**, **IP address** or **Mixed** authentication.

1) Anonymous:

All initiators will get full access permission without any authorization required.

2) CHAP (Challenge-handshake authentication protocol)

All initiators need to specify a CHAP user and secret to connect to the target. iStorage Server has a built-in user called "Guest", which is used for initiators without CHAP secret specified.

3) IP Filters

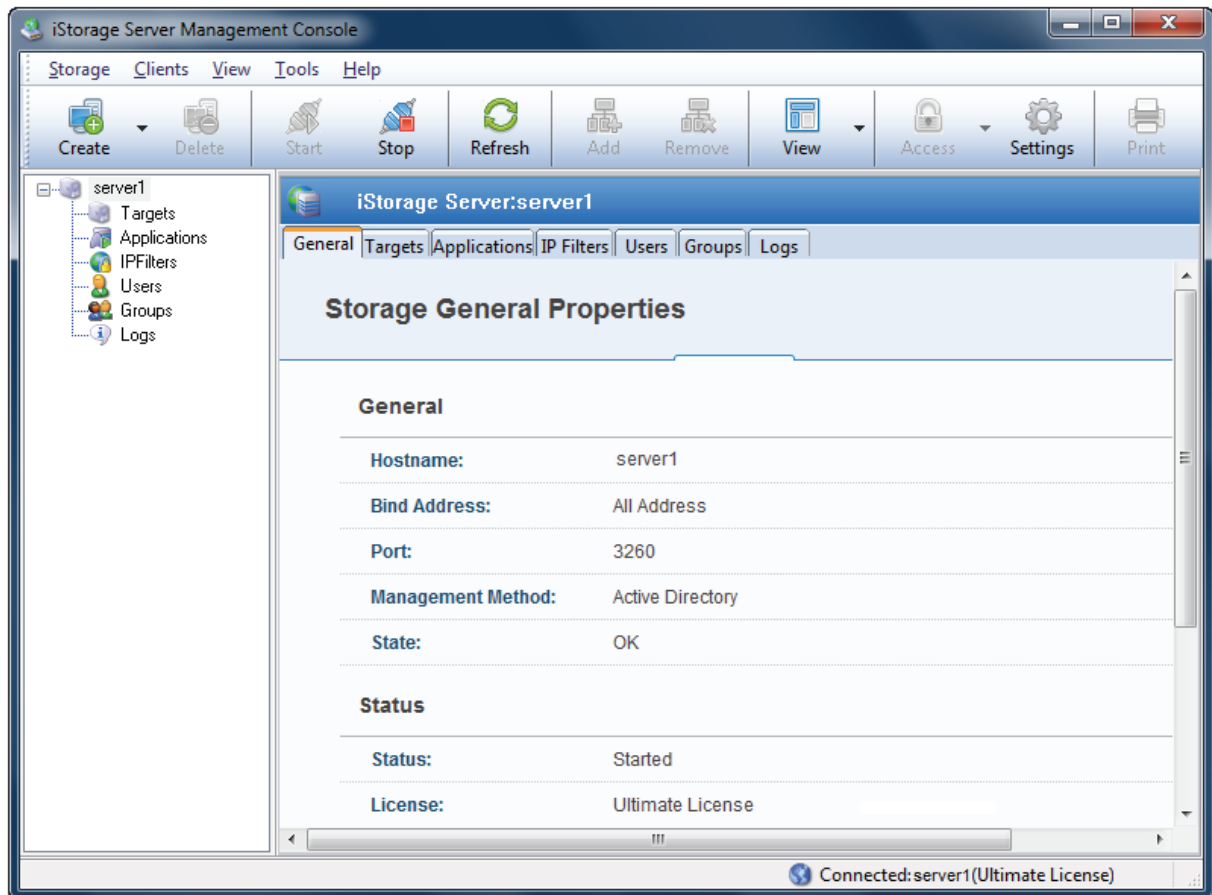
All initiators will be authorized by the incoming IP address defined by IP Filter roles.

4) Mixed

Security policy is determined by both CHAP and IP Filters.

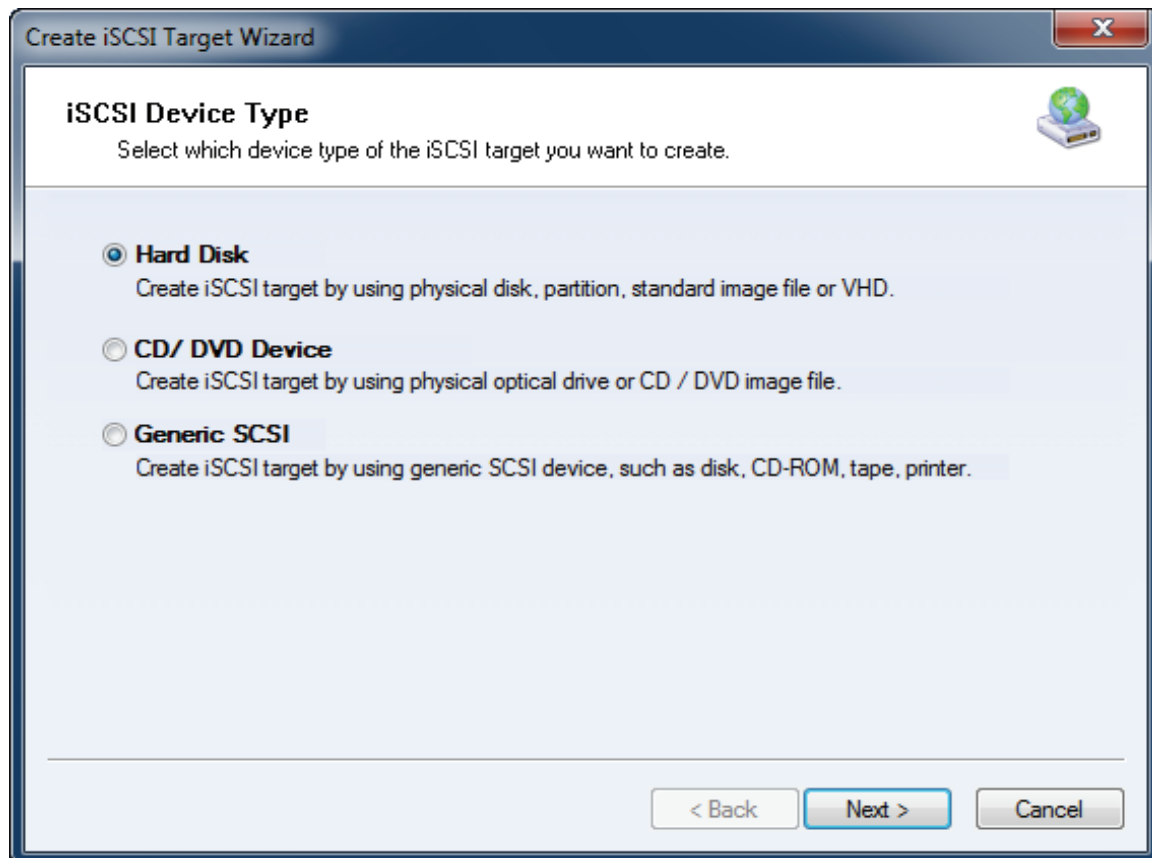
Create Target

Open **iStorage Server Management Console**.



Launch the **iStorage Server Management Console**, press the **Create** button on the toolbar, the **Create Device Wizard** is shown.

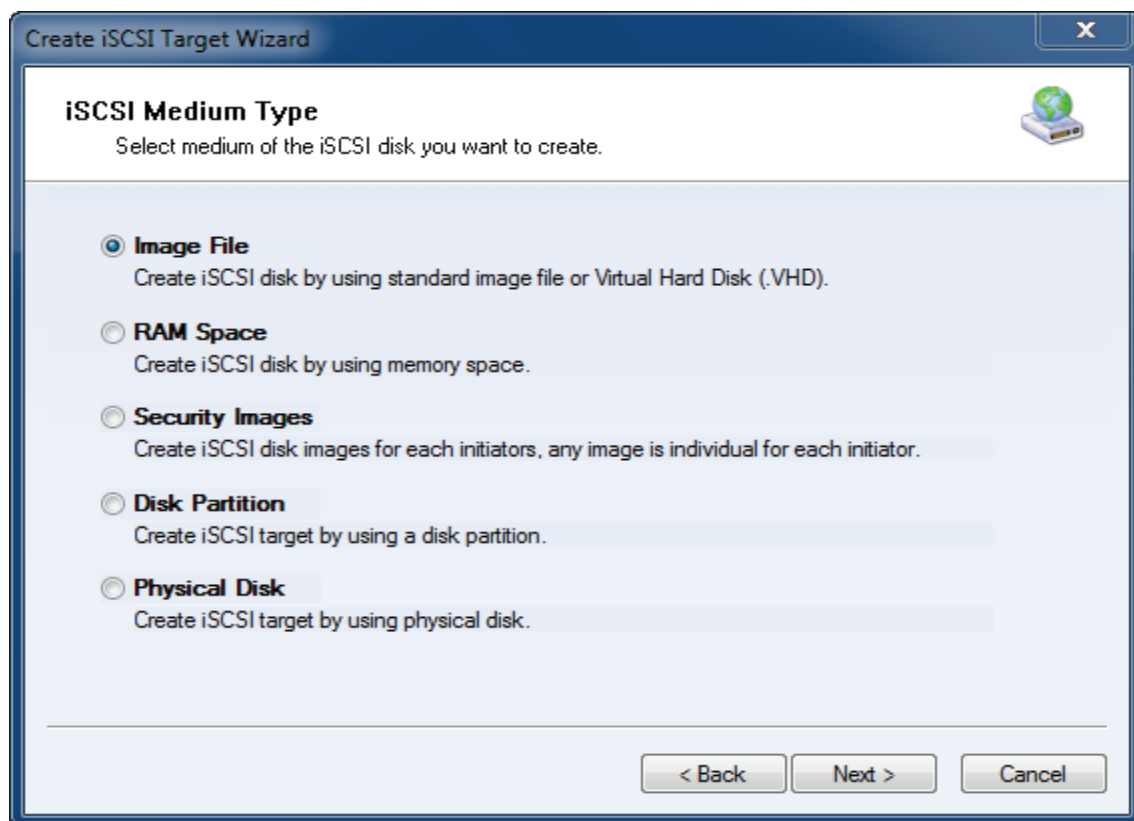
Select device type



Choose **Hard Disk**.

Press the **Next** button to continue.

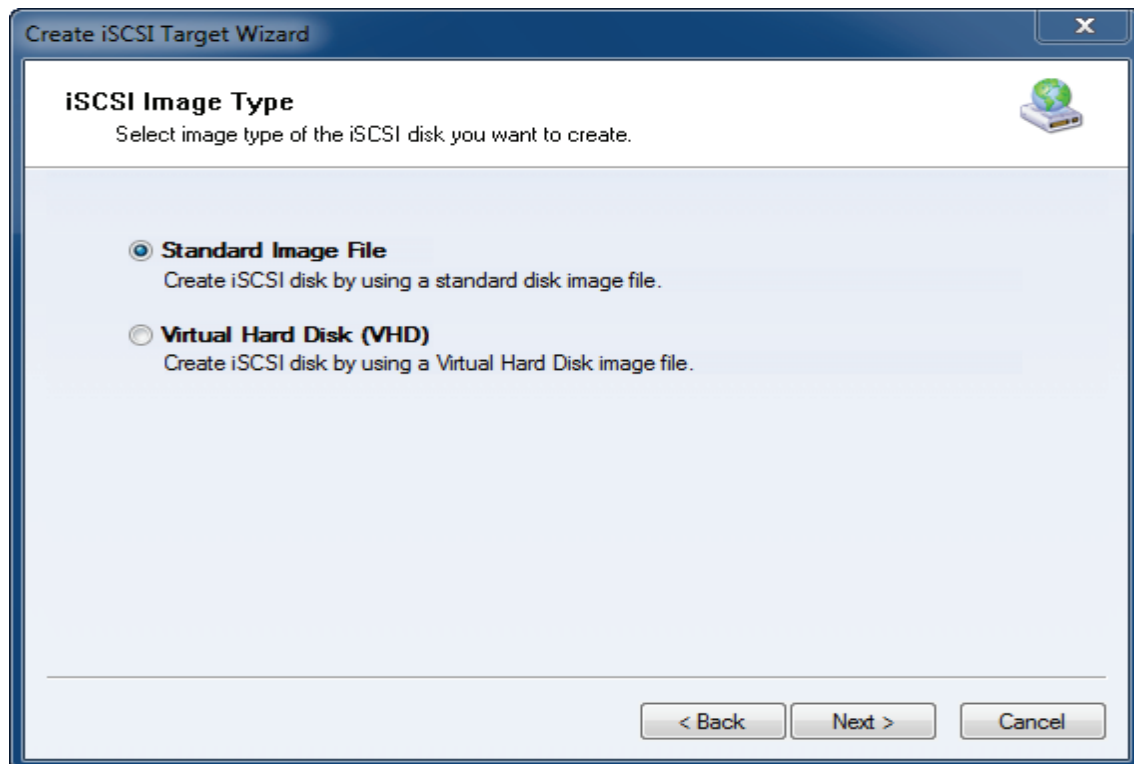
Select a medium type.



Choose **Image File** in **iSCSI Medium Type** window.

Then press **Next** button to continue.

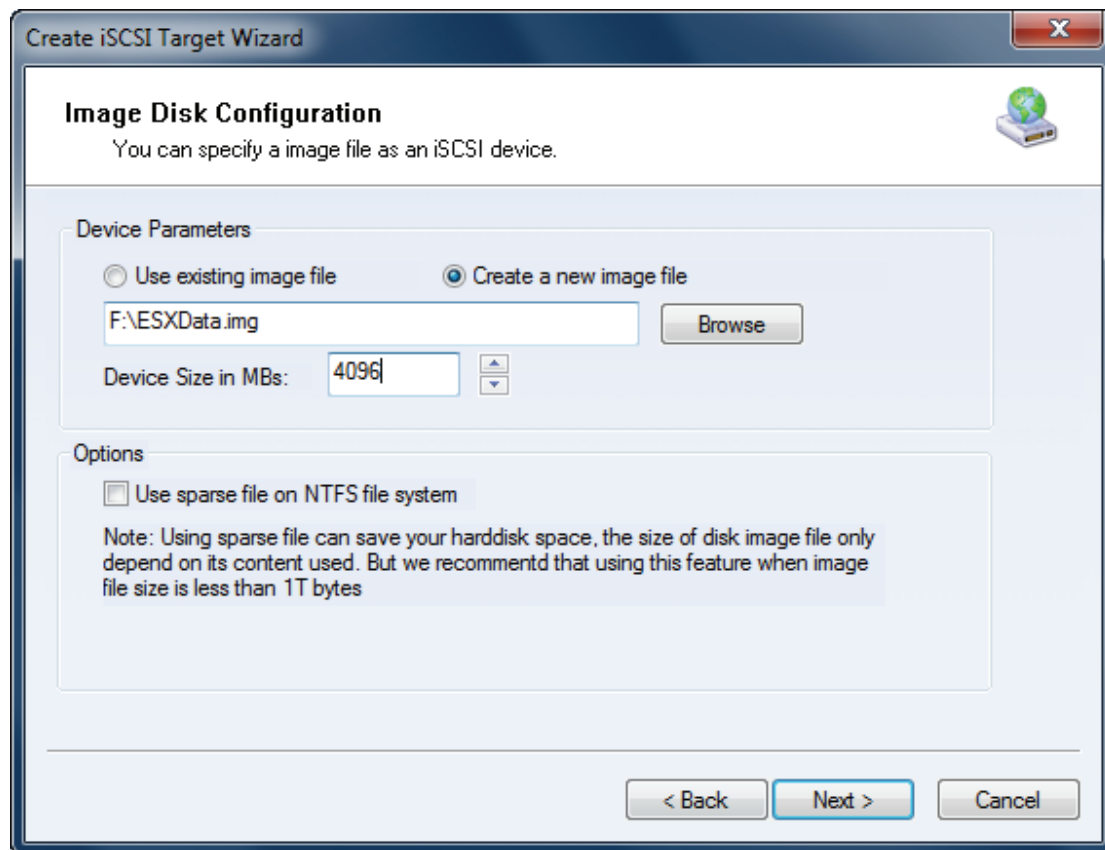
Select an Image type.



Choose **Standard Image File**.

Press the **Next** button to continue.

Specify image file path and size.



Choose **Create a new image file** to create a new image file or choose **Use existing image file** if you have one.

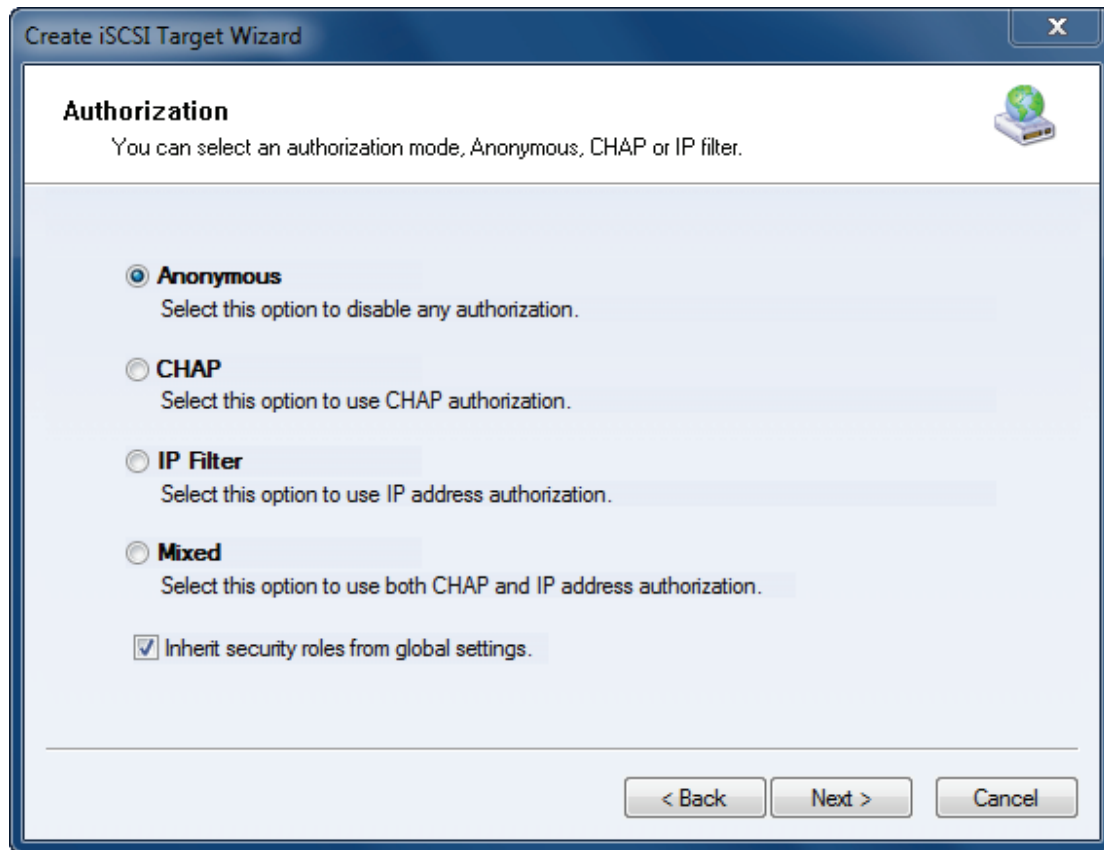
Specify image file full name path.

Specify the device size.

If you check **Use sparse file on NTFS file system**, the size of disk image file only depend on its content used, it can save your hard disk space.

Press the **Next** button to continue.

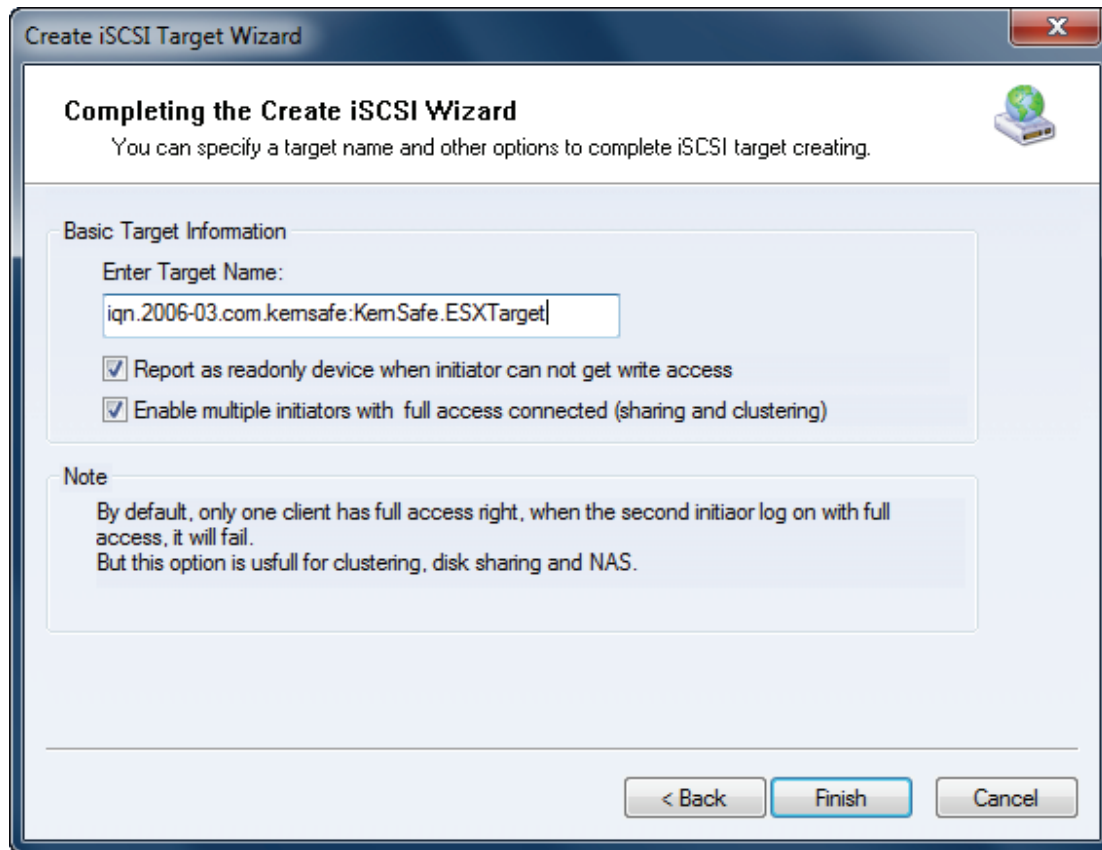
Set authorization mode.



Choose **Anonymous** Authorization.

Press the **Next** button to continue.

Finish creating iSCSI Target.



Type a target name in the **Target Name** field.

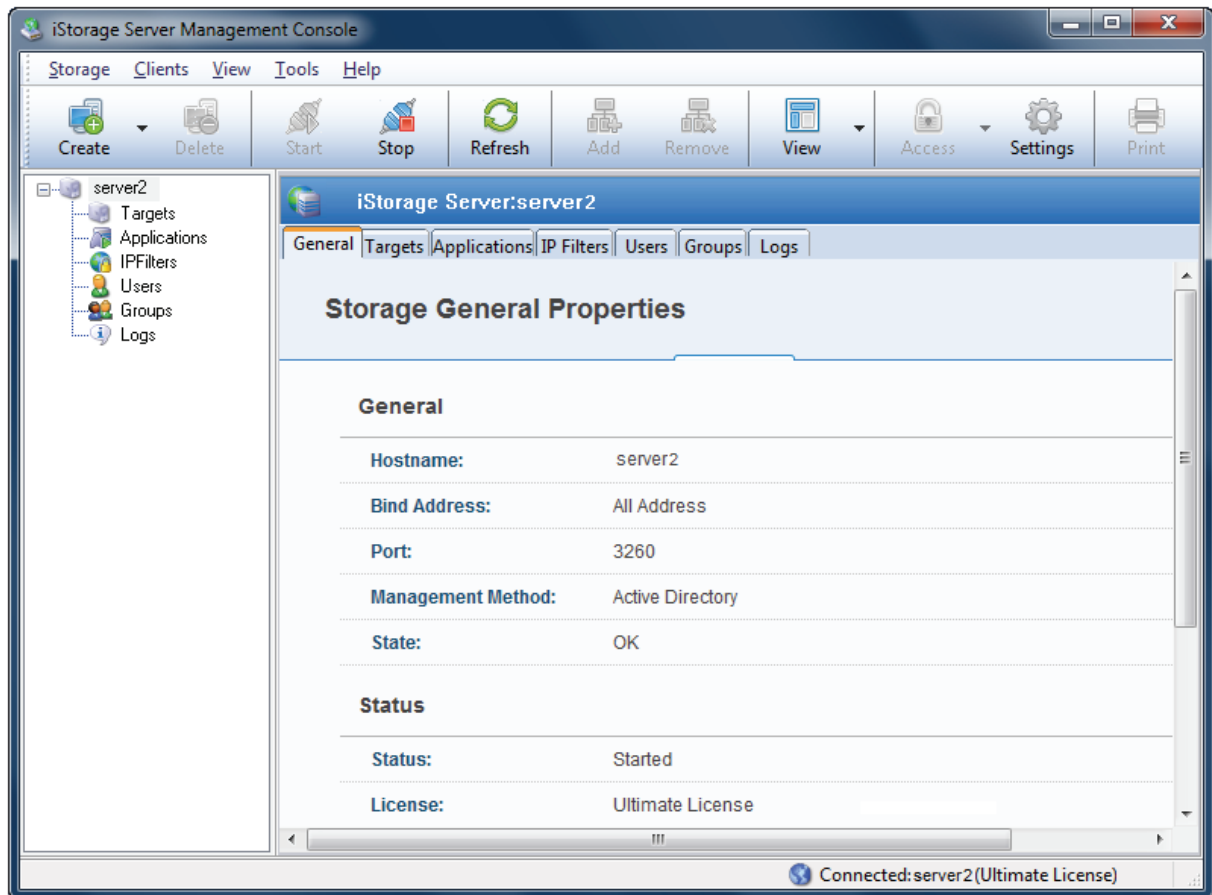
Check **Enable multiple initiators with full access connected (sharing and clustering)**.

Press the **Finish** button to continue.

Configuring on iStorage Server2

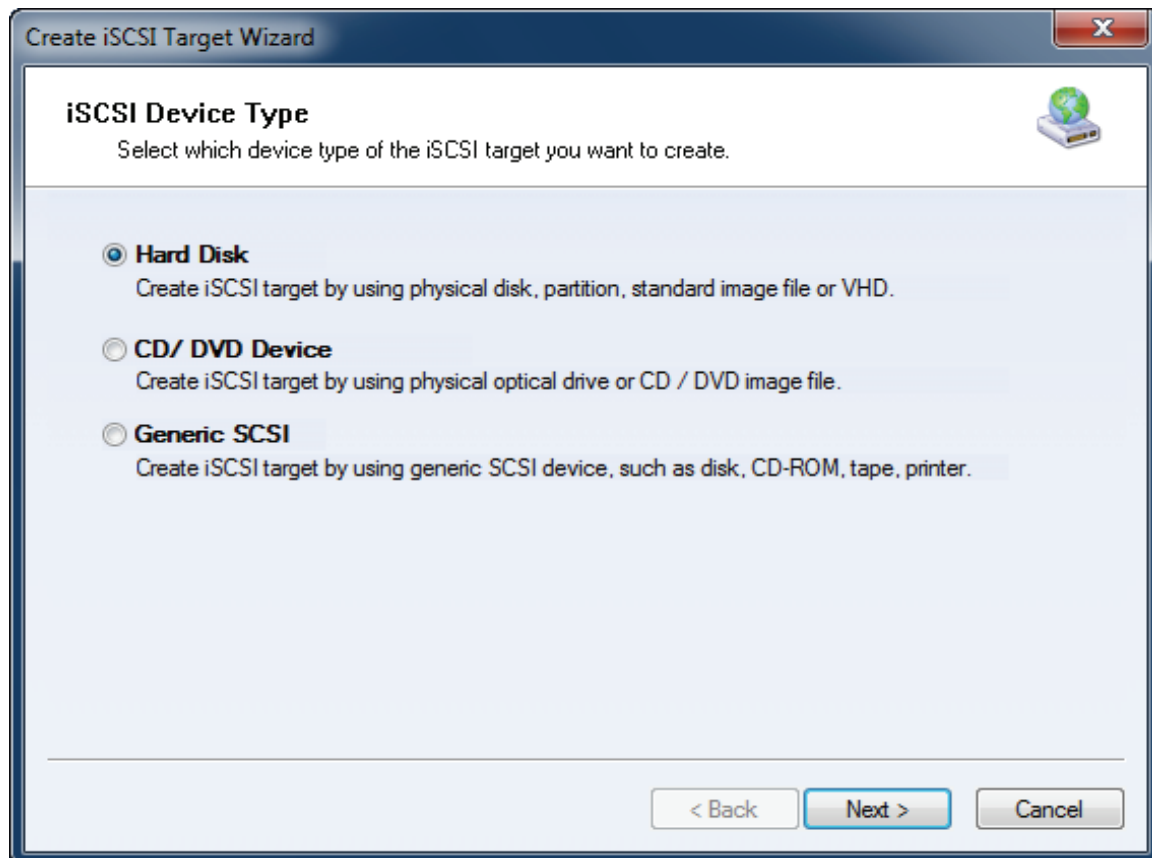
Create Target

Open **iStorage Server Management Console**.



Launch the **iStorage Server management console**, press the **Create** button on the toolbar, the **Create Device Wizard** is shown.

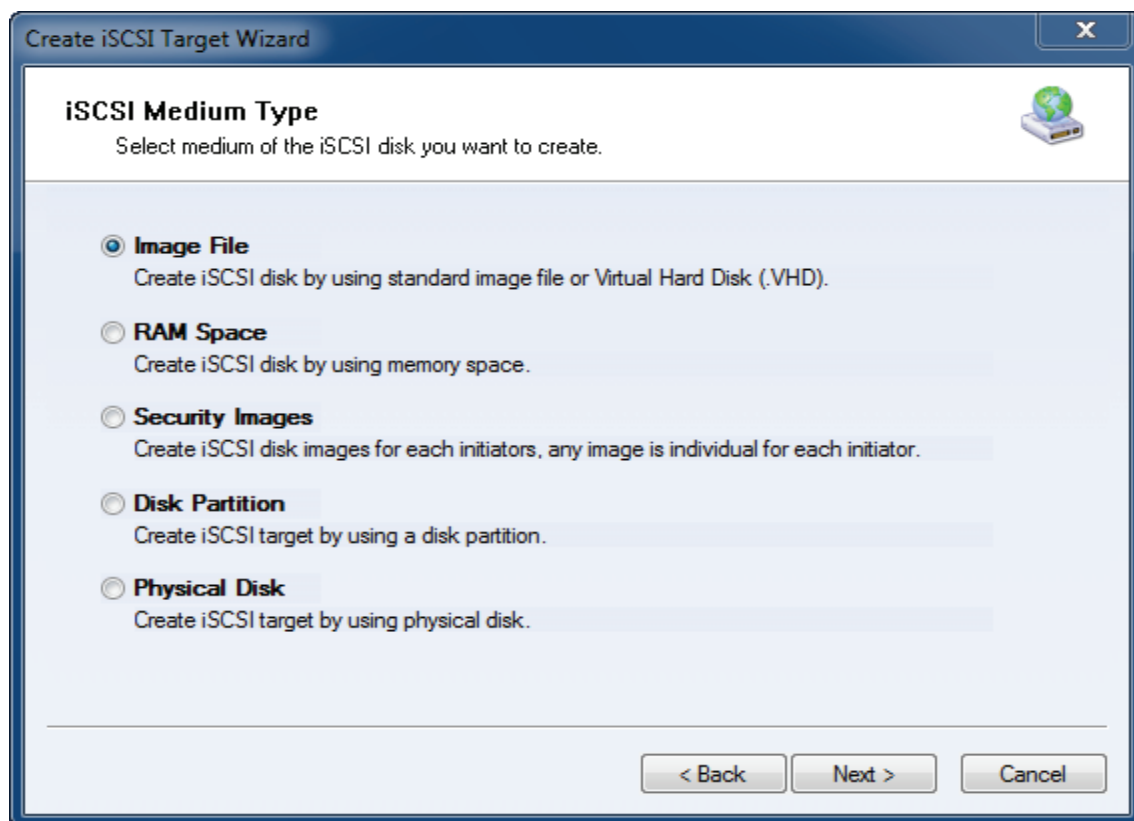
Select device type



Choose **Hard Disk**.

Press the **Next** button to continue.

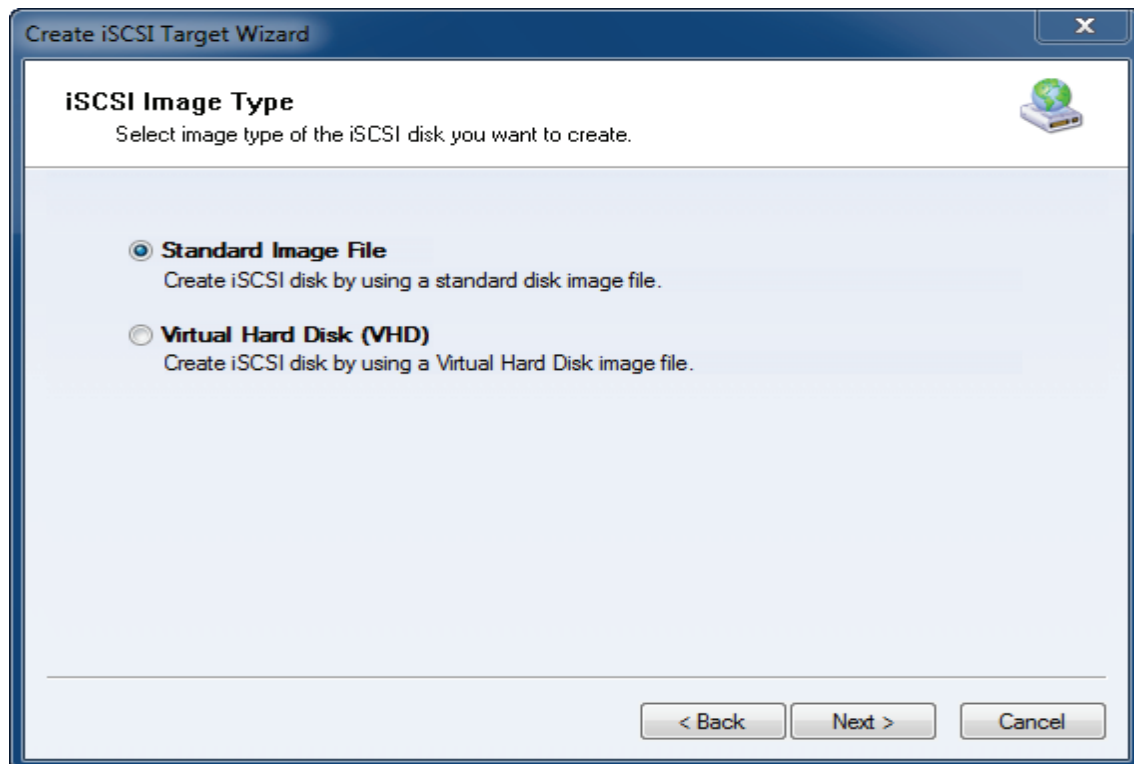
Select a medium type.



Choose **Image File** in **iSCSI Medium Type** window.

Then press **Next** button to continue.

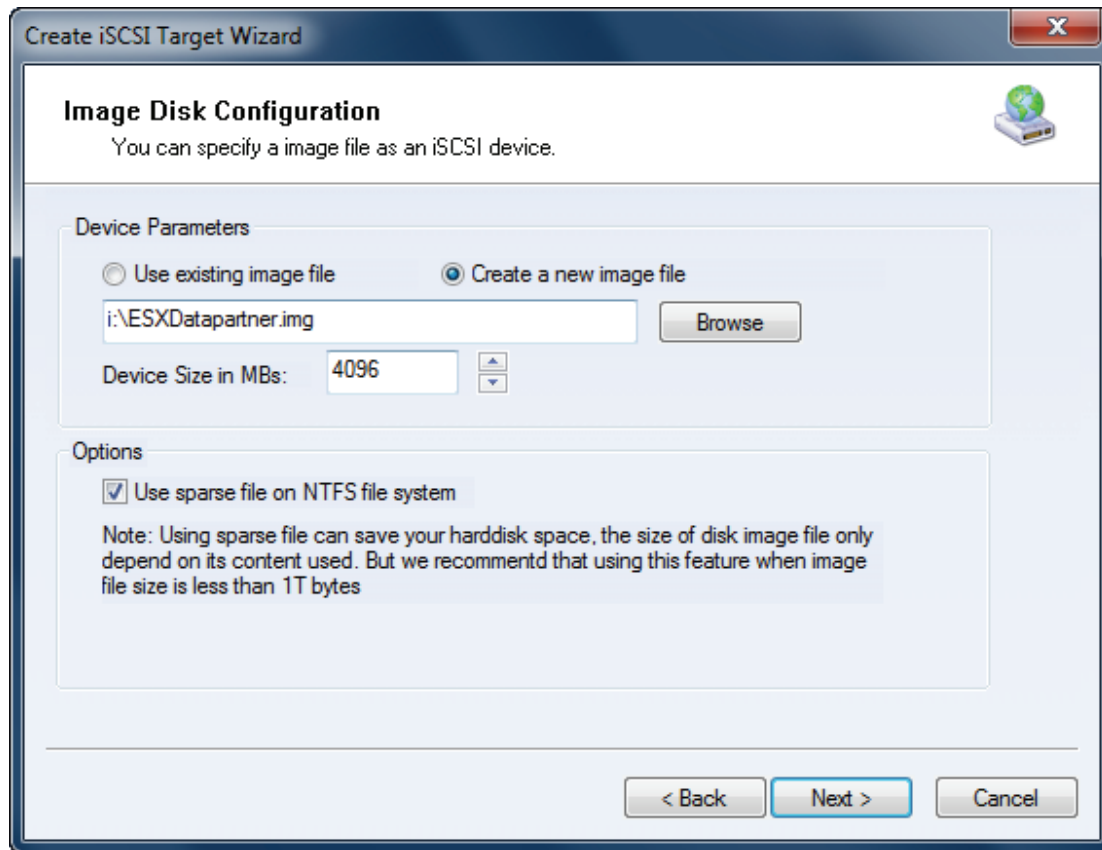
Select an Image type.



Choose **Standard Image File**.

Press the **Next** button to continue.

Specify image file path and size.



Choose **Create a new image file** to create a new image file or choose **Use existing image file** if you have a one.

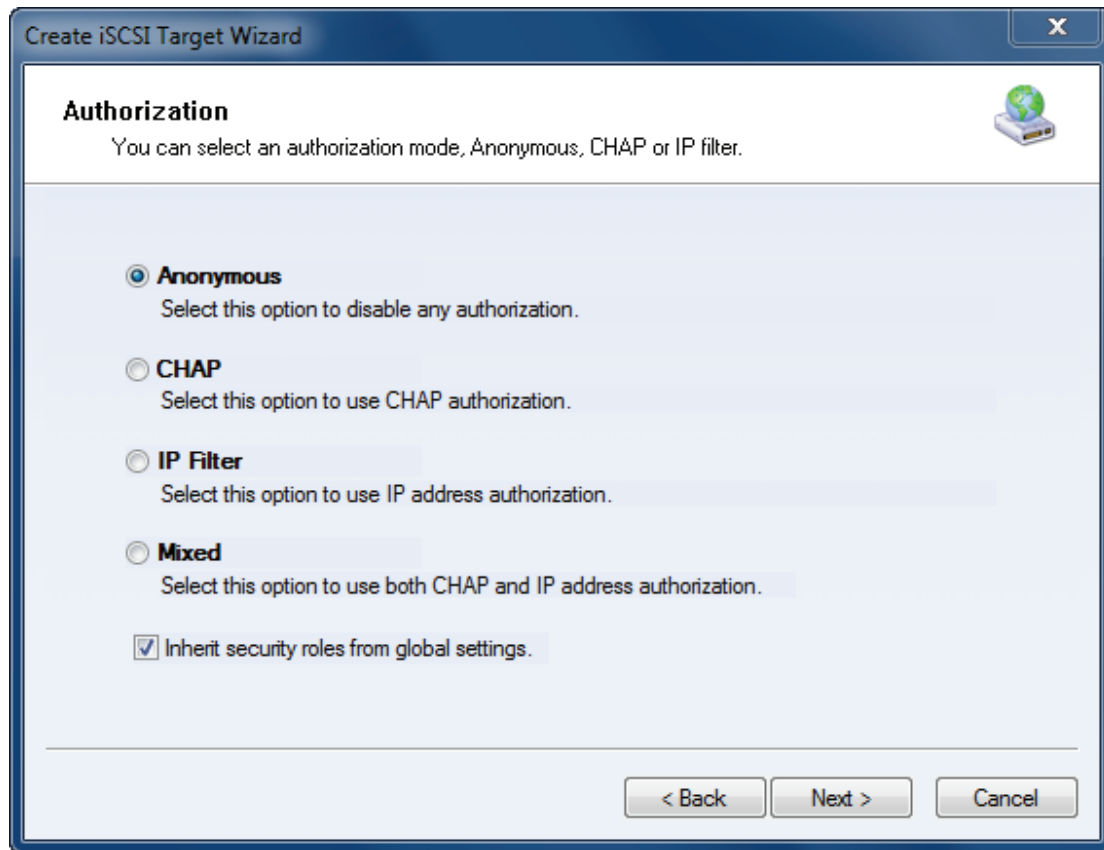
Specify image file full name path.

Specify the device size.

If you check **Use sparse file on NTFS file system**, the size of disk image file only depend on its content used, it can save your hard disk space.

Press the **Next** button to continue.

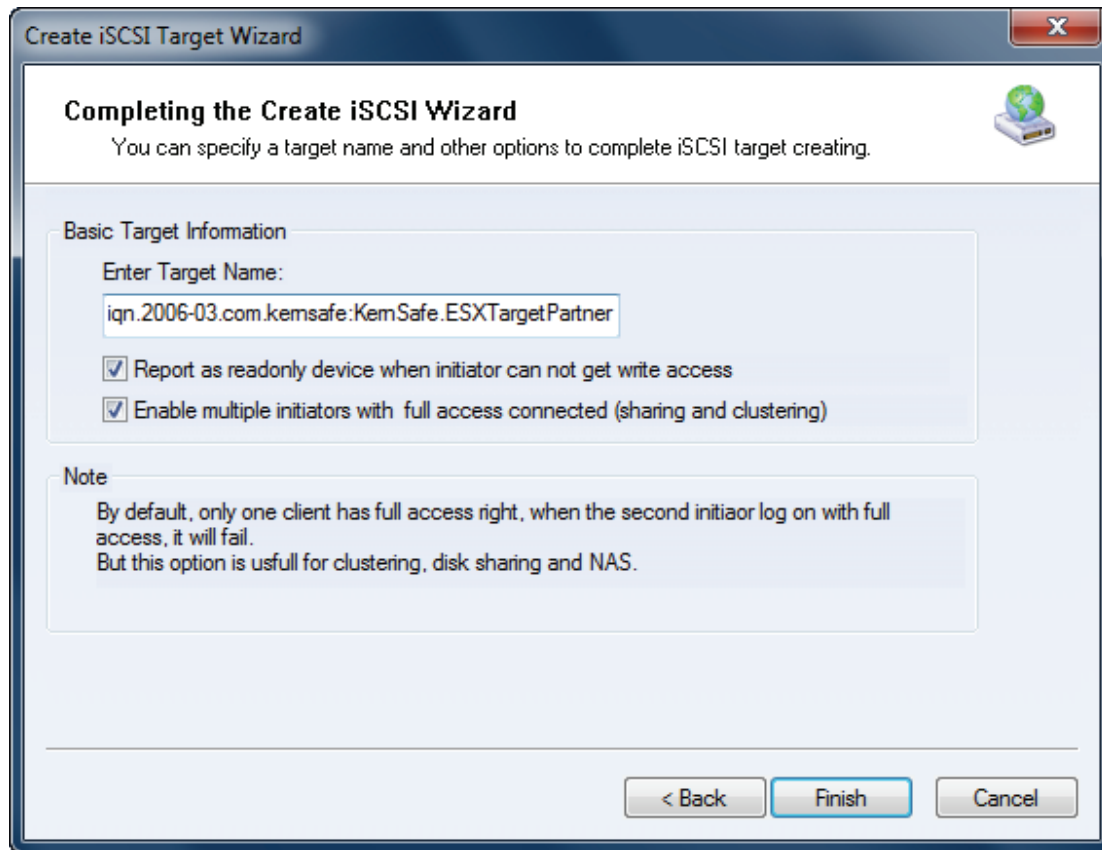
Set authorization mode.



Choose **Anonymous** Authorization.

Press the **Next** button to continue.

Finish creating iSCSI Target.



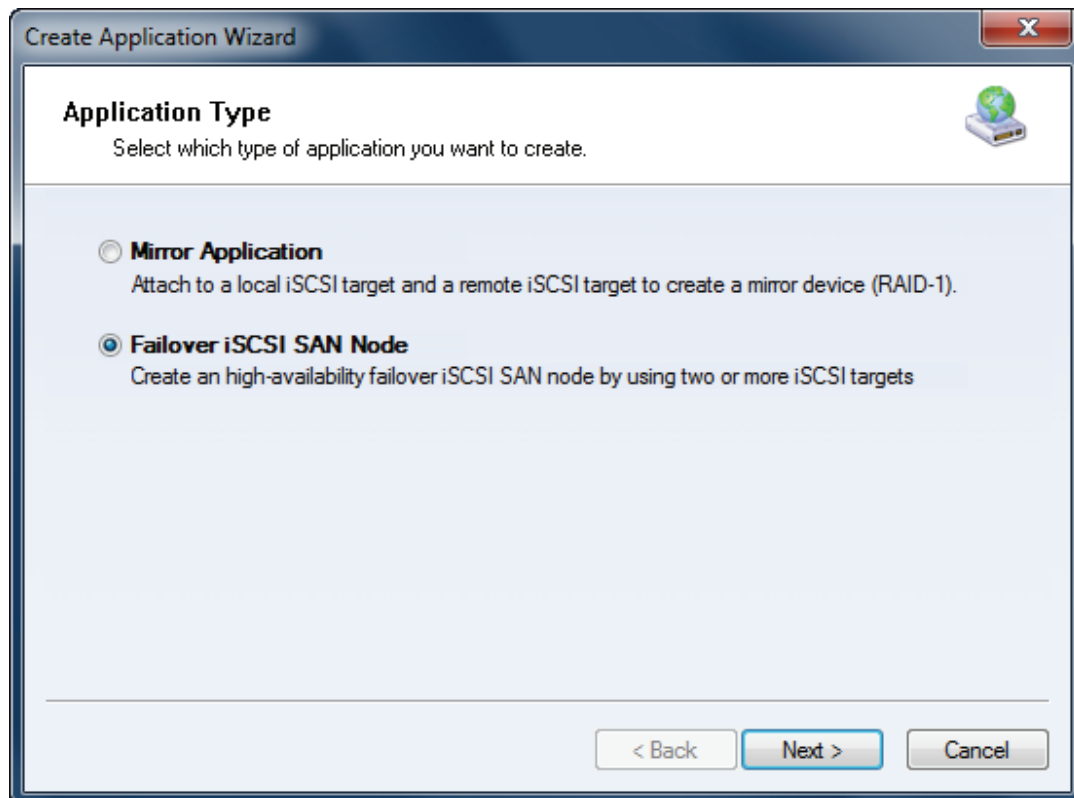
Type a target name in the Target Name field.

Check **Enable multiple initiators with full access connected (sharing and clustering)**.

Press the **Finish** button to continue.

Creating Application on server1

On Server1, right click **Applications** on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** window will be shown.



Choose **Failover iSCSI SAN Node**.

Then press **Next** to continue.

Create Application Wizard

Fail Over Configuration

You can specify two servers to fail over each other.

Base Target

Target Name	Device Type
☒ iqn.2006-03.com.kernsafe:KernSafe.ESXTarget	Disk

Mirror Target

Edit

< Back **Next >** **Cancel**

Check the **KernSafe.ESXTarget** storage and click **Edit** to find the mirror target.

Select iSCSI Target

iSCSI Source

Host Name: 192.168.0.111 Port: 3260

CHAP

☐ Use CHAP to login

User Name:

Secret:

Target

Target: iqn.2006-03.com.kernsafe:KernSafe.ESXTargetpartner

Discovery **OK** **Cancel**

Input the IP and port of server2 in **iSCSI Source** tab, then click **Discovery** on the bottom of the window to find the mirror target, choose the **KernSafe.ESXTargetpartner** in the down-list.

Press **OK** button to continue.

Note: If the target needs CHAP authorization, you should provide User name and secret to logon.

Create Application Wizard

Fail Over Configuration
You can specify two servers to fail over each other.

Base Target

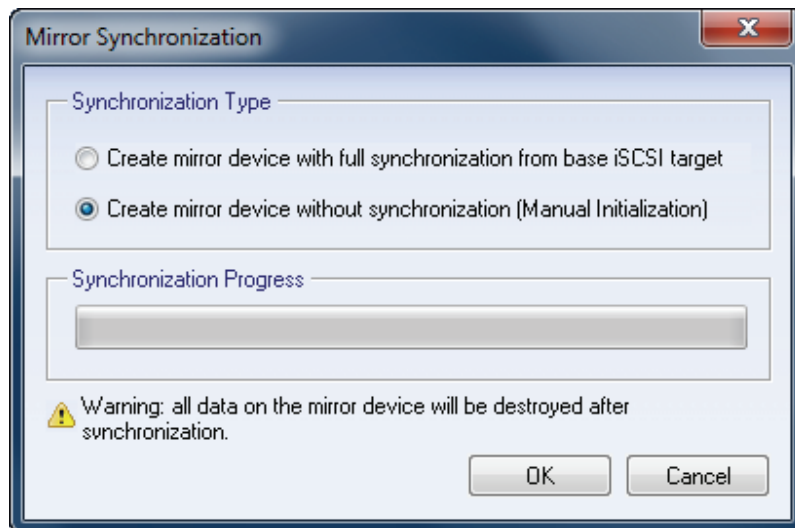
Target Name	Device Type
☒ iqn.2006-03.com.kemsafe:KemSafe.ESXTarget	Disk

Mirror Target

iqn.2006-03.com.kemsafe:KemSafe.ESXTargetpartner Edit

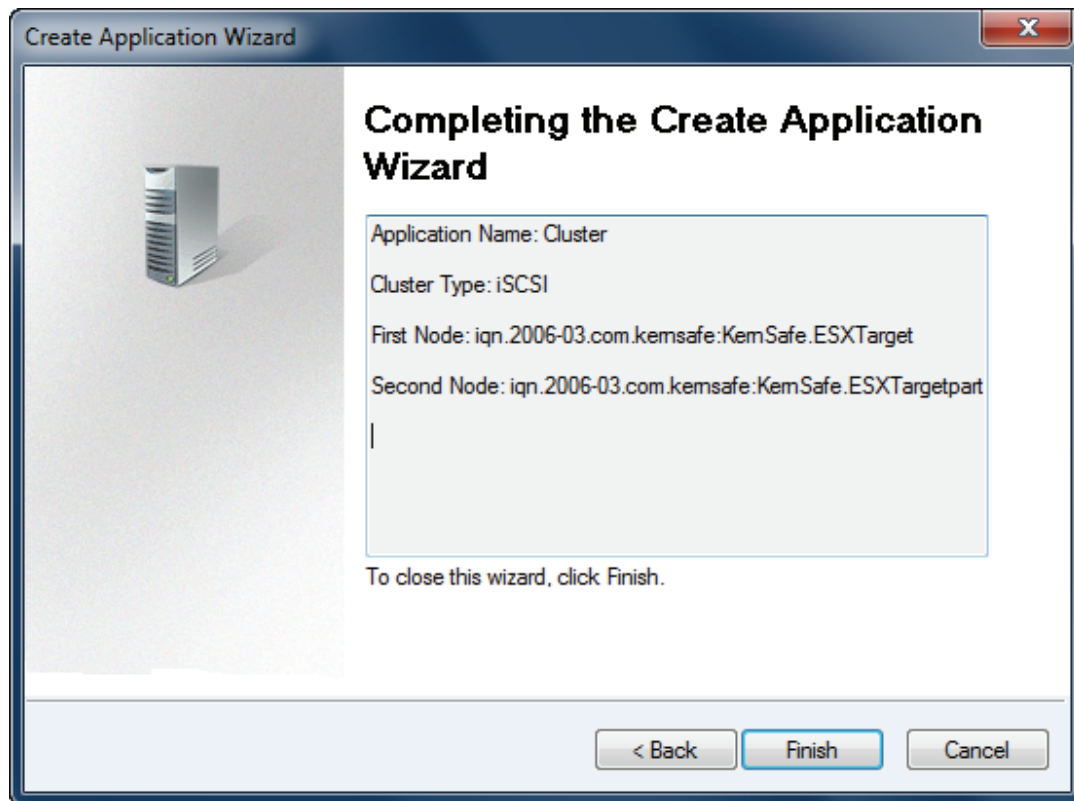
< Back Next > Cancel

The mirror target will be added to the window, then click **Next** button to continue.



Now, the mirror target should be synchronized to the base target, if the two targets are both the new one and do not be initialized, we can choose **Create mirror device without synchronization (Manual Initialization)**, otherwise, we must choose **Create mirror device with full synchronization from base iSCSI target**.

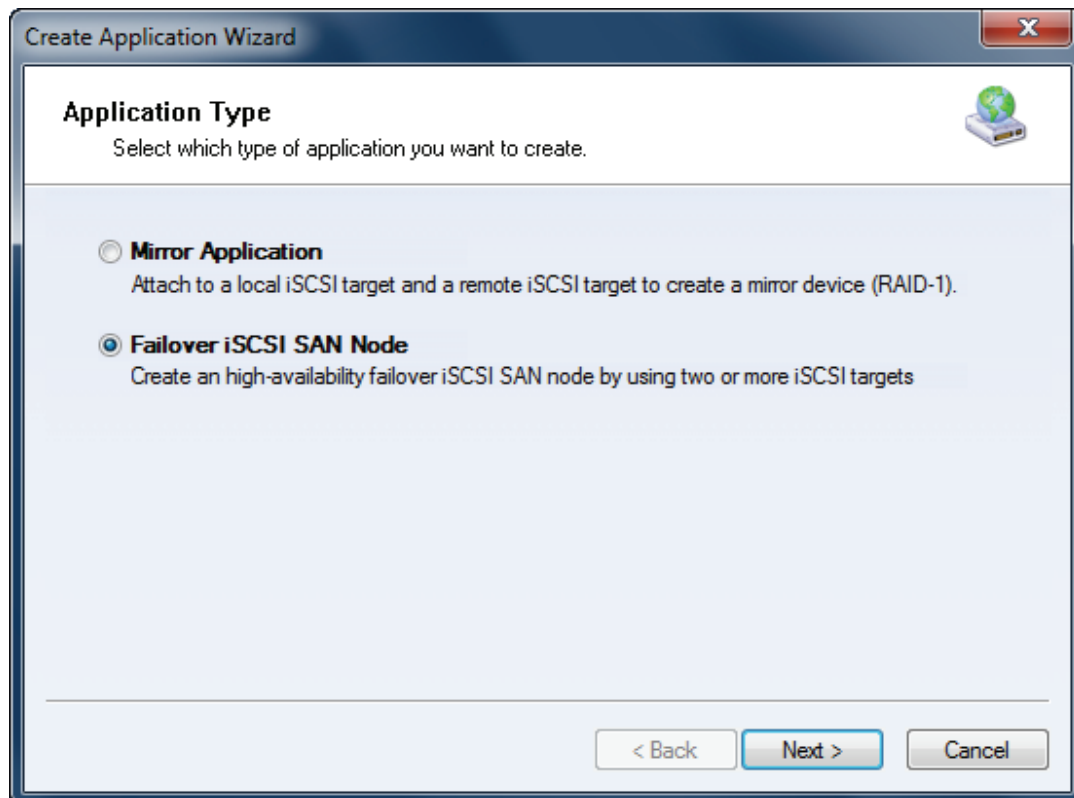
Press **OK** button to continue.



Click **Finish** button to complete the application creation.

Creating Application on server2

On Server2, right click **Applications** on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** window will be shown.



Choose **Failover iSCSI SAN Node**.

Then press **Next** to continue.

Create Application Wizard

Fail Over Configuration

You can specify two servers to fail over each other.

Base Target

Target Name	Device Type
☒ iqn.2006-03.com.kernsafe:KernSafe.ESXTargetpartner	Disk

Mirror Target

Edit

< Back **Next >** **Cancel**

Check the **KernSafe.ESXTargetpartner** storage and click **Edit** to find the mirror target.

Select iSCSI Target

iSCSI Source

Host Name: 192.168.0.195 Port: 3260

CHAP

☐ Use CHAP to login

User Name:

Secret:

Target

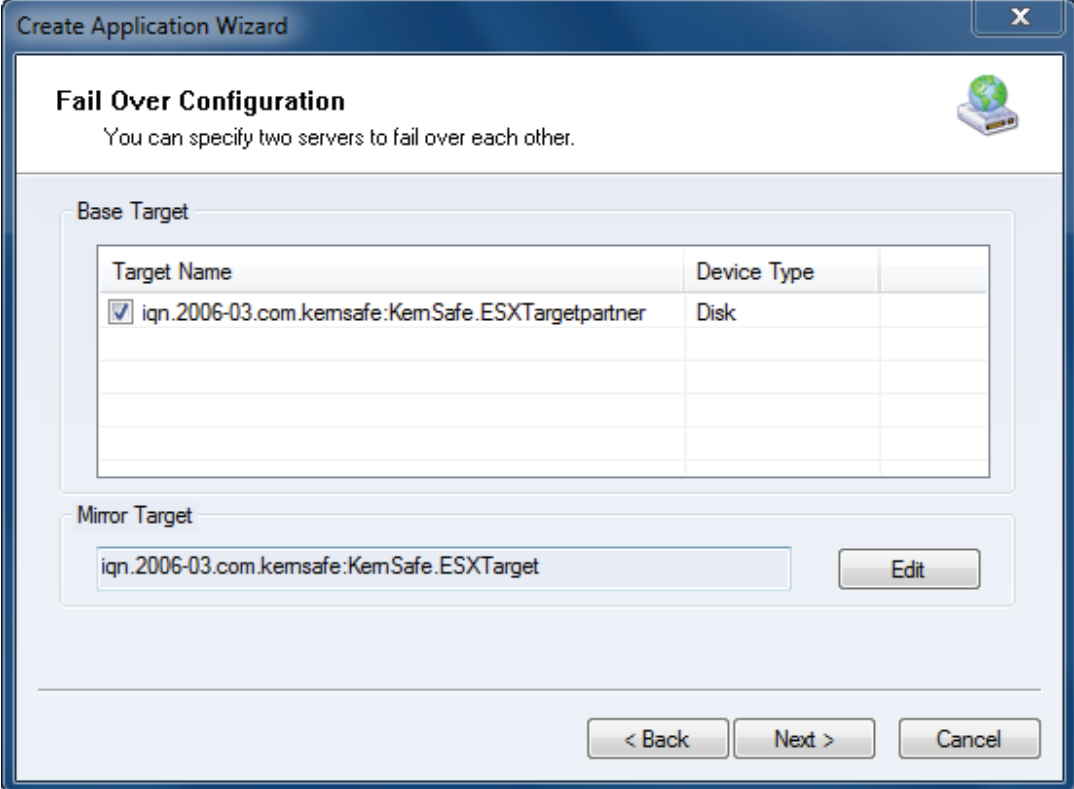
Target: iqn.2006-03.com.kernsafe:KernSafe.ESXTarget

Discovery **OK** **Cancel**

Input the IP and port of server1 in **iSCSI Source** tab, then click **Discovery** on the bottom of the window to find the mirror target, choose the **KernSafe.ESXTarget** in the down-list.

Press **OK** button to continue.

Note: If the target needs CHAP authorization, you should provide User name and secret to logon.



Create Application Wizard

Fail Over Configuration
You can specify two servers to fail over each other.

Base Target

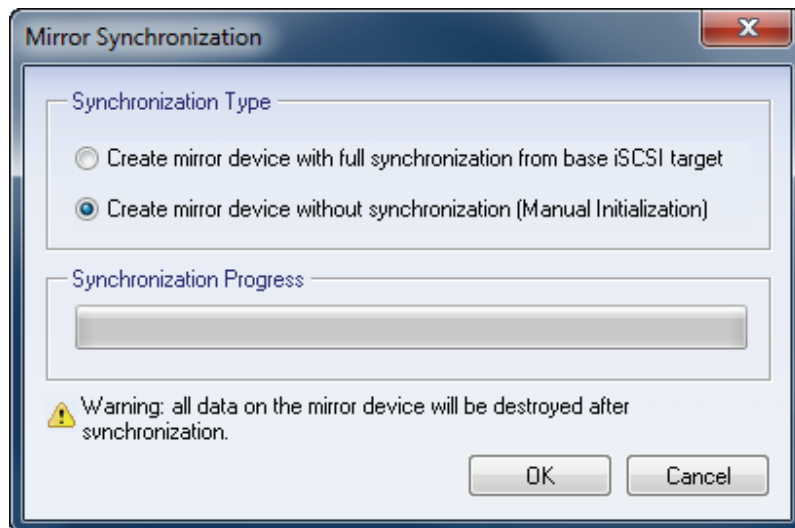
Target Name	Device Type
☒ iqn.2006-03.com.kemsafe:KemSafe.ESXTargetpartner	Disk

Mirror Target

iqn.2006-03.com.kemsafe:KemSafe.ESXTarget Edit

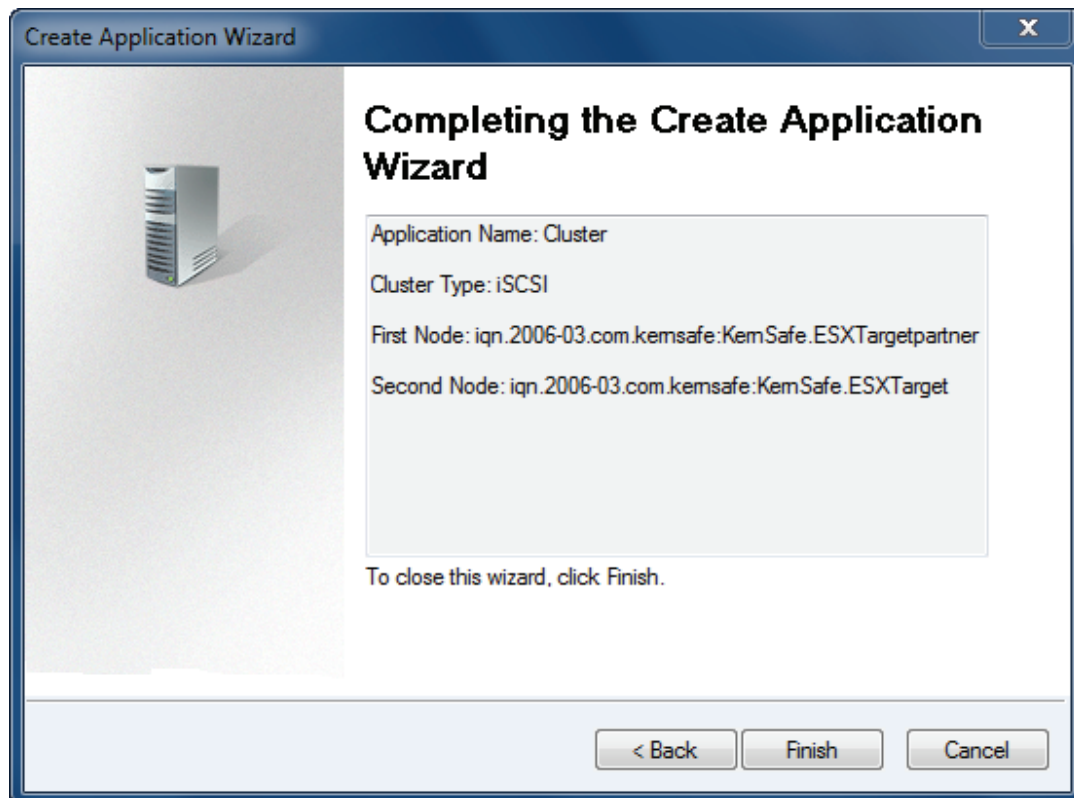
< Back Next > Cancel

The mirror target will be added to the window, then click **Next** button to continue.



Now, the mirror target should be synchronized to the base target, if the two targets are both the new one and do not be initialized, we can choose **Create mirror device without synchronization (Manual Initialization)**, otherwise, we must choose **Create mirror device with full synchronization from base iSCSI target**.

Press **OK** button to continue.

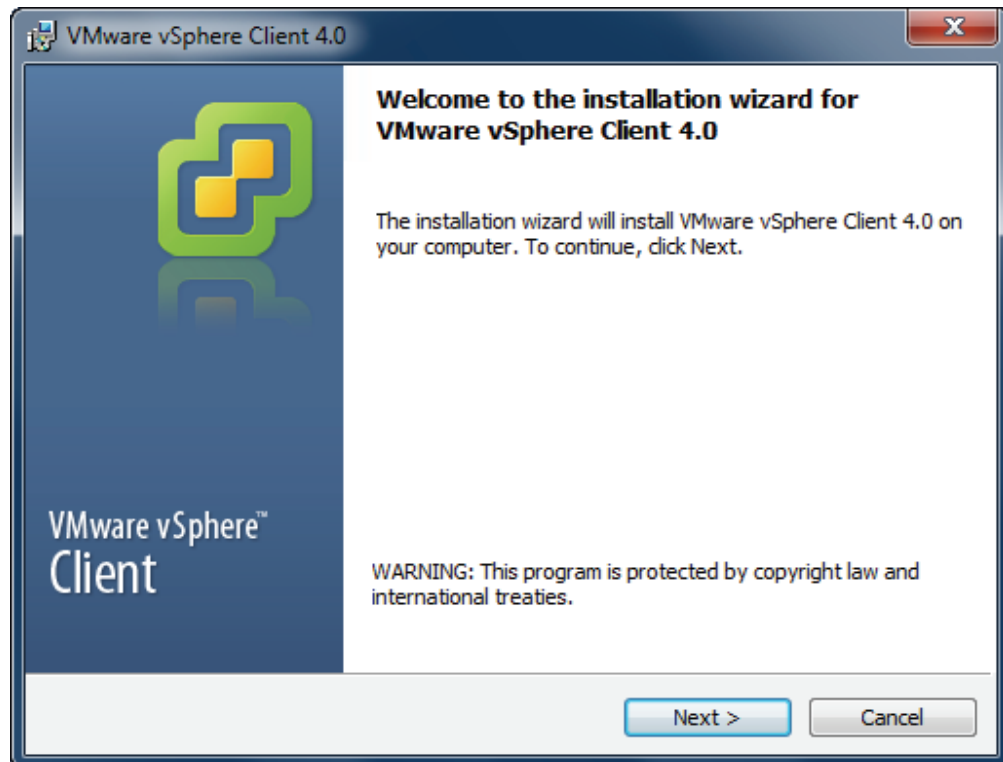


Click **Finish** button to complete the application creation.

Configure VMware ESX Server

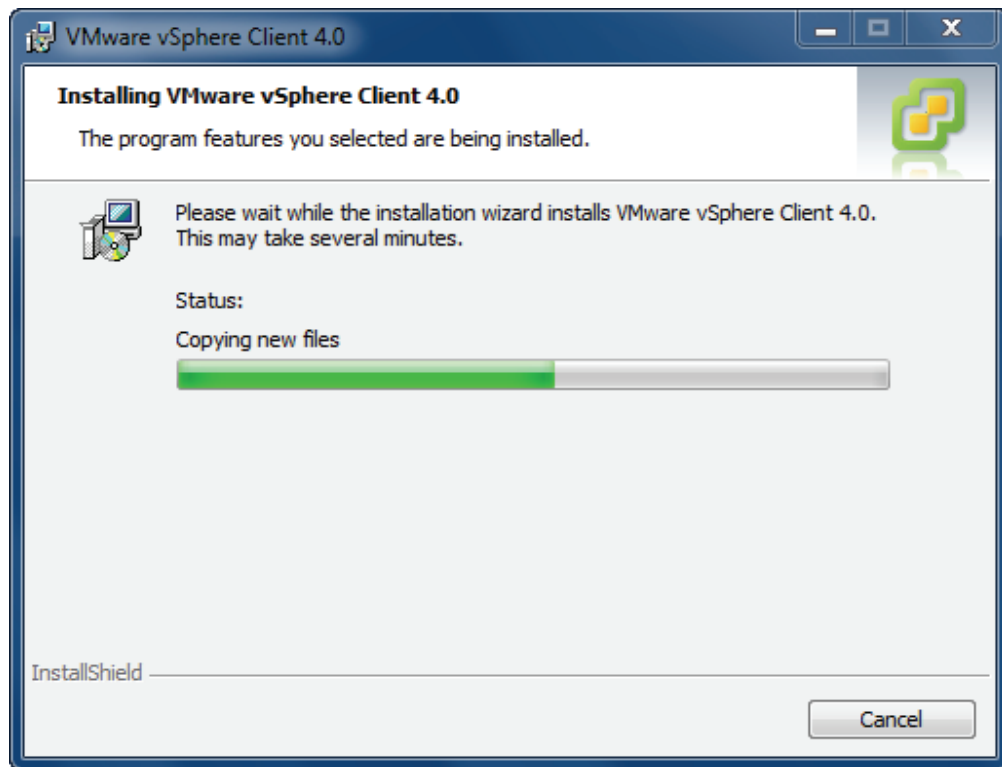
Install VMware Infrastructure Client 4.0

Run VMware Infrastructure Client installation, the following interface is shown.



Press the **Next** button to continue.

Install VMware Infrastructure Client.



After copying files is completed, press the **Finish** button to complete VMware Infrastructure Client installation.

Log on to ESX Server

Run VMware Infrastructure Client, VMware Infrastructure Client Log on dialog is shown.



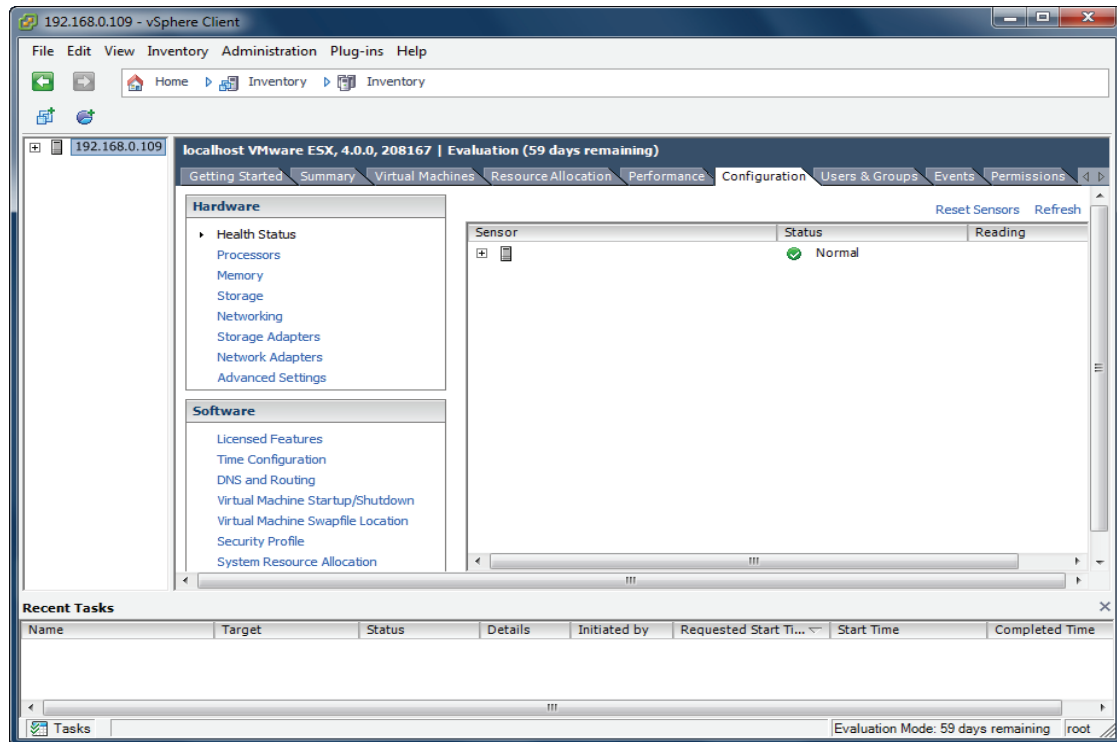
Type **IP address / Name** with which running ESX Server.

Type user name and password.

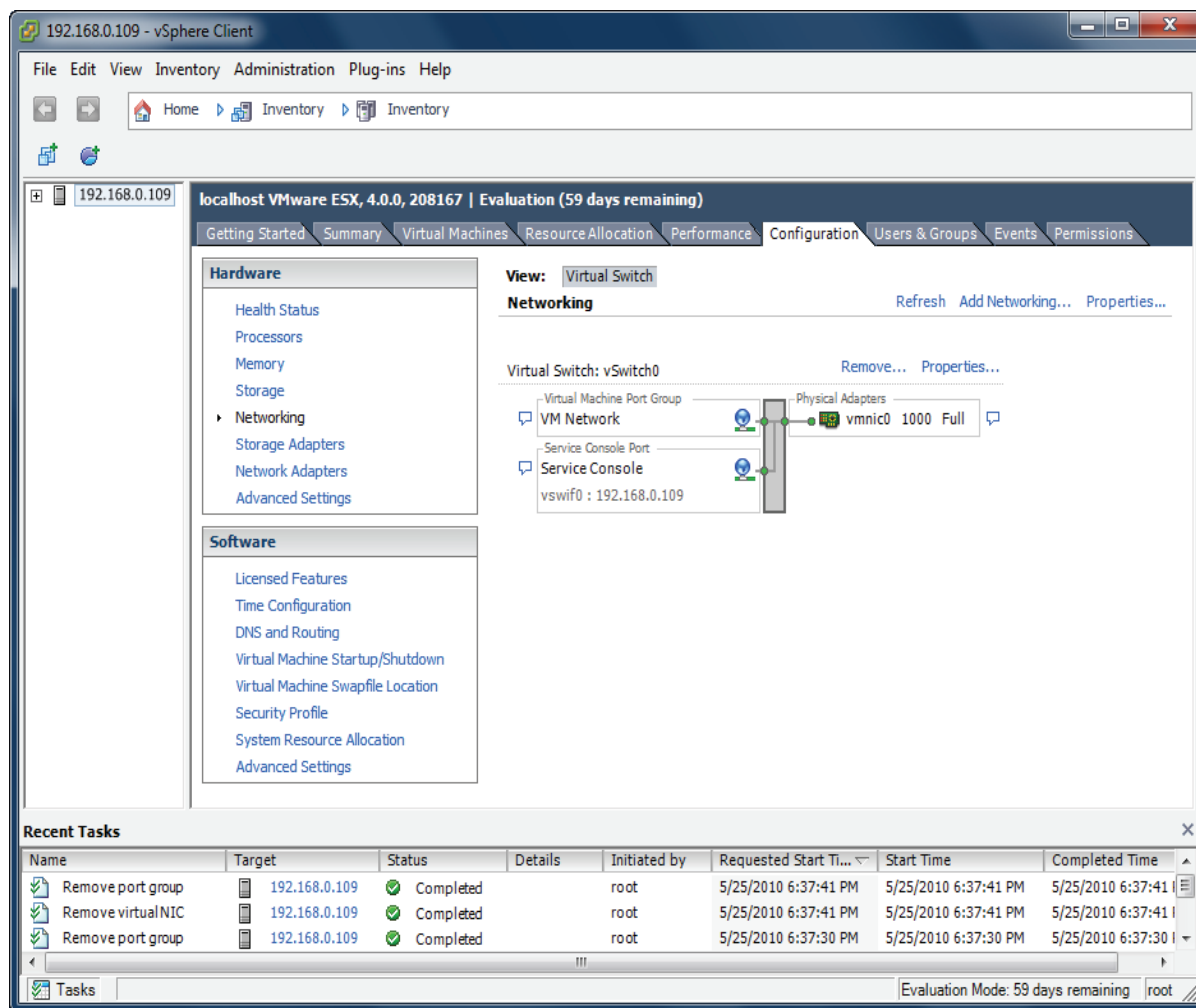
Press the **Login** button to continue.

Configure ESX Server's networking

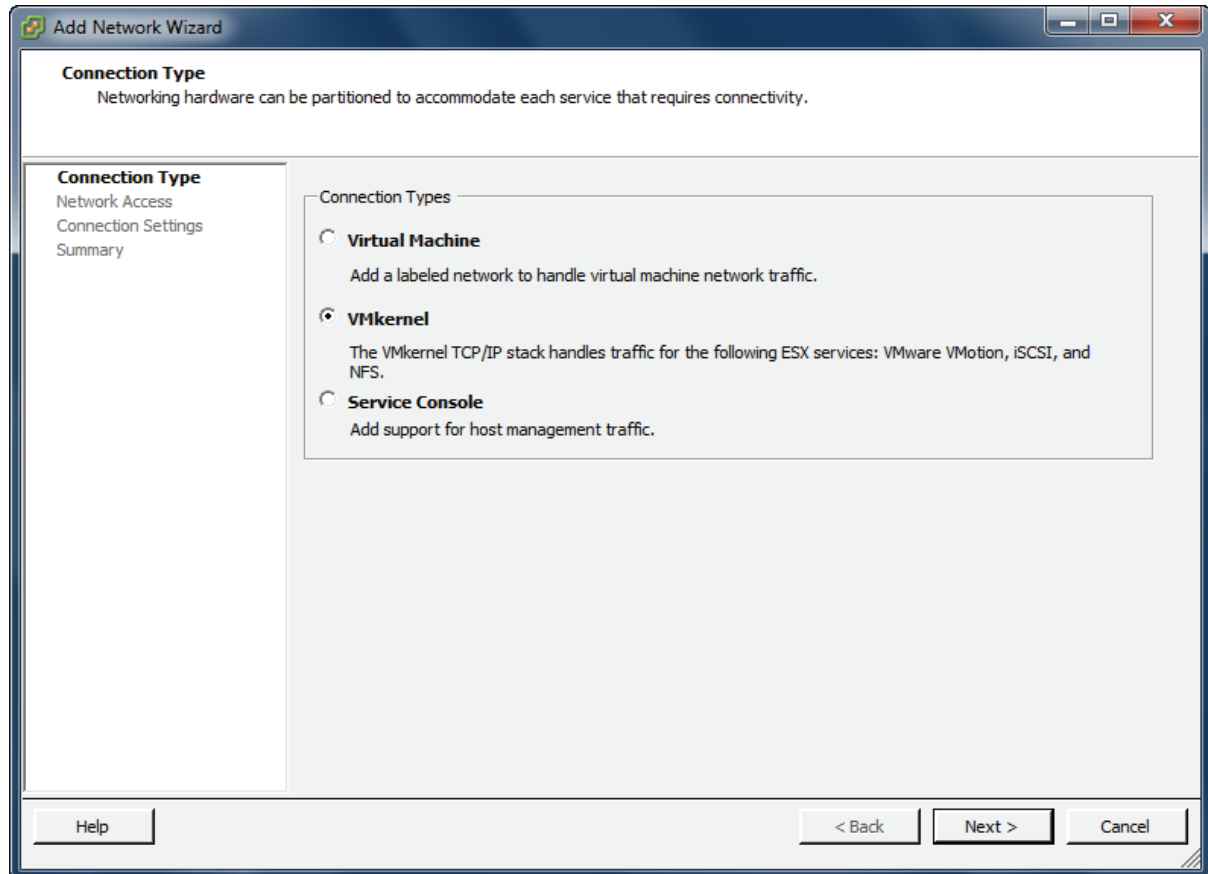
Open VMware Infrastructure Client.



Click **Networking** link in the **Hardware** group, the built-in Virtual Switch is shown.



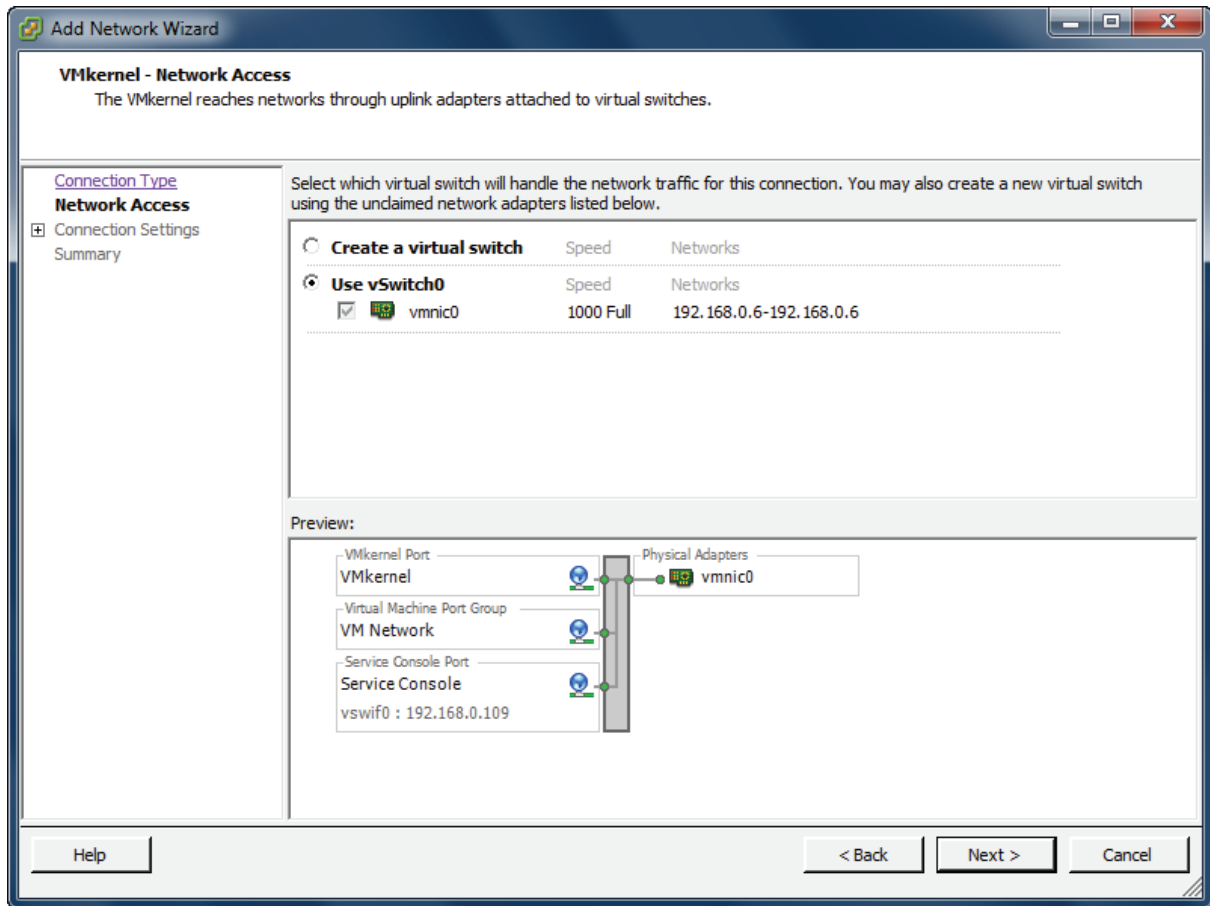
For using iSCSI, we need to create a new Network, click **Add Networking** link, an **Add Network Wizard** is shown.



On the first page of this wizard, select **VmKernel** which allows your virtual machines can use the iSCSI.

Press the **Next** button to continue.

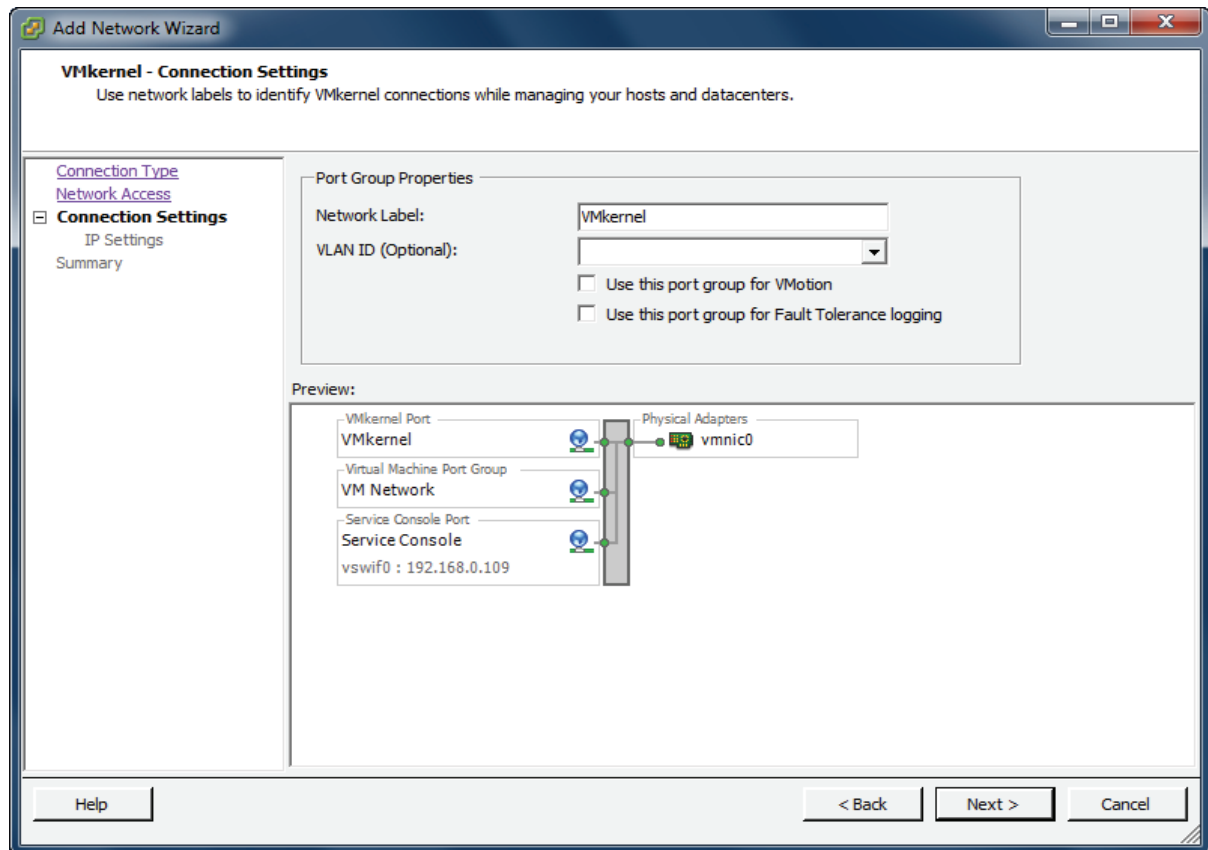
Select which virtual switch will handle the network traffic.



Select **User vSwitch0** option.

Press the **Next** button to continue.

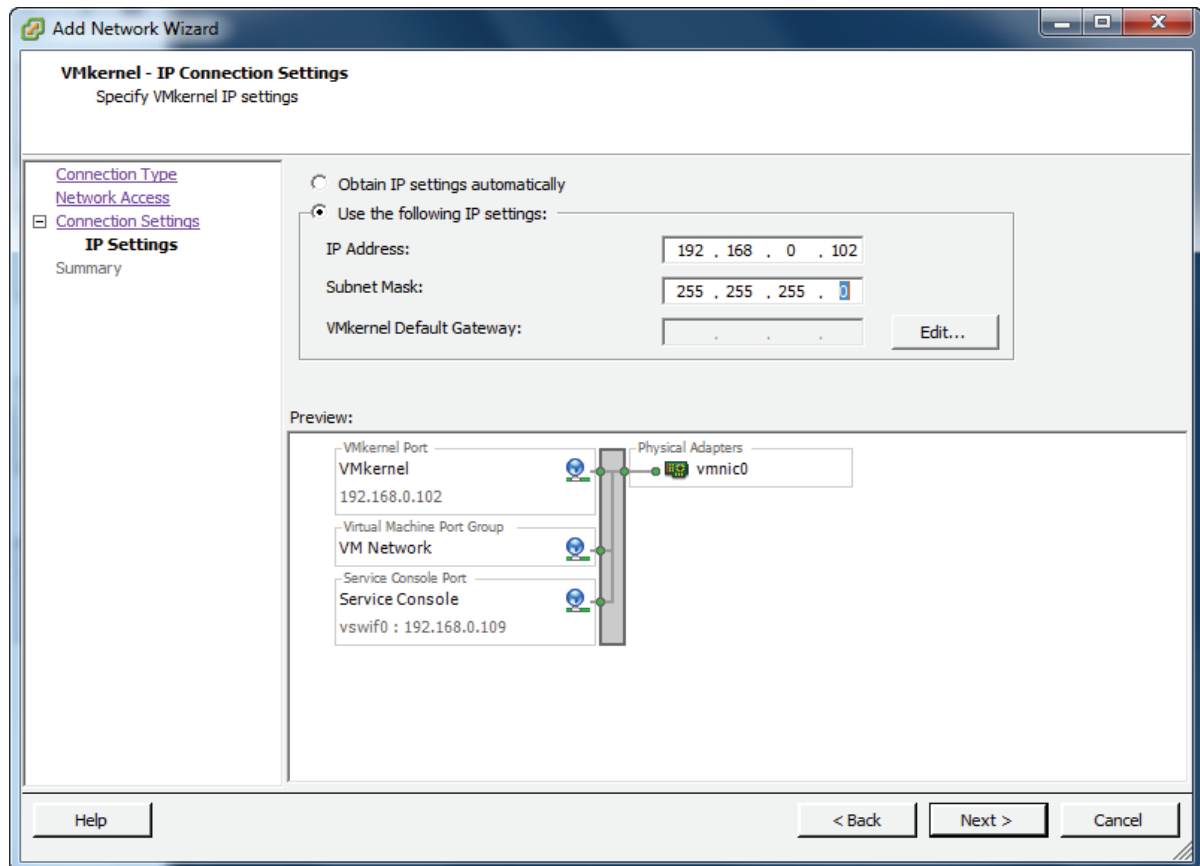
Type the identification of the network adapters.



Give the name of the new network.

Press the **Next** button to continue.

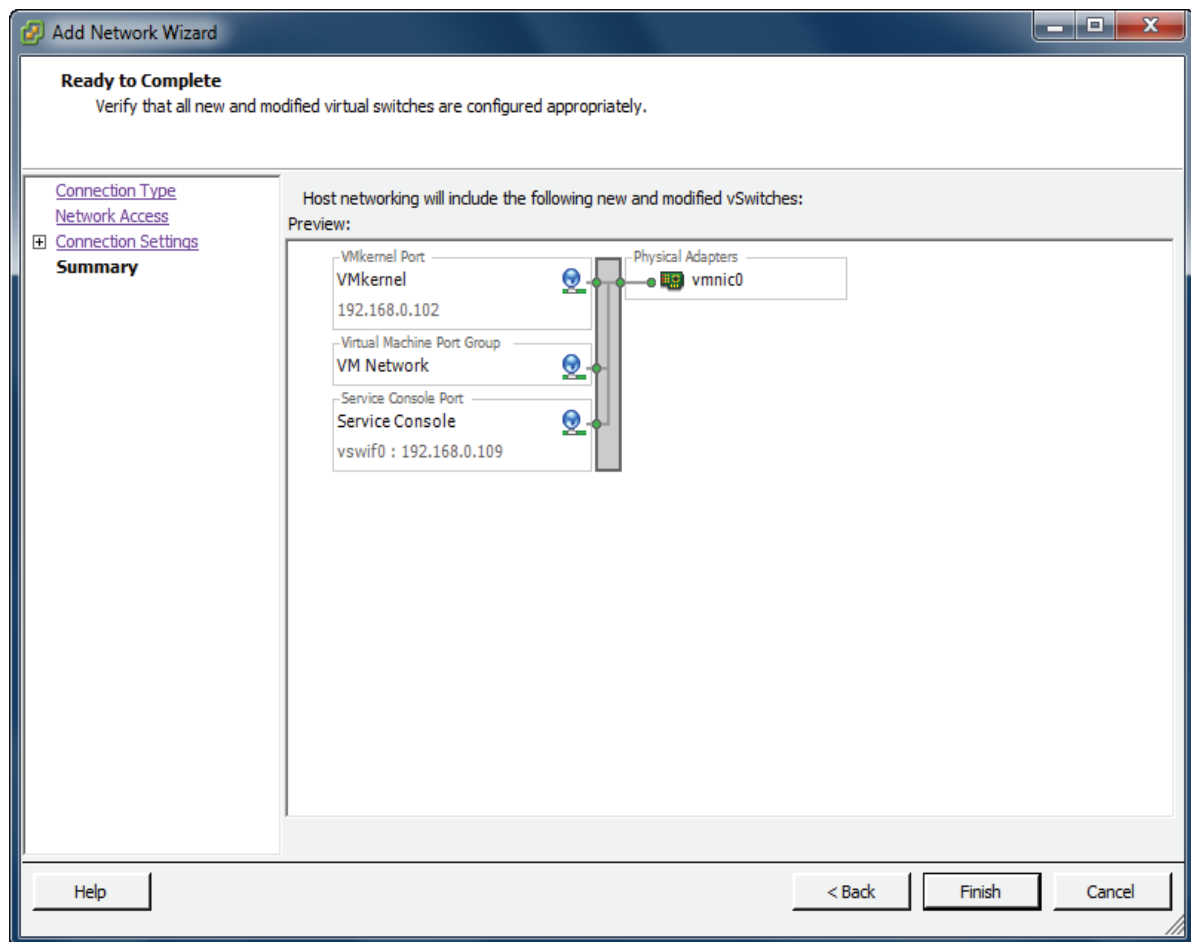
IP Settings



Input IP Address and Subnet mask, we take **192.168.0.102** and **255.255.255.0** as an example.

Press the **Next** button to continue.

Complete add networking



Check the parameters are correct and press the **Back** button if any changes are required.

Press the **Finish** button to complete creating adding network.

Configure iSCSI Storage

Click **Storage Adapters** link in the **Hardware** group.

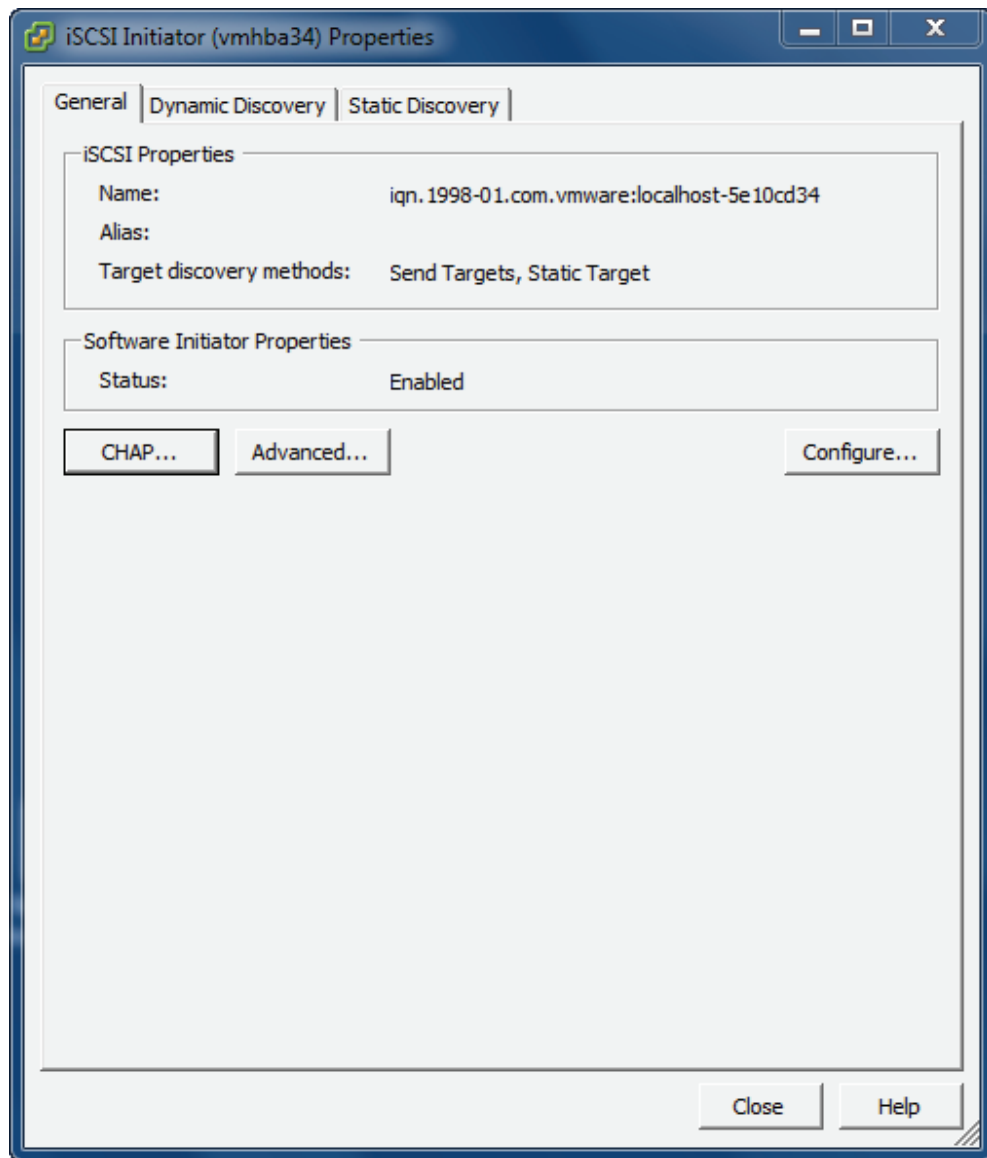
Click **Properties** link.

The **iSCSI Initiator (vmmhba34) Properties** Dialog is shown.

Now we need to disable **Delayed Ack**. Having Delayed Ack enabled can sometimes result in slow read performance that can interfere with High Availability between servers and SAN itself.

To read more about it, please visit:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1002598



To disable delayed Ack, please click on **Advanced...** button.

Then please scroll down and uncheck **Delayed Ack**.

Advanced Settings

Min: 10 Max: 30

NoopInterval

iSCSI option : No-Op Interval

Min: 1 Max: 60

InitR2T ☐

iSCSI option : Init R2T

ImmediateData ☒

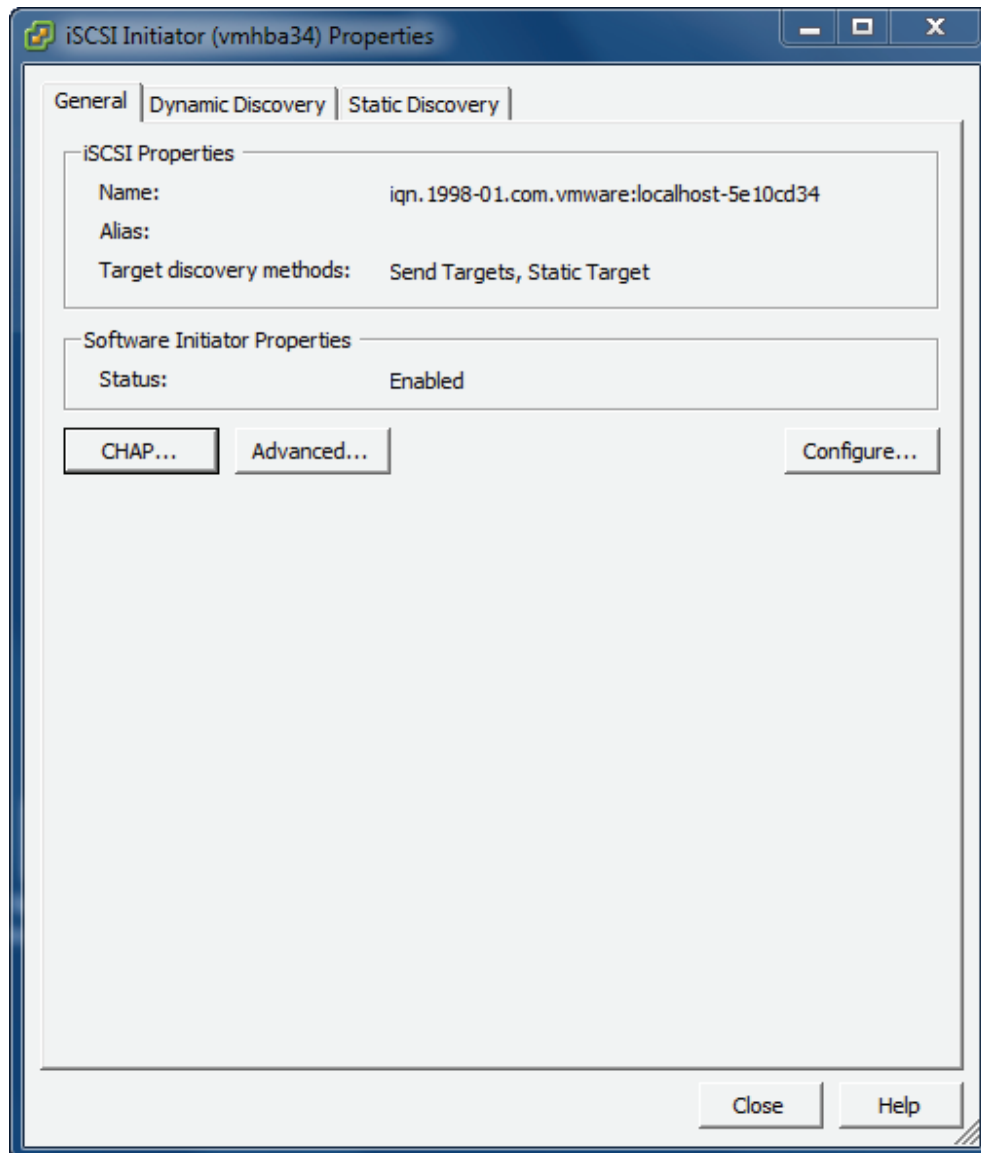
iSCSI option : Immediate Data

DelayedAck ☐

iSCSI option : Delayed Ack

OK Cancel Help

Press **OK** button to continue.

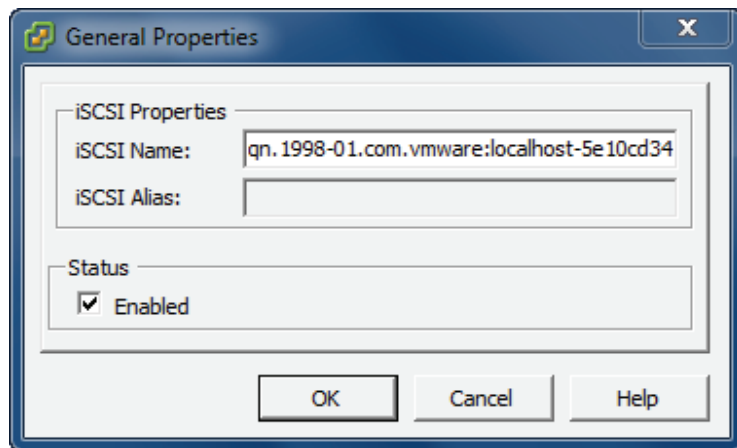


In the **General** page, press the **Configure...** button.

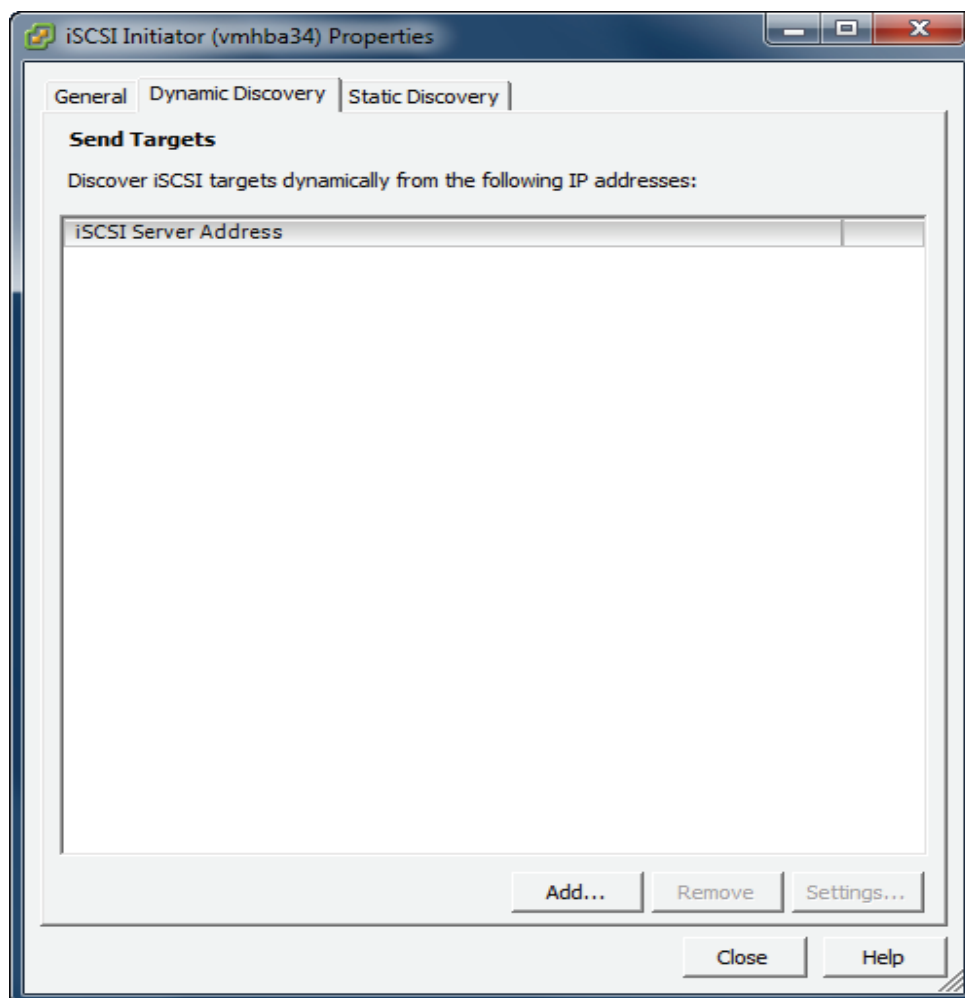
The **General Properties** dialog is shown.

Select **Enabled** check box in the **Status** group.

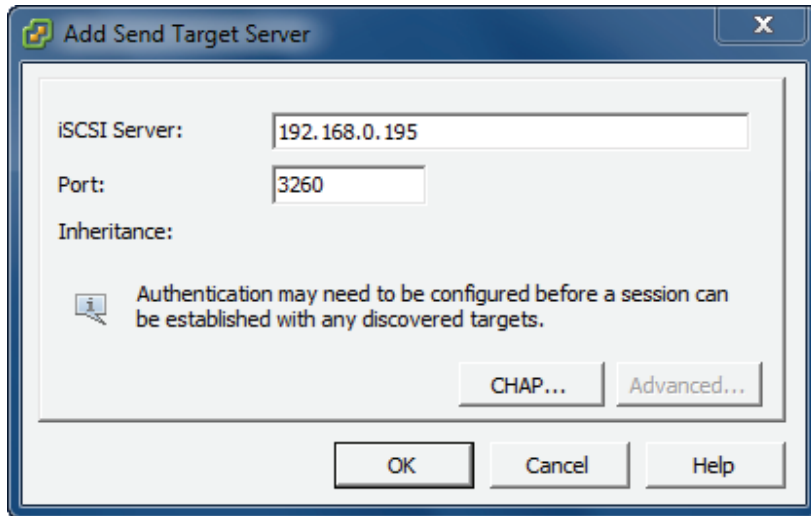
Press the **OK** button to continue.



Add iSCSI Target discovery.

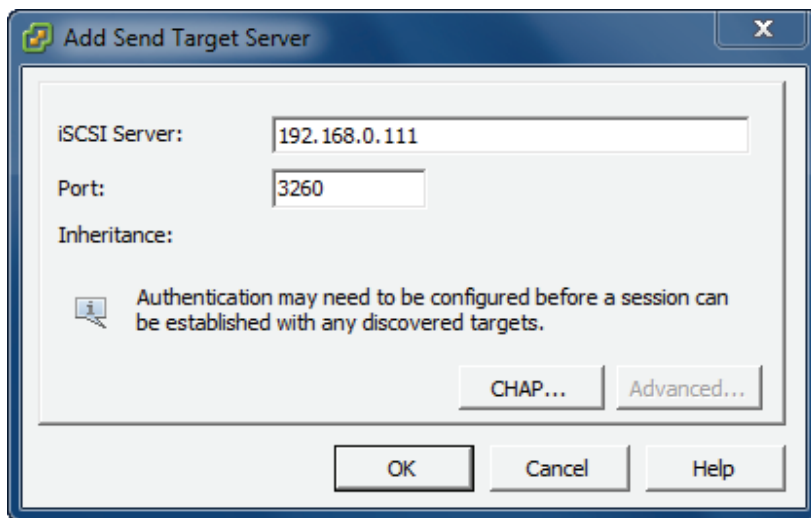


In **Dynamic Discovery** page, press the **Add** button, the **Add Send Targets Server** dialog is shown.



The dialog box is titled "Add Send Target Server" and contains the following fields and controls:

- iSCSI Server:** A text box containing the IP address "192.168.0.195".
- Port:** A text box containing the port number "3260".
- Inheritance:** A label with no associated input field.
- Information Message:** A message icon followed by the text: "Authentication may need to be configured before a session can be established with any discovered targets."
- Buttons:** "CHAP...", "Advanced...", "OK", "Cancel", and "Help".



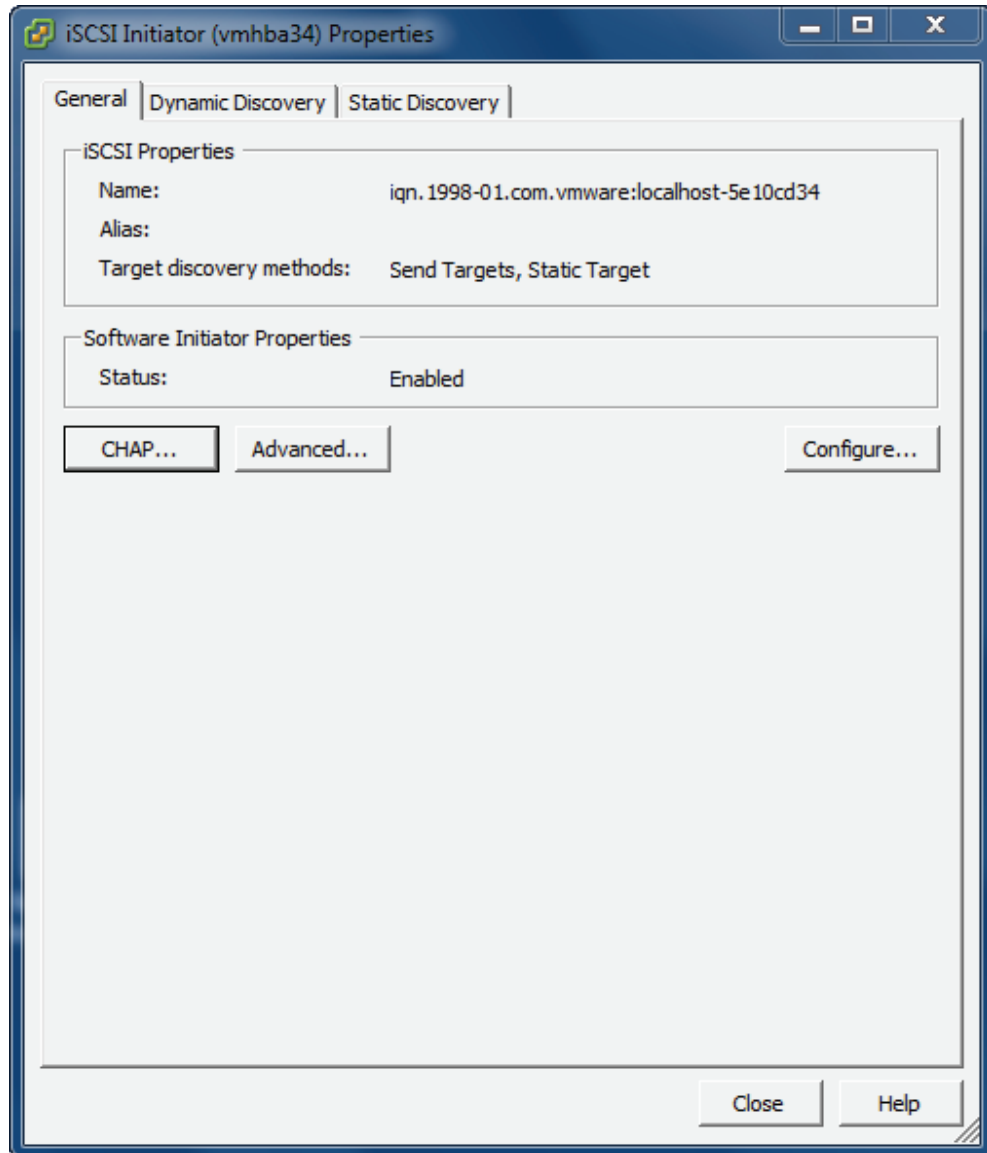
The dialog box is titled "Add Send Target Server" and contains the following fields and controls:

- iSCSI Server:** A text box containing the IP address "192.168.0.111".
- Port:** A text box containing the port number "3260".
- Inheritance:** A label with no associated input field.
- Information Message:** A message icon followed by the text: "Authentication may need to be configured before a session can be established with any discovered targets."
- Buttons:** "CHAP...", "Advanced...", "OK", "Cancel", and "Help".

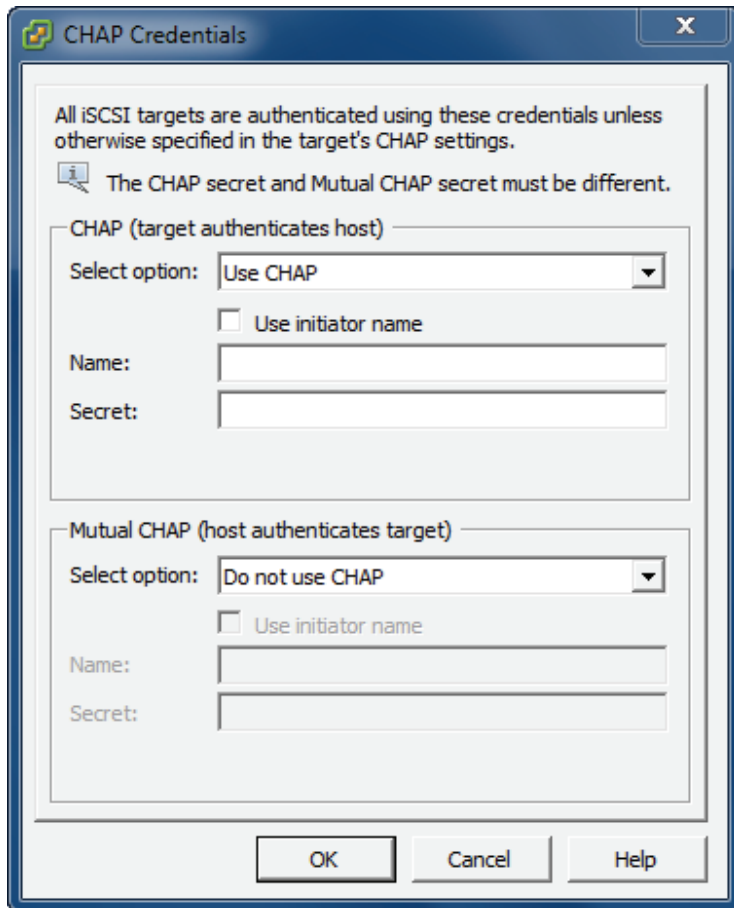
Input iSCSI Server address and port with which is running the iStorage Server.

Press the **OK** button to proceed.

Specify CHAP authentication information.



If you choose CHAP user authorization mode in target of iStorage Server, this step cannot be skipped.
Press the **CHAP** button, the **CHAP Credentials** dialog is shown.



The image shows a Windows-style dialog box titled "CHAP Credentials". At the top, it states: "All iSCSI targets are authenticated using these credentials unless otherwise specified in the target's CHAP settings." Below this is a warning icon and text: "The CHAP secret and Mutual CHAP secret must be different." The dialog is divided into two main sections. The first section is titled "CHAP (target authenticates host)". It contains a "Select option:" dropdown menu with "Use CHAP" selected. Below this is a checkbox labeled "Use initiator name" which is unchecked. There are two text input fields labeled "Name:" and "Secret:". The second section is titled "Mutual CHAP (host authenticates target)". It contains a "Select option:" dropdown menu with "Do not use CHAP" selected. Below this is a checkbox labeled "Use initiator name" which is unchecked. There are two text input fields labeled "Name:" and "Secret:". At the bottom of the dialog are three buttons: "OK", "Cancel", and "Help".

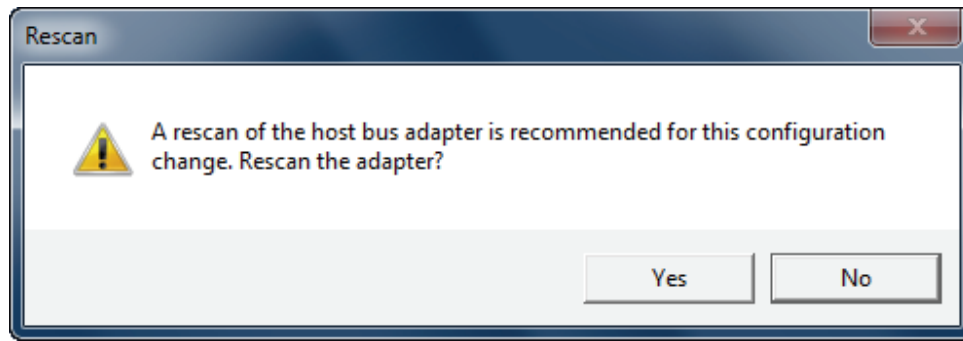
Type CHAP user name and secret in the **CHAP (target authenticates host)** group.

If you do not choose CHAP authentication, you should select **Do not Use CHAP**.

Press the **OK** button in this dialog.

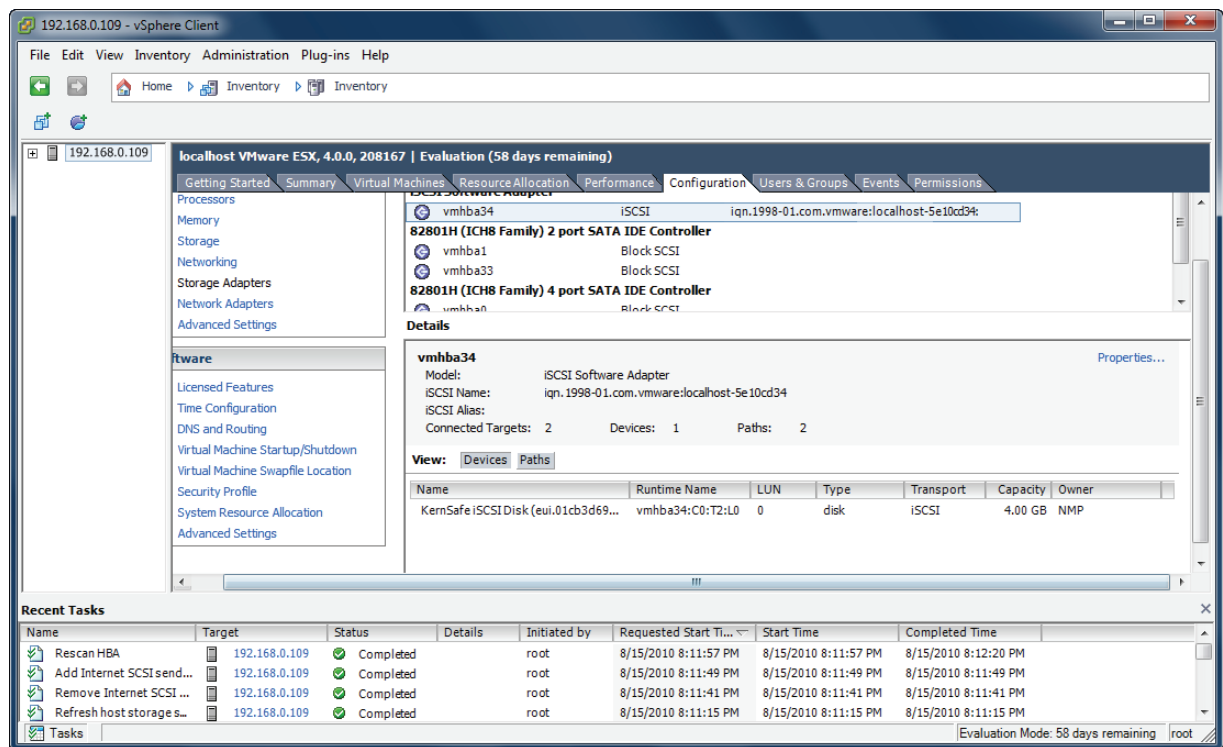
Press the **Close** button in the **iSCSI Initiator (vmmhba34) Properties** dialog to finish iSCSI Target configuration.

A prompt dialog is shown.



Press the **Yes** button to continue.

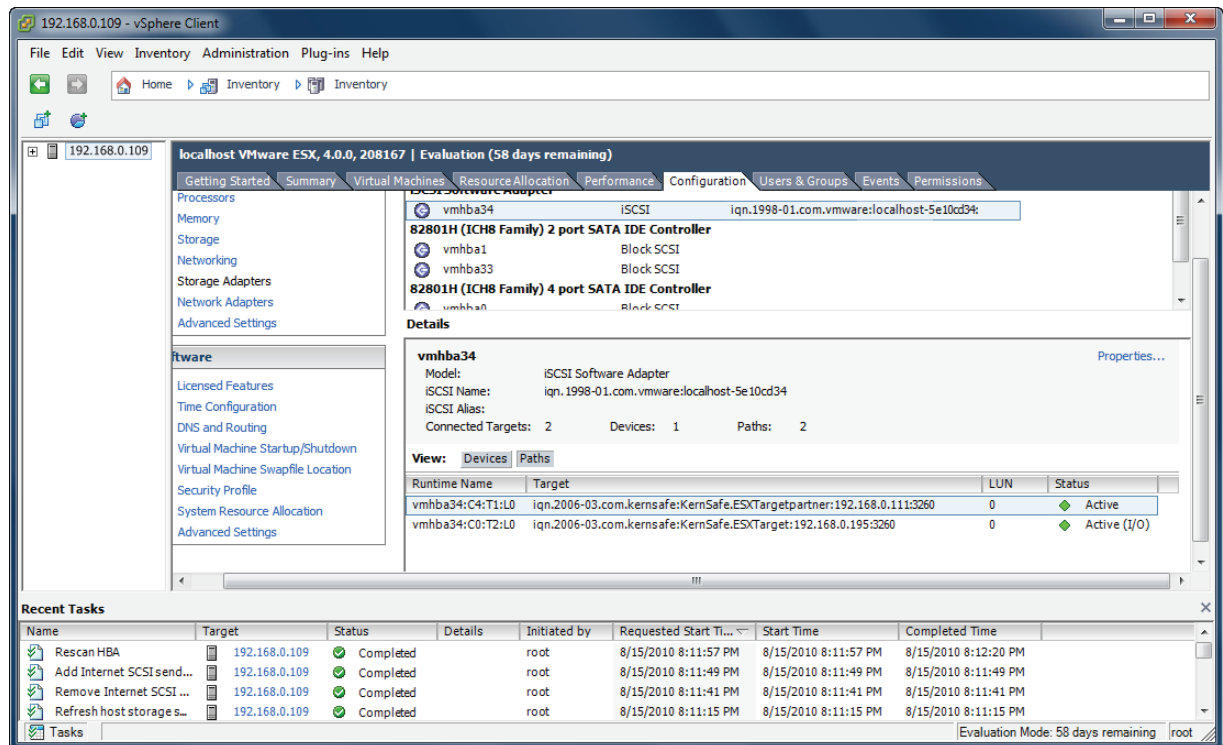
Please wait for a while, you will find an iSCSI device appears in the following interface:



Now, the iSCSI configuration is completed.

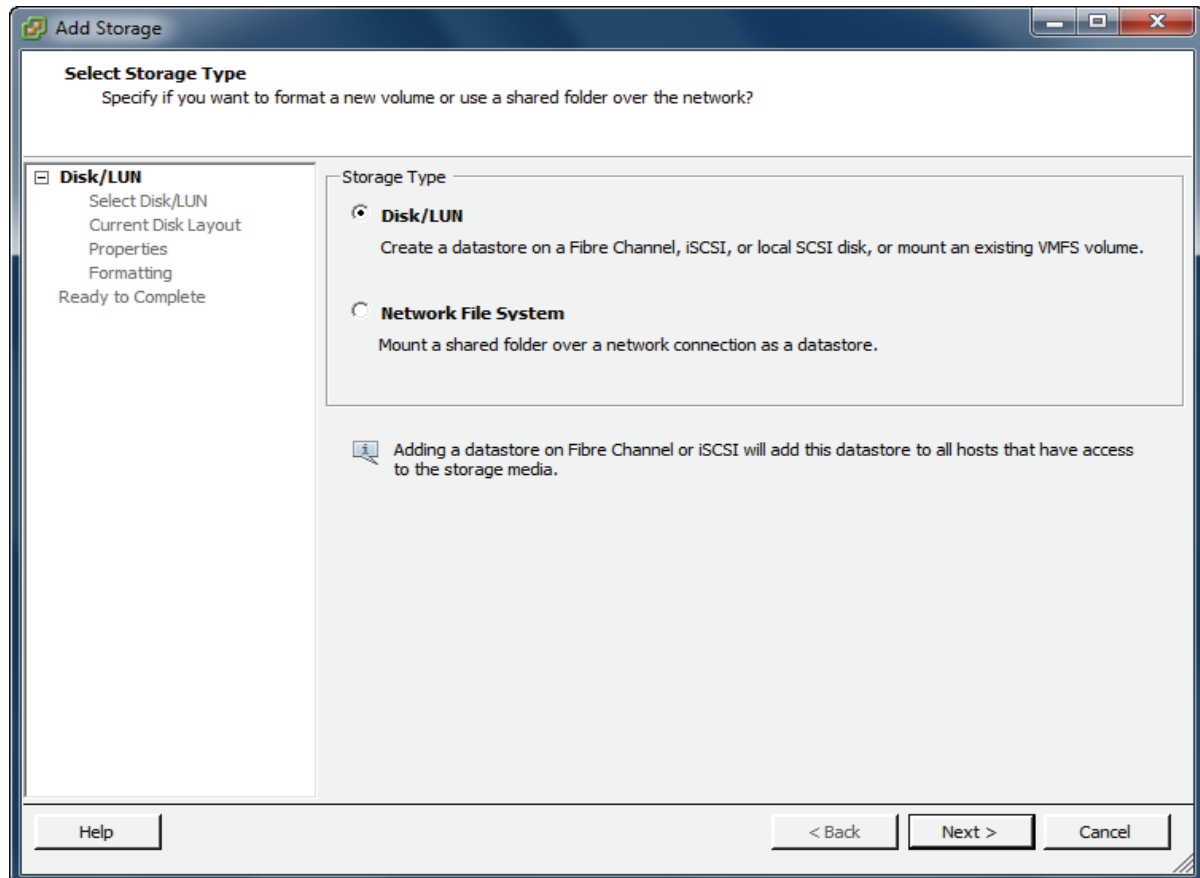
You will see there are two targets are connected but one device is shown in the table.

Click **Paths** label in the **View** panel, you will see two paths which are connected to the device and the status is active.



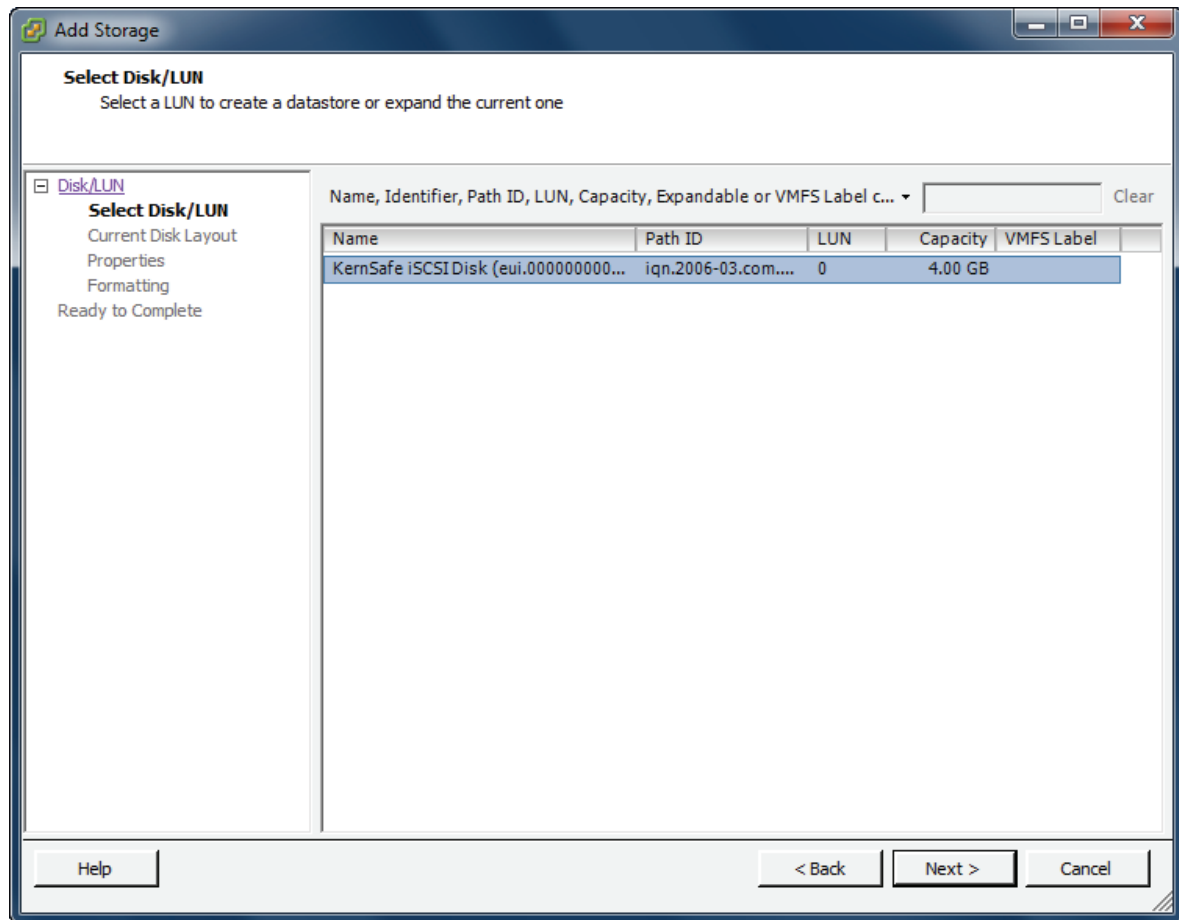
Configure Storage device

Click **Storage** link in the **Hardware** group.



Click **Add Storage** link, the **Add Storage Wizard** is shown.

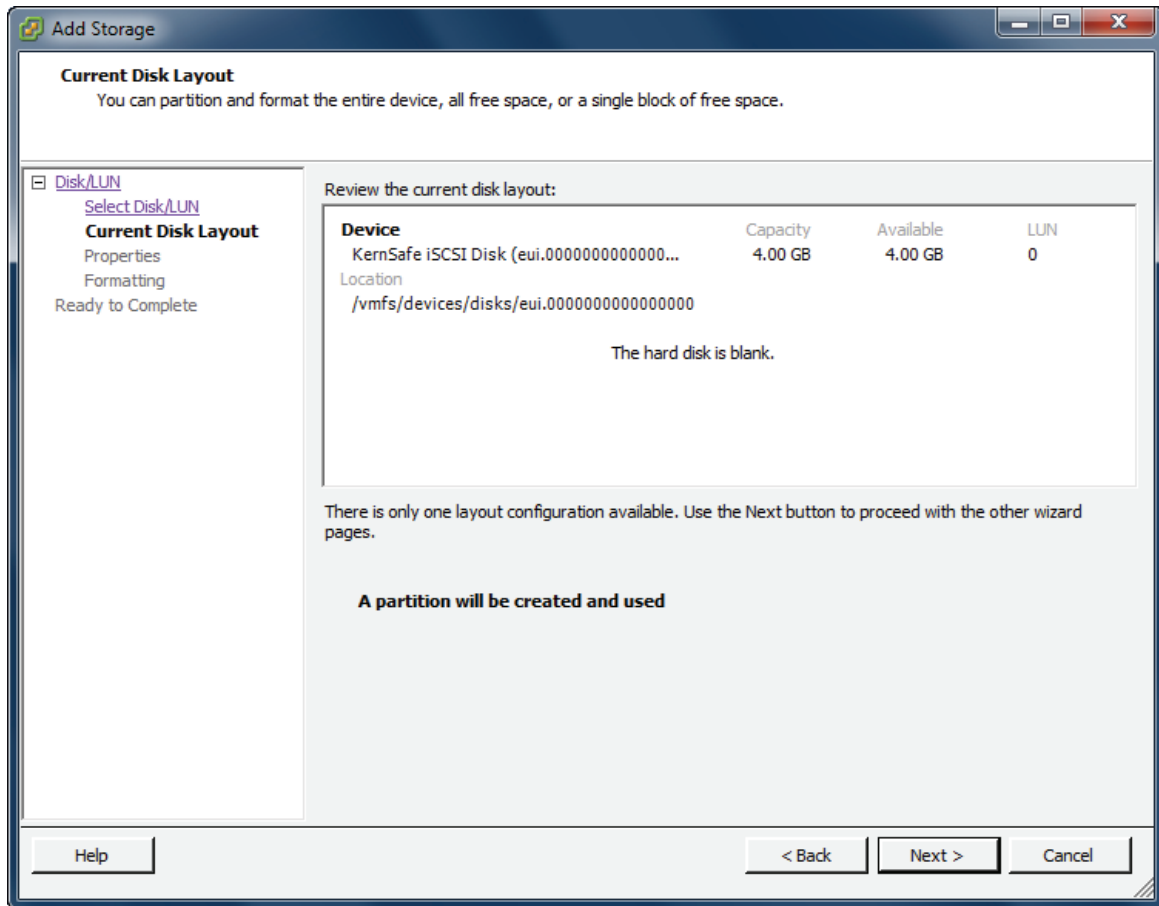
Select Disk/LUN



Select **KernSafe iSCSI Disk** device with the Identifier of **iqn.2006-03.com.kernsafe....**

Press the **Next** button to continue.

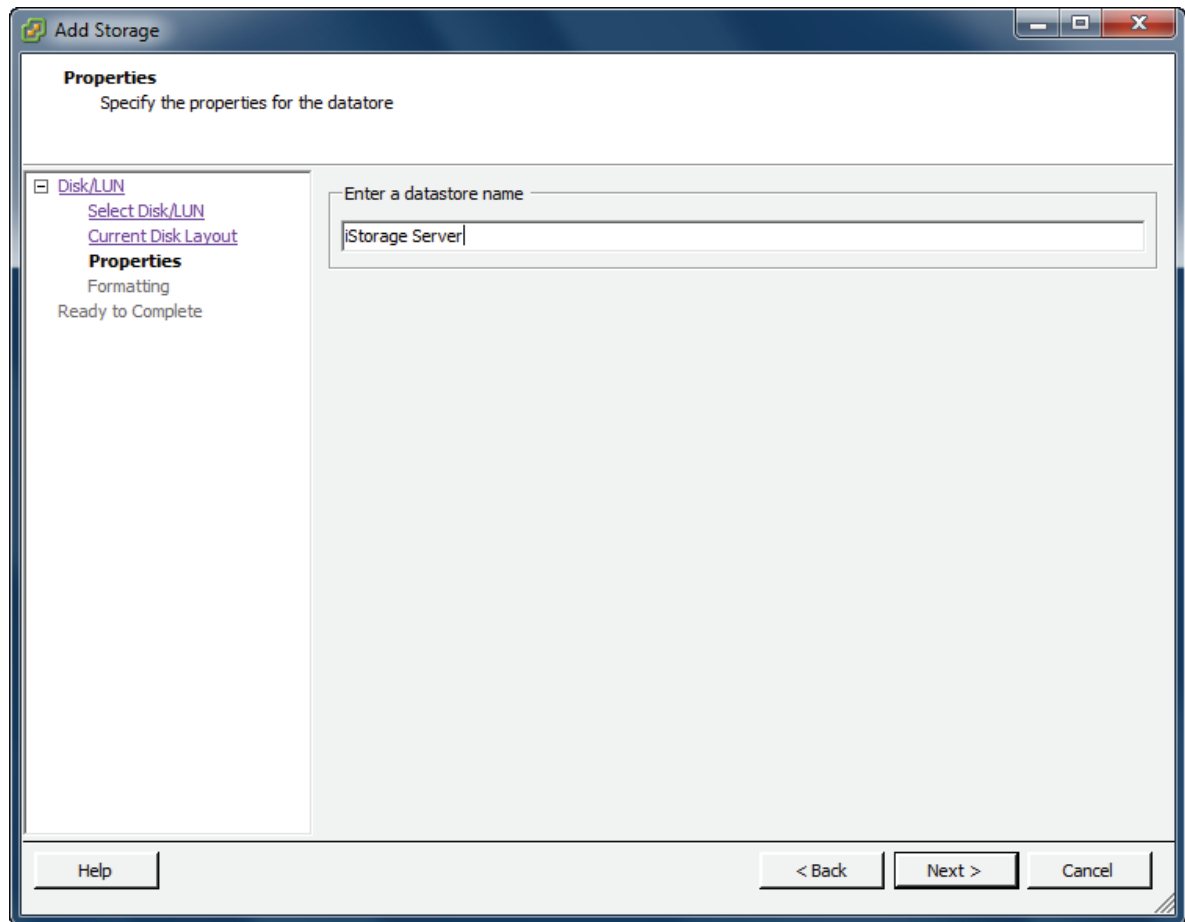
Partition and format the entire device.



Just use the default.

Press the **Next** button to continue.

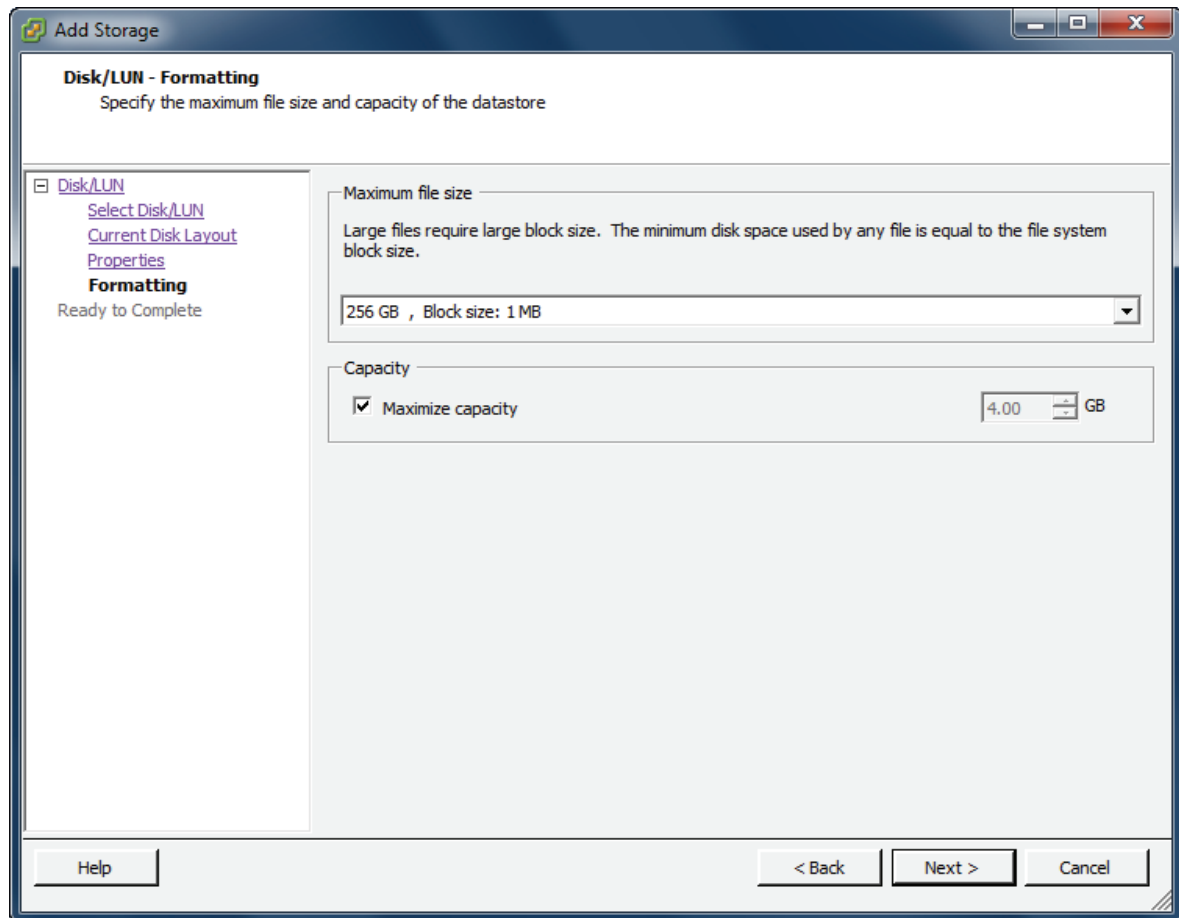
Type the data store name.



Type **iStorage Server** in the **Enter a datastore name**.

Press the **Next** button to continue.

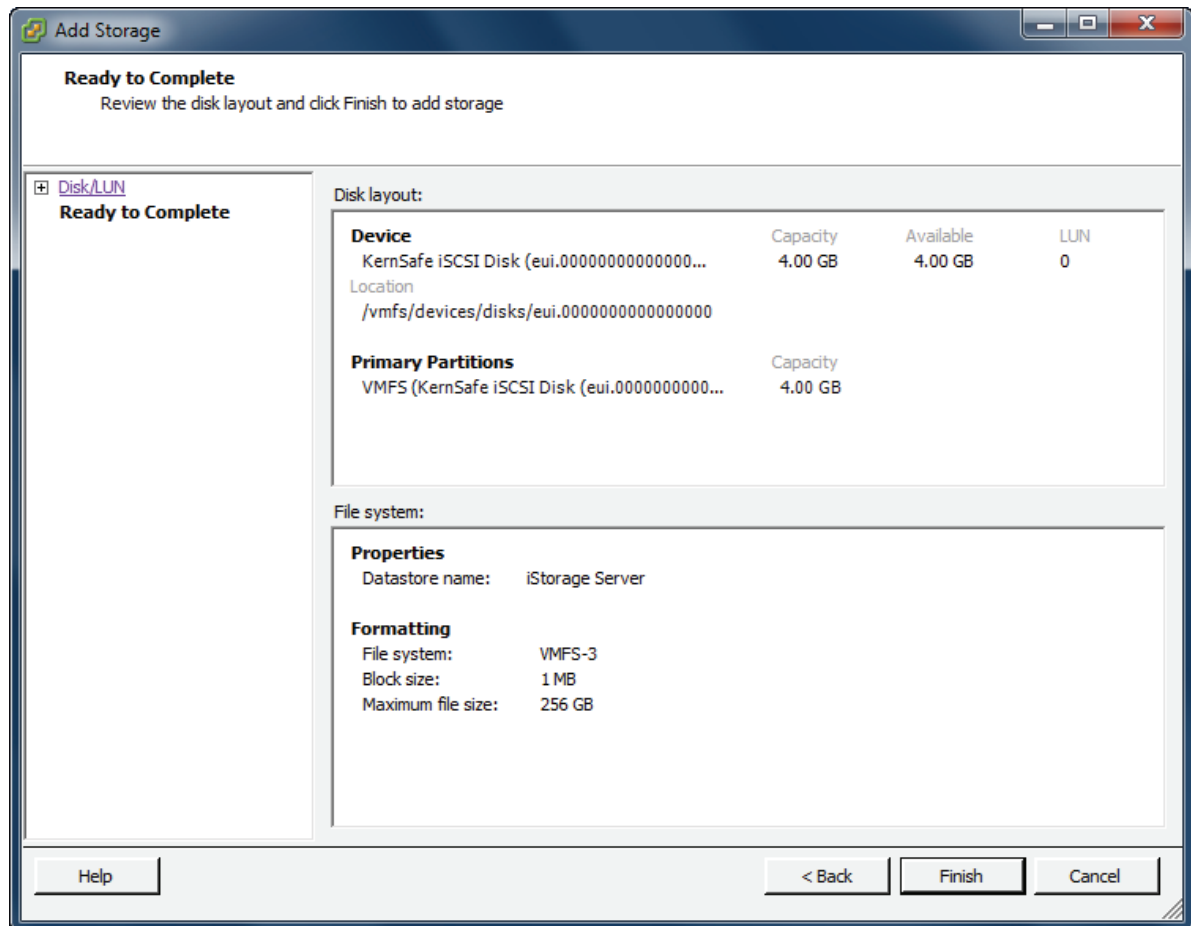
Format entire device



Leave the default recommend settings.

Press the **Next** button to continue.

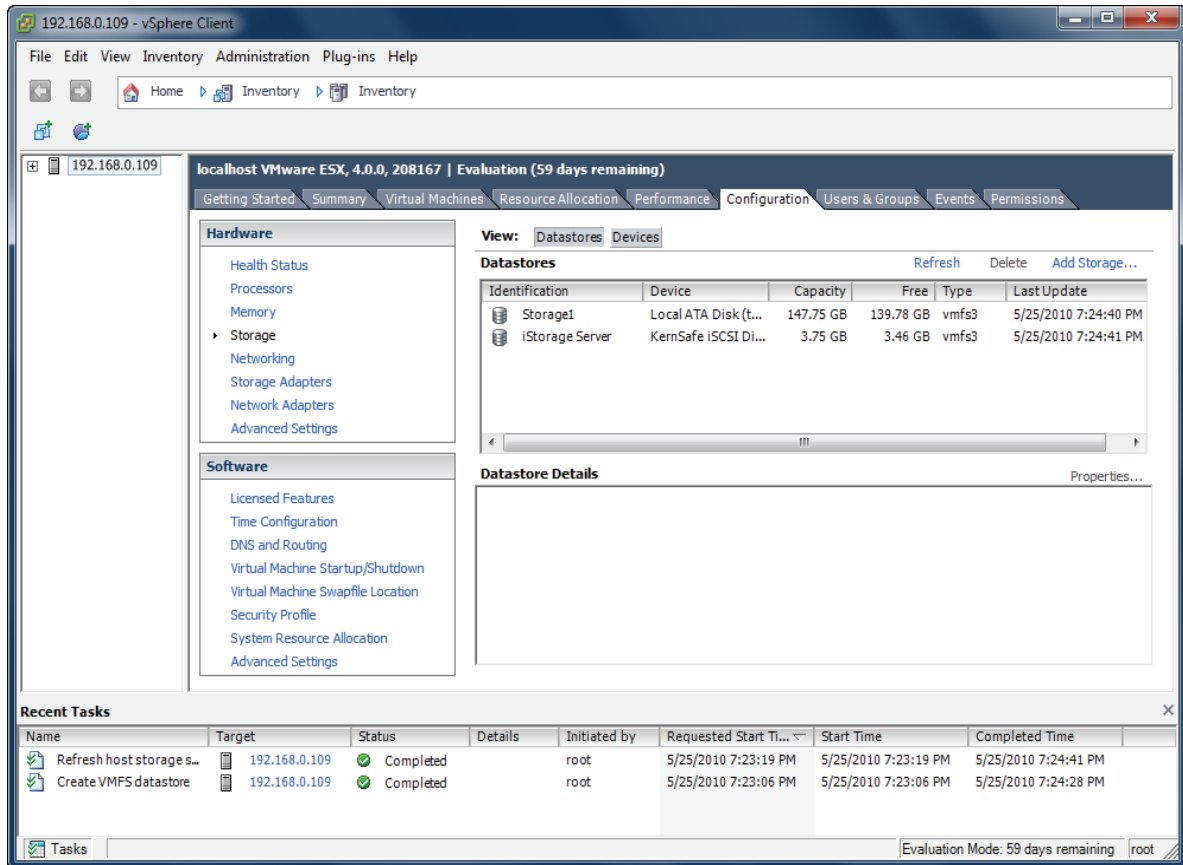
Complete data store creating



OK, now, the storage is going to be created, press the **Finish** button to finish the wizard.

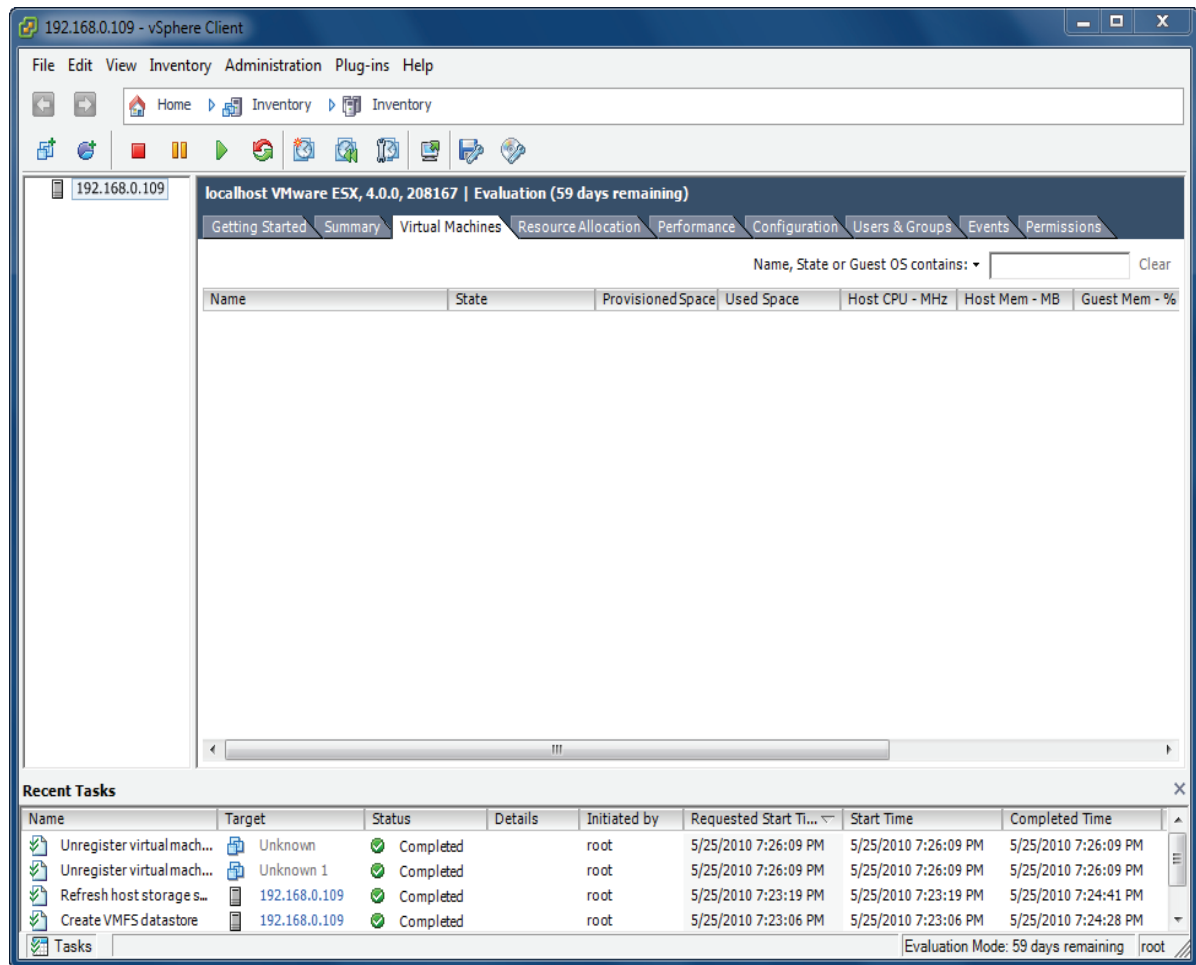
Press the **Yes** button in the following prompt dialog, so that the ESX Server formats the storage.

After this, you can see the storage device in the following interface.



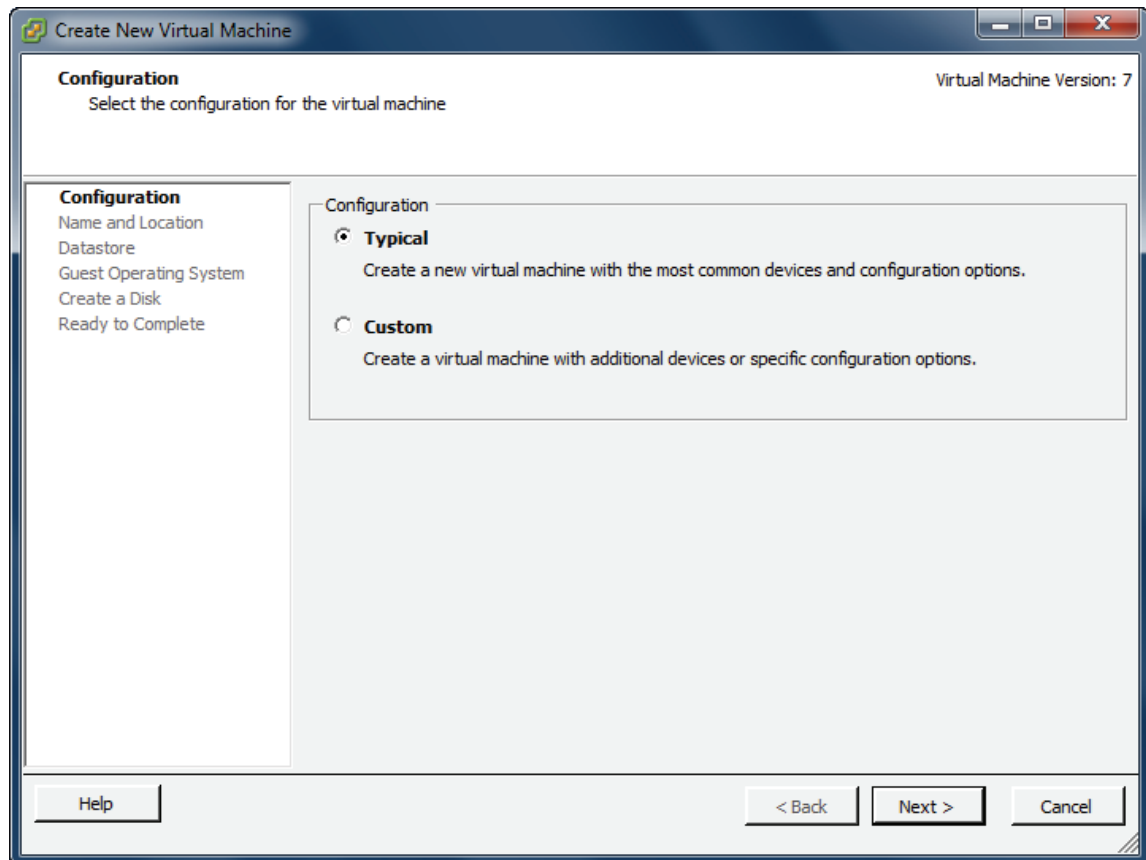
Now, we have the storage to store virtual machines, so next we will install virtual machine on it.

Manage and Install virtual machine



In the **Virtual Machine** tab page of VMware Infrastructure Client, right click on the black page, and then select **New Virtual Machine...**, the **New Virtual Machine Wizard** is shown.

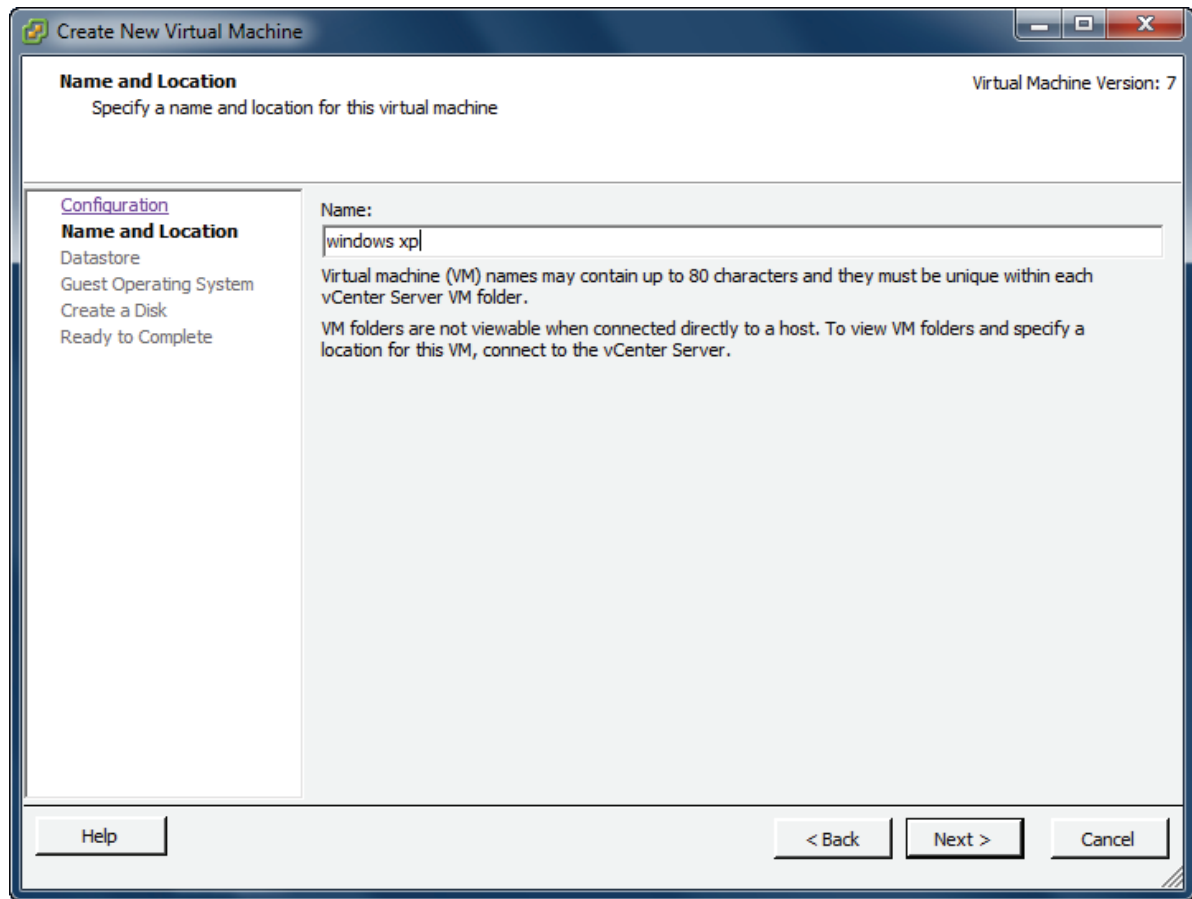
Select the appropriate configuration.



Select **Typical** option.

Press the **Next** button to continue.

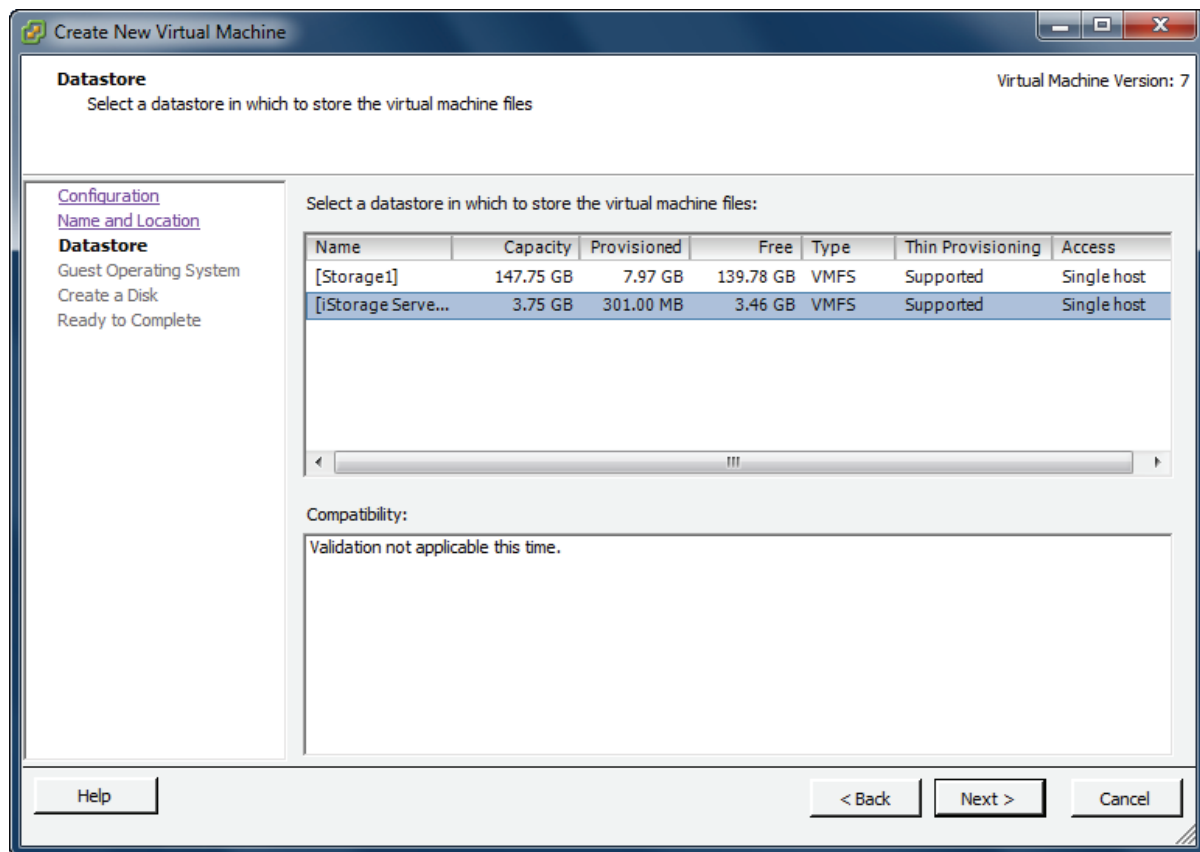
Type the virtual machine name.



Type in the virtual machine name, we take **windows xp** as an example.

Press the **Next** button to continue.

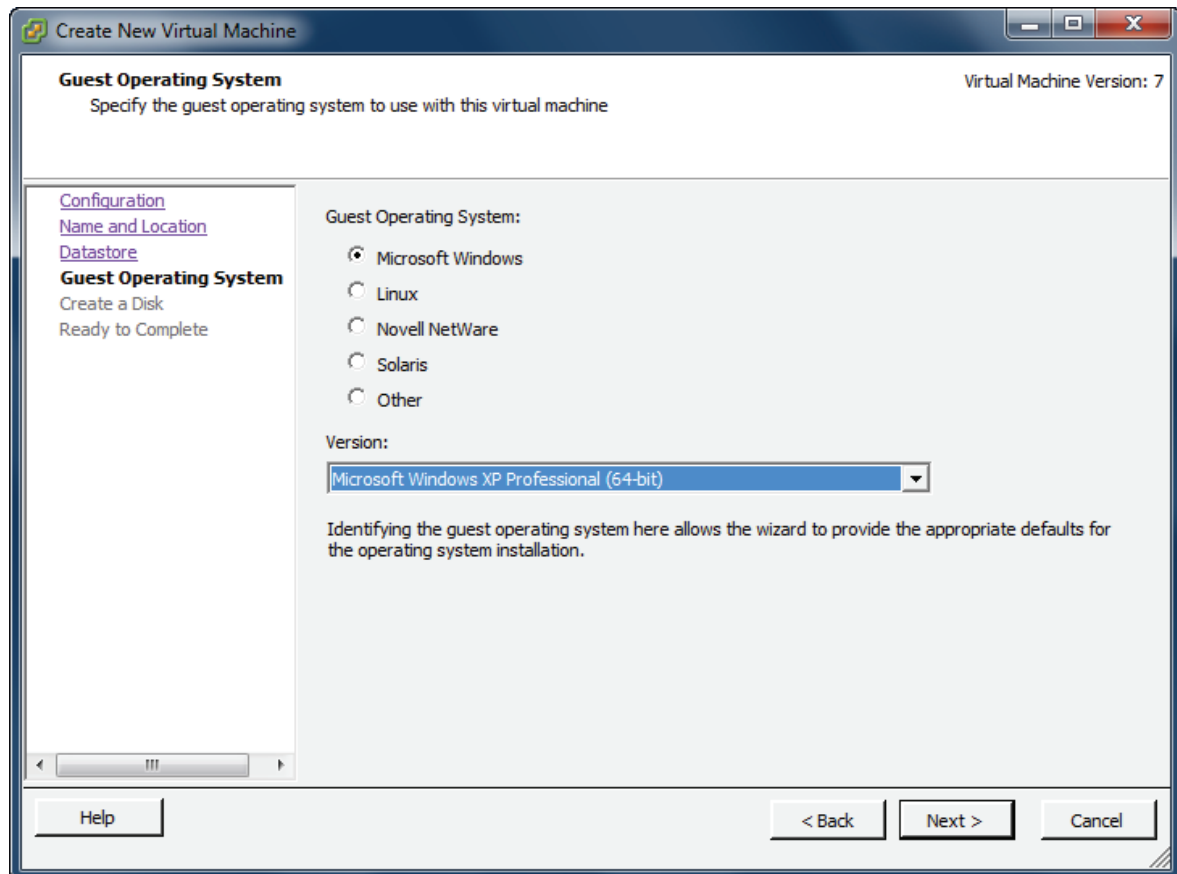
Choose a data store for storing files of the virtual machine.



Specify a data store to store the virtual machine, select **iStorage Server**.

Press the **Next** button to continue.

Choose the guest operation system.



Select operation system, we select **Microsoft Windows XP Professional (64-bit)** as an example.
Press the **Next** button to continue.

Specify the size of virtual disk that will be used by the guest machine.

The screenshot shows a Windows-style window titled "Create New Virtual Machine". The window has a standard title bar with minimize, maximize, and close buttons. The main content area is titled "Create a Disk" with the subtitle "Specify the virtual disk size and provisioning policy". In the top right corner, it says "Virtual Machine Version: 7". On the left side, there is a navigation pane with links: "Configuration", "Name and Location", "Datastore", "Guest Operating System", and "Create a Disk" (which is highlighted). Below "Create a Disk" is the text "Ready to Complete". The main area contains the following settings: "Datastore:" with a dropdown menu showing "iStorage Server"; "Available space (GB):" with a text box containing "3.5"; "Virtual disk size:" with a spinner box set to "3" and a dropdown menu set to "GB"; and two unchecked checkboxes: "Allocate and commit space on demand (Thin Provisioning)" with the description "The virtual disk file starts small and grows as more virtual disk space is used.", and "Support clustering features such as Fault Tolerance" with the description "Selecting this option will increase the time it takes to create the virtual machine." At the bottom of the window, there are three buttons: "Help", "< Back", and "Next >", and a "Cancel" button on the far right.

Create New Virtual Machine

Create a Disk
Specify the virtual disk size and provisioning policy

Virtual Machine Version: 7

[Configuration](#)
[Name and Location](#)
[Datastore](#)
[Guest Operating System](#)
Create a Disk
Ready to Complete

Datastore: iStorage Server

Available space (GB): 3.5

Virtual disk size: 3 GB

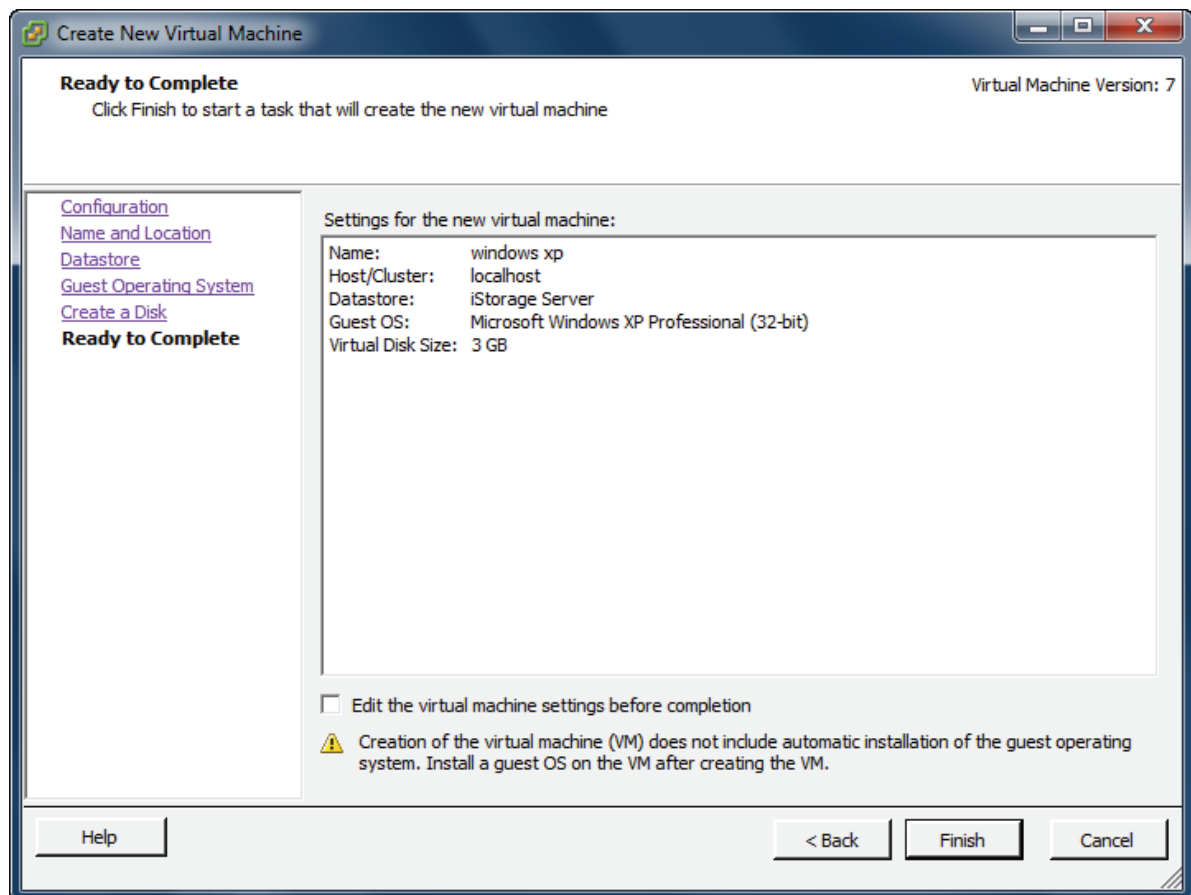
☐ Allocate and commit space on demand (Thin Provisioning)
The virtual disk file starts small and grows as more virtual disk space is used.

☐ Support clustering features such as Fault Tolerance
Selecting this option will increase the time it takes to create the virtual machine.

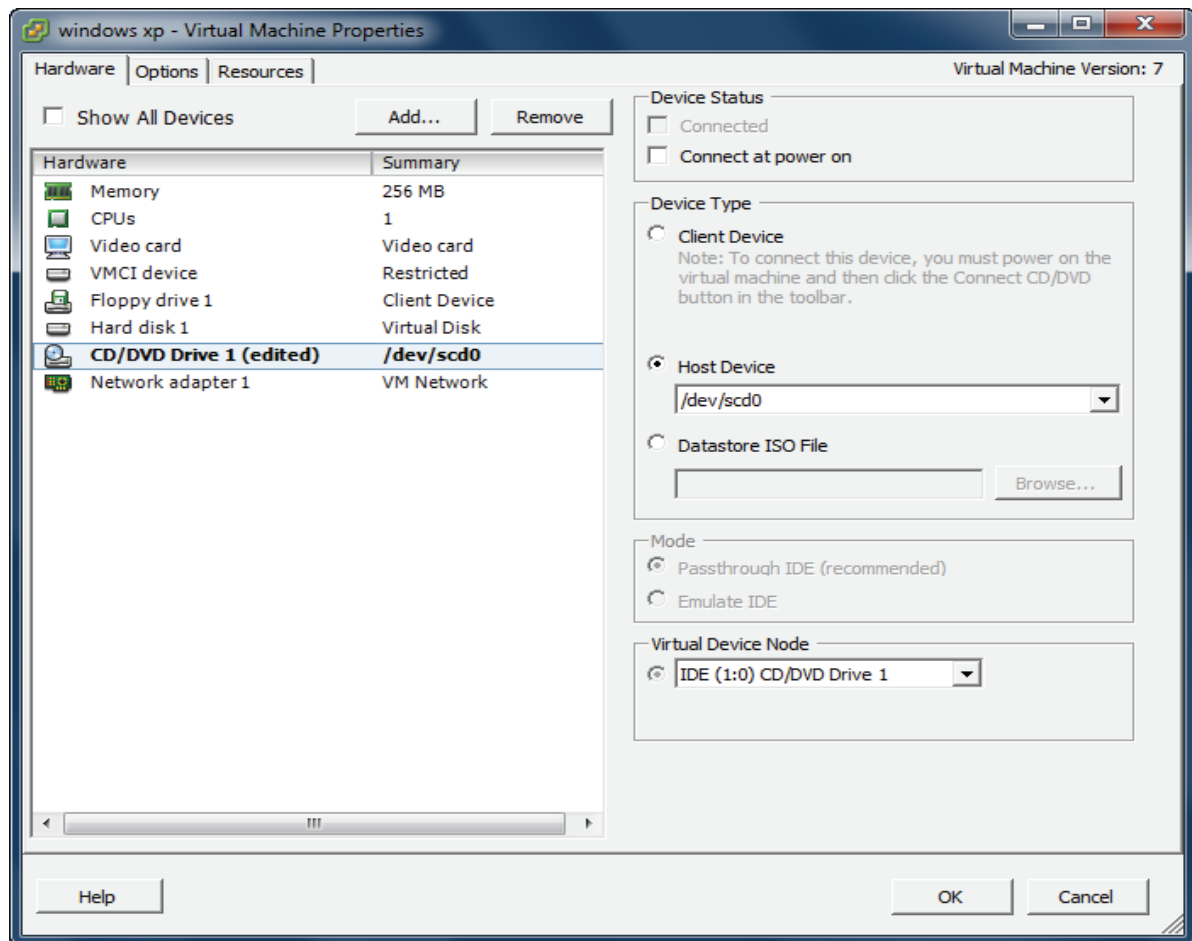
Help < Back Next > Cancel

Press the **Next** button to continue.

Check if the parameters are correct and press the **Back** button if any changes are required.



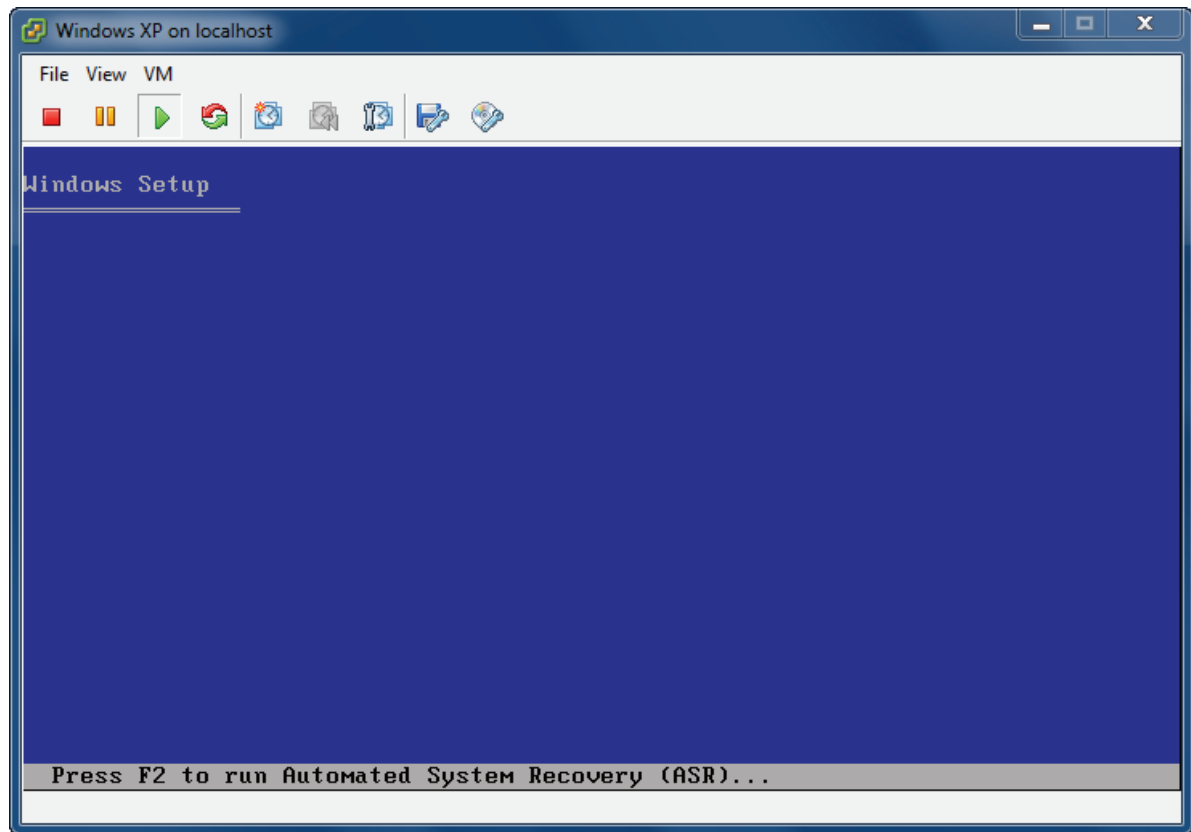
Right click on the **Windows XP**, select **Edit Settings...** on the pop-up menu, the **Virtual Machine Properties** window is shown. In this window, we click **CD/DVD Drive1 (edited)** link in the **Hardware** group and then select **Host Device** we will install OS from client computer.



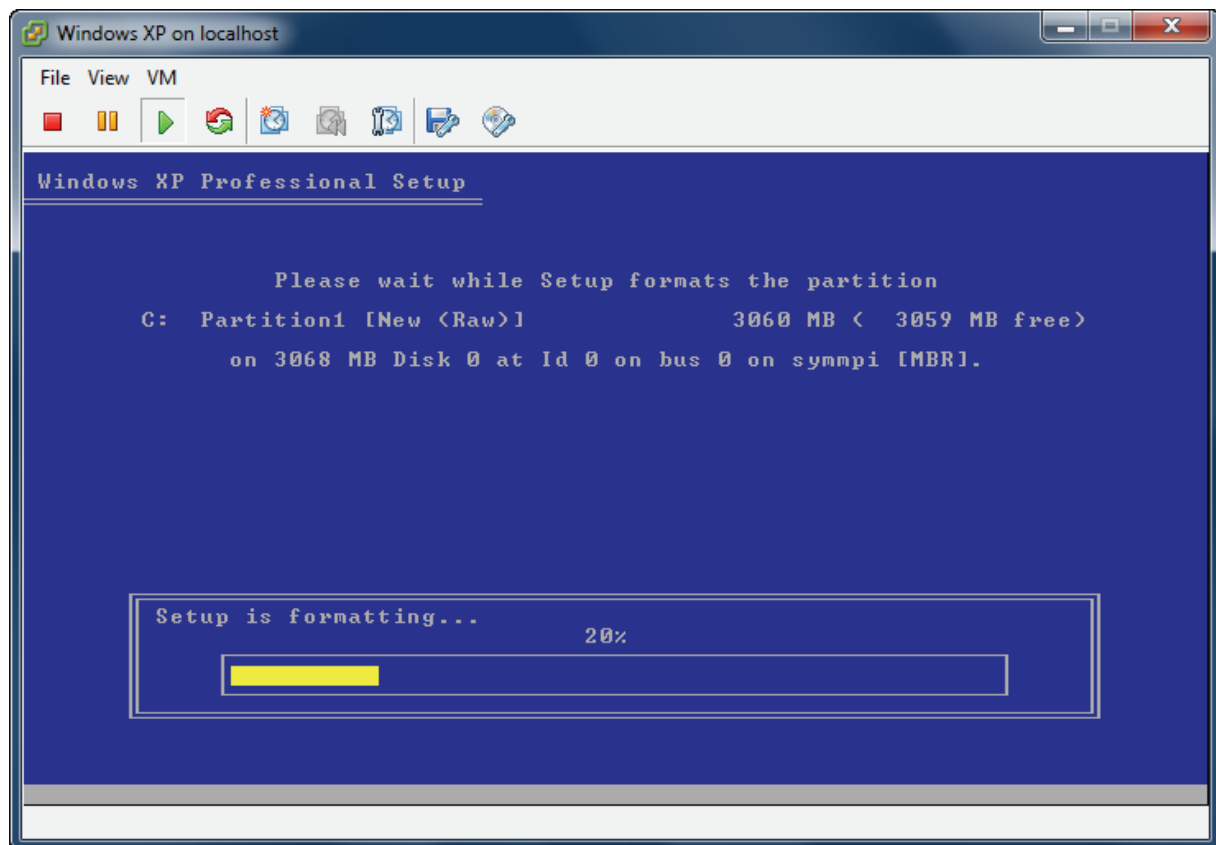
CD device should be set to connect at power on.

Click the **Finish** button to complete virtual machine creating.

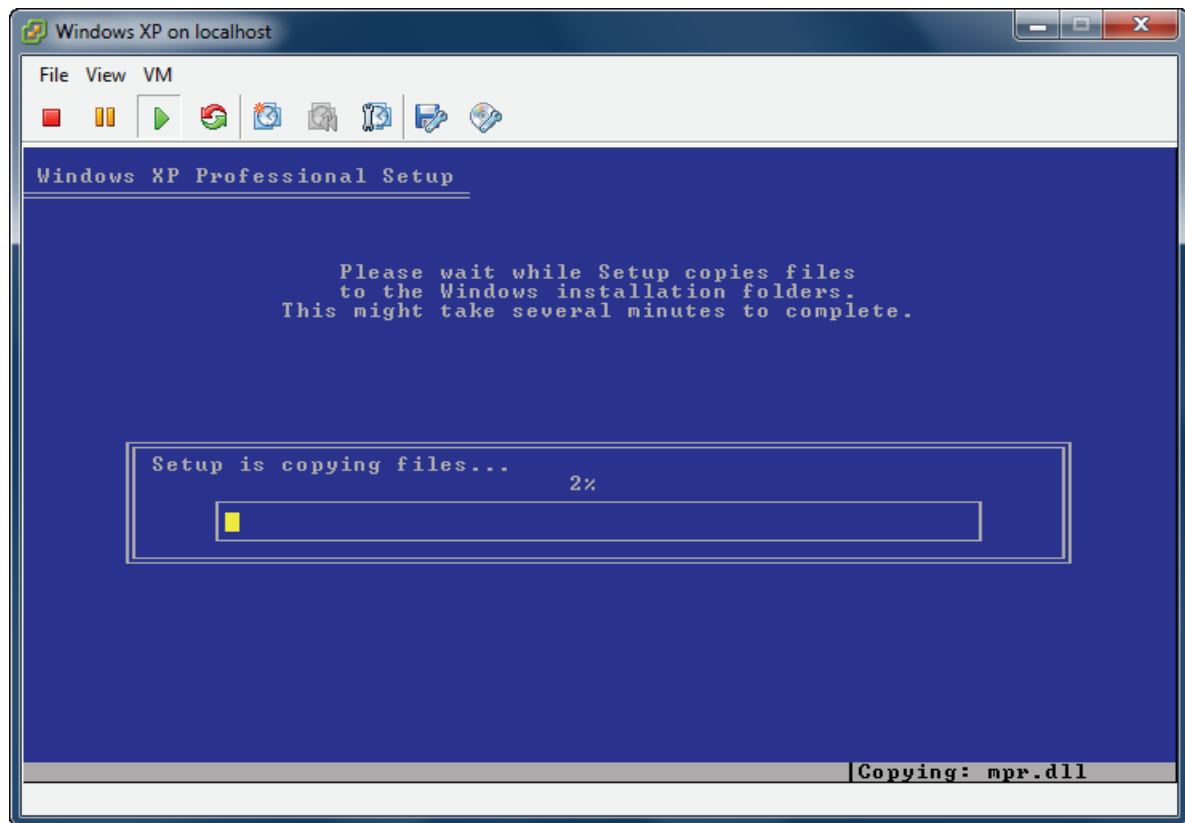
Insert windows XP installation CD, and then power on the virtual machine just created, you will see the windows XP imitation interface:



Formats the partition C:



Copy files



Continue windows install



Likewise, you may install Windows Server 2003, Vista, Windows Server 2008 and Windows 7 or even any version of Linux as you wish.

Contact

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