iStorage Server: High-Availability iSCSI SAN for Windows Server 2008 & Hyper-V Clustering

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KernSafe Technologies, Inc.

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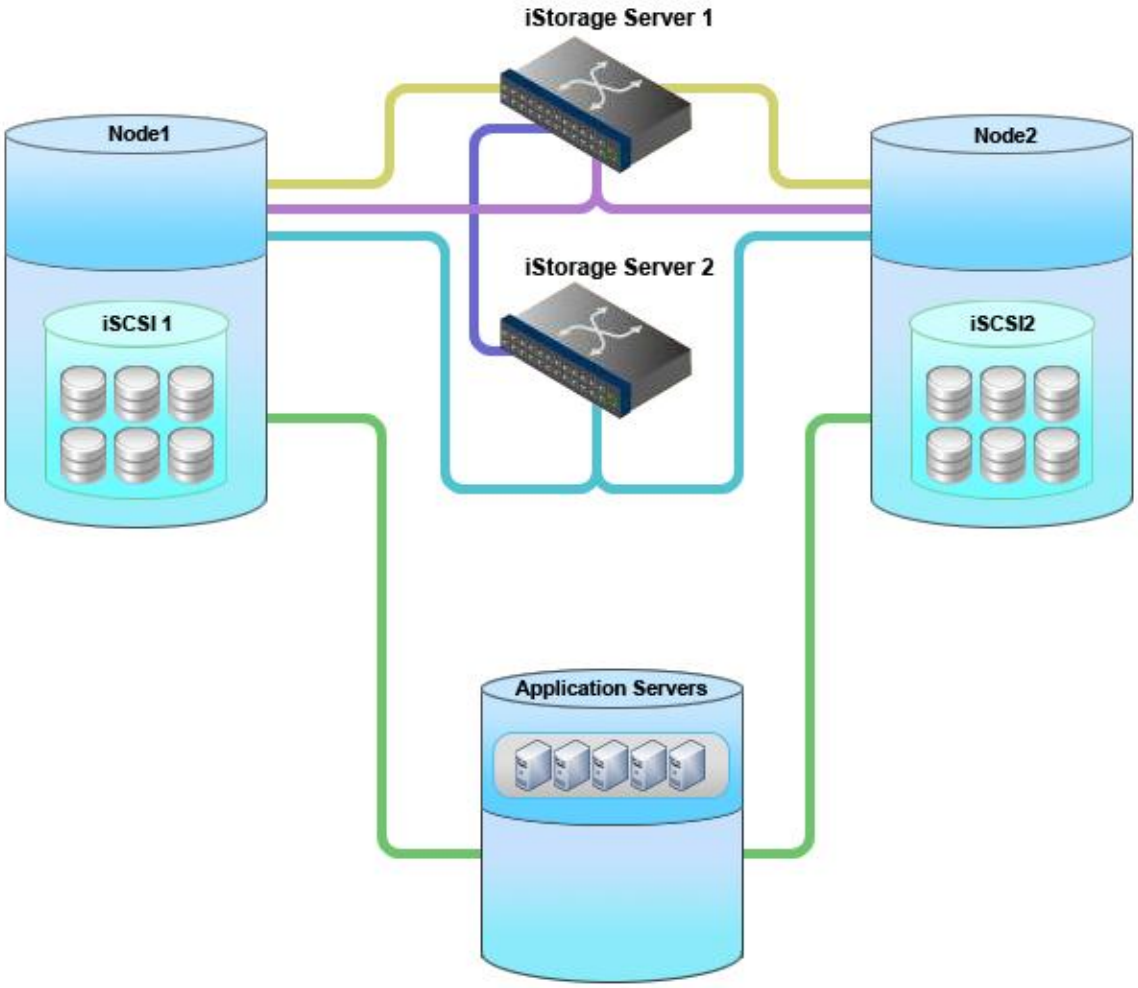
Overview

KernSafe iStorage Server is an advanced and powerful, full-featured software-only iSCSI Target that fully conforms to the latest iSCSI Standard 1.0 (former Draft 20). It is an IP SAN solution allowing you to quickly export existing storages such as disk images, VHD files, physical disks, partitions, CD/DVD-ROMs, tapes or any other type of SCSI based devices and even a variety of popular CD/DVD images to the client machines. The software thus delivers immediate benefits, as it allows storage to be consolidated, virtualized and centrally managed. iStorage Server also provides RAID-1 (mirror) feature enabling you to create two iSCSI devices for mirror backup. 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 poplar in storage industry world and make iStorage Server is suitable for any size of business.

High-availability clusters (also known as HA Clusters or Failover Clusters) are computer clusters that are implemented primarily for the purpose of providing high availability of services which the cluster provides. They operate by having redundant computers or nodes which are then used to provide service when system components fail. Normally, if a server with a particular application crashes, the application will be unavailable until someone fixes the crashed server. HA clustering remedies this situation by detecting hardware/software faults, and immediately restarting the application on another system without requiring administrative intervention, a process known as Failover. As part of this process, clustering software may configure the node before starting the application on it. For example, appropriate file systems may need to be imported and mounted, network hardware may have to be configured, and some supporting applications may need to be running as well.

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 Windows Server 2008 clustering and Hyper-v.



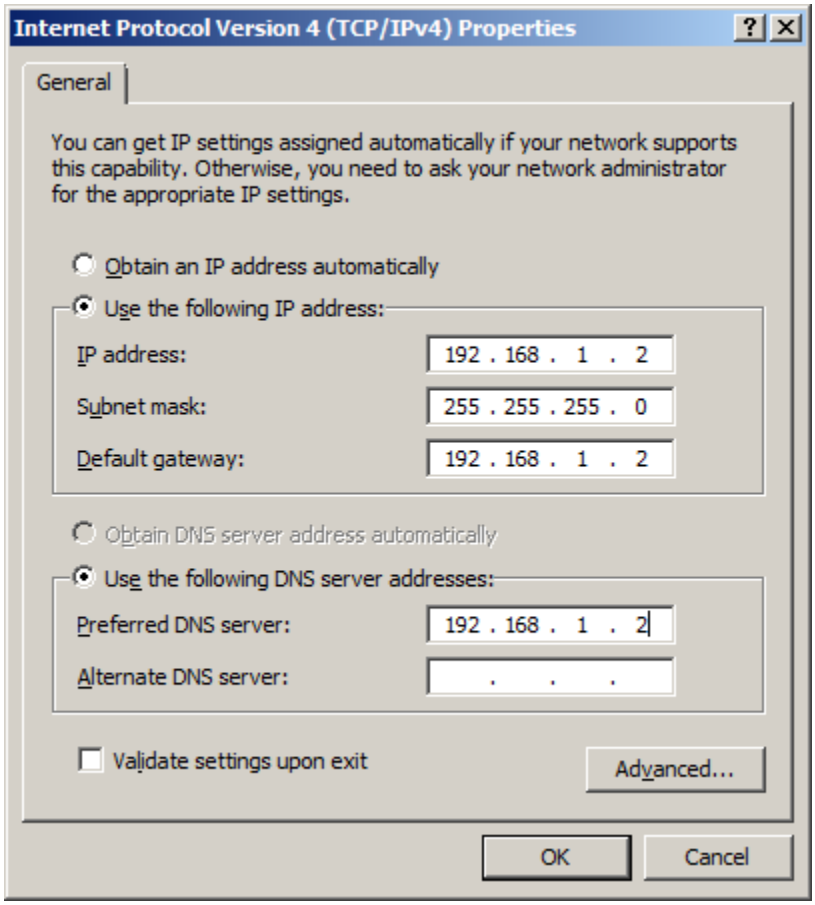
This document gives you detailed step-by-step instructions on KernSafe iStorage Server configuring for Windows Server 2008 or Windows Server 2008 R2 failover clusters. Before to do so, prepare the following four computers or virtual machine in Hyper-v:

Name	IP Address	Detail
08DC	192.168.1.2	Domain Controller
08Node1	192.168.1.101	Failover Node 1
08Node2	192.168.1.102	Failover Node 2
KernStorage1	192.168.0.2	iStorage Server1
KernStorage2	192.168.0.5	iStorage Server2

Configuring on Domain Controller

Network Adapter

For working in clustering environment, the network adapter must be assigned a static IP address. Select the **Internet Protocol Version 4(TCP/IPv4)** and then press the **Properties** button, the **Internet Protocol Version 4 (TCP/IPv4)** dialog is shown. As Active Directory requires DNS, an address must be provided, in this case we can specify itself IP address. DNS will be installed later after installed Active Directory.

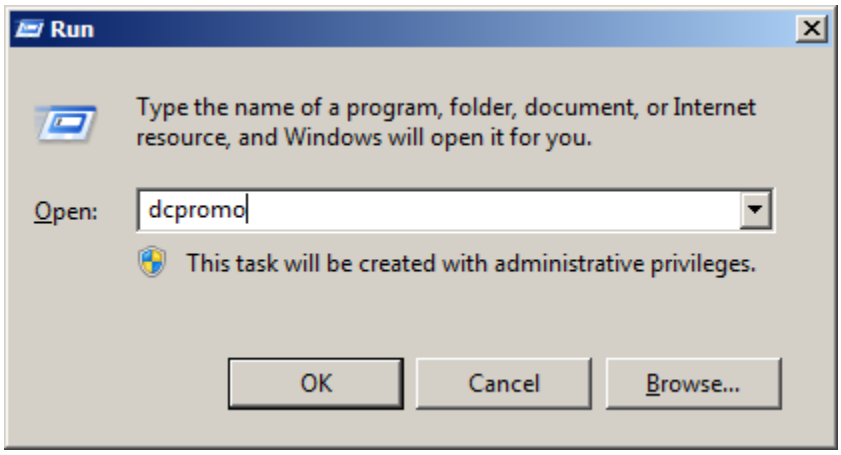


Type the IP address and DNS server address.

Press the **OK** button to continue.

Install Active Directory

Select **Start->Run** and type **dcpromo** in the **Open** input box.

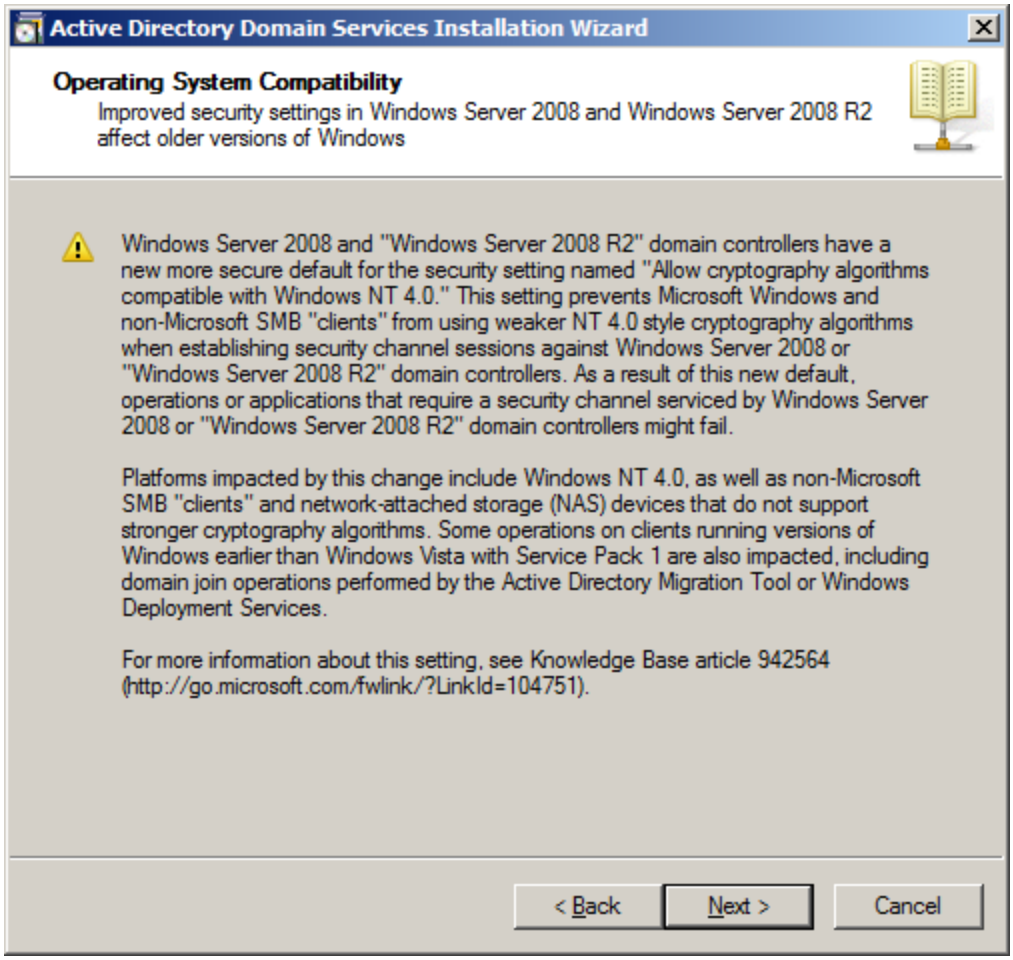


Press the **OK** button to continue.

The **Active Directory Domain Services Installation Wizard** is shown.

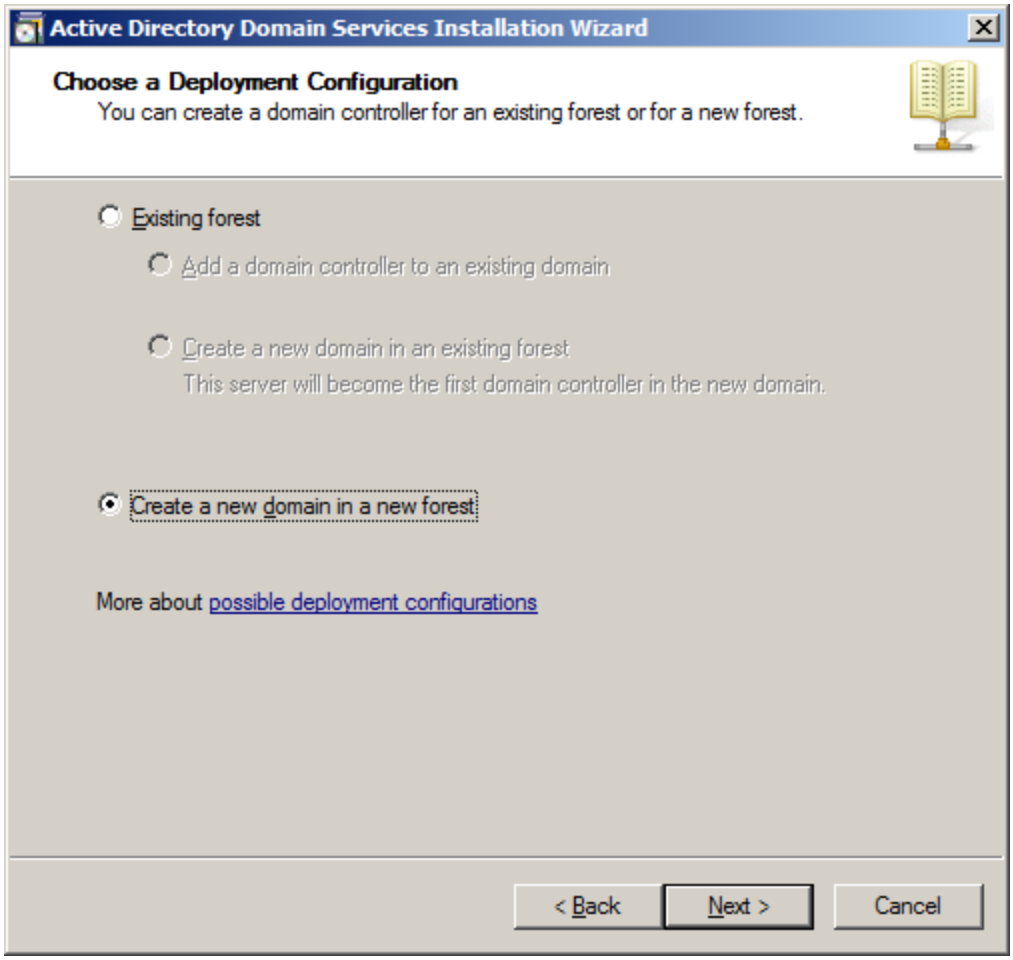
Press the **Next** button to continue.

The **Active Directory Domain Services Installation Wizard** is shown, before clicking on **Next** button, please read the introducing instructions carefully.



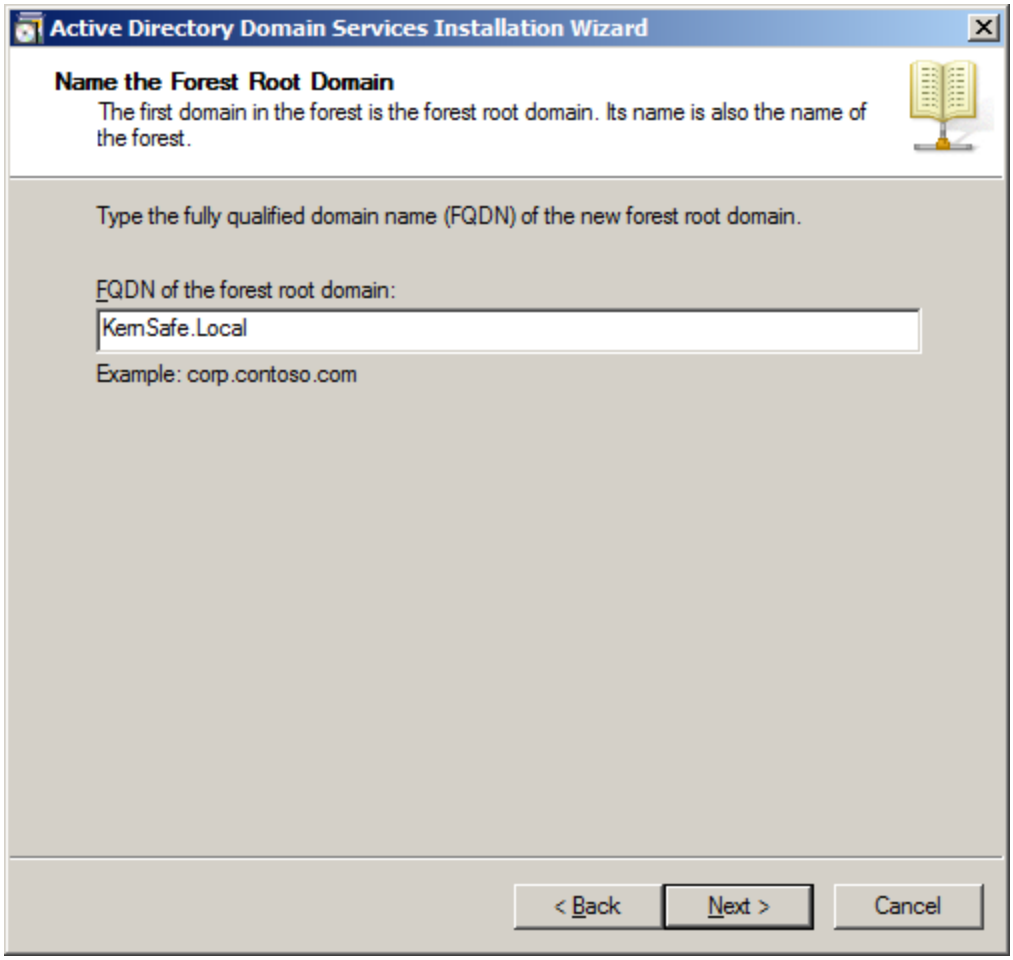
Press the **Next** button to continue.

Because we are creating Active Directory, Select the **Create a new domain in a new forest** option.



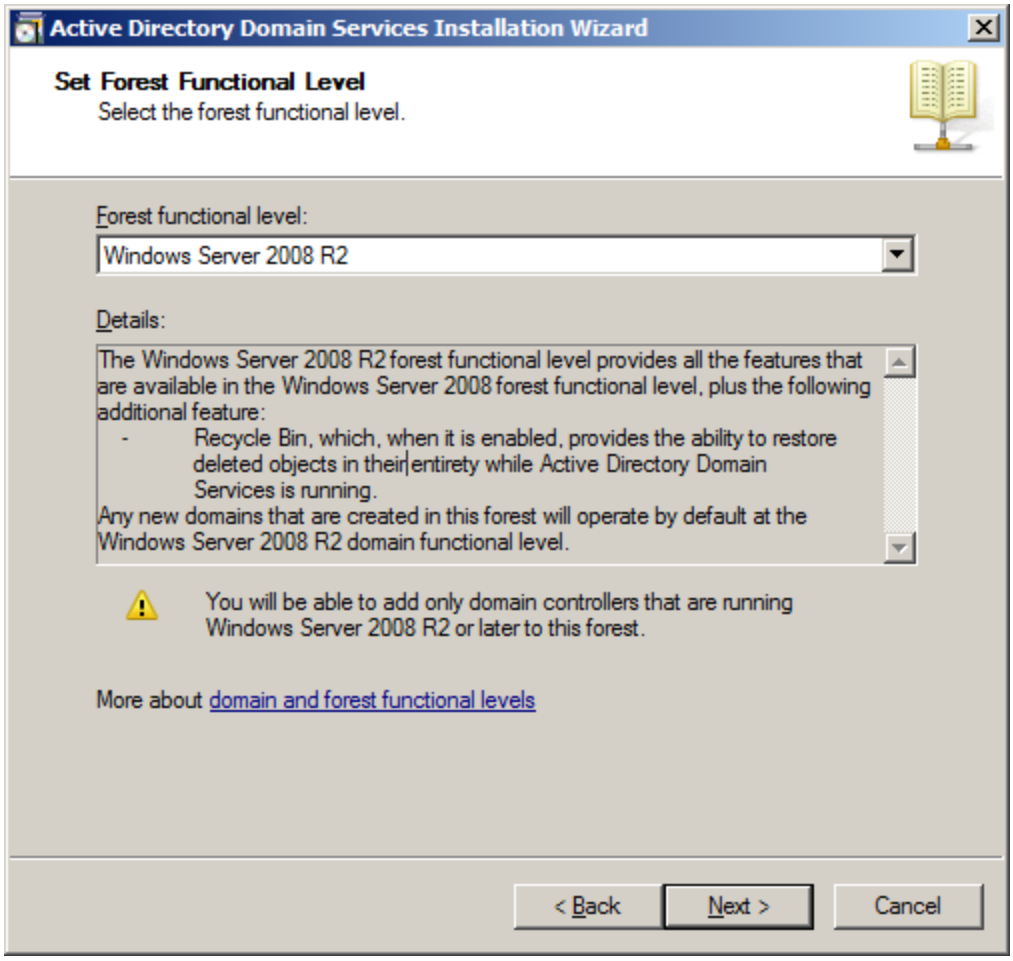
Press the **Next** button to continue.

Specify the name of Forest Root Domain.



Press the **Next** button to continue.

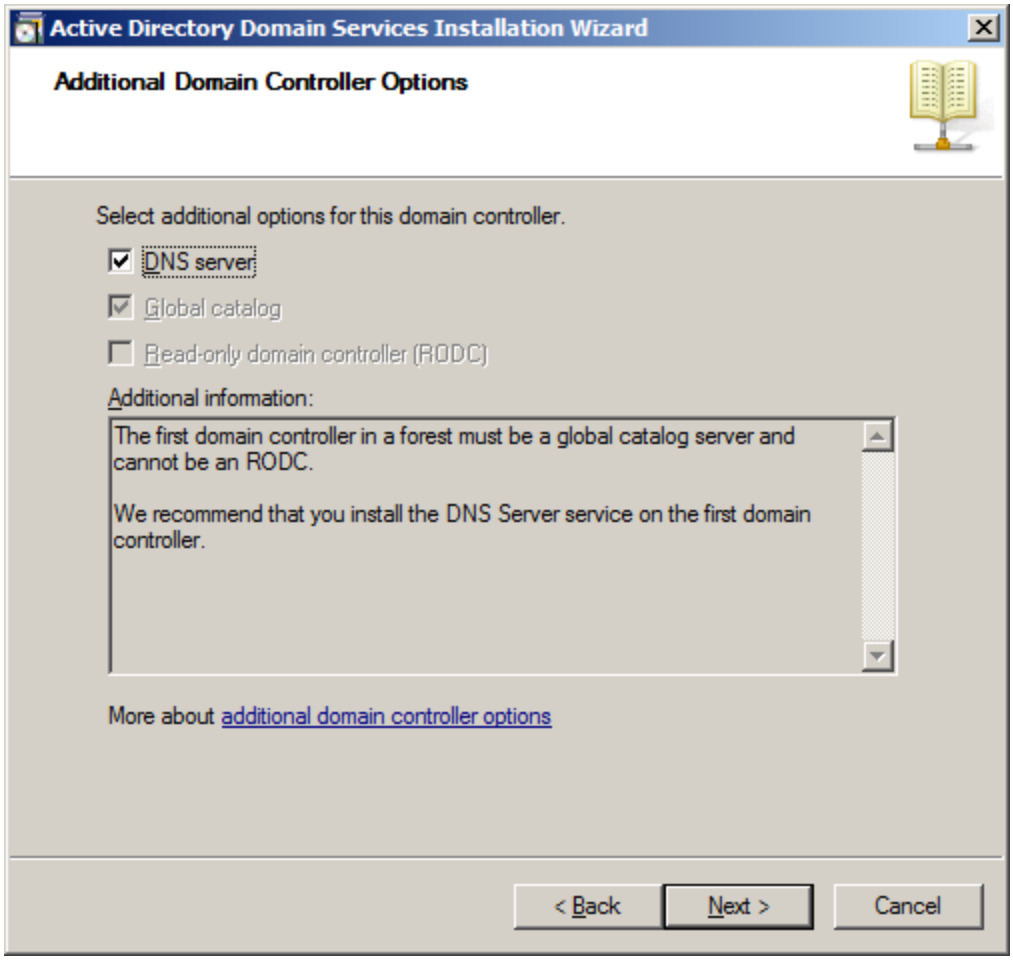
Select the Forest functional level.



Select Windows Server 2008 or Windows Server 2008 R2 if building Windows Server 2008 R2 clustering.

Press the **Next** button to continue.

Select the additional options for this domain controller.



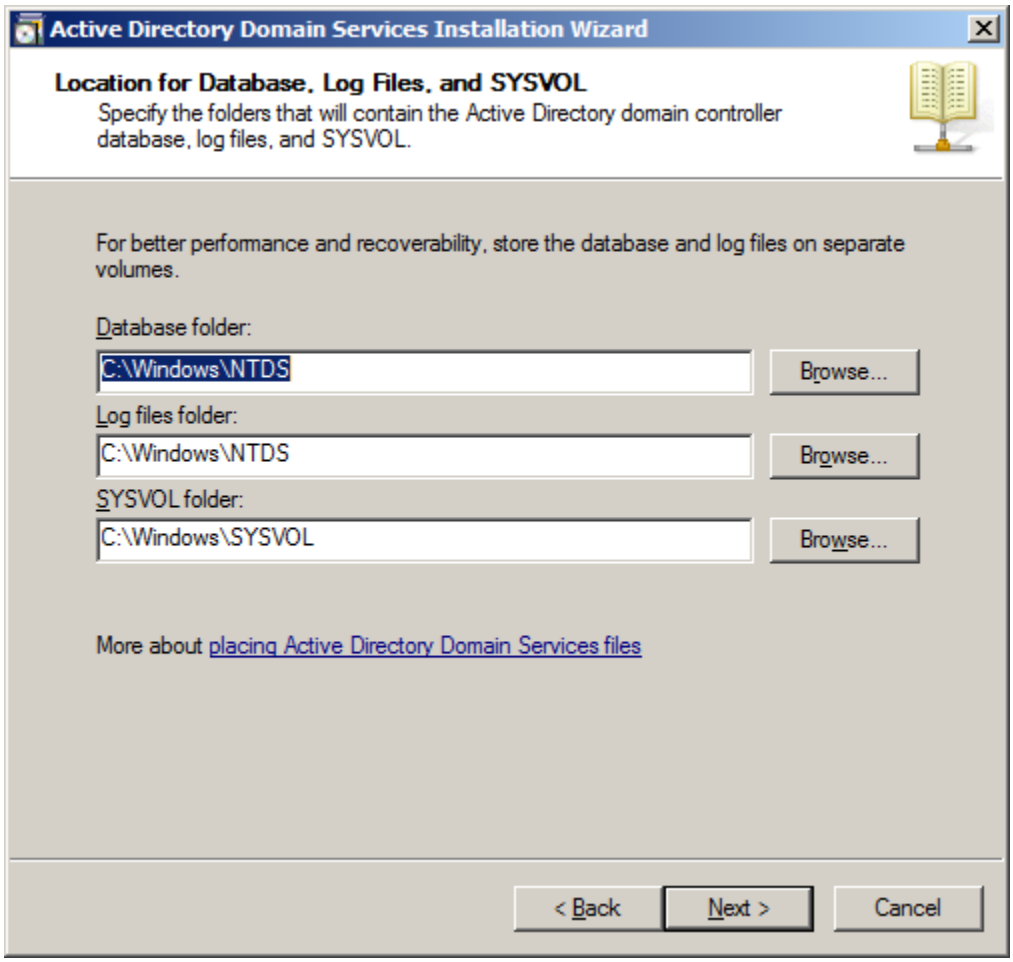
Keep the selection of the **DNS Server**.

Press the **Next** button to continue.

The **Active Directory Domain Services Installation Wizard** is shown.

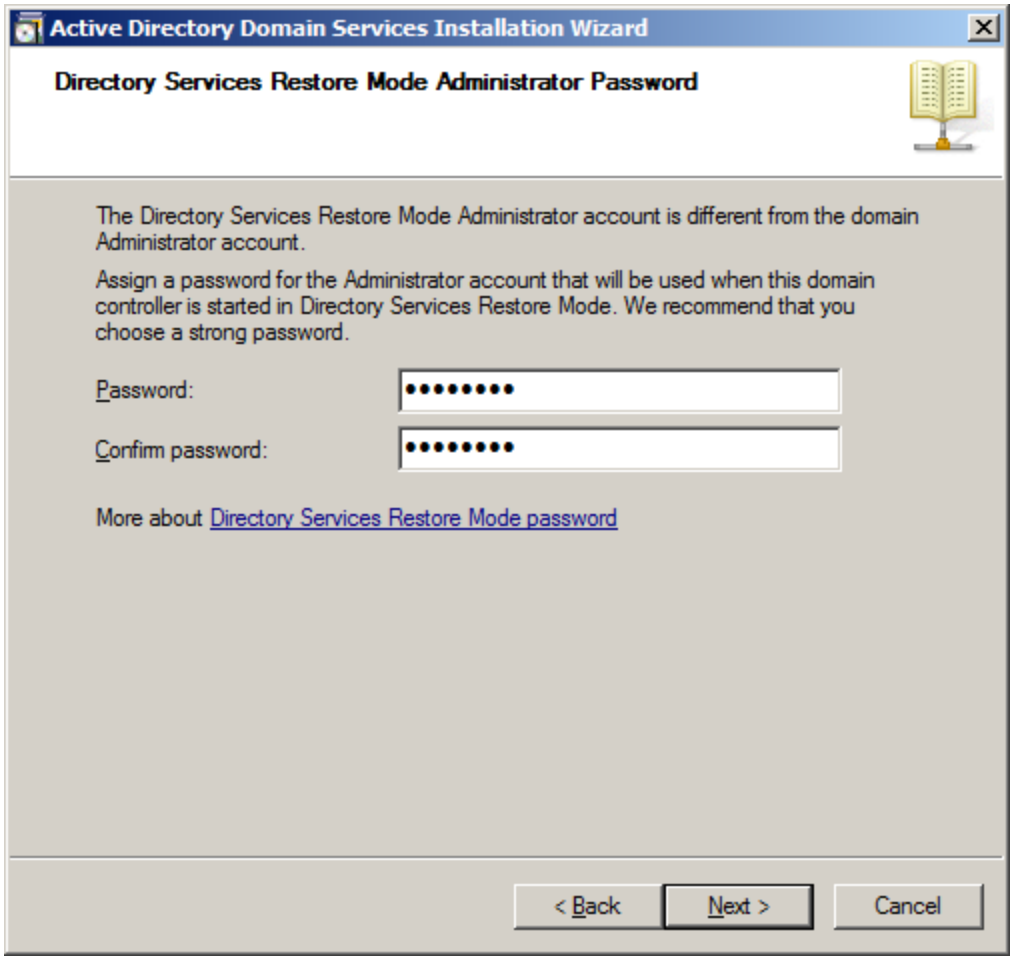
Press the **Yes** button to continue.

Customize the directories for Database folder, Log files folder and SYSVOL folder.



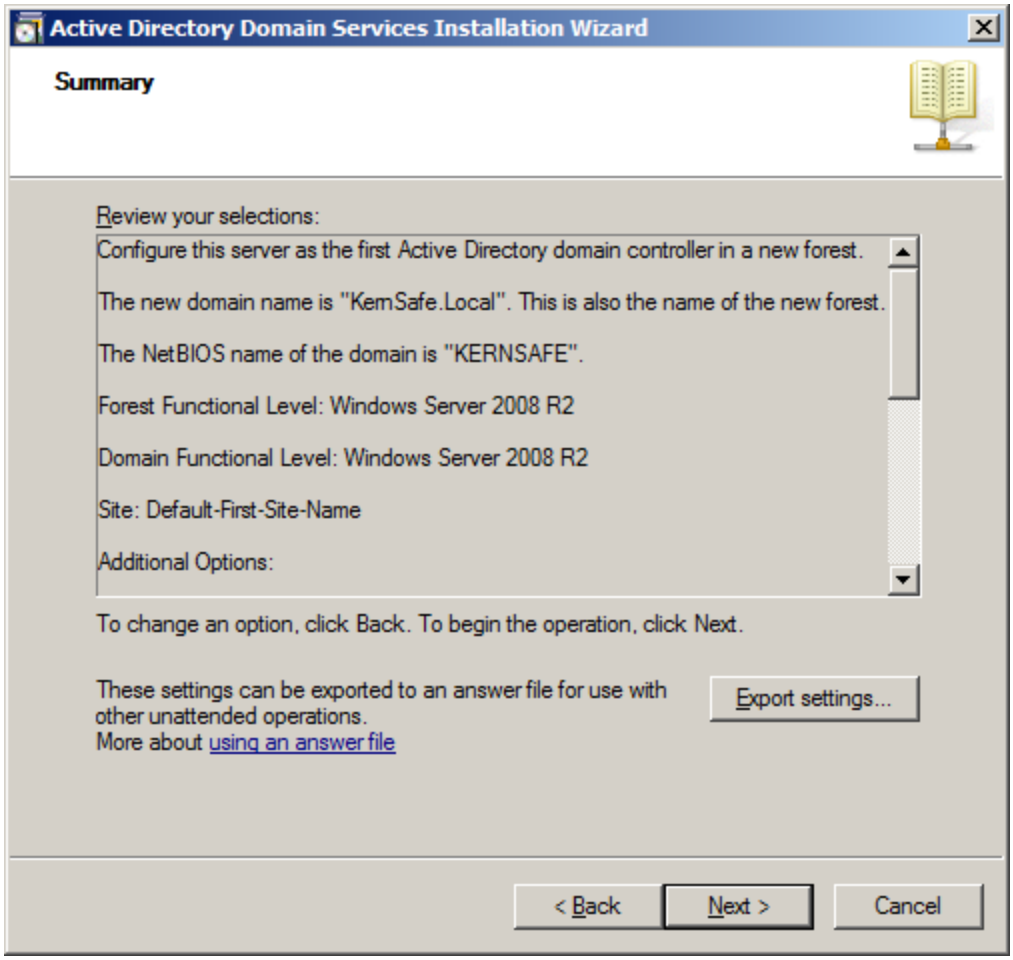
Press the **Next** button to continue.

Specify the **Directory Services Restore Mode Administrator Password**.



Press the **Next** button to continue.

Check if all of the parameters are correct; press the **Back** button if any change is required.

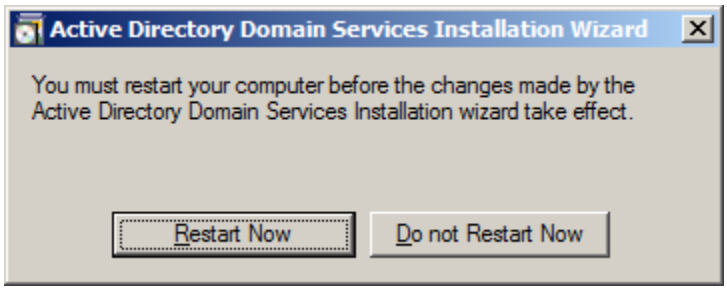


Press the **Next** button to continue.

After a while, Active Directory Domain Services Installation is completed.

Press the **Finish** Button to close the wizard.

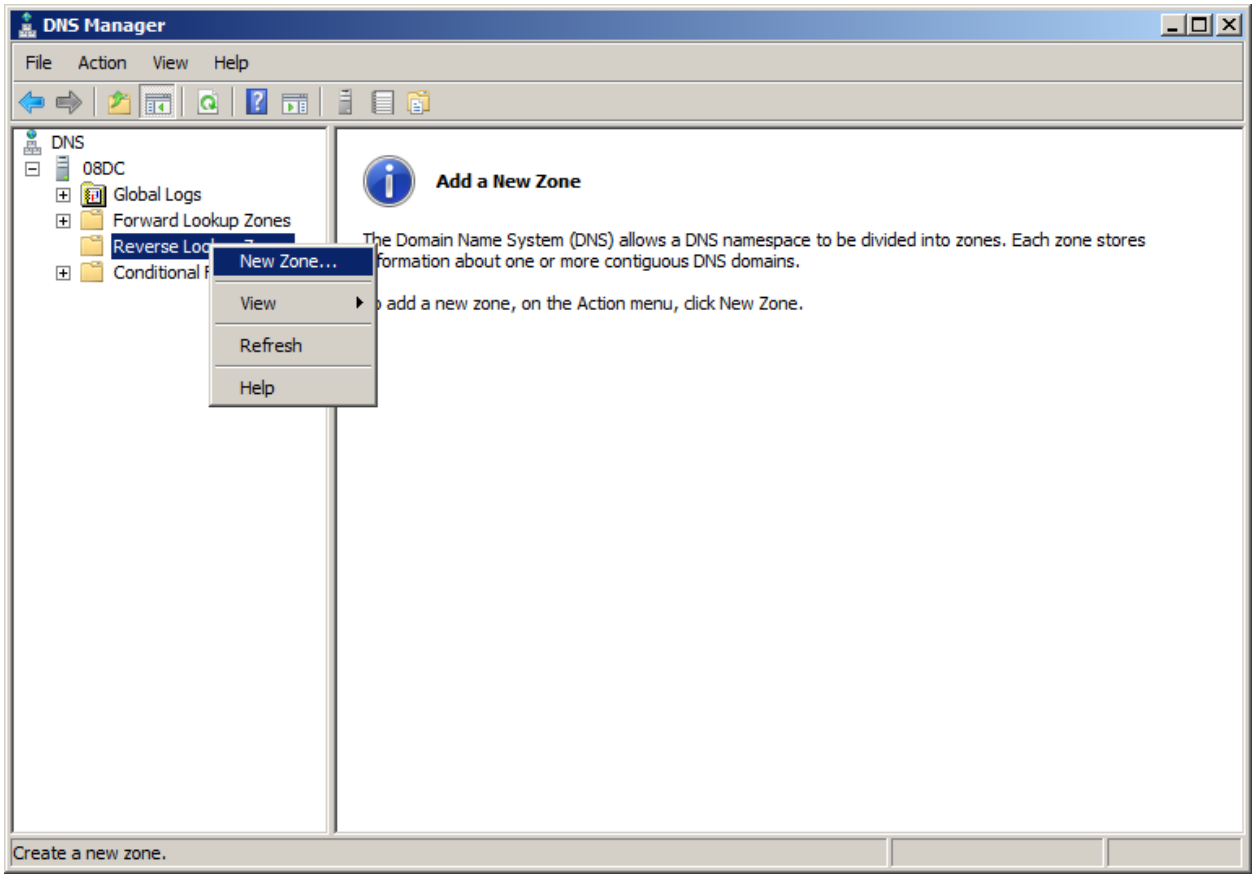
Restart is required.



Press the **Restart Now** button to restart the computer.

Install DNS

Use administrator role to log on to the Domain controller machine and launch the **DNS Manager**.

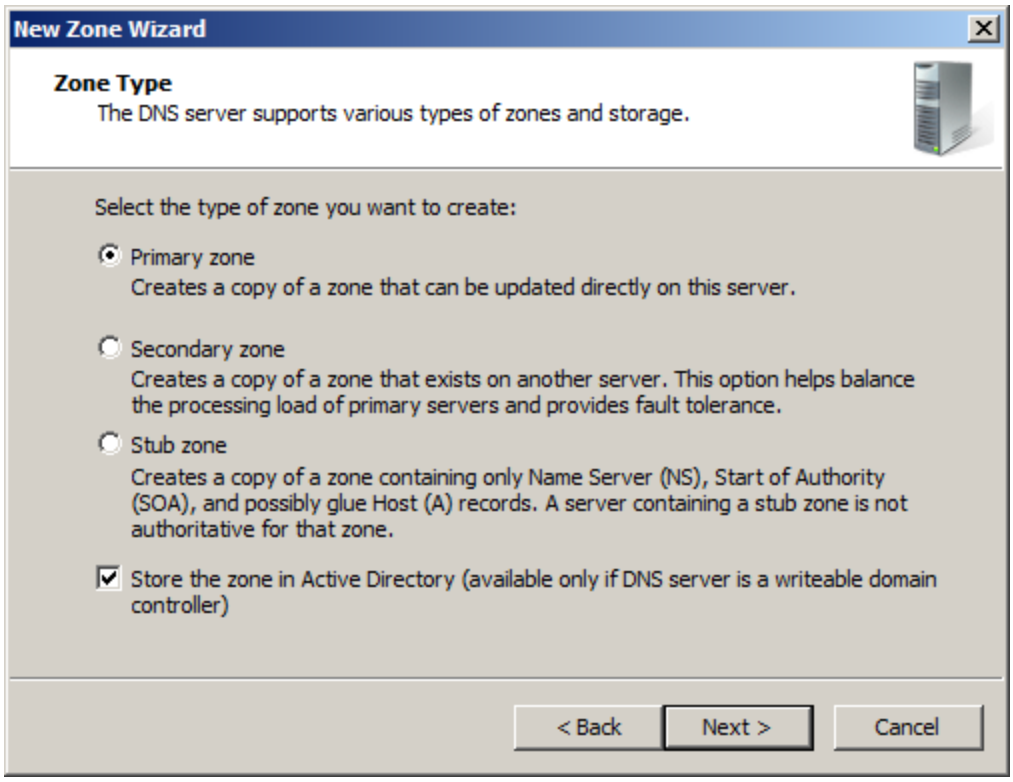


Right click on the **Reverse Lookup Zone** in the left tree view and then select **New Zone…** menu item.

The **New Zone Wizard** is shown.

Press the **Next** button to continue.

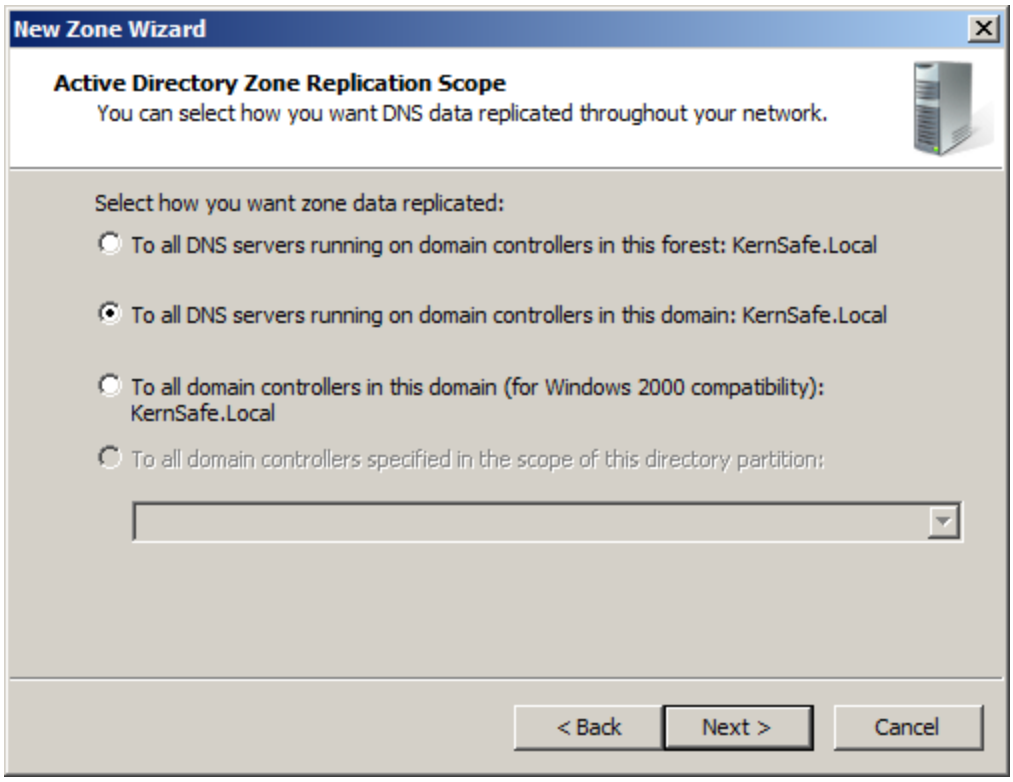
Select zone type.



Select the **Primary zone** and keep the selection of **Store the zone in Active Directory**.

Press the **Next** button to continue.

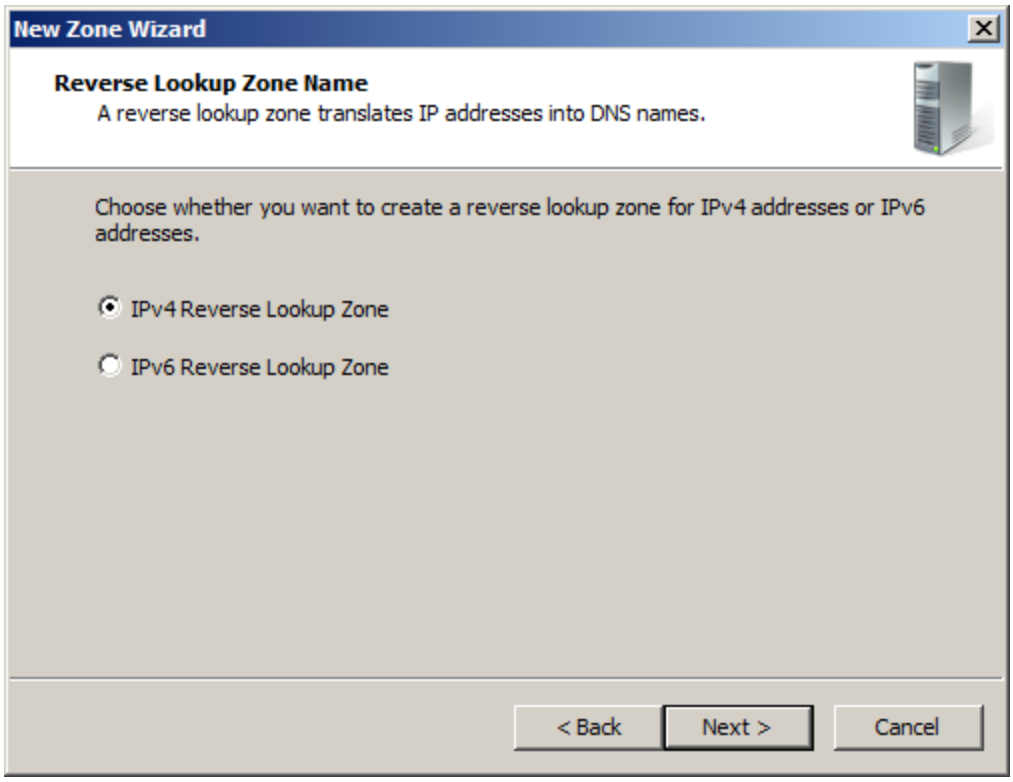
Select zone replication scope.



Keep the default selection.

Press the **Next** button to continue.

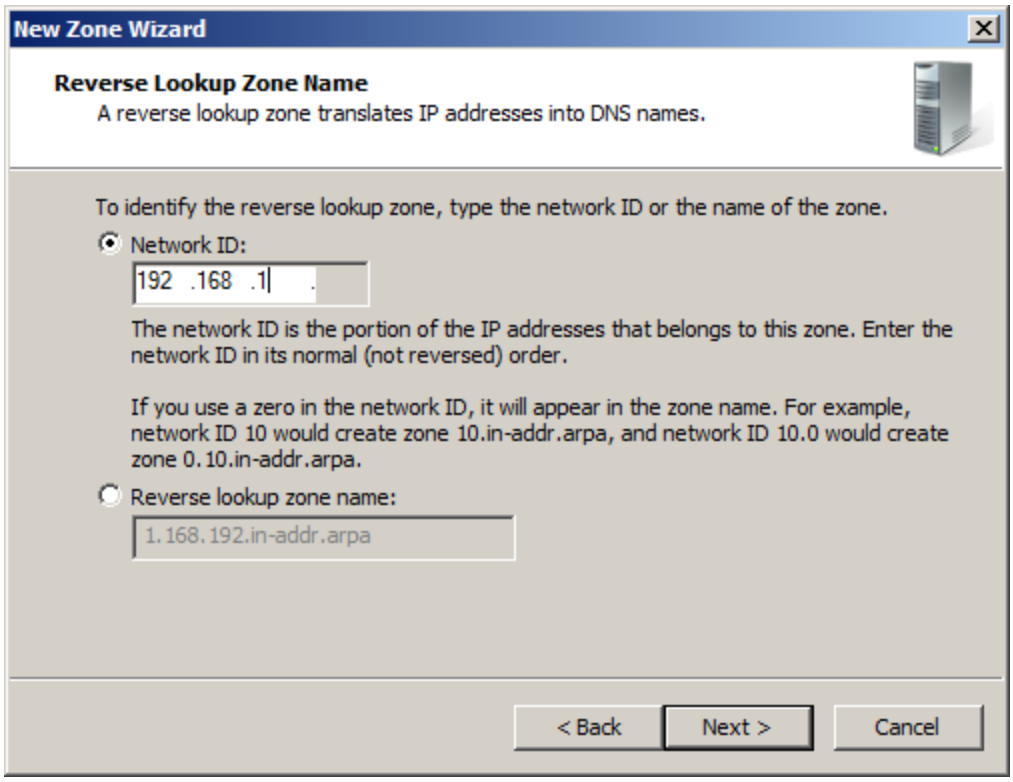
Choose **Reverse Lookup Zone Name**.



Select **IPv4 Reverse Lookup Zone**.

Press the **Next** button to continue.

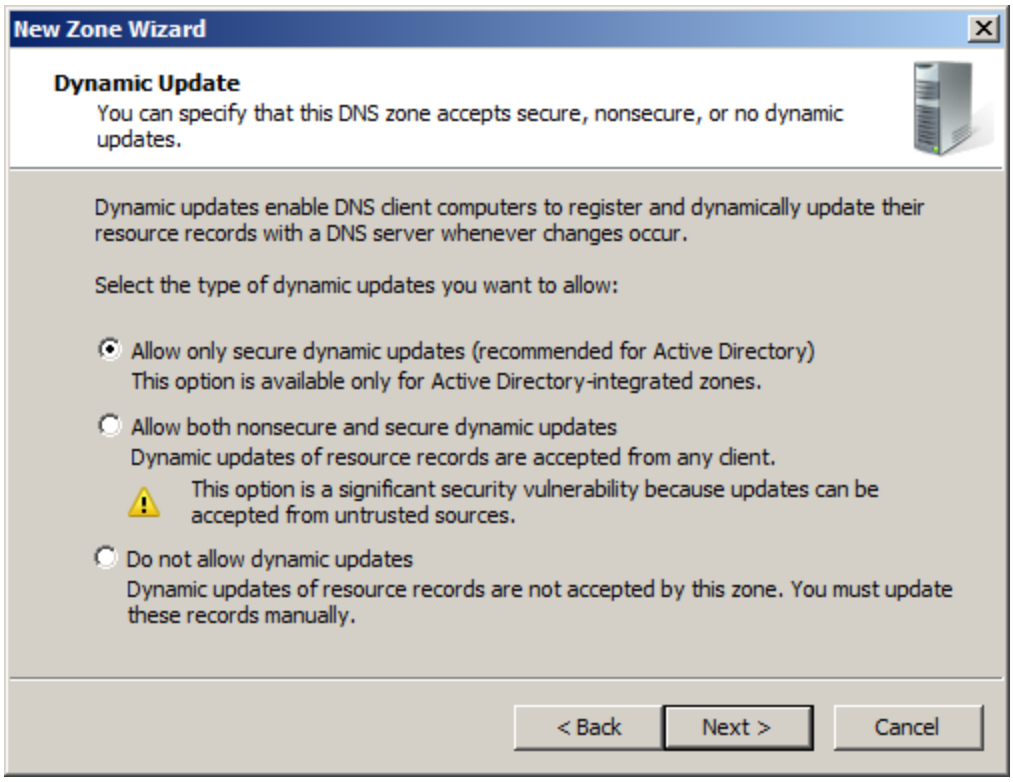
Type the network ID or zone name.



Select the **Network ID** and then type IP address in the **Network ID**.

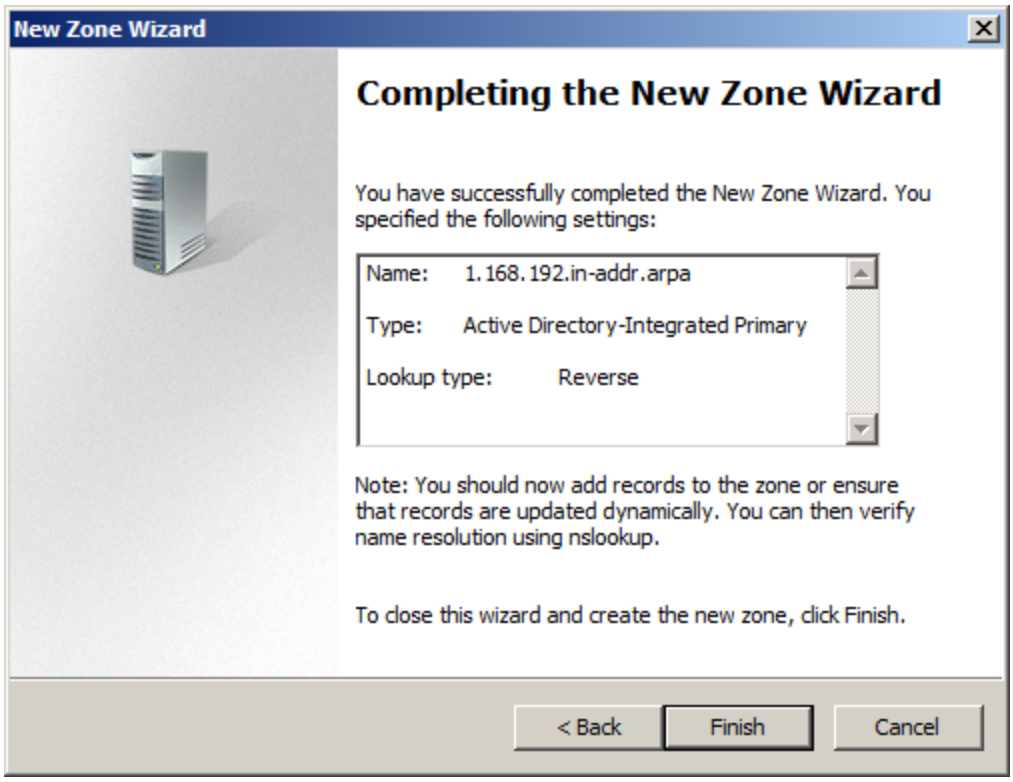
Press the **Next** button to continue.

Specify dynamic update options.



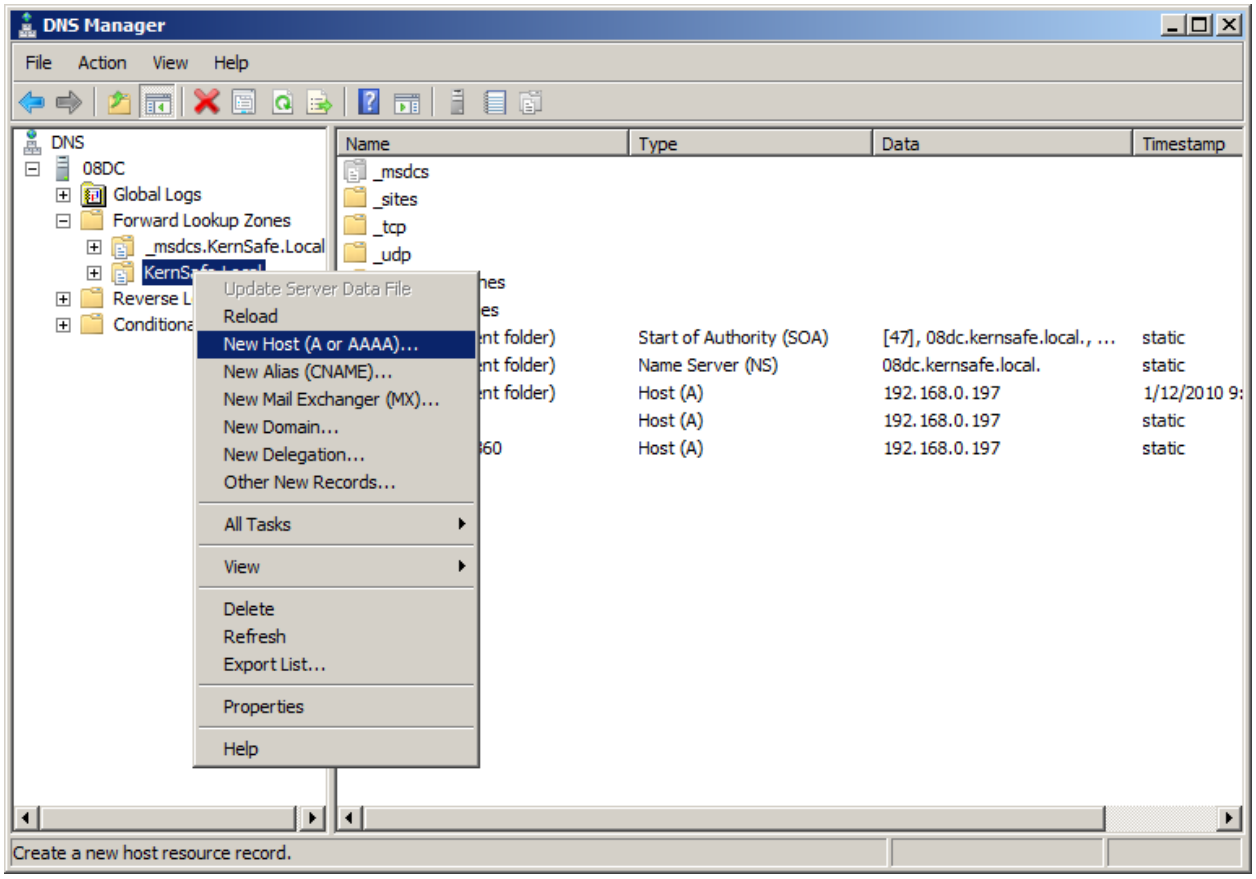
Press the **Next** button to continue.

Check if all of the parameters are correct, press the **Back** button if any change is required.

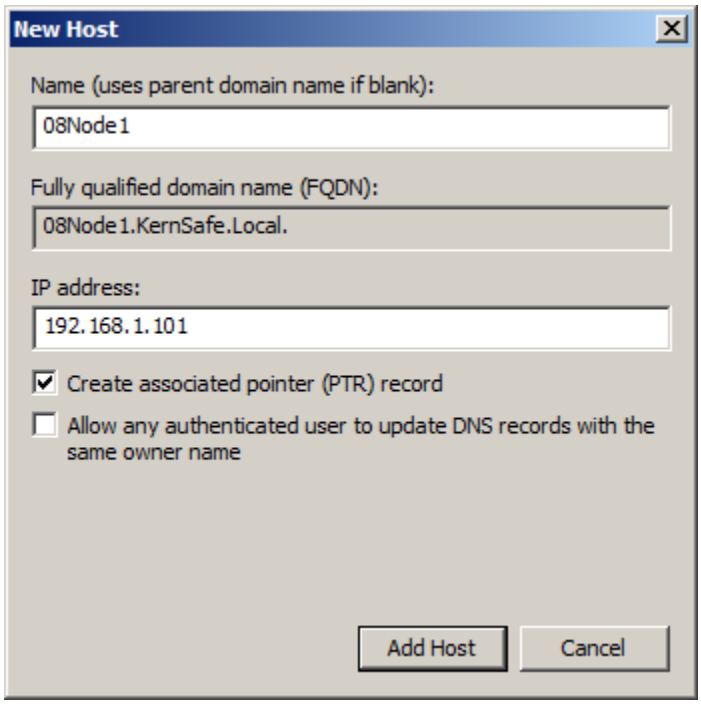


Press the **Finish** button to close the **New Zone Wizard**.

Right click on the **KernSafe.Local** in the left tree view of **DNS Manager**, then select **New Host (A or AAA)…** menu item.



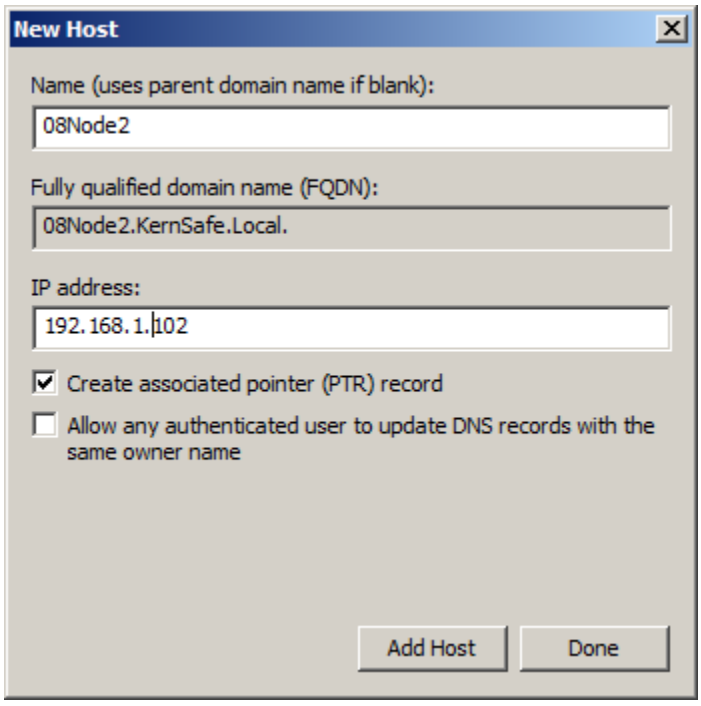
The **New Host** dialog is shown.



Type host name in the **Name** and IP address in the **IP address** field for the **08Node1** machine.

Check the **Create associated pointer (PTR) record** checkbox.

Press the **Add Host** button to add 08Node1 DNS record.



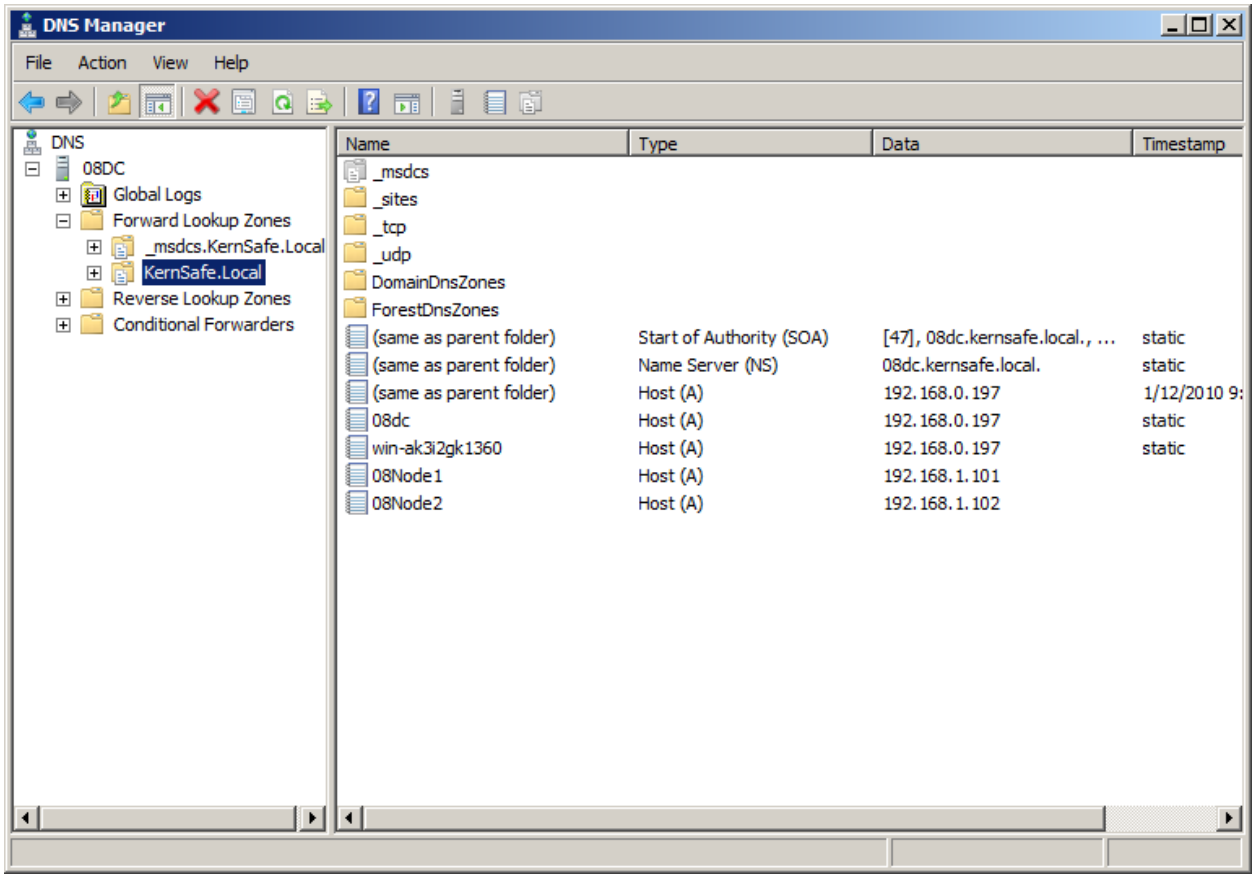
Type host name in the **Name** and IP address in the **IP address** field for the **08Node2** machine.

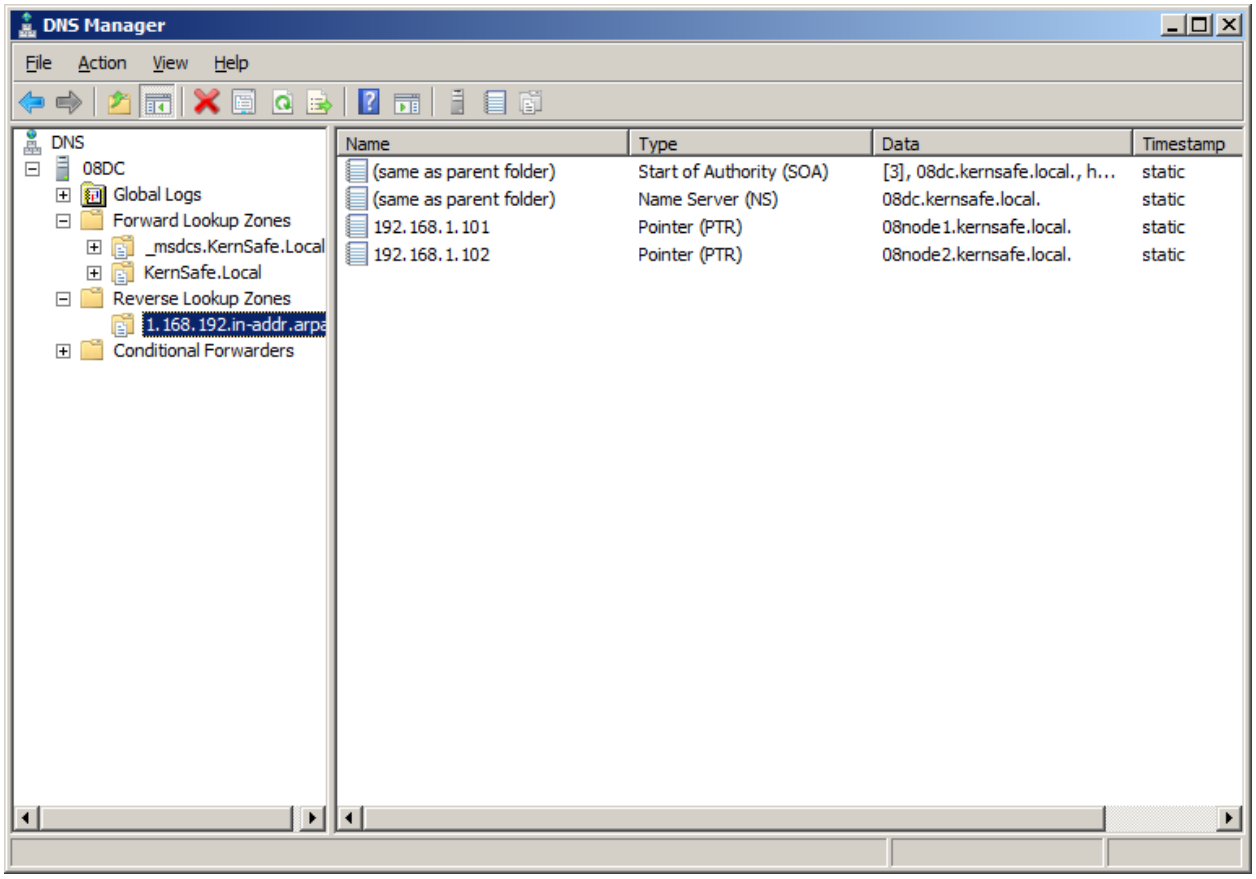
Check the **Create associated pointer (PTR) record** checkbox.

Press the **Add Host** button to add 08Node2 DNS record.

Press the **Done** button to close **New Host** dialog.

Now we will see the two records in the **DNS Manager**.

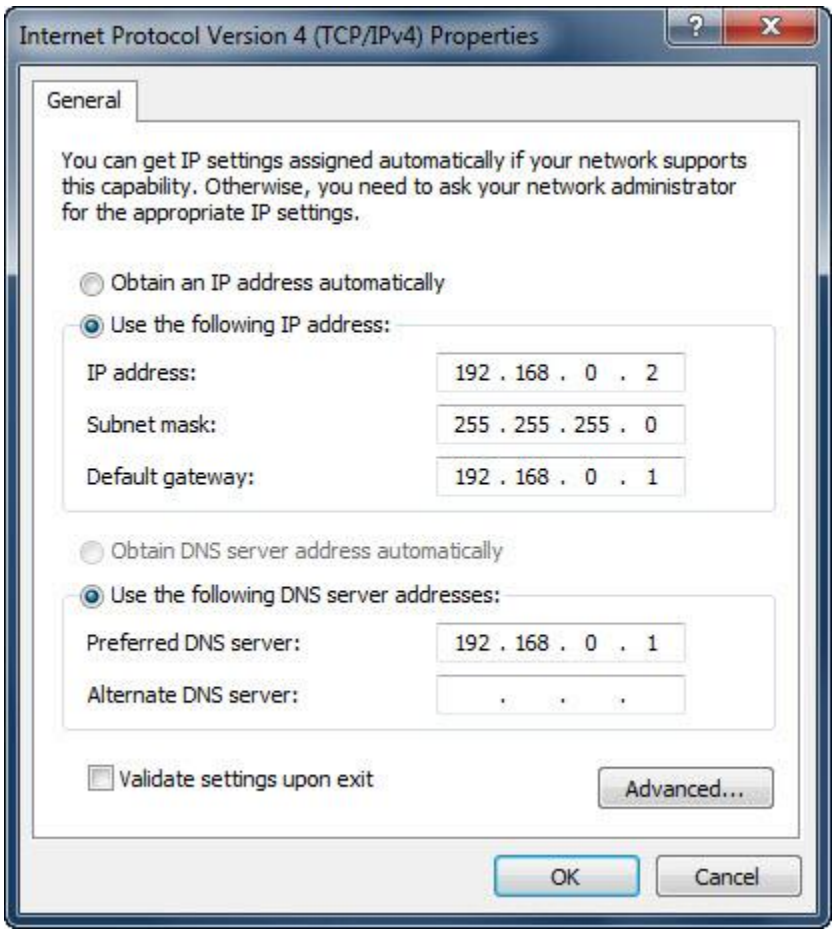

DNS Manager
File
Action
View
Help
DNS
08DC
Global Logs
Forward Lookup Zones
_msdcs.KernSafe.Local
KernSafe.Local
Reverse Lookup Zones
Conditional Forwarders
Name
Type
Data
Timestamp
_msdcs
_sites
_tcp
_udp
DomainDnsZones
ForestDnsZones
(same as parent folder) Start of Authority (SOA) [47], 08dc.kernsafe.local., ... static
(same as parent folder) Name Server (NS) 08dc.kernsafe.local. static
(same as parent folder) Host (A) 192.168.0.197 1/12/2010 9:
08dc Host (A) 192.168.0.197 static
win-ak3i2gk1360 Host (A) 192.168.0.197 static
08Node1 Host (A) 192.168.1.101
08Node2 Host (A) 192.168.1.102



Configuring on iStorage Server1

Network Adapter

For working in clustering environment, the network adapter must be assigned a static IP address. Select the **Internet Protocol Version 4(TCP/IPv4)** and then press the **Properties** button, the **Internet Protocol Version 4 (TCP/IPv4)** dialog is shown.

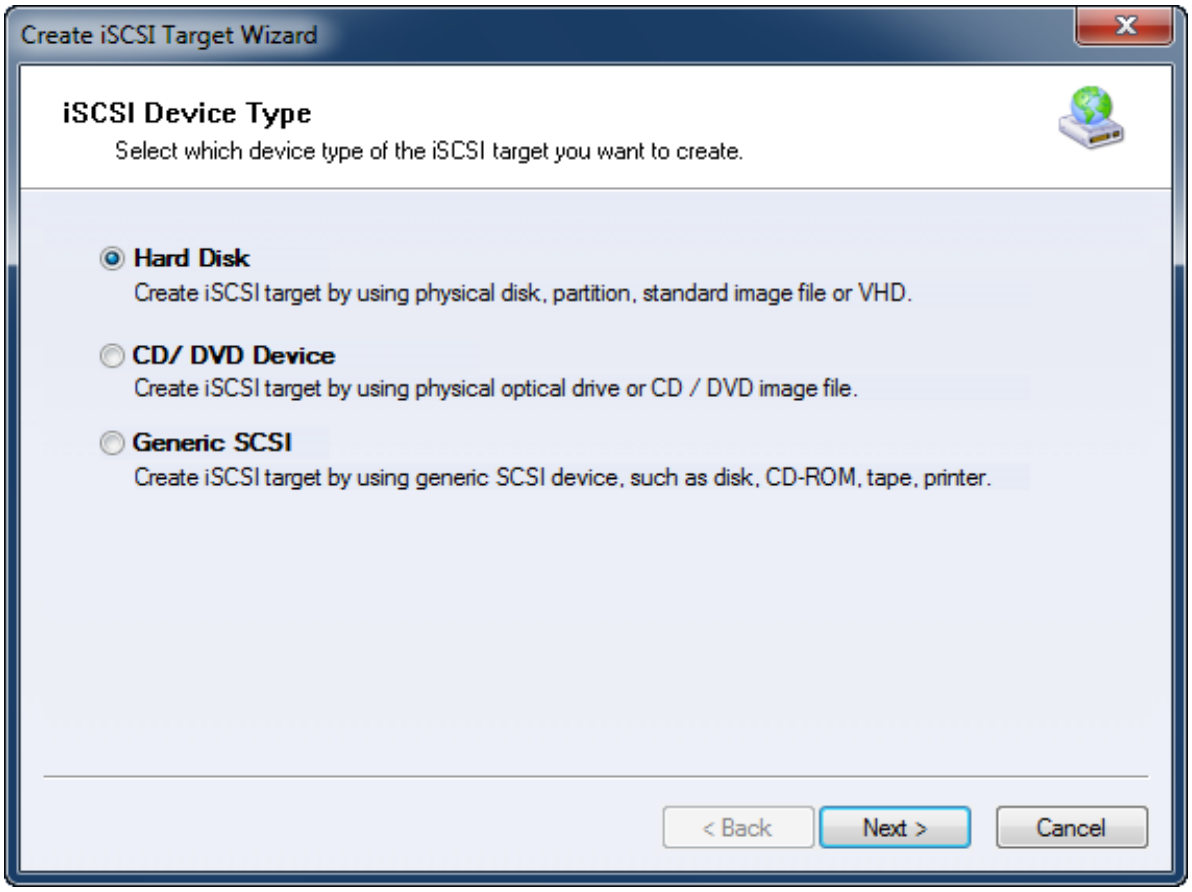


Set the network adapter of KernStorage1 as shown in the figure. IP address is set as 192.168.0.2 and Subnet mask is set as 255.255.255.0.

Preparing Quorum Volume

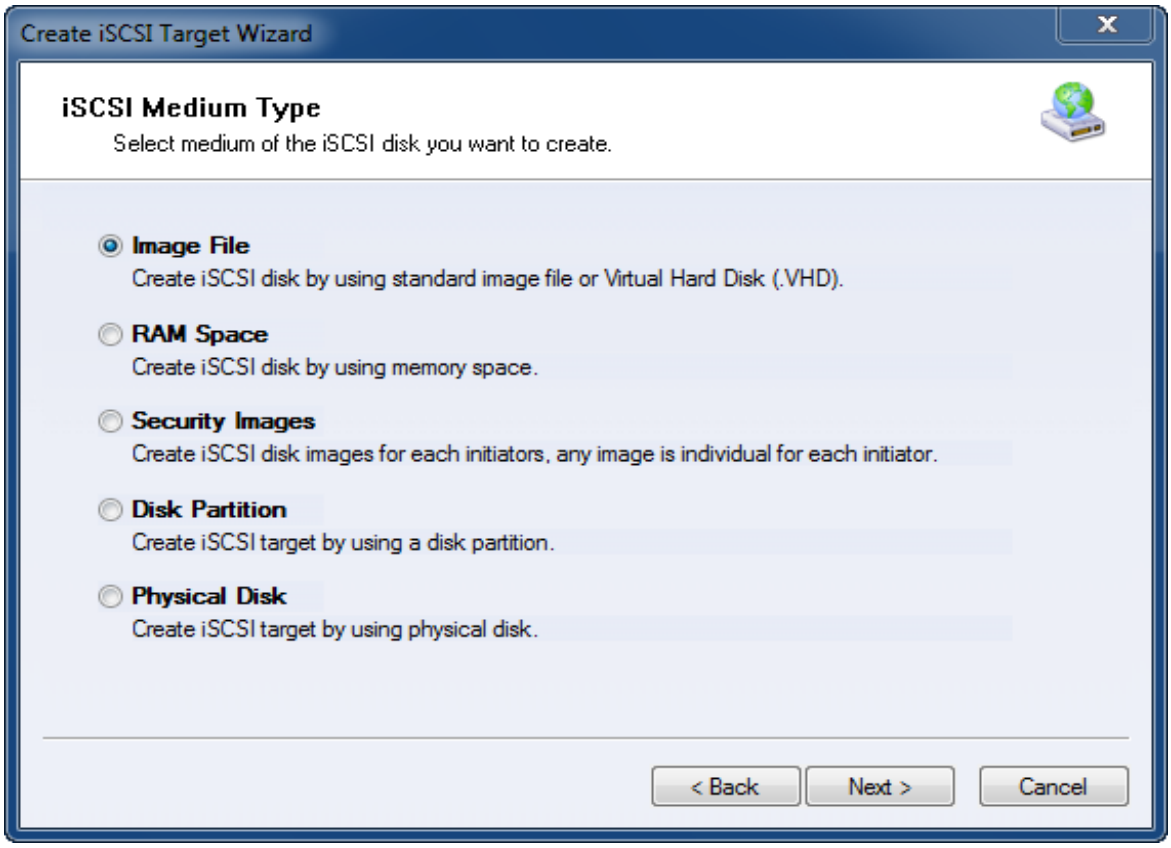
Launch the **iStorage Server management consolle**, press the **Create** button on the toolbar of iStorage Server management console, the **Create Device Wizard** is shown.

Select a device type



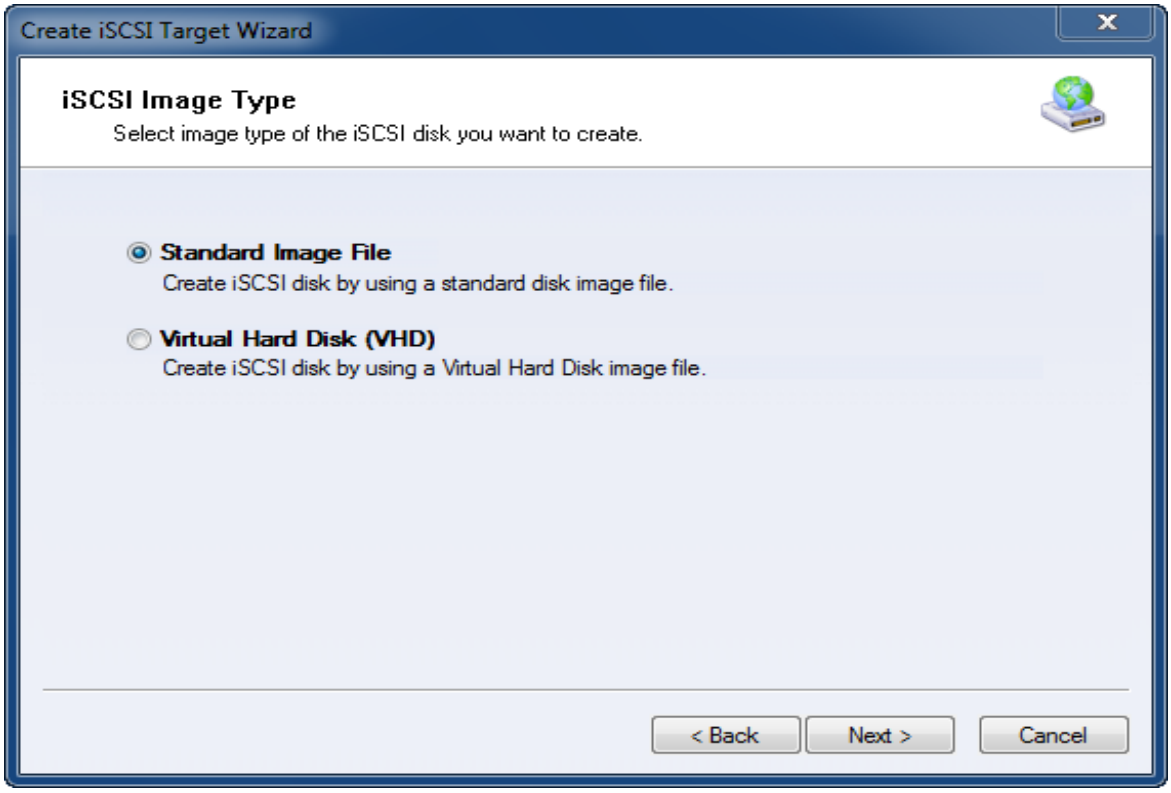
Choose **Hard Disk**.

Press the **Next** button to continue.



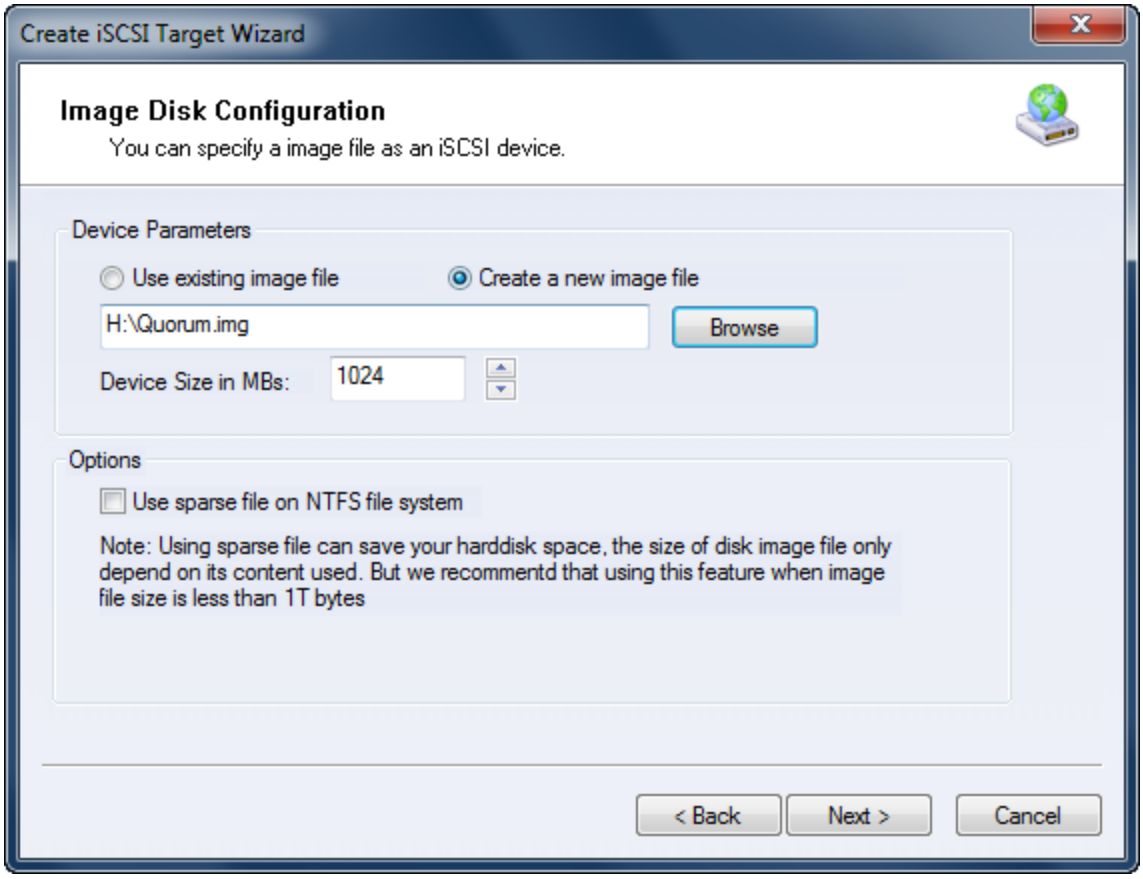
Choose **Image File** in **iSCSI Medium Type** page.

Then press **Next** button to continue.



We choose **Standard Image File** and then press the **Next** button to continue.

Specify image file path and size.

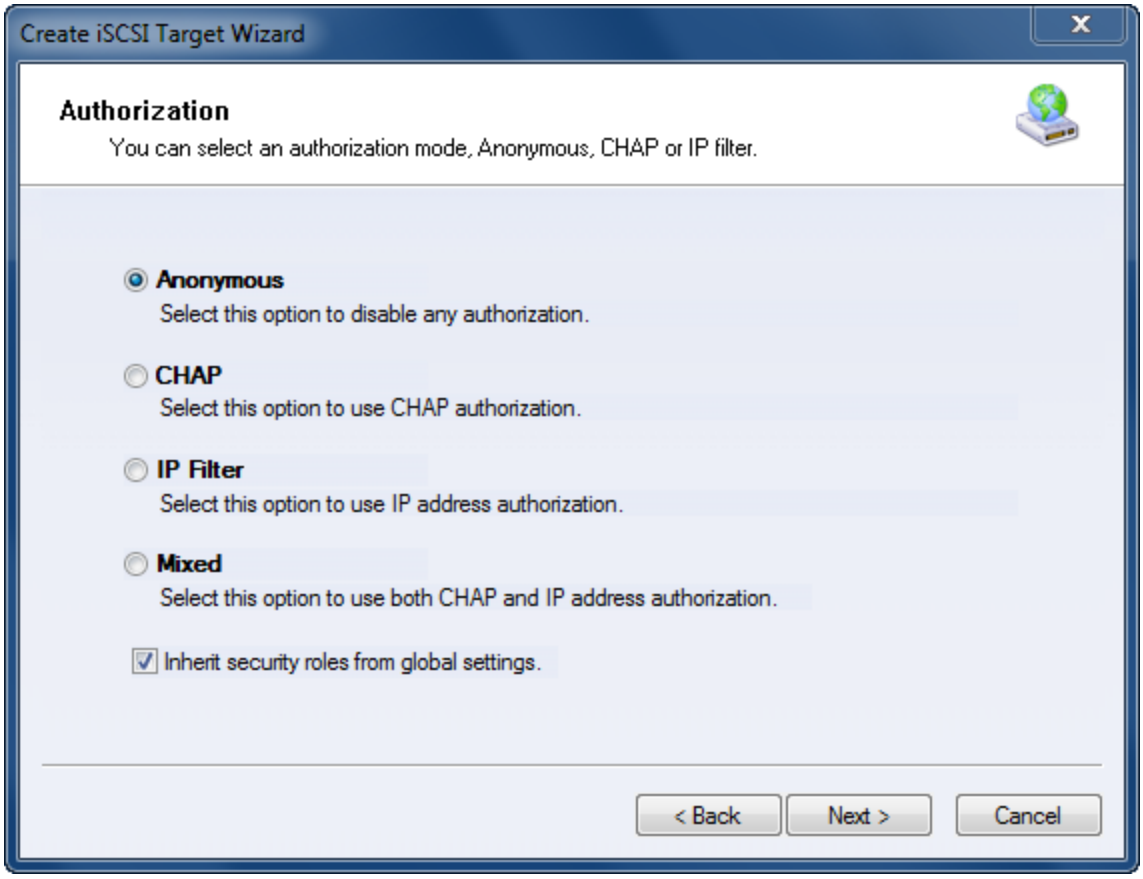


Select **Create a new image file** or **Use existing image file** if you already have one.

Specify the device size.

Press the **Next** button to continue.

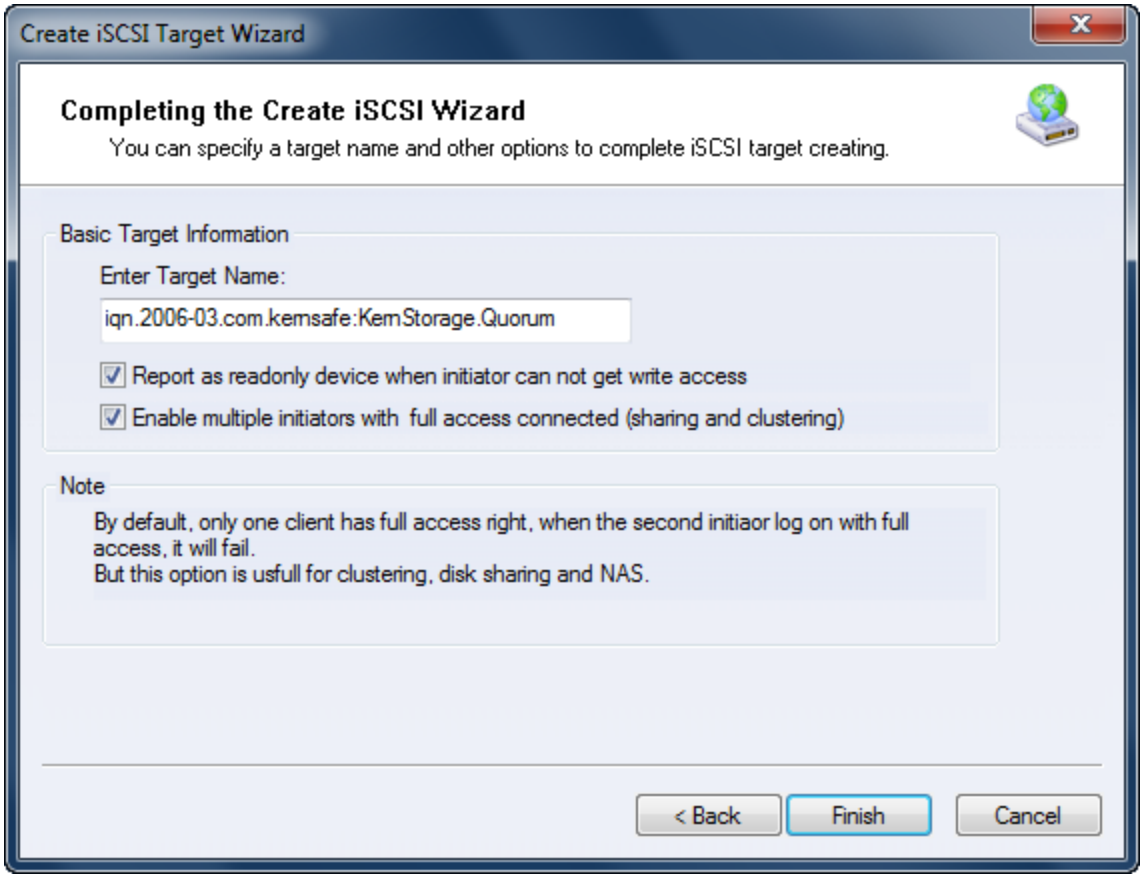
Set authorization mode.



Specify authorization mode as you required, we take **Anonymous** as an example.

Press the **Next** button to continue.

Finish creating iSCSI Target



Type a target name in the Target Name field, or use the default.

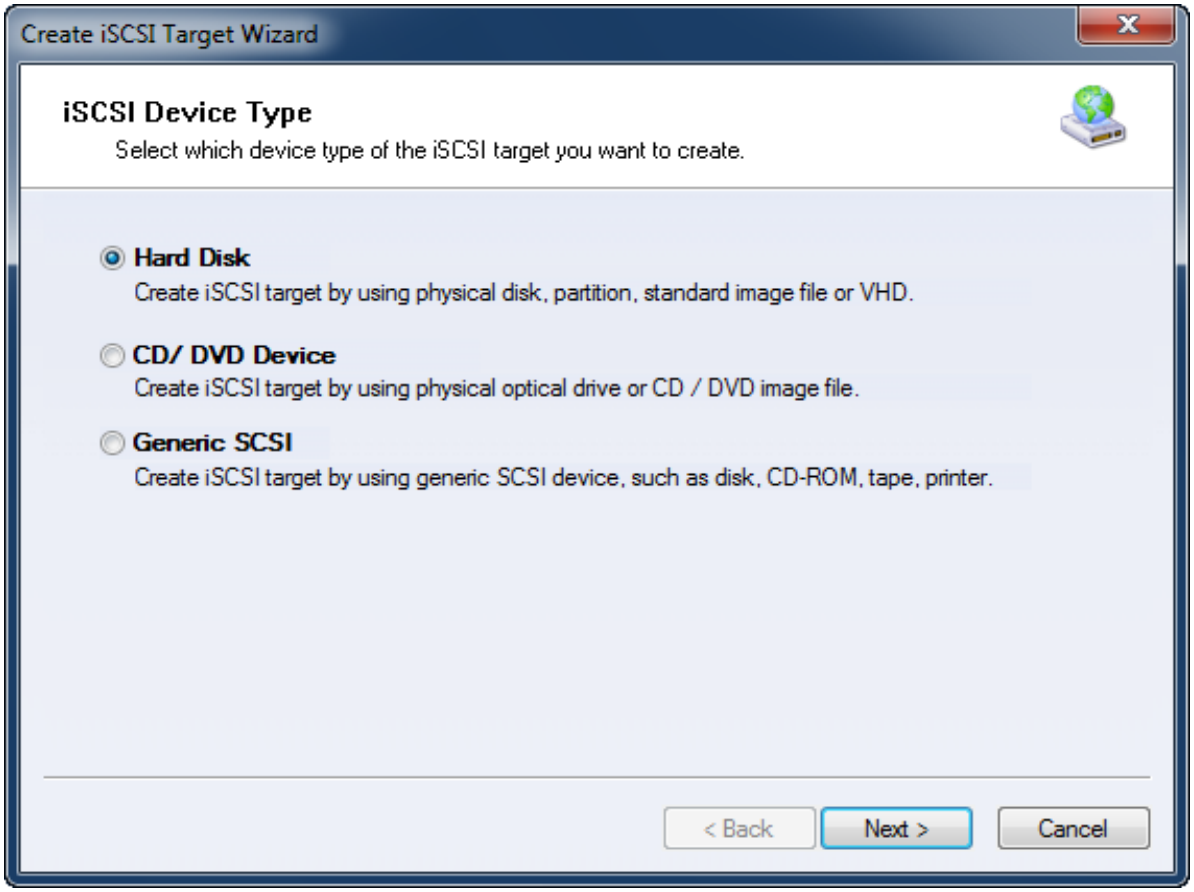
Check the **Enable multiple initiators with full access connected (sharing and clustering)** check box.

Press the **Finish** button to continue.

Preparing Generic Volume

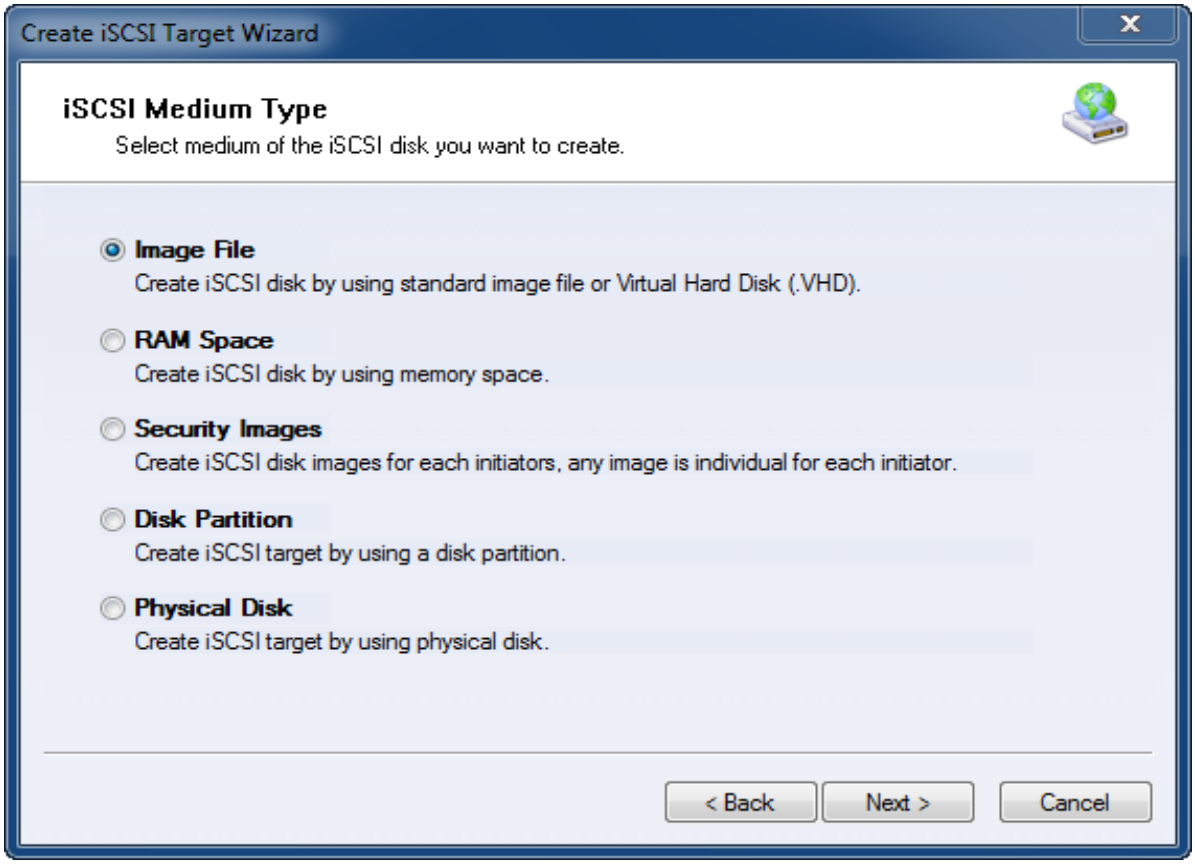
Launch the **iStorage Server management consolle**, press the **Create** button on the toolbar of iStorage Server management console, the **Create Device Wizard** is shown.

Select a device type



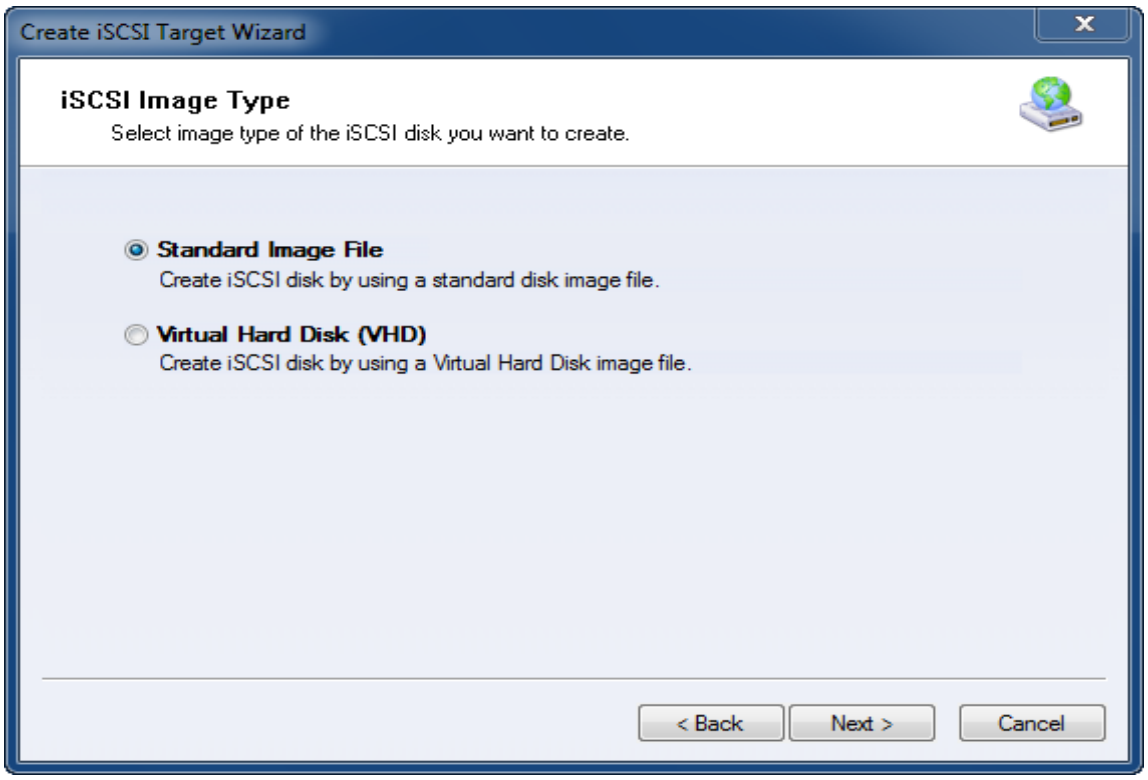
Choose **Hard Disk**.

Press the **Next** button to continue.



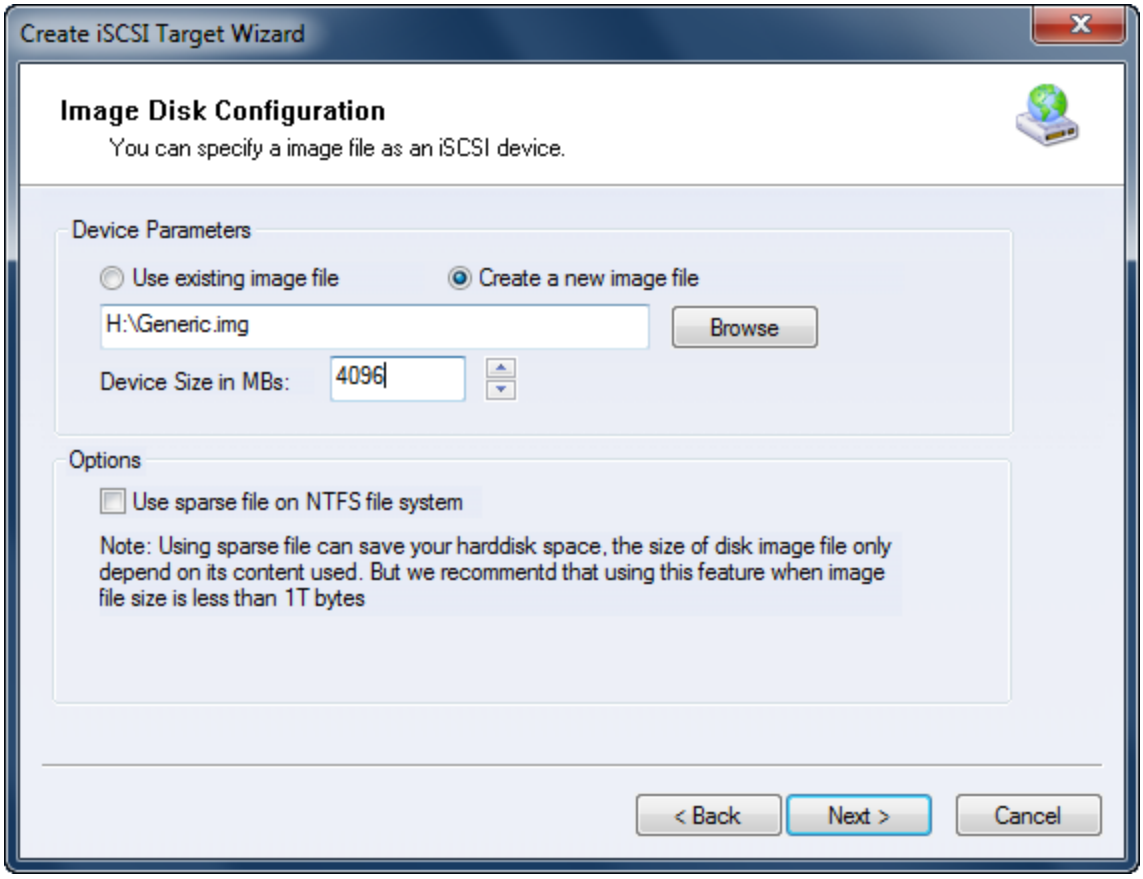
Choose **Image File** in **iSCSI Medium Type** window.

Then press **Next** button to continue.



We choose **Standard Image File** and then press **Next** button.

Specify image file path and size.

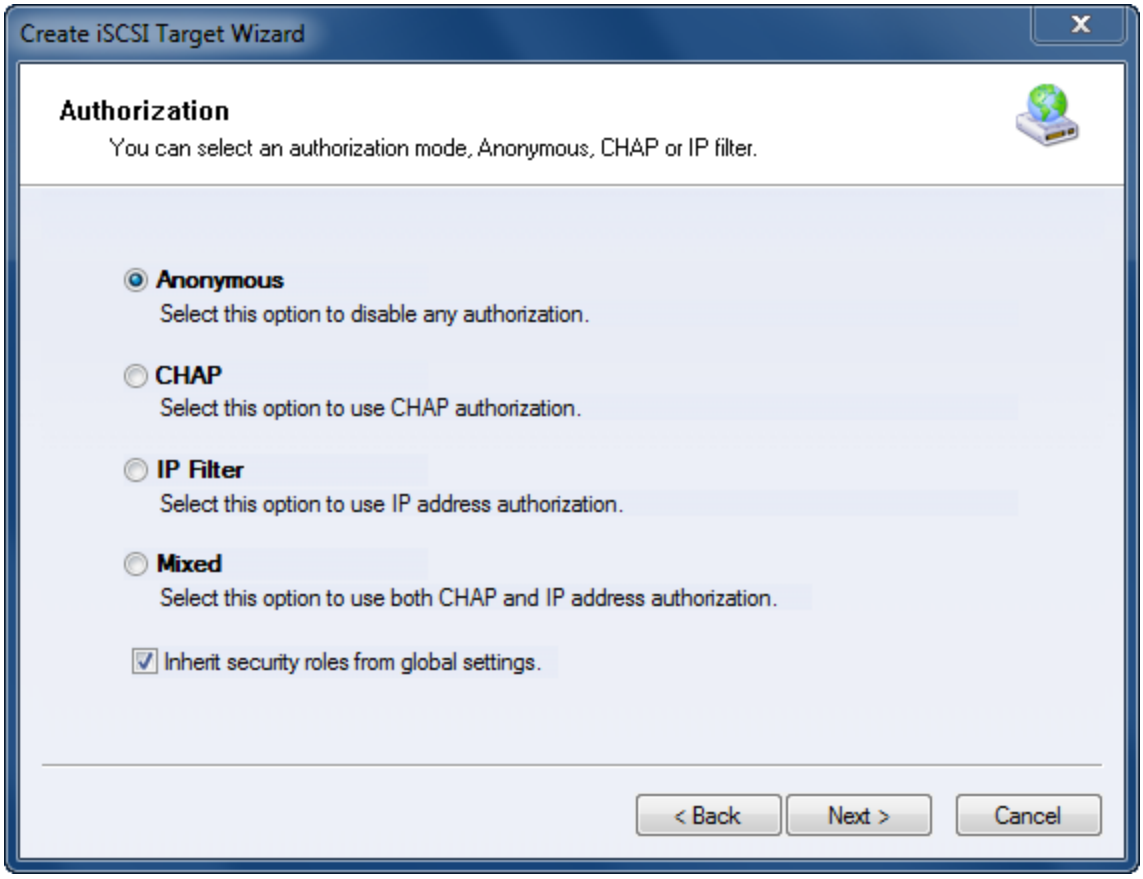


Select **Create a new image file** or **Use existing image file** if you already have one.

Specify the device size.

Press the **Next** button to continue.

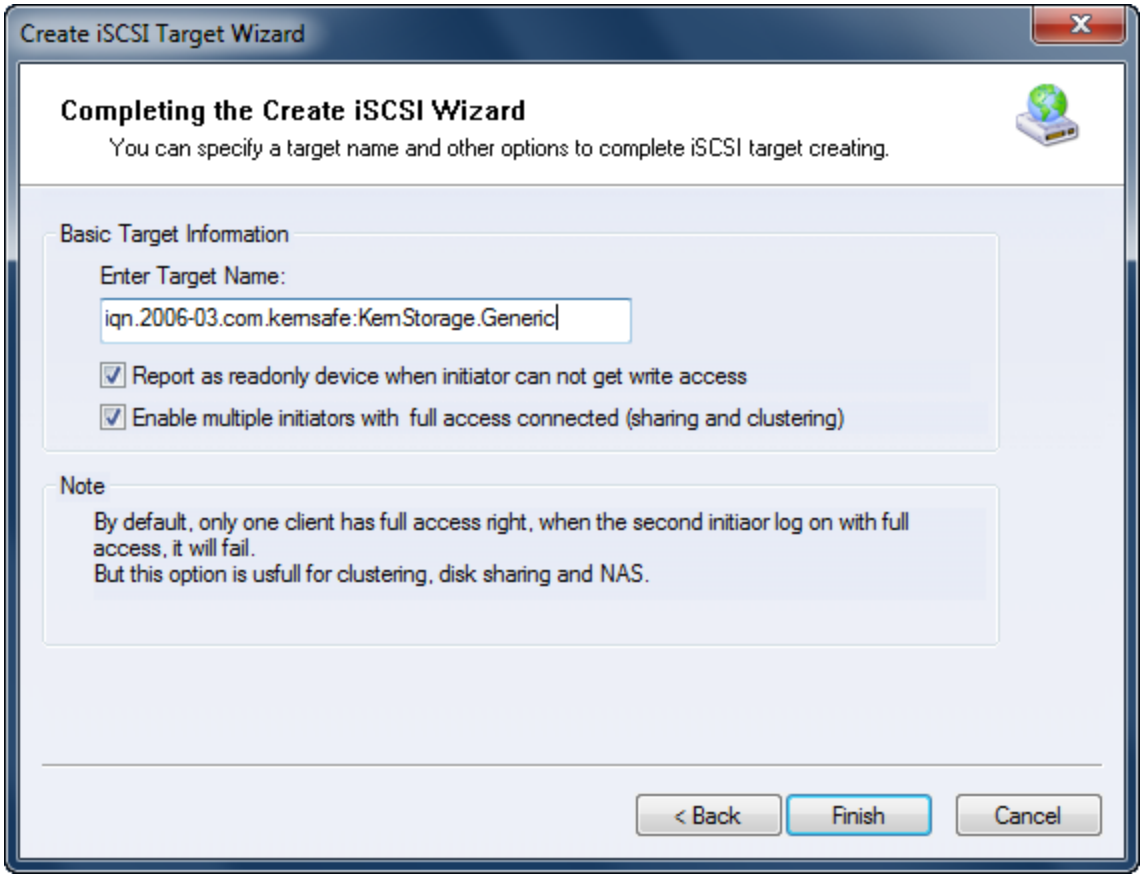
Set authorization mode.



Specify authorization mode as you required, here we use **Anonymous**.

Press the **Next** button to continue.

Finish creating iSCSI Target

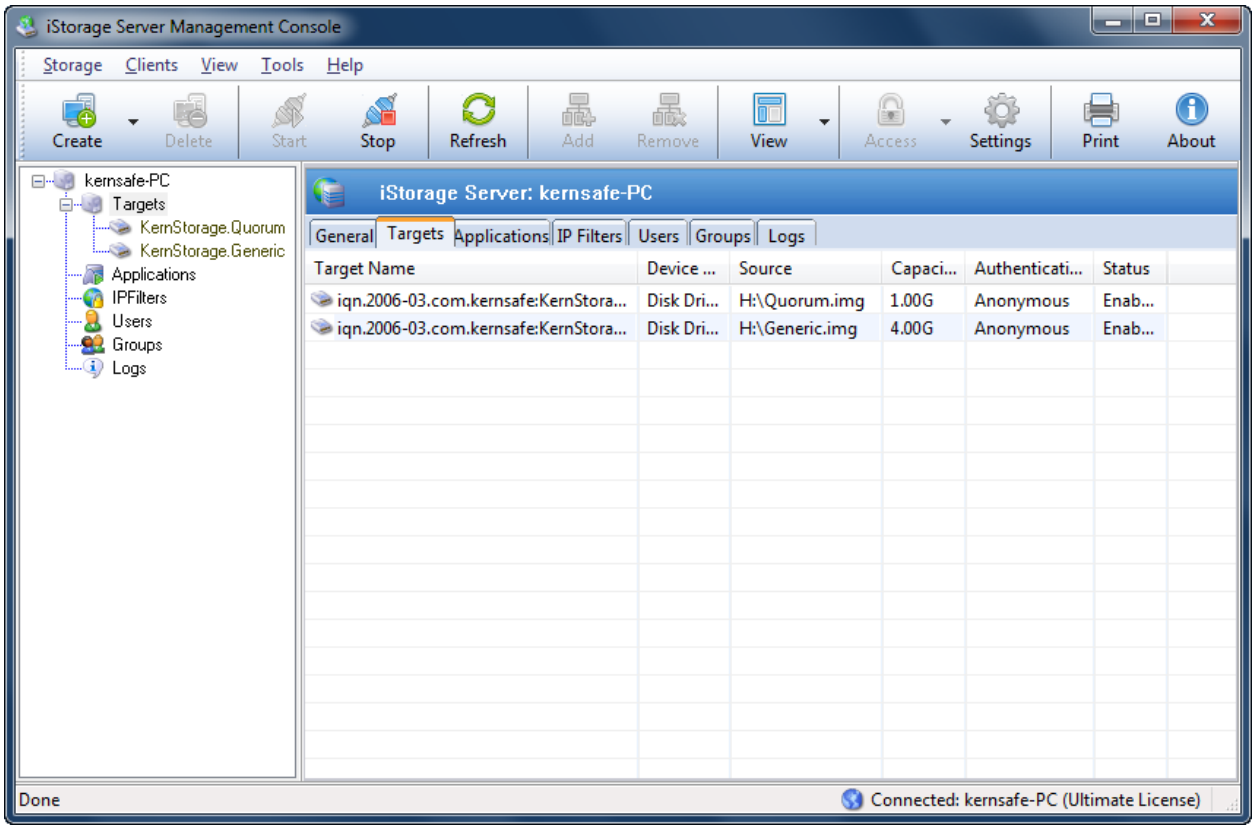


Type a target name in the Target Name field, or use the default.

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

Press the **Finish** button.

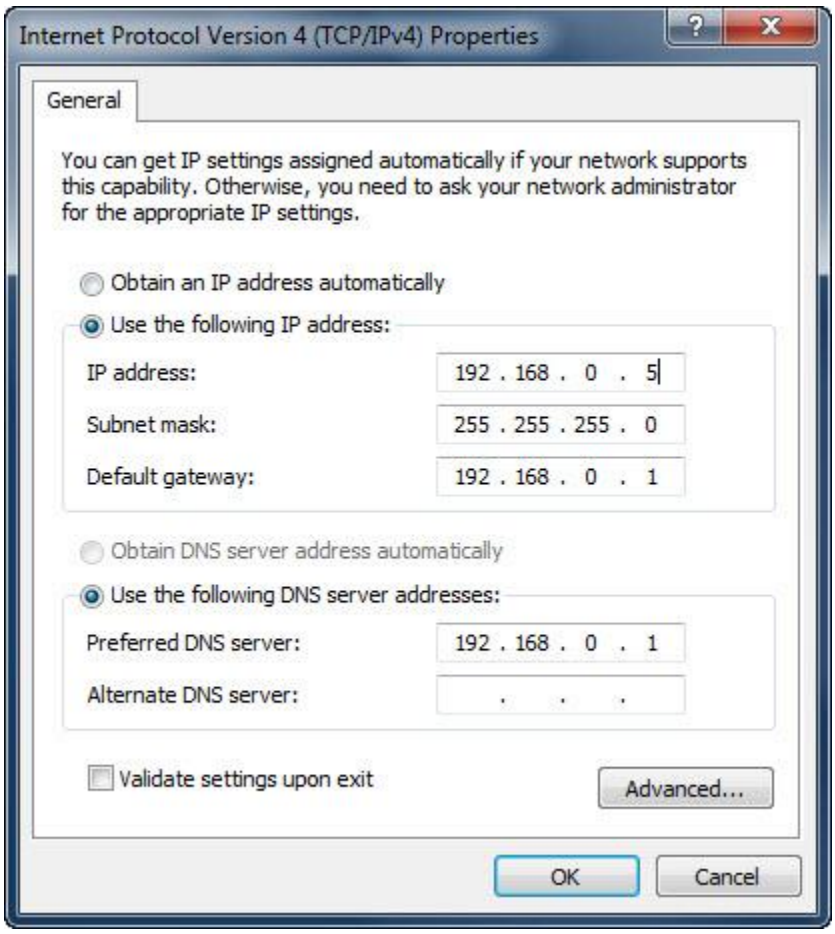
Now the sample images are shown in the iStorage Server management console if successful.



Configuring on iStorage Server2

Network Adapter

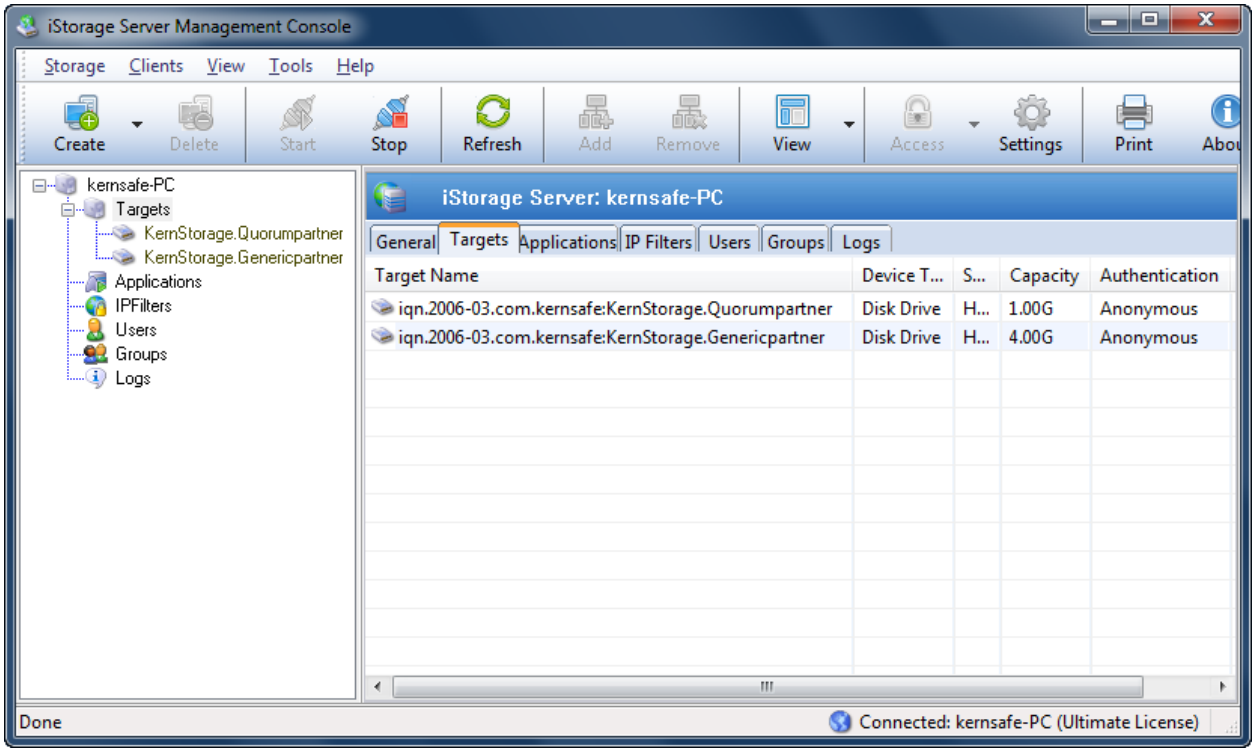
For working in clustering environment, the network adapter must be assigned a static IP address. Select the **Internet Protocol Version 4(TCP/IPv4)** and then press the **Properties** button, the **Internet Protocol Version 4 (TCP/IPv4)** dialog is shown.



Set the network adapter of KernStorage1 as shown in the figure. IP address is set as 192.168.0.3 and Subnet mask is set as 255.255.255.0.

Preparing Volume

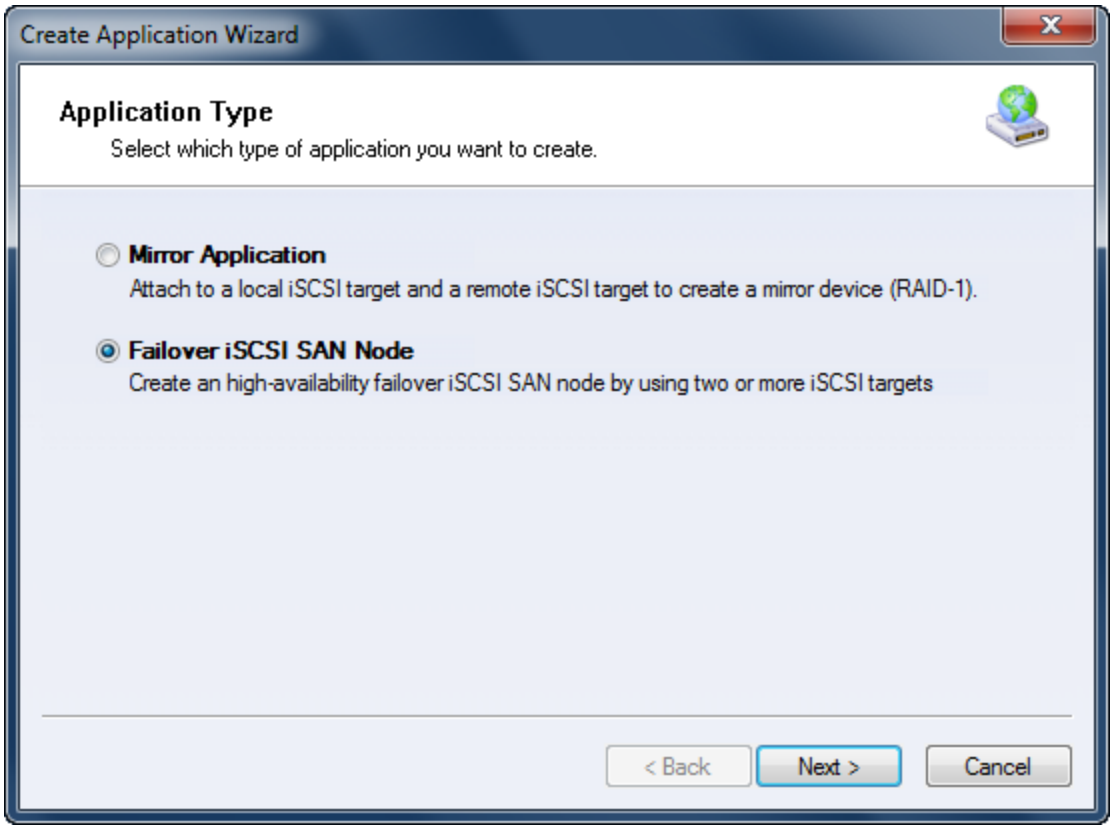
We also need two volumes on iStorage Server2, we named them KernStorage.Qunrumpartner and KernStorage.Genericpartner which has the same size as volumes on iStorage Server1. We create them as we do on iStorage Server1. The main interface is shown as follows if successful.



Creating Application

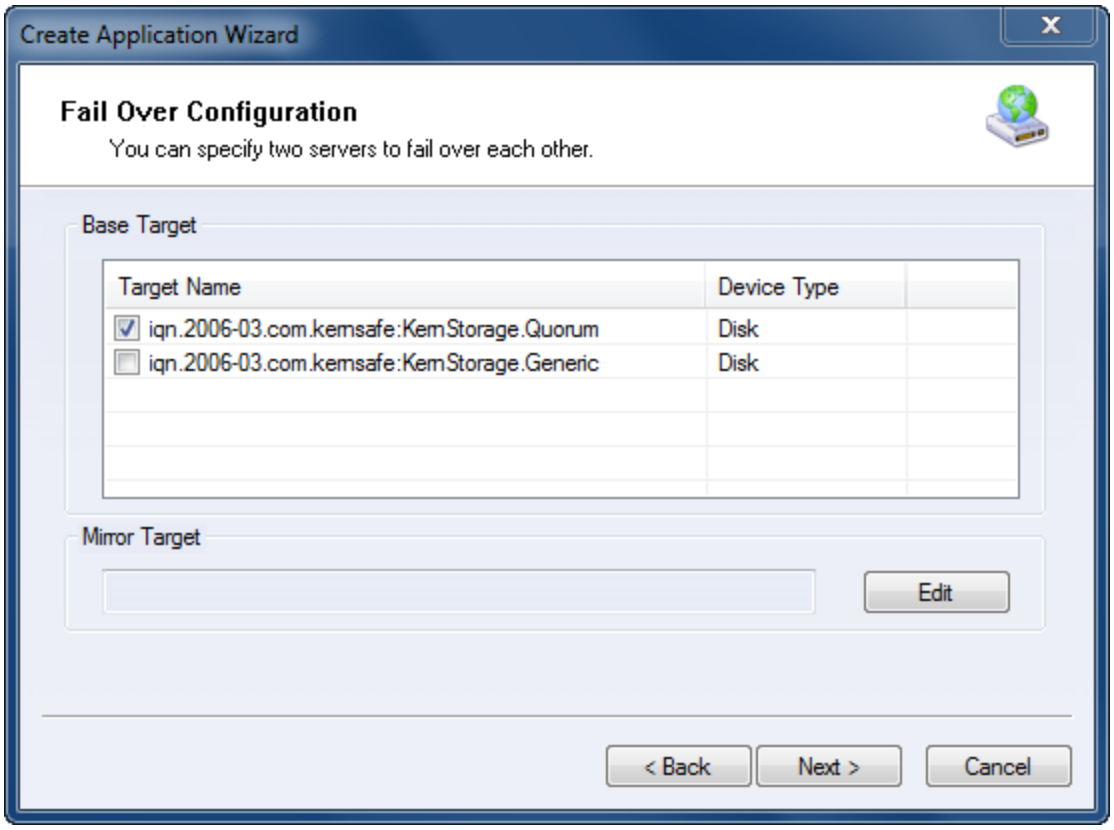
Creating Quorum application

On iStorage 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.

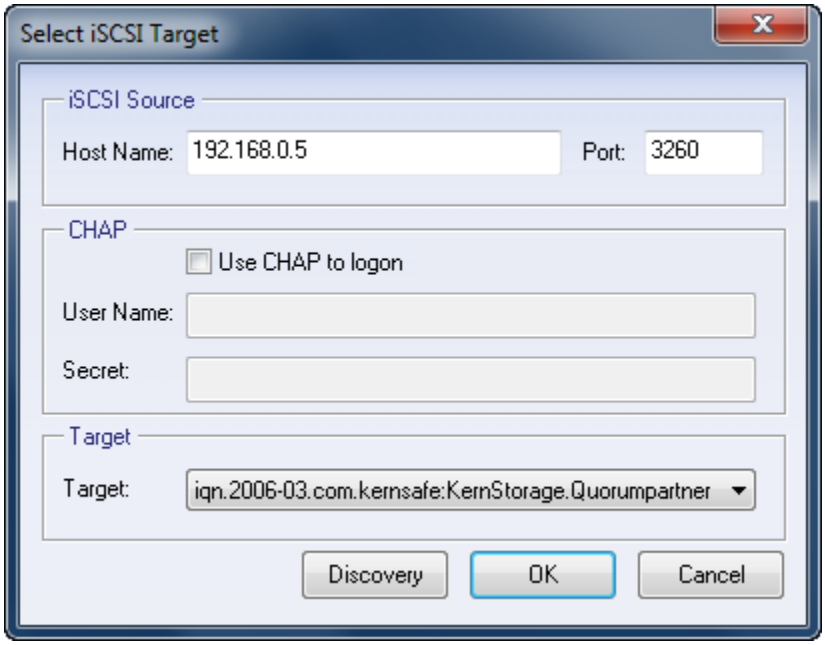


Choose **Failover iSCSI SAN** Node.

Then press **Next** to continue.



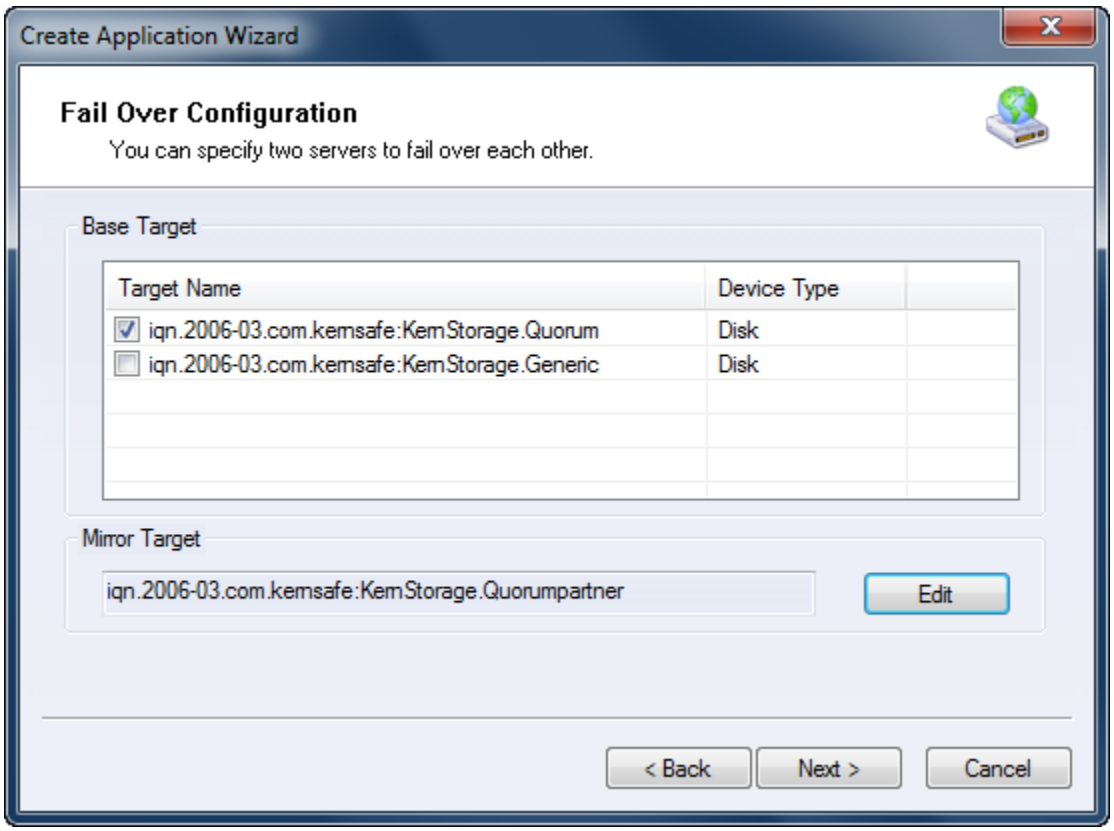
Check the HA storage and click **Edit** to find the mirror target.



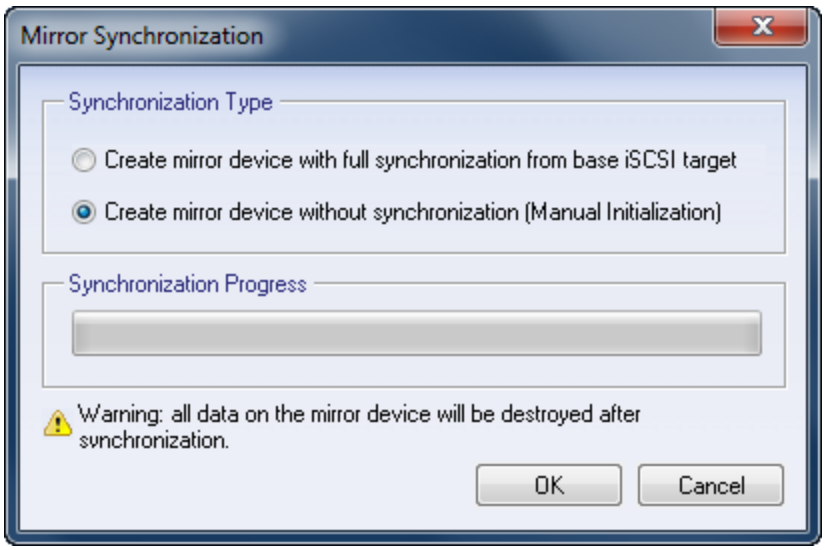
Input the IP and port of server2 in **iSCSI Source** tab, then click **Discovery** on the bottom of the window to find the mirror target, choose the **HApartner** in the down-list.

Press **OK** button to continue.

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

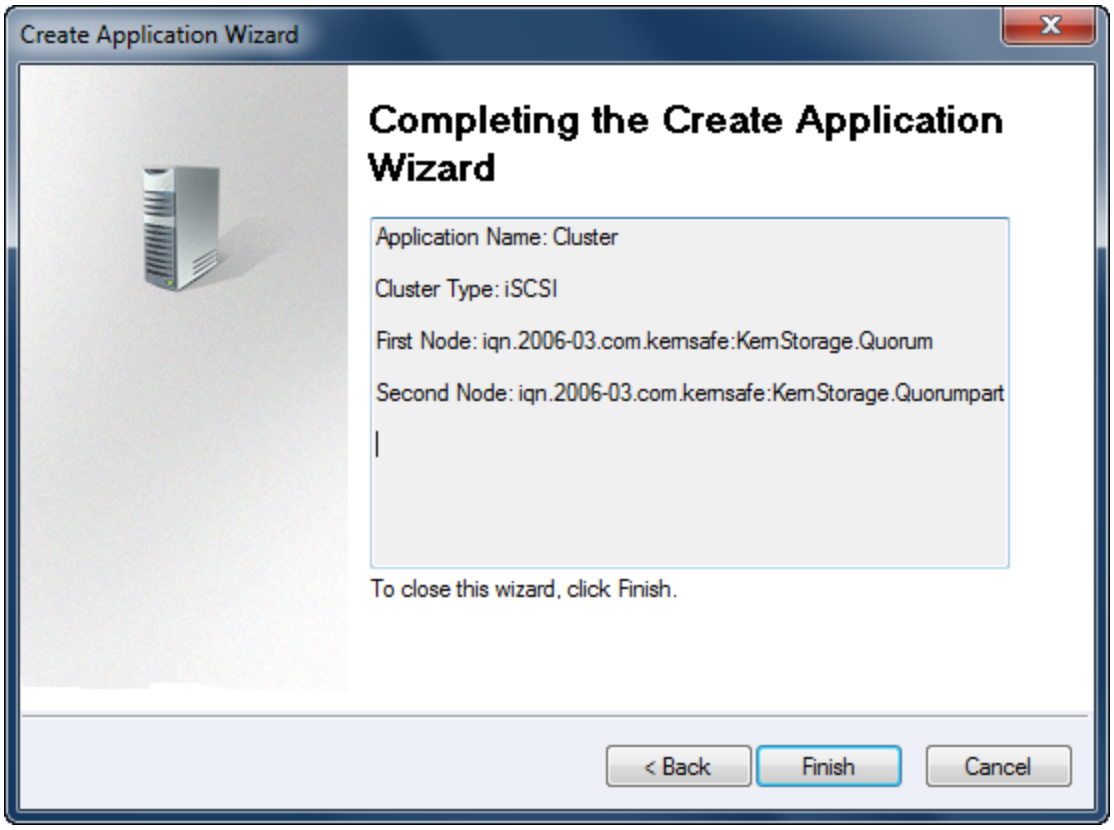


The mirror target will be added to the window, then click **Next** button to continue.



Now, the mirror target should be synchronization 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**.

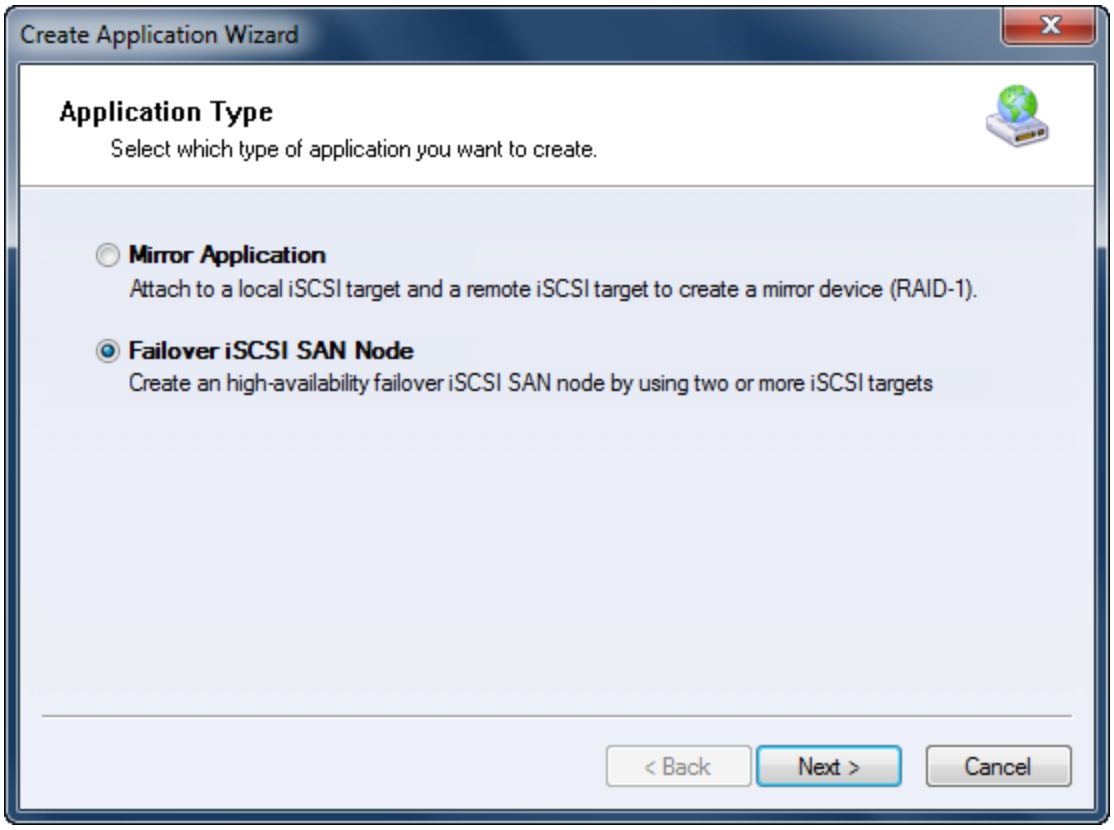
Press **OK** button to continue.



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

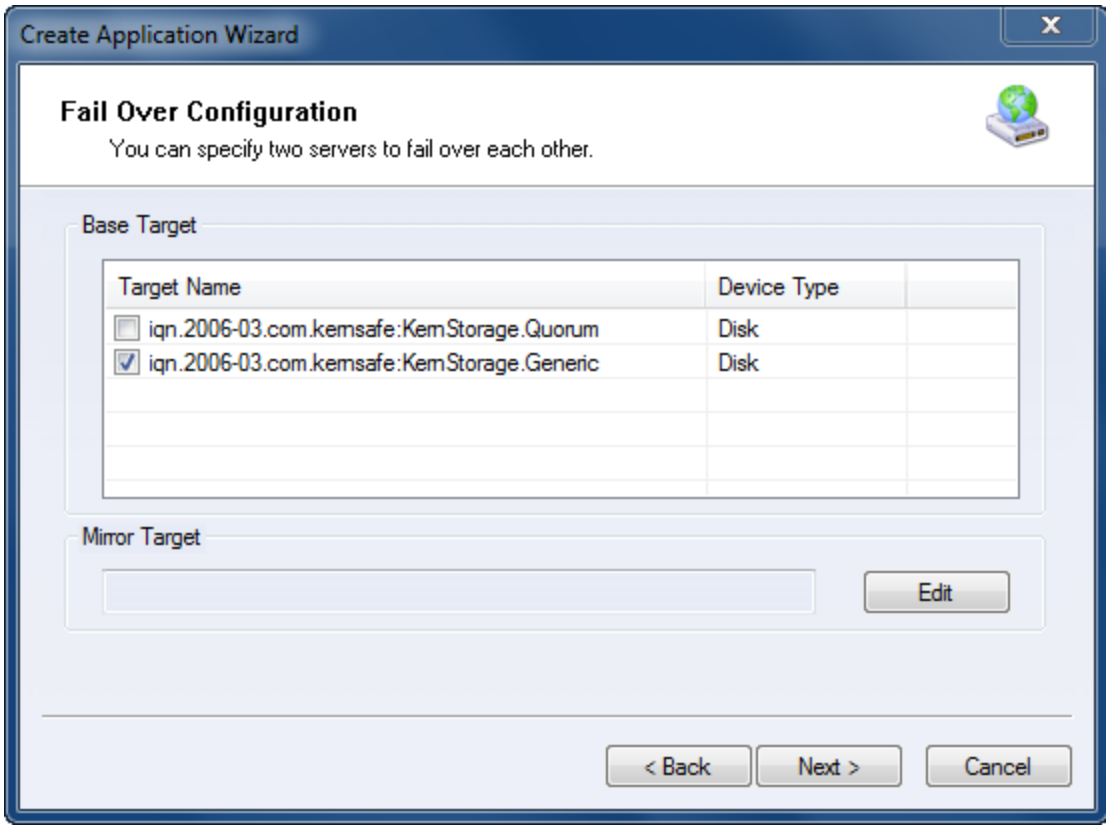
Creating Generic application

On iStorage 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.

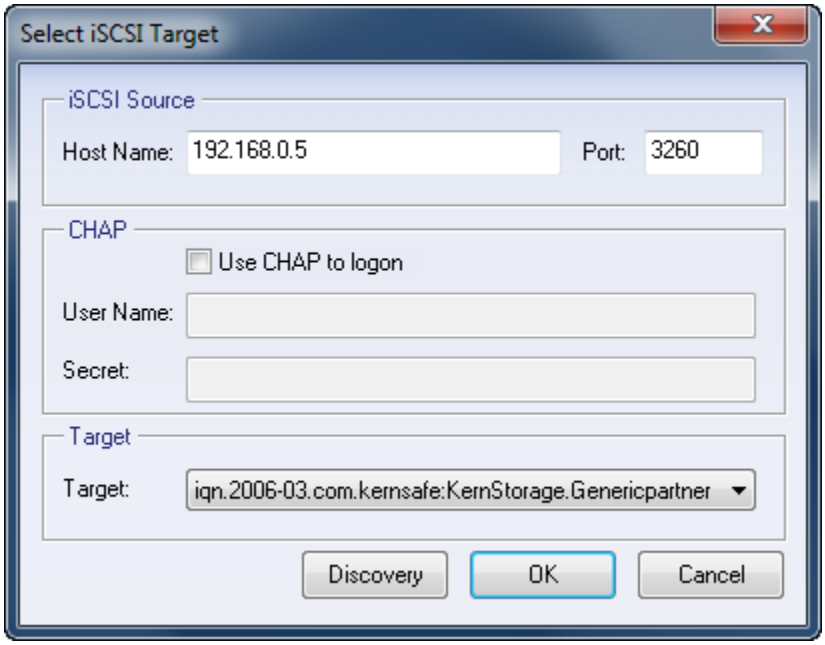


Choose **Failover iSCSI SAN** Node.

Then press **Next** to continue.



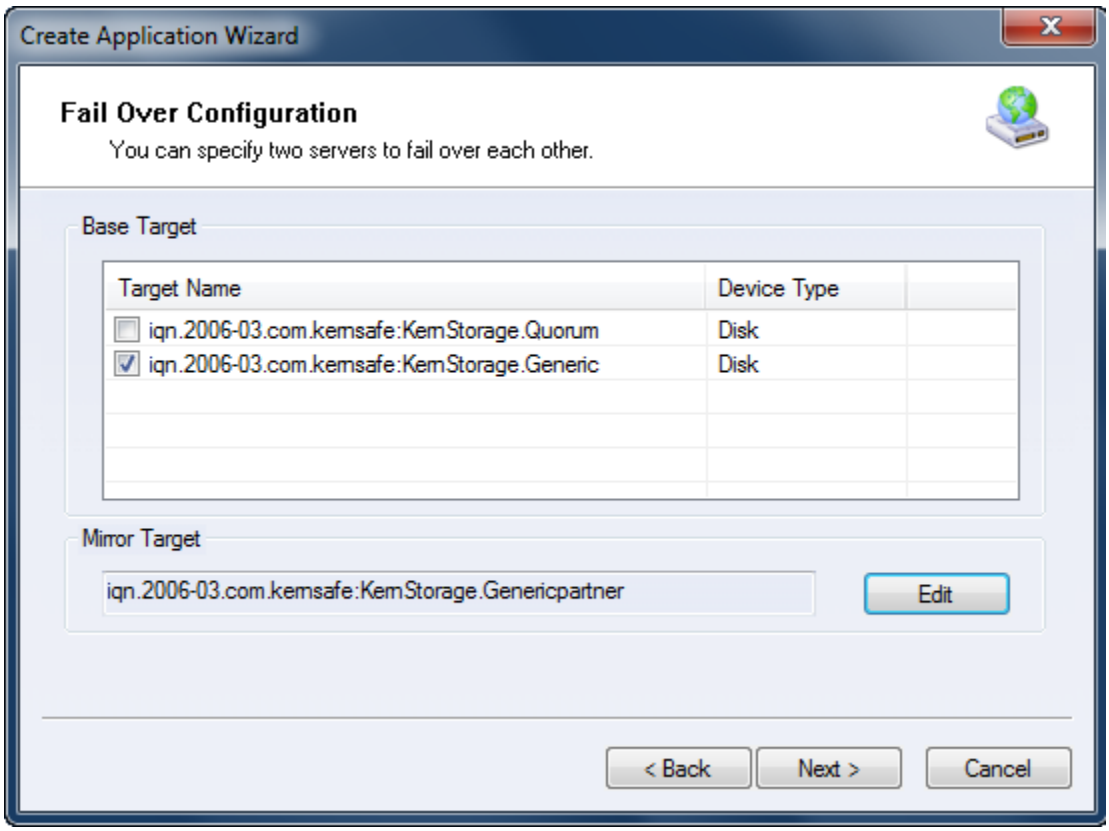
Check the HA storage and click **Edit** to find the mirror target.



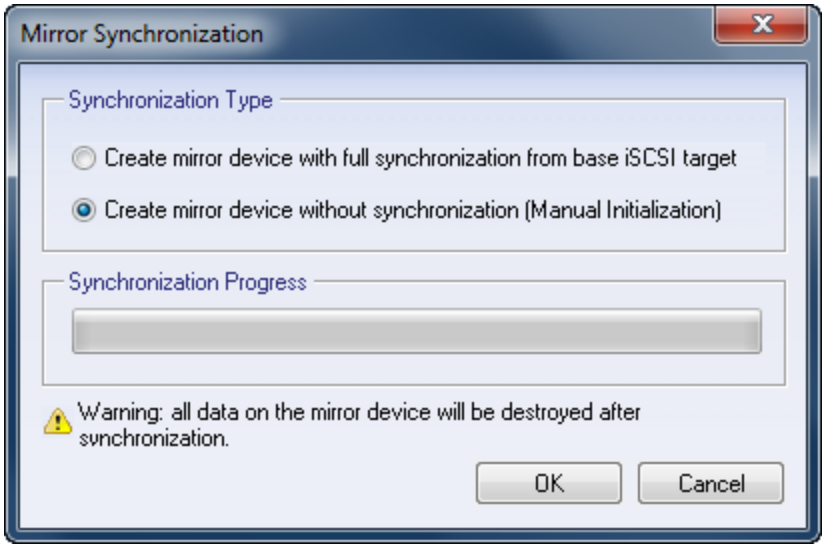
Input the IP and port of server2 in **iSCSI Source** tab, then click **Discovery** on the bottom of the window to find the mirror target, choose the **HApartner** in the down-list.

Press **OK** button to continue.

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

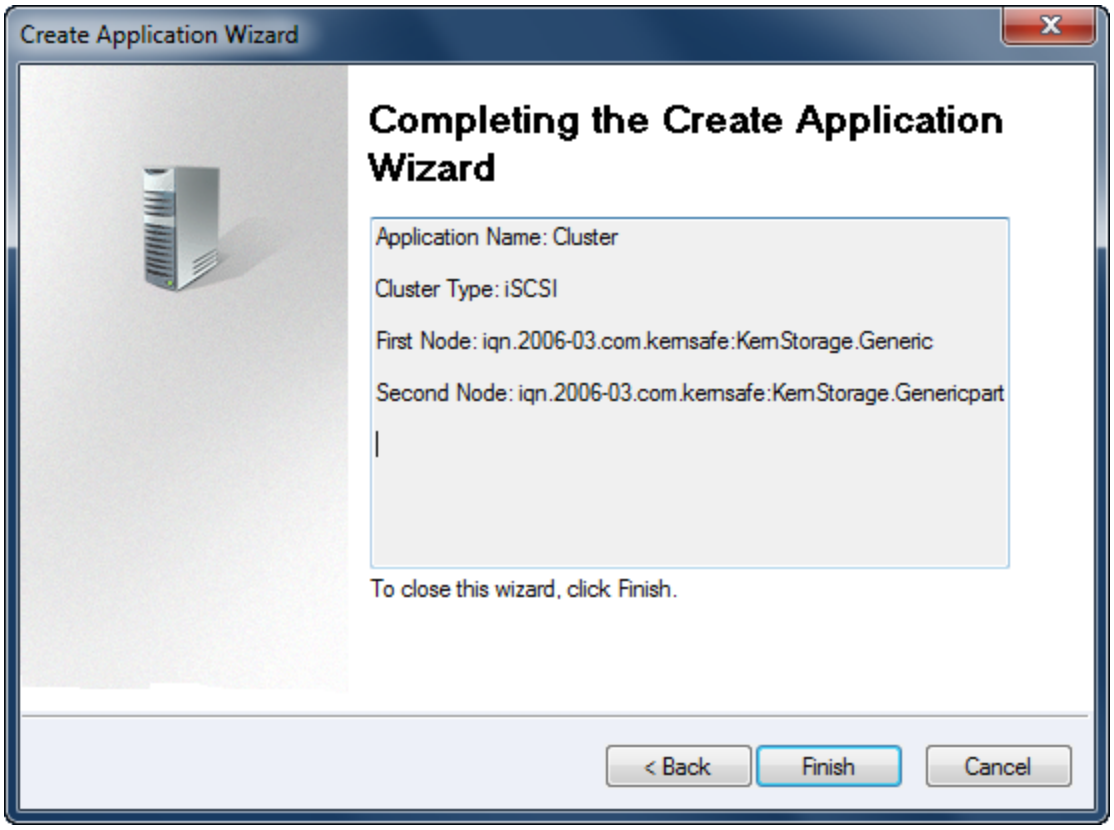


The mirror target will be added to the window, then click **Next** button to continue.

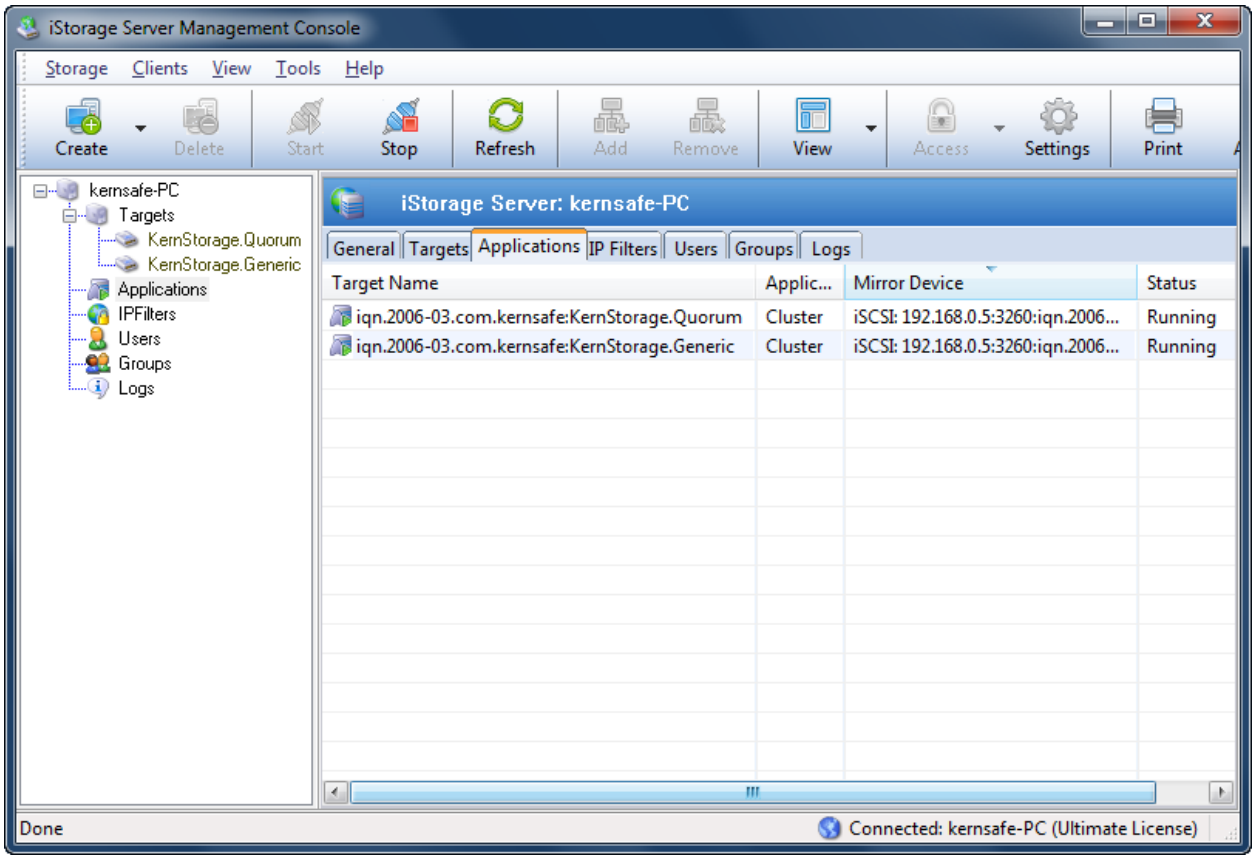


Now, the mirror target should be synchronized to the base target, if the two targets are both the new one and do not be initialized, we can choose **Create mirror device without synchronization (Manual Initialization),** otherwise, we must choose **Create mirror device with full synchronization from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

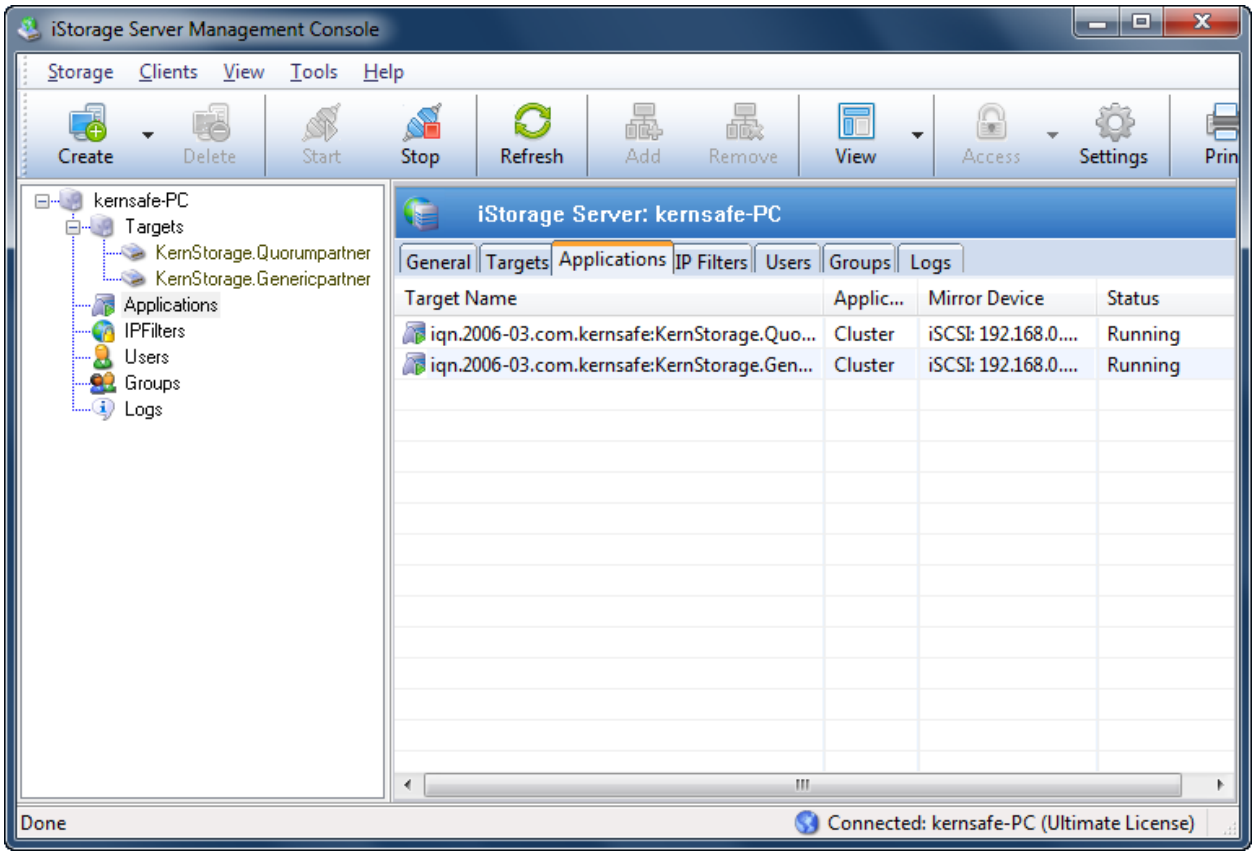
Press **OK** button to continue.



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



Now the two applications will be shown in the main interface if successful and the configuration on the iStorage Server1 is completed. We do the same operations on iStorage Server2 to create applications, after the creation, the main interface will be shown as follows:

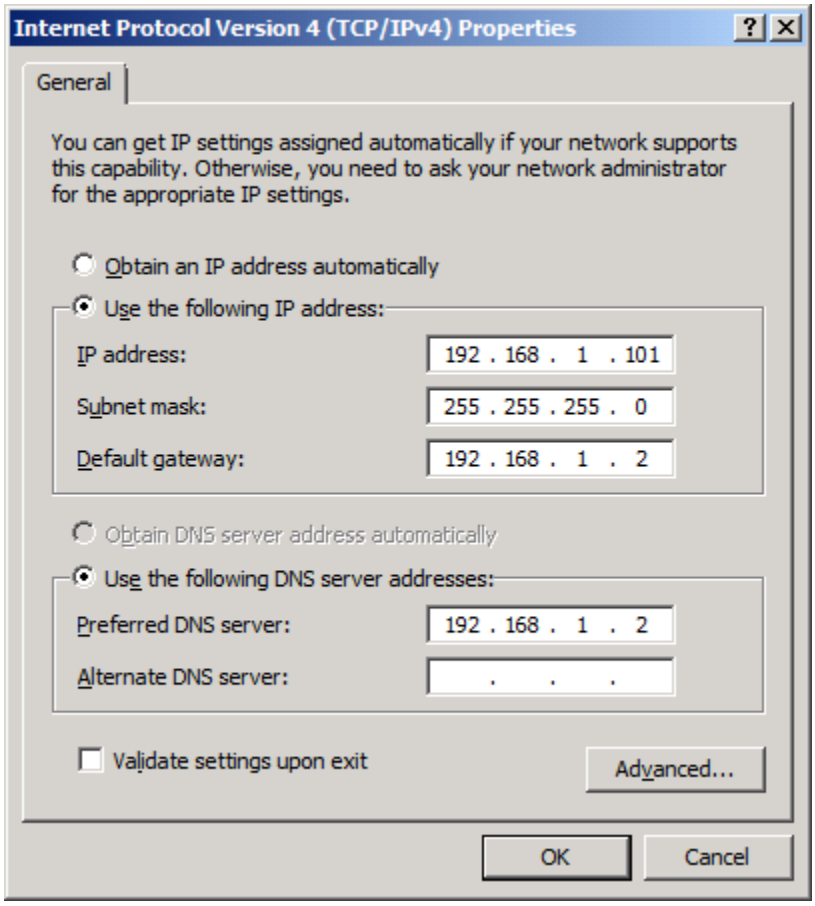


Configuring on Cluster Node 1

Network Adapter

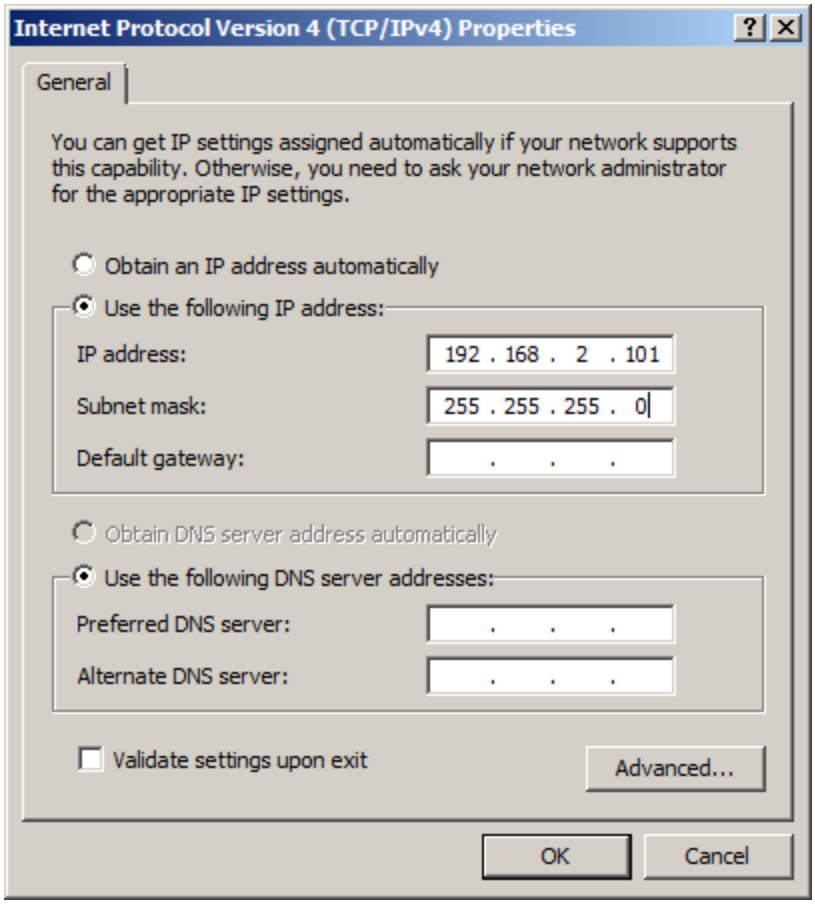
For working in clustering environment, the network adapter must be assigned a static IP address. Select the **Internet Protocol Version 4(TCP/IPv4)** and then press the **Properties** button, the **Internet Protocol**

Version 4 (TCP/IPv4) dialog is shown.



Type in the **IP address**, **Subnet mask**, **Default gateway** and **Preferred DNS server**.

Set the second network adapter of 08Node.



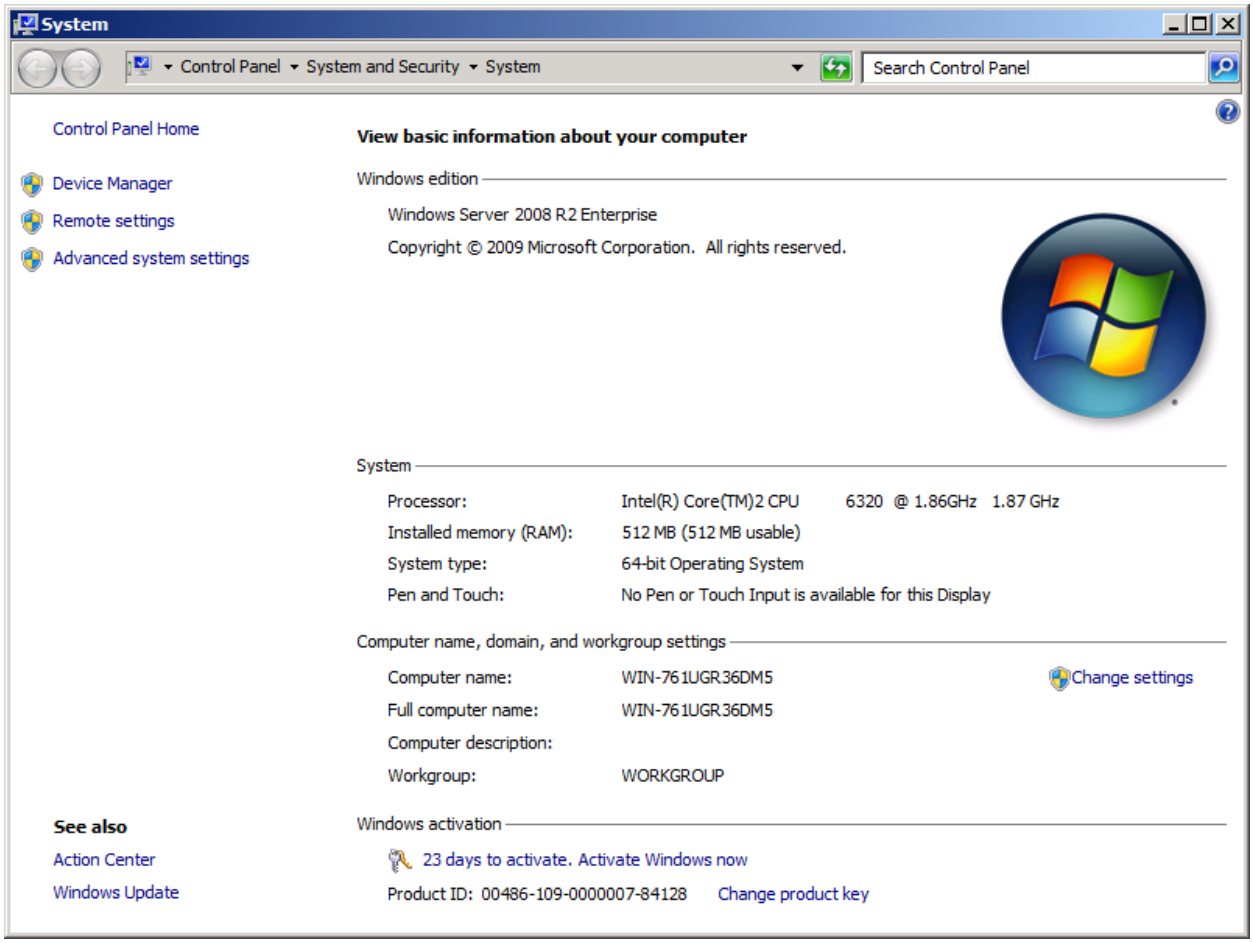
Type in the IP address and Subnet mask.

Press the **OK** button to change IP address.

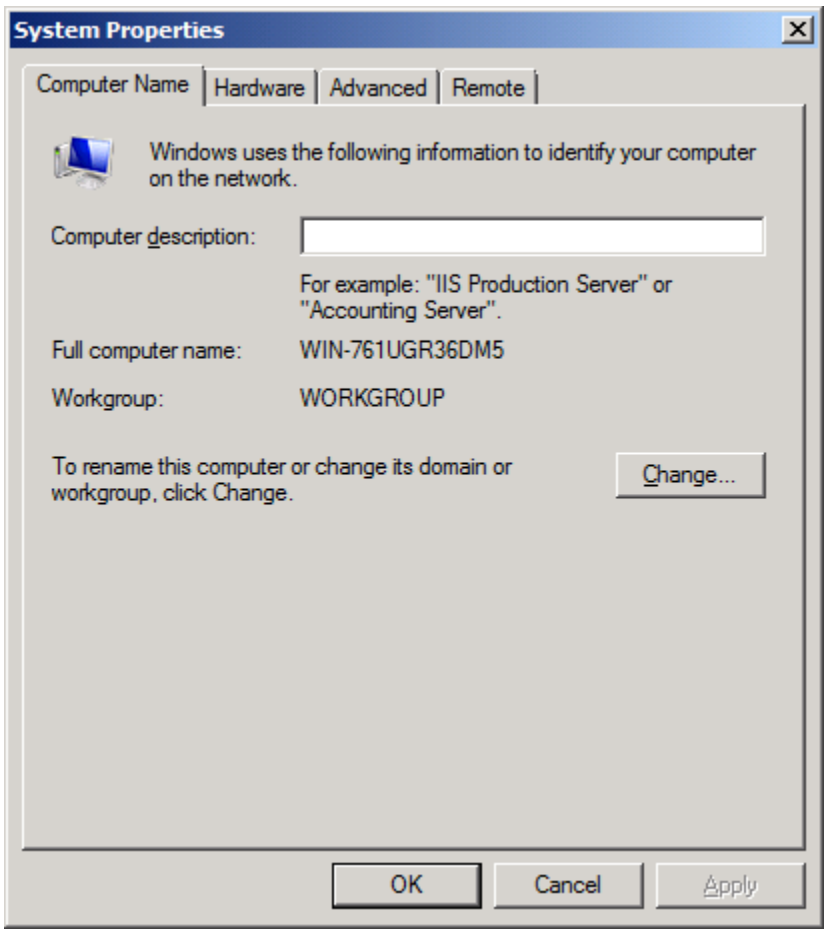
Join to the domain

Press the **OK** button to change IP address.

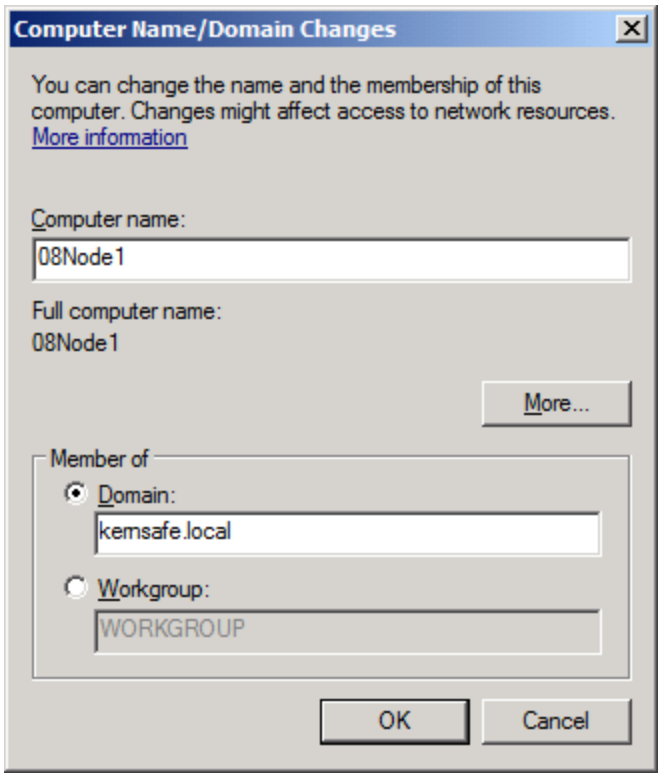
Open System Properties page.



Click on the **Change settings** link, the **System Properties** Dialog is shown.



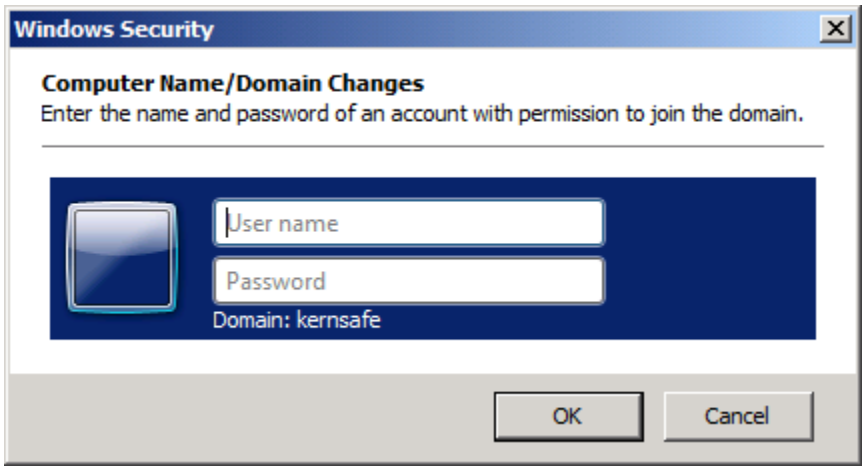
Press the **Change…** button.



Type 08Node1 in the **Computer name** and kernsafe.local in the **Domain**.

Press the **OK** button to change computer name and join the domain.

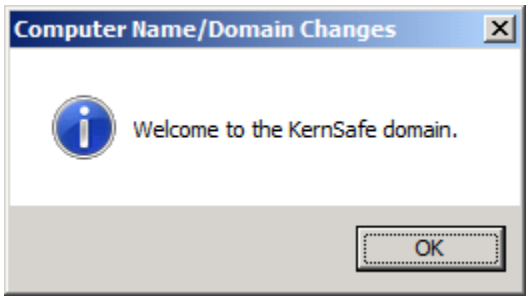
Domain controller account is required to join the domain.



Type your user name and password.

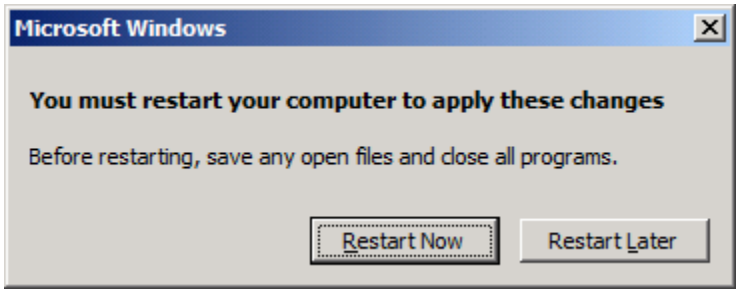
Press the **OK** button to continue.

If successful, the **Computer Name/Domain Changes** notification dialog is shown as below.



Press the **OK** button to continue.

Restart is required.

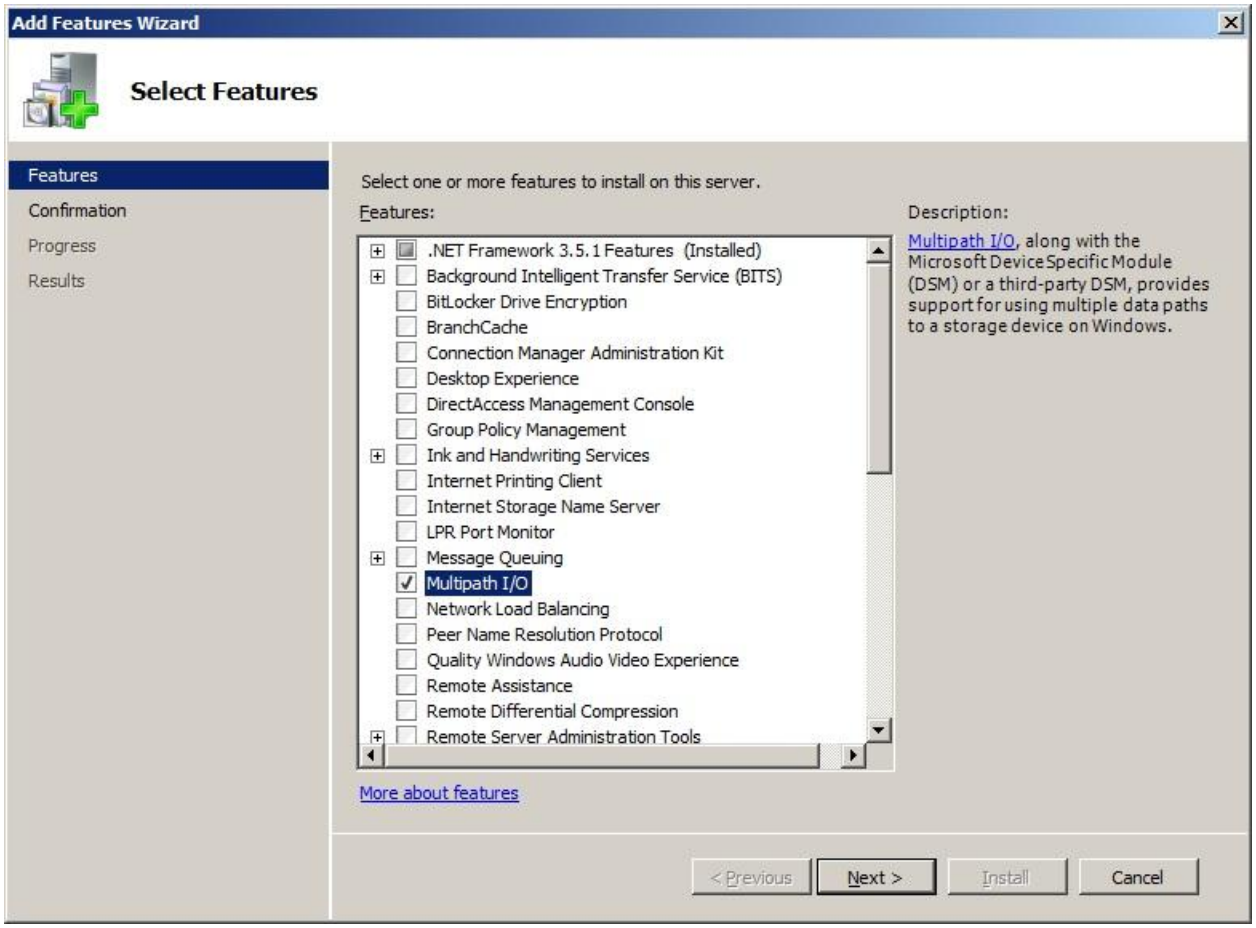


Press the **Restart Now** button to restart the computer.

Install MPIO Feature

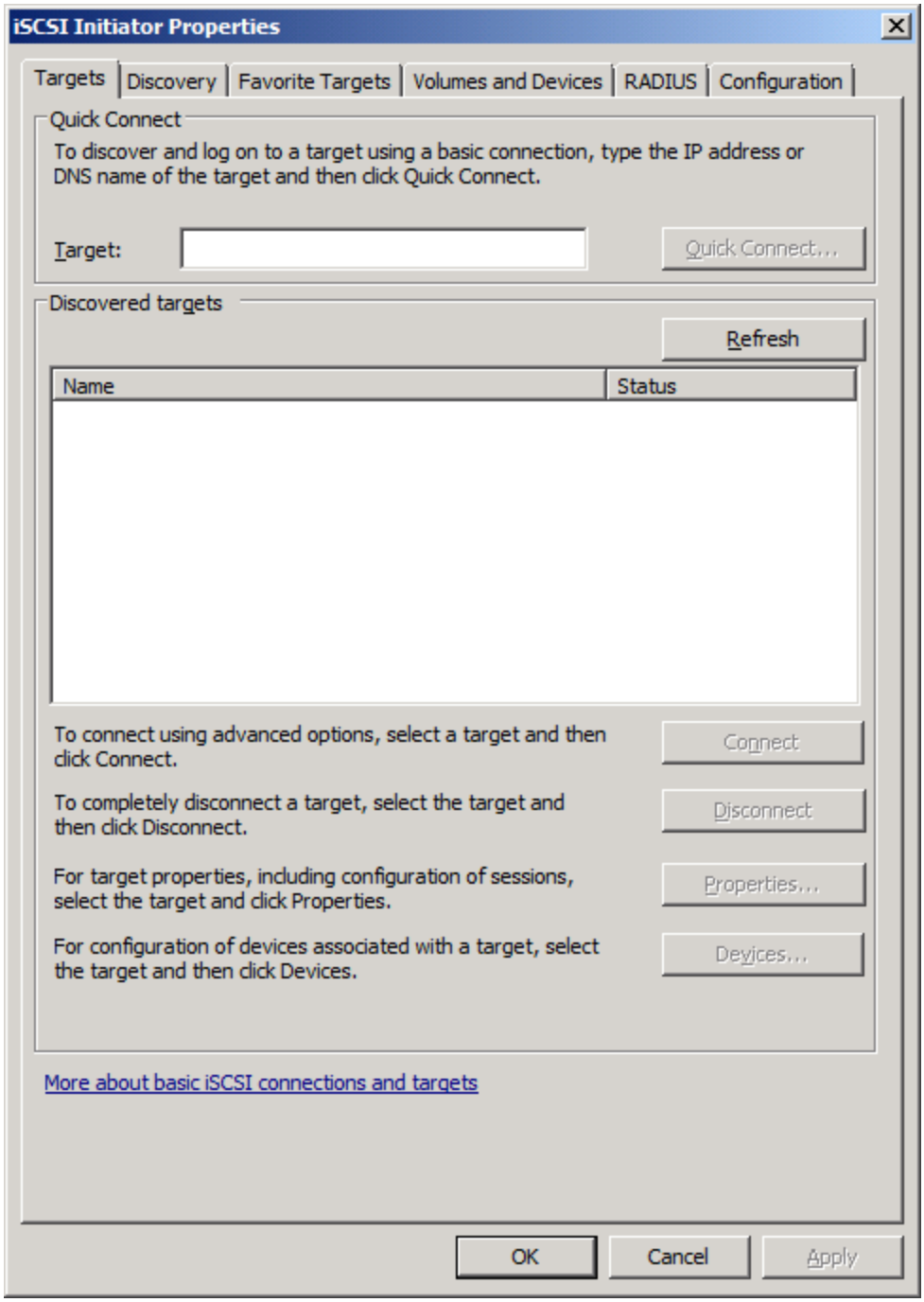
Launch **Start->Administrative Tools->Server Manager**, go to **Features** item, and click **Add** Features.

An **Add Features Wizard** will appear. In the features list select **Multipath I/O** feature and install it.

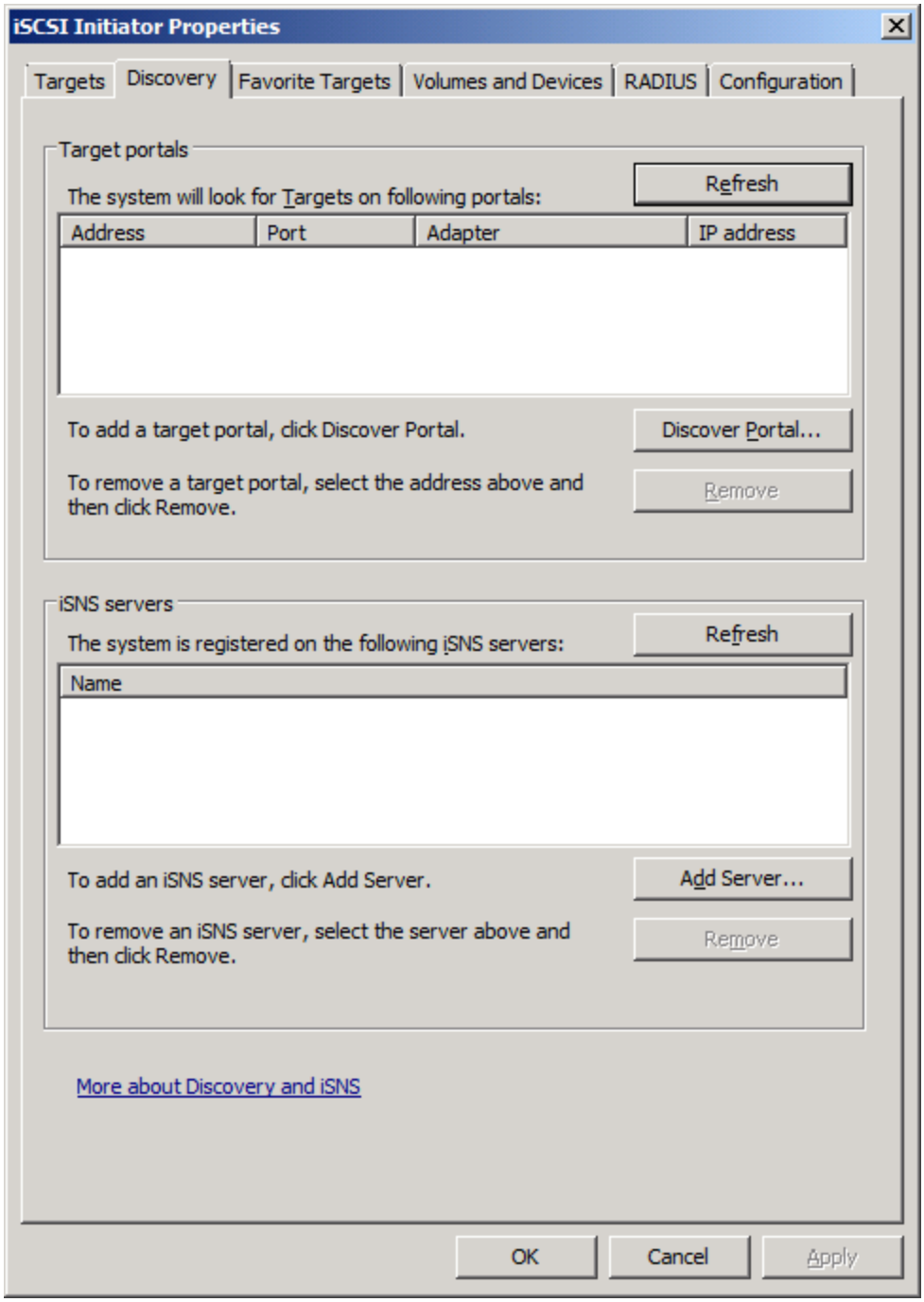


Log in to iSCSI disks

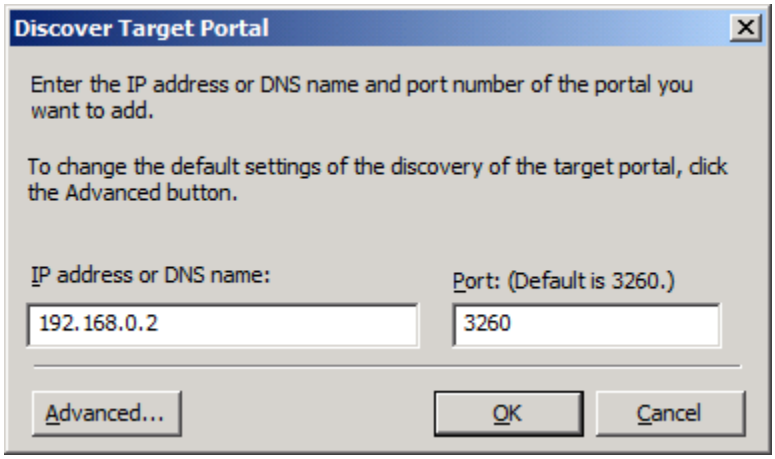
Launch the Administrative Tools -> Microsoft iSCSI initiator.

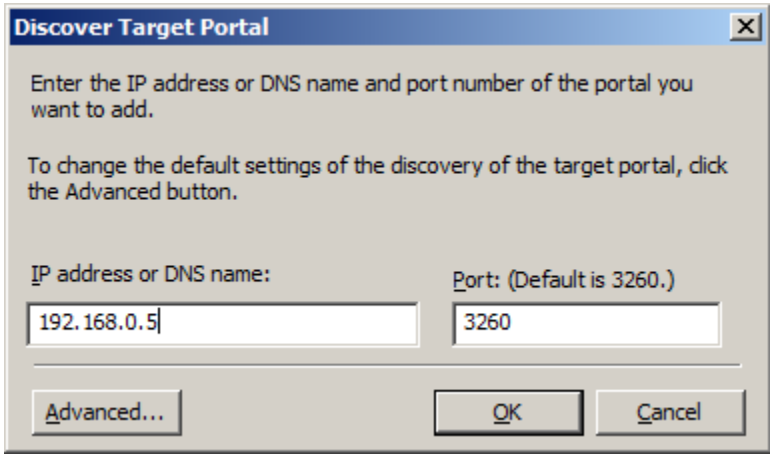


Select the **Discovery** page.



Press the **Discover Portal** button, the **Discover Target Portal** dialog is shown.

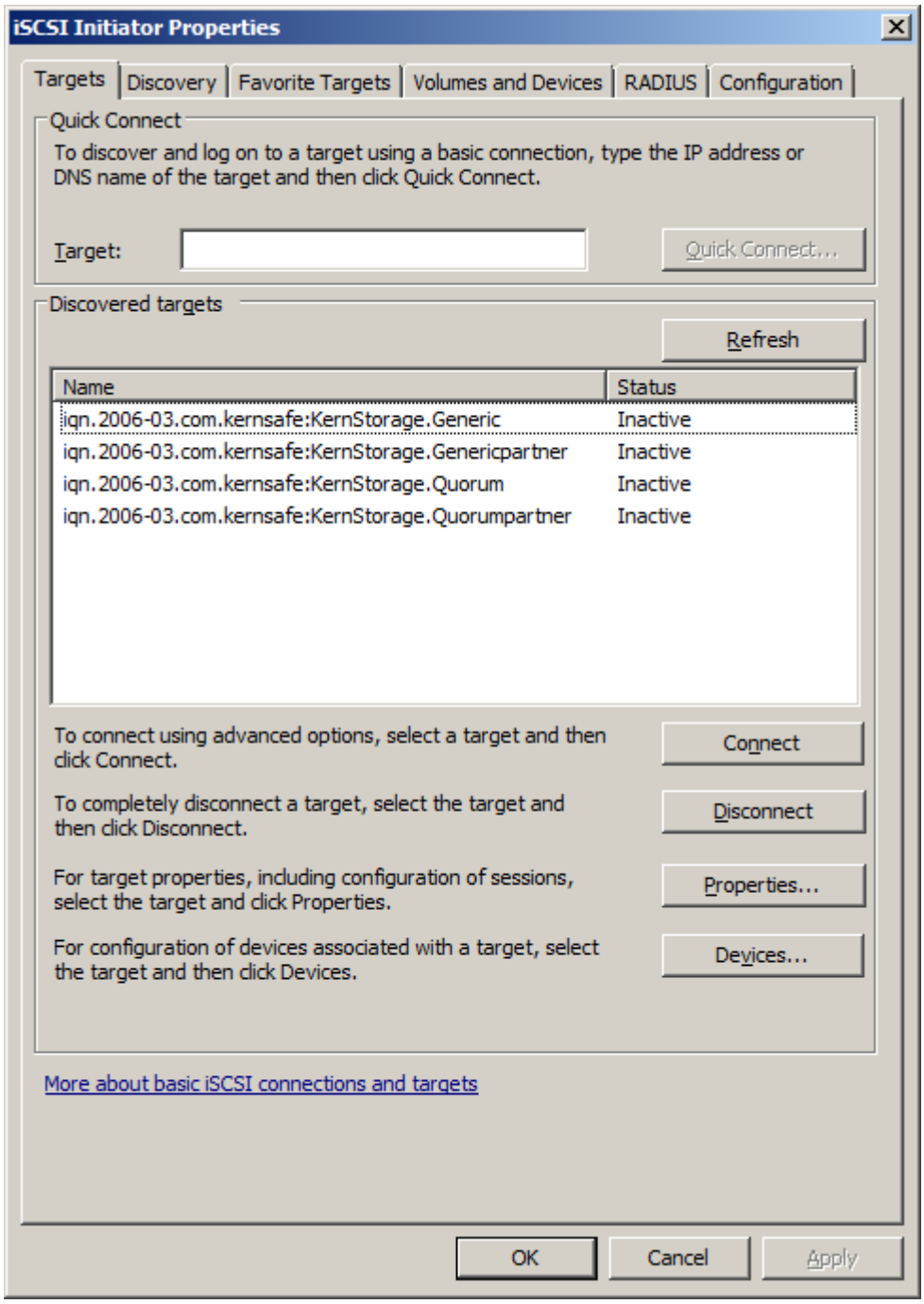




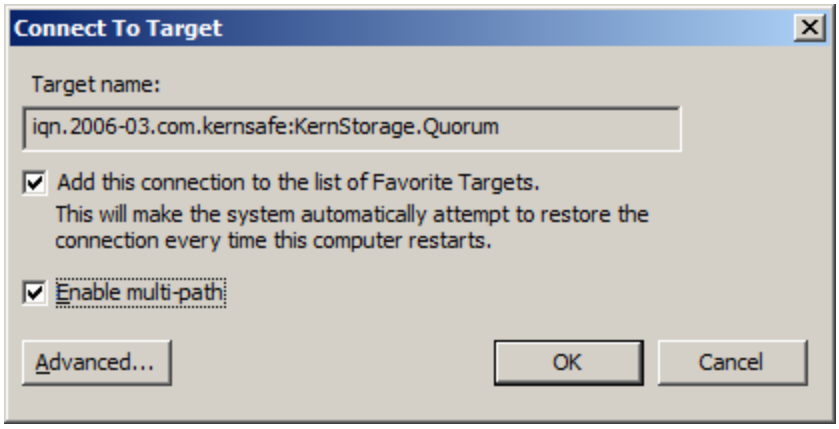
Type **IP address or NDS name** and **Port** of the iStorage Server in the required fields.

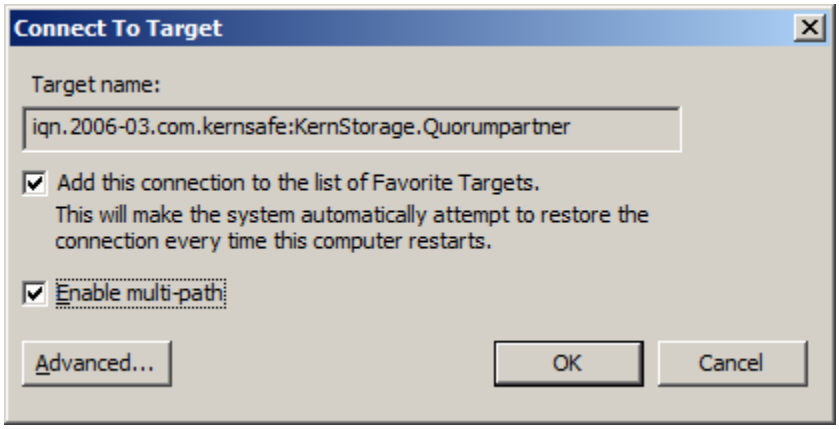
Press the **OK** button to add.

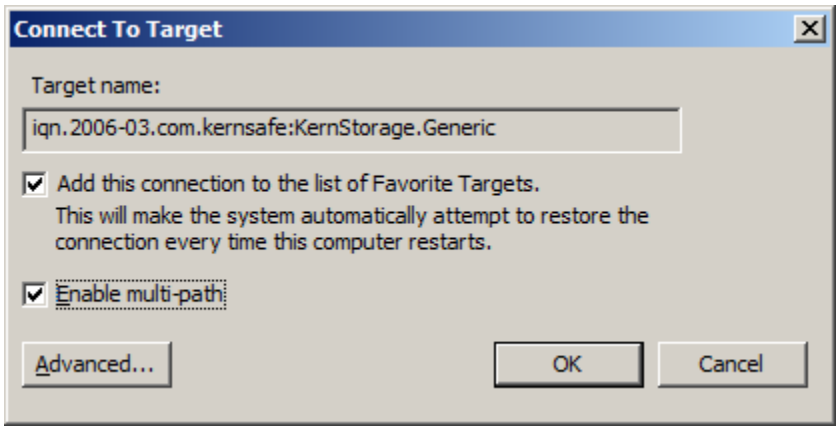
Select the **Targets** page.

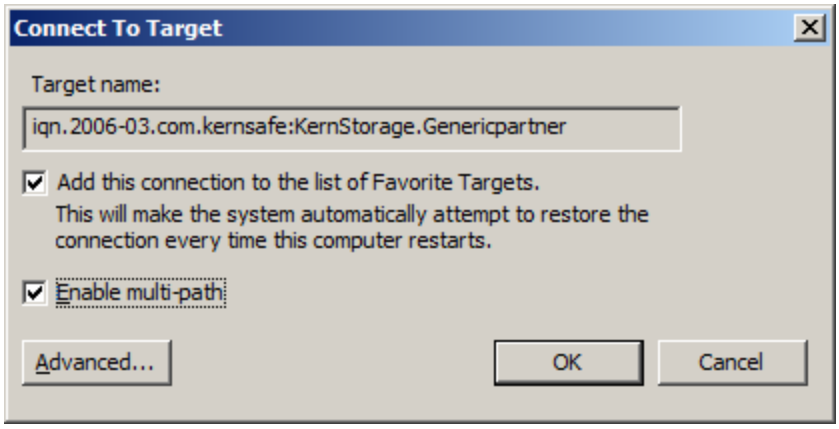


Select the targets just added and then press the **Connect** button.


Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Quorum
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel


Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Quorumpartner
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel

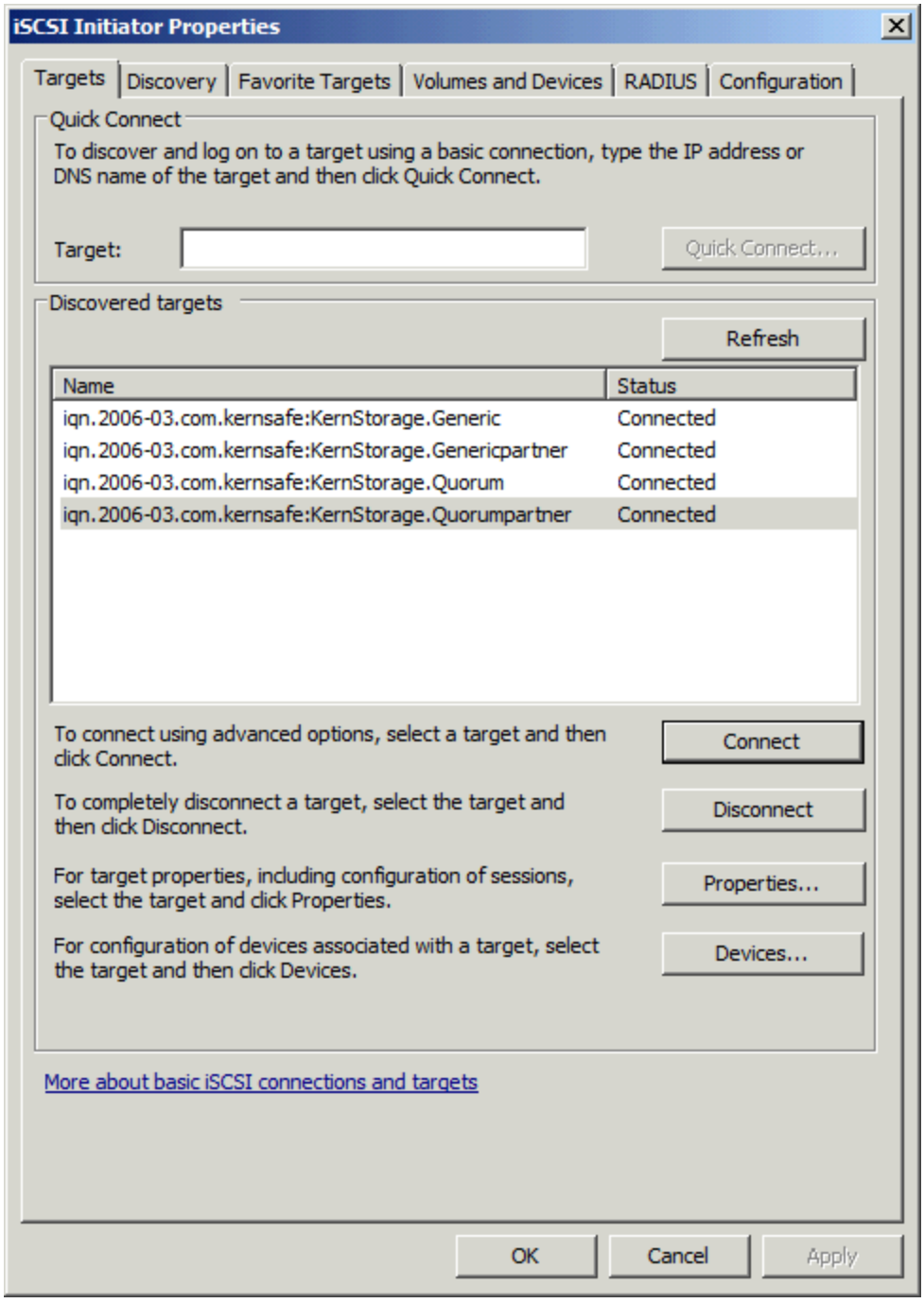

Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Generic
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel



Keep selection of the **Add this connection to the list of Favorite Targets**.

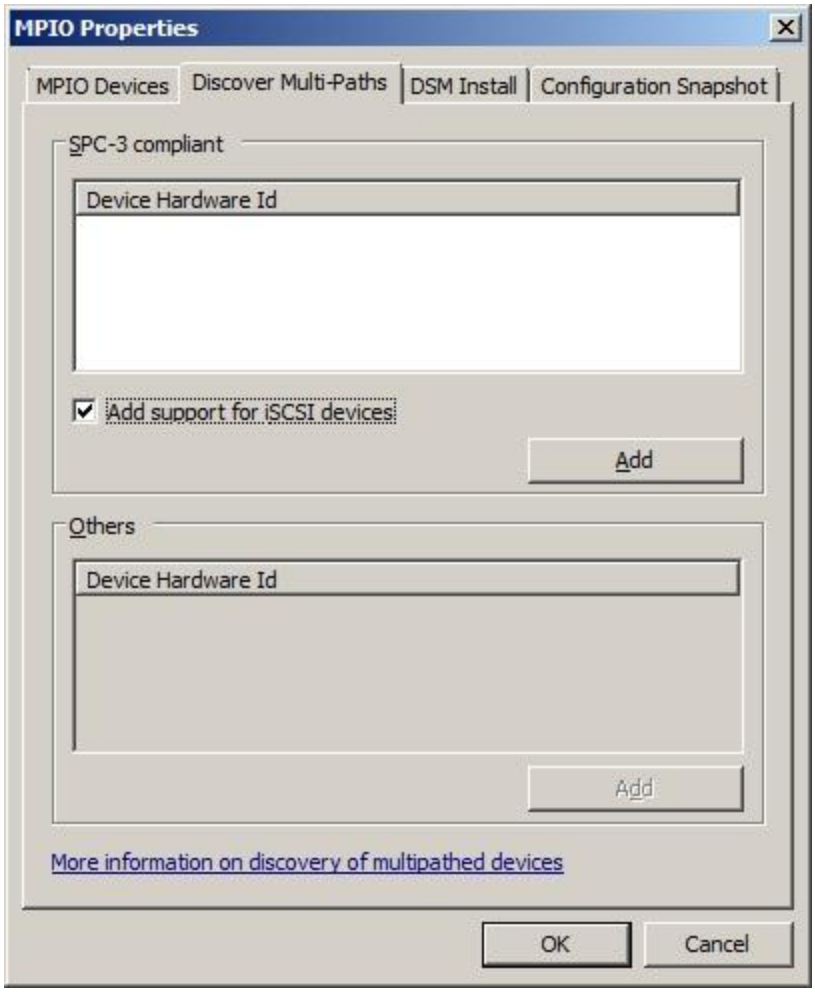
Press the **OK** button to continue.

If successful, the logged on targets are shown in the figure.



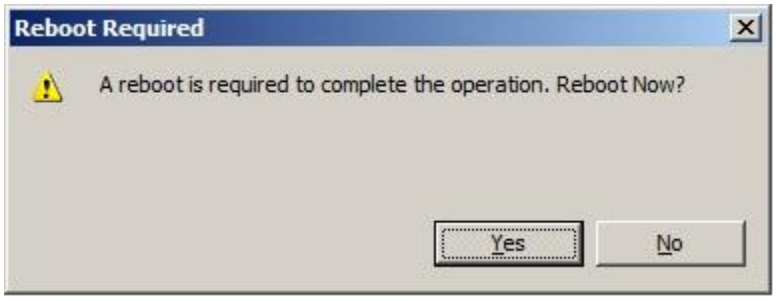
Enable Multipath Support

Launch MPIO manager by clicking **Start->Administrative Tools->MPIO**. Go to **Discover Multi-Paths** tab, check **Add support for iSCSI devices**.



Click the **Add** button.

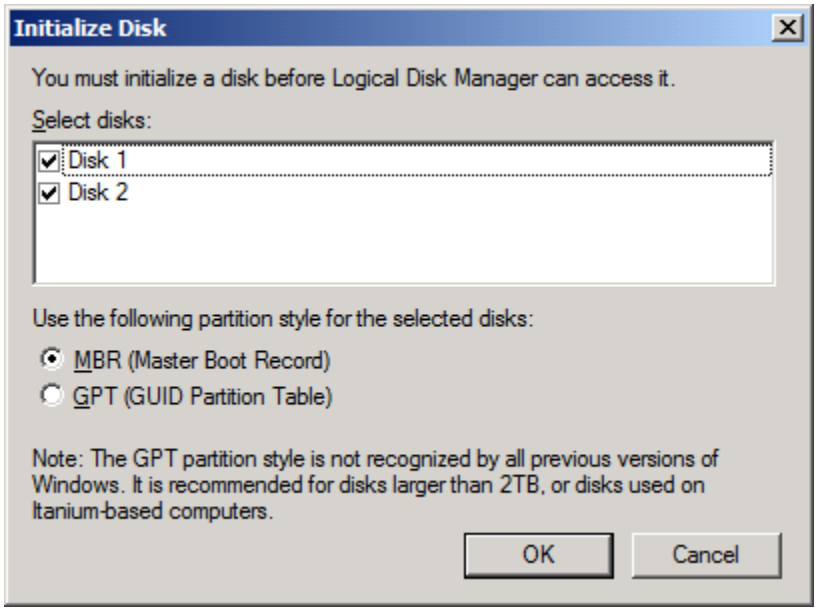
Windows will prompt you to reboot the server.



Click the **Yes** button to restart your server.

Launch the **Windows Computer Management Console**.

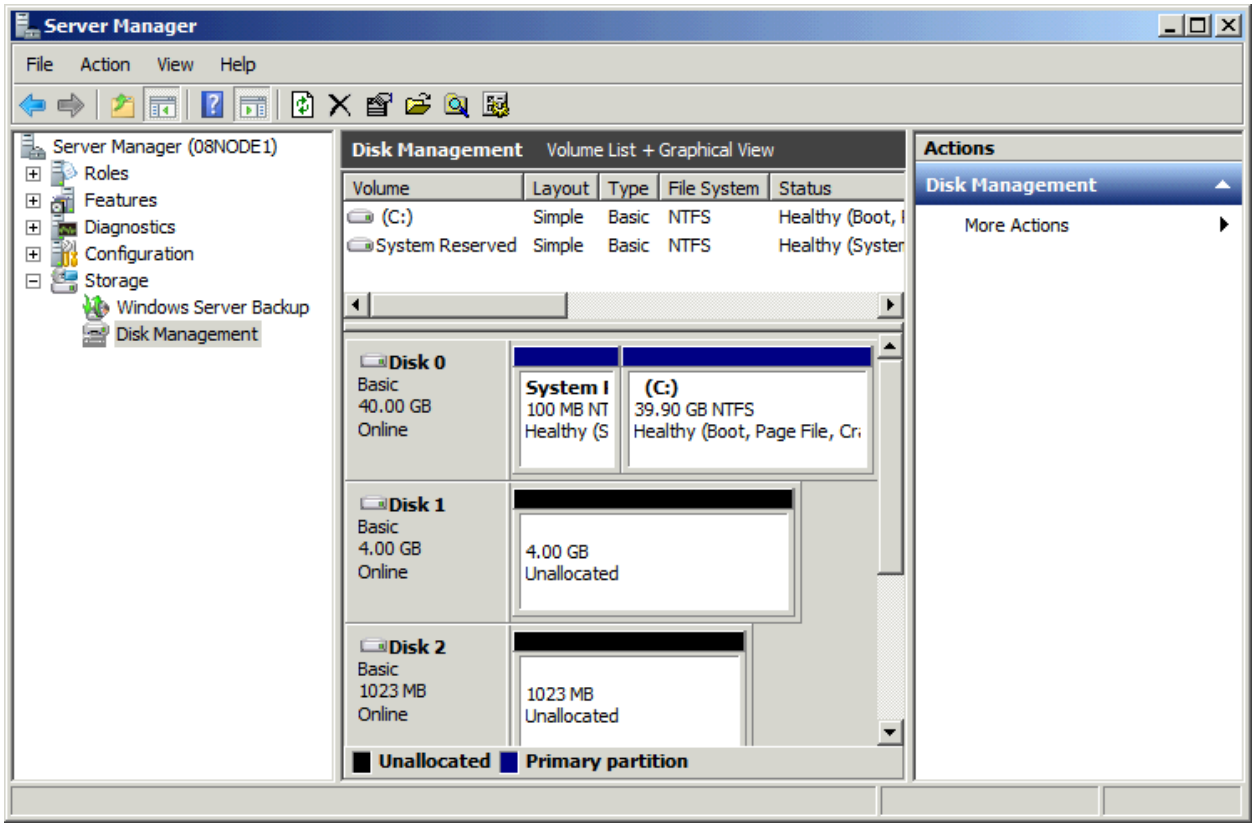
An **Initialize Disk** dialog is shown.



Keep the selection of the tow disks.

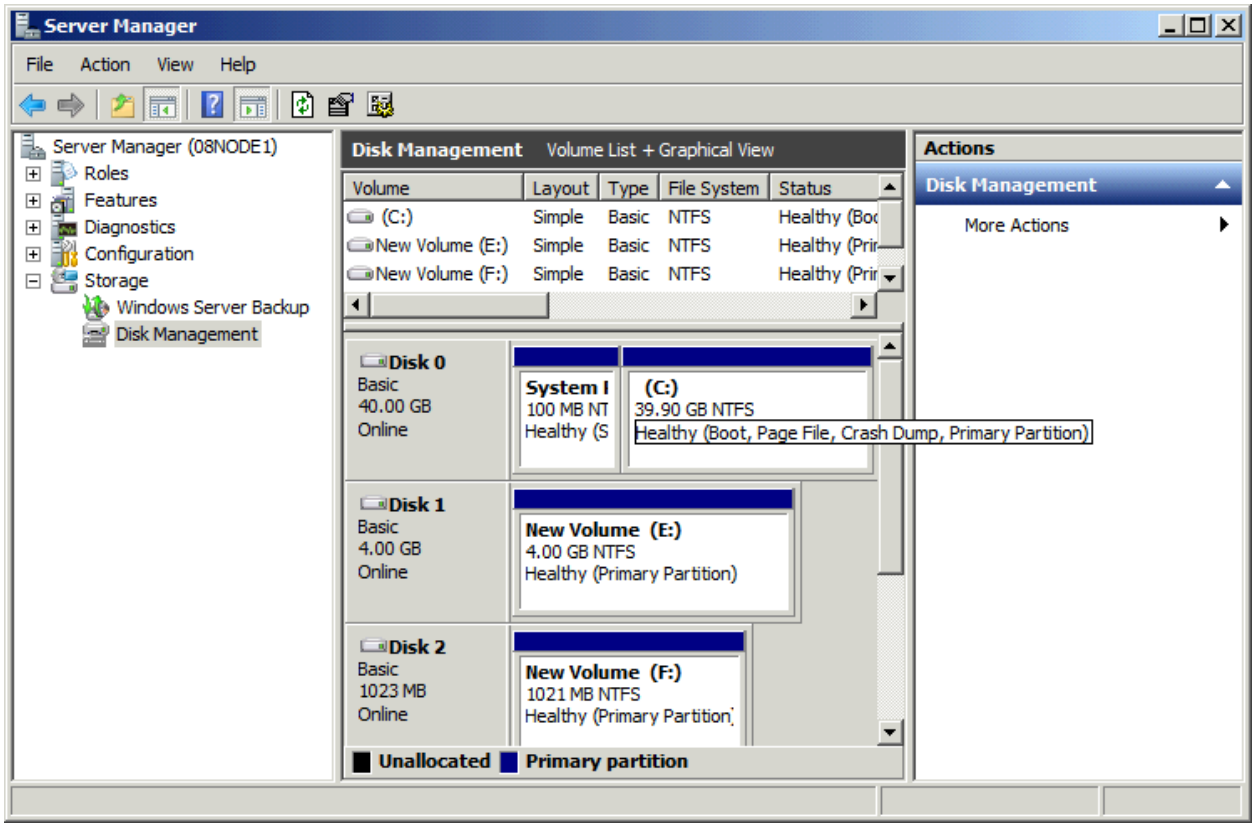
Select partition style for the selected disks.

Press the **OK** button to continue.



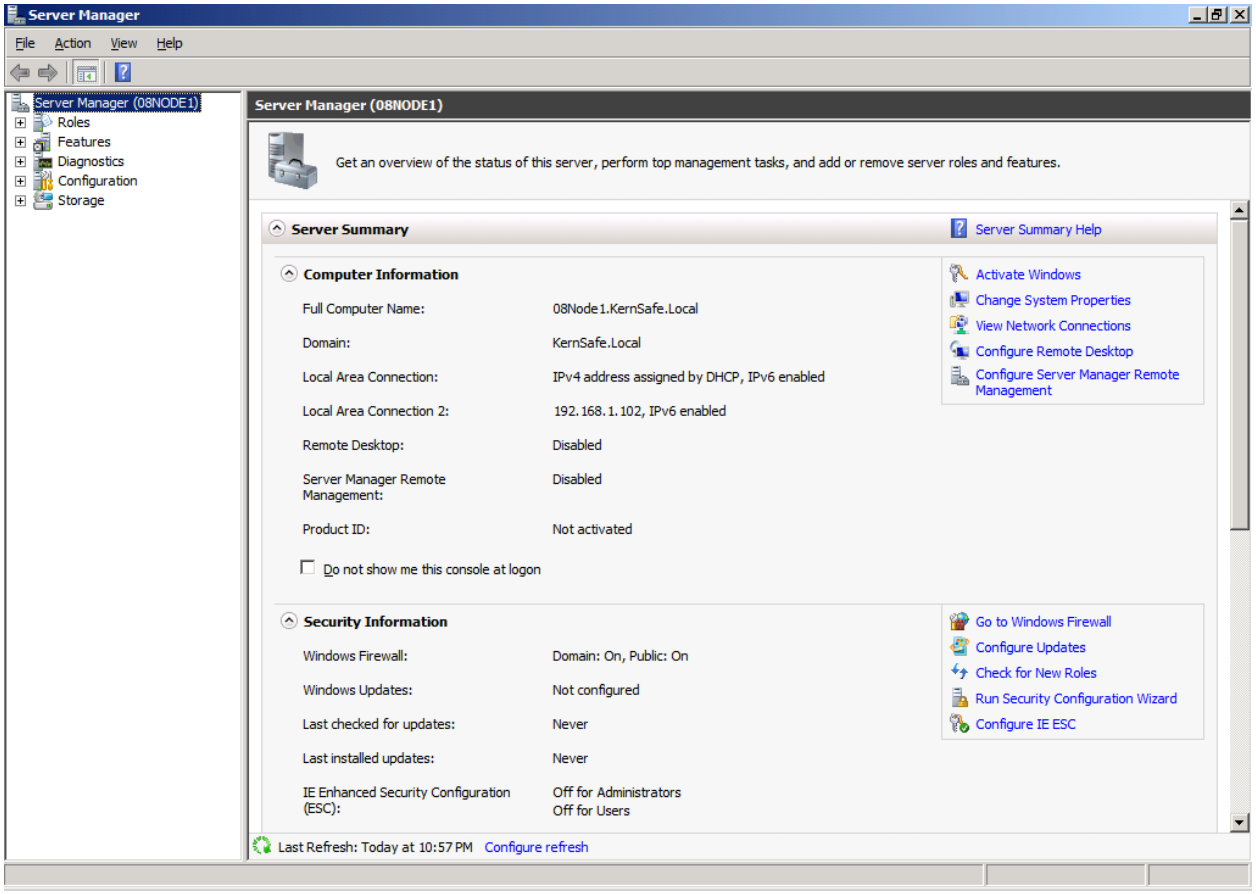
Right click on the Disks and then select New Simple Volume, partition and format the two disks followed by wizard.

If successful, the new volumes created are shown in the figure below.

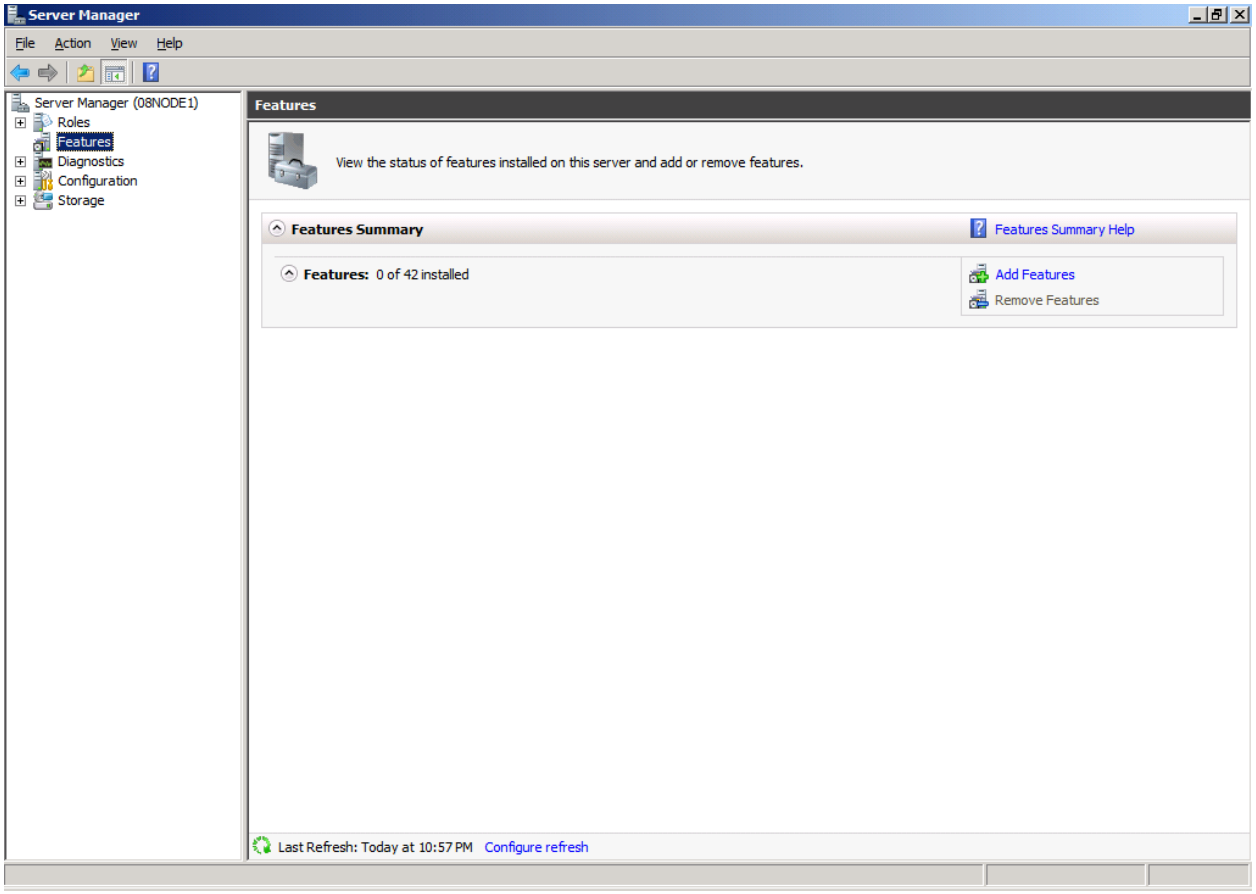


Installing Failover Clustering Service

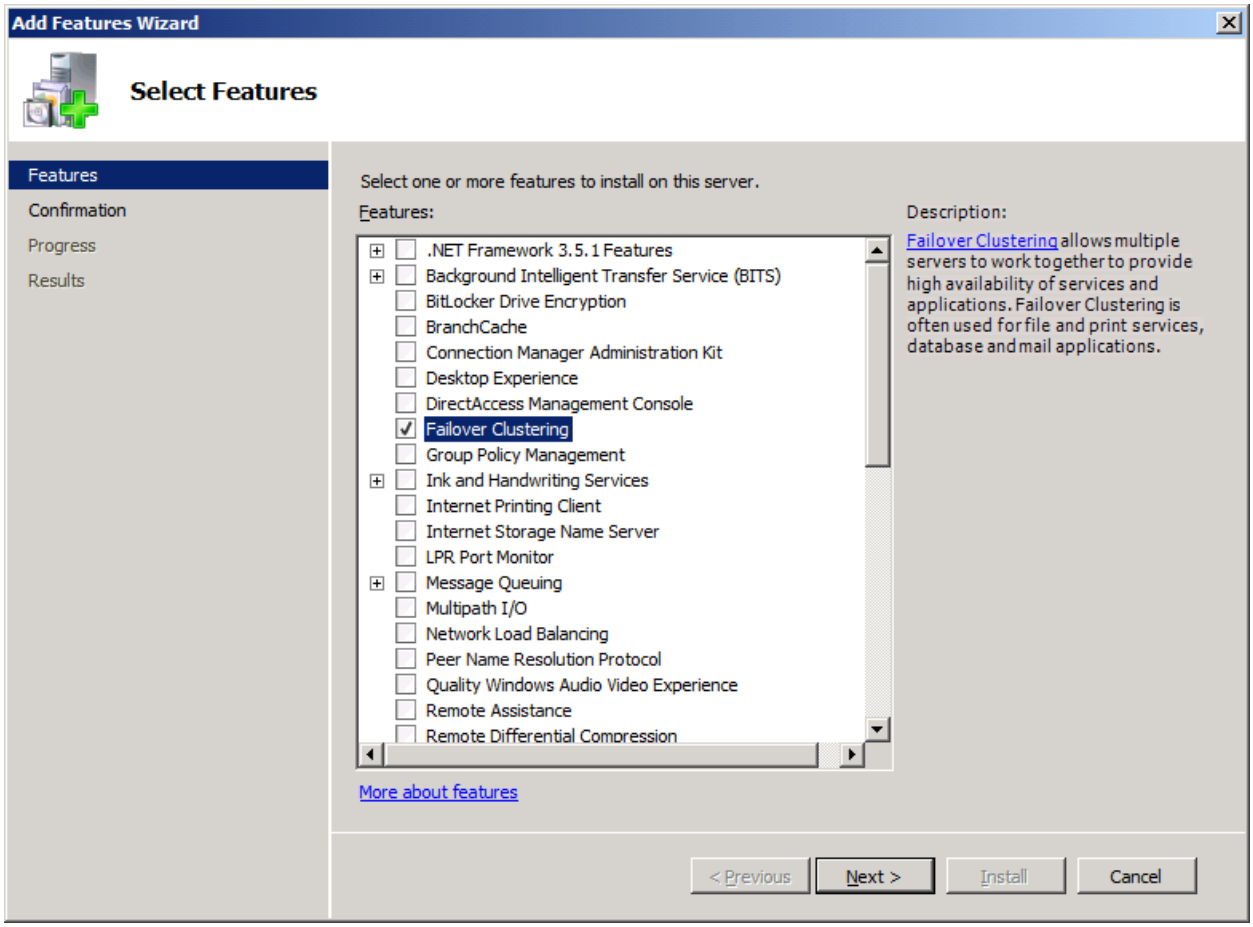
Launch the **Windows Server manager Console**.



Select the **Features** node from the left tree view.

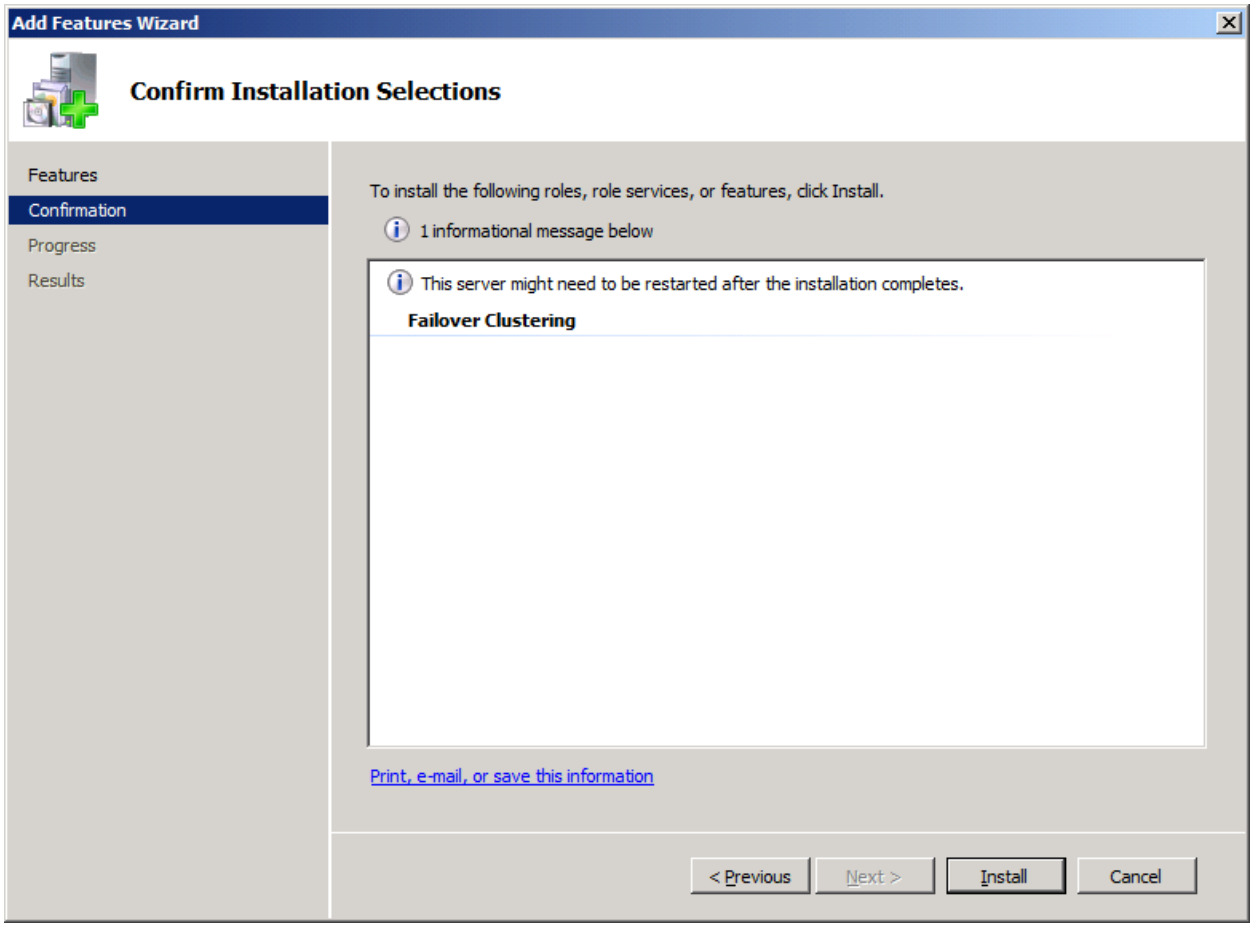


Click the **Add Features** link, the **Add Features Wizard** is shown.



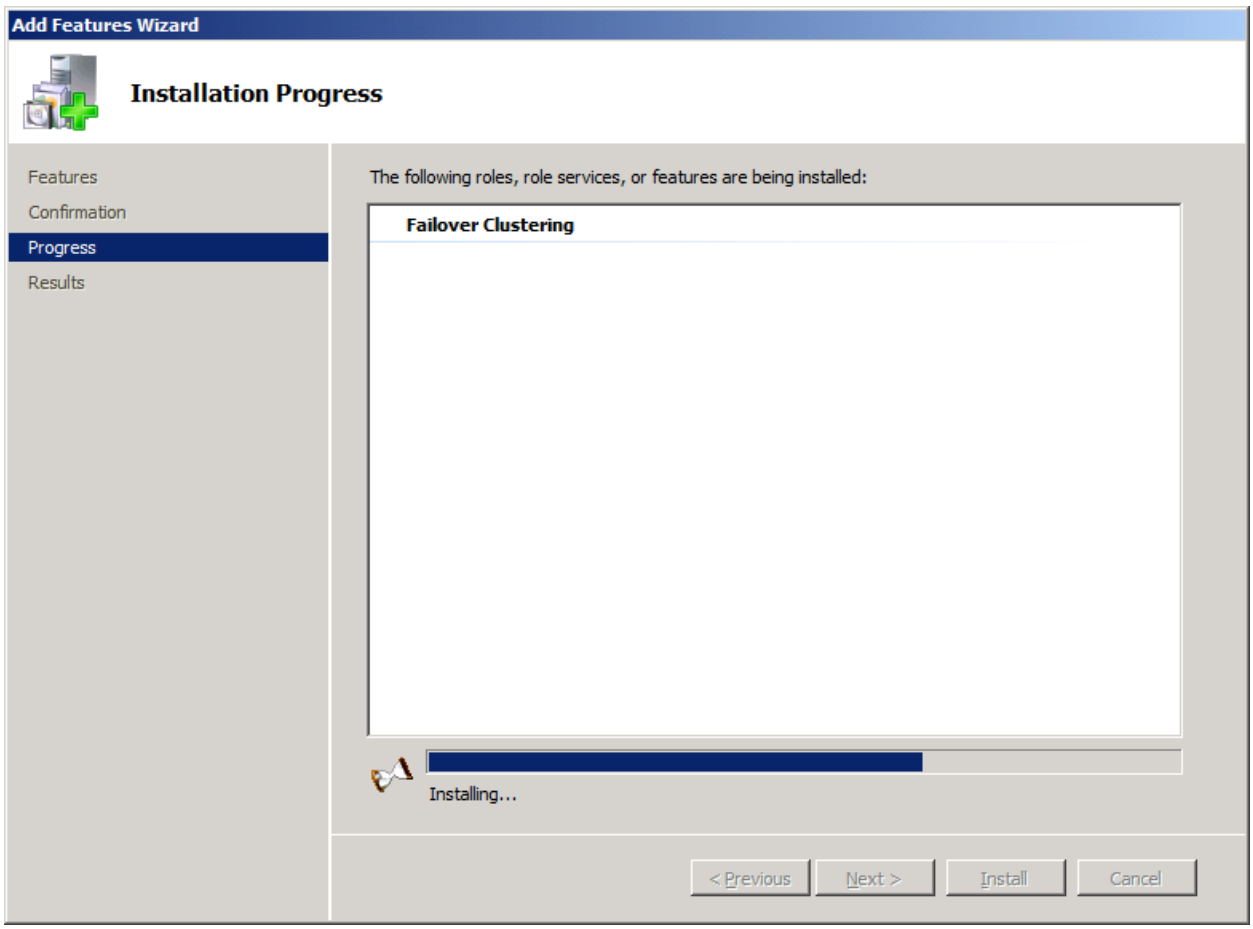
Select the **Failover Clustering**.

Press the **Next** button to continue.

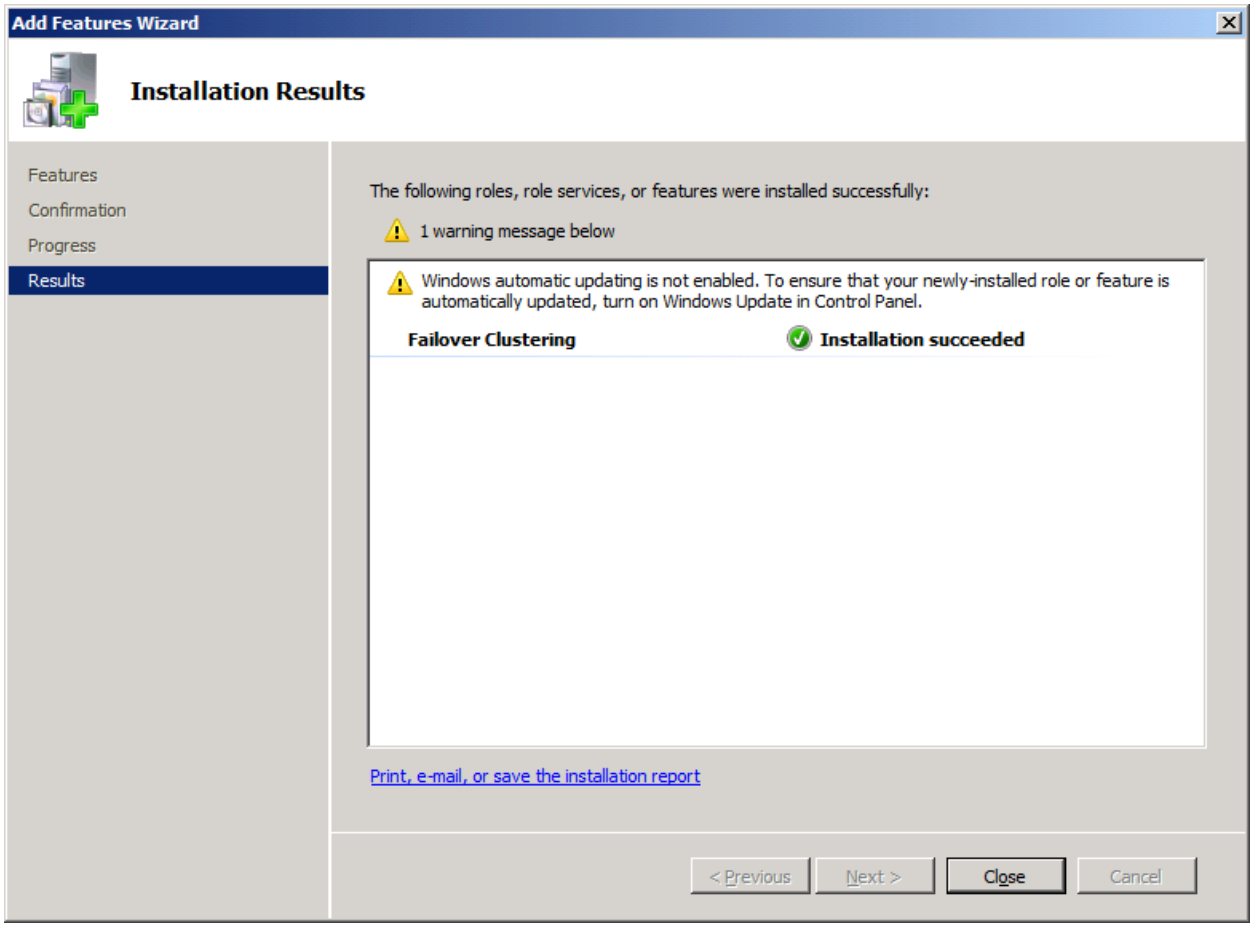


Press the **Install** button to install the **Failover Clustering** feature.

The installation of the Failover Clustering is going on.



If successful, the wizard will complete and show as the figure below.



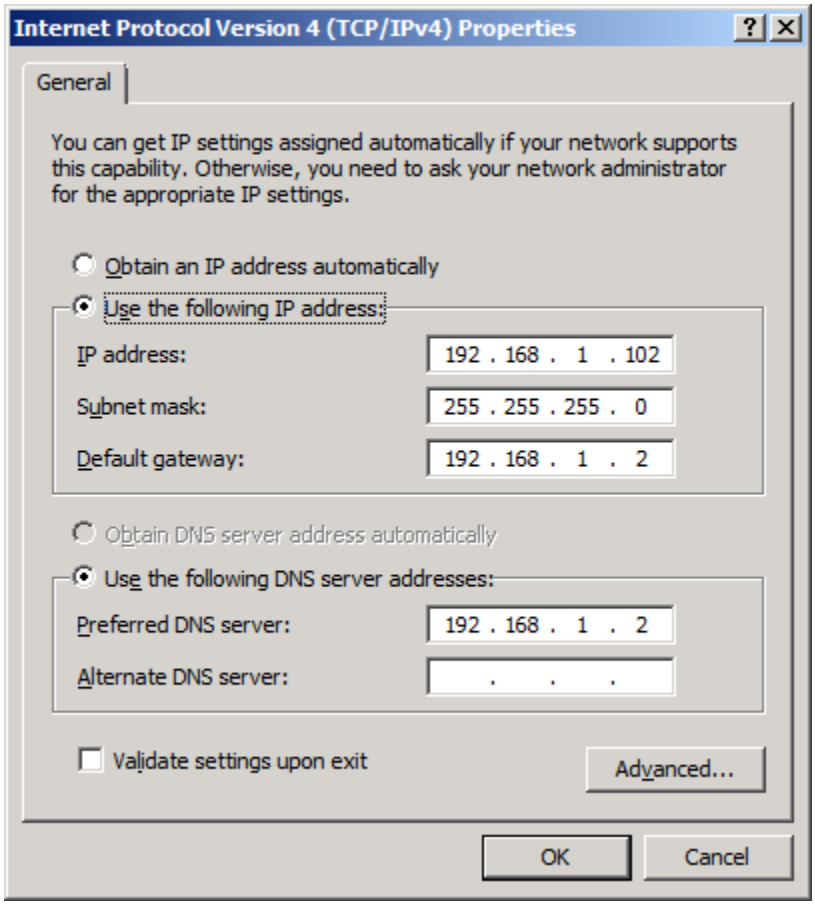
Press the **Close** button.

Configuring on Cluster Node 2

Network Adapter

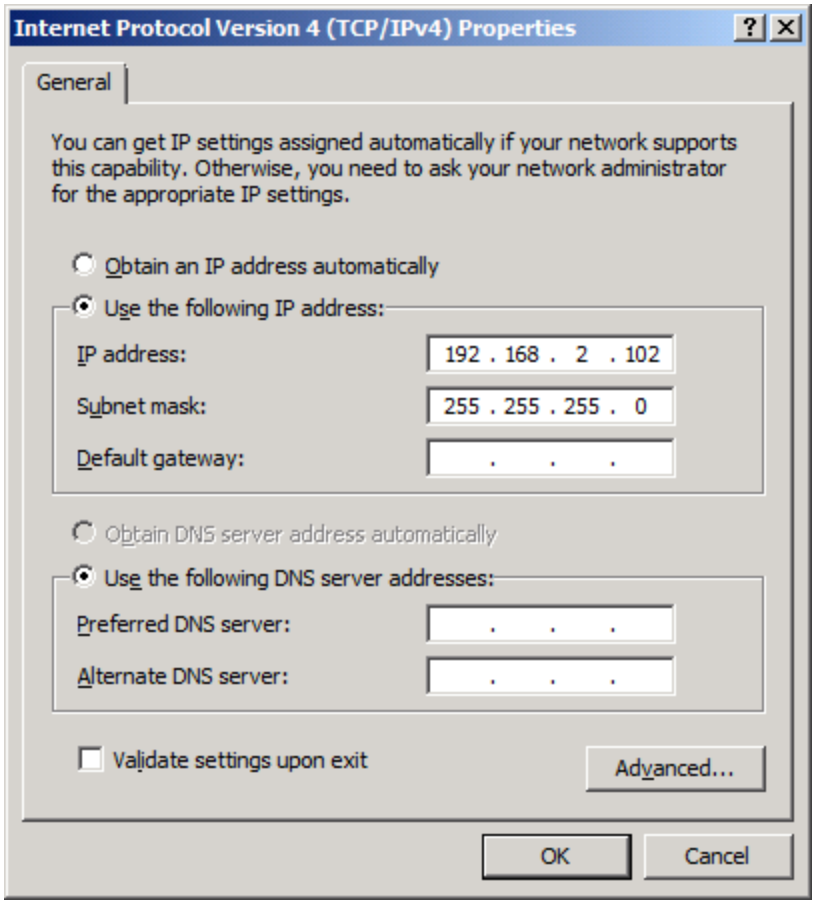
For working in clustering environment, the network adapter must be assigned a static IP address. Select the **Internet Protocol Version 4(TCP/IPv4)** and then press the **Properties** button, the **Internet Protocol**

Version 4 (TCP/IPv4) dialog is shown.



Type in the **IP address**, **Subnet mask**, **Default gateway** and **Preferred NDS server**.

Set the second network adapter of 08Node.



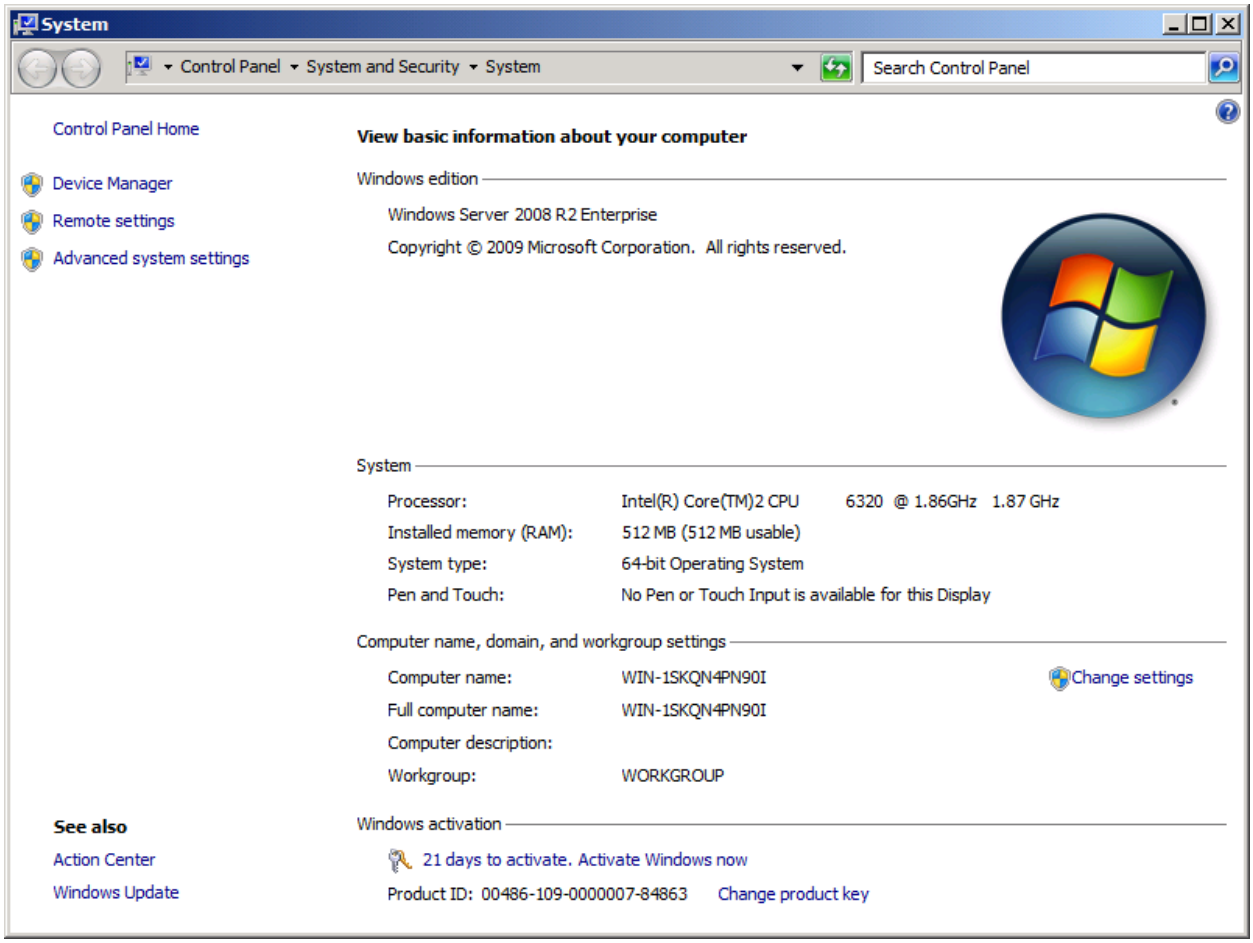
Type in the IP address and Subnet mask.

Press the **OK** button to change IP address.

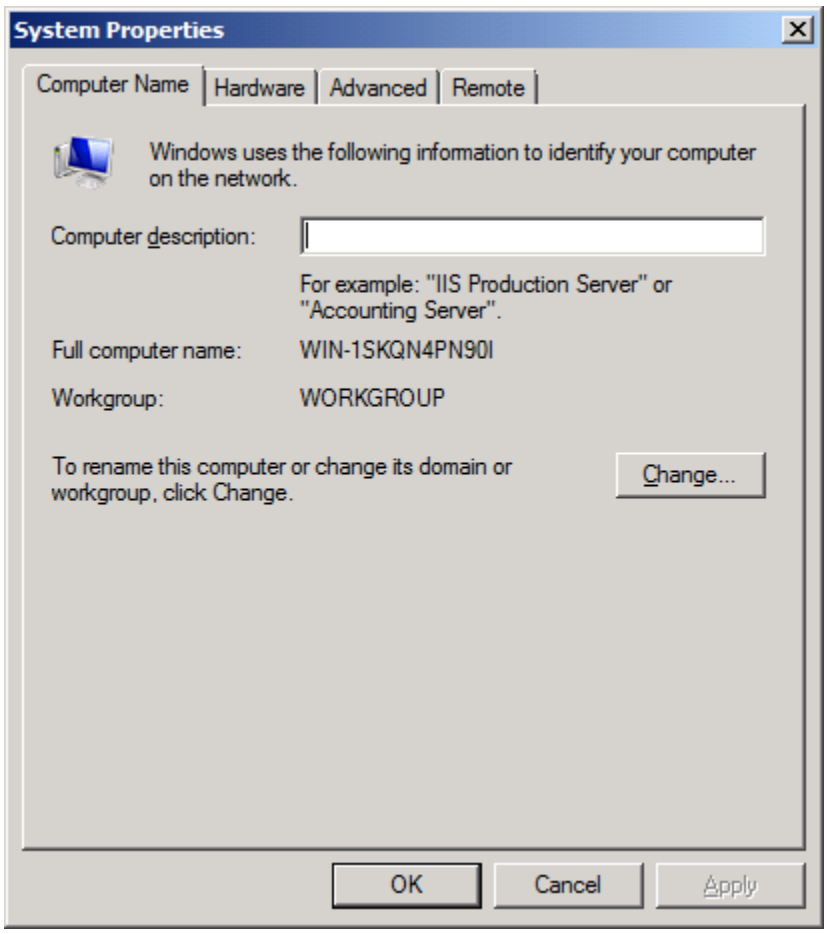
Join to the domain

Press the **OK** button to change IP address.

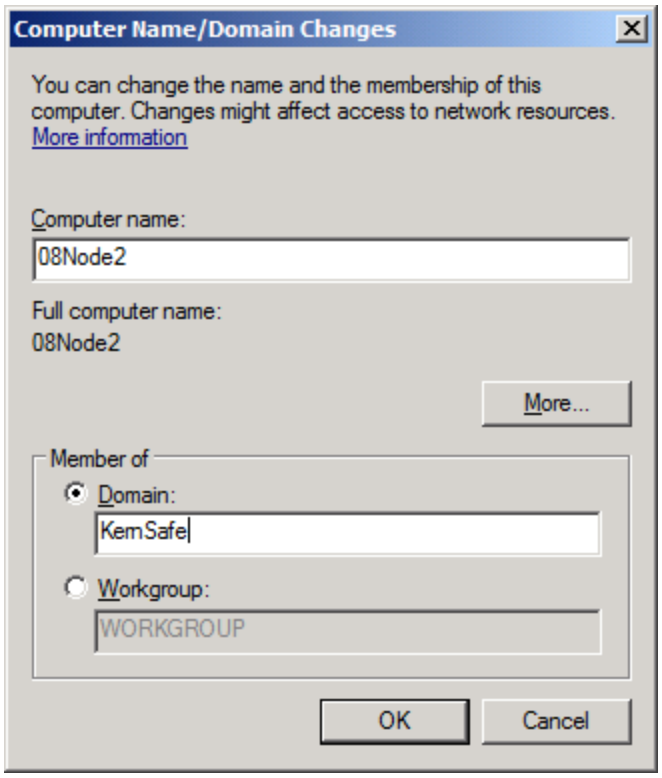
Open System Properties page.



Click on the **Change settings** link, the **System Properties** dialog is shown.



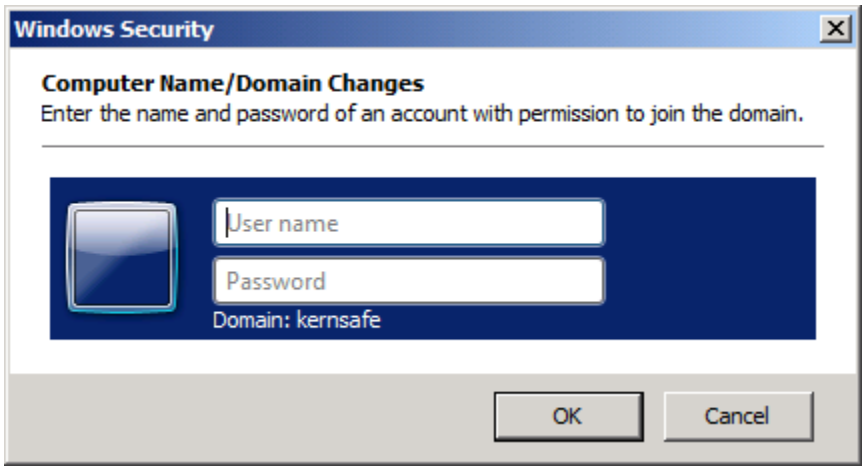
Press the **Change…** button.



Type 08Node2 in the **Computer name** and kernsafe.local in the **Domain**.

Press the **OK** button to change computer name and join the domain.

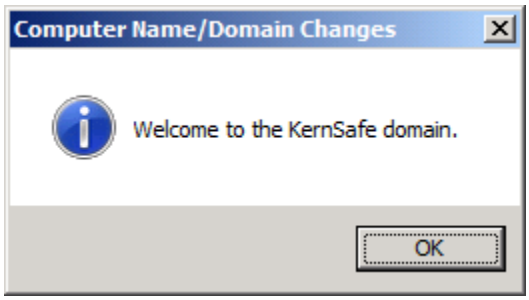
Domain controller account is required to join the domain.



Type your user name and password.

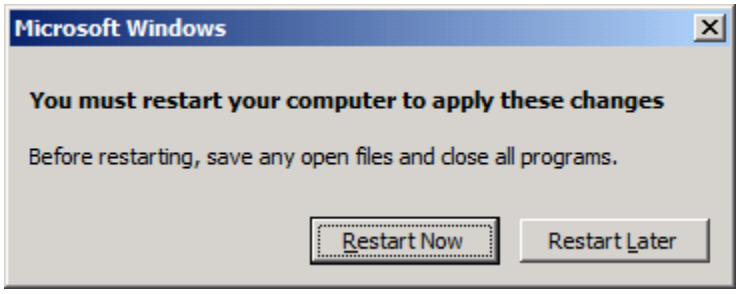
Press the **OK** button to continue.

If successful, the **Computer Name/Domain Changes** notification dialog is shown as below.



Press the **OK** button to continue.

Restart is required.

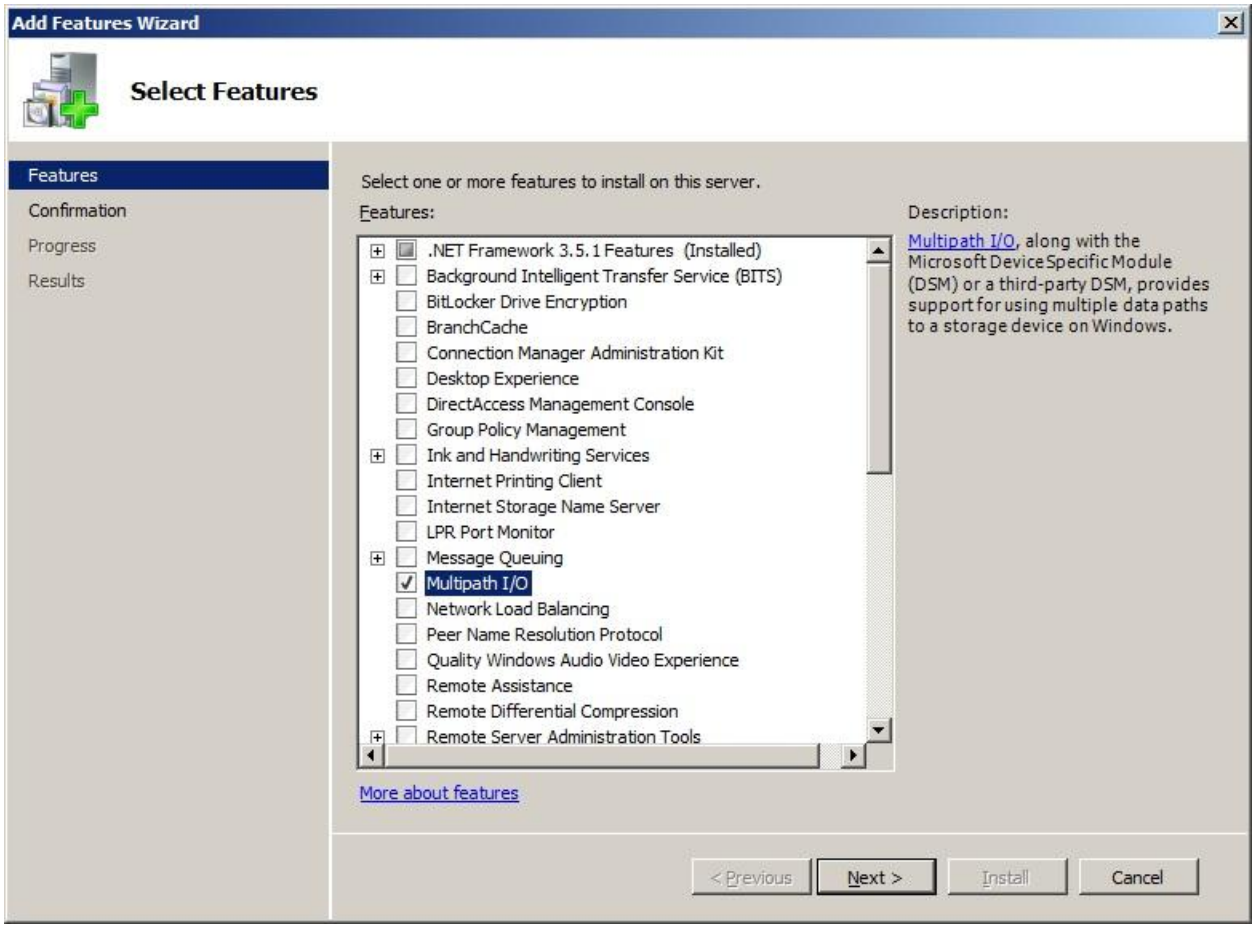


Press the **Restart Now** button to restart the computer.

Install MPIO Feature

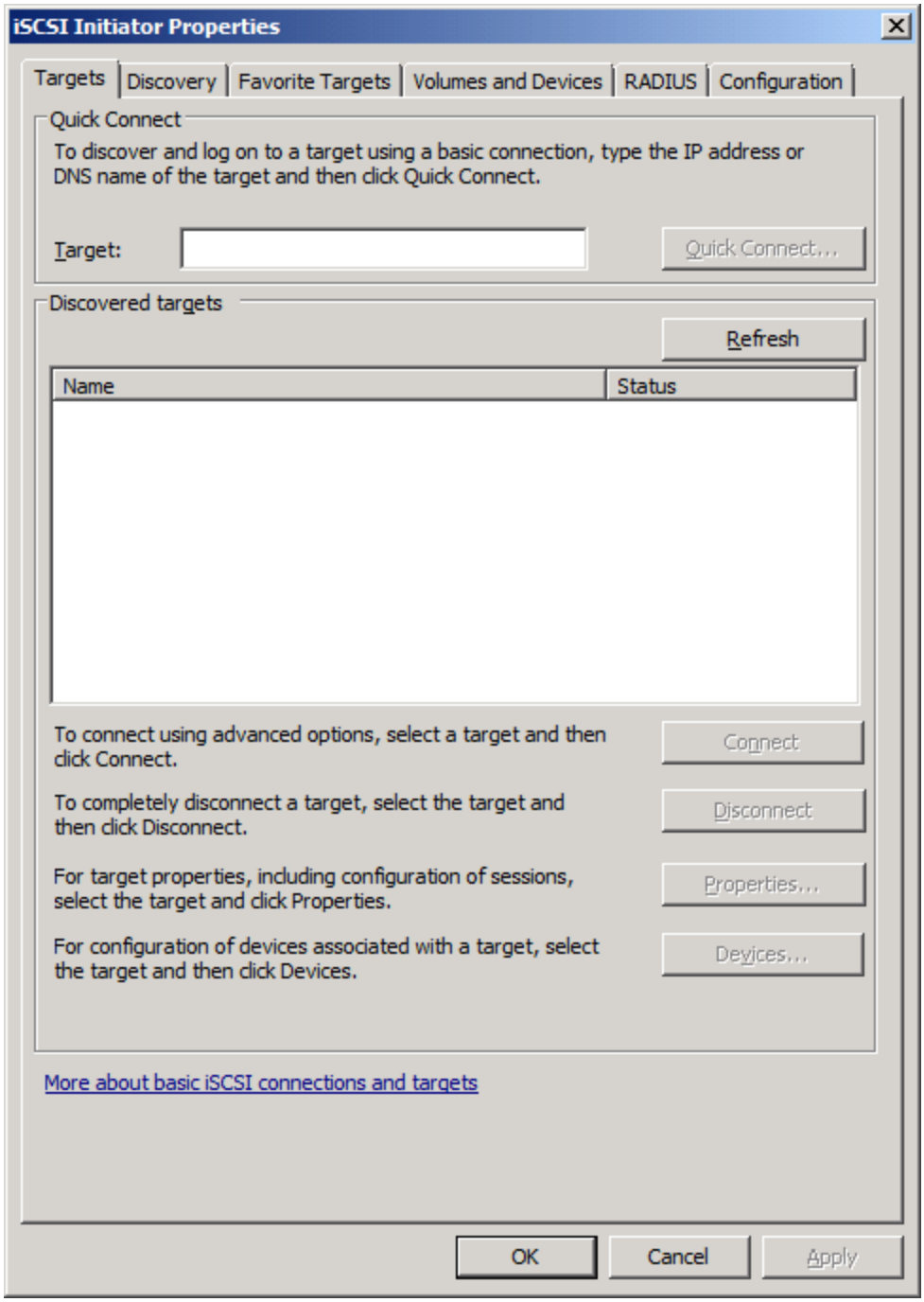
Launch **Start->Administrative Tools->Server Manager**, go to **Features** item, and click **Add** Features.

An **Add Features Wizard** will appear. In the features list select **Multipath I/O** feature and install it.

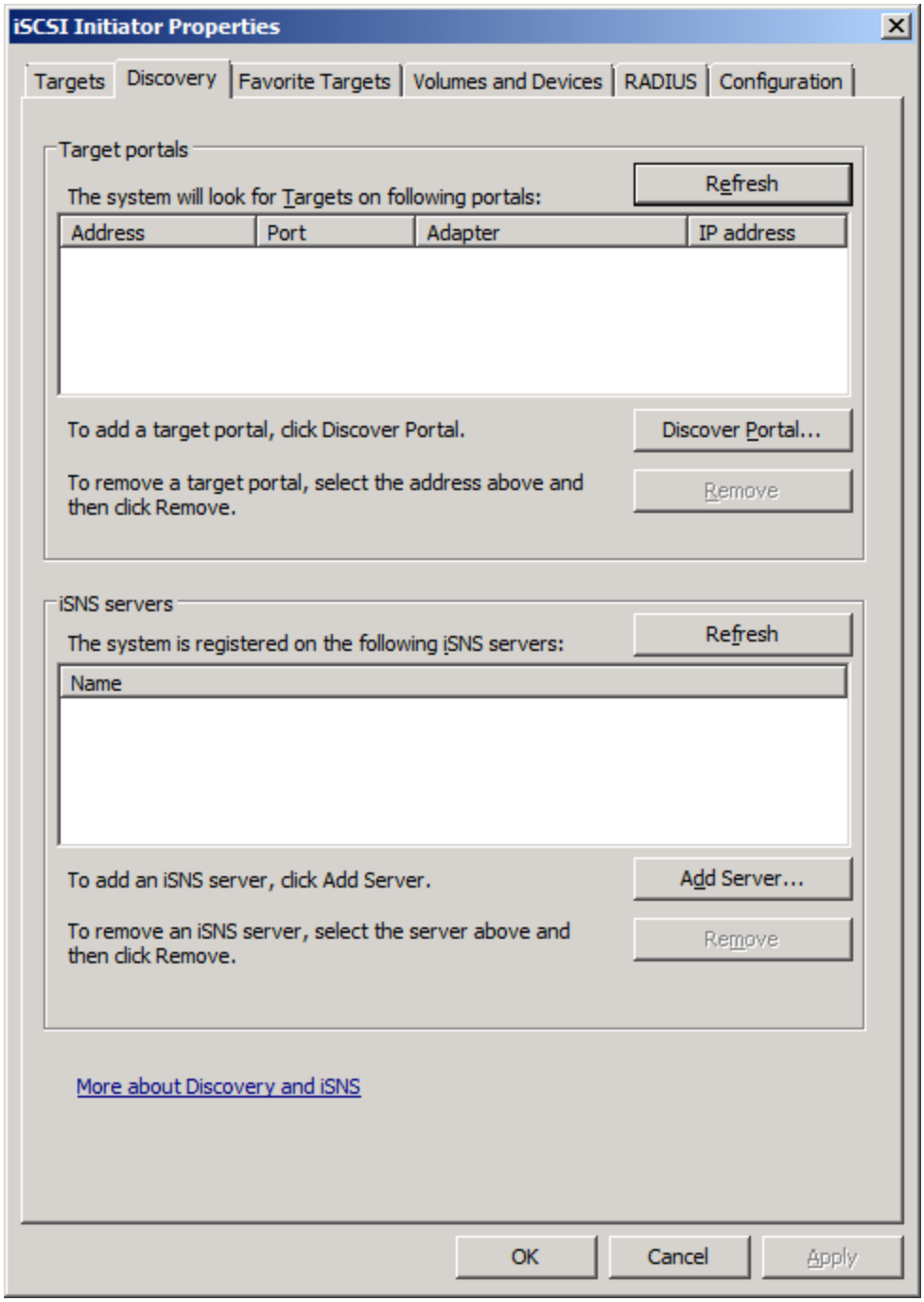


Log in to iSCSI disks

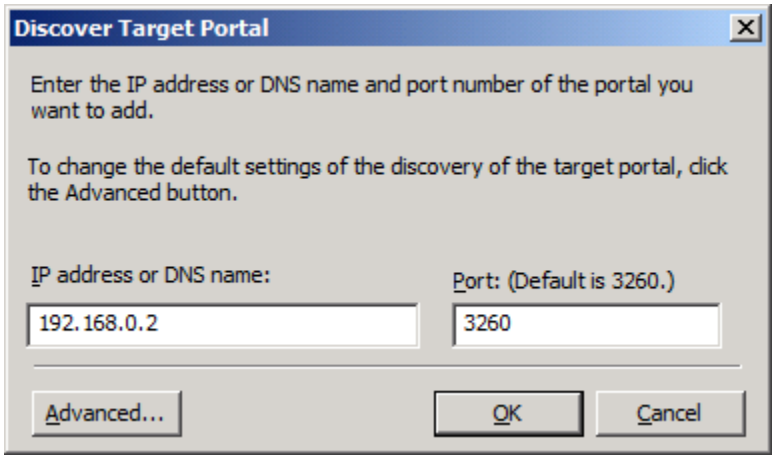
Launch the Administrative Tools -> Microsoft iSCSI initiator.

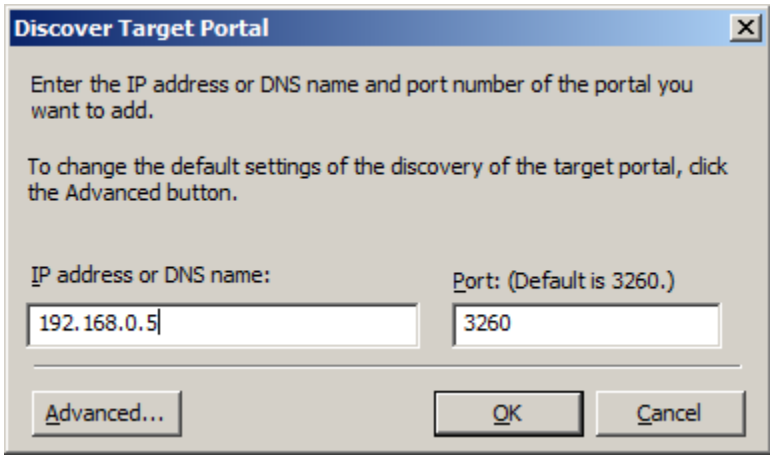


Select the **Discovery** page.



Press the **Discovery Portal** button, the **Discovery Target Portal** dialog is shown.

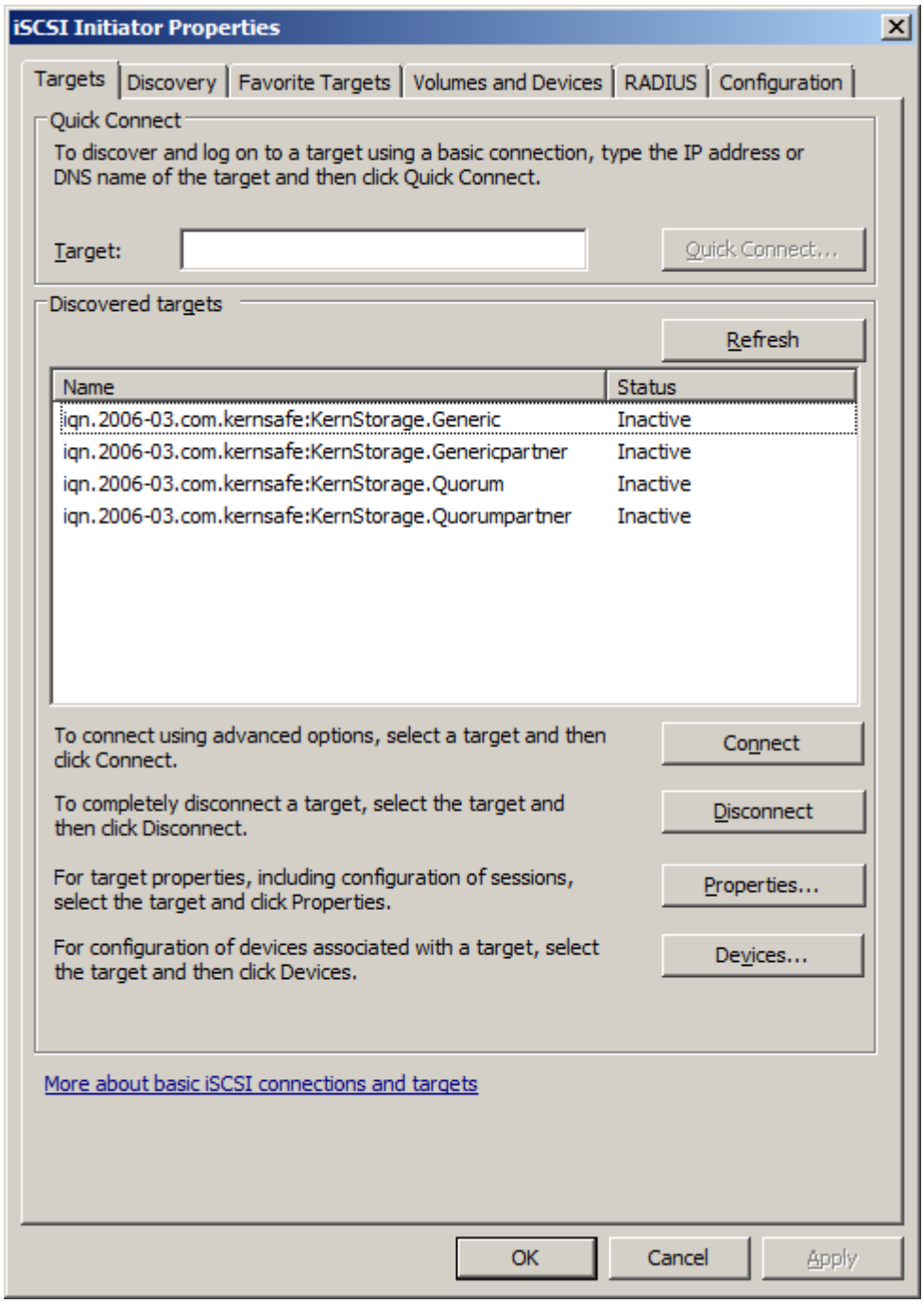




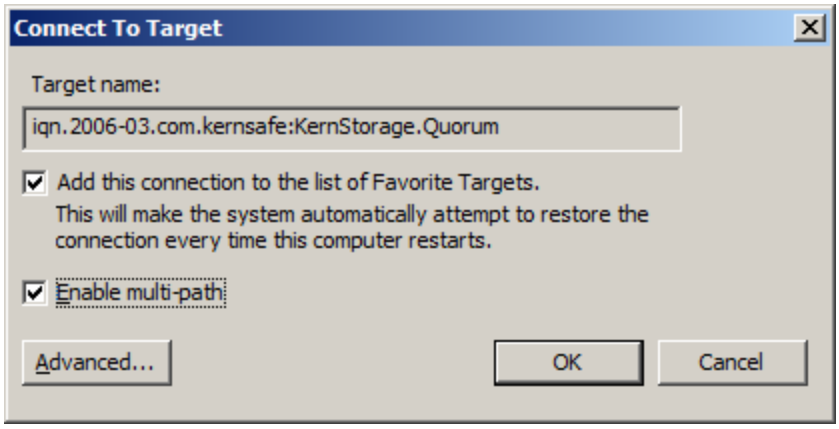
Type **IP address or NDS name** and **Port** of the iStorage Server in the required fields.

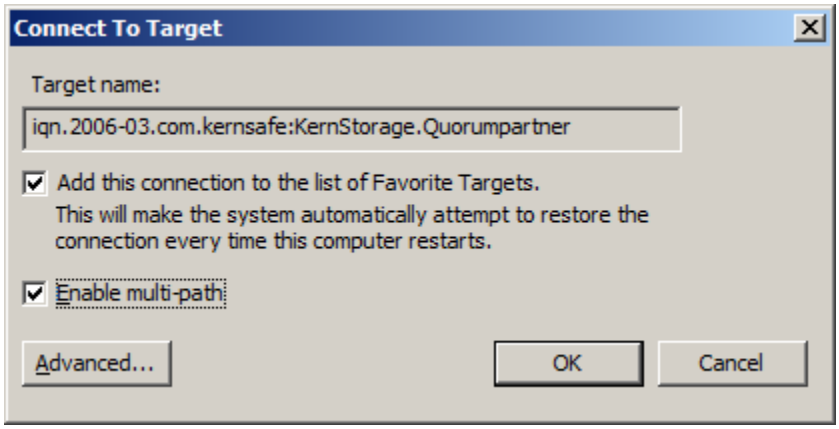
Press the **OK** button to add.

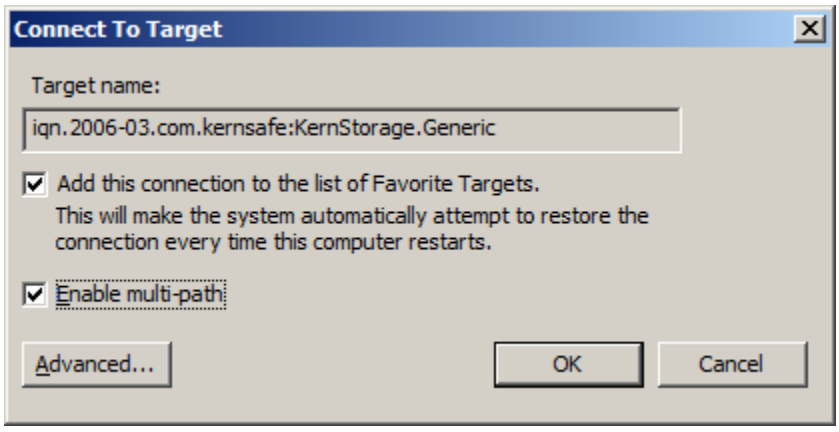
Select the **Targets** page.

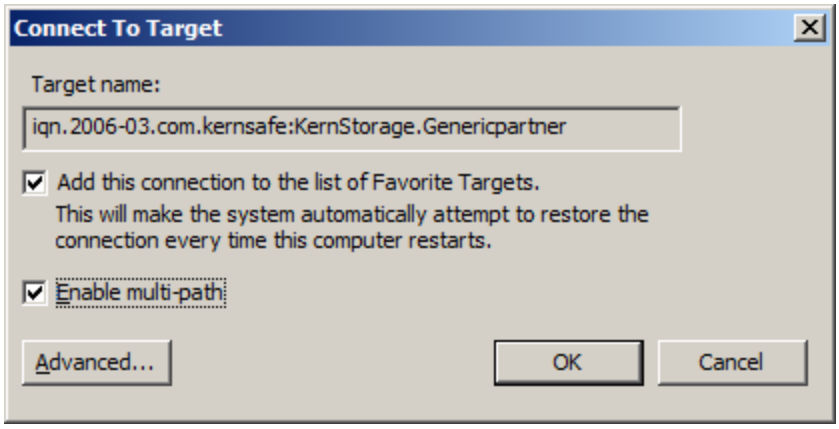


Select the targets just added and then press the **Connect** button.


Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Quorum
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel


Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Quorumpartner
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel

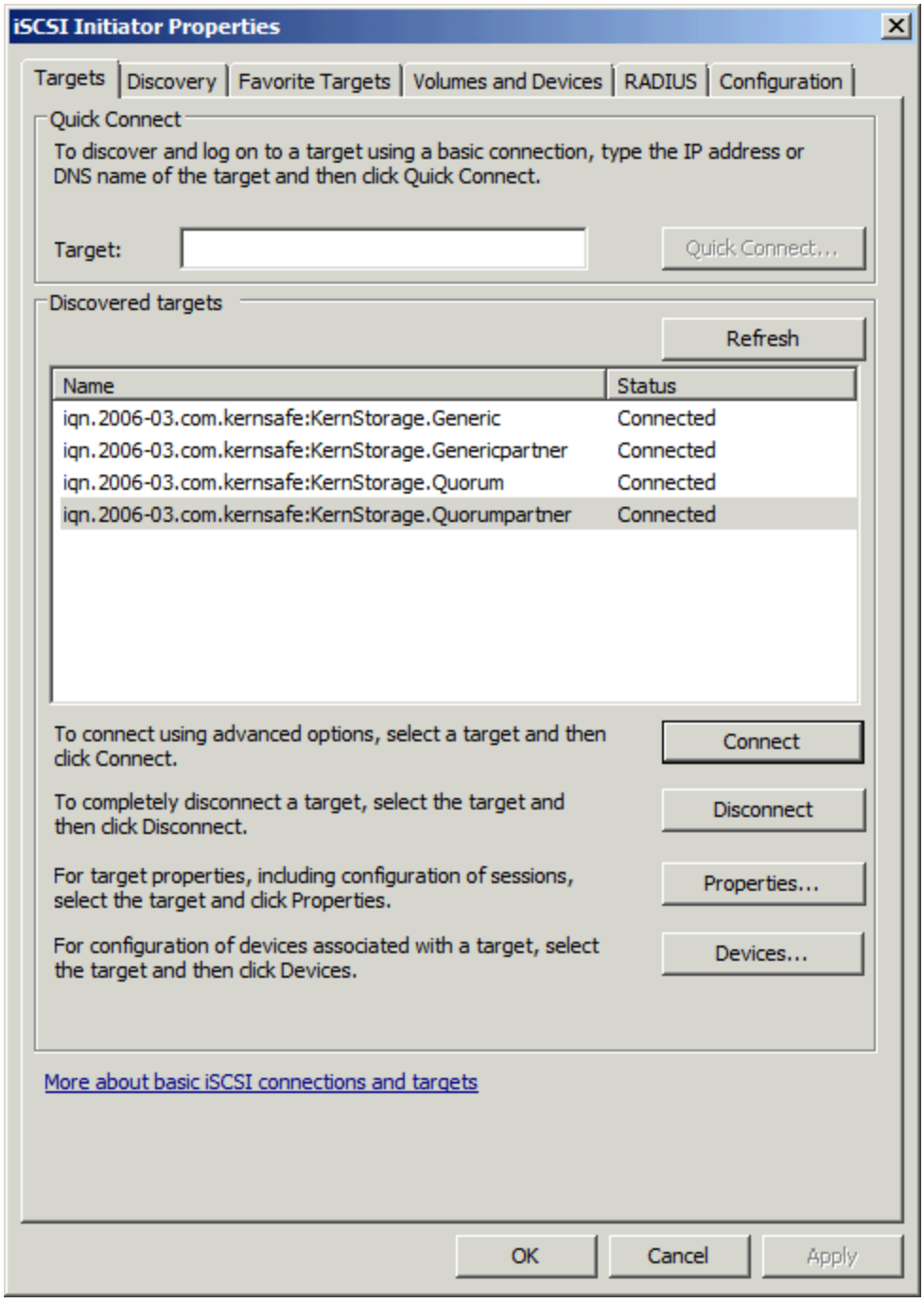

Connect To Target
Target name:
iqn.2006-03.com.kernsafe:KernStorage.Generic
Add this connection to the list of Favorite Targets.
This will make the system automatically attempt to restore the connection every time this computer restarts.
Enable multi-path
Advanced...
OK
Cancel



Keep selection of **the Add this connection to the list of Favorite Targets**.

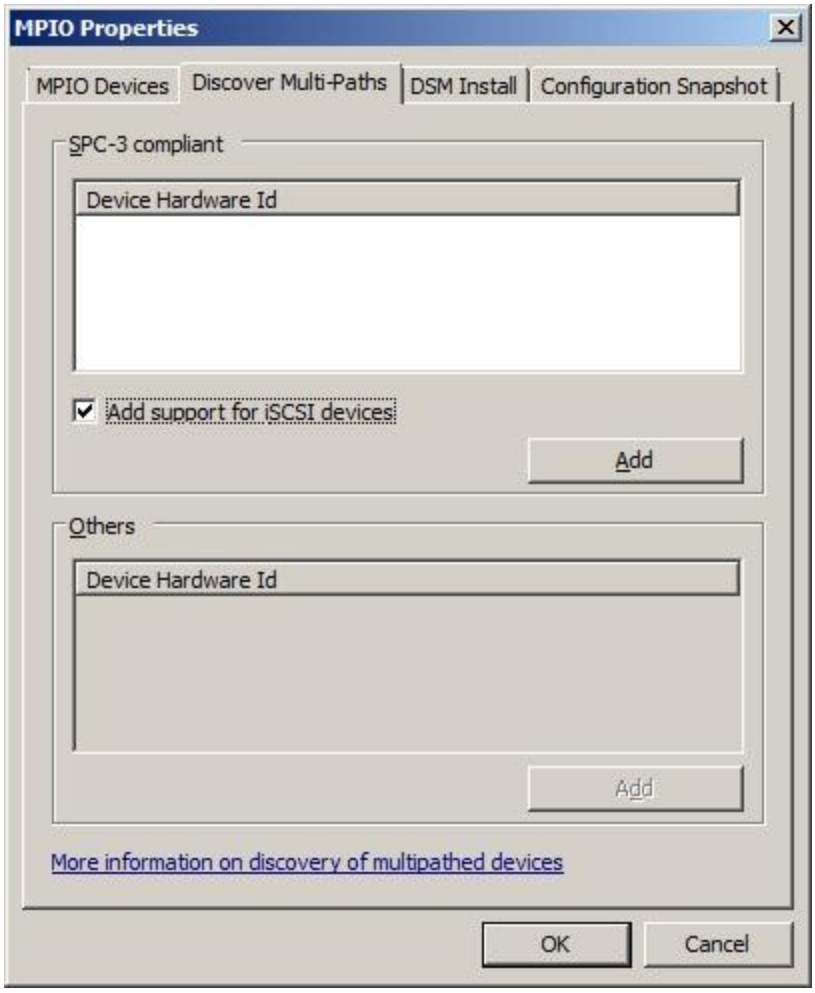
Press the **OK** button to continue.

If successful, the logged on targets are shown in the figure.



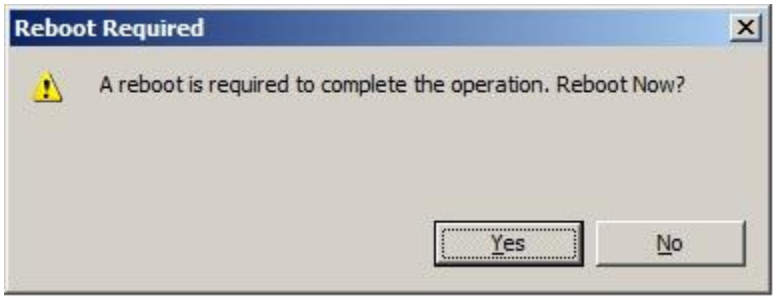
Enable Multipath Support

Launch MPIO manager by clicking **Start->Administrative Tools->MPIO**. Go to **Discover Multi-Paths** tab, check **Add support for iSCSI devices**.



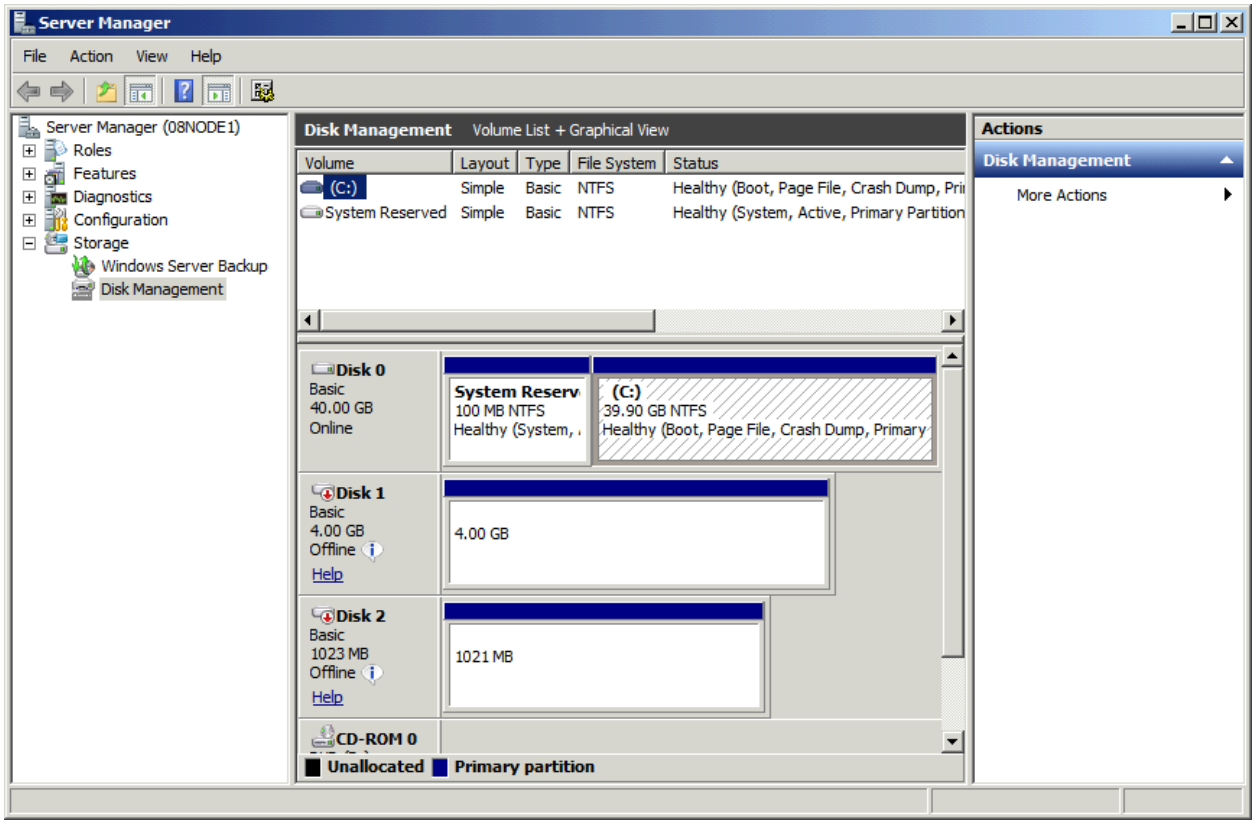
Click the **Add** button.

Windows will prompt you to reboot the server.



Click the **Yes** button to restart your server.

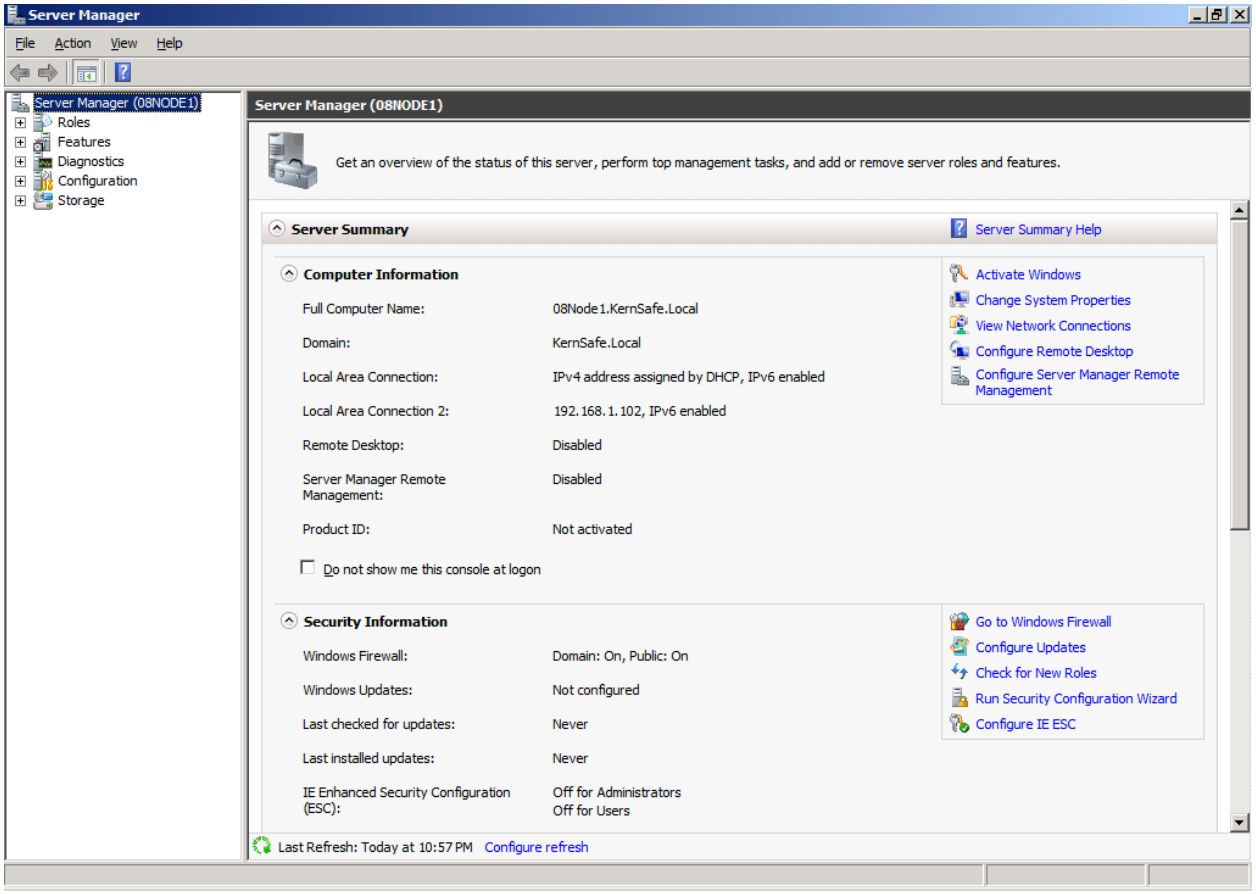
Launch the **Windows Computer Management Console**.



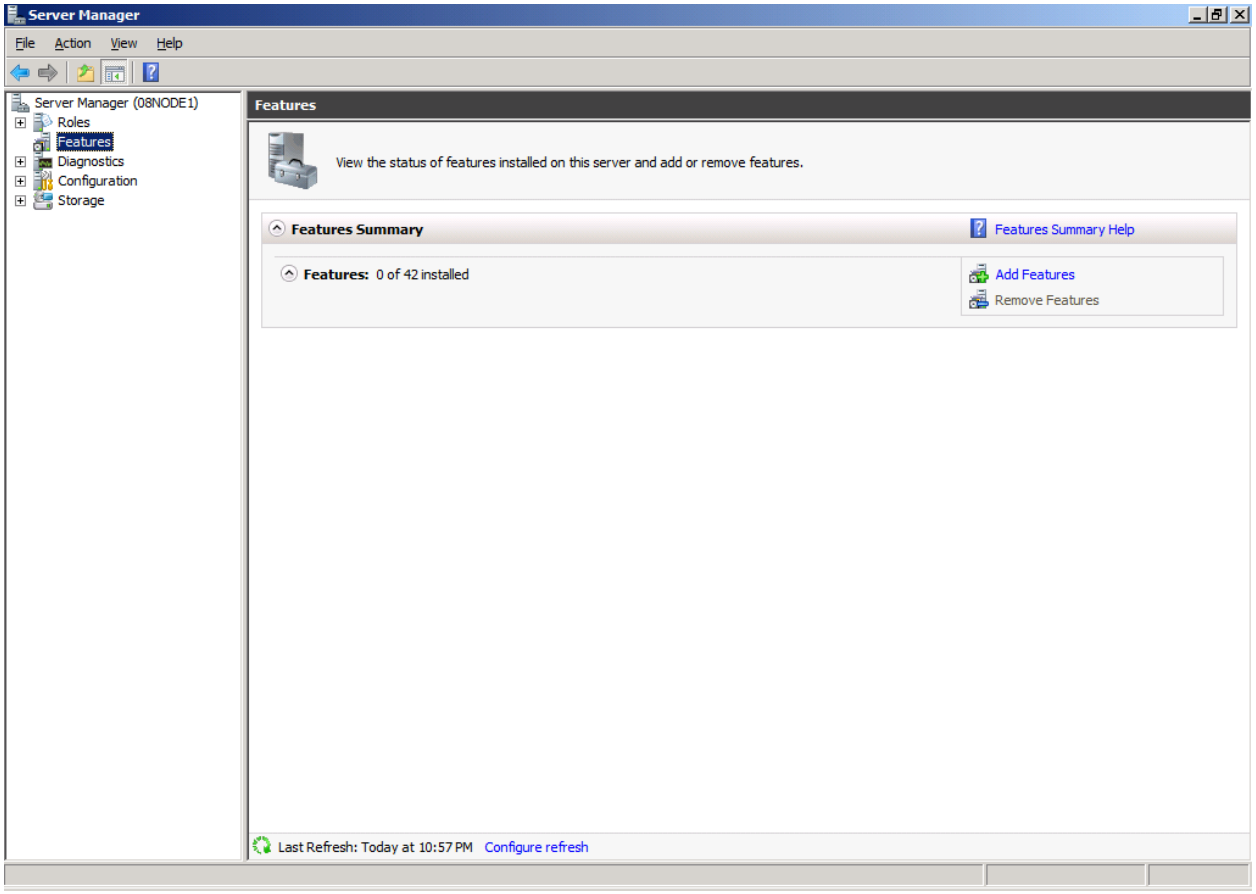
Disk1 and **Disk2** are offline, we should not bring them online.

Installing Failover Clustering Service

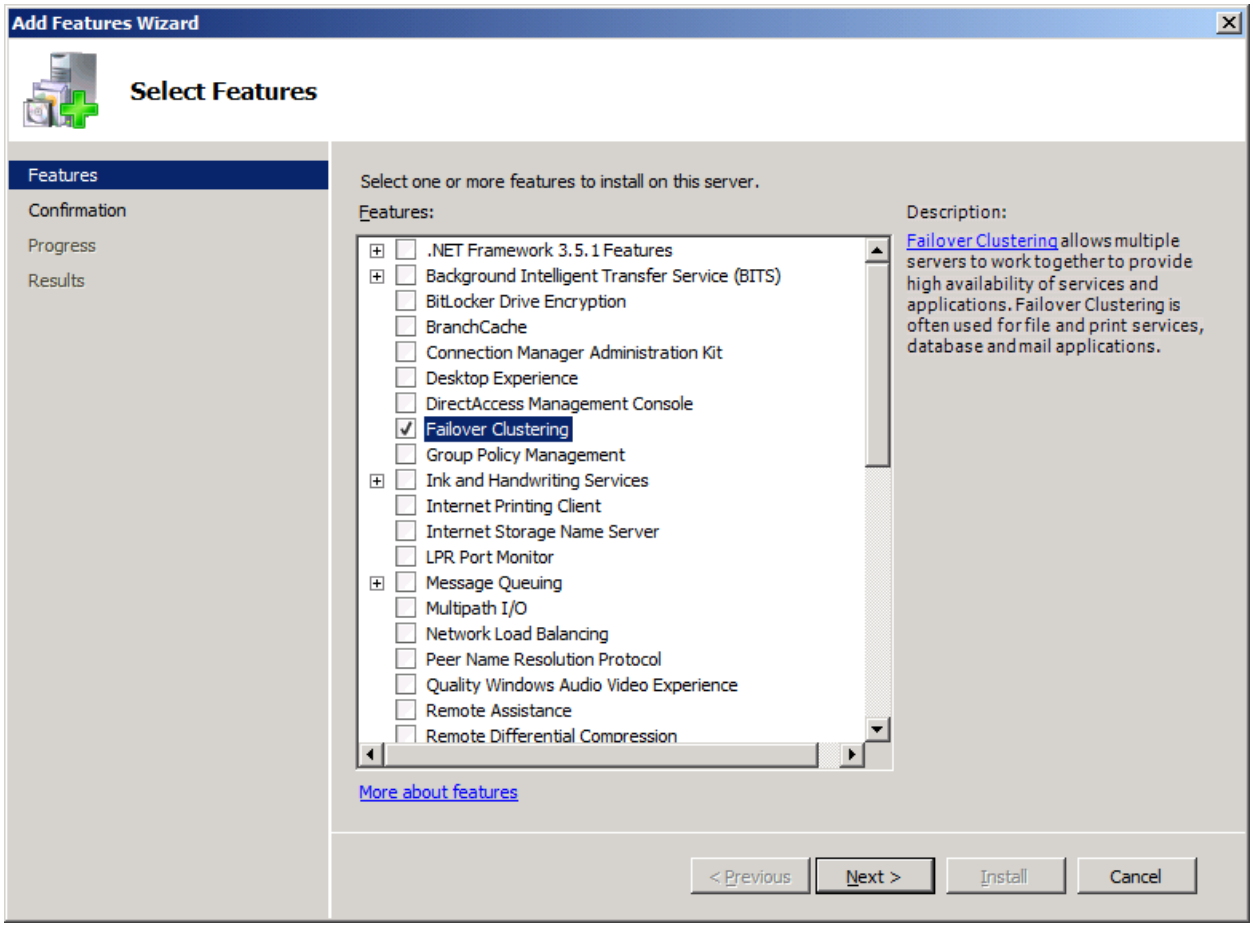
Launch the **Windows Server manager Console**.



Select the **Features** node from the left tree view.

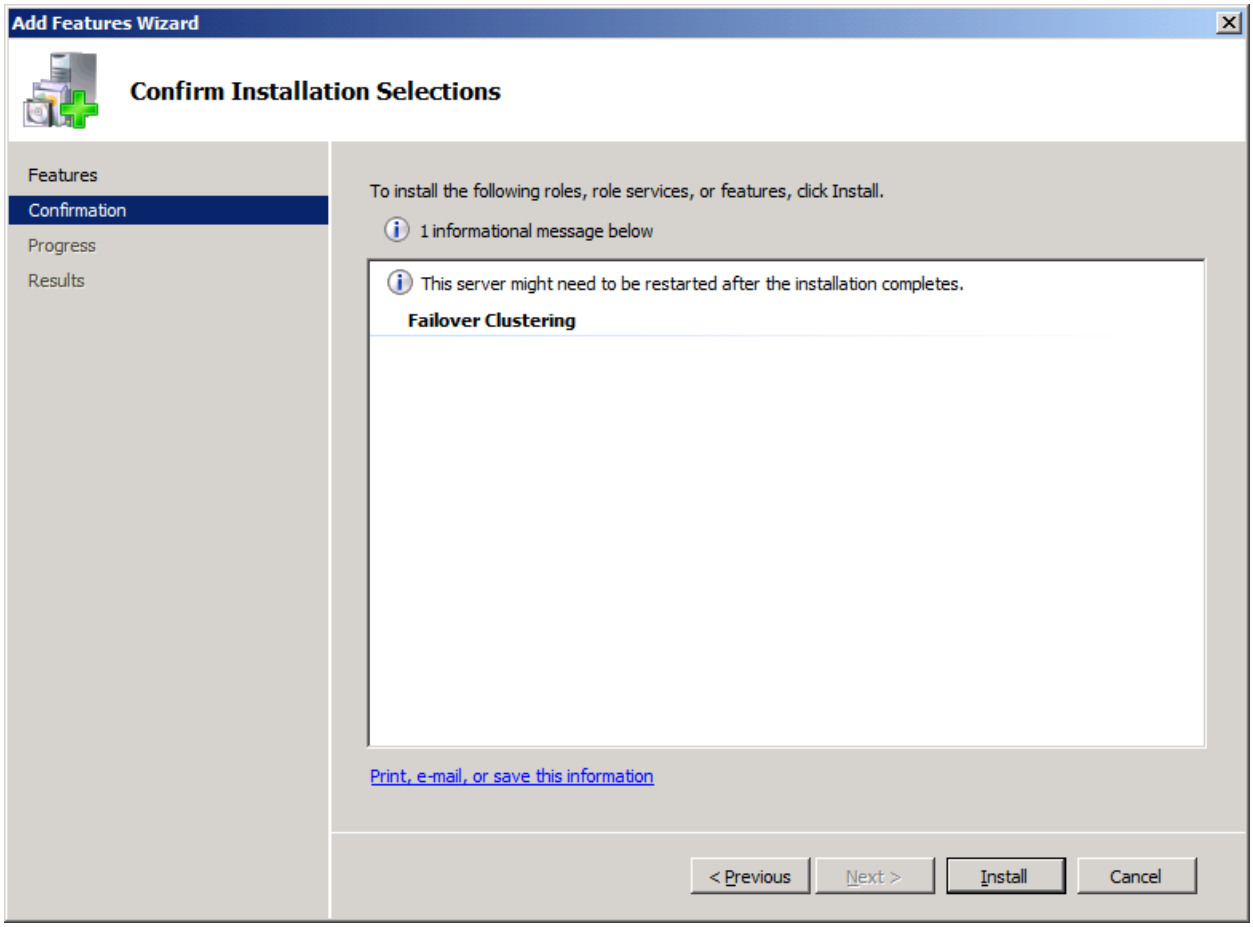


Click the **Add Features** link, the **Add Features Wizard** is shown.



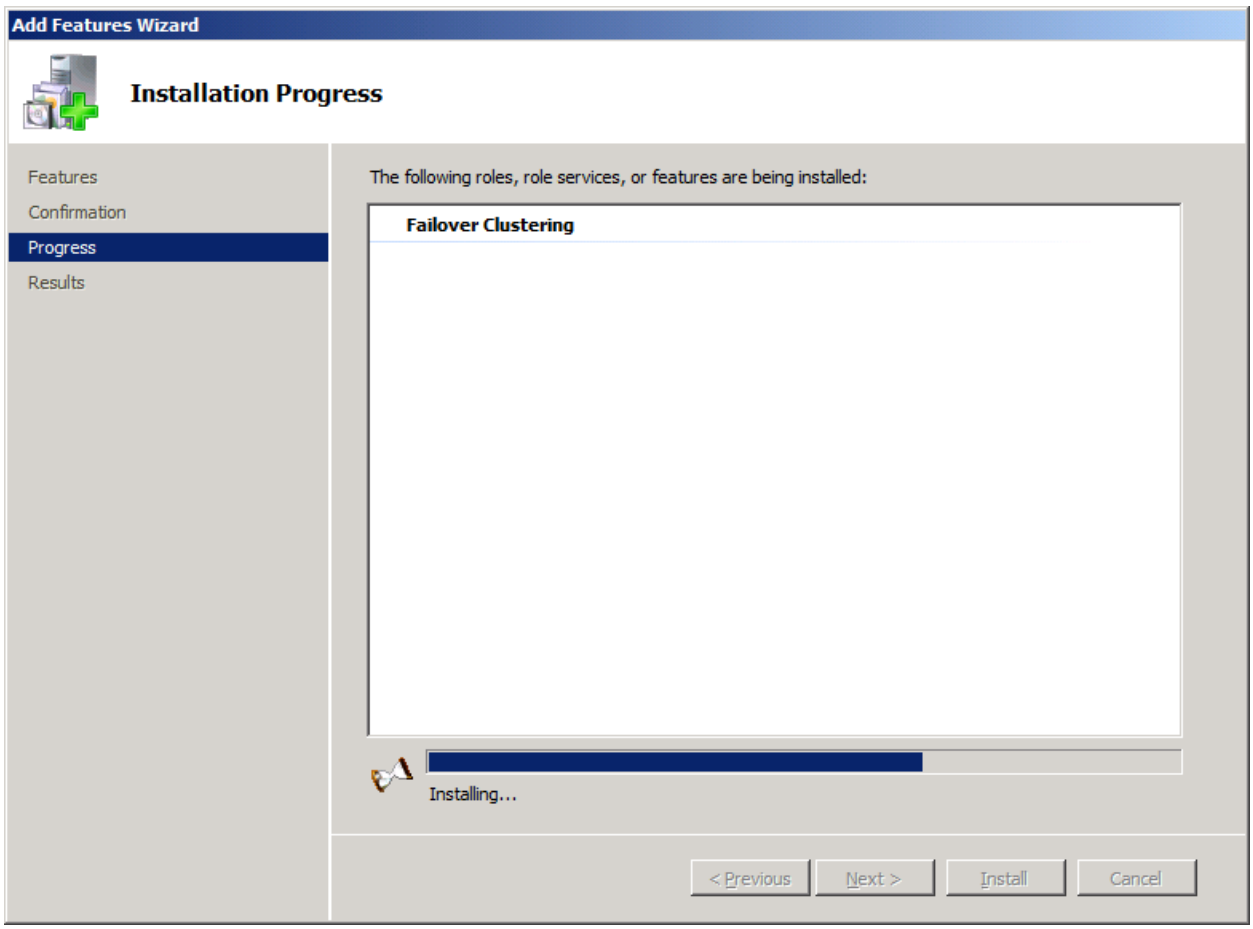
Select the **Failover Clustering**.

Press the **Next** button to continue.

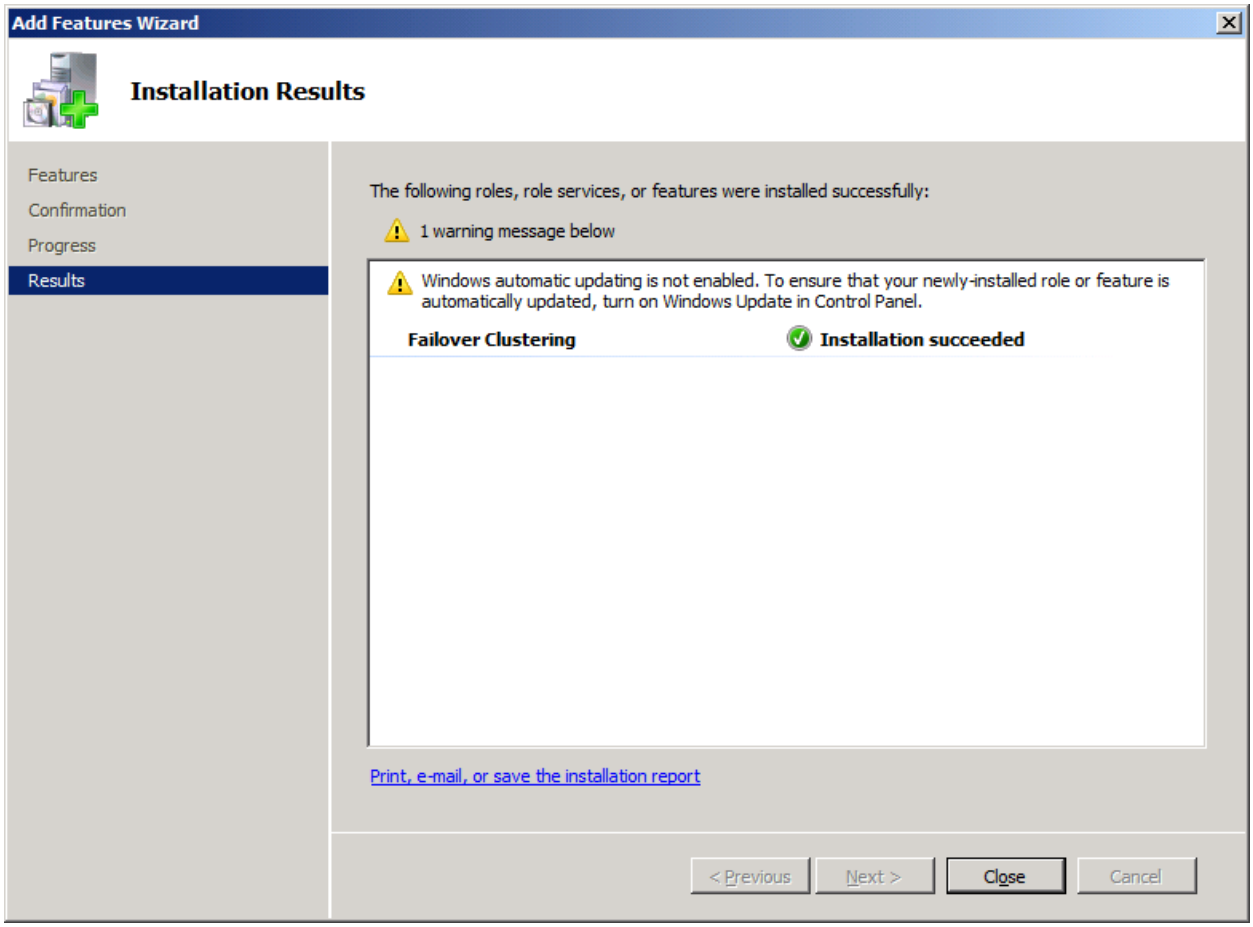


Press the **Install** button to install the **Failover Clustering** feature.

The installation of the Failover Clustering is going on.



If successful, the wizard will complete and show as the figure below.



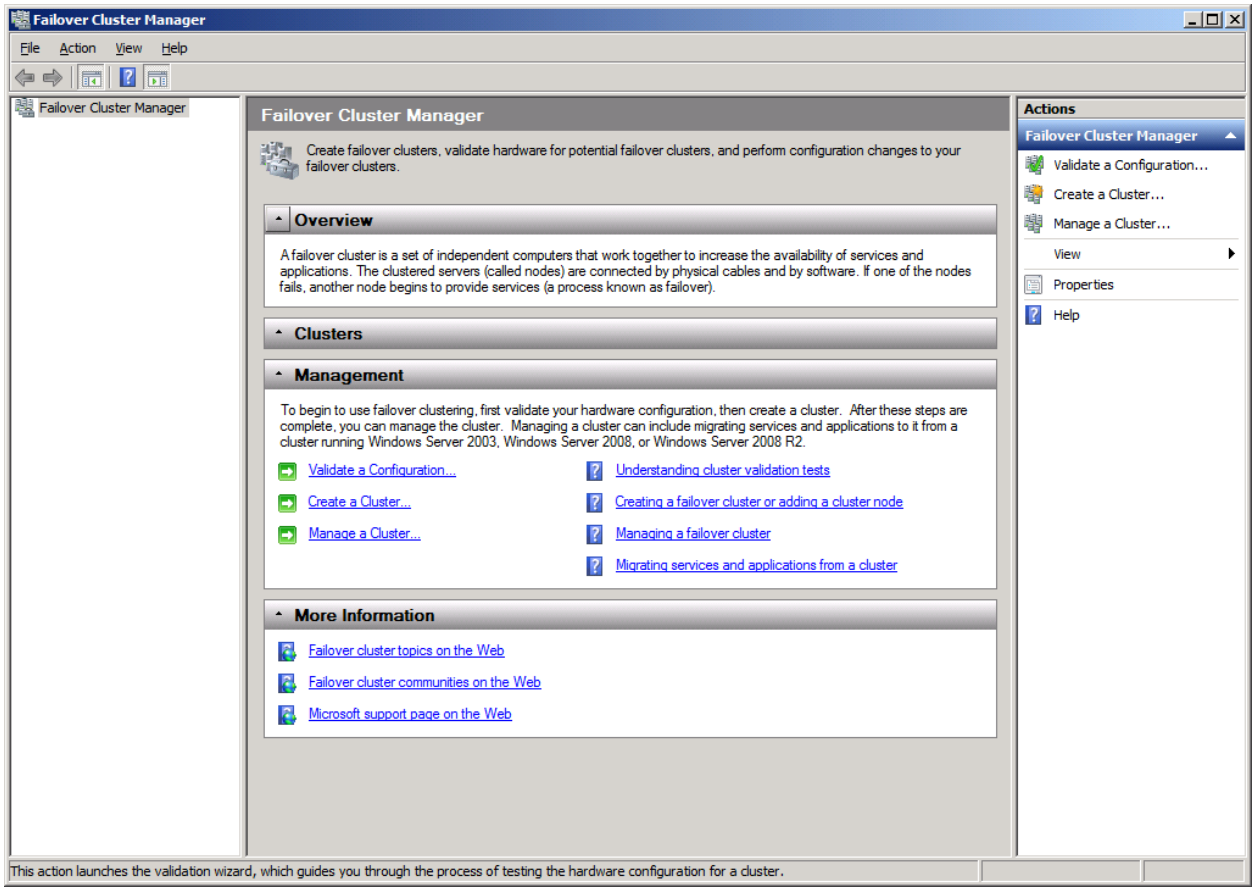
Press the **Close** button.

Configuring Failover Clustering

Validate a Configuration

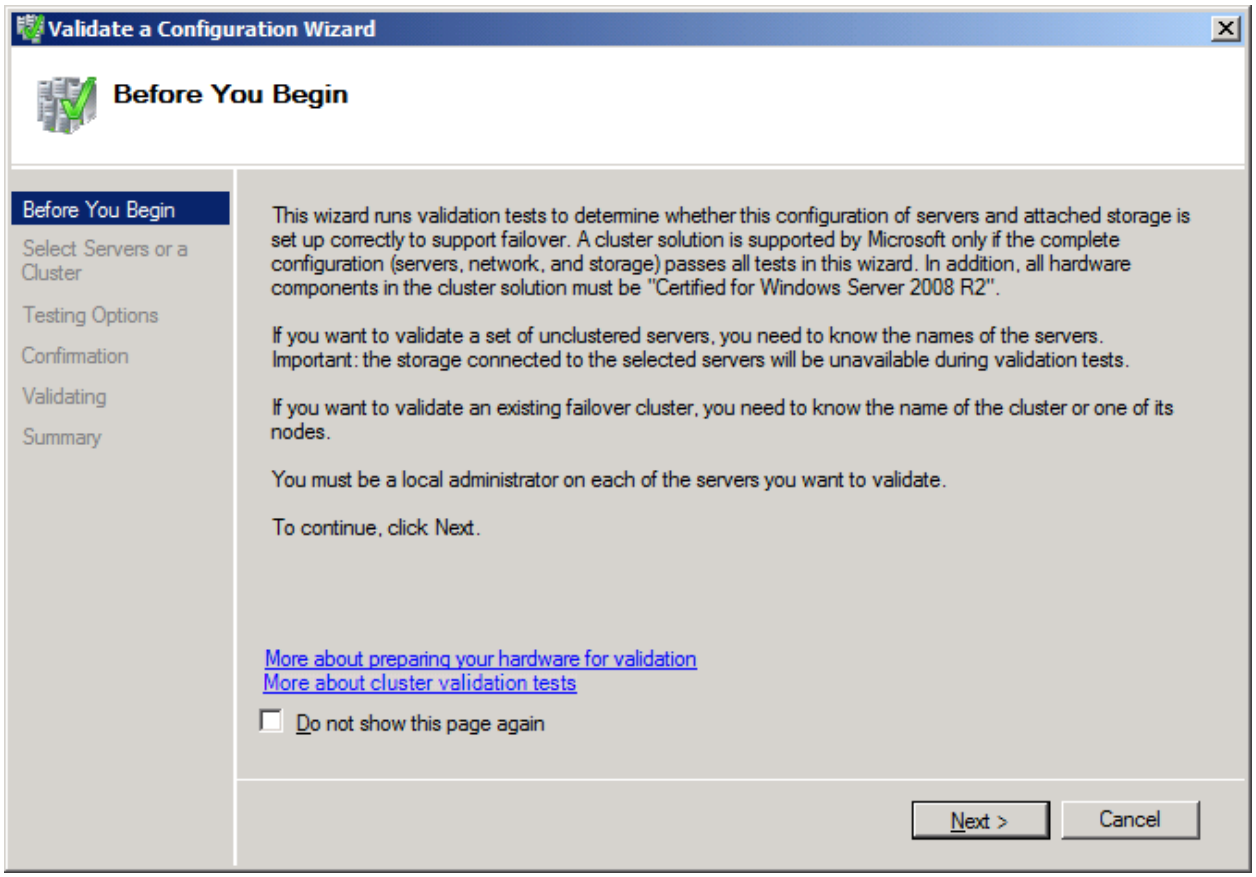
Note that this step is not necessary for creating a cluster, but it ensures that the configuration is suitable for failover clustering.

Launch to the **Windows Failover Cluster Manager** console in node 1 or node 2 machines.



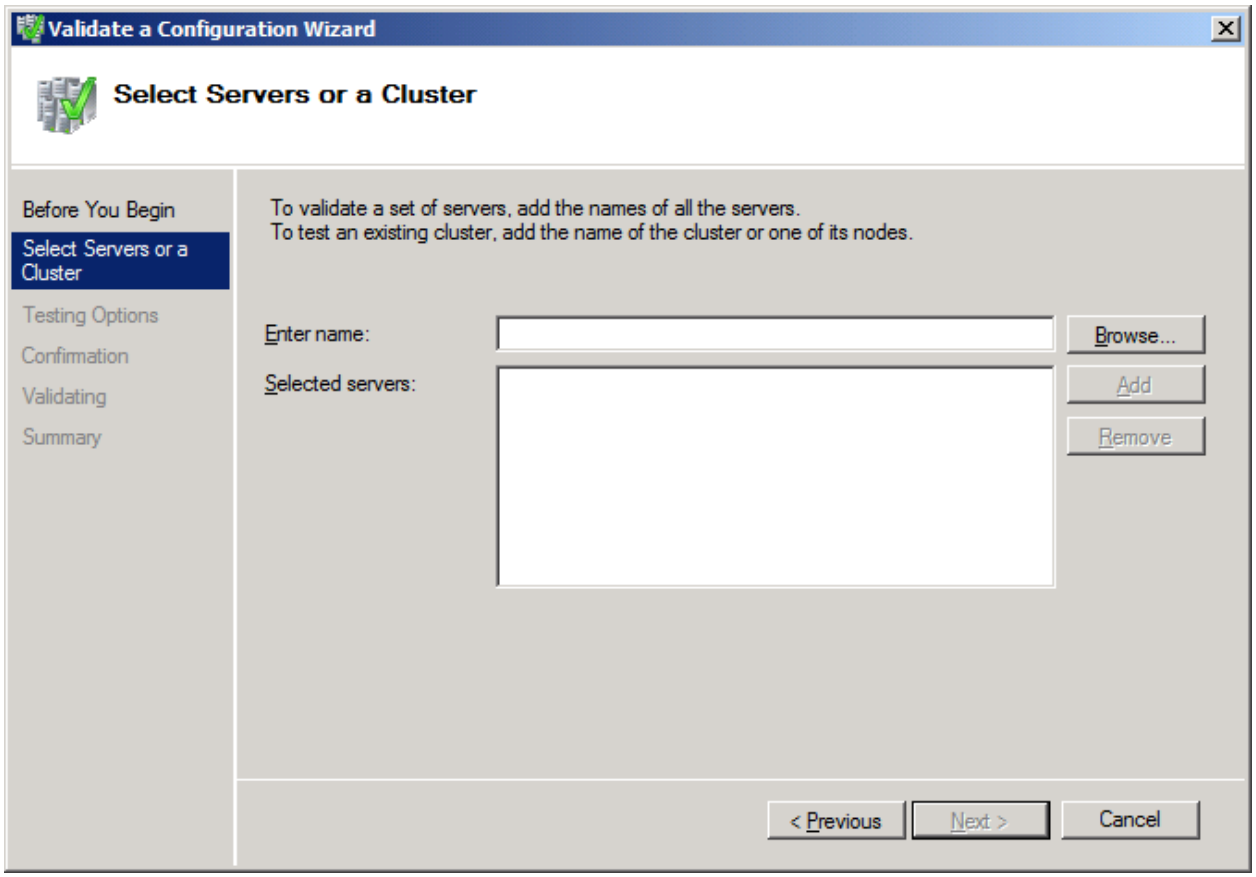
Click on the **Validate a Configuration…** link.

The **Validate a Configuration Wizard** is shown.

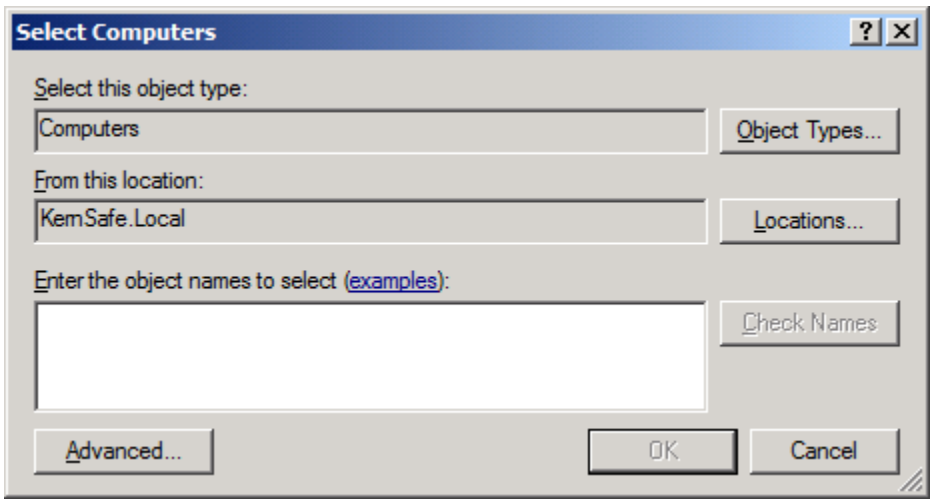


Press the **Next** button to continue.

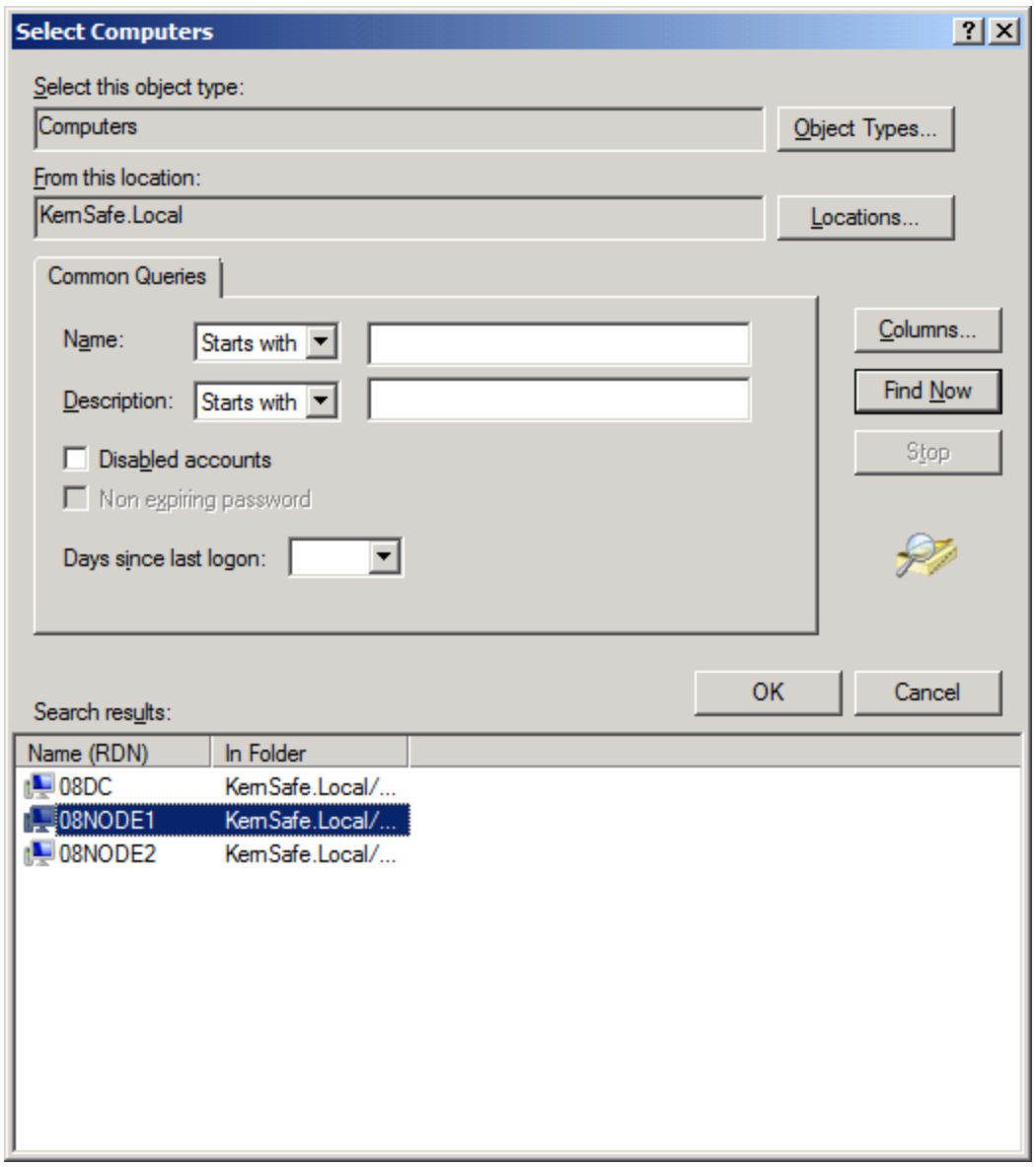
Add nodes to the cluster.



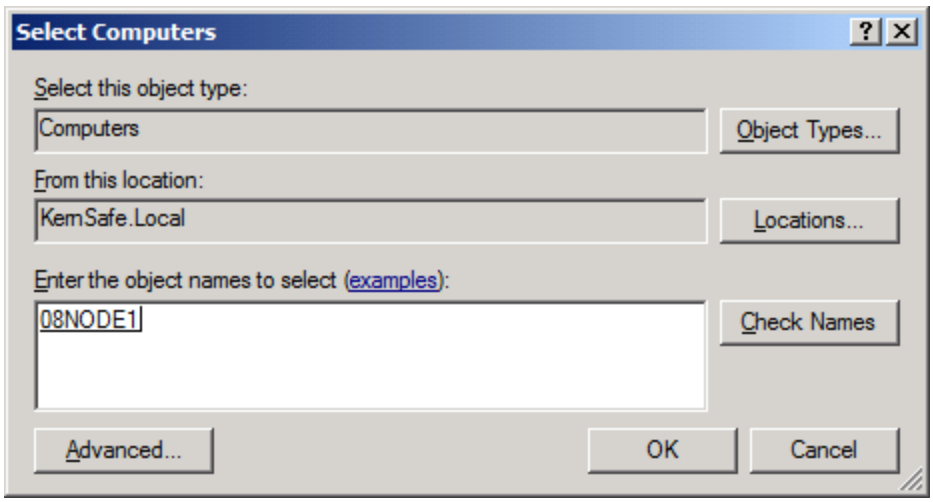
Press the **Browse** button, the **Select Computers** dialog is shown.



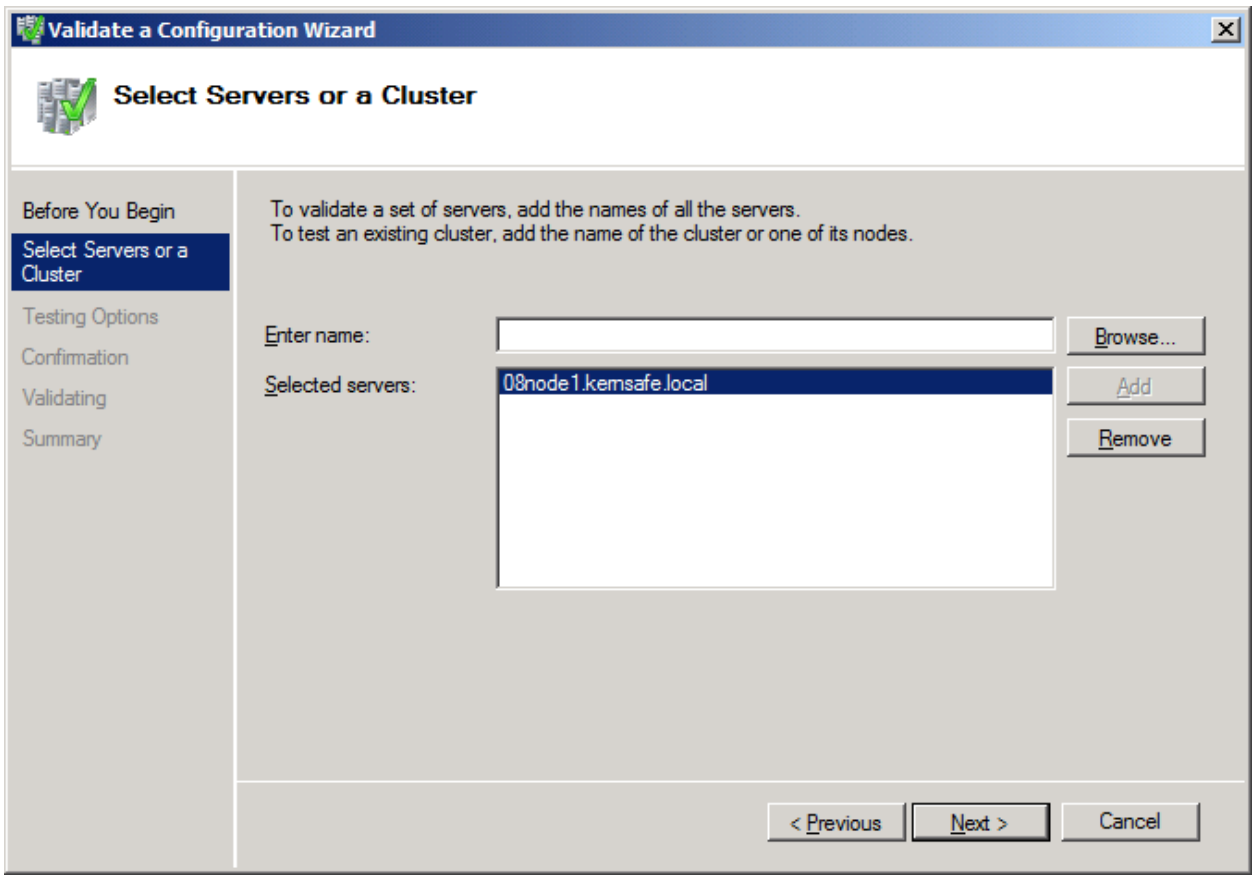
Press the **Advanced…** button.



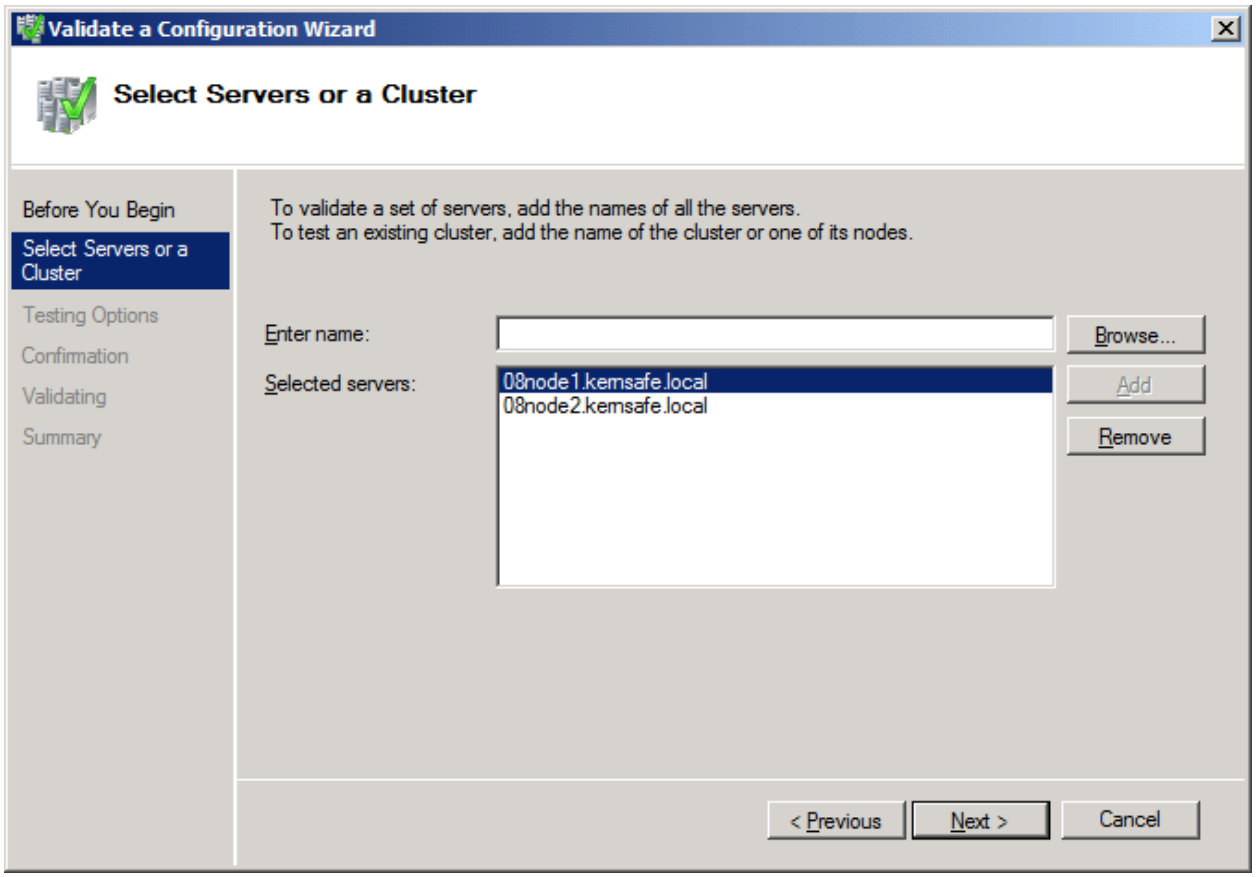
Select the **08NODE1** item and then press the **OK** button to add.



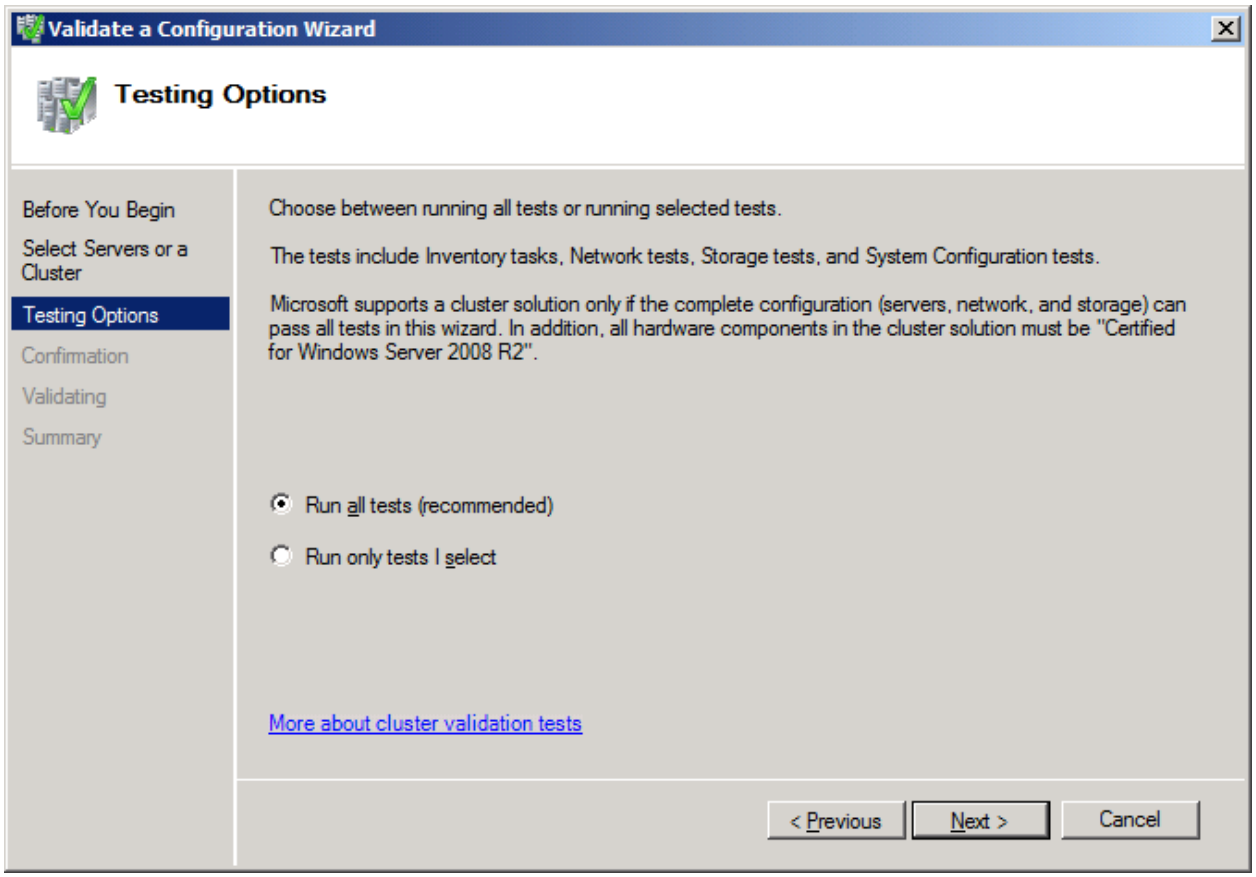
Press the **OK** button.



Press the **Browse…** button and add **08NODE2** by through the same way.

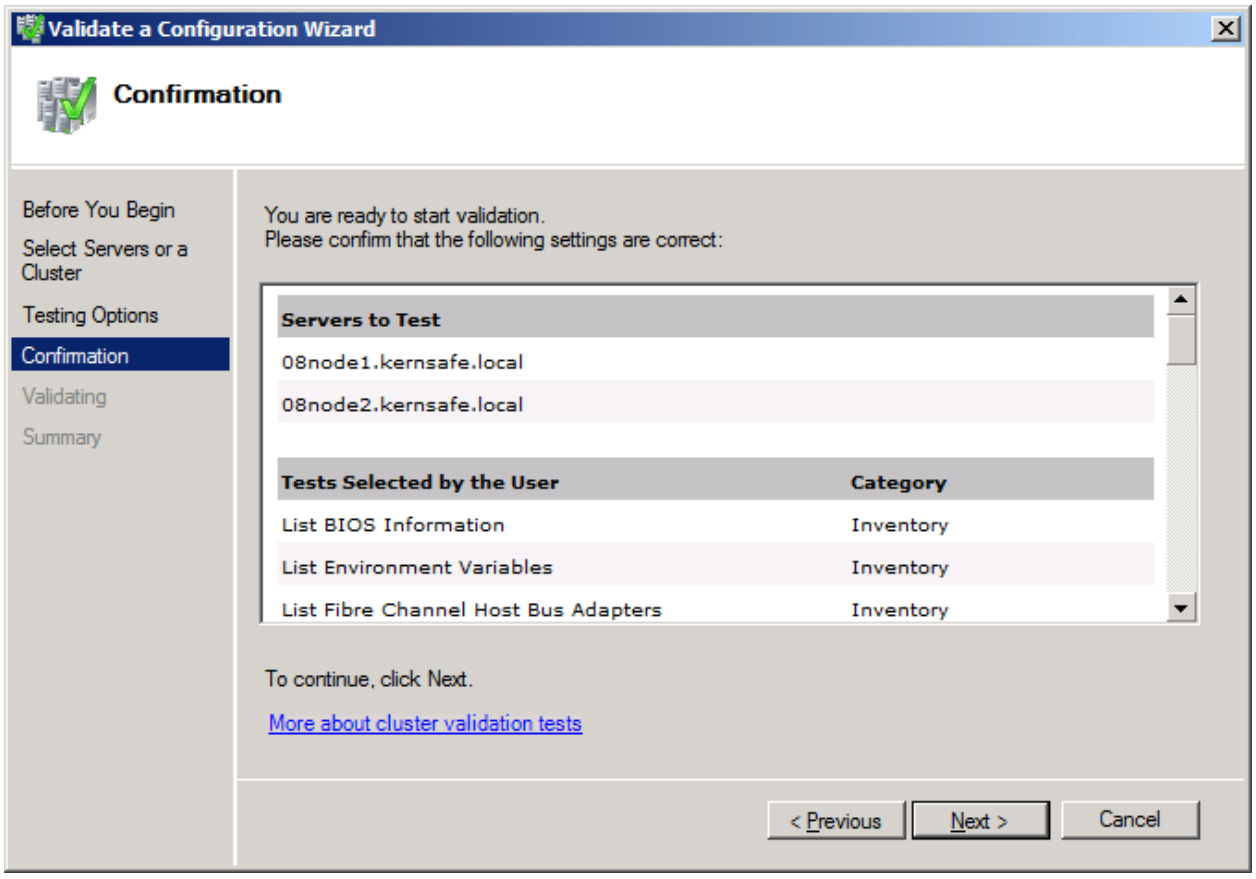


Press the **Next** button to continue.



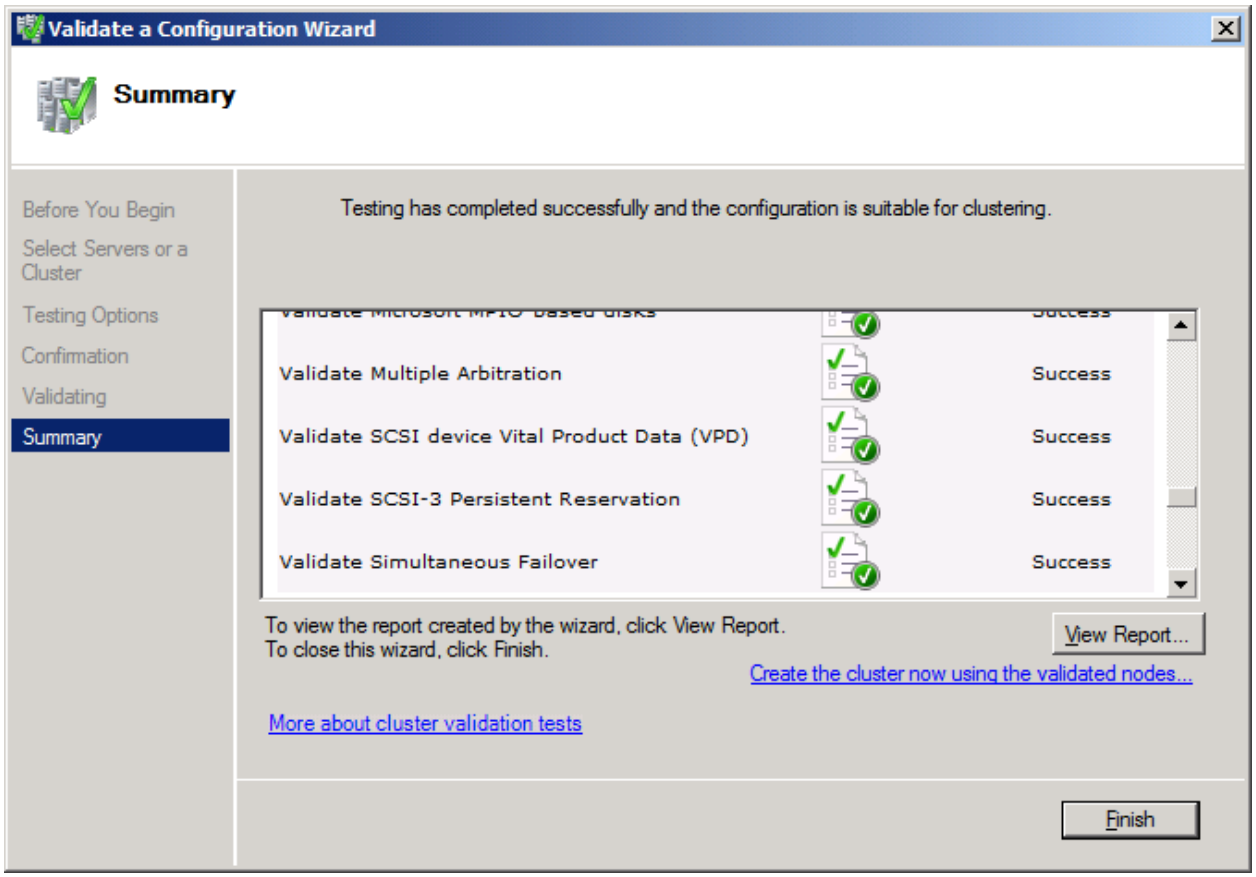
Select **Run all tests (recommended)**.

Press the **Next** button to continue.



Press the **Next** button to continue.

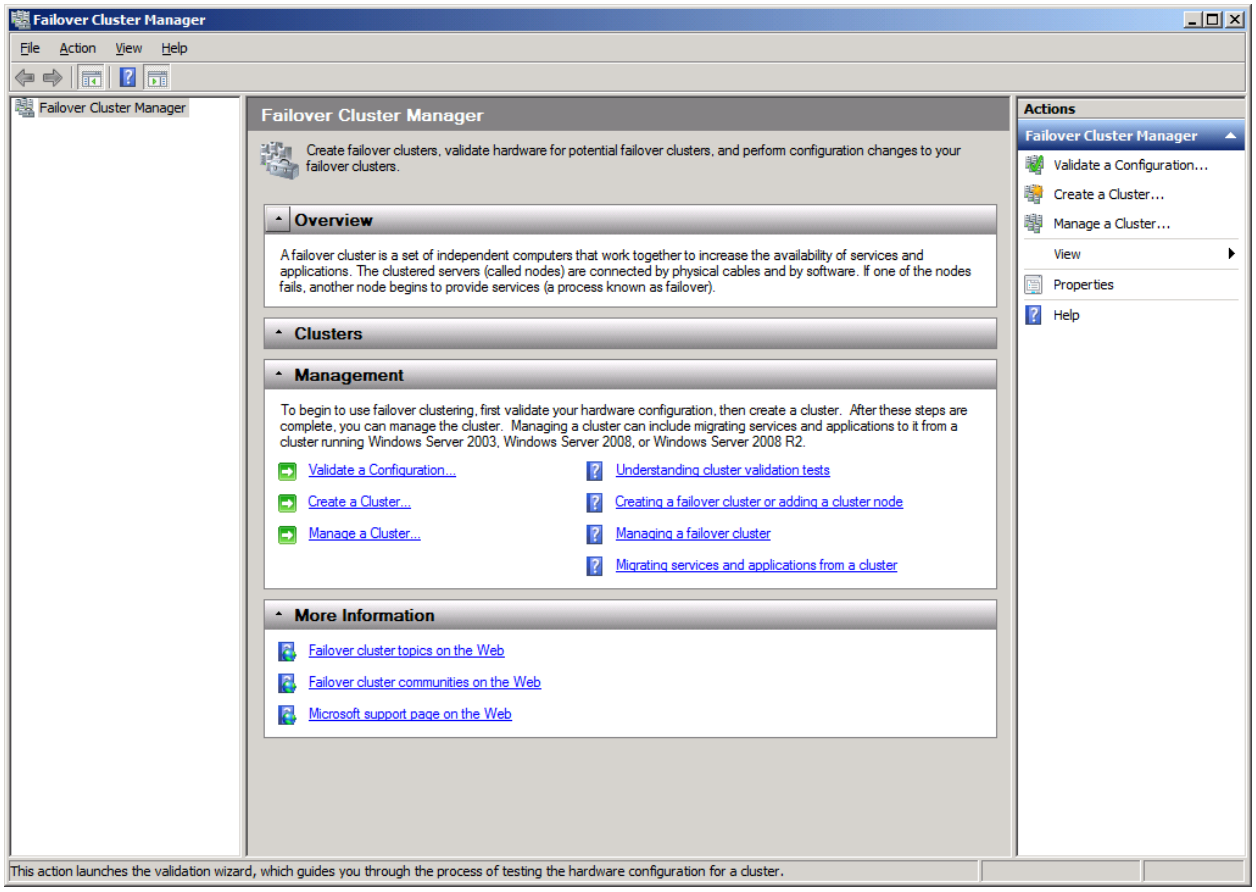
If successful, all the tests include **SCSI-3 Persistent Reservation** are valid and shown as the figure below.



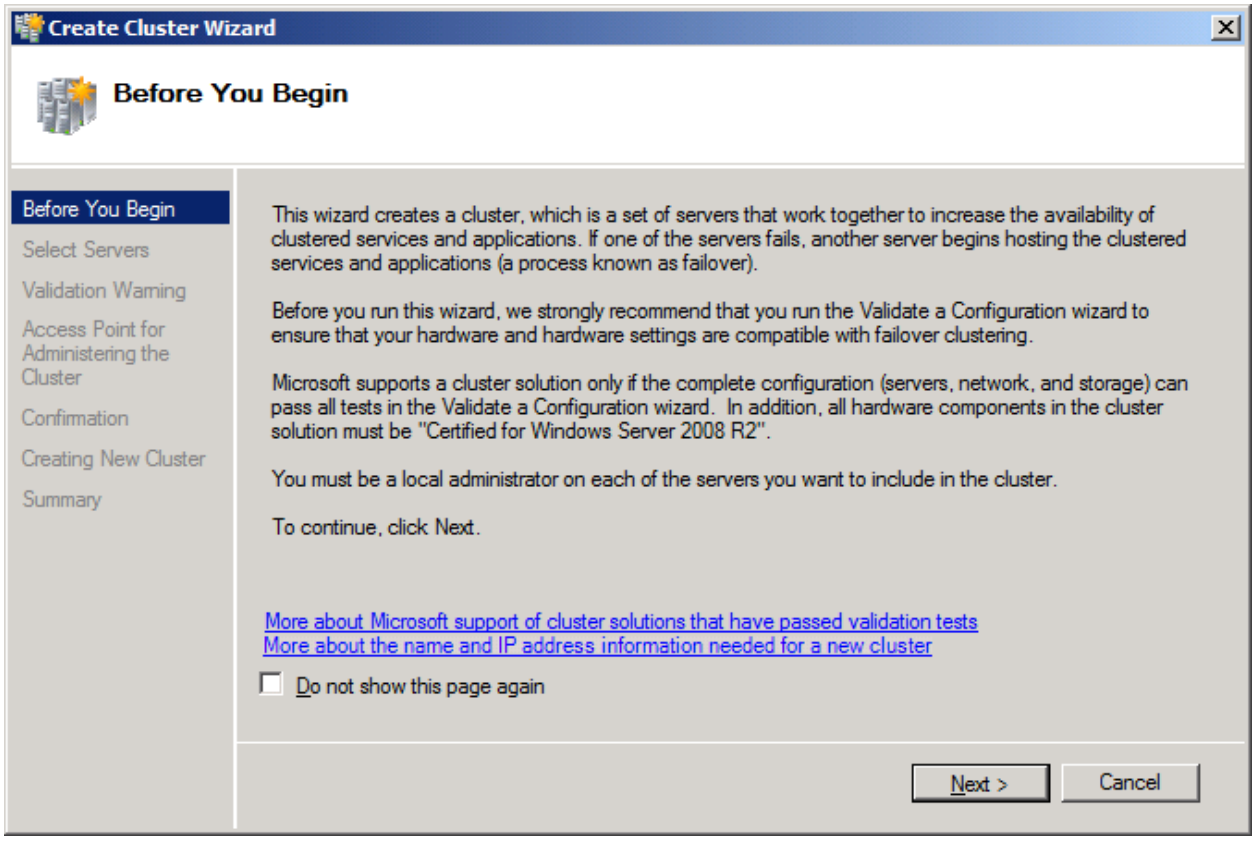
Press the **Finish** button to complete configuration validation.

Create a Failover Cluster

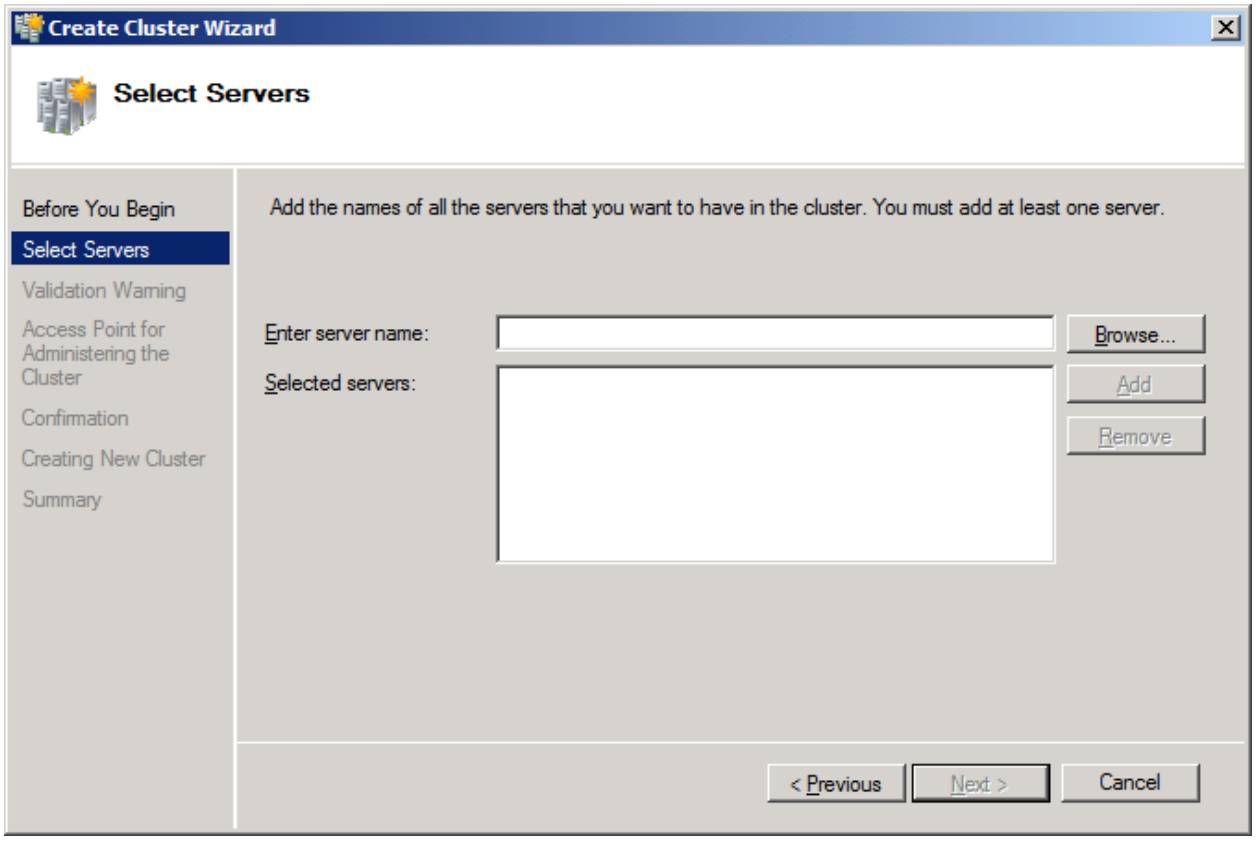
Click on the **Create a Cluster…** item in the **Actions** panel of **Failover Cluster Manager**.



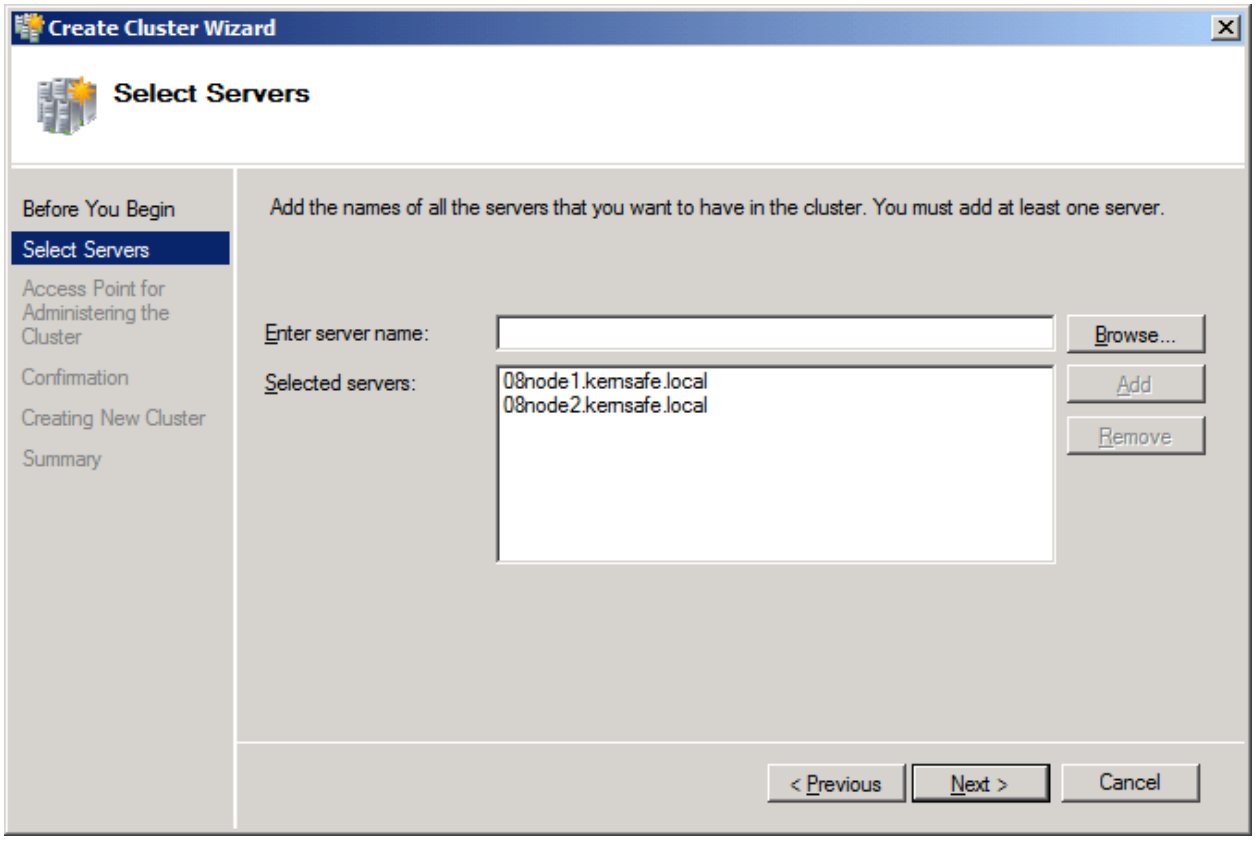
The **Create Cluster Wizard** is shown.



Press the **Next** button to continue.

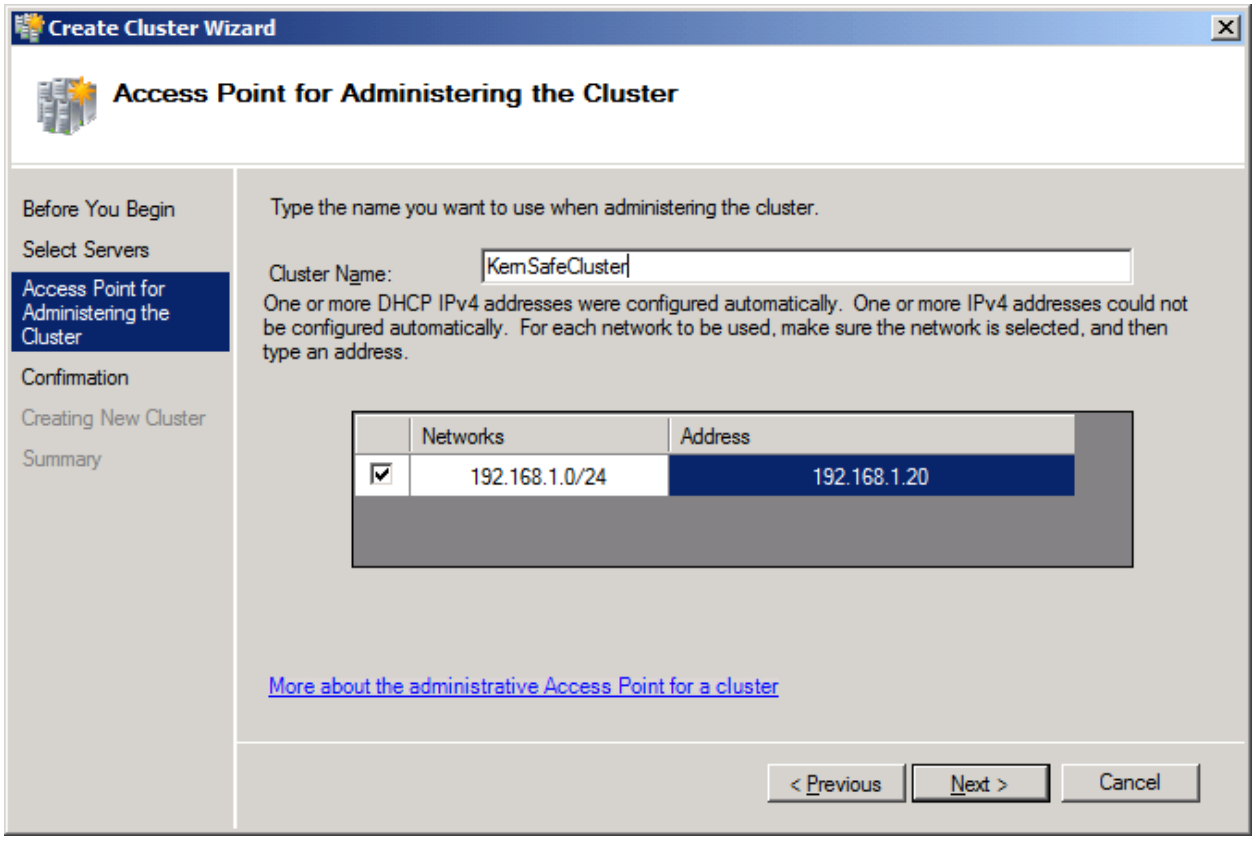


Press the **Browse…** button and the **Add** button to add nodes to this cluster.



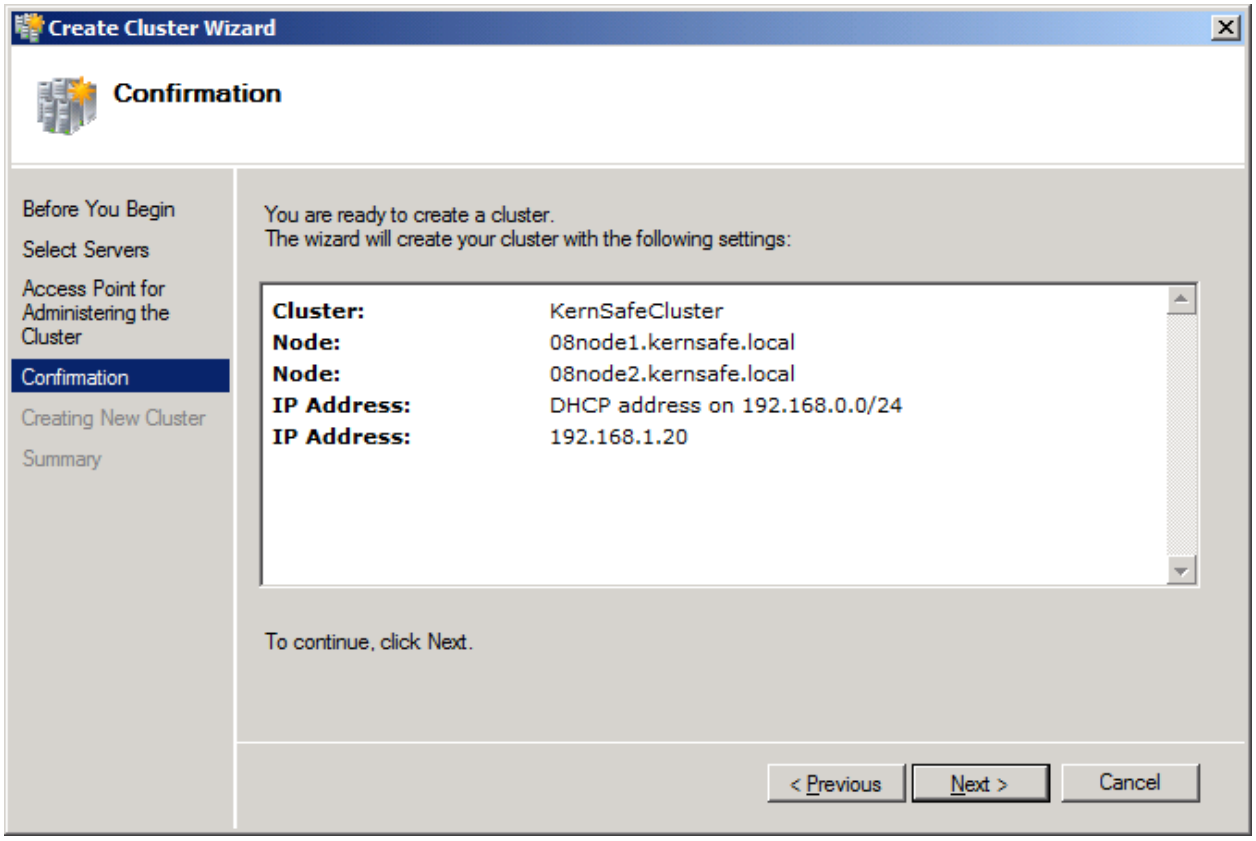
Press the **Next** button to continue.

Specify IP address for the cluster.



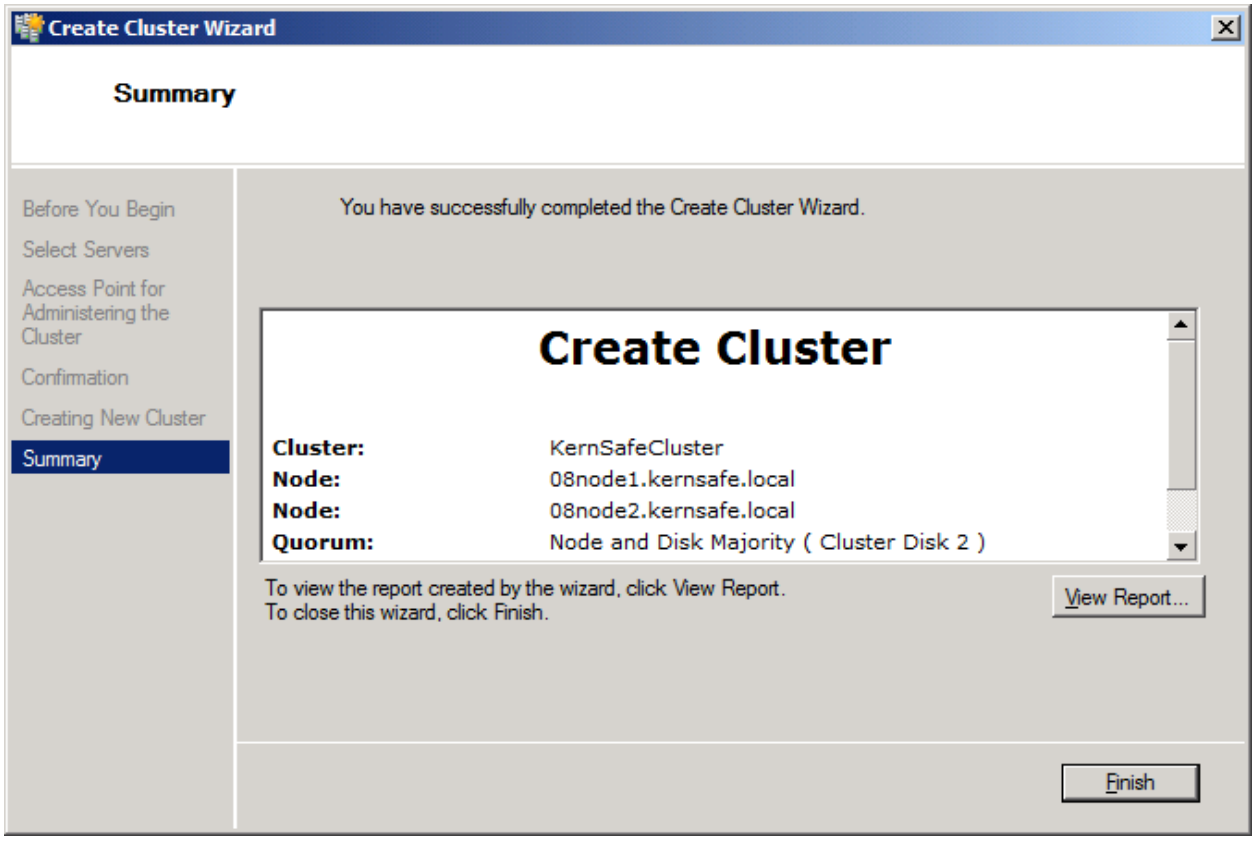
Type an IP address in the **Address** field.

Press the **Next** button to continue.

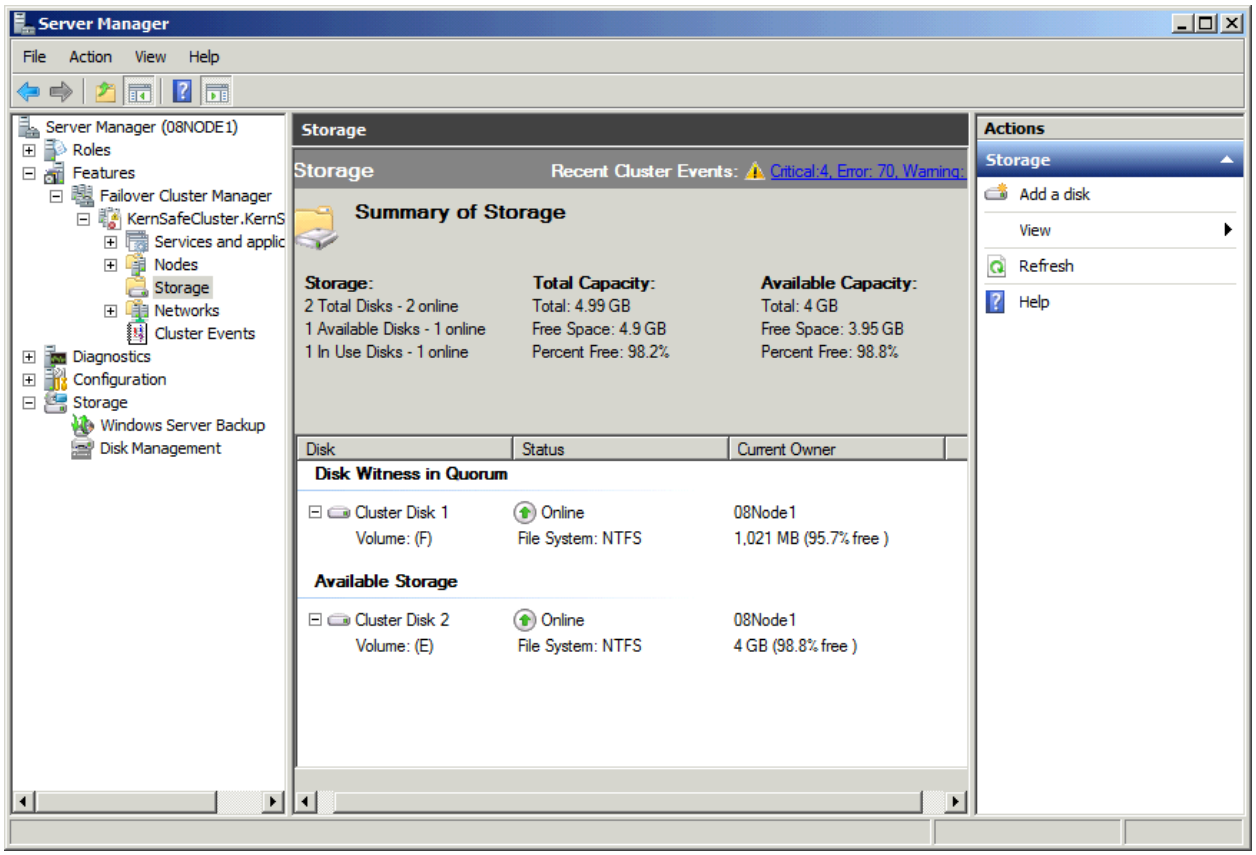


Press the **Next** button to continue or press the **Previous** button if any changes are needed.

If successful, the **Create Cluster Wizard** is complete as shown in the figure below.



Press the **Finish** button to continue.



Now the creation of the cluster is completed, expand the cluster node and select the Storage node, it will shown as the figure below, both cluster disks are shown online.

Contact

Support:	support@kernsafe.com
Sales:	sales@kernsafe.com
Home Page:	http://www.kernsafe.com/
Product Page:	http://www.kernsafe.com/product/istorage-server.aspx
Licensing	http://www.kernsafe.com/product/istorage-server/license-compares.aspx
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