

# **iStorage Server: High Availability iSCSI SAN for Windows Server 2012 Cluster**

Tuesday, December 26, 2013



KernSafe Technologies, Inc

[www.kernsafe.com](http://www.kernsafe.com)

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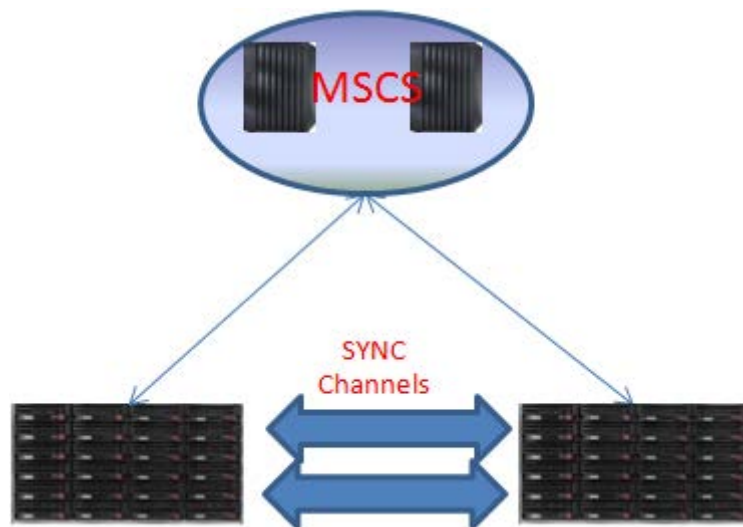
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# Overview

KernSafe iStorage Server is an advanced and powerful, full-featured software-only iSCSI Target which is fully compatible with the newest Windows Server 2012. iStorage Server can deliver immediate benefits for the new server environment which is implemented with Window Server 2012 as it is allowed to centralized manage and consolidate storage. iStorage Server provides a lot of features, such as RAID, VHD, CDP, Snapshot and Failover etc. These features are very popular and important in Storage Industry and make iStorage Server suitable for any size of business.

Microsoft 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. 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 system 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.



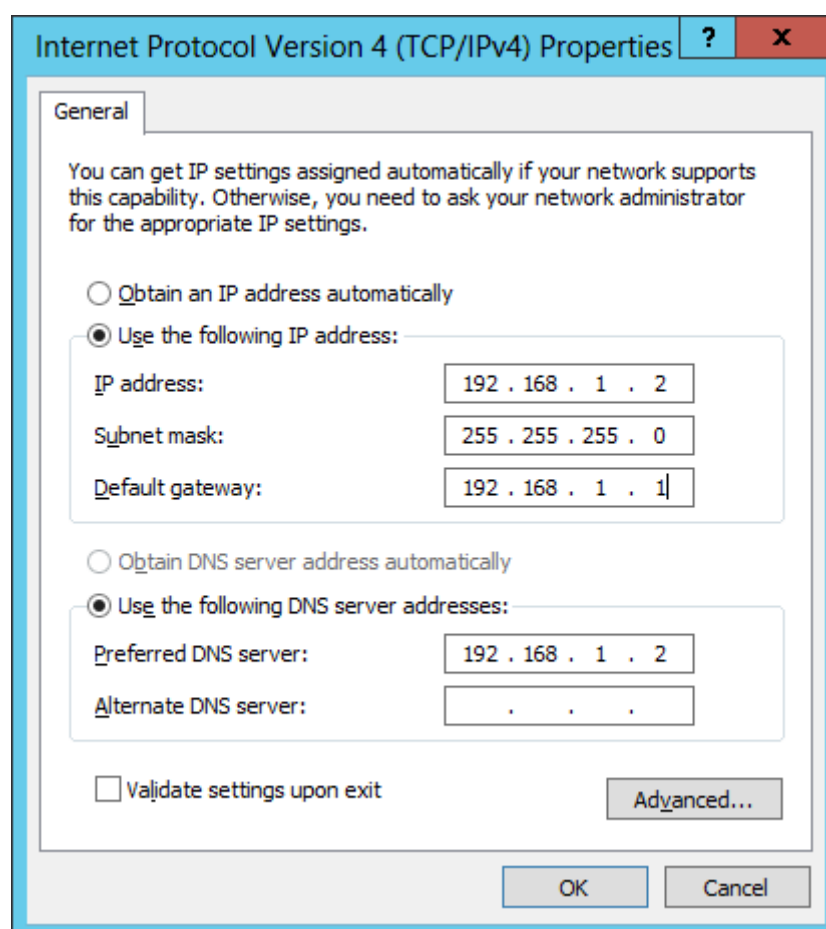
After iStorage Server 3.0, it allows to create High Availability iSCSI SAN with multiple NICs to improve performance and prevent Split-Brain.

Name	IP Address	Detail
12DC	192.168.1.2	Domain Controller
12node1	Heart-beat: 192.168.1.103 DATA: 192.168.0.103	Cluster Node 1
12node2	Heart-beat: 192.168.1.104 DATA: 192.168.0.104	Cluster Node 2
iStorage Server1	DATA: 192.168.0.105 SYNC: 192.168.2.105	iStorage Server 1
iStorage Server2	DATA: 192.168.0.106 SYNC: 192.168.2.106	iStorage Server 2

# Configure Domain Controller

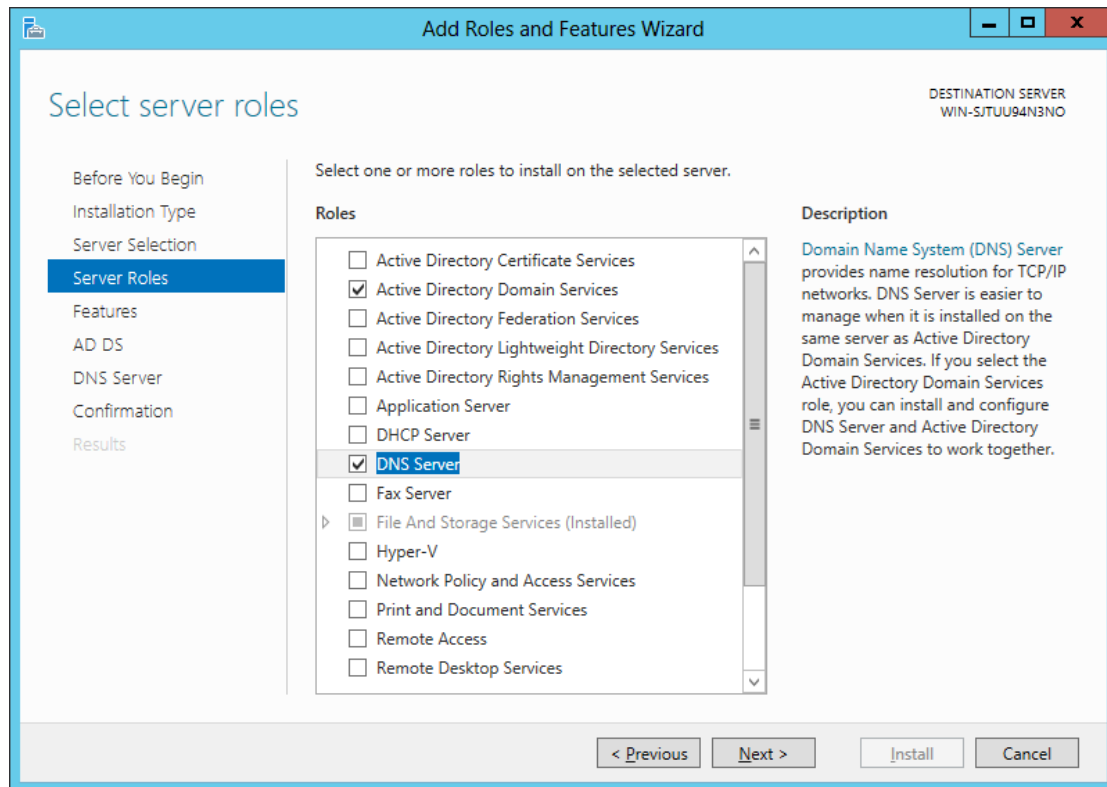
## Install Active Directory and DNS roles

Because of working as Domain Controller, the network adapter should be assigned a **static** IP Address. As it is also the DNS Server, We need to configure the DNS as itself.



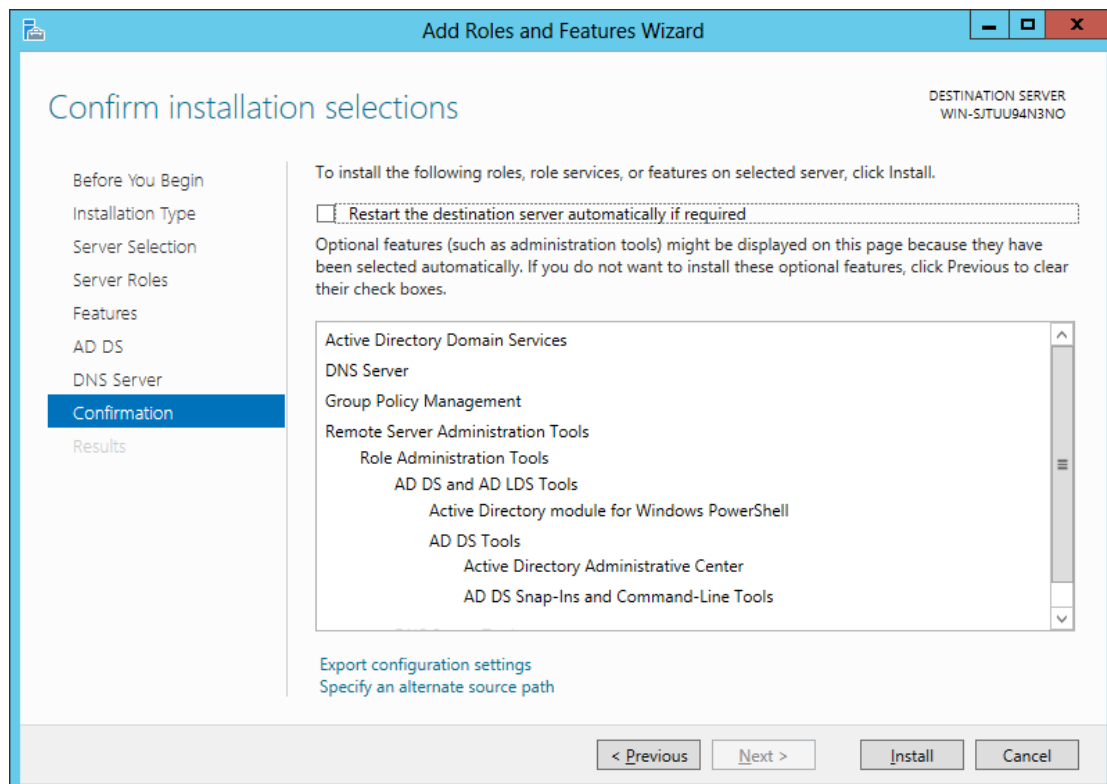
After the Network Adapter is configured successfully, we then can add the roles.

Launch the **Server Manager** and click the **Manage** on the top right corner, then select **Add Roles and Features**. The Wizard will be shown as below.



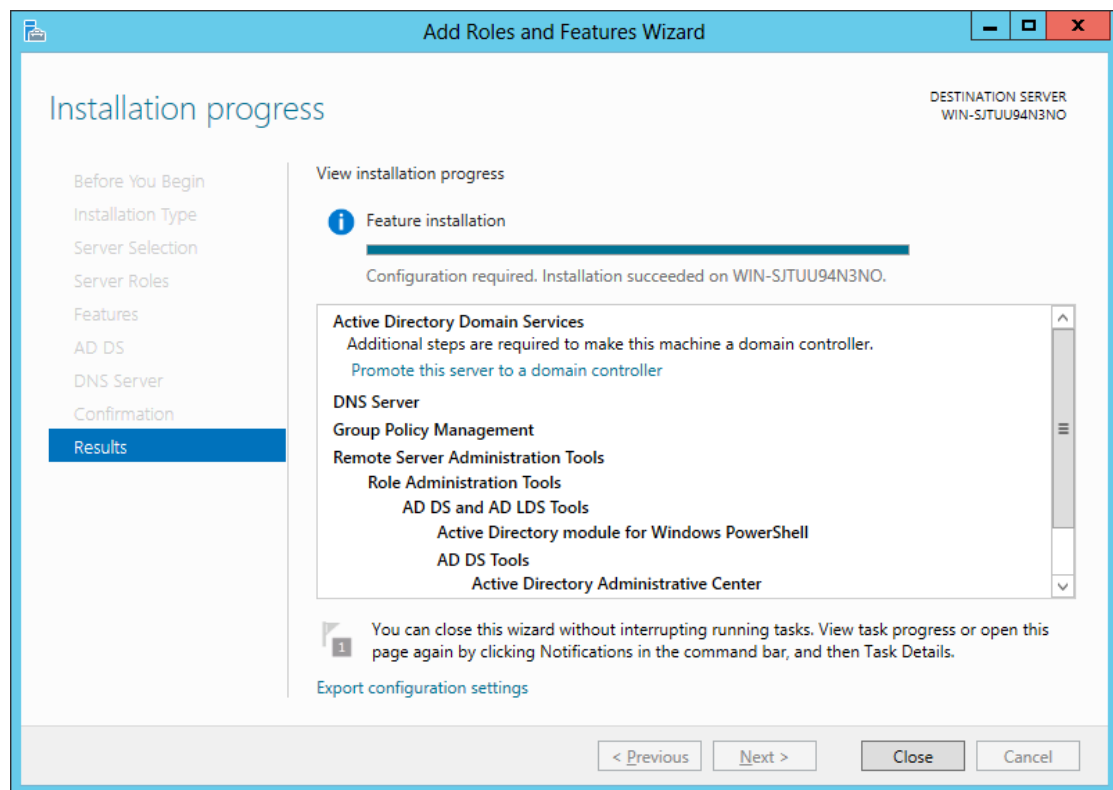
Select Roles: **“Active Directory Domain Services”** and **“DNS Server”**.

Press **Next** to continue.



Check **“Restart the destination server automatically if required”**.

Then press **Install**.

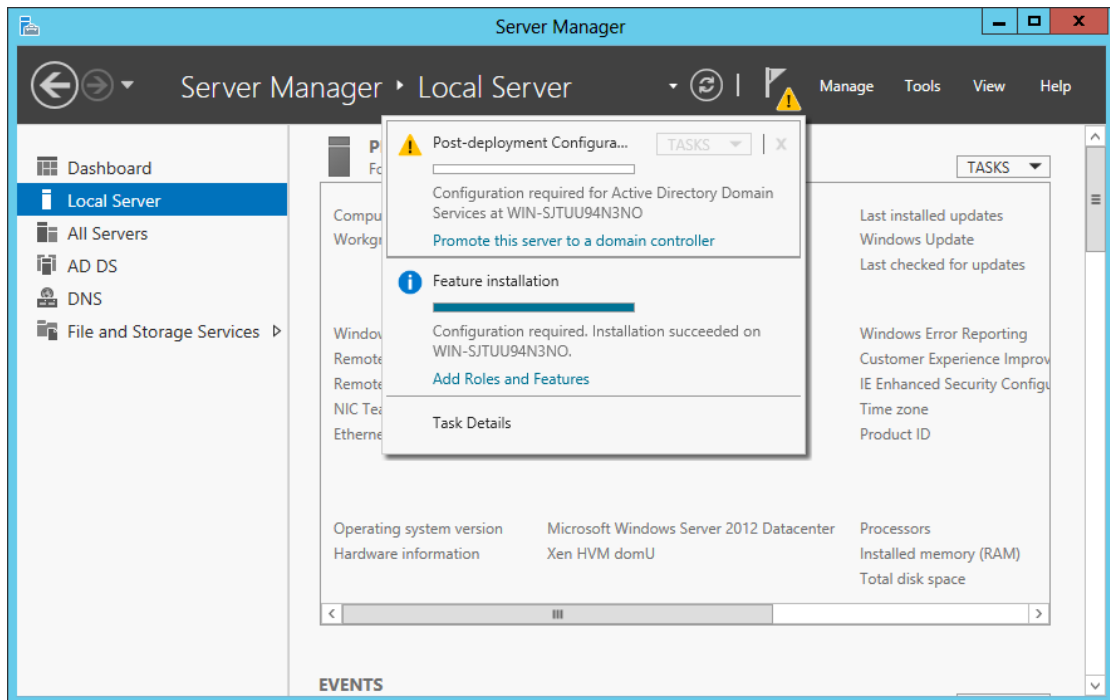


Press **Close** to complete the installation.

## Configure Active Directory Role

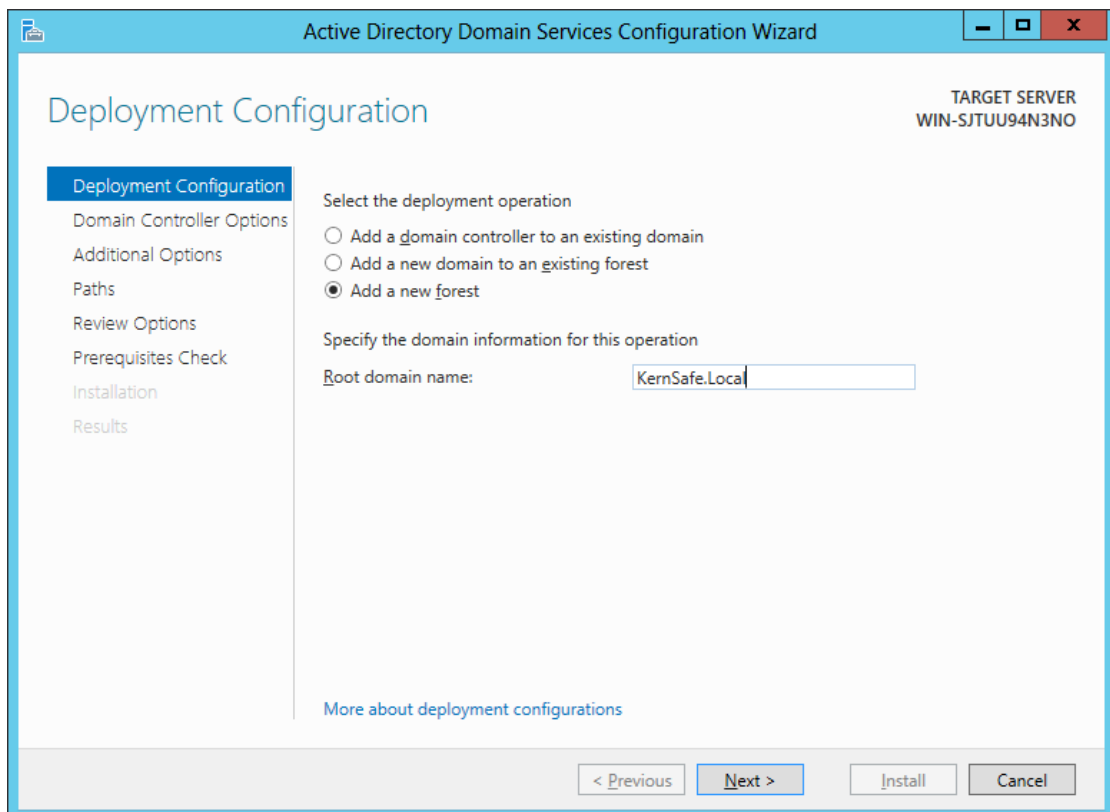
After the roles are successfully installed, press the **Notifications**.





Click **“Promote this server to a domain controller”**.

The configuration wizard will be shown as below.



Select **“Add a new forest”** and then enter the **Root domain name**.

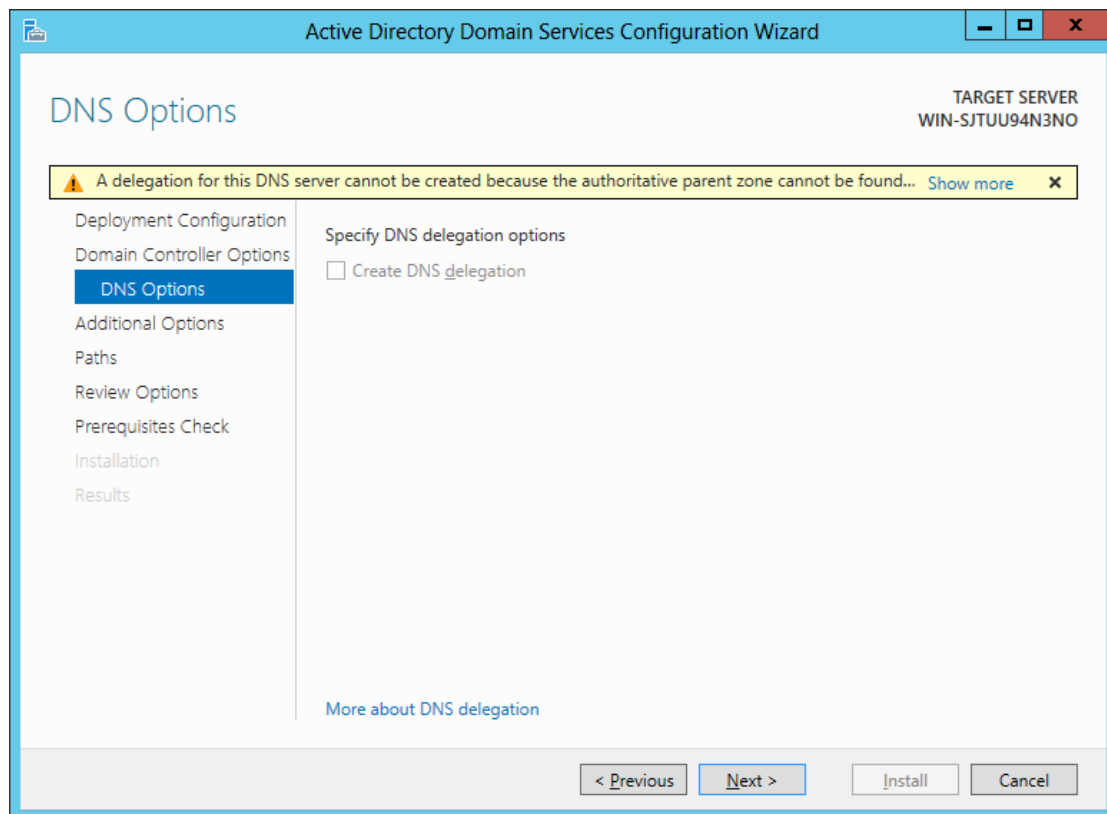
Press **Next** to continue.

The screenshot shows the 'Active Directory Domain Services Configuration Wizard' window. The title bar includes the Windows logo, the text 'Active Directory Domain Services Configuration Wizard', and standard window controls. The main window has a light blue header with the title 'Domain Controller Options' on the left and 'TARGET SERVER WIN-SJTUU94N3NO' on the right. A left-hand navigation pane lists the following steps: 'Deployment Configuration', 'Domain Controller Options' (highlighted in blue), 'DNS Options', 'Additional Options', 'Paths', 'Review Options', 'Prerequisites Check', 'Installation', and 'Results'. The main content area is titled 'Select functional level of the new forest and root domain'. It contains two dropdown menus: 'Forest functional level:' and 'Domain functional level:', both set to 'Windows Server 2012'. Below these is a section 'Specify domain controller capabilities' with three checkboxes: 'Domain Name System (DNS) server' (checked), 'Global Catalog (GC)' (checked), and 'Read only domain controller (RODC)' (unchecked). Further down is a section 'Type the Directory Services Restore Mode (DSRM) password' with two password fields labeled 'Password:' and 'Confirm password:', each containing a series of dots. At the bottom of the main content area is a link 'More about domain controller options'. The bottom of the window features a grey bar with four buttons: '< Previous', 'Next >' (highlighted in blue), 'Install', and 'Cancel'.

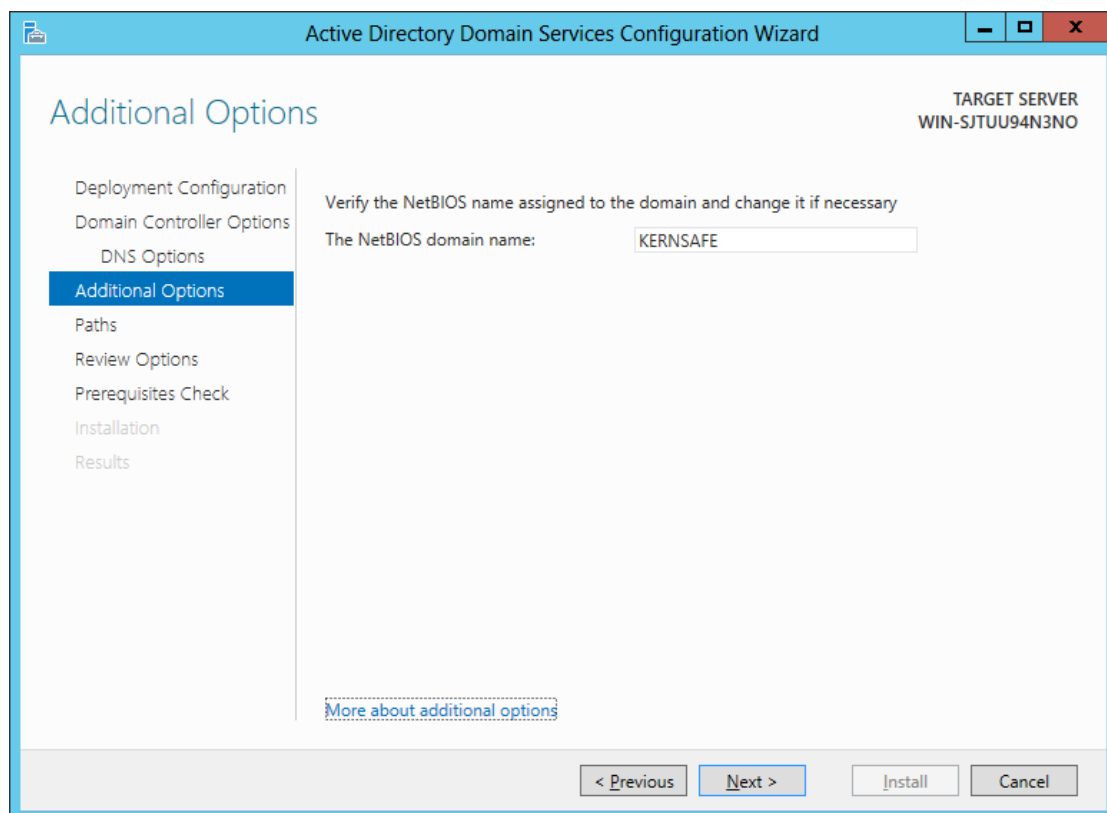
Configure the **Forest functional level** and **Domain functional level**.

Type the DSRM password.

Press **Next** to continue.



Leave it default and press **Next** to continue.



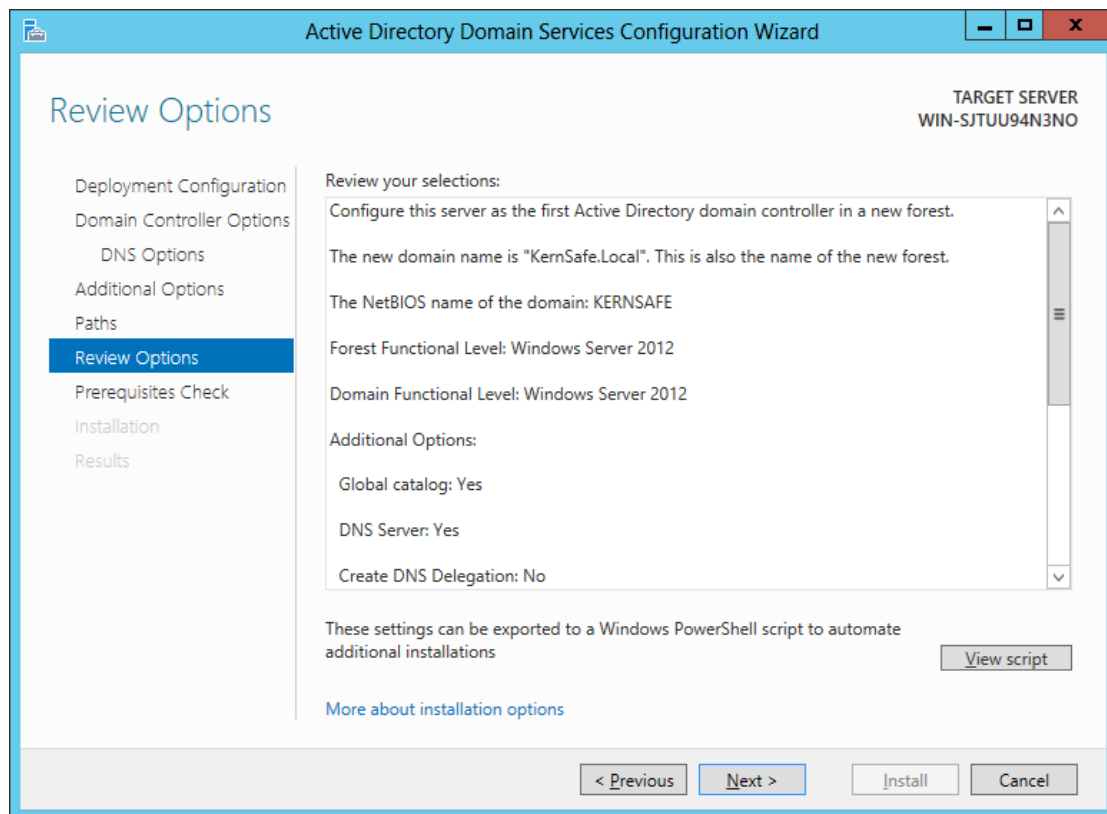
The NetBIOS domain name will be “KERNSAFE” and press **Next** to

continue.

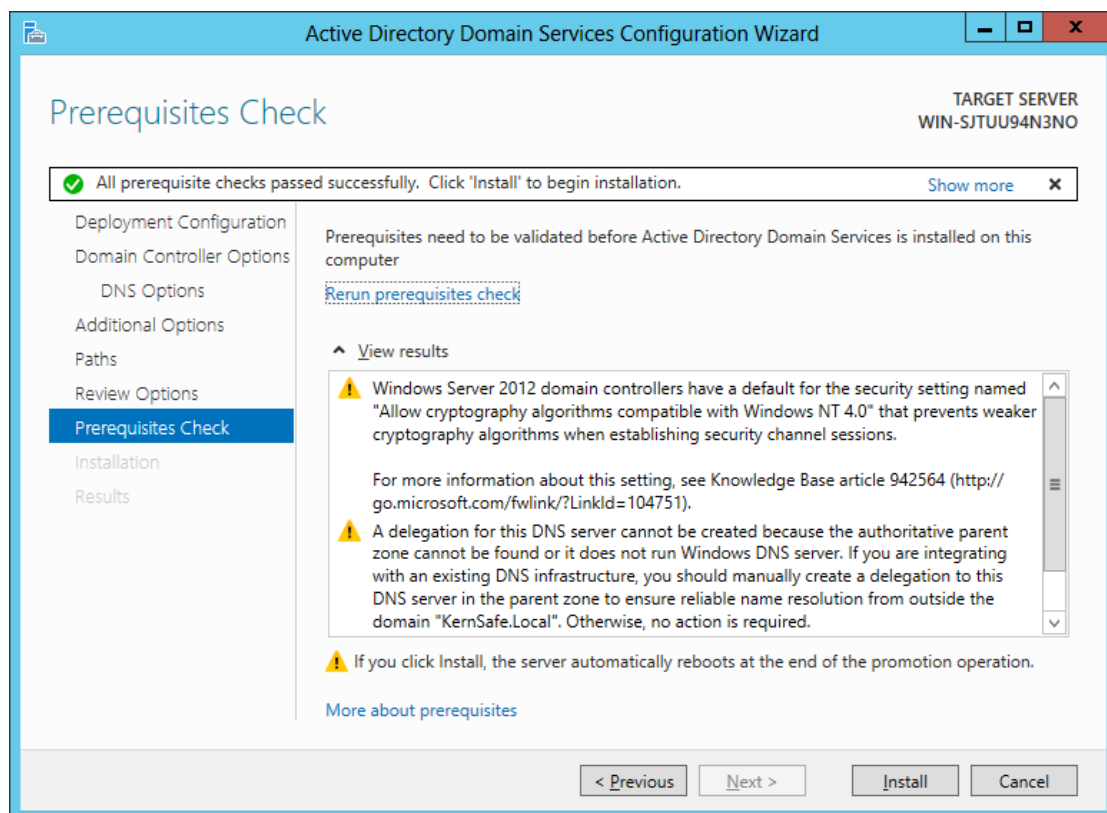
The screenshot shows the 'Active Directory Domain Services Configuration Wizard' window. The title bar includes standard Windows window controls. On the left is a navigation pane with the following items: 'Deployment Configuration', 'Domain Controller Options', 'DNS Options', 'Additional Options', 'Paths' (which is highlighted with a blue background), 'Review Options', 'Prerequisites Check', 'Installation', and 'Results'. The main area of the wizard is titled 'Paths' and contains the instruction 'Specify the location of the AD DS database, log files, and SYSVOL'. Below this instruction are three text boxes with browse buttons (three dots) to their right: 'Database folder:' with 'C:\Windows\NTDS', 'Log files folder:' with 'C:\Windows\NTDS', and 'SYSVOL folder:' with 'C:\Windows\SYSVOL'. In the top right corner, it says 'TARGET SERVER WIN-SJTUU94N3NO'. At the bottom of the main area is a link that says 'More about Active Directory paths'. The bottom of the window features a grey bar with four buttons: '< Previous', 'Next >' (highlighted with a blue border), 'Install', and 'Cancel'.

Customize the database, log file and SYSVOL directories.

Press **Next** to continue.



Check if all the parameters are correct, press **Next** to continue.

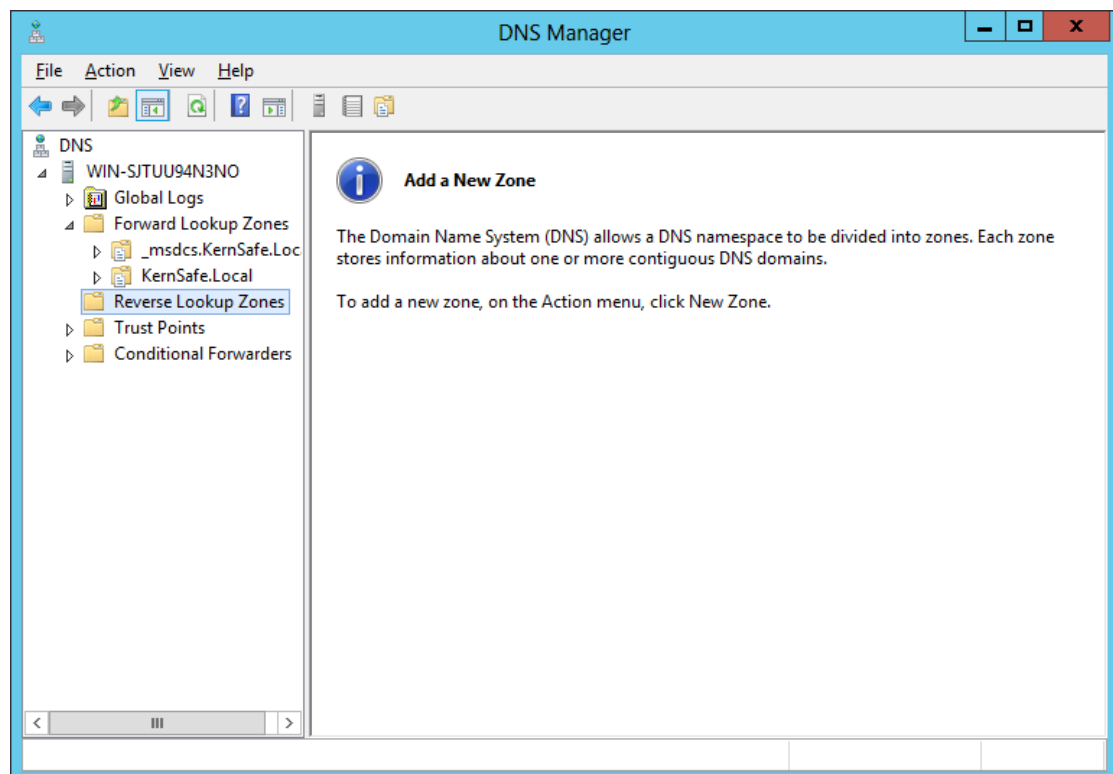


Press **Install** to run the installation.

After it finishes installing, the server will reboot automatically to take effect.

## Configure DNS Server Role

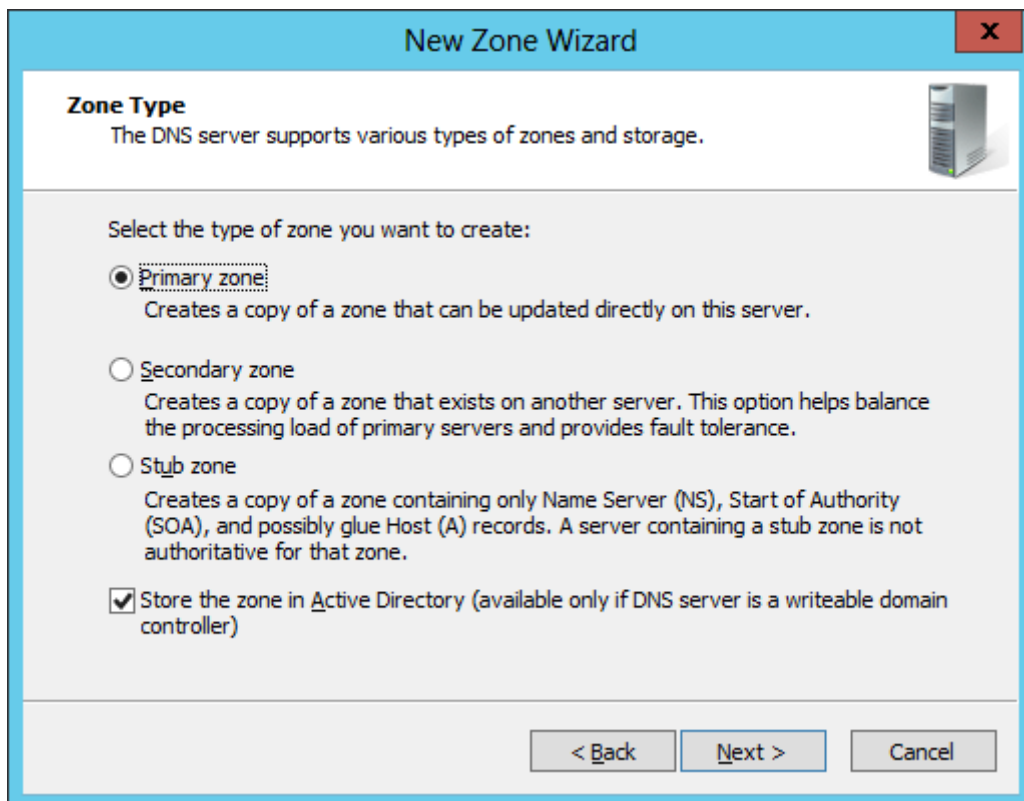
Log on the server with domain controller administrator, and then launch the **DNS Manager**.



Right click the “**Reverse Lookup Zones**” and then press **New Zone**.

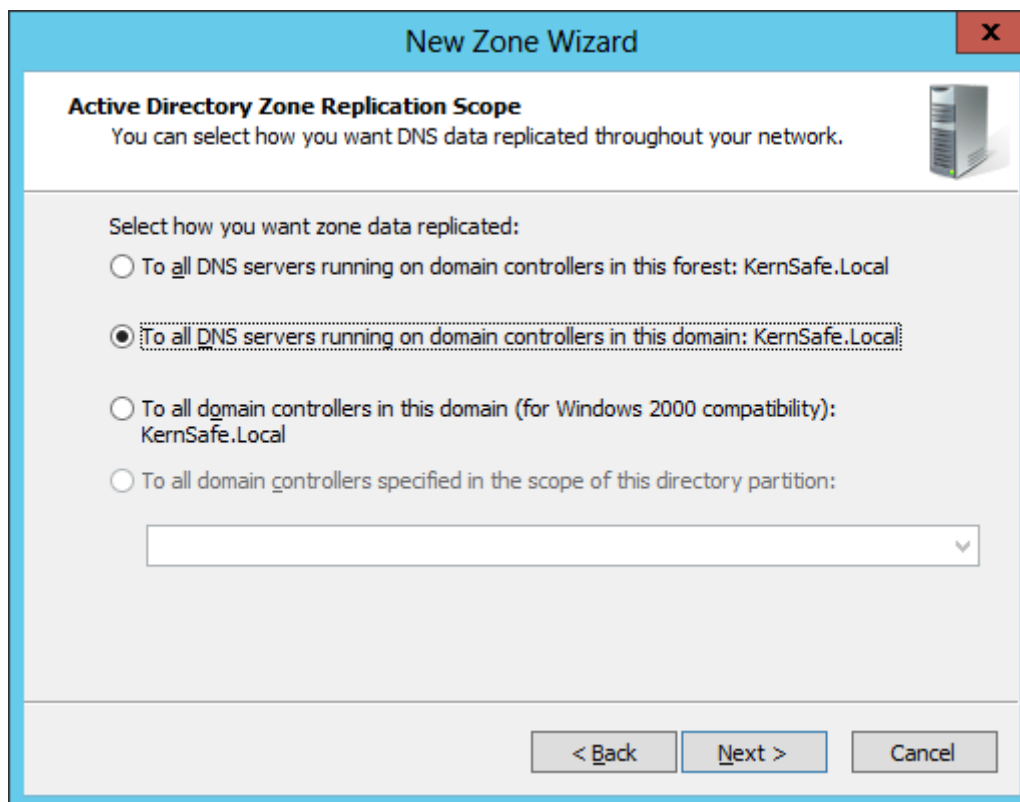


Press **Next** to continue.



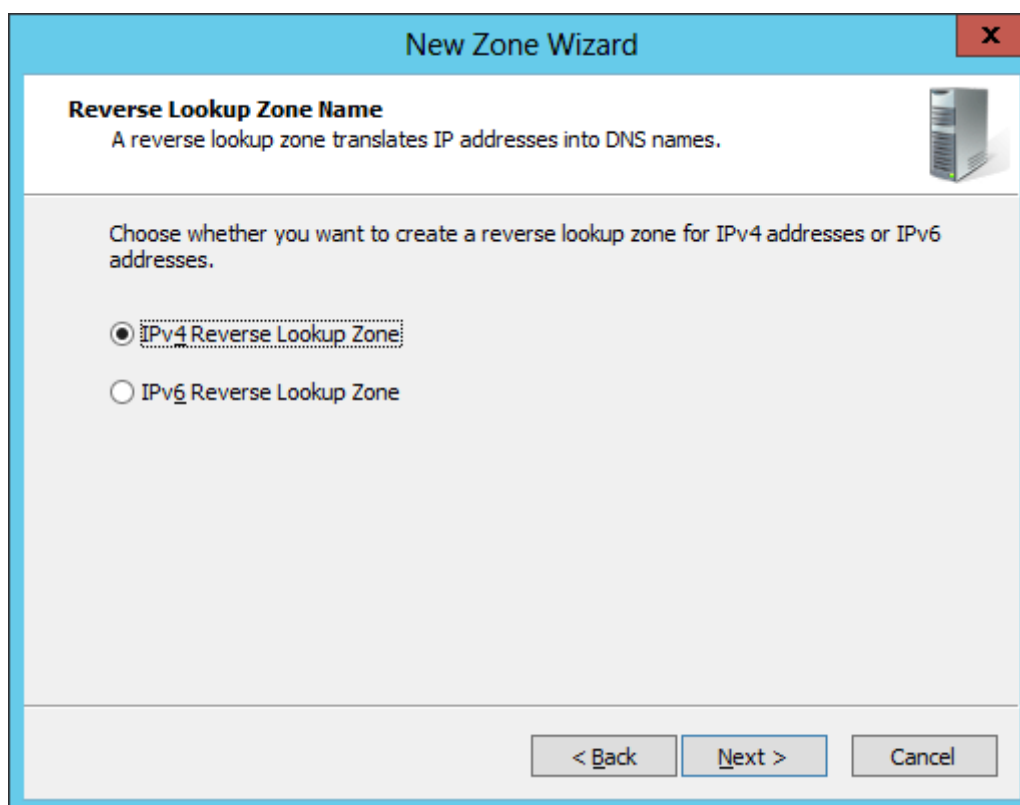
Select **Primary zone**.

Press **Next** to continue.



The screenshot shows the 'New Zone Wizard' window with the title bar 'New Zone Wizard' and a close button. The main heading is 'Active Directory Zone Replication Scope' with a subtext: 'You can select how you want DNS data replicated throughout your network.' There is a server icon on the right. The instruction says 'Select how you want zone data replicated:'. There are four radio button options: 1. 'To all DNS servers running on domain controllers in this forest: KernSafe.Local' (unselected). 2. 'To all DNS servers running on domain controllers in this domain: KernSafe.Local' (selected). 3. 'To all domain controllers in this domain (for Windows 2000 compatibility): KernSafe.Local' (unselected). 4. 'To all domain controllers specified in the scope of this directory partition:' (unselected) with a text box below it. At the bottom are three buttons: '< Back', 'Next >', and 'Cancel'.

Keep default and press **Next** to continue.

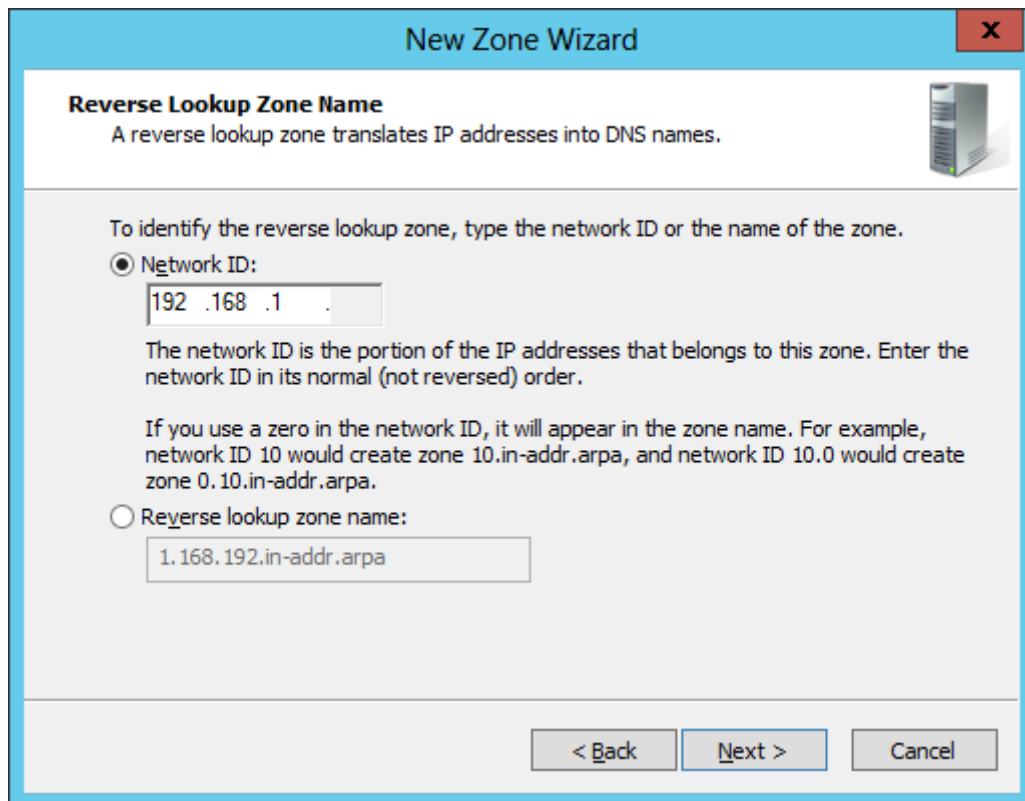


The screenshot shows the 'New Zone Wizard' window with the title bar 'New Zone Wizard' and a close button. The main heading is 'Reverse Lookup Zone Name' with a subtext: 'A reverse lookup zone translates IP addresses into DNS names.' There is a server icon on the right. The instruction says 'Choose whether you want to create a reverse lookup zone for IPv4 addresses or IPv6 addresses.' There are two radio button options: 1. 'IPv4 Reverse Lookup Zone' (selected). 2. 'IPv6 Reverse Lookup Zone' (unselected). At the bottom are three buttons: '< Back', 'Next >', and 'Cancel'.



Select **IPv4 Reverse Lookup Zone**.

Press **Next** to continue.



The image shows a Windows-style dialog box titled "New Zone Wizard". It has a blue title bar with a close button (X) in the top right corner. The main content area has a light gray background. At the top, it says "Reverse Lookup Zone Name" followed by a description: "A reverse lookup zone translates IP addresses into DNS names." To the right of this text is a small icon of a server rack. Below this, a instruction reads: "To identify the reverse lookup zone, type the network ID or the name of the zone." There are two radio button options. The first is "Network ID:", which is selected. Below it is a text input field containing "192 .168 .1". Below the input field is a paragraph explaining that the network ID is the portion of the IP address that belongs to the zone and should be entered in normal order. It gives examples: network ID 10 creates zone 10.in-addr.arpa, and network ID 10.0 creates zone 0.10.in-addr.arpa. The second radio button option is "Reverse lookup zone name:", which is not selected. Below it is a text input field containing "1.168.192.in-addr.arpa". At the bottom of the dialog, there are three buttons: "< Back", "Next >", and "Cancel".

**New Zone Wizard**

**Reverse Lookup Zone Name**  
A reverse lookup zone translates IP addresses into DNS names.

To identify the reverse lookup zone, type the network ID or the name of the zone.

☒ **Network ID:**  
192 .168 .1

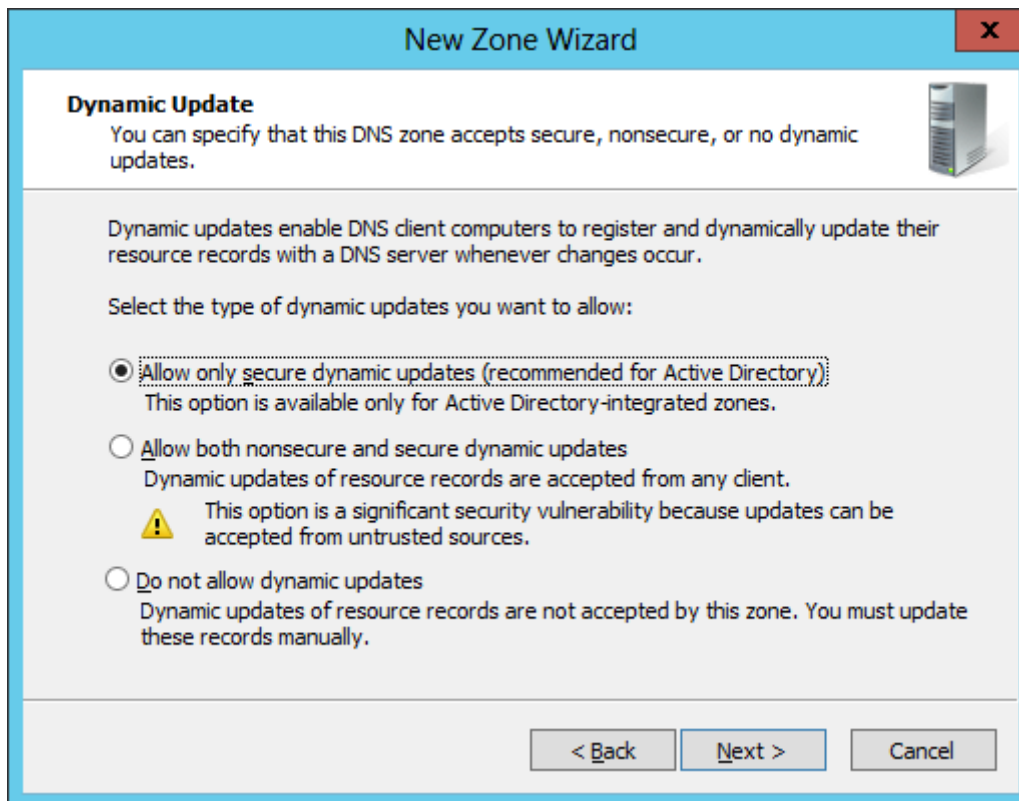
The network ID is the portion of the IP addresses that belongs to this zone. Enter the network ID in its normal (not reversed) order.

If you use a zero in the network ID, it will appear in the zone name. For example, network ID 10 would create zone 10.in-addr.arpa, and network ID 10.0 would create zone 0.10.in-addr.arpa.

☐ **Reverse lookup zone name:**  
1.168.192.in-addr.arpa

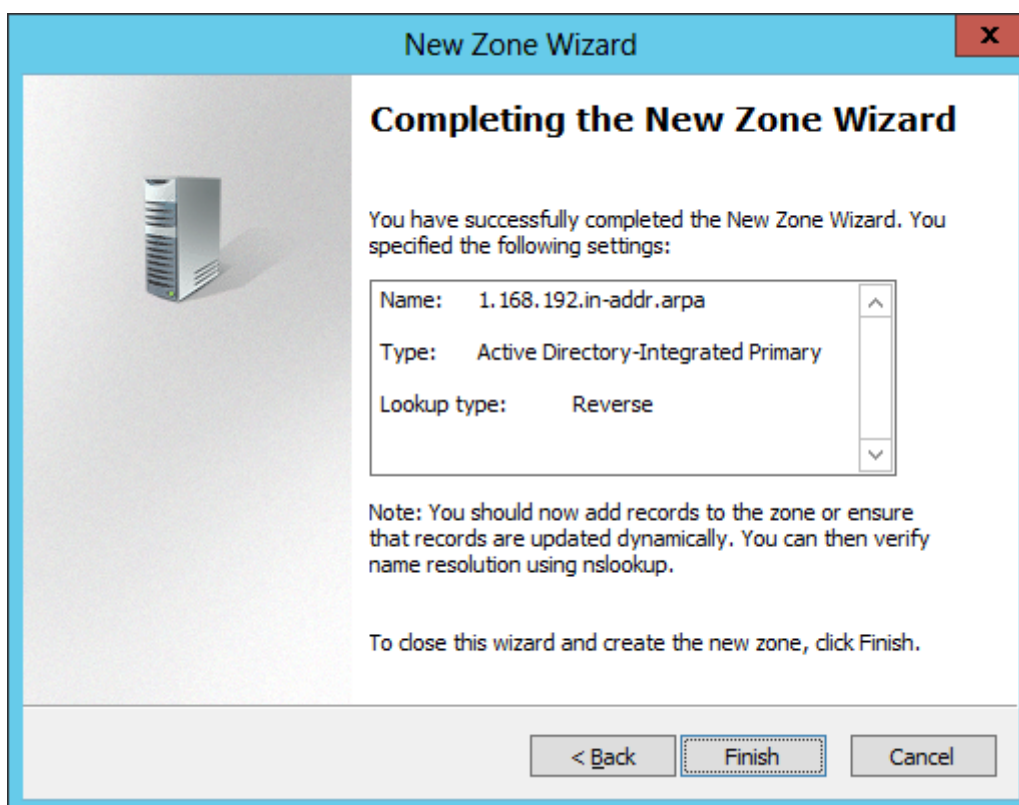
< Back   Next >   Cancel

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



Specify dynamic update option.

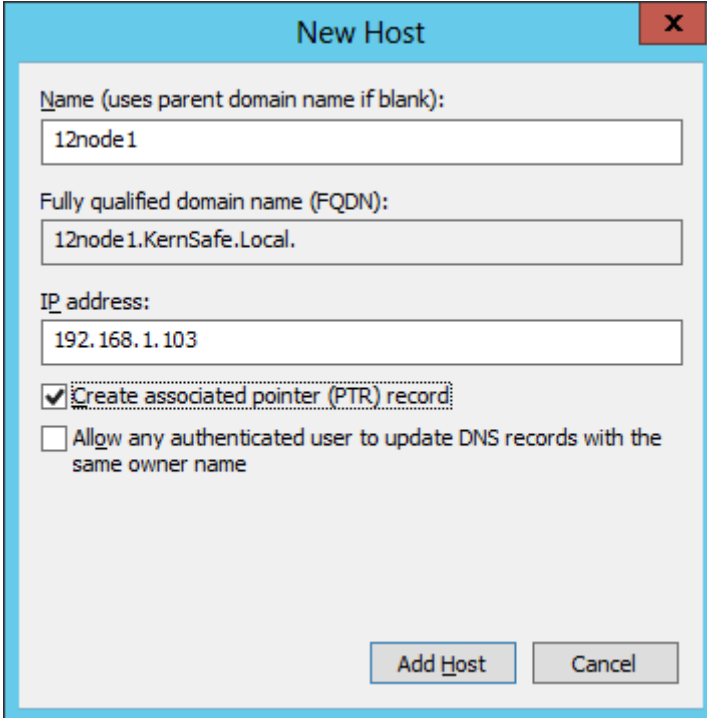
Press **Next** to continue.



Check if all the parameters are correct, and press **Finish**.

After the Reverse Lookup zone is successfully configured, then right click on the **KerSafe.Local** in the left tree view of **DNS Manager**, then select **New Host(A or AAA)...** menu item.

The **New Host** dialogue is shown as below.



The screenshot shows the 'New Host' dialog box with the following fields and options:

- Name (uses parent domain name if blank):** 12node1
- Fully qualified domain name (FQDN):** 12node1.KernSafe.Local.
- IP address:** 192.168.1.103
- ☒ **Create associated pointer (PTR) record:**
- ☐ **Allow any authenticated user to update DNS records with the same owner name**
- Add Host** button
- Cancel** button

Type the **Name** and **IP address** for the cluster node – 12node1.

Check **Create associated pointer (PTR) Record**.

Press **Add Host** button to add 12node1 record. Then add the 12node2.

New Host

Name (uses parent domain name if blank):  
12node2

Fully qualified domain name (FQDN):  
12node2.KernSafe.Local.

IP address:  
192.168.1.104

☒ Create associated pointer (PTR) record

☐ Allow any authenticated user to update DNS records with the same owner name

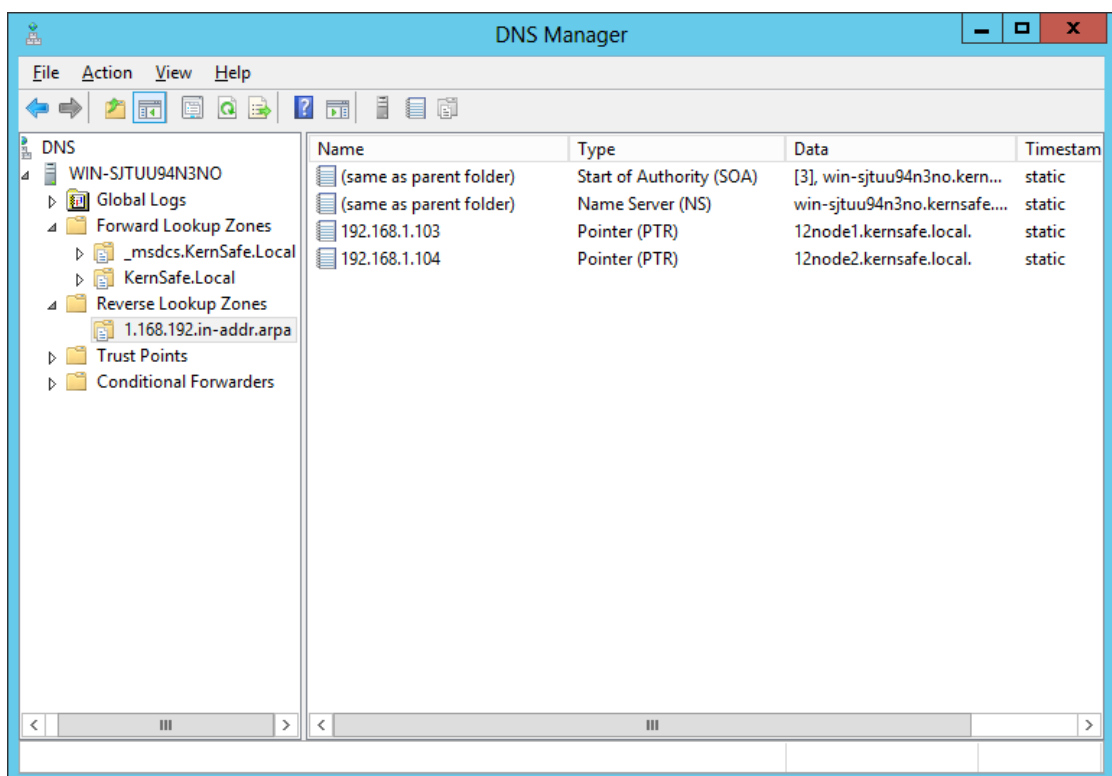
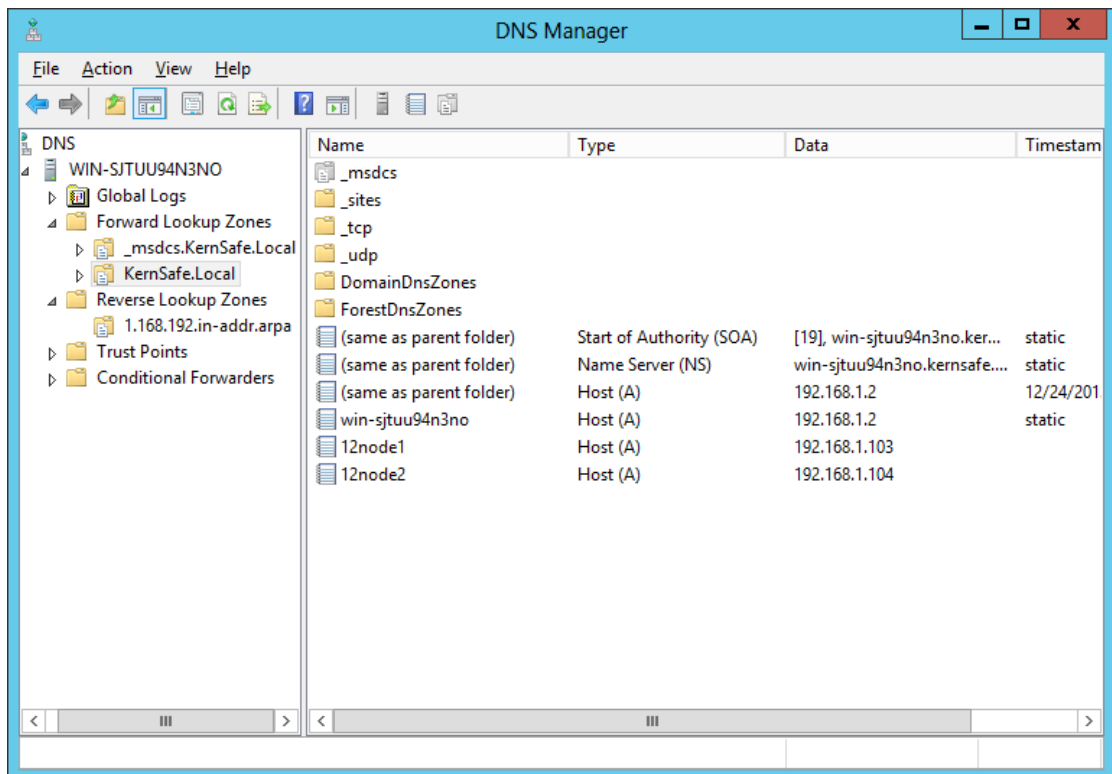
Add Host Done

Type the **Name** and **IP address** for the cluster node – 12node2.

Check **Create associated pointer (PTR) Record**.

Press **Add Host** button to add 12node2 record.

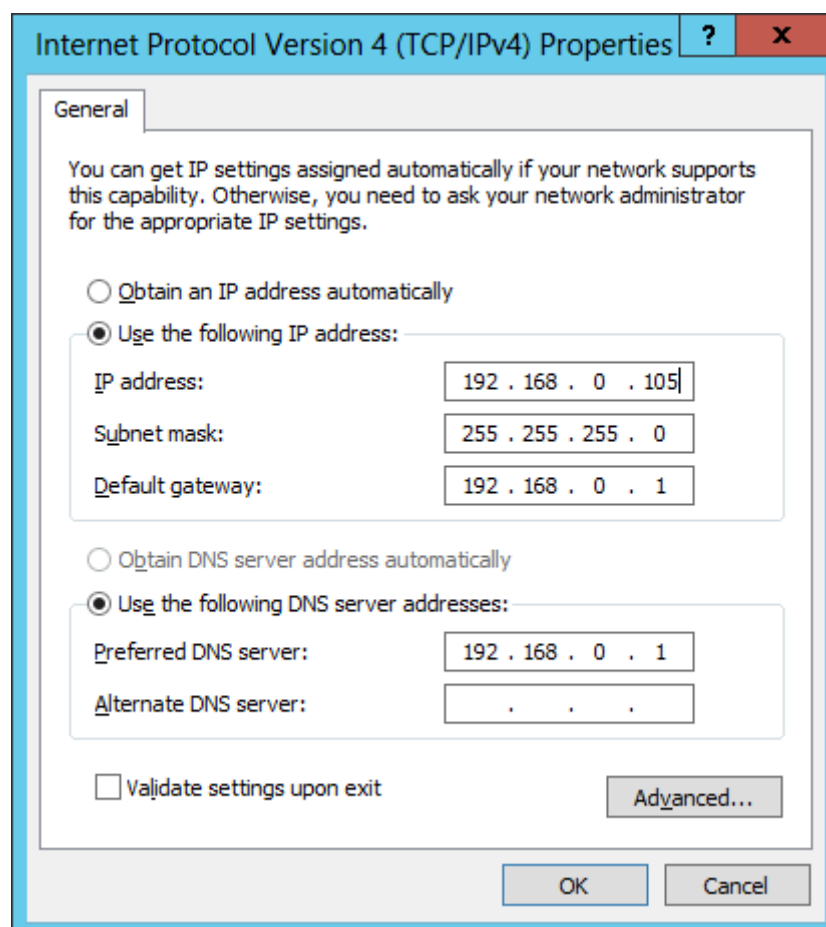
Now we will see the two records in **DNS Manager**.



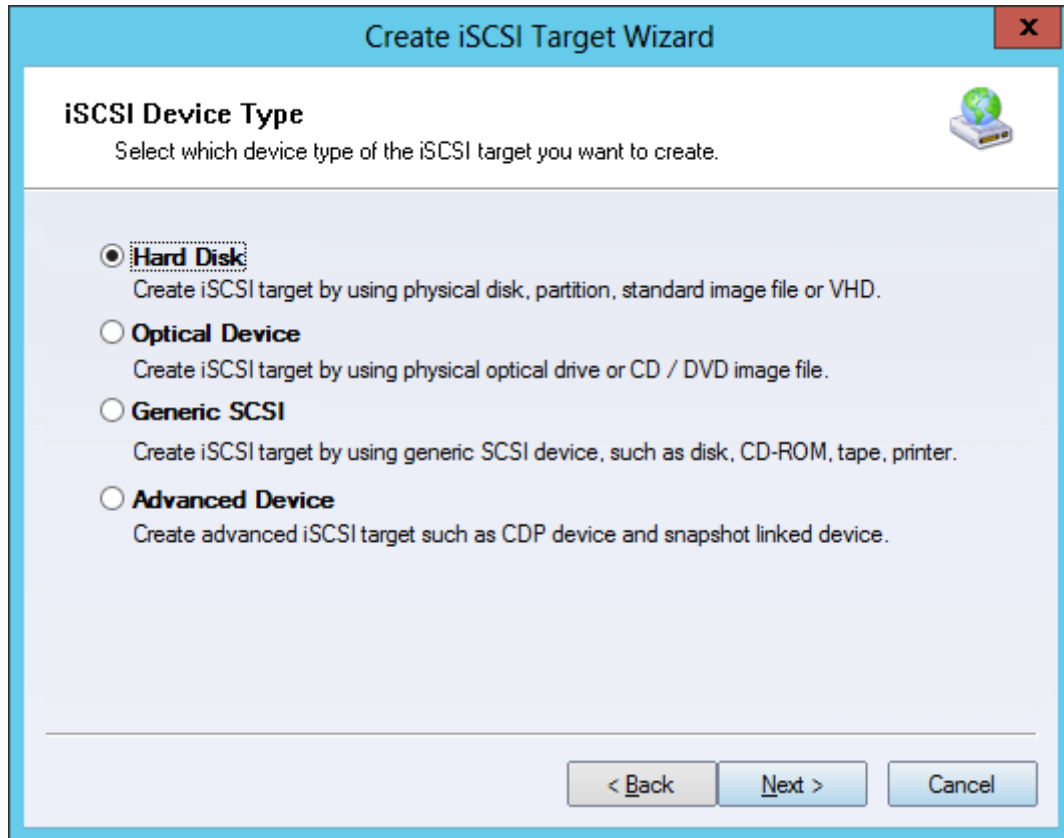
# Configure iStorage Server1

## Prepare Quorum volume

For working in clustering environment, the network adapter must be assigned a static IP Address.



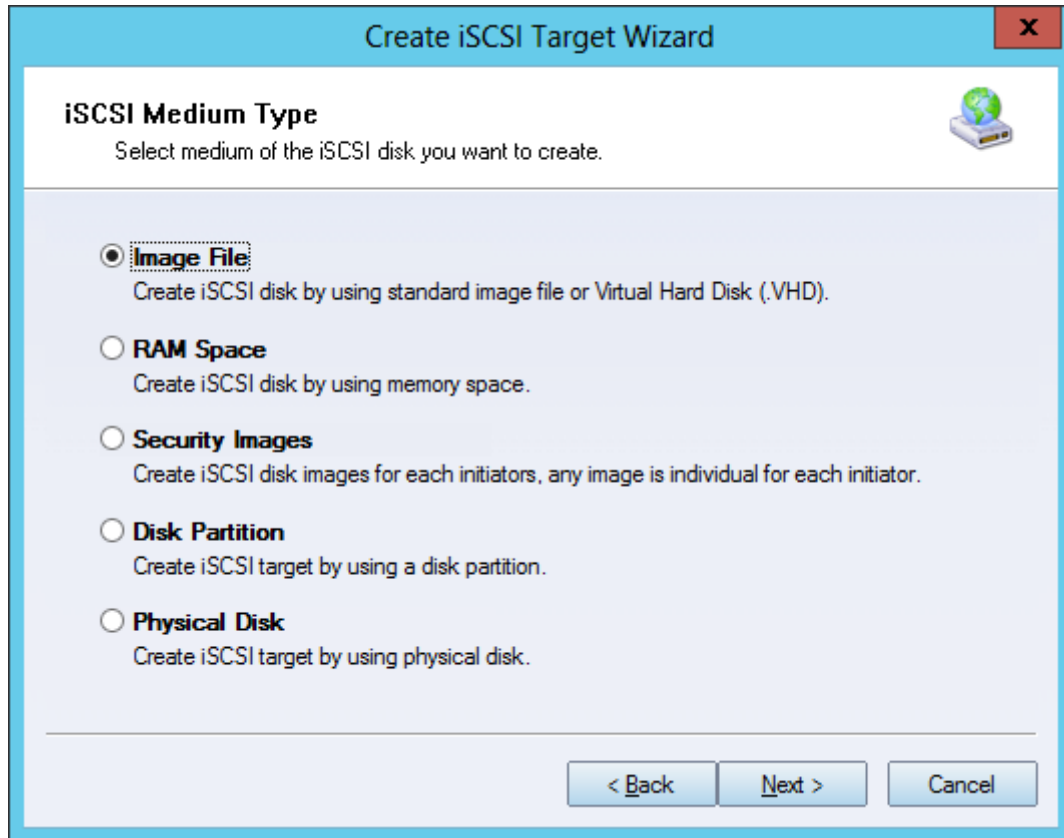
Launch the **iStorage Server Management Console**, press the Create button on the toolbar of iStorage Server Management Console, the **Create iSCSI Target Wizard** will be shown as below.



Select an **iSCSI Device Type**.

Choose **Hard Disk**.

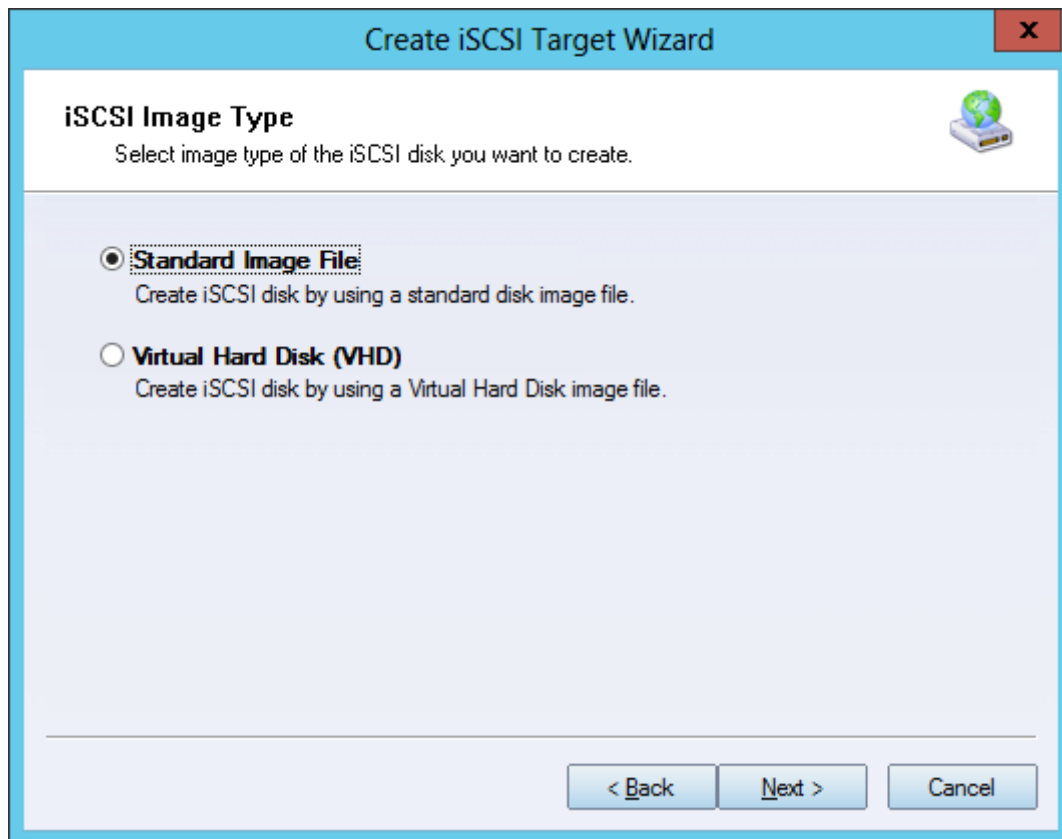
Press **Next** to continue.



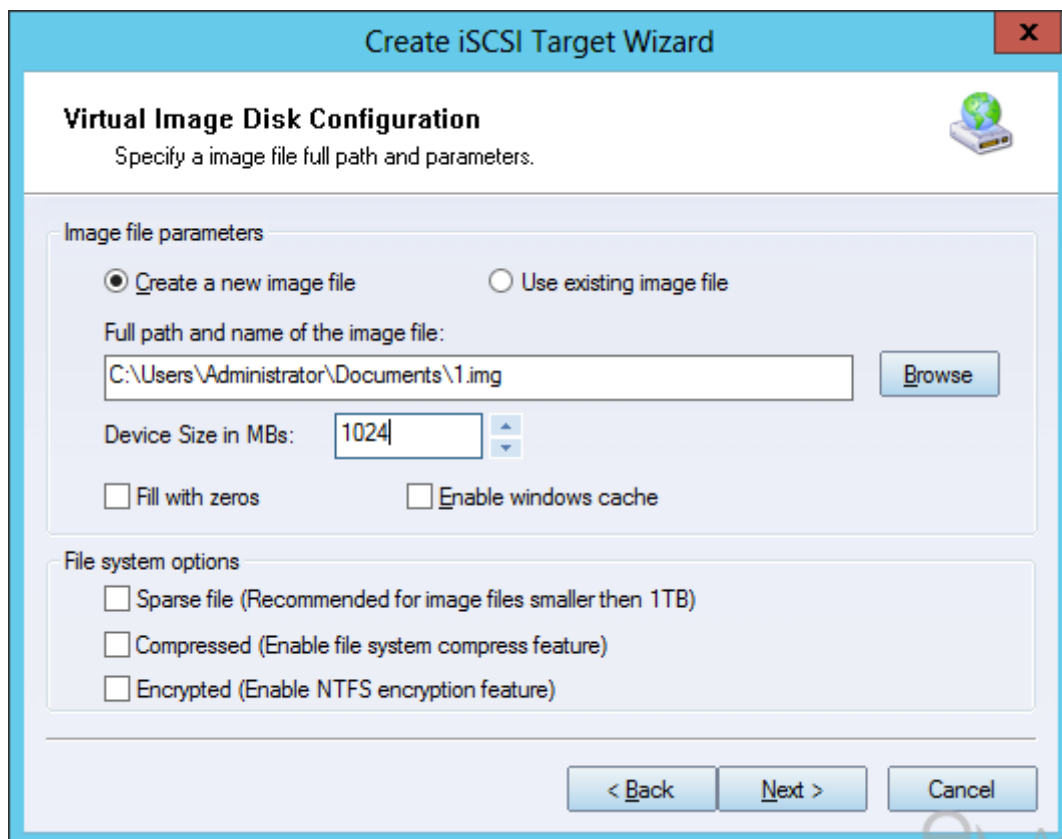
Choose **Image File** in **iSCSI Medium Type**.

Press **Next** to continue.





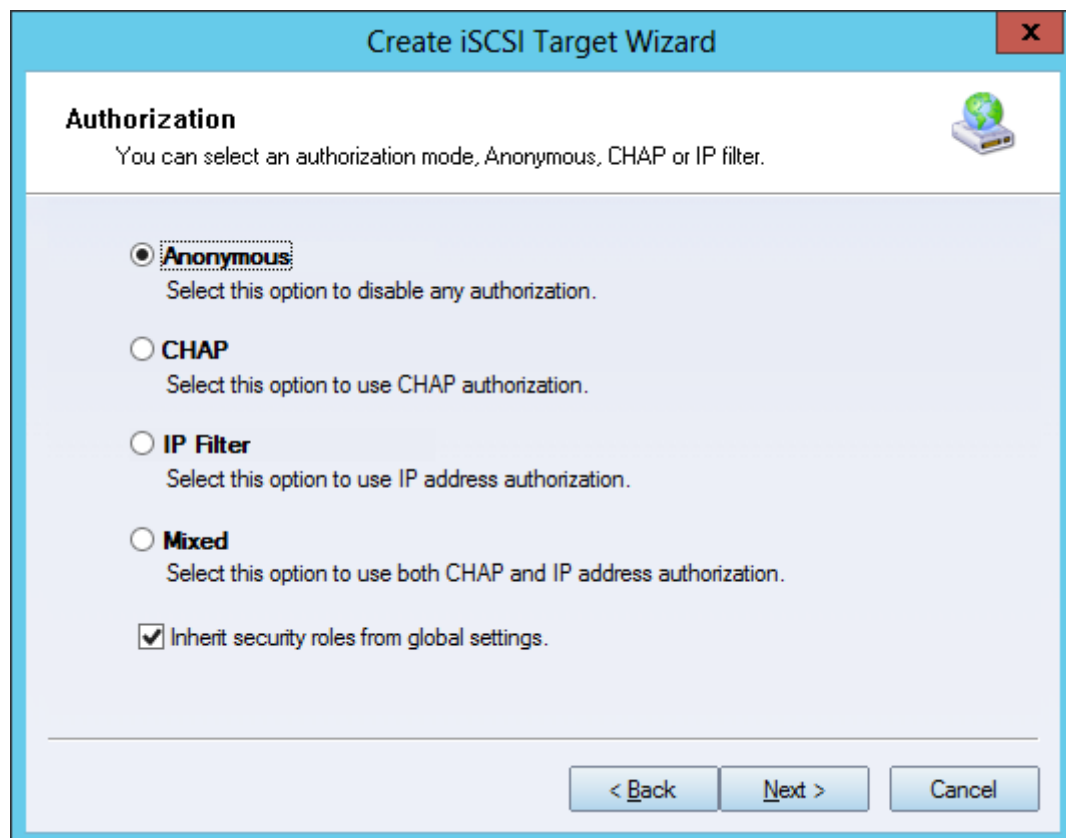
We choose **Standard Image File** and press **Next** to continue.



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

Specify the **file path** and **device capacity**.

Press **Next** to continue.



Specify authorization method as you require. We take **Anonymous** as example.

Press **Next** to continue.

**Create iSCSI Target Wizard**

**Completing the Create iSCSI Wizard**  
You can specify a target name and other options to complete iSCSI target creating.

**Basic Target Information**

Target Name:  
06-03.com.kemsafe:KemSafe.Quorum

☒ Report as readonly device when initiator can not get write access

☒ Enable multiple initiators with full access connected (sharing and clustering)

**Note**  
By default, only one client has full access right, when the second initiator log on with full access, it will fail.  
But this option is useful for clustering, disk sharing and NAS.

< Back   Finish   Cancel

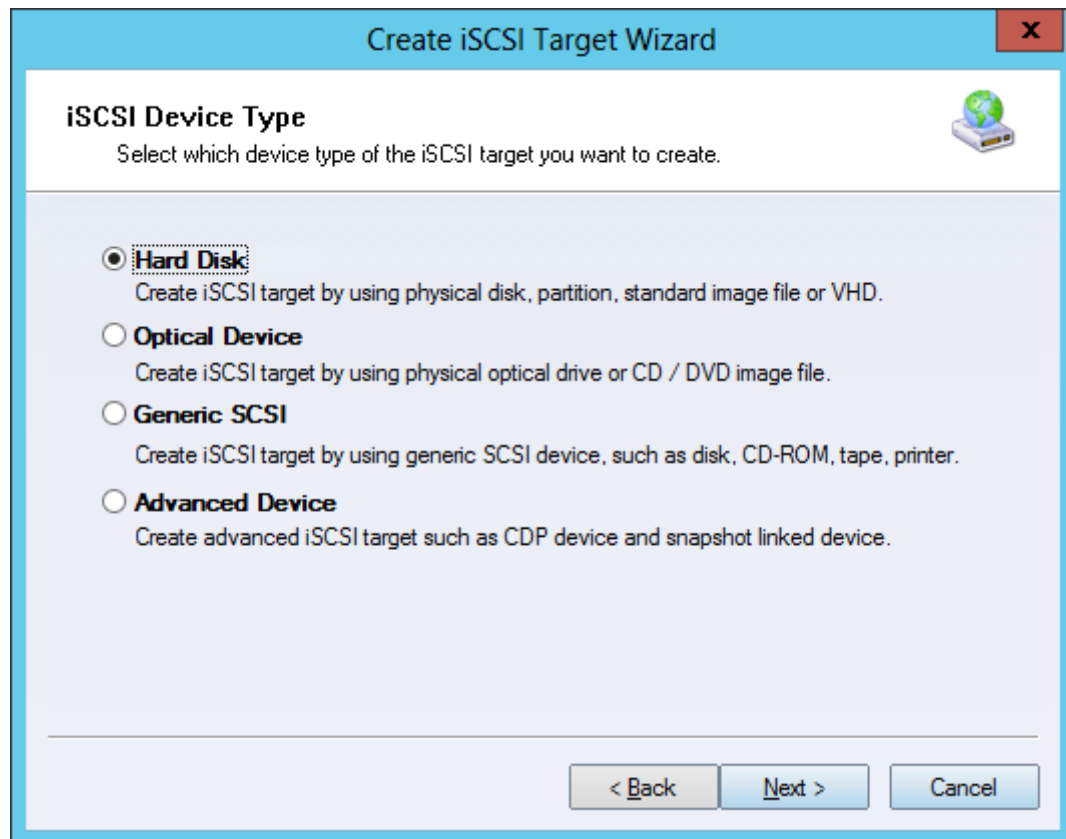
Type the **Target Name** as you like or use the default.

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

Press **Finish** button to complete the creation.

## Prepare Generic Volume

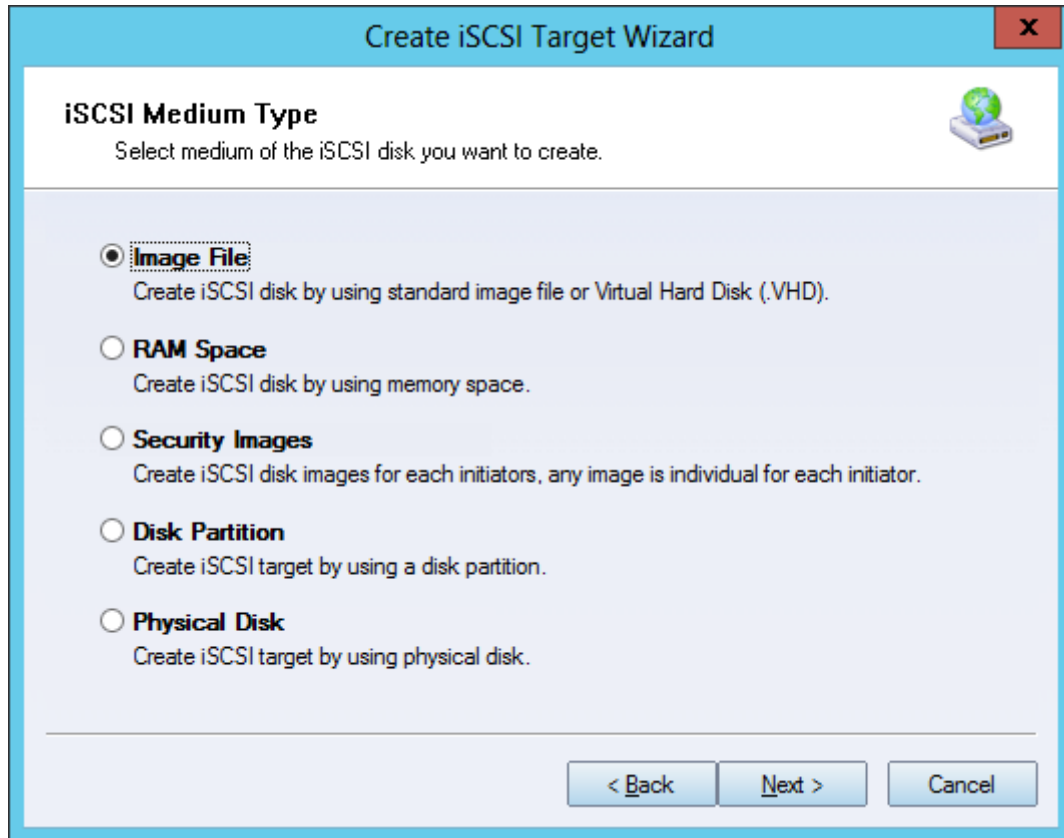
Launch the **iStorage Server Management Console**, press the Create button on the toolbar of iStorage Server Management Console, the **Create iSCSI Target Wizard** will be shown as below.



Select an **iSCSI Device Type**.

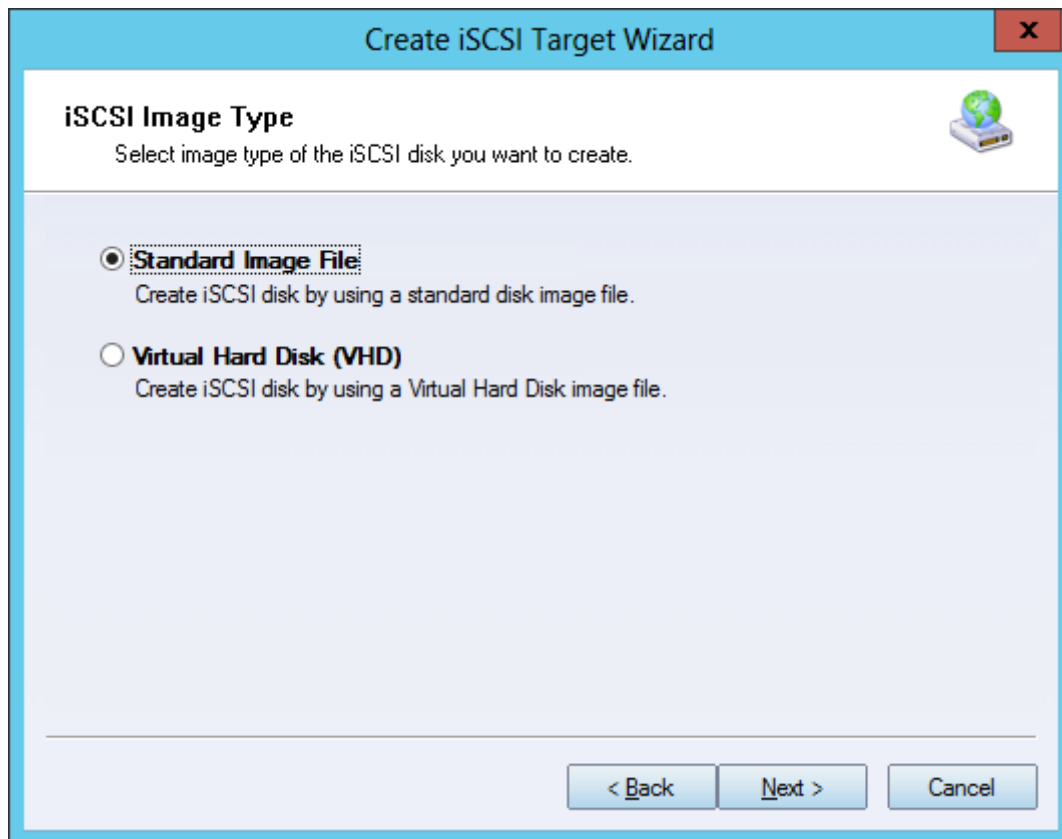
Choose **Hard Disk**.

Press **Next** to continue.

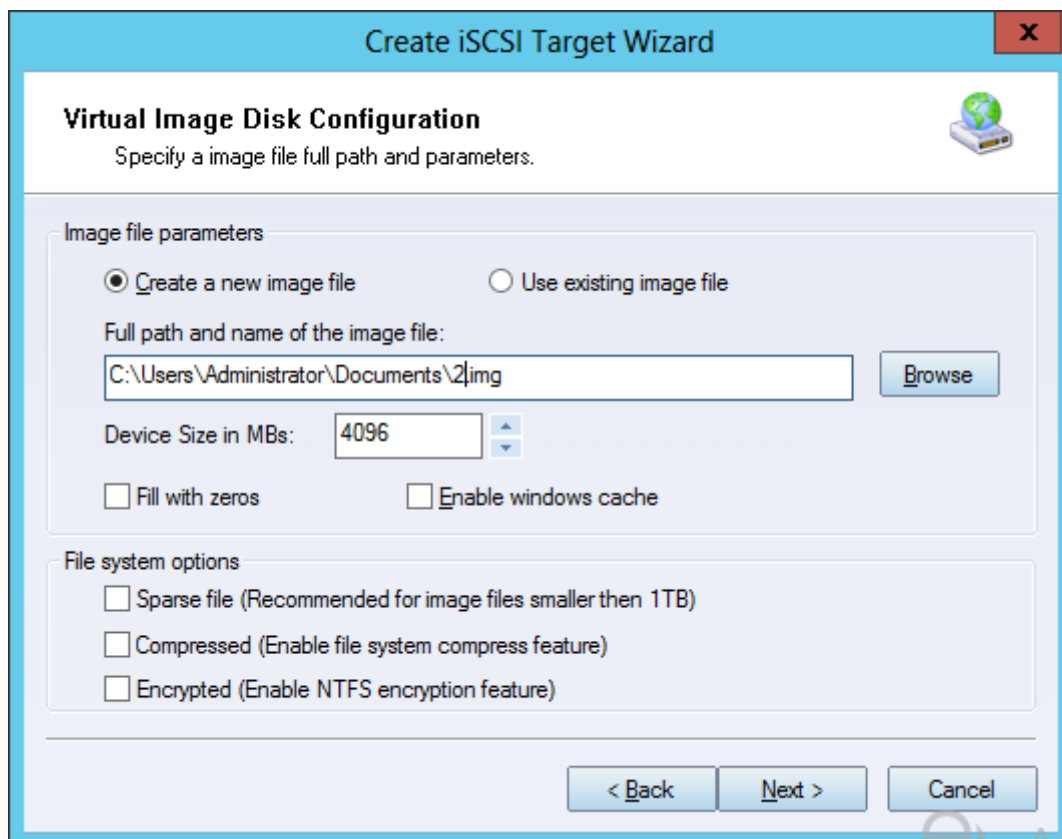


Choose **Image File** in **iSCSI Medium Type**.

Press **Next** to continue.



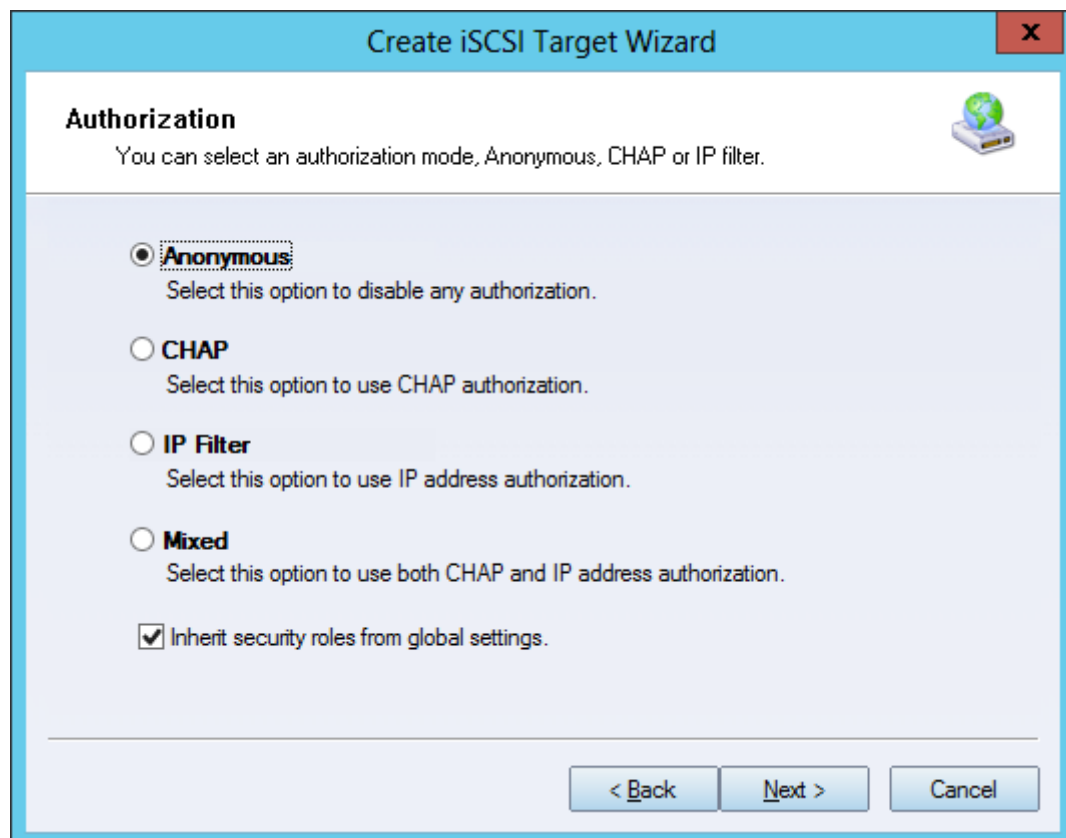
We choose **Standard Image File** and press **Next** to continue.



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

Specify the **file path** and **device capacity**.

Press **Next** to continue.



Specify authorization method as you require. We take **Anonymous** as example.

Press **Next** to continue.

**Create iSCSI Target Wizard**

**Completing the Create iSCSI Wizard**

You can specify a target name and other options to complete iSCSI target creating.

**Basic Target Information**

Target Name:  
06-03.com.kemsafe:KemSafe.Generic

☒ Report as readonly device when initiator can not get write access

☒ Enable multiple initiators with full access connected (sharing and clustering)

**Note**

By default, only one client has full access right, when the second initiaor log on with full access, it will fail.  
But this option is usfull for clustering, disk sharing and NAS.

< Back   Finish   Cancel

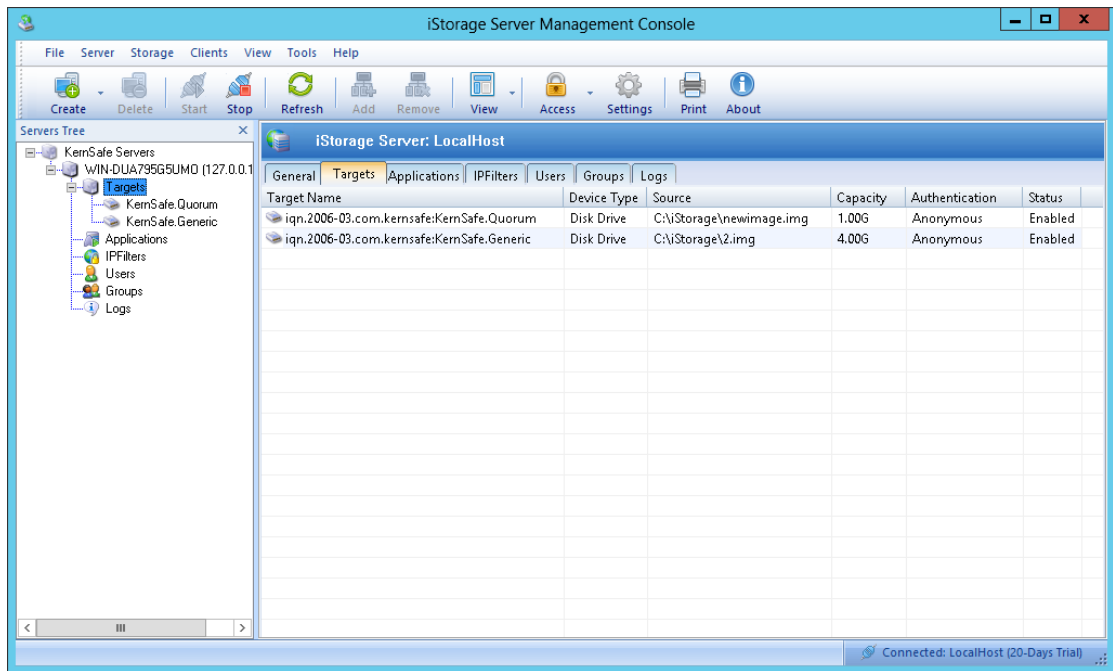
Type the **Target Name** as you like or use the default.

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

Press **Finish** button to complete the creation.

Now the sample images are shown as below in management console if successful.

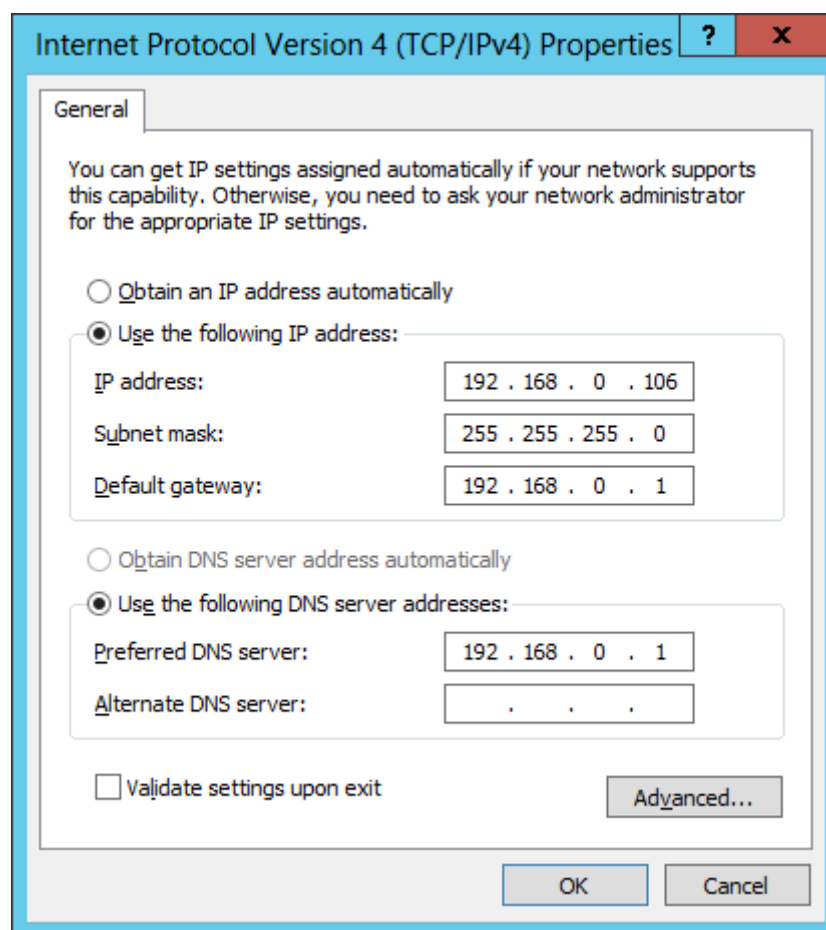




# Configure iStorage Server2

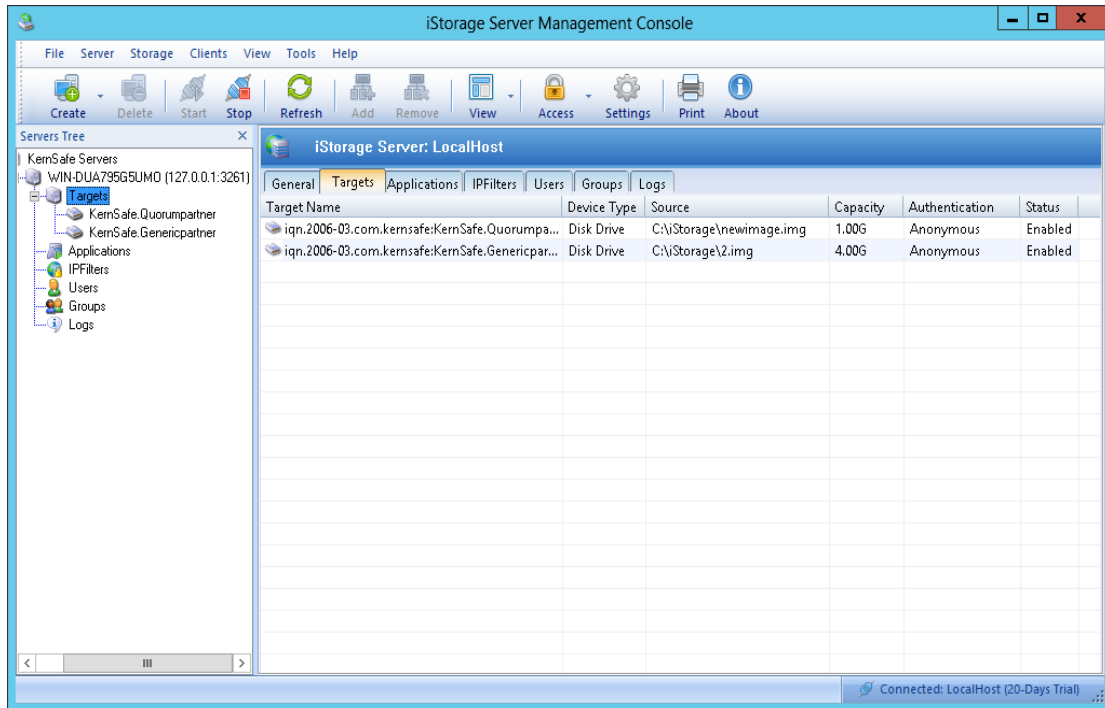
## Prepare volumes

Firstly for working in clustering environment, the Network Adapter must be assigned a static IP.



Set the IP address as we planned, press **OK** to finish.

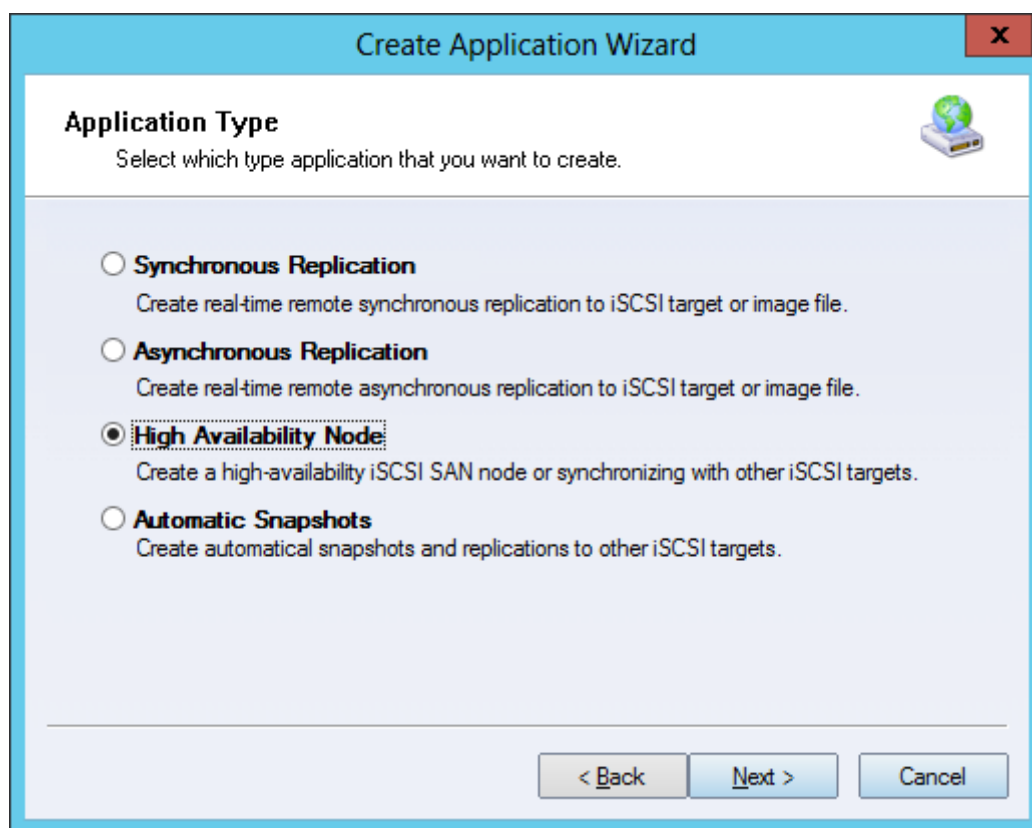
We also need two volumes on iStorage Server2, we name them **KernSafe.Quorumpartner** and **KernSafe.Genericpartner** which have same capacity as on iStorage Server1. We create them as we do on iStorage Server1.



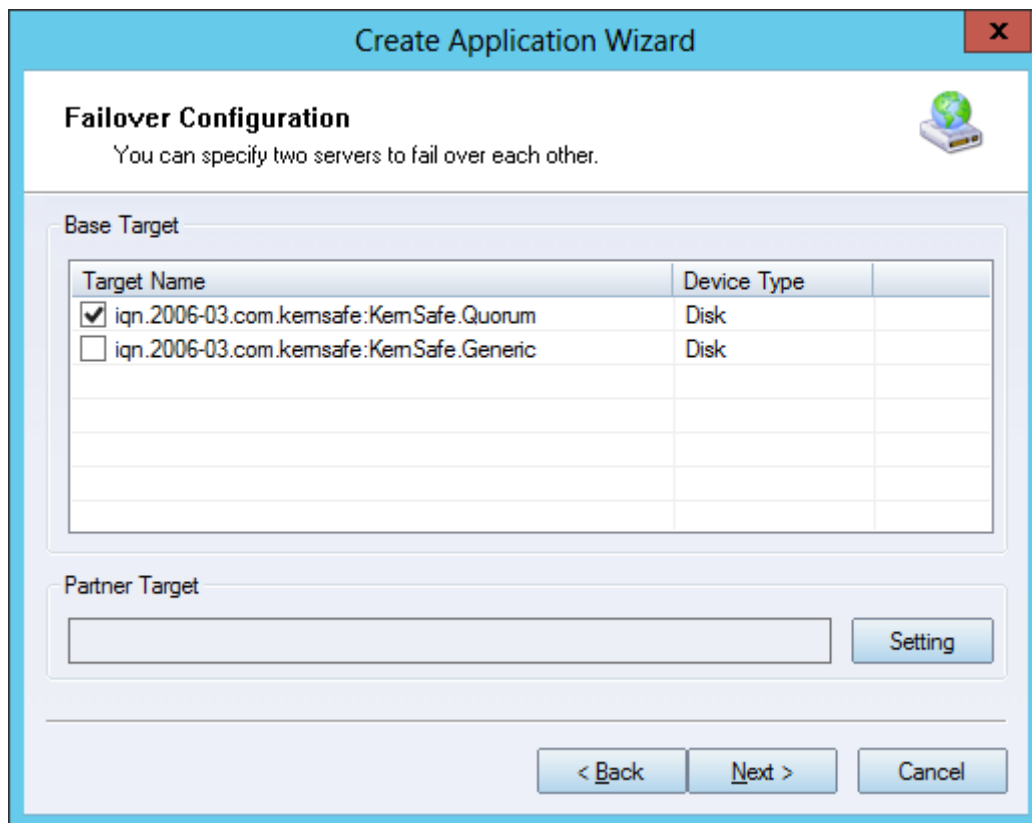
# Create Application

## Create Application with Quorum volumes

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** will be shown as below.



Select **High Availability Node** and press **Next** to continue.



**Create Application Wizard**

**Failover Configuration**  
You can specify two servers to fail over each other.

**Base Target**

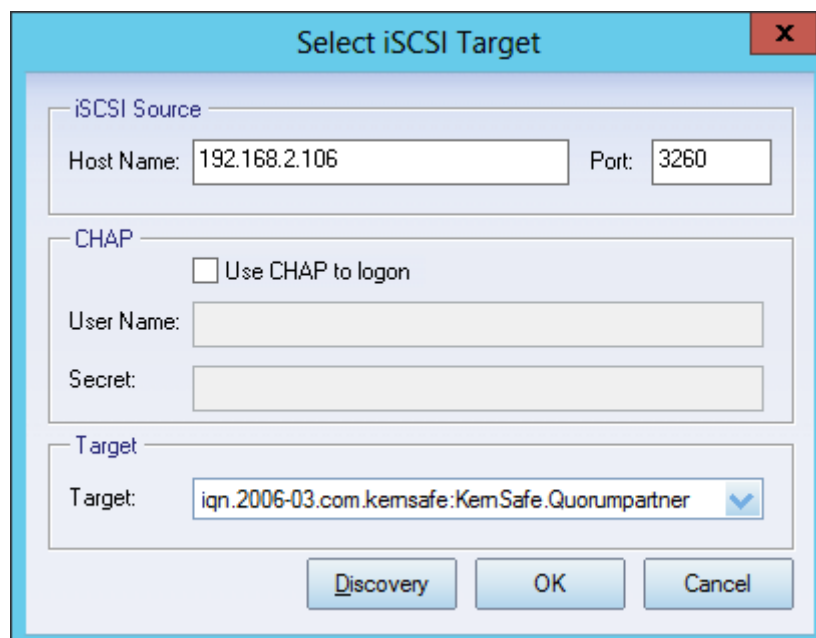
Target Name	Device Type
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Quorum	Disk
<input type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Generic	Disk

**Partner Target**

**Setting**

< Back   Next >   Cancel

Check the **Quorum** target and press **Setting** to configure the partner target.



**Select iSCSI Target**

**iSCSI Source**

Host Name: 192.168.2.106   Port: 3260

**CHAP**

☐ Use CHAP to logon

User Name:  

Secret:  

**Target**

Target: iqn.2006-03.com.kemsafe:KemSafe.Quorumpartner

Discovery   OK   Cancel

Input the **IP Address** which is used for SYNC of iStorage Server2 in iSCSI Source.

Press **Discovery** to find the mirror target and choose the **Quorumpartner** in the drop-down list. Then press **OK** to continue.

**Note:** If the mirror target needs CHAP authorization, you need to provide User Name and Secret.

**Create Application Wizard**

**Failover Configuration**  
You can specify two servers to fail over each other.

**Base Target**

Target Name	Device Type	
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Quorum	Disk	
<input type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Generic	Disk	

**Partner Target**

iqn.2006-03.com.kemsafe:KemSafe.Quorumpartner Setting

< Back Next > Cancel

The partner target will be added to the windows, press **Next** to continue.

**Create Application Wizard**

**Synchronization Settings**  
You can specify parameters for synchronization.

**Sync**

Local Address: Any Local Port: Any

Remote Address: 192.168.2.106 Remote Port: 3260

**Alternative Sync 1**

Local Address: Any Local Port: Any

Remote Address: 192.168.0.106 Remote Port: 3260

**Alternative Sync 2**

Specify a folder to save temporary data dump (folder must exist):

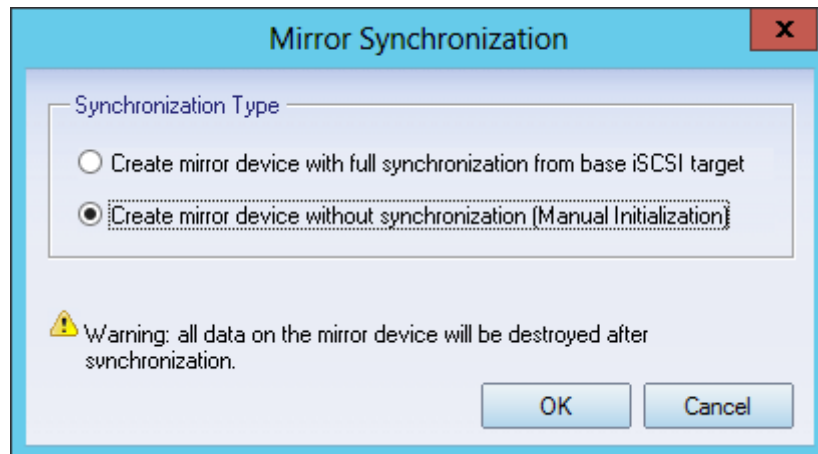
C:\Temp\ Browse

< Back Next > Cancel

Specify the Synchronization Channel. To prevent Split-Brain, after iStorage Server 3.0, HA feature allows to as much as 4 channels for SYNC.

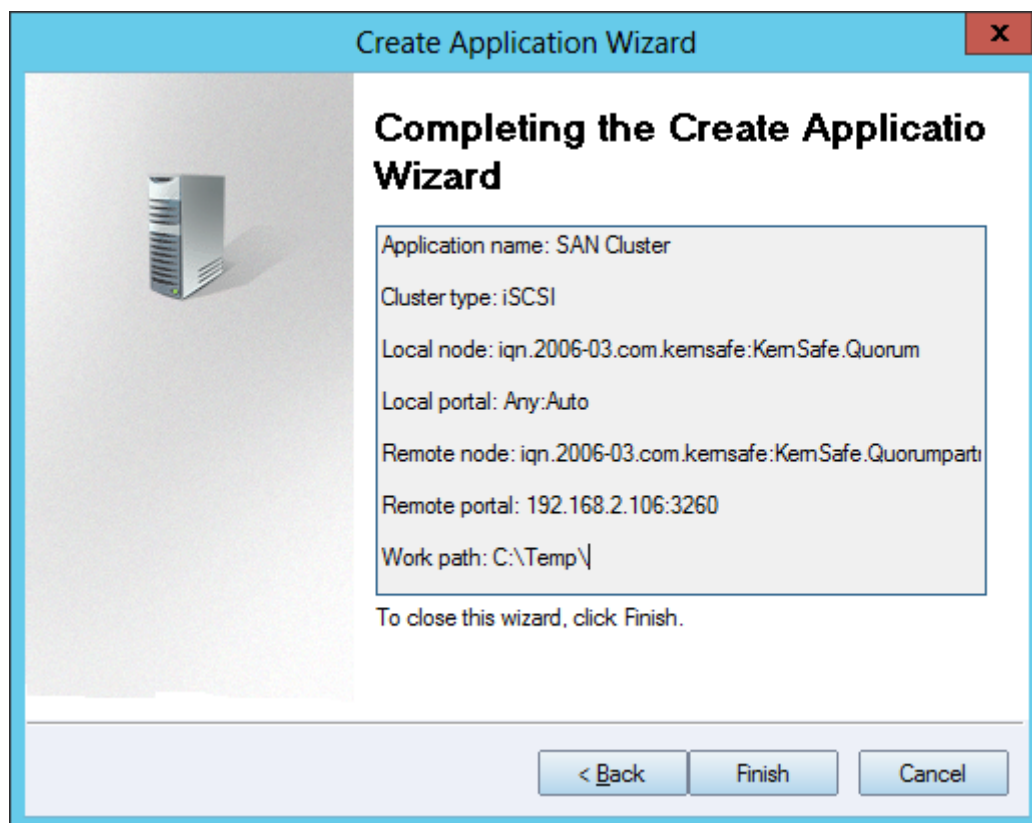
**Note:** User must specify parameters for Sync Channel and can scroll up the window and specify more channels for alternatives, these alternatives work as heart-beat and can be used when Sync channel got broken, these alternatives will prevent split-brain.

Press **Next** to continue.



Now, the base target should be synchronized to partner target. If the two targets are both new and not initialized, we 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.

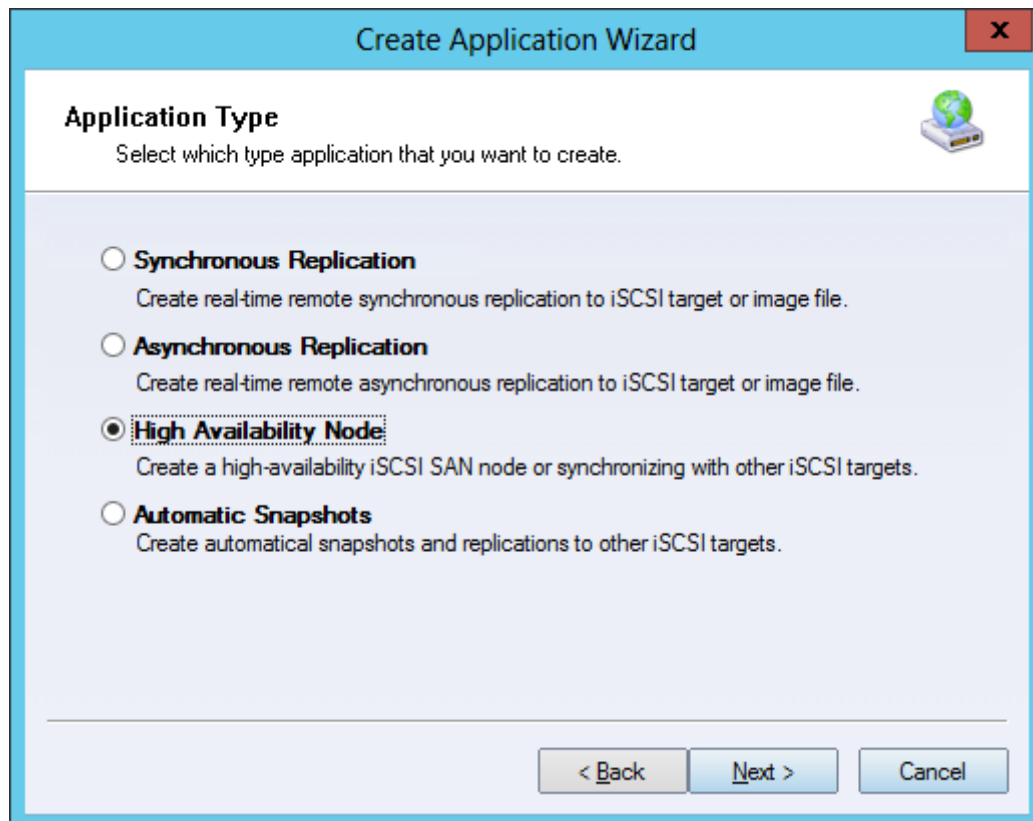


Press **Finish** to complete the creation.

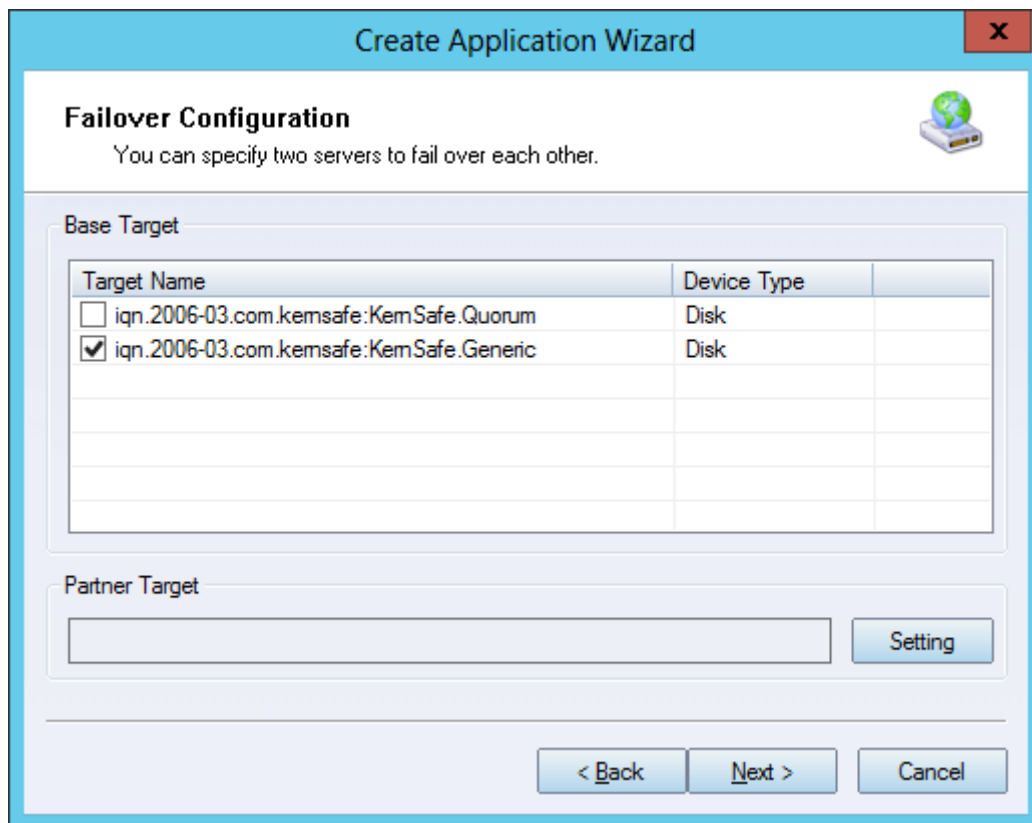


## Create Application with Generic volumes

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** will be shown as below.



Select **High Availability Node** and press **Next** to continue.



**Create Application Wizard**

**Failover Configuration**  
You can specify two servers to fail over each other.

**Base Target**

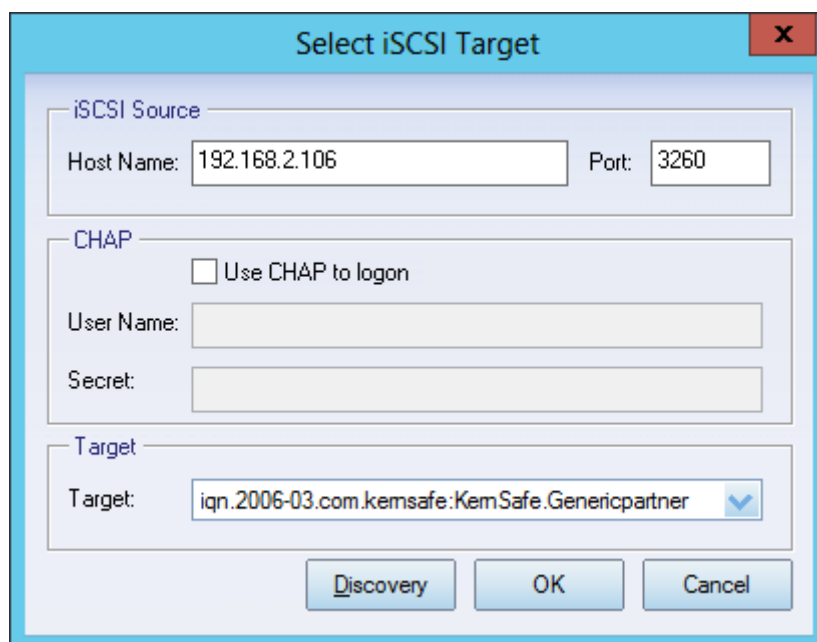
Target Name	Device Type
<input type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Quorum	Disk
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Generic	Disk

**Partner Target**

**Setting**

< **Back**   **Next** >   **Cancel**

Check the **Generic** target and press **Setting** to configure partner target.



**Select iSCSI Target**

**iSCSI Source**

Host Name: 192.168.2.106   Port: 3260

**CHAP**

☐ Use CHAP to logon

User Name:  

Secret:  

**Target**

Target: iqn.2006-03.com.kemsafe:KemSafe.Genericpartner

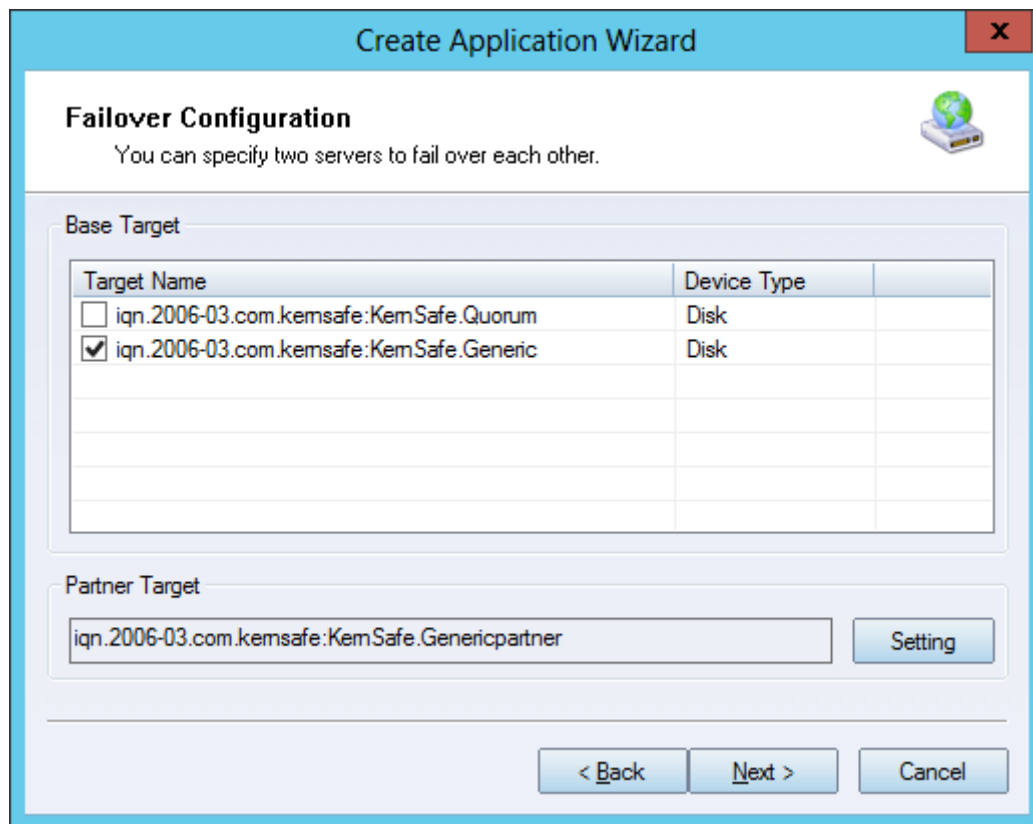
**Discovery**   **OK**   **Cancel**

Input the IP Address which is user for SYNC of iStorage Server2, then press **Discovery** to find the mirror target **Genericpartner**.

**Note:** If the mirror target needs CHAP authorization, you need to provide

User Name and Secret.

Press **OK** to continue.



The image shows a 'Create Application Wizard' dialog box with a 'Failover Configuration' tab. The tab title is 'Failover Configuration' and it includes a subtitle 'You can specify two servers to fail over each other.' and a small globe icon. The dialog is divided into two main sections: 'Base Target' and 'Partner Target'. The 'Base Target' section contains a table with two columns: 'Target Name' and 'Device Type'. There are two rows of data: the first row is 'iqn.2006-03.com.kemsafe:KemSafe.Quorum' with 'Disk' as the device type and an unchecked checkbox; the second row is 'iqn.2006-03.com.kemsafe:KemSafe.Generic' with 'Disk' as the device type and a checked checkbox. The 'Partner Target' section has a text input field containing 'iqn.2006-03.com.kemsafe:KemSafe.Genericpartner' and a 'Setting' button. At the bottom of the dialog are three buttons: '< Back', 'Next >', and 'Cancel'.

Target Name	Device Type
<input type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Quorum	Disk
<input checked="" type="checkbox"/> iqn.2006-03.com.kemsafe:KemSafe.Generic	Disk

Partner Target

iqn.2006-03.com.kemsafe:KemSafe.Genericpartner

Setting

< Back   Next >   Cancel

Press **Next** to continue.

**Create Application Wizard**

**Synchronization Settings**  
You can specify parameters for synchronization.

**Sync**

Local Address: Any Local Port: Any

Remote Address: 192.168.2.106 Remote Port: 3260

**Alternative Sync 1**

Local Address: Any Local Port: Any

Remote Address: 192.168.0.106 Remote Port: 3260

**Alternative Sync 2**

Specify a folder to save temporary data dump (folder must exist):

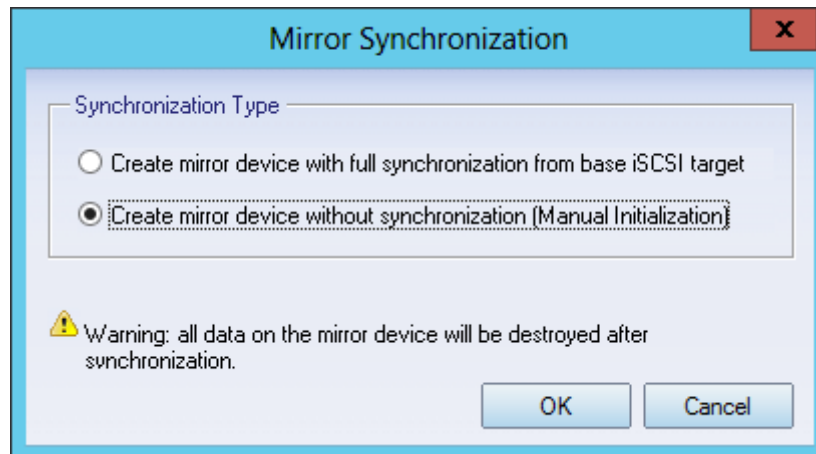
C:\Temp\ Browse

< Back Next > Cancel

Specify the Synchronization Channel. To prevent Split-Brain, after iStorage Server 3.0, HA feature allows to as much as 4 channels for SYNC.

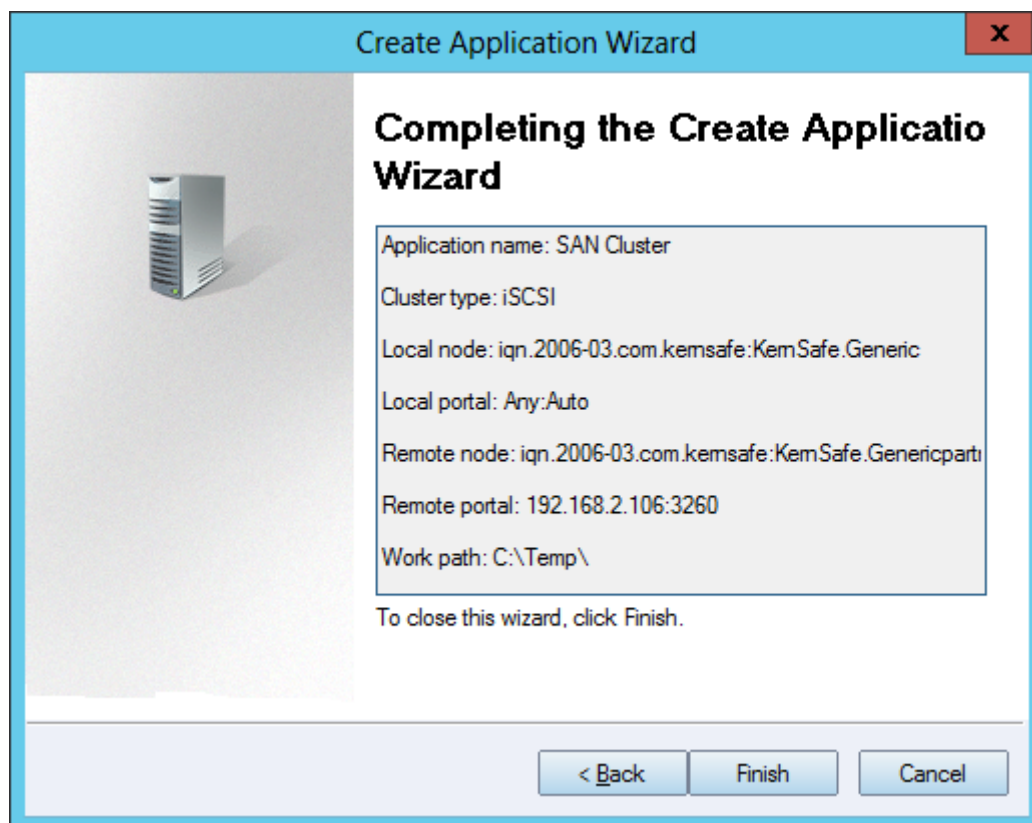
**Note:** User must specify parameters for Sync Channel and can scroll up the window and specify more channels for alternatives, these alternatives work as heart-beat and can be used when Sync channel got broken, these alternatives will prevent split-brain.

Press **Next** to continue.



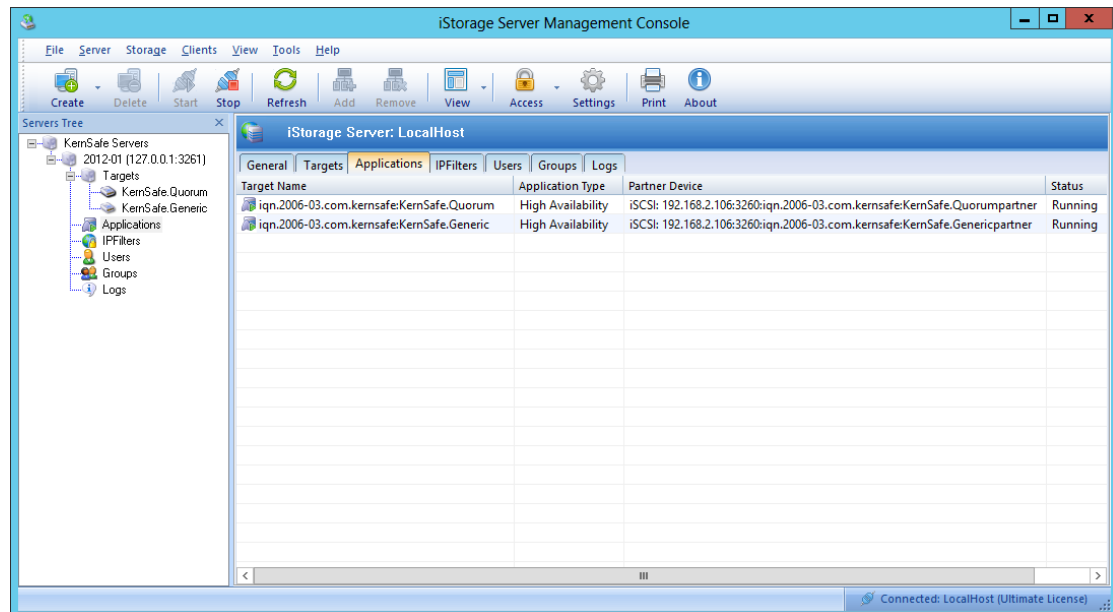
Now, the base target should be synchronized to partner target. If the two targets are both new and not initialized, we choose **Create mirror device without synchronization (Manual Initialization)**. Otherwise, we must choose **Create mirror device with full synchronization from base iSCSI target**.

Press **OK** button to continue.



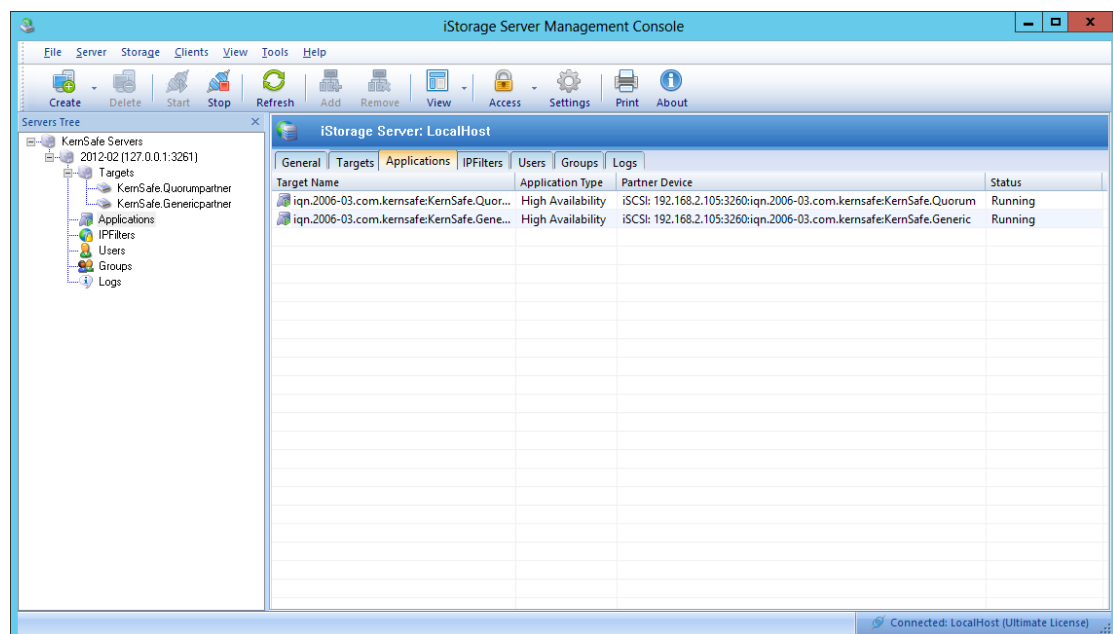
Press **Finish** to complete the creation.

Now, the two applications should be shown as below if successful.



The configuration on iStorage Server 1 is completed.

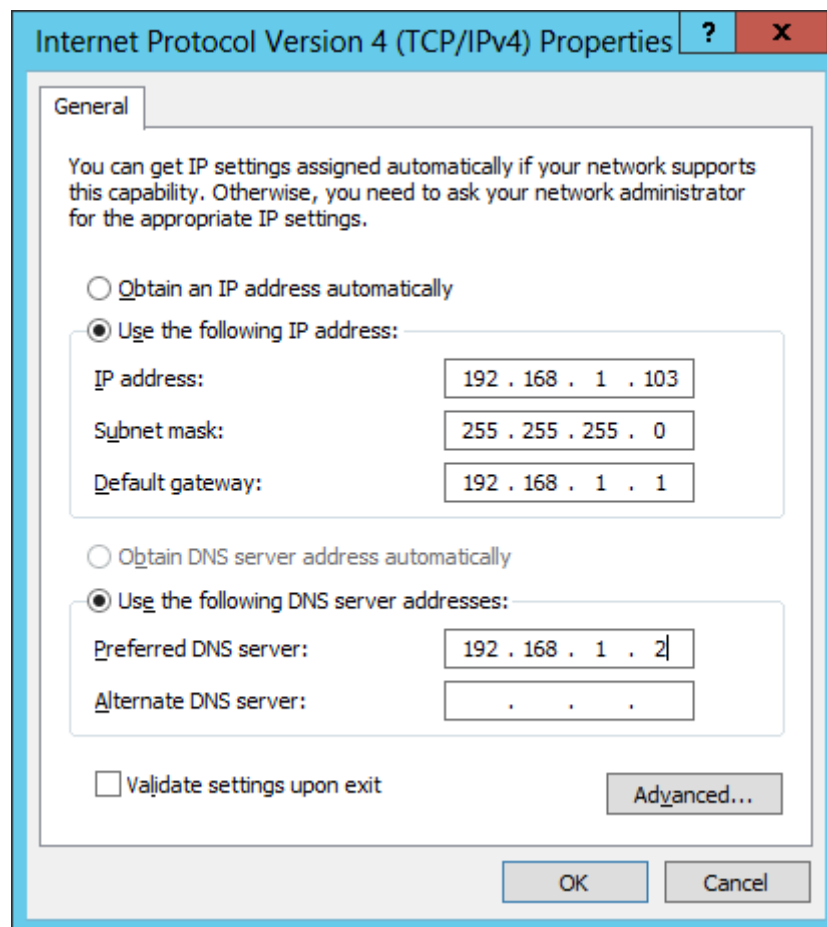
We do the same operations on iStorage Server 2 to create applications; the main interface will be shown as below.



# Configure Cluster Node 1

## Join to the Domain

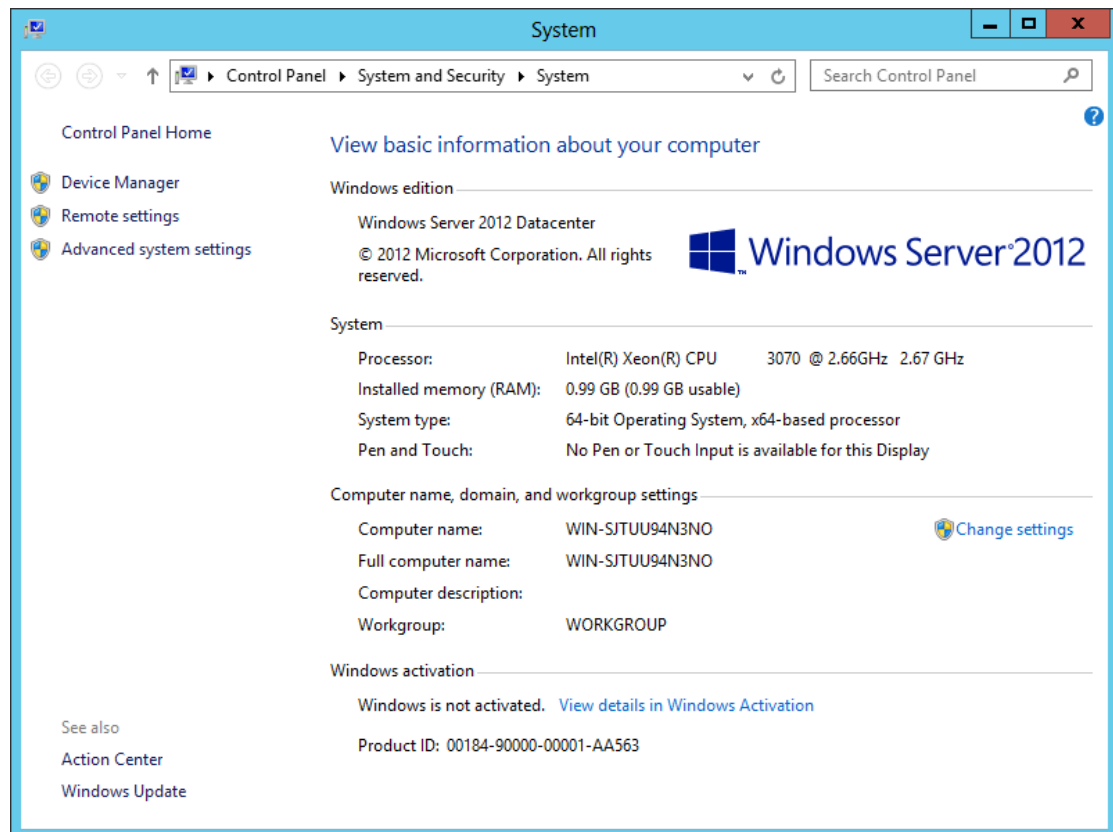
For working in the clustering environment, the **Network Adapter** must be assigned a static IP Address.



Type the IP Address, subnet, gateway and DNS. The DNS should point to Domain Controller.

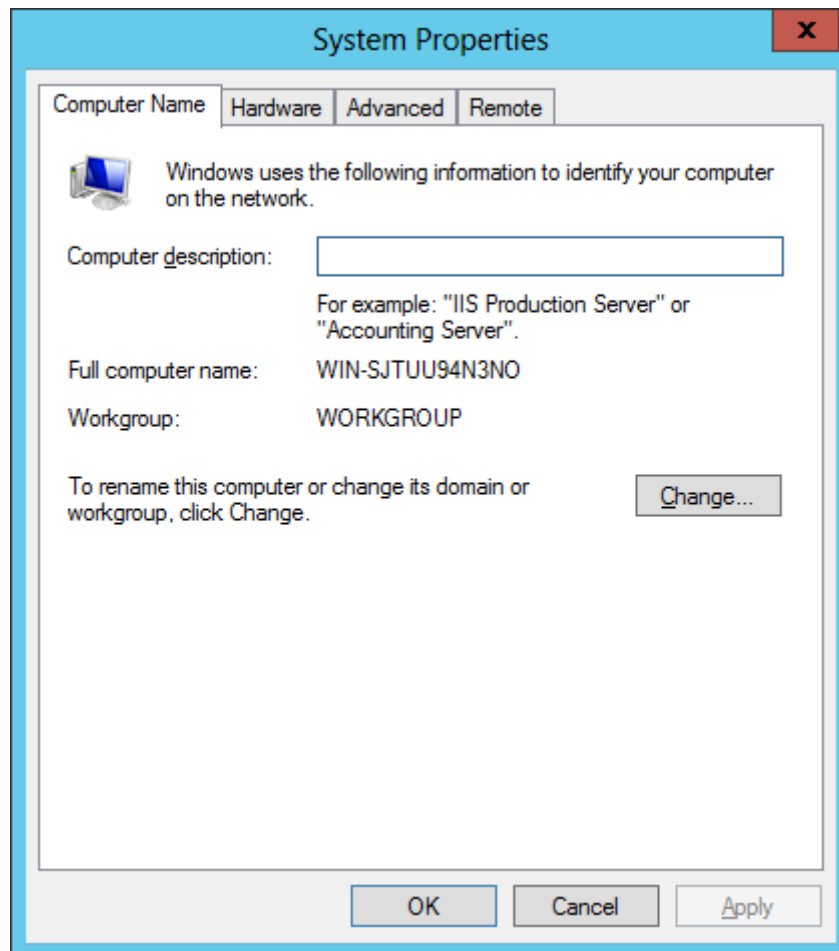
After the Network Adapter is successfully configured, we can join the domain.

Right click **Computer** and then open **Properties**.

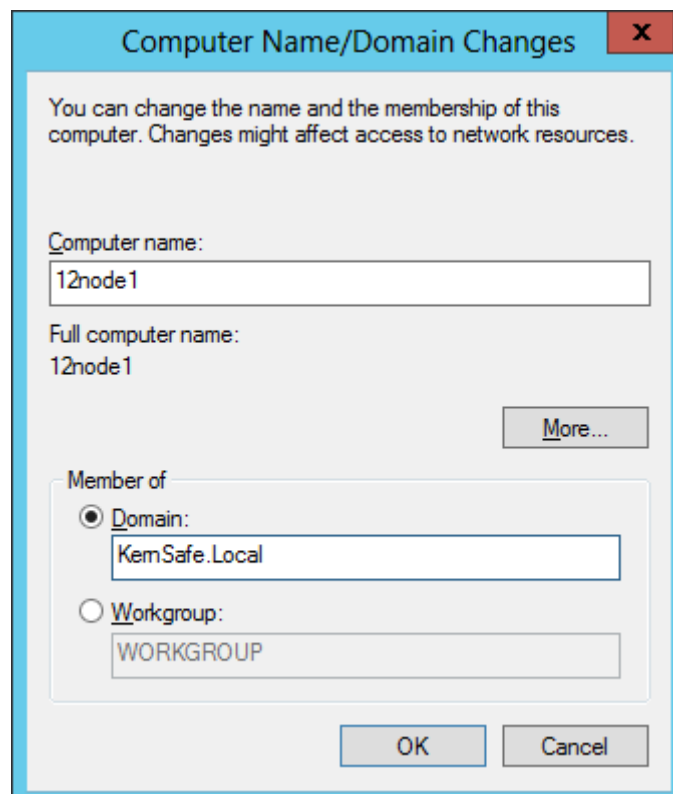


Click **Change settings** and then we can configure the System properties.





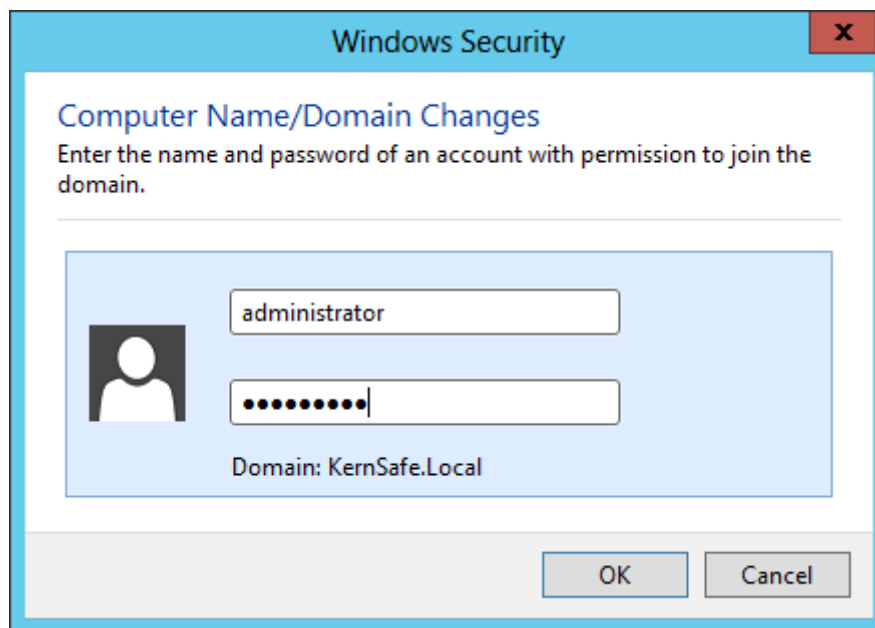
Press **Change** to rename computer and change its domain.



Type Computer name **12node1**.

Select Domain in **Member of** and type Domain name **KernSafe.Local** we have set.

Press **OK** to continue.

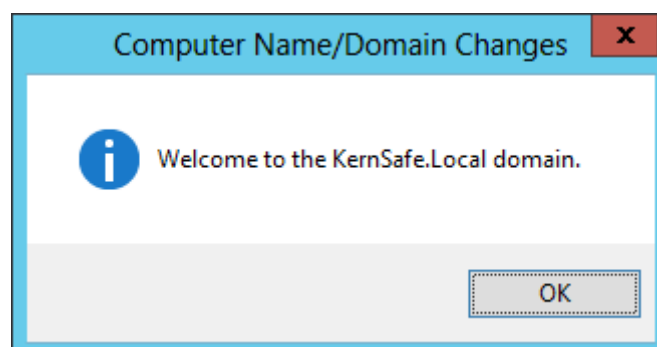


Domain Controller account is required to join the domain.

Type user name and password.

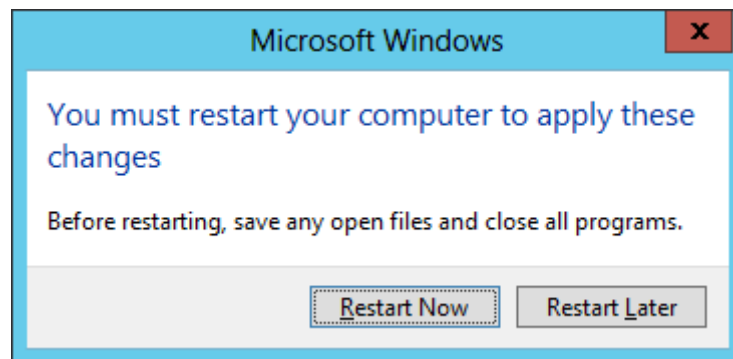
Press **OK** to continue.

If successful, a notification window as below will be shown.



Press **OK** to continue.

But reboot is required.

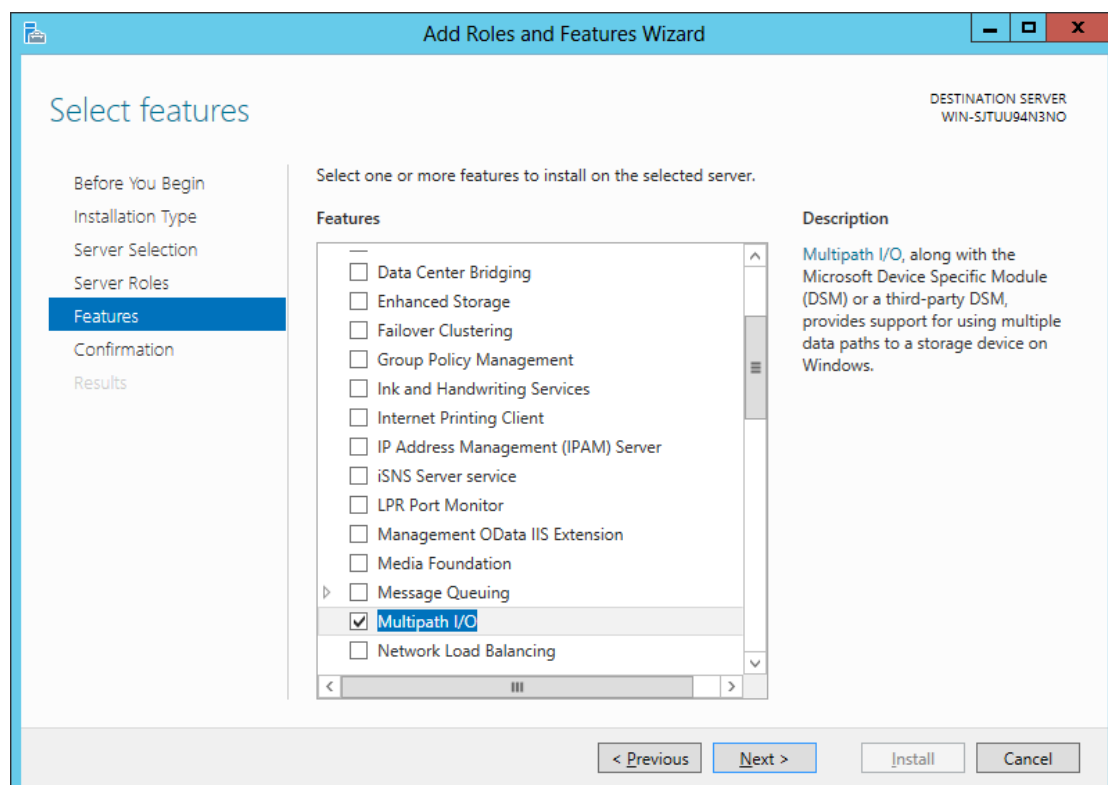


Press **Restart Now** to finish joining.

## Install MPIO

Launch the **Server Manager** in Windows Server 2012 and then click **Manage** on the top right corner, select **Add Roles and Features**.

Then the wizard will be shown as below.

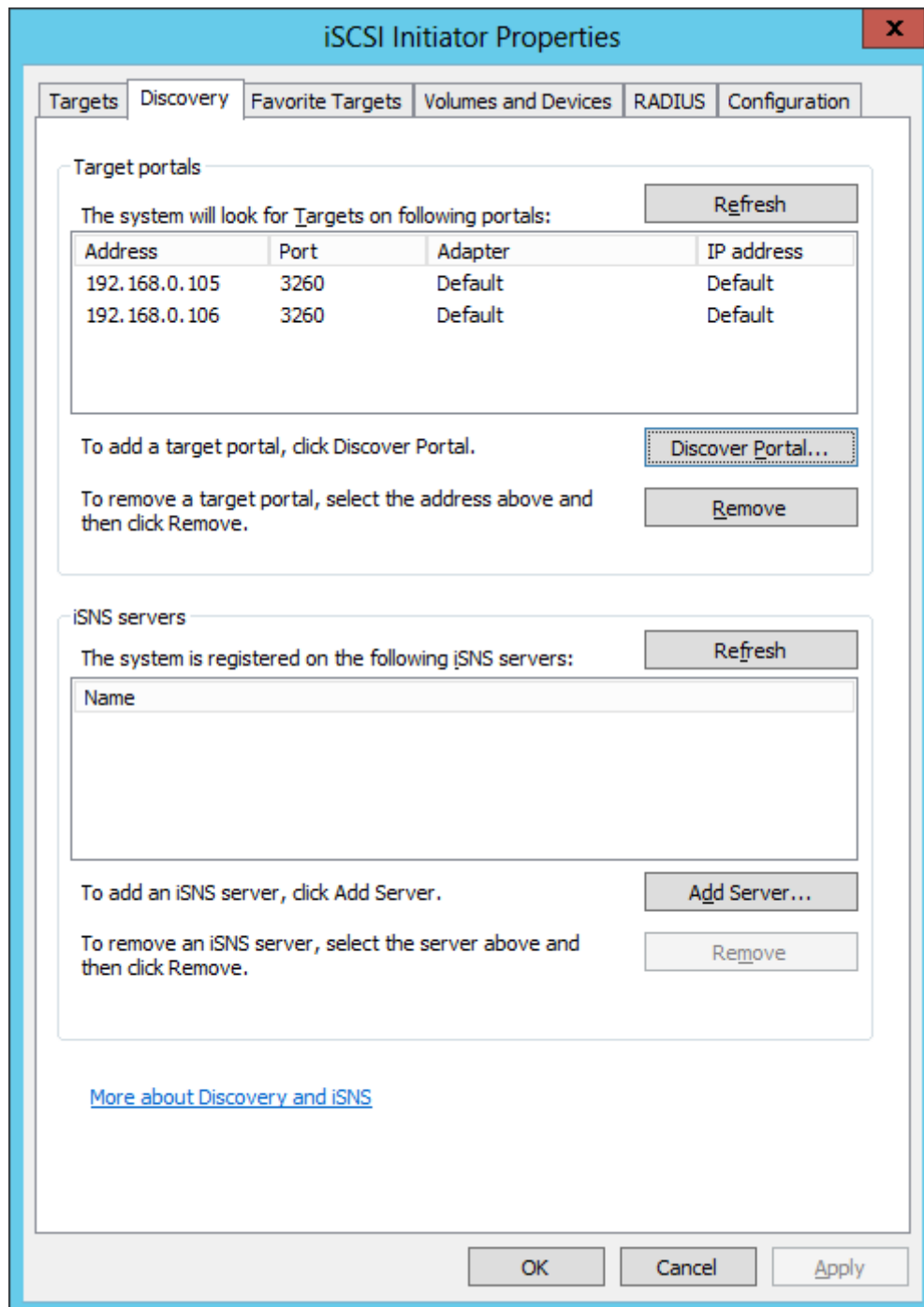


Select **Multipath I/O** and install it following the wizard.

## Connect to iSCSI Target

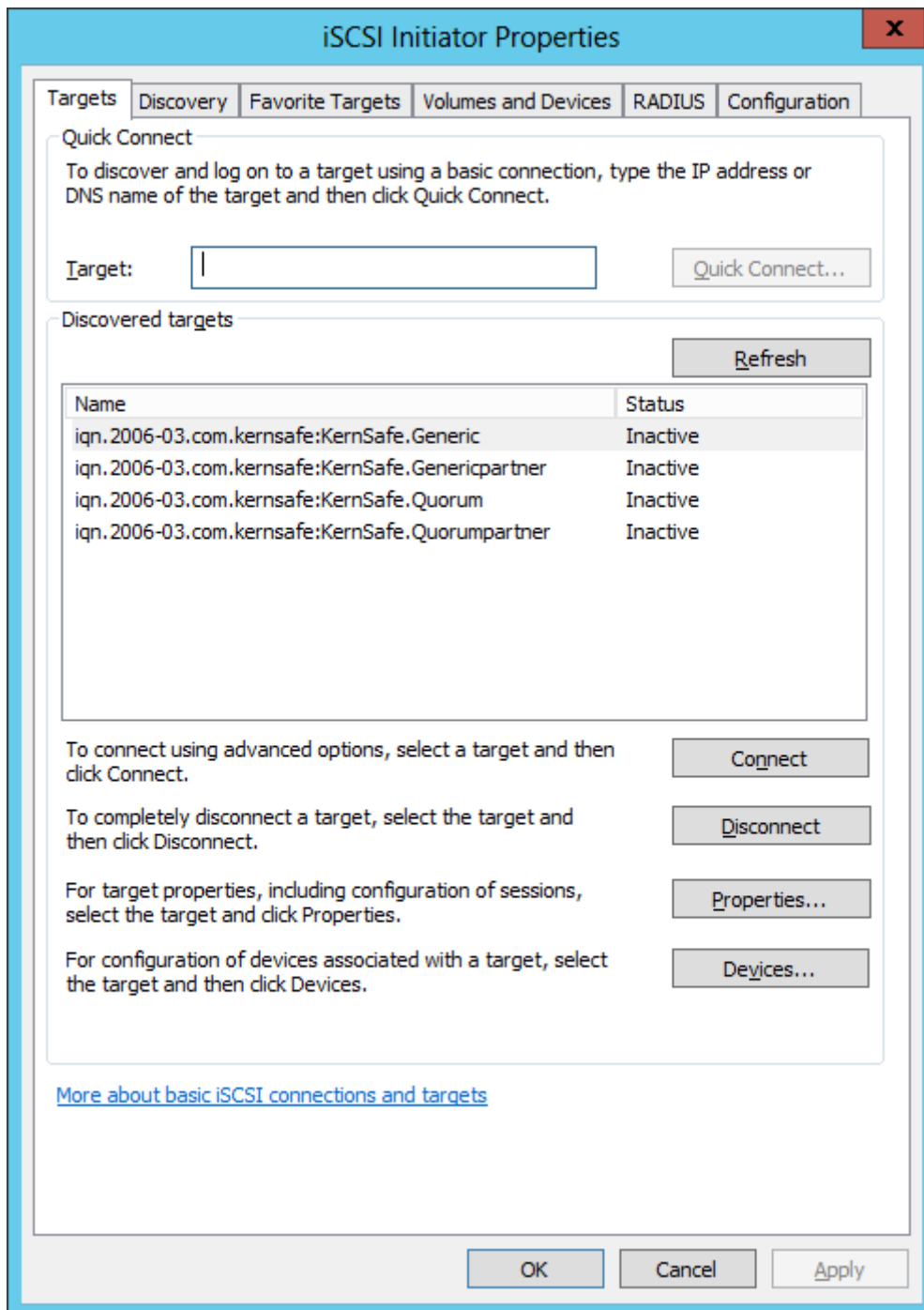
Launch the **Administrator tools-> Microsoft iSCSI initiator**.

Turn to **Discovery** tab.



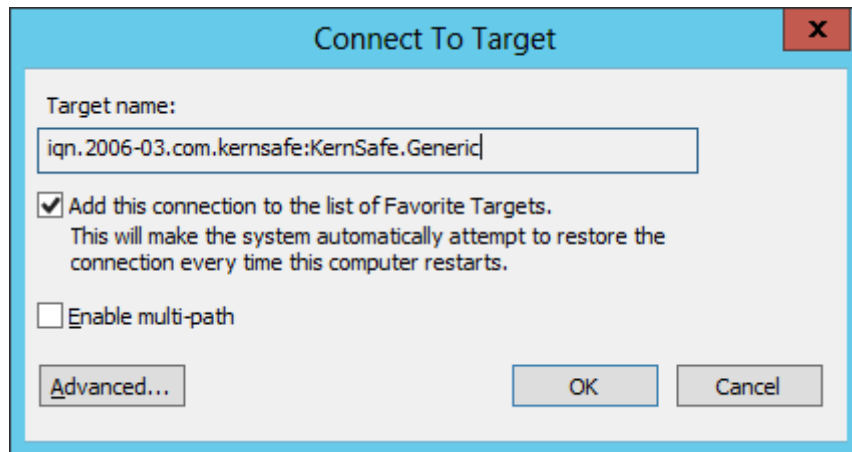
Press **Discover Portal** button and then input each IP of iStorage Server.

Then turn to **Targets** tab.



On the **Discovered targets** list, you will see all four targets we have created on iStorage Server.

Select first one and press **Connect**.



Keep default and press **OK** to connect.

Connect other three targets in the same way.

iSCSI Initiator Properties

Targets

Discovery

Favorite Targets

Volumes and Devices

RADIUS

Configuration

Quick Connect

To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.

Target:

Quick Connect...

Discovered targets

Refresh

Name	Status
iqn.2006-03.com.kernsafe:KernSafe.Generic	Connected
iqn.2006-03.com.kernsafe:KernSafe.Genericpartner	Connected
iqn.2006-03.com.kernsafe:KernSafe.Quorum	Connected
iqn.2006-03.com.kernsafe:KernSafe.Quorumpartner	Connected

To connect using advanced options, select a target and then click Connect.

Connect

To completely disconnect a target, select the target and then click Disconnect.

Disconnect

For target properties, including configuration of sessions, select the target and click Properties.

Properties...

For configuration of devices associated with a target, select the target and then click Devices.

Devices...

[More about basic iSCSI connections and targets](#)

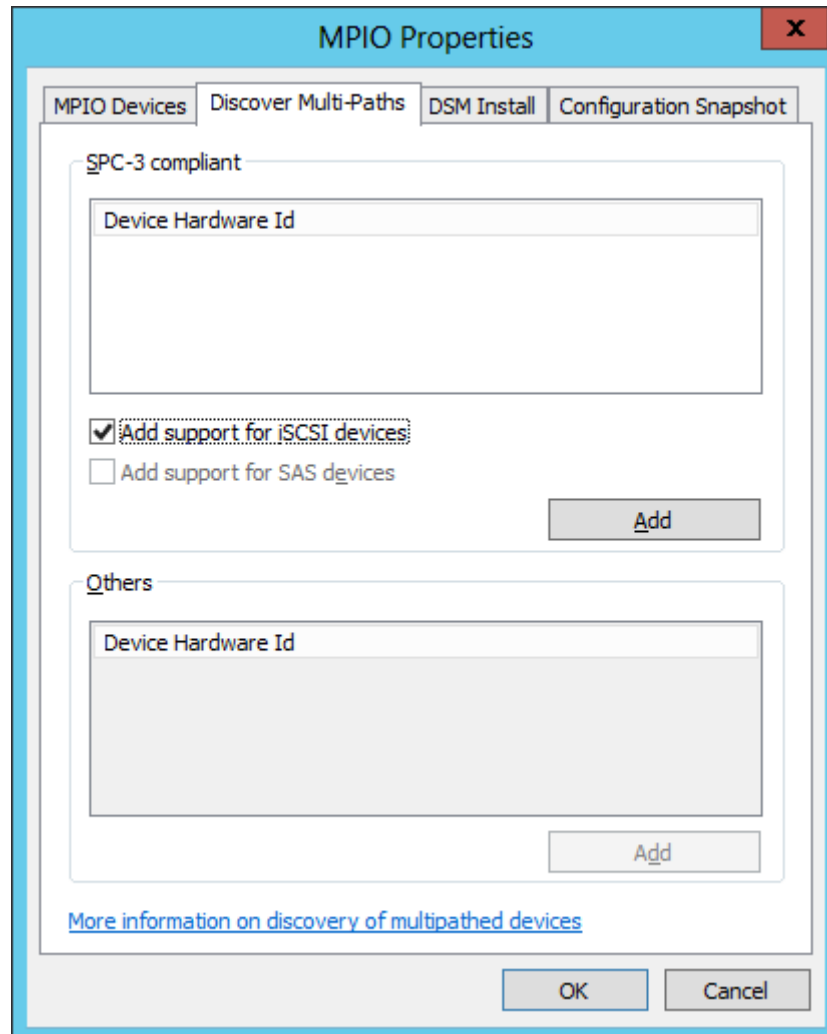
OK

Cancel

Apply

## Enable MPIO

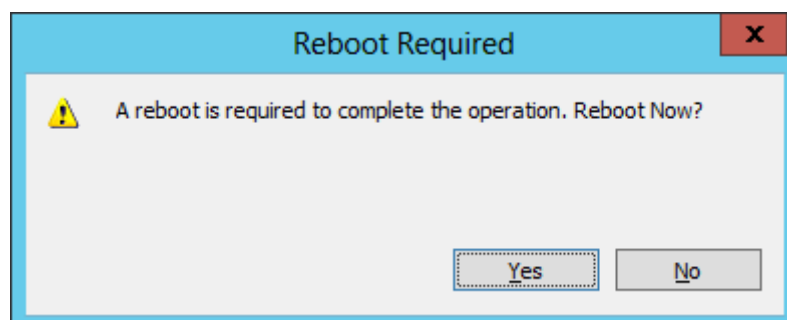
Launch **Administrative Tools-> MPIO**.



Turn to **Discover Multi-Paths** tab.

Check **Add support for iSCSI devices** and then press **Add**.

Press **OK** to continue.



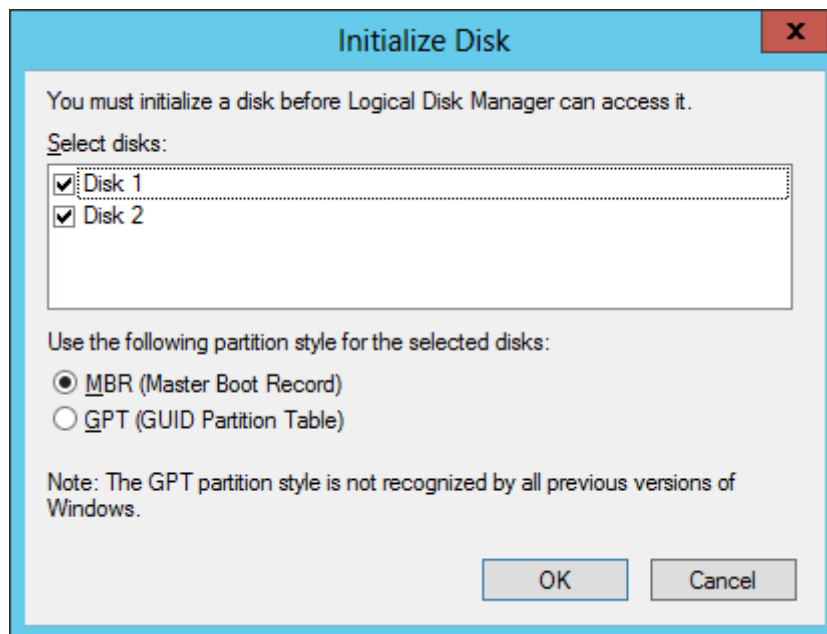


Reboot is required to enable MPIO.

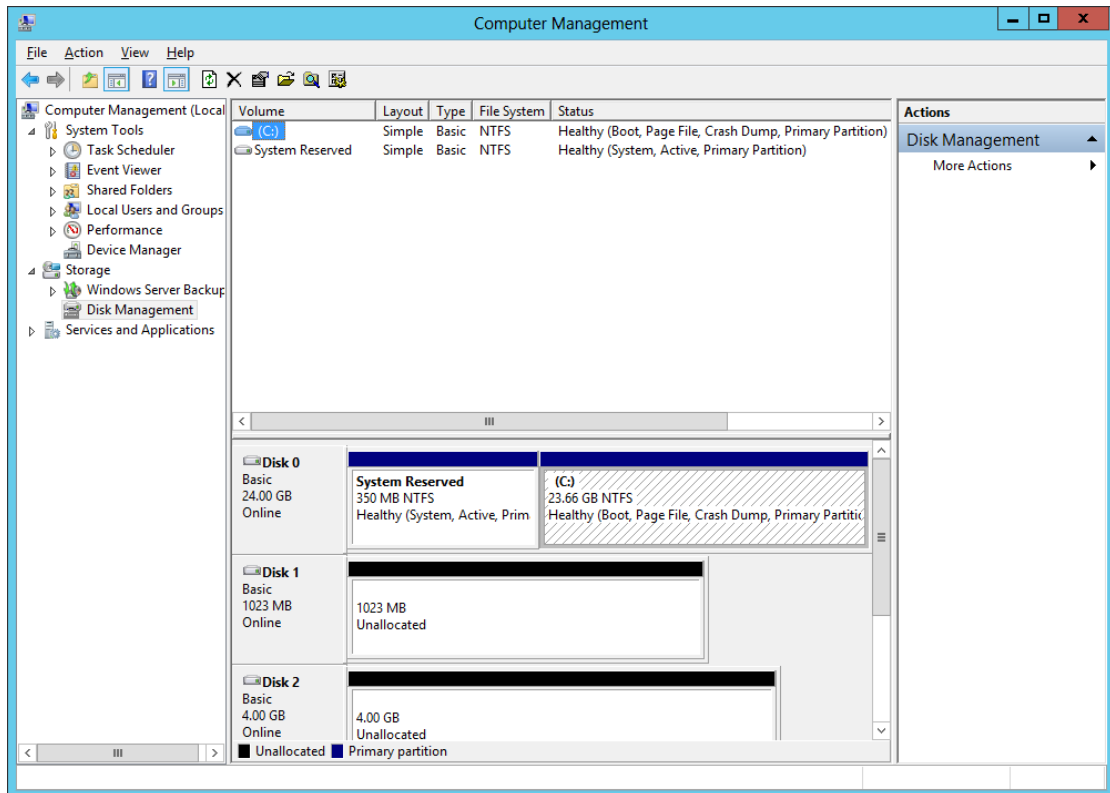
Press **Yes** to restart.

After the node is successfully restarted, launch **Administrative Tools-> Computer Management**.

An **Initialize Disk** dialog is shown.

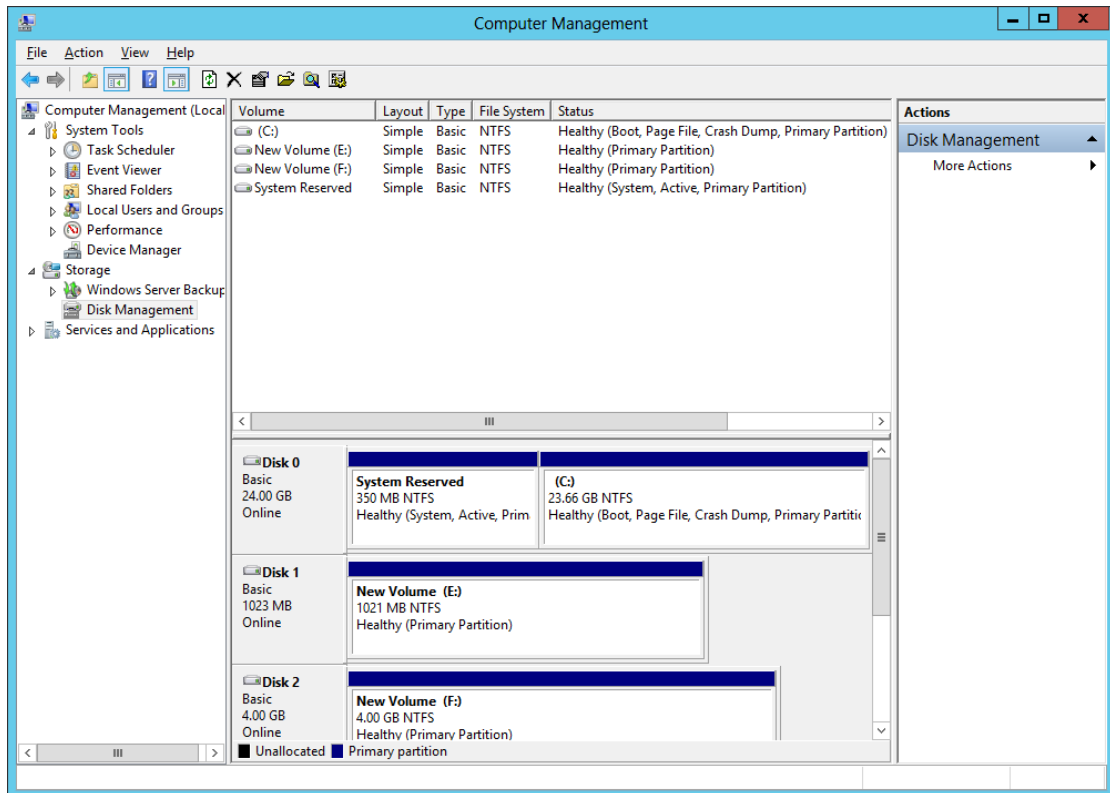


Press **OK** to initialize disk.



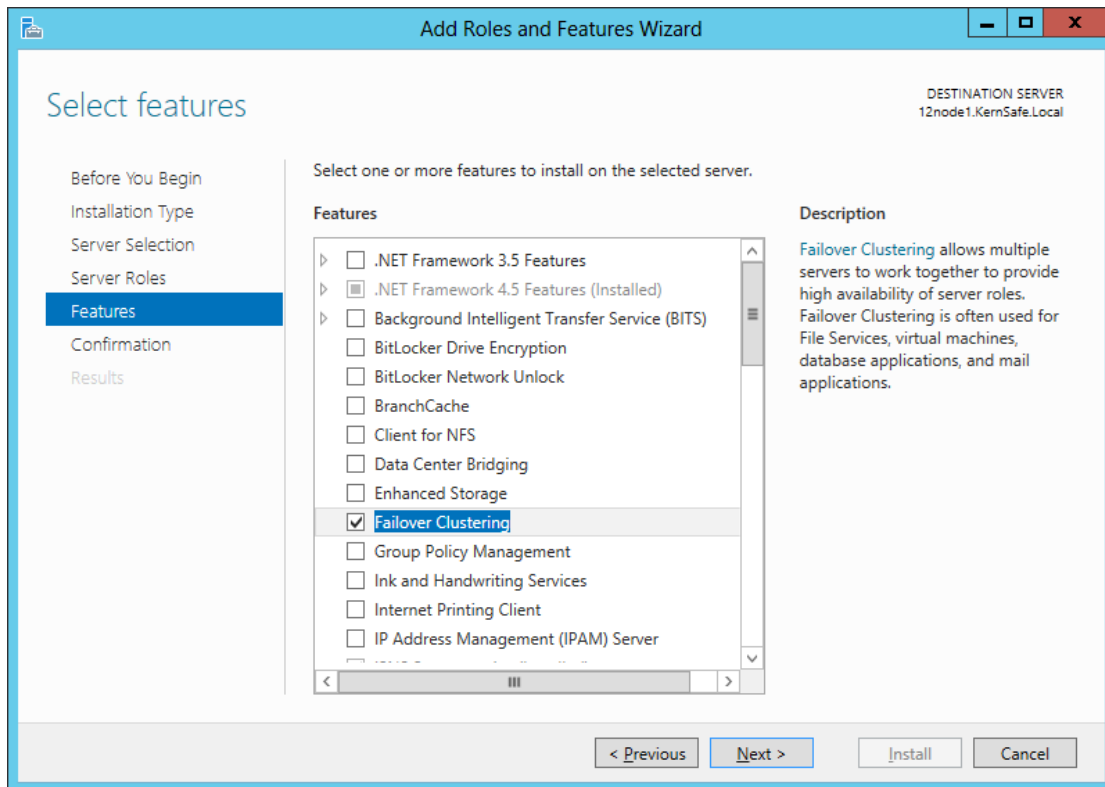
Right click on the disk and then select **New Simple Volume**, partition and format the disks by following wizard.

If successfully, the new volumes created are shown as below.



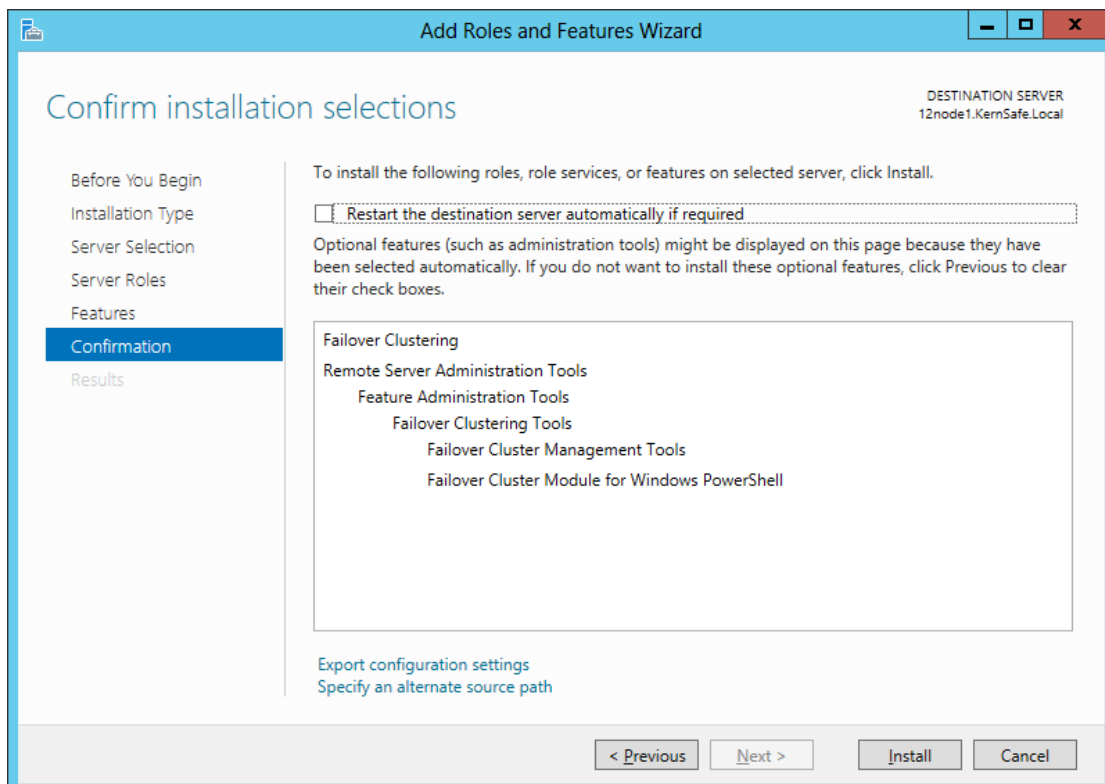
## Install Failover Clustering

Launch **Server Manager Management Console** and click the **Manage** on the top right corner, then select **Add Roles and Features**. The Wizard will be shown as below.

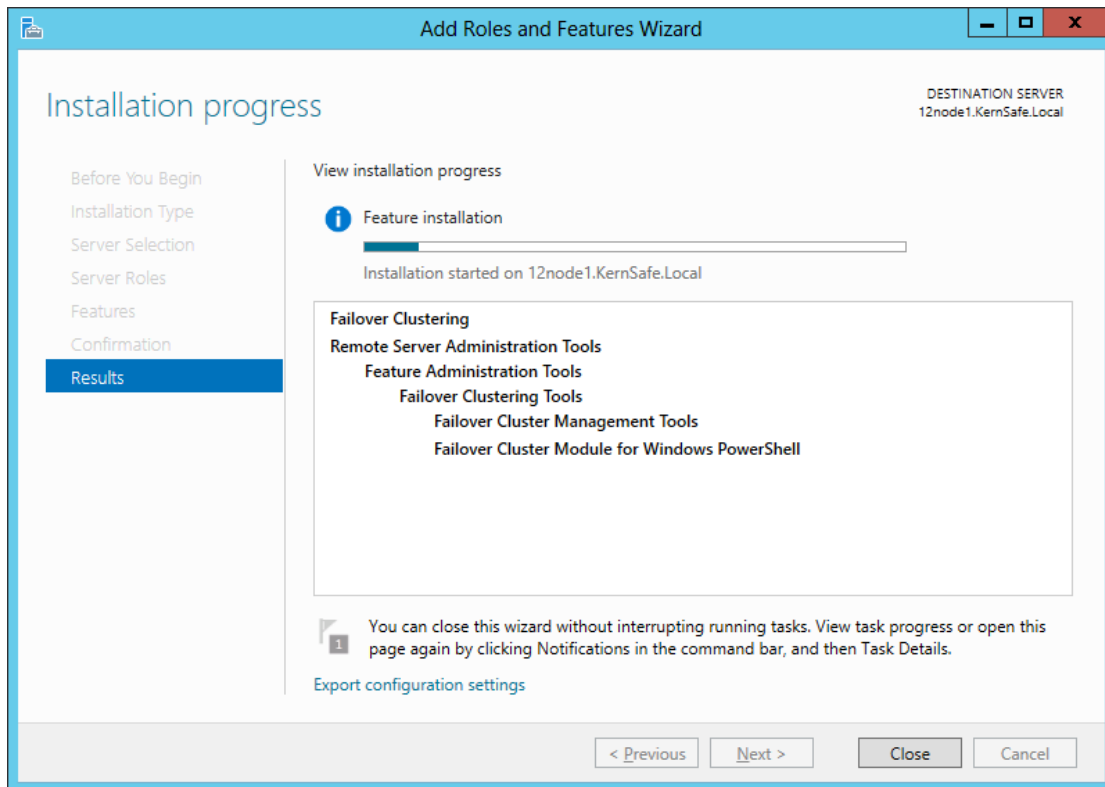


Select Feature **Failover Clustering**.

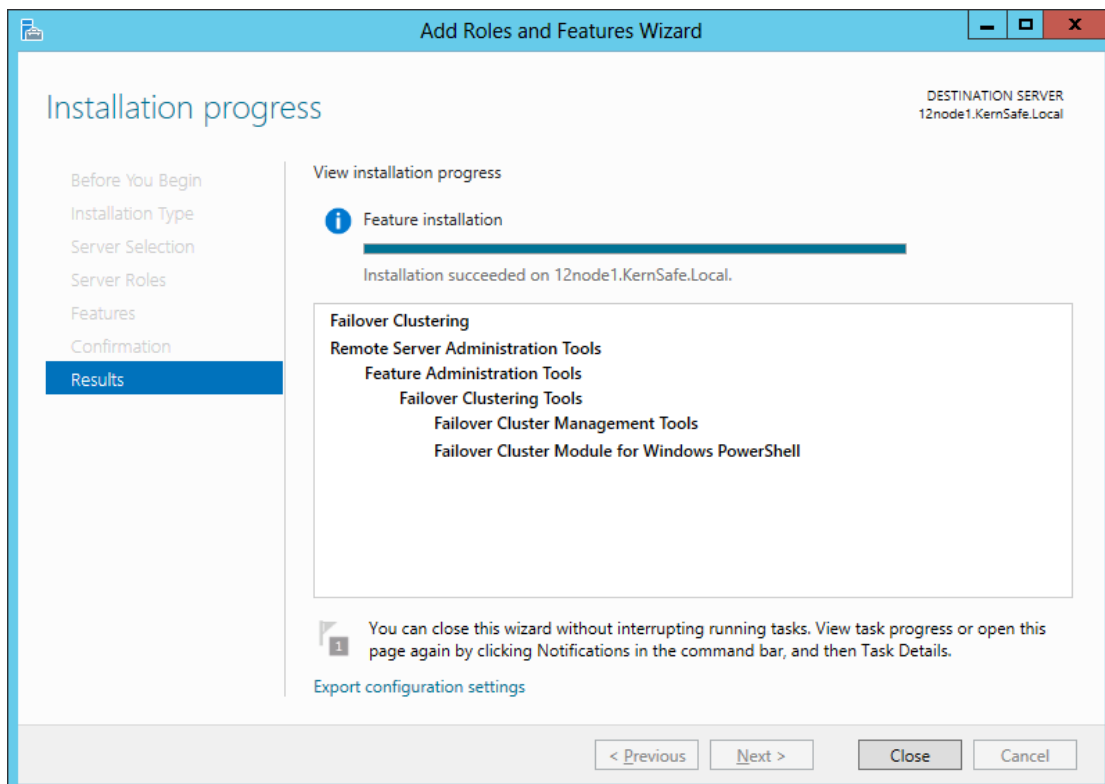
Press **Next** to continue.



Press **Install** to add **Failover Clustering** feature.



**Note:** You can close the windows to make it work in the background.

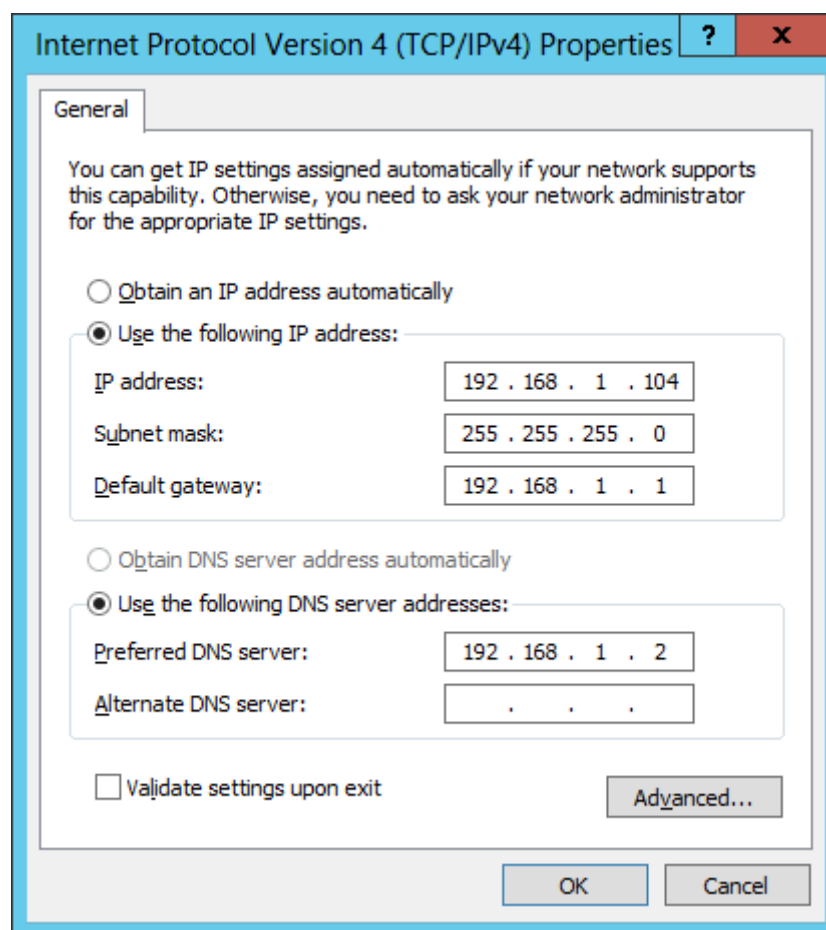


After the feature installation succeeds, you can press **Close** button.

# Configure Cluster Node 2

## Join to the Domain

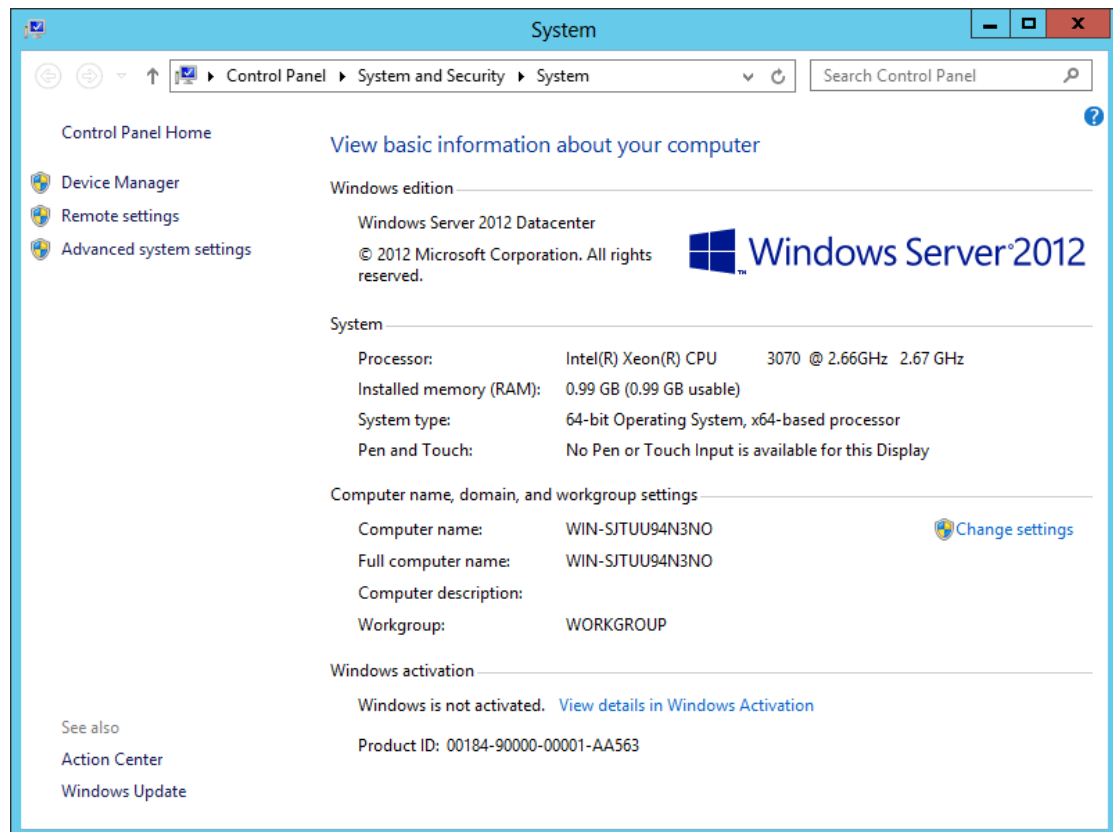
For working in the clustering environment, the **Network Adapter** must be assigned a static IP Address.



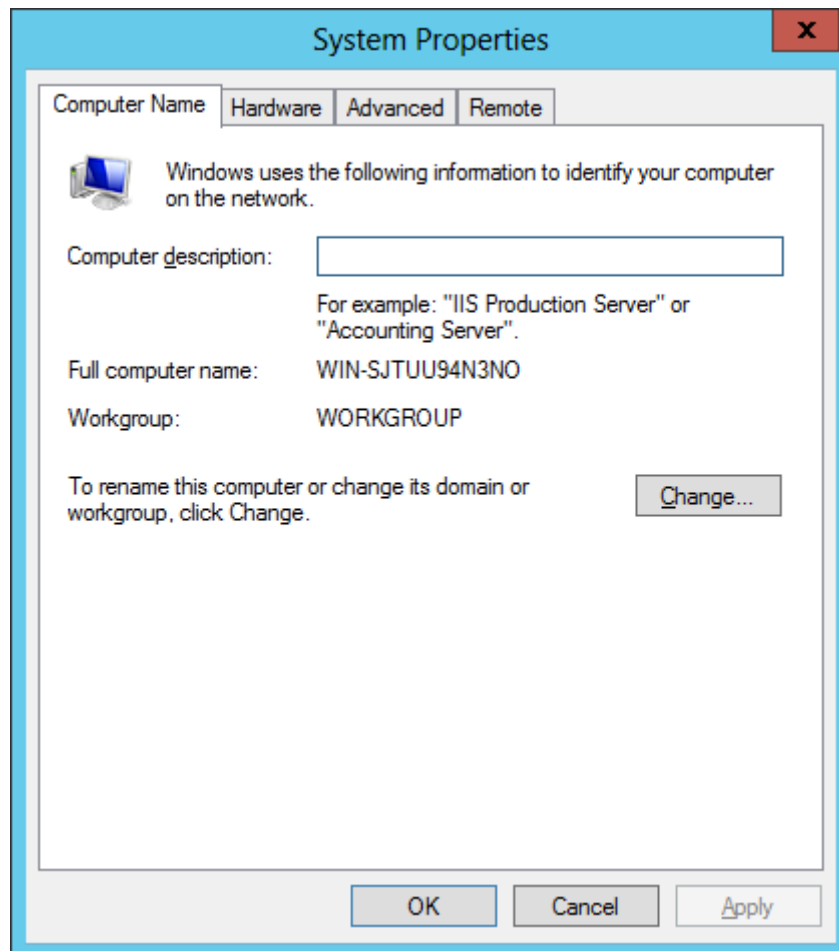
Type the IP Address, subnet, gateway and DNS. The DNS should point to Domain Controller.

After the Network Adapter is successfully configured, we can join the domain.

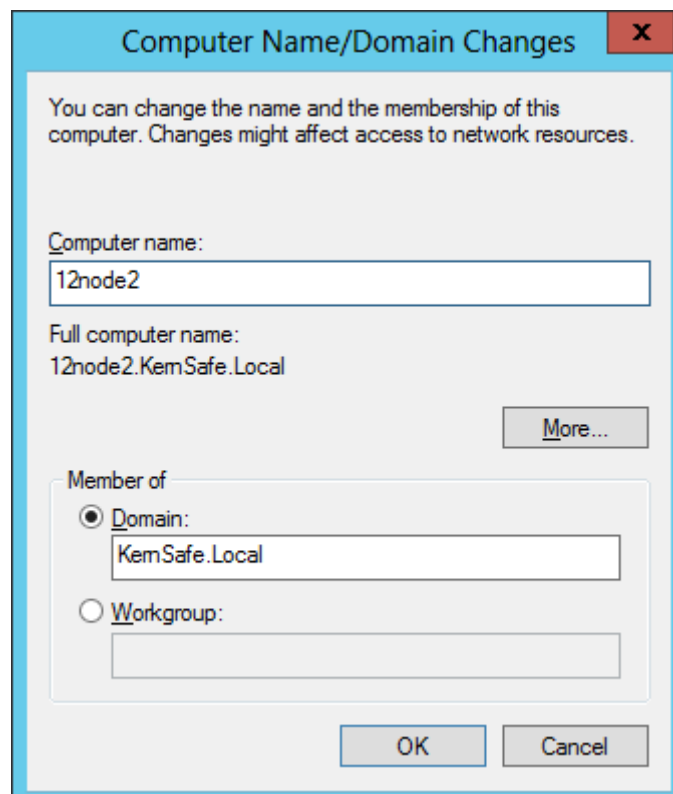
Right click **Computer** and then open **Properties**.



Click **Change settings** and then we can configure the System properties.



Press **Change** to rename computer and change its domain.

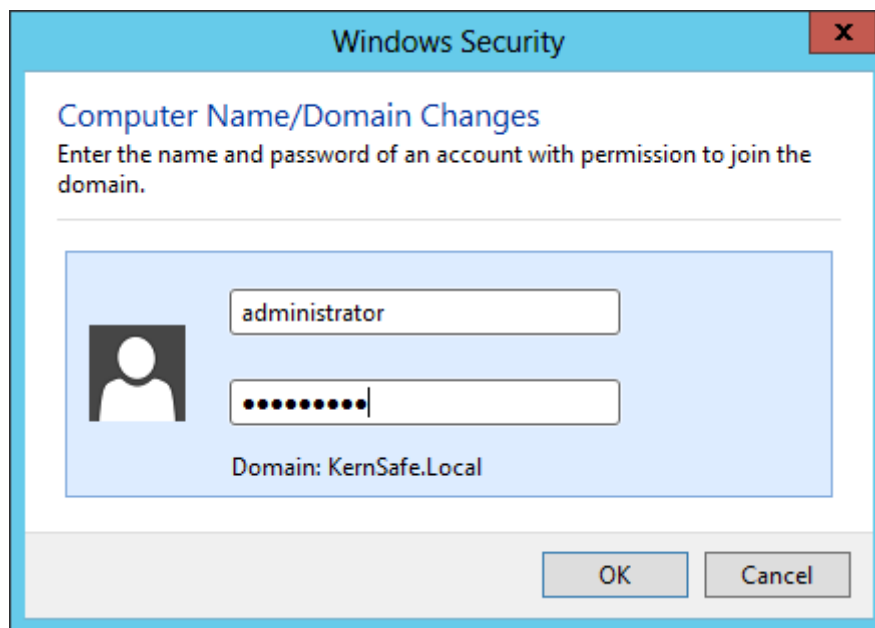




Type Computer name **12node2**.

Select Domain in **Member of** and type Domain name **KernSafe.Local** we have set.

Press **OK** to continue.

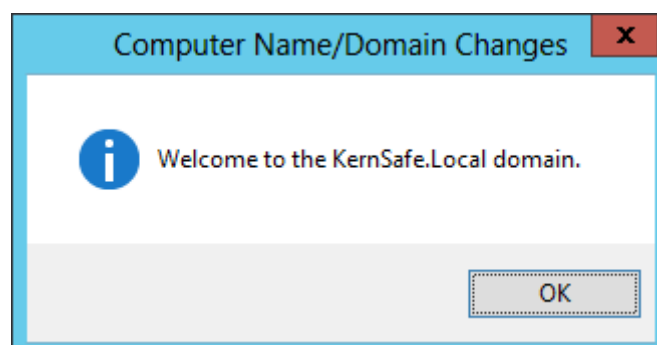


Domain Controller account is required to join the domain.

Type user name and password.

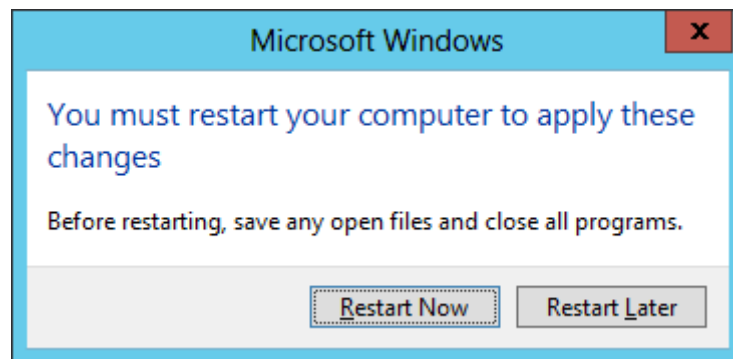
Press **OK** to continue.

If successful, a notification window as below will be shown.



Press **OK** to continue.

But reboot is required.

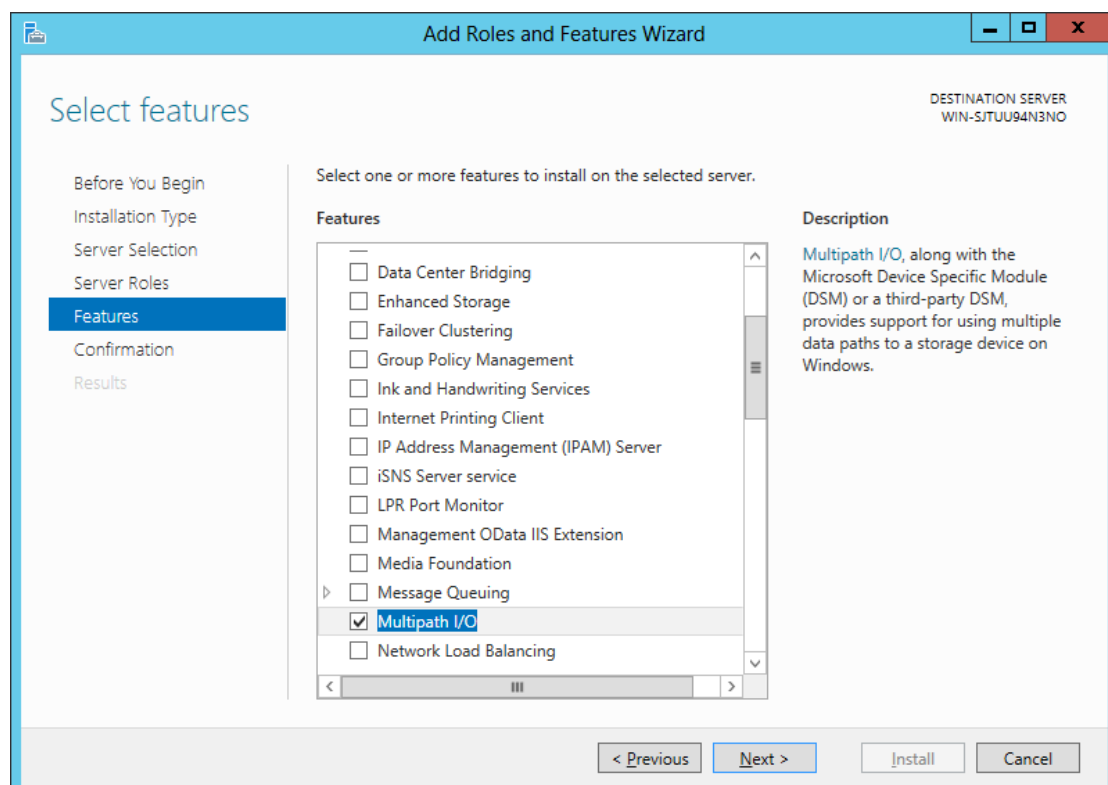


Press **Restart Now** to finish joining.

## Install MPIO

Launch the **Server Manager** in Windows Server 2012 and then click **Manage** on the top right corner, select **Add Roles and Features**.

Then the wizard will be shown as below.

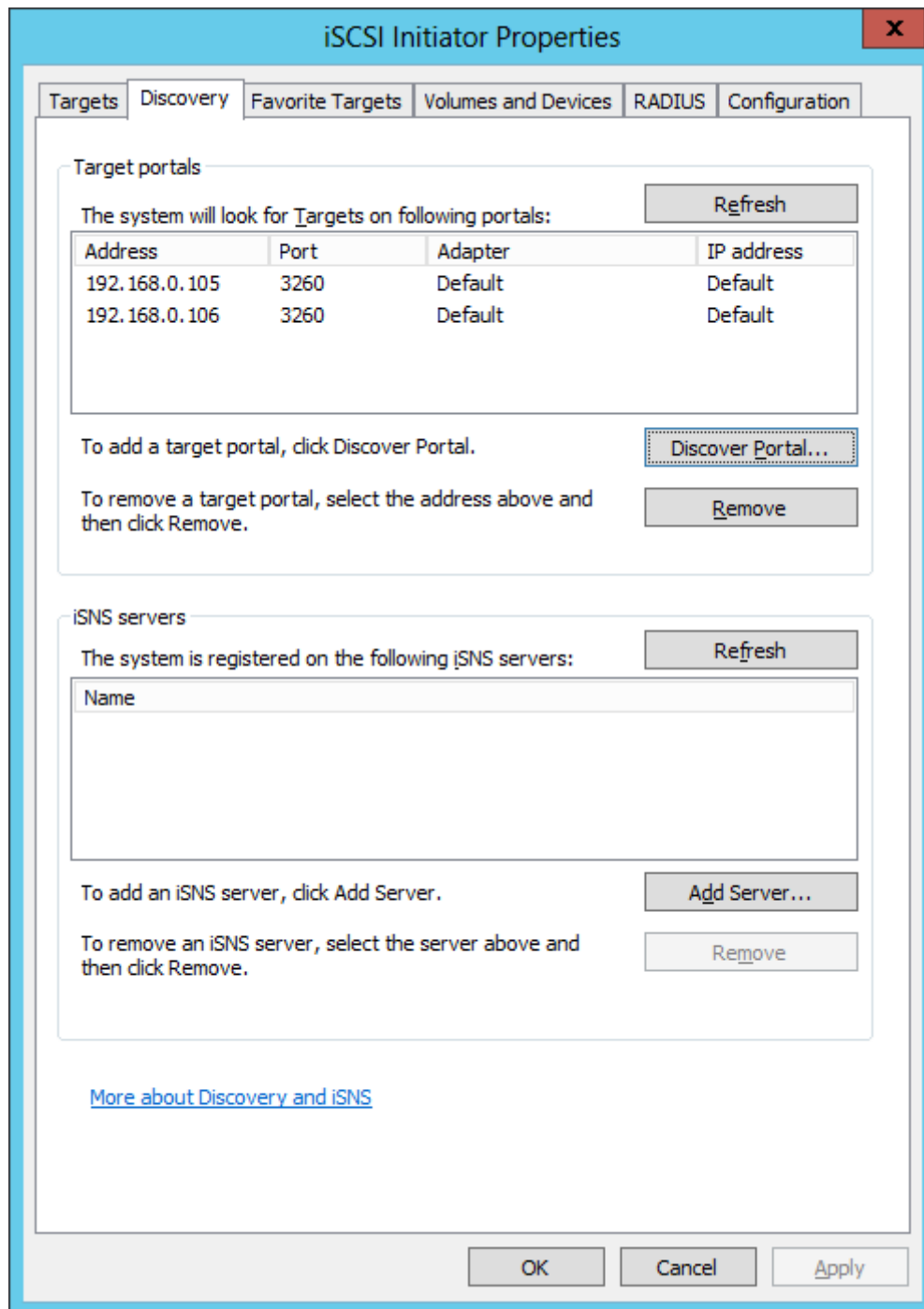


Select **Multipath I/O** and install it following the wizard.

## Connect to iSCSI Target

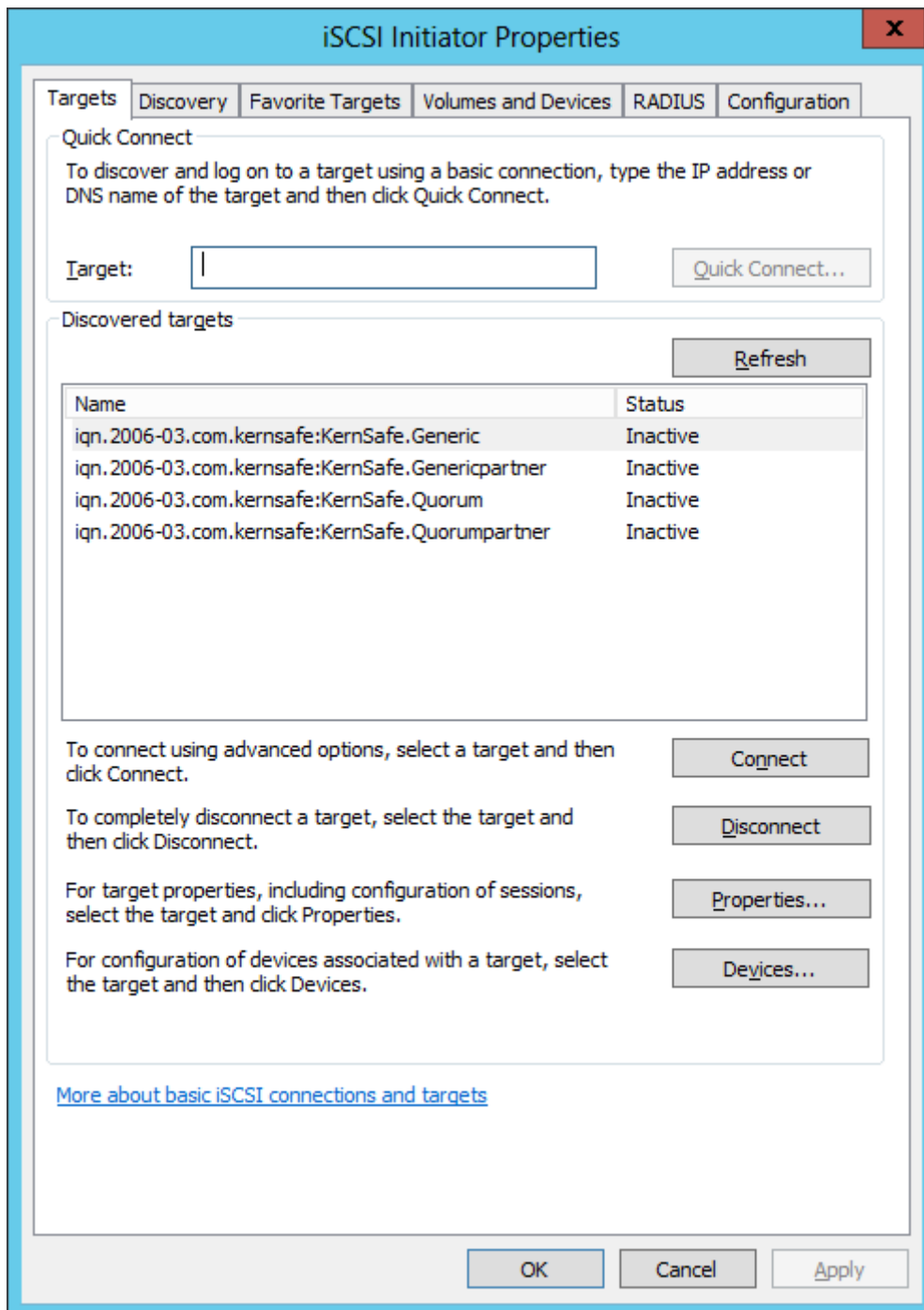
Launch the **Administrator tools-> Microsoft iSCSI initiator**.

Turn to **Discovery** tab.



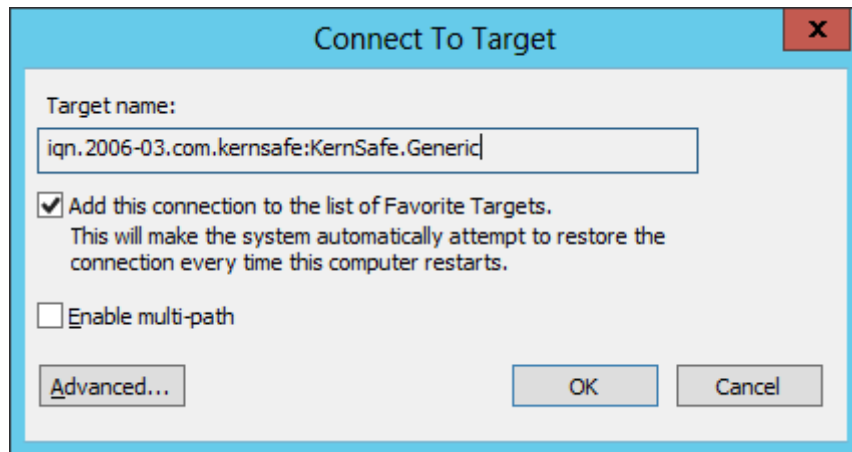
Press **Discover Portal** button and then input each IP of iStorage Server.

Then turn to **Targets** tab.



On the **Discovered targets** list, you will see all four targets we have created on iStorage Server.

Select first one and press **Connect**.



Keep default and press **OK** to connect.

Connect other three targets in the same way.

iSCSI Initiator Properties

X

Targets

Discovery

Favorite Targets

Volumes and Devices

RADIUS

Configuration

Quick Connect

To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.

Target:

Quick Connect...

Discovered targets

Refresh

Name	Status
iqn.2006-03.com.kernsafe:KernSafe.Generic	Connected
iqn.2006-03.com.kernsafe:KernSafe.Genericpartner	Connected
iqn.2006-03.com.kernsafe:KernSafe.Quorum	Connected
iqn.2006-03.com.kernsafe:KernSafe.Quorumpartner	Connected

To connect using advanced options, select a target and then click Connect.

Connect

To completely disconnect a target, select the target and then click Disconnect.

Disconnect

For target properties, including configuration of sessions, select the target and click Properties.

Properties...

For configuration of devices associated with a target, select the target and then click Devices.

Devices...

[More about basic iSCSI connections and targets](#)

OK

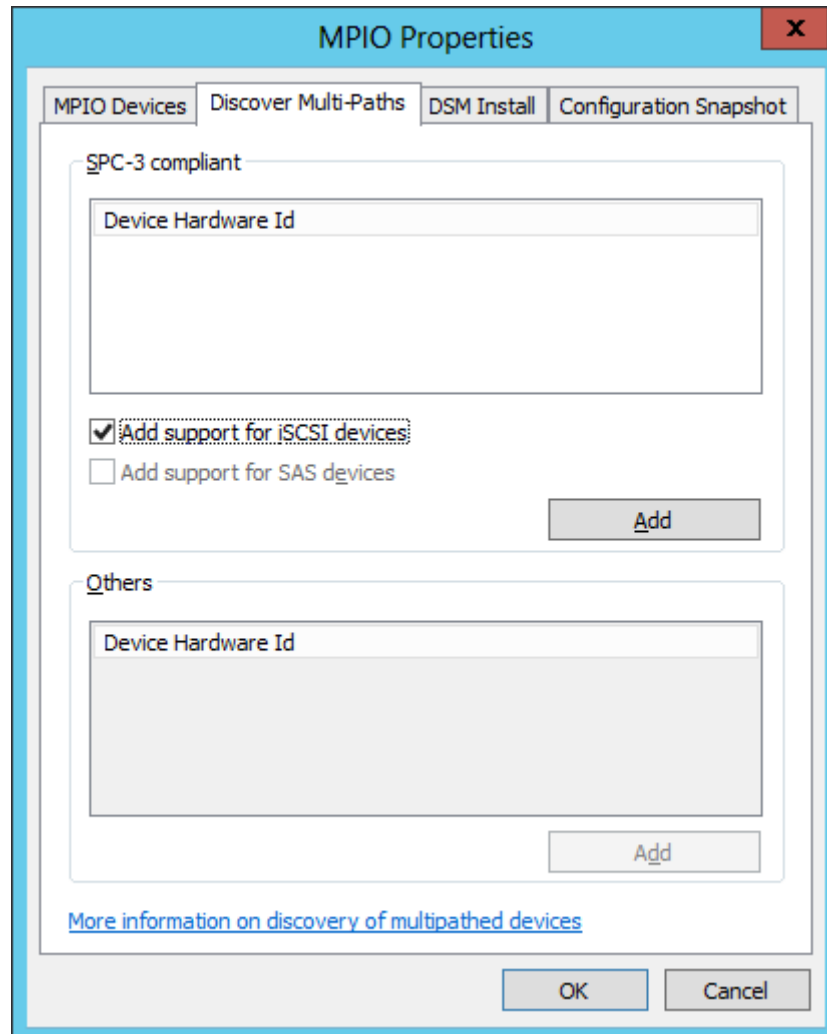
Cancel

Apply

67

## Enable MPIO

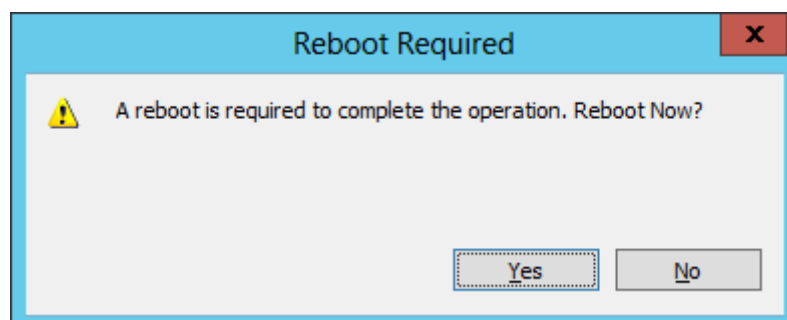
Launch **Administrative Tools-> MPIO**.



Turn to **Discover Multi-Paths** tab.

Check **Add support for iSCSI devices** and then press **Add**.

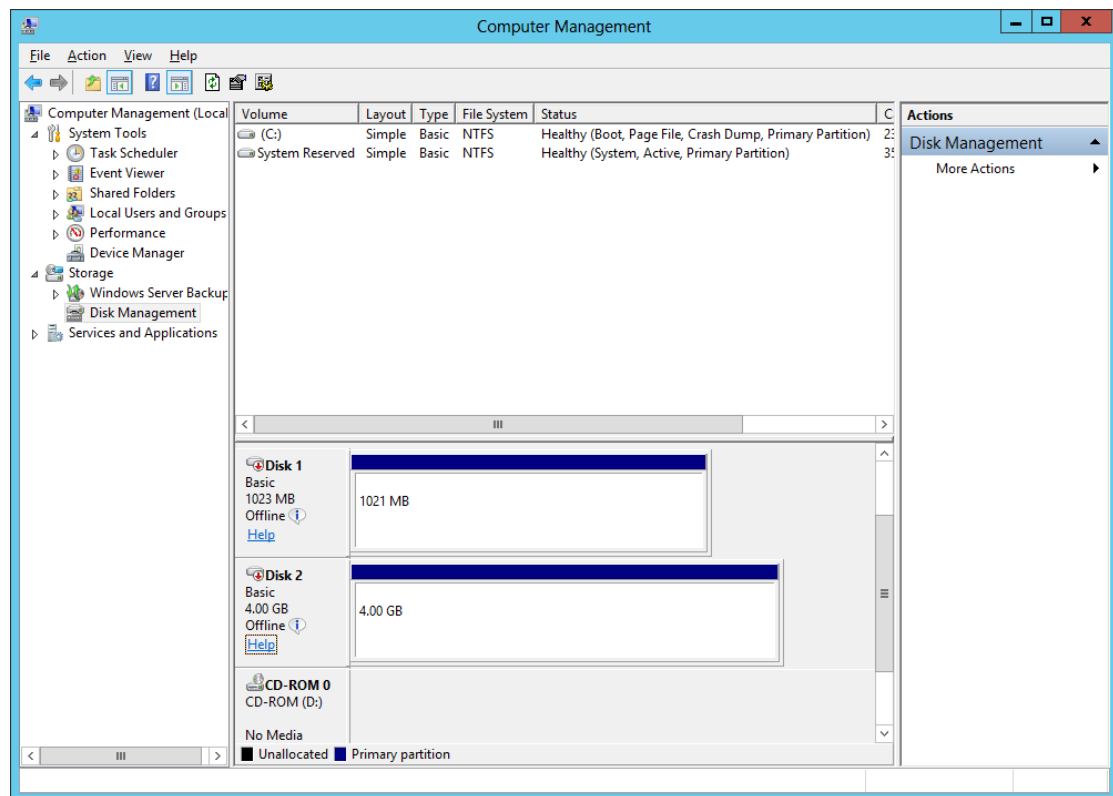
Press **OK** to continue.



Reboot is required to enable MPIO.

Press **Yes** to restart.

After the node is successfully restarted, launch **Administrative Tools->Computer Management**.



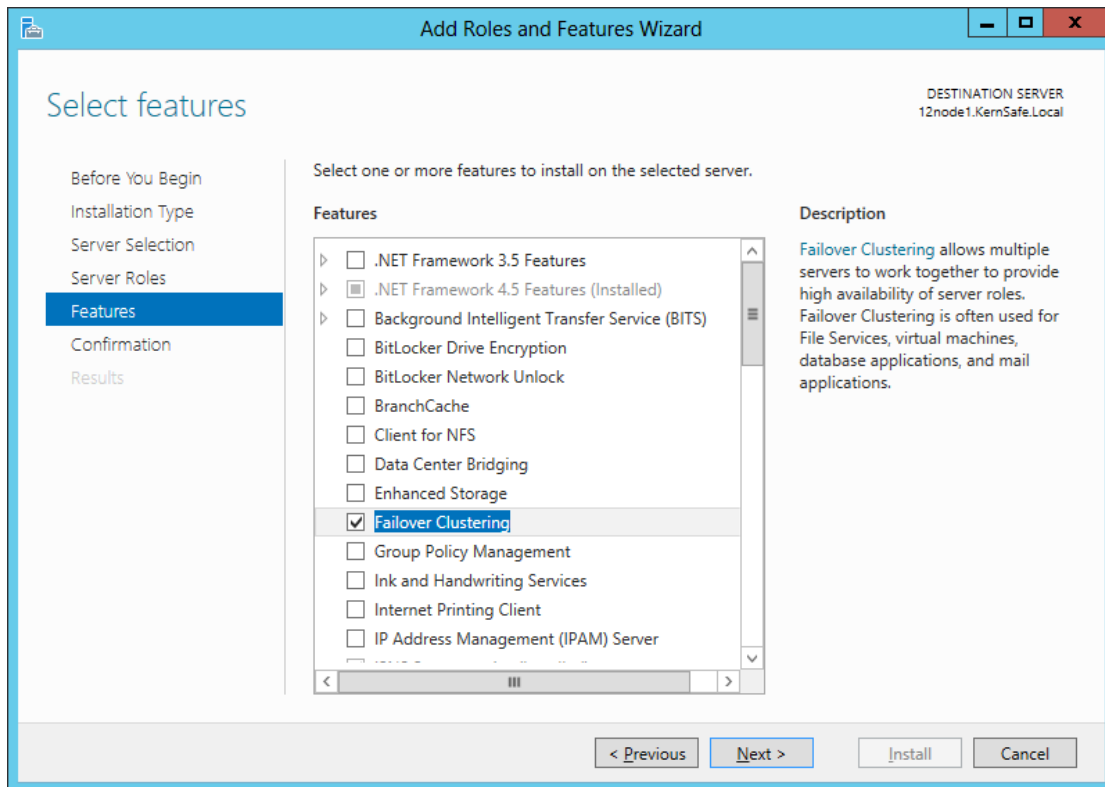
Disk 1 and Disk 2 are offline.

**Note:** We should not bring them online.

## Install Failover Clustering

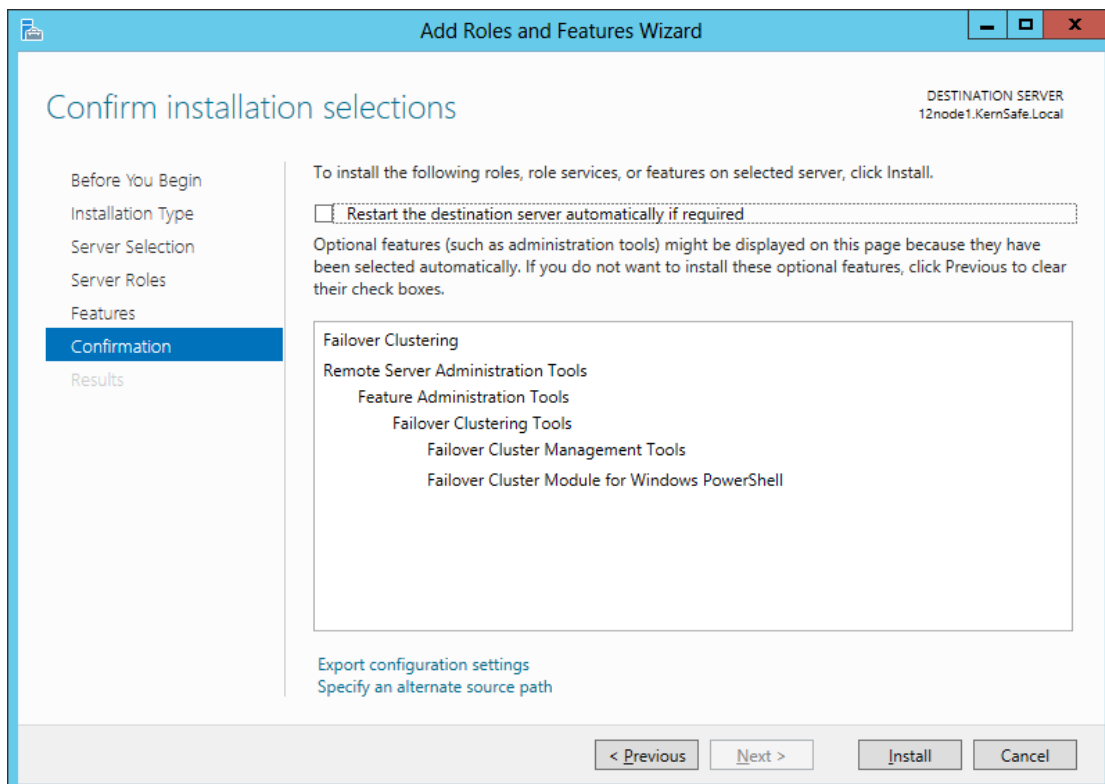
Launch **Server Manager Management Console** and click the **Manage** on the top right corner, then select **Add Roles and Features**. The Wizard will be shown as below.



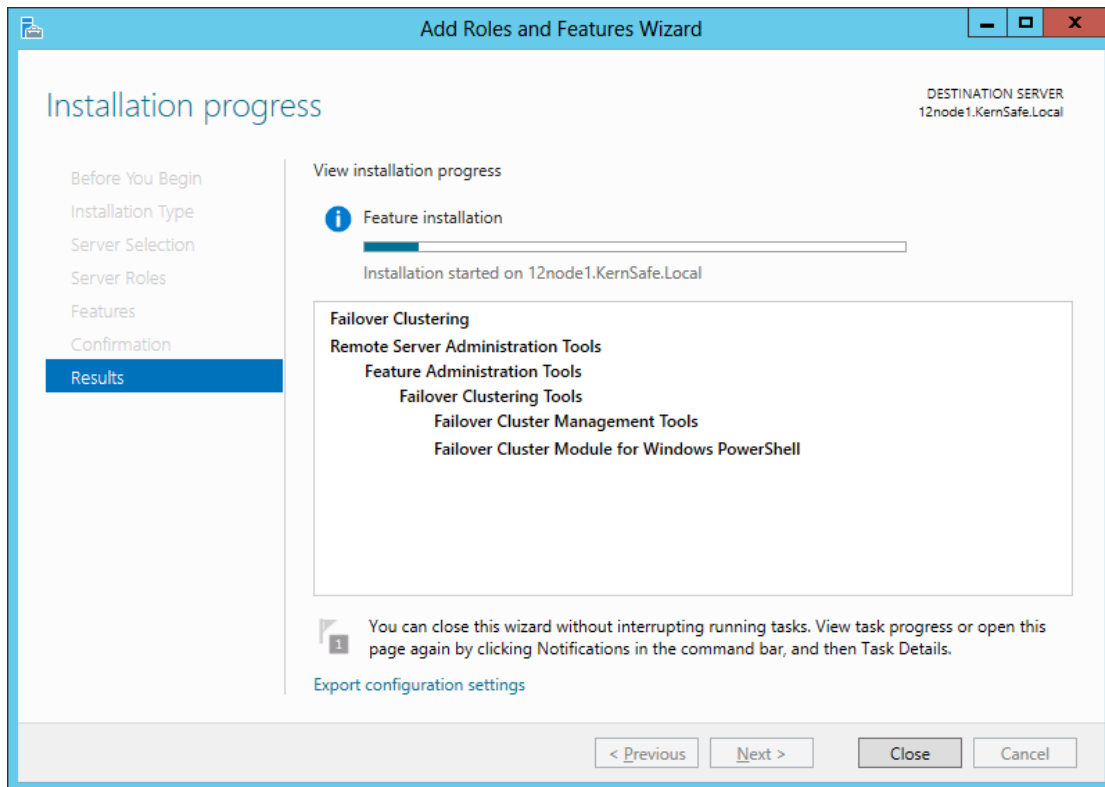


Select Feature **Failover Clustering**.

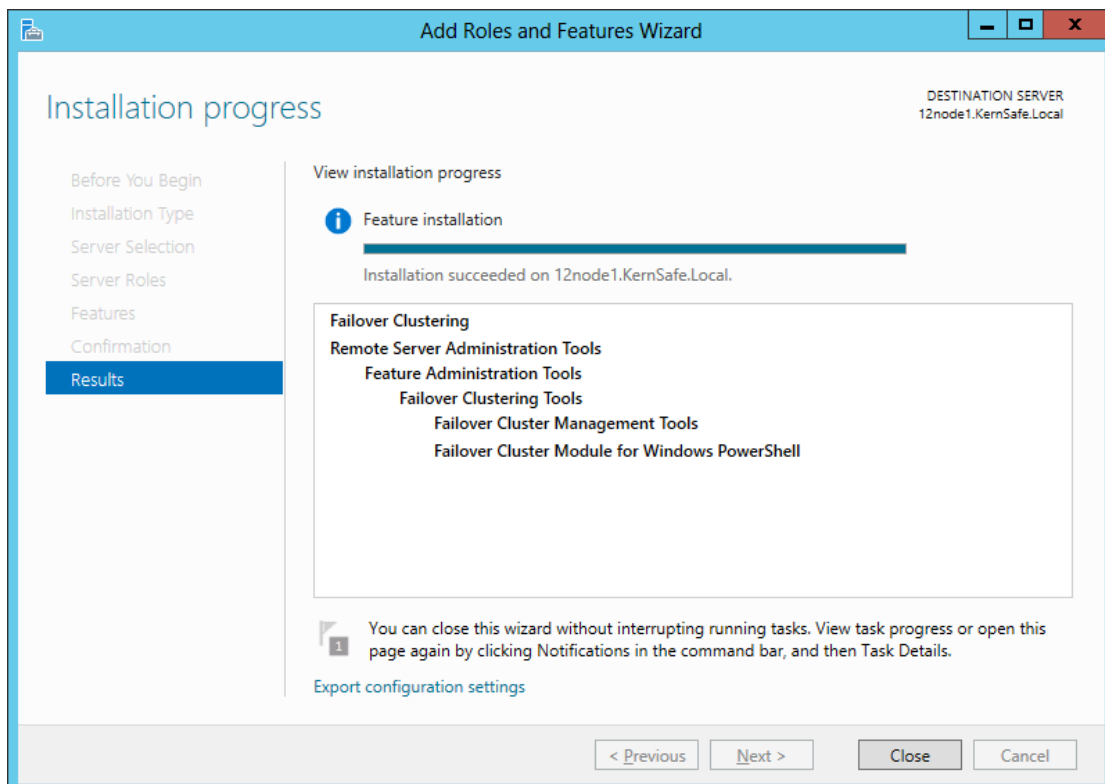
Press **Next** to continue.



Press **Install** to add **Failover Clustering** feature.



**Note:** You can close the windows to make it work in the background.



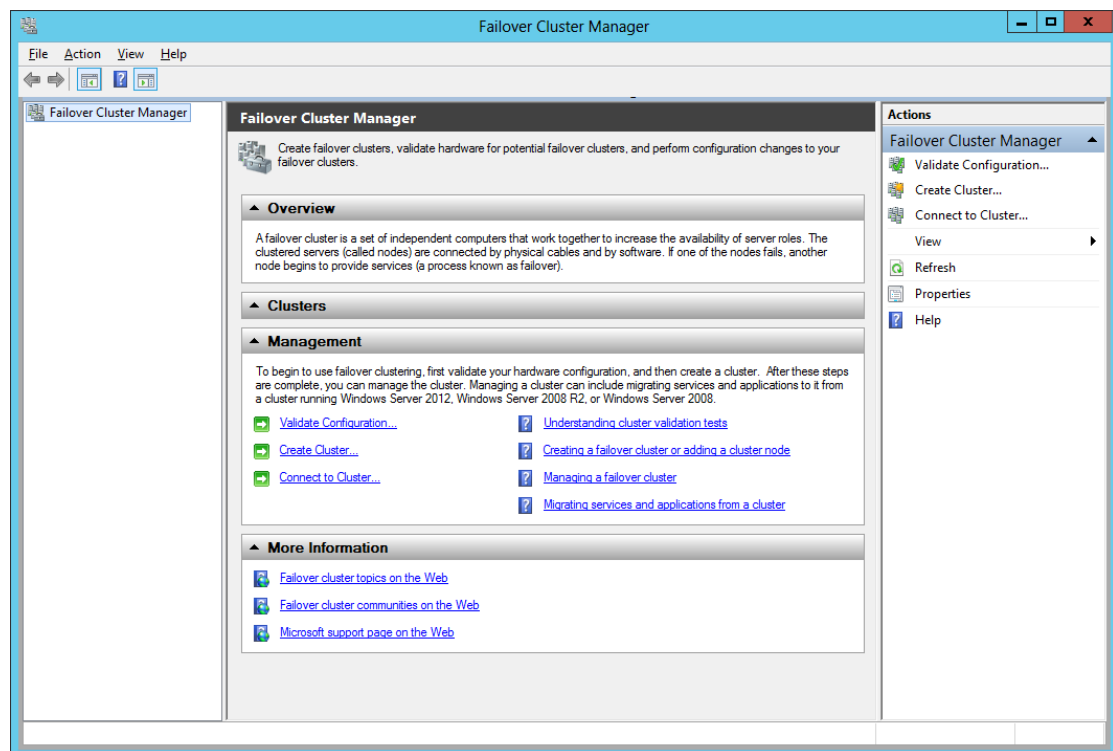
After the feature installation succeeds, you can press **Close** button.

# Configure Failover Clustering

## Validate a Configuration

**Note:** This step is not necessary for creating a cluster, but it ensures the configuration is suitable for failover clustering.

Launch the **Failover Cluster Manager** in node1 or node2.



Click **Validate Configuration...** on the right tree view.

The **Validate a Configuration Wizard** will be shown as below.

The screenshot shows the 'Validate a Configuration Wizard' window. The title bar is blue with the text 'Validate a Configuration Wizard' and a close button. The main area has a light blue header with a green checkmark icon and the text 'Before You Begin'. On the left is a vertical navigation pane with the following items: 'Before You Begin' (highlighted), 'Select Servers or a Cluster', 'Testing Options', 'Confirmation', 'Validating', and 'Summary'. The main content area contains the following text: 'This wizard runs validation tests to determine whether this configuration of servers and attached storage is set up correctly to support failover. A cluster solution is supported by Microsoft only if the complete configuration (servers, network, and storage) passes all tests in this wizard. In addition, all hardware components in the cluster solution must be "Certified for Windows Server 2012."' followed by two paragraphs of instructions for unclustered servers and existing failover clusters. Below this is a checkbox labeled 'Do not show this page again'. At the bottom right are 'Next >' and 'Cancel' buttons.

**Before You Begin**

This wizard runs validation tests to determine whether this configuration of servers and attached storage is set up correctly to support failover. A cluster solution is supported by Microsoft only if the complete configuration (servers, network, and storage) passes all tests in this wizard. In addition, all hardware components in the cluster solution must be "Certified for Windows Server 2012."

If you want to validate a set of unclustered servers, you need to know the names of the servers. Important: the storage connected to the selected servers will be unavailable during validation tests.

If you want to validate an existing failover cluster, you need to know the name of the cluster or one of its nodes.

You must be a local administrator on each of the servers that you want to validate.

To continue, click Next.

[More about preparing your hardware for validation](#)

[More about cluster validation tests](#)

☐ Do not show this page again

Next > Cancel

Press **Next** to continue.

The screenshot shows the 'Validate a Configuration Wizard' window at the 'Select Servers or a Cluster' step. The title bar is blue with the text 'Validate a Configuration Wizard' and a close button. The main area has a light blue header with a green checkmark icon and the text 'Select Servers or a Cluster'. On the left is a vertical navigation pane with the following items: 'Before You Begin', 'Select Servers or a Cluster' (highlighted), 'Testing Options', 'Confirmation', 'Validating', and 'Summary'. The main content area contains the following text: 'To validate a set of servers, add the names of all the servers. To test an existing cluster, add the name of the cluster or one of its nodes.' Below this is a text input field labeled 'Enter name:' with a 'Browse...' button to its right. Below the input field is a list box labeled 'Selected servers:' with 'Add' and 'Remove' buttons to its right. At the bottom right are '< Previous', 'Next >', and 'Cancel' buttons.

**Select Servers or a Cluster**

To validate a set of servers, add the names of all the servers. To test an existing cluster, add the name of the cluster or one of its nodes.

Enter name:  Browse...

Selected servers:

Add Remove

< Previous Next > Cancel

Press **Browse...**



Click **Find Now**.

**Select Computers**

Select this object type:  
Computers Object Types...

From this location:  
KemSafe.Local Locations...

**Common Queries**

Name: Starts with

Description: Starts with

☐ Disabled accounts

☐ Non expiring password

Days since last logon:

Columns...

Find Now

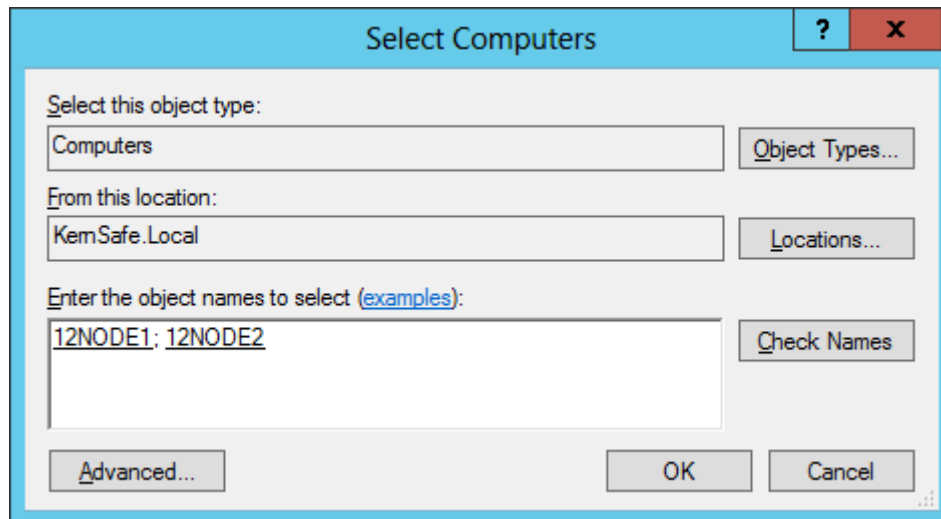
Stop

Search results: OK Cancel

Name	In Folder
12NODE1	KemSafe.Local/...
12NODE2	KemSafe.Local/...
WIN-SJTUU9...	KemSafe.Local/...

Select **12NODE1** and press **OK**.

Then add **12NODE2** and press **OK**.



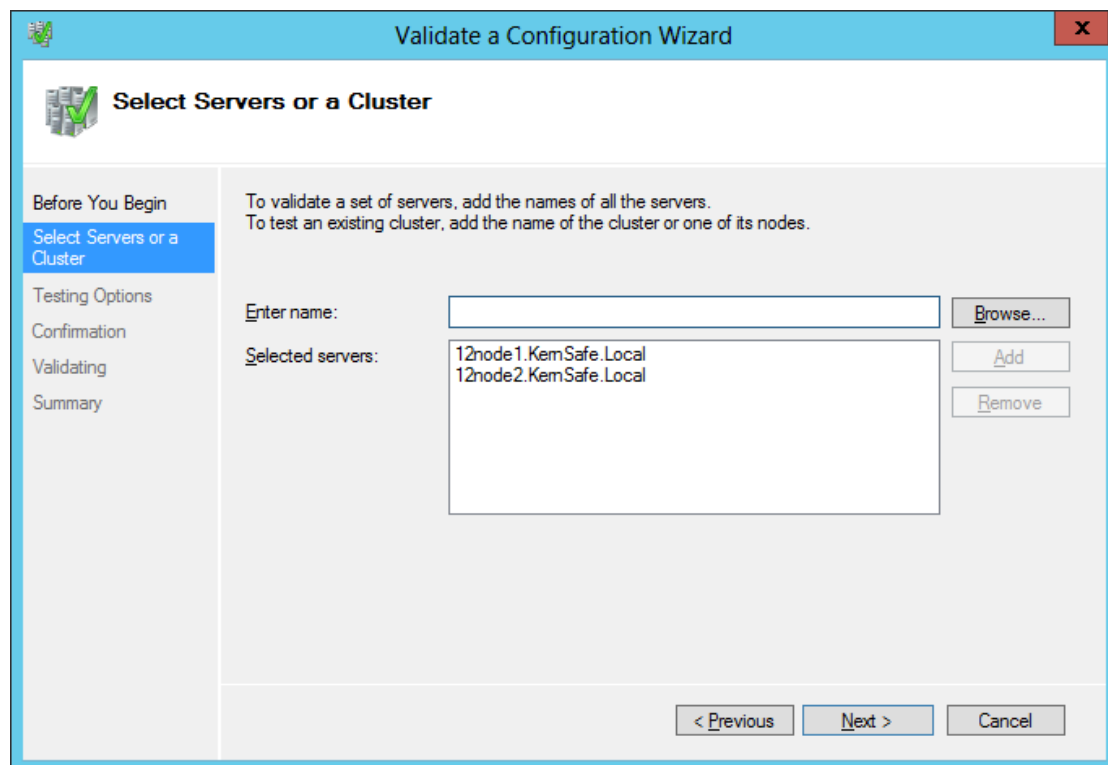
**Select Computers**

Select this object type:

From this location:

Enter the object names to select (examples):

Press **OK** to continue.



**Validate a Configuration Wizard**

**Select Servers or a Cluster**

Before You Begin  
**Select Servers or a Cluster**  
 Testing Options  
 Confirmation  
 Validating  
 Summary

To validate a set of servers, add the names of all the servers.  
 To test an existing cluster, add the name of the cluster or one of its nodes.

Enter name:

Selected servers:

< Previous Next > Cancel

Press **Next** to continue.

**Validate a Configuration Wizard**

**Testing Options**

Before You Begin  
Select Servers or a Cluster  
**Testing Options**  
Confirmation  
Validating  
Summary

Choose between running all tests or running selected tests.

The tests examine the Cluster Configuration, Hyper-V Configuration, Inventory, Network, Storage, and System Configuration.

Microsoft supports a cluster solution only if the complete configuration (servers, network, and storage) can pass all tests in this wizard. In addition, all hardware components in the cluster solution must be "Certified for Windows Server 2012."

☒ Run all tests (recommended)  
☐ Run only tests I select

[More about cluster validation tests](#)

< Previous   Next >   Cancel

Keep default and press **Next** to continue.

**Validate a Configuration Wizard**

**Confirmation**

Before You Begin  
Select Servers or a Cluster  
Testing Options  
**Confirmation**  
Validating  
Summary

You are ready to start validation.  
Please confirm that the following settings are correct:

**Servers to Test**

- 12node1.KernSafe.Local
- 12node2.KernSafe.Local

Tests Selected by the User	Category
List Fibre Channel Host Bus Adapters	Inventory
List iSCSI Host Bus Adapters	Inventory
List SAS Host Bus Adapters	Inventory
List BIOS Information	Inventory
List Environment Variables	Inventory

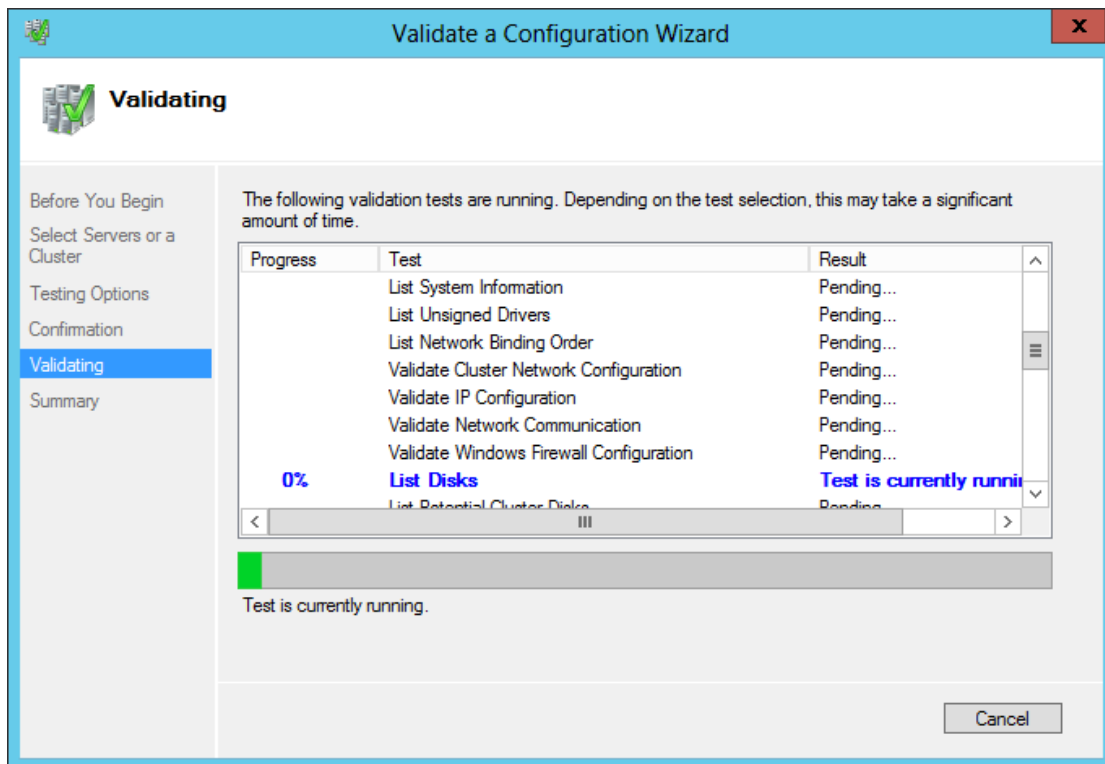
To continue, click Next.

[More about cluster validation tests](#)

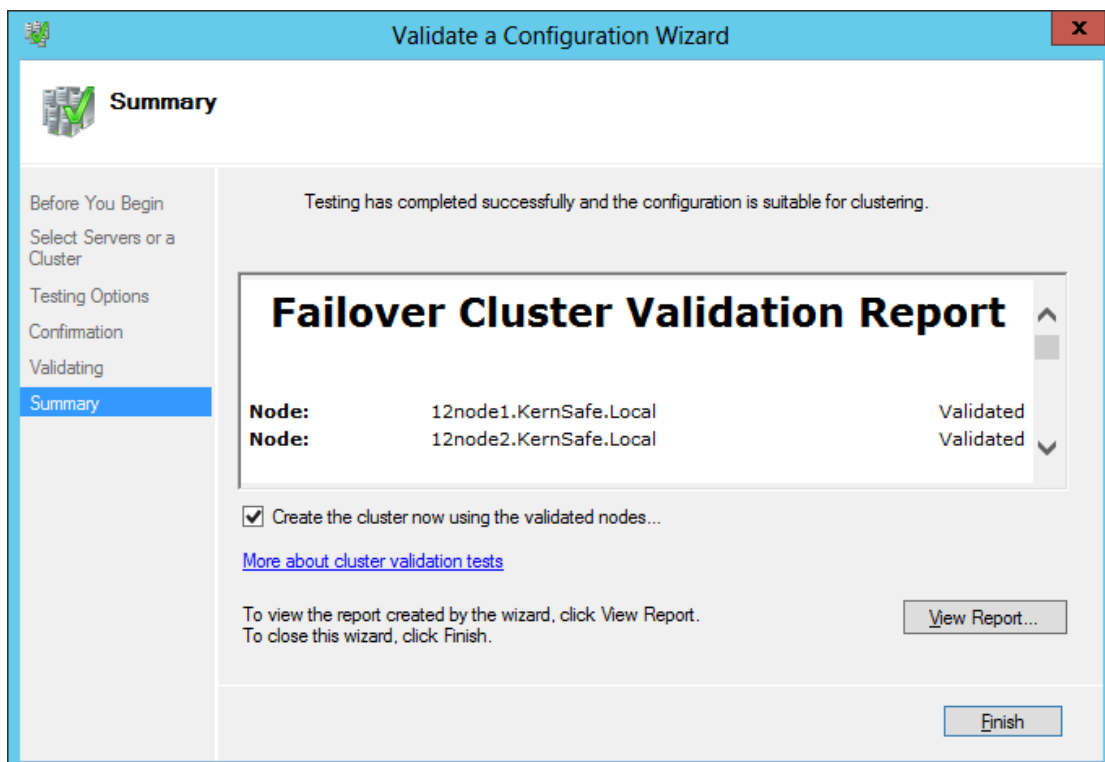
< Previous   Next >   Cancel

Press **Next** to run tests.



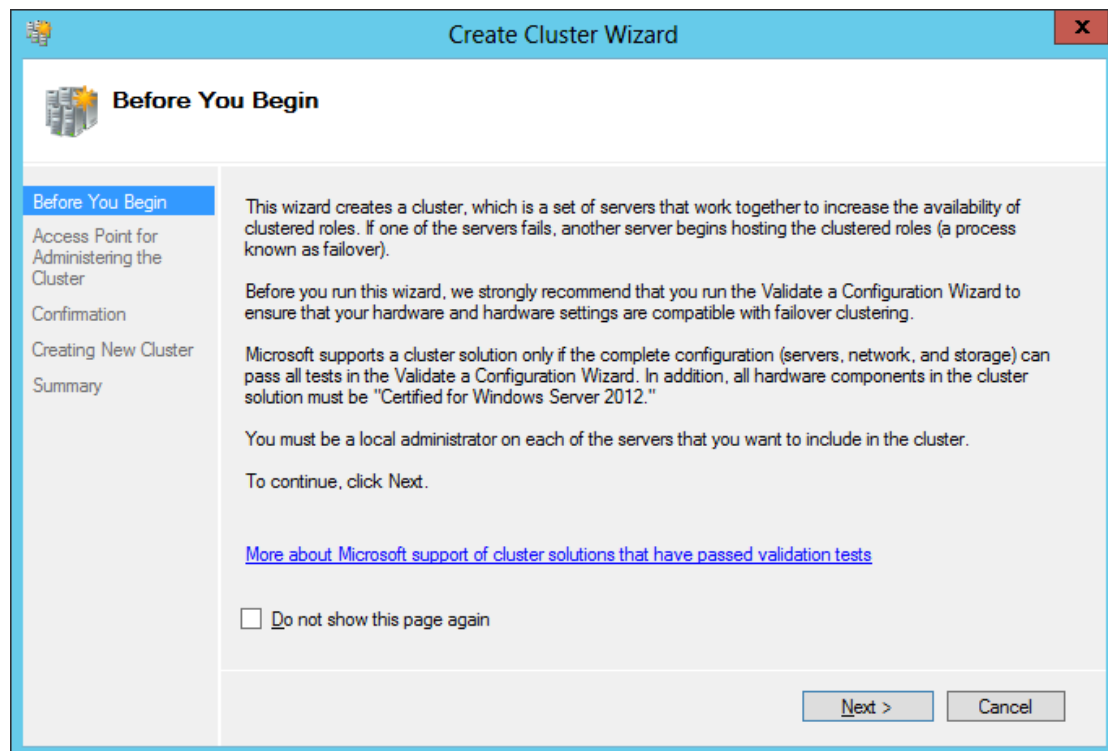


If the configuration passes the tests, you will see a dialog as below.

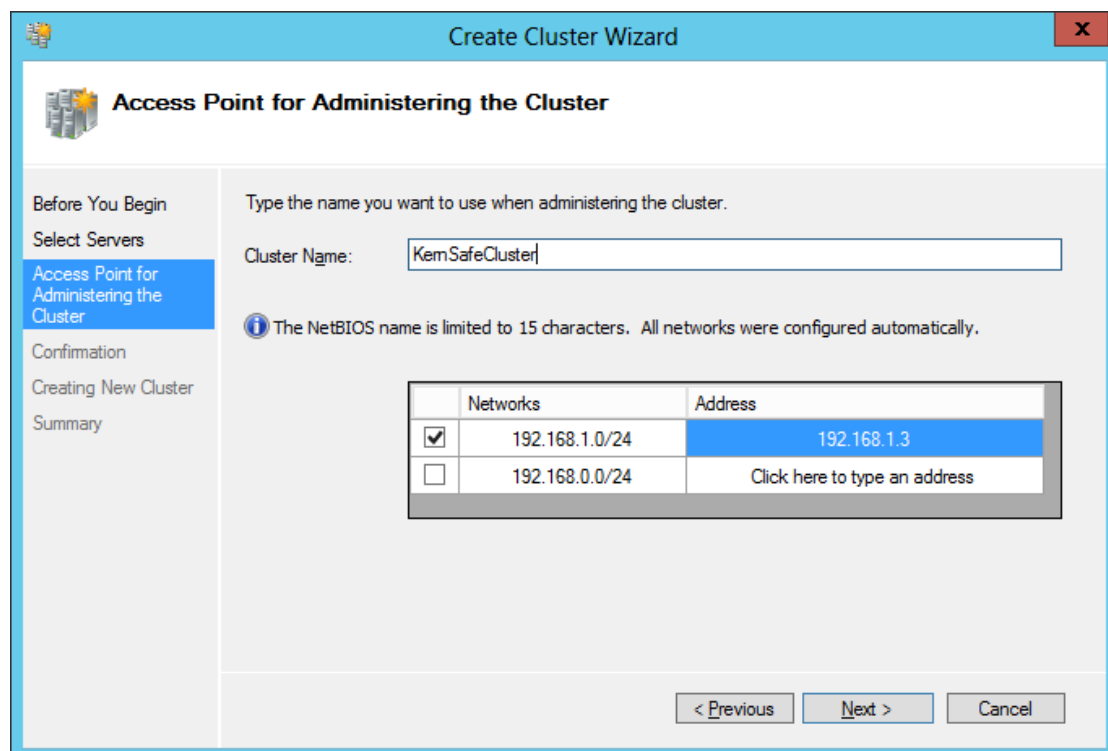


Keep default and press **Finish** to start to create a cluster.

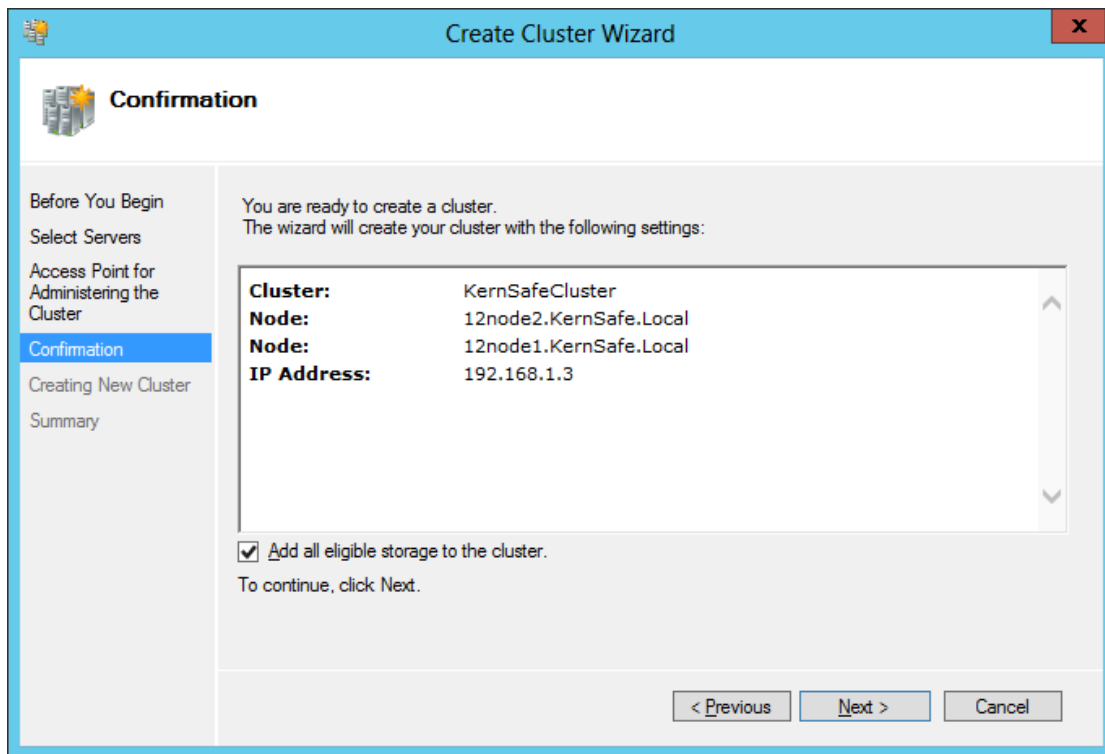
# Create Cluster



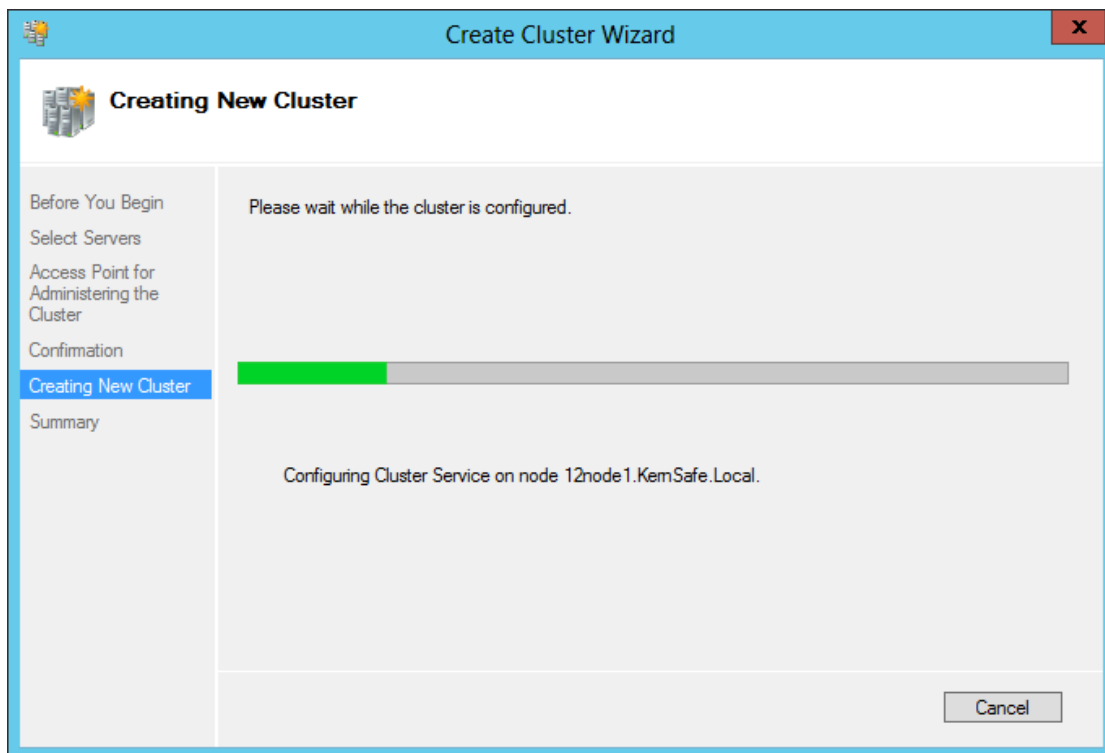
Press **Next** to continue.



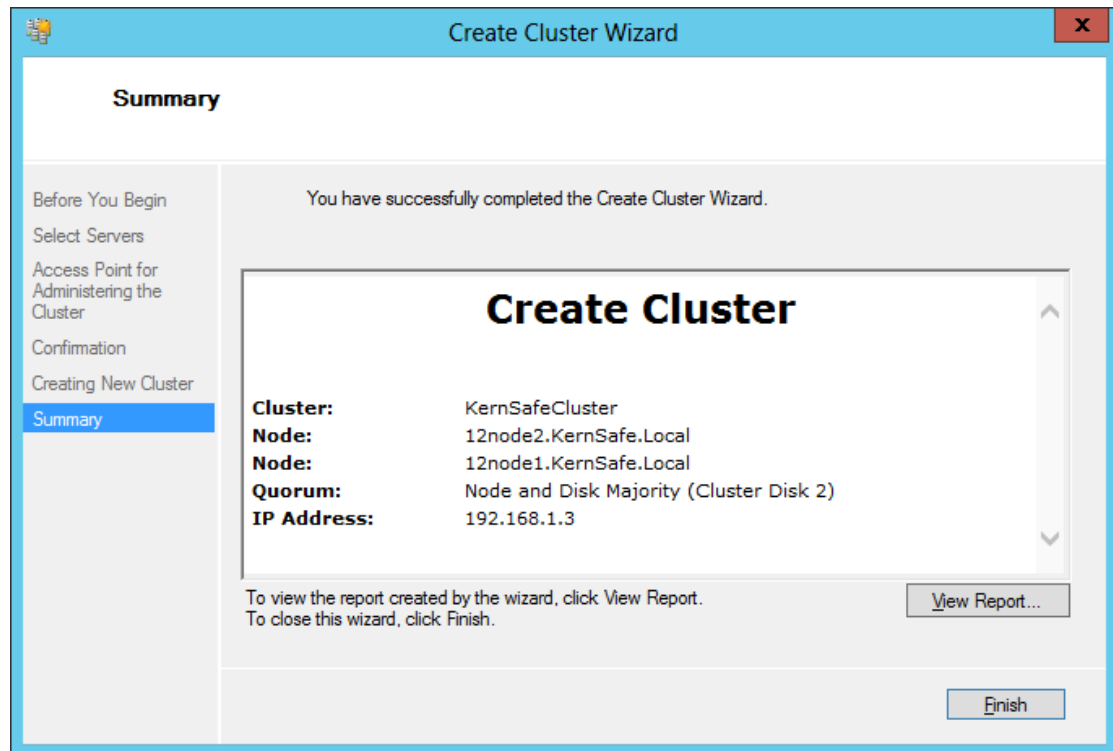
Type a **Cluster Name** and configure the IP Address of the cluster.



Keep default and press **Next** to continue.



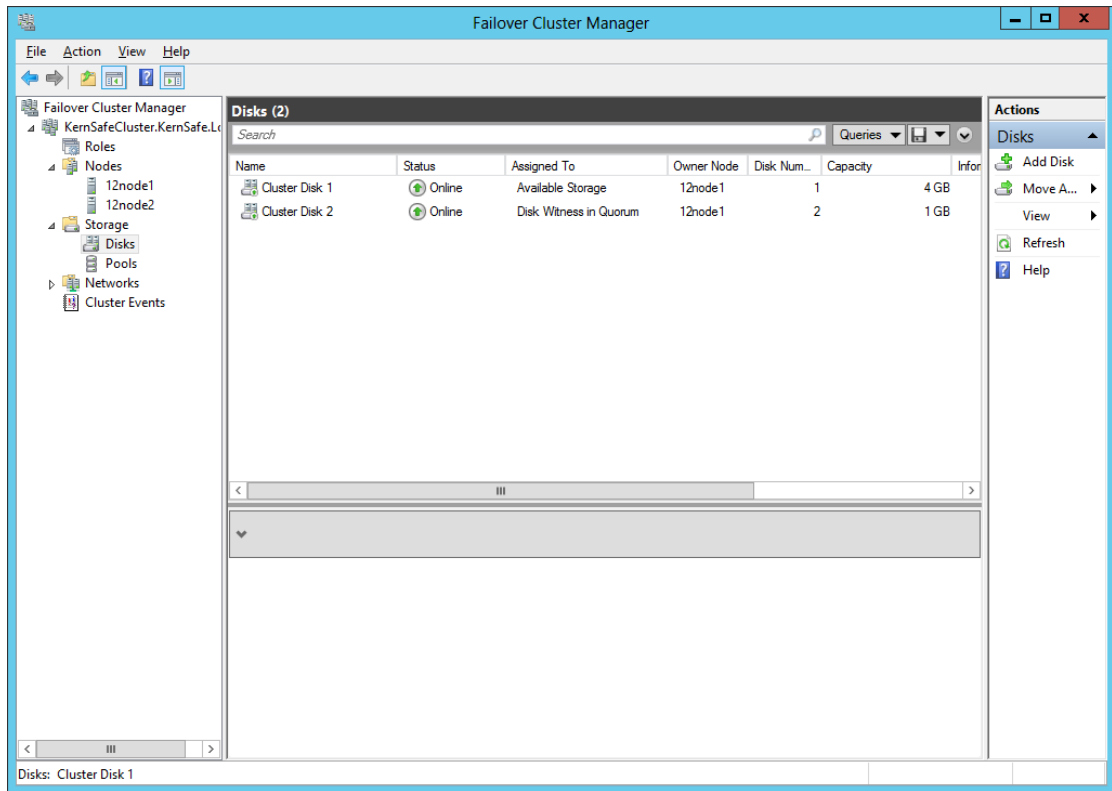
You can press **Cancel** button to stop the creation.



Check the configuration of the cluster and press **Finish** to complete.

After the Cluster is successfully created, you can connect the cluster through **Failover Cluster Manager**.

**Note:** You must log on the cluster node with domain administrator account.



## Contact

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