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

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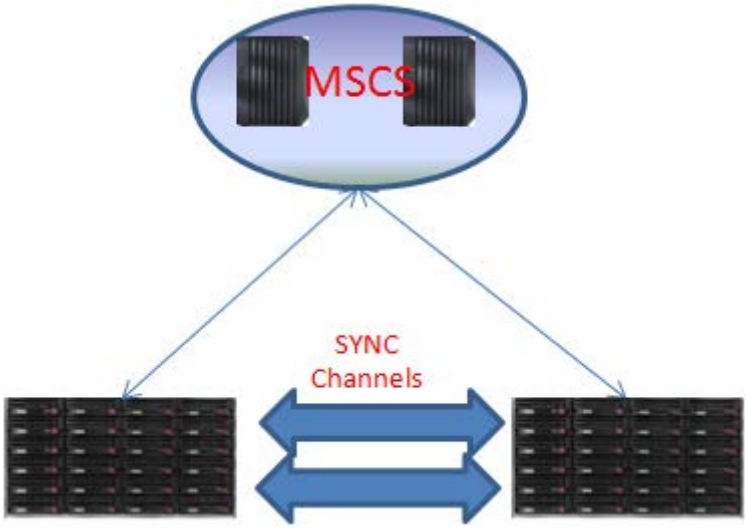
Overview

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.



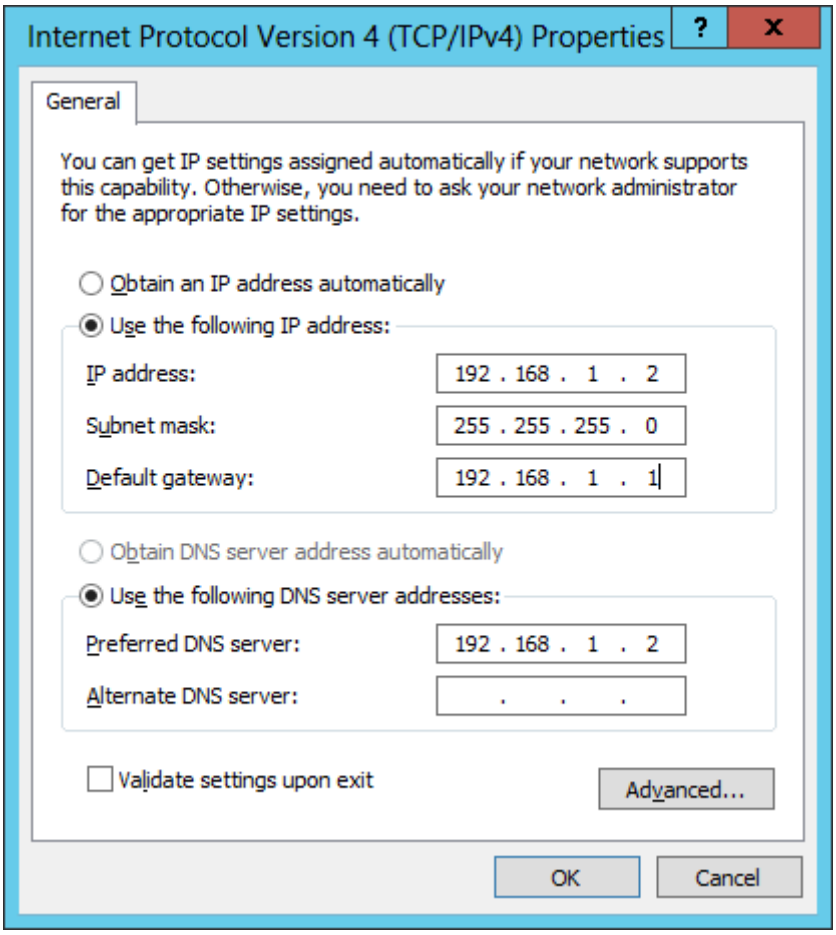
After iStorage Server 3.0, it allows to create High Availability iSCSI SAN with multiple NICs to improve performance and prevent Split-Brain.

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

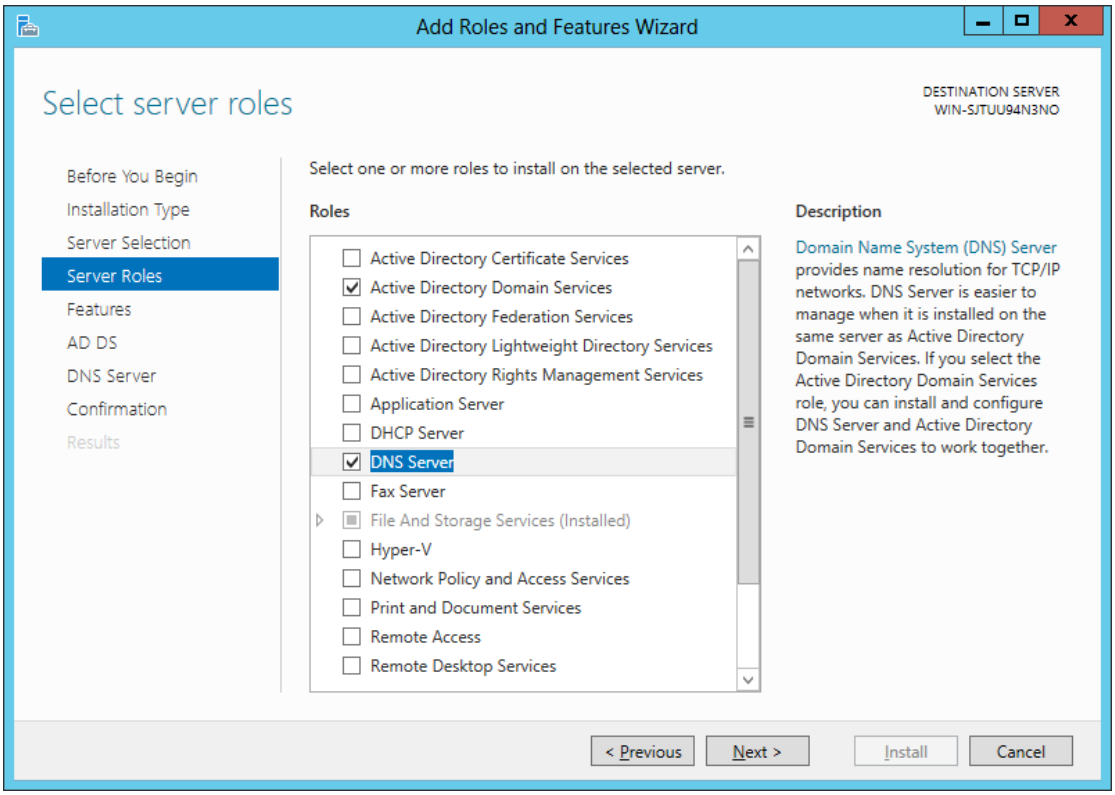
Install Active Directory and DNS roles

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.



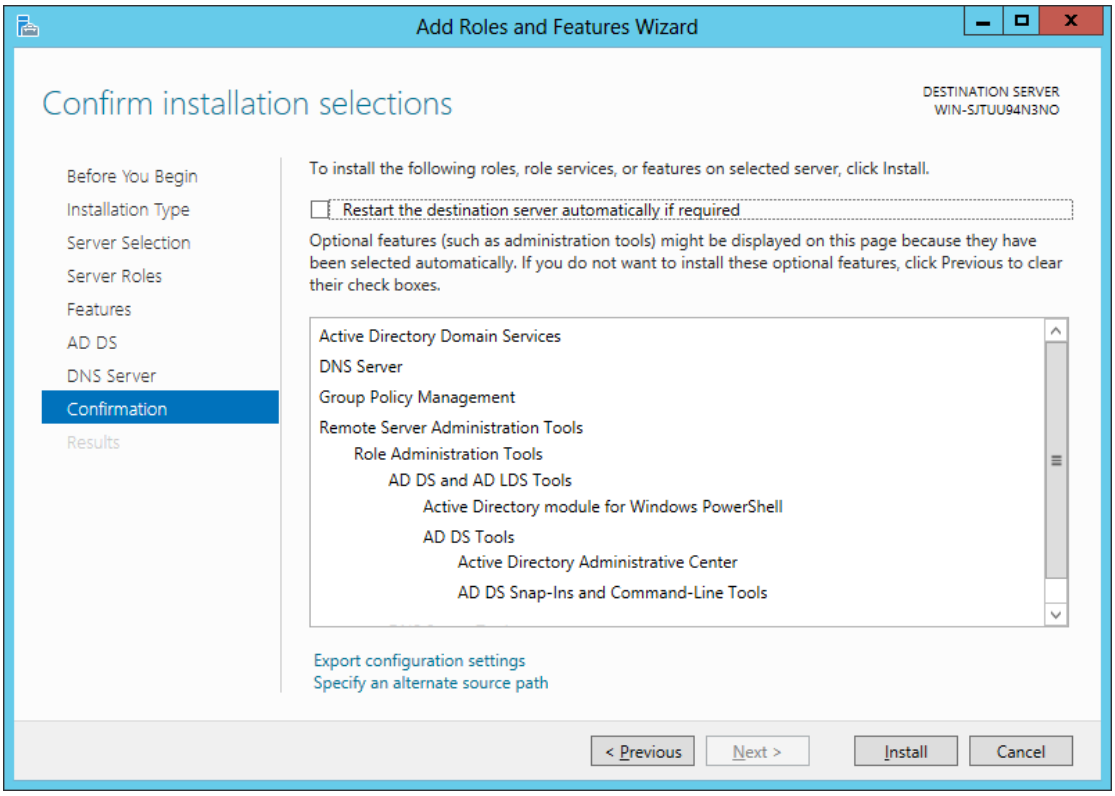
After the Network Adapter is configured successfully, we then can add the roles.

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.



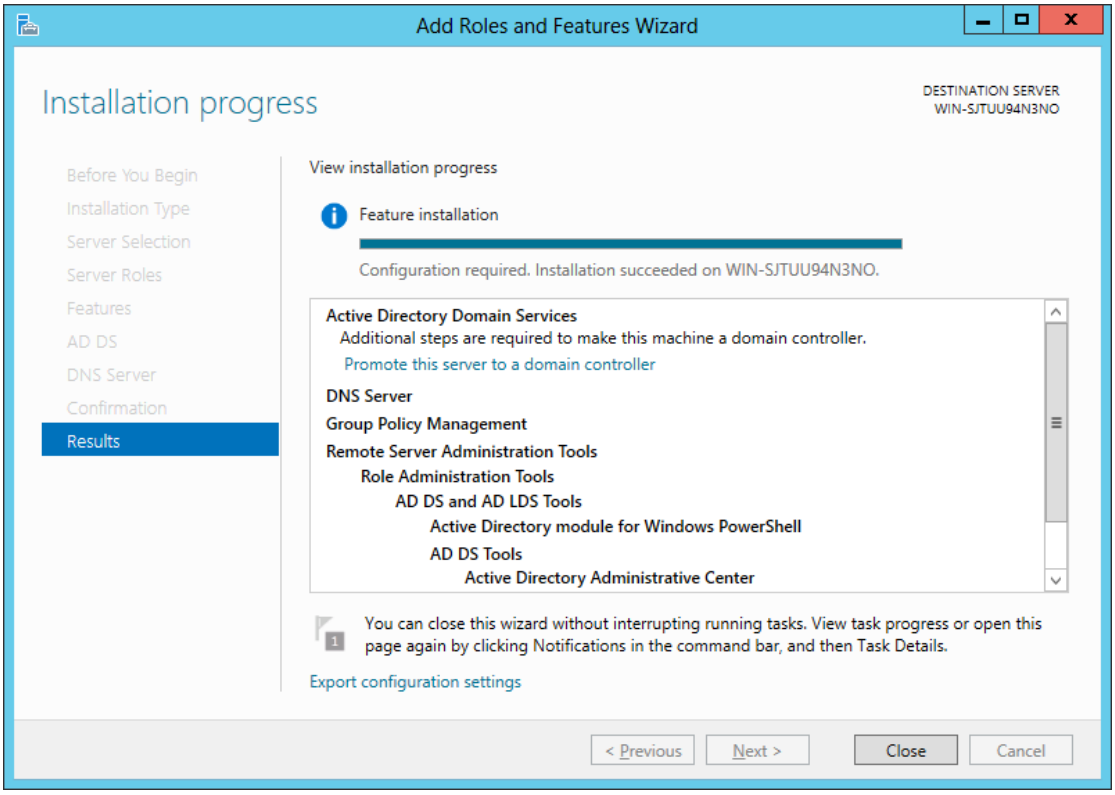
Select Roles: “**Active Directory Domain Services**” and “**DNS Server**”.

Press **Next** to continue.



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

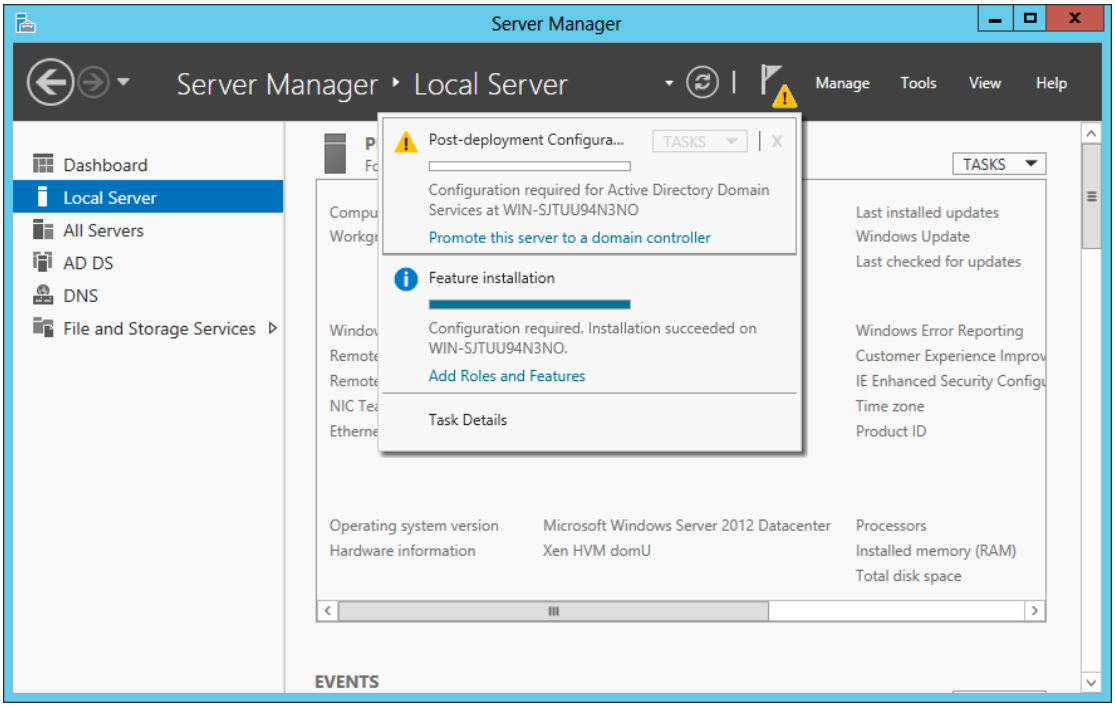
Then press **Install**.



Press **Close** to complete the installation.

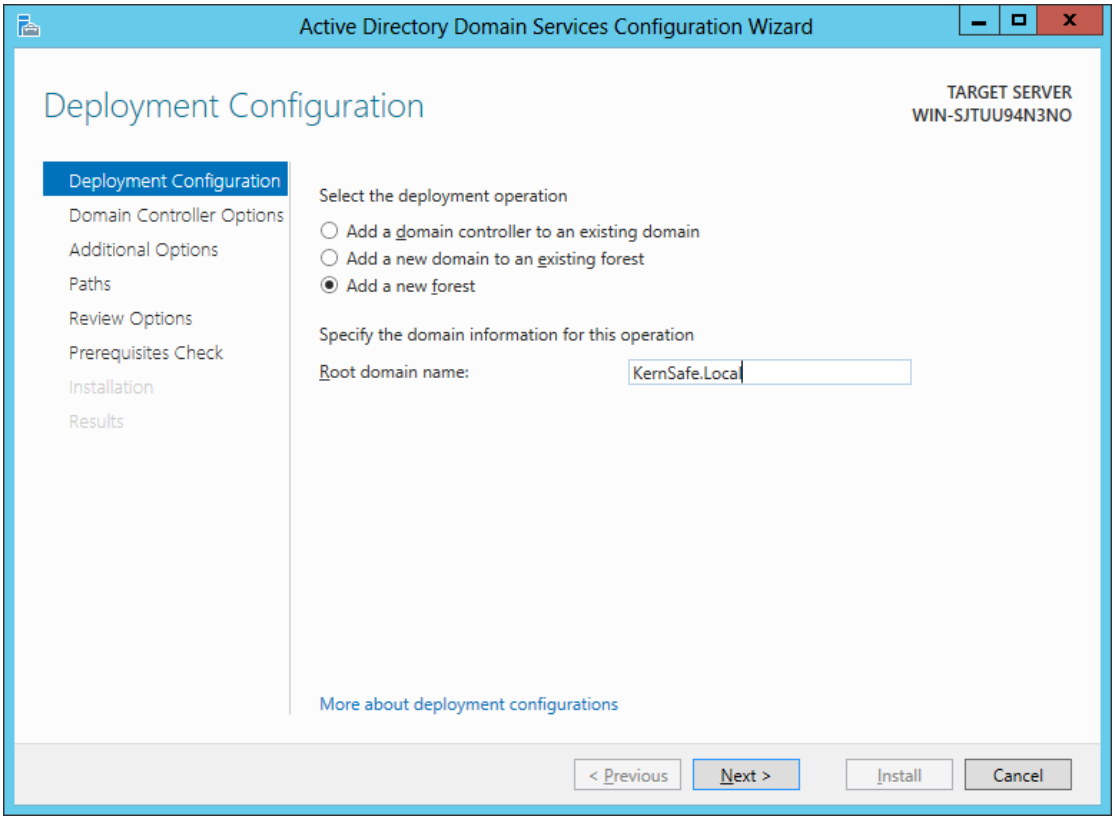
Configure Active Directory Role

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



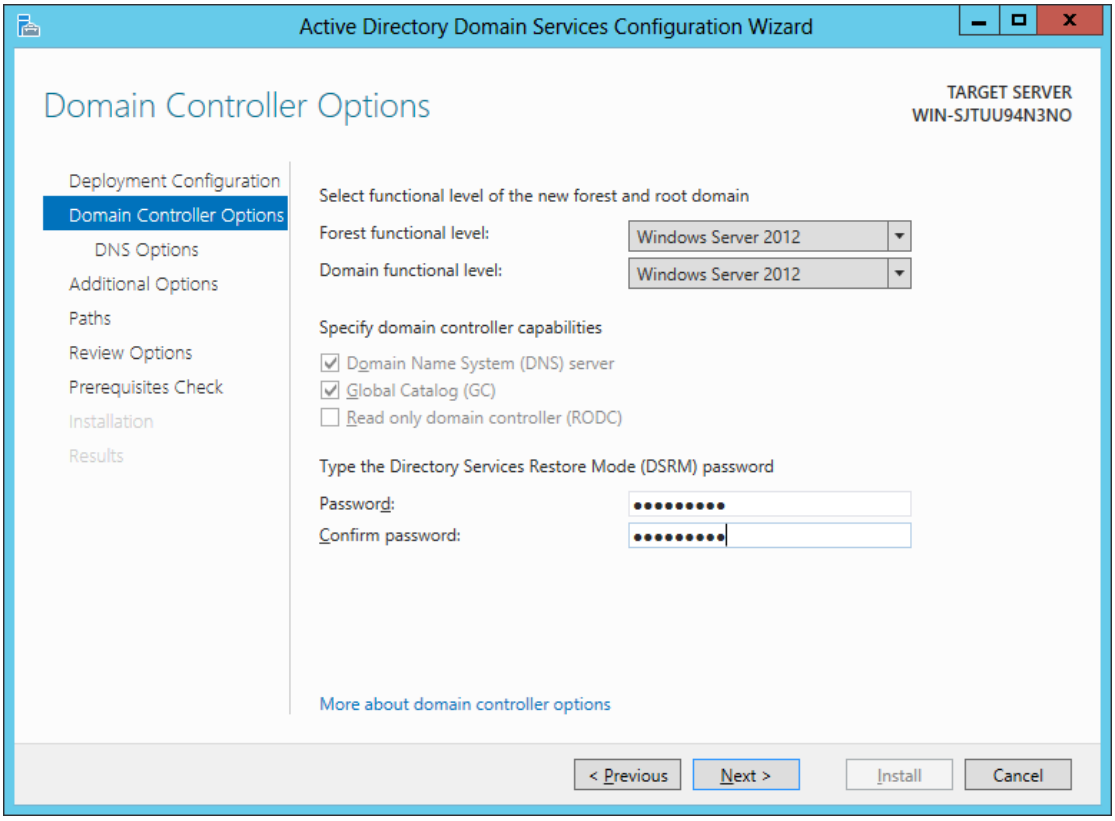
Click "**Promote this server to a domain controller**".

The configuration wizard will be shown as below.



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

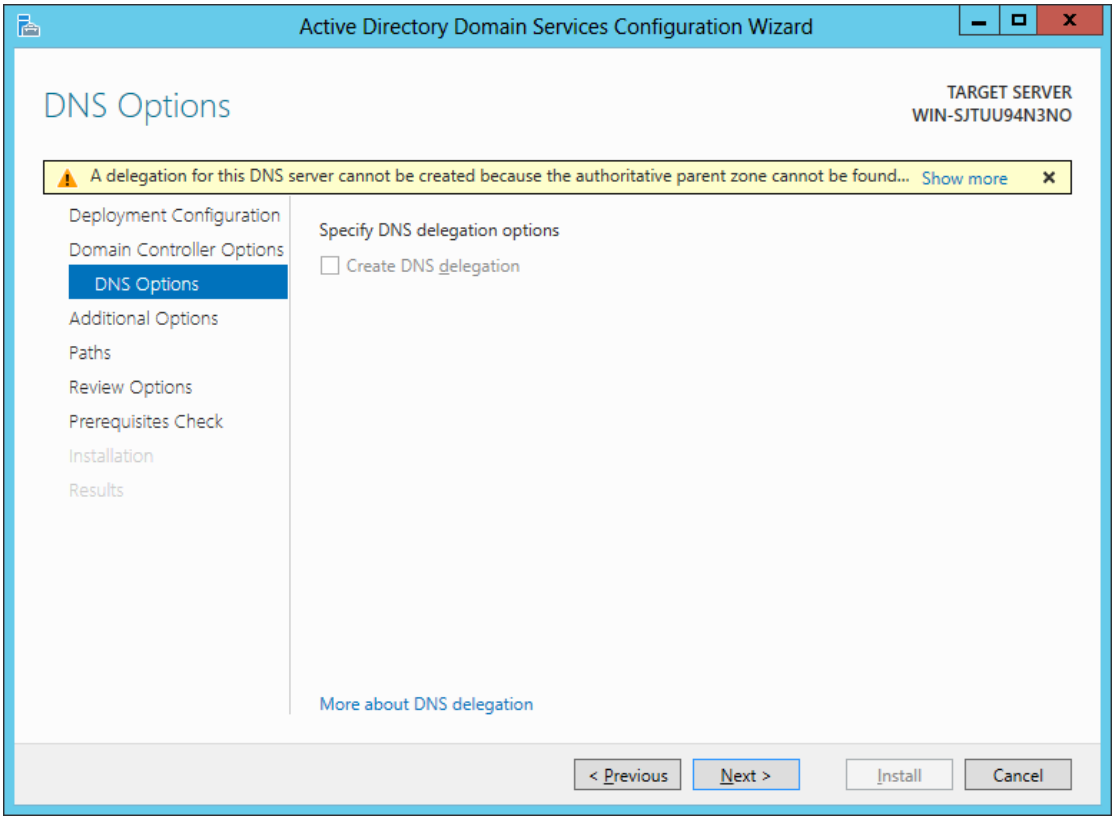
Press **Next** to continue.



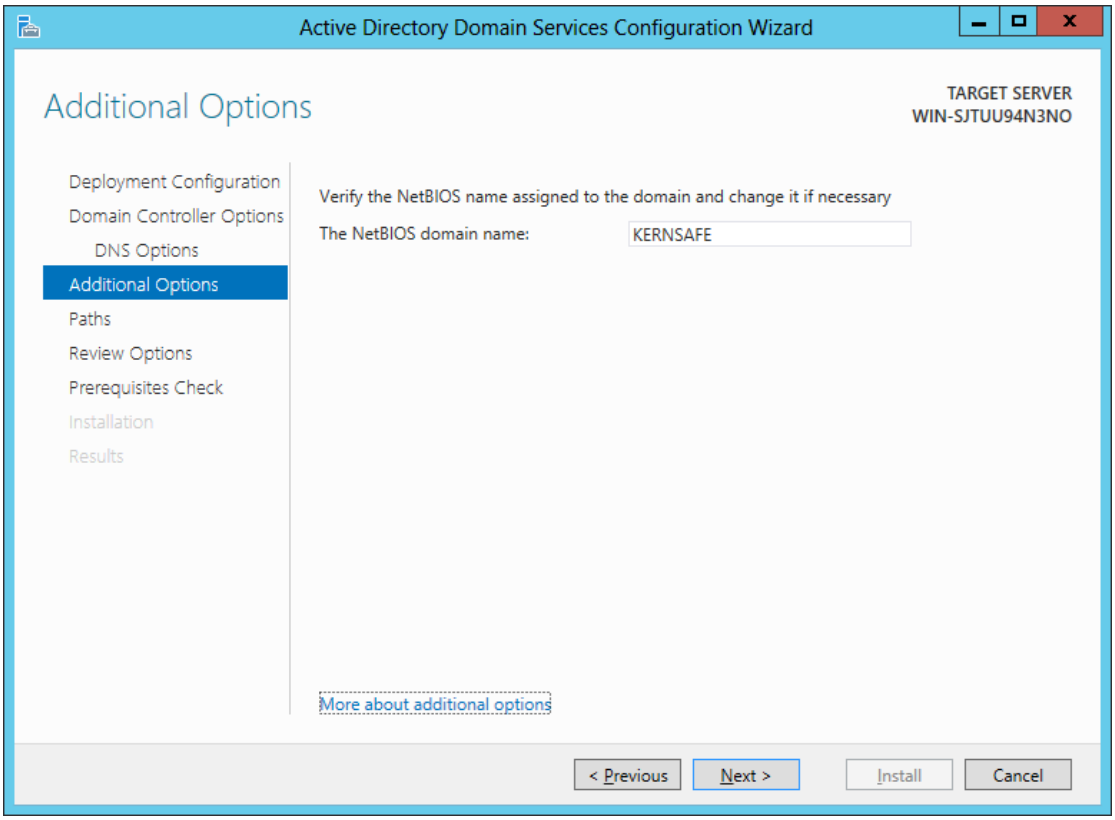
Configure the **Forest functional level** and **Domain functional level**.

Type the DSRM password.

Press **Next** to continue.

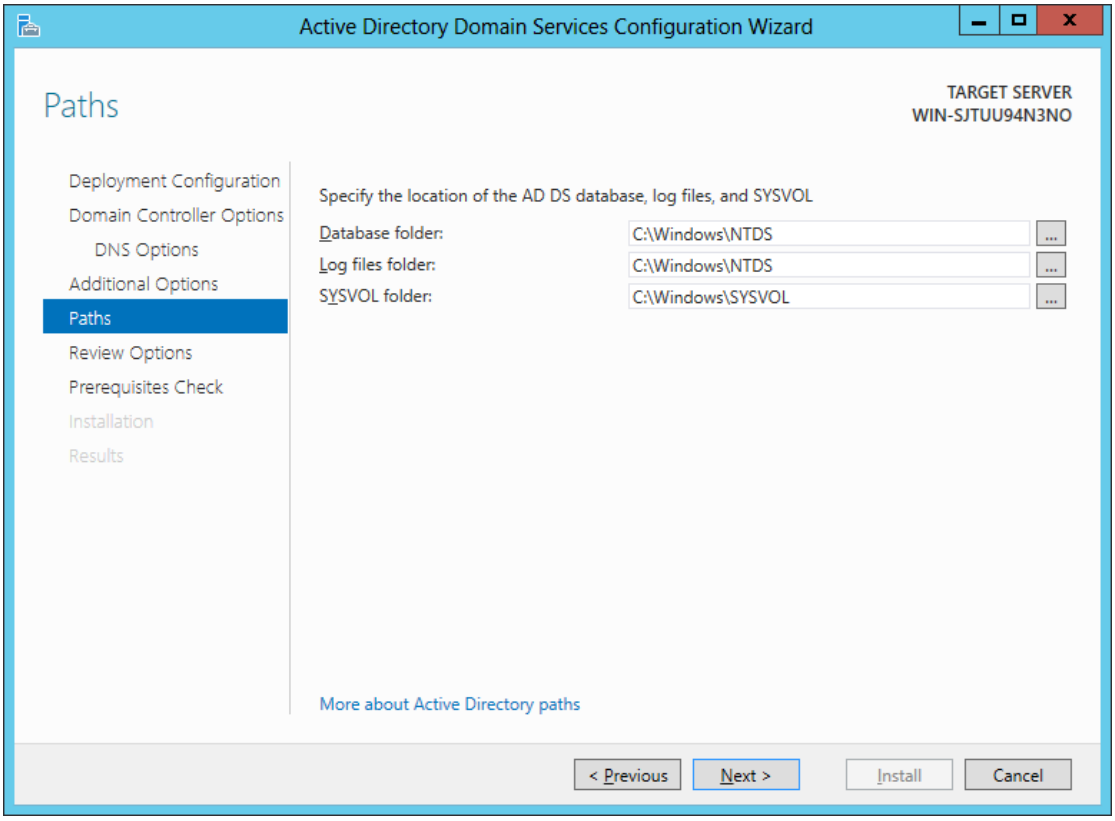


Leave it default and press **Next** to continue.



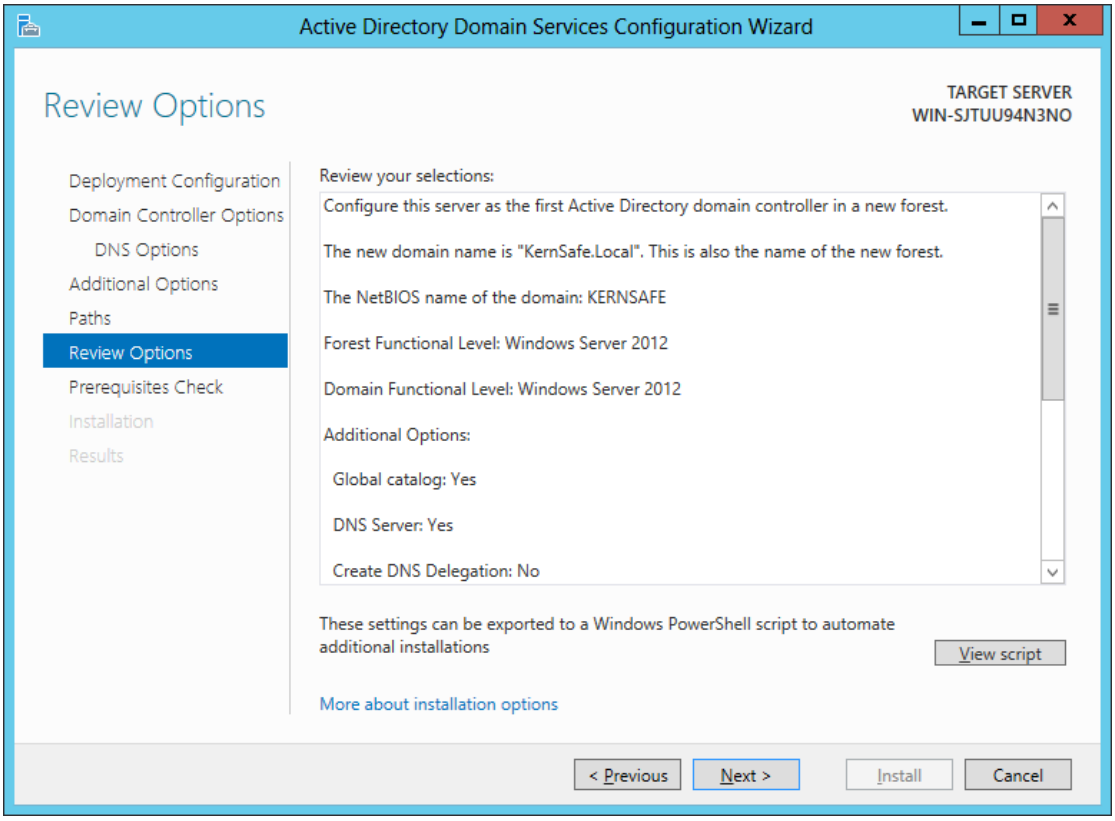
The NetBIOS domain name will be “KERNSAFE” and press **Next** to

continue.

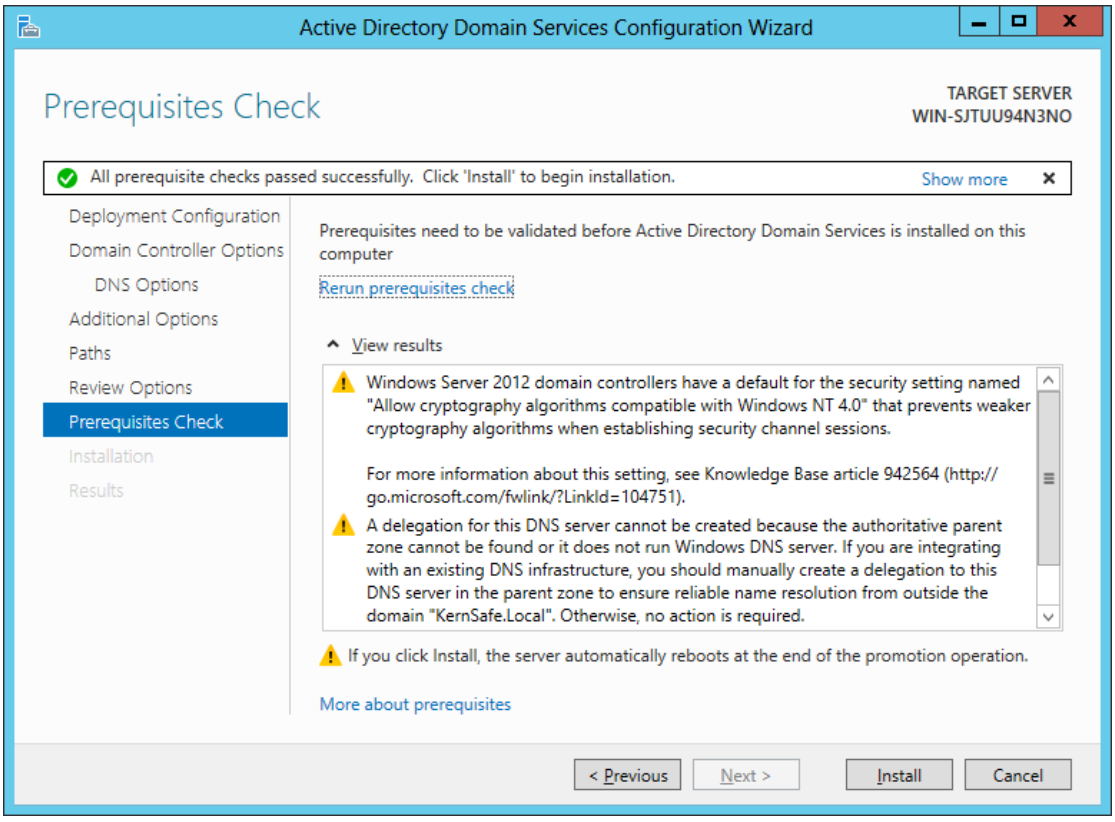


Customize the database, log file and SYSVOL directories.

Press **Next** to continue.



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

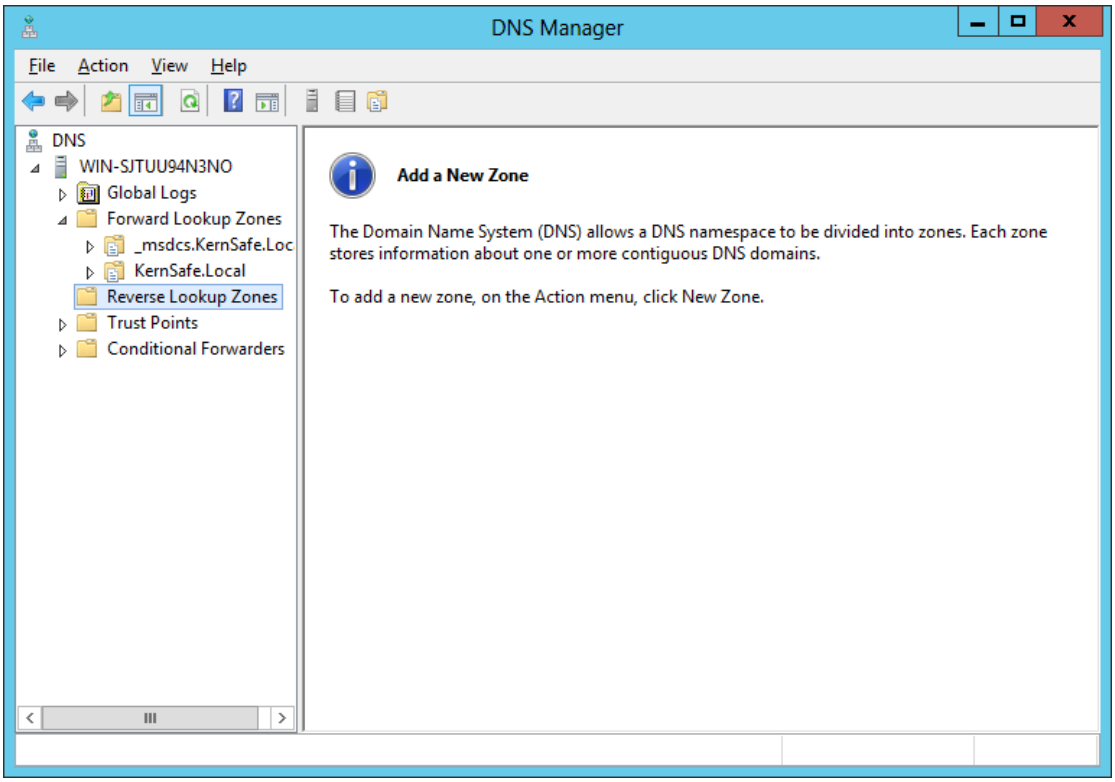


Press **Install** to run the installation.

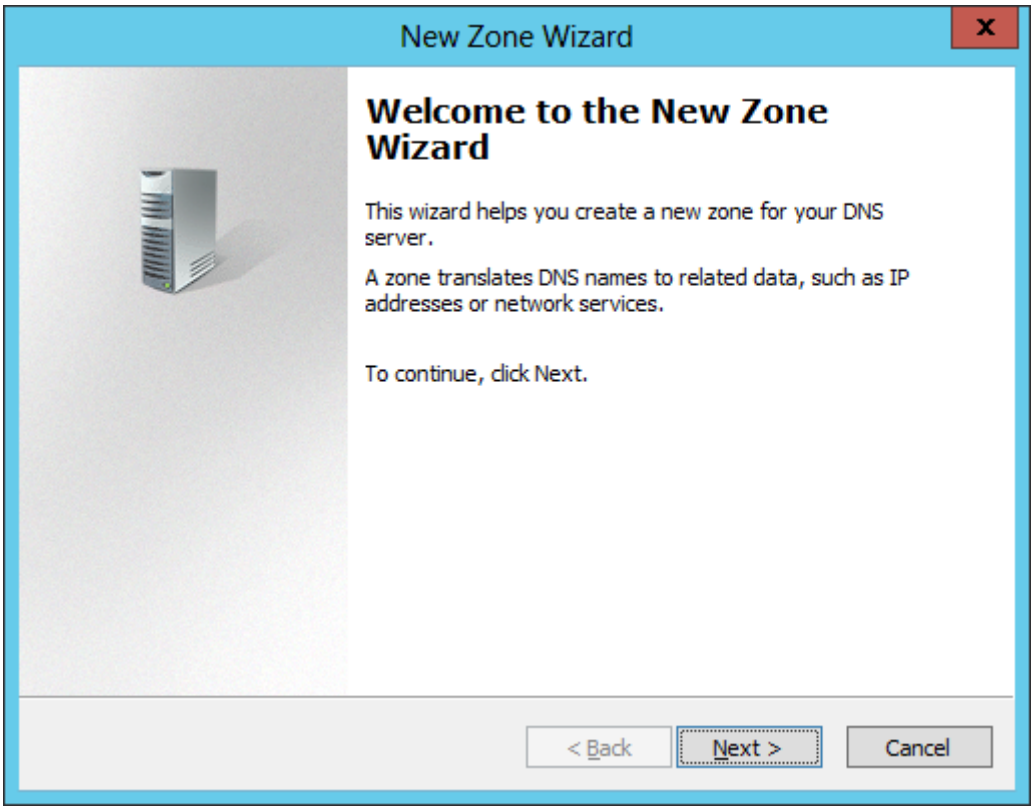
After it finishes installing, the server will reboot automatically to take effect.

Configure DNS Server Role

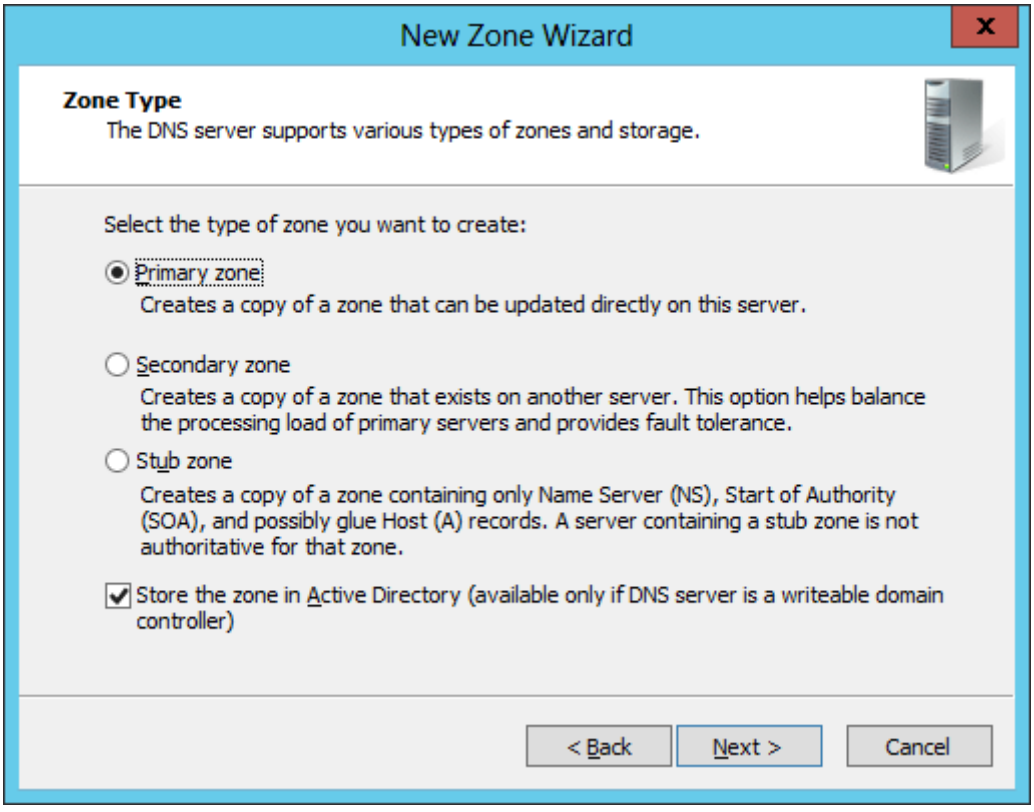
Log on the server with domain controller administrator, and then launch the **DNS Manager**.



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

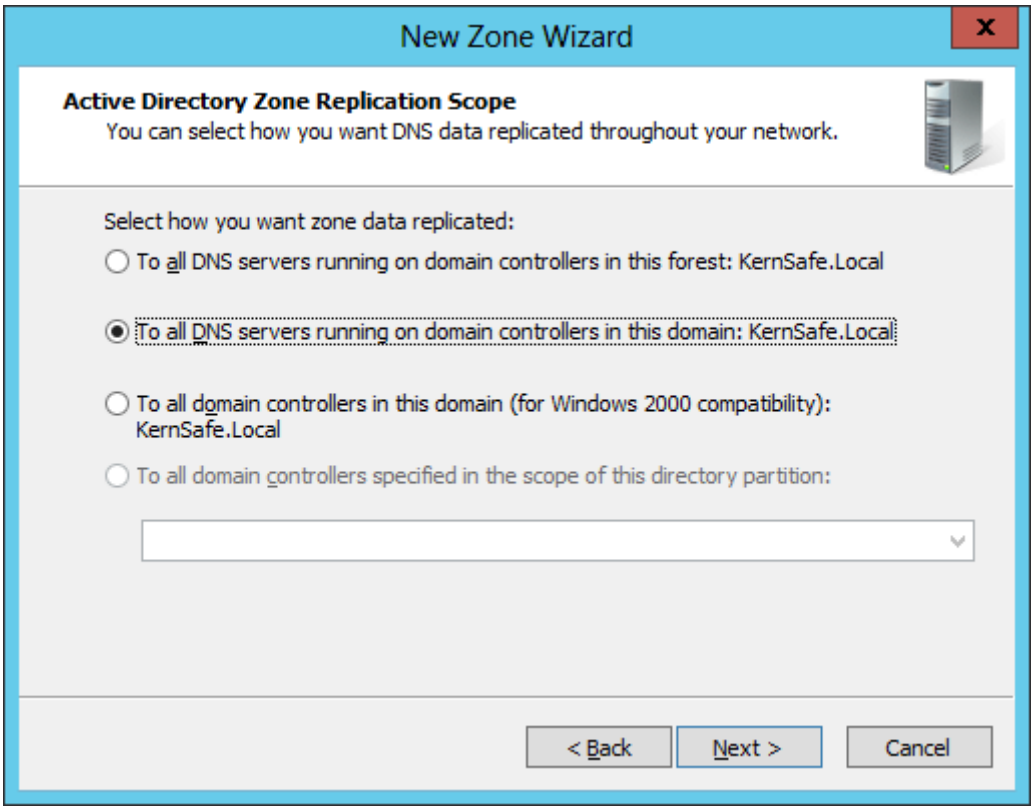


Press **Next** to continue.

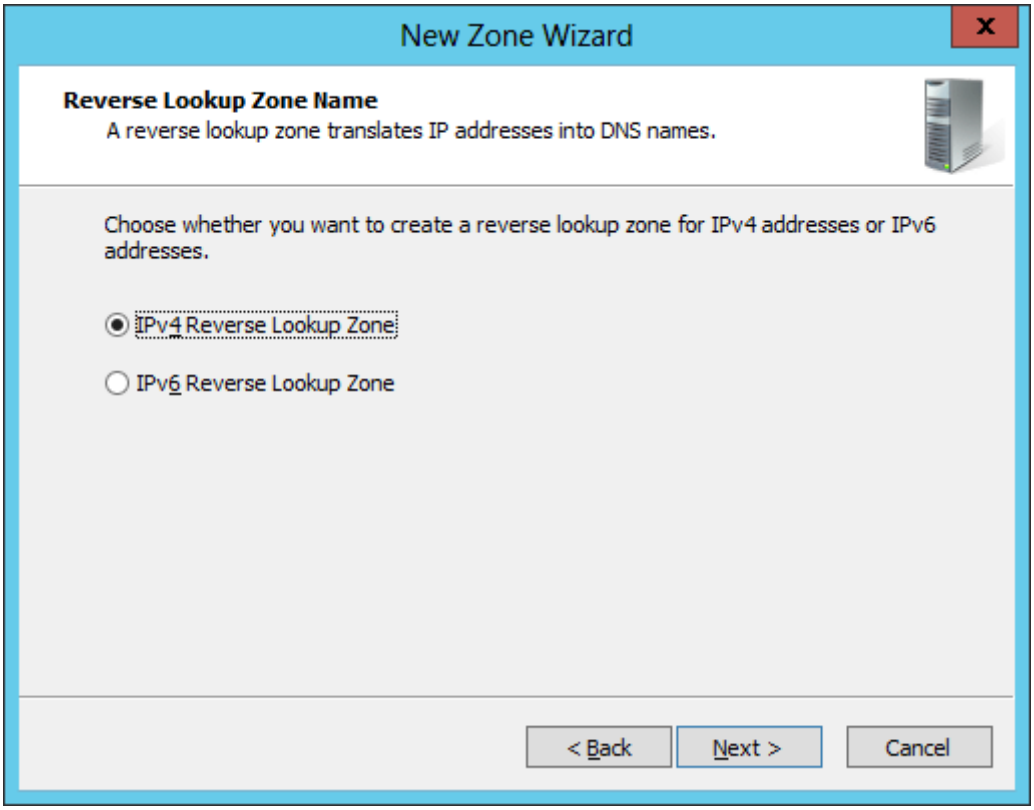


Select **Primary zone**.

Press **Next** to continue.

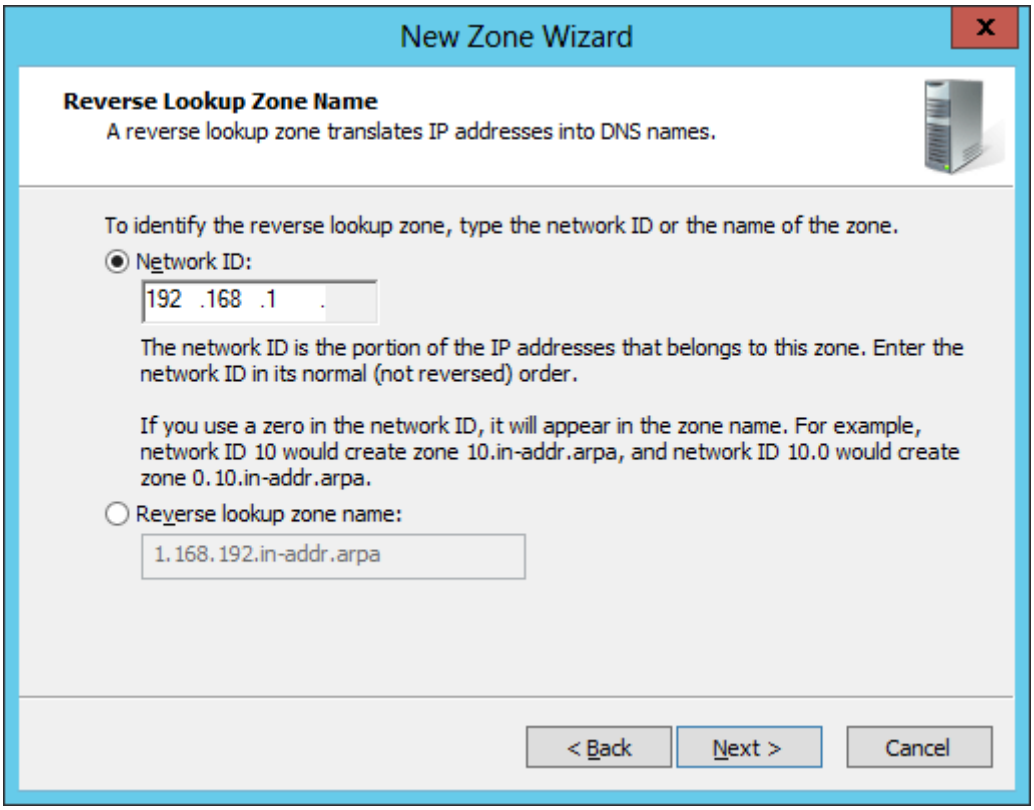


Keep default and press **Next** to continue.

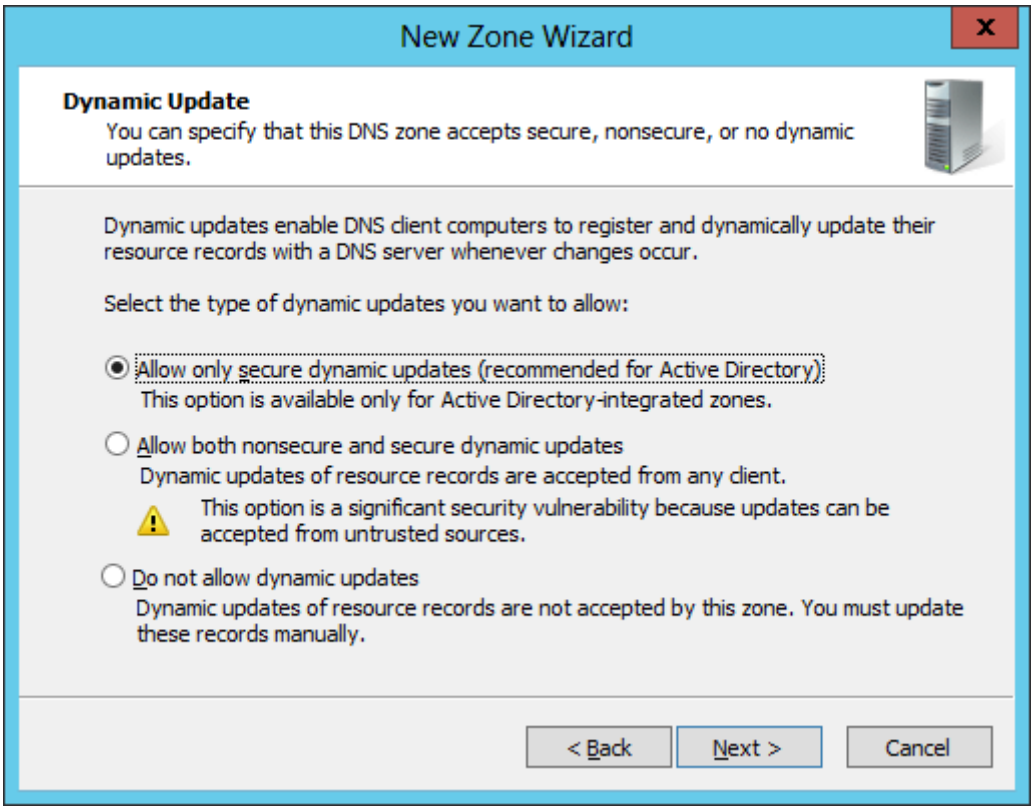


Select **IPv4 Reverse Lookup Zone**.

Press **Next** to continue.

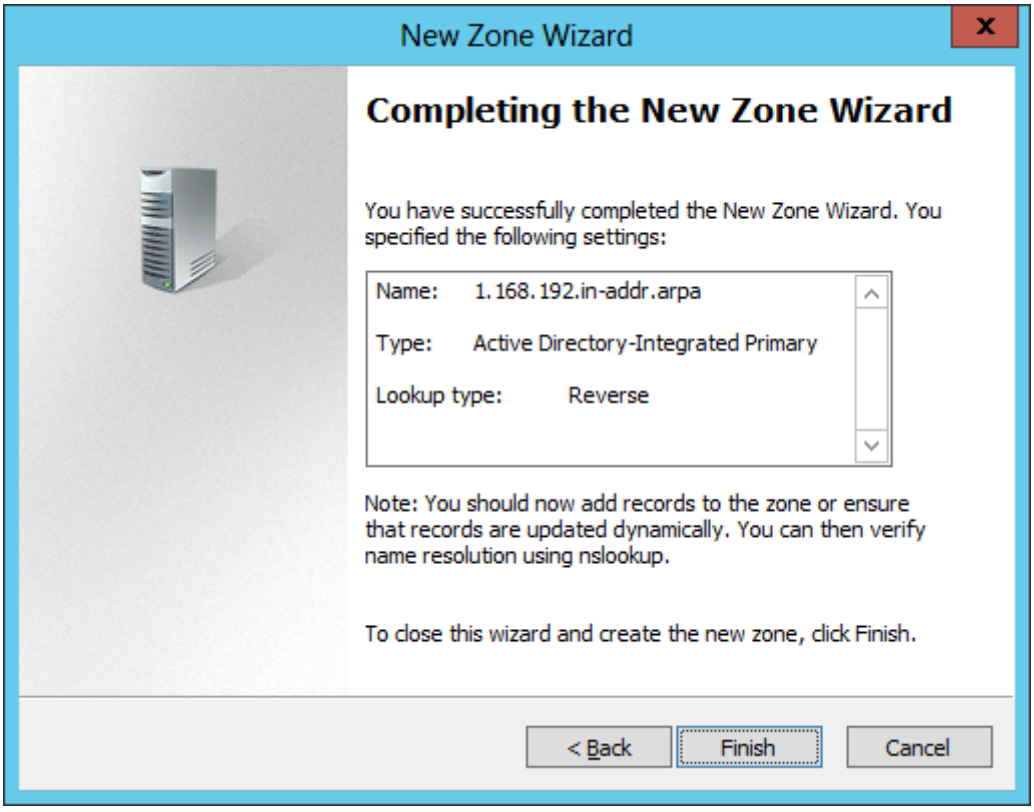


Select **Network ID** and then type the IP Address in the Network ID.



Specify dynamic update option.

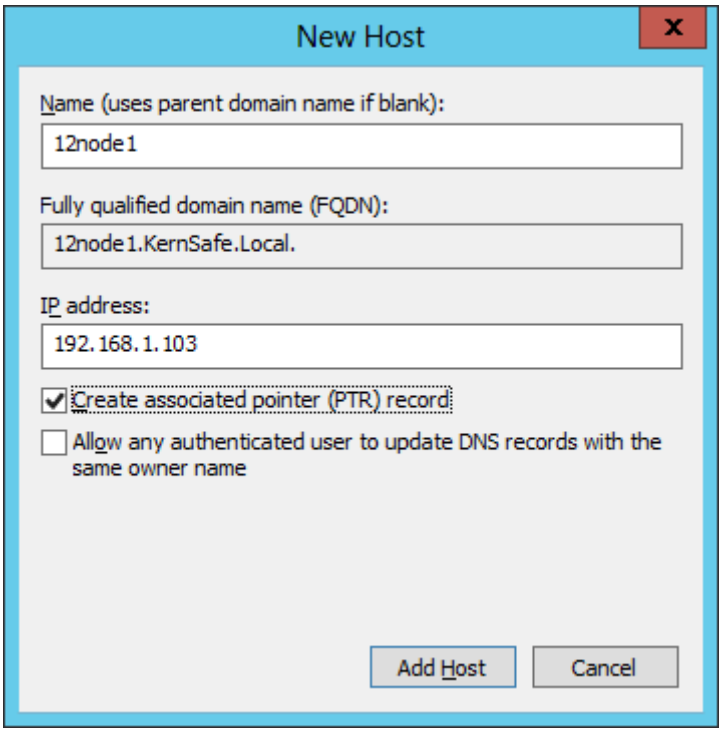
Press **Next** to continue.



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.

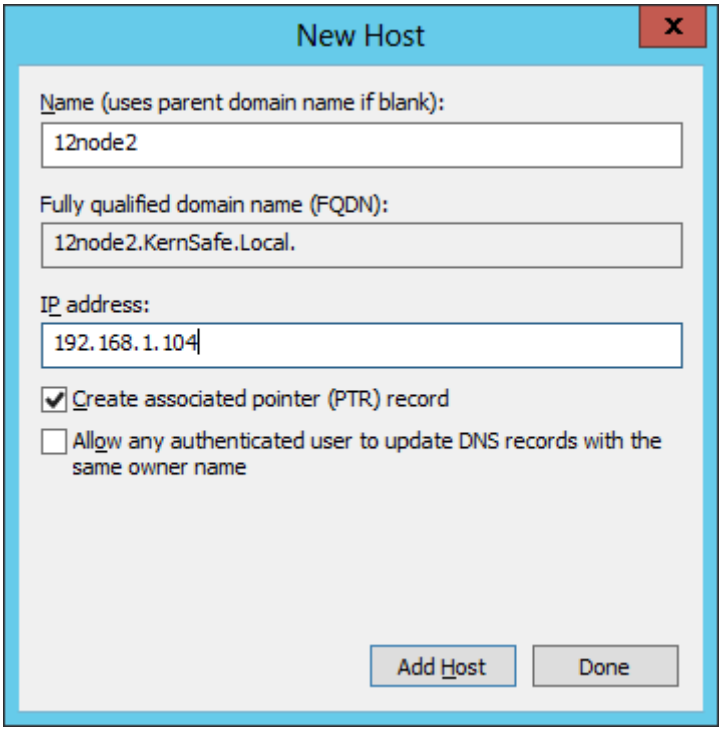
The **New Host** dialogue is shown as below.



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

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

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

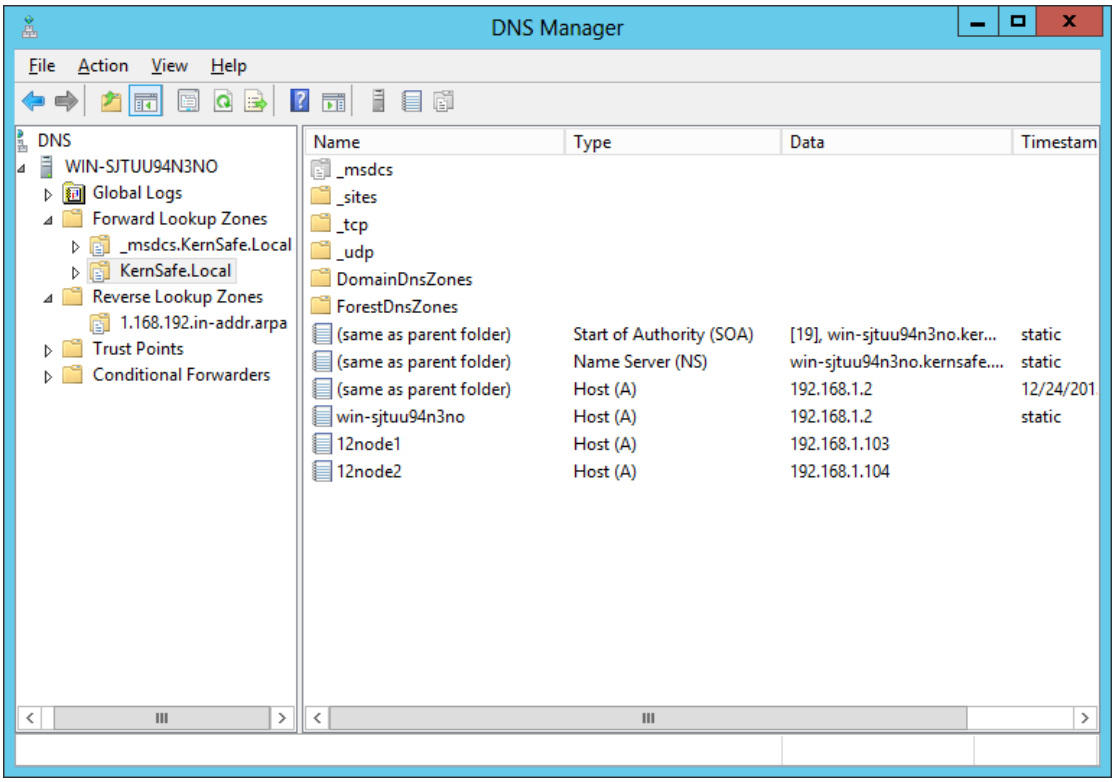


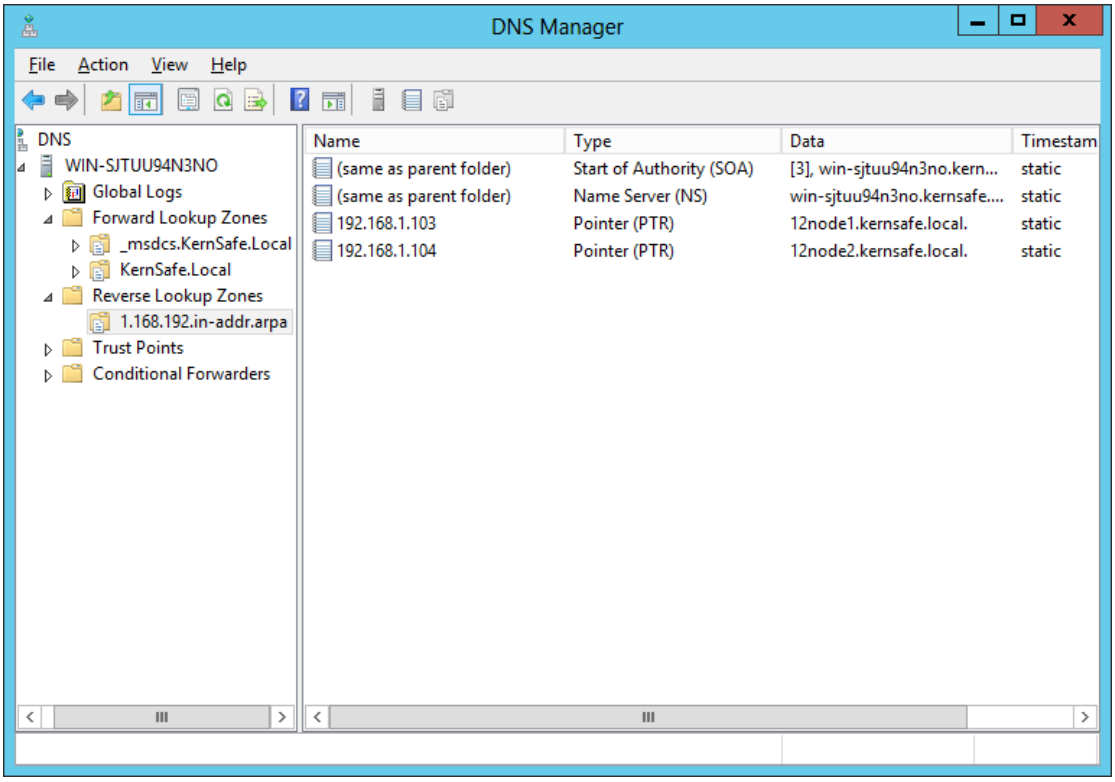
Type the **Name** and **IP address** for the cluter node – 12node2.

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

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

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

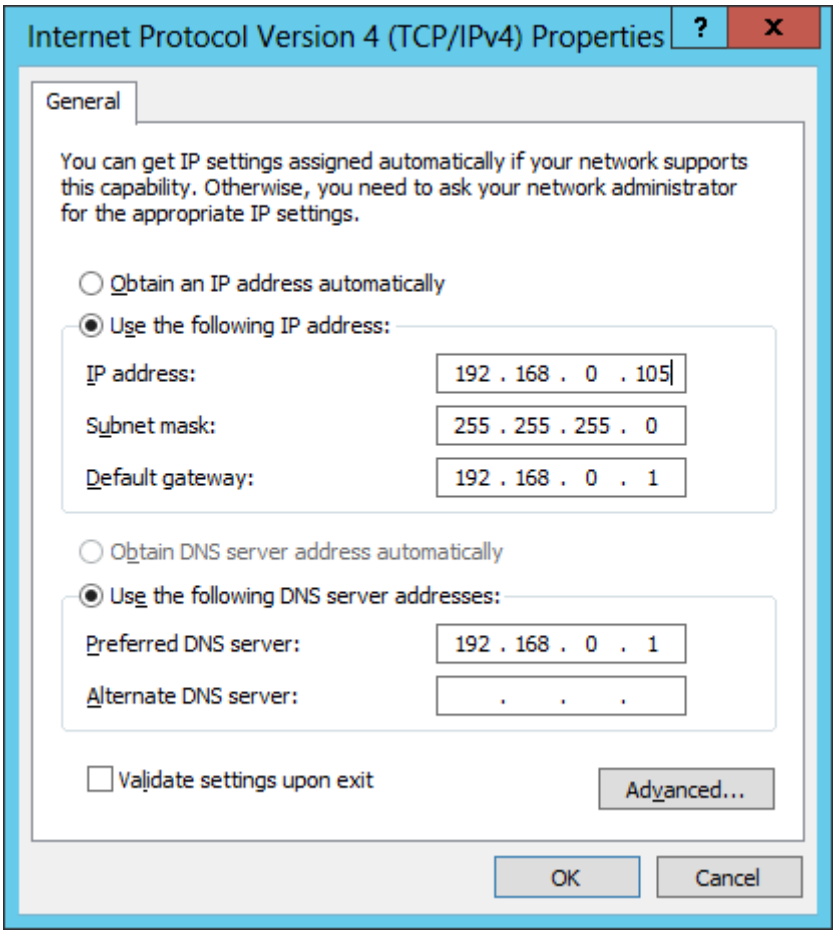

DNS Manager
File Action View Help
DNS
WIN-SJTUU94N3NO
Global Logs
Forward Lookup Zones
_msdcs.KernSafe.Local
KernSafe.Local
Reverse Lookup Zones
1.168.192.in-addr.arpa
Trust Points
Conditional Forwarders
Name Type Data Timestam
_msdcs
_sites
_tcp
_udp
DomainDnsZones
ForestDnsZones
(same as parent folder) Start of Authority (SOA) [19], win-sjtuu94n3no.ker... static
(same as parent folder) Name Server (NS) win-sjtuu94n3no.kernsafe.... static
(same as parent folder) Host (A) 192.168.1.2 12/24/201
win-sjtuu94n3no Host (A) 192.168.1.2 static
12node1 Host (A) 192.168.1.103
12node2 Host (A) 192.168.1.104


DNS Manager
File Action View Help
DNS
WIN-SJTUU94N3NO
Global Logs
Forward Lookup Zones
_msdcs.KernSafe.Local
KernSafe.Local
Reverse Lookup Zones
1.168.192.in-addr.arpa
Trust Points
Conditional Forwarders
Name Type Data Timestam
(same as parent folder) Start of Authority (SOA) [3], win-sjtuu94n3no.kern... static
(same as parent folder) Name Server (NS) win-sjtuu94n3no.kernsafe.... static
192.168.1.103 Pointer (PTR) 12node1.kernsafe.local. static
192.168.1.104 Pointer (PTR) 12node2.kernsafe.local. static

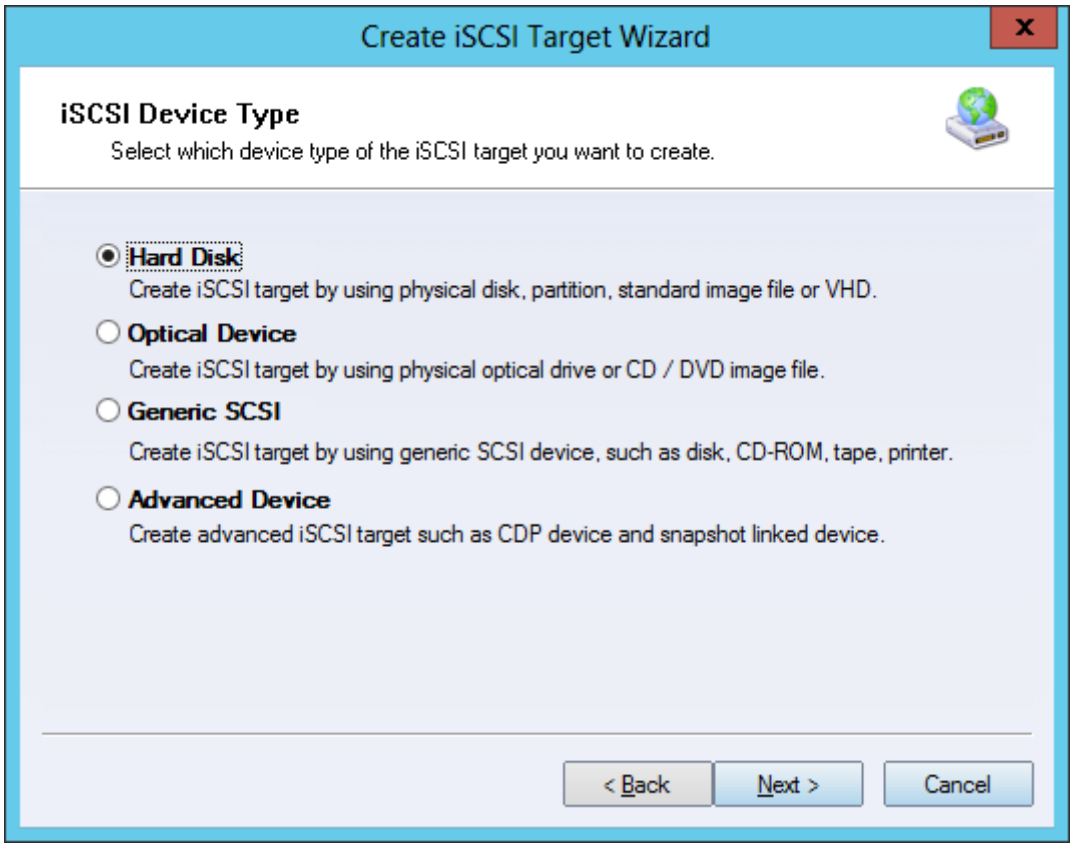
Configure iStorage Server1

Prepare Quorum volume

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



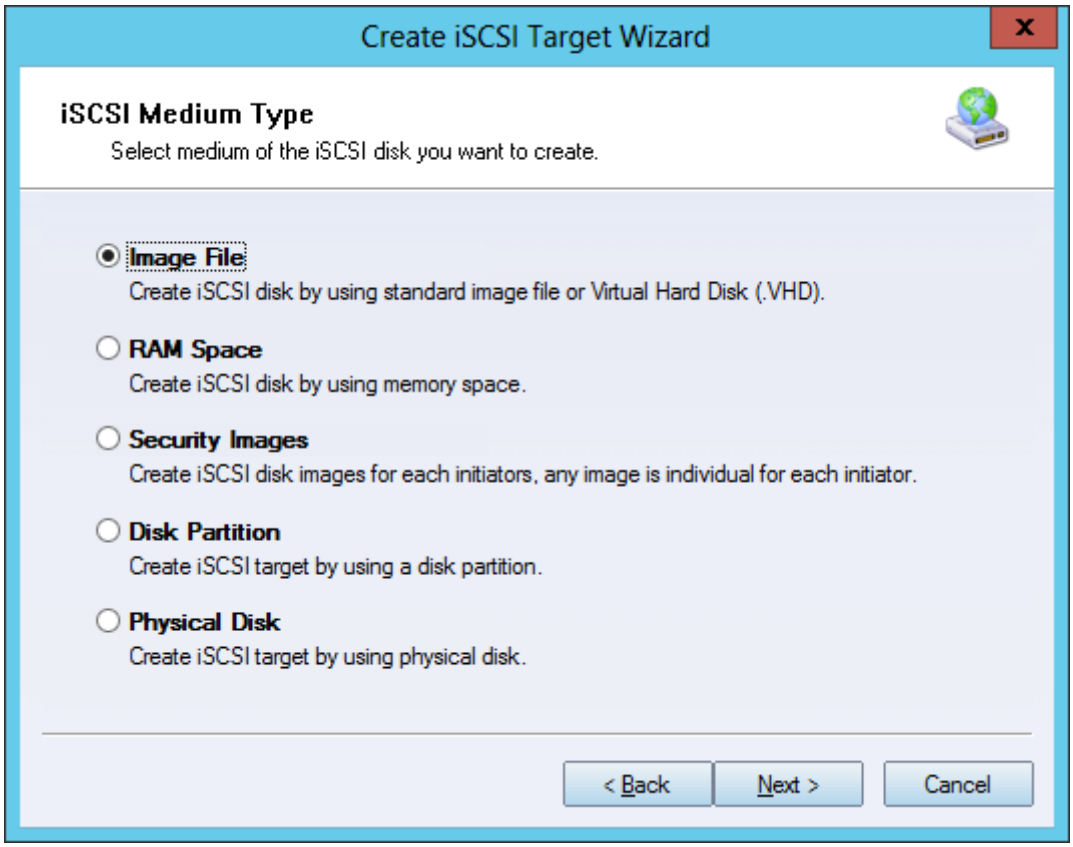
Launch the **iStorage Server Management Console**, press the Create button on the toolbar of iStorage Server Management Console, the **Create iSCSI Target Wizard** will be shown as below.



Select an **iSCSI Device Type**.

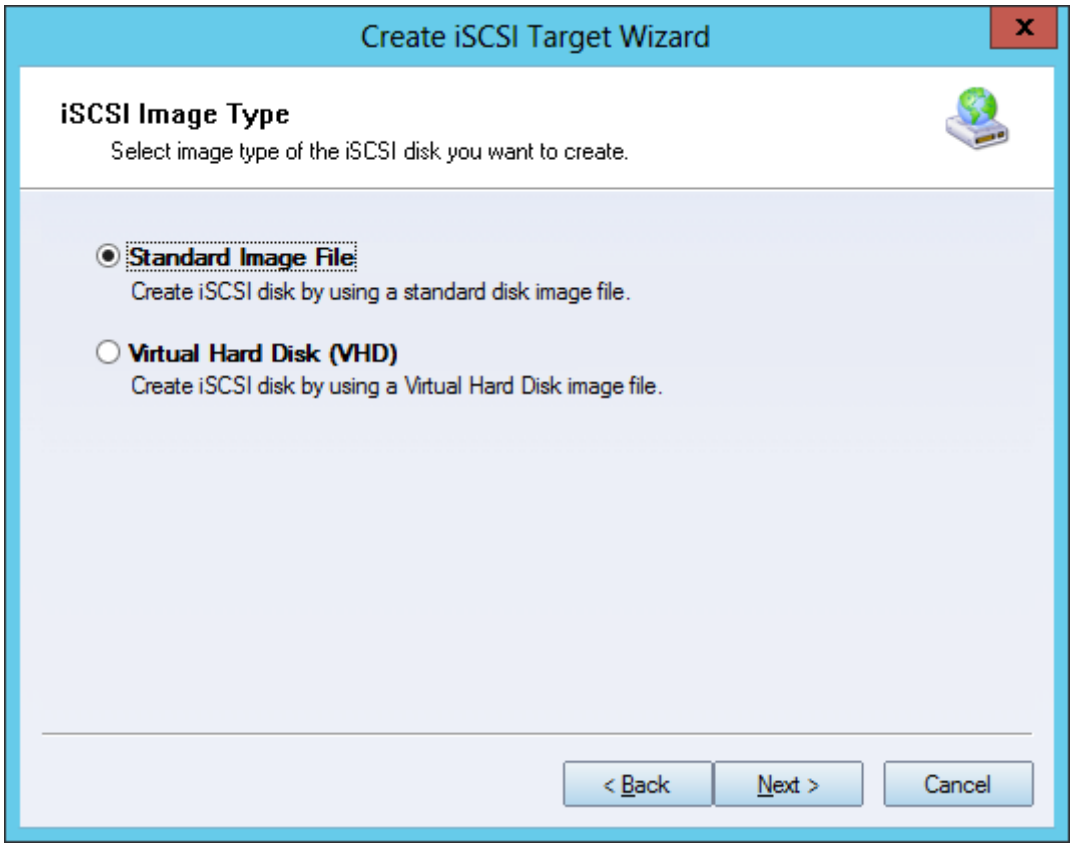
Choose **Hard Disk**.

Press **Next** to continue.

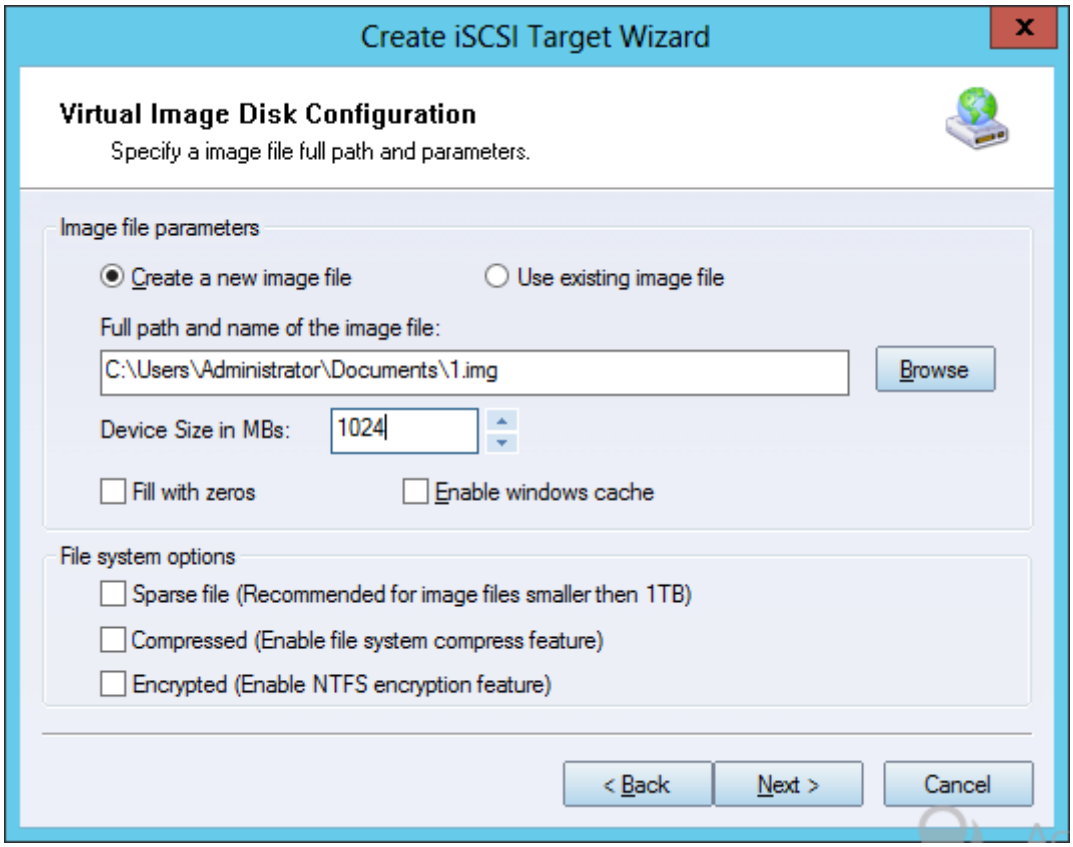


Choose **Image File** in **iSCSI Medium Type**.

Press **Next** to continue.



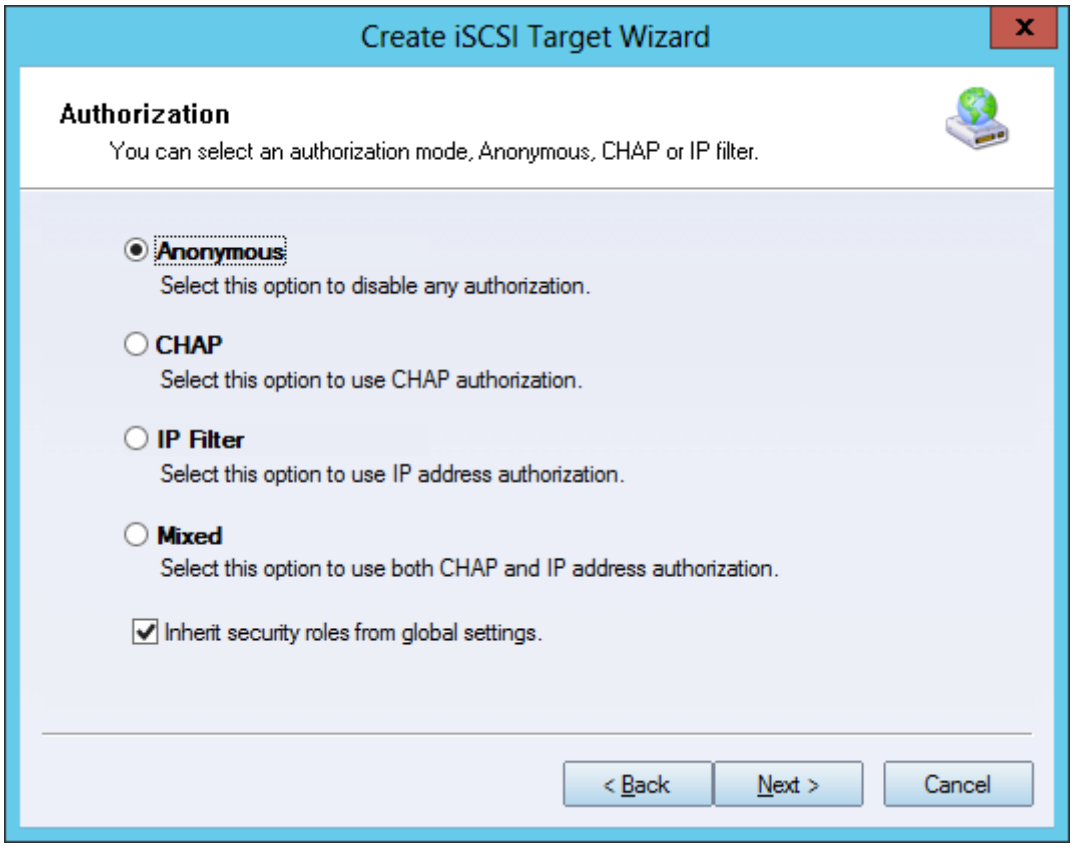
We choose **Standard Image File** and press **Next** to continue.



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

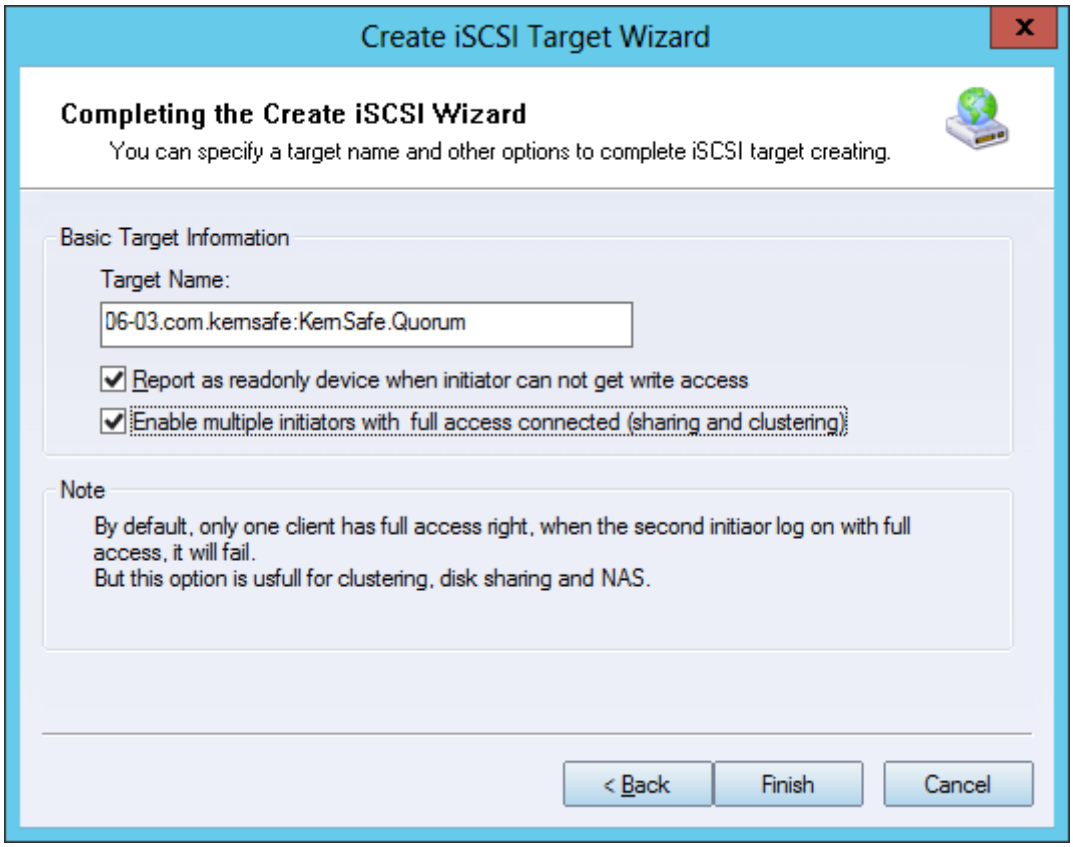
Specify the **file path** and **device capacity**.

Press **Next** to continue.



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

Press **Next** to continue.



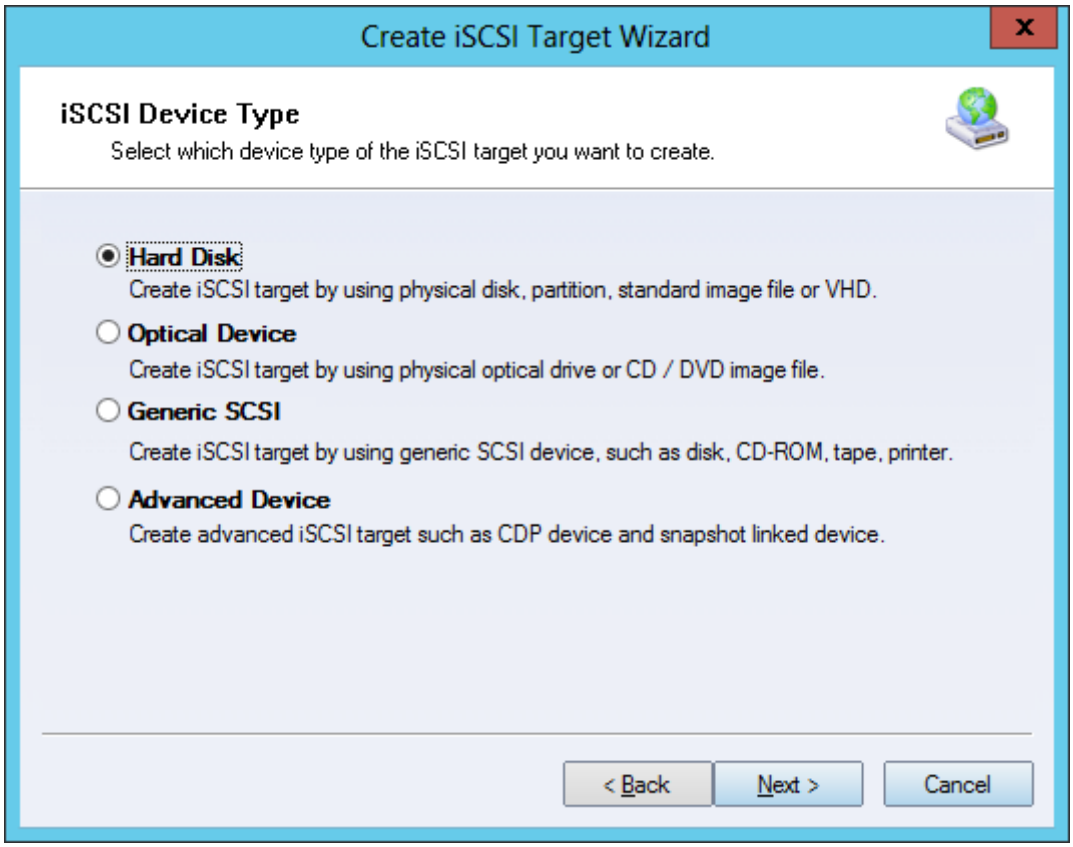
Type the **Target Name** as you like or use the default.

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

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

Prepare Generic Volume

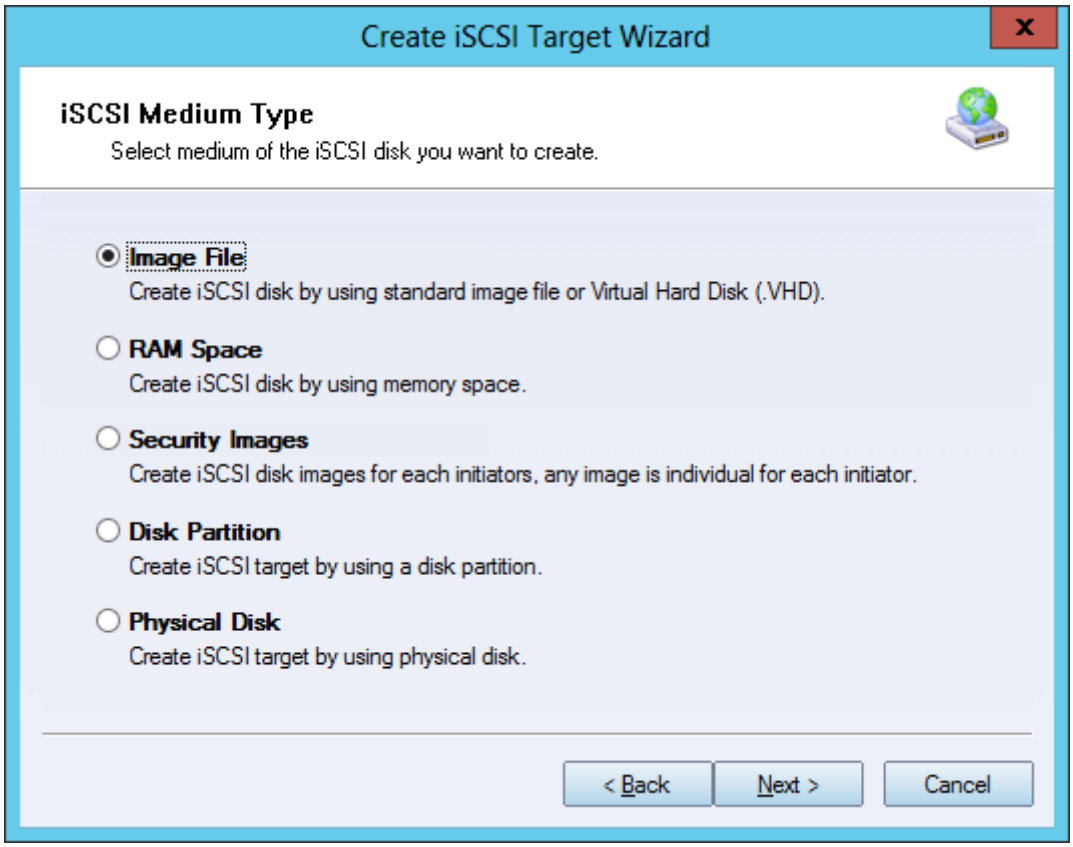
Launch the **iStorage Server Management Console**, press the Create button on the toolbar of iStorage Server Management Console, the **Create iSCSI Target Wizard** will be shown as below.



Select an **iSCSI Device Type**.

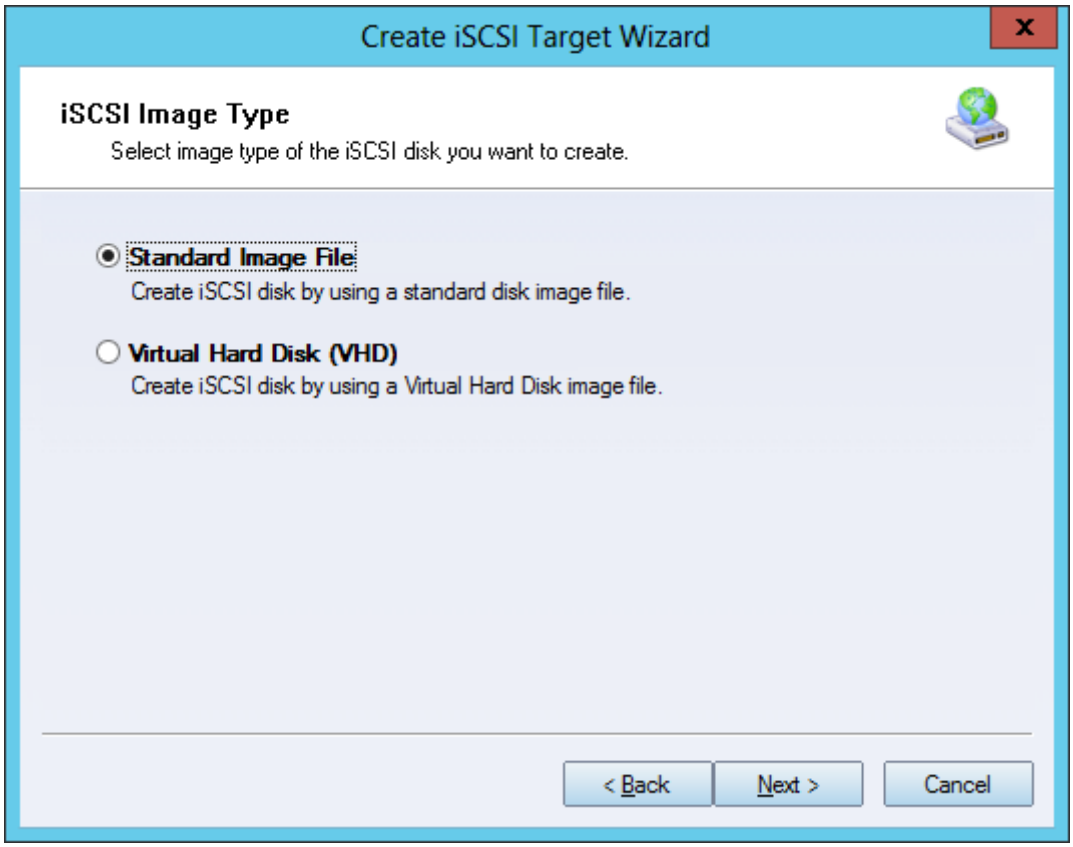
Choose **Hard Disk**.

Press **Next** to continue.

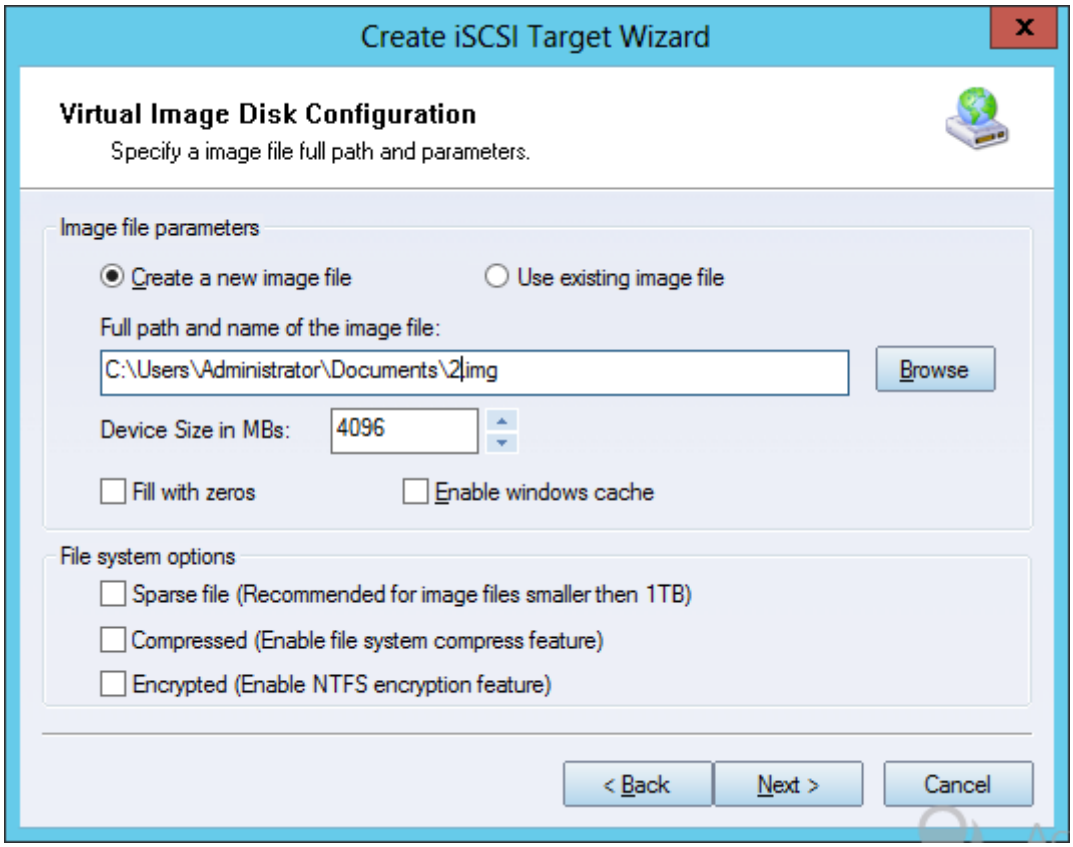


Choose **Image File** in **iSCSI Medium Type**.

Press **Next** to continue.



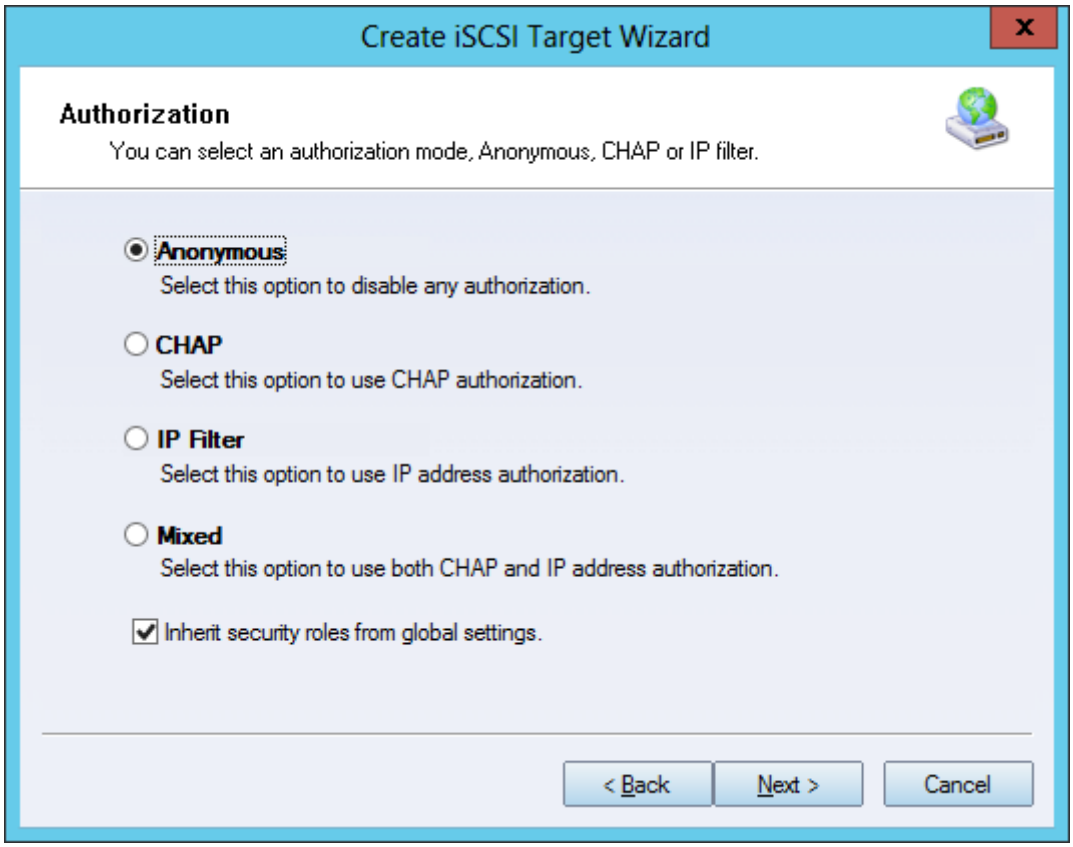
We choose **Standard Image File** and press **Next** to continue.



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

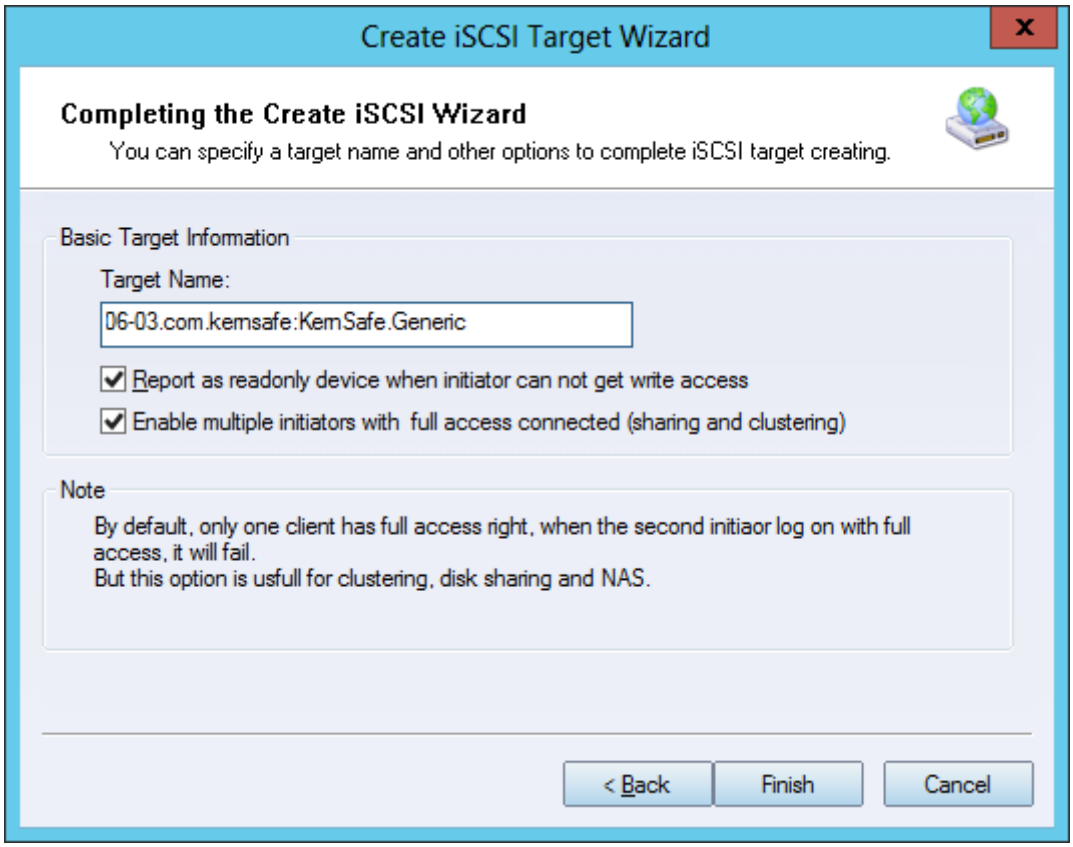
Specify the **file path** and **device capacity**.

Press **Next** to continue.



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

Press **Next** to continue.

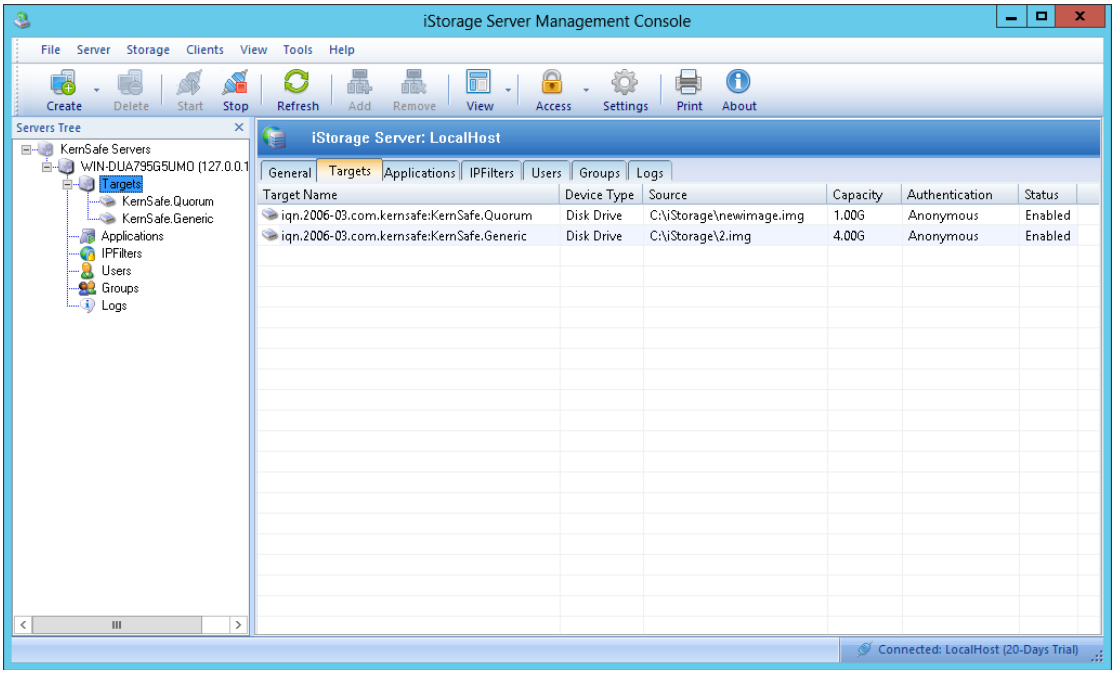


Type the **Target Name** as you like or use the default.

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

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

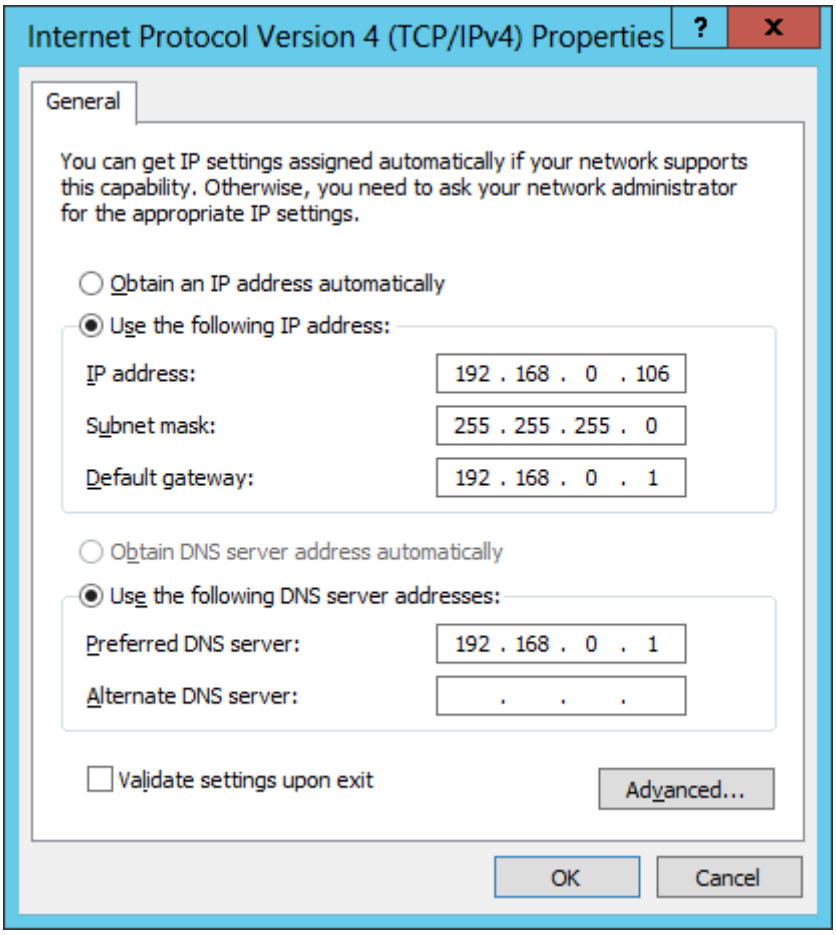
Now the sample images are shown as below in management console if successful.


iStorage Server Management Console
File Server Storage Clients View Tools Help
Create Delete Start Stop Refresh Add Remove View Access Settings Print About
Servers Tree
KernSafe Servers
WIN-DUA795G5UMO (127.0.0.1
Targets
KernSafe.Quorum
KernSafe.Generic
Applications
IPFilters
Users
Groups
Logs
iStorage Server: LocalHost
General Targets Applications IPFilters Users Groups Logs
Target Name Device Type Source Capacity Authentication Status
iqn.2006-03.com.kernsafe:KernSafe.Quorum Disk Drive C:\iStorage\newimage.img 1.00G Anonymous Enabled
iqn.2006-03.com.kernsafe:KernSafe.Generic Disk Drive C:\iStorage\2.img 4.00G Anonymous Enabled
Connected: LocalHost (20-Days Trial)

Configure iStorage Server2

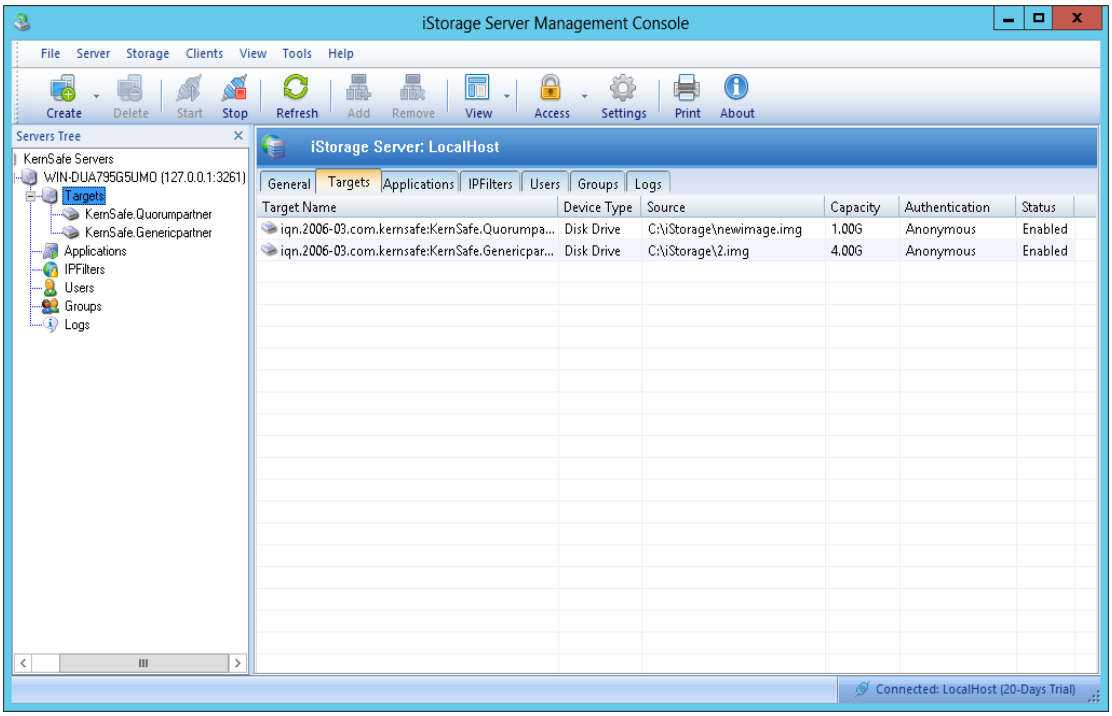
Prepare volumes

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.

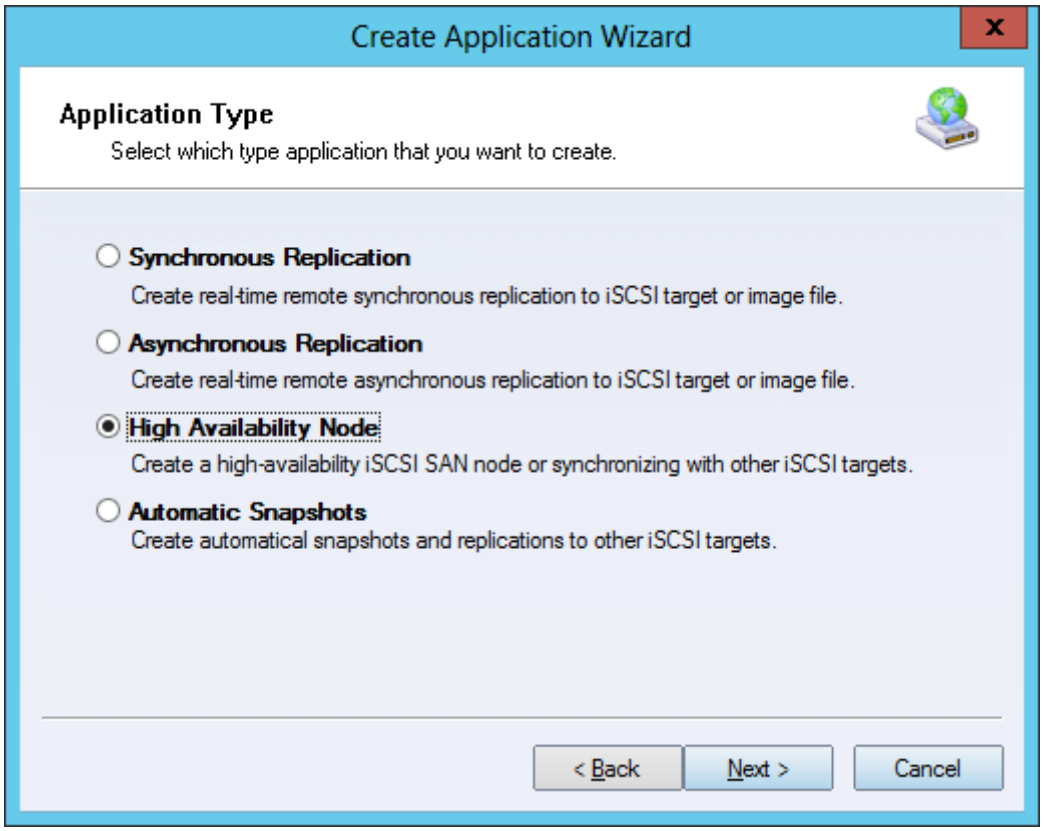
We also need two volumes on iStorage Server2, we name them **KernSafe.Quorumpartner** and **KernSafe.Genericpartner** which have same capacity as on iStorage Sevrer1. We create them as we do on iStorage Server1.


iStorage Server Management Console
File Server Storage Clients View Tools Help
Create Delete Start Stop Refresh Add Remove View Access Settings Print About
Servers Tree
KernSafe Servers
WIN-DUA795G5UMO (127.0.0.1:3261)
Targets
KernSafe.Quorumpartner
KernSafe.Genericpartner
Applications
IPFilters
Users
Groups
Logs
iStorage Server: LocalHost
General Targets Applications IPFilters Users Groups Logs
Target Name Device Type Source Capacity Authentication Status
iqn.2006-03.com.kernsafe:KernSafe.Quorumpa... Disk Drive C:\iStorage\newimage.img 1.00G Anonymous Enabled
iqn.2006-03.com.kernsafe:KernSafe.Genericpar... Disk Drive C:\iStorage\2.img 4.00G Anonymous Enabled
Connected: LocalHost (20-Days Trial)

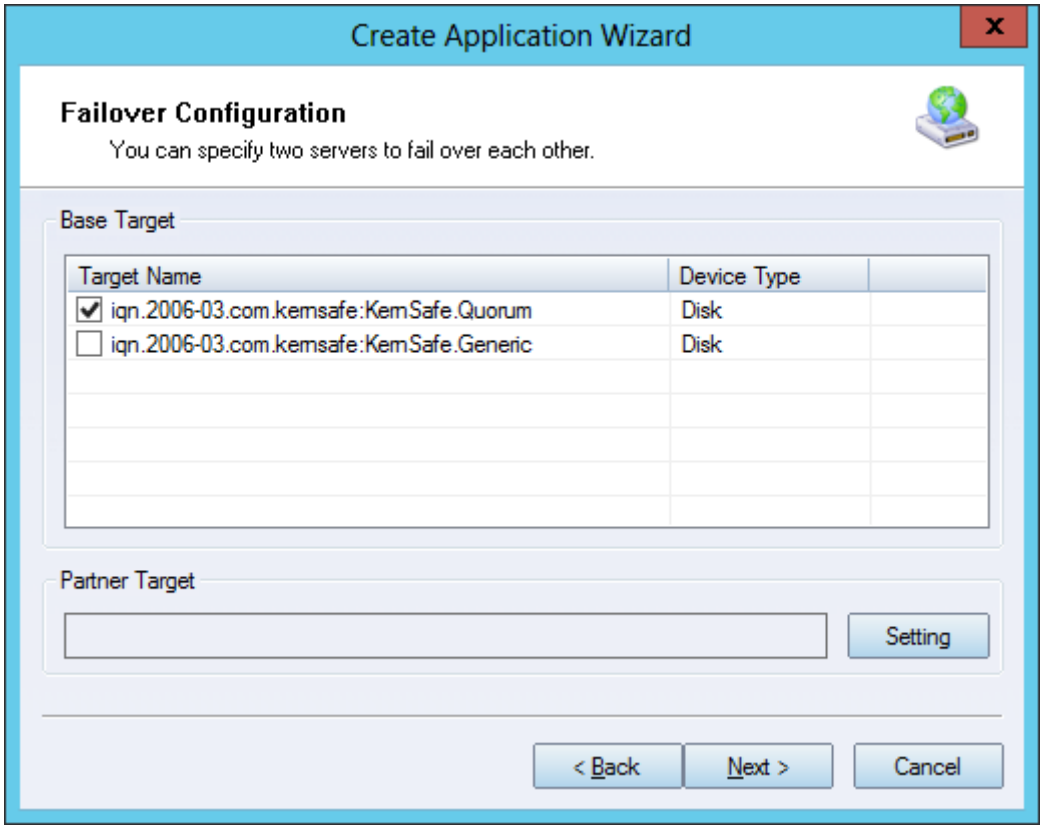
Create Application

Create Application with Quorum volumes

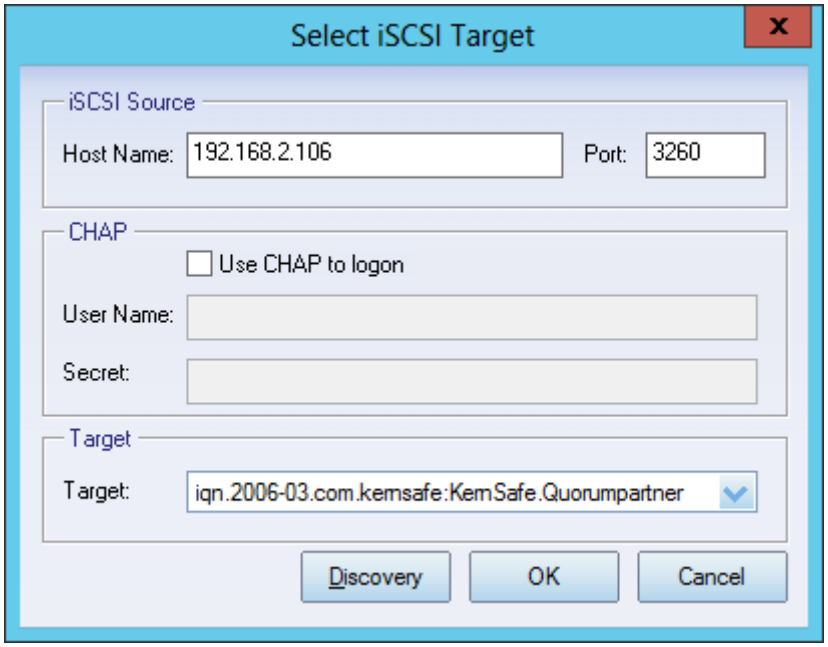
On iStorage Server1, right click Applications on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** will be shown as below.



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



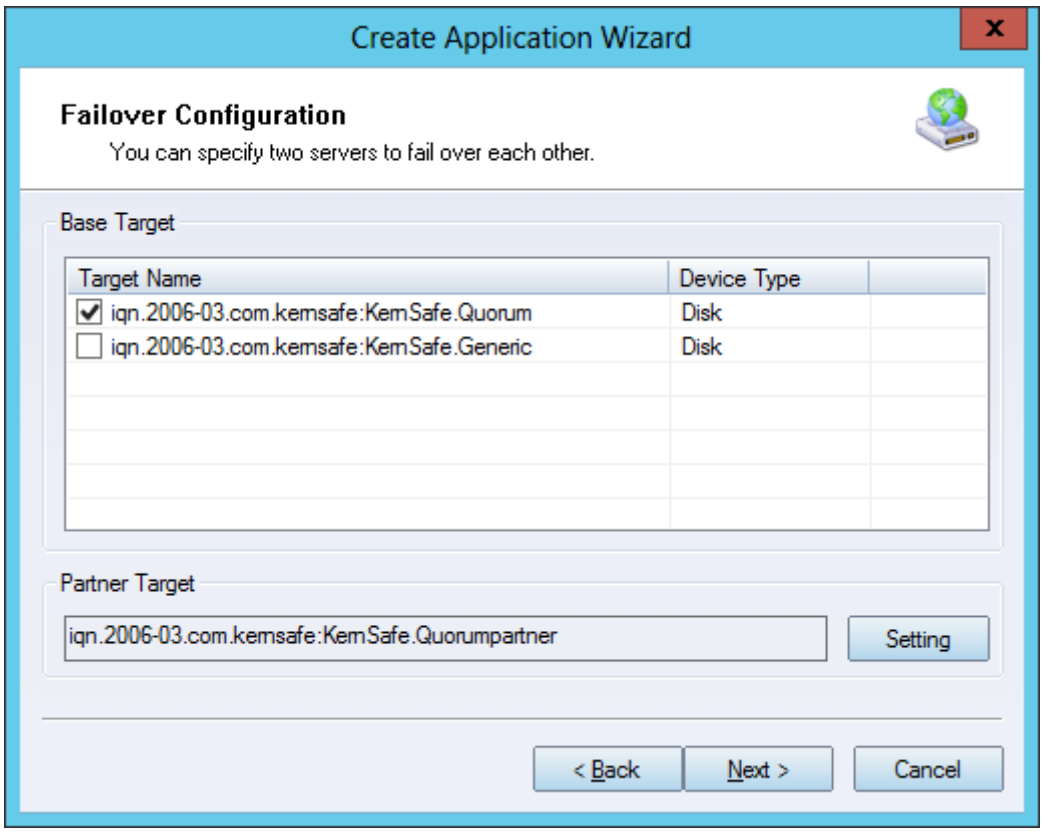
Check the **Quorum** target and press **Setting** to configure the partner target.



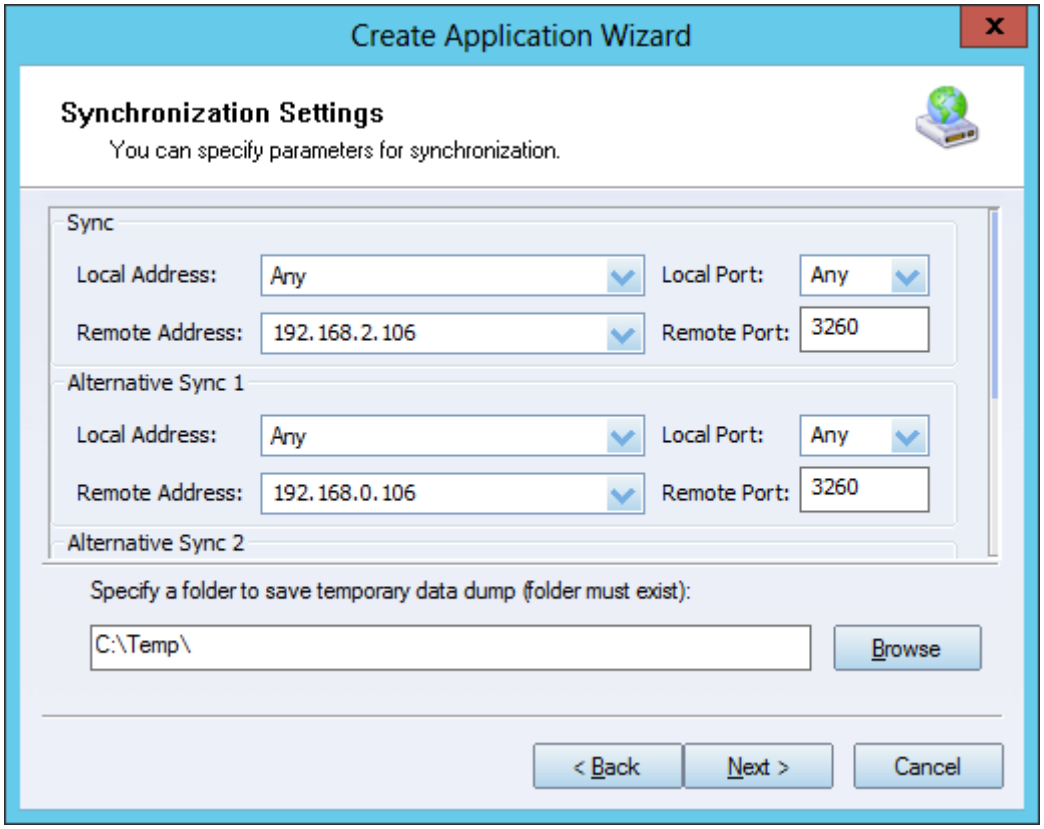
Input the **IP Address** which is used for SYNC of iStorage Server2 in iSCSI Source.

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.



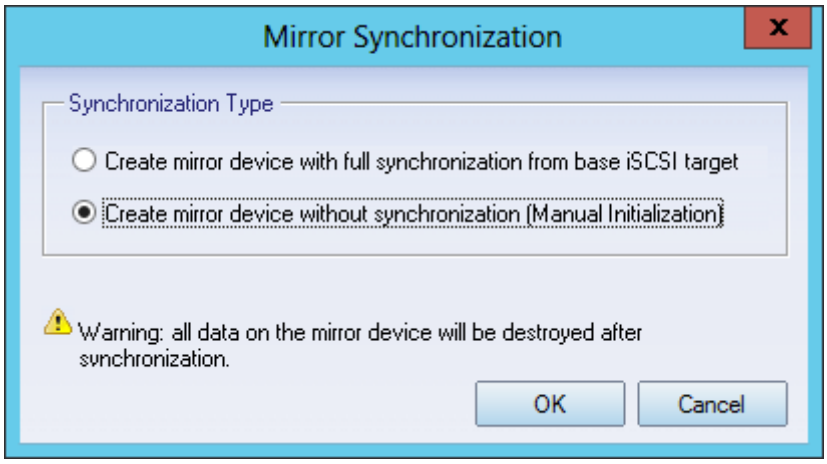
The partner target will be added to the windows, press **Next** to continue.



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

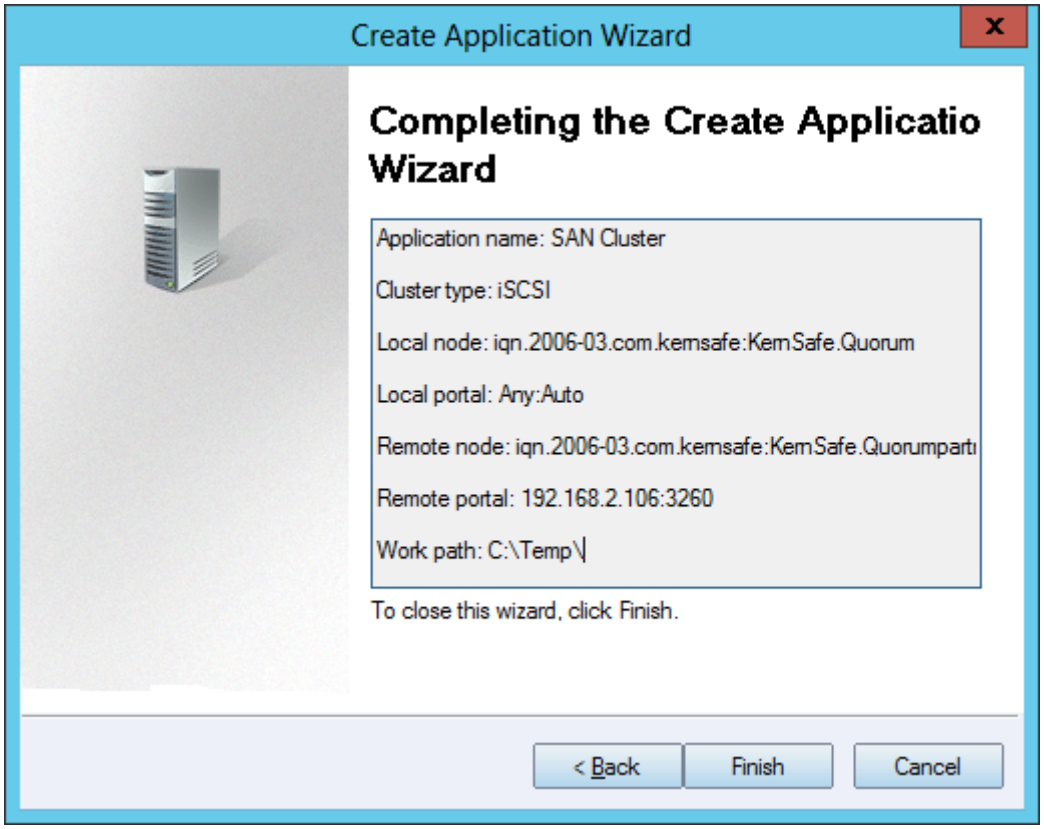
Note: User must specify parameters for Sync Channel and can scroll up the window and specify more channels for alternatives, these alternatives work as heart-beat and can be used when Sync channel got broken, these alternatives will prevent split-brain.

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 C**reate mirror device without synchronization (Manual Initialization)**. Otherwise, we must choose C**reate mirror device with full synchronization from base iSCSI target**.

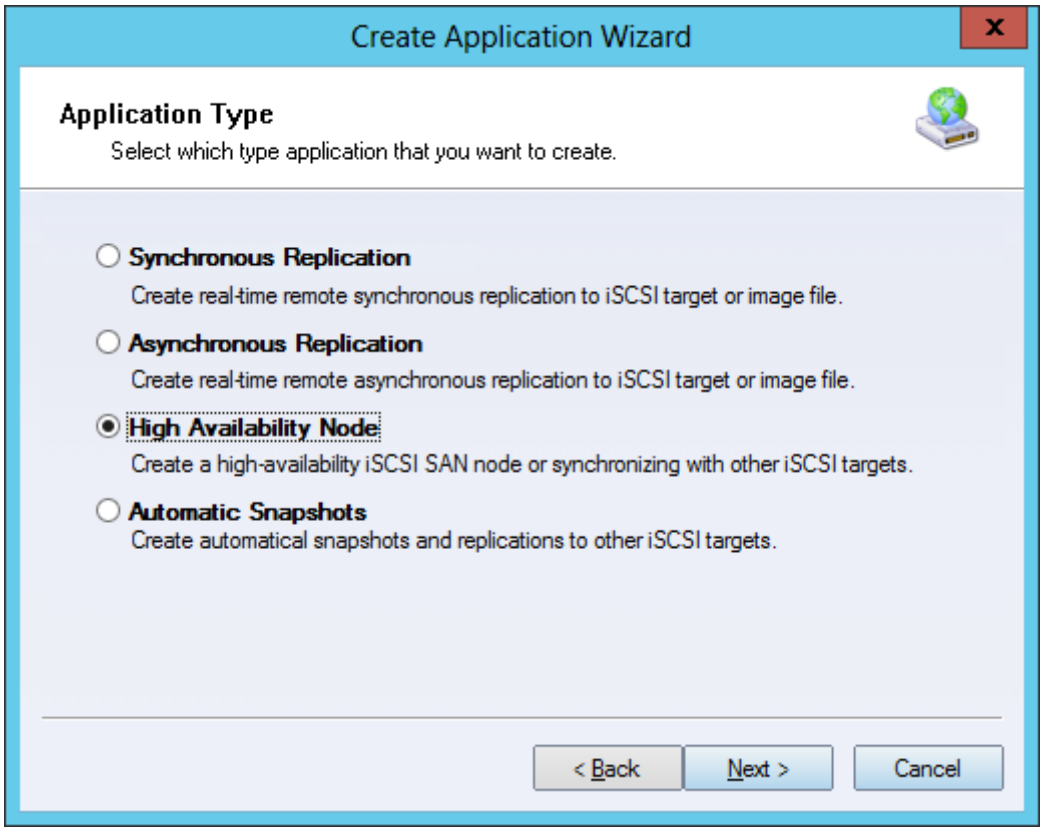
Press **OK** button to continue.



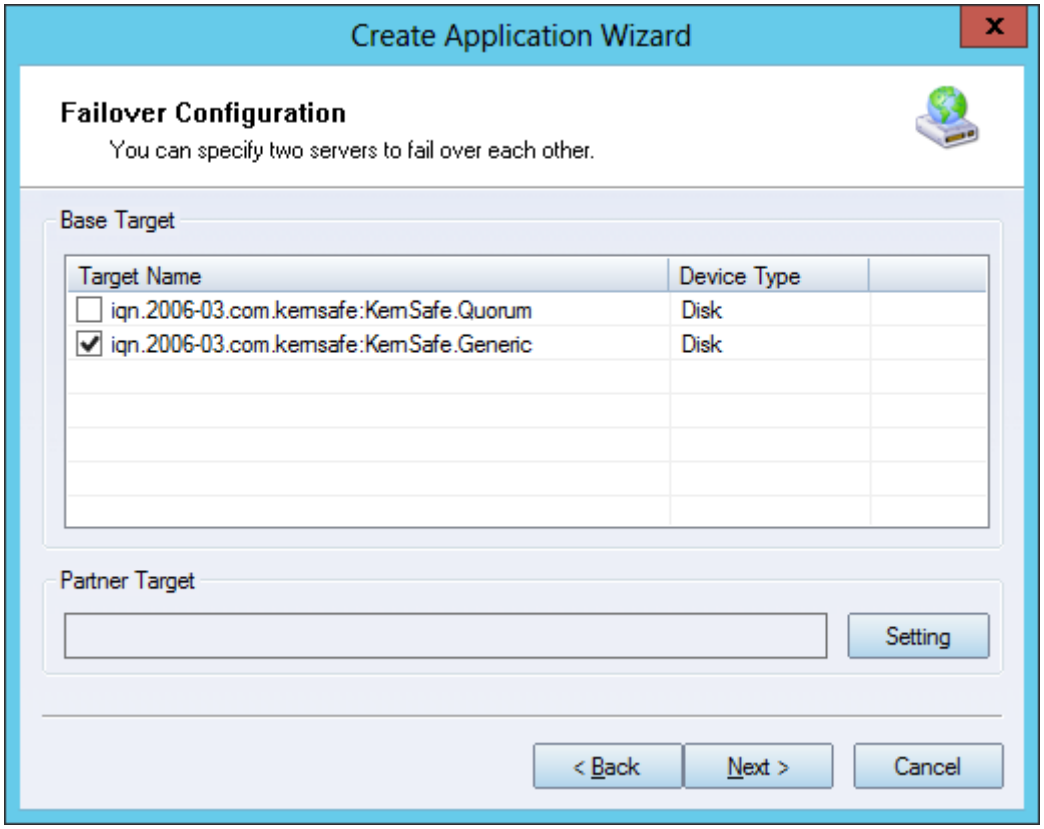
Press **Finish** to complete the creation.

Create Application with Generic volumes

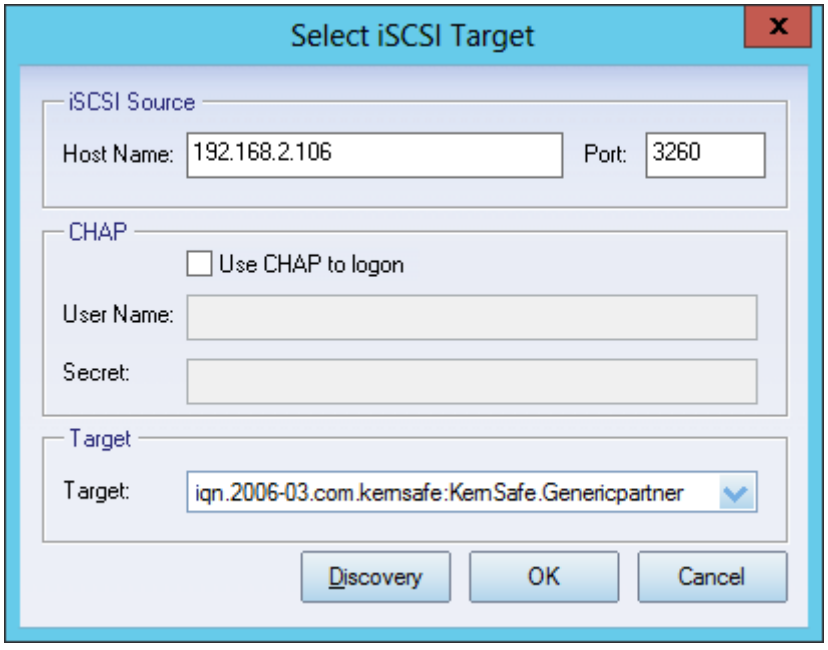
On iStorage Server1, right click Applications on the left tree of the main interface, choose **Create Application** on the pop-up menu, the **Create Application Wizard** will be shown as below.



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



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

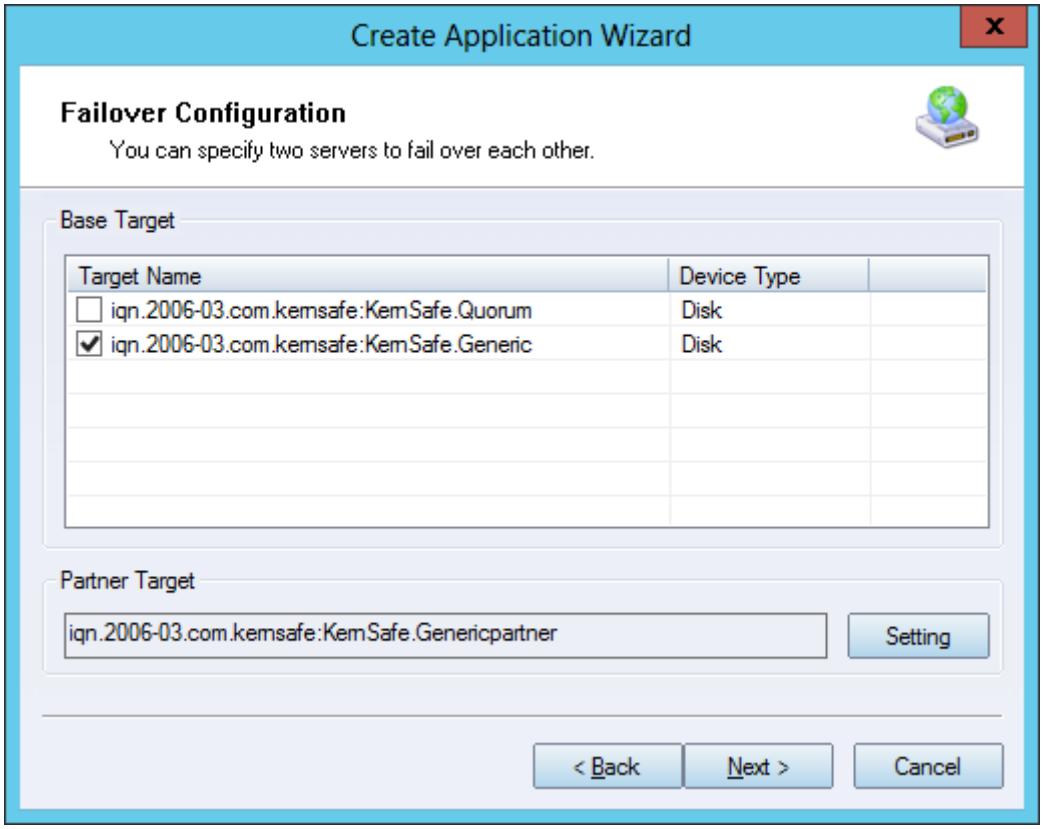


Input the IP Address which is user for SYNC of iStorage Server2, then press **Discovery** to find the mirror target **Genericpartner**.

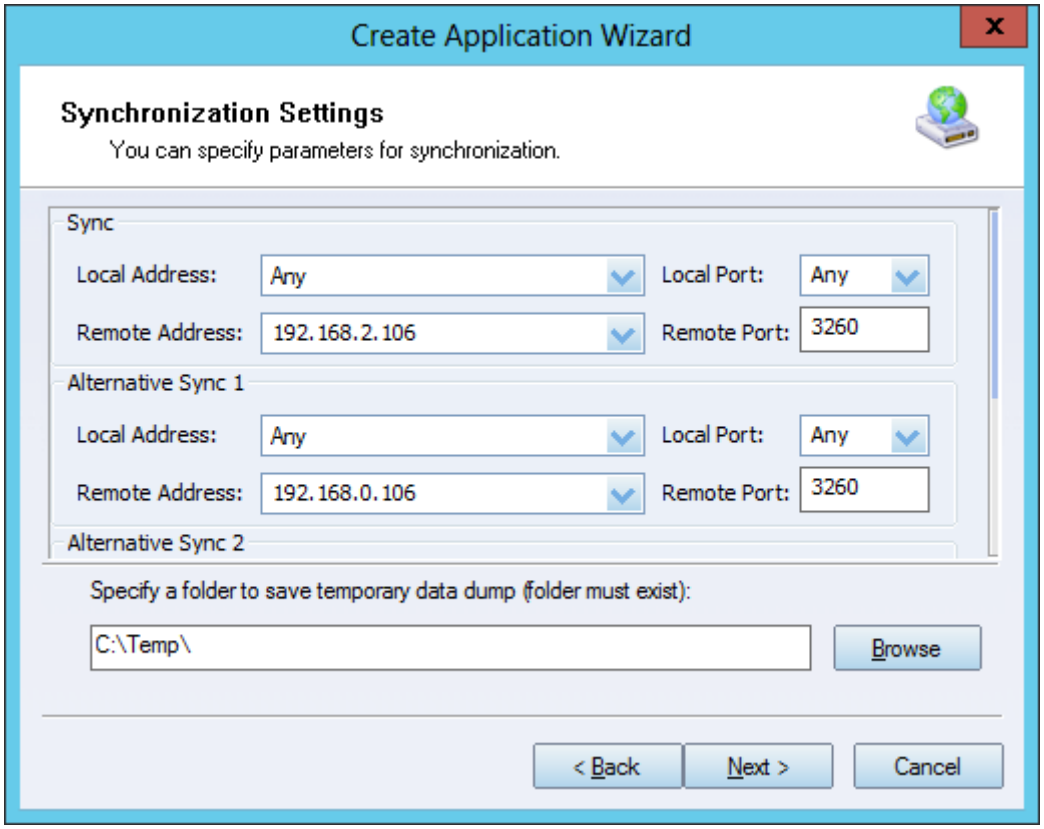
Note: If the mirror target needs CHAP authorization, you need to provide

User Name and Secret.

Press **OK** to continue.



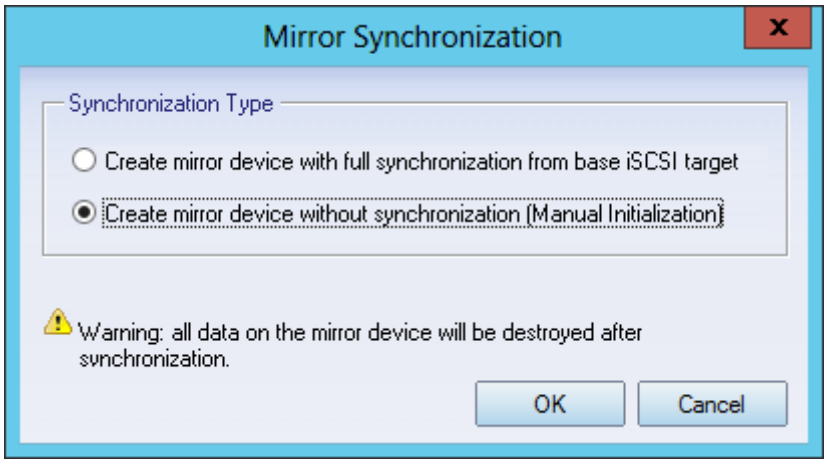
Press **Next** to continue.



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

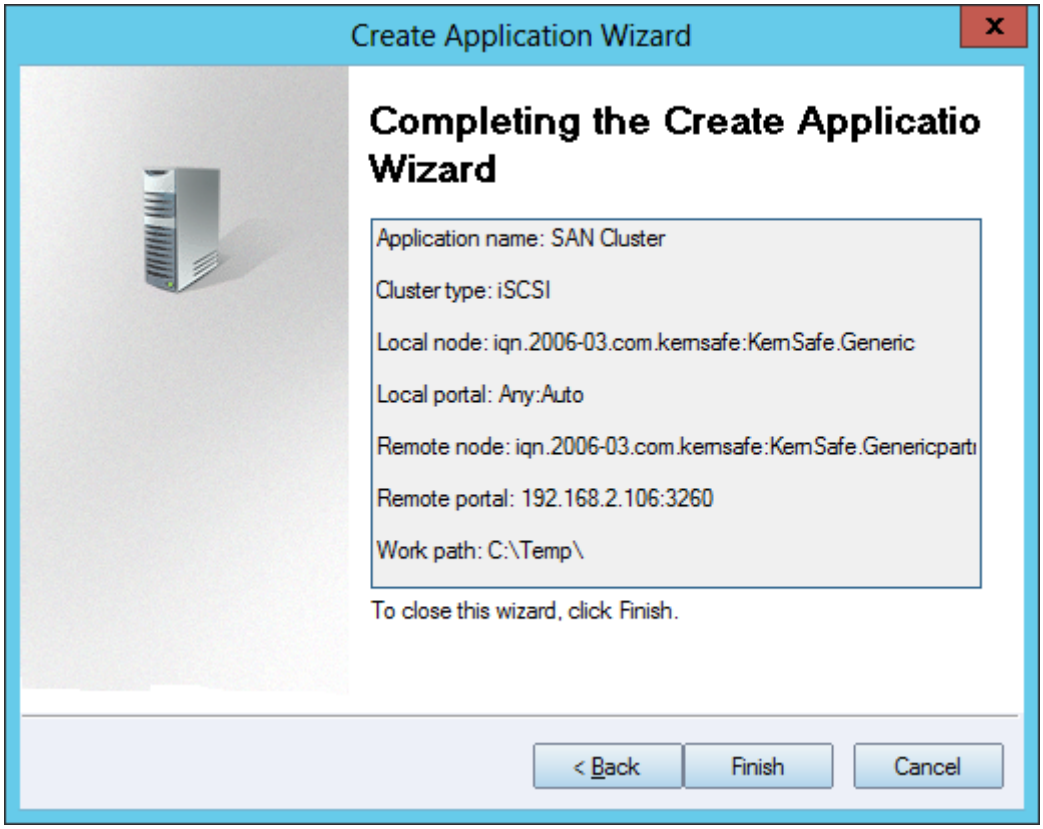
Note: User must specify parameters for Sync Channel and can scroll up the window and specify more channels for alternatives, these alternatives work as heart-beat and can be used when Sync channel got broken, these alternatives will prevent split-brain.

Press **Next** to continue.



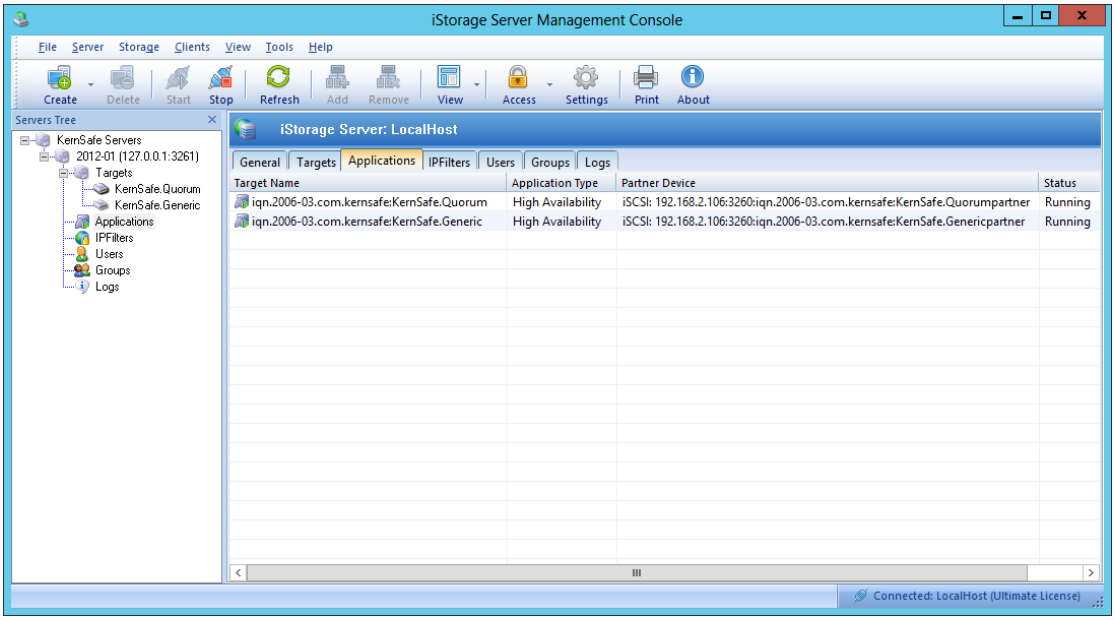
Now, the base target should be synchronized to partner target. If the two targets are both new and not initialized, we choose C**reate mirror device without synchronization (Manual Initialization)**. Otherwise, we must choose C**reate mirror device with full synchronization from base iSCSI target**.

Press **OK** button to continue.



Press **Finish** to complete the creation.

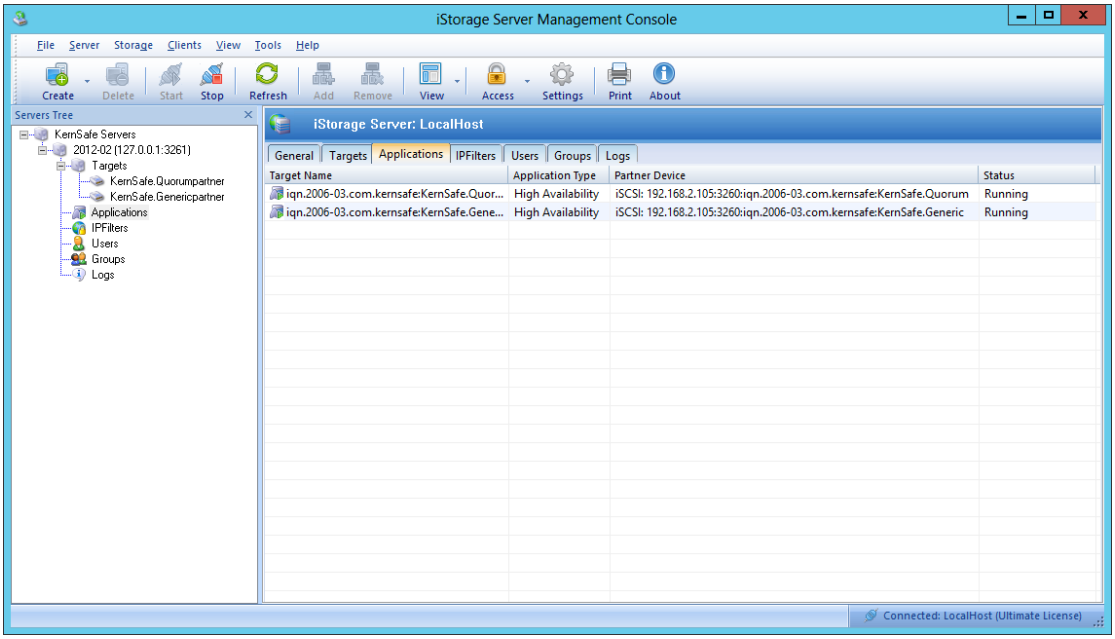
Now, the two applications should be shown as below if successful.



The configuration on iStorage Server 1 is completed.

We do the same operations on iStorage Server 2 to create applications;

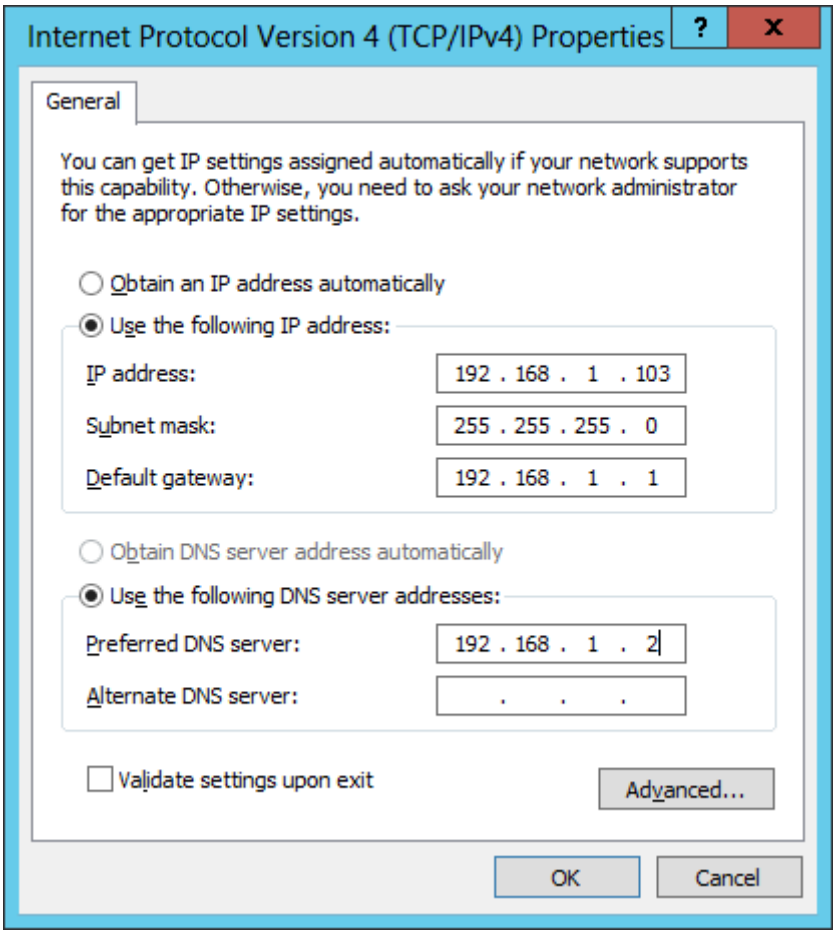
the main interface will be shown as below.



Configure Cluster Node 1

Join to the Domain

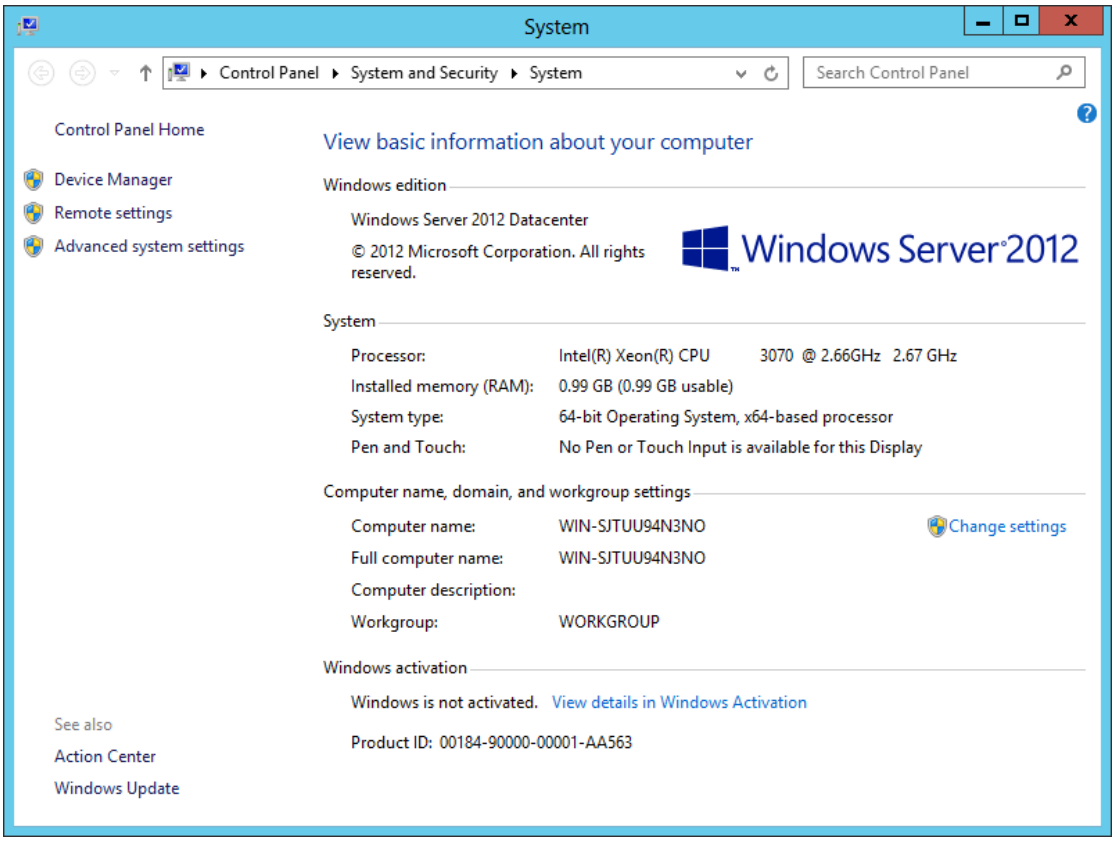
For working in the clustering environment, the **Network Adapter** must be assigned a static IP Address.



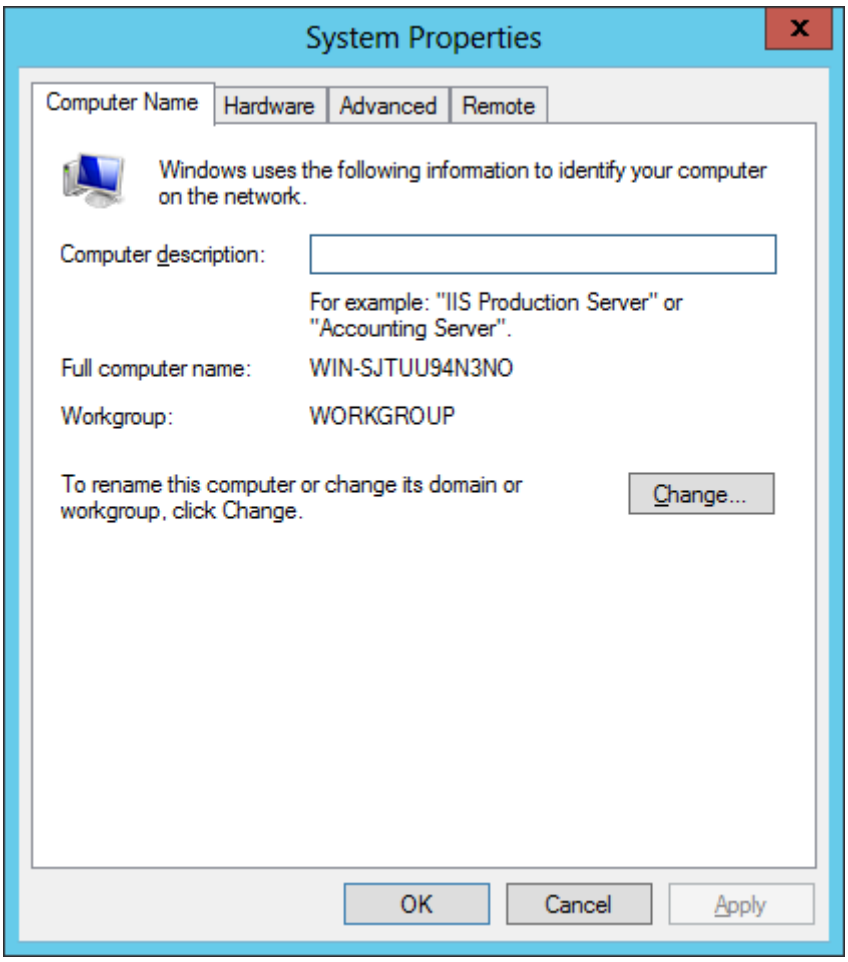
Type the IP Address, subnet, gateway and DNS. The DNS should point to Domain Controller.

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

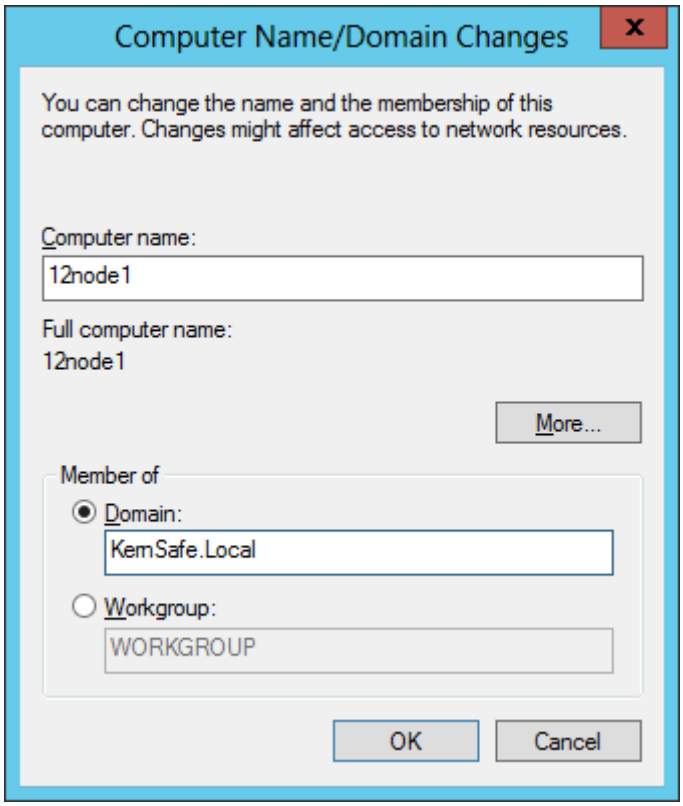
Right click **Computer** and then open **Properities**.



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



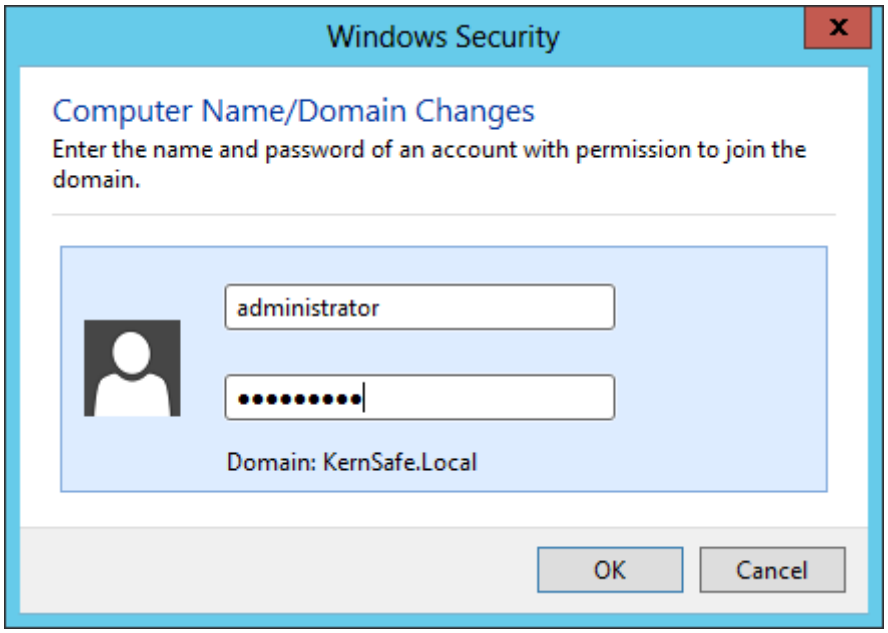
Press **Change** to rename computer and change its domain.



Type Computer name **12node1**.

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

Press **OK** to continue.

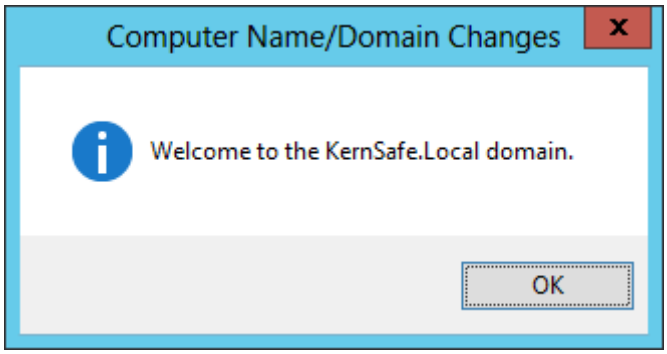


Domain Controller account is required to join the domain.

Type user name and password.

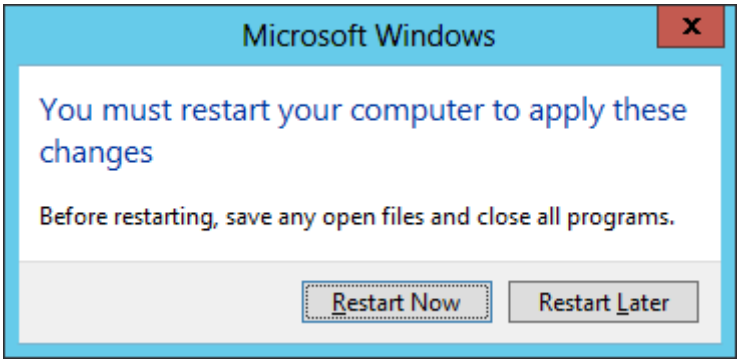
Press **OK** to continue.

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



Press **OK** to continue.

But reboot is required.

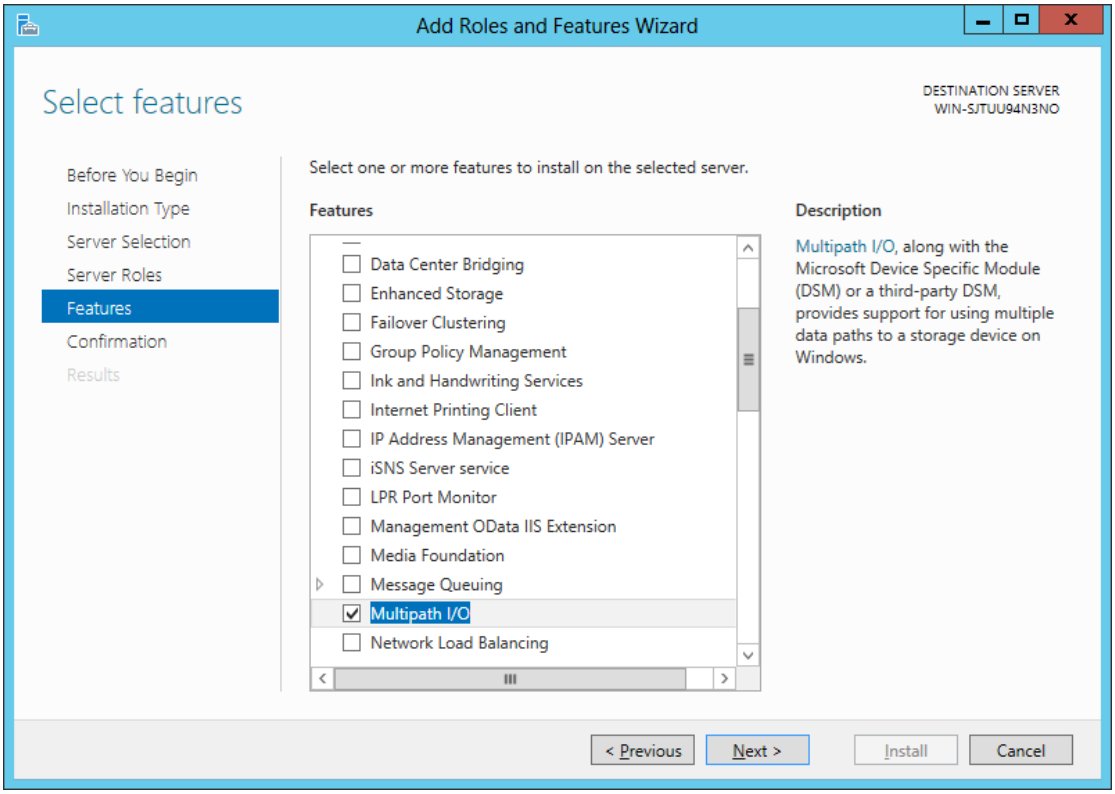


Press **Restart Now** to finish joining.

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.

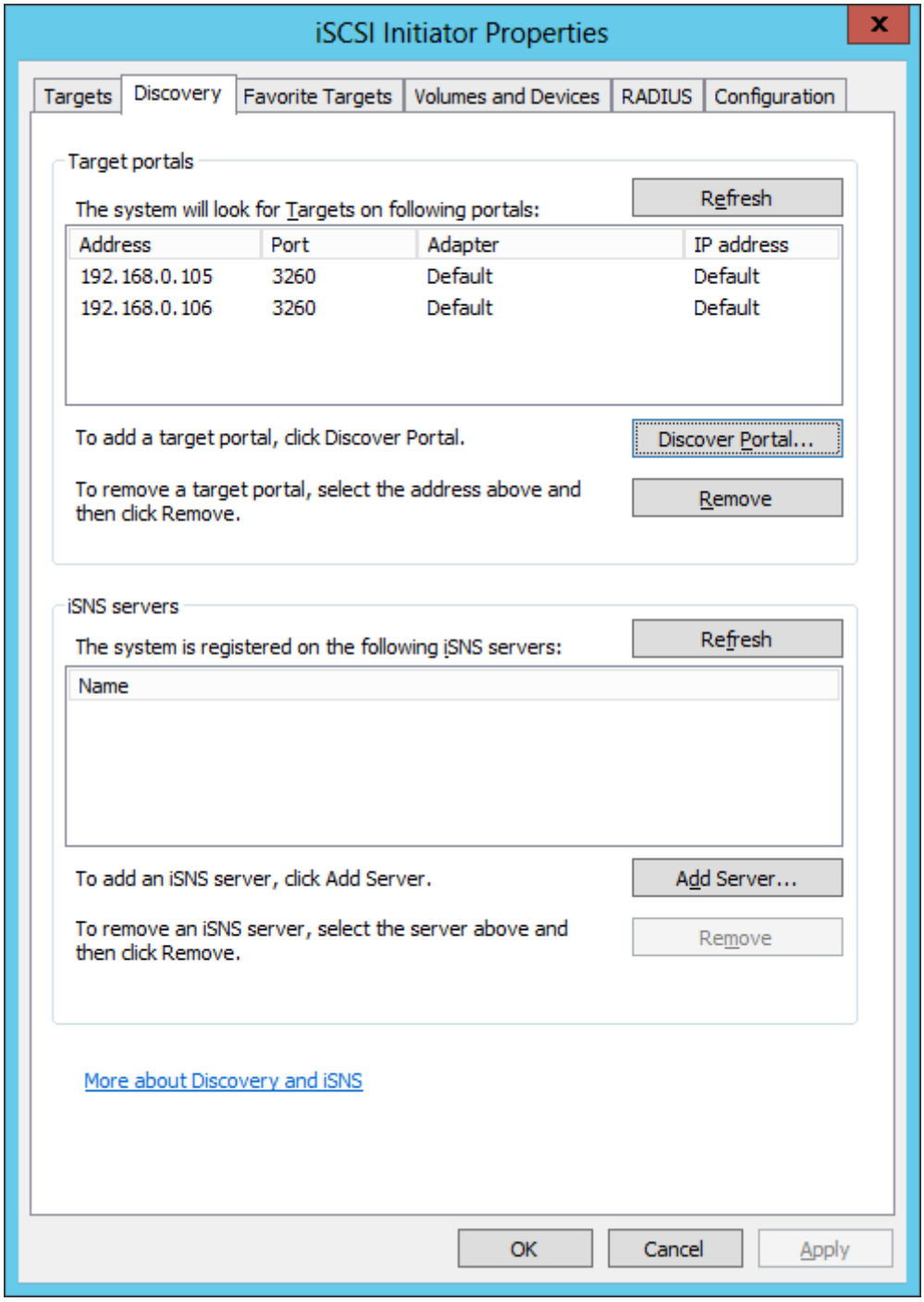


Select **Multipath I/O** and install it following the wizard.

Connect to iSCSI Target

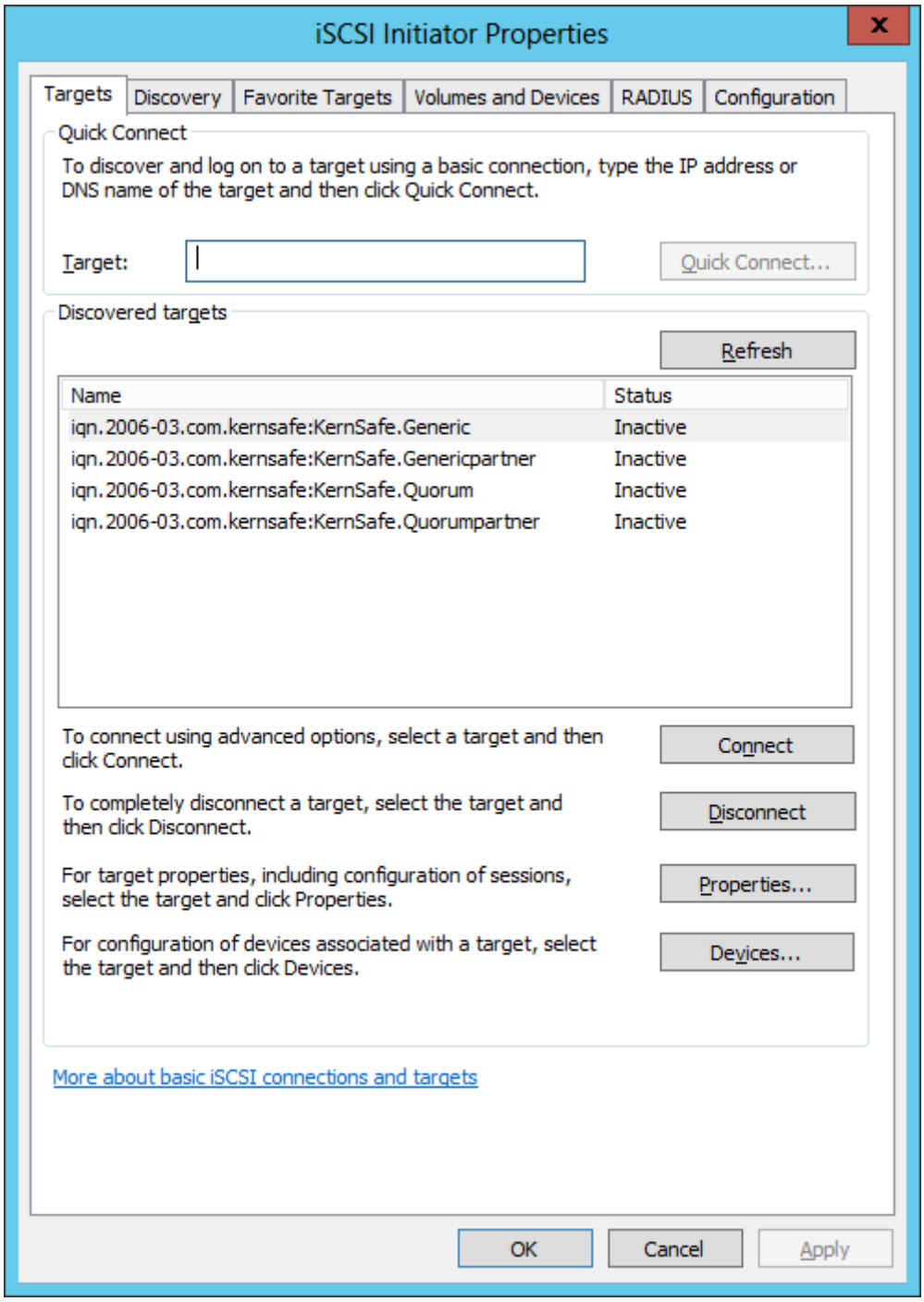
Launch the **Administrator tools-> Microsoft iSCSI initiator**.

Turn to **Discovery** tab.



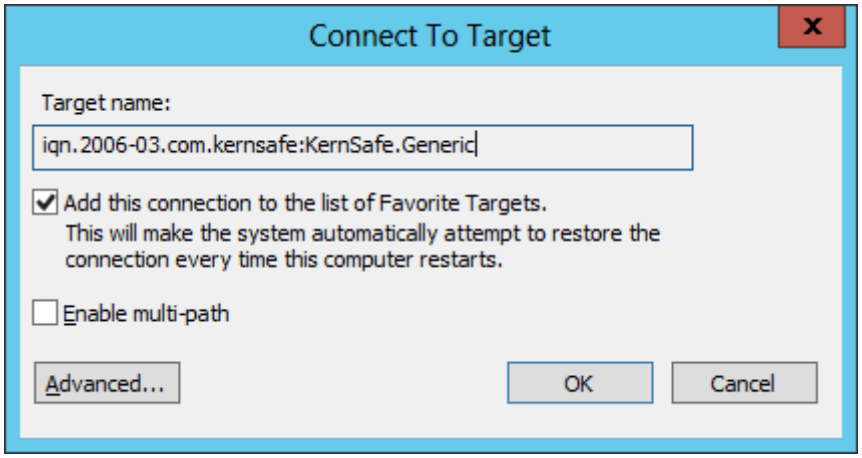
Press **Discover Portal** button and then input each IP of iStorage Server.

Then turn to **Targets** tab.



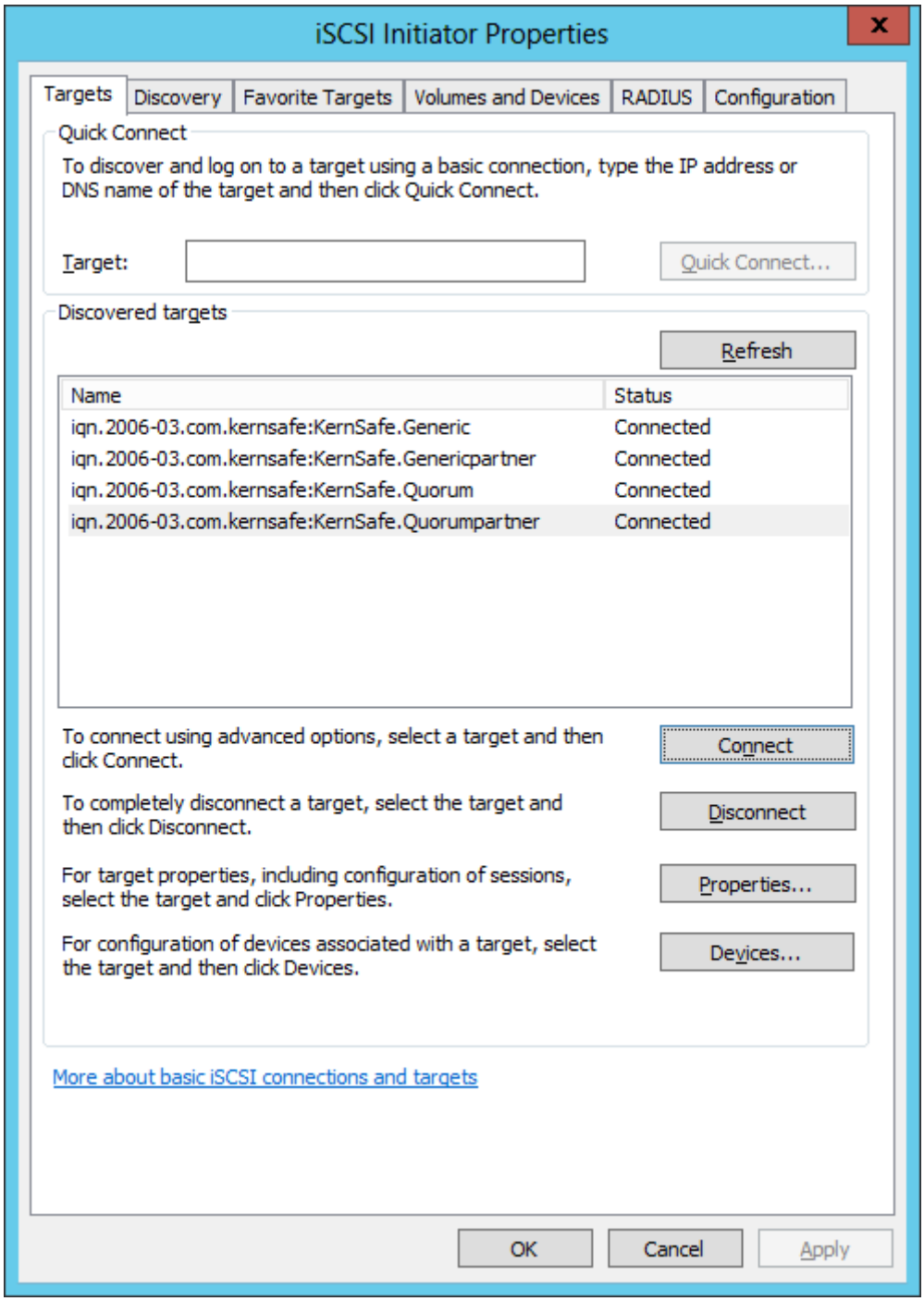
On the **Discovered targets** list, you will see all four targets we have created on iStorage Server.

Select first one and press **Connect**.



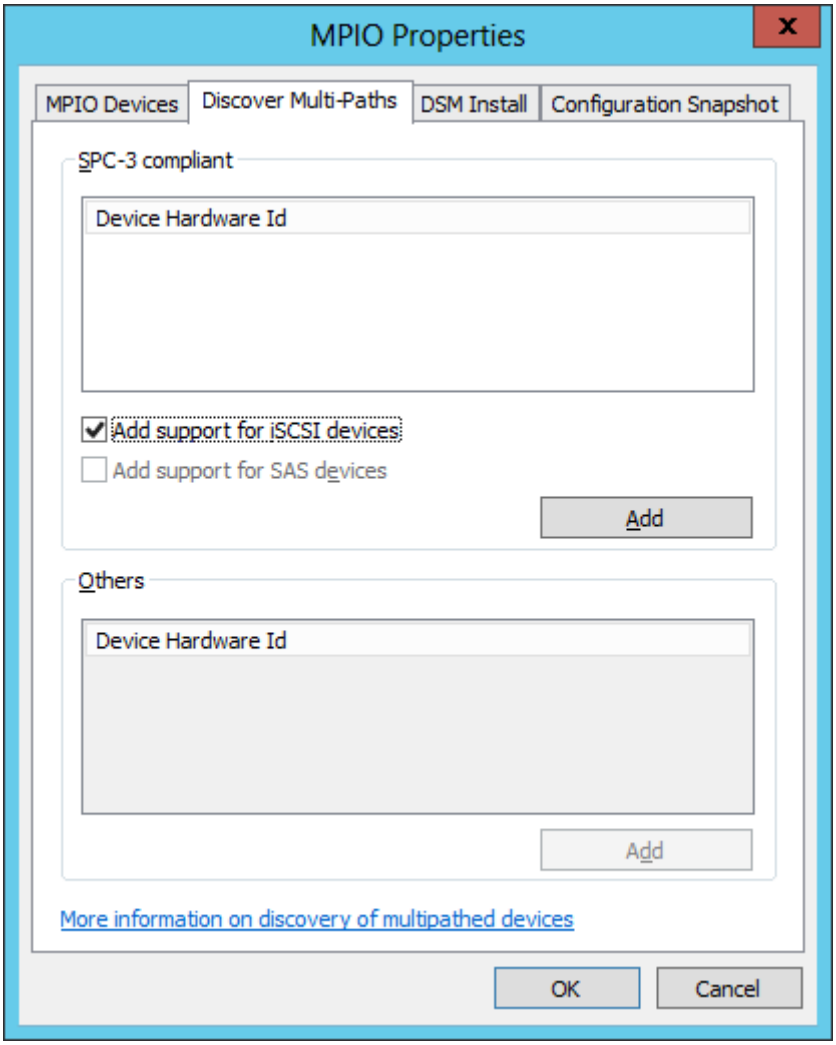
Keep default and press **OK** to connect.

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

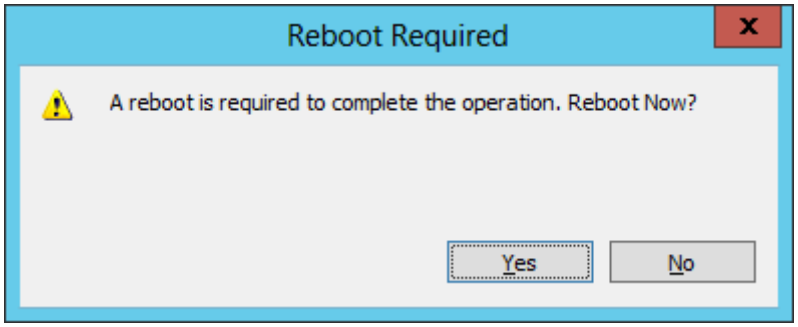
Launch **Administrative Tools-> MPIO**.



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

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

Press **OK** to continue.

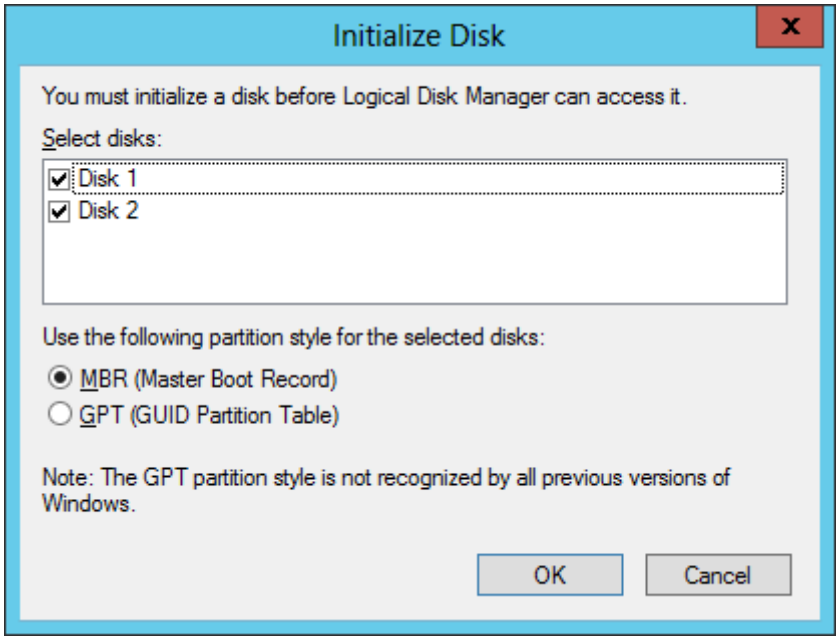


Reboot is required to enable MPIO.

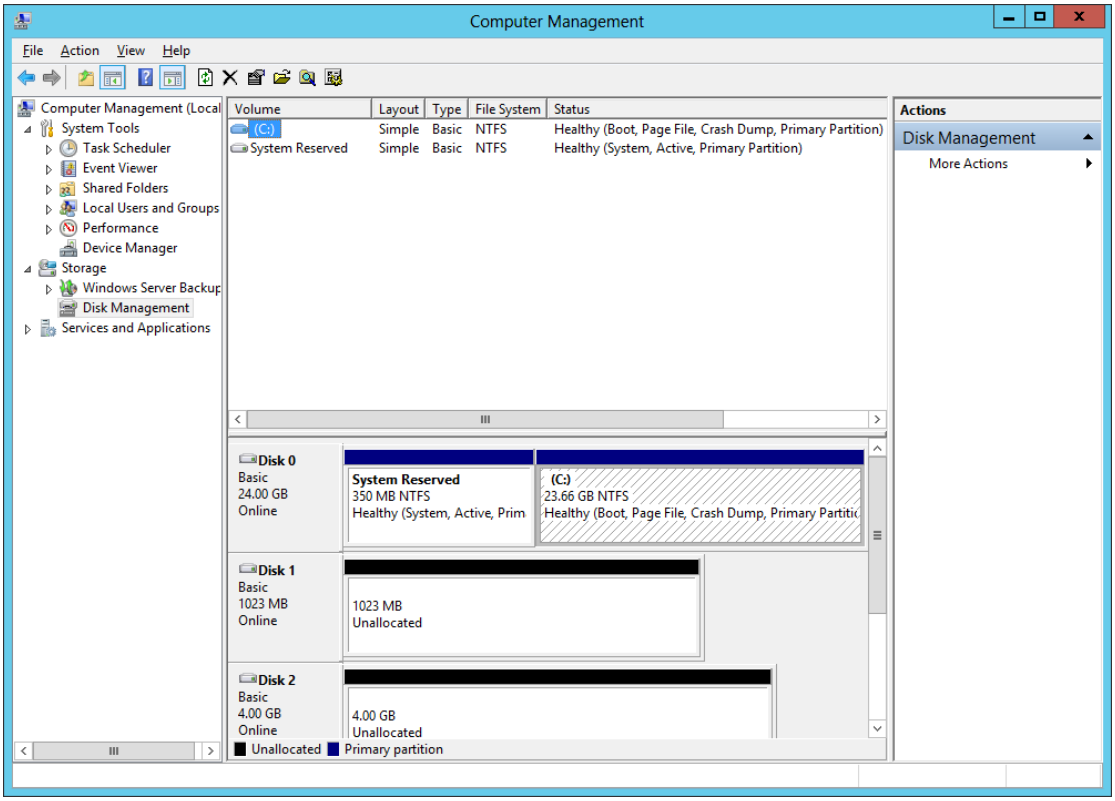
Press **Yes** to restart.

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

An **Initialize Disk** dialog is shown.

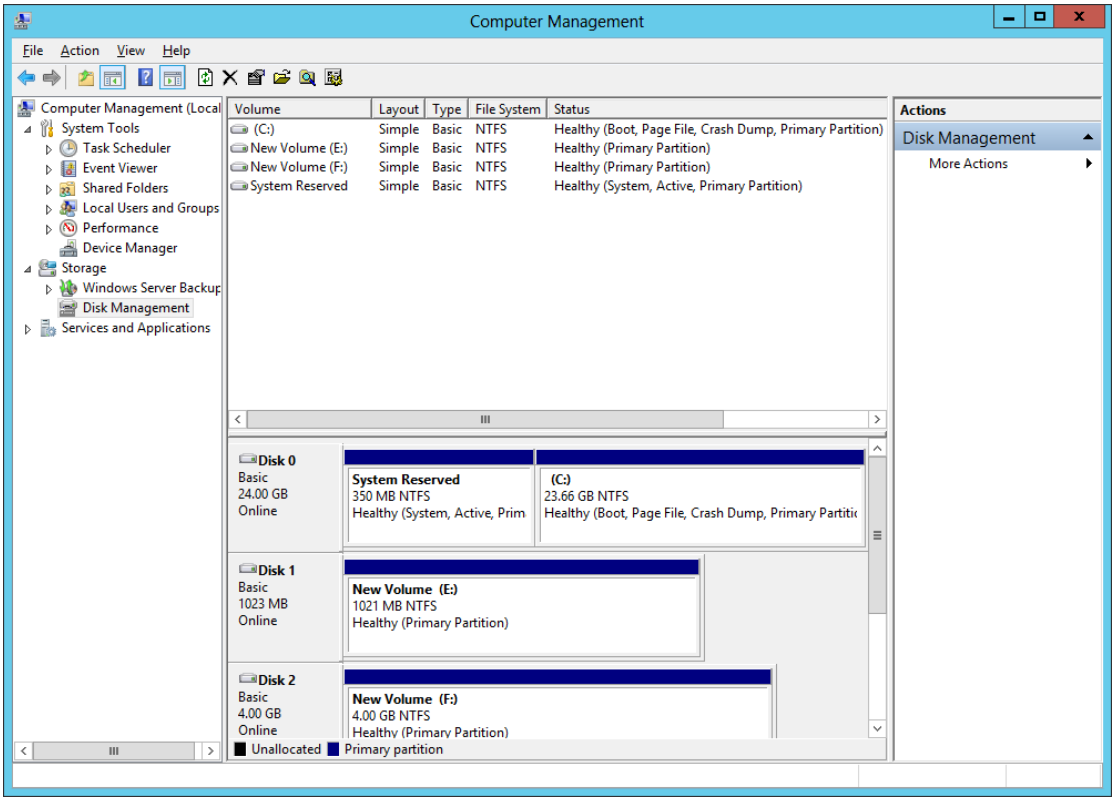


Press **OK** to initialize disk.



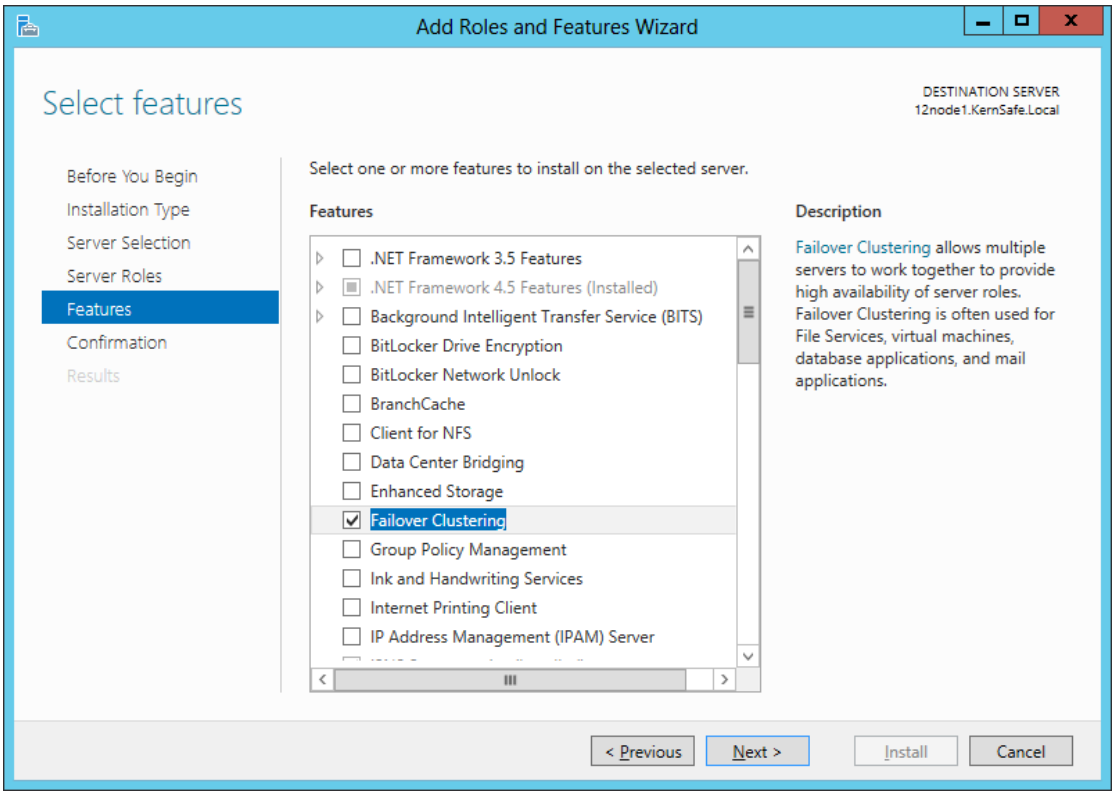
Right click on the disk and then select **New Simple Volume**, partition and format the disks by following wizard.

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



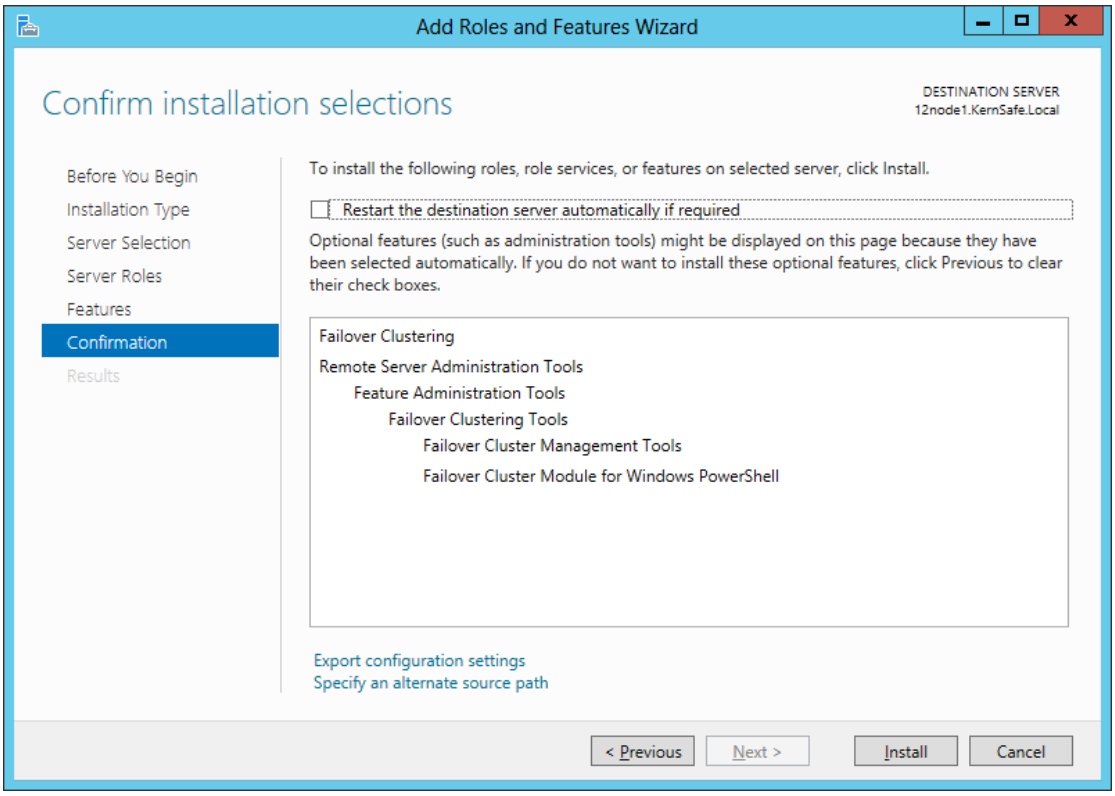
Install Failover Clustering

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.

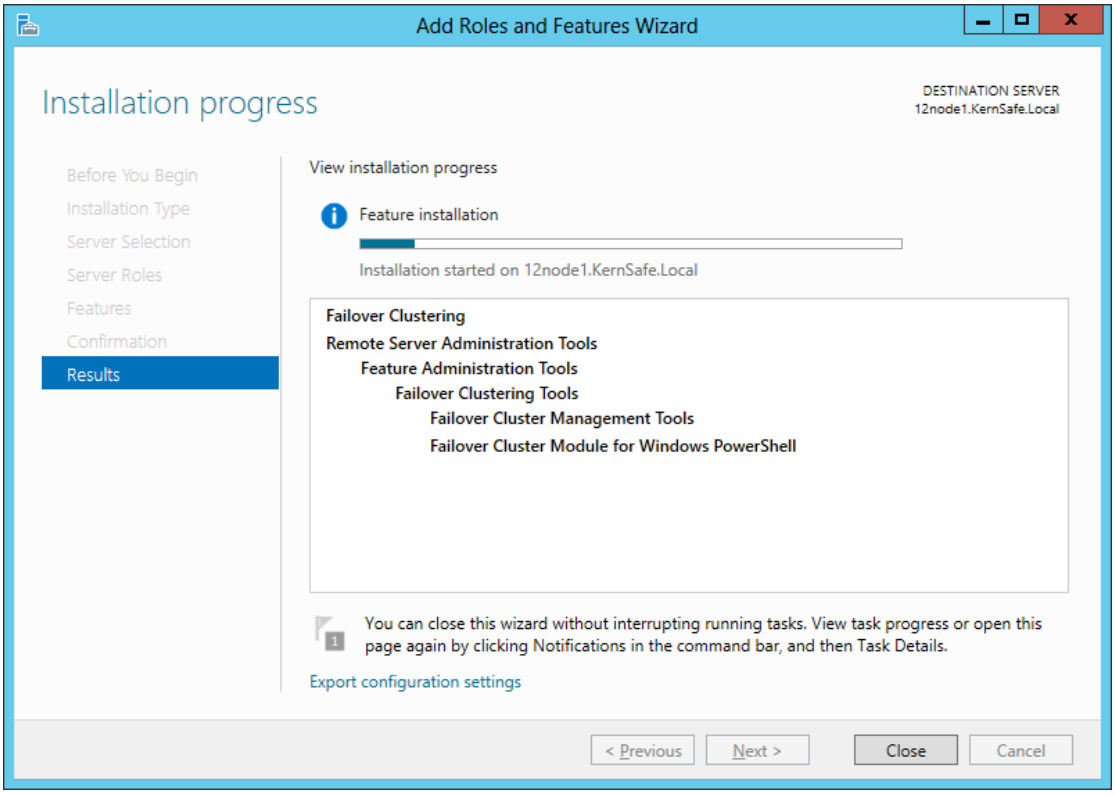


Select Feature **Failover Clustering**.

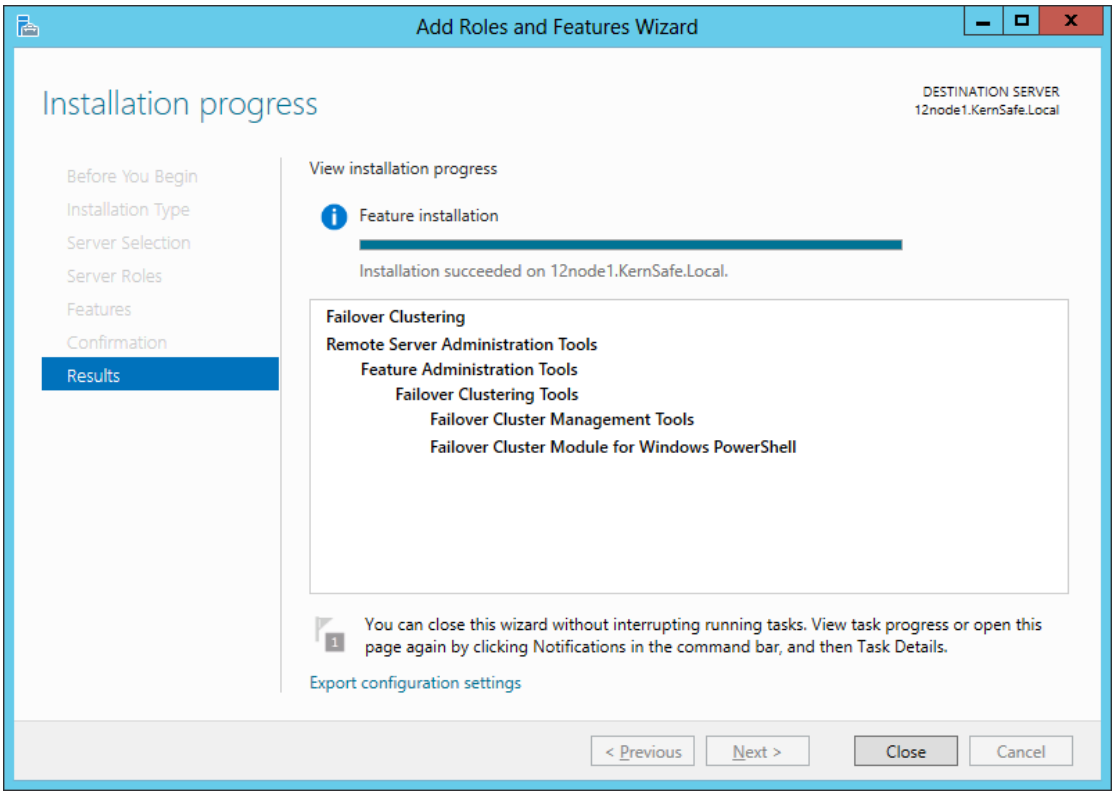
Press **Next** to continue.



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



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

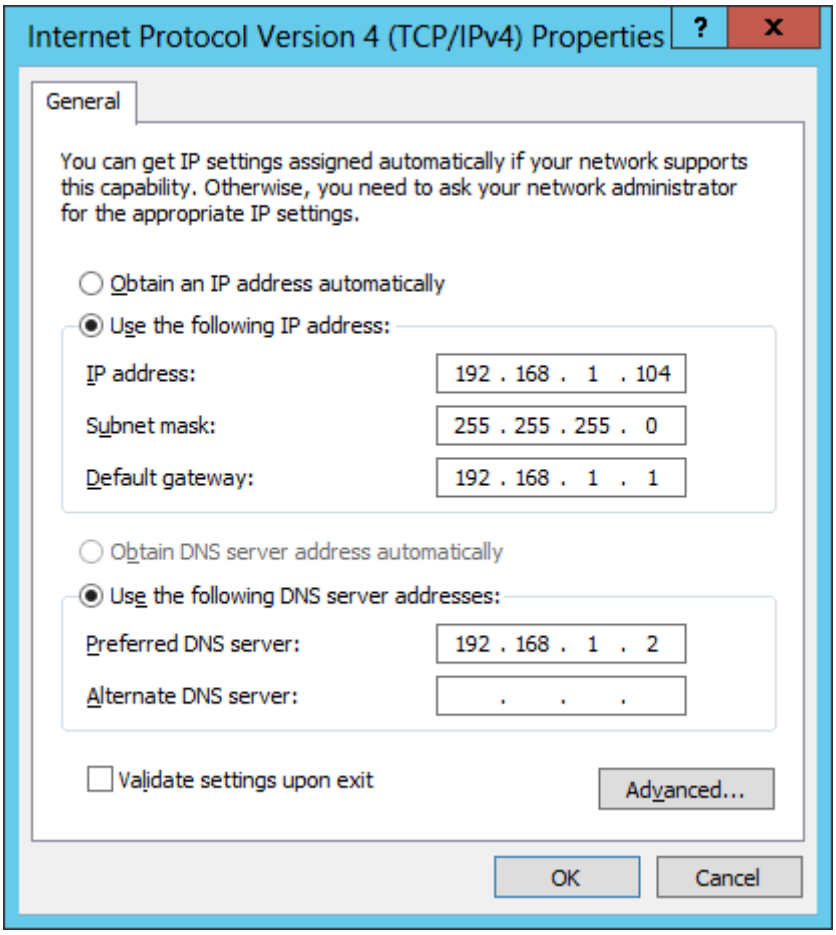


After the feature installation succeeds, you can press **Close** button.

Configure Cluster Node 2

Join to the Domain

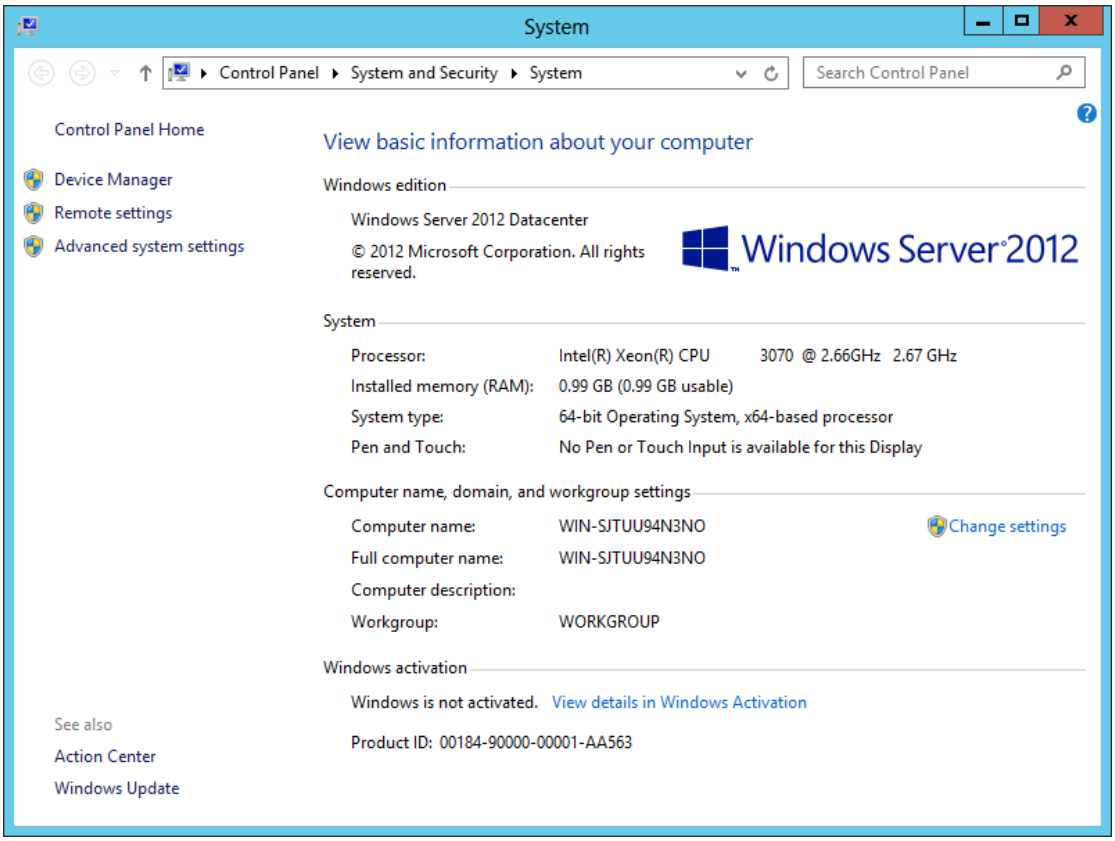
For working in the clustering environment, the **Network Adapter** must be assigned a static IP Address.



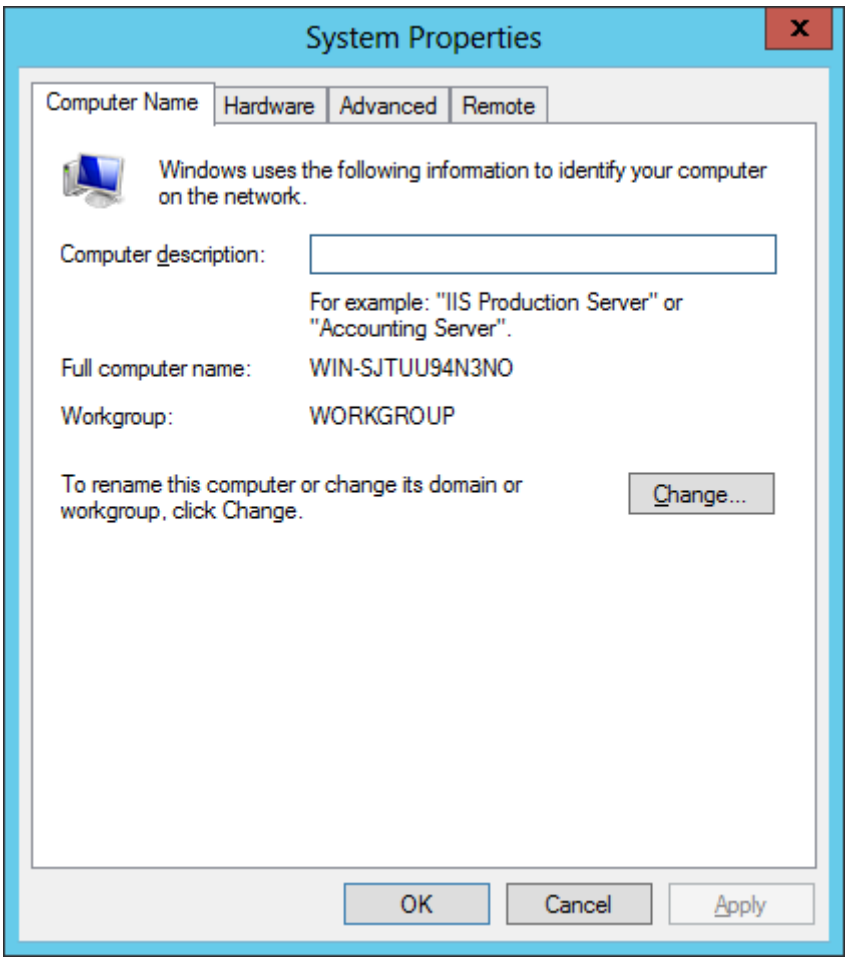
Type the IP Address, subnet, gateway and DNS. The DNS should point to Domain Controller.

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

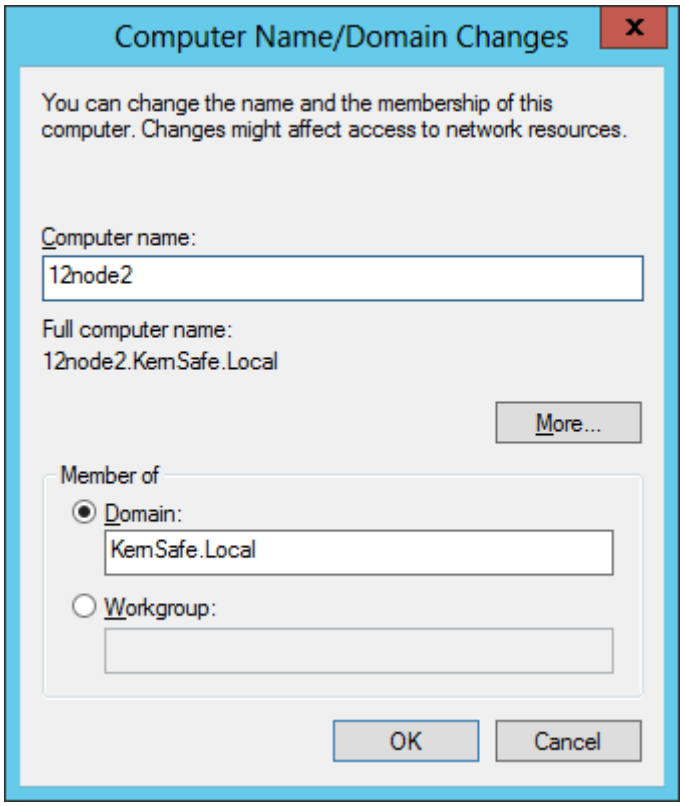
Right click **Computer** and then open **Properties**.



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



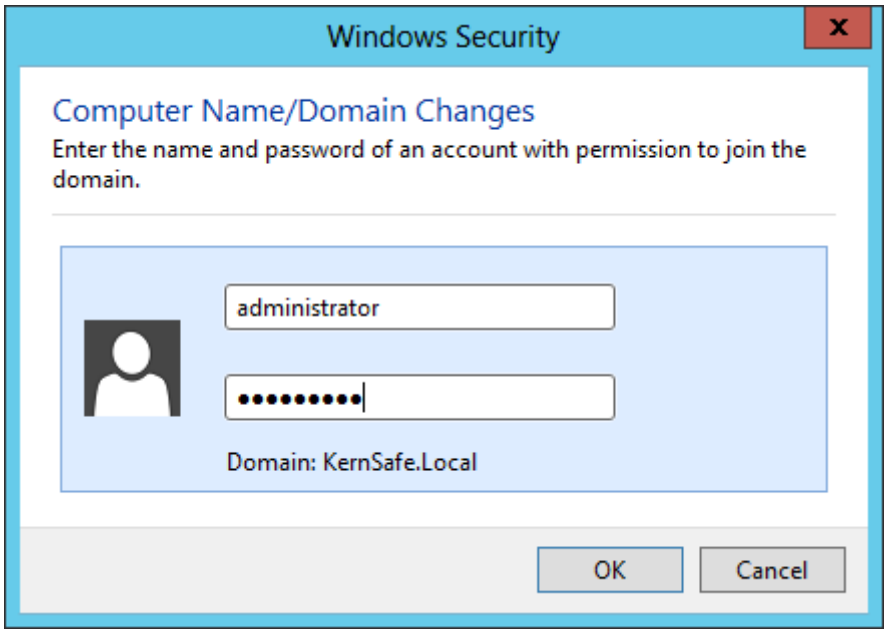
Press **Change** to rename computer and change its domain.



Type Computer name **12node2**.

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

Press **OK** to continue.

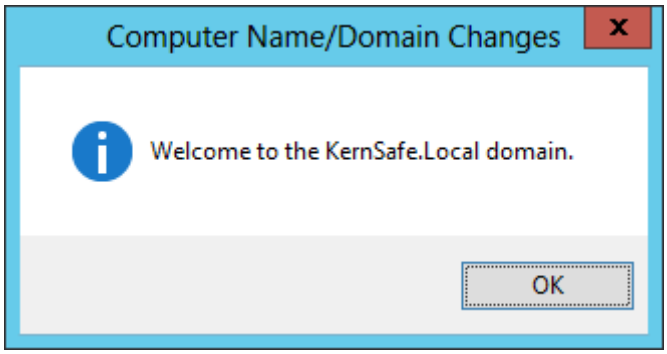


Domain Controller account is required to join the domain.

Type user name and password.

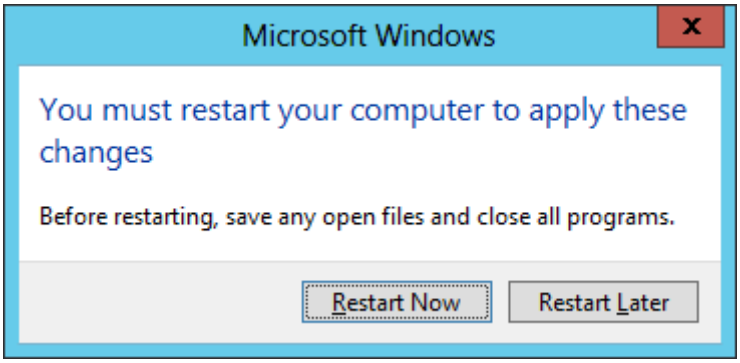
Press **OK** to continue.

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



Press **OK** to continue.

But reboot is required.

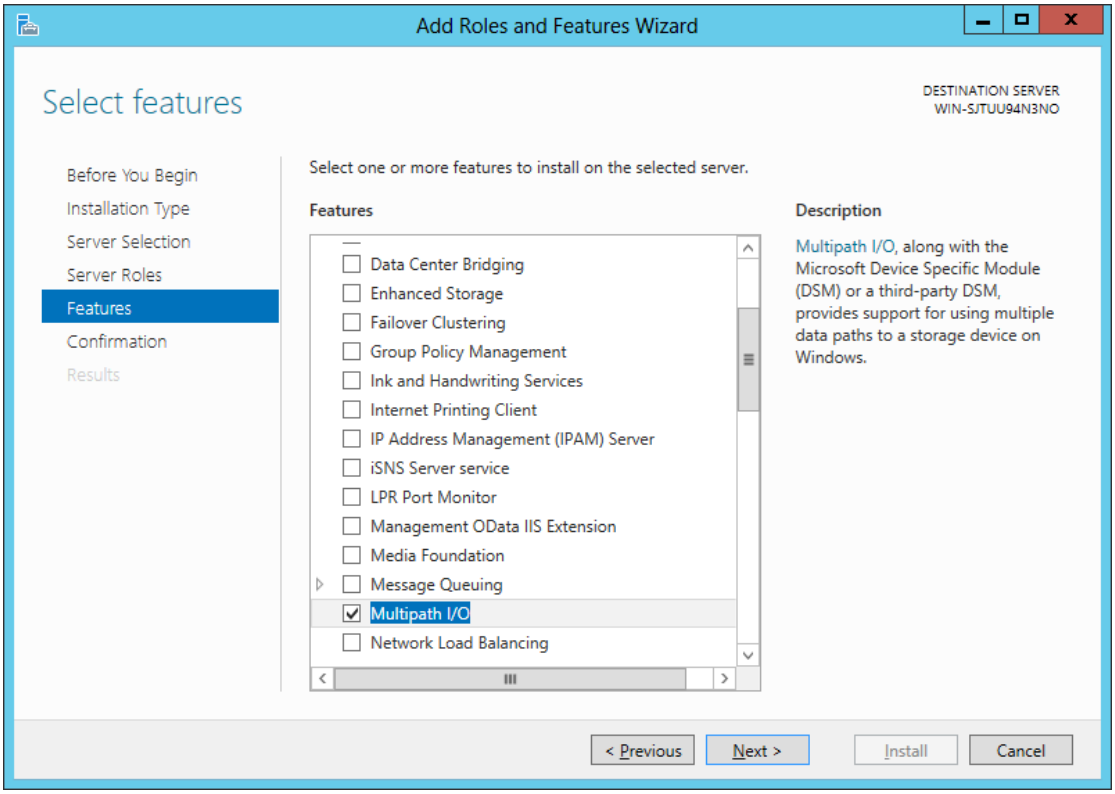


Press **Restart Now** to finish joining.

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.

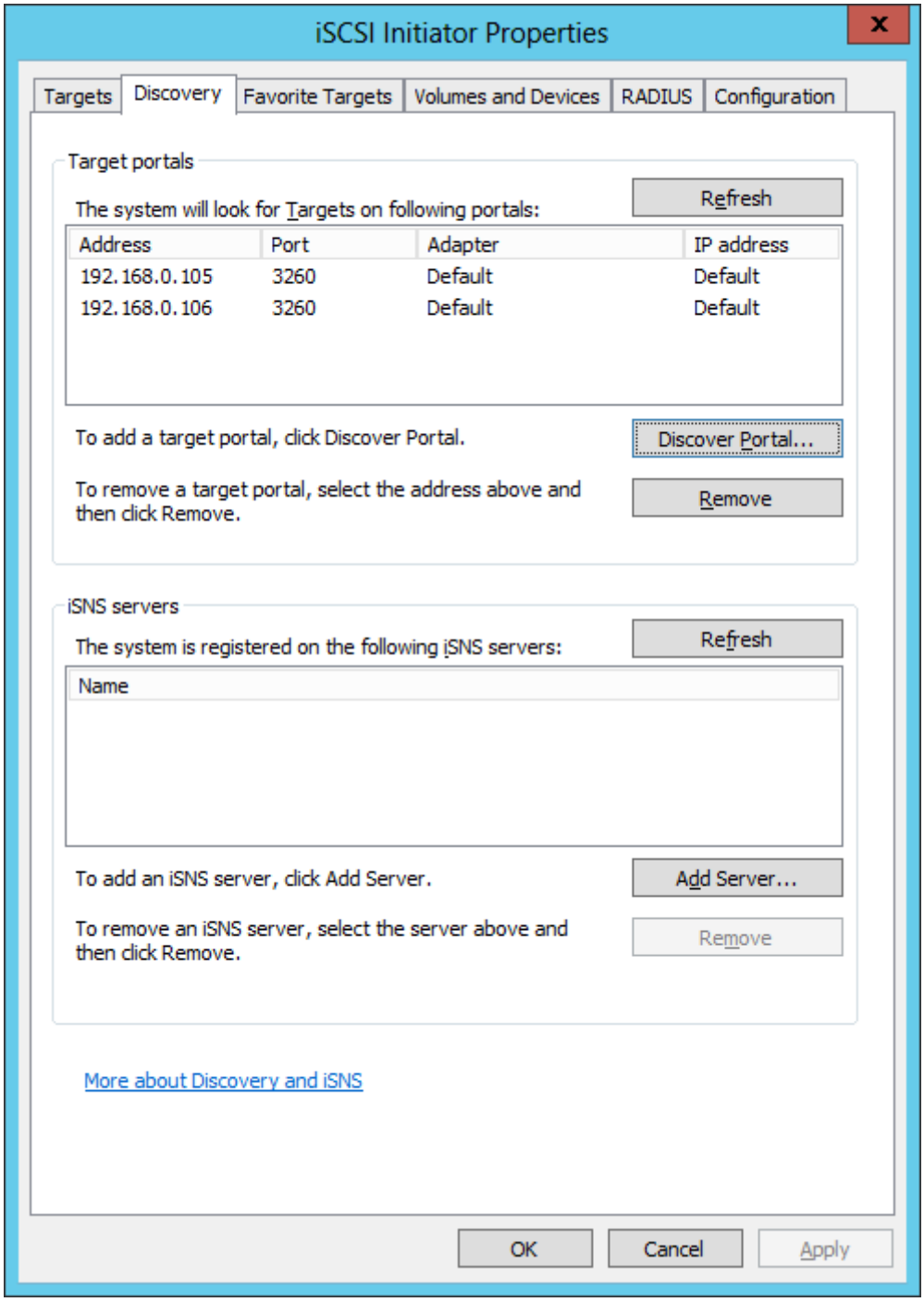


Select **Multipath I/O** and install it following the wizard.

Connect to iSCSI Target

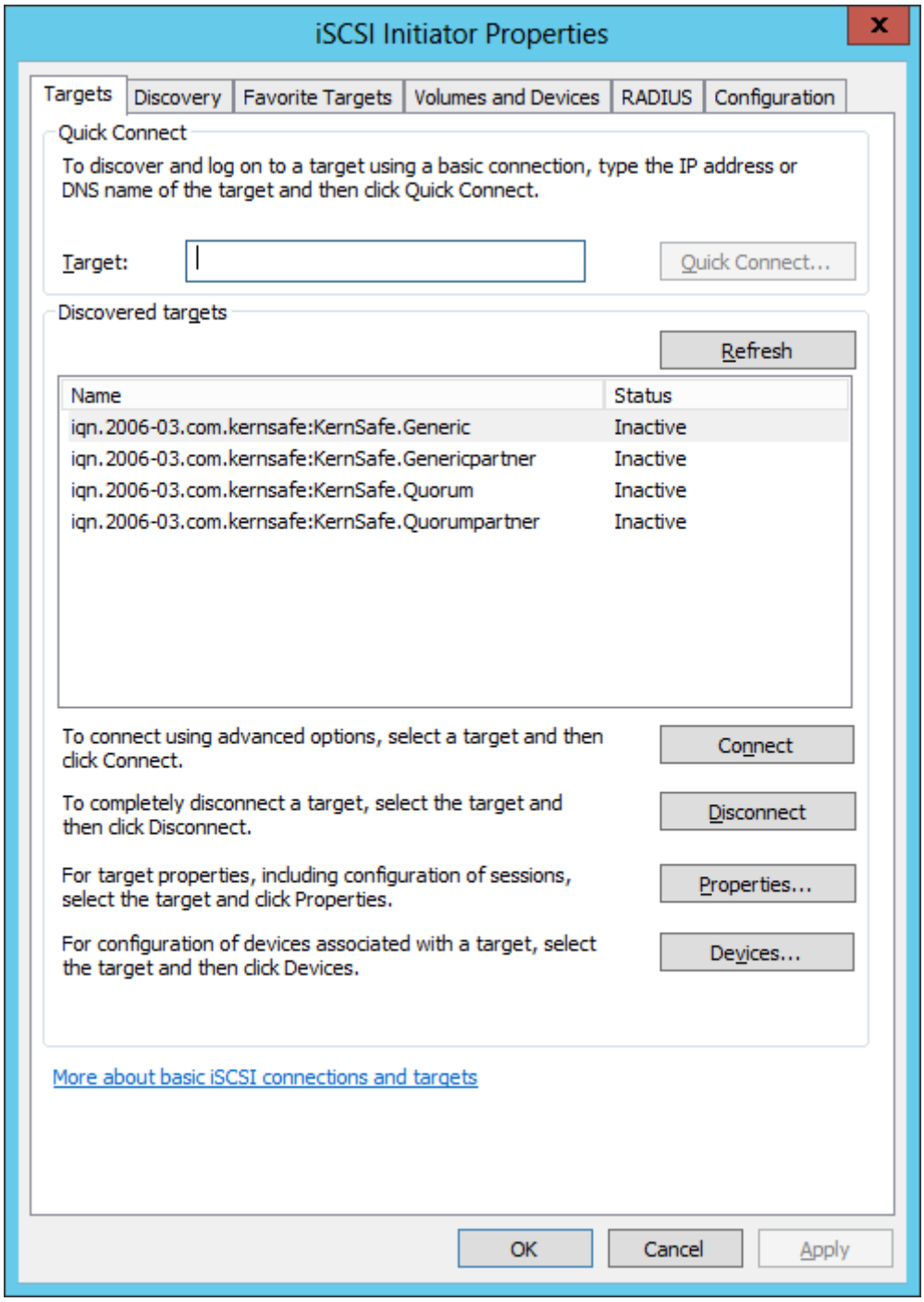
Launch the **Administrator tools-> Microsoft iSCSI initiator**.

Turn to **Discovery** tab.



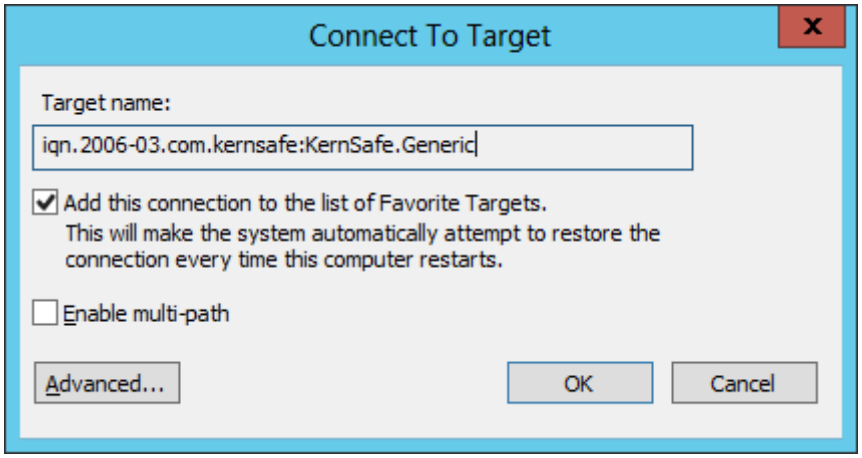
Press **Discover Portal** button and then input each IP of iStorage Server.

Then turn to **Targets** tab.



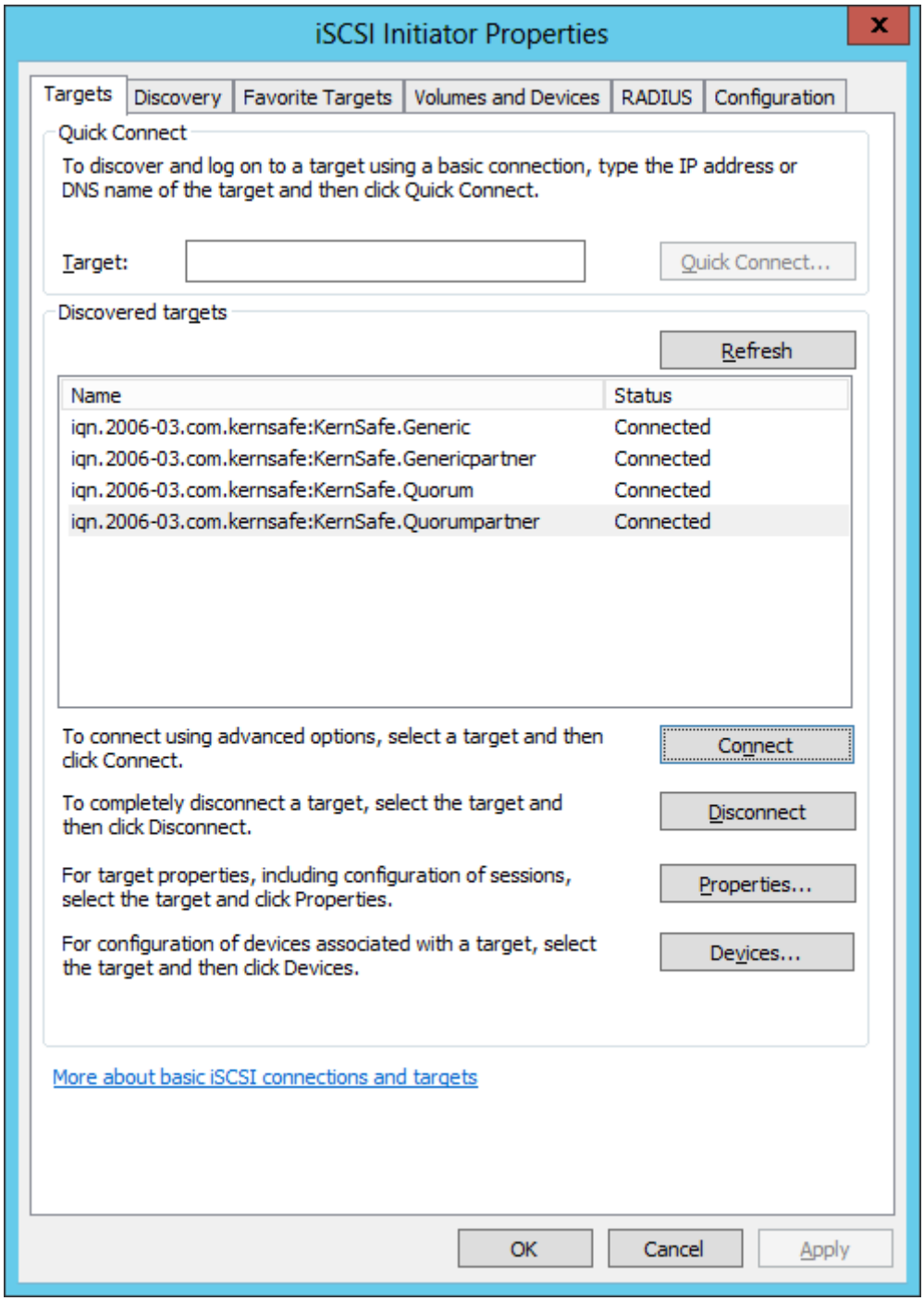
On the **Discovered targets** list, you will see all four targets we have created on iStorage Server.

Select first one and press **Connect**.



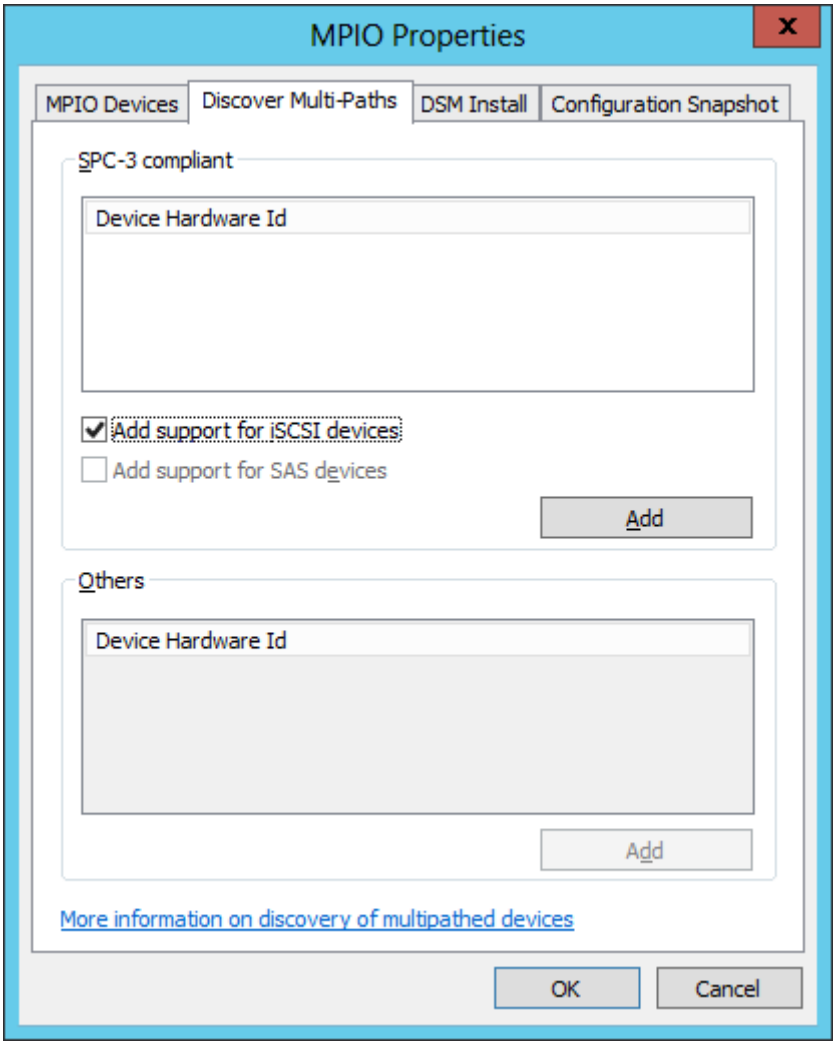
Keep default and press **OK** to connect.

Connect other three targets in the same way.


iSCSI Initiator Properties
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

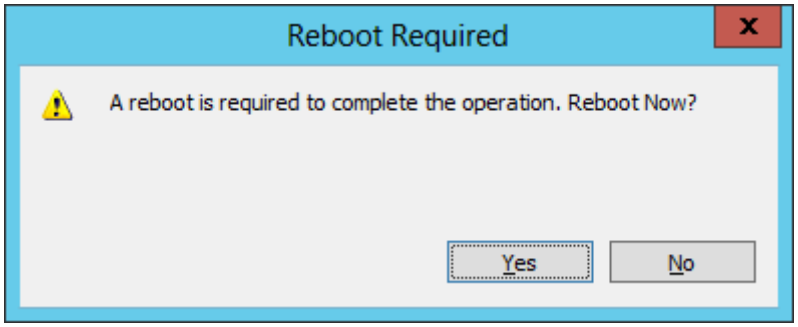
Launch **Administrative Tools-> MPIO**.



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

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

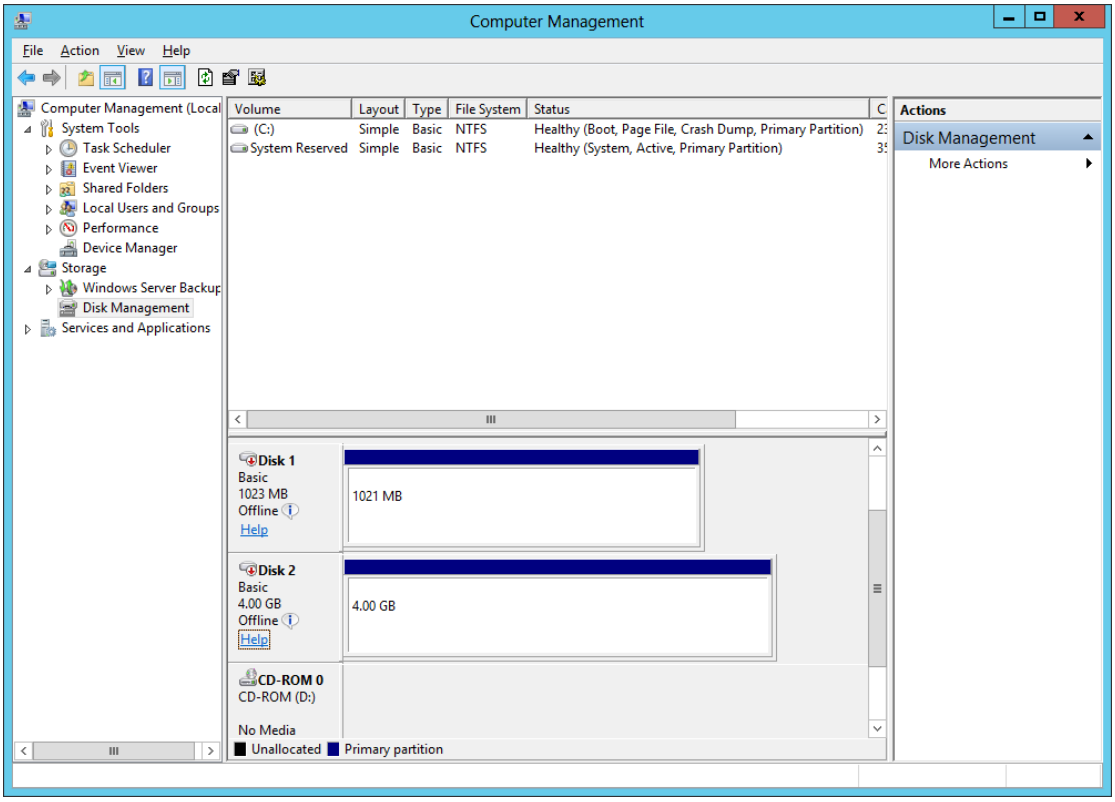
Press **OK** to continue.



Reboot is required to enable MPIO.

Press **Yes** to restart.

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

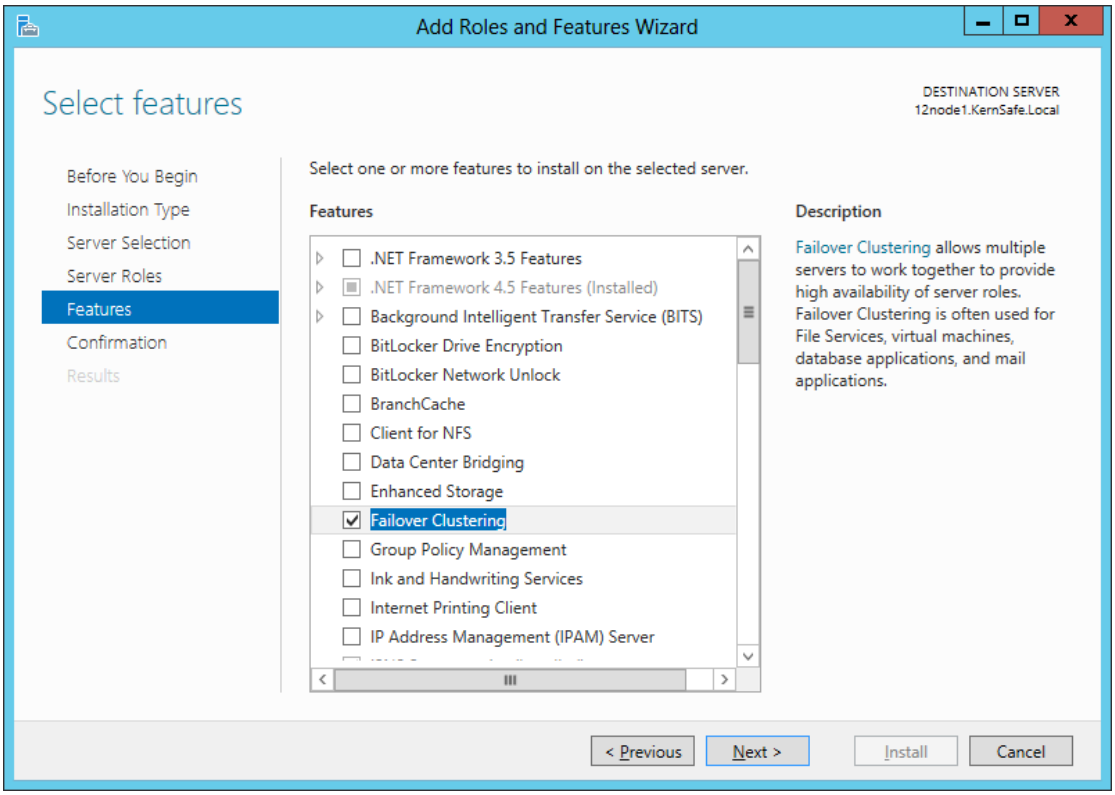


Disk 1 and Disk 2 are offline.

Note: We should not bring them online.

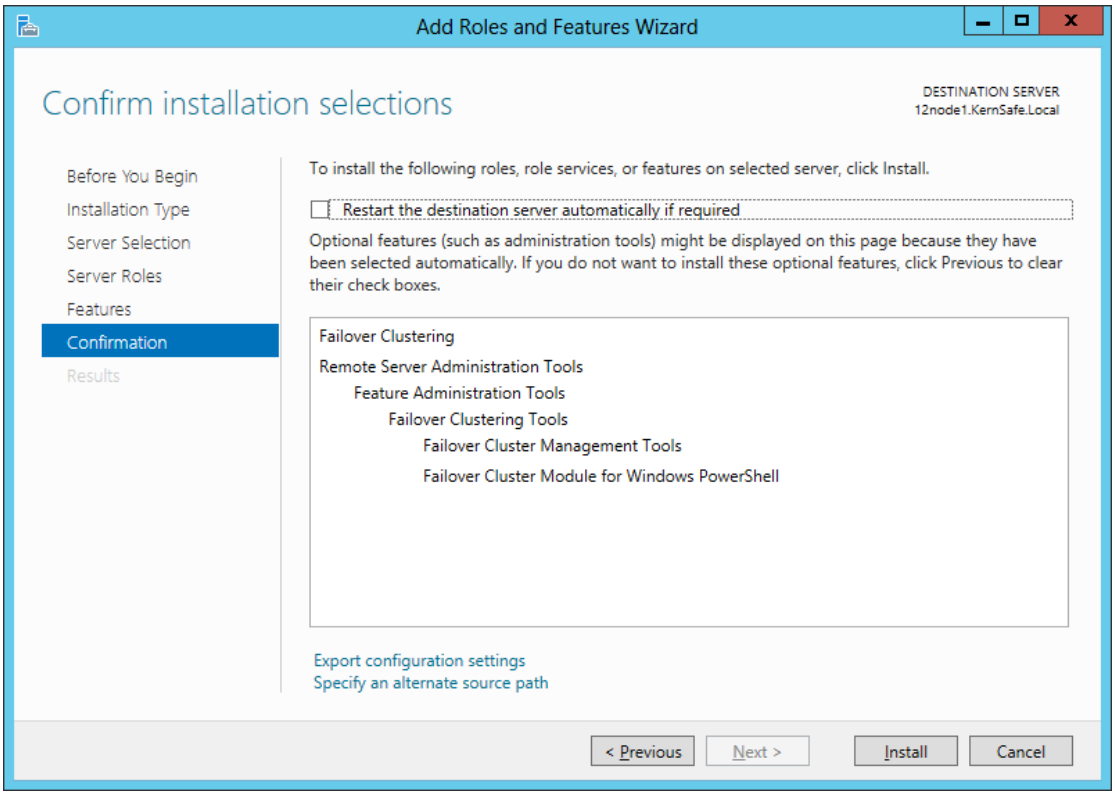
Install Failover Clustering

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.

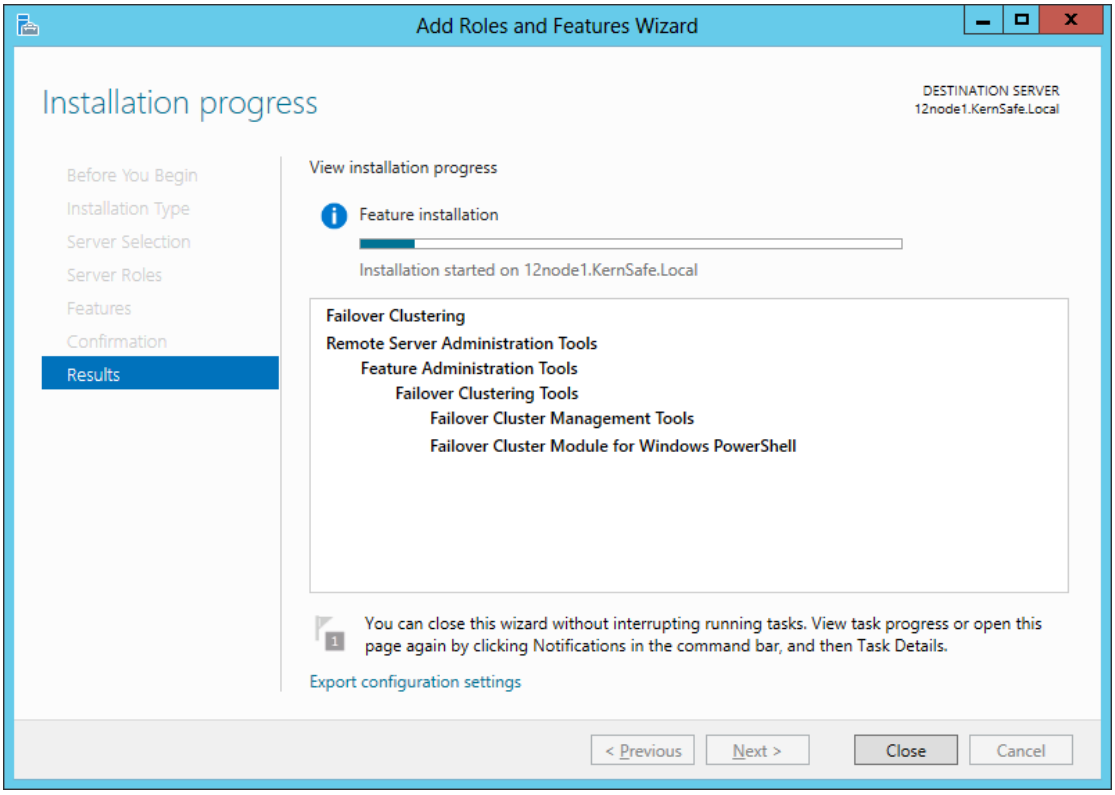


Select Feature **Failover Clustering**.

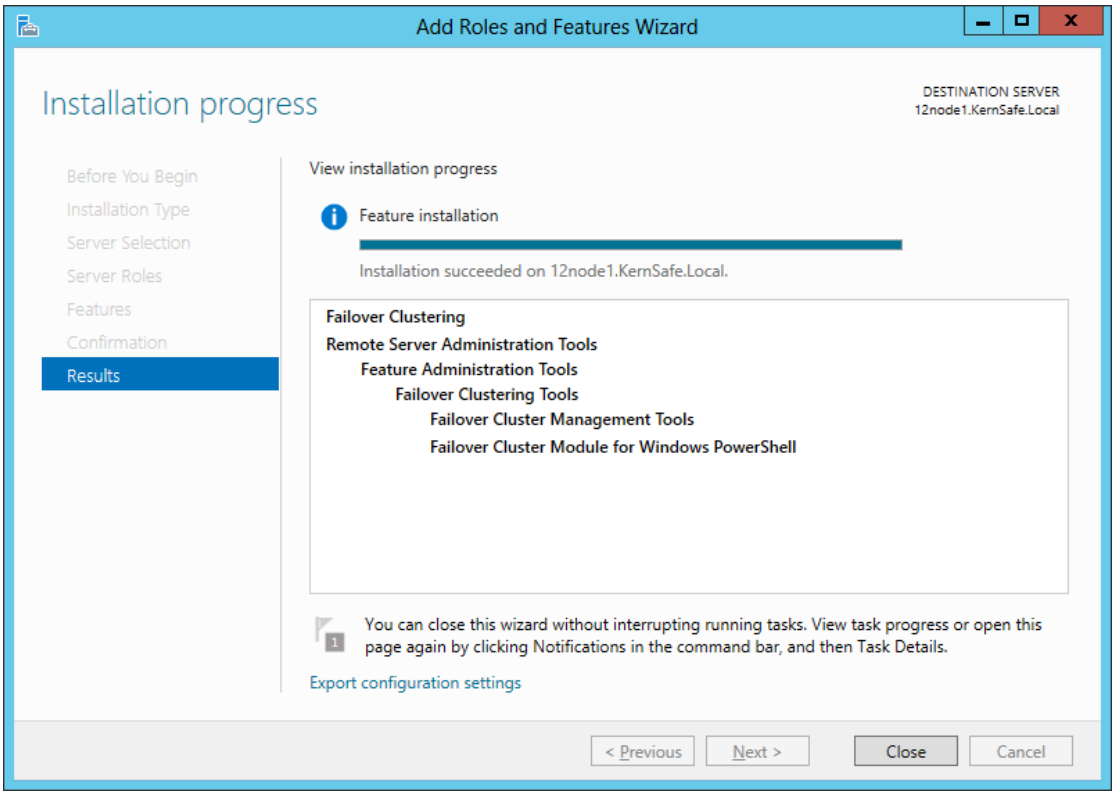
Press **Next** to continue.



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



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



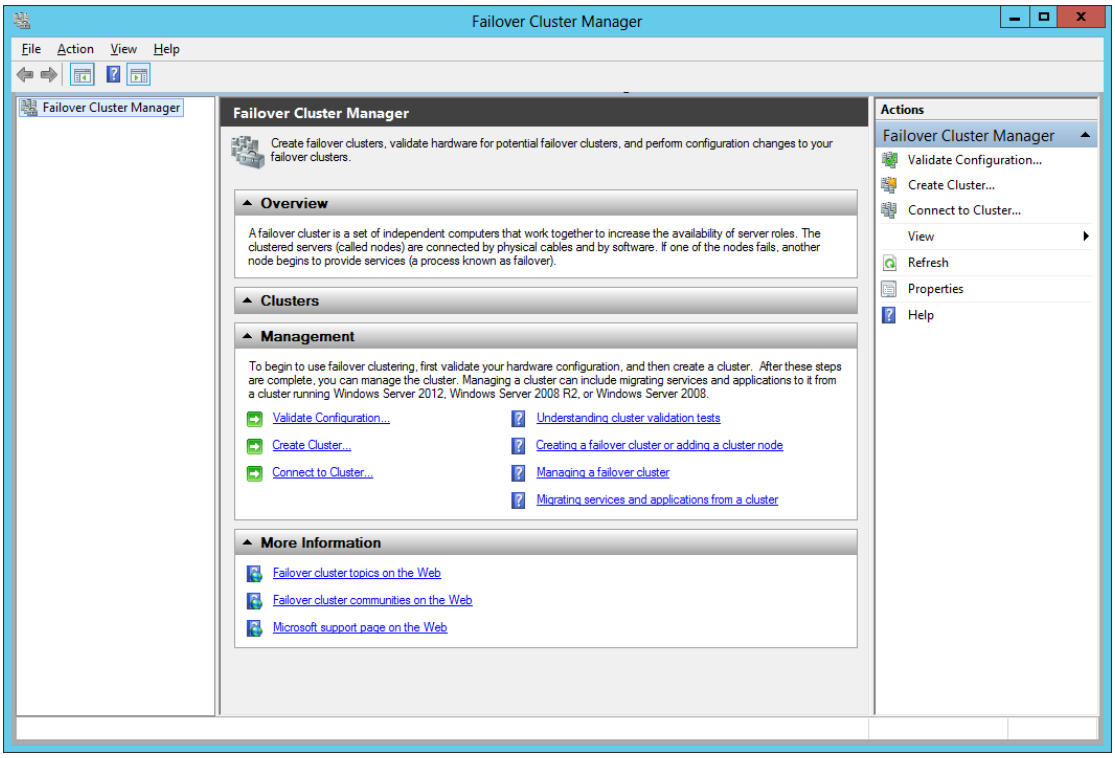
After the feature installation succeeds, you can press **Close** button.

Configure Failover Clustering

Validate a Configuration

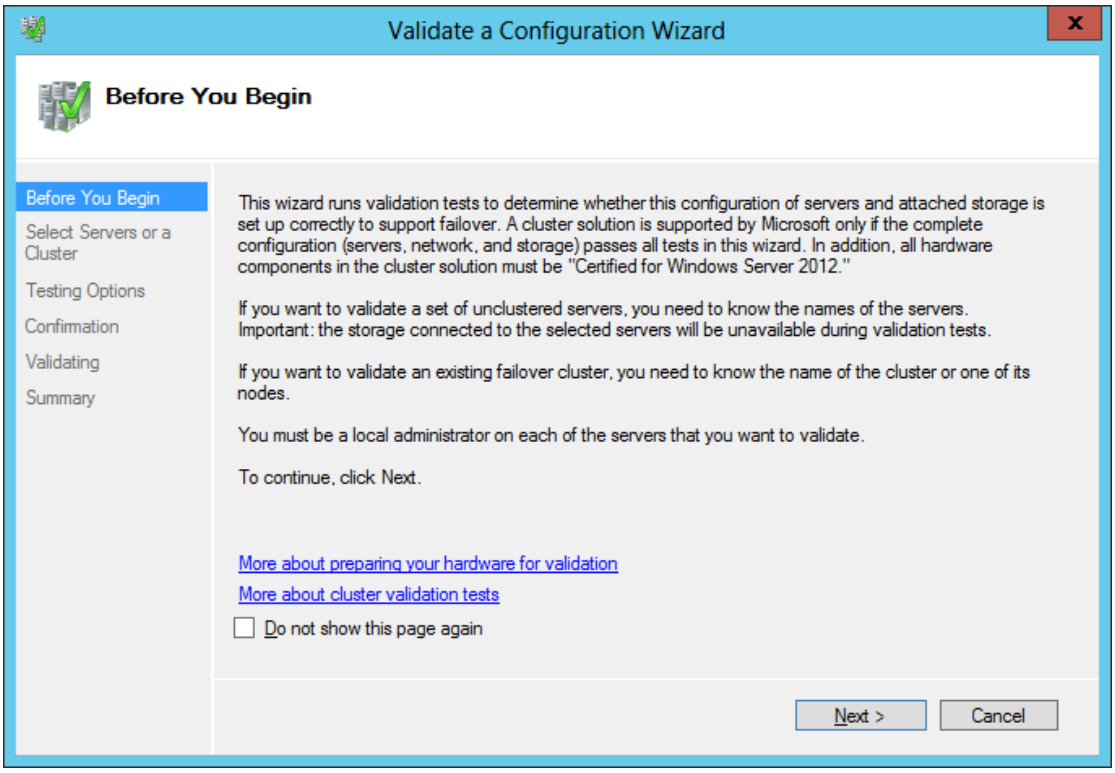
Note: This step is not necessary for creating a cluster, but it ensures the configuration is suitable for failover clustering.

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

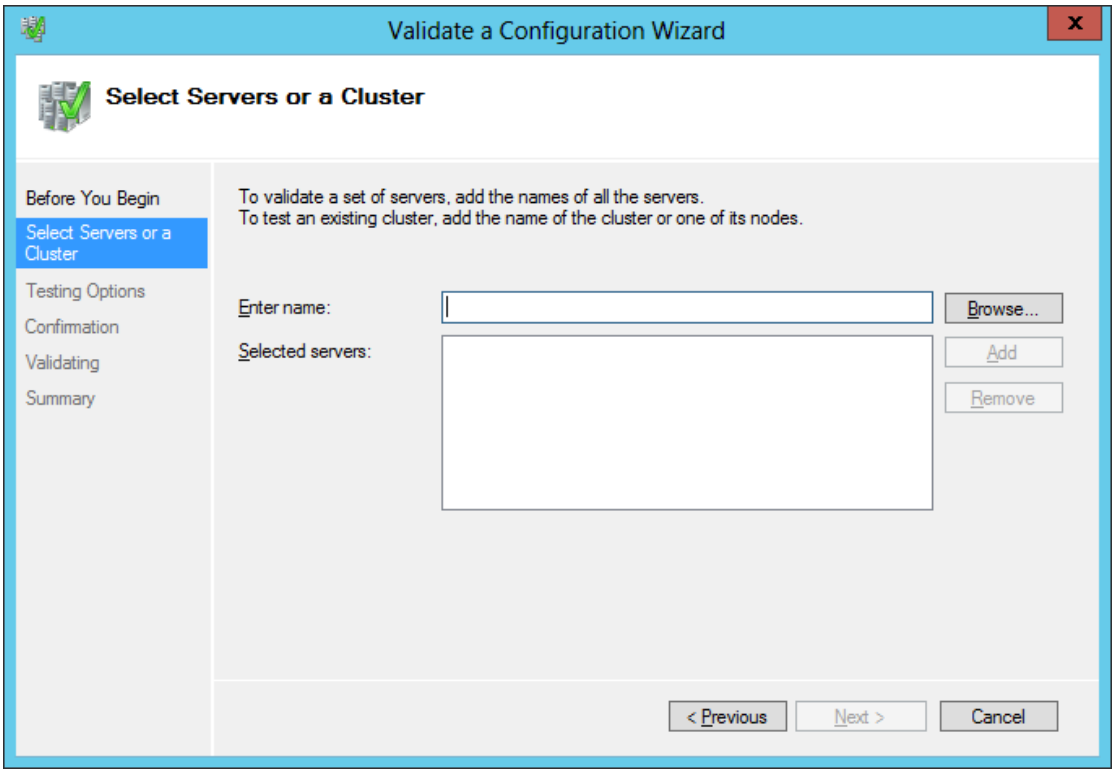


Click **Validate Configuration…** on the right tree view.

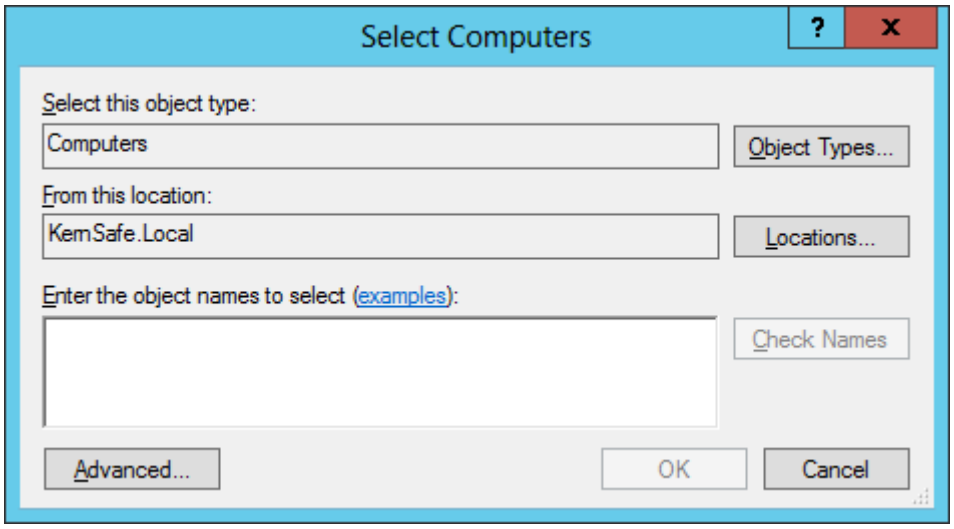
The **Validate a Configuration Wizard** will be shown as below.



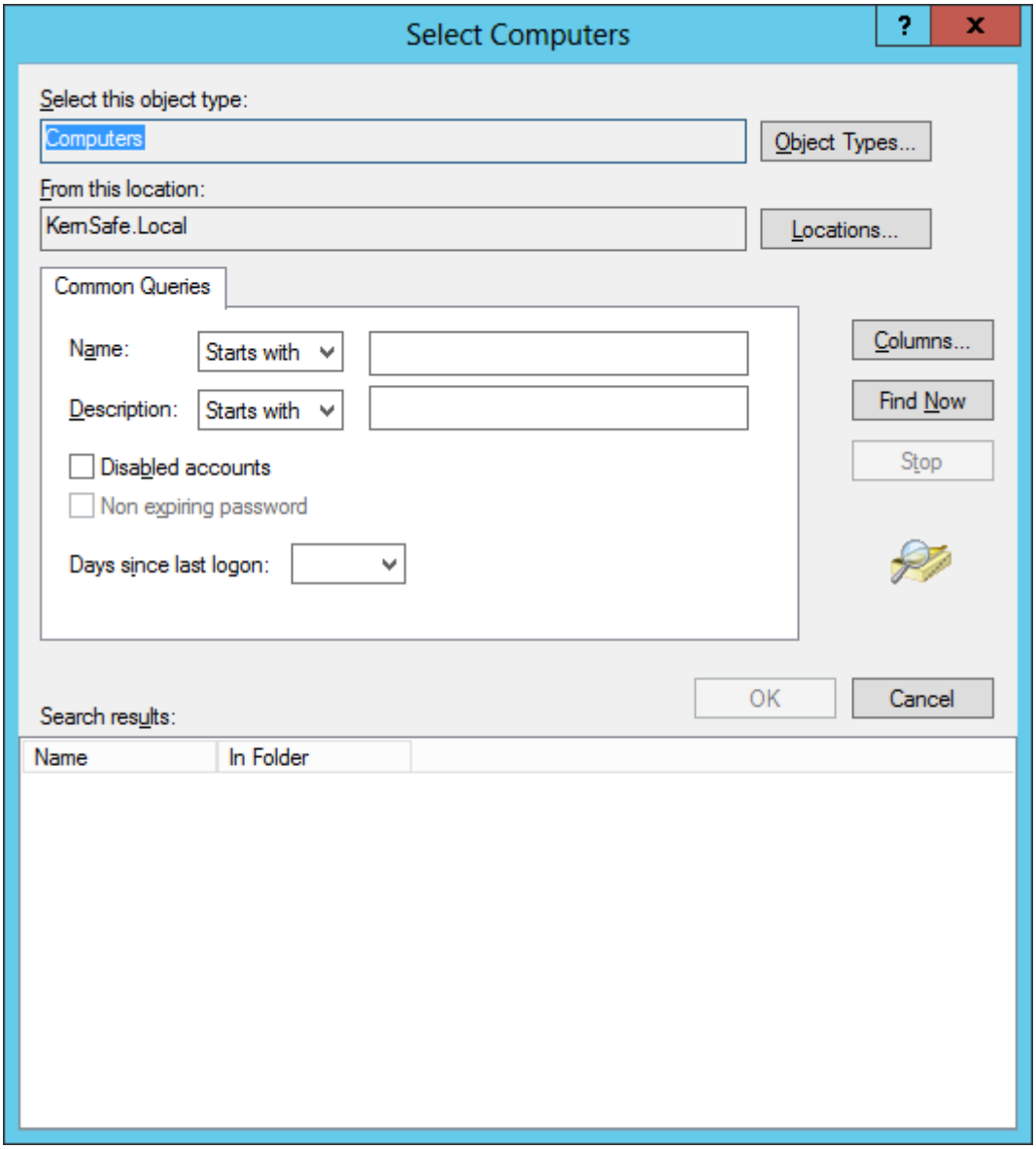
Press **Next** to continue.



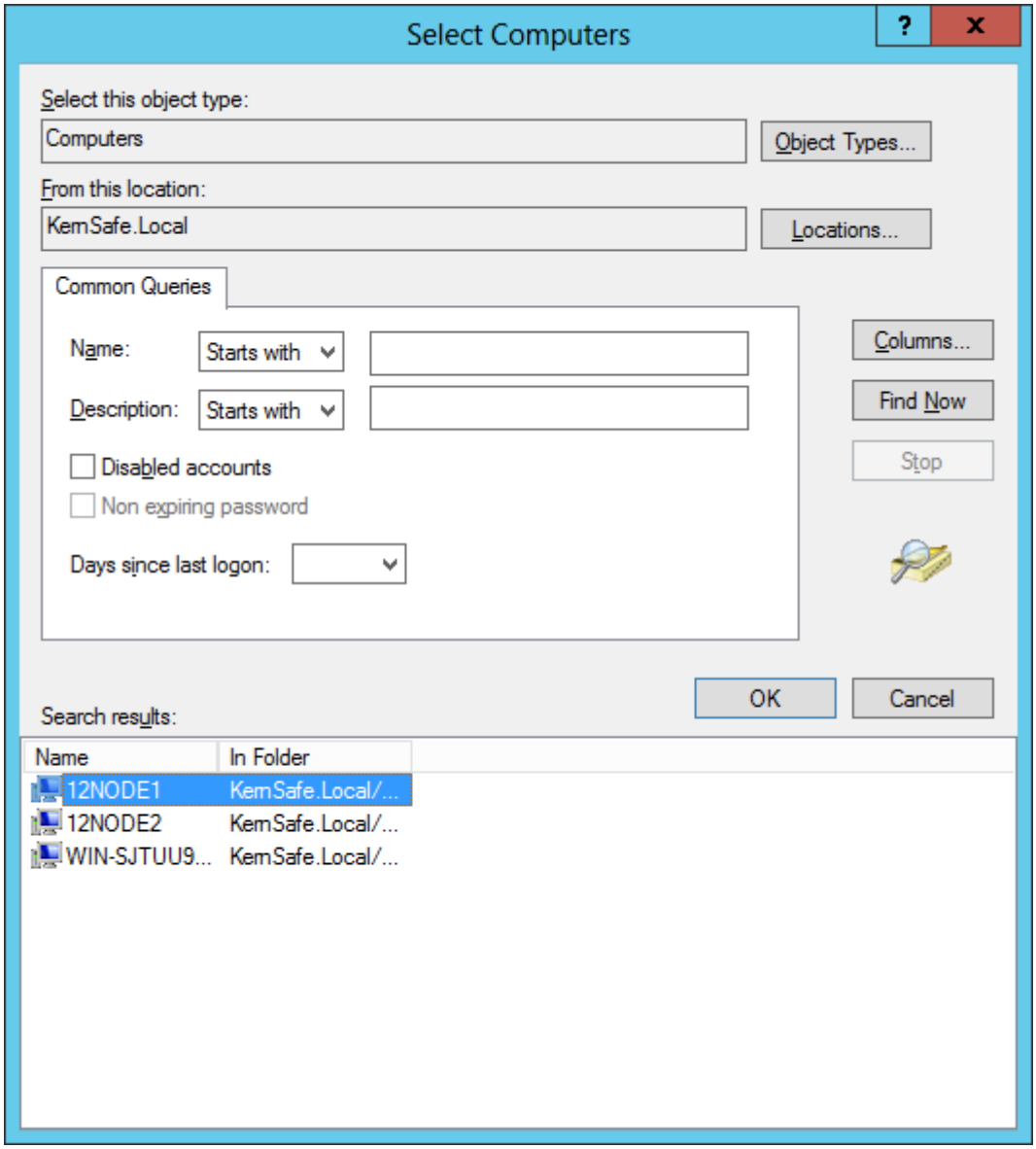
Press **Browse...**



Click **Advanced** to find the nodes.

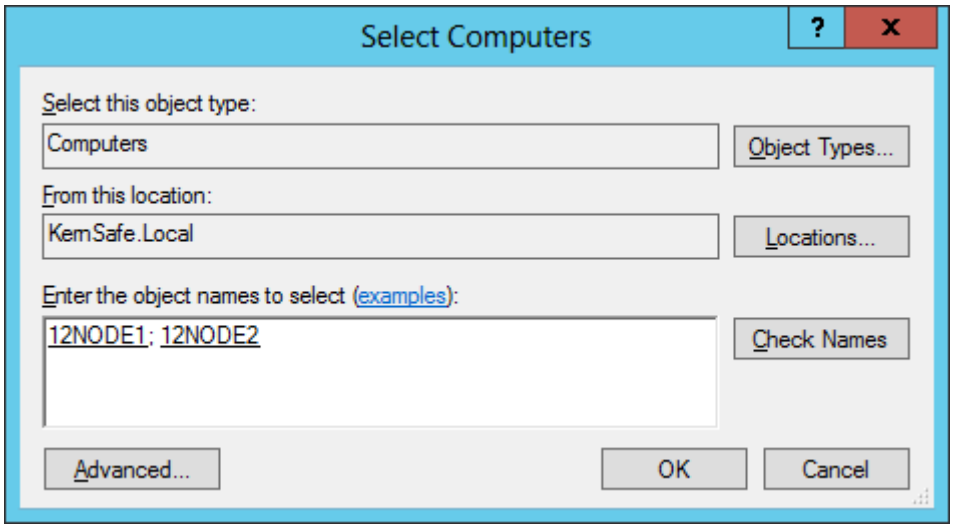


Click **Find Now.**

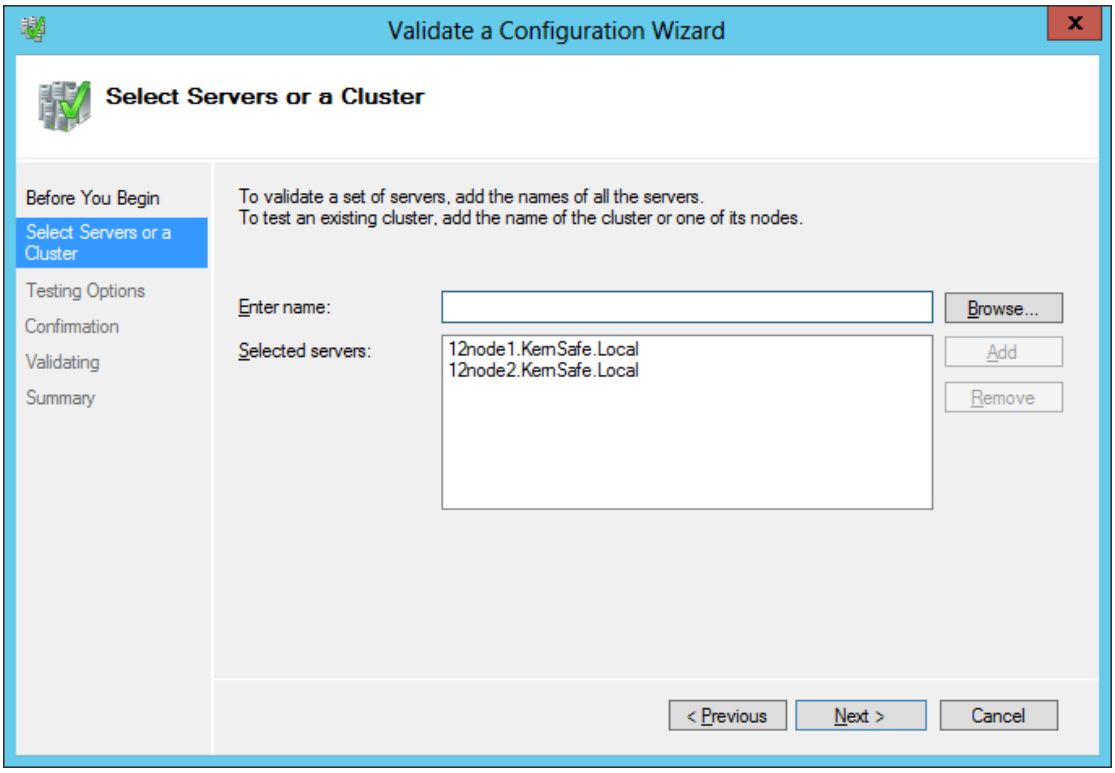


Select **12NODE1** and press **OK**.

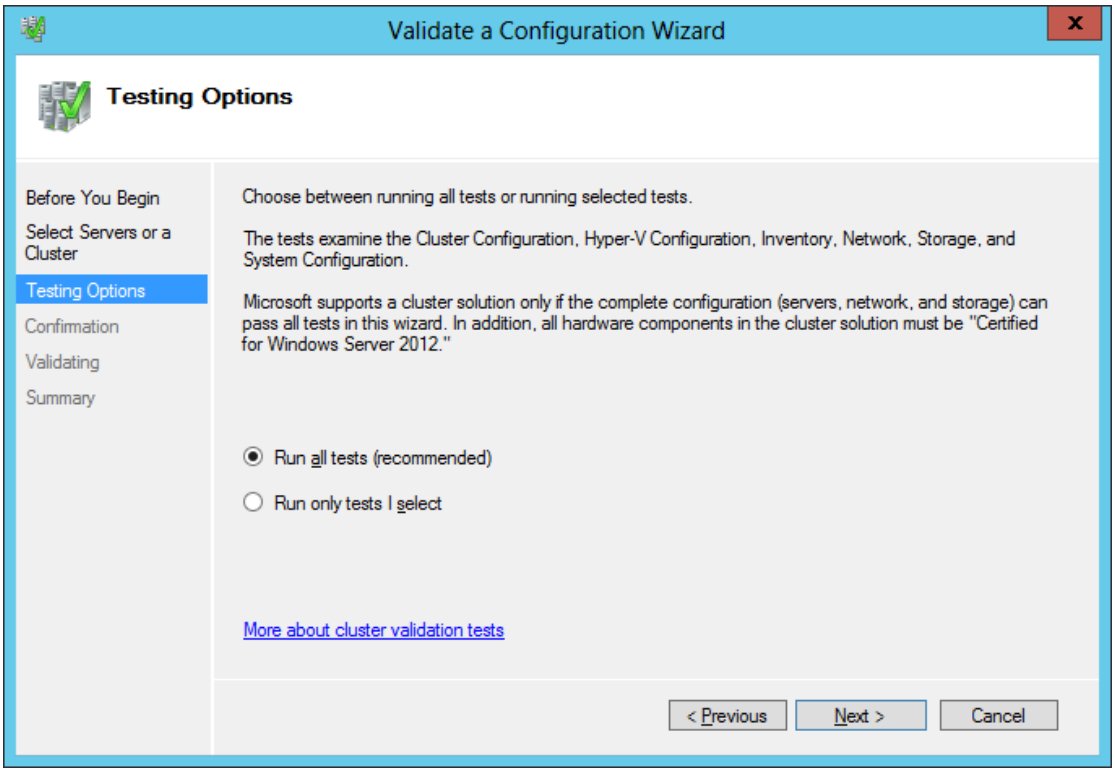
Then add **12NODE2** and press **OK**.



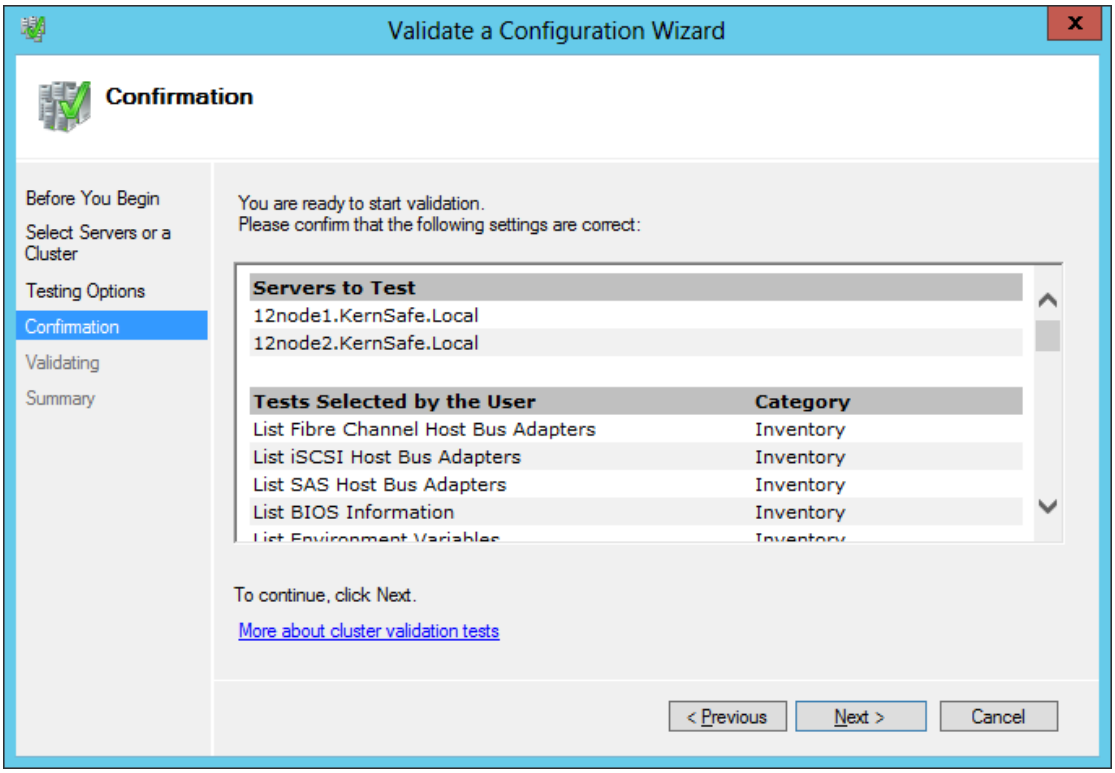
Press **OK** to continue.



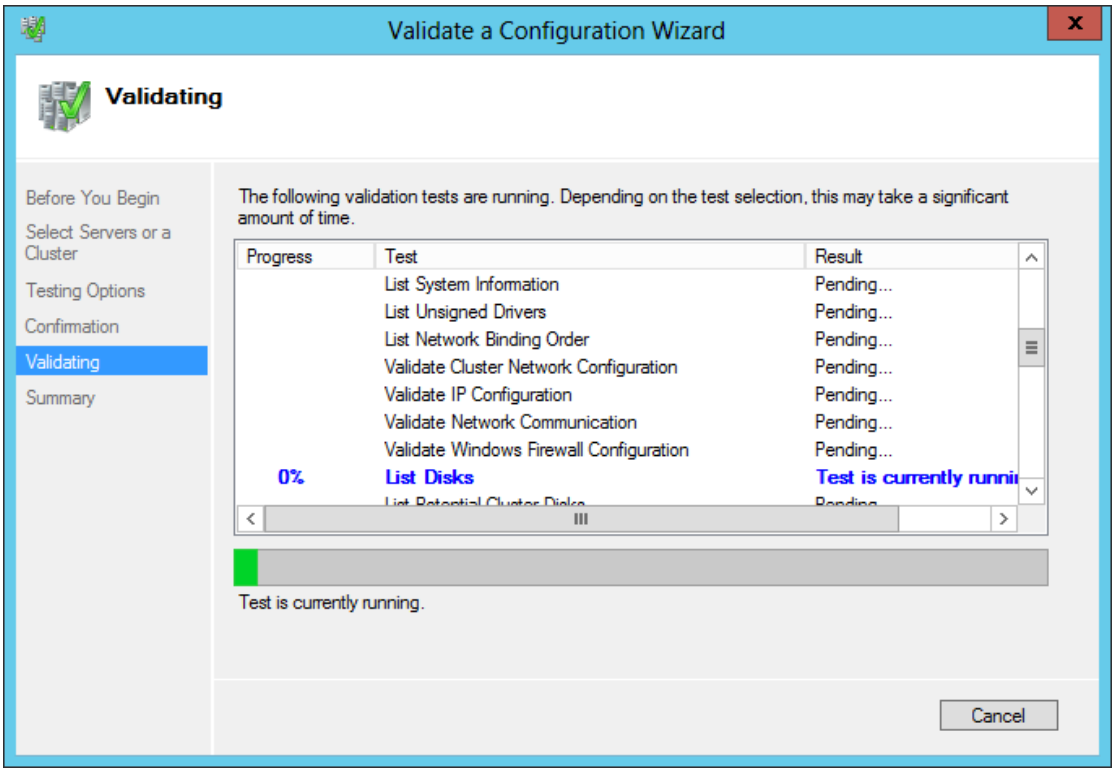
Press **Next** to continue.



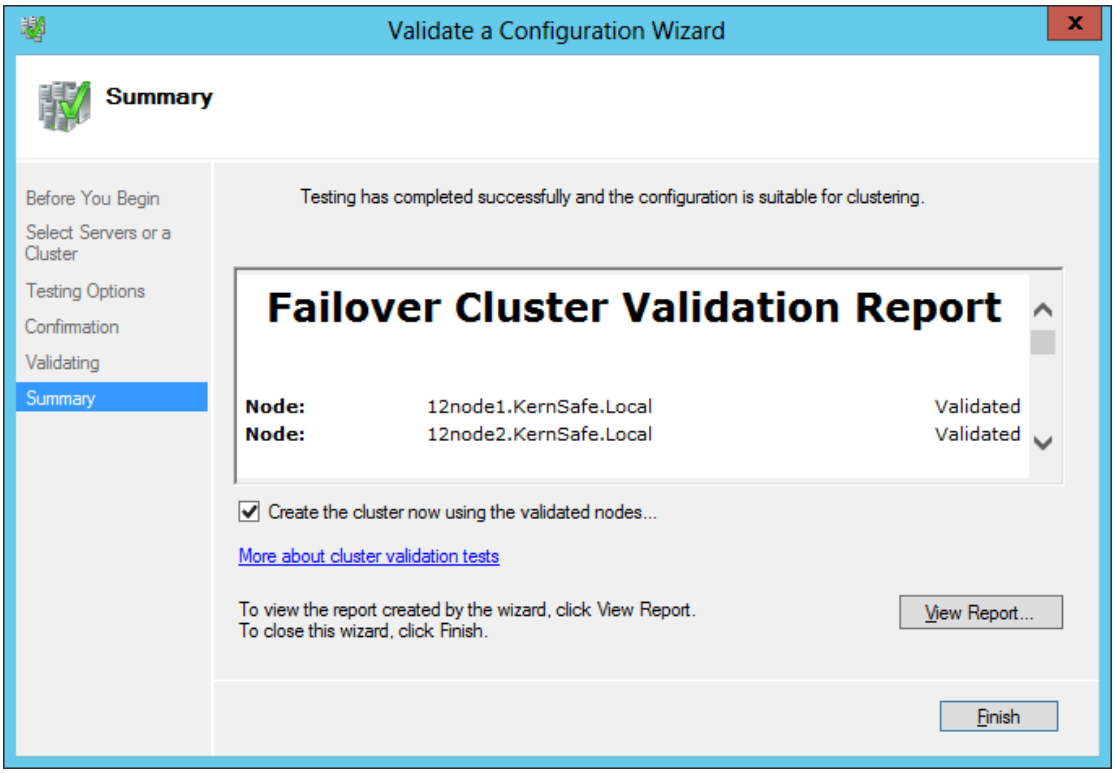
Keep default and press **Next** to continue.



Press **Next** to run tests.

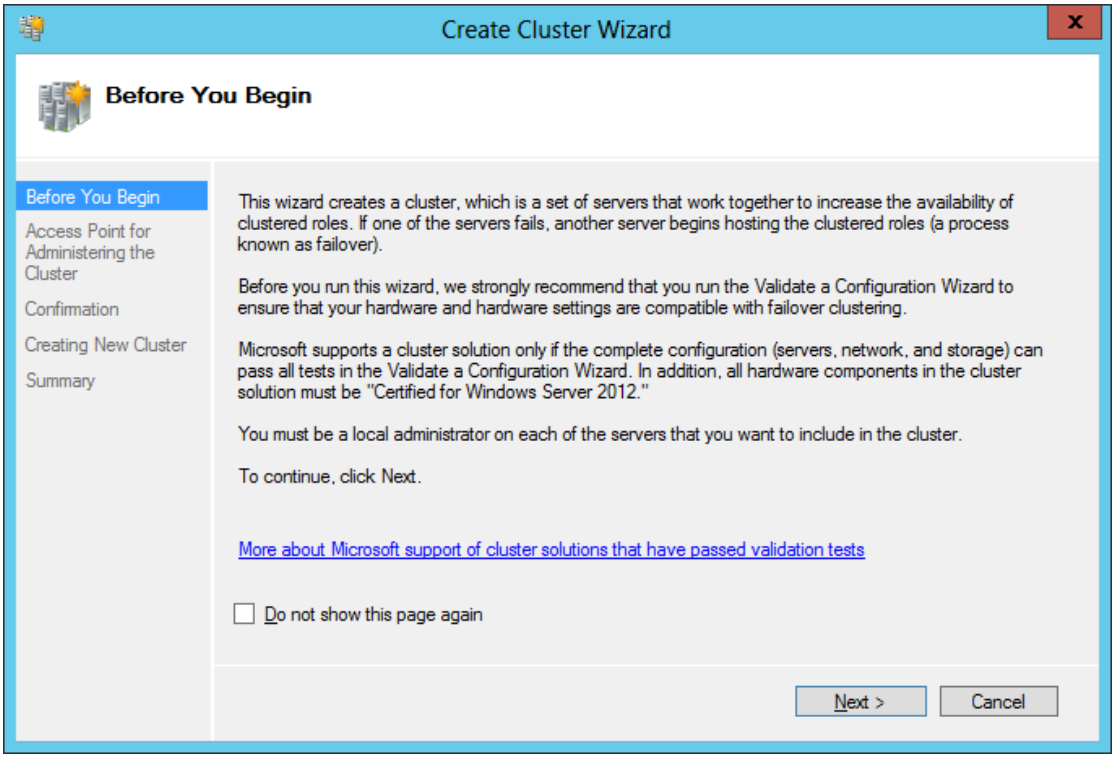


If the configuration passes the tests, you will see a dialog as below.

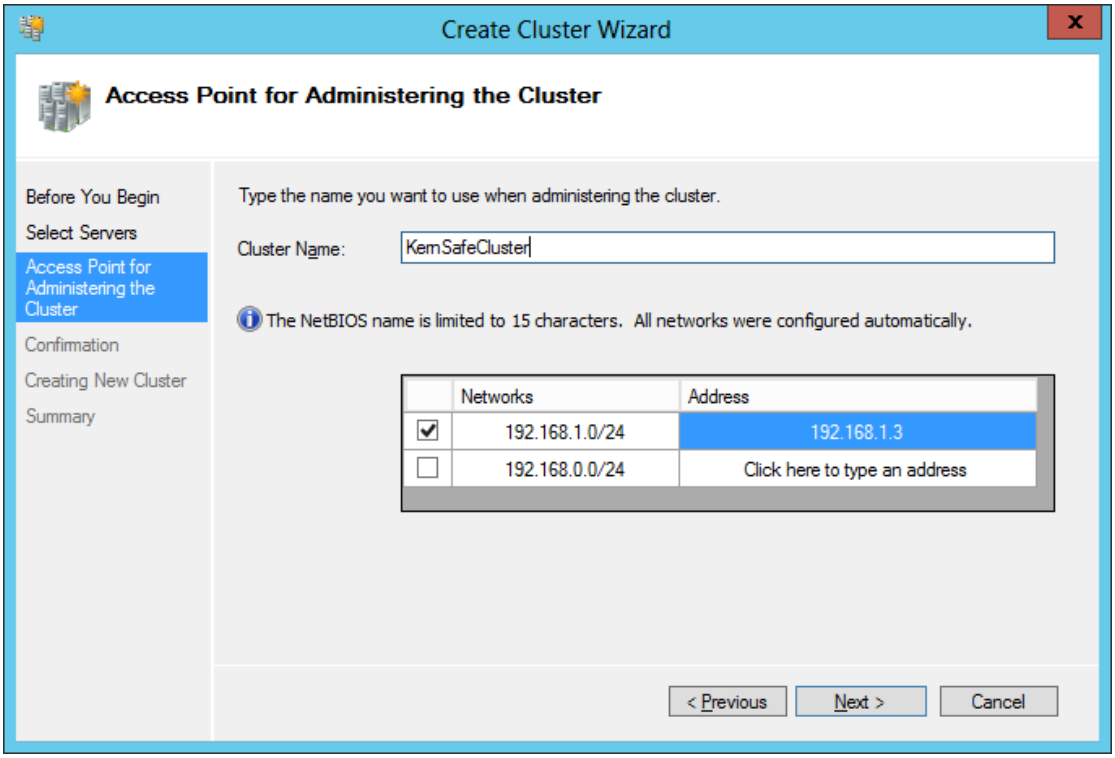


Keep default and press **Finish** to start to create a cluster.

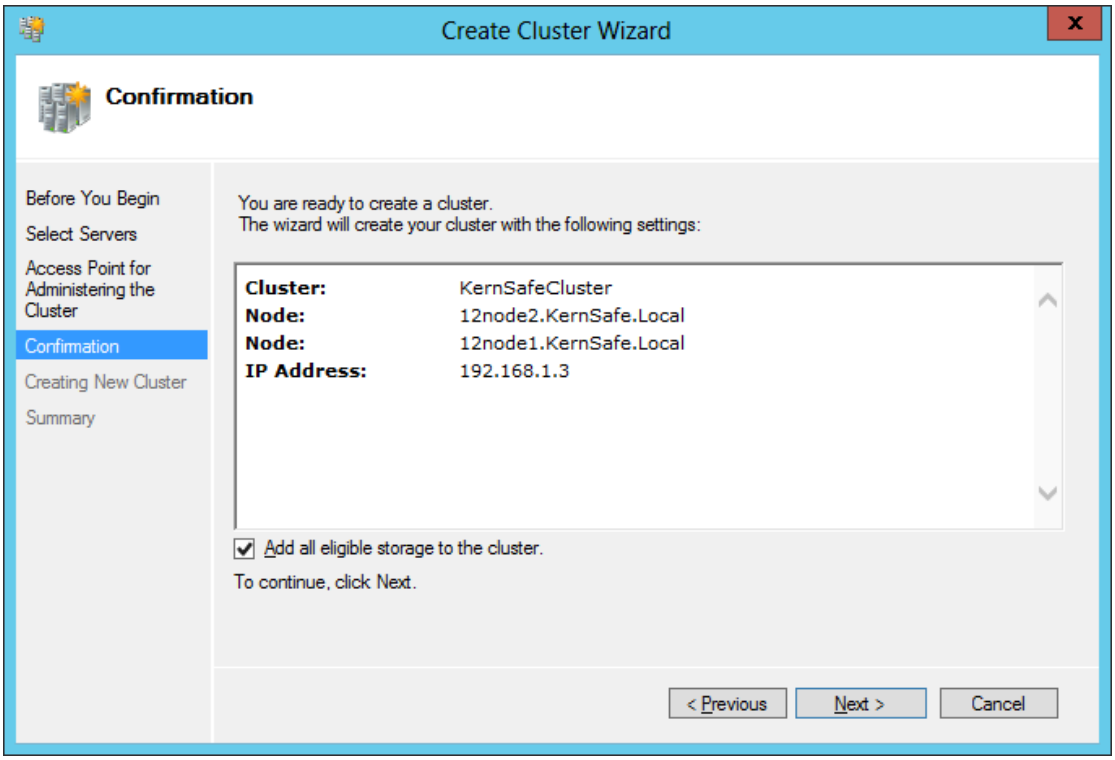
Create Cluster



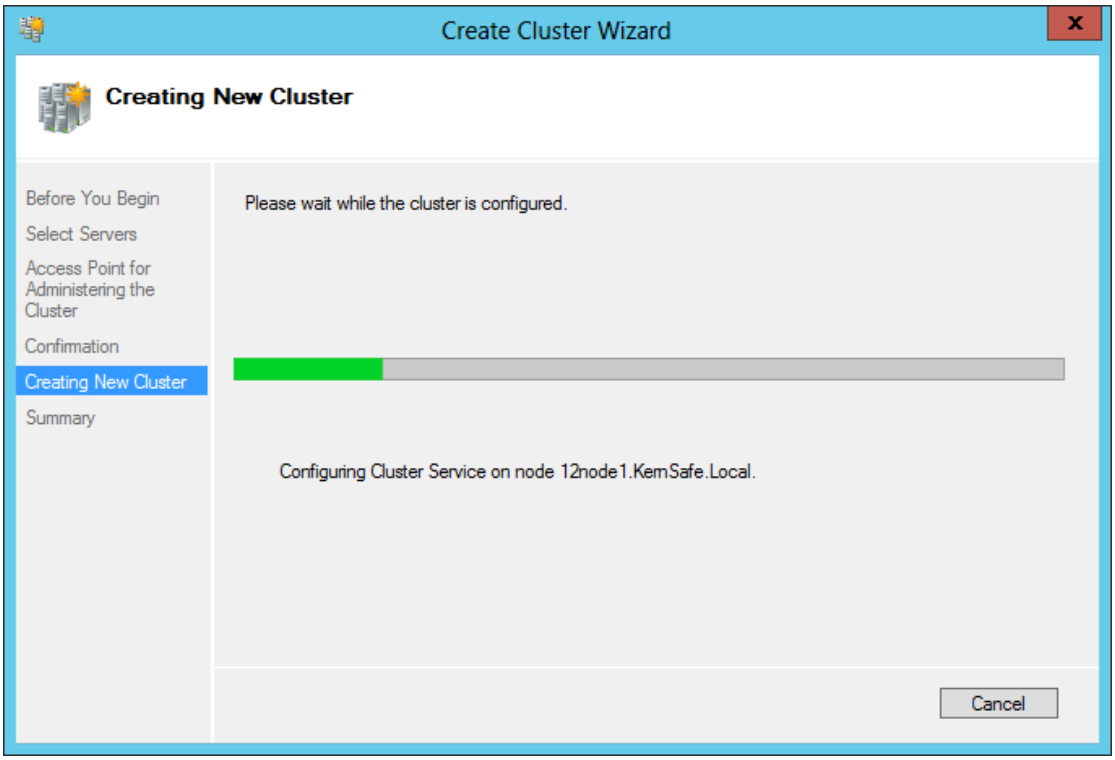
Press **Next** to continue.



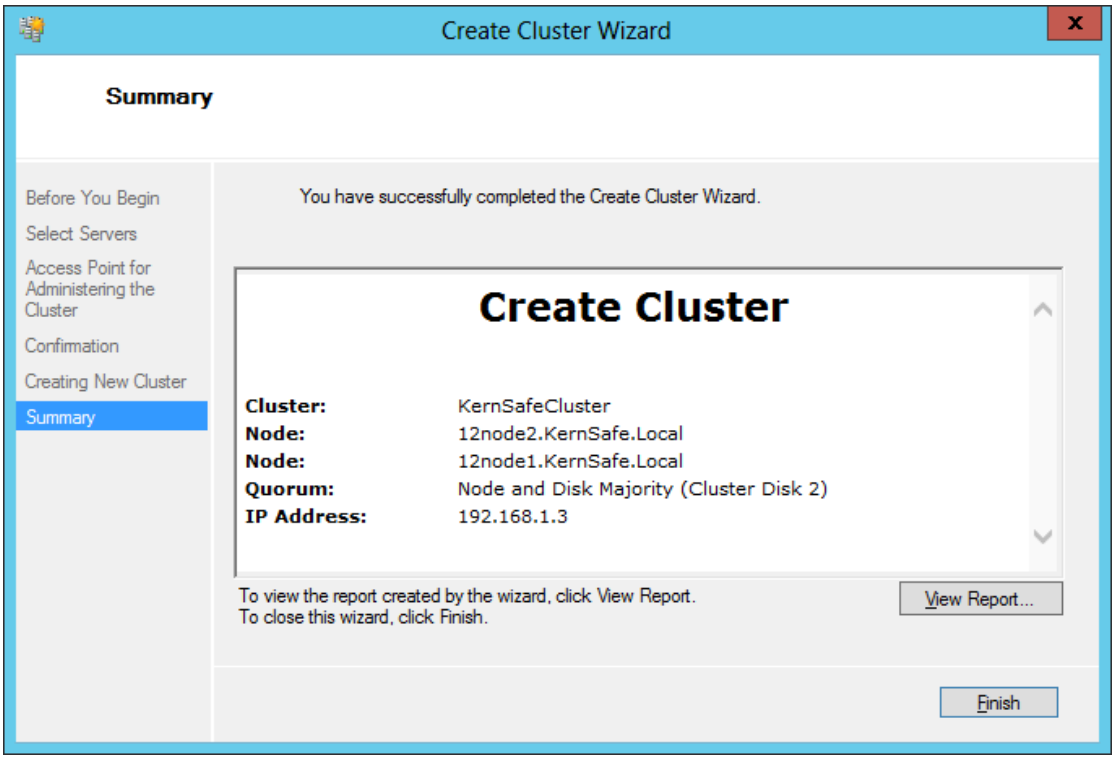
Type a **Cluster Name** and configure the IP Address of the cluster.



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



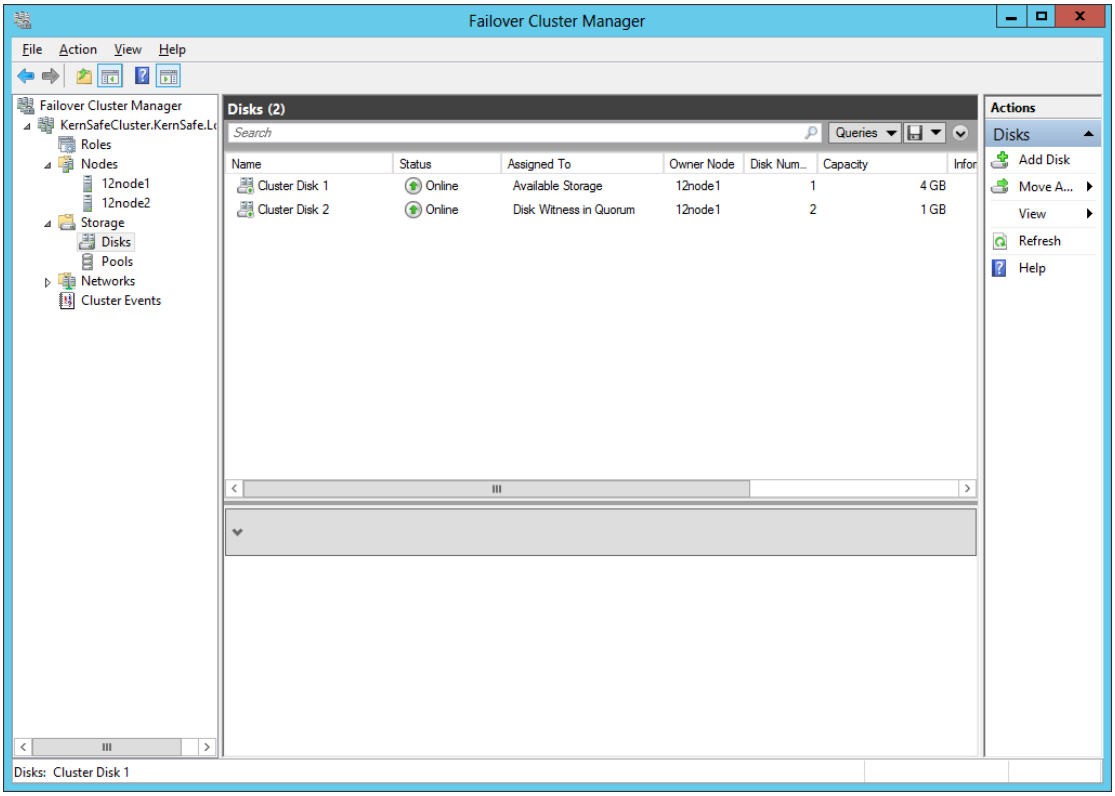
You can press **Cancel** button to stop the creation.



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.


Failover Cluster Manager
File Action View Help
Failover Cluster Manager
KernSafeCluster.KernSafe.L
Roles
Nodes
12node1
12node2
Storage
Disks
Pools
Networks
Cluster Events
Disks (2)
Search
Queries
Name Status Assigned To Owner Node Disk Num... Capacity Infor
Cluster Disk 1 Online Available Storage 12node1 1 4 GB
Cluster Disk 2 Online Disk Witness in Quorum 12node1 2 1 GB
Actions
Disks
Add Disk
Move A...
View
Refresh
Help
Disks: Cluster Disk 1

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