

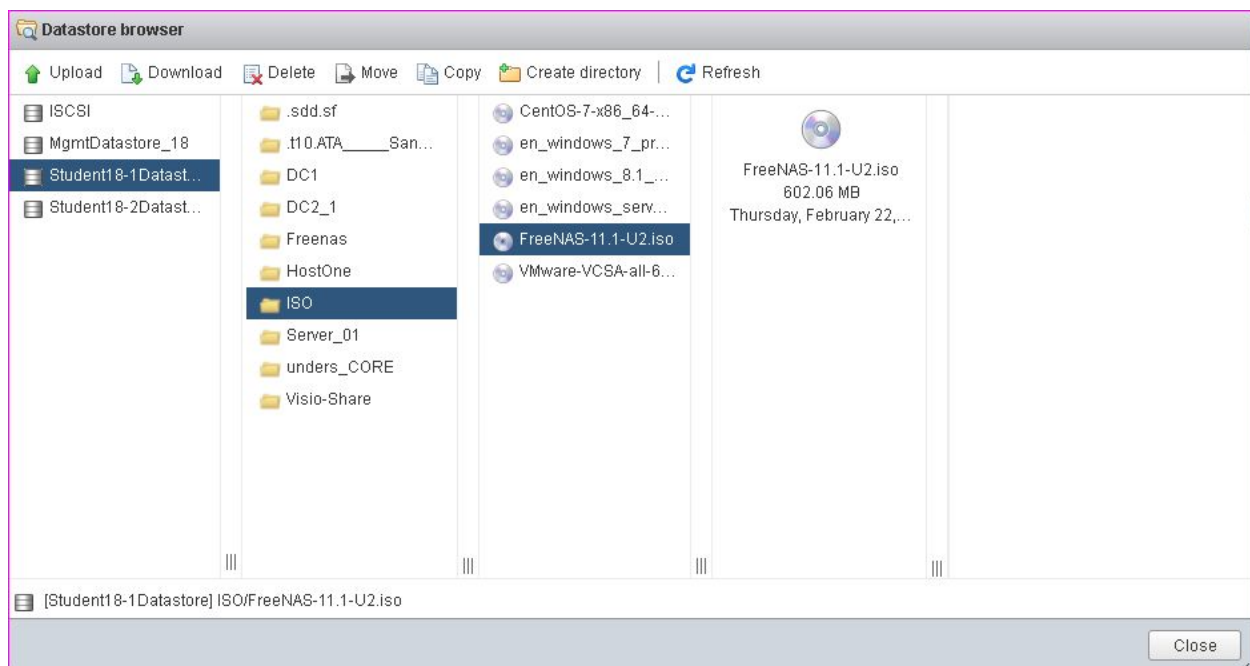
2012 R2 Clustering

Tyler Wiersma and Jordan Brown


Overview

Setting up FreeNas

To set up FreeNas first you need to download the latest iso from FreeNas's official site (<http://www.freenas.org/download/>), in our case it was version 11.1. Next you need to upload it to a datastore with in your ESXI.





Now create a VM and use the FreeNas ISO you just uploaded to the datastore.
Make sure you have at least 8GB's for the actual Freenas ISO to go on, and 3 other
10GB Hard disks to make a RaidZ. Add at least 2 network adapters as well.


 **Edit settings - Freenas (ESXi 6.0 virtual machine)**

































Virtual Hardware

VM Options

 Add hard disk

 Add network adapter

 Add other device

 CPU 	2		
 Memory 	8192	MB	
 Hard disk 1 	16	GB	
 Hard disk 2 	10	GB	
 Hard disk 3 	10	GB	
 Hard disk 4 	10	GB	
 SCSI Controller 0	LSI Logic Parallel		
 SATA Controller 0			
 USB controller 1	USB 2.0		
 Network Adapter 1	External2	<input checked="" type="checkbox"/> Connect	
 Network Adapter 2	Internal-Network	<input checked="" type="checkbox"/> Connect	
 Network Adapter 3	1 - VM WAN 18 - CONNECT VMs HERE	<input checked="" type="checkbox"/> Connect	
 CD/DVD Drive 1	Datastore ISO file	<input checked="" type="checkbox"/> Connect	
 Video Card	Specify custom settings		

Save

Cancel

Configuring FreeNas

Now once we have booted up the FreeNas VM it's time to configure FreeNas.

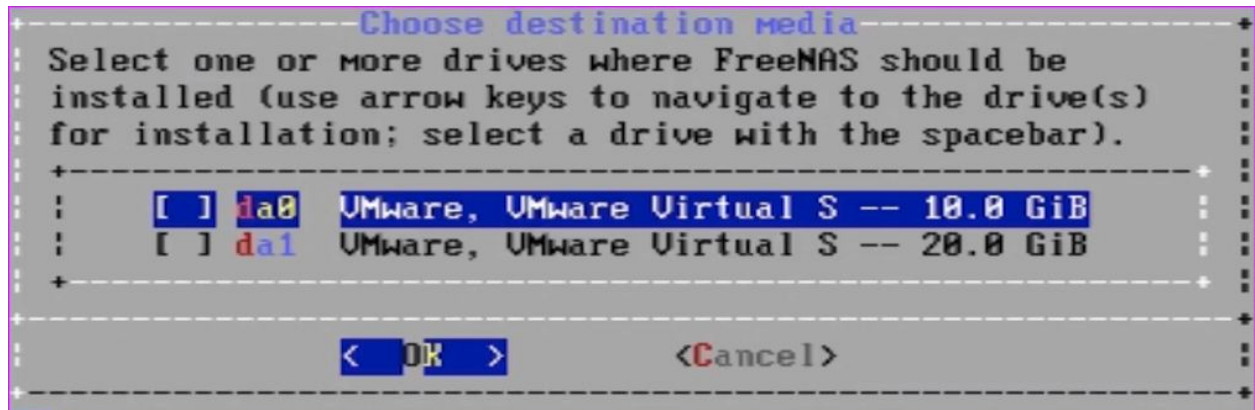
Once you get to the installer click enter on "FreeNas" to get the options menu

Now you are in the console setup hover over **Install/Upgrade** and click **Ok**.



If FreeNas prompts you saying you have less than recommended amount of RAM, either click **yes** to continue at your own risk, or **no** then start over and add at least 4GB of RAM.

Now you can choose which drive you wish to install just FreeNas on by hitting **space** on the drive and then **ok**.

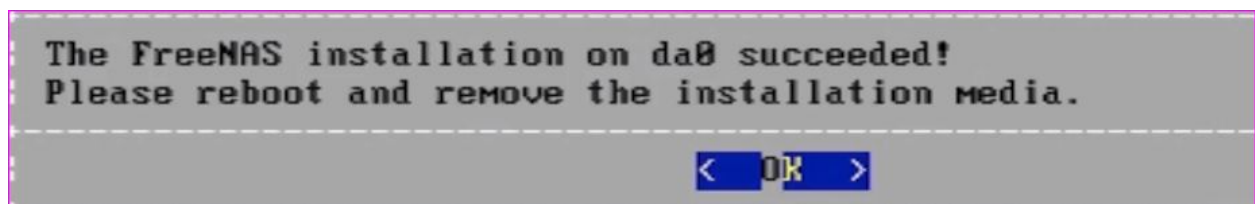


The next prompt will ask for a root password type it in twice to confirm, and make sure you remember it!

The next prompt will ask if you want to use UEFI or BIOS we chose BIOS and clicked **enter**.

Now it's installing FreeNas on your specified drive, this will take a few moments.

At the end of the installation you will need to reboot, click **Ok** to reboot.



Once it has rebooted it will give you a link to the website using a DHCP address from one of your NIC's. Enter the URL into a browser to be connected to the FreeNas interface.

```
You may try the following URLs to access the web user interface:  
http://192.168.2.73
```

Login using username **root** and the root password you made earlier.

Set up the initial the first page of the initial wizard to the right timezone and language then exit out.



Now it's time to set up storage and ISCSI.

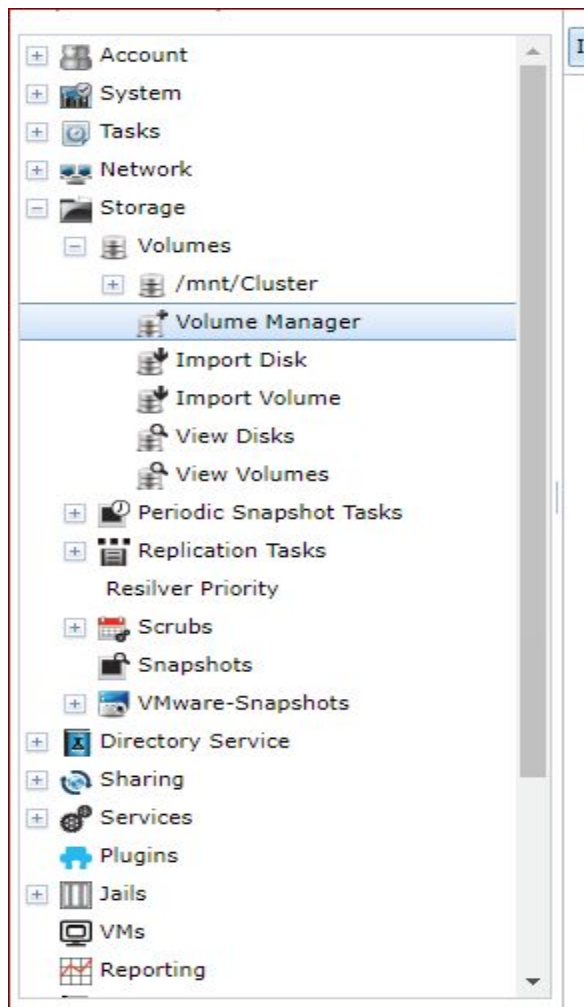
FreeNas Storage

Making a Raidz:

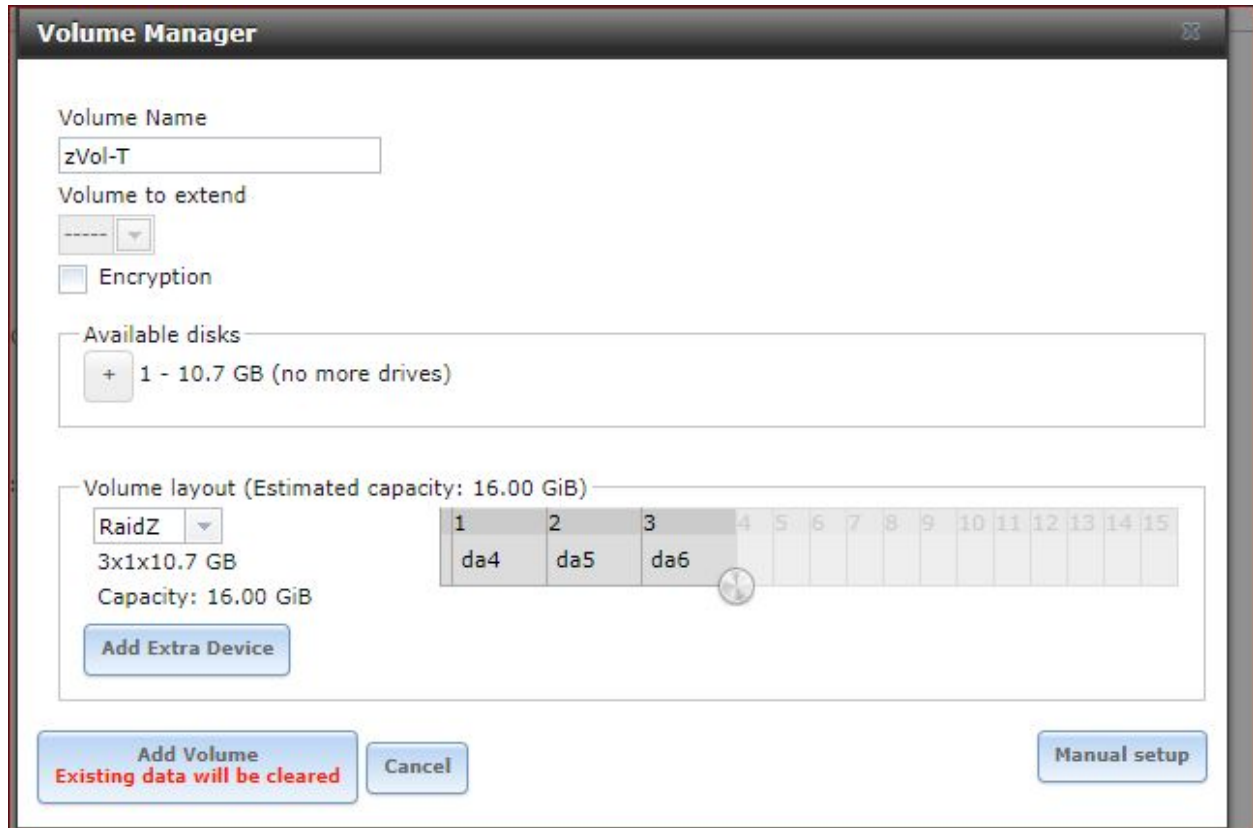
Make sure you have 3 hard drives, of the same size, for a parity drive.

For this example, we made 3 drives of 10 gigabytes each, resulting in a 16GB parity drive.

Browse to the FreeNas site, login, and browse to the Volume manager option. Double click on that, and follow the screenshots.



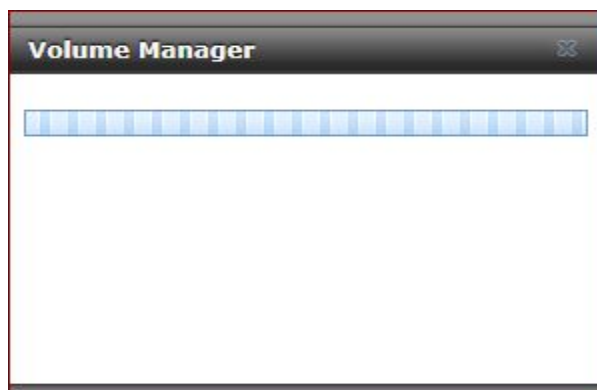
Give the volume a name, drag the scroll ball at the bottom to 3 to specify you are using 3 disks, which is a ZFS RAIDz volume. Make sure the drop down box is set to RaidZ then Hit “**Add Volume**”.



The Volume Manager window displays the configuration for a new volume. The 'Volume Name' field is set to 'zVol-T'. The 'Volume to extend' dropdown is empty. The 'Encryption' checkbox is unchecked. The 'Available disks' section shows a single disk: '+ 1 - 10.7 GB (no more drives)'. The 'Volume layout' section shows 'RaidZ' selected in the dropdown, with a capacity of '16.00 GiB'. A table below shows the layout of disks: 1 (da4), 2 (da5), 3 (da6), and disks 4 through 15 are empty. A scroll ball is positioned over disk 3. The 'Add Extra Device' button is visible. At the bottom, there are three buttons: 'Add Volume' (with a red warning 'Existing data will be cleared'), 'Cancel', and 'Manual setup'.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
da4	da5	da6												

The volume will then be created.



The Volume Manager window shows the newly created volume as a single bar in the top section. The rest of the window is empty.

Now that the main volume manager is set up go to the volume you just created and click it then at the bottom click add zVol.



Give the new zvol a name, a comment relative to its job, and a size. Leave the rest default and click **Add zvol**.

A screenshot of a "Create zvol" dialog box. The title bar says "Create zvol". Below the title bar, it says "Create zvol on Cluster". The form contains the following fields and controls:

- zvol name:** A text input field with a red border and a red exclamation mark icon. A callout bubble points to it with the text "This value is required."
- Comments:** A text input field.
- Size for this zvol:** A text input field with an information icon (i) to its right.
- Force size:** A checkbox that is unchecked, with an information icon (i) to its right.
- Sync:** A dropdown menu showing "Inherit (standard)".
- Compression level:** A dropdown menu showing "Inherit (lz4)".
- ZFS Deduplication:** A section with a text description: "Enabling dedup can drastically reduce performance and affect the ability to access data. Compression usually offers similar space savings with much lower performance impact and overhead." Below the description is a dropdown menu showing "Inherit (off)".
- Sparse volume:** A checkbox that is unchecked, with an information icon (i) to its right.

At the bottom of the dialog are three buttons: "Add zvol", "Cancel", and "Advanced Mode".

Now you're ready to start building your iSCSI infrastructure.

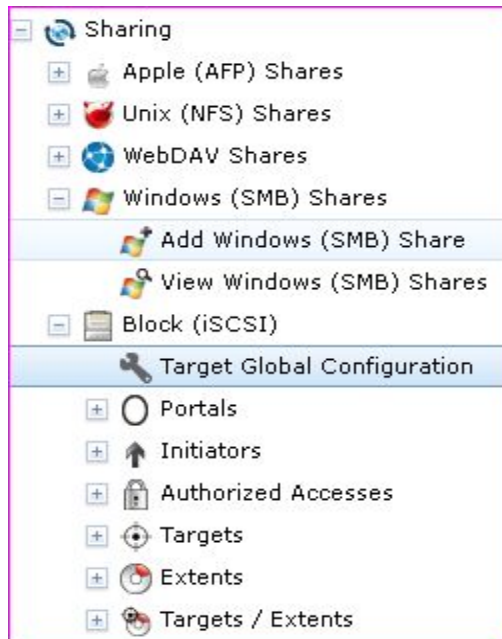
ISCSI

Setting up iSCSI:

First go to services and make sure iSCSI is on, by default it is off, if so turn it on by clicking “**Start Now**”.

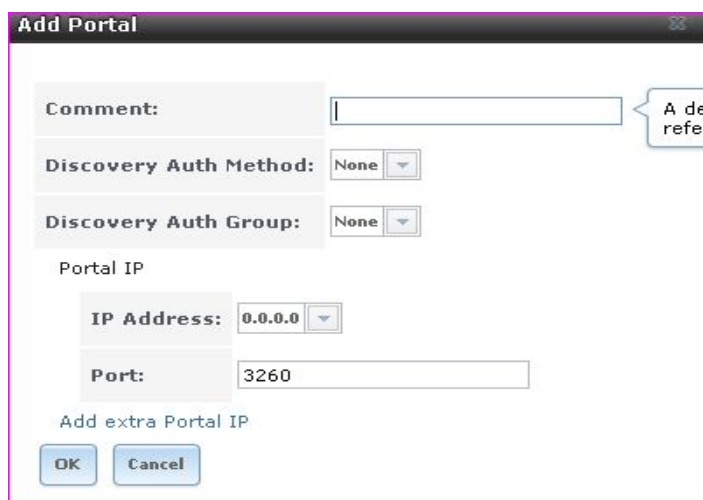


Then to get to iSCSI go to **Sharing > Block (iScsi) > Target Global Configuration**.



Leave it as is and go to the tab beside it “**Portals**” to configure your main listener.

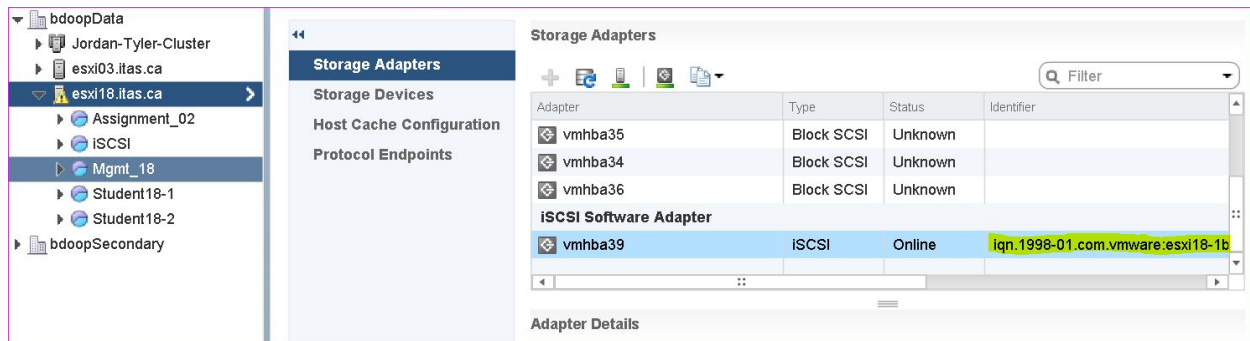
At the top left of the page click “**Add Portal**”. In the Add portal wizard give it a comment relative to what it’s doing (ie. “main listener”) select the IP you want the main listener to use from the drop down box of IP’s, leave everything else to their defaults. Then click **Ok** to confirm.



Next go to the “**Initiators**” tab.

At the top left of the page click “**Add Initiator**”.

To find the Identifier we must first log into our vCenter and go to **Hosts & Clusters > ESXI18 > Manage > Storage Adapters** click on the iSCSI one and copy its identifier (the iqn.12345).



Now back in FreeNAS inside the **Add Initiator** wizard paste in the iqn identifier for the **Initiator** and for the **Authorized network** make it the ESXI towers IP or leave it as All and give it a comment. Then click **Ok** to confirm.

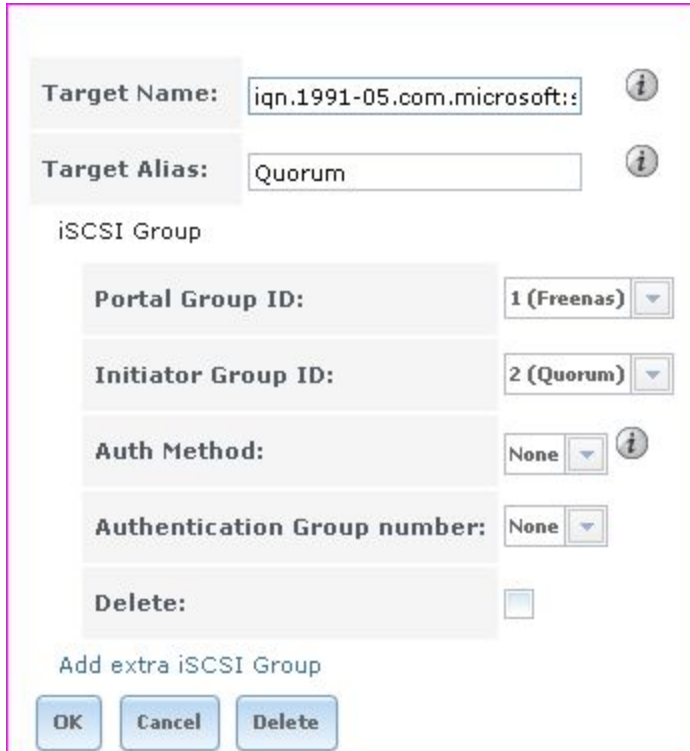
The screenshot shows the 'Add Initiator' wizard in FreeNAS. It has three main input fields: 'Initiators:', 'Authorized network:', and 'Comment:'. The 'Initiators:' field contains the identifier 'iqn.1998-01.com.vmware:esxi18-1b39a604'. The 'Authorized network:' field contains '10.104.142.18/24'. The 'Comment:' field contains 'esxi18'. At the bottom are three buttons: 'OK', 'Cancel', and 'Delete'.

Initiators:	iqn.1998-01.com.vmware:esxi18-1b39a604
Authorized network:	10.104.142.18/24
Comment:	esxi18

OK Cancel Delete

Skip over the **Authorized Access** tab and go to the **Targets** tab.
At the top left of the page click “**Add Target**”.

Give use the iqn target from earlier as the name, give it an alias under **portal group ID** chose the main listener we created earlier in the drop down box. For the **Initiator Group ID** use the initiator created earlier and click **Ok**.












The screenshot shows a dialog box for adding a new iSCSI target. It contains the following fields and controls:

- Target Name:** A text input field containing the value "iqn.1991-05.com.microsoft:::". To its right is a small circular icon with an 'i'.
- Target Alias:** A text input field containing the value "Quorum". To its right is a small circular icon with an 'i'.
- iSCSI Group:** A section header for the configuration group.
- Portal Group ID:** A dropdown menu currently showing "1 (Freenas)".
- Initiator Group ID:** A dropdown menu currently showing "2 (Quorum)".
- Auth Method:** A dropdown menu currently showing "None". To its right is a small circular icon with an 'i'.
- Authentication Group number:** A dropdown menu currently showing "None".
- Delete:** A checkbox that is currently unchecked.
- Add extra iSCSI Group:** A text label below the main configuration fields.
- Buttons:** At the bottom are three buttons: "OK", "Cancel", and "Delete".

Next go to the **Extents** tab.

At the top left of the page click “**Add Extent**”

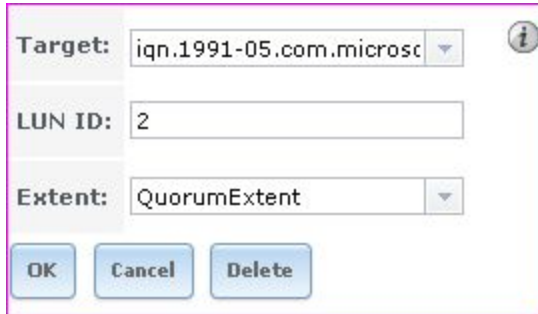
Give the Extent a name, Under the **Device** drop down box choose which device you want to store this Extent in. Give it a comment and leave the rest default. Then click **Ok** to confirm.

Extent Name:	<input type="text" value="Cluster"/>	
Extent Type:	<input type="text" value="Device"/>	
Device:	<input type="text" value="Cluster/Cluster (10.0 GiB)"/>	
Serial:	<input type="text" value="005056aa0a2101"/>	
Logical Block Size:	<input type="text" value="512"/>	
Disable Physical Block Size Reporting:	<input type="checkbox"/>	
Available Space Threshold (%):	<input type="text"/>	
Comment:	<input type="text" value="Clusterevx"/>	
Enable TPC:	<input checked="" type="checkbox"/>	
Xen initiator compat mode:	<input type="checkbox"/>	
LUN RPM:	<input type="text" value="SSD"/>	
Read-only:	<input type="checkbox"/>	
<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Delete"/>		

Next go to the **Associated Targets** tab.

At the top left of the page click “**Add Target/Extent**”

Choose from the **Target** drop down box which target you want to use, give it an ID, and choose which Extent you want to link it with. Then click **Ok**.



Target: iqn.1991-05.com.microsoft

LUN ID: 2

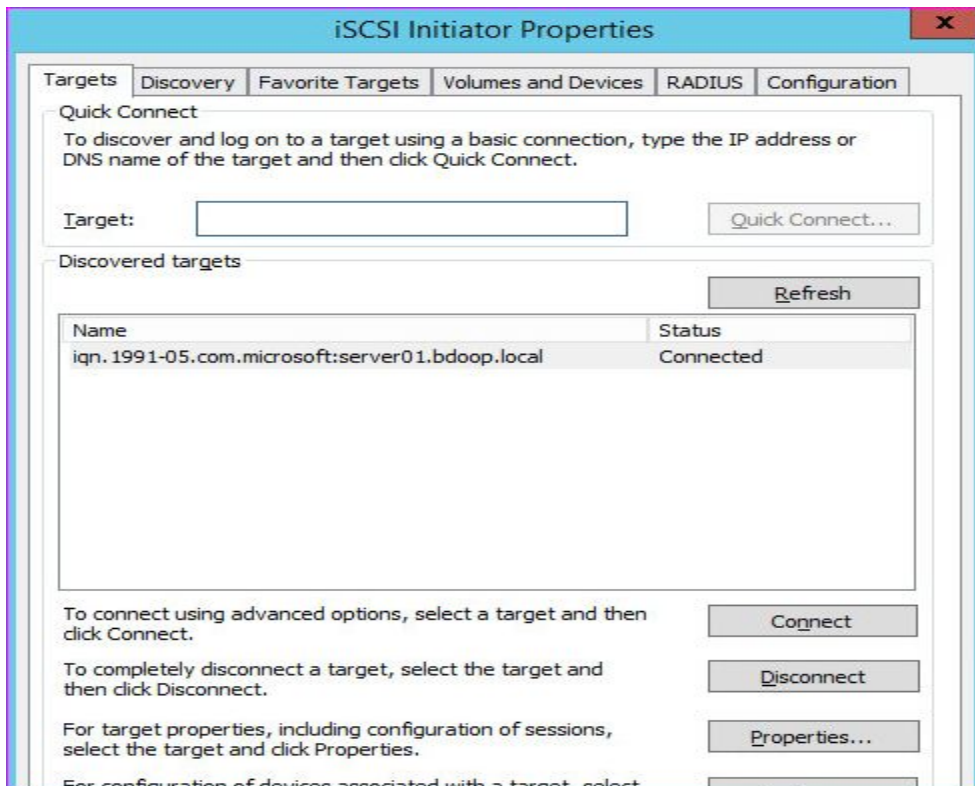
Extent: QuorumExtent

OK Cancel Delete

Setting up iSCSI Initiator within a server:

Now we can get out of FreeNas and go to a created server within your ESXI.

Login to a windows 2012 r2 server and go to iSCSI Initiator (windows + s “iSCSI Initiator”).



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.1991-05.com.microsoft:server01.bdoop.local	Connected

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

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

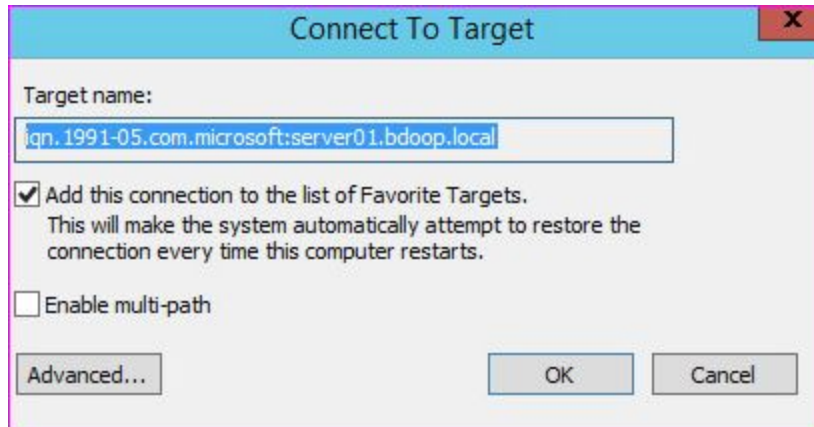
For target properties, including configuration of sessions, select the target and click Properties.

For configuration of devices associated with a target, select

Connect Disconnect Properties...

Under “**Target:**” type in the main listeners ip “10.104.142.124” and click **Quick Connect** you should then see the iqn Initiator name, click **Connect**.

Inside the **Connect to Target** pop up window click **Ok**.

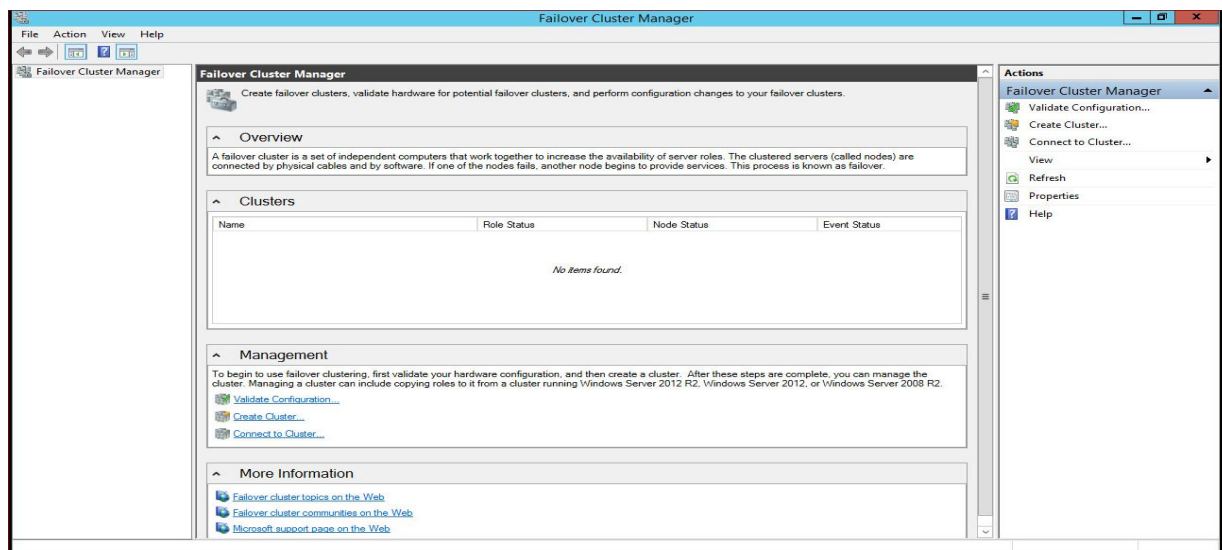


Repeat these Steps for the Second server as well!

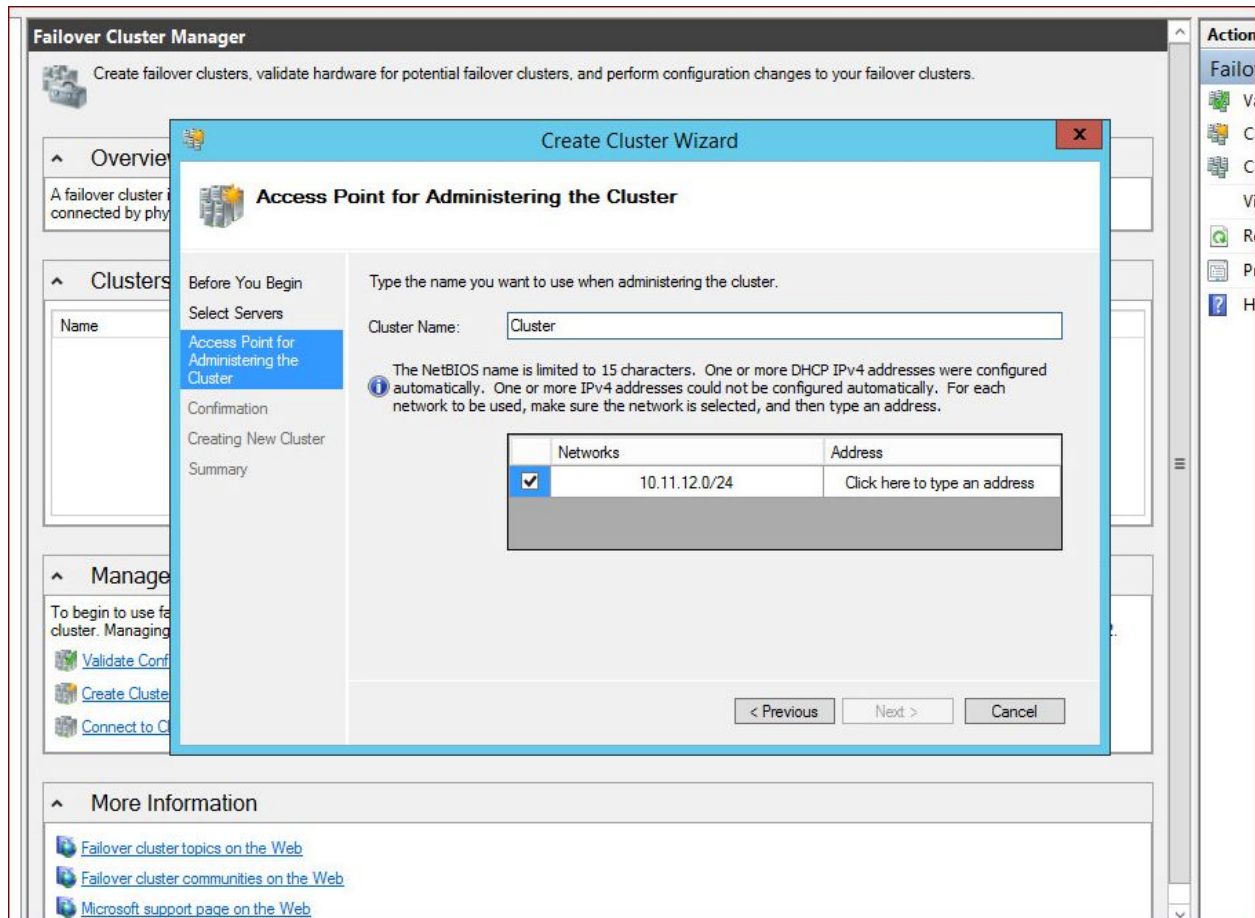
Clustering

Start by installing **Failover clustering** in server managers roles & features.

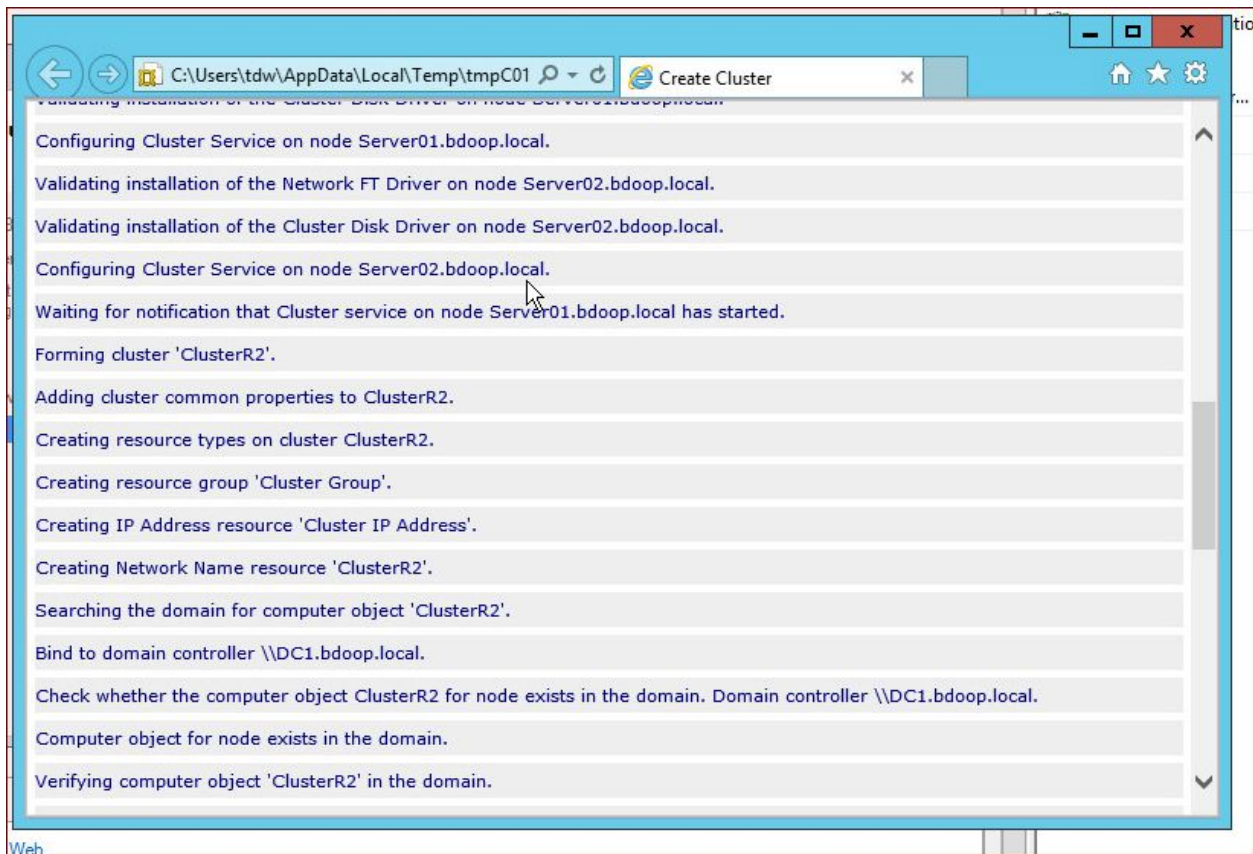
Go to failover cluster manager. As we need to create one, click the Create Cluster option...



Name your cluster, and connect it to the domain network. Hit next, confirm, and wait it out.



Here's a Summary of what you configured in the form of report



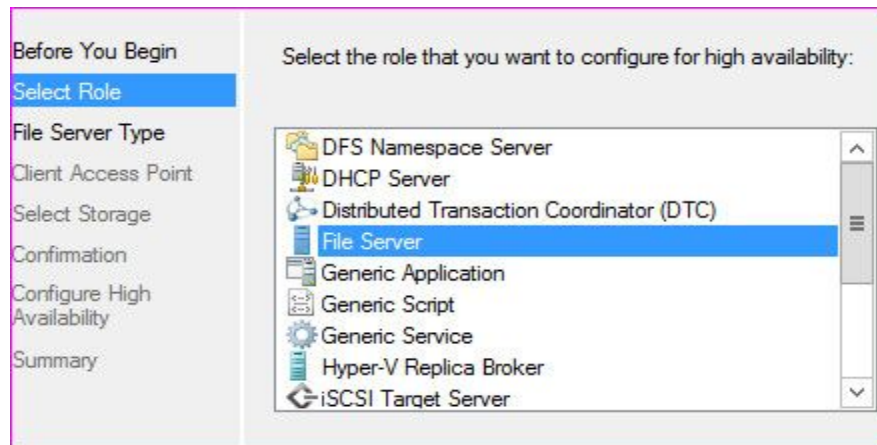
Once you have made the cluster check to see if the disks are online.

Name	Status	Assigned To	Owner Node	Disk Number
 Cluster Disk 1	 Online	Available Storage	Node4	
 Cluster Disk 2	 Online	Disk Witness in Quorum	Node4	

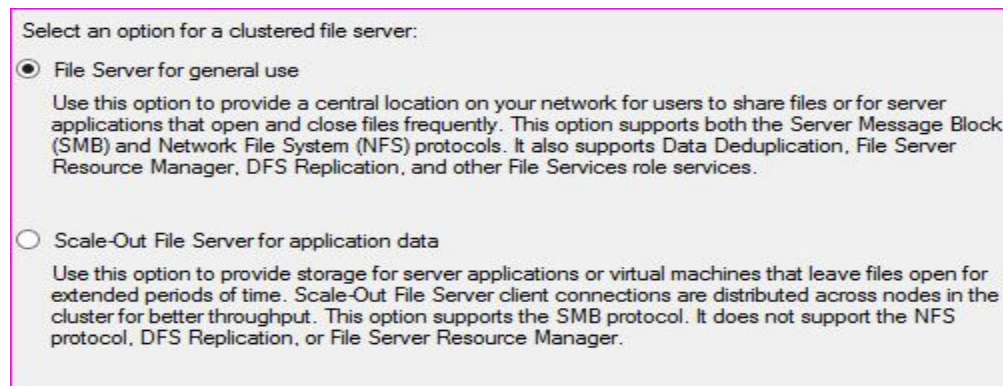
Now we can set up shared storage for our clients.

Shared Storage

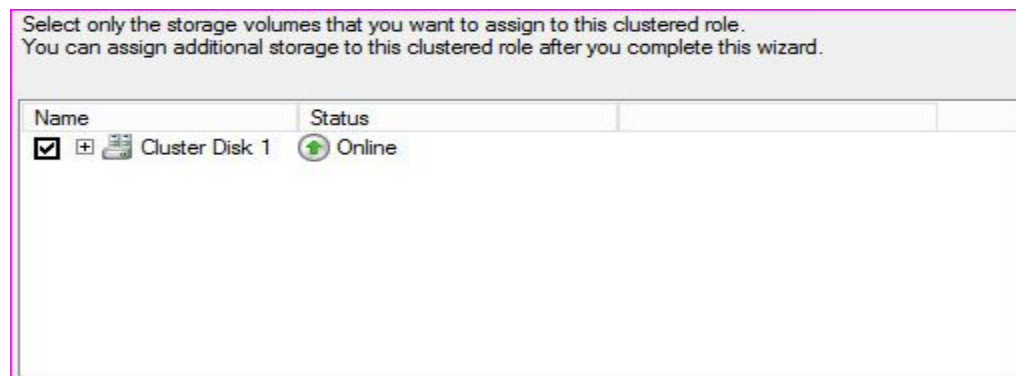
Now right click on Roles, and click **add role**, then choose **File Server**.



For the **File Server Type** keep as default “SMB” and click **Next** to continue.



In the “**Client access Point**” tab give this shared storage a name and click **Next** to continue.



Make sure it's using your internal IP address when receiving a DHCP; otherwise there may be trouble later on (we had this as external at first and it took us a while to realize and fix it). Click **Next**.

You are ready to configure high availability for a File Server.

Storage:	Cluster Disk 1
Network Name:	Clustershare
OU:	CN=Computers,DC=rat,DC=local
IP Address:	DHCP address on 10.104.142.0/24

Check the summary and click **Finish**.

File Server

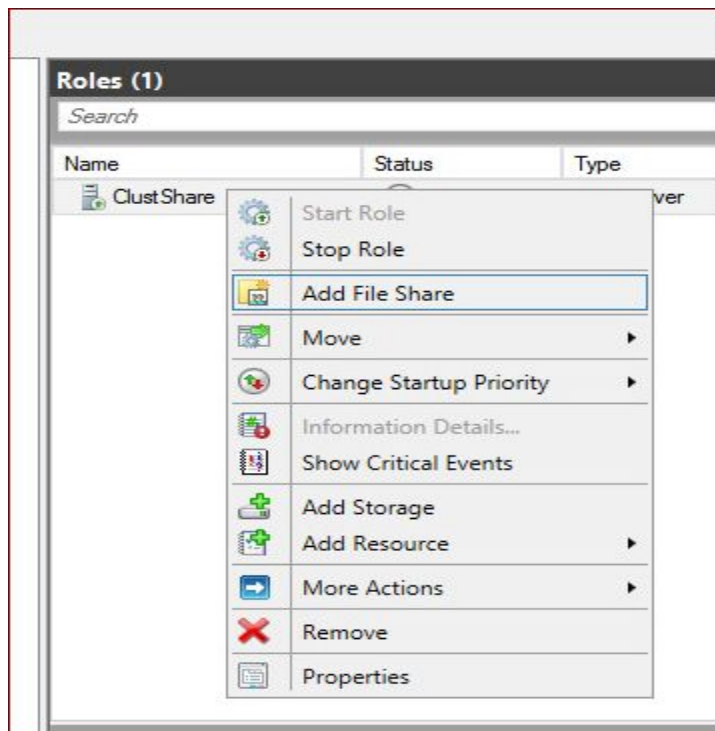
Storage:	Cluster Disk 1
Network Name:	Clustershare
OU:	CN=Computers,DC=rat,DC=local
IP Address:	DHCP address on 10.104.142.0/24

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

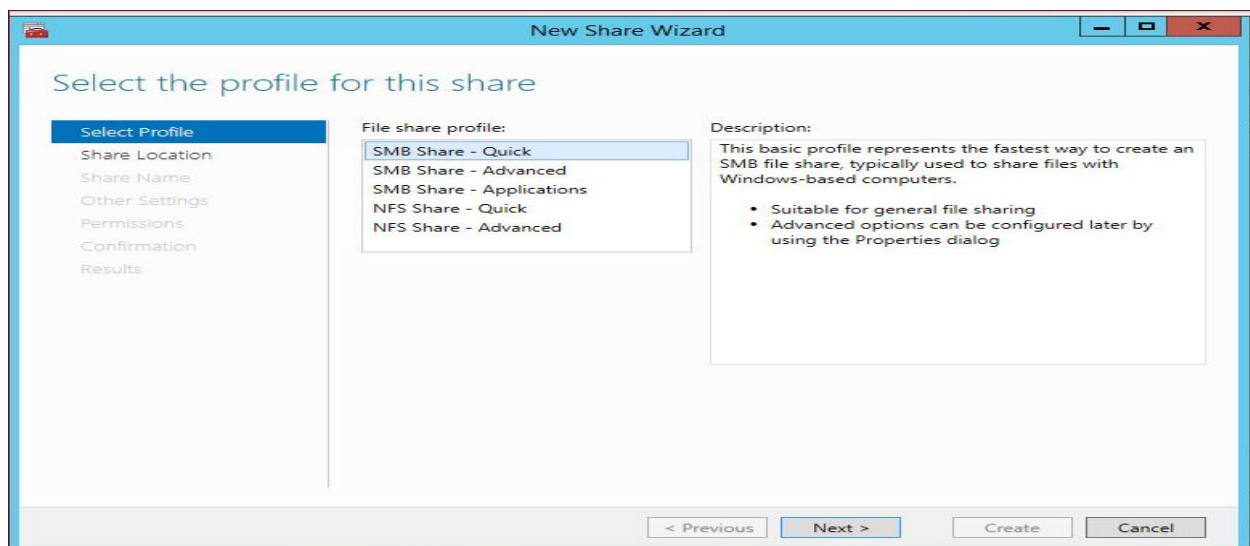
[View Report...](#)

[Finish](#)

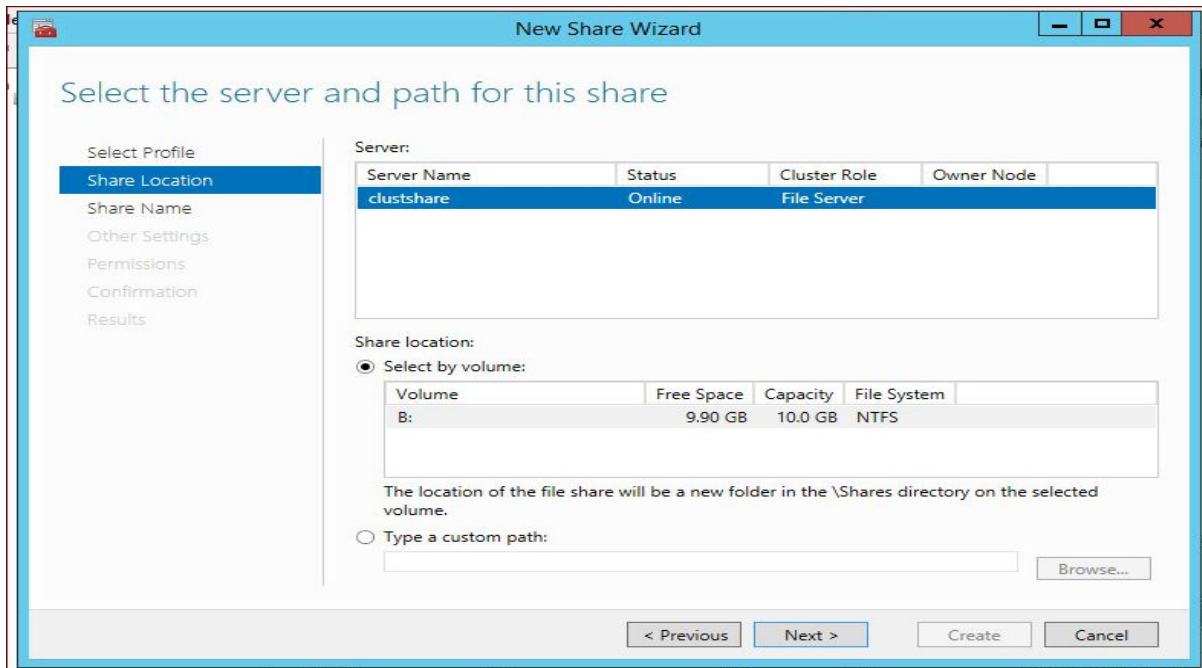
Now under **Roles** right click your share and **Click** Add File Share.



Under shares right click **properties** It should initialize the file server if you have everything configured correctly. After this is finished a **SMB** file share wizard should pop up. Select the option **SMB Share - Quick** and hit **Next**.



Select the location of the share by clicking on it and hit **Next**.



The screenshot shows the 'New Share Wizard' window with the 'Share Location' step selected in the left sidebar. The main area is titled 'Select the server and path for this share'. It features a 'Server:' table with columns for Server Name, Status, Cluster Role, and Owner Node. Below this is a 'Share location:' section with two radio buttons: 'Select by volume' (selected) and 'Type a custom path:'. The 'Select by volume' option shows a table with columns for Volume, Free Space, Capacity, and File System. At the bottom, there are navigation buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

Server Name	Status	Cluster Role	Owner Node
clustshare	Online	File Server	

Share location:

☒ Select by volume:

Volume	Free Space	Capacity	File System
B:	9.90 GB	10.0 GB	NTFS

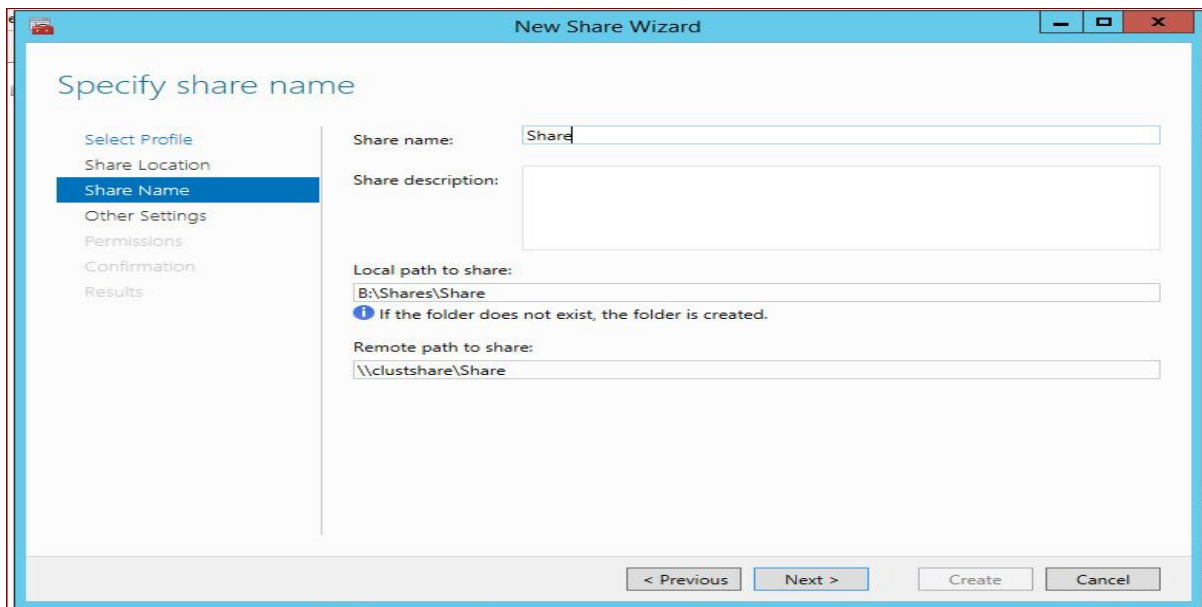
The location of the file share will be a new folder in the \Shares directory on the selected volume.

☐ Type a custom path:

Browse...

< Previous Next > Create Cancel

Give the new share a name and it will automatically create the path, then hit **Next**.



The screenshot shows the 'New Share Wizard' window with the 'Share Name' step selected in the left sidebar. The main area is titled 'Specify share name'. It features a 'Share name:' text box with the value 'Share'. Below this is a 'Share description:' text box. The 'Local path to share:' text box contains 'B:\Shares\Share'. A blue information icon with the text 'If the folder does not exist, the folder is created.' is displayed. The 'Remote path to share:' text box contains '\\clustshare\Share'. At the bottom, there are navigation buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

Share name: Share

Share description:

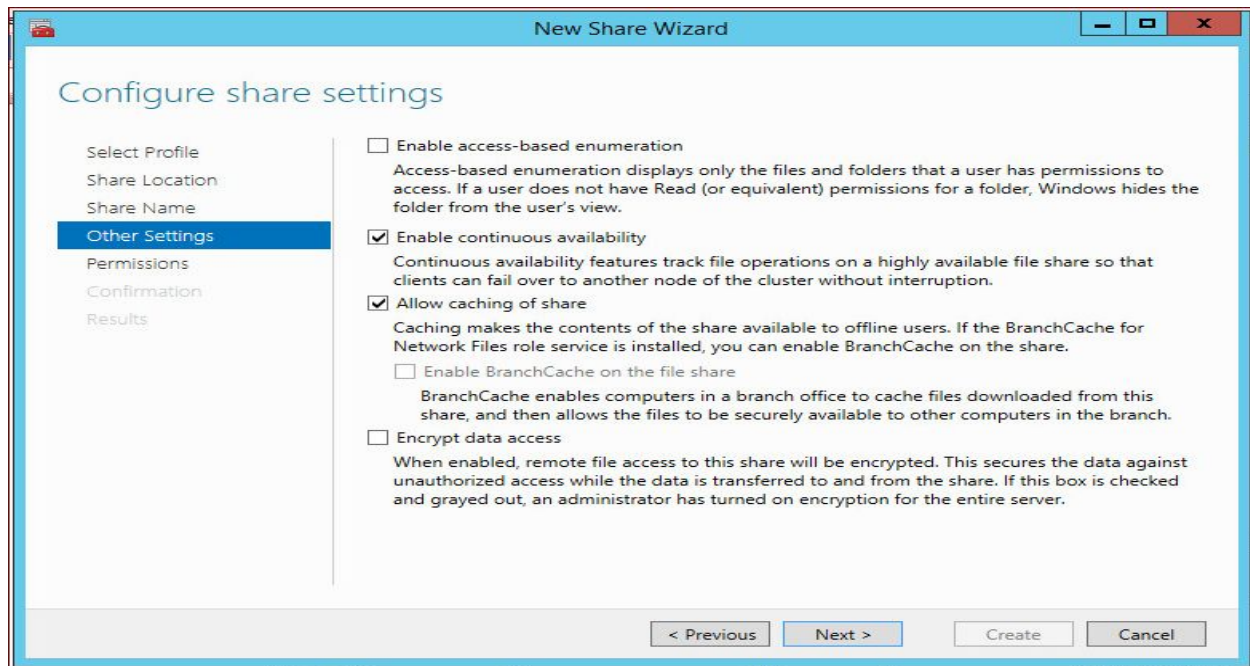
Local path to share: B:\Shares\Share

i If the folder does not exist, the folder is created.

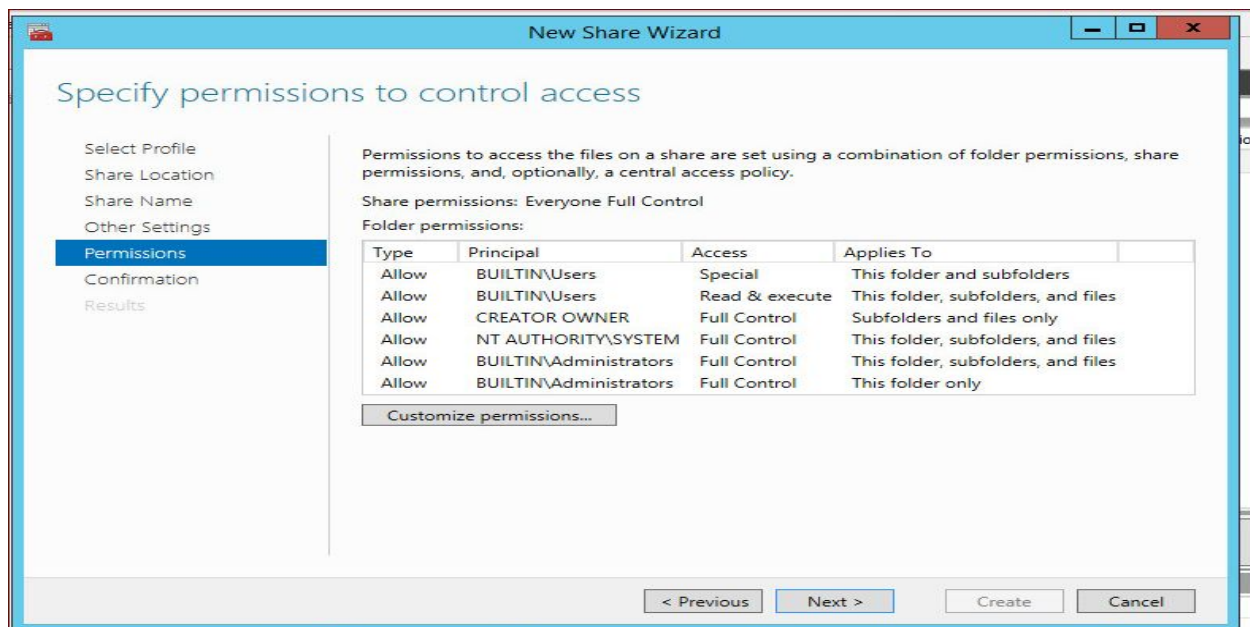
Remote path to share: \\clustshare\Share

< Previous Next > Create Cancel

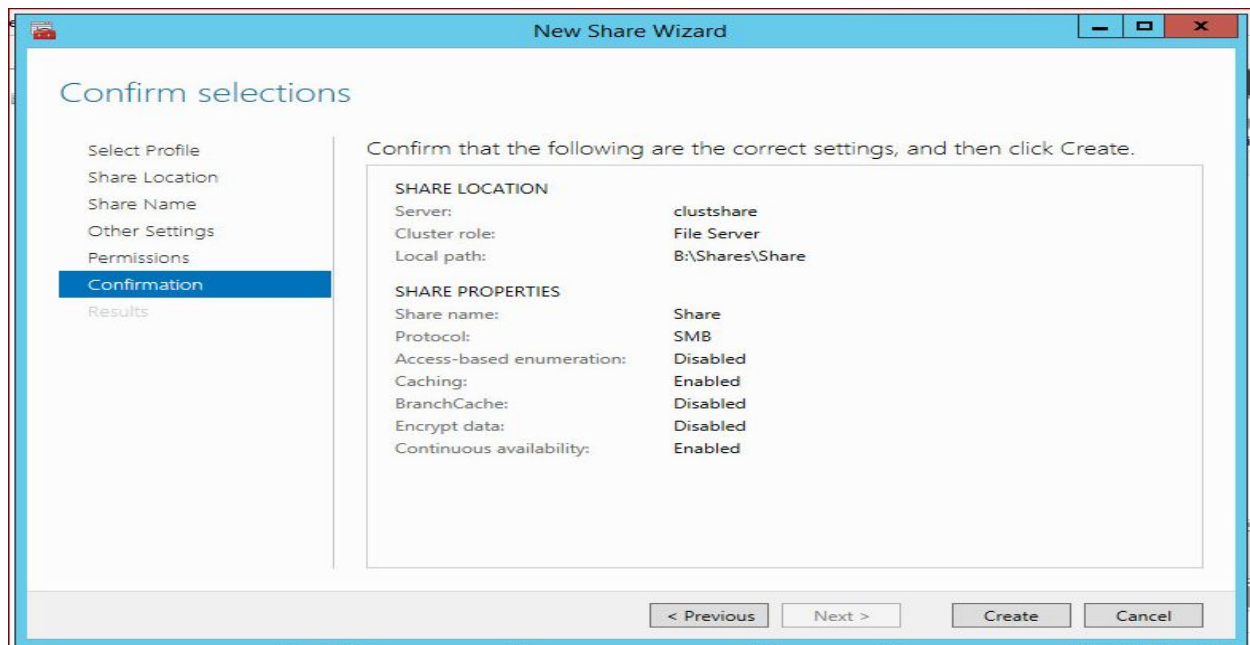
Defaults here are fine. Hit next.



Add any users you might want to allow for **special** permissions... Otherwise just move on. Hit **Next**.



Check over the settings you configured and make sure they look reasonable, then hit **Next**.



Setting up heartbeat network

To start, we created a new switch, with a port group called “heartbeat”, and added a NIC to both servers that we wanted to connect to it. Just make sure each server is using this NIC and they can ping each other.

```
PS C:\Users\jbrown> ping 10.10.1.64

Pinging 10.10.1.64 with 32 bytes of data:
Reply from 10.10.1.64: bytes=32 time<1ms TTL=128
Reply from 10.10.1.64: bytes=32 time<1ms TTL=128
Reply from 10.10.1.64: bytes=32 time<1ms TTL=128
Reply from 10.10.1.64: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.1.64:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\jbrown>
```

GPO Drive Map

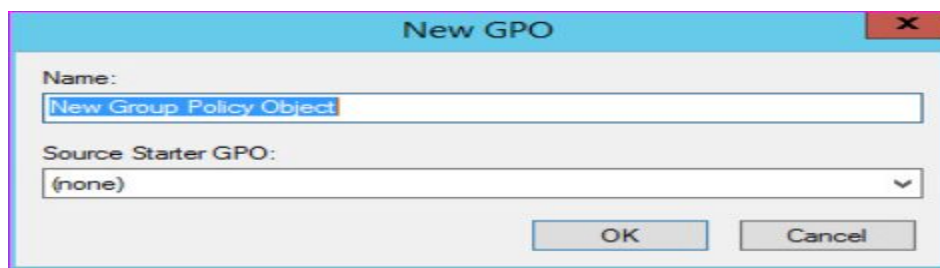
For this part we will be configuring a GPO to set up a drive map of the shared file server we just created for a client computer, this way end users can connect to our cluster file share much easier.

Configuration of GPO

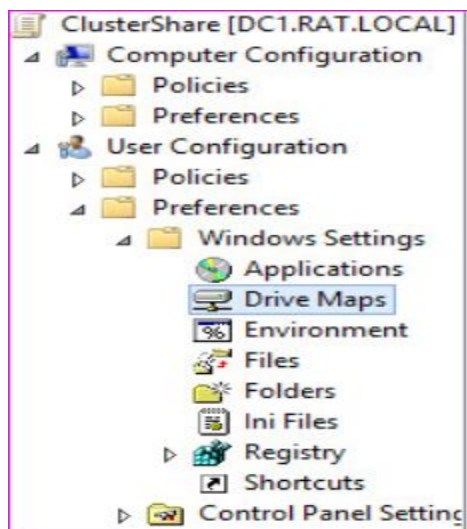
In server manager click on **Tools** at the top right choose and open **Group Policy Management**.

Once open right click an OU click **Create a GPO in this domain, and Link it here...**

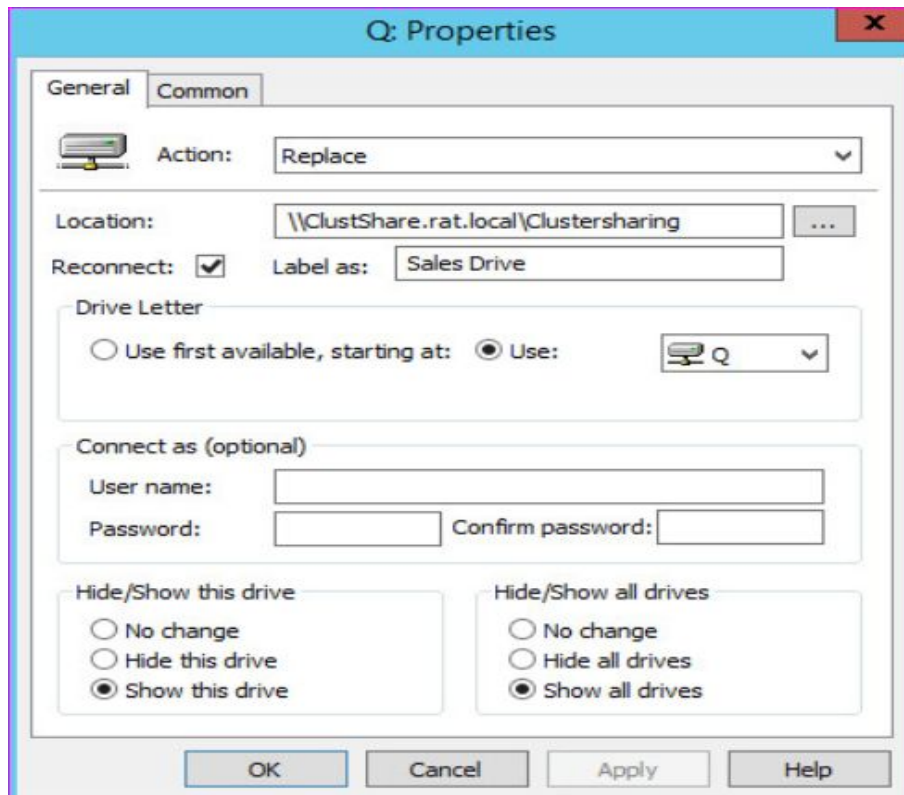
Give the GPO a Name and click **Ok**.



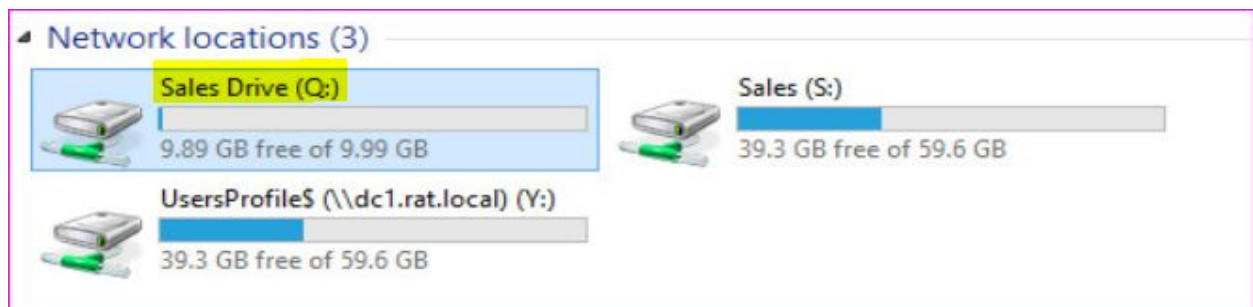
Go to **User Configuration > Preferences > Windows Settings** and right click on Drive Maps and click **New Mapped Drive**.



Our shared folder was located at \\CLUSTSHARE\\B\$, SO we made the share here, we called it clustersharing. So in the Drive Map properties make sure you specify the correct location of the shared folder, then hit the check box for **Reconnect** give it a **Label** and a **Drive letter**, hit **Ok** to submit your configurations.

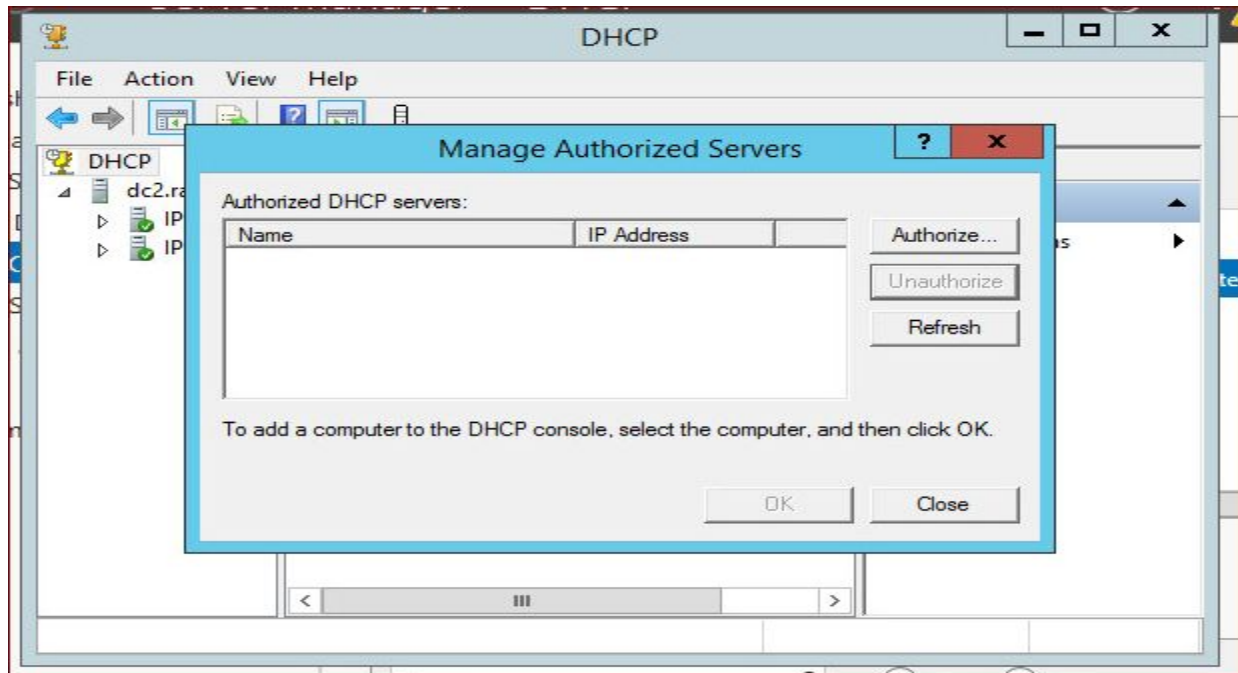


Now login to the client corresponding to the GPO OU and if you configured everything right it should be there after a quick "**gpforce /update**" in the cmd and after another login it will show up in file explorer under **This PC > Network Locations**.

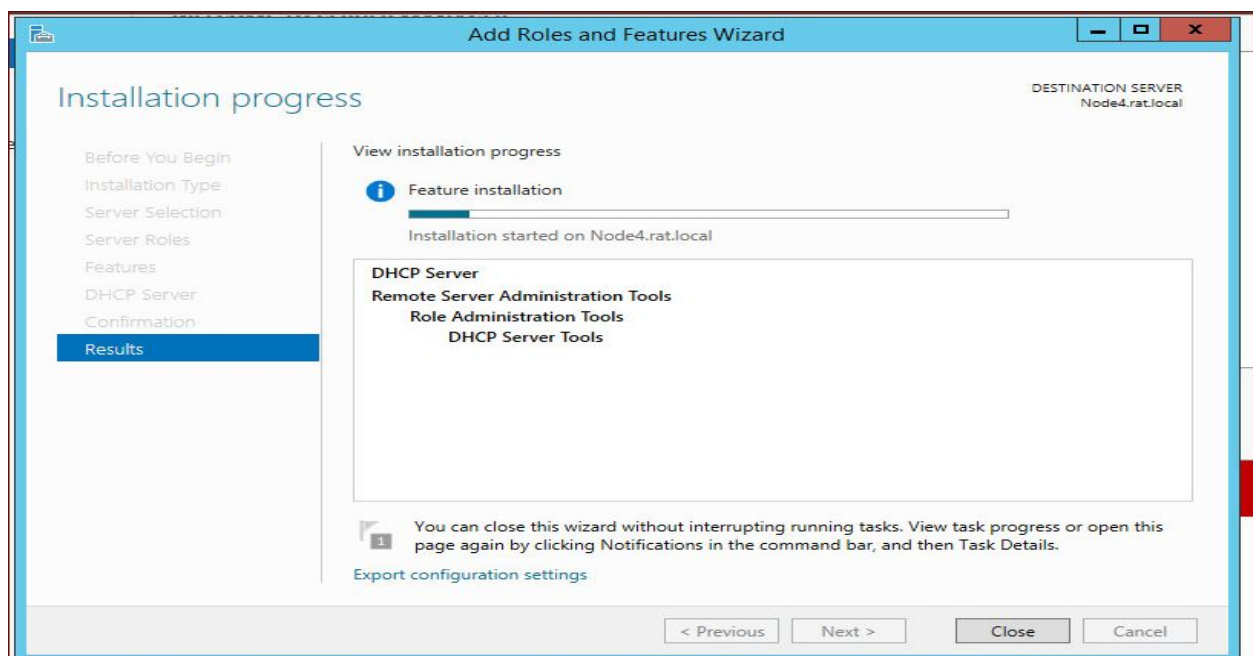


Redundant DHCP servers

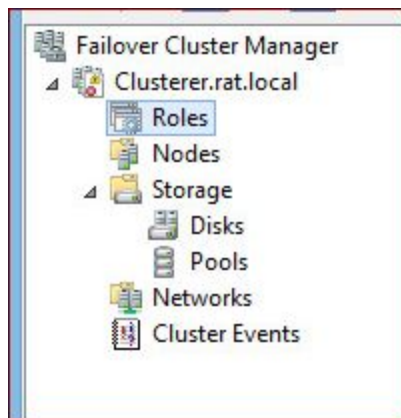
Don't forget to **un-authorize** your dhcp server!



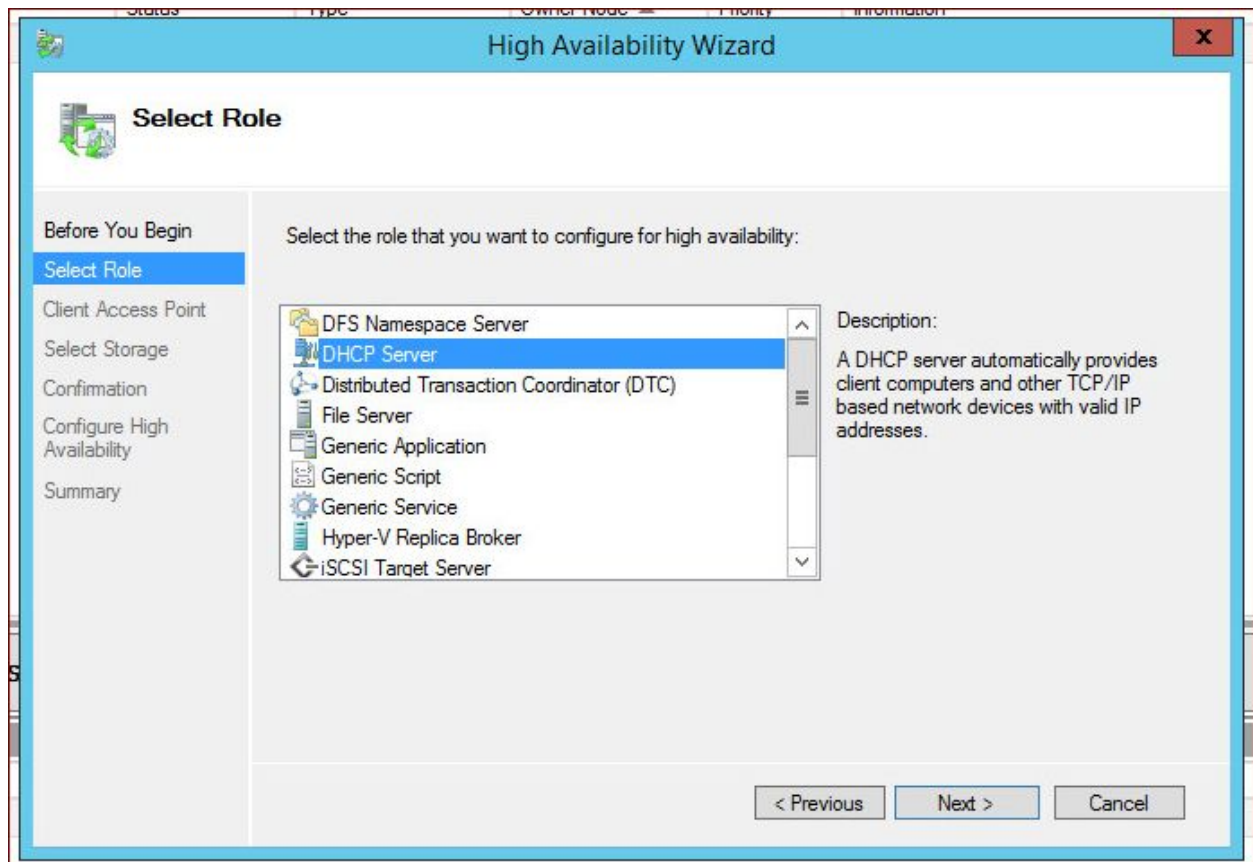
Install the DHCP role on your nodes within Server Manager (Add Roles and Features)!



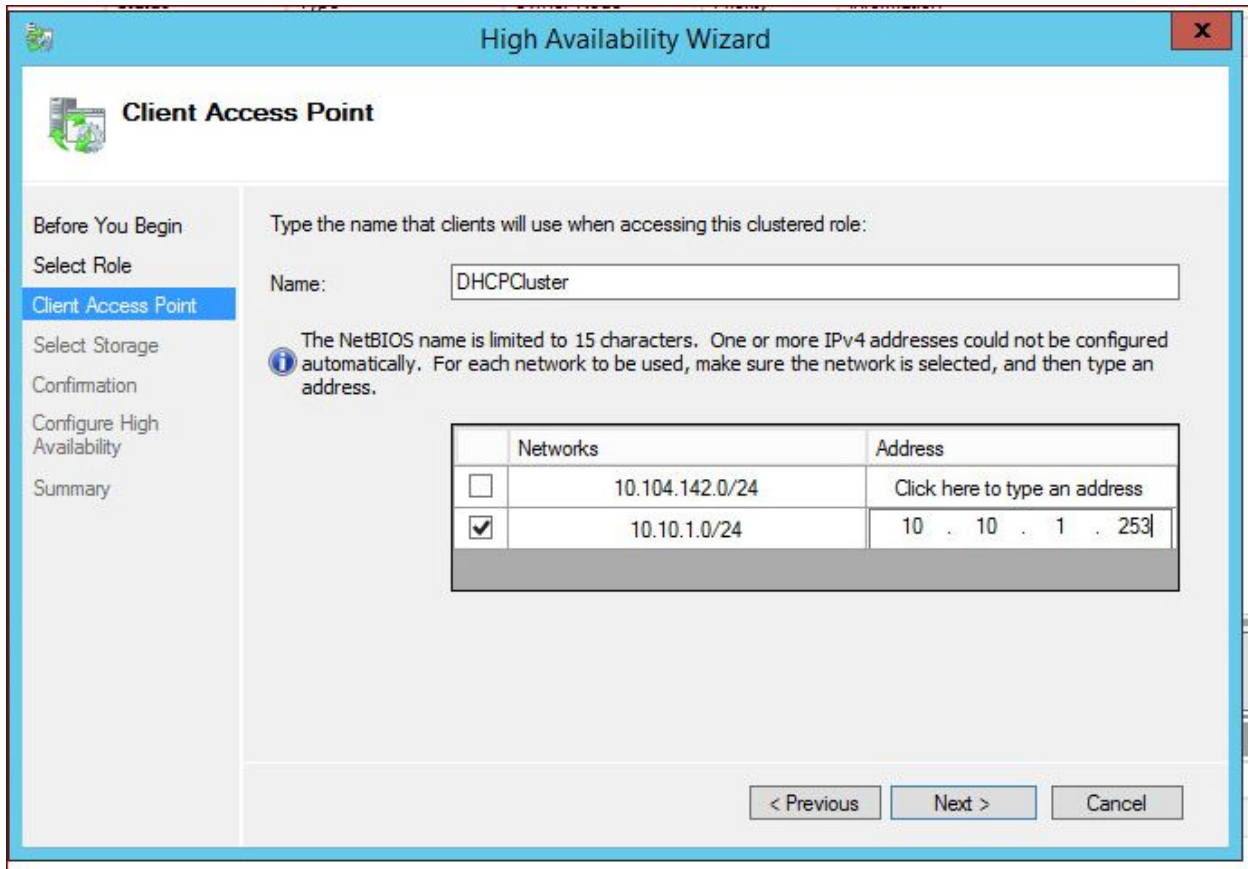
Inside Failover Cluster,
Click **Roles**, after finished installing **DHCP** on both nodes.



Click **DHCP Server**, then **next**.



Put it **ONLY** on the network you need it on, and give it an IP. Hit next.



The image shows a Windows Server configuration window titled "High Availability Wizard" with a sub-header "Client Access Point". On the left is a navigation pane with the following steps: "Before You Begin", "Select Role", "Client Access Point" (highlighted), "Select Storage", "Confirmation", "Configure High Availability", and "Summary". The main area is titled "Type the name that clients will use when accessing this clustered role:". Below this, there is a "Name:" label and a text box containing "DHCPCluster". An information icon (i) is followed by a note: "The NetBIOS name is limited to 15 characters. One or more IPv4 addresses could not be configured automatically. For each network to be used, make sure the network is selected, and then type an address." Below the note is a table with two columns: "Networks" and "Address".

	Networks	Address
<input type="checkbox"/>	10.104.142.0/24	Click here to type an address
<input checked="" type="checkbox"/>	10.10.1.0/24	10 . 10 . 1 . 253

At the bottom right of the window are three buttons: "< Previous", "Next >", and "Cancel".

Choose your **storage**, hit confirm, and watch your new **DHCP** server go. Also, make sure to authorize it as a **DHCP server!!!**

Now our Cluster give IP's through DHCP on our internal network to clients.

Summary

A cluster is a redundant pool of servers that can provide roles to a domain, provided by windows. A cluster can be setup and running quite quickly, provided you do not mess up the disks like we did. Having a cluster of servers on your domain will help keep your servers up and alive.

References

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