ITAS141 Project 3: Clustered File System with FreeNAS

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Setting up FreeNAS 11.3

After configuring the necessary virtual machines to set up our environment (A client windows 10 machine, 2 Windows File Servers as well as a Domain Controller if you don't already have one) and finally our FreeNAS machine.) The configuration of the windows machines is straight forward with the only exception being that we will install the file server and Failover Cluster roles on them, so we will exclude showing them in this documentation.

After configuring our FreeNAS machine with a total of 4 Hard Disks, one for install and the other 3 to create our software raid, which we can add to our initial configuration of FreeNAS. After this we can then create our login to access the web client using the "root" username and our created password. And begin the install process of FreeNAS, and after letting the install finish we can start to configure our network for the FreeNAS web interface.

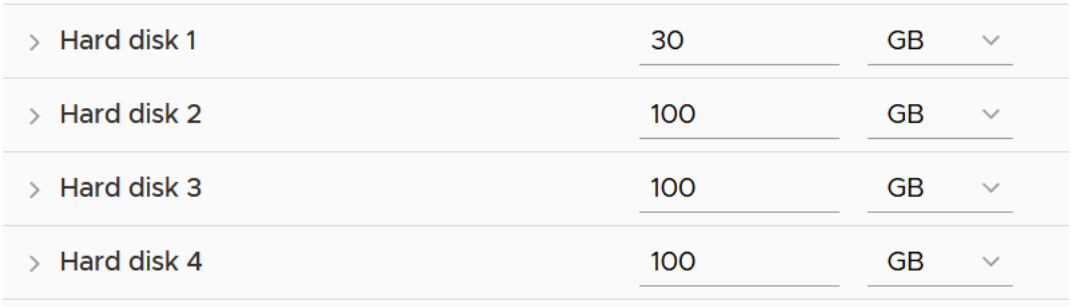


Figure 1: Hard drives to create FreeNAS software raid

To do this, we will want to let our FreeNAS start and go to the "Configure Network Interfaces" which we can do by pressing 1. After this, we can then select our network card and then start to configure our network. Press N when it asks you to delete current network configuration and keep pressing "N" until you are given the option to add your IPv4 address.

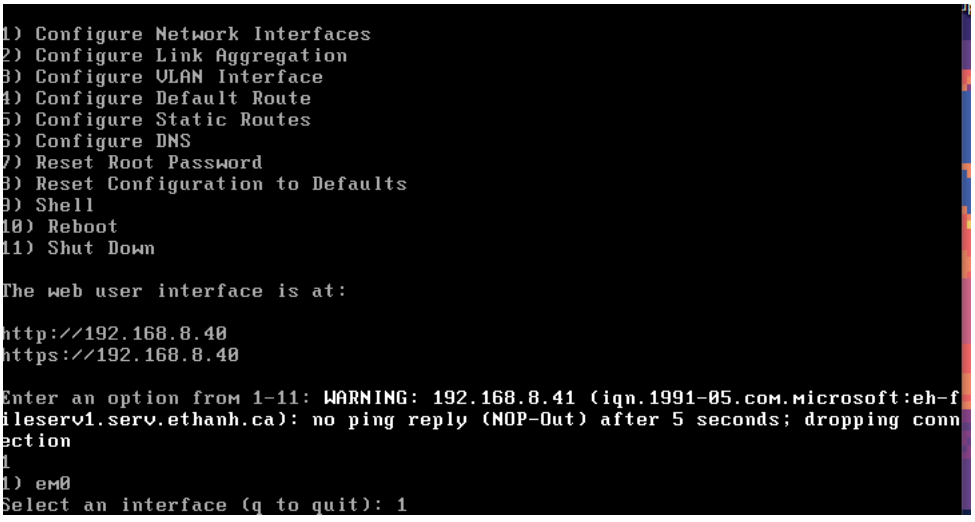


Figure 2: Selecting our interface from the menu

From there, we will then add an IP address that is within the range of our Domain Controller, for my Domain Controller I used 192.168.8.40 with a subnet mask of 255.255.255.0. After a few moments, our web UI will be created under our IP Address and we can then have access to a GUI version of FreeNAS.

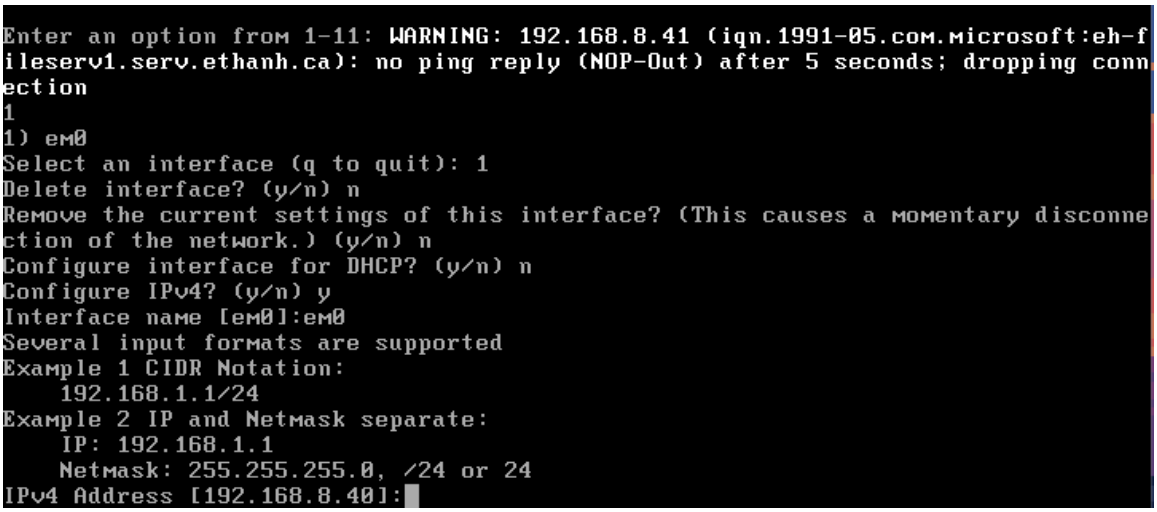


Figure 3: Giving a IP Address within our domain

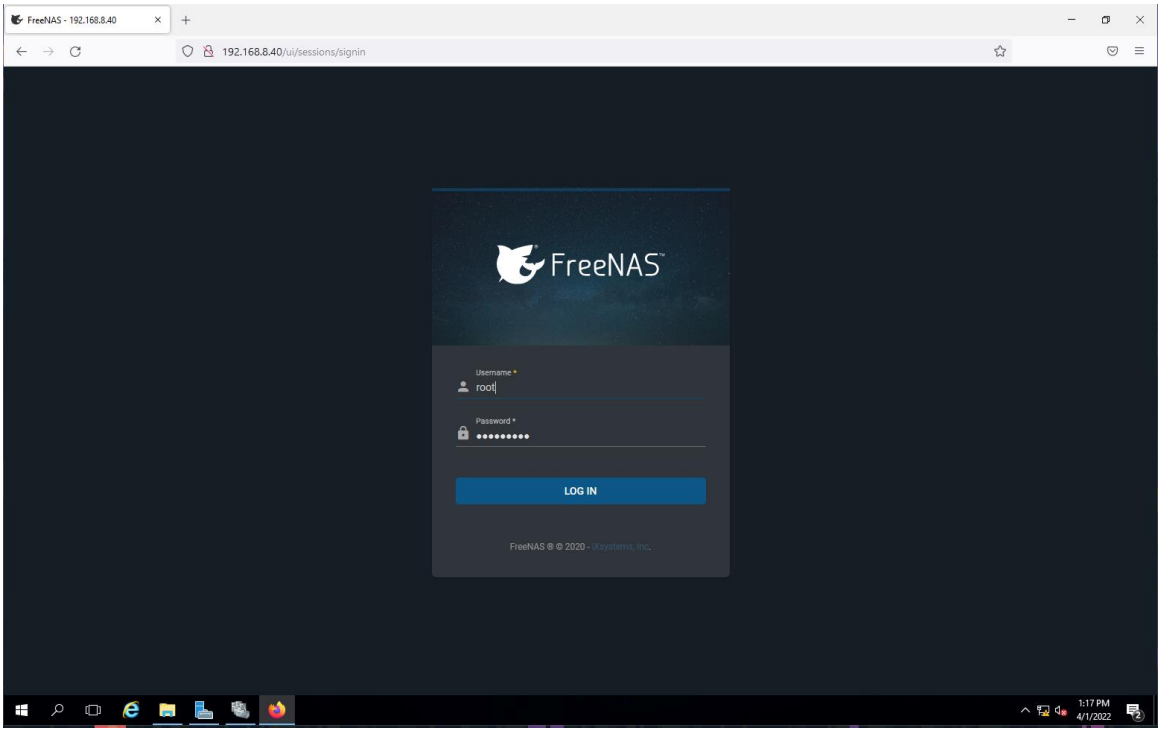


Figure 4: FreeNAS login page, login using root

Setting up FreeNAS UI

Using the “root” username and the password we created, we are then given access to our home screen of FreeNAS

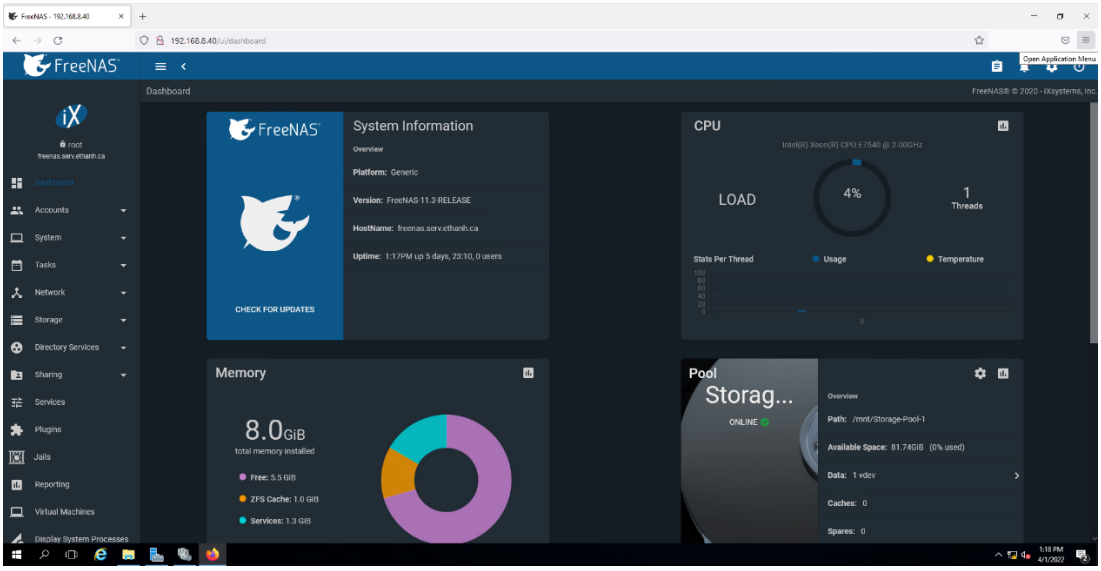


Figure 5: FreeNAS homepage

On the left, we can see a large selection of features that FreeNAS offers, to start we will be working inside the “Storage” tab on the left. From this tab we can then set up the storage that we want to use. For this after we click the storage tab, and create a new pool

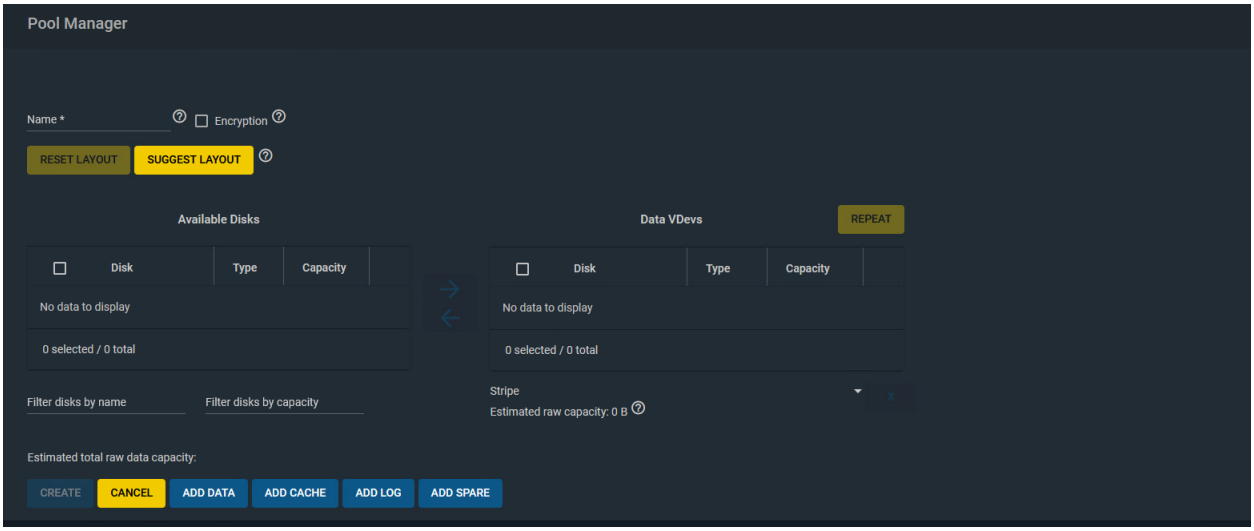


Figure 6: Pool manager in FreeNAS, Name pool and choose disks we want to use

In here, we can choose a name for the pool and then add our respective disks that we would like to use to create the storage solution. Below we can see the setup of my pool and we can replicate that going forward.

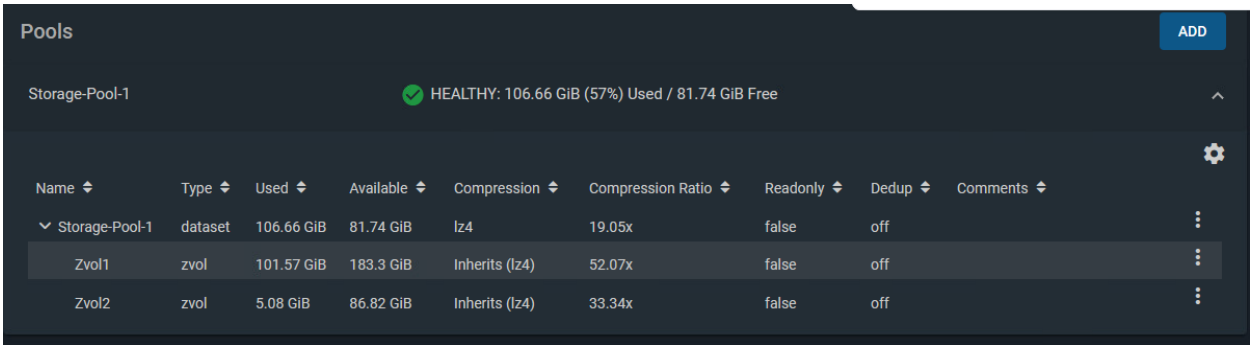


Figure 7: Created Pool with 2 volumes

After the storage pool has been created, we will then create volumes on the storage pool that we can use and add to our machines. Because our failover cluster needs 1 central storage pool, and a quorum pool for our machine to. We can accomplish this from the same page after our storage is set up, we can create volumes and size them for us to use. Refer to figure 7 for these volumes

We can give these volumes a specific size and a name that we can use to identify them.

After this, we can move to the left and click on “Sharing”, from here we can setup our initiators and our targets for our Windows machines, so they can access the storage that we create through FreeNAS.

The first thing we can configure will be the portal, the portal will allow us to make our IP discoverable to the Windows iSCSI initiator, so we can make communication with the storage. We can click “Add” in the top section and then add the IP as well as a portal group.

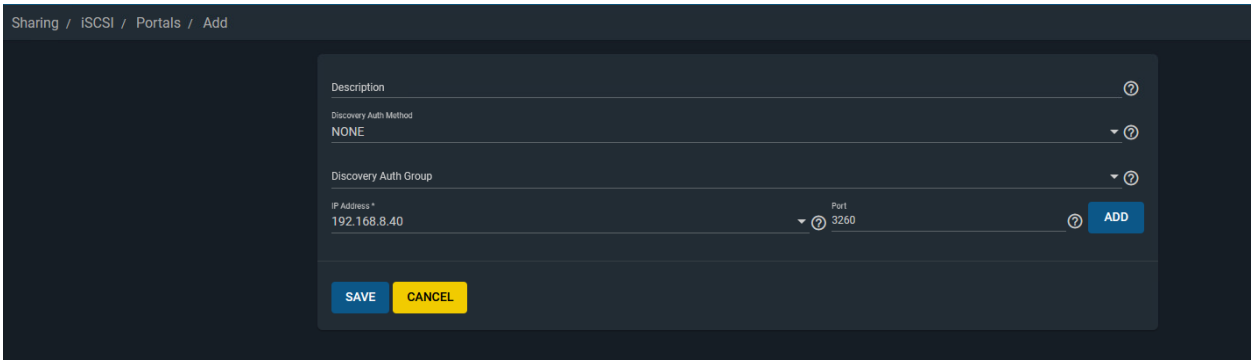


Figure 8: Configuring the FreeNAS portal

Once this has been created we can then move on to Targets, from here we can give a target name to our volumes and extents, this along with the portal will become the identifiers for our volumes on the iSCSI. To do this, we can create a target name that we can use as our main name identifier for the target, and then set a portal group ID that we can use as a numerical identifier for this target. If we had another portal group already created and we wanted to add another identifier into it, we could choose a different number. However, since this is the first group, we will choose 1.

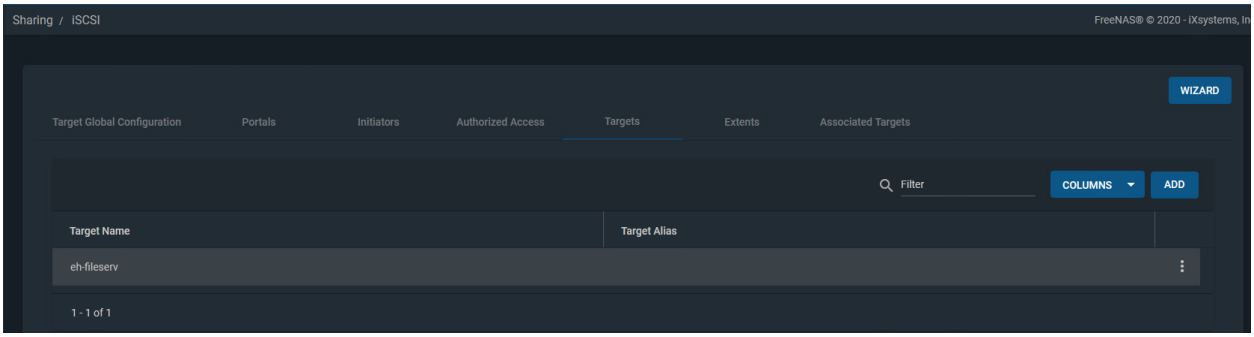


Figure 9: Completed target

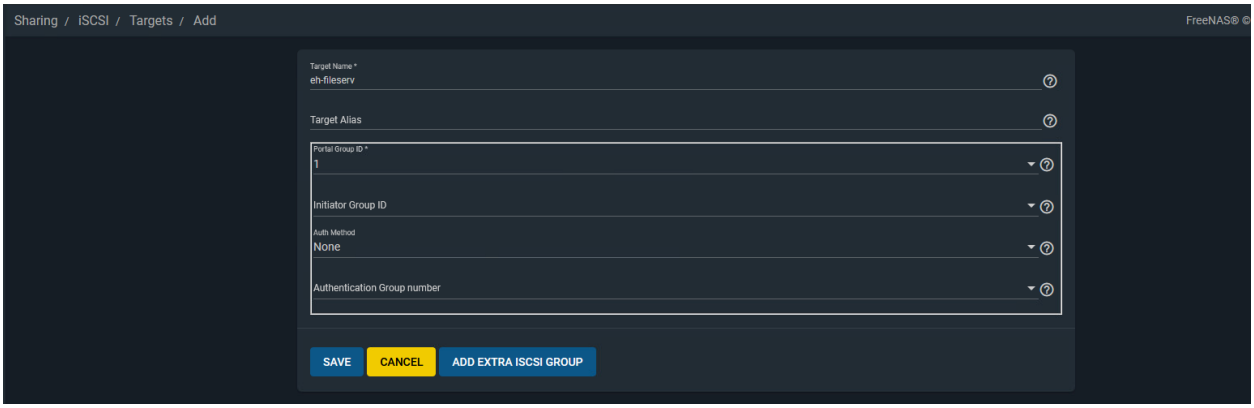


Figure 10: Filling out the target info

After creating all the identifiers for the disks, we will create our extents for our disk which will be the volumes that we would like to add to our machine.

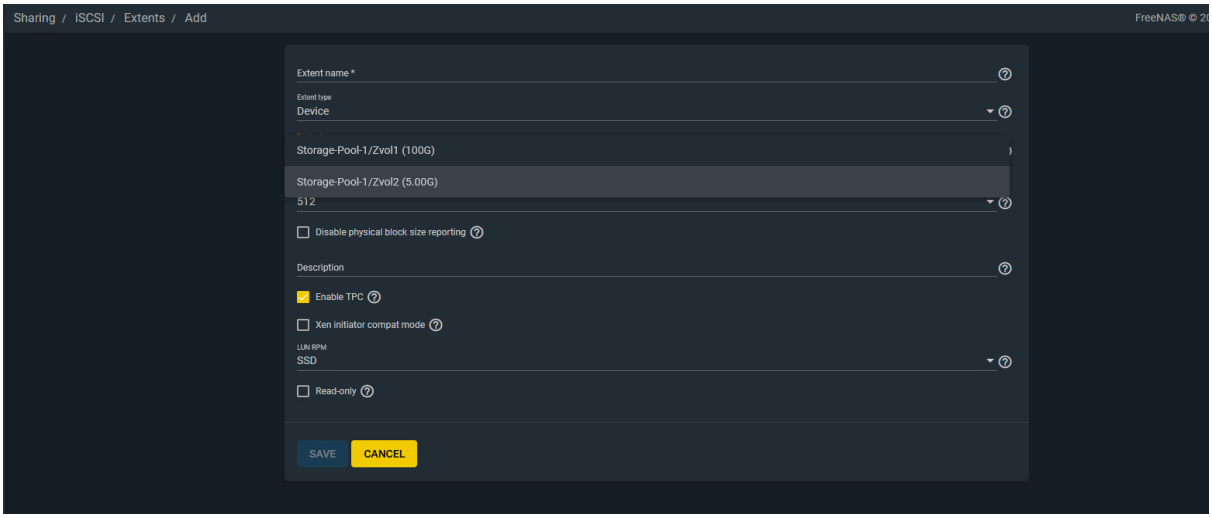


Figure 11: Creating the extent using our volumes

For this, we can give the extent a name to help identify the volumes. The 100gb Zvol will be labeled as the storage disk, while the Zvol2 will be identified as the Quorum disk that we will need installed. Everything else can be left as default unless it needs to be changed otherwise.

The last thing that needs to be configured on FreeNAS is the Associated Targets. Associated Targets are adding your extents that we made previously, associating them with your Target that we also created earlier, which will render the NAS devices usable.

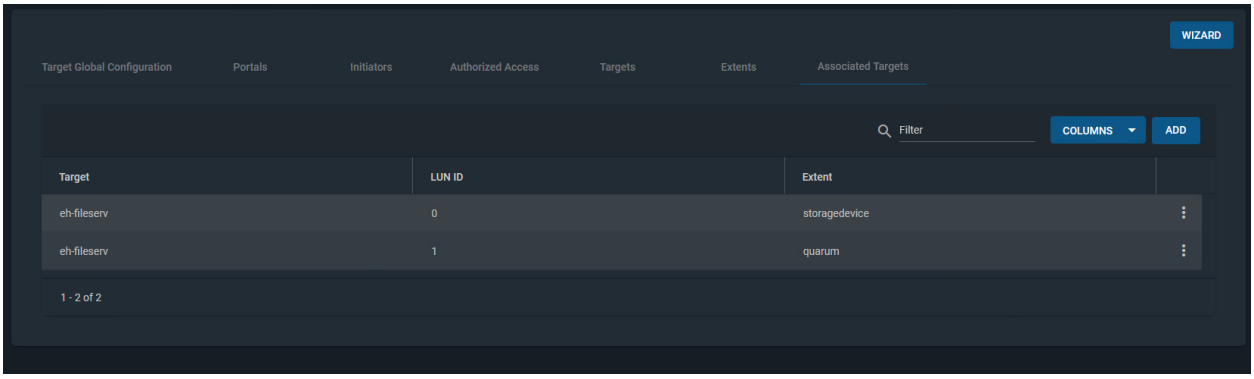


Figure 12: Completed associated targets

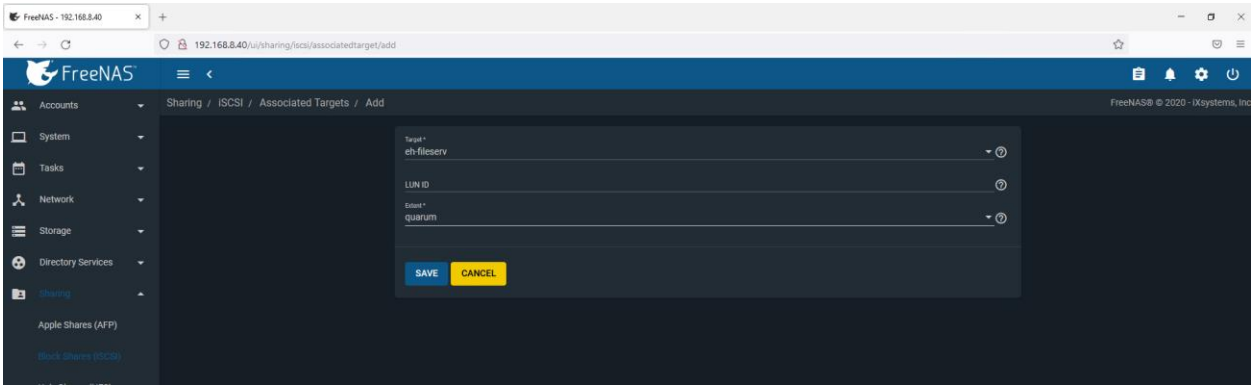


Figure 13: Adding our extents to our target

Once again, clicking “Add” we can create these associated targets, which are simple enough as we can click the “Target” drop down menu as well as the extent dropdown menu and select the Target we created as well as what volume/extent we would like to add. From the figure above, we can see the Quorum extent being added under the eh-fileserv target, we can do this process twice. Once for the Quorum and once for the Storage disk that we would like to add. After this is done we can move to our Windows File Share machines and configure the iSCSI machine there.

Setting up our Windows File Servers

After finishing the setup of the FreeNAS machine, we can then setup our iSCSI initiator and Failover Cluster Manager on our Windows server machines. We can start this process by installing the File Server role on the Roles and Features install in server manager which will manage shared folders and enable members to access network files on the machine. Click next, and on the features section we can install the Failover Cluster manager, which will give us the MMC snap-in to manage our nodes and create our clusters.

Once installed, we will first work inside the iSCSI initiator, so we can get our machine to access the network storage. Inside server manager click “Tools” and go down to iSCSI initiator, the first tab we will access is the Target tab, which we can add the IP Address of our FreeNAS machine then click Quick Connect.

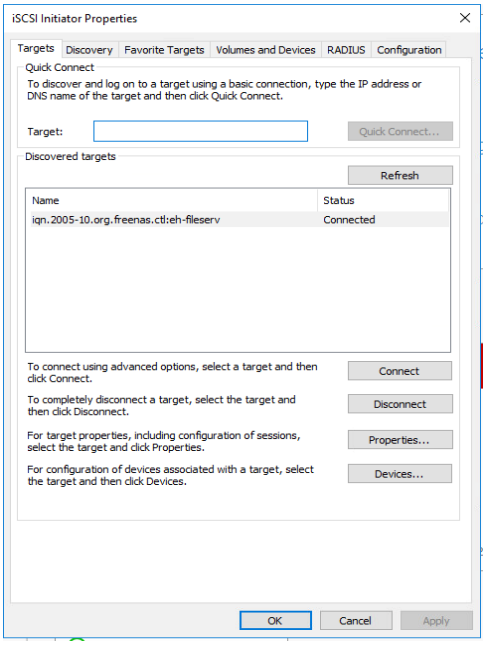


Figure 14: Adding the FreeeNAS iSCSI setup to Windows

After the IP address has been added, we can then click the “Volumes and Devices” tab which will then allow us to add our 2 previous extents as usual network storage. We can just click “Quick connect” once we get to the tab, which will then add the 2 volumes as usable storage.

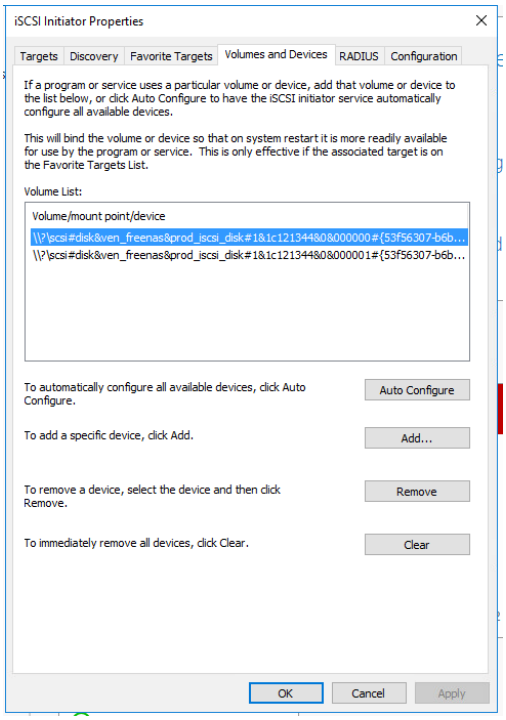


Figure 15: Auto confiugre the 2 extents to be used

From here, we can go to disk management on our Windows Server machines and we should see 2 disks that are offline, these 2 disks will be the volumes from our FreeNAS machine. Put the disks into an online state and then turn create new volumes into them.

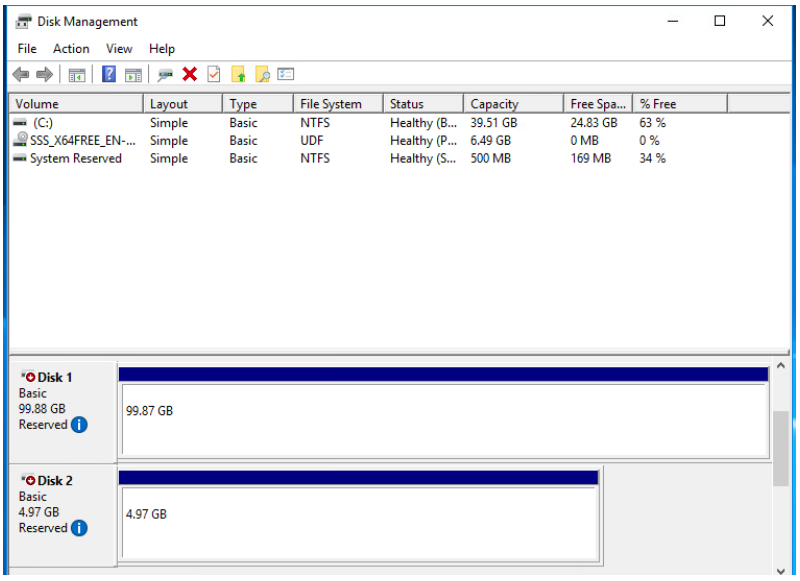


Figure 16: Initializing the 2 disks to be used

Once this is done, we can see storage with a NAS icon within the file explorer on windows.

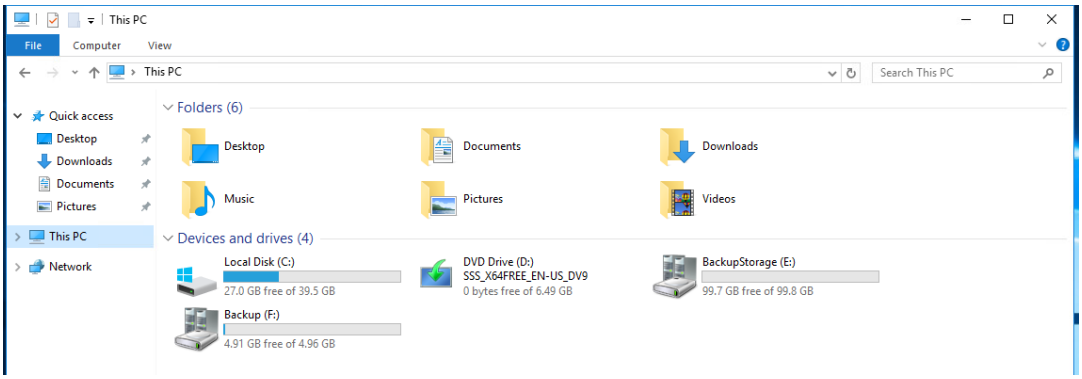


Figure 17: 2 Usable disks on the machine

Failover Cluster Manager

Once configuring the iSCSI manager has been completed, we can open our Failover Cluster Manager. We will be greeted with an empty home screen as we have no clusters or roles configured.

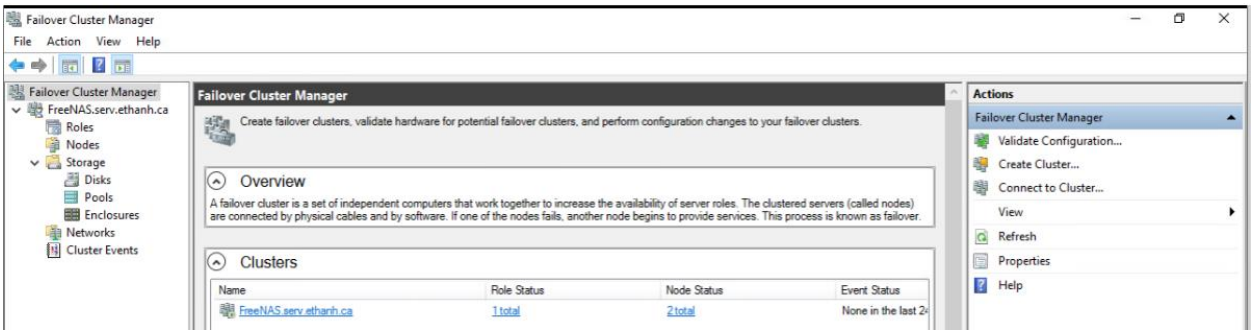


Figure 18: Adding the cluster to be used

We can first run the “Validate Configuration” to make sure that our Failover cluster is configured properly and that we have no major errors stopping us from creating the cluster. After this has finished, we can then use the “Create Cluster” on the right action pane to create the cluster.

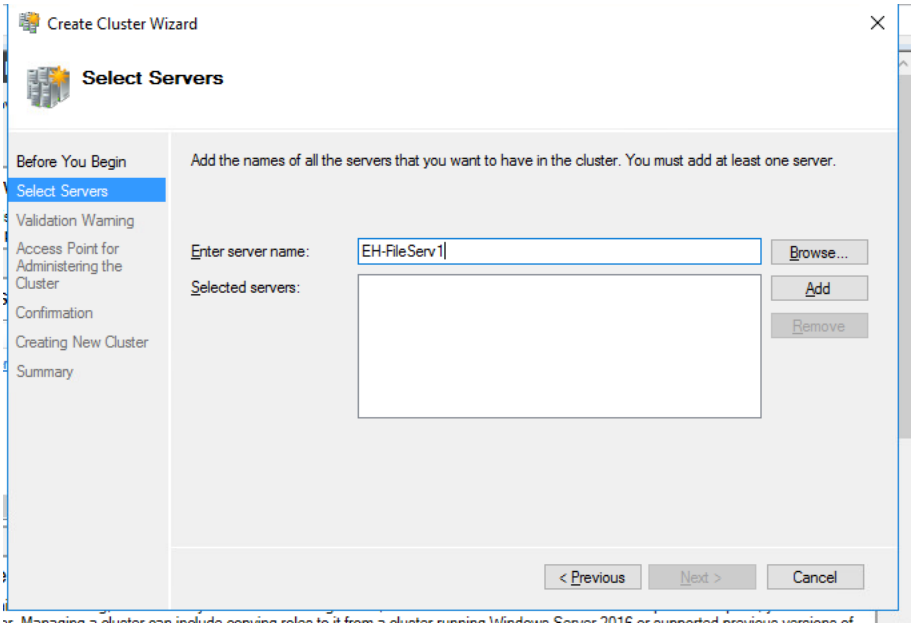


Figure 19: Adding servers to the cluster

From here, we can add all the servers we want to add to our cluster. In this case we will add our 2 File Servers and the Client machine that we would like to add to the cluster.

From here we can just click next as we did the validation earlier, in the “Access Point” screen we can type the name for our cluster and give the IP Addresses we want it to run on. In this case I used 192.168.8.43 and my heartbeat network of 172.16.8.42 for redundancy. Click through the defaults and finish the creation of the cluster.

Now that we have a created cluster, we can configure the storage and create nodes inside the cluster. Click the dropdown menu on the left menu plane and click the “Nodes” option

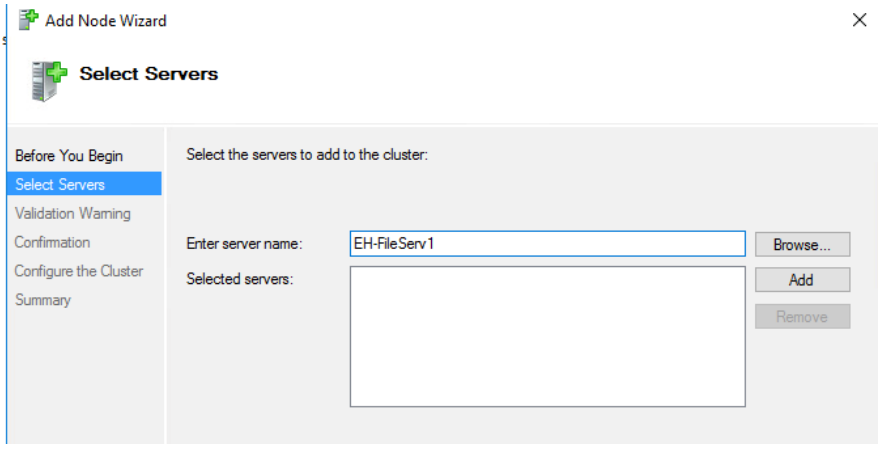


Figure 20: Adding servers to the Node

Once again, we can add our 2 Windows Server as nodes as the servers will act as our storage for the machines. The cluster is already validated so we can just click next through it. Confirm the confirmation and select whatever server you would like to be your primary node, for us it will be Node 1. When finished you should have the following:

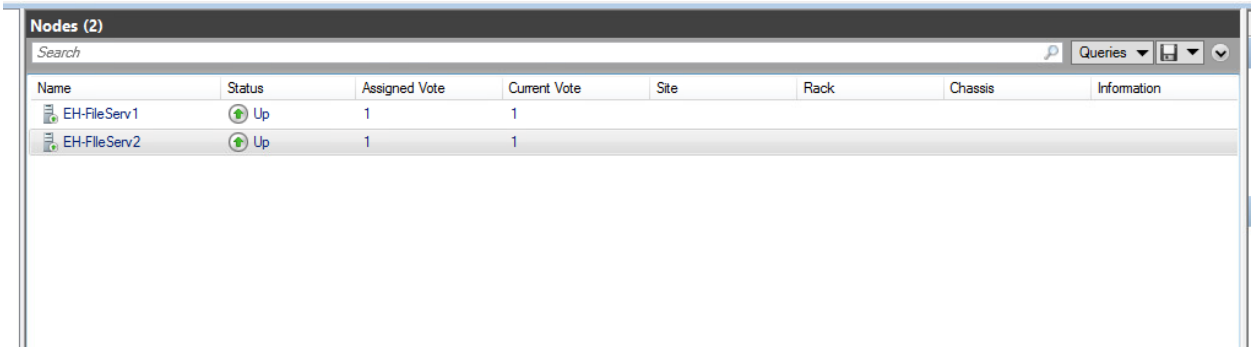


Figure 21: All nodes added

Finally, we can finish off with the “Roles” option. We can select “Roles” from the dropdown menu attached to our Failover Cluster on the left action bar. Here we can select the file server role option, and then keep the default “File Server Type” unless it needs to be changed otherwise.

We can add our 2 networks, the heartbeat as well as the domain network, select our necessary storage that we would like to add to the role and from there we can continue to select defaults and finish our configuration of our role.

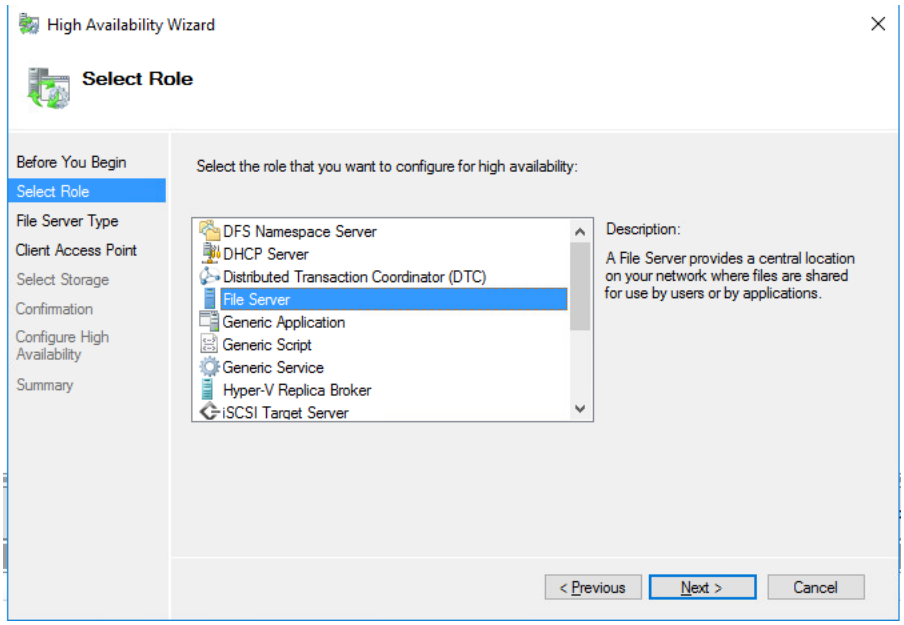


Figure 22: File Server role

After the role has been created, you will see a role that has been created in the roles section.

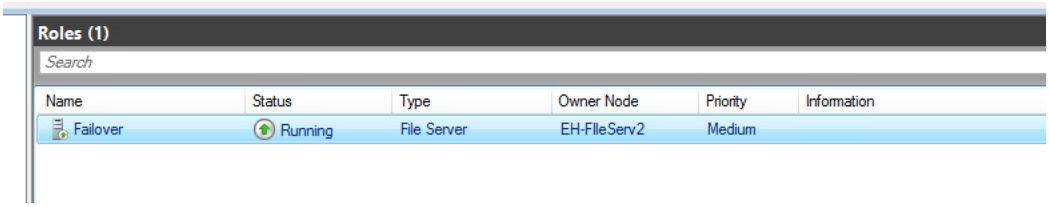


Figure 23: Creation of the role

We then need to create a usable share for our devices to connect to, right click the role that we created, and we can then click “Add File Share”

From the menu we can select the default share profile, and in Share Location, select our role and the volume that we gave to the role.

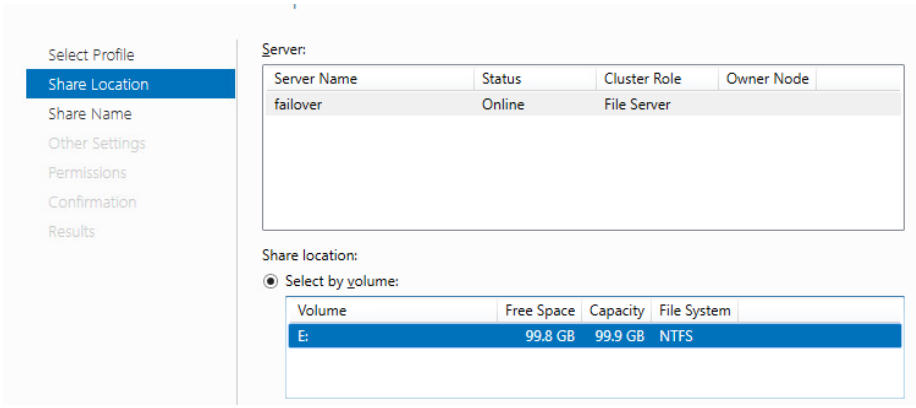


Figure 24: Selecting the volume to use

The “Share Name” page allows us to name our share, we will want to record this info as we will use it to make our share useable to our client machine. Name your share as you see fit and then record the names. In my case I will want to remember the name of our remote path and the name of our share, for me it will be FileShare

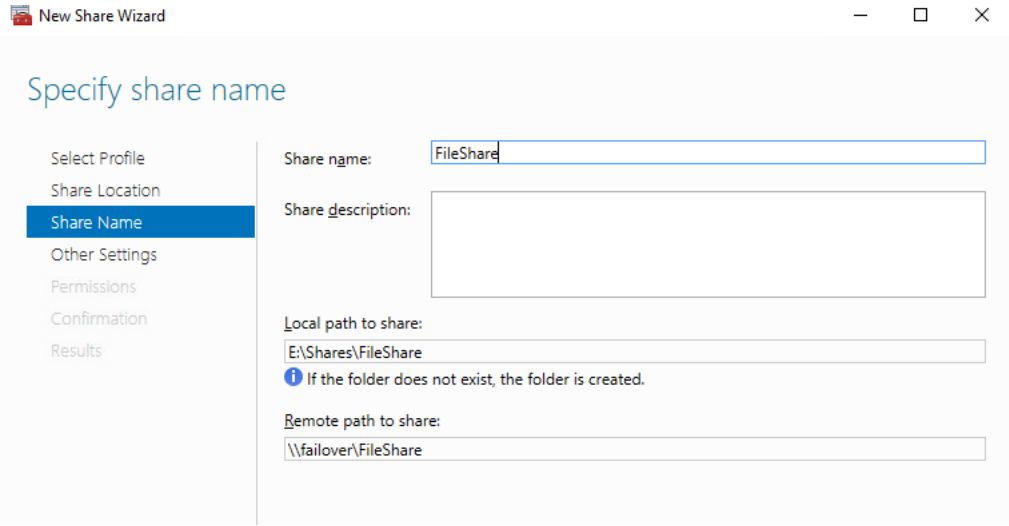


Figure 25: Giving the share a name to use

From here we can accept the default settings and permissions and finish the file share.

Mapping the disk to a client

To make this disk usable to the people on our network, we can move over to our Windows 10 client machine that has been domain joined, open File explorer and click the “Computer” tab, then “Map Network Drive.”

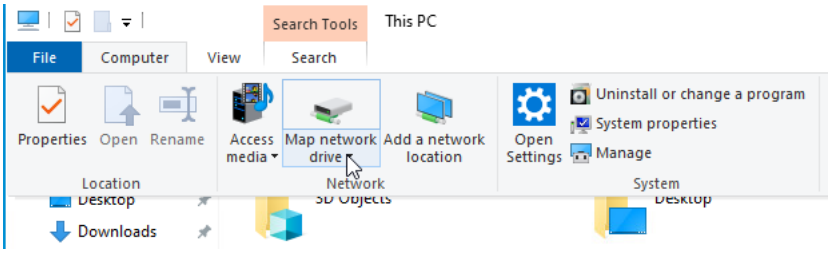


Figure 26: Mapping a network drive

On the following menu, we can add the remote path name that we recorded in the previous step and give the drive a letter value, click finish and the drive should be mapped to the client machine under Network Locations.

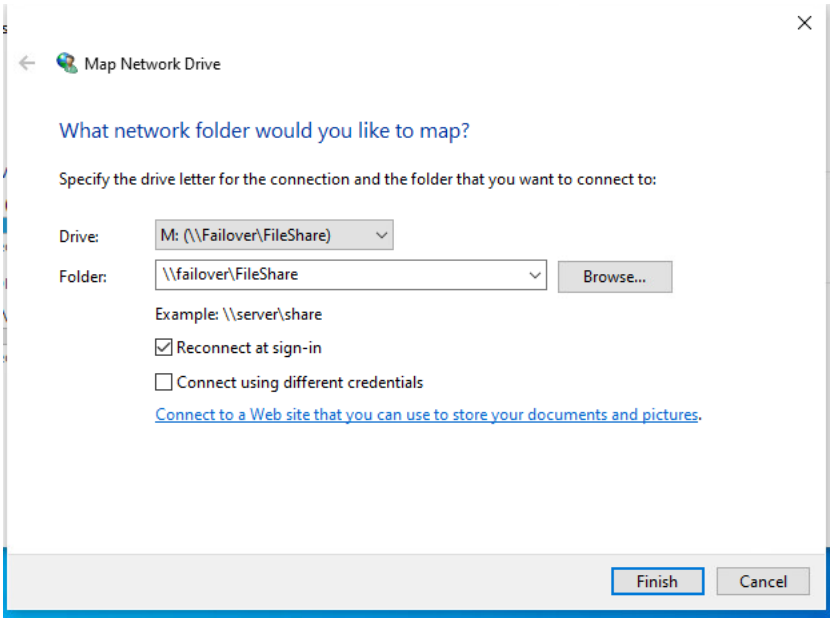


Figure 27: Adding the names to the network drive

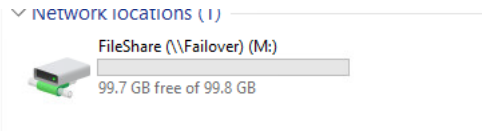


Figure 28: Sucesfully added network drive

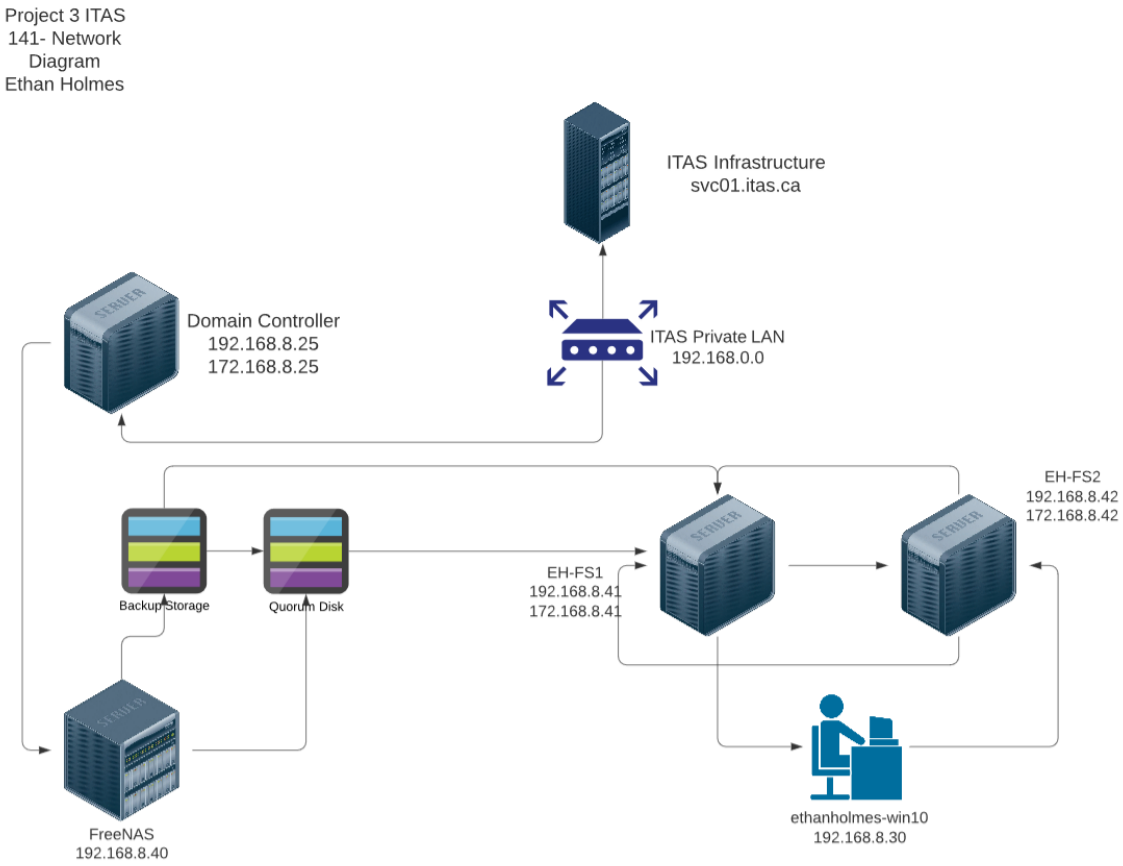
We have now completed the mapping of our FileShare.

Summary

Having previously worked with the Failover Cluster Manager, I found that this project was easy to do. Especially as FreeNAS was an incredibly easy and powerful product to use, which for me was the highlight of this project.

YouTube Link/Network Diagram

https://youtu.be/cXbvSyPhdBk


Project 3 ITAS
141- Network
Diagram
Ethan Holmes
ITAS Infrastructure
svc01.itas.ca
Domain Controller
192.168.8.25
172.168.8.25
ITAS Private LAN
192.168.0.0
EH-FS2
192.168.8.42
172.168.8.42
Backup Storage
Quorum Disk
EH-FS1
192.168.8.41
172.168.8.41
FreeNAS
192.168.8.40
ethanholmes-win10
192.168.8.30