

ITAS 233 Project 03

FreeNAS Failover Clustering

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Submitted on

11/26/2019

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Introduction

FreeNAS failover clustering project is basically creating a failover clustering using the FreeNAS Operating System. FreeNAS is an operating system that can be installed on virtually on any hardware platform to share data over the internet. FreeNAS is the simplest way to create a centralized and easily accessible place for your data. Failover clustering is a windows feature which enables you to group multiple servers into a fault-tolerant cluster and provides you new and improved features for software-defined datacentre. It is important to make the iSCSI before creating the failover cluster in the windows.

Responsibility

The Project is completed as an individual project. Basically, we install, configure and produce FreeNAS ,iSCSI and failover clustering. We install FreeNAS on the Esxi server and configure the iSCSI and failover clustering using the windows server . We will be also installing roles for the failover clustering in one of the windows server clients and assigning a quorum disk for one of the drives in the iSCSI server.

PART 1: Installation of the FreeNAS

On the part one, we will be installing and configuring the FreeNAS and assigning an IP address for the FreeNAS on one of the network interfaces. Moreover, we be also making a dataset and Zvol from the hard disk that we have installed on the iSCSI server. We will be also accessing from one of the domain connected windows server clients to get the web-interface of the windows server.

Setting up the FreeNAS Server

- Install two Windows server 2016 clients on the esxi.
NOTE: make sure you are domain connected and two nic that are added to FreeNAS should be connected on both clients.
Client 1: 192.168.0.31/24 , 192.168.1.31/24,192.168.2.31/24,192.168.3.31.24
Client 2: 192.168.0.32/24 , 192.168.1.32/24,192.168.2.32/24,192.168.3.32/24
- Install FreeNAS as one of the VM.
 IPADDRESS : 192.168.0.30/24 , 192.168.1.30/24
- In that server make sure you have the 2 Nic are added to the FreeNAS.
- Both the **Virtual Switch Nic** should be add to as external network drive .
One external nic 192.168.0.0 – Port is external
One Internet Access – Port is external connected to the VM network

Installation of the FreeNAS Server

Step1:Download the **FreeNAS** iso from the link and upload the file into the datastorage:

<https://download.freenas.org/11.2/STABLE/U6/x64/FreeNAS-11.2-U6.iso>

Step 2: Add new virtual machine in the vmware esxi, as shown on the **figure 1**.

Under the Guest OS family, Choose **others**,

Under the guest OS version tab, choose FreeBSD 11(64-bit).



Figure 1: Adding a FreeNAS Operating System

Step 2: Add three 10 GB storage hard disk which are thin provision.

Step 3:Add a network adapter which is not only connected to the 192.168.0 but also to the 192.168.1 network.

Step 4: Make sure you have selected the iso file of the FreeNAS server on the installation.

Step 5: Start the FreeNAS VM.

Step 6: Select install/Upgrade

Step 7: Choose the drive that need to be installed using the **spacebar** and **hit ok**.

Step 8: Type the **root** password.

Step 9: Wait for the FreeNAS operating system need to be installed.

Step 10: Wait for the pc to reboot.

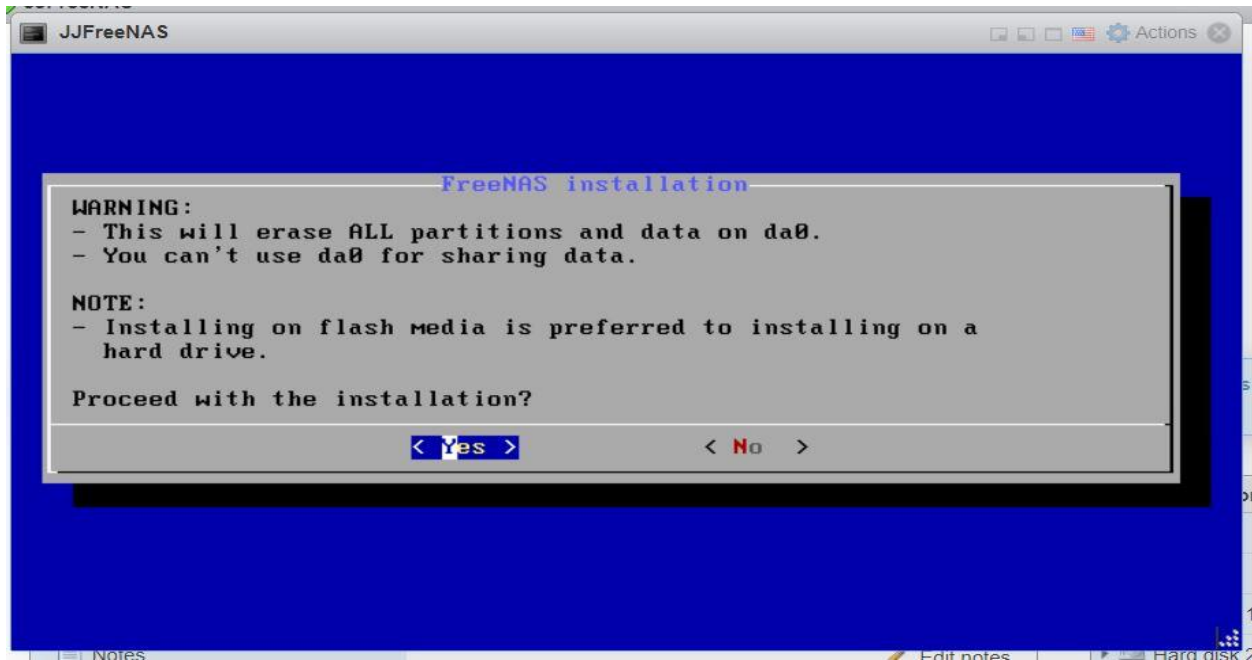


Figure 2: Installation of the freeNAS

Setting static ip address of the FreeNAS Server

Step 1: under the FreeNAS console, type the option 1 to configure the interface.

Step 2: choose the interface that needed to assign a static ip address .

Step 3: Type **n** twice to skip removing current settings and remove DHCP configuration from the FreeNAS.

Step 5: Type **y** to set an ipv4 address and press **enter** when it asks to type the interface

Step 6: type the IP address and subnet mask from the following options and press **enter**.

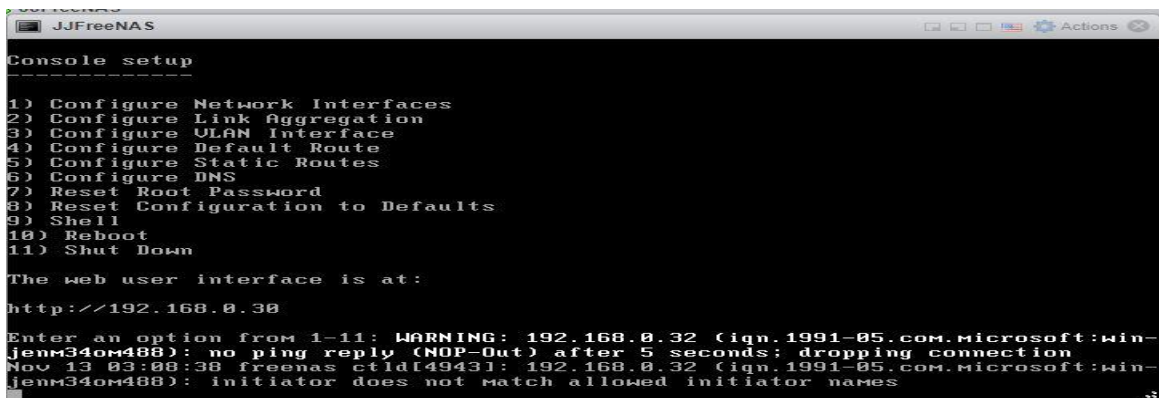


Figure 3: Centos boot up screen

Accessing the web interface of the FreeNAS

Step 1: Type the IP address of the FreeNAS on the web browser.

Note: Make sure that the client is connected to the same network adapter where the FreeNAS is connected.

Step 2: login into the FreeNAS and password given on the installation.

Setting a storage pool on the FreeNAS

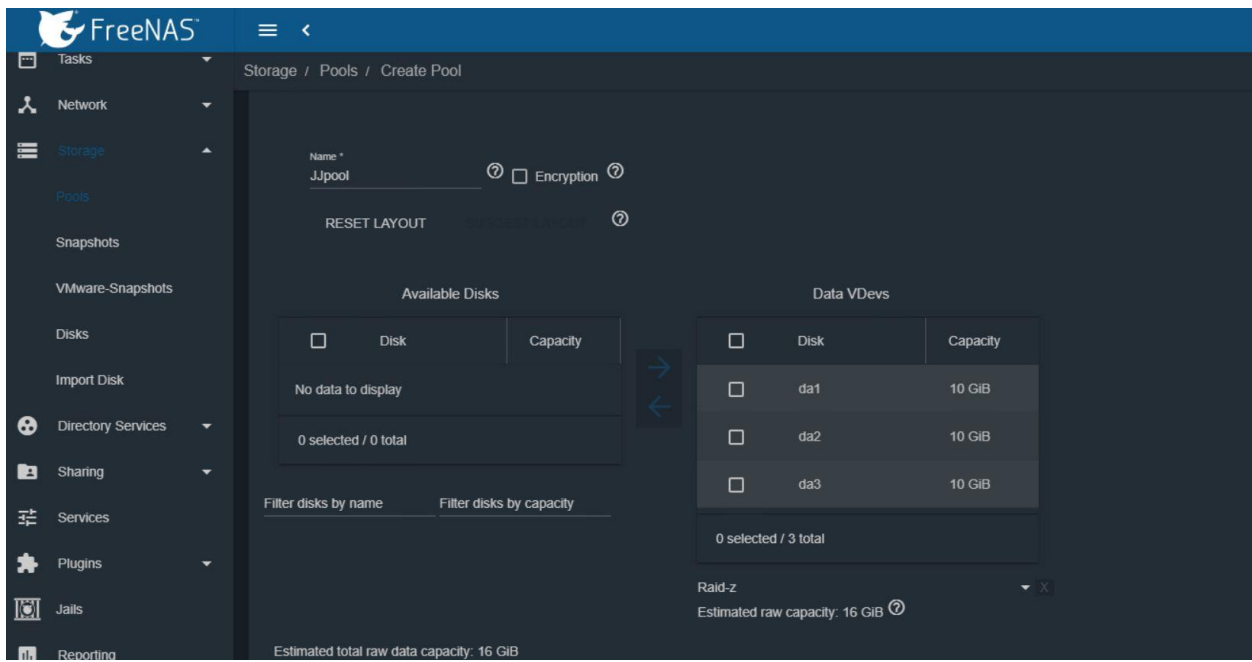


Figure 4: Creating a dataset on the FreeNAS

Step 1: Login into the web interface in the FreeNAS .

Step 2: Under to the storage tab in the web interface, Select **pools**.

Step 3: Under the pool tab, Click on **ADD**.

Step 4: After adding the pool tab, choose **Raid-z** in which type of the disk that need to be formatted.

Step 5: Click on the **Create** button.

Creating a Zvol from the storage pools

Step 1: Go to the pool tab option from the **left-hand** menu under the **storage**.

Step 2: Click on the menu option which has 3 dots on the **data set**.

Step 3: Choose **add Zvol**.

Step 4: Type the **name** of the Zvol as well as the amount of the zdisk volume that you require for the Zvol.

Note: you have to create 2 Zvol with **10 GB** and **2 Gb** for the quorum disk and shared volume for this project.

Step 5: Click on the **save** button after creation of the z volume.

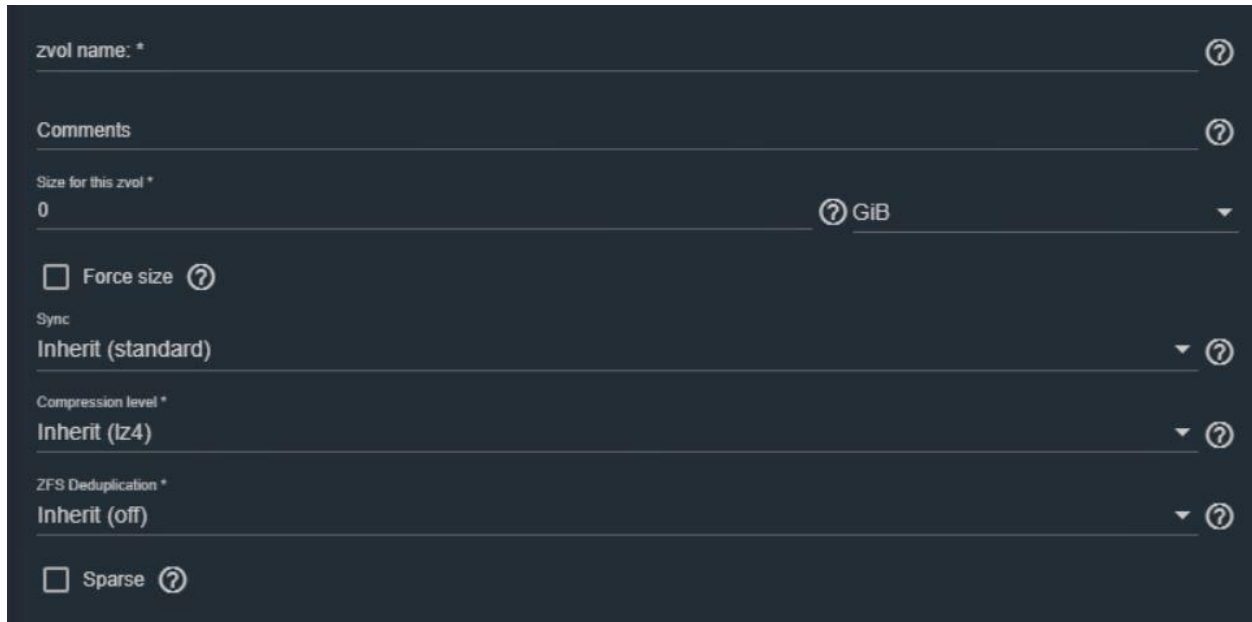


Figure 5: The Zvol manager

PART 2 : Creation of the iSCSI target and initiator

Create a iSCSI target on the FreeNAS

Name	Running	Start Automatically	Actions
AFP	<input type="checkbox"/>	<input type="checkbox"/>	
Domain Controller	<input type="checkbox"/>	<input type="checkbox"/>	
Dynamic DNS	<input type="checkbox"/>	<input type="checkbox"/>	
FTP	<input type="checkbox"/>	<input type="checkbox"/>	
iSCSI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
LLDP	<input type="checkbox"/>	<input type="checkbox"/>	
netdata	<input type="checkbox"/>	<input type="checkbox"/>	
NFS	<input type="checkbox"/>	<input type="checkbox"/>	

Figure 6:Enabling service to the iSCSI

Step 1: Enable the iSCSI service from the **left-menu** from the service tab.

Step 2:Go to the **sharing tab**, Choose **Block(iSCSI)** from the sharing tab.

Step 3: From the **right-hand** side, Click on the **Portals tab**, Choose **ADD** option form there.

Step 4: From the screen that appeared from the **ADD** option.

Step 5: Select the IP address in which your iSCSI FreeNAS target should listen.

Step 6: Comment out the IP address if you prefer. It is not important to comment the IP address,

Step 7: Under the **initiators** tab, type the name of the initiators separated by the spaces.

Note: you can get the initiator name from the configuration screen of the clients from the iSCSI initiator service on the clients.

Step 8: Under the **target** tab, type the name of the target name and target alias .

Step 9: Choose the portal id and initiators id as same as you have created before.

Step 10: Click in the save button after you have created the target.

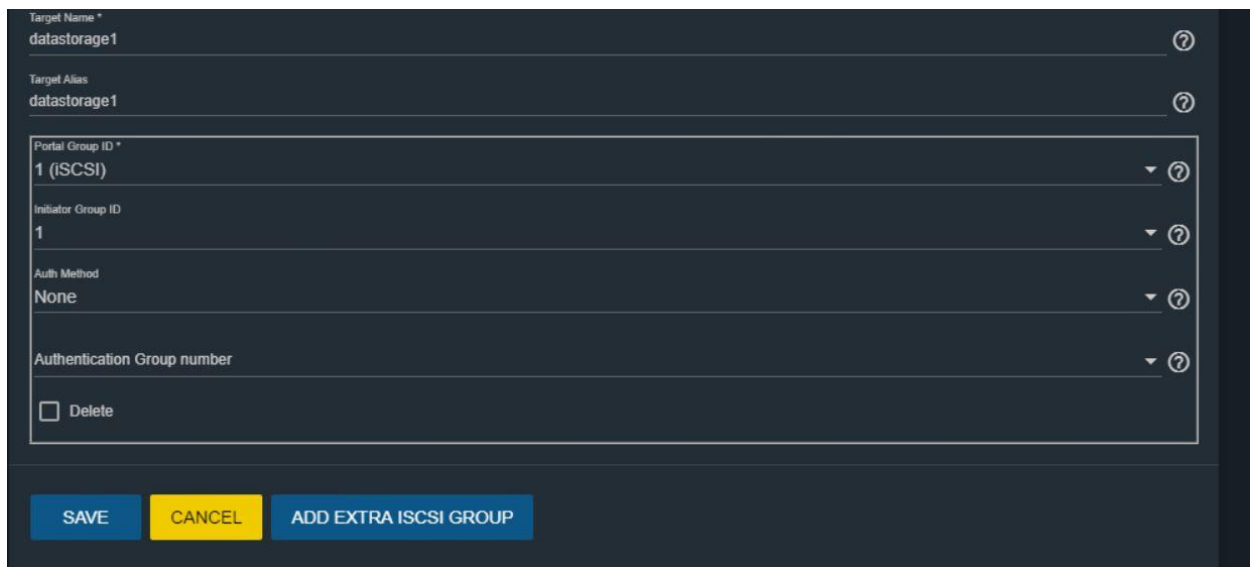
The screenshot shows the 'Target Name' configuration window in FreeNAS. It has a dark theme. At the top, 'Target Name' is set to 'datastorage1'. Below it, 'Target Alias' is also 'datastorage1'. The 'Portal Group ID' is set to '1 (iSCSI)'. The 'Initiator Group ID' is set to '1'. The 'Auth Method' is set to 'None'. There is an 'Authentication Group number' field which is empty. At the bottom left, there is a checkbox labeled 'Delete' which is unchecked. At the bottom, there are three buttons: 'SAVE' (blue), 'CANCEL' (yellow), and 'ADD EXTRA ISCSI GROUP' (blue). Each input field has a question mark icon to its right for help.

Figure 7: The target menu of the FreeNAS

Adding the data storage into the extent.

Step 11: Under the extent tab, Click on the add button.

Step 12: Type **datastorage1**(any name you prefer) in the extent name tag .

Step 13: Choose **Device** on the **Extend type option**.

Step 14: On the device tab, select the **Zvol** that you wanted to share using the iSCSI.

Step 15: On the logical block size, choose 512 which is an default logical block size.

Step 16: Type 5 under the threshold space tab.

Note: This gives a remainder, when the free space is only 5 percent left on the iSCSI hard drive.

Step 17: You could use the comment tab if you prefer.

Step 18: Click on the save button.

The screenshot shows the 'Extend' configuration page for 'datastorage1'. The fields are as follows:

- Extent name ***: datastorage1
- Extent type**: Device
- Device ***: jipool/Zvol2 (10.0G)
- Serial**: 000c295c3da600
- Logical block size**: 512
- ☐ **Disable physical block size reporting**
- Available space threshold (%)**: 5
- Comment**
- ☒ **Enable TPC**
- ☐ **Xen initiator compat mode**
- LUN RPM**: SSD
- ☐ **Read-only**

At the bottom, there are 'SAVE' and 'CANCEL' buttons.

Figure 8: Extend of the data storage

Note: you must add two extend for both Zvol for the extend.

Creation of the associated Targets

Step 1: Click on the **add** option under the **associated tab**.

The screenshot shows the 'Target' configuration page. The fields are as follows:

- Target ***: datastorage1
- LUN ID ***: 0
- Extent ***: datastorage1

At the bottom, there are 'SAVE' and 'CANCEL' buttons.

Step 2: On the target tag, type the name of the target

Step 3: On the extend, Choose the data storage that you have created.

Step 4: Add one more the associated tab with the same target and with the different extend data storage.

Step 5: This add two extend data storage to the same target.

Setting iSCSI initiator on the cluster node

Step 1: Sign into the cluster windows server 1 as an **Administrator**.

Step 2: Click tools, **iSCSI Initiator**,

Step 3: Type the IP address of the FreeNAS server on the target options, for me : **192.168.0.30**

Step 4: Under the **Volumes and Devices** tab, click **Auto-configure** to automatically connect all the available devices

Step 5: Click **OK**, when finished/

Step 6: Do the above steps after switching to the windows server cluster 2.

Step 7: Switch to the windows server cluster1, go to the **disk** from the **file and storage services**/

Step 8: Make both the iSCSI disk online .

Step 9: Create a new volume with a volume label with **cluster1** and **cluster2**. Choose a letter for the drive

Step 10: Close when done.

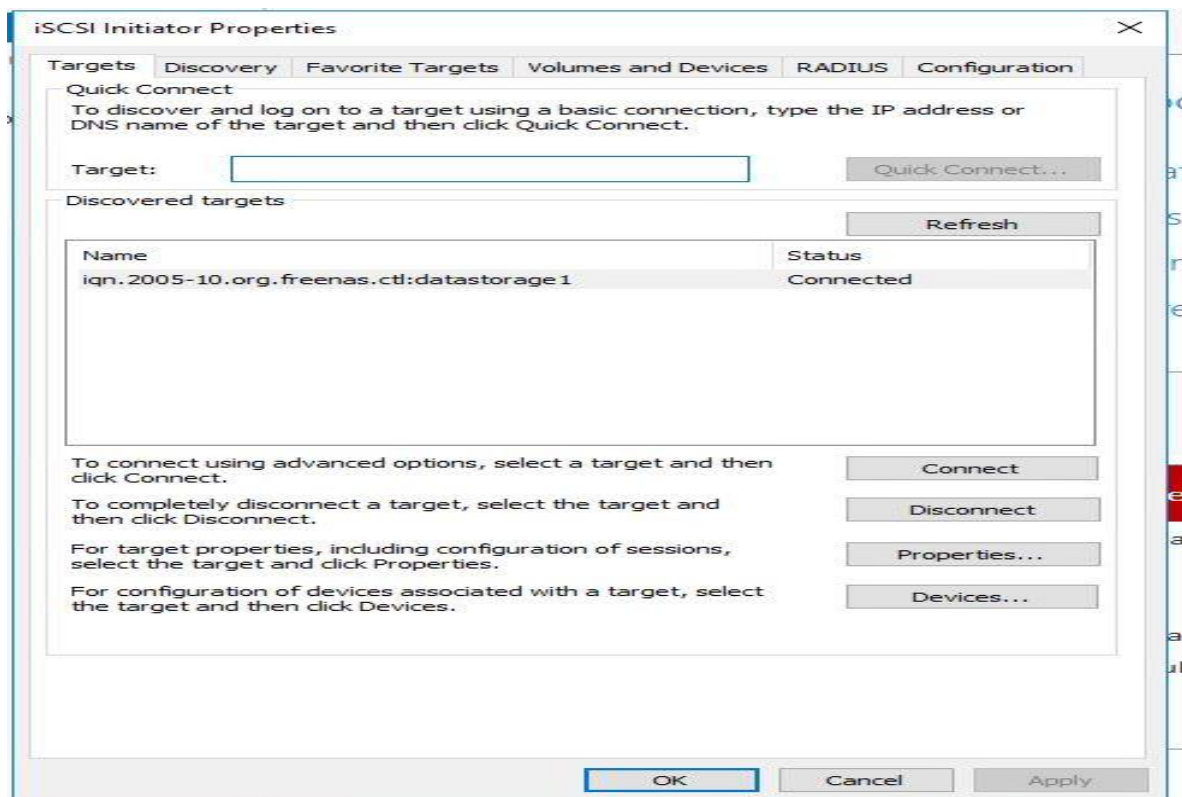


Figure 9: Setting a iscsi initiator on the windows cluster

Installing the failover Clustering Feature and Validating a cluster configuration

Step 1: Sign into the windows server cluster 1,

Step 2: Open the PowerShell, install the failover cluster using the command **Install-windowsFeature Failover-Clustering -IncludesManagmentTools**

Step 3: install the same features on the other cluster server without the management tools in the commands

Step 4: Go to the **tools**, choose the **Failover cluster Manager** from the menu.

Step 5: Click on the **validate configuration** from the **Action pane** .

Step 6: On the validate configuration windows appears, click **Next**.

Step 7: In the select servers or cluster options, **type the name of both the windows cluster server**. The name should be like the **DNS** entries ,

Step 8: In the testing options, choose all the **run all tests**.

Step 9: under the confirmation screen, click **Next**.

Step 10: After the confirmation, try to solve all the **errors and read all the warnings** .

Step 11: It is important to solve all the errors before continuing too the next step.

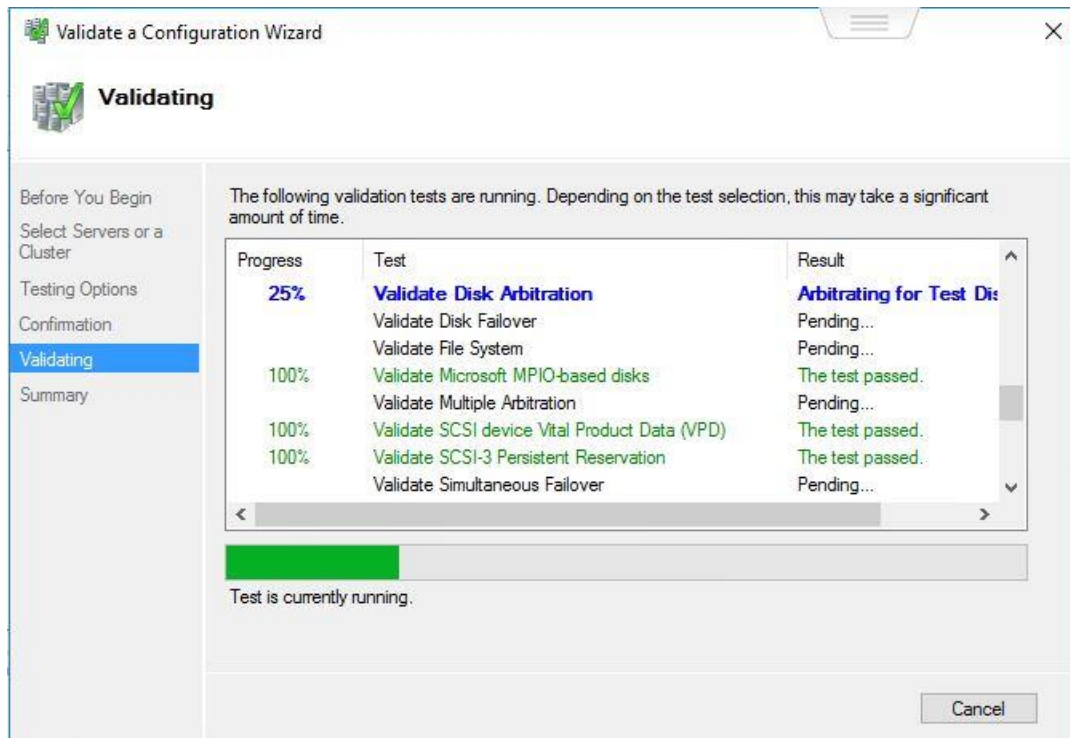


Figure 10: Validating the server cluster

Creating a Failover Cluster

Step 1: Sign into the server cluster management server as an Administrator

Step 2: Open the failover cluster manager, click **create cluster**.

Step 3: Click next, type the name of **cluster servers** that you need to add, in my situation. I will add jjnasserver1 and jjnasserver2. **Using the add option**, Click **next**.

Step 4: Type a name for the failover cluster server, put an IP address on that subnet such as 192.168.0.100.

Step 5: Choose the quorum witness disk when you make the server, Click **Next**.

Step 6: Read the confirmation screen and make sure all the details are right.

Step 7: Click **create**, This create a failover cluster node for the cluster computer that you have created.

Step 8: You will notice new entries in the DNS after the creation of the failover cluster.

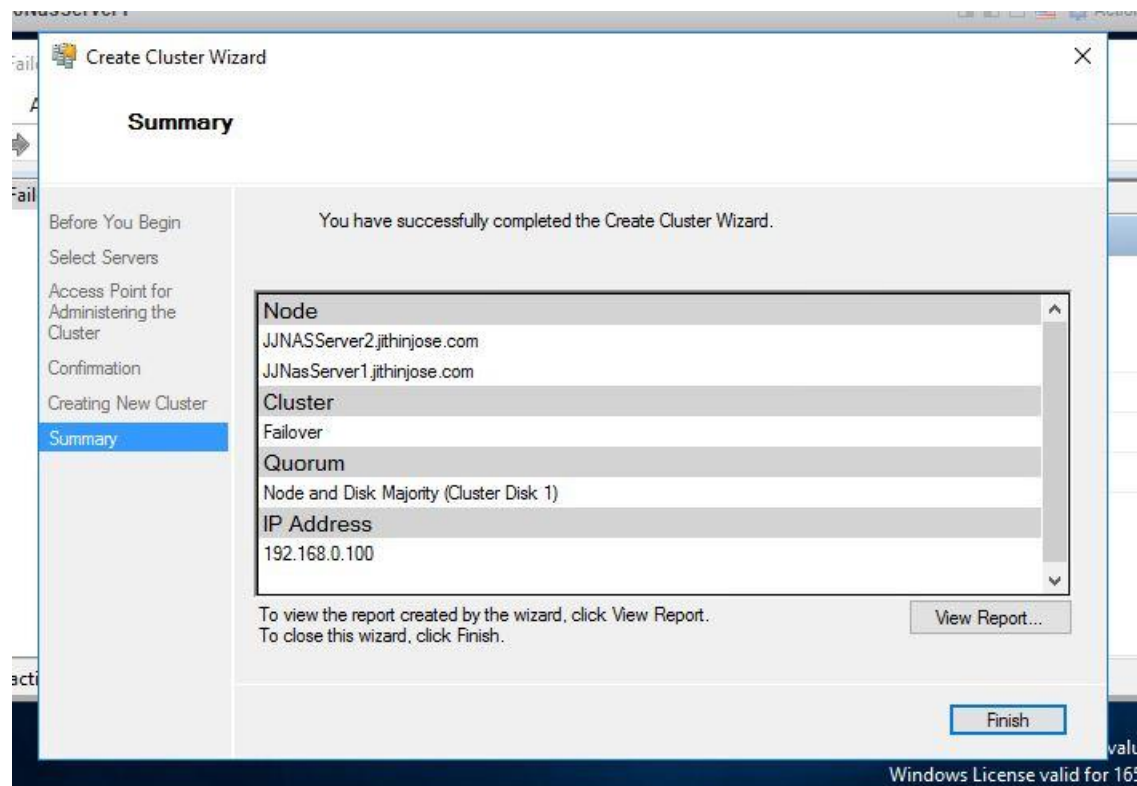


Figure 11: Configuring two cluster in the failover cluster

Creating a File Server Failover Cluster

Step 1: Install File Server on two windows cluster using this PowerShell command. **Install-WindowsFeature FS-FileServer**

Step 2: Switch to the server and where cluster management tools is installed and open the failover cluster manager.

Step 3: Right click on the **roles**, click on the configure role to start the high availability wizard.

Step 4: Click **File Server** and on next window, click **file server for general use** selected, click **Next**.

Step 5: Type failoverFS , click here to type an IP address as 192.168.0.101, click **Next**.

Step 6: Choose the **cluster disk 2** and click next for the confirmation screen.

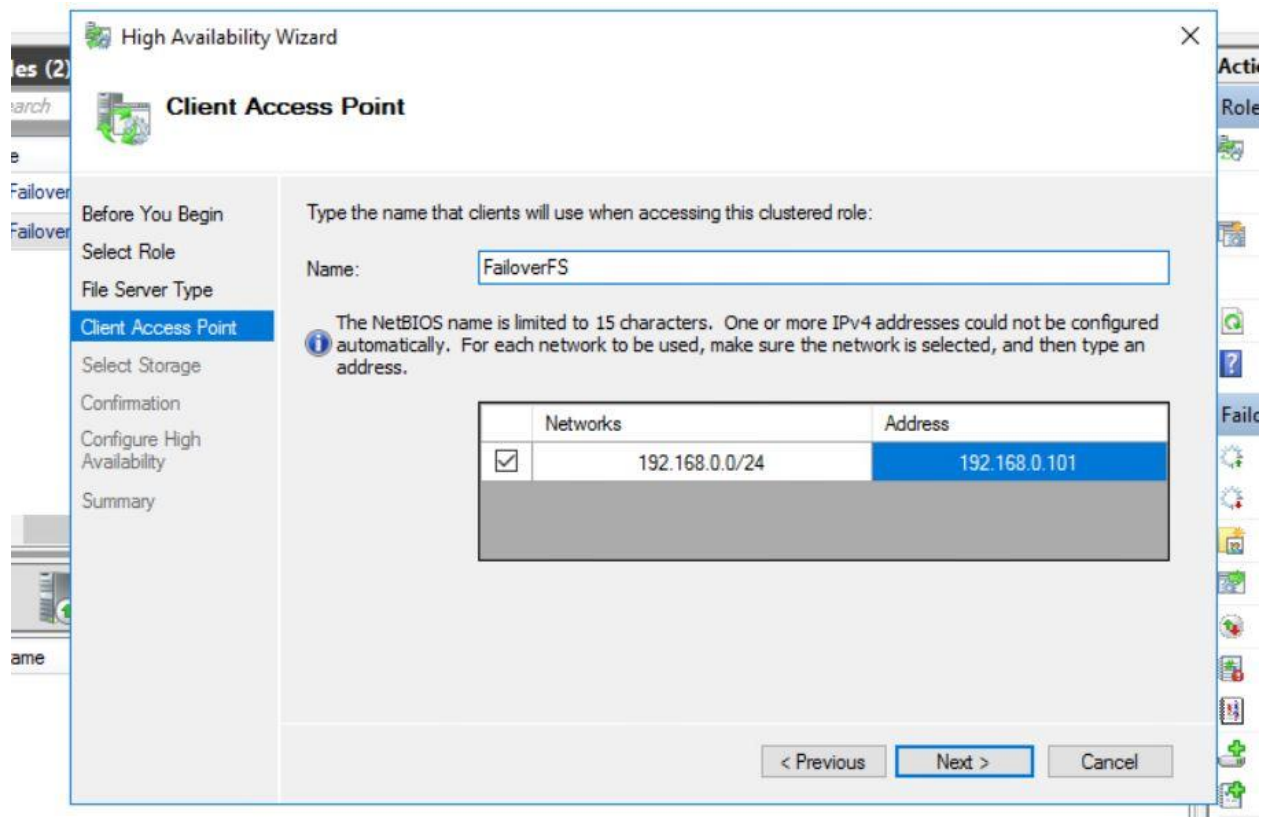


Figure 12: Creation of the failover FS

Sharing a file on the failover cluster and creating a GPO

Step 1: Right click on the failover cluster under the role, click on the file share

Step 2: In order to make the GPO, go to the domain controller server.

Step 3: Go to **Active directory users and computers**, make a new organizational unit from the servers.

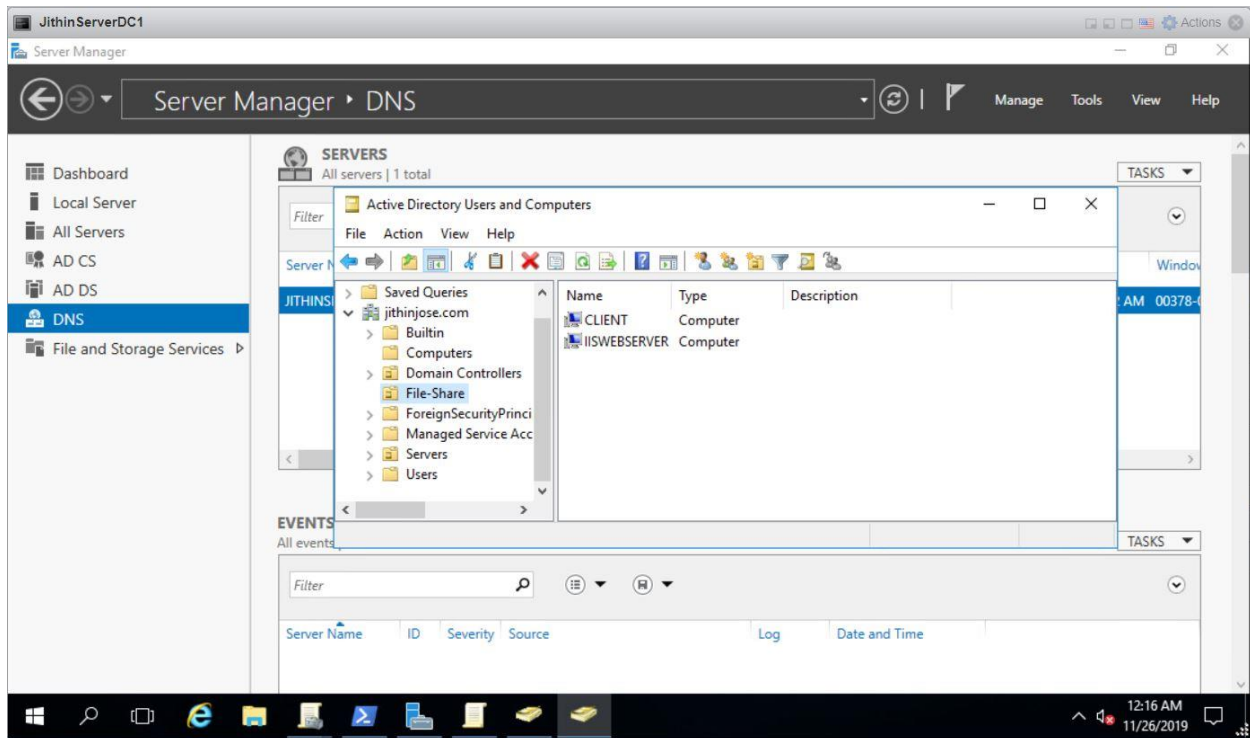


Figure 13: Creation of the organization unit for the clients

Step 4: Under the group policy management form the **tools** in the server manager.

Step 5: Right click on your domain from OU in which you need to map the network drive.

Step 6: Give a meaning full name for the GPO.

Step 7: Right-click on the newly created GPO and choose to edit.

Step 8: Go to the following location.

Use **Configuration → preference → Windows Settings → Drive Maps**.

Step 9: Right click on **Drive Maps** and then click **New → Mapped Drive**.

Step 10: Choose 'create' from the action drop down.

Note: Make sure you select **reconnect** option as **Run in logged-on user's security context** option from the common tab.

Step 11: Go the command prompt of the server in the Organizational unit and type **gpupdate /force**.

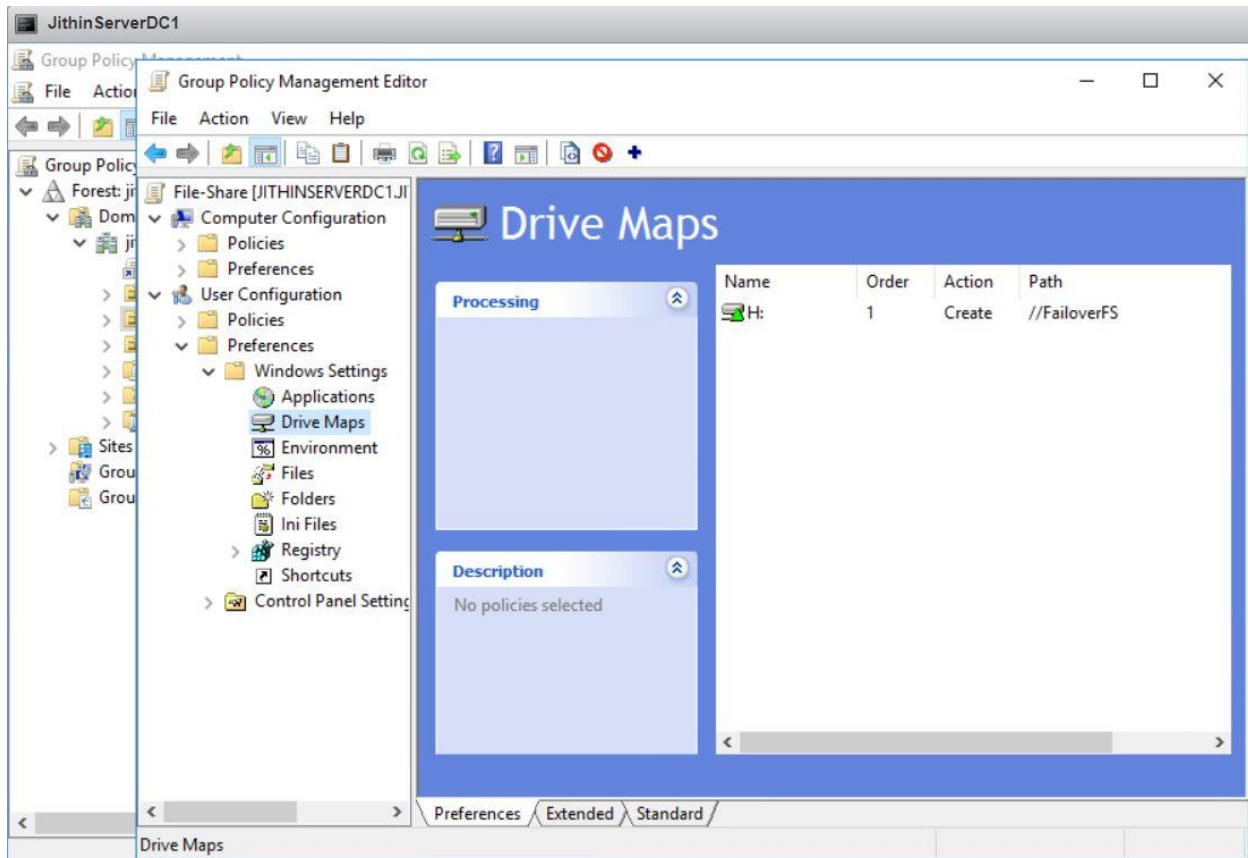


Figure 14: Mapping drive for the clients using the GPO

Creating a Redundant DHCP server on the Failover Cluster

Step 1: To create the DHCP of the failover cluster, you must create the Zvol on the FreeNAS.

Step 2: Go to the FreeNAS Web interface GUI on the free storage.

Step 3: Create a Zvol on the FreeNAS using the FreeNAS of the web interface use one of the above steps.

Step 4: Initialize and format the new Zvol disk using the Disk Management.

Step 5: Install DHCP server on the both cluster nodes.

Step 6: Go to the role manager, in the failover cluster manager

Step 6: In the select role window, click **DHCP Server**

Step 7: Choose the cluster storage named **cluster storage 3**.

Step 8: In the Client Access Point Window , type the name of the **FailoverDHCP** or any name that need to register

Step 9: Type the IP address of the subnet for the DHCP as 192.168.0.102.

Step 10: On the confirmation windows, check the solution for the errors that you find.

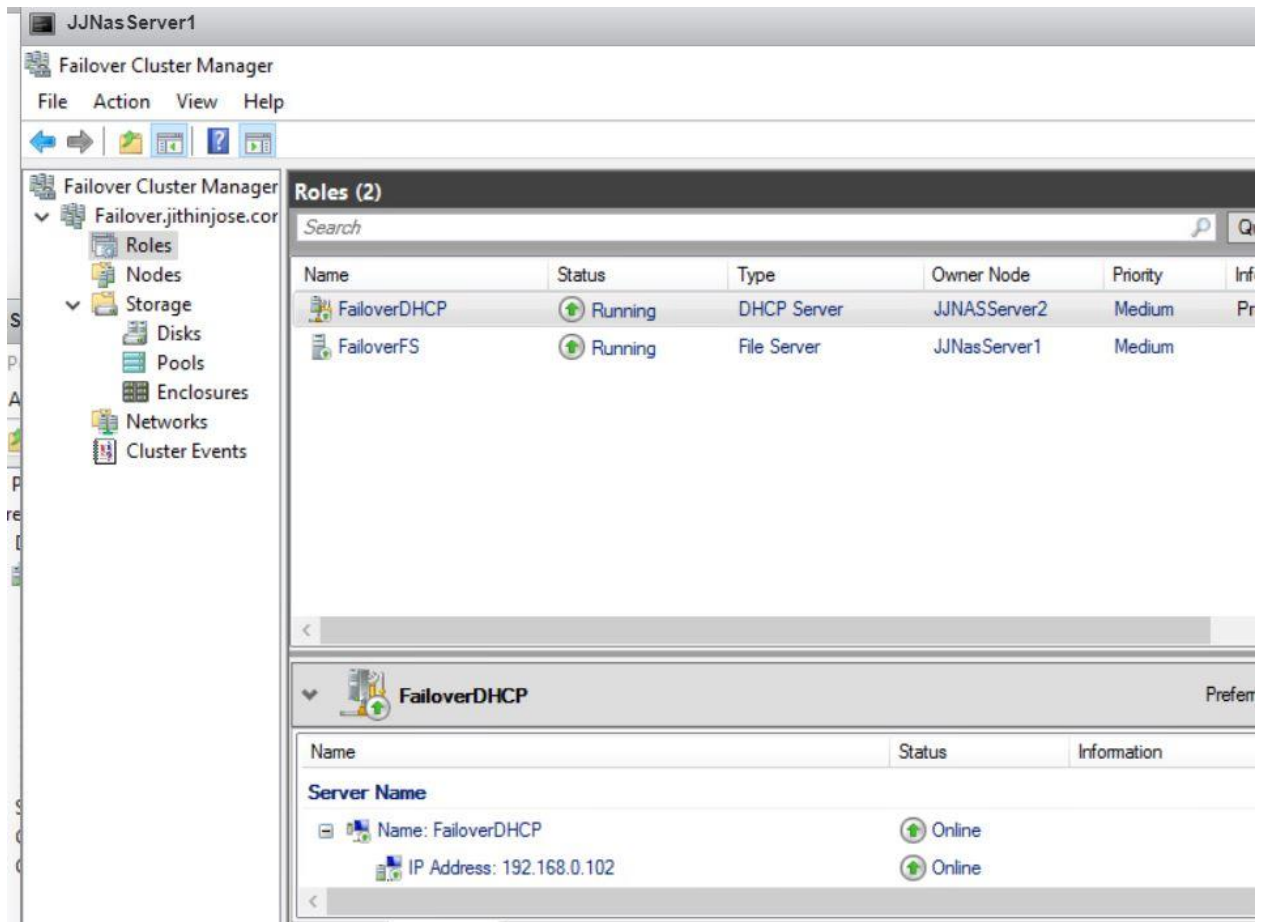


Figure 15: Creation of the failover cluster for the DHCP

Conclusion

The project was really a good aspect for learning a deep information about setting up the FreeNAS storage on the failover cluster node using the windows server. This project helped to figure out making different roles using the failover cluster manager such as Fileserver and DHCP. In this project, we made iSCSI target using the FreeNAS and iSCSI initiator are made on the windows server node. I also learned how to configure failover cluster manager using the iSCSI storage and installing different roles on the failover cluster manager.

All I enjoyed in the project was dealing with the several failures and errors in validating the failover cluster manager. It was so fun to figure out the solution for the errors occurred in the failover cluster manager. According to me, The failover cluster manager created by me is a redundant for the file server, DHCP between the two nodes and there is good redundancy between the network adapter.

Reference

“How to install FreeNAS [Accessed 6 October 2019]

<https://www.youtube.com/watch?v=QeKJ2dmJTcl> ”

“Setting up the static IP address on the FreeNAS [Accessed 10 October 2019]

<https://pureinfotech.com/set-static-ip-address-freenas/> ”

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“Installation, configuration of failover cluster manager

Greg Tomsho, 2018, MCSA Guide to Installation. Storage and Compute with Windows server 2016, Chapter 8 activities”

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<https://www.faqforge.com/windows/map-shared-folder-network-drive-using-group-policy/>

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