



# Windows Server 2019 Scale Out File Server Cluster using PetaSAN

Version 1.0



## Revision History

Date	Version	Description
15-7-2019	1.0	Initial version



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## 1. Purpose

The purpose of this guide is to show how to create a Windows 2019 Scale Out File Server Cluster using PetaSAN for its underlying scale-out storage.

## 2. Pre-requisites

This guide assumes the reader has followed the Quick Start guide and has deployed a working PetaSAN cluster. We will be using the same subnet assignments as given in the Quick Start example.

Additionally this guide requires:

- 2 x Windows Server 2019 named sofs-1 and sofs-2 with 3 physical interfaces.  
These will act as our 2 SOFS servers
- 1 x Windows Server 2019 named AD with 1 physical interface  
This will act as our Active Directory server. We will also use it for central cluster management of the SOFS nodes.

## 3- Why PetaSAN and SOFS ?

SOFS has become the most popular solution for storing data for applications such as Hyper-V and SQL Servers. PetaSAN is ideal for use as the underlying storage for SOFS due to the following:

- PetaSAN provides scale-out storage at the disk block level, whereas SOFS provides scale-out at the file system and file share levels.
- A single PetaSAN disk can serve as the main storage volume for SOFS, making administration much simpler. In PetaSAN, a single disk is served by all storage nodes in parallel.
- PetaSAN storage is symmetric allowing all SOFS servers to run in Direct IO mode, concurrently writing to the same shares, for details on Direct IO, please refer to <https://blogs.technet.microsoft.com/josebda/2013/10/30/automatic-smb-scale-out-rebalancing-in-windows-server-2012-r2/>
- PetaSAN uses cloud based technology which supports storage over-commitment, it is possible to create a very large flat disk whose initial size exceeds physical storage available and then add physical storage as needed.

## 4. Network setup

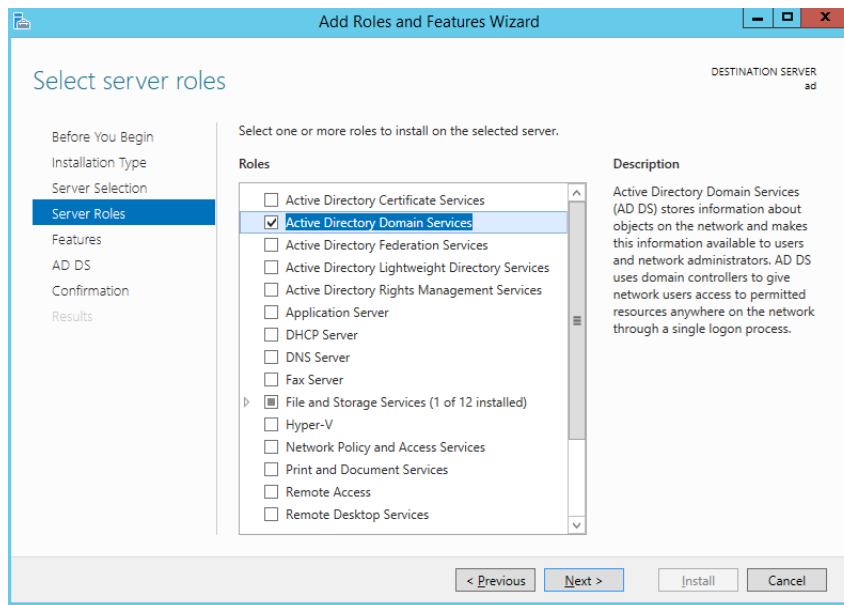
The Windows servers used in this guide are configured with the following IP addresses

	AD	sofs-1	sofs-2
Management	10.0.1.50	10.0.1.51	10.0.1.52
Gateway	10.0.1.1	10.0.1.1	10.0.1.1
iSCSI 1		10.0.2.51	10.0.2.52
iSCSI 2		10.0.3.51	10.0.3.52

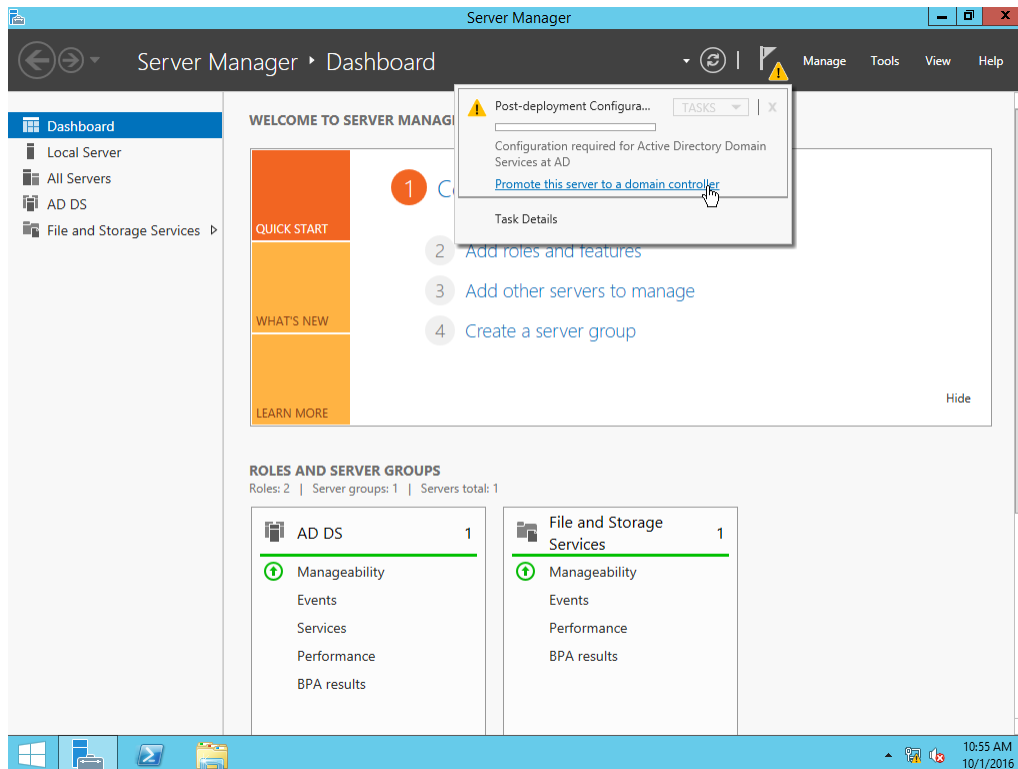
## 5. Active Directory Setup

### 5.1 Setup the AD Server

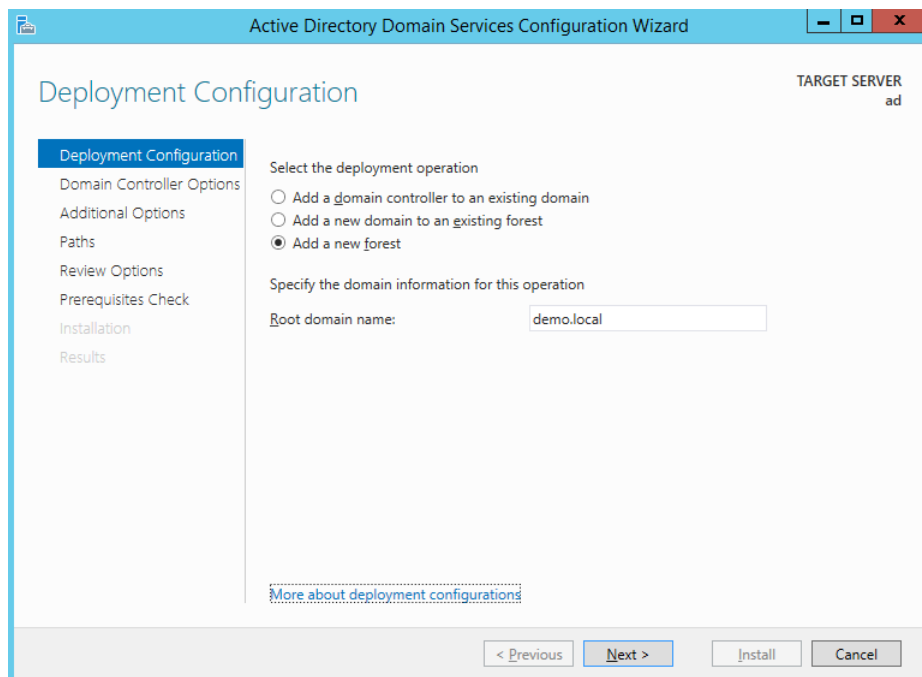
On the designated node for AD, add the role “Active Directory Domain Services” and reboot



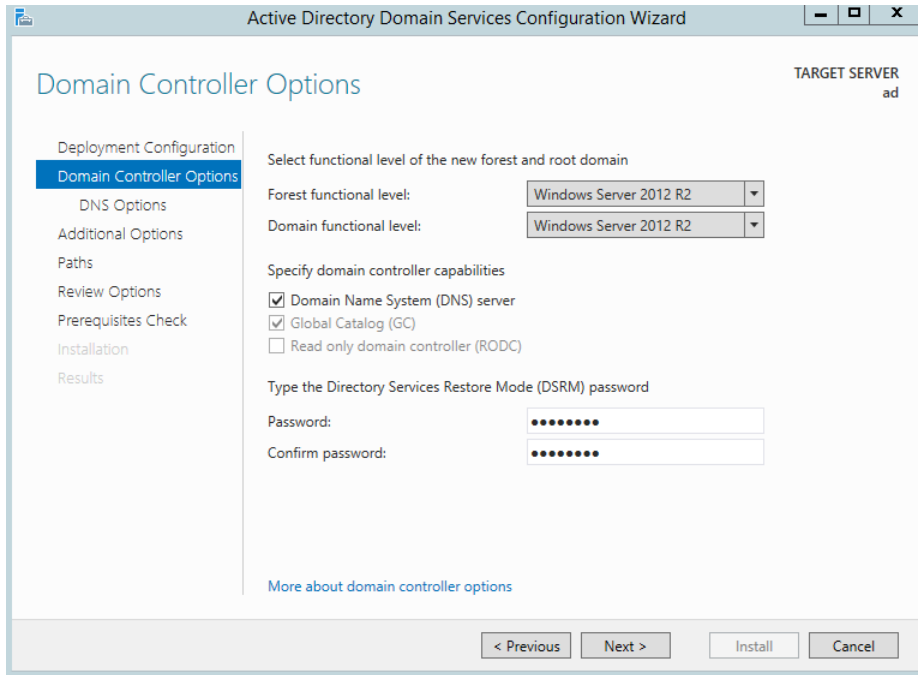
After reboot, select “Promote the server to a domain controller”



In the configuration wizard choose “Add a new forest” and enter the domain name “demo.local”



Enter the password



Active Directory Domain Services Configuration Wizard

Domain Controller Options

TARGET SERVER: ad

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Select functional level of the new forest and root domain

Forest functional level: Windows Server 2012 R2

Domain functional level: Windows Server 2012 R2

Specify domain controller capabilities

☒ Domain Name System (DNS) server

☒ Global Catalog (GC)

☐ Read only domain controller (RODC)

Type the Directory Services Restore Mode (DSRM) password

Password: .....

Confirm password: .....

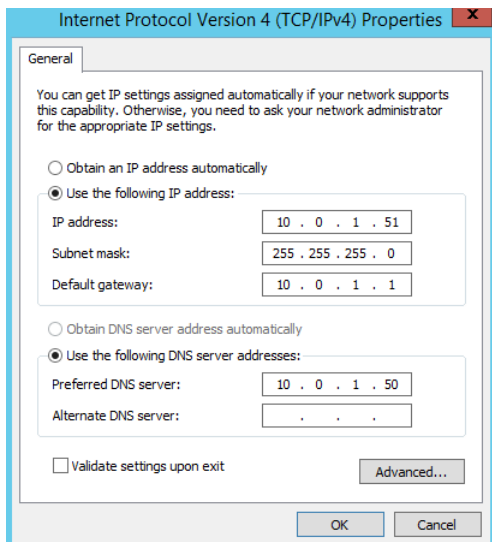
[More about domain controller options](#)

< Previous Next > Install Cancel

Reboot system when done.

## 5.2 Joining the AD Server

On both sofs-1 and sofs-2 nodes, edit the DNS setting to point to the AD server



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 10 . 0 . 1 . 51

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 10 . 0 . 1 . 1

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: 10 . 0 . 1 . 50

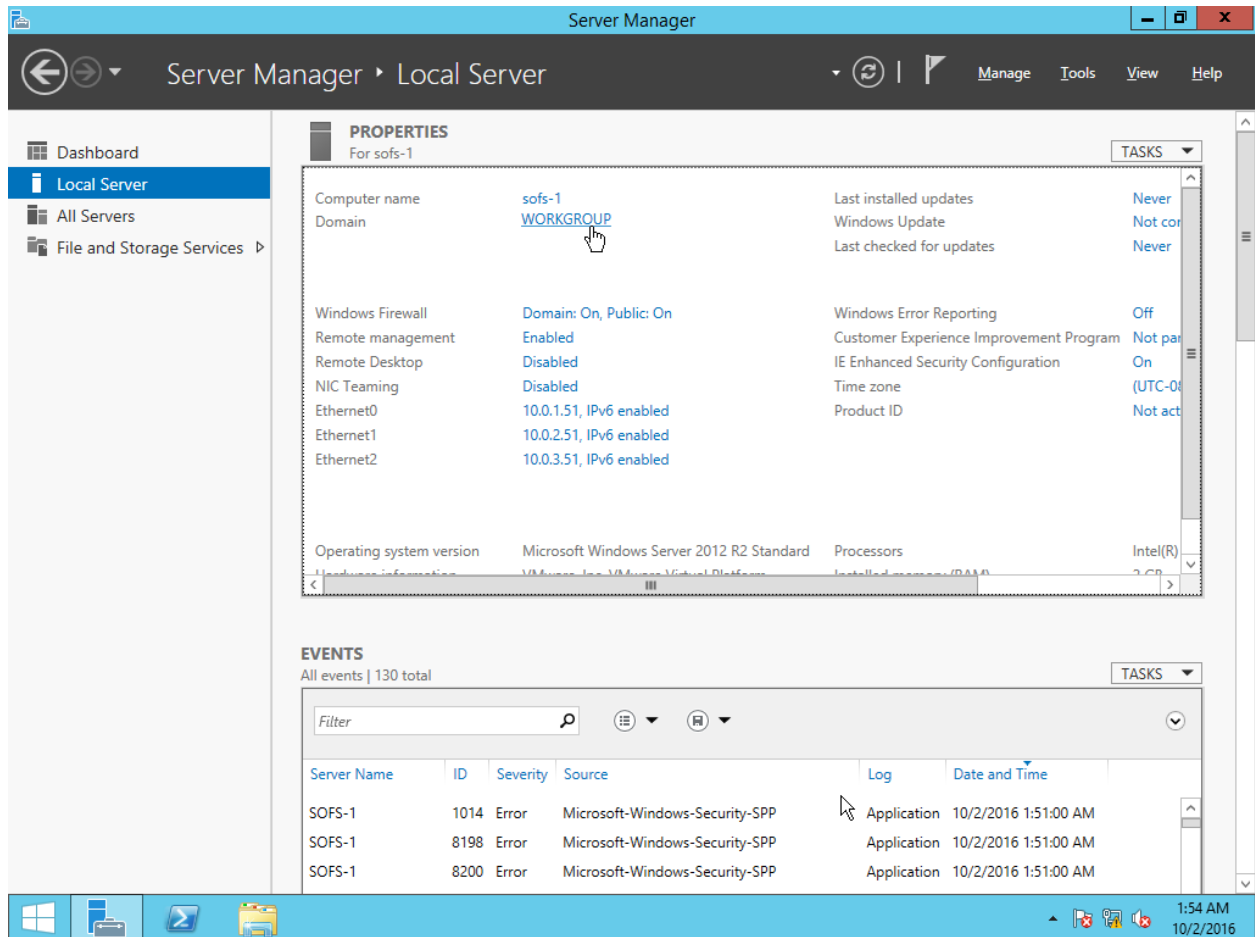
Alternate DNS server: . . .

☐ Validate settings upon exit

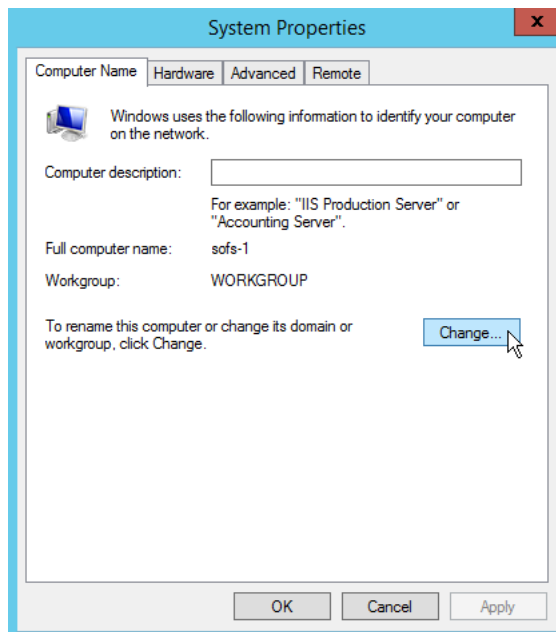
Advanced...

OK Cancel

Then in “Server Manager -> Local Server” click on “WORKGROUP” in the “Domain” field.

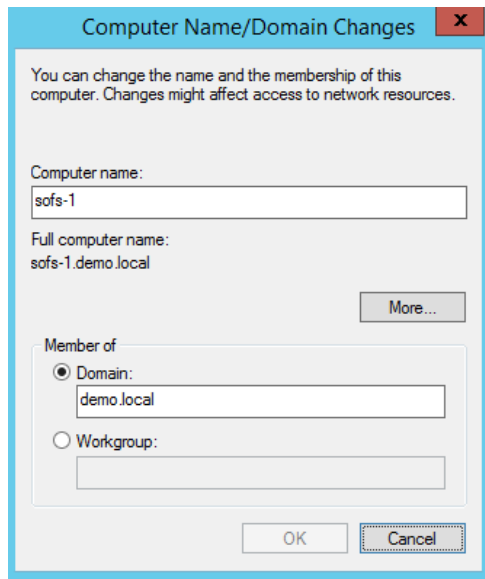


In “System Properties”, click “Change...”

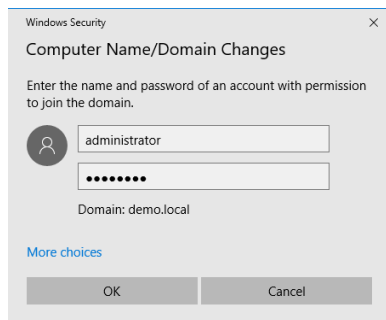




Enter “demo.local” in the domain field



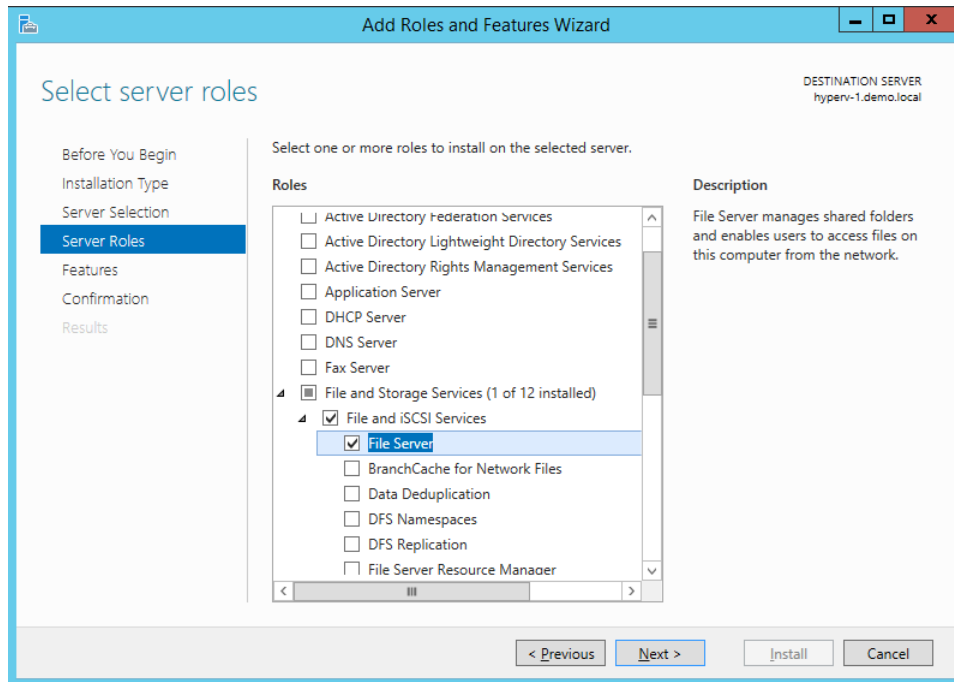
Enter the AD password



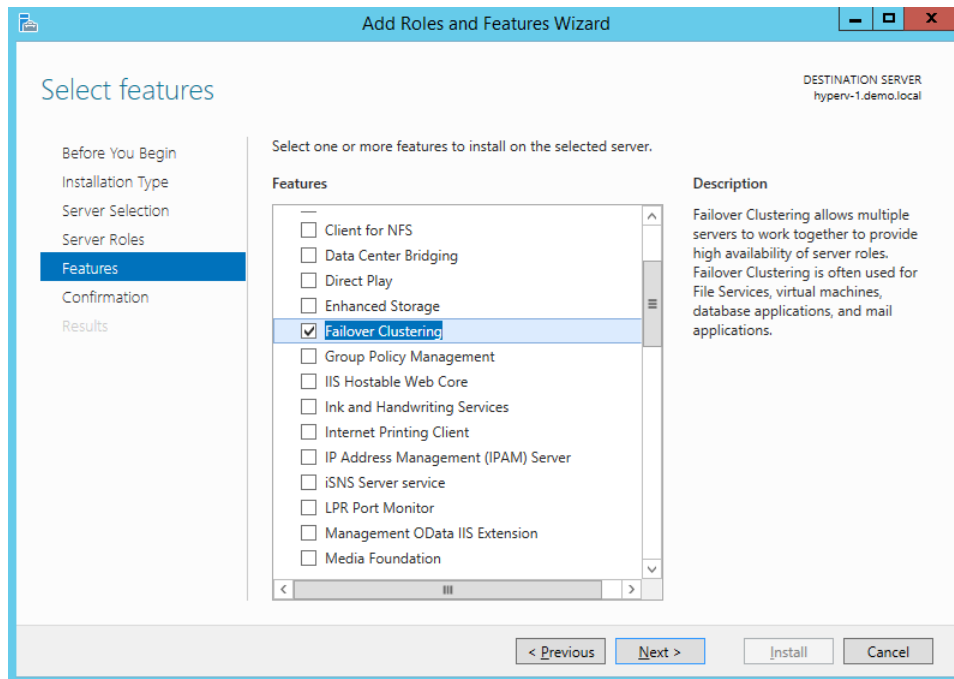
This should be all for joining the domain, please repeat the same steps for sofs-2.

## 6. Configuring node roles

On both sofs-1 and sofs-2 add the “File Server” Role.



On the AD server as well on sofs-1 and sofs-2 add the “Failover Clustering” feature.



Reboot each node when done.

## 7. Connecting the PetaSAN disks

We need to create 2 disks in PetaSAN:

1. Disk1: 100TB x 4 paths with CHAP authentication. This will serve as the main data store for the SOFS shares.
2. Disk2: 1G x 4 paths with CHAP authentication. This will serve as a quorum disk, this is used by Windows Clustered Shared Volumes (CSV) to control concurrent access to the first disk from multiple machines.

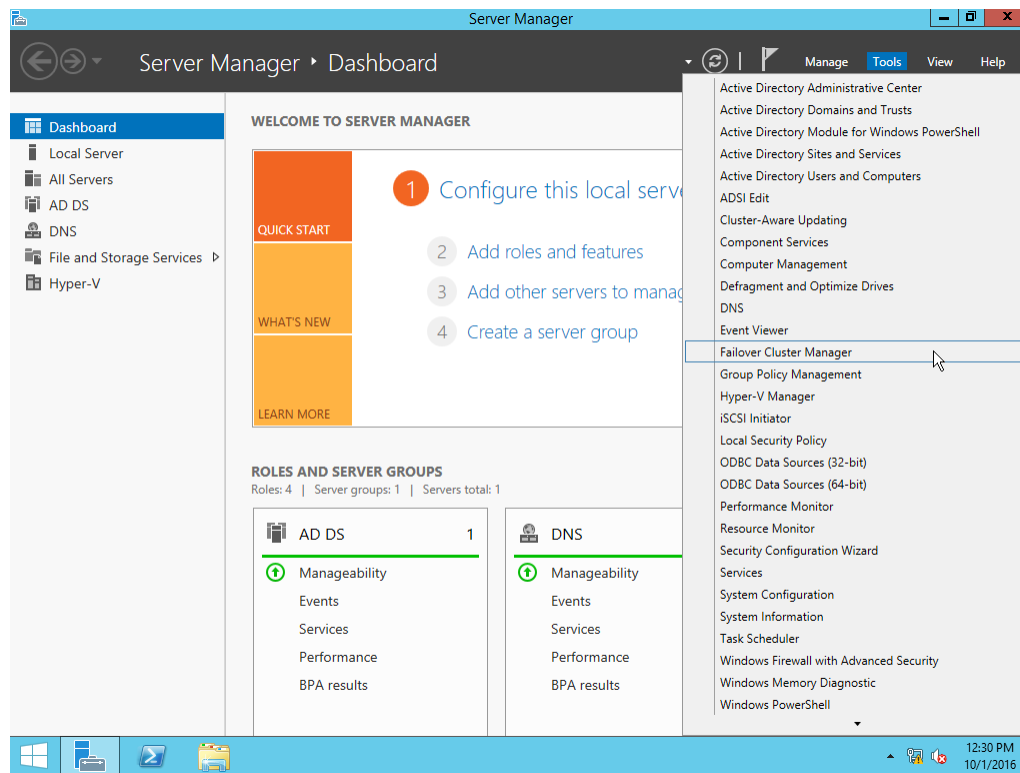
We need to connect to these 2 disks from both sofs-1 and sofs-2 servers. Please refer to *Connecting to PetaSAN from Windows 2019 using MPIO* guide for step by step instructions.

Note that initializing and formatting the disks should be done once from one node only, for example from sofs-1.

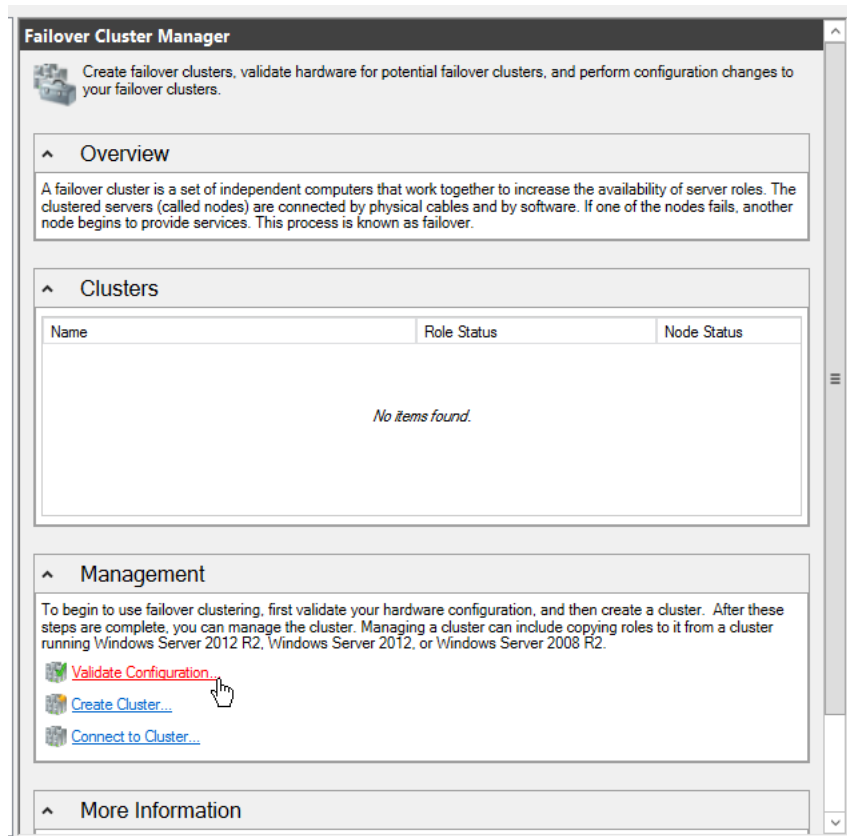
## 8. Validating the cluster

As discussed earlier, we selected to use our AD server as the machine we use for cluster management. Before we create our cluster, we should let Windows validate it first by running a couple of tests.

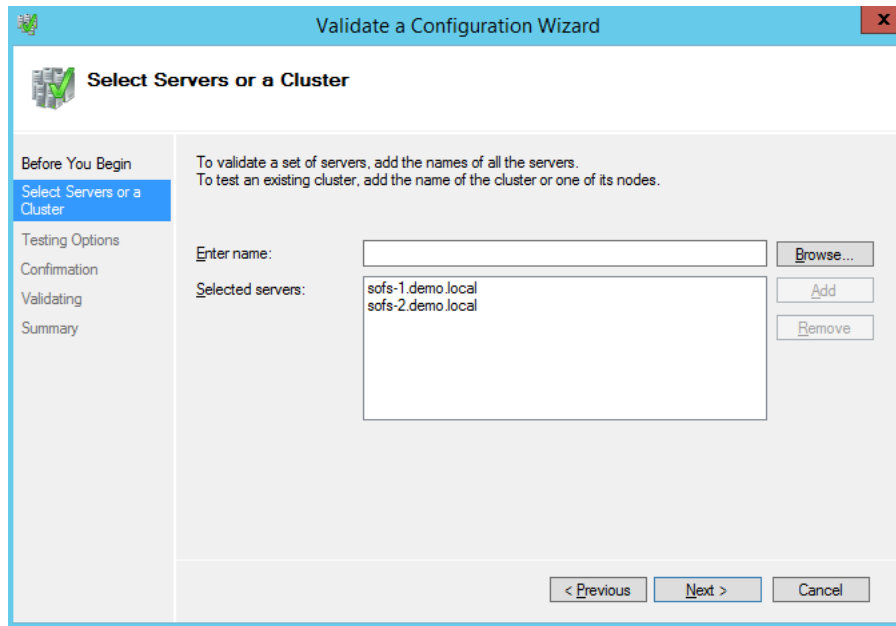
On the AD server open the “Failover Cluster Manager”



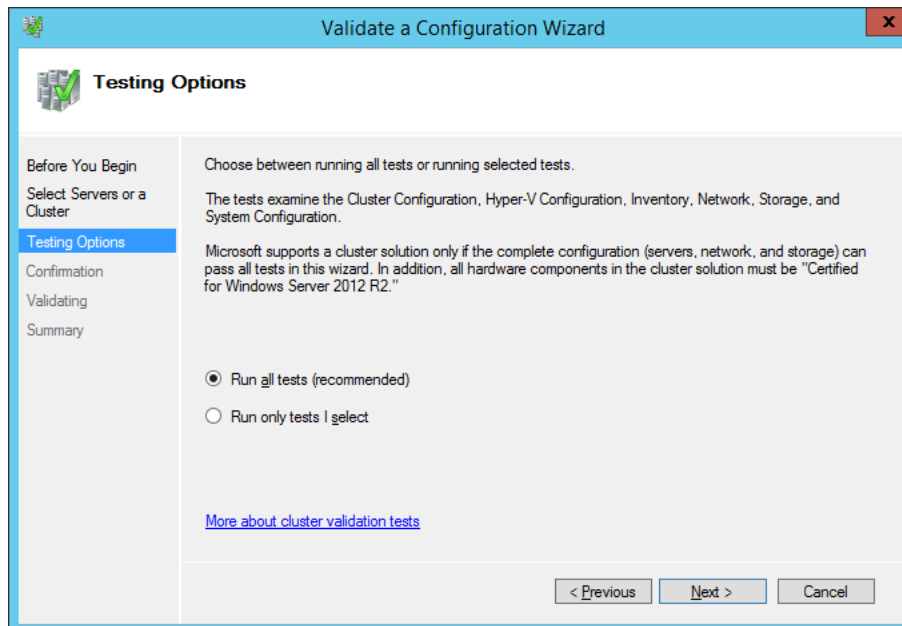
Next click on “Validate Configuration”



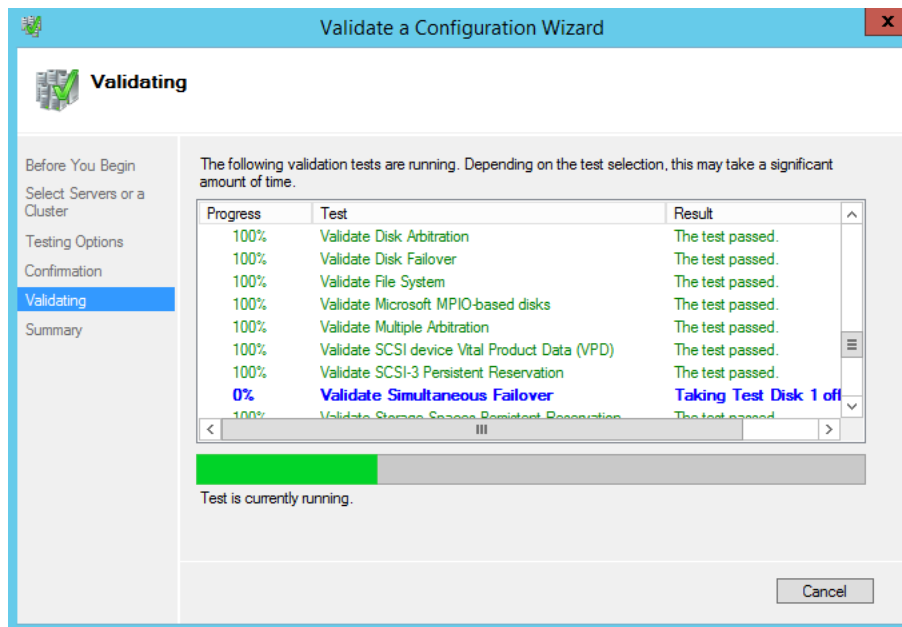
In the validation wizard, add both sofs-1 and sofs-2



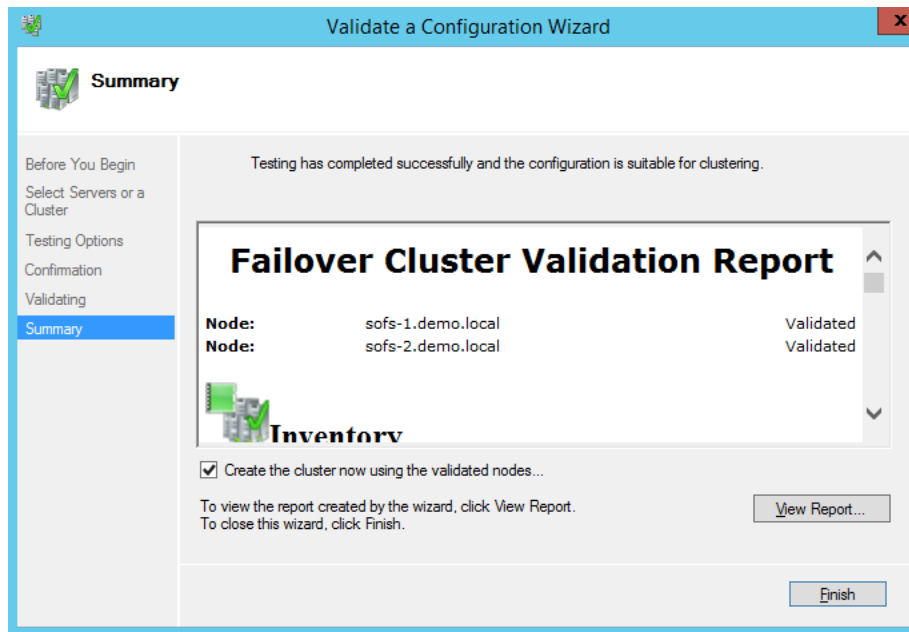
Next choose to run all tests



The wizard will take a couple of minutes to run various tests; these include many important storage failover and validation tests for our PetaSAN disks.



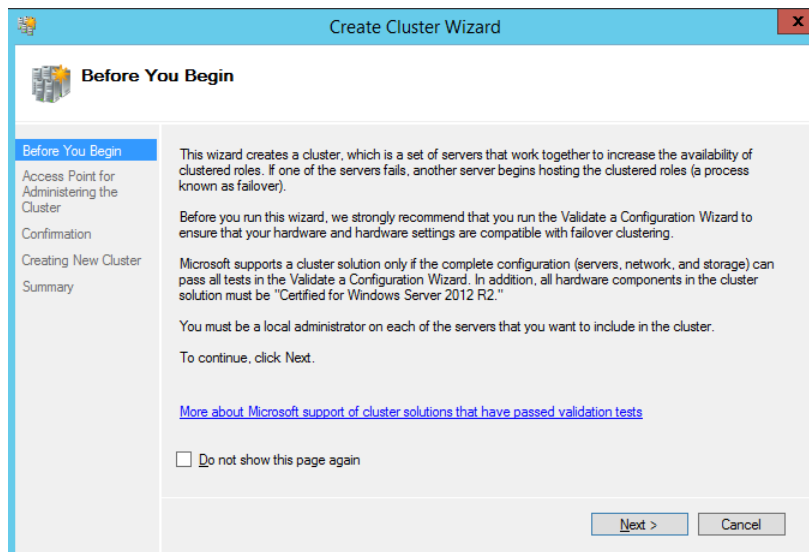
Once completed, the wizard displays a cluster validation report.



If all is good, leave the “Create the cluster now using the validated nodes” checked and click on the “Finish” button.

## 9. Cluster Creation

After successful validation, the create cluster wizard is displayed

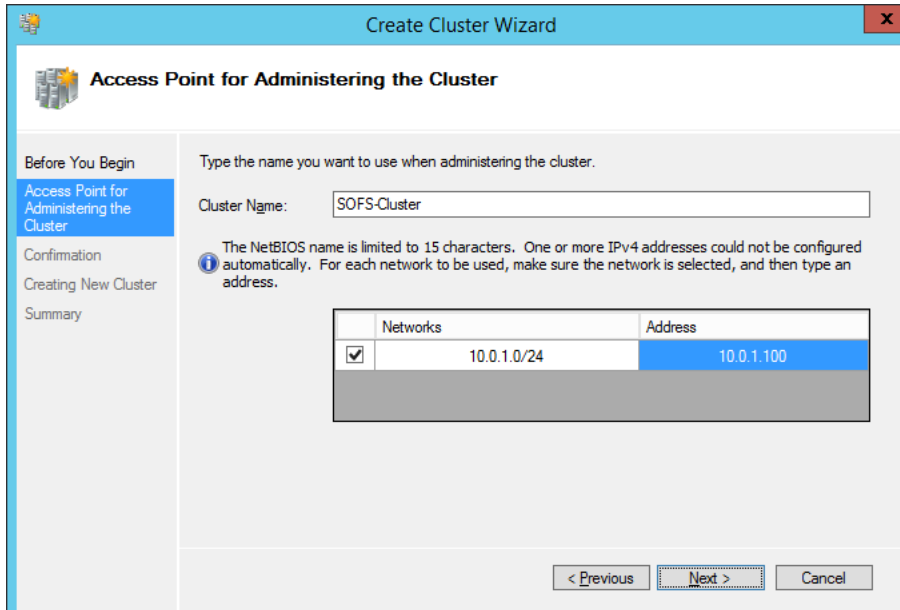


Enter the cluster name, for example “SOFS Cluster”

We need to assign an IP address for the cluster and specify which network interface it will use.

Windows will display a list of candidate interfaces to choose from, it will not list interfaces it thinks are not appropriate, such as those used for iSCSI storage.

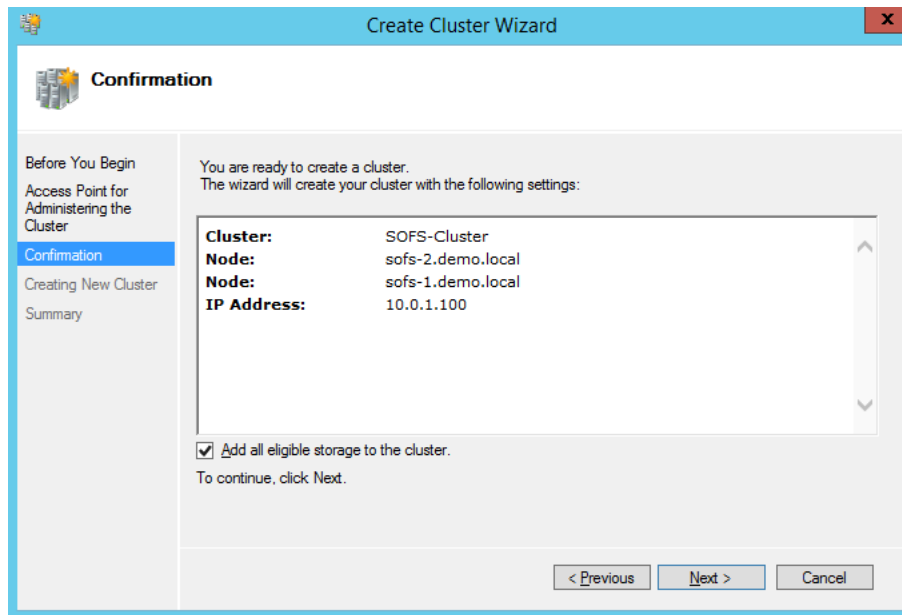
In our example we chose IP 10.0.1.100 for our cluster. When clients connect to our SOFS, they connect using this IP.



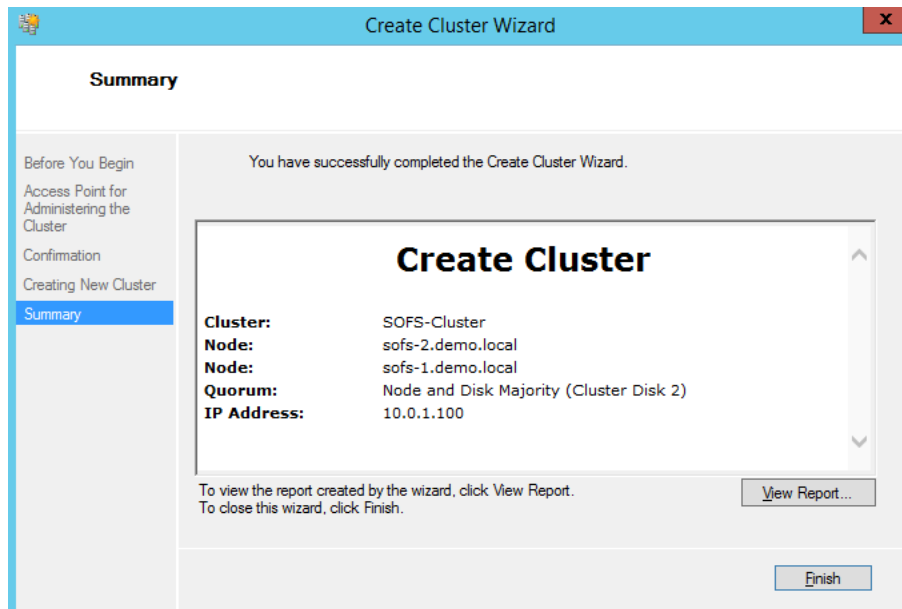
	Networks	Address
<input checked="" type="checkbox"/>	10.0.1.0/24	10.0.1.100

- *Note: In our simple setup, the SOFS cluster IO resides on the same network as our Management traffic. For setups requiring better isolation, we could have added a fourth interface card and created a subnet specifically for SOFS IO traffic.*

Click “Next”



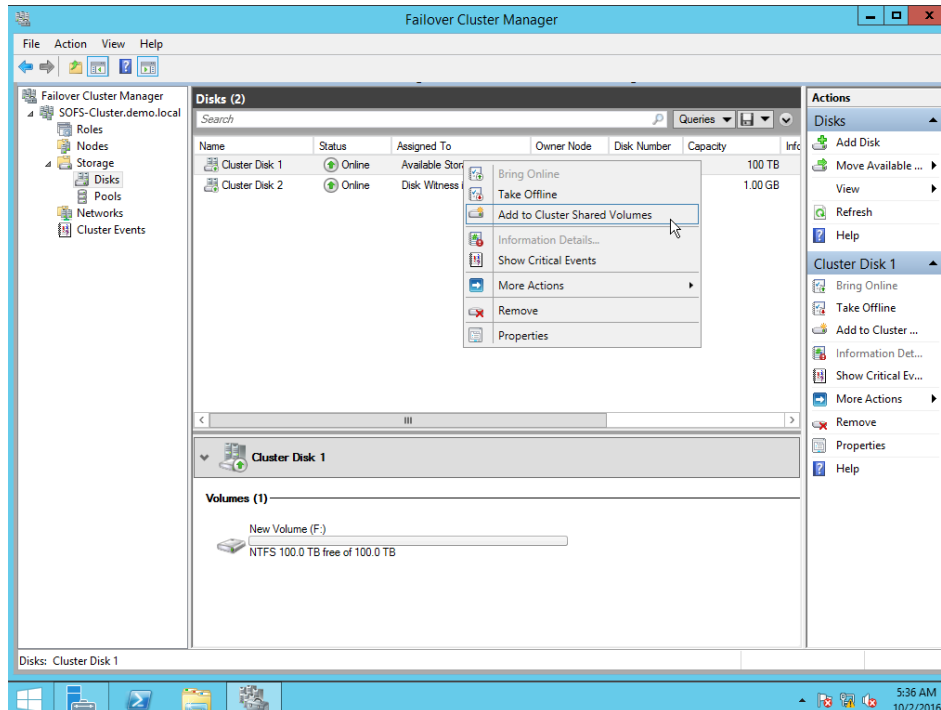
Click “Next”, then “Finish”



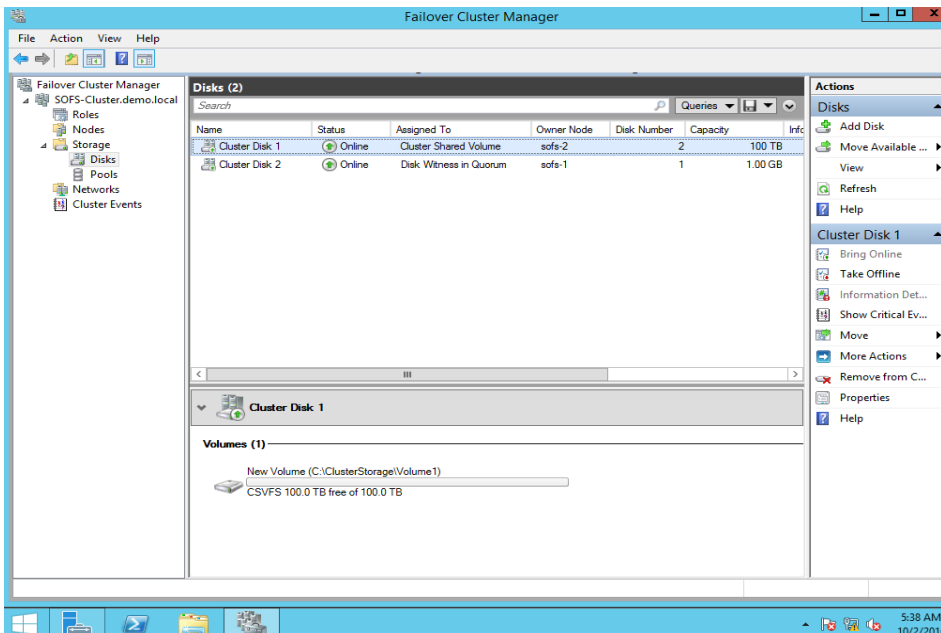


Once the cluster is created, go to Storage -> Disks

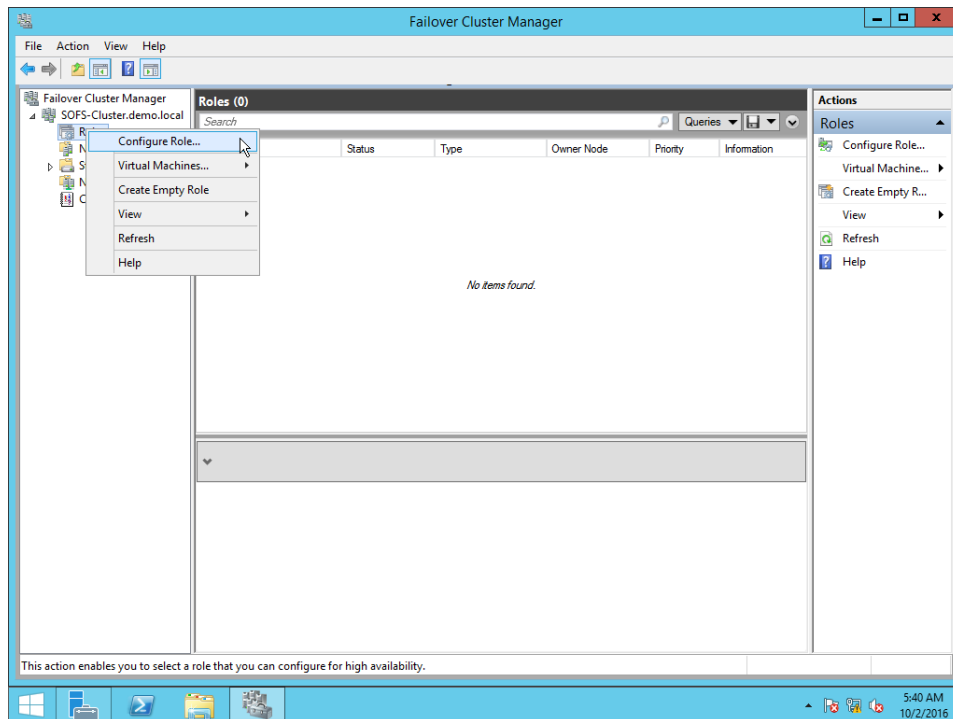
Right click on the 100 TB disk add select “Add to Cluster Shared Volumes”



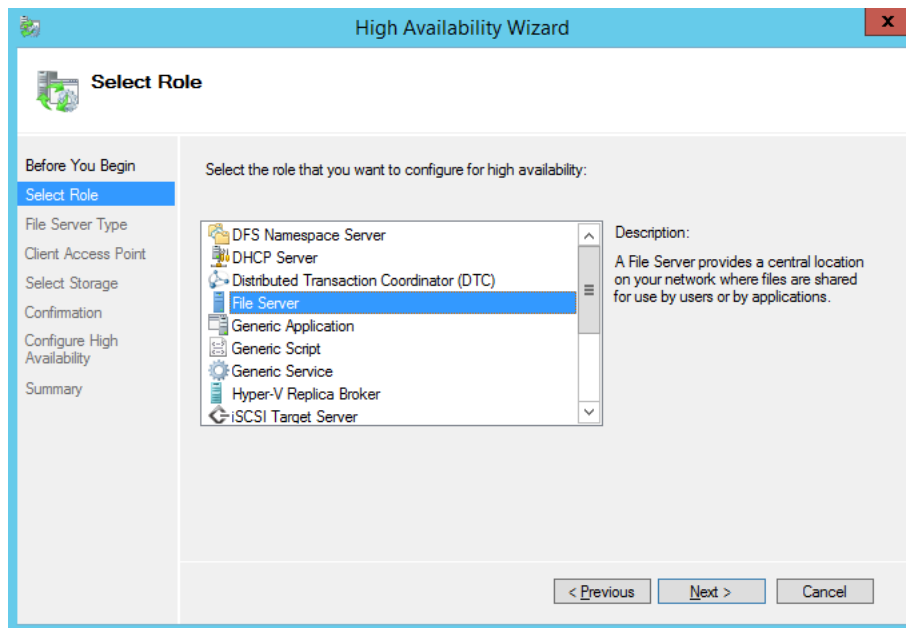
On the bottom pane, the 100 TB disk volume will change from NTFS to CSVFS (Clustered Shared Volume File System), this allows the volume to be used by many SOFS nodes concurrently. Notice too that it is now accessible as “C:\ClusterStorage\Volume1”



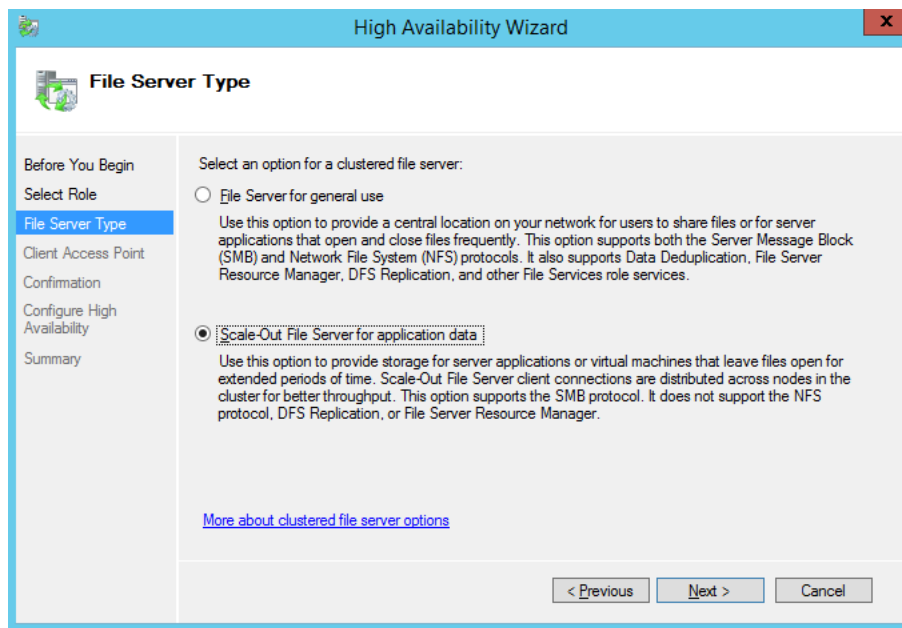
Right click on “Roles” and select “Configure Role...”



In the “Select Role” choose “File Server”

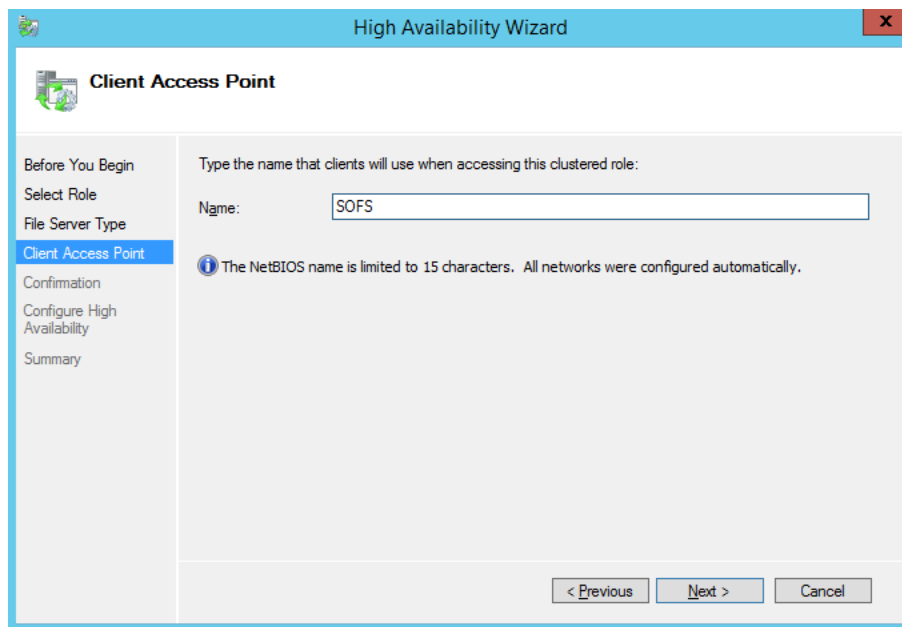


Select “Scale Out File Server for application data”

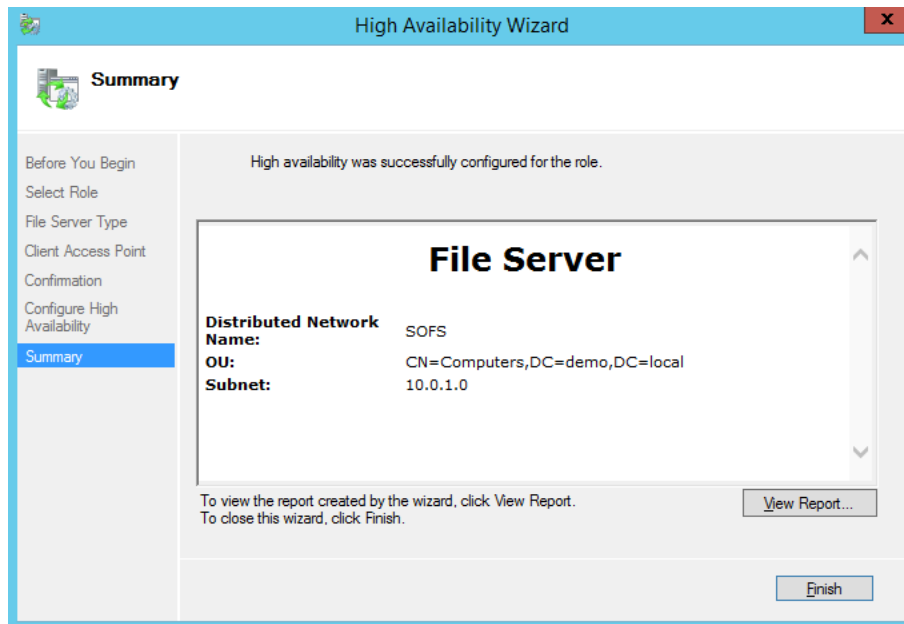


We then enter the cluster network (NetBIOS) name; in our example it is “SOFS”

Clients will access shares on the cluster using this name



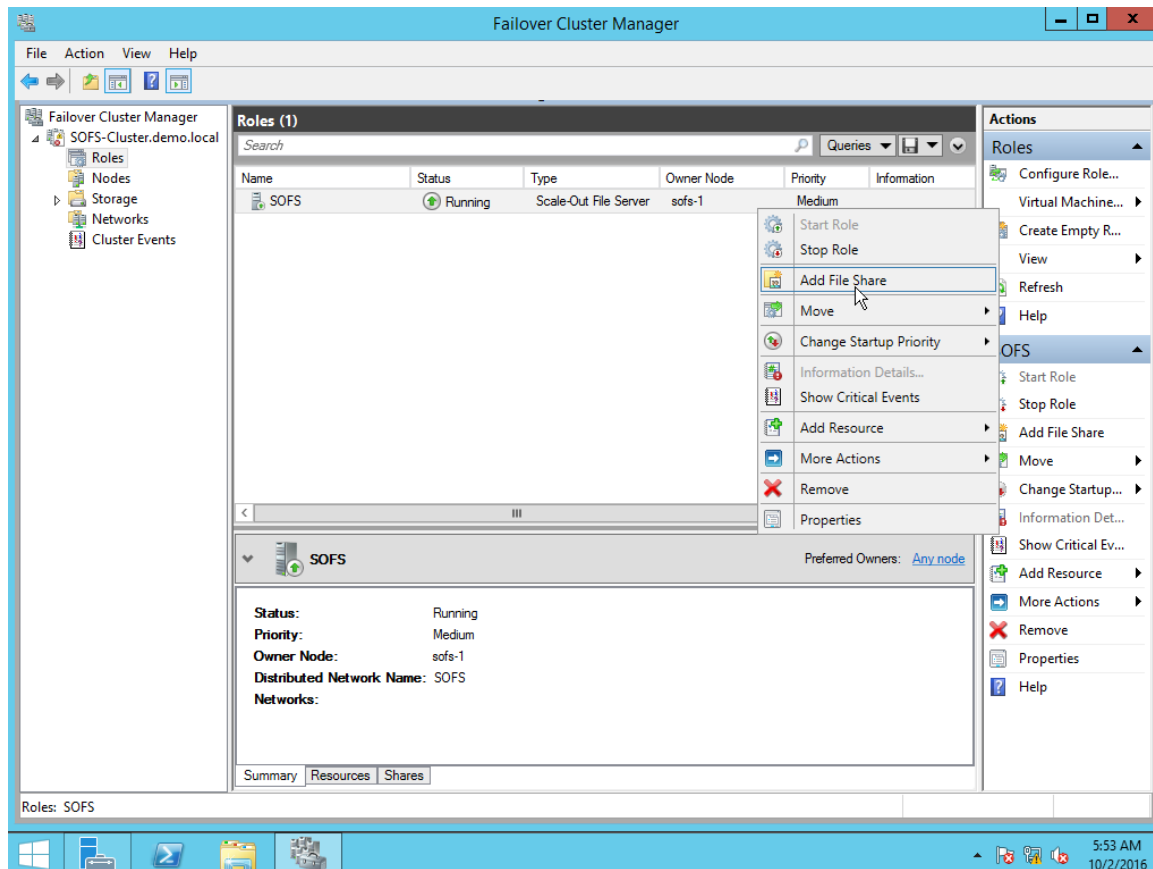
Click “Finish” to complete.



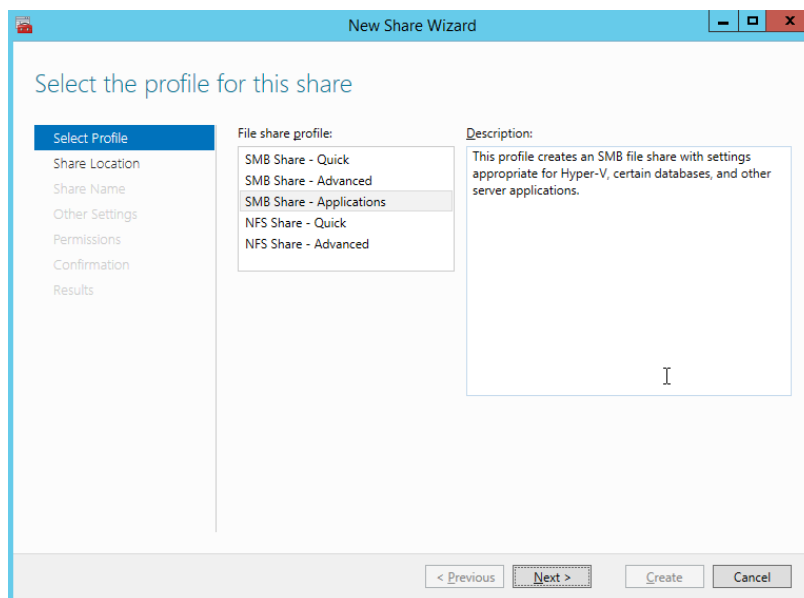
We have successfully created our SOFS cluster, our next step is to add shares to it.

## 10. Adding Shares

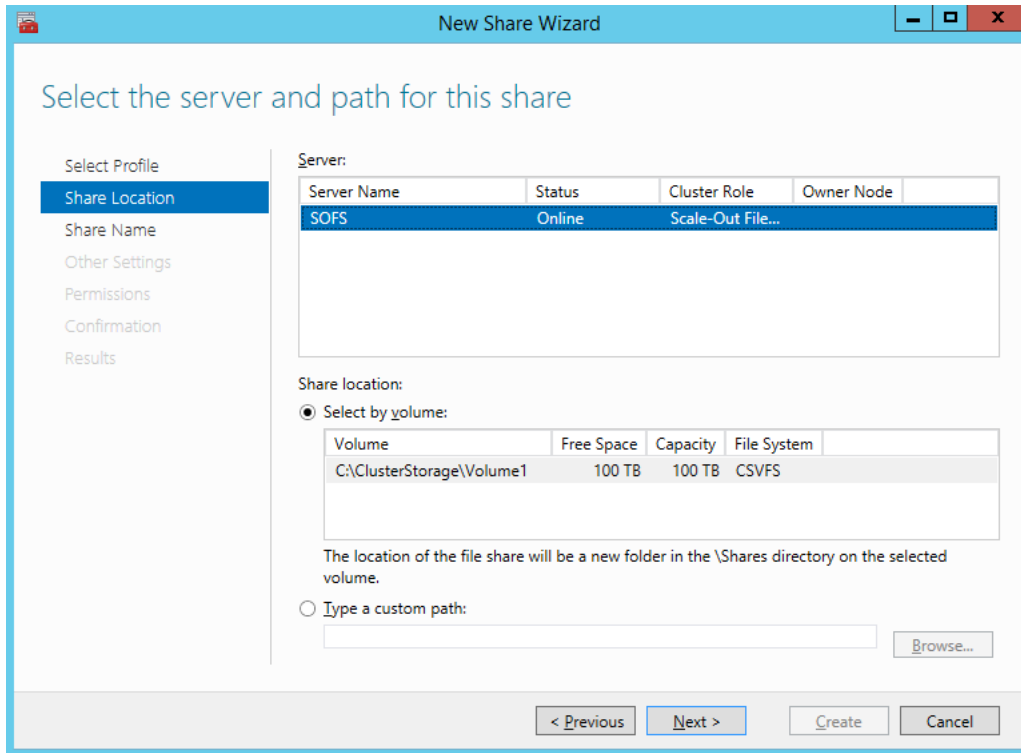
To add a share, right click on the “SOFS” cluster role we added and click “Add File Share”



In the wizard select “SMB Share – Applications” profile.



In the “Select the server and path for this share” accept the default values.



Select the server and path for this share

Select Profile

- Share Location
- Share Name
- Other Settings
- Permissions
- Confirmation
- Results

Server:

Server Name	Status	Cluster Role	Owner Node
SOFS	Online	Scale-Out File...	

Share location:

☒ Select by volume:

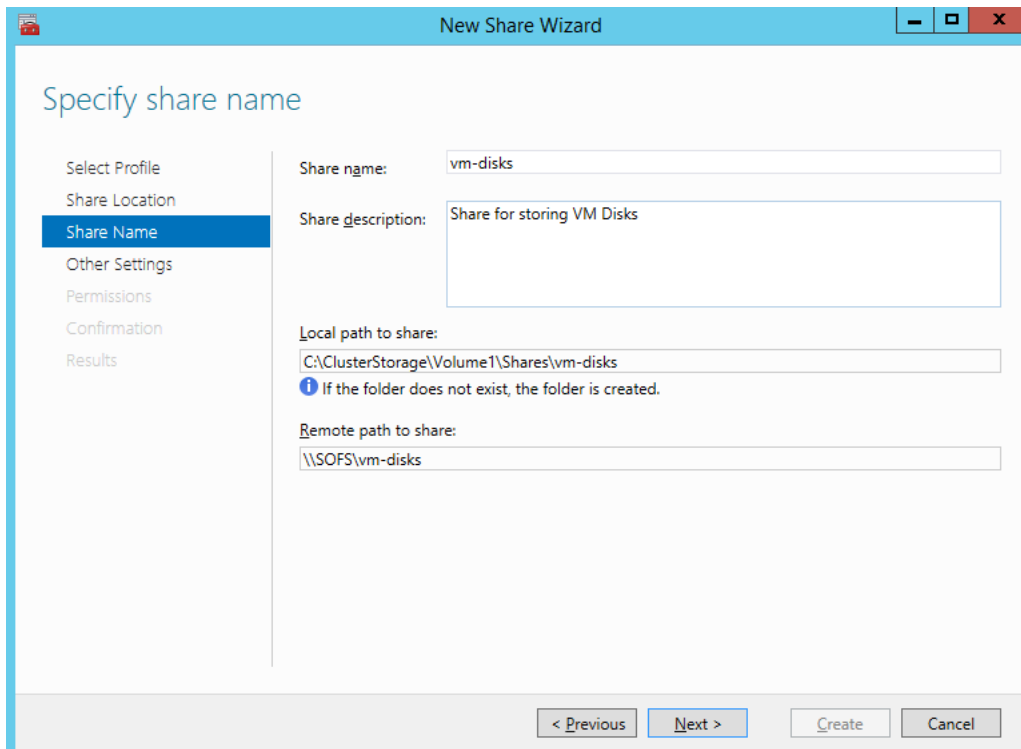
Volume	Free Space	Capacity	File System
C:\ClusterStorage\Volume1	100 TB	100 TB	CSVFS

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

☐ Type a custom path:

< Previous Next > Create Cancel

Now enter the name and description for the new share, for example “vm-disks”



Specify share name

Select Profile

- Share Location
- Share Name
- Other Settings
- Permissions
- Confirmation
- Results

Share name:

Share description:

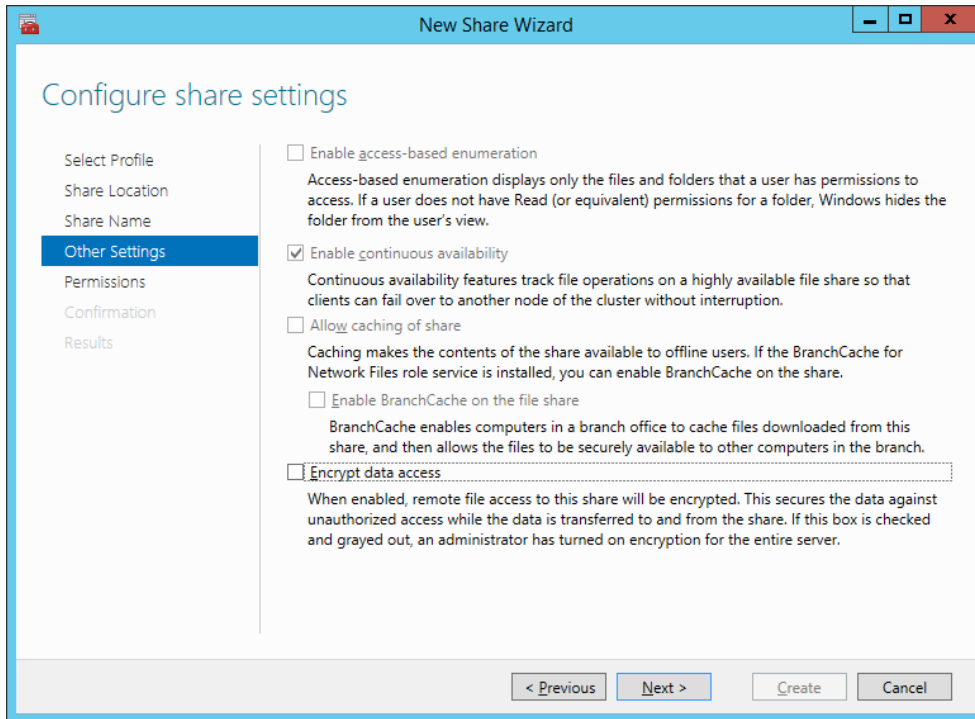
Local path to share:

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

Remote path to share:

< Previous Next > Create Cancel

For the share settings, accept the defaults and click “Next”



**Configure share settings**

Select Profile  
Share Location  
Share Name  
**Other Settings**  
Permissions  
Confirmation  
Results

☐ Enable access-based enumeration  
Access-based enumeration displays only the files and folders that a user has permissions to access. If a user does not have Read (or equivalent) permissions for a folder, Windows hides the folder from the user's view.

☒ Enable continuous availability  
Continuous availability features track file operations on a highly available file share so that clients can fail over to another node of the cluster without interruption.

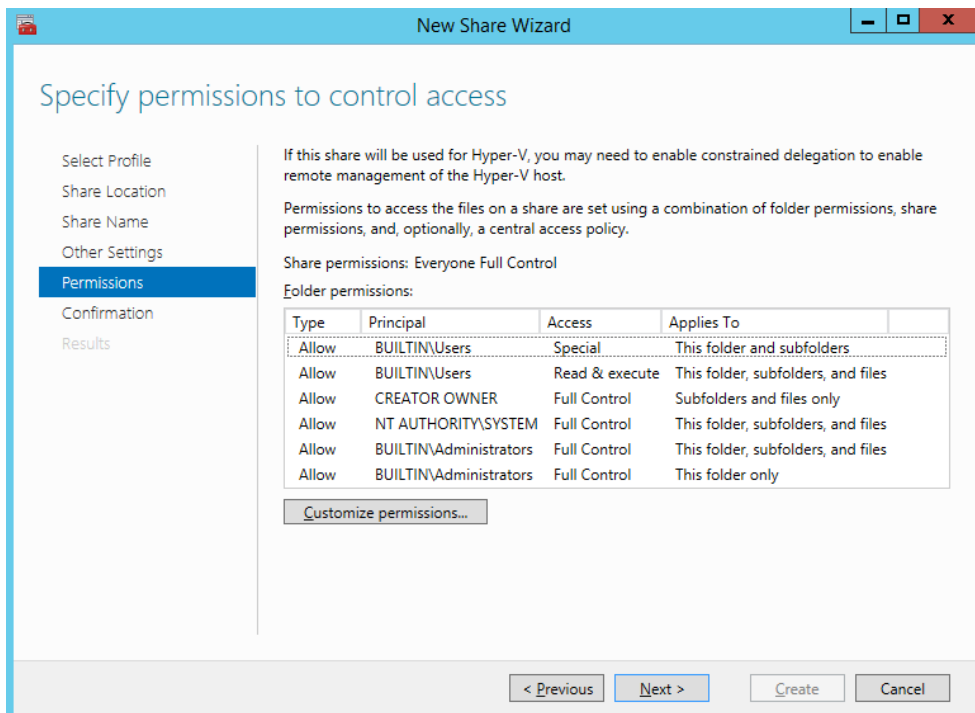
☐ Allow caching of share  
Caching makes the contents of the share available to offline users. If the BranchCache for Network Files role service is installed, you can enable BranchCache on the share.

☐ Enable BranchCache on the file share  
BranchCache enables computers in a branch office to cache files downloaded from this share, and then allows the files to be securely available to other computers in the branch.

☐ Encrypt data access  
When enabled, remote file access to this share will be encrypted. This secures the data against unauthorized access while the data is transferred to and from the share. If this box is checked and grayed out, an administrator has turned on encryption for the entire server.

< Previous   Next >   Create   Cancel

For Permissions, accept the defaults and click “Next”



**Specify permissions to control access**

Select Profile  
Share Location  
Share Name  
Other Settings  
**Permissions**  
Confirmation  
Results

If this share will be used for Hyper-V, you may need to enable constrained delegation to enable remote management of the Hyper-V host.

Permissions to access the files on a share are set using a combination of folder permissions, share permissions, and, optionally, a central access policy.

Share permissions: Everyone Full Control

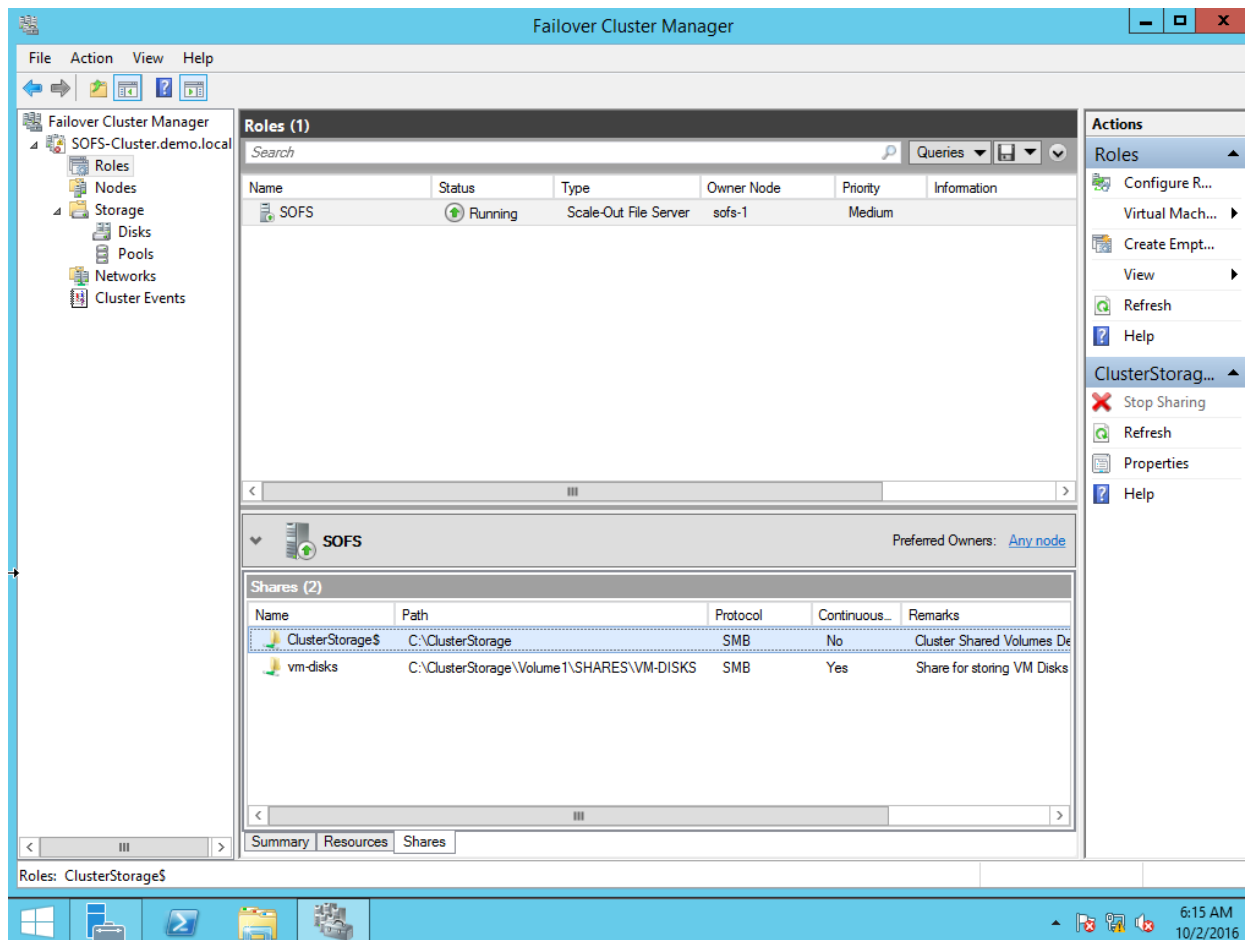
Folder permissions:

Type	Principal	Access	Applies To
Allow	BUILTIN\Users	Special	This folder and subfolders
Allow	BUILTIN\Users	Read & execute	This folder, subfolders, and files
Allow	CREATOR OWNER	Full Control	Subfolders and files only
Allow	NT AUTHORITY\SYSTEM	Full Control	This folder, subfolders, and files
Allow	BUILTIN\Administrators	Full Control	This folder, subfolders, and files
Allow	BUILTIN\Administrators	Full Control	This folder only

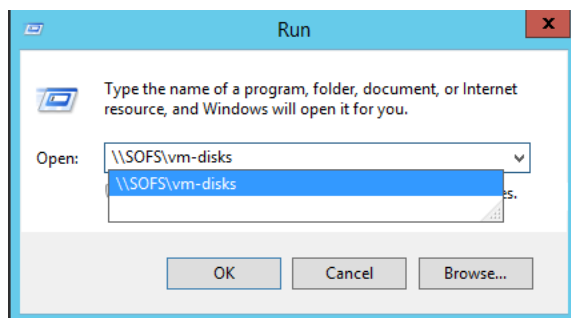
[Customize permissions...](#)

< Previous   Next >   Create   Cancel

Once the new share wizard is done, we should see our new share added on the lower section of the window as per below:



That is it, our share is up and running. In our example setup, clients access the share using the name \\SOFS\vm-disks



Finally we can add more nodes to our SOFS cluster to increase throughput. All SOFS nodes will have simultaneous concurrent IO on the share.