

# CAPSTONE

A01340485

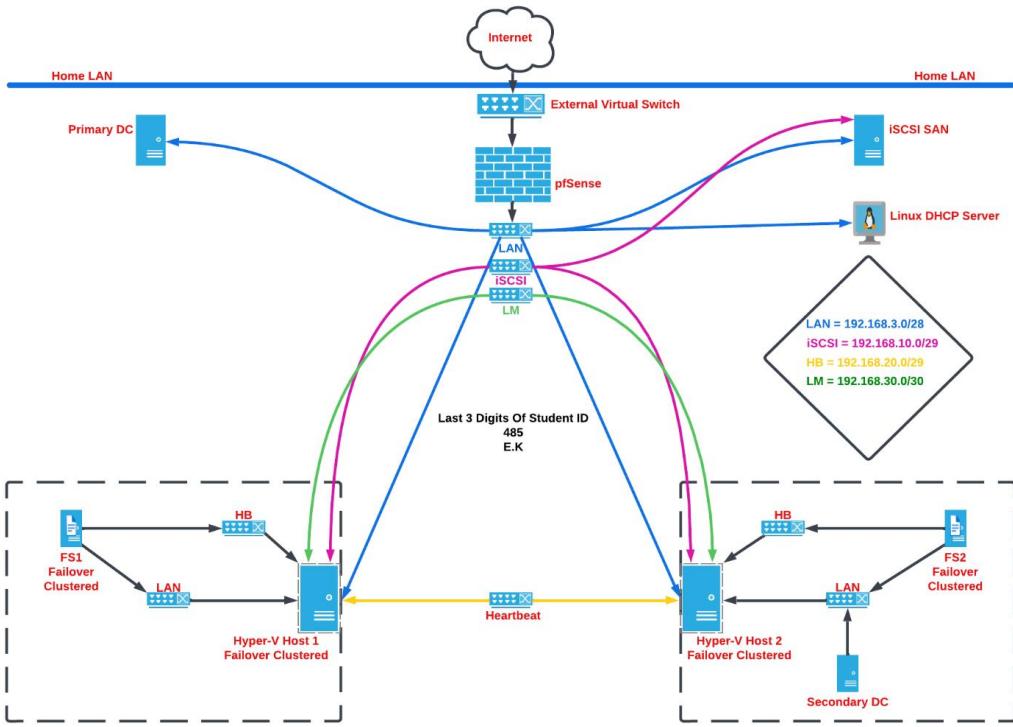
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## Network Diagram



## Networking & IP Information

Name	Network	Purpose	Subnet	Host IP Range	Switch Type
<b>WAN</b>	<b>10.0.0.0/24</b>	Home Network	-----	-----	External
<b>LAN</b>	<b>192.168.3.0/28</b>	LAN	<b>255.255.255.240</b>	<b>192.168.3.1-192.168.3.14</b>	Internal
<b>iSCSI</b>	<b>192.168.10.0/29</b>	iSCSI SAN	<b>255.255.255.248</b>	<b>192.168.10.1-192.168.10.6</b>	Private
<b>HB</b>	<b>192.168.20.0/29</b>	Heartbeat	<b>255.255.255.248</b>	<b>192.168.20.1-192.168.20.6</b>	Private
<b>LM</b>	<b>192.168.30.0/30</b>	Live Migration	<b>255.255.255.252</b>	<b>192.168.30.1-192.168.30.2</b>	Private

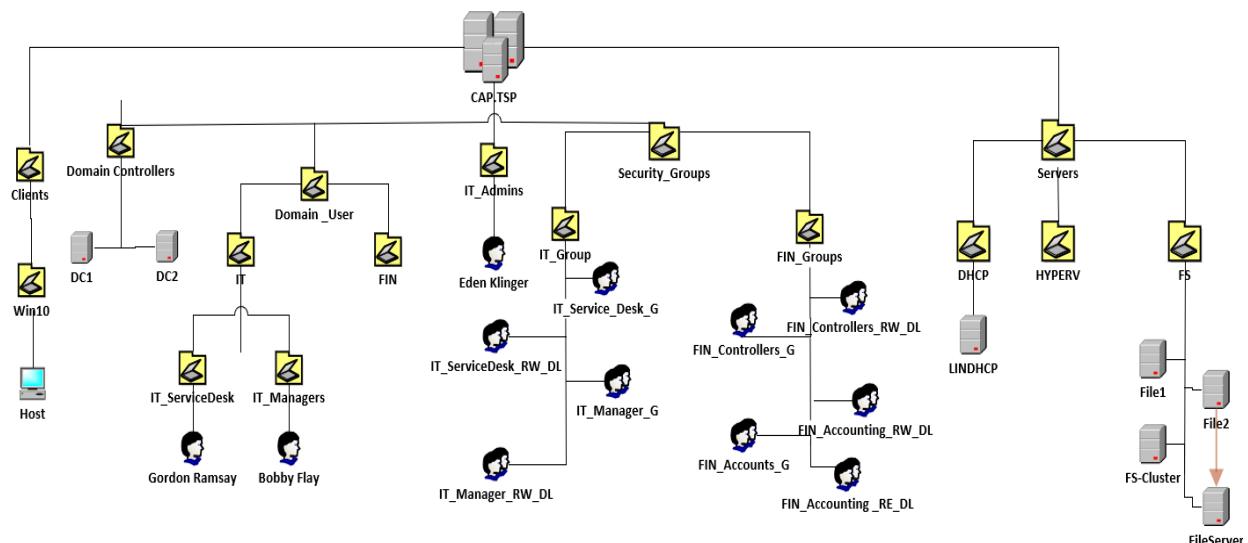
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## IP Address Chart

Devices	LAN	WAN	iSCSI	HB	LM
Host	192.168.3.13	10.0.0.11			
pfSense	192.168.3.14	10.0.0.254			
DC1	192.168.3.1				
DC2	192.168.3.2				
Linux DHCP	192.168.3.3				
SAN	192.168.3.4		192.168.10.3		
HV1	192.168.3.5		192.168.10.1	192.168.20.1	192.168.30.1
HV2	192.168.3.6		192.168.10.2	192.168.20.2	192.168.30.2
HV-Cluster	192.168.3.7				
FS1	192.168.3.8			192.168.20.3	
FS2	192.168.3.9			192.168.20.4	
FS-Cluster	192.168.3.10				
File Server	192.168.3.11				

## ADDS Diagram



## Creating & Configuring pfSense

Head over <https://www.pfsense.org/download/> and download pfSense to create our Firewall with NAT Routing. Select the same options as the image below, proceed to download.

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Select Image To Download

Version: 2.6.0

Architecture: AMD64 (64-bit) 

Installer: DVD Image (ISO) Installer

Mirror: Austin, TX USA

Supported by 

[!\[\]\(620f07b383c70ac985ef745f2f4ffa65\_img.jpg\) DOWNLOAD](#)

SHA256 Checksum for compressed (.gz) file:  
941a68c7f20c4b635447cceda429a027f816bdb78d54b8252bb87abf1fc22ee3

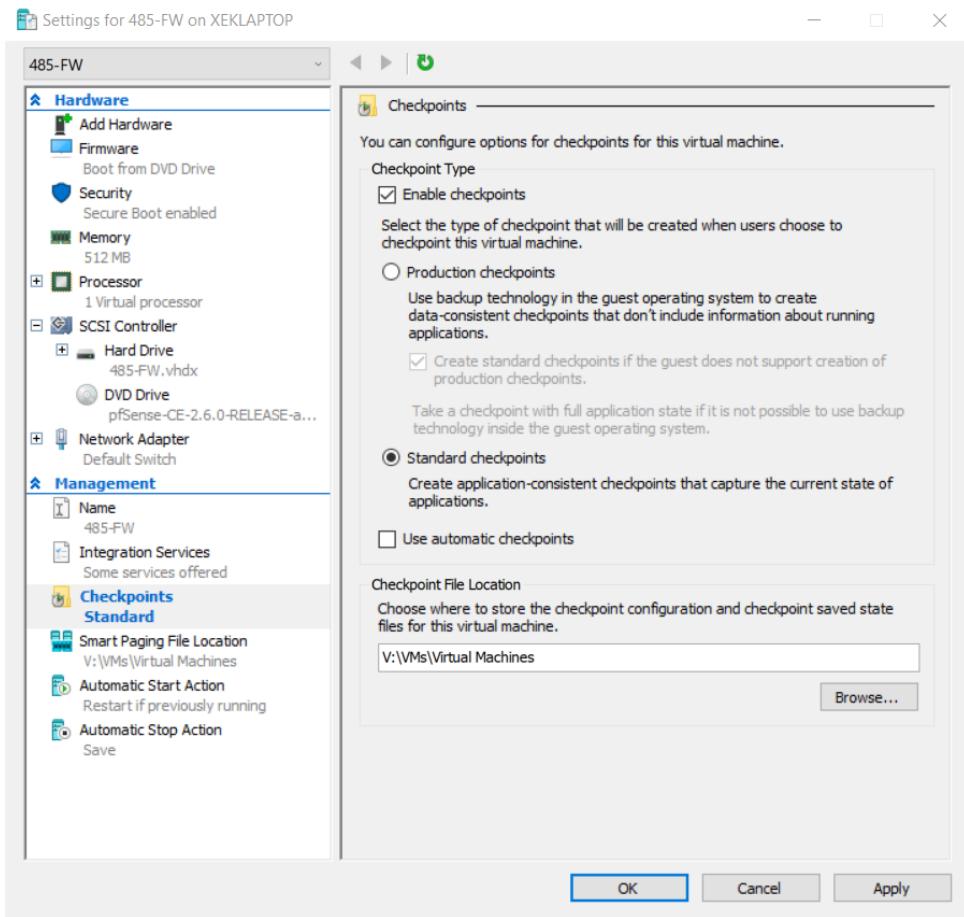
Create your Virtual Machine with the following settings:

Name: 485-FW  
Generation: Generation 2  
Memory: 512 MB  
Network: Default Switch  
Hard Disk: V:\VMs\VHDX\485-FW.vhdx (VHDX, dynamically expanding)  
Operating System: Will be installed from V:\Software\ISO\pfSense-CE-2.6.0-RELEASE-amd64.iso

Uncheck “Use Automatic Checkpoints”

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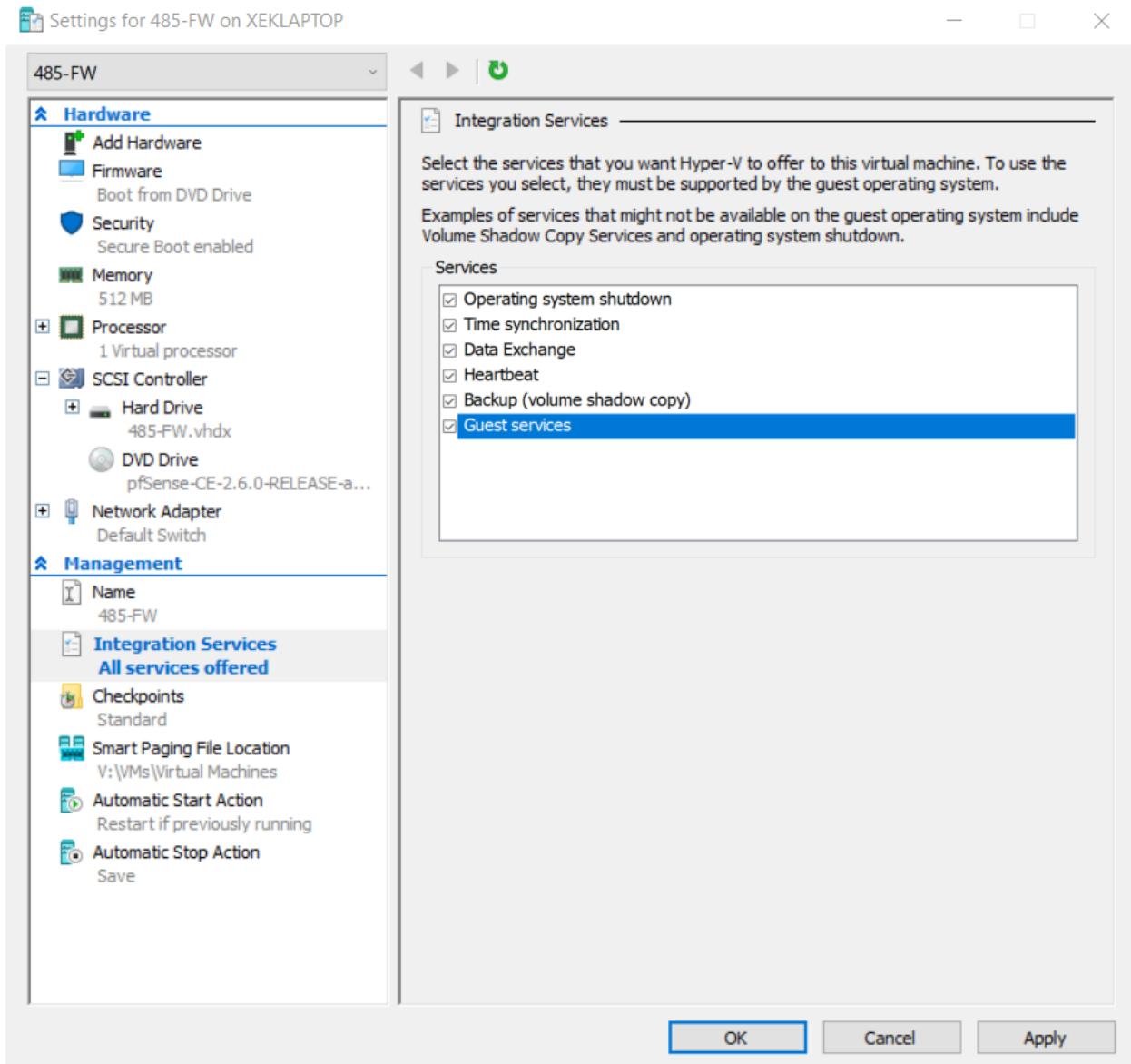
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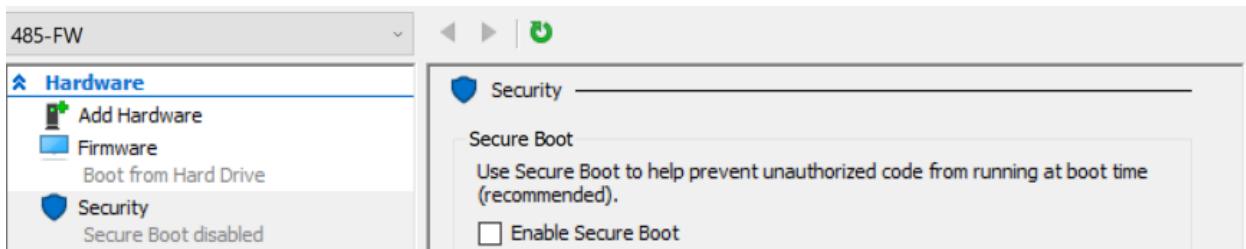
Enable “Guest Services”

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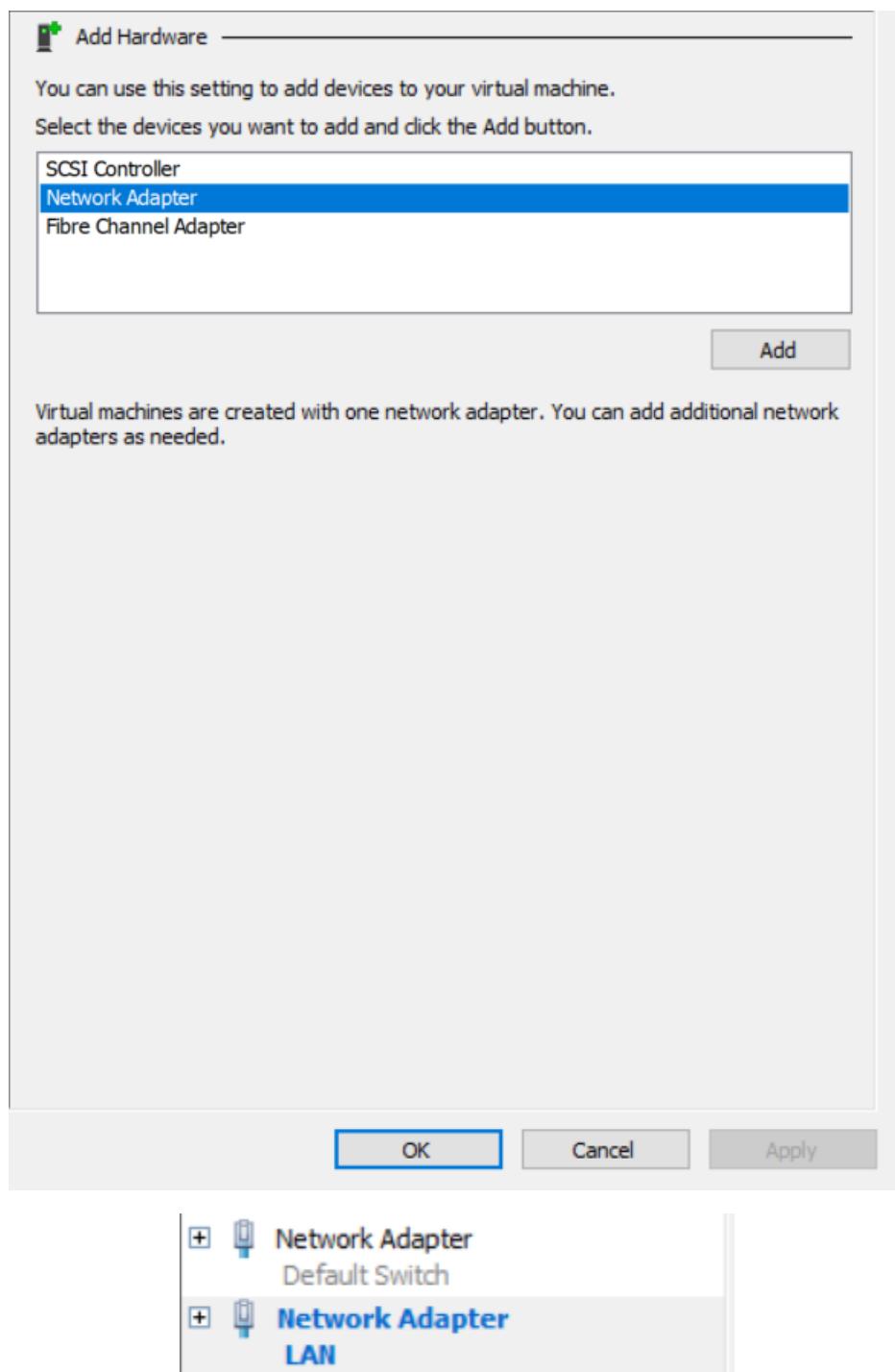
Uncheck “Enable Secure Boot”



We're now going to add our second adapter "LAN"

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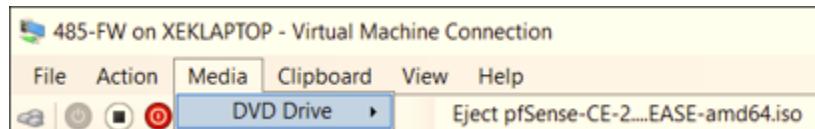


Now proceed to boot pfSense.

After the VM reboot, turn it off and remove the disk to avoid going through the installation process again. Start the VM.

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We're now going to configure pfSense.

hn0	00:15:5d:00:0b:05 (down) Hyper-V Network Interface	fe80::215:5dff:fe00:b06	OK
Network Adapter (Dynamic MAC:...)	LAN	fe80::215:5dff:fe00:b06	OK

```
*** Welcome to pfSense 2.6.0-RELEASE (amd64) on pfSense ***

WAN (wan)      -> hn0      -> v4/DHCP4: 172.28.187.0/20
LAN (lan)      -> hn1      -> v4: 192.168.1.1/24

0) Logout (SSH only)          9) pfTop
1) Assign Interfaces          10) Filter Logs
2) Set interface(s) IP address 11) Restart webConfigurator
3) Reset webConfigurator password 12) PHP shell + pfSense tools
4) Reset to factory defaults   13) Update from console
5) Reboot system               14) Enable Secure Shell (sshd)
6) Halt system                 15) Restore recent configuration
7) Ping host                   16) Restart PHP-FPM
8) Shell

Enter an option: 2
```

Enter the WAN interface name or 'a' for auto-detection  
(hn0 hn1 or a): hn0

Should VLANs be set up now [y\ln]? n

Enter the LAN interface name or 'a' for auto-detection  
NOTE: this enables full Firewalling/NAT mode.  
(hn1 a or nothing if finished): hn1

The interfaces will be assigned as follows:  
WAN -> hn0  
LAN -> hn1  
Do you want to proceed [y\ln]? y

Configure the LAN (hn1)

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```
*** Welcome to pfSense 2.6.0-RELEASE (amd64) on pfSense ***

WAN (wan)      -> hn0      -> v4/DHCP4: 172.28.187.0/20
LAN (lan)      -> hn1      -> v4: 192.168.1.1/24

0) Logout (SSH only)          9) pfTop
1) Assign Interfaces          10) Filter Logs
2) Set interface(s) IP address 11) Restart webConfigurator
3) Reset webConfigurator password 12) PHP shell + pfSense tools
4) Reset to factory defaults   13) Update from console
5) Reboot system               14) Enable Secure Shell (sshd)
6) Halt system                 15) Restore recent configuration
7) Ping host                   16) Restart PHP-FPM
8) Shell

Enter an option: 2
```

```
Available interfaces:

1 - WAN (hn0 - dhcp, dhcp6)
2 - LAN (hn1 - static)
```

```
Enter the number of the interface you wish to configure: 2
```

```
Enter the new LAN IPv4 address. Press <ENTER> for none:
> 192.168.3.14/28
```

```
For a WAN, enter the new LAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
```

```
>
```

```
Enter the new LAN IPv6 address. Press <ENTER> for none:
>
```

```
Do you want to enable the DHCP server on LAN? (y/n) n
```

```
Do you want to revert to HTTP as the webConfigurator protocol? (y/n) y
```

```
The IPv4 LAN address has been set to 192.168.3.14/28
```

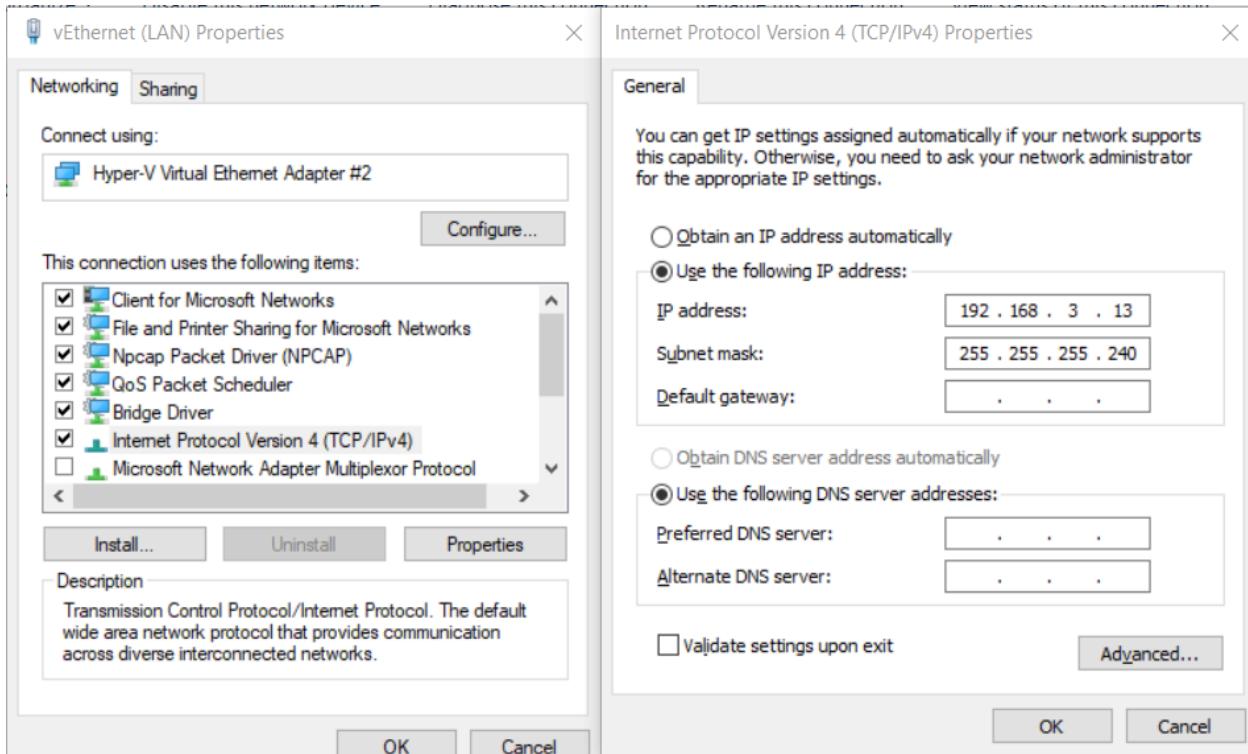
```
You can now access the webConfigurator by opening the following URL in your web browser:
http://192.168.3.14/
```

```
Press <ENTER> to continue.
```

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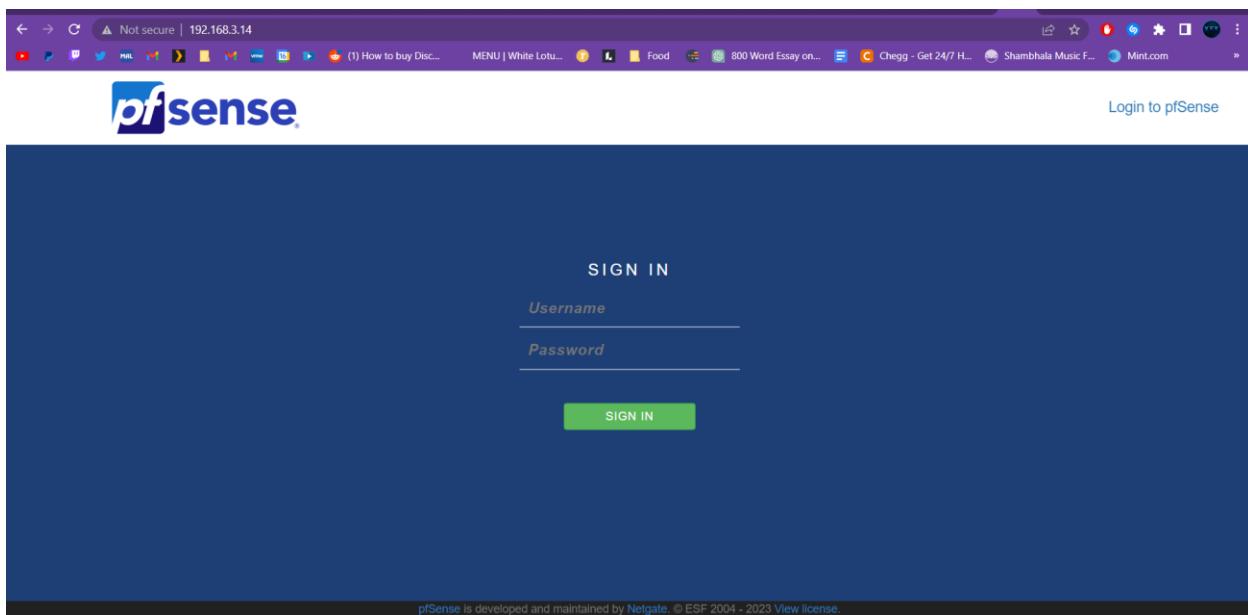
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Now head to your host machine's network adapters and edit your "LAN".



Now head over to pfSense using the LAN you configured (<http://192.168.3.14/>)

Login using the following, Username: admin | Password: pfsense



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We're now going to configure our firewall.

I disabled DNS Resolver & Enabled DNS Forwarder

The screenshot shows a two-part configuration interface for a firewall.

**General DNS Resolver Options:** A section with a "Enable" button and a checkbox labeled "Enable DNS resolver".

**General DNS Forwarder Options:** A section with a "Enable" button and a checked checkbox labeled "Enable DNS forwarder".

**Firewall / Aliases / IP:** A main navigation bar with tabs for Firewall, Services, and Aliases. Below it is a green "Add" button.

**Firewall / Aliases / Edit:** A detailed configuration dialog for an alias named "InternetAccessDenied".  
Properties:

- Name:** InternetAccessDenied
- Description:** Internet Access Denied
- Type:** Host(s)

**Host(s):** A table with a single row.

<b>Hint:</b> Enter as many hosts as desired. Hosts must be specified by their IP address or fully qualified domain name (FQDN). FQDN hostnames are periodically re-resolved and updated. If multiple IPs are returned by a DNS query, all are used. An IP range such as 192.168.1.1-192.168.1.10 or a small subnet such as 192.168.1.16/28 may also be entered and a list of individual IP addresses will be generated.	
<b>IP or FQDN:</b>	Address: <input type="text"/> Description: <input type="text"/>

Create an alias, then press save.

Go to Firewall, Rules, LAN then click the add button.

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Firewall / Rules / LAN

Floating	WAN	LAN									
<input type="checkbox"/>	States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description	Actions
<input checked="" type="checkbox"/>	2 /1.59 MiB	*	*	*	LAN Address	80	*	*		Anti-Lockout Rule	
<input type="checkbox"/>	<input checked="" type="checkbox"/> 4 /54 Kib	IPv4 *	LAN net	*	*	*	*	none		Default allow LAN to any rule	
<input type="checkbox"/>	<input checked="" type="checkbox"/> 0 /0 B	IPv6 *	LAN net	*	*	*	*	none		Default allow LAN IPv6 to any rule	

Add Add Delete Save Separator

Firewall / Rules / Edit

Edit Firewall Rule

Action	Block	
Choose what to do with packets that match the criteria specified below. Hint: the difference between block and reject is that with reject, a packet (TCP RST or ICMP port unreachable for UDP) is returned to the sender, whereas with block the packet is dropped silently. In either case, the original packet is discarded.		
Disabled	<input type="checkbox"/> Disable this rule Set this option to disable this rule without removing it from the list.	
Interface	LAN	
Choose the interface from which packets must come to match this rule.		
Address Family	IPv4	
Select the Internet Protocol version this rule applies to.		
Protocol	Any	
Choose which IP protocol this rule should match.		
Source	<input type="checkbox"/> Source <input type="checkbox"/> Invert match <input type="checkbox"/> Single host or alias <input type="checkbox"/> InternetAccessDenied / <input type="checkbox"/>	
Extra Options	<p><b>Log</b> <input checked="" type="checkbox"/> Log packets that are handled by this rule Hint: the firewall has limited local log space. Don't turn on logging for everything. If doing a lot of logging, consider using a remote syslog server (see the Status: System Logs: Settings page).</p> <p><b>Description</b> <input type="text" value="Block Internet Access Denied"/> A description may be entered here for administrative reference. A maximum of 52 characters will be used in the ruleset and displayed in the firewall log.</p> <p><b>Advanced Options</b> </p>	

Save

Now we're going to head back to Firewall/Aliases/Edit.

Firewall / Aliases / Edit

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We're going to click the little pencil and add the devices we're going to block.



Host(s)	
<b>Hint</b> Enter as many hosts as desired. Hosts must be specified by their IP address or fully qualified domain name (FQDN). FQDN hostnames are periodically re-resolved and updated. If multiple IPs are returned by a DNS query, all are used. An IP range such as 192.168.1.1-192.168.1.10 or a small subnet such as 192.168.1.16/28 may also be entered and a list of individual IP addresses will be generated.	
IP or FQDN	SAN
192.168.3.4	
192.168.3.5	
192.168.3.6	

(Disable this for now).

## Creating & Configuring DC1

We're now going to create our DC1, I used a parent disk to speed up the process.

Name: 485-DC1  
Generation: Generation 2  
Memory: 512 MB  
Network: LAN  
Hard Disk: None

### Hard Drive

Add

New

Format: VHDX
Type: differencing
Name: 485-DC1.vhdx
Location: V:\VMs\VHDX
Parent: V:\VMs\VHDX\ParentCoreServer.vhdx

I used the following password:

(Pa\$\$w0rd)

```
Enter new credentials for Administrator or hit ESC to cancel
New password : *****
Confirm password : *****
```

We're now going to do our post installation setup using the following script.

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```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> $IP = Read-Host -Prompt 'Input your IP Address'
>> $MaskBits = 28 # This means subnet mask = 255.255.255.240
>> $Gateway = "192.168.3.14"
>> $IPType = "IPv4"
>> # Retrieve the network adapter that you want to configure
>> $adapter = Get-NetAdapter | ? {$_.Status -eq "up"}
>> # Remove any existing IP, gateway from our ipv4 adapter
>> If (($adapter | Get-NetIPConfiguration).IPv4Address.IPAddress) {
>>   $adapter | Remove-NetIPAddress -AddressFamily $IPType -Confirm:$false
>> }
>> If (($adapter | Get-NetIPConfiguration).Ipv4DefaultGateway) {
>>   $adapter | Remove-NetRoute -AddressFamily $IPType -Confirm:$false
>> }
>> # Configure the IP address and default gateway
>> $adapter | New-NetIPAddress ` 
>>   -AddressFamily $IPType ` 
>>   -IPAddress $IP ` 
>>   -PrefixLength $MaskBits ` 
>>   -DefaultGateway $Gateway
>> # Rename the Network Adapter
>> Rename-NetAdapter -Name "Ethernet" -NewName "LAN"
>> # Name Computer, and rename the local admin account
>> Rename-Computer -NewName (Read-Host -Prompt 'Input the new PC name')
>> Rename-LocalUser -Name "Administrator" -NewName "Eden"
>> Restart-Computer -Force
```

Then input your IP Address “192.168.3.1”.

Then input your PC’s name “485-DC1”.

We’re now going to disable the firewall.

```
PS C:\Users\Administrator> netsh advfirewall set allprofiles state off
```

Now we will enable the server’s response to pings.

```
=====
Welcome to Windows Server 2022 Datacenter Evaluation
=====

1) Domain/workgroup:           Workgroup: WORKGROUP
2) Computer name:             485-DC1
3) Add local administrator
4) Remote management:         Enabled

5) Update setting:            Download only
6) Install updates
7) Remote desktop:            Disabled

8) Network settings
9) Date and time
10) Telemetry setting:        Required
11) Windows activation

12) Log off user
13) Restart server
14) Shut down server
15) Exit to command line (PowerShell)

Enter number to select an option: -
```

```
Enter number to select an option: 4 -
```

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```
=====
Configure remote management
=====

Remote management is enabled.
Server response to ping is enabled.

1) Enable remote management
2) Disable remote management
3) Enable server response to ping
4) Disable server response to ping

Enter selection (Blank=Cancel): 3.
```

We're now going to create our ADdb drive to store our SYSVOL and NTFS.

Format:	VHDX
Type:	dynamically expanding
Name:	ADdb.vhdx
Location:	V:\VMs\VHDX
Size:	10 GB

```
PS C:\Users\Administrator> Get-Disk
Number Friendly Name Serial Number          HealthStatus   OperationalStatus  Total Size Partition
-----  -----  -----  -----
0      Msft Virtu...                   Healthy        Online           127 GB GPT
1      Msft Virtu...                   Healthy        Offline          10 GB RAW

PS C:\Users\Administrator> Initialize-Disk 1
PS C:\Users\Administrator> New-Partition -DiskNumber 1 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\scsi#disk&ven_msft&prod_virtual_disk#5&2fd2f1bb&0&000001#{53f56307-b6bf-11d0-94f2-00a0c91efb8b}
PartitionNumber DriveLetter Offset          Size Type
-----  -----  -----
2              D      16777216       9.98 GB Basic

PS C:\Users\Administrator> Format-Volume -DriveLetter D
DriveLetter FriendlyName FileSystemType DriveType HealthStatus OperationalStatus SizeRemaining  Size
-----  -----  -----  -----
D          NTFS      Fixed    Healthy     OK            9.95 GB 9.98 GB

PS C:\Users\Administrator>
```

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```
PS C:\Users\Administrator> CD D:\  
PS D:\> mkdir NTDS

Directory: D:\

Mode          LastWriteTime    Length Name
----          -----          ---- 
d-----      3/22/2023  1:12 AM           NTDS

PS D:\> mkdir SYSVOL

Directory: D:\

Mode          LastWriteTime    Length Name
----          -----          ---- 
d-----      3/22/2023  1:13 AM           SYSVOL

PS D:\>
```

## Installing ADDS

```
PS D:\> Install-WindowsFeature AD-Domain-Services -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
----- -----          -----          -----
True     No            Success       {Active Directory Domain Services, Group P...
```

## Promoting The Core Server (DC1)

```
PS D:\> Import-Module ADDSDeployment
PS D:\> Install-ADDSForest -DomainName "cap.tsp" -DomainNetbiosName "cap" -InstallDns -DomainMode WinThreshold -DatabasePath "D:\NTDS" -SysvolPath "D:\SYSVOL" -LogPath "D:\NTDS" -NoRebootOnCompletion:$false
SafeModeAdministratorPassword: *****
Confirm SafeModeAdministratorPassword: *****

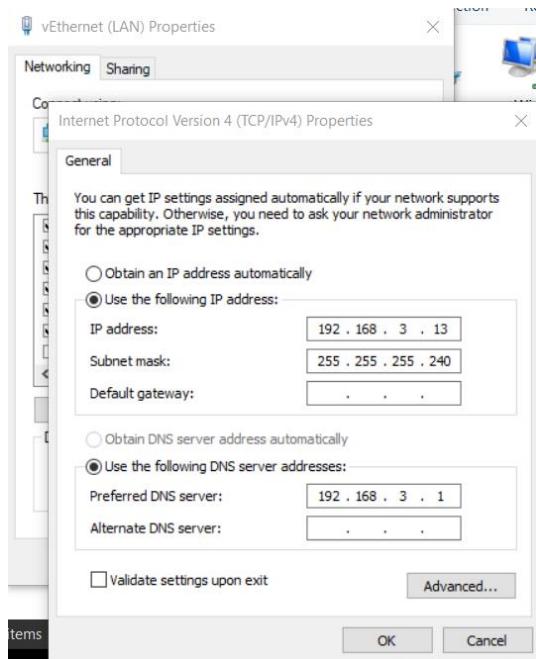
The target server will be configured as a domain controller and restarted when this operation is complete.
Do you want to continue with this operation?
[Y] Yes  [A] Yes to All  [N] No  [L] No to All  [S] Suspend  [?] Help (default is "Y"): A
```

## Host Configuration

You're now going to head to your LAN Adapter on your host machine and add your DC1 as your DNS.

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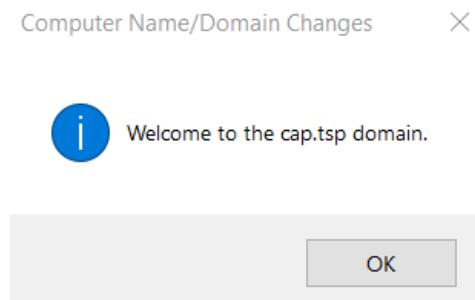
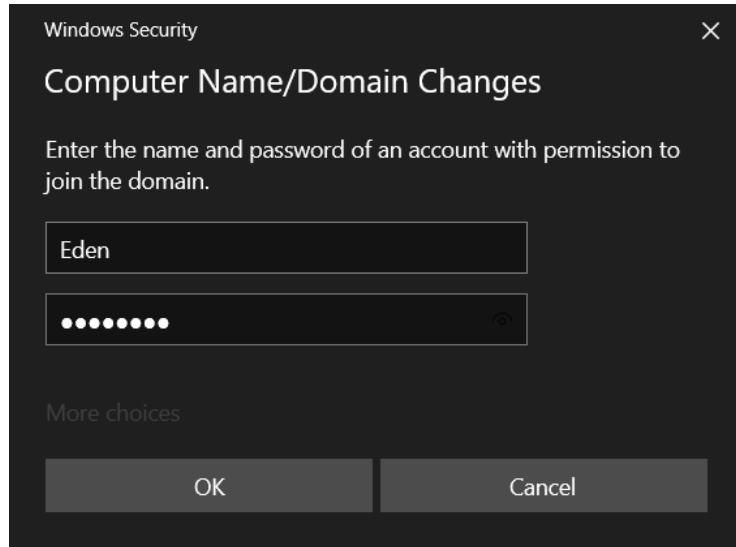
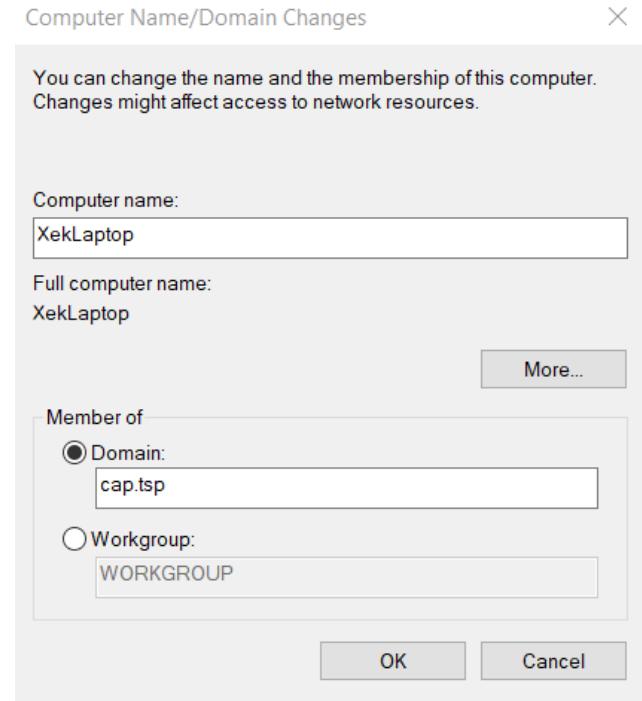


Type “name” in your search bar.



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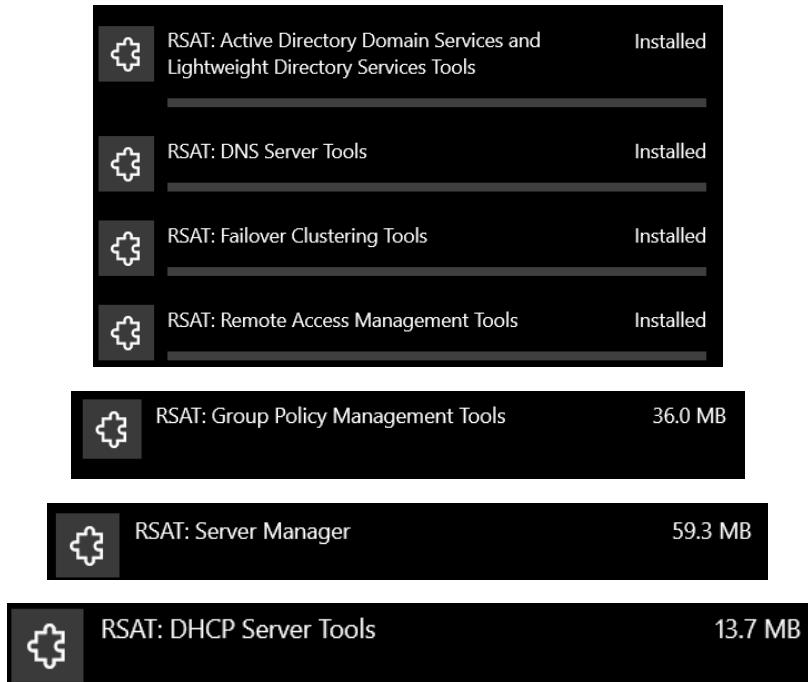
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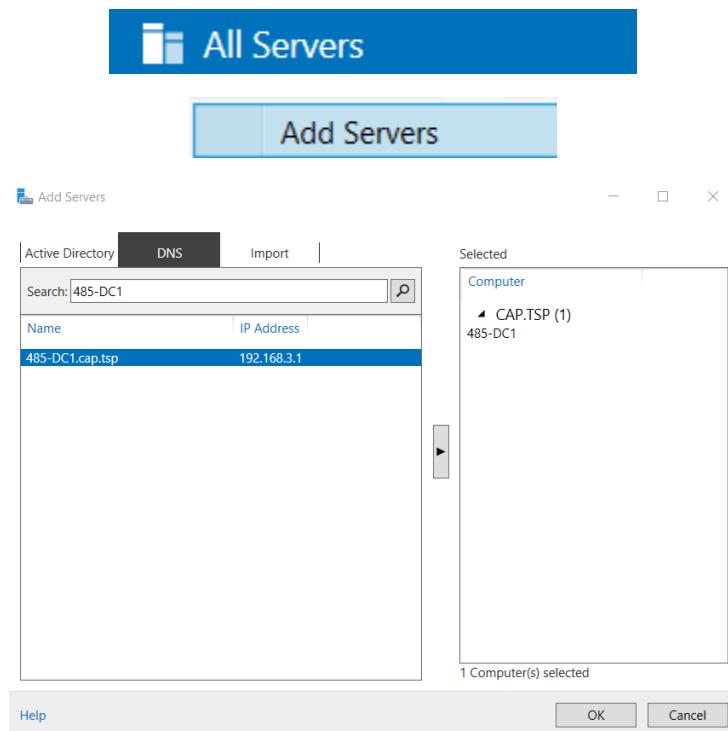
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We're now going to install the following RSAT Tools:



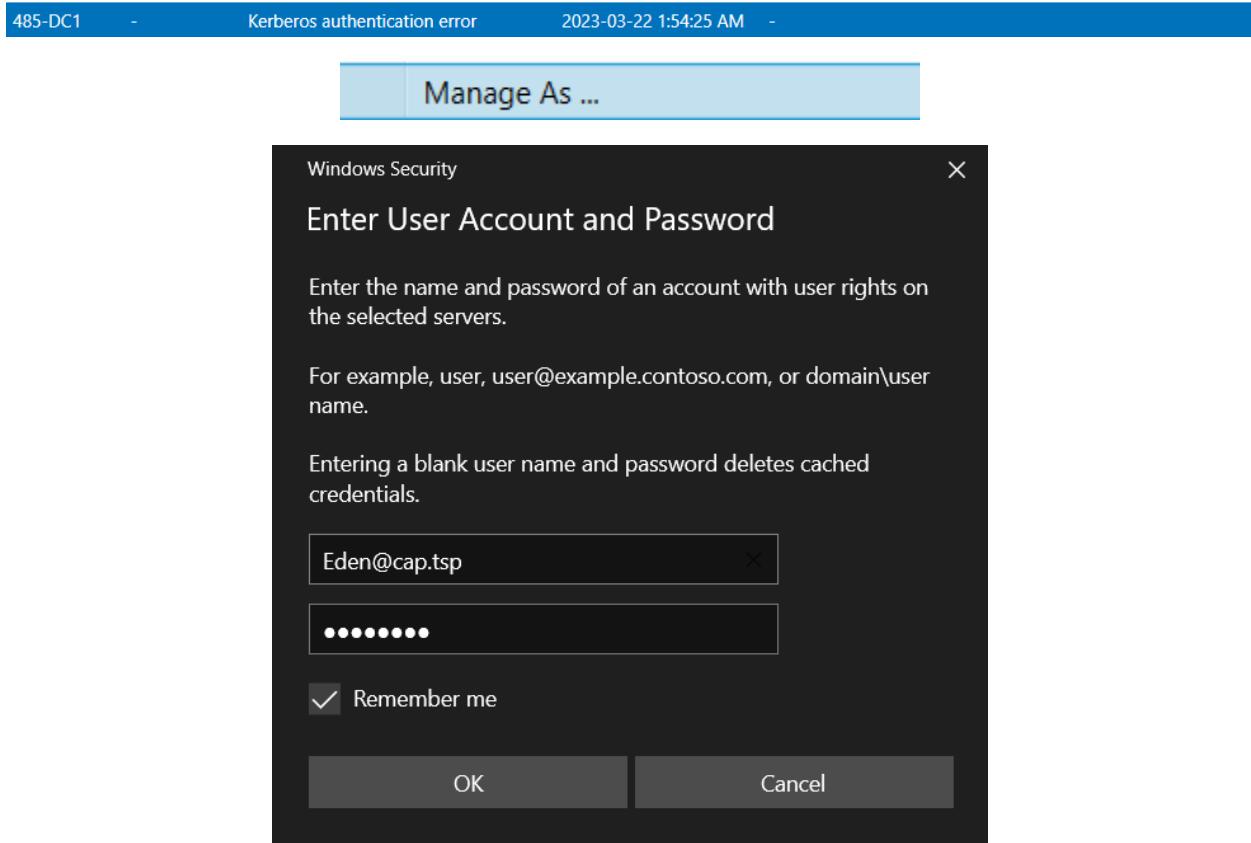
Next, you're going to add DC1 to Server Manager.

Right click “All Servers” and select “Add Servers”.



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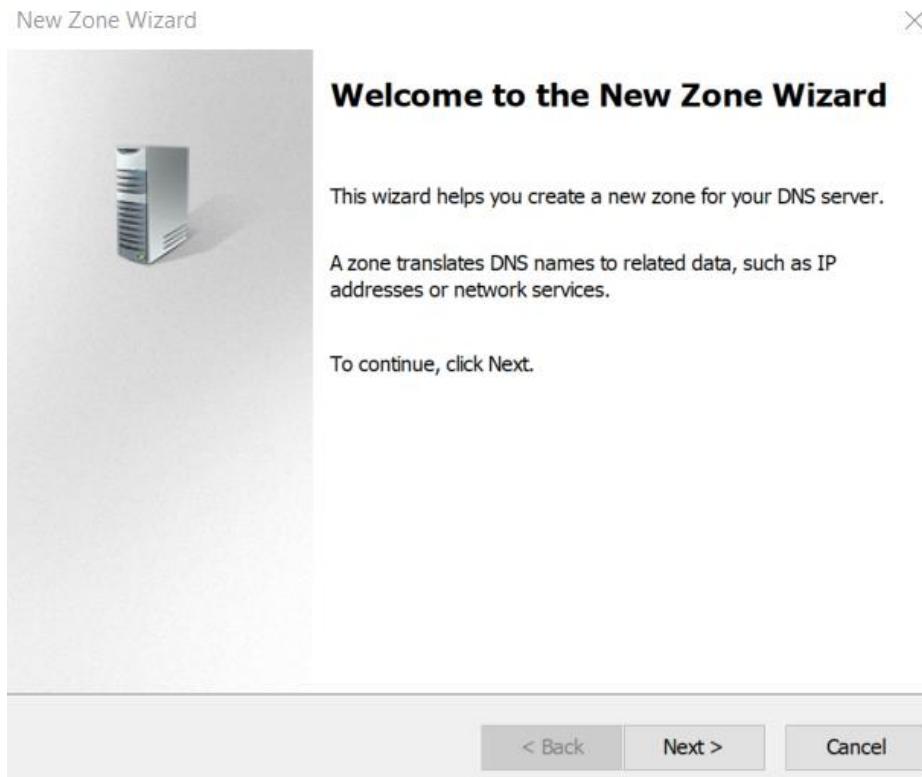
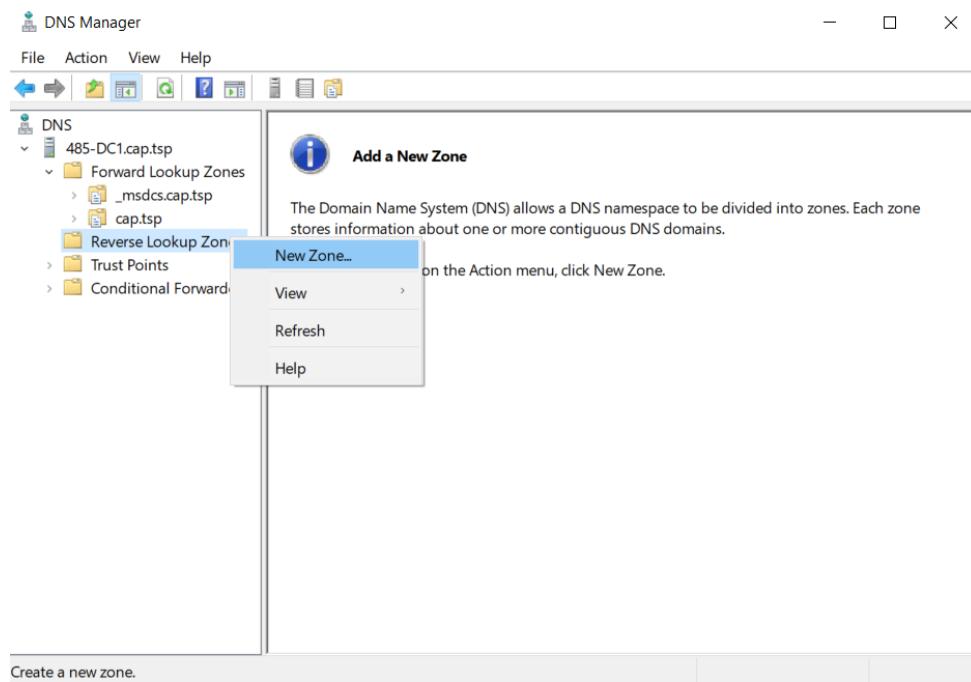
485-DC1 192.168.3.1 Online - Performance counters not started 2023-03-22 2:01:26 AM 00455-50000-00001-AA860 (Activated)

Now we're going to create a DNS Reverse Lookup Zone

The screenshot shows the Windows Server Management Portal. On the left, there's a navigation pane with "DNS" and "File and Storage Services". The main area displays a table with columns: Server Name, IPv4 Address, Manageability, Last Update, and Windows Activation. One row is visible for "485-DC1" with IP "192.168.3.1", status "Online - Performance counters not started", last update "2023-03-22 2:01:26 AM", and activation "00455-50000-00001-AA860 (Activated)". A context menu is open over this row, listing options: "Add Roles and Features", "Restart Server", "Computer Management", "Remote Desktop Connection", "Windows PowerShell", "Configure NIC Teaming", and "DNS Manager". The "DNS Manager" option is highlighted with a blue background.

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New Zone Wizard



## Zone Type

The DNS server supports various types of zones and storage.



Select the type of zone you want to create:

Primary zone

Creates a copy of a zone that can be updated directly on this server.

Secondary zone

Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.

Stub zone

Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.

Store the zone in Active Directory (available only if DNS server is a writeable domain controller)

< Back

Next >

Cancel

New Zone Wizard



## Active Directory Zone Replication Scope

You can select how you want DNS data replicated throughout your network.



Select how you want zone data replicated:

To all DNS servers running on domain controllers in this forest: cap.tsp

To all DNS servers running on domain controllers in this domain: cap.tsp

To all domain controllers in this domain (for Windows 2000 compatibility): cap.tsp

To all domain controllers specified in the scope of this directory partition:

< Back

Next >

Cancel

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New Zone Wizard

**Reverse Lookup Zone Name**

A reverse lookup zone translates IP addresses into DNS names.



Choose whether you want to create a reverse lookup zone for IPv4 addresses or IPv6 addresses.

 IPv4 Reverse Lookup Zone IPv6 Reverse Lookup Zone

&lt; Back

Next &gt;

Cancel

New Zone Wizard

**Reverse Lookup Zone Name**

A reverse lookup zone translates IP addresses into DNS names.



To identify the reverse lookup zone, type the network ID or the name of the zone.

 Network ID:

The network ID is the portion of the IP addresses that belongs to this zone. Enter the network ID in its normal (not reversed) order.

If you use a zero in the network ID, it will appear in the zone name. For example, network ID 10 would create zone 10.in-addr.arpa, and network ID 10.0 would create zone 0.10.in-addr.arpa.

 Reverse lookup zone name:

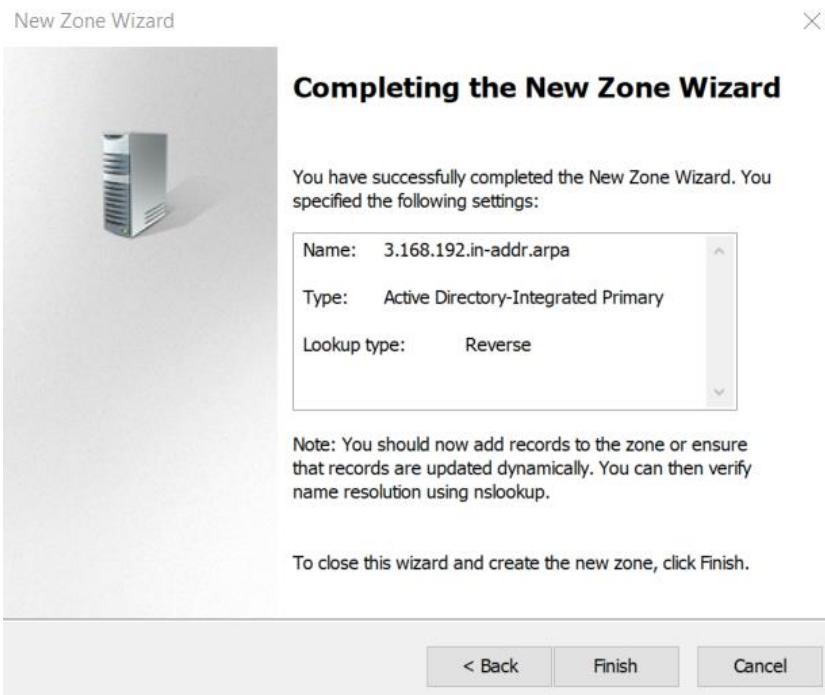
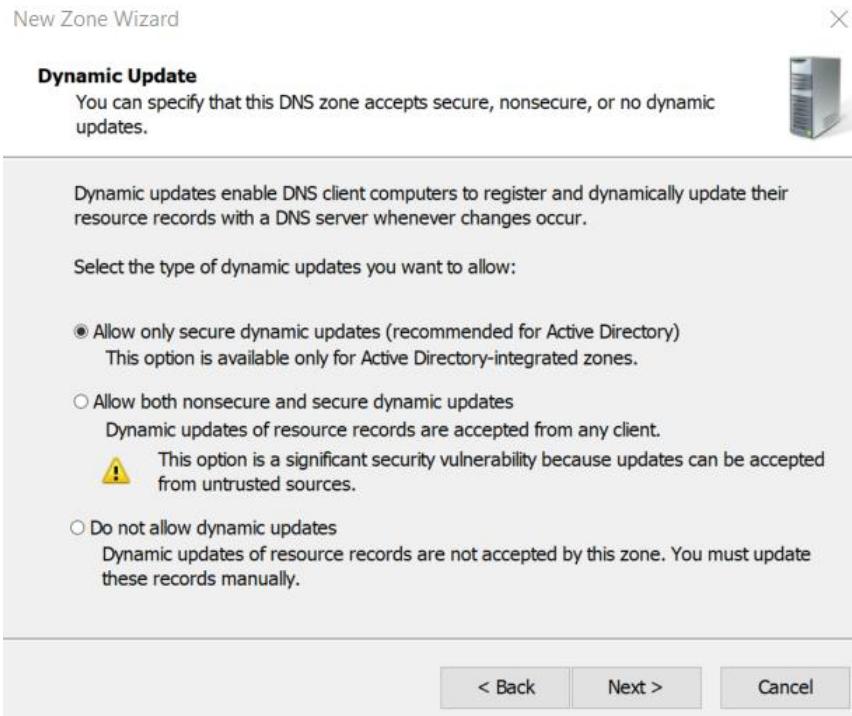
&lt; Back

Next &gt;

Cancel

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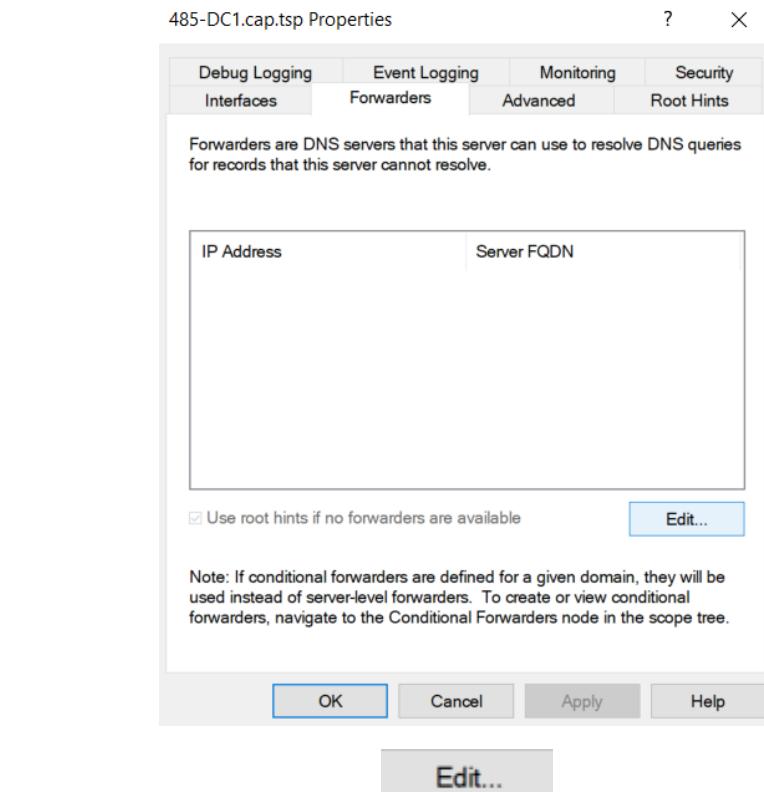
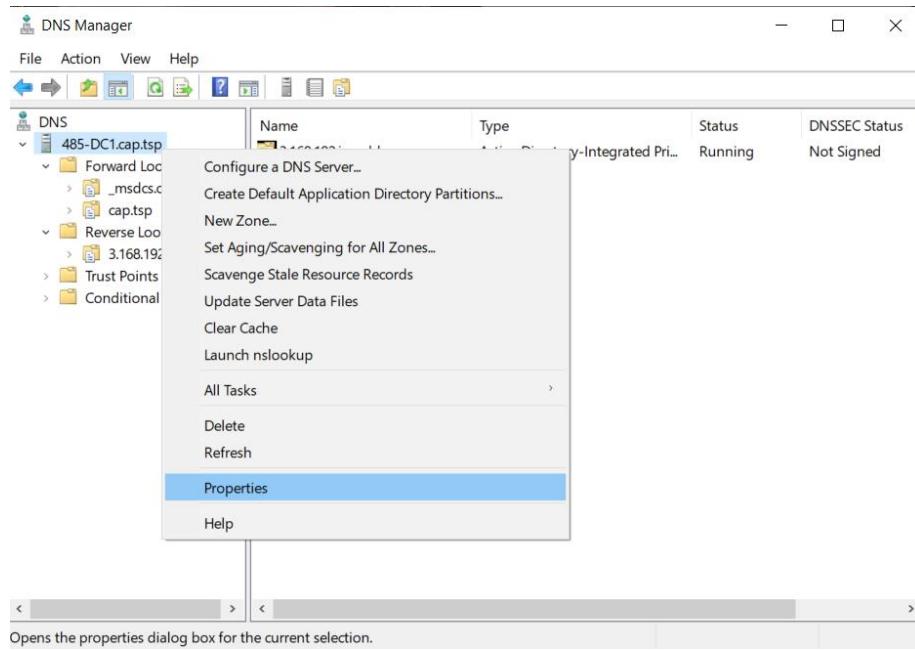
A01340485



We're now going to add our pfSense default gateway as our forwarder to reach the internet.

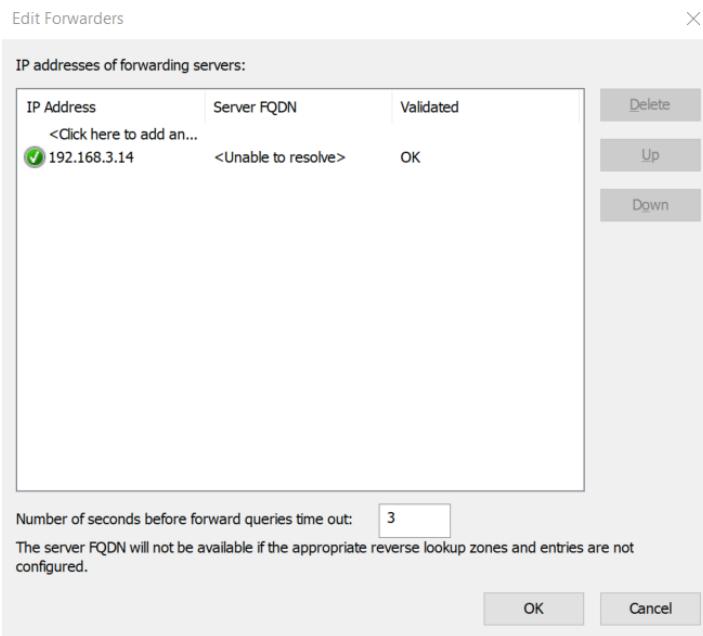
# CAPSTONE

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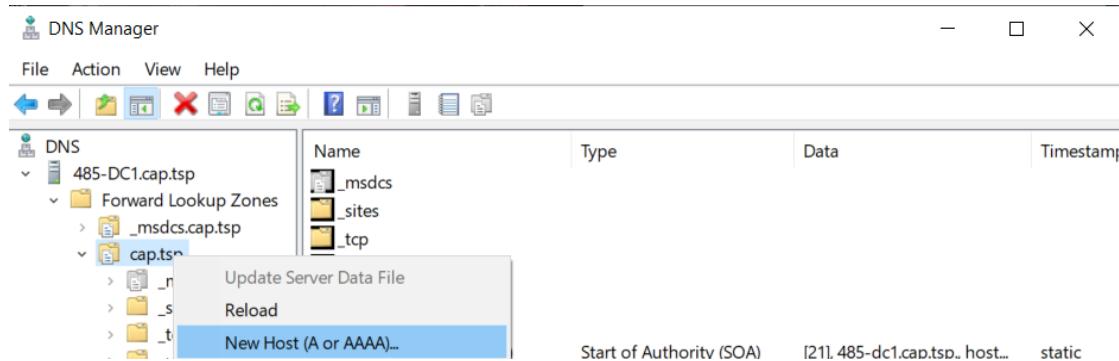


# CAPSTONE

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We're now going to add an “A Record” in DNS for our pfSense.



# CAPSTONE

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New Host

Name (uses parent domain name if blank):  
485-FW

Fully qualified domain name (FQDN):  
485-FW.cap.tsp.

IP address:  
192.168.3.14

Create associated pointer (PTR) record

Allow any authenticated user to update DNS records with the same owner name

Add Host Cancel

Next we will add a PTR record in our Reverse Lookup Zones for our “485-FW/485-DC1”

485-dc1	Host (A)	192.168.3.1
485-FW	Host (A)	192.168.3.14

Reverse Lookup Zones

3.168.192.in-addr.arpa

Update Server Data File

Reload

New Pointer (PTR)...

# CAPSTONE

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New Resource Record X

**Pointer (PTR)**

Host IP Address:

Fully qualified domain name (FQDN):

Host name:  
 Browse...

Allow any authenticated user to update all DNS records with the same name. This setting applies only to DNS records for a new name.

OK Cancel



192.168.3.14

Pointer (PTR)

485-FW.cap.tsp.



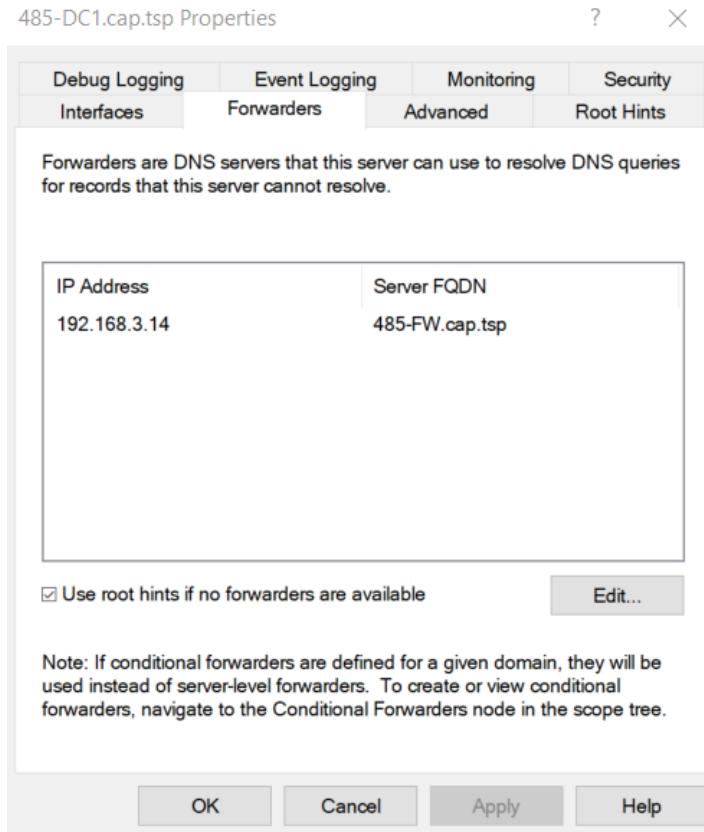
192.168.3.1

Pointer (PTR)

485-dc1.cap.tsp

# CAPSTONE

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```
PS C:\Windows\system32> nslookup
Default Server: 485-dc1.cap.tsp
Address: 192.168.3.1

> 485-FW.cap.tsp
Server: 485-dc1.cap.tsp
Address: 192.168.3.1

Name: 485-FW.cap.tsp
Address: 192.168.3.14
```

## Installing & Configuring Linux DHCP

We're now going to create a CentOS VM.

Name:	485-Linux-DHCP
Generation:	Generation 2
Memory:	2048 MB
Network:	LAN
Hard Disk:	V:\VMs\VHD\485-Linux-DHCP.vhdx (VHDX, dynamically expanding)
Operating System:	Will be installed from V:\Software\ISO\CentOS-7-x86_64-Everything-2009.iso

# CAPSTONE

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CentOS

INSTALLATION SUMMARY

CENTOS 7 INSTALLATION

us Help!

LOCALIZATION

DATE & TIME Americas/New York timezone

LANGUAGE SUPPORT English (United States)

KEYBOARD English (US)

SOFTWARE

INSTALLATION SOURCE Local media

SOFTWARE SELECTION Minimal Install

SYSTEM

INSTALLATION DESTINATION Automatic partitioning selected

KDUMP Kdump is enabled

NETWORK & HOST NAME Not connected

SECURITY POLICY No content found

Quit Begin Installation

We won't touch your disks until you click 'Begin Installation'.

Please complete items marked with this icon before continuing to the next step.

# CAPSTONE

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**SOFTWARE SELECTION**

Done CENTOS 7 INSTALLATION

Base Environment

- Minimal Install**  
Basic functionality.
- Compute Node**  
Installation for performing computation and processing.
- Infrastructure Server**  
Server for operating network infrastructure services.
- File and Print Server**  
File, print, and storage server for enterprises.
- Basic Web Server**  
Server for serving static and dynamic internet content.
- Virtualization Host**  
Minimal virtualization host.
- Server with GUI**  
Server for operating network infrastructure services, with a GUI.
- GNOME Desktop**  
GNOME is a highly intuitive and user friendly desktop environment.
- KDE Plasma Workspaces**  
The KDE Plasma Workspaces, a highly-configurable graphical user interface which includes a panel, desktop, system icons and desktop widgets, and many powerful KDE applications.
- Development and Creative Workstation**  
Workstation for software, hardware, graphics, or content development.

Add-Ons for Selected Environment

- Debugging Tools**  
Tools for debugging misbehaving applications and diagnosing performance problems.
- Compatibility Libraries**  
Compatibility libraries for applications built on previous versions of CentOS Linux.
- Development Tools**  
A basic development environment.
- Security Tools**  
Security tools for integrity and trust verification.
- Smart Card Support**  
Support for using smart card authentication.
- System Administration Tools**  
Utilities useful in system administration.

**INSTALLATION DESTINATION**

Done CENTOS 7 INSTALLATION

Device Selection

Select the device(s) you'd like to install to. They will be left untouched until you click on the main menu's "Begin Installation" button.

Local Standard Disks

40 GiB	Msft Virtual Disk	sda / 40 GiB free
--------	-------------------	-------------------

Disks left unselected here will not be touched.

Specialized & Network Disks

Add a disk...
---------------

Disks left unselected here will not be touched.

Other Storage Options

Partitioning

Automatically configure partitioning.  I will configure partitioning.  
 I would like to make additional space available.

Encryption

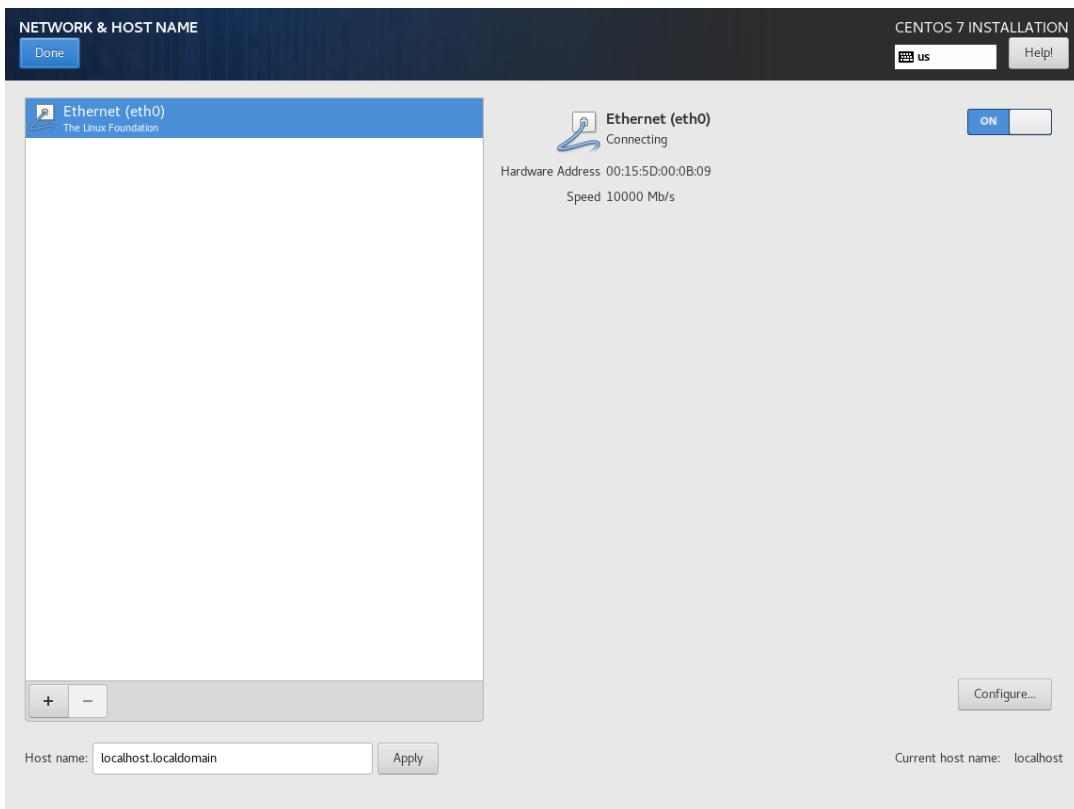
Encrypt my data. You'll set a passphrase next.

[Full disk summary and boot loader...](#)

1 disk selected; 40 GiB capacity: 40 GiB free [Refresh...](#)

# CAPSTONE

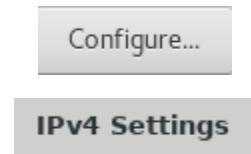
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(I forgot to add my hostname)

```
eden@localhost ~]$ hostnamectl set-hostname 485-Linux-DHCP
==== AUTHENTICATING FOR org.freedesktop.hostname1.set-static-hostname ===
Authentication is required to set the statically configured local host name, as well as the pretty host name.
Authenticating as: Eden (eden)
Password:
```

We're now going to assign our "485-Linux-DHCP" IP address.



# CAPSTONE

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Editing eth0

Connection name: **eth0**

General Ethernet 802.1X Security DCB Proxy **IPv4 Settings** IPv6 Settings

Method: Manual

**Addresses**

Address	Netmask	Gateway
192.168.3.3	28	192.168.3.14

Add Delete

DNS servers: 192.168.3.1

Search domains:

DHCP client ID:

Require IPv4 addressing for this connection to complete

Routes...

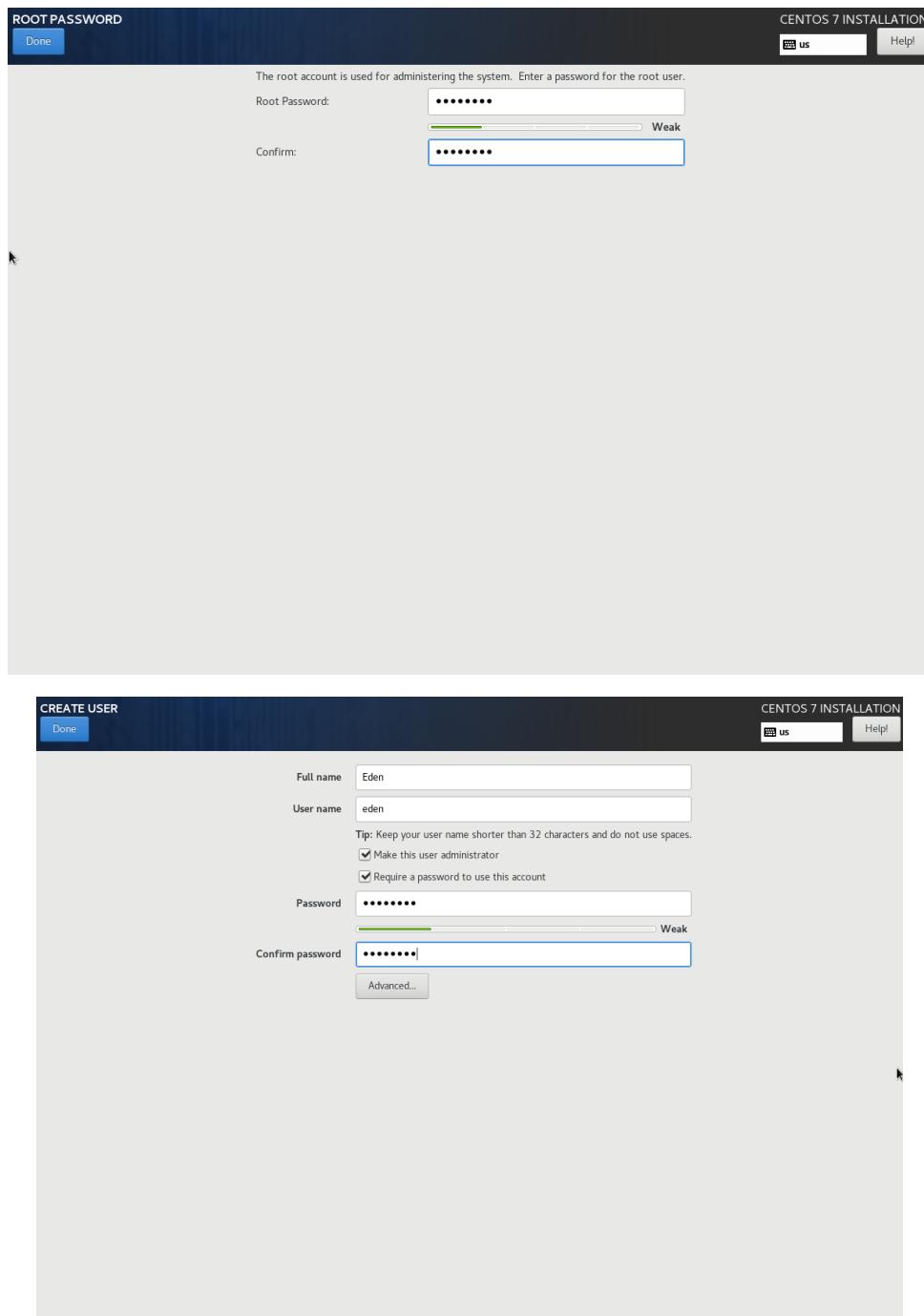
Cancel Save

 **Ethernet (eth0)**  
Connected

ON

# CAPSTONE

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We're now going to install DHCP in our CLI.

```
[eden@localhost ~]$ sudo yum install dhcp
```

# CAPSTONE

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```

dhcpc-libs           x86_64          12:4.2.5-83.el7.centos.1      updates          133 k
Transaction Summary
=====
Install  1 Package
Upgrade   ( 3 Dependent packages)

Total download size: 1.1 M
Is this ok [y/d/N]: y
Downloading packages:
Delta RPMs disabled because /usr/bin/applydelta rpm not installed.
Warning: /var/cache/yum/x86_64/7/updates/packages/dhcpc-libs-4.2.5-83.el7.centos.1.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID f4a88eb5: N
Huge
Public key for dhcpc-libs-4.2.5-83.el7.centos.1.x86_64.rpm is not installed
(1:4): dhcpc-libs-4.2.5-83.el7.centos.1.x86_64.rpm                                | 133 kB  00:00:05
(2:4): dhclient-4.2.5-83.el7.centos.1.x86_64.rpm                                 | 296 kB  00:00:09
(3:4): dhcpc-libs-4.2.5-83.el7.centos.1.x86_64.rpm                                | 177 kB  00:00:16
(4:4): dhcpc-libs-4.2.5-83.el7.centos.1.x86_64.rpm                                | 155 kB  00:00:17
Total                                         62 kB/s ± 1.1 MB  00:00:17

Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
Importing GPG key 0xF4A88EB5
Userid       : "CentOS-7 Key (CentOS 7 Official Signing Key) <security@centos.org>"
Fingerprint: 6341 ab27 53d7 9a78 a7e2 7b11 24c6 a8a? f4a8 0e85
Package     : centos-release-7-9.2009.0.el7.centos.x86_64 (@anaconda)
From       : /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
Is this ok [y/n]: y
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Upgrading: 12:dhcpc-libs-4.2.5-83.el7.centos.1.x86_64                               1/7
    Updating : 12:dhcpc-common-4.2.5-83.el7.centos.1.x86_64                           2/7
      Installing: 12:dhcpc-4.2.5-83.el7.centos.1.x86_64                            3/7
    Updating : 12:dhclient-4.2.5-83.el7.centos.x86_64                             4/7
      Clean up: 12:dhcpc-1.1.8-5-8.el7.centos.x86_64                         5/7
    Updating : 12:dhcpc-1.1.8-5-8.el7.centos.x86_64                         6/7
      Clean up: 12:dhcpc-1.1.8-5-8.el7.centos.x86_64                         7/7
  Verifying: 12:dhcpc-common-4.2.5-83.el7.centos.1.x86_64                         1/7
  Verifying: 12:dhcpc-4.2.5-83.el7.centos.1.x86_64                           2/7
  Verifying: 12:dhclient-4.2.5-83.el7.centos.x86_64                            3/7
  Verifying: 12:dhcpc-1.1.8-5-8.el7.centos.x86_64                         4/7
  Verifying: 12:dhcpc-1.1.8-5-8.el7.centos.x86_64                         5/7
  Verifying: 12:dhcpc-common-4.2.5-83.el7.centos.1.x86_64                      6/7
  Verifying: 12:dhcpc-libs-4.2.5-83.el7.centos.1.x86_64                      7/7
Installed:
  dhcpc.x86_64 12:4.2.5-83.el7.centos.1

Dependency Updated:
  dhclient.x86_64 12:4.2.5-83.el7.centos.1      dhcpc-common.x86_64 12:4.2.5-83.el7.centos.1      dhcpc-libs.x86_64 12:4.2.5-83.el7.centos.1

Complete!
[eden@localhost ~]15

```

```
[eden@localhost ~]$ sudo yum install nano
```

```
[eden@localhost ~]$ sudo nano /etc/dhcp/dhcpd.conf
```

Add the following:

```

# 
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp*/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#
subnet 192.168.3.0 netmask 255.255.255.240 {
    range 192.168.3.12 192.168.3.12;
    option routers 192.168.3.14;
    option domain-name-servers 192.168.3.1 192.168.3.2;

```

```
[eden@localhost ~]$ sudo systemctl start dhcpcd
```

```
[eden@localhost ~]$ sudo systemctl restart dhcpcd
```

Now we're going to join the domain.

```
[eden@localhost ~]$ sudo yum install realmd sssd oddjob oddjob-mkhomedir adcli samba-common-tools krb5-workstation openldap-clients policycoreutils-python
```

```
[eden@localhost ~]$ sudo nano /etc/krb5.conf
```

# CAPSTONE

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```
GNU nano 2.3.1                                         File: /etc/krb5.conf

# Configuration snippets may be placed in this directory as well
includedir /etc/krb5.conf.d/

[logging]
default = FILE:/var/log/krb5libs.log
kdc = FILE:/var/log/krb5kdc.log
admin_server = FILE:/var/log/kadmind.log

[libdefaults]
dns_lookup_realm = false
ticket_lifetime = 24h
renew_lifetime = 7d
forwardable = true
rdns = false
pkinit_anchors = FILE:/etc/pki/tls/certs/ca-bundle.crt
default_realm = cap.tsp

[realms]
cap.tsp = {
    kdc = 485-dc1.cap.tsp
    admin_server = 485-dc1.cap.tsp
}

cap.tsp = {}

[domain_realm]
cap.tsp = cap.tsp
cap.tsp = cap.tsp

[eden@localhost ~]$: sudo realm join --user=eden cap.tsp
Password for eden:
[eden@localhost ~]$
```

```
GNU nano 2.3.1                                         File: /etc/sssd/sssd.conf

[sssd]
domains = cap.tsp
config_file_version = 2
services = nss, pam

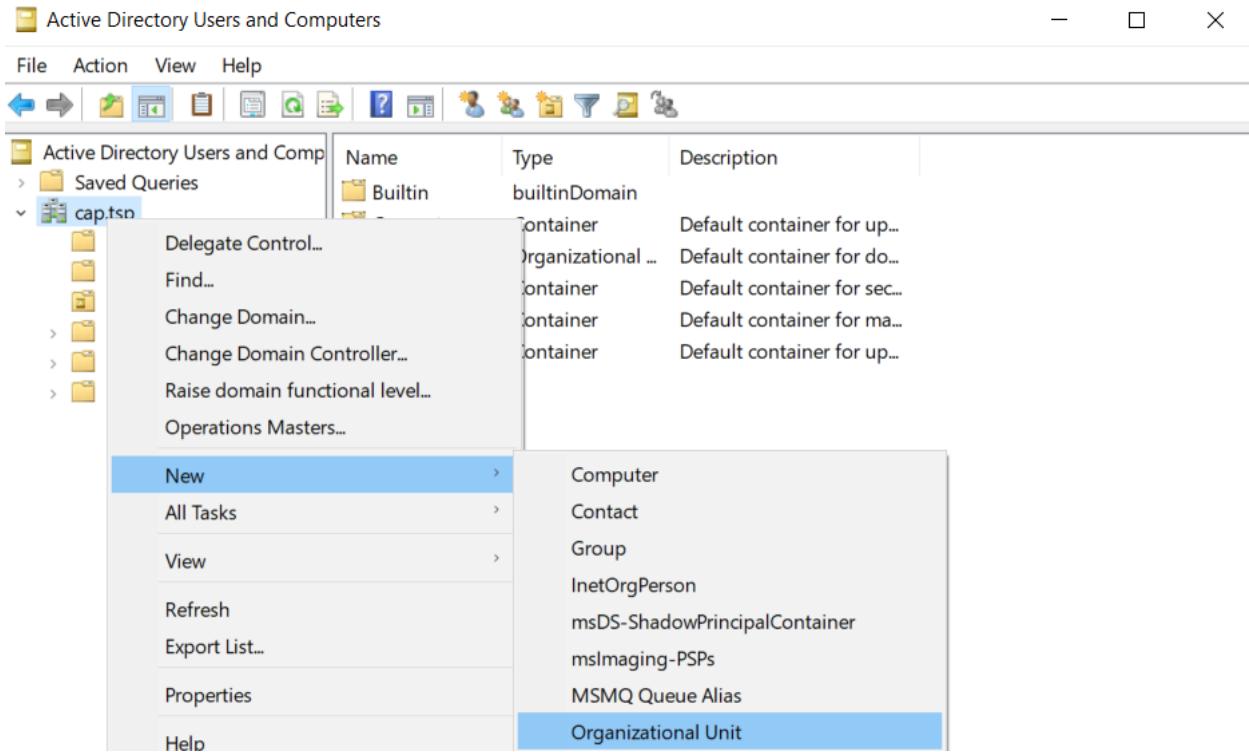
[domain/cap.tsp]
ad_domain = cap.tsp
krb5_realm = CAP.TSP
realmd_tags = manages-system joined-with-samba
cache_credentials = True
id_provider = ad
krb5_store_password_if_offline = True
default_shell = /bin/bash
ldap_id_mapping = True
use_fully_qualified_names = True
fallback_homedir = /home/%u@%d
access_provider = ad
auth_provider = ad
ad_server = 485-DC1.cap.tsp
```

# CAPSTONE

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```
[eden@localhost ~]$ realm list
cap.tsp
  type: kerberos
  realm-name: CAP.TSP
  domain-name: cap.tsp
  configured: kerberos-member
  server-software: active-directory
  client-software: sssd
  required-package: oddjob
  required-package: oddjob-mkhomedir
  required-package: sssd
  required-package: adcli
  required-package: samba-common-tools
  login-formats: %U@cap.tsp
  login-policy: allow-realm-logins
[eden@localhost ~]$ _
```

## Creating An Active Directory OU Structure



# CAPSTONE

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## San Installation & Configuration

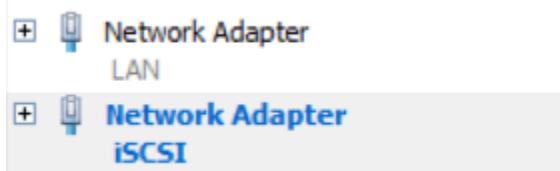
We're going to create our SAN VM.

# CAPSTONE

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Format: VHDX  
Type: differencing  
Name: 485-SAN.vhdx  
Location: V:\VMs\VHDX  
Parent: V:\VMs\VHDX\ParentCoreServer.vhdx

You're now going to add a second network adapter.



Proceed to boot the VM.

Head to Powershell and run this script:

This is the post installation setup for our SAN.

```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> $IP = Read-Host -Prompt 'Input your IP Address'
>> $MaskBits = 28 # This means subnet mask = 255.255.255.240
>> $Gateway = "192.168.3.14"
>> $IPTYPE = "IPv4"
>> # Retrieve the network adapter that you want to configure
>> $adapter = Get-NetAdapter | ? {$_.Status -eq "up"}
>> # Remove any existing IP, gateway from our ipv4 adapter
>> If (($adapter | Get-NetIPConfiguration).IPv4Address.IPAddress) {
>>   $adapter | Remove-NetIPAddress -AddressFamily $IPTYPE -Confirm:$false
>> }
>> If (($adapter | Get-NetIPConfiguration).Ipv4DefaultGateway) {
>>   $adapter | Remove-NetRoute -AddressFamily $IPTYPE -Confirm:$false
>> }
>> # Configure the IP address and default gateway
>> $adapter | New-NetIPAddress `
>>   -AddressFamily $IPTYPE
>>   -IPAddress $IP
>>   -PrefixLength $MaskBits
>>   -DefaultGateway $Gateway
>> # Rename the Network Adapter
>> Rename-NetAdapter -Name "Ethernet" -NewName "LAN"
>> # Name Computer, and rename the local admin account
>> Rename-Computer -NewName (Read-Host -Prompt 'Input the new PC name')
>> Rename-LocalUser -Name "Administrator" -NewName "Eden"
>> Restart-Computer -Force
Input your IP Address: 192.168.3.4
```

**Input the new PC name: 485-SAN**

Your SAN will now restart.

We're now going to change the iSCSI IP Address.

## CAPSTONE

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```
PS C:\Users\Administrator> Get-NetAdapter
Name           InterfaceDescription          ifIndex Status     MacAddress      LinkSpeed
----           -----                   -----   -----   -----
Ethernet 3     Microsoft Hyper-V Network Adapter #3    7 Up      00-15-5D-00-0B-0D  10 Gbps
Ethernet 2     Microsoft Hyper-V Network Adapter #2    2 Up      00-15-5D-00-0B-0C  10 Gbps

PS C:\Users\Administrator> New-NetIPAddress -AddressFamily IPv4 -IPAddress 192.168.10.3 -PrefixLength 29 -InterfaceIndex 7
AddressFamily : IPv4
InterfaceIndex: 7
InterfaceAlias: Ethernet 3
Type          : Unicast
PrefixLength  : 29
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Tentative
ValidLifetime : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime: Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : ActiveStore

AddressFamily : IPv4
InterfaceIndex: 7
InterfaceAlias: Ethernet 3
Type          : Unicast
PrefixLength  : 29
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime: Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore
```

Disable the firewall.

```
PS C:\Users\Administrator> netsh advfirewall set allprofiles state off
Ok.
```

We're now going to enable "Jumbo Packets".

```
PS C:\Users\Administrator> Get-NetAdapter
Name           InterfaceDescription          ifIndex Status     MacAddress      LinkSpeed
----           -----                   -----   -----   -----
iSCSI          Microsoft Hyper-V Network Adapter #3    7 Up      00-15-5D-00-0B-0D  10 Gbps
LAN            Microsoft Hyper-V Network Adapter #2    2 Up      00-15-5D-00-0B-0C  10 Gbps

PS C:\Users\Administrator> Set-NetAdapterAdvancedProperty -Name "LAN" -DisplayName "Jumbo Packet" -DisplayValue "9014 bytes"
PS C:\Users\Administrator> Set-NetAdapterAdvancedProperty -Name "iSCSI" -DisplayName "Jumbo Packet" -DisplayValue "9014 bytes"
PS C:\Users\Administrator> Get-NetAdapterAdvancedProperty -Name "iSCSI" -DisplayName "Jumbo Packet"

Name           DisplayName          DisplayValue          RegistryKeyword RegistryValue
----           -----          -----          -----          -----
iSCSI          Jumbo Packet       9014 Bytes          *JumboPacket    {9014}

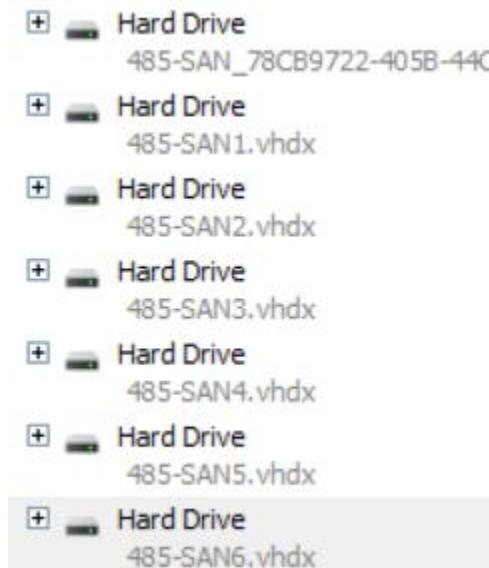
PS C:\Users\Administrator> Get-NetAdapterAdvancedProperty -Name "LAN" -DisplayName "Jumbo Packet"

Name           DisplayName          DisplayValue          RegistryKeyword RegistryValue
----           -----          -----          -----          -----
LAN            Jumbo Packet       9014 Bytes          *JumboPacket    {9014}
```

We're now going to add 6 additional 45GB disks to the SAN.

# CAPSTONE

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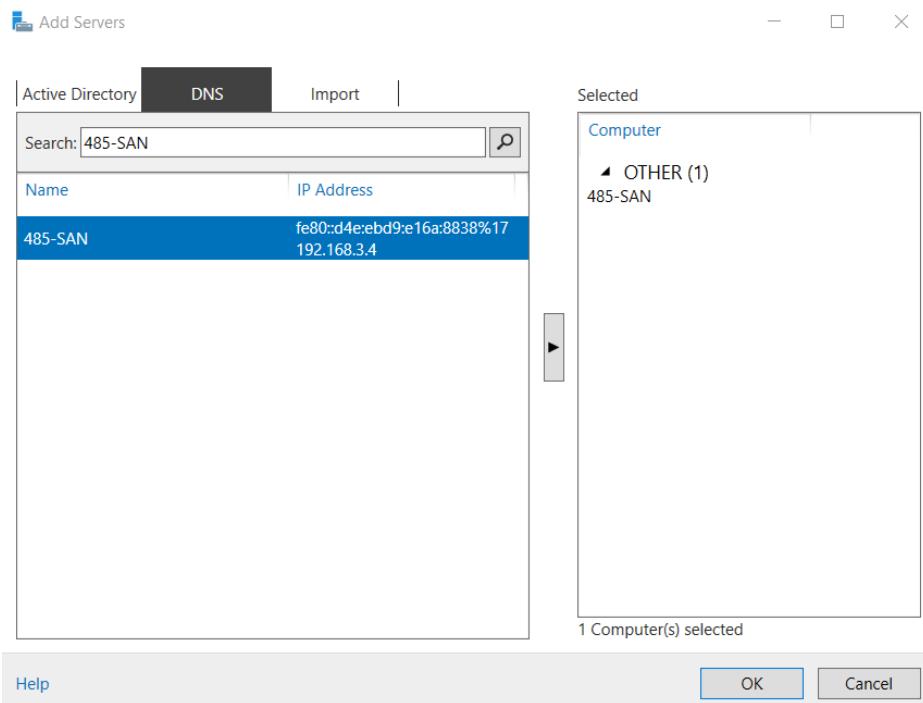


Now we will be establishing trust between our SAN and our Host as it's not domain joined.

```
PS C:\Windows\system32> Set-Item WSMAN:\localhost\client\trustedhosts -value "192.168.3.4,485-SAN"

WinRM Security Configuration.
This command modifies the TrustedHosts list for the WinRM client. The computers in the TrustedHosts list might not be
authenticated. The client might send credential information to these computers. Are you sure that you want to modify
this list?
[Y] Yes [N] No [S] Suspend [?] Help (default is "Y"): Y
```

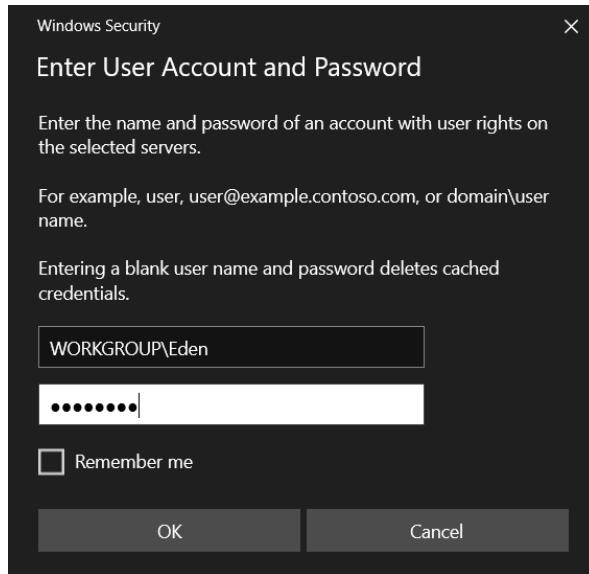
Now we're going to add our SAN to your Server Manager.



# CAPSTONE

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Now we're going to go to "Manage As" to get rid of the Kerberos error.



We're now going to bring all 6 of our newly created disks online using the following command:

```
PS C:\Users\Administrator> Get-Disk |Where-Object IsOffline -eq $true | Set-Disk -IsOffline $false
PS C:\Users\Administrator> Get-Disk
```

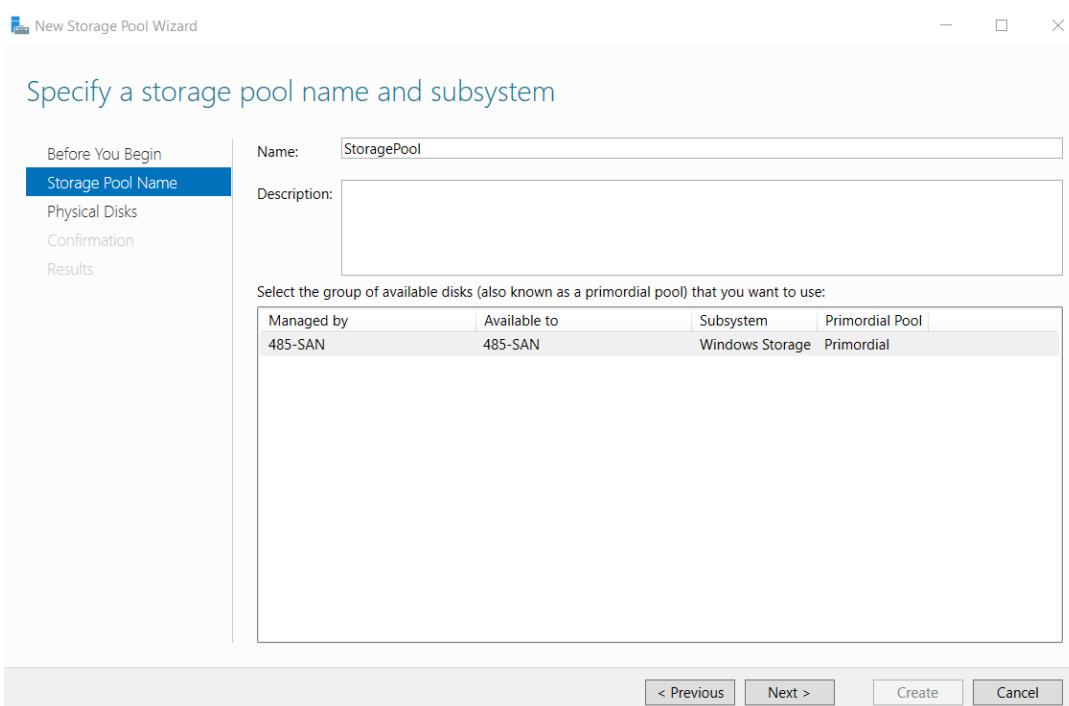
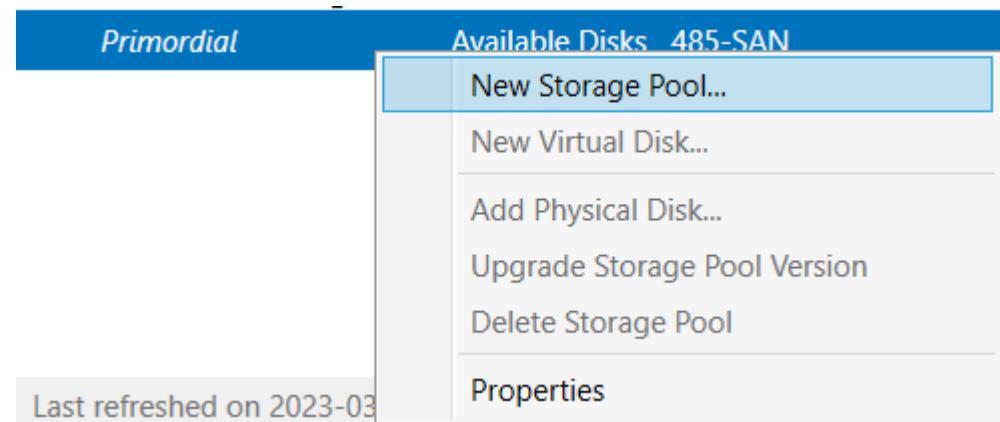
Number	F	Serial Number	HealthStatus	OperationalStatus	Total Size	Partiti on Style
r						
i						
e						
n						
d						
l						
y						
N						
a						
m						
e						
-----						
0	M		Healthy	Online	127 GB	GPT
1	M		Healthy	Online	45 GB	RAW
2	M		Healthy	Online	45 GB	RAW
3	M		Healthy	Online	45 GB	RAW
4	M		Healthy	Online	45 GB	RAW
5	M		Healthy	Online	45 GB	RAW
6	M		Healthy	Online	45 GB	RAW

We're now going to create a Storage Pool.

Server Manager ▶ File and Storage Services ▶ Volumes ▶ Storage Pools

# CAPSTONE

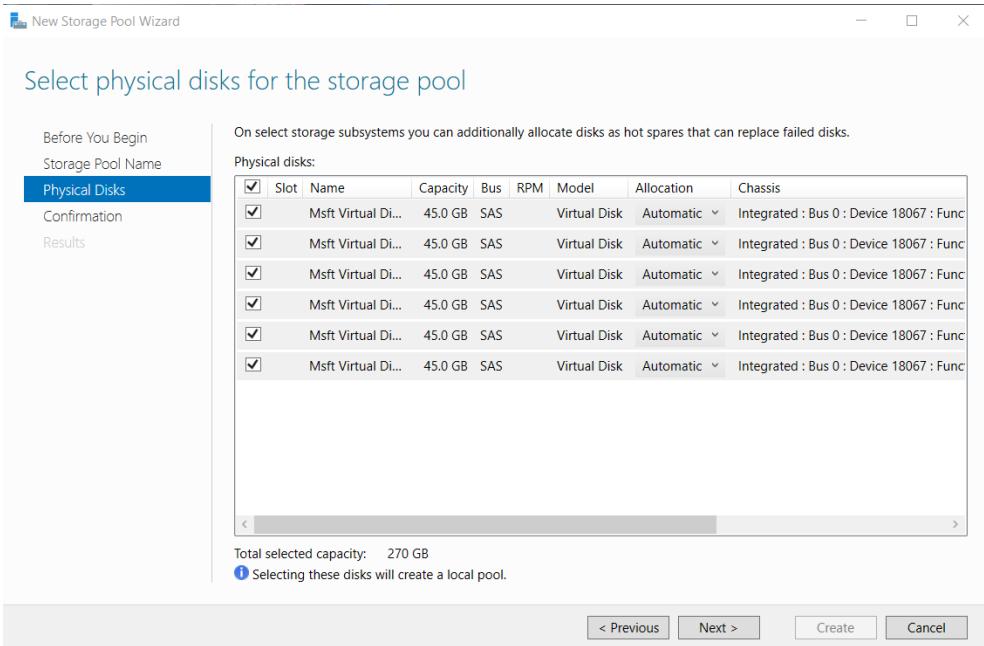
A01340485



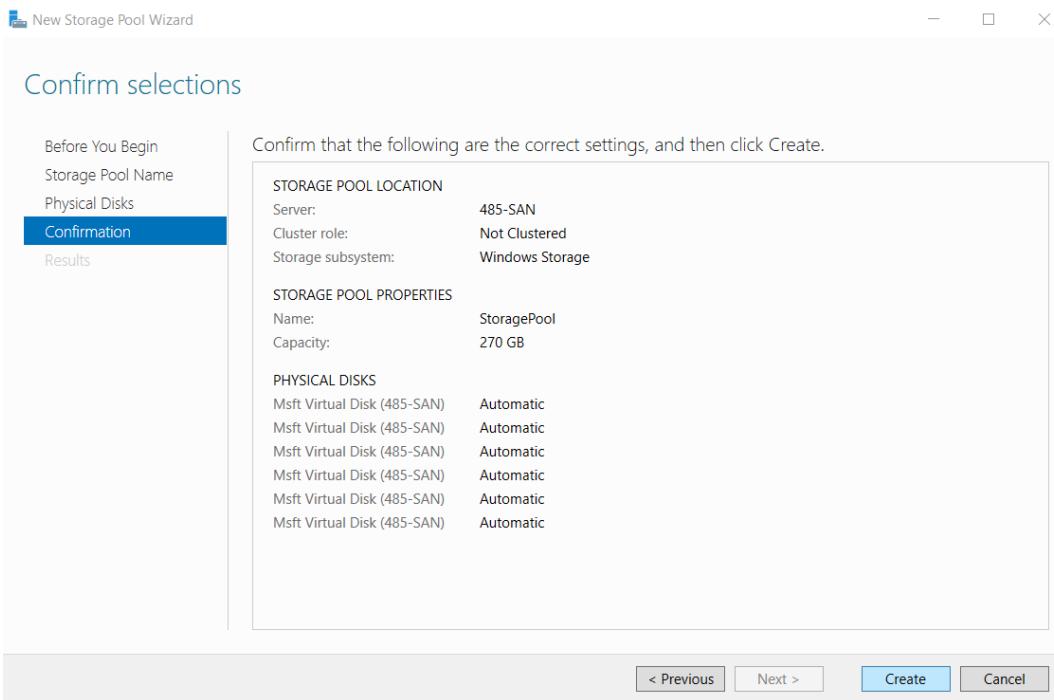
Select all 6 of the disks we've added.

# CAPSTONE

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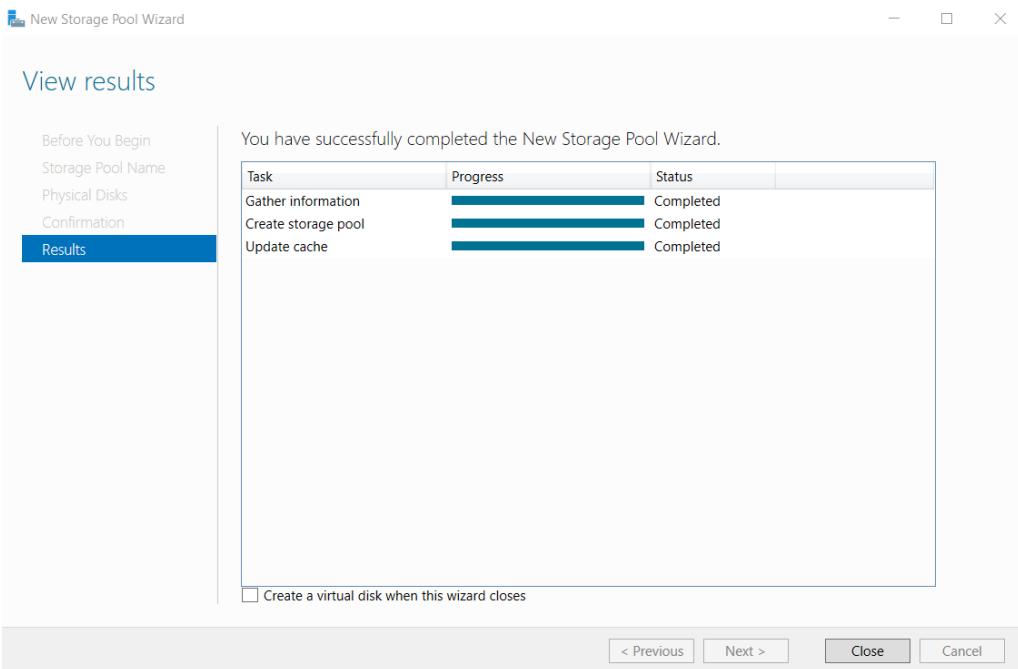


Now go ahead and select create.



# CAPSTONE

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Next, we're going to create our Virtual Disk in the SAN Powershell to avoid it failing in the GUI.

```
PS C:\Users\Administrator> New-VirtualDisk -StoragePoolFriendlyName StoragePool -FriendlyName VirtualDisk -ResiliencySettingName Parity -Size 100GB -ProvisioningType Fixed -PhysicalDiskRedundancy 2 -NumberOfColumns 6
```

FriendlyName	ResiliencySettingName	FaultDomainRedundancy	OperationalStatus	HealthStatus	Size	FootprintOnPool	StorageEfficiency
VirtualDisk	Parity	2	OK	Healthy	100 GB	155.25 GB	64.41%

VIRTUAL DISKS										TASKS
StoragePool on 485-SAN										
Filter										
⚠	Name	Status	Layout	Provisioning	Capacity	Allocated	Volume	Clustered	Tiered	Write-B
	VirtualDisk	Parity	Fixed	100 GB	100 GB					1.00 GB

We're now going to create a Quorum disk in the SAN Powershell.

```
PS C:\Users\Administrator> New-VirtualDisk -StoragePoolFriendlyName StoragePool -FriendlyName Quorum -ResiliencySettingName Parity -Size 1GB -ProvisioningType Fixed -PhysicalDiskRedundancy 2 -NumberOfColumns 6
```

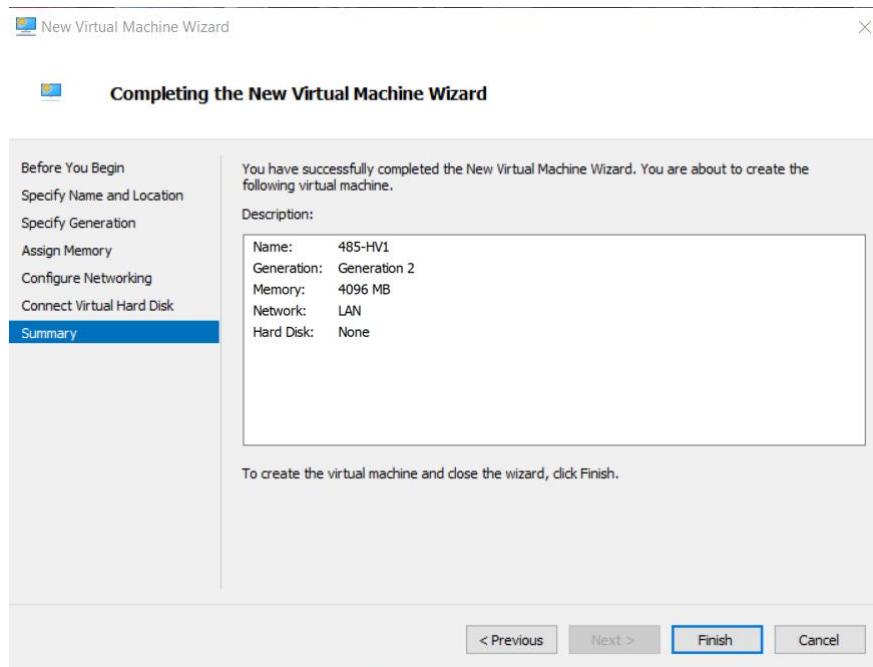
FriendlyName	ResiliencySettingName	FaultDomainRedundancy	OperationalStatus	HealthStatus	Size	FootprintOnPool	StorageEfficiency
Quorum	Parity	2	OK	Healthy	4 GB	11.25 GB	35.56%

# CAPSTONE

A01340485

Name	Status	Layout	Provisioning	Capacity	Allocated	Volume	Clustered	Tiered	Write-B
Quorum	Parity	Fixed		4.00 GB	4.00 GB				1.00 GB

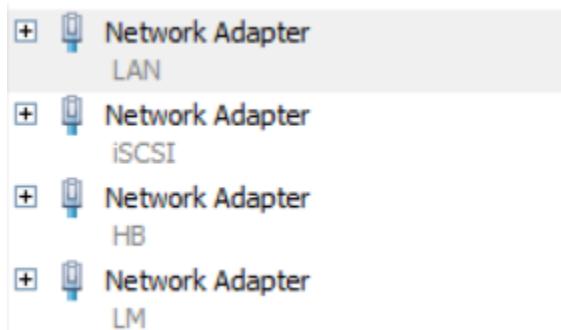
## Creating & Configuring HV1 & HV2



Next, we're going to add processors.



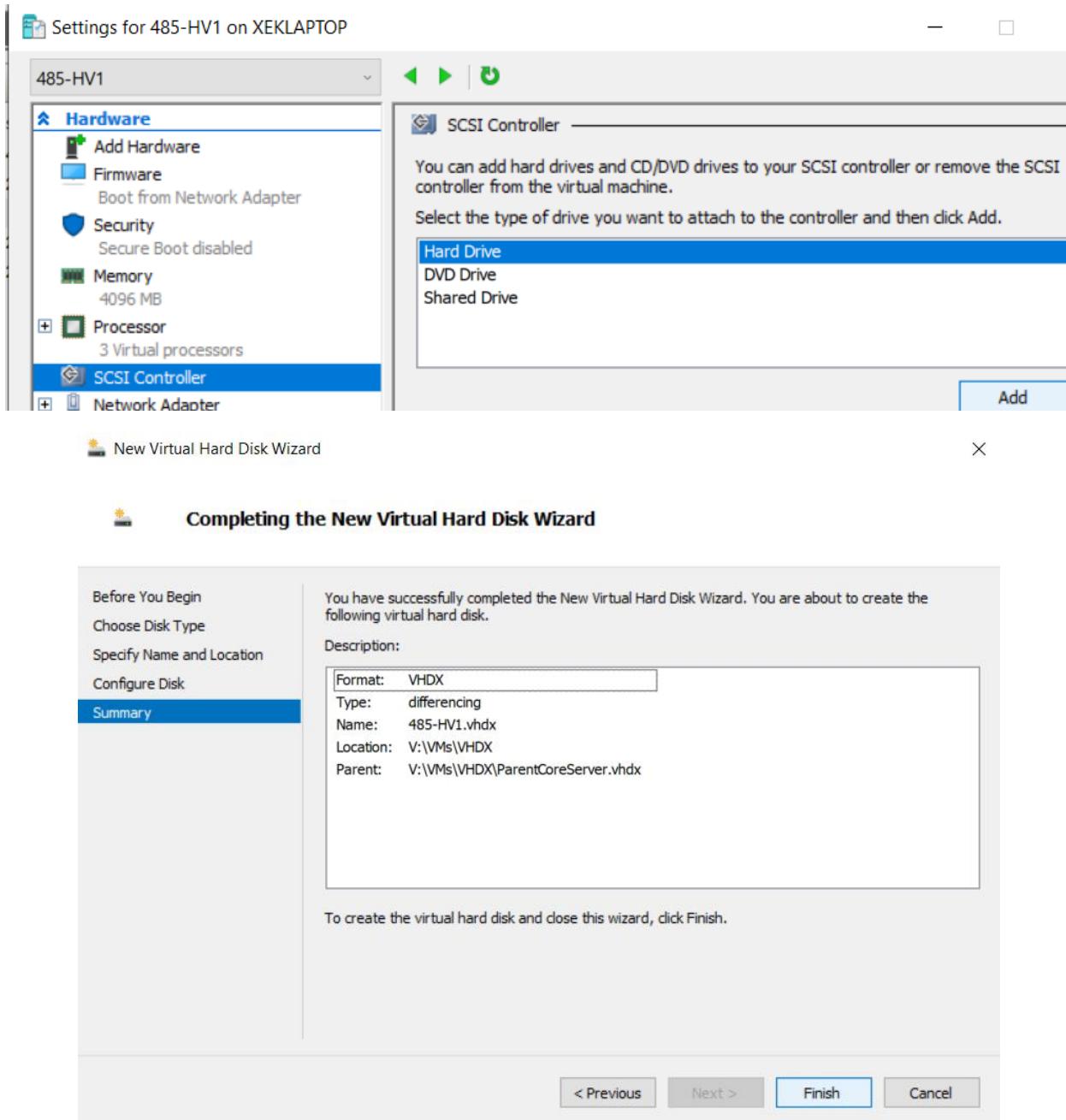
Now you will add 3 more Network Adapters.



# CAPSTONE

A01340485

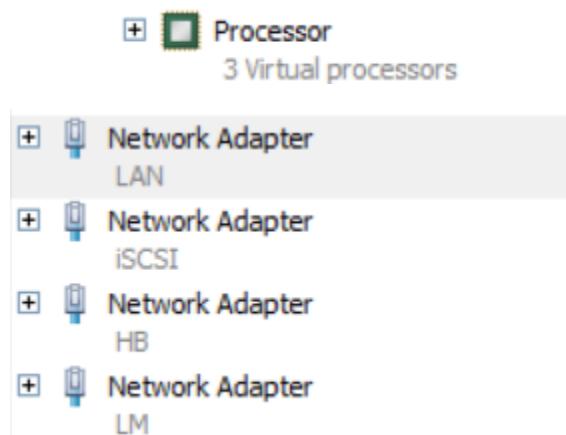
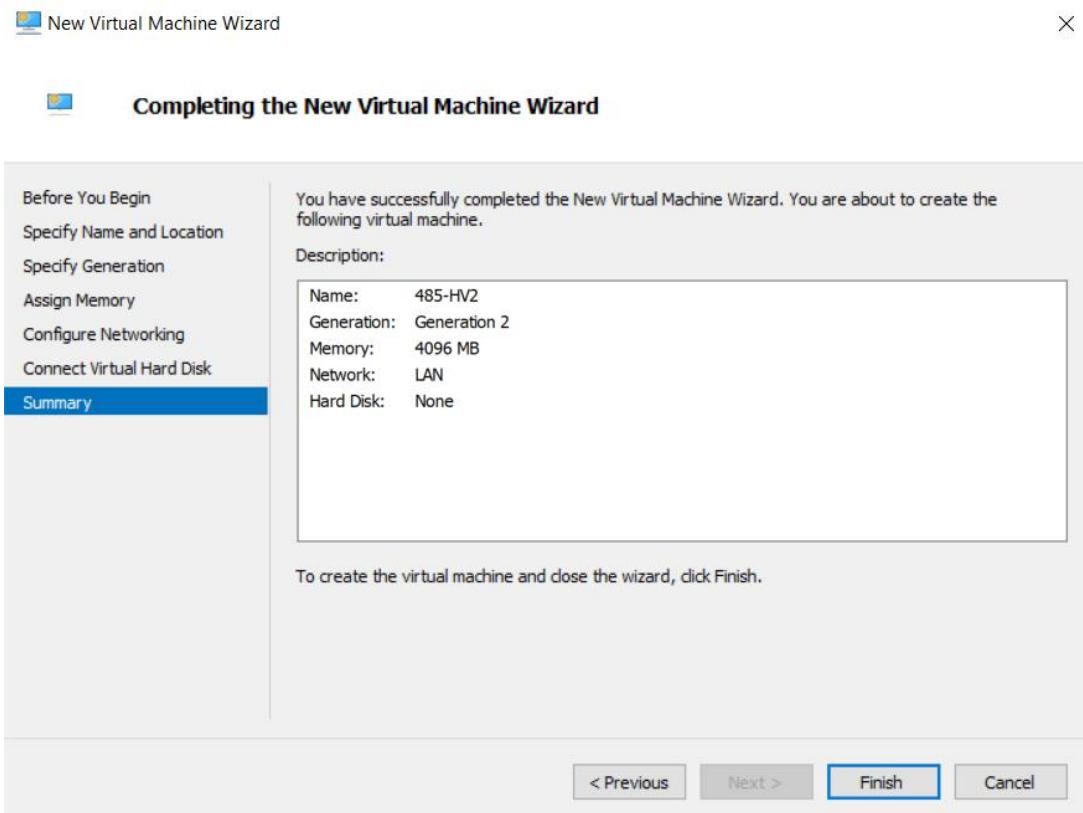
Now we're going to use our differencing disk.



Do the exact same as you did for HV1 for HV2.

# CAPSTONE

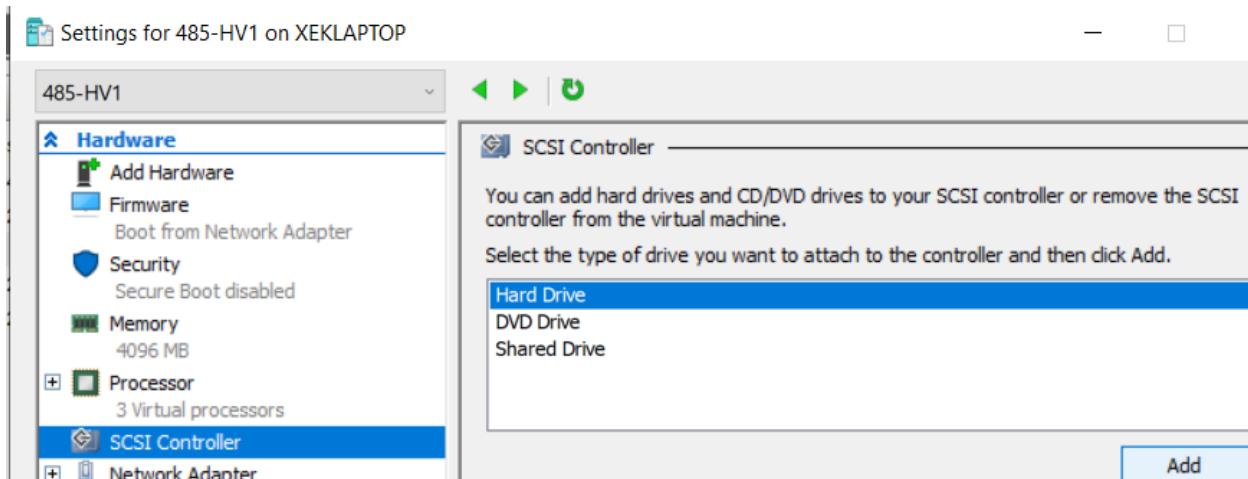
A01340485



Now we're going to use our differencing disk.

## CAPSTONE

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Format: VHDX  
Type: differencing  
Name: 485-HV2.vhdx  
Location: V:\VMs\VHDX  
Parent: V:\VMs\VHDX\ParentCoreServer.vhdx

We're now going to configure HV1.

```
=====
Welcome to Windows Server 2022 Datacenter Evaluation
=====

1) Domain/workgroup:           Workgroup: WORKGROUP
2) Computer name:             WIN-NPNPGCPBC2S
3) Add local administrator
4) Remote management:         Enabled

5) Update setting:            Download only
6) Install updates
7) Remote desktop:            Disabled

8) Network settings
9) Date and time
10) Telemetry setting:        Required
11) Windows activation

12) Log off user
13) Restart server
14) Shut down server
15) Exit to command line (PowerShell)

Enter number to select an option: 2
```

We're going to change the name of our device.

# CAPSTONE

A01340485

```
=====
Computer name
=====
Current computer name: WIN-NPNPGCPBC2S
Enter new computer name (Blank=Cancel): 485-HV1
Changing computer name...
WARNING: The changes will take effect after you restart the computer WIN-NPNPGCPBC2S.
Restart now? (Y)es or (N)o: Y
```

Next, we're going to rename our Network Adapters.

```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Get-NetAdapter

Name           InterfaceDescription      ifIndex Status    MacAddress
----           -----                   -----   -----
Ethernet 5     Microsoft Hyper-V Network Adapter #5      8 Up      00-15-5D-00-0B-0F
Ethernet 2     Microsoft Hyper-V Network Adapter #2      6 Up      00-15-5D-00-0B-11
Ethernet 3     Microsoft Hyper-V Network Adapter #3      5 Up      00-15-5D-00-0B-10
Ethernet 4     Microsoft Hyper-V Network Adapter #4      4 Up      00-15-5D-00-0B-0E

PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 4" -NewName "LAN"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 5" -NewName "iSCSI"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 3" -NewName "HB"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 2" -NewName "LM"
PS C:\Users\Administrator> Get-NetAdapter

Name           InterfaceDescription      ifIndex Status    MacAddress
----           -----                   -----   -----
iSCSI          Microsoft Hyper-V Network Adapter #5      8 Up      00-15-5D-00-0B-0F
LM             Microsoft Hyper-V Network Adapter #2      6 Up      00-15-5D-00-0B-11
HB             Microsoft Hyper-V Network Adapter #3      5 Up      00-15-5D-00-0B-10
LAN            Microsoft Hyper-V Network Adapter #4      4 Up      00-15-5D-00-0B-0E
```

Now we're going to statically assign IP Addresses for each individual Network Adapter.

# CAPSTONE

A01340485

(LAN)

```
=====
          Network adapter settings
=====

NIC index: 2
Description: Microsoft Hyper-V Network Adapter #4
IP address: 169.254.101.105,
             fe80::5780:6005:4e83:daf8
Subnet mask: 255.255.0.0
DHCP enabled: True

Default gateway:
Preferred DNS server:
Alternate DNS server:

 1) Set network adapter address
 2) Set DNS servers
 3) Clear DNS server settings

Enter selection (Blank=Cancel): 1
Select (D)HCP or (S)tatic IP address (Blank=Cancel): S
Enter static IP address (Blank=Cancel): 192.168.3.5
Enter subnet mask (Blank=255.255.255.0): 255.255.255.240
Enter default gateway (Blank=Cancel): 192.168.3.14
Setting NIC to static IP...
Successfully released DHCP lease.
Successfully enabled static addressing. DHCP for this network adapter is disabled.
Successfully set gateway.
Successfully set network adapter address.
(Press ENTER to continue): .
```

```
Default gateway:      192.168.3.14
Preferred DNS server: 192.168.3.1
Alternate DNS server: 192.168.3.2

 1) Set network adapter address
 2) Set DNS servers
 3) Clear DNS server settings
```

```
Enter selection (Blank=Cancel): 2
Enter new preferred DNS server (Blank=Cancel): 192.168.3.1
Enter alternate DNS server (Blank=None): 192.168.3.2.
```

# CAPSTONE

A01340485

(iSCSI)

```
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "iSCSI" -IPAddress 192.168.10.1 -PrefixLength 29

IPAddress      : 192.168.10.1
InterfaceIndex : 8
InterfaceAlias : iSCSI
AddressFamily   : IPv4
Type           : Unicast
PrefixLength   : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 192.168.10.1
InterfaceIndex : 8
InterfaceAlias : iSCSI
AddressFamily   : IPv4
Type           : Unicast
PrefixLength   : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Invalid
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : PersistentStore

PS C:\Users\Administrator>
```

# CAPSTONE

A01340485

(HB)

```
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "HB" -IPAddress 192.168.20.1 -PrefixLength 29

IPAddress      : 192.168.20.1
InterfaceIndex  : 5
InterfaceAlias  : HB
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 192.168.20.1
InterfaceIndex  : 5
InterfaceAlias  : HB
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Invalid
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : PersistentStore
```

(LM)

```
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "LM" -IPAddress 192.168.30.1 -PrefixLength 30

IPAddress      : 192.168.30.1
InterfaceIndex  : 6
InterfaceAlias  : LM
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 30
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 192.168.30.1
InterfaceIndex  : 6
InterfaceAlias  : LM
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 30
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Invalid
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : PersistentStore
```

## CAPSTONE

A01340485

Index #	IP address	Description
2	192.168.3.5	Microsoft Hyper-V Network Adapter #4
3	192.168.10.1	Microsoft Hyper-V Network Adapter #5
4	192.168.20.1	Microsoft Hyper-V Network Adapter #3
5	192.168.30.1	Microsoft Hyper-V Network Adapter #2

Next, we're going to disable the firewall.

```
PS C:\Users\Administrator> netsh advfirewall set allprofiles state off
0k.
```

We're going to allow this server to be pinged.

```
=====
          Configure remote management
=====

Remote management is enabled.
Server response to ping is disabled.

1) Enable remote management
2) Disable remote management
3) Enable server response to ping
4) Disable server response to ping

Enter selection (Blank=Cancel): 3.
```

To ensure that HV1 can do virtualization within itself this command needs to be done.

```
PS C:\Windows\system32> Set-VMProcessor -VMName 485-HV1 -ExposeVirtualizationExtensions $true
```

Now we're going to domain join HV1.

```
Enter number to select an option: 1.
```

```
Join (D)omain or (W)orkgroup? (Blank=Cancel): D.
```

```
Name of domain to join (Blank=Cancel): cap.tsp
```

```
Specify an authorized domain\user (Blank=Cancel): cap.tsp\Eden
```

```
Password for cap.tsp\Eden: *****
```

```
WARNING: The changes will take effect after you restart the computer 485-HV1.
Successfully joined domain.
Do you want to change the computer name before restarting? (Y)es or (N)o: Y.
```

# CAPSTONE

A01340485

We're now going to configure HV2

```
=====
Welcome to Windows Server 2022 Datacenter Evaluation
=====

1) Domain/workgroup:           Workgroup: WORKGROUP
2) Computer name:             WIN-NPNPGCPBC2S
3) Add local administrator
4) Remote management:         Enabled
5) Update setting:            Download only
6) Install updates
7) Remote desktop:            Disabled
8) Network settings
9) Date and time
10) Telemetry setting:        Required
11) Windows activation
12) Log off user
13) Restart server
14) Shut down server
15) Exit to command line (PowerShell)

Enter number to select an option: 2
```

We're going to change the name of our device.

```
=====
Computer name
=====

Current computer name: WIN-NPNPGCPBC2S

Enter new computer name (Blank=Cancel): 485-HV2
Changing computer name...
WARNING: The changes will take effect after you restart the computer WIN-NPNPGCPBC2S.
Restart now? (Y)es or (N)o: Y
```

Next, we're going to rename our Network Adapters.

# CAPSTONE

A01340485

```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Get-NetAdapter

Name           InterfaceDescription          ifIndex Status   MacAddress      LinkSpeed
----           -----                      ----  -----
Ethernet 3     Microsoft Hyper-V Network Adapter #3    8 Up       00-15-5D-00-0B-15  10 Gbps
Ethernet 4     Microsoft Hyper-V Network Adapter #4    6 Up       00-15-5D-00-0B-13  10 Gbps
Ethernet 5     Microsoft Hyper-V Network Adapter #5    4 Up       00-15-5D-00-0B-14  10 Gbps
Ethernet 2     Microsoft Hyper-V Network Adapter #2    2 Up       00-15-5D-00-0B-12  10 Gbps

PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 2" -NewName "LAN"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 4" -NewName "iSCSI"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 5" -NewName "HB"
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet 3" -NewName "LM"
PS C:\Users\Administrator> Get-NetAdapter

Name           InterfaceDescription          ifIndex Status   MacAddress      LinkSpeed
----           -----                      ----  -----
LM            Microsoft Hyper-V Network Adapter #3    8 Up       00-15-5D-00-0B-15  10 Gbps
iSCSI          Microsoft Hyper-V Network Adapter #4    6 Up       00-15-5D-00-0B-13  10 Gbps
HB            Microsoft Hyper-V Network Adapter #5    4 Up       00-15-5D-00-0B-14  10 Gbps
LAN           Microsoft Hyper-V Network Adapter #2    2 Up       00-15-5D-00-0B-12  10 Gbps
```

Now we're going to statically assign IP Addresses for each individual Network Adapter.

(LAN)

```
=====
          Network adapter settings
=====

NIC index:      2
Description:    Microsoft Hyper-V Network Adapter #2
IP address:    169.254.251.44,
               fe80::5781:1e9e:e84a:18e1
Subnet mask:   255.255.0.0
DHCP enabled:  True

Default gateway:
Preferred DNS server:
Alternate DNS server:

  1) Set network adapter address
  2) Set DNS servers
  3) Clear DNS server settings

Enter selection (Blank=Cancel): 1
Select (D)HCP or (S)tatic IP address (Blank=Cancel): S
Enter static IP address (Blank=Cancel): 192.168.3.6
Enter subnet mask (Blank=255.255.255.0): 255.255.255.240
Enter default gateway (Blank=Cancel): 192.168.3.14
Setting NIC to static IP...
Successfully released DHCP lease.
Successfully enabled static addressing. DHCP for this network adapter is disabled.
Successfully set gateway.
Successfully set network adapter address.
(Press ENTER to continue):
```

## CAPSTONE

A01340485

```
Default gateway:      192.168.3.14
Preferred DNS server: 192.168.3.1
Alternate DNS server: 192.168.3.2

1) Set network adapter address
2) Set DNS servers
3) Clear DNS server settings

Enter selection (Blank=Cancel): 2
Enter new preferred DNS server (Blank=Cancel): 192.168.3.1
Enter alternate DNS server (Blank=None): 192.168.3.2
Successfully assigned DNS server(s).
(Press ENTER to continue): S
```

(iSCSI)

```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "iSCSI" -IPAddress 192.168.10.2 -PrefixLength 29

IPAddress      : 192.168.10.2
InterfaceIndex  : 6
InterfaceAlias   : iSCSI
AddressFamily    : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin     : Manual
SuffixOrigin     : Manual
AddressState     : Tentative
ValidLifetime   : Infinite ([TimeSpan]::.MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::.MaxValue)
SkipAsSource     : False
PolicyStore      : ActiveStore

IPAddress      : 192.168.10.2
InterfaceIndex  : 6
InterfaceAlias   : iSCSI
AddressFamily    : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin     : Manual
SuffixOrigin     : Manual
AddressState     : Invalid
ValidLifetime   : Infinite ([TimeSpan]::.MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::.MaxValue)
SkipAsSource     : False
PolicyStore      : PersistentStore

PS C:\Users\Administrator>
```

# CAPSTONE

A01340485

(HB)

```
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "HB" -IPAddress 192.168.20.2 -PrefixLength 29

IPAddress      : 192.168.20.2
InterfaceIndex  : 4
InterfaceAlias  : HB
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 192.168.20.2
InterfaceIndex  : 4
InterfaceAlias  : HB
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 29
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Invalid
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : PersistentStore

PS C:\Users\Administrator>
```

(LM)

```
PS C:\Users\Administrator> New-NetIPAddress -InterfaceAlias "LM" -IPAddress 192.168.30.2 -PrefixLength 30

IPAddress      : 192.168.30.2
InterfaceIndex  : 8
InterfaceAlias  : LM
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 30
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 192.168.30.2
InterfaceIndex  : 8
InterfaceAlias  : LM
AddressFamily   : IPv4
Type            : Unicast
PrefixLength    : 30
PrefixOrigin    : Manual
SuffixOrigin    : Manual
AddressState    : Invalid
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : PersistentStore

PS C:\Users\Administrator>
```

## CAPSTONE

A01340485

Index #	IP address	Description
2	192.168.3.6	Microsoft Hyper-V Network Adapter #2
3	192.168.10.2	Microsoft Hyper-V Network Adapter #4
4	192.168.20.2	Microsoft Hyper-V Network Adapter #5
5	192.168.30.2	Microsoft Hyper-V Network Adapter #3

Next, we're going to disable the firewall.

```
PS C:\Users\Administrator> netsh advfirewall set allprofiles state off
0k.
```

We're going to allow this server to be pinged.

```
=====
          Configure remote management
=====

Remote management is enabled.
Server response to ping is disabled.

1) Enable remote management
2) Disable remote management
3) Enable server response to ping
4) Disable server response to ping

Enter selection (Blank=Cancel): 3.
```

To ensure that HV2 can do virtualization within itself this command needs to be done.

```
PS C:\Windows\system32> Set-VMProcessor -VMName 485-HV2 -ExposeVirtualizationExtensions $true
```

Now we're going to domain join HV2.

```
Enter number to select an option: 1.
```

```
Join (D)omain or (W)orkgroup? (Blank=Cancel): D.
```

```
Name of domain to join (Blank=Cancel): cap.tsp
```

```
Specify an authorized domain\user (Blank=Cancel): cap.tsp\Eden
```

```
Password for cap.tsp\Eden: *****.
```

```
WARNING: The changes will take effect after you restart the computer 485-HV1.
Successfully joined domain.
Do you want to change the computer name before restarting? (Y)es or (N)o: Y.
```

Now we're going to join HV1 & HV2 to our host's Server Manager.

## CAPSTONE

A01340485

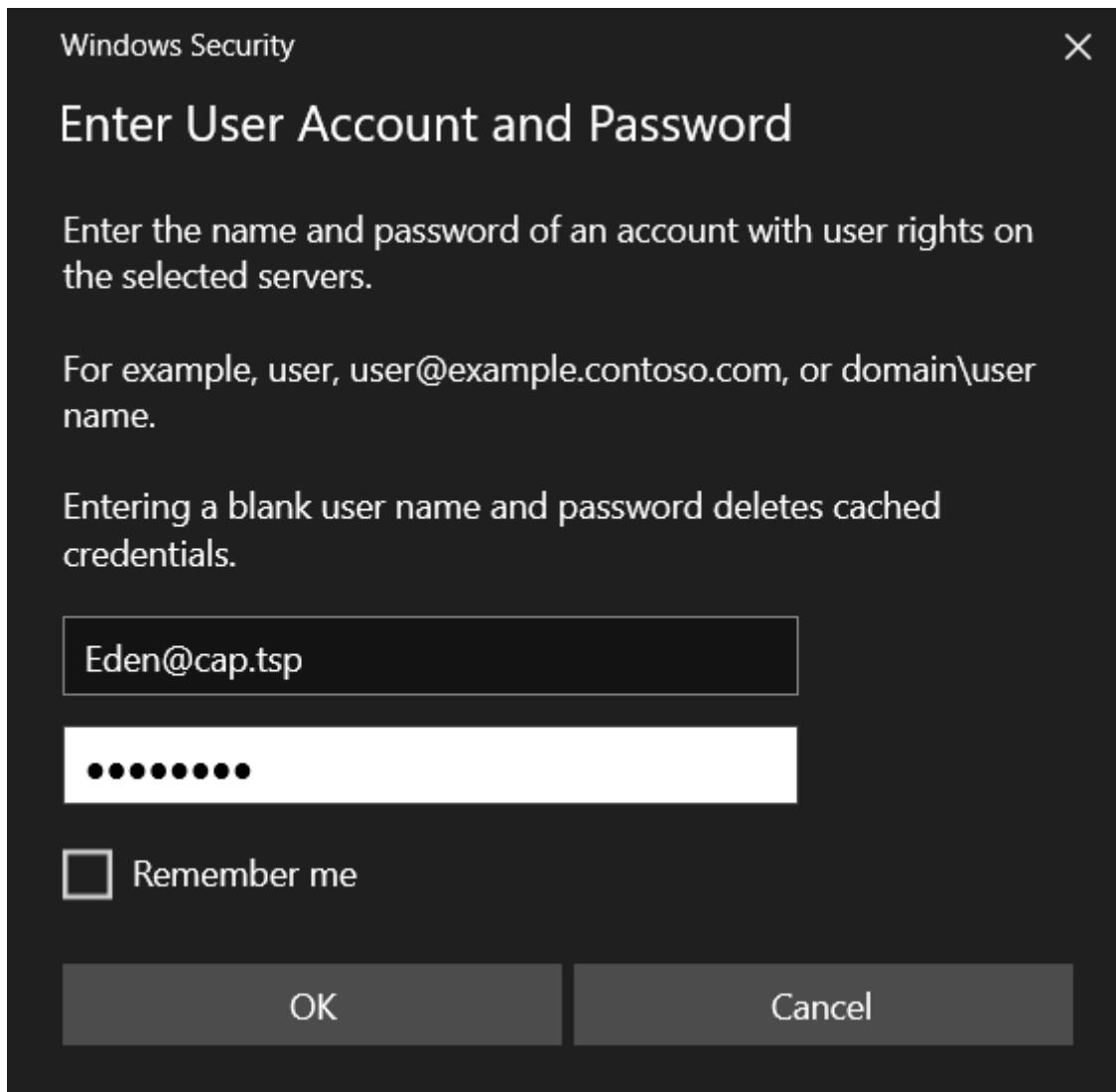
The screenshot shows the Windows Server Manager interface. The main title bar reads "Server Manager > All Servers". On the left, there's a navigation menu with "Dashboard", "All Servers" (which is selected and highlighted in blue), "AD DS", "DNS", and "File and Storage Services". To the right, under "Servers", it says "All servers | 2 total". Below this is a table with columns "Server Name" and "IPv4 Address", showing two entries: "485-HV1" and "485-HV1".

A modal window titled "Add Servers" is open in the foreground. It has tabs for "Active Directory", "DNS" (which is selected), and "Import". A search bar contains the IP address "192.168.3.5". The results table shows one entry: "485-HV1.cap.tsp" with IP "192.168.3.5". This entry is highlighted with a blue selection bar. To the right of the table is a "Selected" pane showing "Computer" with "485-HV1" listed. At the bottom of the Selected pane, it says "1 Computer(s) selected". At the very bottom of the modal are "OK" and "Cancel" buttons.

Now we're going to right click them and select "Manage As" to resolve the Kerberos authentication error.

# CAPSTONE

A01340485



485-HV1	192.168.10.1,192.168.20.1,192.168.3.5,192.168.30.1	Online
485-HV2	192.168.10.2,192.168.20.2,192.168.3.6,192.168.30.2	Online
485-DC1	192.168.3.1	Online
485-SAN	192.168.10.3,192.168.3.4	Online

## Failover Cluster Configuration

Now we're going to install Hyper-V in Powershell on HV1 & HV2.

```
PS C:\Users\Administrator> Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V -All
Do you want to restart the computer to complete this operation now?
[Y] Yes [N] No [?] Help (default is "Y"): _
```

# CAPSTONE

A01340485

Now we're going to install a Failover-Cluster role on HV1 & HV2.

```
PS C:\Users\Administrator> Install-WindowsFeature failover-clustering -IncludeManagementTools
```

Now head to your SAN and install the following feature.

```
PS C:\Users\Administrator> Install-WindowsFeature FS-iscsitarget-server -IncludeManagementTools
```

Now we are going to format, initialize & partition the Virtual Disk.

```
PS C:\Users\Administrator> Initialize-Disk 7
PS C:\Users\Administrator> New-Partition -DiskNumber 7 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\storage#disk#{6075d5b7-0dfb-4a57-a28d-ec2557e8d7cb}#{53f56307-b6bf-11d0-94f2-00a0c91efb8b}

PartitionNumber DriveLetter Offset Size Type
----- ----- -----
2 D 16777216 99.98 GB Basic

PS C:\Users\Administrator> Format-volume -DriveLetter D -FileSystem REFS
```

We're now going to format our iSCSI Virtual Disk.

```
PS C:\Users\Administrator> New-IscsiVirtualDisk -Path "D:\Data\485-iSCSIVirtualDisk.vhdx" -Size 90gb -UseFixed
```

Now you will do the same except for the Quorum/Witness.

```
PS C:\Users\Administrator> Get-disk

Number Friendly Name Serial Number HealthStatus OperationalStatus Total Size Partition Style
----- -----
0 Msft Virtu... Healthy Online 127 GB GPT
7 VirtualDisk {6075d5b7-0dfb-4a57-a28d-ec25... Healthy Online 100 GB GPT
8 Quorum {ef9edb92-78d6-46d9-a915-dbdd... Healthy Offline 4 GB RAW

PS C:\Users\Administrator> Initialize-Disk 8
PS C:\Users\Administrator> New-Partition -DiskNumber 8 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\storage#disk#{ef9edb92-78d6-46d9-a915-dbdd76ca0a68}#{53f56307-b6bf-11d0-94f2-00a0c91efb8b}

PartitionNumber DriveLetter Offset Size Type
----- ----- -----
2 E 16777216 3.98 GB Basic

PS C:\Users\Administrator> Format-Volume -DriveLetter D -FileSystem REFS

DriveLetter FriendlyName FileSystemType DriveType HealthStatus OperationalStatus SizeRemaining Size
----- -----
D ReFS Fixed Healthy OK 98.34 GB 99.94 GB
```

I accidentally formatted by "D:" drive which was my VirtualDisk so now I am going to recreate my VirtualDisk & my Quorum.

(What I should have written)

```
PS D:\> Format-Volume -DriveLetter E -FileSystem REFS
```

Now I'm going to recreate my VirtualDisk.

# CAPSTONE

A01340485

```
PS D:\> New-IscsiVirtualDisk -Path "D:\VirtualDisk\VirtualDisk.vhdx" -Size 95gb -UseFixed
```

Now we're going to create the Quorum.

```
PS D:\> New-IscsiVirtualDisk -Path "E:\VirtualDisk\Quorum.vhdx" -Size 1gb -UseFixed
```

We're now going to set our target on the Virtual Disk we created earlier.

```
PS D:\> New-IscsiServerTarget -TargetName "VirtualDisk" -InitiatorId @("IPAddress:192.168.10.1","IPAddress:192.168.10.2")
```

(Write down for later) iqn.1991-05.com.microsoft:485-san-virtualdisk-target

We're now going to set our target as the Quorum we created earlier.

```
PS D:\> New-IscsiServerTarget -TargetName "Quorum" -InitiatorId @("IPAddress:192.168.10.1","IPAddress:192.168.10.2")
```

(Write down for later) iqn.1991-05.com.microsoft:485-san-quorum-target

We're now going to map the Virtual Disk.

```
PS D:\> Add-IscsiVirtualDiskTargetMapping -targetname "VirtualDisk" -Path "D:\VirtualDisk\VirtualDisk.vhdx"
```

We're now going to map the Quorum.

```
PS D:\> Add-IscsiVirtualDiskTargetMapping -TargetName "Quorum" -Path "E:\VirtualDisk\Quorum.vhdx"
```

Now we're going to head to HV1 & HV2 and enter the following commands:

```
PS C:\Users\Administrator> Start-Service -name msISCSI
PS C:\Users\Administrator> Set-service -name msISCSI -StartupType Automatic
```

Head to HV2 and enter the following:

```
PS C:\Users\Administrator> New-IscsiTargetPortal -TargetPortalAddress 192.168.10.3

InitiatorInstanceName :
InitiatorPortalAddress :
IsDataDigest      : False
IsHeaderDigest    : False
TargetPortalAddress : 192.168.10.3
TargetPortalPortNumber : 3260
PSComputerName    :
```

We're now going to connect our iSCSI Target

```
PS C:\Users\Administrator> Connect-IscsiTarget -NodeAddress iqn.1991-05.com.microsoft:485-san-quorum-target -IsPersistent:$true
PS C:\Users\Administrator> Connect-IscsiTarget -NodeAddress iqn.1991-05.com.microsoft:485-san-virtualdisk-target -IsPersistent:$true

AuthenticationType : NONE
InitiatorInstanceName : ROOT\ISCSIPRT\0000_0
InitiatorNodeAddress : iqn.1991-05.com.microsoft:485-hv1.cap.tsp
InitiatorPortalAddress : 0.0.0.0
InitiatorSideIdentifier : 400001370000
IsConnected       : True
IsDataDigest      : False
IsDiscoveried    : True
IsHeaderDigest    : False
IsPersistent     : True
NumberOfConnections : 1
SessionIdentifier : fffff00029f5e0010-4000013700000002
TargetNodeAddress : iqn.1991-05.com.microsoft:485-san-quorum-target
TargetSideIdentifier : 0100
PSComputerName   :

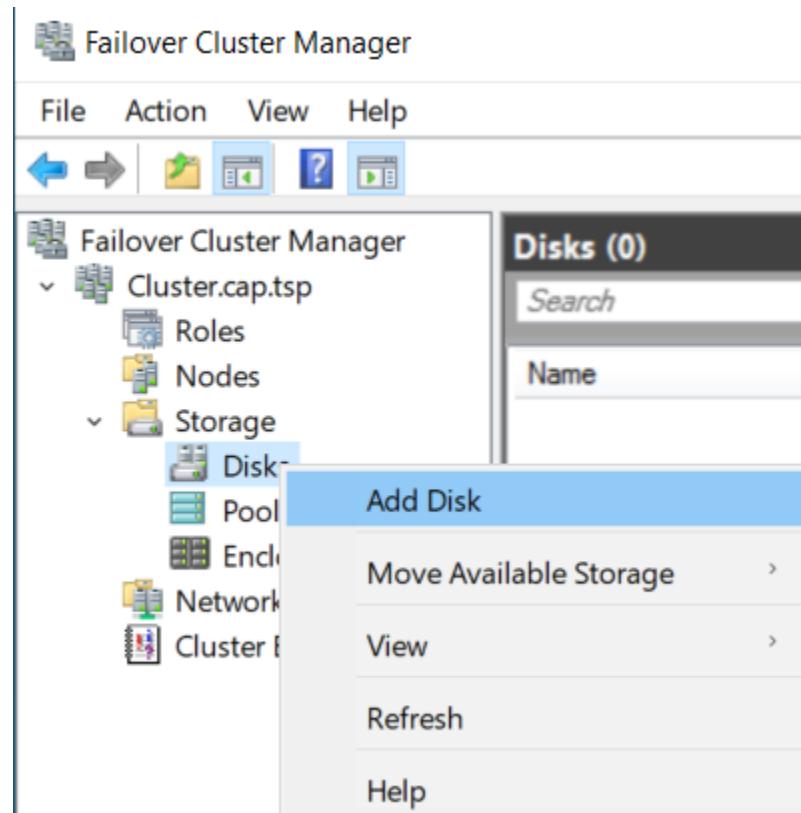
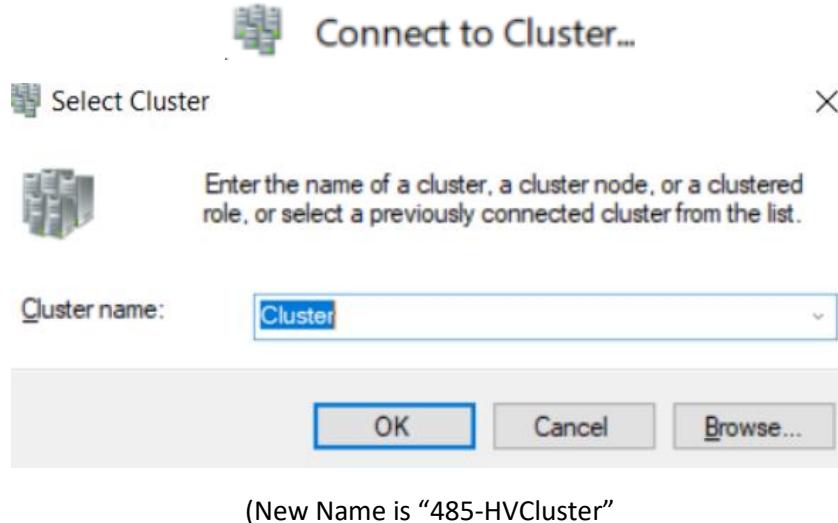
AuthenticationType : NONE
InitiatorInstanceName : ROOT\ISCSIPRT\0000_0
InitiatorNodeAddress : iqn.1991-05.com.microsoft:485-hv2.cap.tsp
InitiatorPortalAddress : 0.0.0.0
InitiatorSideIdentifier : 400001370000
IsConnected       : True
IsDataDigest      : False
IsDiscoveried    : True
IsHeaderDigest    : False
IsPersistent     : True
NumberOfConnections : 1
SessionIdentifier : fffff858b63aeb010-4000013700000002
TargetNodeAddress : iqn.1991-05.com.microsoft:485-san-virtualdisk-target
TargetSideIdentifier : 0200
PSComputerName   :
```

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We're now going to install the Cluster.

```
PS C:\Users\Administrator> New-Cluster -Name 485-HVCluster -Node 485-HV1, 485-HV2 -StaticAddress 192.168.3.7
```



Now we're going to bring our Virtual Disk & Quorum online.

(Virtual Disk)

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```
PS C:\Users\Administrator> get-disk
Number F Serial Number          HealthStatus   OperationalStatus   Total Size Partition
      r
      i
      e
      n
      d
      l
      y
      N
      a
      m
      e
-----
0     M  M C6E68D1C-9606-4CF0-A585-57B25... Healthy       Online            127 GB GPT
1     M  M B8DA4BC1-F6A4-4799-A580-7055E... Healthy       Offline           1 GB RAW
                                         Offline           95 GB RAW

PS C:\Users\Administrator> Initialize-Disk 1
PS C:\Users\Administrator> New-Partition -DiskNumber 1 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\Disk{ffffe686-64b3-5cae-ae30-acf3bbbaa90d}

PartitionNumber DriveLetter Offset          Size Type
-----        -----
2              D          16777216          94.98 GB Basic

PS C:\Users\Administrator> Format-Volume -DriveLetter D -FileSystem ReFS
DriveLetter FriendlyName FileSystemType DriveType HealthStatus OperationalStatus SizeRemaining   Size
-----        -----
D             ReFS       Fixed      Healthy    OK           93.36 GB 94.94 GB
```

(Quorum)

```
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Get-disk
Number Friendly Name          Serial Number          HealthStatus   OperationalStatus   Total Size Partition
      r
      i
      e
      n
      d
      l
      y
      N
      a
      m
      e
-----
0     Msft Virtual Disk        C6E68D1C-9606-4CF0-A585-57B25... Healthy       Online            127 GB GPT
1     MSFT Virtual HD         B8DA4BC1-F6A4-4799-A580-7055E... Healthy       Offline           1 GB RAW
                                         Online           95 GB GPT

PS C:\Users\Administrator> Initialize-Disk 1
PS C:\Users\Administrator> New-Partition -DiskNumber 1 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\Disk{c9a0c116-0595-ef7e-2a02-1d61921bb596}

PartitionNumber DriveLetter Offset          Size Type
-----        -----
2              D          16777216          1007.94 MB Basic

PS C:\Users\Administrator> Format-Volume -DriveLetter D -FileSystem ReFS
DriveLetter FriendlyName FileSystemType DriveType HealthStatus OperationalStatus SizeRemaining   Size
-----        -----
D             ReFS       Fixed      Healthy    OK           93.36 GB 94.94 GB
D             ReFS       Fixed      Healthy    OK           186 MB   960 MB

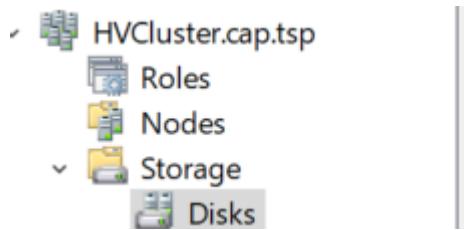
PS C:\Users\Administrator>
```

We're now going to open Failover Cluster Manager & connect to the cluster we created earlier.

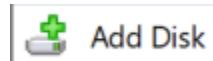
After that head down to

# CAPSTONE

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Select “Add Disk” and select the 2 disks you created.



Add Disks to a Cluster

X

Select the disk or disks that you want to add.

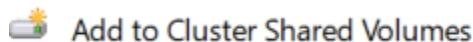
Available disks:

Resource Name	Disk Info	Capacity	Signature/Id
<input checked="" type="checkbox"/> Cluster Disk 1	Disk 2 on node 485-HV2	1.00 GB	{7f64778b-6518-47de-83a0-60ef67602bf2}
<input checked="" type="checkbox"/> Cluster Disk 2	Disk 1 on node 485-HV2	95.0 GB	{83c6762a-519b-481a-a9b2-ac2082040655}

OK

Cancel

We’re now going to select “Add to Cluster Shared Volumes” on our Virtual Disk.



After you’ve selected “Add to Cluster Shared Volumes”

Navigate to file explorer and search the following:

# CAPSTONE

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Network > 485-HV1.cap.tsp > C\$ > ClusterStorage > Volume1

Inside of "Volume1" create the following:

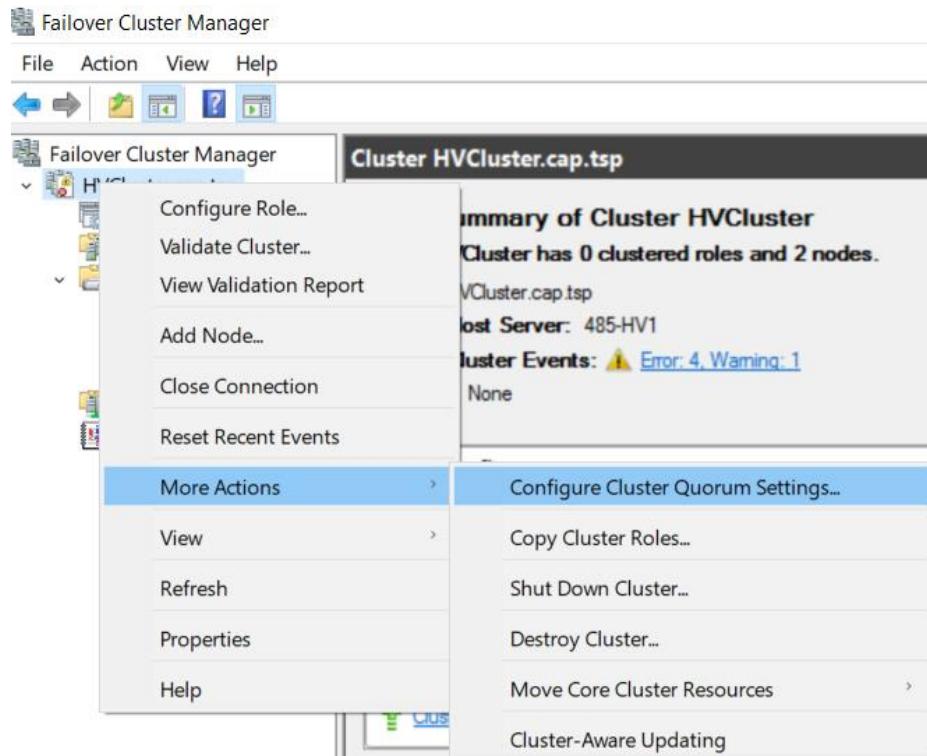
	Name	Date modified	Type
ss	ISO	2023-03-28 8:28 PM	File folder
ds	VHDX	2023-03-28 8:28 PM	File folder
its	VM	2023-03-28 8:28 PM	File folder

Now we're going to locate our ISO and place it in the ISO folder.

	Name	Date modified	Type	Size
s	SERVER_EVAL_x64FRE_en-us	2023-01-06 1:40 PM	Disc Image File	4,925,874 ...

We're now going to assign our Quorum disk as the witness.

Right click "HVCluster>More Actions>Configure Cluster Quorum Settings"



# CAPSTONE

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## Summary

Before You Begin  
Select Quorum Configuration Option  
Select Quorum Witness  
Configure Storage Witness  
Confirmation  
Configure Cluster Quorum Settings  
**Summary**

You have successfully configured the quorum settings for the cluster.

### Cluster Managed Voting

Enabled

### Witness Type

Disk Witness

### Witness Resource

Quorum

[View Report...](#)

[Finish](#)

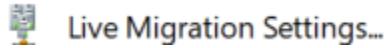
## Witness: Quorum

## Live Migration

Now we're going to head to.



Networks



Live Migration Settings...

# CAPSTONE

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Live Migration Settings

Networks for Live Migration

Select one or more networks for virtual machines to use for live migration. Use the buttons to list them in order from most preferred at the top to least preferred at the bottom.

Name	Up	Down
LM		
LAN		
HB		
iSCSI		

OK Cancel Apply

Properties

485-DC2 Properties

General Failover

**Failover**

Specify the number of times the Cluster service will attempt to restart or fail over the clustered role in the specified period.

If the clustered role fails more than the maximum in the specified period, it will be left in the failed state.

Maximum failures in the specified period:

Period (hours):

**Fallback**

Specify whether the clustered role will automatically fail back to the most preferred owner (which is set on the General tab).

Prevent failback

Allow failback

Immediately

Failback between:  and  hours

OK Cancel Apply

# CAPSTONE

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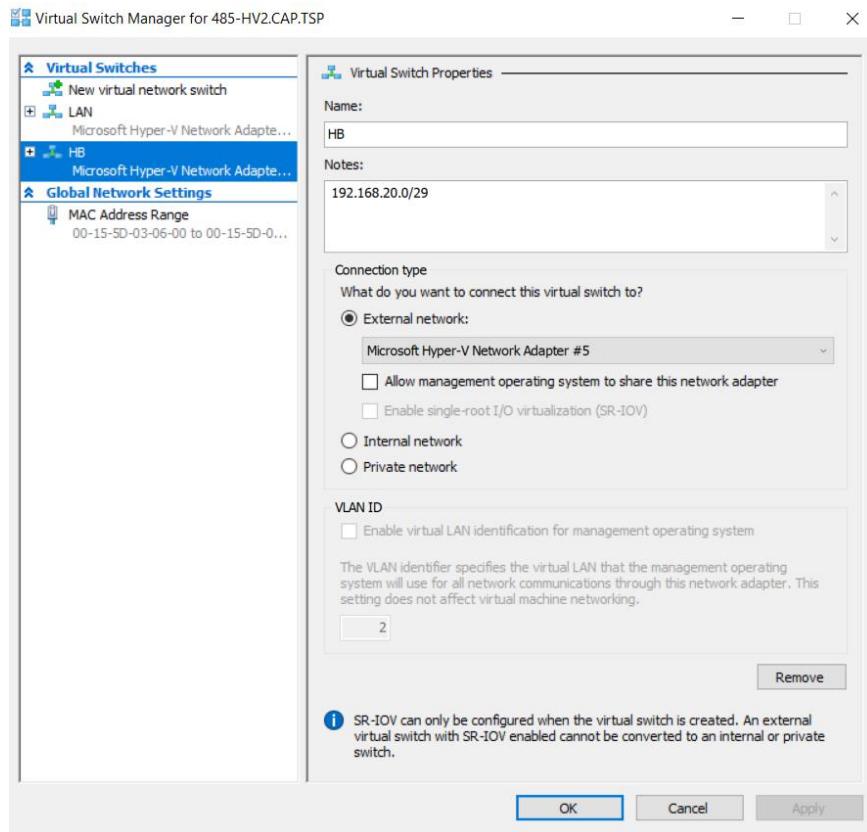
We're now going to create our switches for (485-HV2).

The screenshot shows the Windows Server Manager interface. The left navigation pane is visible with options like Dashboard, All Servers, AD DS, DNS, File and Storage Services, and Hyper-V. The Hyper-V option is selected and highlighted in blue. The main content area is titled "SERVERS" and shows three servers: 485-HV1, 485-HV2, and HVCluster. The 485-HV2 server is selected, indicated by a blue border around its row. A context menu is open for the 485-HV2 server, listing options such as Add Roles and Features, Restart Server, Computer Management, Remote Desktop Connection, Windows PowerShell, Configure NIC Teaming, Add other servers in the cluster to the server pool, Update Cluster, and Hyper-V Manager. The "Hyper-V Manager" option is also highlighted in blue.

The screenshot shows the "Virtual Switch Manager..." dialog box. The left pane displays a tree view of network configurations: "Virtual Switches" (with "New virtual network switch" and "LAN" selected), "Global Network Settings" (with "MAC Address Range" listed). The right pane is titled "Virtual Switch Properties" for the "LAN" switch. It includes fields for "Name" (set to "LAN") and "Notes" (set to "192.168.3.0/29"). Under "Connection type", the "External network:" radio button is selected, with "Microsoft Hyper-V Network Adapter #2" chosen from the dropdown. The "Allow management operating system to share this network adapter" checkbox is checked. Under "VLAN ID", there is a note about SR-IOV and a "Remove" button. At the bottom are "OK", "Cancel", and "Apply" buttons.

# CAPSTONE

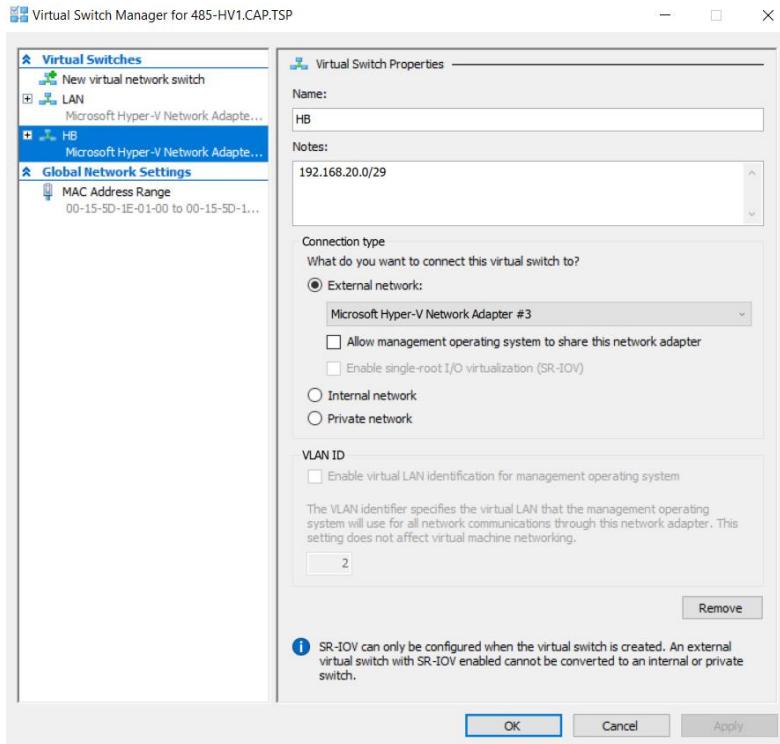
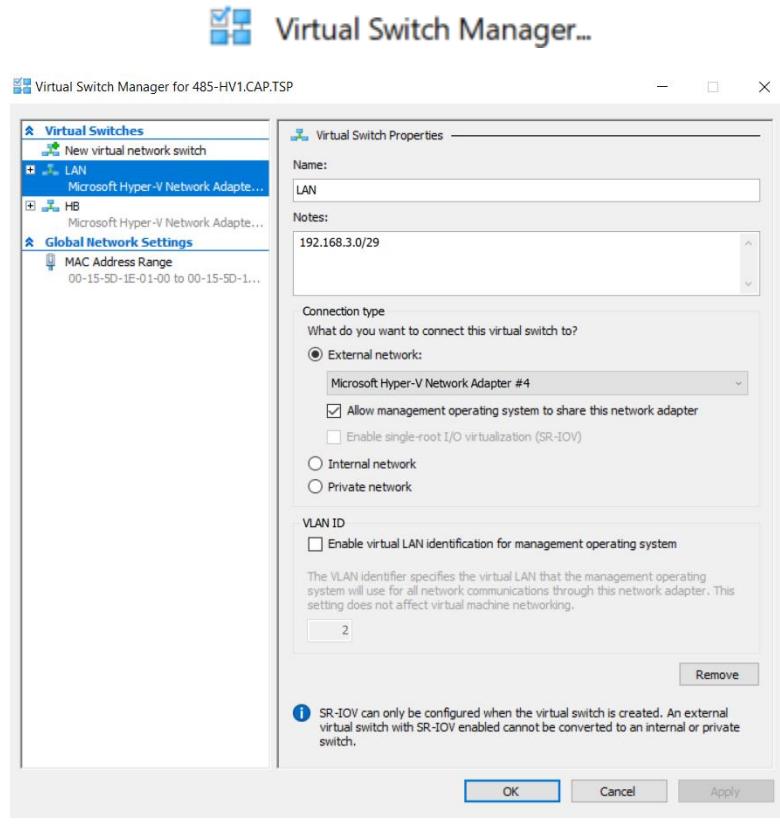
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We're now going to create our switches for (485-HV1).

# CAPSTONE

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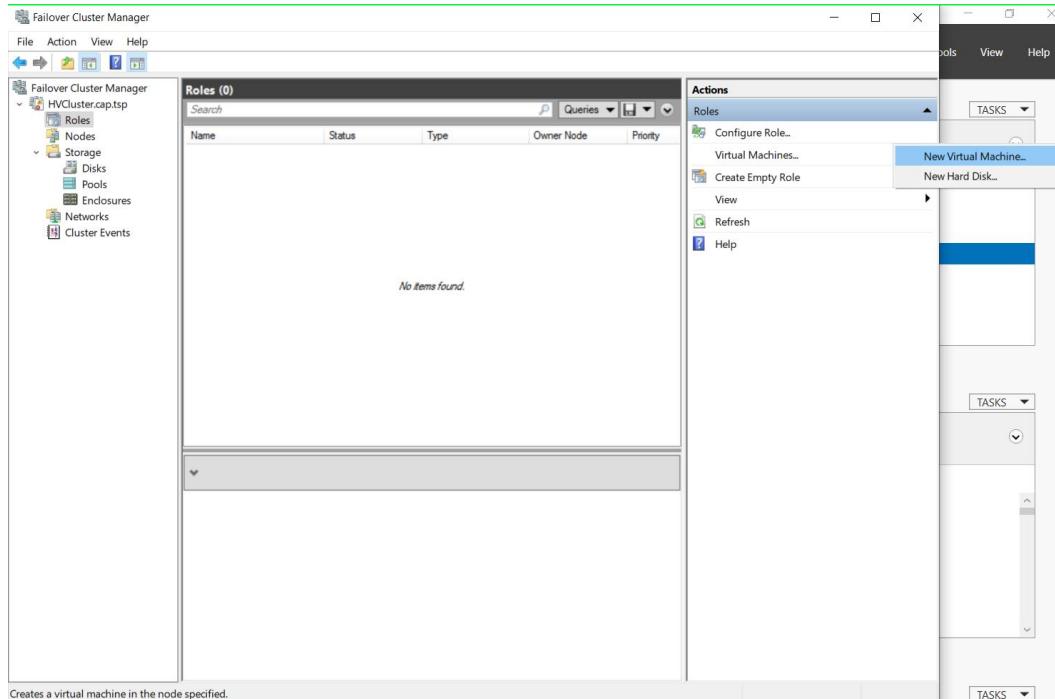


# CAPSTONE

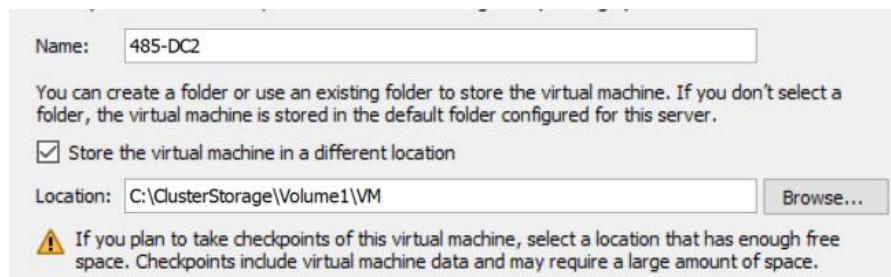
A01340485

## Creating & Configuring DC2

We're now going to create our DC2 inside of (485-HV1)



Make sure you change the location to the following:



Name: 485-DC2  
Generation: Generation 2  
Memory: 1024 MB  
Network: LAN  
Hard Disk: C:\ClusterStorage\volume1\vhdx\485-DC2.vhdx (VHDX, dynamically expanding)  
Operating System: Will be installed from C:\ClusterStorage\volume1\iso\server\_eval\_x64fre\_en-us.iso

# CAPSTONE

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High Availability Wizard X

**Summary**

Configure High Availability

Summary

High availability was successfully configured for the role.

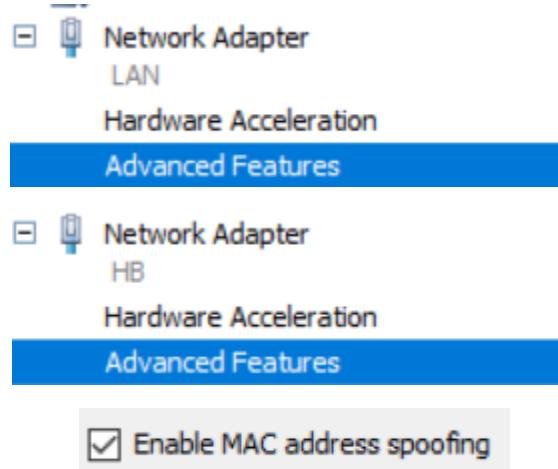
Result	
485-DC2	Success
Results by Category	
Virtual Machine	Success

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

[View Report...](#)

[Finish](#)

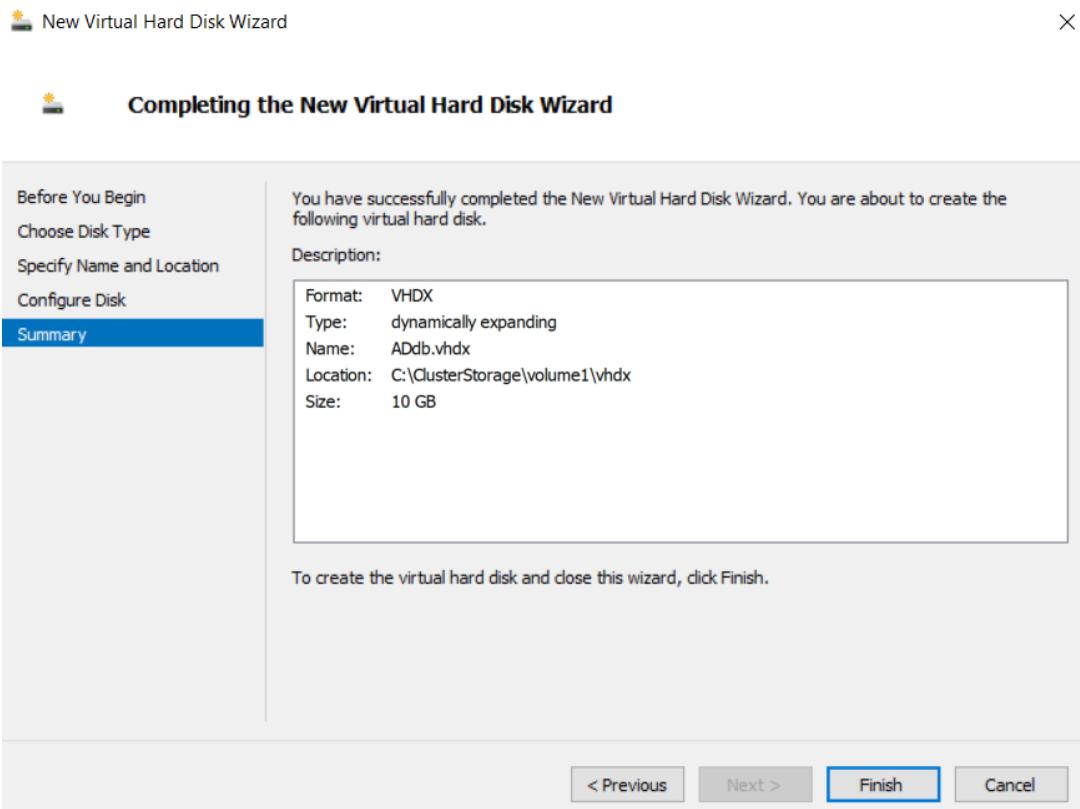
Head to “Advanced Features” and enable “Mac Address Spoofing” on HV1/HV2.



Now create your “ADdb” drive for your “485-DC2”

# CAPSTONE

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We're now going to do post installation setup on our "485-DC2"

First, we're going to change the device's name.

```
=====
Computer name
=====
Current computer name: WIN-7TMVIJOD61U
Enter new computer name (Blank=Cancel): 485-DC2
Changing computer name...
WARNING: The changes will take effect after you restart the computer WIN-7TMVIJOD61U.
Restart now? (Y)es or (N)o: Y
```

We're now going to rename our local user.

```
PS C:\Users\Administrator> Rename-LocalUser -Name "Administrator" -NewName "Eden"
```

Now we will set the IP settings.

# CAPSTONE

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```
Network adapter settings
=====
NIC index: 1
Description: Microsoft Hyper-V Network Adapter
IP address: 169.254.49.25,
              fe80::7049:c9c1:f14d:3119
Subnet mask: 255.255.0.0
DHCP enabled: True

Default gateway:
Preferred DNS server:
Alternate DNS server:

1) Set network adapter address
2) Set DNS servers
3) Clear DNS server settings

Enter selection (Blank=Cancel): 1
Select (D)HCP or (S)tatic IP address (Blank=Cancel): S
Enter static IP address (Blank=Cancel): 192.168.3.2
Enter subnet mask (Blank=255.255.255.0): 255.255.255.240
Enter default gateway (Blank=Cancel): 192.168.3.14
Setting NIC to static IP...
Successfully released DHCP lease.
Successfully enabled static addressing. DHCP for this network adapter is disabled.
Successfully set gateway.
Successfully set network adapter address.
(Press ENTER to continue):
```

```
Enter selection (Blank=Cancel): 2
Enter new preferred DNS server (Blank=Cancel): 192.168.3.1
Enter alternate DNS server (Blank=None): 192.168.3.2
Successfully assigned DNS server(s).
(Press ENTER to continue):
```

Now we're going to rename our network adapter.

```
PS C:\Users\Administrator> Rename-NetAdapter -Name "Ethernet" -NewName "LAN"
PS C:\Users\Administrator> Get-NetAdapter
Name           InterfaceDescription          ifIndex Status     MacAddress      LinkSpeed
----           InterfaceDescription          -----   -----   -----
LAN            Microsoft Hyper-V Network Adapter       4 Up      00-15-5D-03-06-03    10 Gbps
PS C:\Users\Administrator>
```

After joining the domain, initialize and format the database drive.

# CAPSTONE

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```
PS C:\Users\eden> get-disk
Number Friendly Name Serial Number          HealthStatus   OperationalStatus   Total Size Partition
                                                Style
-----  -----
1       Msft Virtu...                         Healthy        Online             15 GB GPT
2       Msft Virtu...                         Healthy        Offline            10 GB RAW

PS C:\Users\eden> Initialize-Disk 1
PS C:\Users\eden> New-Partition -DiskNumber 1 -UseMaximumSize -AssignDriveLetter

DiskPath: \\?\scsi#disk&ven_msft&prod_virtual_disk#582041ffd9806000001#[53f56307-b6bf-11d0-94f2-00a0c91efb8b]

PartitionNumber DriveLetter Offset          Size Type
-----  -----
1               E           16777216      9.98 GB Basic

PS C:\Users\eden> Format-Volume -DriveLetter E
DriveLetter FriendlyName FileSystemType DriveType HealthStatus OperationalStatus SizeRemaining  Size
-----  -----
E           NTFS         Fixed     Healthy    OK          9.95 GB 9.98 GB

PS C:\Users\eden>
```

Now we will create the file paths.

```
PS C:\Users\eden> e:
PS E:\> mkdir NTDS

Directory: E:\

Mode          LastWriteTime          Length Name
----          -----          ----
d---          3/29/2023 10:27 PM          NTDS

PS E:\> mkdir SYSVOL

Directory: E:\

Mode          LastWriteTime          Length Name
----          -----          ----
d---          3/29/2023 10:27 PM          SYSVOL
```

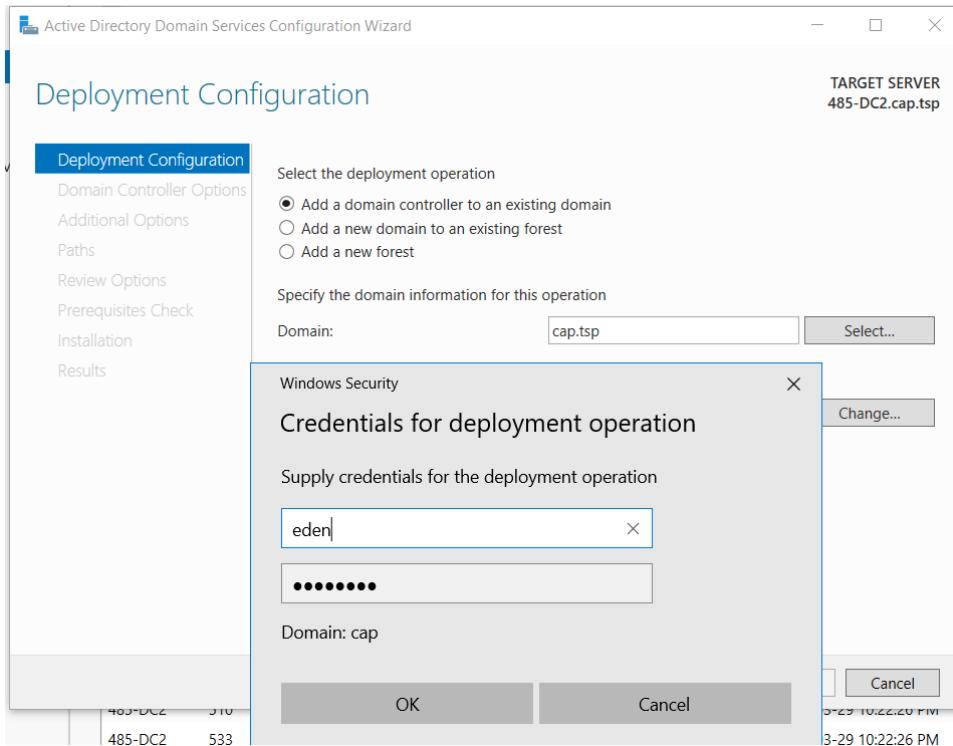
We are now going to Install ADDS.

```
PS C:\Users\eden> Install-WindowsFeature -Name ad-domain-services -IncludeManagementTools
```

Promote DC2 to a Domain Controller.

# CAPSTONE

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Do not update DNS Delegation

Specify DNS delegation options

Update DNS delegation

Replicate from DC1

Specify additional replication options

Replicate from:

485-DC1.cap.tsp

Change paths to database drive.

Specify the location of the AD DS database, log files, and SYSVOL

Database folder:

E:\Windows\NTDS

Log files folder:

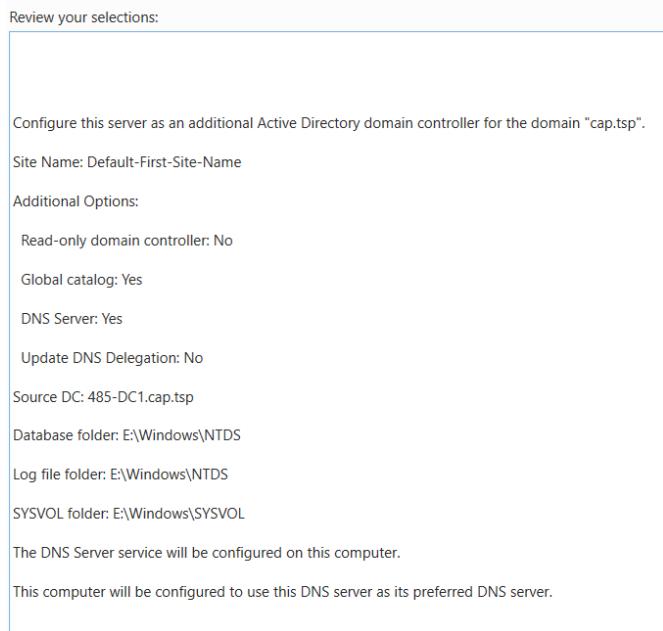
E:\Windows\NTDS

SYSVOL folder:

E:\Windows\SYSVOL

# CAPSTONE

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We are now going to browse in ADUC for both DC's to make sure that they replicate.

The screenshot displays three separate instances of the Active Directory Users and Computers (ADUC) management console. Each window shows the 'Domain Controllers' container under the 'cap.tsp' domain. The first two windows show a list of security groups:

Name	Type
FIN Manager RW DL	Security Group ...
FIN Manager_G	Security Group ...
FIN Service Desk G	Security Group ...
FIN Service Desk RW DL	Security Group ...

The third window shows a more detailed view of the 'Security Groups' container, listing the same four groups along with their respective types.

## Creating & Configuring FS1

We're now going to create our FS1 inside of (485-HV1)

# CAPSTONE

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Name: 485-FS1  
Generation: Generation 2  
Memory: 1024 MB  
Network: LAN  
Hard Disk: C:\ClusterStorage\volume1\vhdx\485-FS1.vhdx (VHDX, dynamically expanding)  
Operating System: Will be installed from \\485-HV1.cap.tsp\C\$\ClusterStorage\Volume1\ISO\SERVER.

High Availability Wizard X

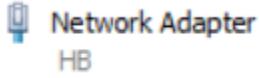
**Summary**

Configure High Availability	High availability was successfully configured for the role.								
<b>Summary</b>	<table border="1"><tr><td><b>Result</b></td><td></td></tr><tr><td>485-FS1</td><td>Success</td></tr><tr><td><b>Results by Category</b></td><td></td></tr><tr><td>Virtual Machine</td><td>Success</td></tr></table>	<b>Result</b>		485-FS1	Success	<b>Results by Category</b>		Virtual Machine	Success
<b>Result</b>									
485-FS1	Success								
<b>Results by Category</b>									
Virtual Machine	Success								

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

[View Report...](#) [Finish](#)

Now you're going to add your HB network adapter, FS1 should have an external LAN & HB.



You would then do post installation setup, domain join, then you would install roles & features.

## Creating & Configuring FS2

We're now going to create our FS2 inside of (485-HV2)

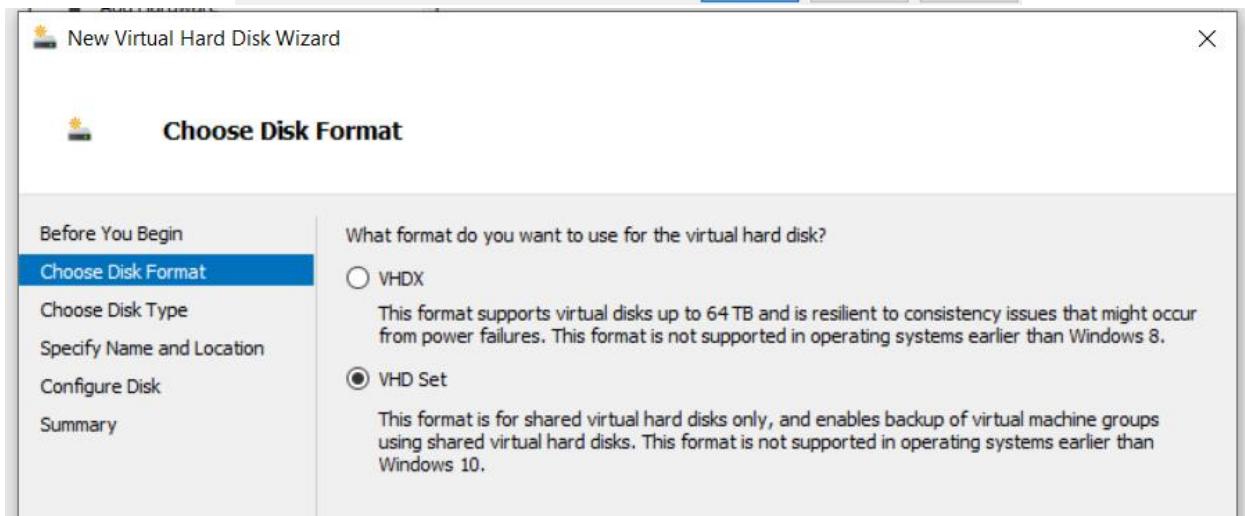
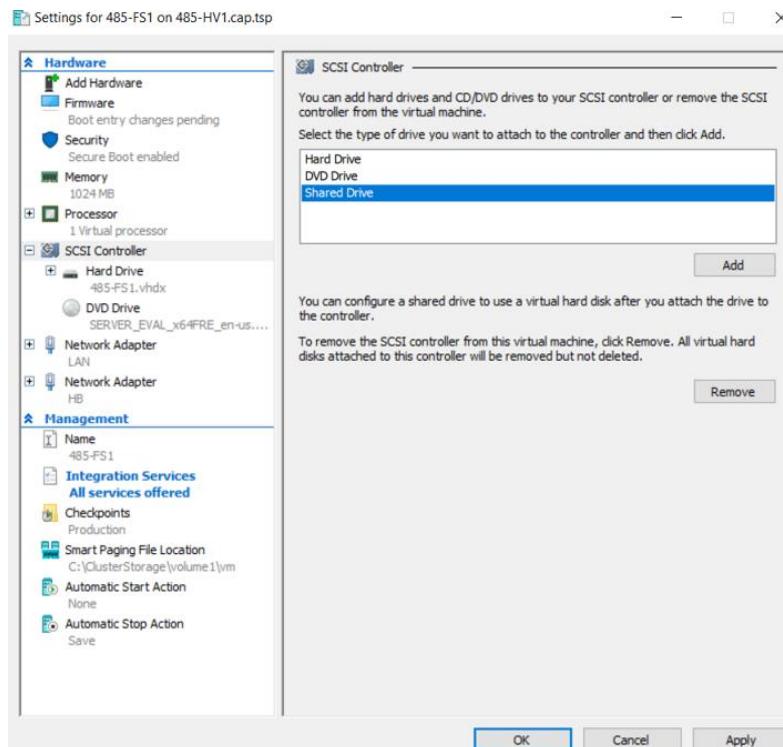
# CAPSTONE

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Name: 485-FS2  
Generation: Generation 2  
Memory: 1024 MB  
Network: LAN  
Hard Disk: C:\Clusterstorage\Volume1\VHDX\485-FS2.vhdx (VHDX, dynamically expanding)  
Operating System: Will be installed from \\485-HV1.cap.tsp\C\$\ClusterStorage\Volume1\ISO\SERVER.

(VHD Set)

Didn't create one, never finished FS2.



# CAPSTONE

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---

Format: VHDSet  
Type: dynamically expanding  
Name: FSData.vhds  
Location: C:\ClusterStorage\volume1\vhdx  
Size: 15 GB

---

Format: VHDSet  
Type: dynamically expanding  
Name: FSWitness.vhds  
Location: C:\ClusterStorage\volume1\vhdx  
Size: 2 GB

## Making Mapped Drive & Folder Redirection

(Mapped drives and Folder redirection are done after the File servers, which I never finished.)

(Sorry for the screenshot quality, I took a video and went back for screenshots)

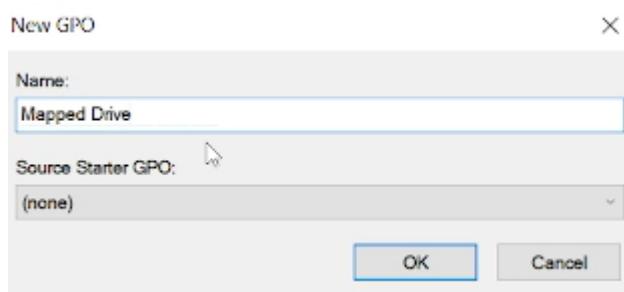
First, you're going to head to "Group Policy Management".

Group Policy Management

Head to the "Group Policy Objects" in "cap.tsp".

Create a policy named "Mapped Drive".

We're now going to edit it.



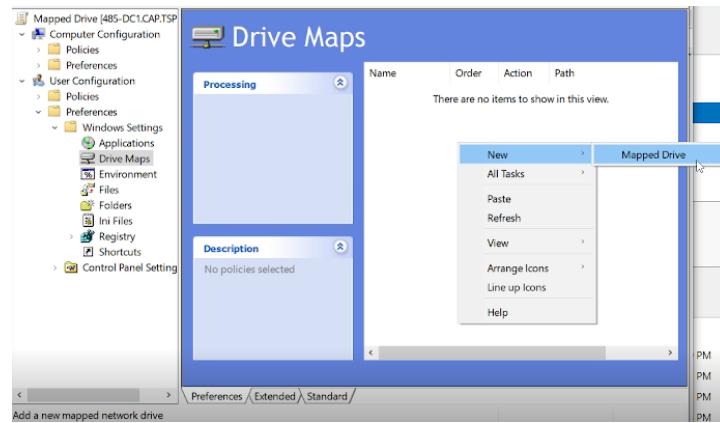
Head to "Drive Maps".

# CAPSTONE

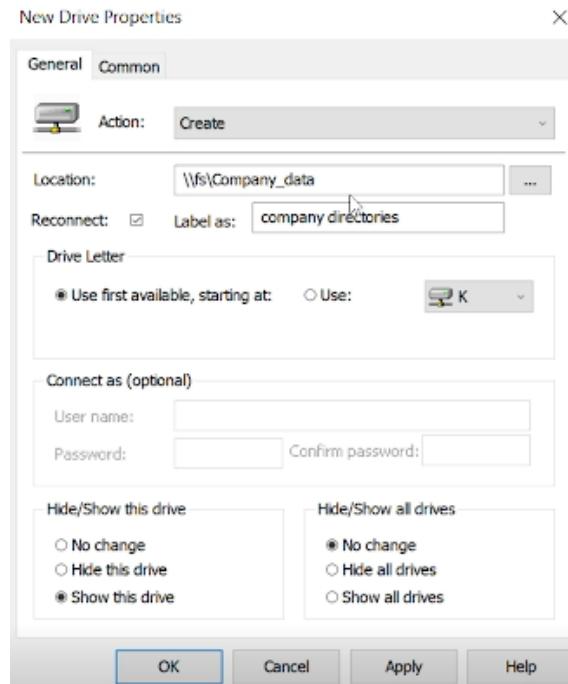
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Select new and select “Mapped Drive”



Enter the following and hit apply and ok.

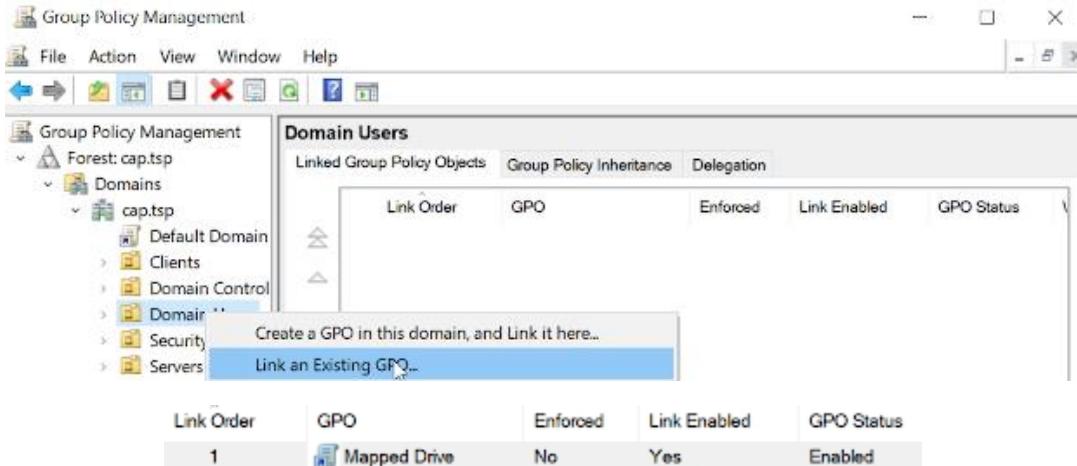


# CAPSTONE

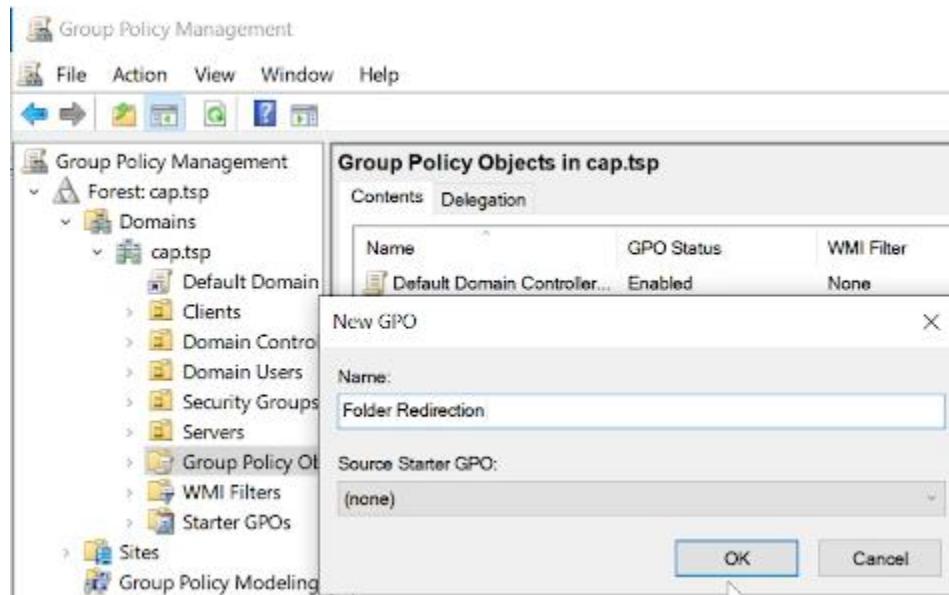
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Now you will head to “Domain Users”.

And link the existing GPO you created.



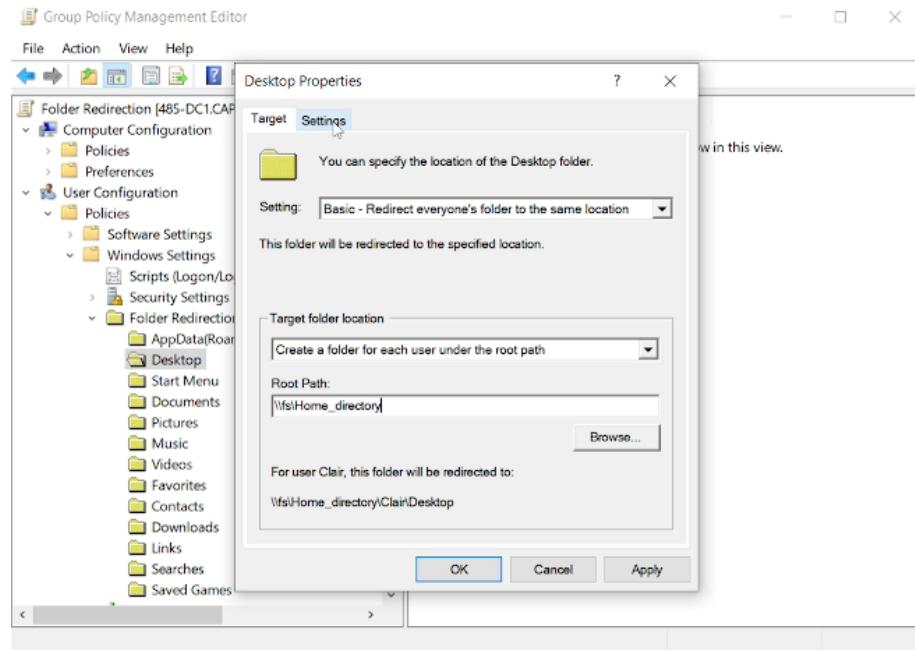
Now create a new GPO called “Folder Redirection”.



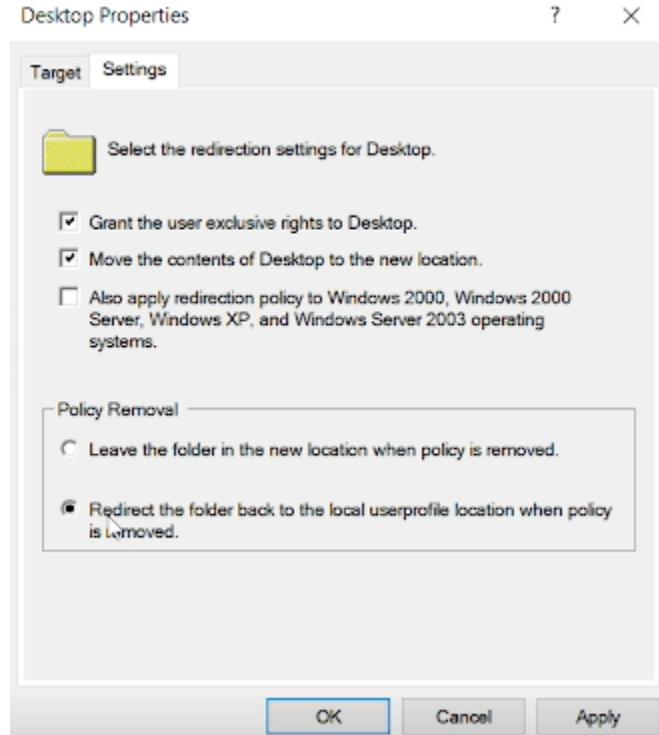
Now edit that GPO, head to User Configuration > Policies > Windows Settings > Folder Redirection > Desktop.

# CAPSTONE

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Head to settings and switch the policy removal then hit apply.



# CAPSTONE

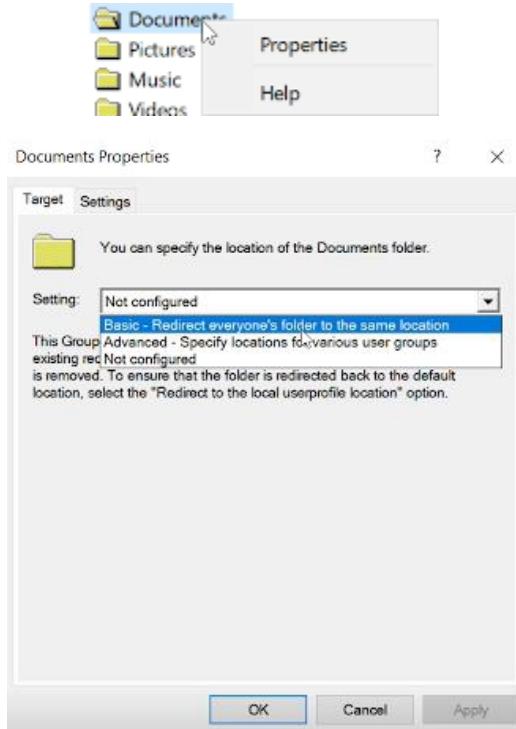
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Warning:

If there are Group Policy settings related to Folder Redirection that do not apply to Windows 2000, Windows 2000 Server, Windows XP or Windows Server 2003, you will not be able to change any Folder Redirection settings in this Group Policy Object (GPO) from those operating systems.

Do you want to continue?

Now you will head to “Documents” & “Properties”.



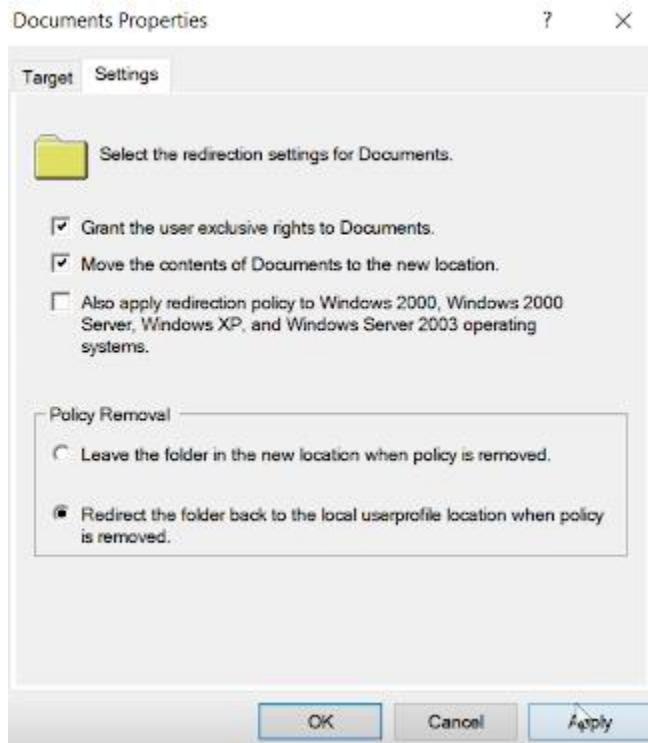
Now set your “Root Path” to the following:

Root Path:

Head over to “Settings”

# CAPSTONE

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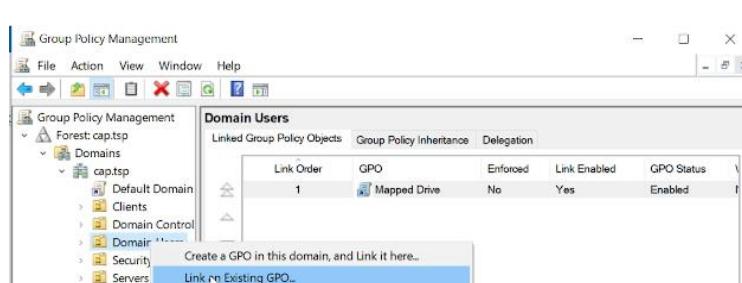


Select apply & ok.



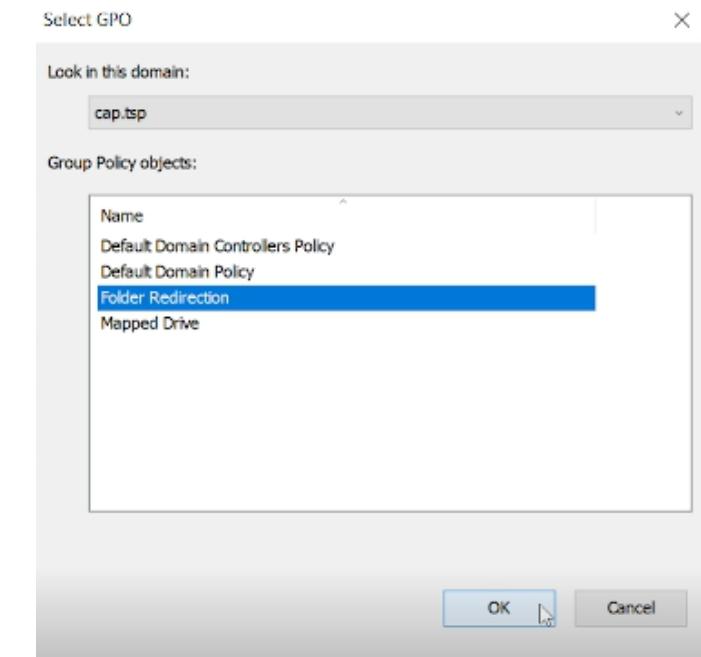
Select yes.

Head back to “Domain Users”



# CAPSTONE

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The main window title is "Group Policy Management". The left pane shows the navigation tree with "Forest: cap.tsp" selected. Under "Domains", "cap.tsp" is expanded, showing "Default Domain Policy", "Clients", "Domain Controllers", and "Domain Users". "Domain Users" is also expanded, showing "Folder Redirection", "Mapped Drive", "FIN", "IT", "Security Groups", "Servers", "Group Policy Objects", "WMI Filters", and "Starter GPOs".

The right pane is titled "Domain Users" and displays a table of "Linked Group Policy Objects".

Link Order	GPO	Enforced	Link Enabled	Order
1	Mapped Drive	No	Yes	E
2	Folder Redirection	No	Yes	E

# CAPSTONE

A01340485

## Reflective Writing

I'm not sure where to start, this project was a rollercoaster. A bunch of the information I learned prior, quickly came back as I was doing it again, this type of repetition really helped me learn. I'd be lying to you if I said this was an easy project. Regardless of the difficulty I found it to be extremely interesting and a great challenge. Whether it be the Firewall, Group Policies, Share Files, SAN, File Servers. I'd say the most interesting part for me personally was Clustering the Hypervisors, despite having a million issues to overcome. Prior to this program I thought I knew a bunch of IT terms and technologies, but I was quickly humbled.

Although I encountered many issues during this project such as corrupting most of my environment. There was one specific issue I never found a permanent fix for. HV1/HV2 and HVCluster kept getting "Online – Data retrieval failures occurred", I must have spent at least 12 hours trying to fix this. I restarted the msISCSI service, restarted HV1/HV2, I made sure the targets were connected, made sure the portal was correct, made sure I had set the correct initiators. I tried deleting the Cluster & recreating it, making sure to delete the A record and removing the Cluster from ADUC. But shortly after thinking I had fixed it with my new Cluster, I refreshed Server Manager and got disappointed to see "Data retrieval failures occurred". After that happening I was led to believe that it could have been corruption of HV1/HV2, but throughout this all. The cluster seemed to work perfectly fine, so I pushed through due to a lack of time.

Many of the guides I used throughout this Capstone project were previously documented from past assignments, thankfully they were good enough to lead me in the right direction. Looking back, I wish I spent more effort on my documentation having known so much we had learned in the past would be used in our final project. Towards the beginning of the project, I tried to put extra effort into my Capstone's documentation. I tried to manage my time wisely by setting at least 8 hours a day to spend progressing through the project & working on my documentation. Life quickly took its toll and I found myself not spending as much time as I would have liked working on the project. Regardless of my time management, there were many times where I felt like I couldn't do this, or I didn't understand. But I persevered and tried my best to keep a positive attitude, which resulted in me handing in this project, despite not meeting all the deliverables.

I wouldn't have got as far as I did without the help of the troubleshooting channel and many individuals in this program. I tried my best to ask questions, to understand concepts rather than just doing them. I let myself be vulnerable, by asking questions and asking for help. This program took me out of my comfort zone, and I wouldn't change a thing. I want to end this off by saying a huge thanks to you Rajen, and Orrett as well. You guys exceeded my expectations of professors. Because of this program, I am ready to step foot into the IT world, I feel extremely ready to work and continue to learn.