

Université Antonine (UA)
Faculté d'ingénierie
Département Informatique et Télécommunications



Projet : Système Propriétaire

Windows server 2019 and Hyper-V

Préparé par: Elie Bou Saba

-Theoretical Part:

I-What's new in Windows Server2019

Windows Server 2019 is built on the strong foundation of Microsoft's previous release, Windows Server 2016. It was announced on the 20th of March 2018 and then was released officially on the 2nd of October 2018 and it has three editions: Essentials, Standard and Datacenter. The Datacenter version comes with a price of 6155\$ which is the most expensive between the three where Standard and Essential edition are priced respectively for 927\$ and 501\$. Each edition is designed for specific type and size of the organization with different virtualization and datacenter requirements. Windows Server 2019 adds new capabilities and features like Hybrid capabilities with Microsoft Azure and Hyper-converged Infrastructure in addition to a set of updates improving storage, security, and administration. This release will help IT professionals modernize their infrastructure and applications because of the large number of services given by it.



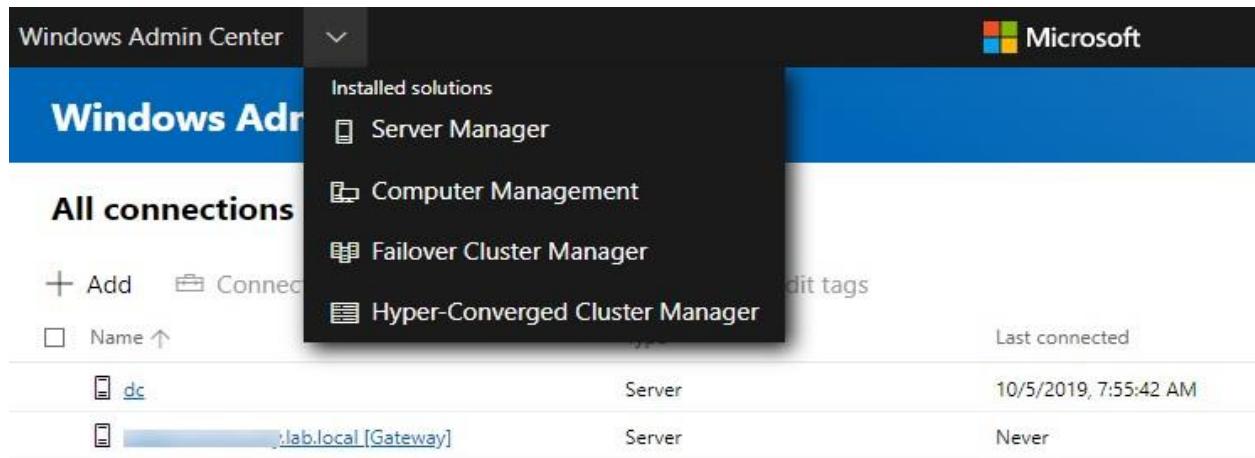
A-Editions:

While Windows Server 2012 cannot be bought anymore, the same editions of windows server 2016 are applicable and improved in the new Windows Server 2019 and we mention three of them:

- Windows Server Essentials: This design is addressed for small organizations and businesses having up to 25 users maximum that needs a physical or virtual server to satisfy their needs. The Essential edition offers an “all-in-one” kind of system where all features like Active Directory and MS Exchange are on one system.
- Windows Server Standard: Designed for small or medium businesses that need either more than one server to isolate server roles like domain controller and print servers, or applications, such as a medical billing system or more than 20 users. This edition allows two virtual machines per each license purchased.
- Windows Server Datacenter: Large businesses usually buy this edition where they need a certain number of virtual machines on a single physical server. The Datacenter license provides the widest range of features and capabilities with the least amount of licensing limitations among all Server editions.

B-Top 10 New Features:

1- Windows Admin Center: WAC or Windows Admin Center is a browser-based app that is free to download and super lightweight. It can be installed on a client machine Windows 10, Windows Server 2016 or later operating systems, or remotely on a server. This feature makes the experience of remote server management better by making it flexible and easy to administrate. WAC is the surface that holds many built-in tools such as Server Manager, Computer Management, Failover Cluster Manager, or HyperConverged Cluster manager. It sets up a quick website on Microsoft Edge or Google Chrome browser and offers a web interface that allows the adding of your infrastructure’s objects and monitoring and configuring them.



- Some important features of Windows Admin Center:

- Azure hybrid services.
- Azure Backup.
- Azure Monitor.
- Azure Security Center.
- Firewall.
- PowerShell.
- Remote Desktop.
- Storage replica.
- Services.
- Network.
- Virtual Machines.
- Scheduled Tasks.

2- Enhanced Security: Windows Server 2019 made a lot of improvements in his security sector which made him Microsoft's most secured operating system to this date. Windows Defender is upgraded to a new technology named Windows Defender Advanced threat Protection or ATP which is anti-malware protection that suppresses potential malicious files and attacks on machine and network. Windows Defender ATP has something called Exploit Guard which put in place a new set of host-intrusion capabilities:

- Attack Surface Reduction or ASR: Blocks malicious ransomware behavior and threats attacking an enterprise machine.

- Exploit protection: Easy configuration of a set of mitigations for vulnerability exploits to keep the system protected.
- Network protection: Block any outbound process on the device to hosts and IP addresses that are untrusted through Windows Defender SmartScreen.
- Controlled folder access: Block malicious processes from getting access to protected folders

The screenshot shows the Windows Defender Security Center interface. At the top, there's a navigation bar with 'Windows Defender Security Center' and a search bar. Below the navigation bar, it says 'Machines > ascwinstsvr'. The main area is divided into four cards:

- Machine Overview:** Shows a laptop icon, the machine name 'ascwinstsvr', and a button 'Actions ▾'. It also displays domain information ('Domain: Workgroup'), OS version ('OS: WindowsServer2016 64-bit (Build 14393)'), and a link to 'Machine IP addresses'.
- Logged on users:** Shows 0 logged-on users. Sub-categories include Interactive [0], RemoteInteractive [0], and Other [0].
- No known risk:** Shows 0 active alerts. A legend indicates 0 High, 0 Medium, 0 Low, and 0 In... risks.
- Machine reporting:** Shows a laptop icon and a summary: 'Machine not found in Azure ATP'. It also includes 'First seen: 18 hours ago' and 'Last seen: 6 hours ago'.

Moreover, Windows Server 2019 enhanced Security with Software Defined Networking or SDN:

- Shielded Virtual Machines Improvements:

- Branch office improvements: Run shielded virtual machines on machines with intermittent connectivity to the Host Guardian Service by leveraging offline mode and the new fallback HGS server. If HGS fails to reach, we will still be able to start the shielded Virtual Machines.

- Troubleshooting improvements: Troubleshoot the shielded virtual machine easily and that is done by enabling support for VMConnect Enhanced Session Mode and PowerShell Direct. So, if the connection to VM is lost we can still be able to update its configuration to restore access.

- Linux support: Windows Server 2019 can now support some Linux operating systems like Red Hat, Ubuntu... inside shielded virtual machines.

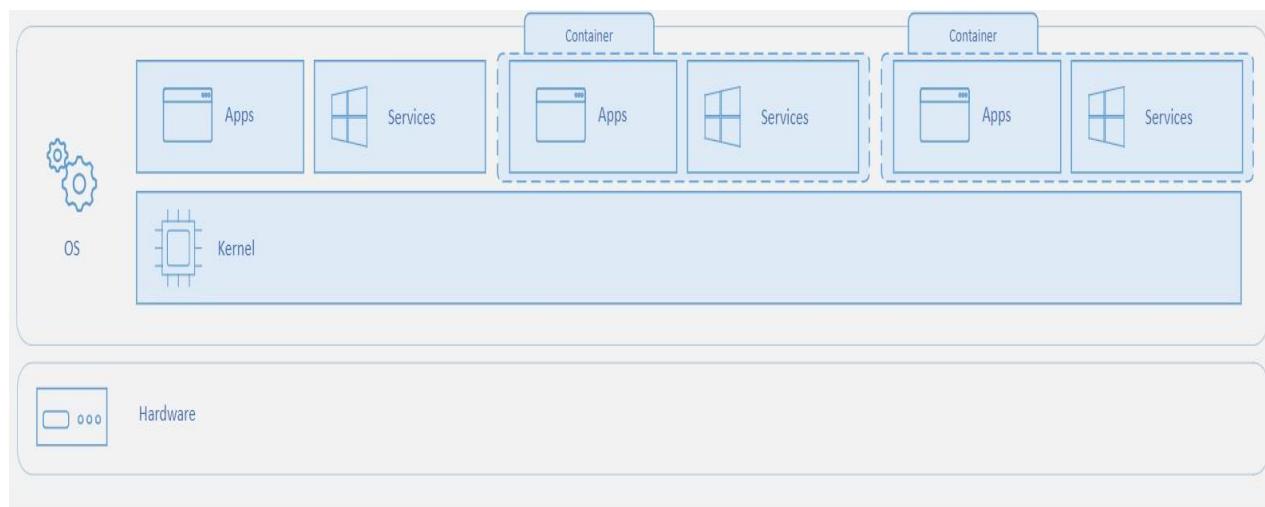
- HTTP/2 for a faster and safer Web:

- Increase in throughput because of the changed TPC congestion provider to Cubic.

- Coalescing of connection is improved which lead to proper encryption of data and reliable delivery.

3- Containers: Containers provide an isolated, lightweight environment essential for an easier build for modern, scalable apps. They are built on top of the machine's Kernel and packaged in a base image because they are isolated from the host user mode so they need their own copy of system files.

Windows-based containers can be developed and tested using visual studio code which supports Docker. Furthermore, you can publish apps as container images to the public DockerHub to let others use. Containers use Azure Disk or a file share like Azure Files to save data. Microsoft developed Hyper-V containers to improve flexibility for running containers. The key difference between containers and virtual machines is that VMs has their own kernel on a complete operating system which is not the case for containers.



- Windows Server 2019 made some improvement to containers:

- bringing the functionality to run windows-based and Linux-based containers on the same container using the same docker daemon.

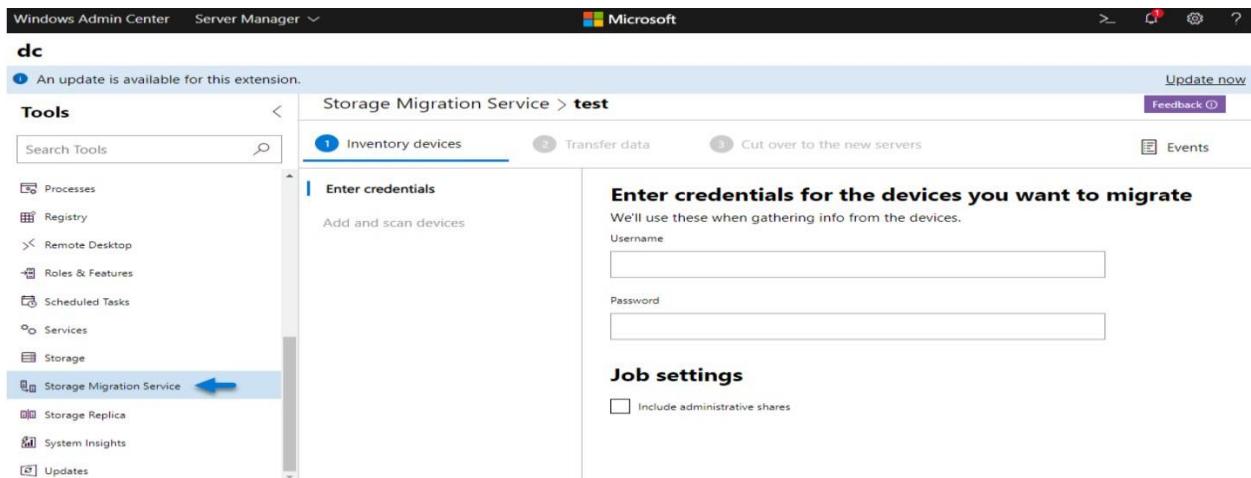
- Enhanced networking by improving the usability of Kubernetes on Windows and the support of container networking plugins.

- Reduced size and higher performance of containers: Improvement of startup times and download size and size on disk of the base container image which will speed up the container workflows.

- Improved integrated identity: Windows integrated authentication in containers became reliable and easier.

4- Storage: There has been some changes made on storage of Windows Server 2019.

- Storage Migration Service: A new technology that makes the process of migrating servers to a new version of Windows Server easier. This service offers a graphical tool that supplies data on servers and transfers it and the configuration settings (shares, NTFS permissions, and ownerships) to newer servers and after that, the old servers' identities can optionally be moved to the new servers so that users and apps have to change nothing. Files can also be migrated to the Azure cloud. Storage Migration Service makes setting up multiple migrations at the same time possible and all of this operation is handled with this service in Windows Admin Center. Storage Migration Service is also compatible with very old systems, such as Windows Server 2003 so he can migrate off files from the old the new server. However, Storage migration service is limited by only moving files, folders, and attributes.



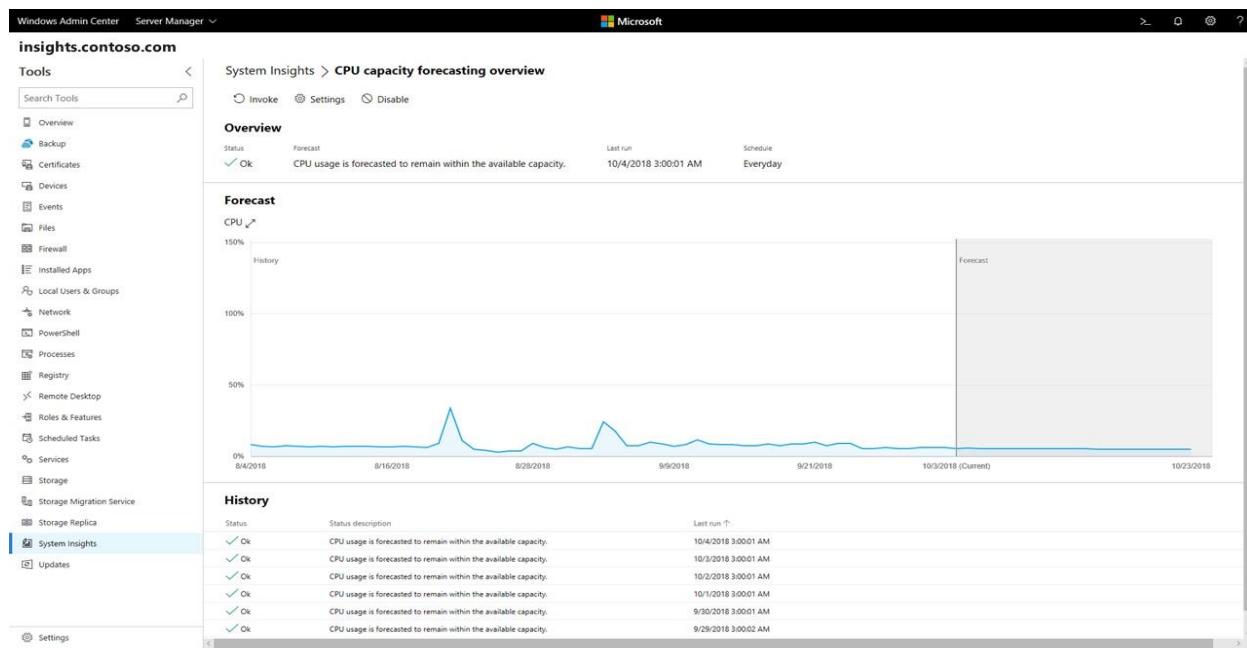
- Storage Spaces Direct: Down below is a list of new services in Storage Spaces Direct:

- Deduplication and compression for ReFS volumes.
- Native support for persistent memory.
- Nested resiliency for two-node hyper-converged infrastructure at the edge.
- Two-server clusters using a USB flash drive as a witness.
- Windows Admin Center support.
- Performance history.
- Scale up to 4 PB per cluster.
- Mirror-accelerated parity is 2X faster.
- Drive latency outlier detection.
- Manually delimit the allocation of volumes to increase fault tolerance.

- Storage Replica: Support the following benefits:

- Test failover which allows mounting of destination storage to backup data or validates replica.
- Supports Windows Admin Center.
- The performance of the Storage Replica log is improved.

5- System Insights: This new feature offers local predictive analytics to Windows Server which it uses a model of machine-learning to analyze locally the system data in Windows Server like performance counters and events to see how well the servers are running and even make predictions about how well it will continue running in the future by estimating the resources needed in the future for networking compute and storage and this is done by making analysis based on your previous usage patterns. It has been a long time where counters were configured manually and as part of troubleshooting, not an ongoing day-to-day analysis, so this feature reduces the operational expenses related to managing the performance of your servers on a long term.



6- Desktop Experience: Windows Server 2019 is a Long-Term Servicing Channel (LTSC) release

which includes the Desktop Experience that gives us access to its fully graphical interface that looks a lot like Windows 10 interface. The problem that existed in Semi-Annual Channel (SAC) that implements Server Core and Nano Server in older versions of Windows Server was the missing of the graphical interface experience which made the interaction and process with the servers more complex for administrators. There is still a possibility to choose the installation with GUI or without it. In fact, choosing installation without GUI could be effective for lower overhead on the performance of the operating system, and it is more security-focused because of its smaller surface.

7- **Failover Clustering:** There has been some added feature to Failover Clustering.

- Cluster sets.
- Azure-aware clusters.
- Cross-domain cluster migration.
- USB witness.
- Cluster infrastructure improvements.
- Cluster Aware Updating supports Storage Spaces Direct.
- File share witness enhancements.
- Cluster hardening.
- Failover Cluster no longer uses NTLM authentication.

8- **Automated client connectivity:** The new Windows Server 2019 offers two remote access technologies right out of the box (Always On VPN or AOVPN and DirectAccess) so that users do not worry about their connection to the corporate network even when they are not physically in the enterprise so that way will be able to access their data and work from other locations in an easy way and without connection issues.

9- **Linux Support:** Three improvements expand Linux capabilities on Windows Server.

- Windows Subsystem for Linux: Windows Server 2019 made a huge step by adding an entire subsystem that allows the user to perform GNU/Linux environment including applications and command-line tools alongside your windows desktop and command-line directly in the Windows Server machine without the overhead of a virtual machine, and by doing that you can access your files from within Linux. This feature runs a Windows console with a base shell, the default text-based shell, and language used for Linux distributions.
- Kubernetes: It is an open-source orchestration platform used by IT admins to manage Linux containers. Kubernetes deploys containers based on OS-level virtualization, which makes them small and fast. Deployed workloads on Kubernetes can use network security to protect both Linux and Windows services using embedded tooling. The platform automates the deployment, maintenance, and operation of application containers across clusters of nodes. The containers run in Pods and can share resources.
- Hyper-V shielded virtual machine: In previous versions of Windows Server, only Windows virtual machines were Hyper-V shielded VMs. However, Windows Server 2019 bring Hyper-V shielded VMs available for Linux VMs.

10- Project Honolulu: This server management tool that project Honolulu gives is a central console that allows an easy management GUI and GUI-less Windows 2019,2016 and 2012 servers by IT professionals. This project makes tasks like server configuration, performance monitoring, settings tasks... easier to manage on a mix of servers in their environment

Windows Server 2019 editions

Editions	Description	Licensing requirements	CAL model	Pricing
Windows Server 2019 Datacenter	For highly virtualized datacenters and	Core based	WS CAL	\$6,155

	cloud environments			
Windows Server 2019 Standard	For physical or minimally virtualized environments	Core based	WS CAL	\$972
Windows Server 2019 Essentials	For small businesses with up to 25 users and 50 devices	Specialty server	No CAL required	\$501
Microsoft Hyper-V Server 2019	Free hypervisor download.	N/A	N/A	N/A

B-Differences between Windows Server 2016 Hyper-V and Windows Server 2019 Hyper-V:

Difference	Windows server 2016	Windows server 2019
Core processors on hardware	320	512
Physical memory	24 TB	64 TB

Storage migration service	no	Yes, it helps to migrate data, security and configuration from legacy system to WS 2019
Storage pool	1 PB	4 PB
Shielded VMs for Linux	no	Yes, support shielded VM for Linux to protect Linux from attacks
Windows subsystem for Linux	no	Yes, it allows developers and app administrators to use

Logical Processors:

. Windows Server 2016 Hyper-V and Windows Server 2019 Hyper-V have a maximum logical processors up to 512 with two requirements that must be enabled in the firmware which are Hardware-assisted virtualization and Hardware-enforced Data Execution Prevention(DEP) but the host OS(root partition) will only see 320 logical processors.

Physical Memory:

Users can configure up to 24 TB of physical memory on both Windows Servers which can maximize the use of memory.

Virtual Processors per host:

A Hyper-V running on Windows Server 2016 and 2019 can support up to 2048 running Virtual Machines per server.

Virtual Processors per Virtual Machine:

This depends on the Guest Operating System, the number of virtual processors supported by a Guest Operating System might be lower and the maximum virtual processors support actually depends on the

number of Physical processors configured on the Hyper-V Host. In the case of a virtual machine running on both Windows Servers, a maximum of 240 virtual processors can be configured for a Virtual Machine for generation 2 and 64 for generation 1.

Memory per Virtual Machine:

It depends on the requirements for the specific operating system to determine the minimum and recommended amounts, but for both Windows Servers 2016 and 2019 Hyper-V, they can configure 12 TB per VM for generation 2 and 1 TB for generation 1 as a maximum.

Active Virtual Machines:

It depends on the capacity of Hyper-V Server.. You can run 1024 Virtual Machines on a Hyper-v Server running Windows Server 2016 and 2019.

Nodes Per Cluster:

The Datacenter edition of both Windows Servers Operating System supports 64 nodes in a single cluster, there is no recommended ratio or multiplier of reserved nodes to active nodes. You can increase the number of nodes if you want to reserve additional nodes as long as it doesn't exceed the maximum number of nodes per cluster.

Locks and limits	Windows server 2019 Standard	Windows server 2019 Datacenter
Maximum number of users	Based on CALs	Based on CALs
Maximum SMB connections	16,777,216	16,777,216
Maximum RRAS connections	Unlimited	Unlimited
Maximum IAS connections	2,147,483,647	2,147,483,647

Maximum RDS connections	65,535	65,535
Maximum number of 64-bit sockets	64	64
Maximum number of cores	Unlimited	Unlimited
Maximum RAM	24 TB	24 TB
Can be used as virtualization guest	Yes; 2 virtual machines, plus one Hyper-V host per license	Yes; unlimited virtual machines , plus one Hyper-V host per license
Server can join a domain	Yes	Yes
Edge network protection/firewall	No	No
DirectAccess	Yes	Yes
DLNA codecs and web media streaming	Yes, if installed as Server with Desktop Experience	Yes, if installed as Server with Desktop Experience

C-Some Hyper-V performance issues

○ Storage related problems

Many of the most common problems that Hyper-V administrators tend to experience are storage related. A variety of problems ranging from poor virtual machine performance to issues with high availability can potentially be related to performance.

1- Slow storage performance

Poor disk performance tends to be one of the more difficult problems to troubleshoot in a HyperV environment. This is because there are so many different things that can cause slow storage performance.

a- Storage architecture

One common cause is resource contention. In any virtualized environment, there is a finite amount of storage I/O available, and this I/O must be shared among the virtual machines.

If the I/O demand exceeds (or approaches) the I/O capacity, then performance will suffer. In these types of situations, it is usually advisable to move some virtual machines to an alternate Hyper-V host (assuming that local storage is being used).

b- Checkpoints

Checkpoints don't usually have a major impact on write performance, assuming that the checkpoints are stored on a high speed volume. However, checkpoints can have a significant impact on read performance. A virtual machine's read performance tends to correspond directly to the number of checkpoints that exist for the virtual machine. The reason for this is that each checkpoint represents a differencing disk. When a virtual machine receives a read instruction, Hyper-V has to read each differencing disk in sequence, until it finds the requested data.

2- Painfully slow file copies

One problem that many Hyper-V administrators have reported is that of extremely slow file transfers. In some situations, the file transfers can be so slow that the file copy process times out before the file transfer can be complete.

3- Virtual machines are listed as being in a critical state and cannot be powered on

Another somewhat common problem that is often storage related involves a situation in which virtual machines cannot be powered on. Although this problem can sometimes be permissions related, it is more often related to the inability of Hyper-V to communicate with the storage on which virtual machine components reside. When this problem occurs, the Hyper-V Manager will hide the option to power on the virtual machine, and will also display a status message indicating that Hyper-V cannot connect to virtual machine storage.

This problem can be caused by a storage failure, a storage disconnection, or by a change to a drive mapping. The problem can also stem from storage permissions being changed in a way that prevent Hyper-V from being able to read and write to the storage medium.

○ Permissions problems

Often times problems that occur within Hyper-V can be attributed to permissions problems. These problems may result in Access Denied errors, and a variety of other error messages. In fact, there are too many different types of permissions related errors to be able to list them all here. Even so, the vast majority of these errors can be attributed to one of two things:

- A disconnect between a management tool and Hyper-V in which the management tool lacks the permission to perform the appropriate action
- A permissions problem in which Hyper-V lacks the required access to virtual machine resources.

1- An error occurring while attempting to connect to server

One type of error that you could potentially receive indicates that an error has occurred while attempting to connect to the server.

III-Hyper-V Clustering:

We already defined what Windows Hyper-V is, and how it works, now we are going to talk about its clustering feature. But first let's talk about Clustering itself.

High Availability Cluster:

It's a group of 2 or more physical servers, which host virtual machines. The physical machines cooperate to provide high redundancy and failover to the virtual machines with approximately no downtime on the virtual machines. They are used to peak the server hardware by allocating VMs to the nodes with the lowest current workload.

Understanding Fail Overs:

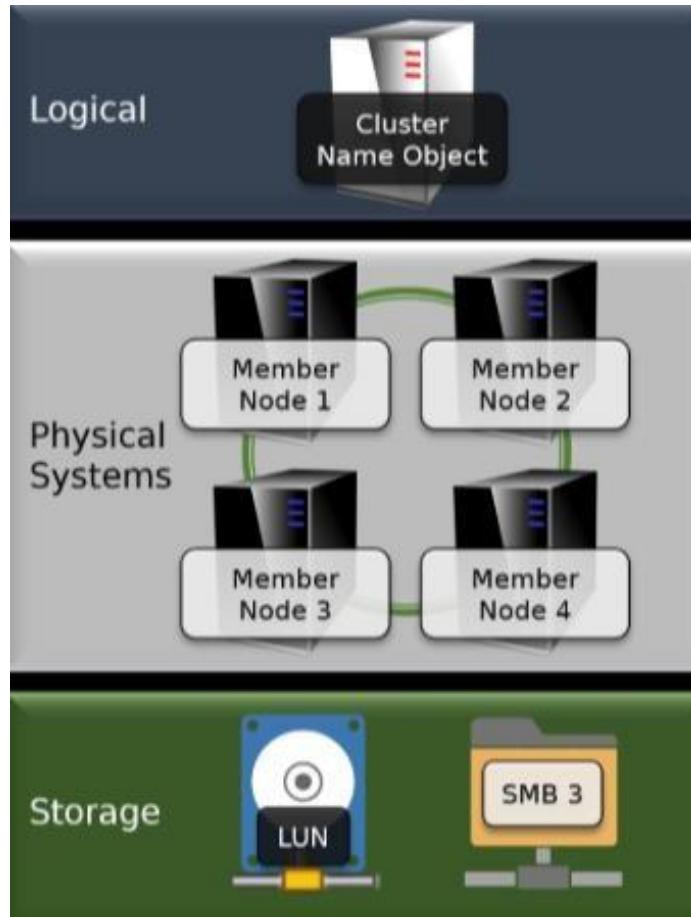
There are 2 types of failovers:

Planned Failover : A scheduled event to fail over from production to the replica server.

Unplanned Failover : When there is a failure at the primary site. This is when you can bring up the replicated virtual machine on the Replica Host server with limited downtime in your production environment.

Hyper-V Cluster:

It is done by installing the Failover Cluster Role to each server node in the group. Then, the Failover Cluster Role is used to create the clusters and join servers to it.



Requirements and decisions:

-First: recommended minimum of 4 NIC's in each server node:

- 1-WAN Connection
- 2-Cluster heartbeat
- 3-Live Migration (can be combined with 2)
- 4-Shared Storage Network

-Second: Figure out storage solution:

1-For a cluster to be effective, each node needs to be able to access the same storage locations simultaneously. (Achieved by using a Clustered Shared Volume(CSV))

*A CSV is a disk/pool of disks that act like a logical disk on the system.

-Third: Migrate the VM into the cluster:

With a VM running on the cluster and its disk resources hosted on the CSV, we can now add the VM to the cluster under the Virtual Machine Role.

How it works:

When a failover happens, one node will lose the heartbeat signal from another node which has become offline. The coordinator node will then transfer the ownership of the connection to the VM that was running on the offline node to another node which is still online, and that new node will now host the VM. The process can take a minute, but there will be no need to copy the VM disk anywhere since all nodes are connected to the same storage volume. End users will notice little to no connection interruption to the VM.

Another useful scenario that HA Clusters provide is something called [Cluster Aware Updating](#). With this feature enabled, each node will take turns running windows updates and rebooting to complete the process while automatically migrating VMs around the cluster to keep everything online.

Weak Points:

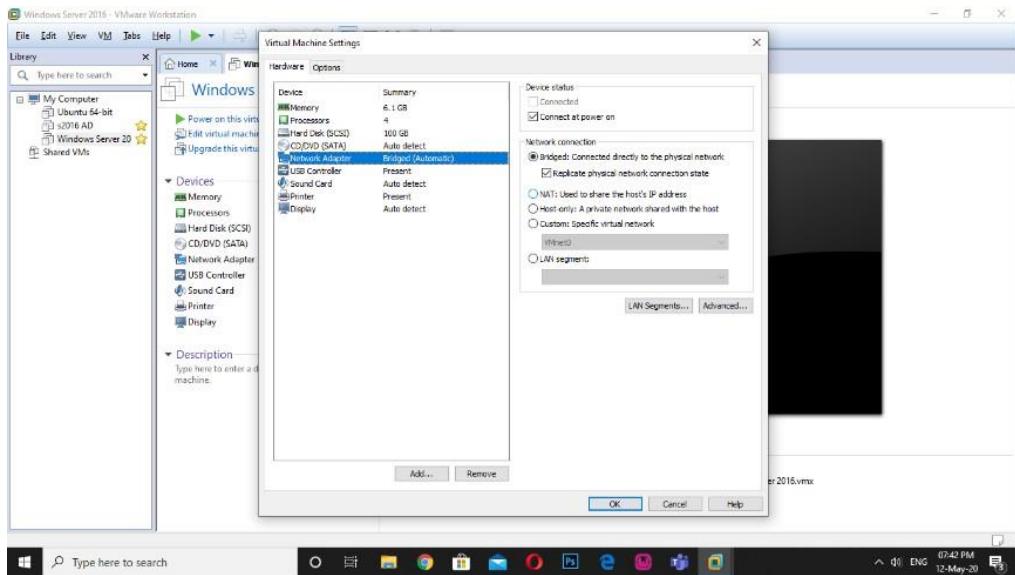
-The shared storage solution: If it goes offline everything becomes useless.

-Everything between the nodes and the storage volume is a point of failure (switch,net cables,NICs...)

-Practical Part:

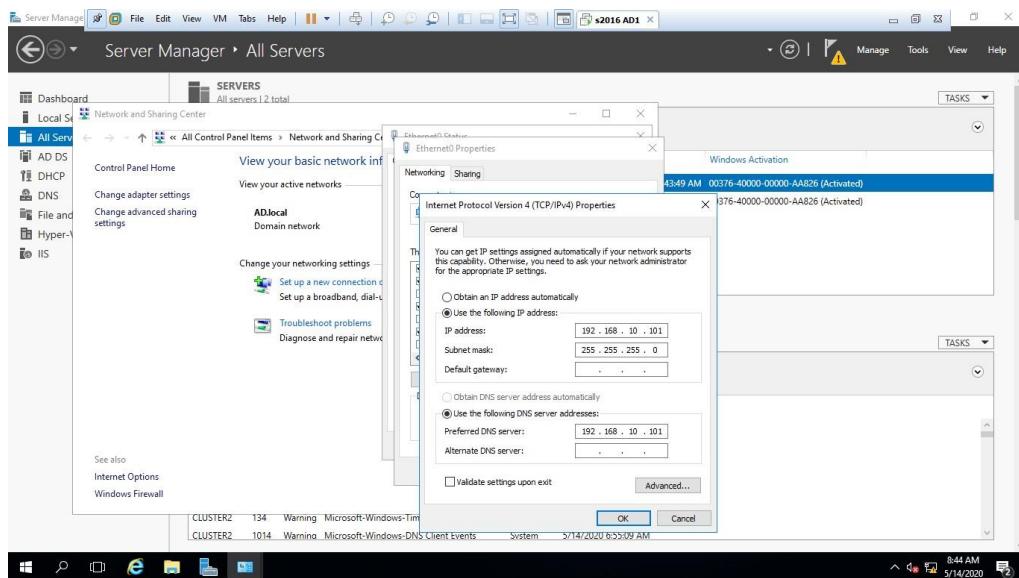
-Creating The Cluster:

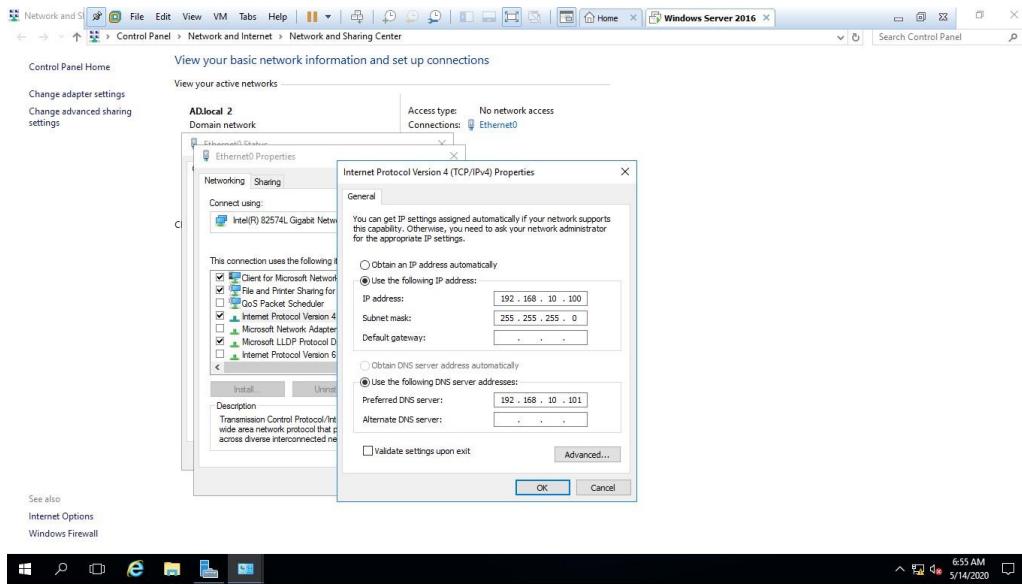
Step 1- Connect Both machines directly to the physical network and check the “Replicate physical network connection state”



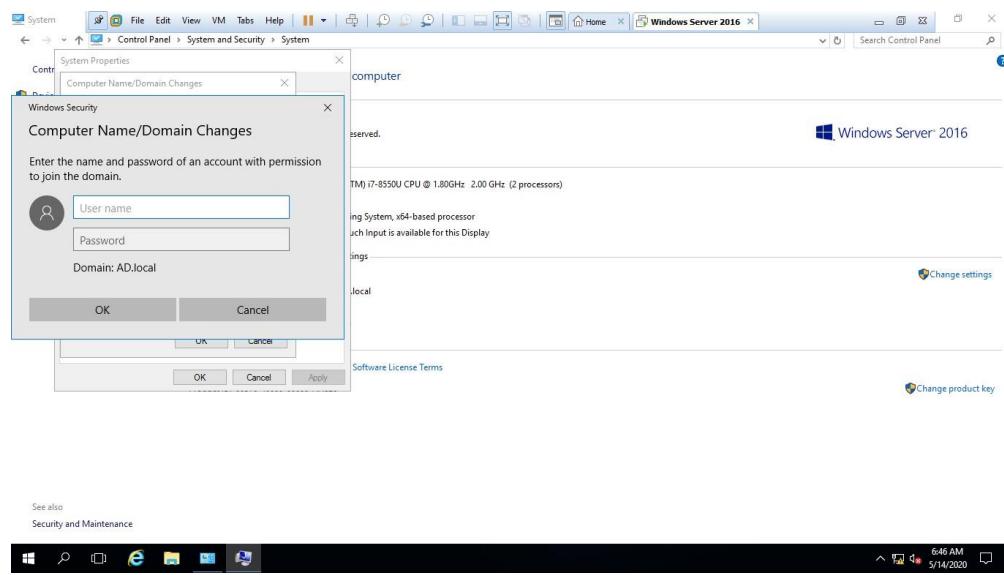
Step 2- On Cluster2 Server set IP address: 192.168.10.100 and DNS 192.168.10.101

On AD set IP address: 192.168.10.101 and DNS 192.168.10.101

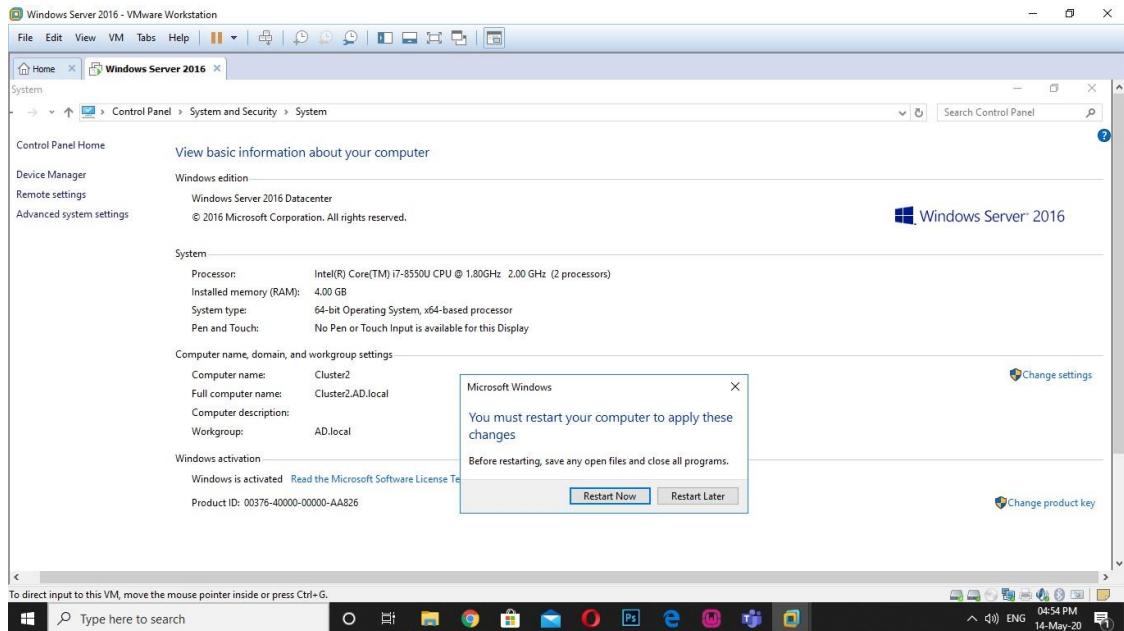




Step 3- Go to control Panel on server Cluster2->System and change configuration of domain and computer name: change name to Cluster2 and domain to AD.local then enter Administrator username and password

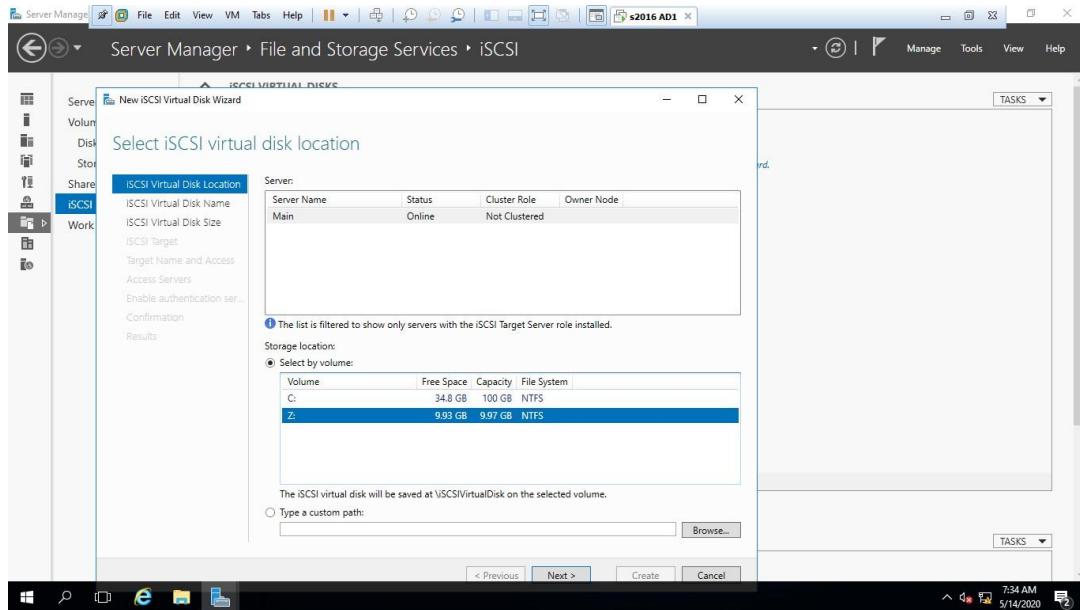


Step 4- restart PC to apply changes



Step 5- Download iSCSI on both servers then go to AD and add another virtual disk from the settings and connect ot to a volume to be able to share it and name it Shared with a letter (Z:)
 Step 6- Go to file and storage services on the AD and proceed to iSCSI to create a new iSCSI.

Step 7-Select the new created Volume Z: to be shared:

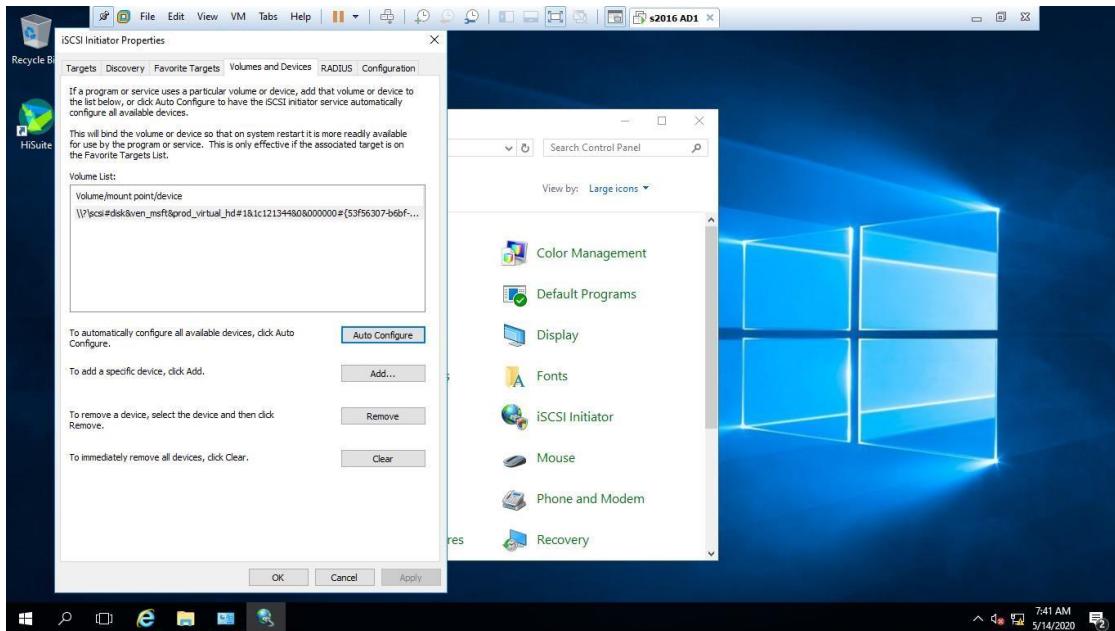


Step 8-Select the two servers : Cluster2 and AD to share the iSCSI file to.

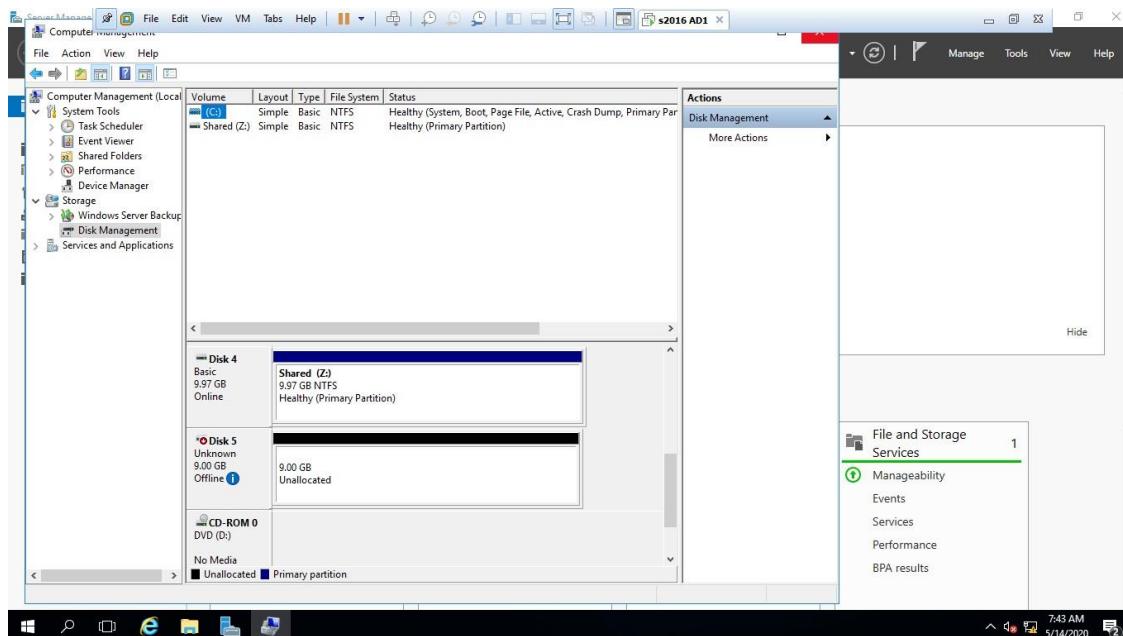
Step 9- After finishing the wizard go to each Server to the iSCSI initiator in the tools section and write the name of the server holding the volume shared (here main) and click quick connect to connect to the server. Sometimes the iSCSI service might be off then go to Control Panel->

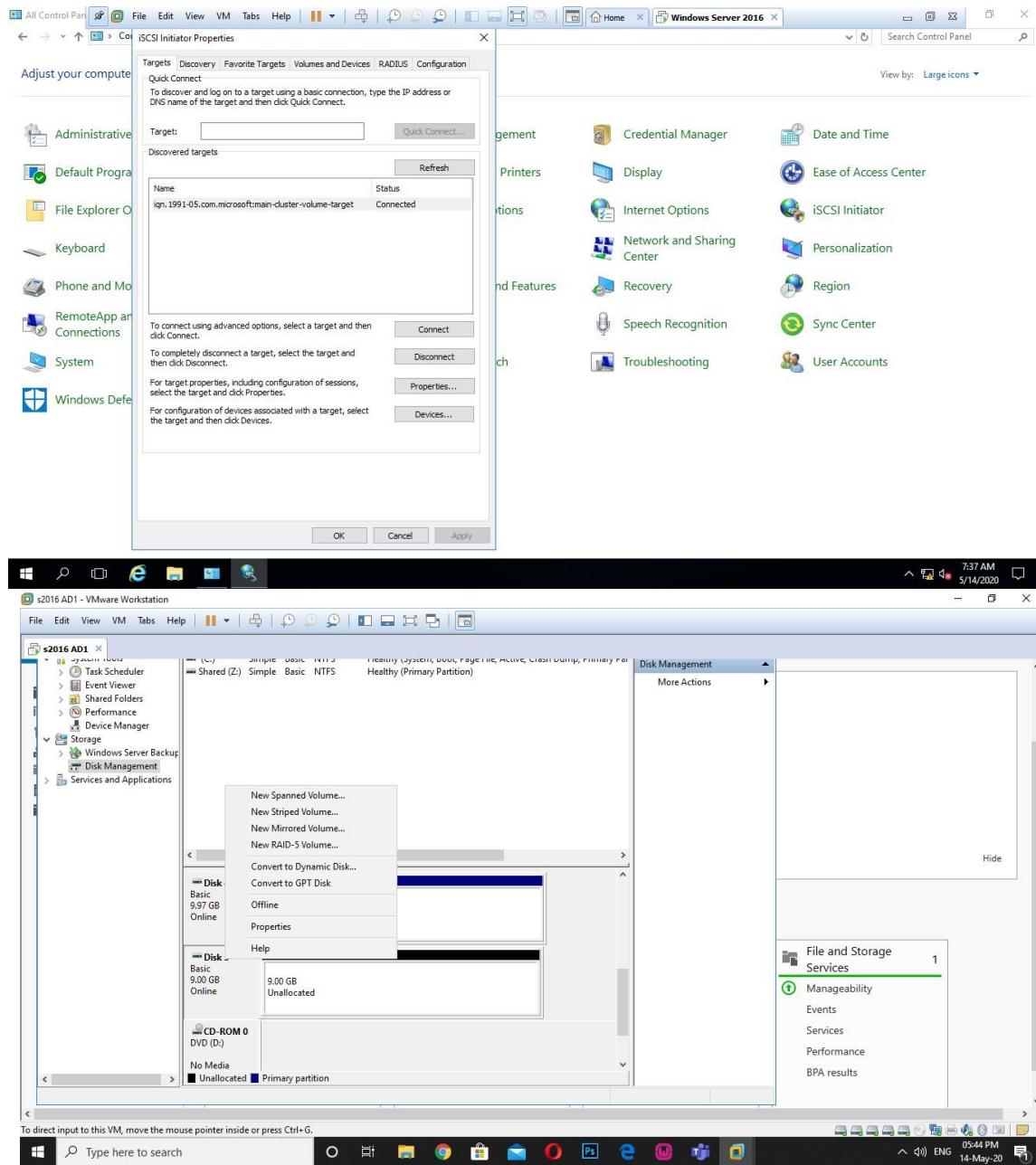
Administrative tools and double click on iSCSI and turn it in and in the properties make it automatic so you don't have to turn it on manually anymore.

Step 10- After connecting to the server go to the Volume and Devices in the section above and click on Autoconfigure. Now you will be able to see the shared volume on both servers.

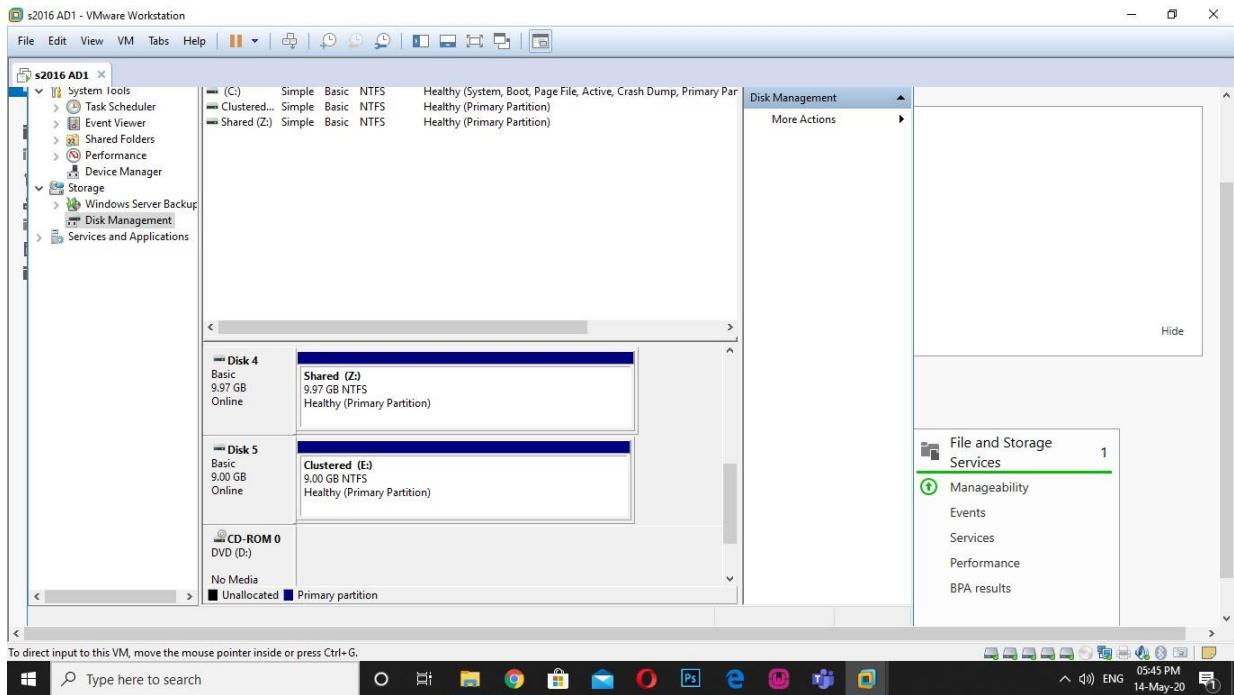


Step 11- On both servers go to the search bar on the desktop-> search for disk management. You'll see a message that a new disk has been inserted. When you scroll down You'll see the Disk unallocated. That is the shared volume. Right click on it and turn it online then right click on the disk and click New Spanned Volume.

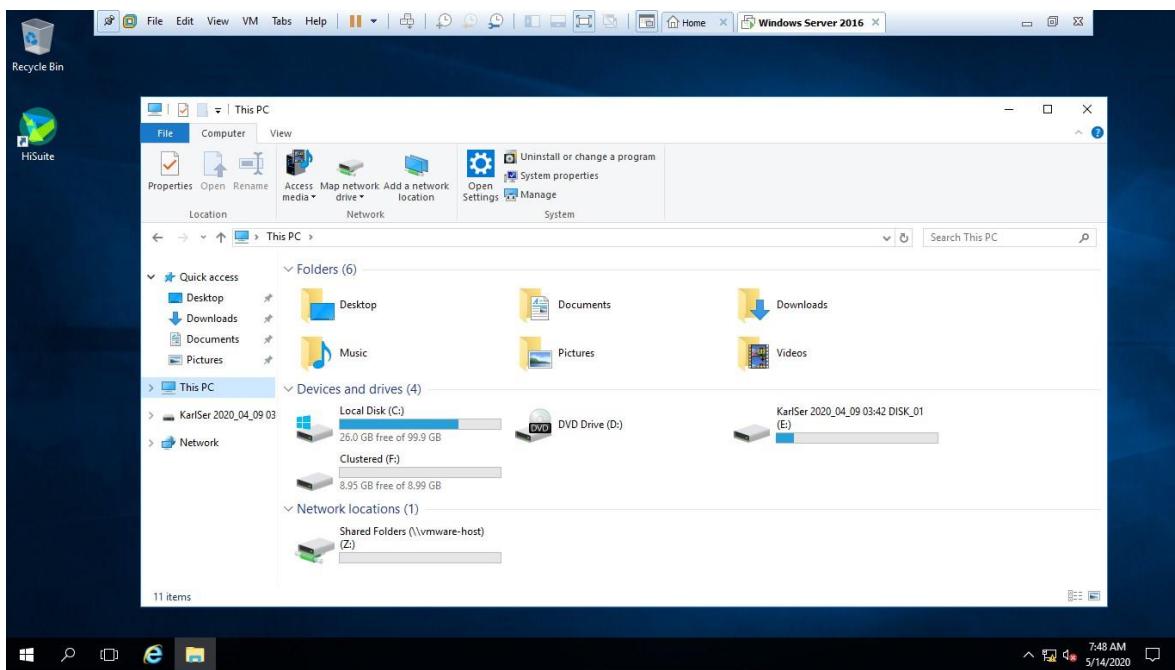




Step 12- Now we can see that the disk has been successfully turned on and is working.

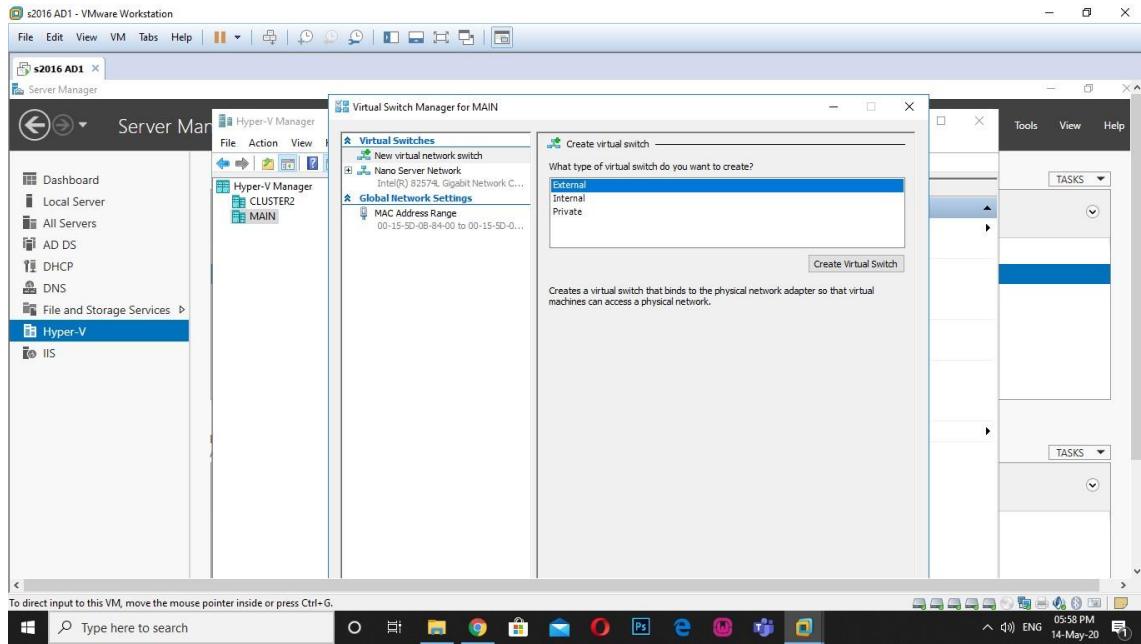


This is a picture of the the volumes we can see on the Cluster2 Server. We gave it the letter (F:) .

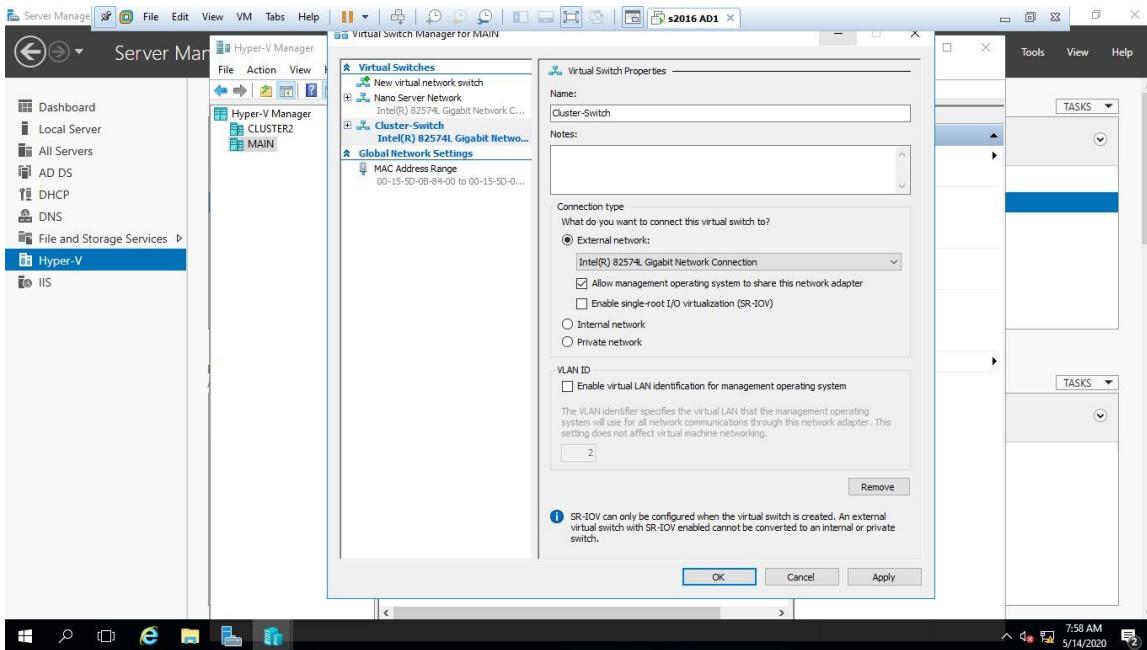


Step 13- Now we add the Hyper-V role to both servers.

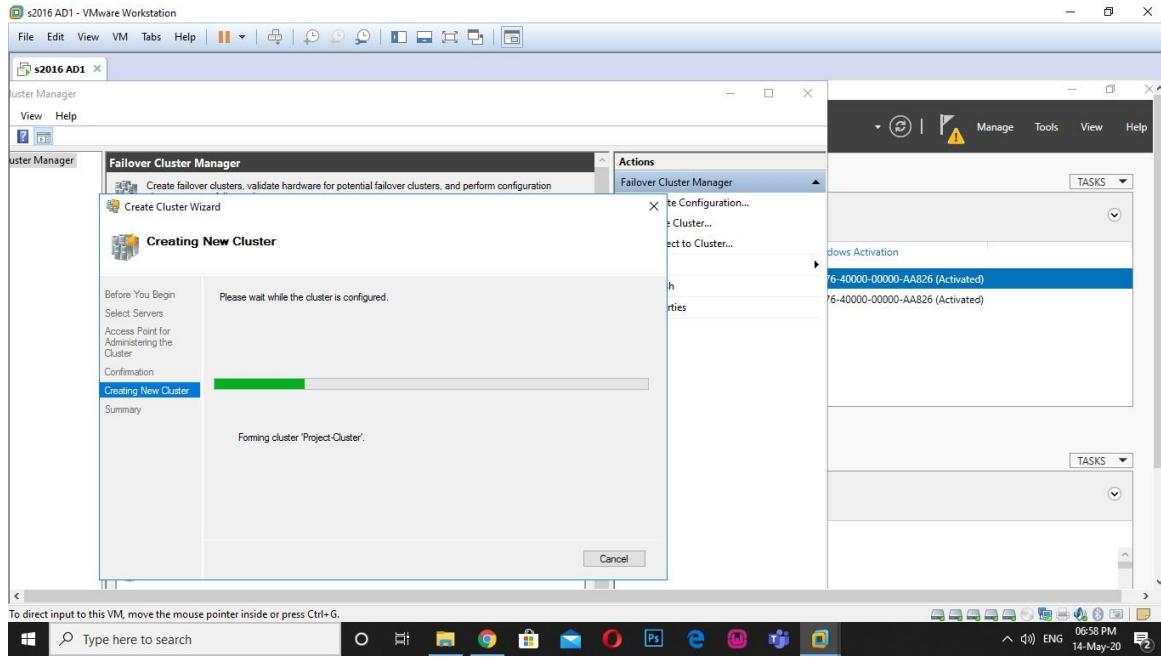
Step 14- Go to tools on both servers and connect both servers. Right Click on Both servers and go to Virtual switch manager->Create Virtual Switch with external option selected.



Step 15-Name the switch on both servers Cluster-Switch and choose the private network connection type-> Apply-> Ok

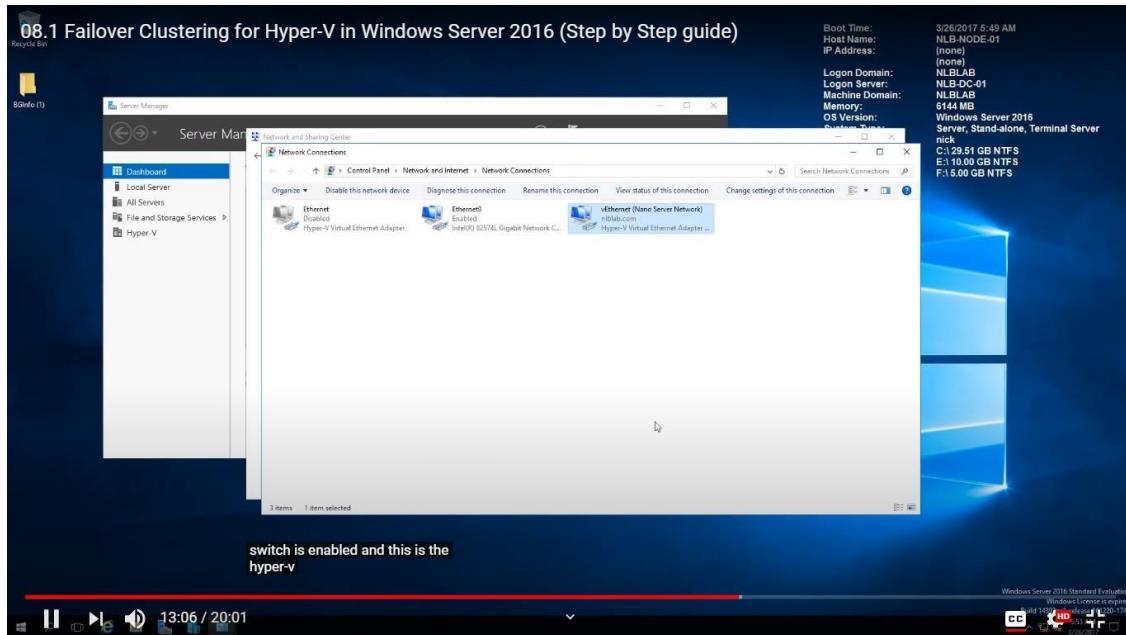


Step 16- Now go to Failover Cluster Manager in tools on AD and create a cluster-> Add the 2 servers Cluster2 and AD->You will be asked to enter an Address for the Cluster just put the IP:192.168.10.102 Run the diagnostic to check for any problem then confirm the creation.

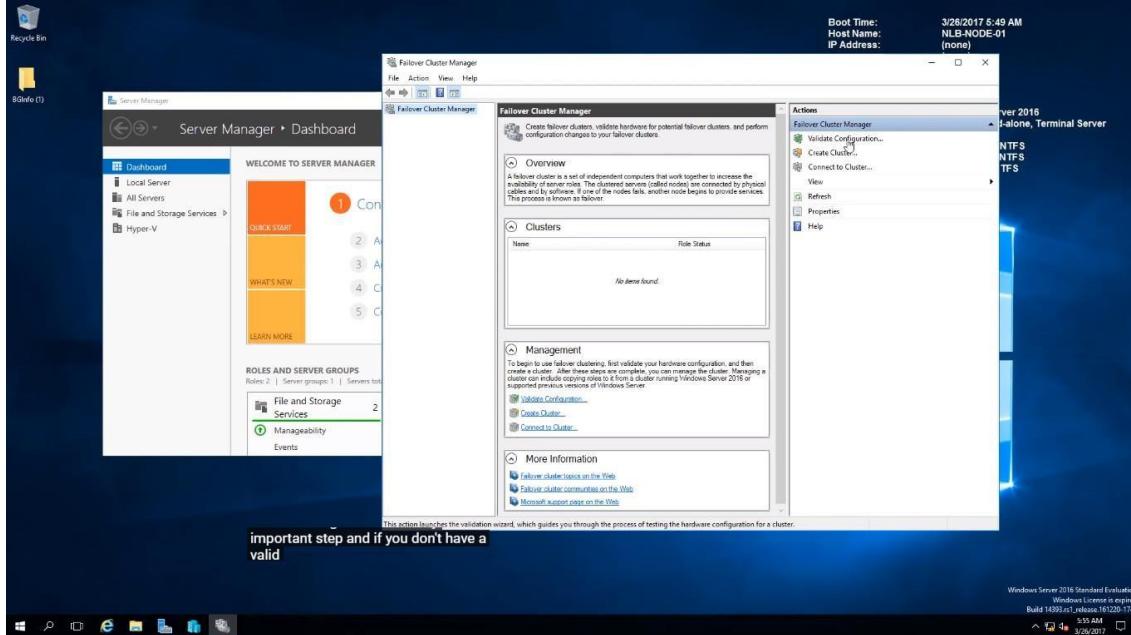


FROM NOW ON THE STEPS WILL BE SCREENSHOTS FROM THE INTERNET BECAUSE OF THE FAILUROF MY VIRTUAL MACHINES:

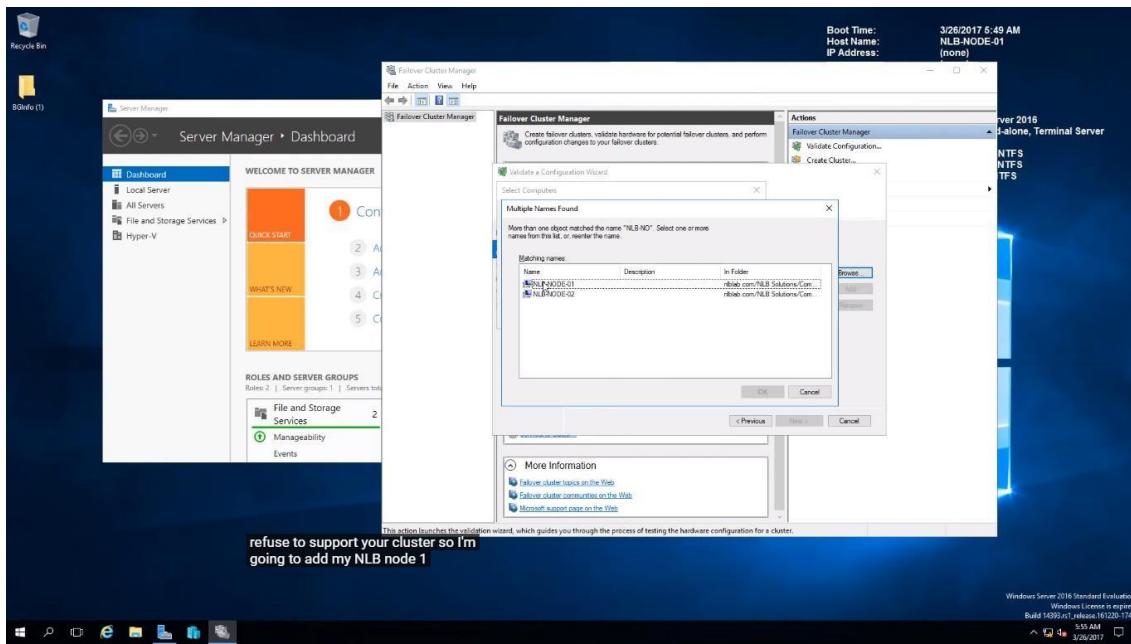
Step 17-Now that the external network is on we go to Control Panel->Network and Sharing Center->Adapter Setting. We can see the created Hyper-V network card.

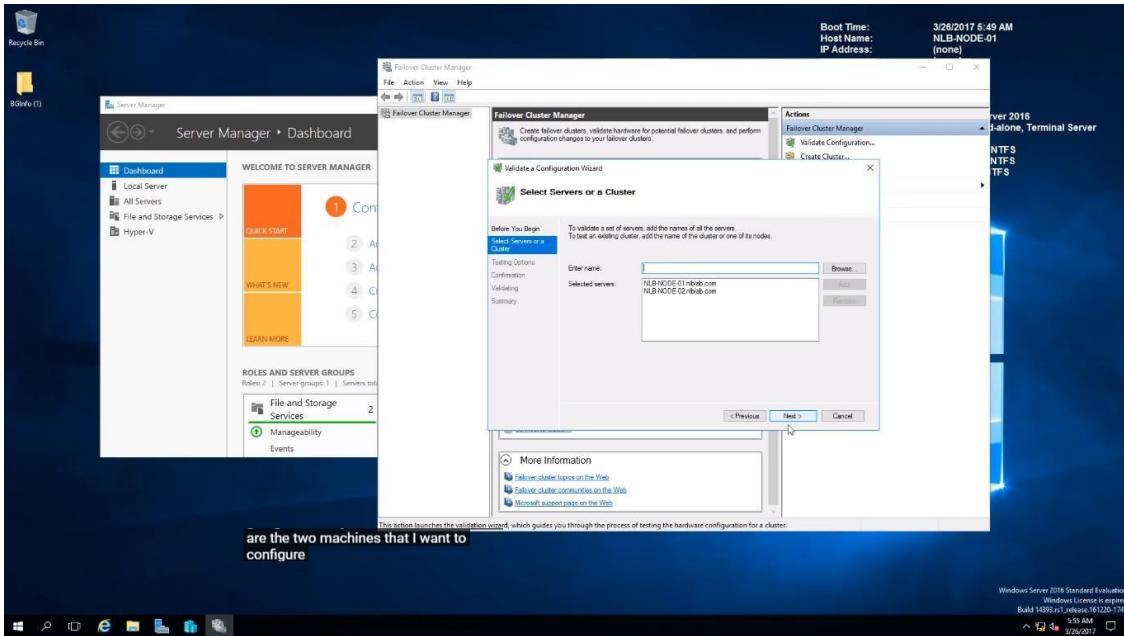


Step 18 Validating the cluster configuration: Go to Failover Cluster and select Validate Configuration

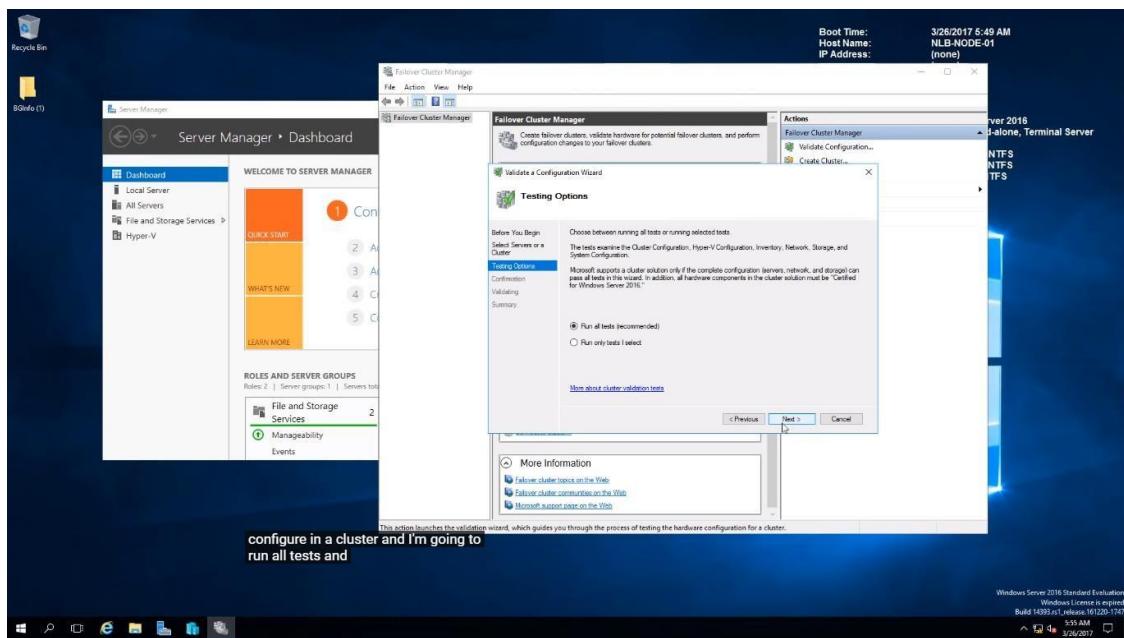


Step 19- When the wizard opens select the nodes to be part of the cluster

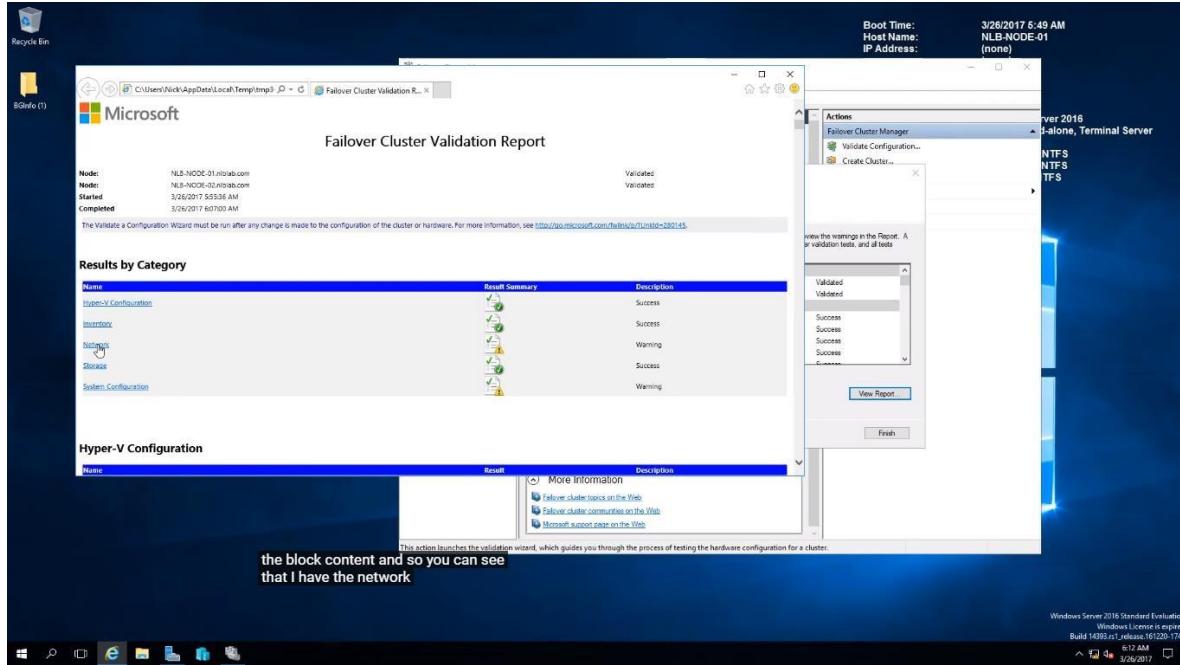




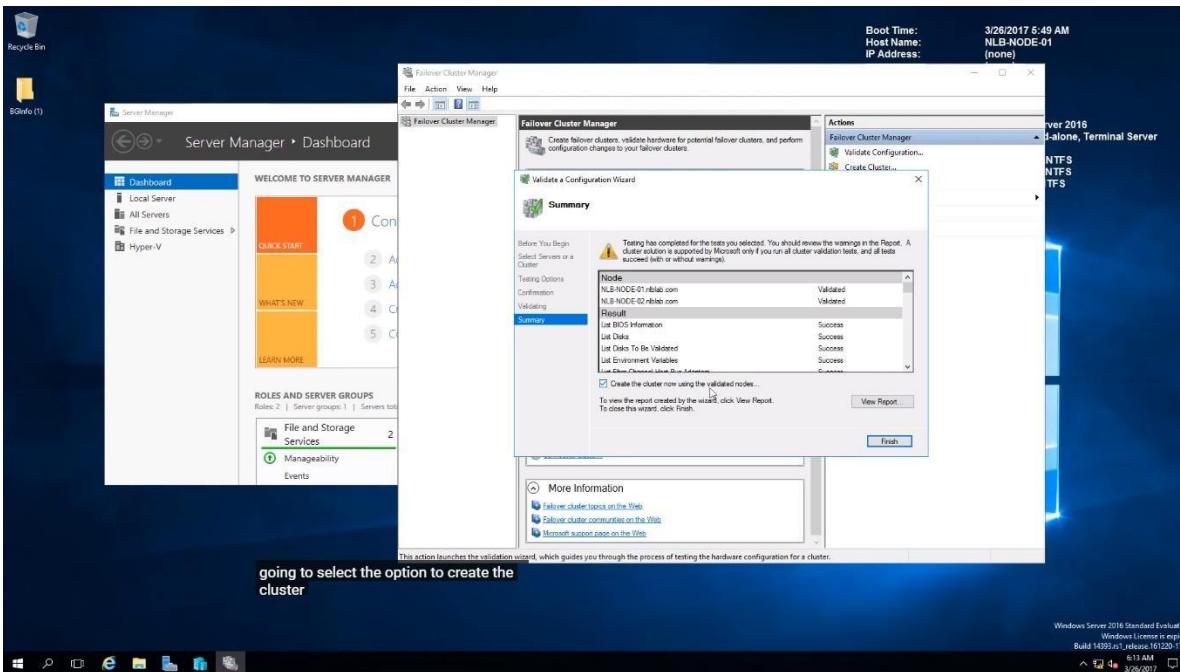
Step 20- Run all tests



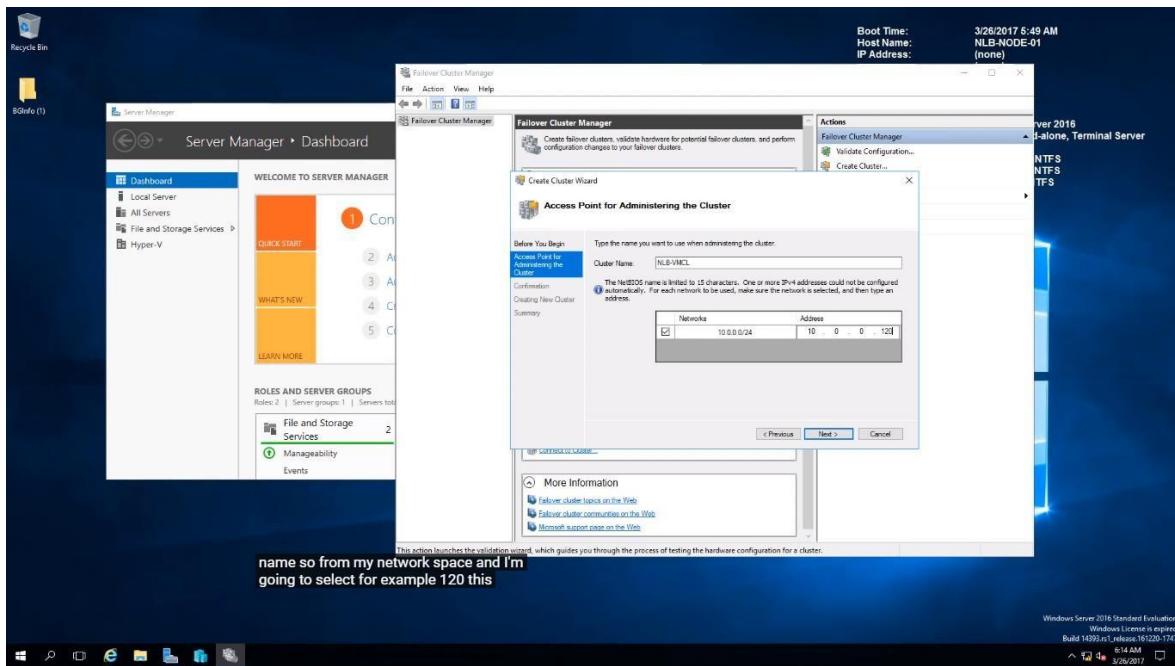
Step 21 We might see some warning especially that we are using one NIC card for each server connection which is one single point of failure but its okay in our case.



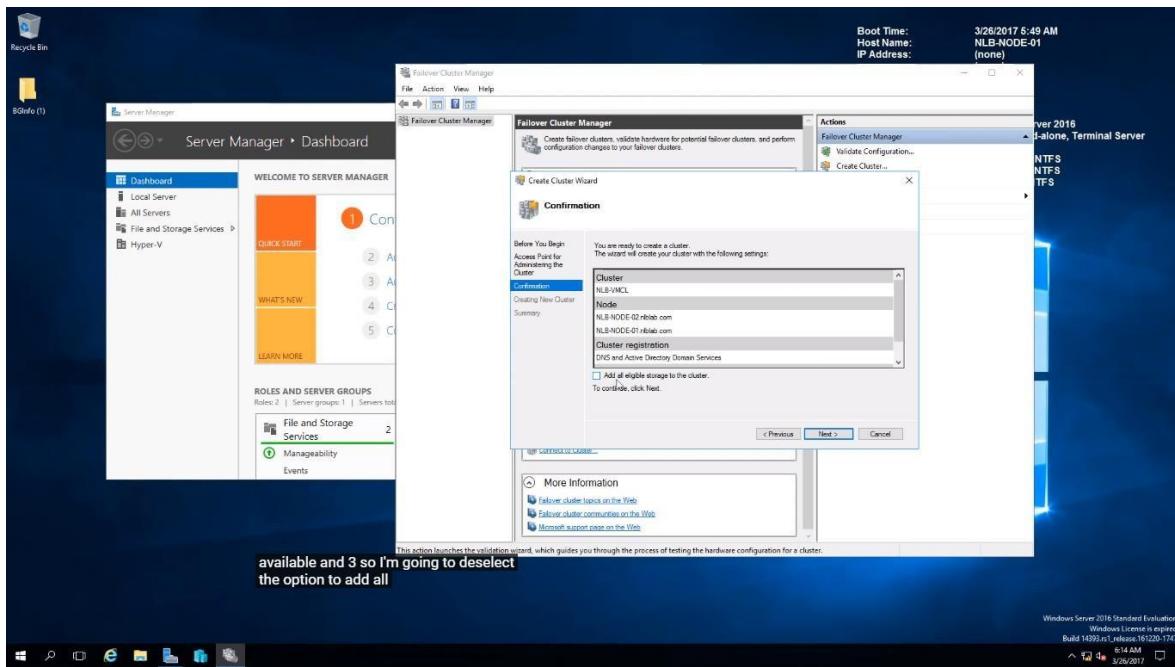
Step 22- Return to the wizard and check the box create the cluster



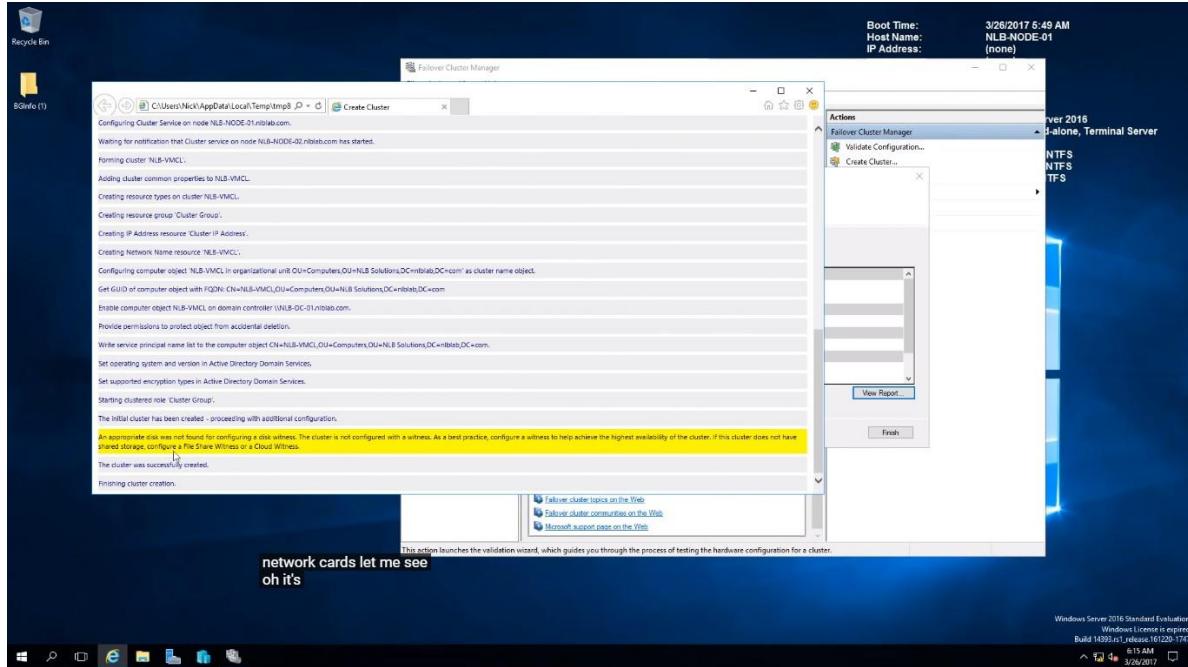
Step 23 Select a random not used IP in the Subdomain we are using to be the clusters IP:



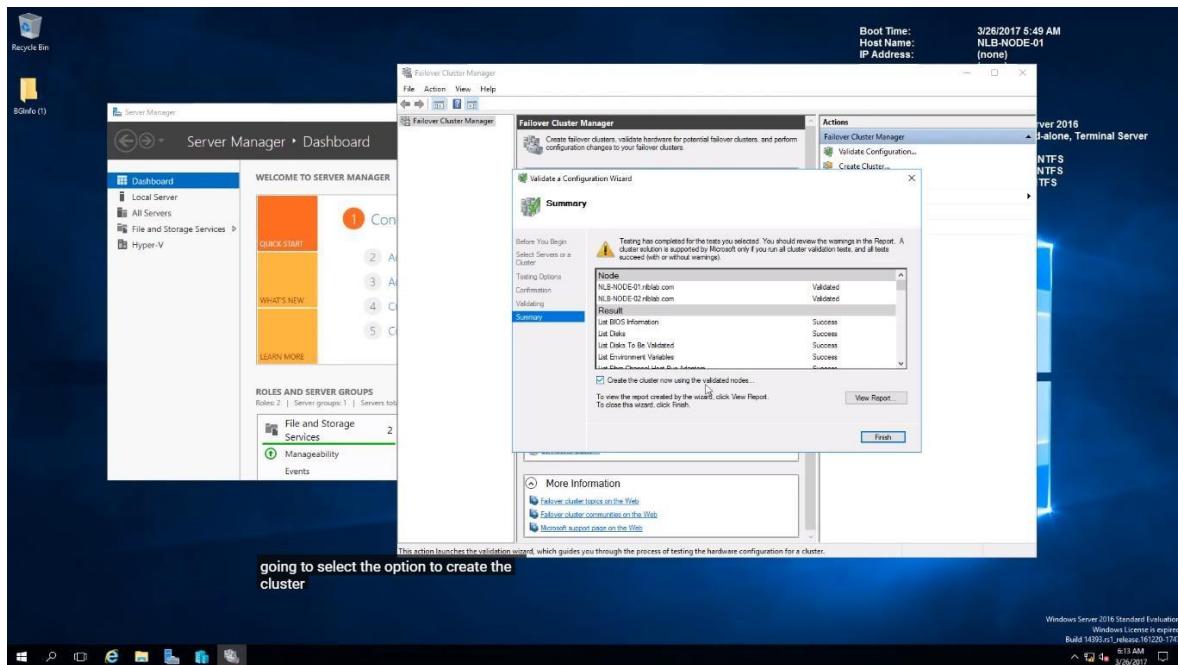
Step 24- Uncheck the add all eligible storage to the cluster

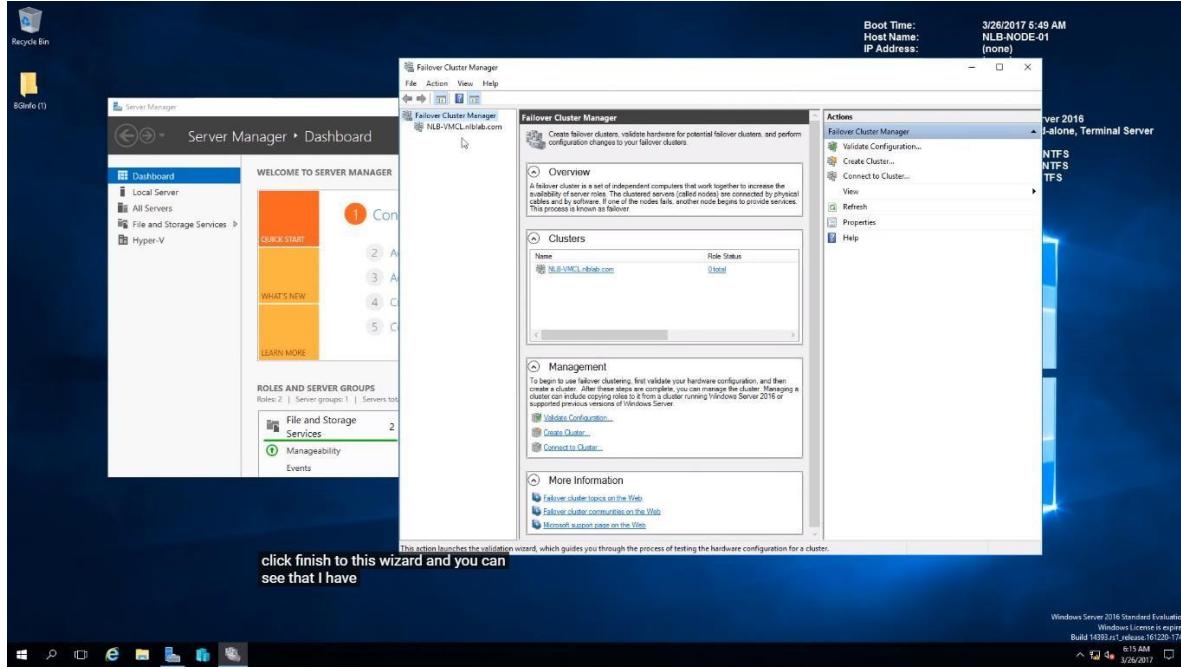


Step 25 We will get a report that tells us a disk witness hasn't been set to the Cluster so we will add it after finishing the Validation of the Cluster

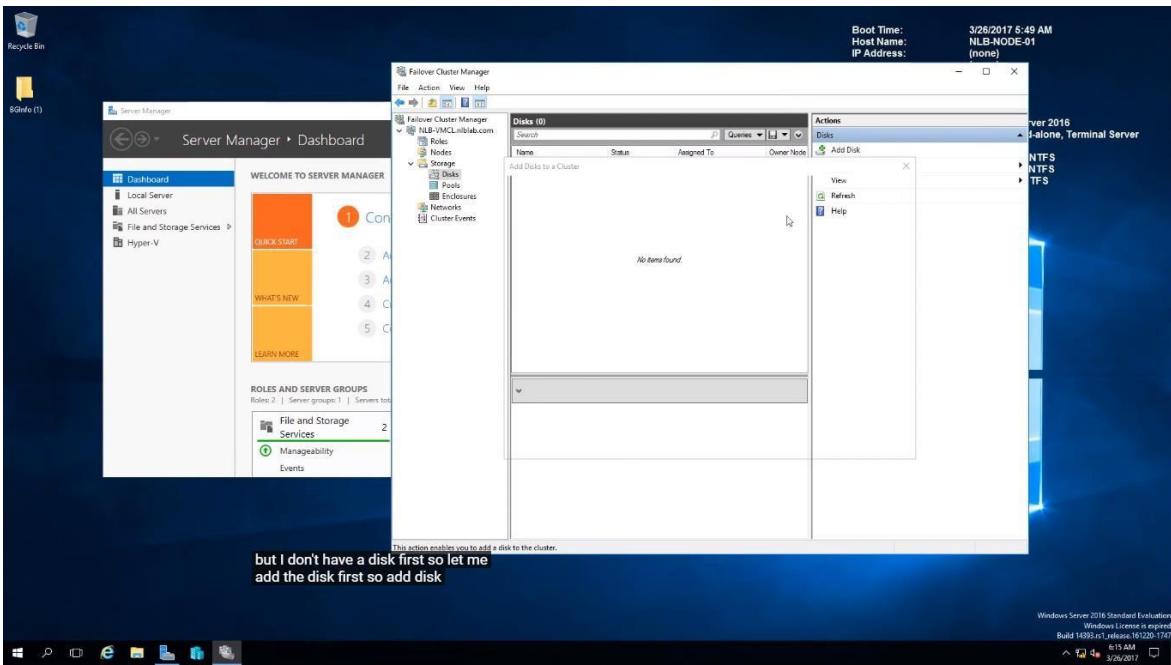


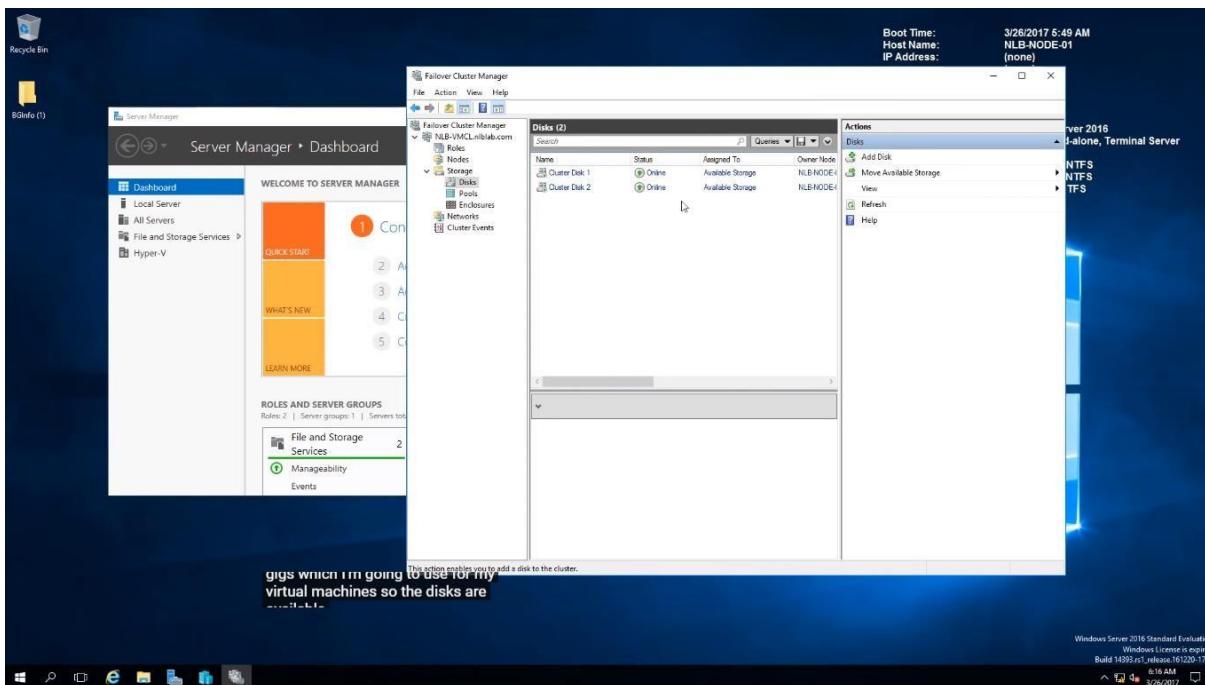
Step 26- Click finish to end the Validation



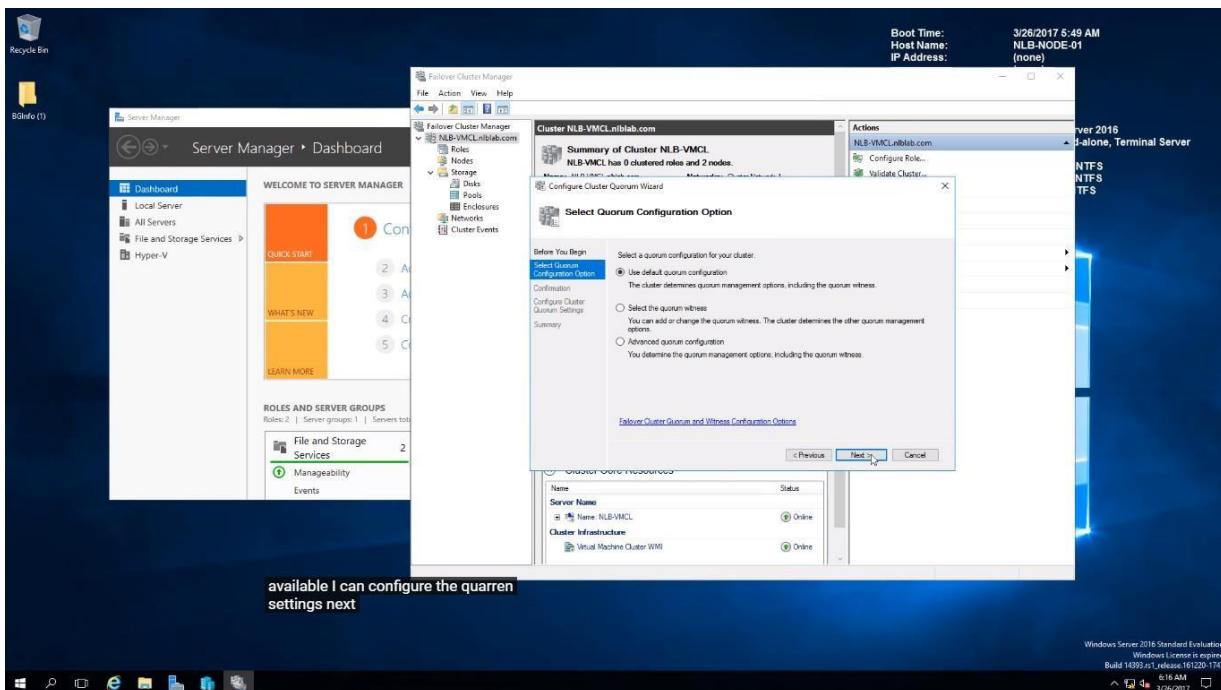


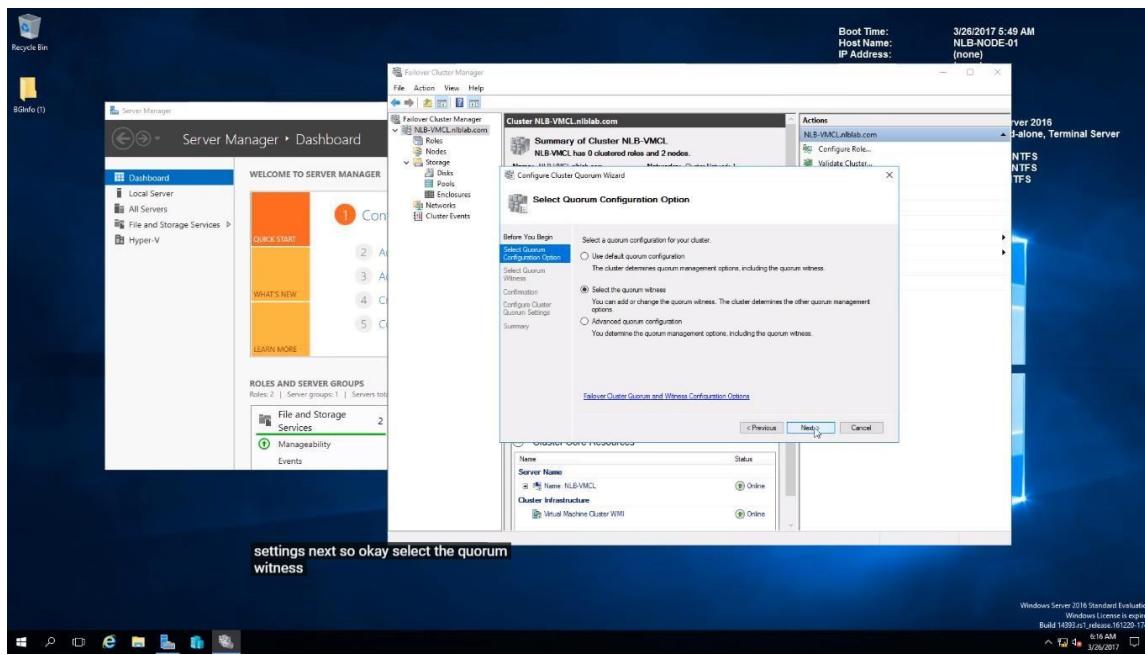
Step 27- Our Cluster is now missing a witness disk so what we need to do first is add the disks to the Cluster and select one of them to be the witness disk



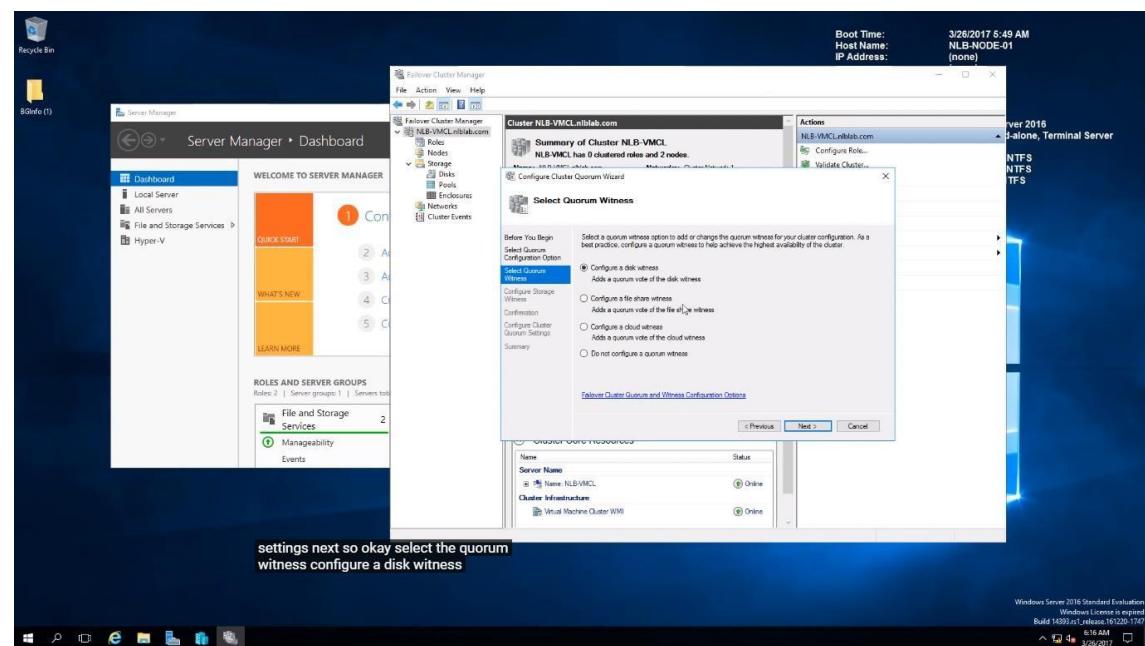


Step 28- Right click on the cluster created and go to Configure Cluster Quorum and follow the steps below:

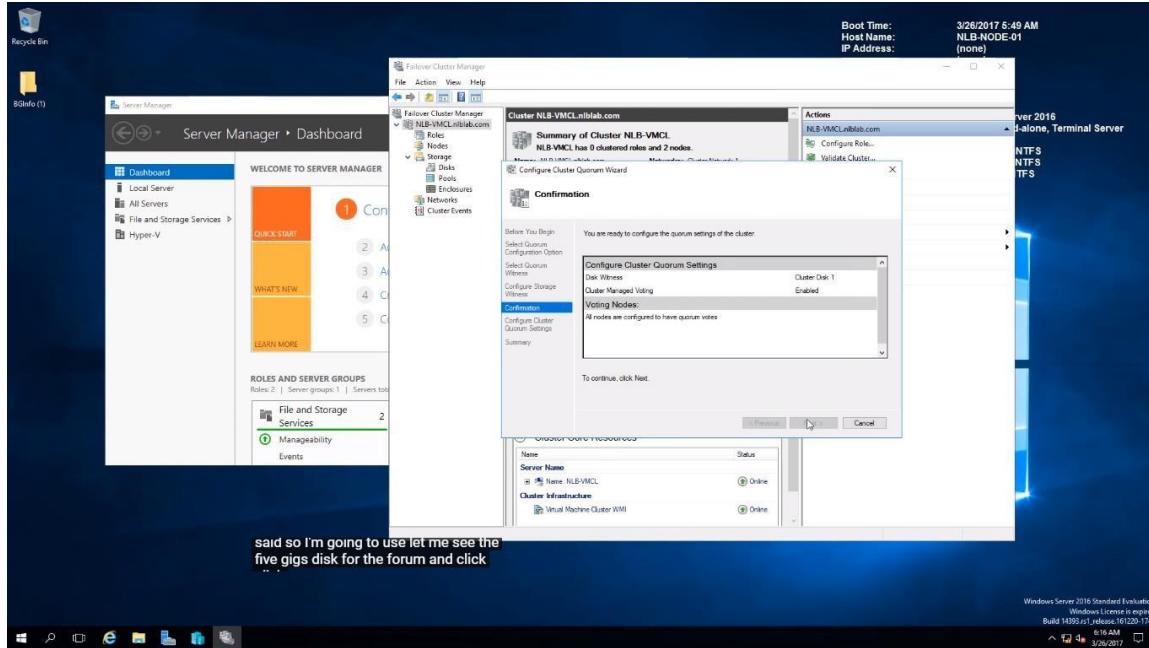




settings next so okay select the quorum witness



settings next so okay select the quorum witness configure a disk witness



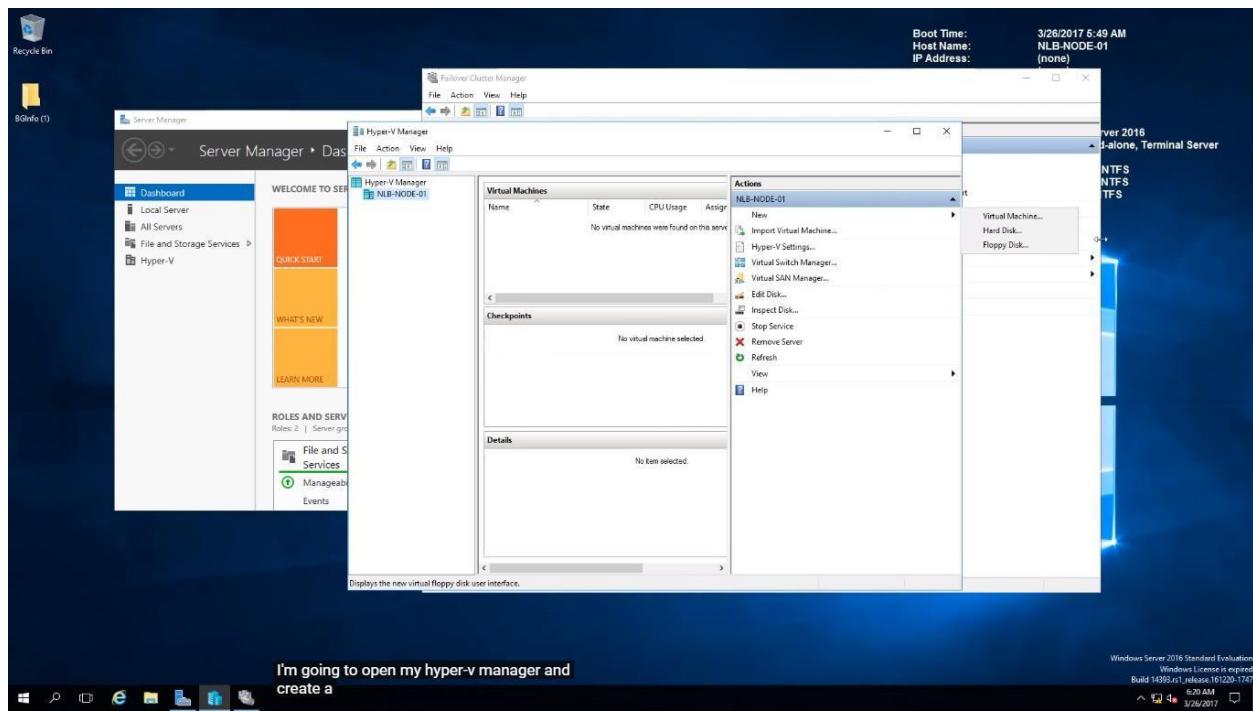
The Hyper-V Cluster is now created and clear of any error.

-Sharing a virtual machine on the cluster:

Step 1- We start by configuring one virtual machine on one of the nodes of the cluster (It doesn't matter which node).

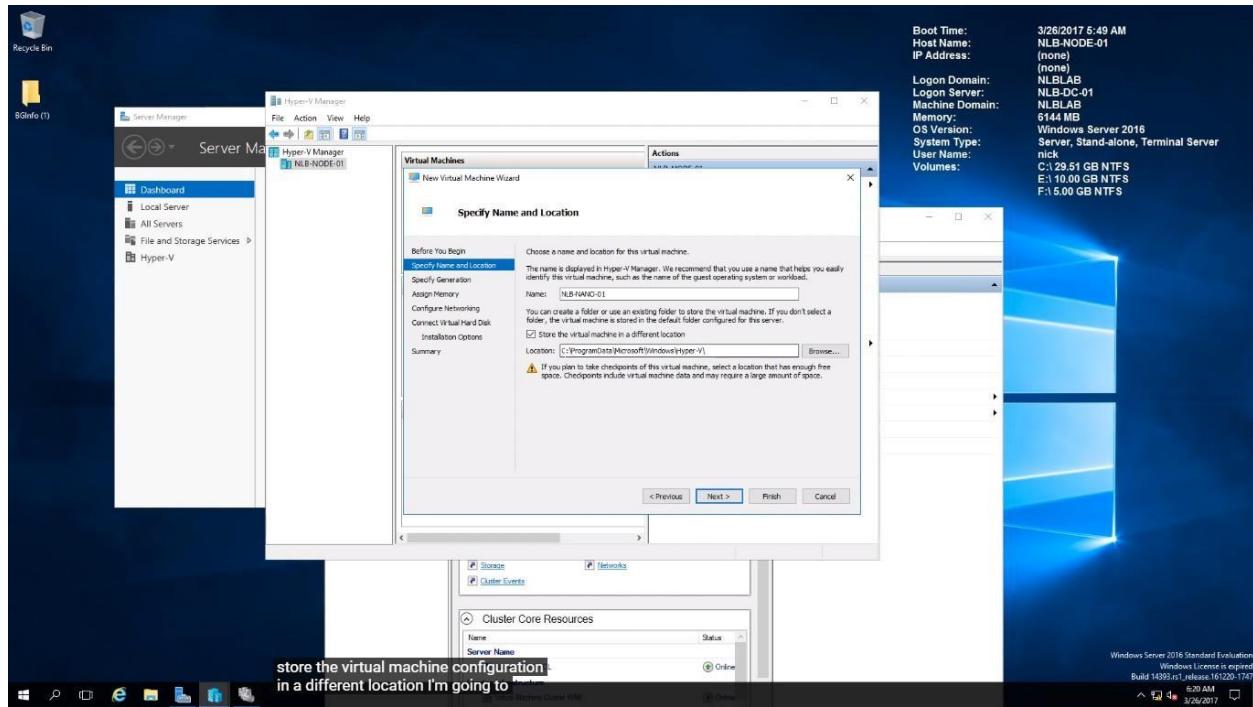
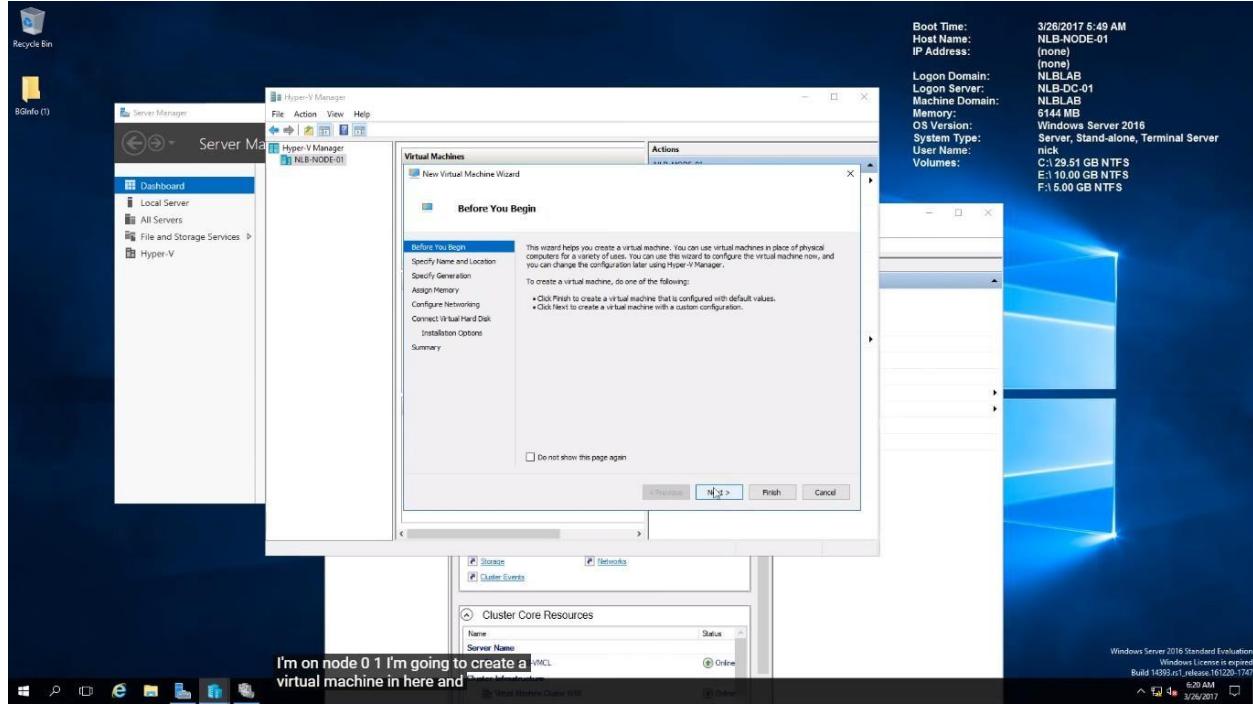
We download the Disc Image of the Nano Server with the ISS role installed on the node we chose.

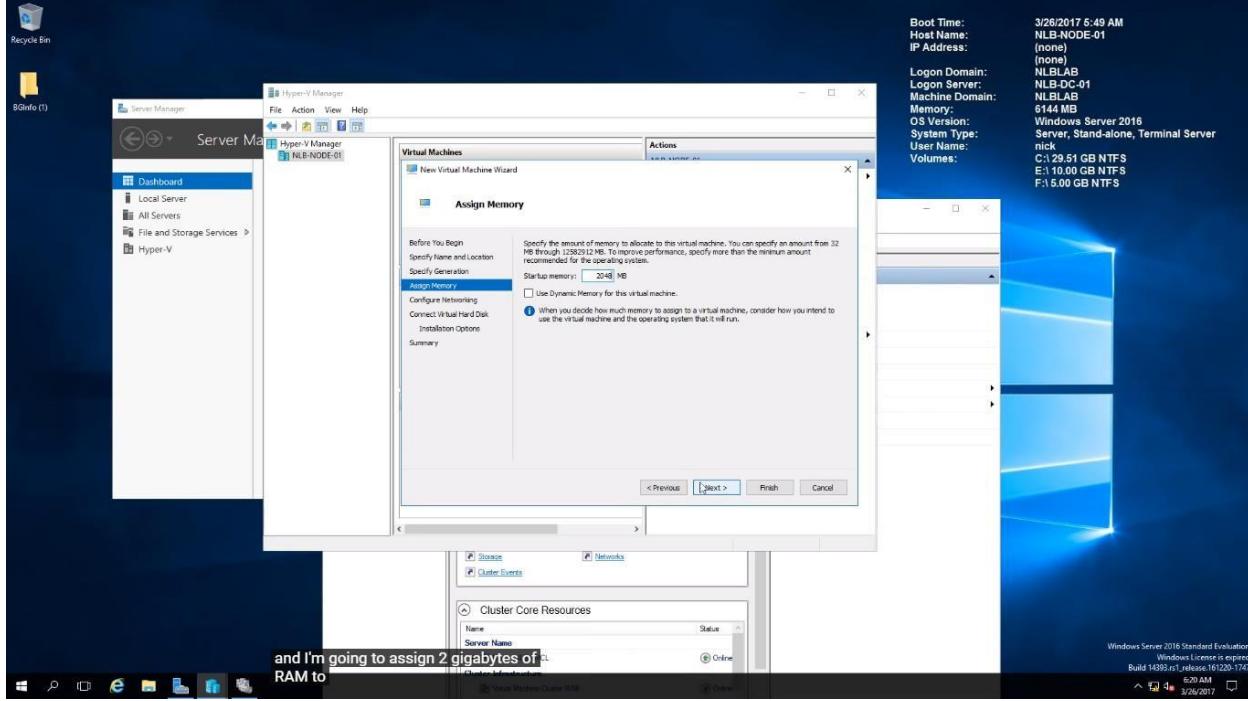
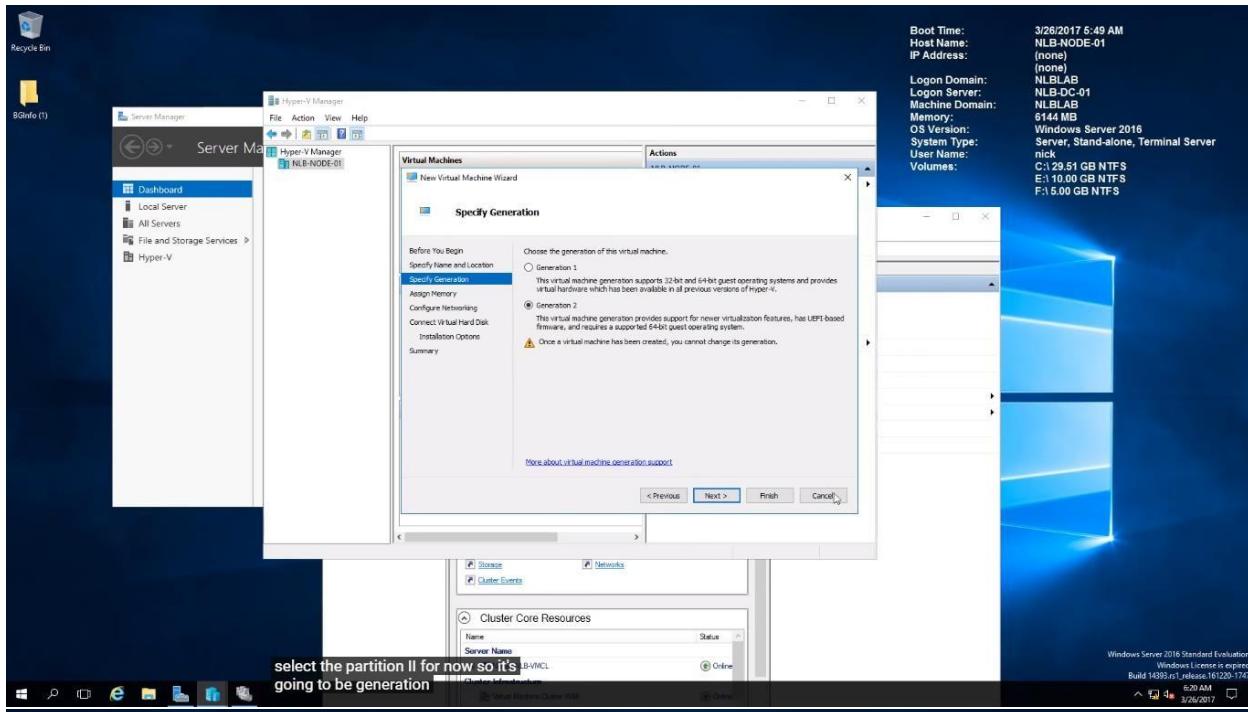
Step 2- Open the Hyper-V Manager on the node with the disk on it and select New->Virtual Machine

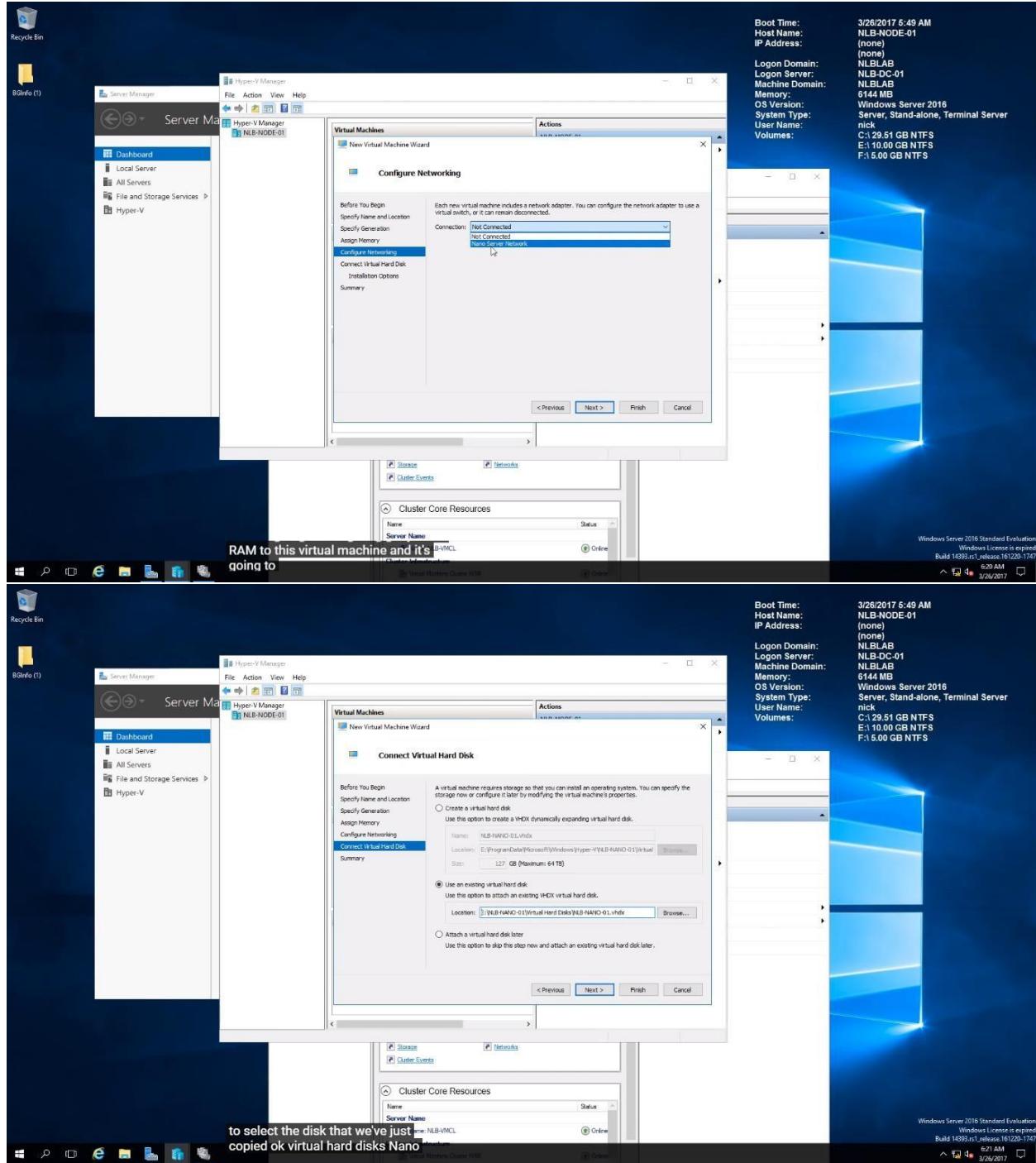


I'm going to open my hyper-v manager and
create a

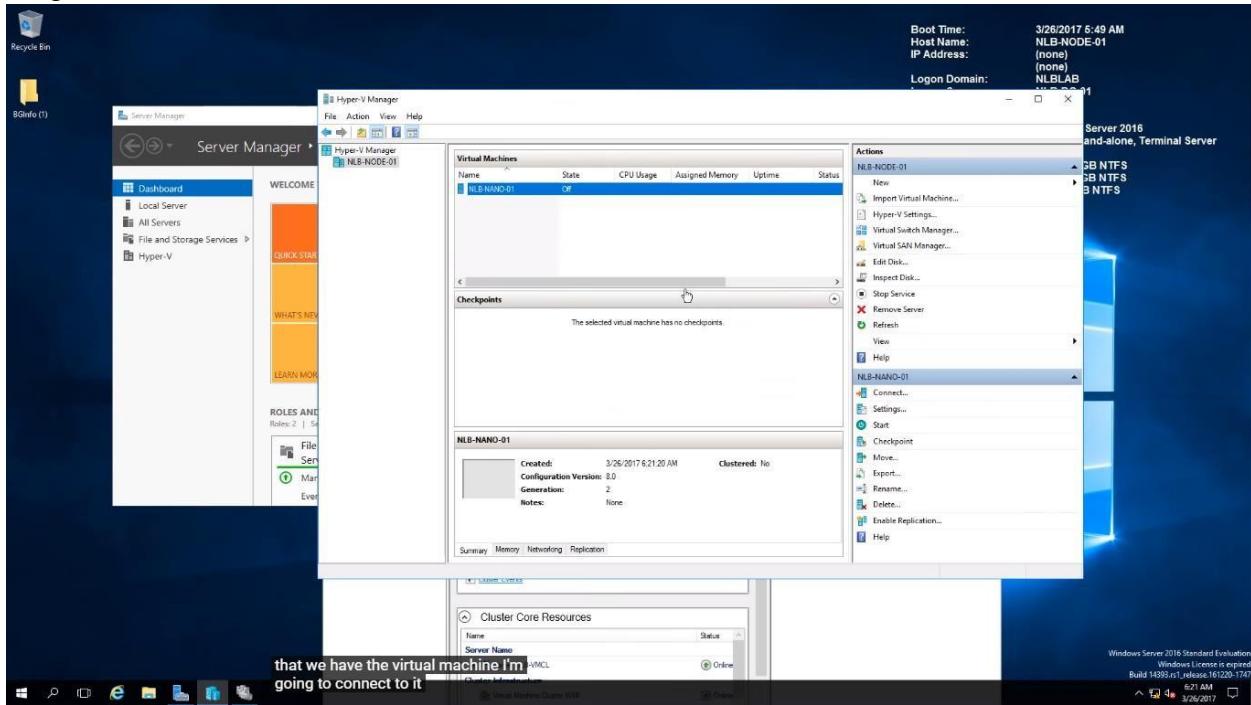
Step 3- Follow the steps of the wizard



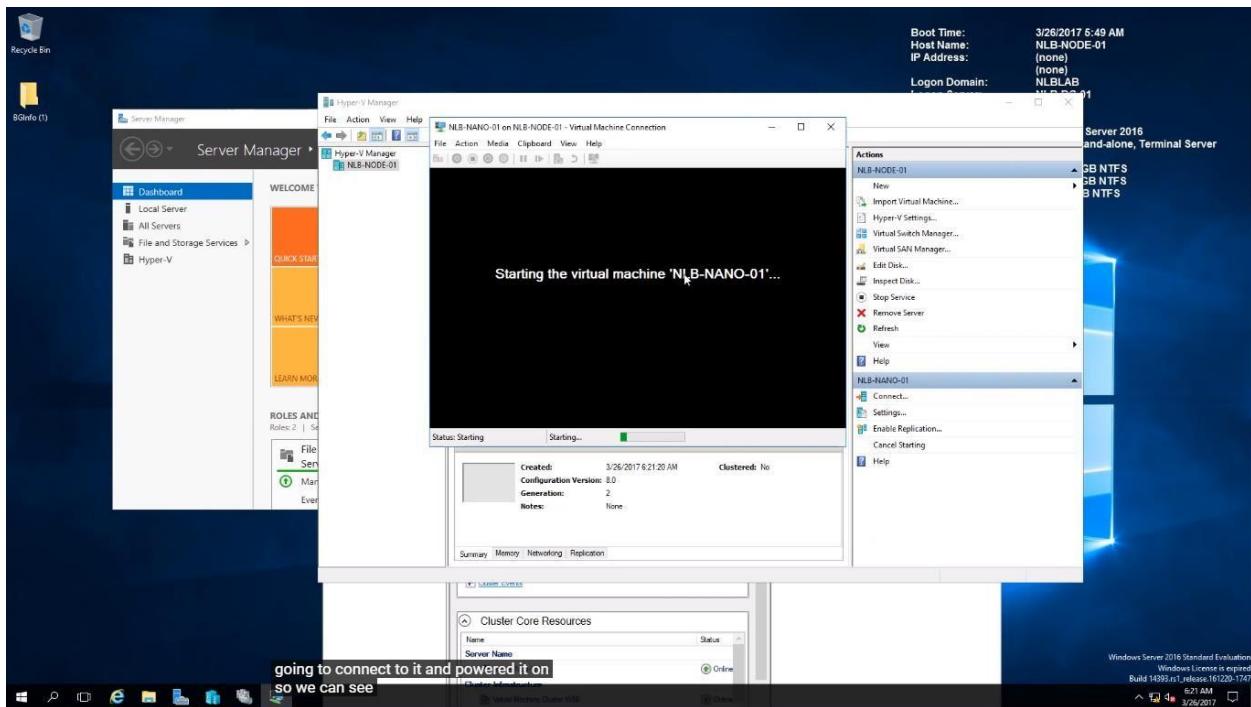




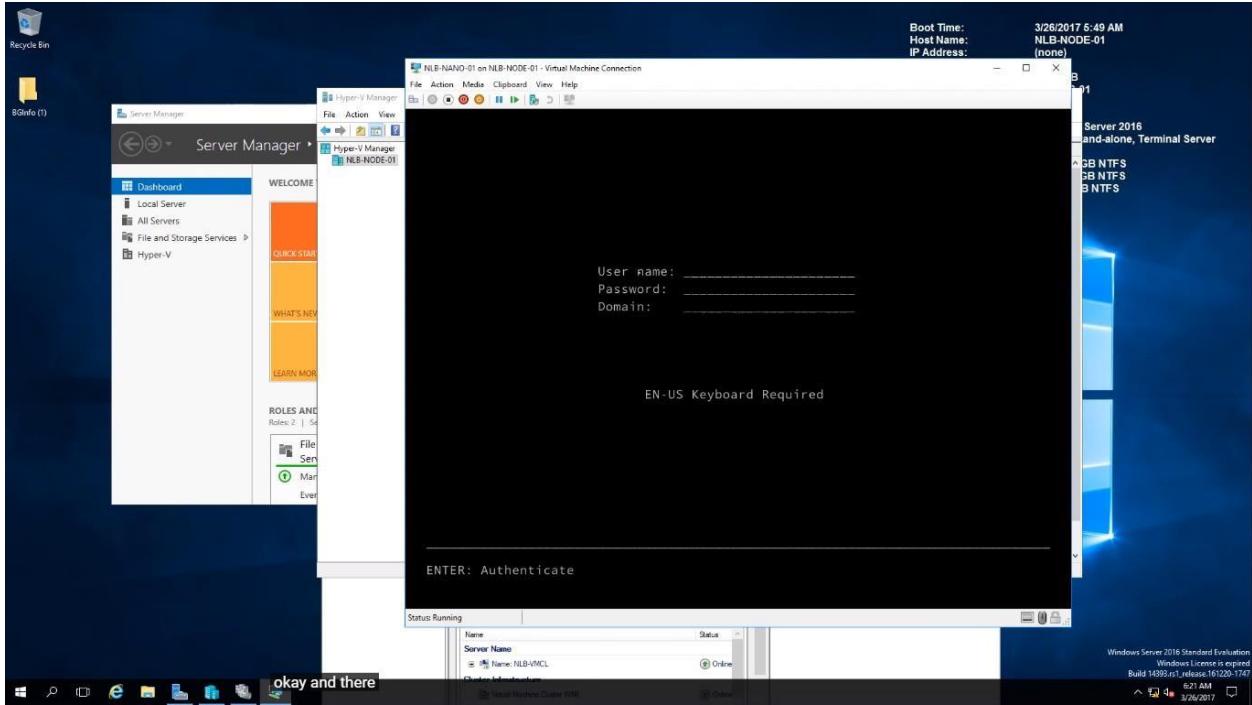
Step 4 After the wizard is done right click on the Virtual machine created and click online to bring it online



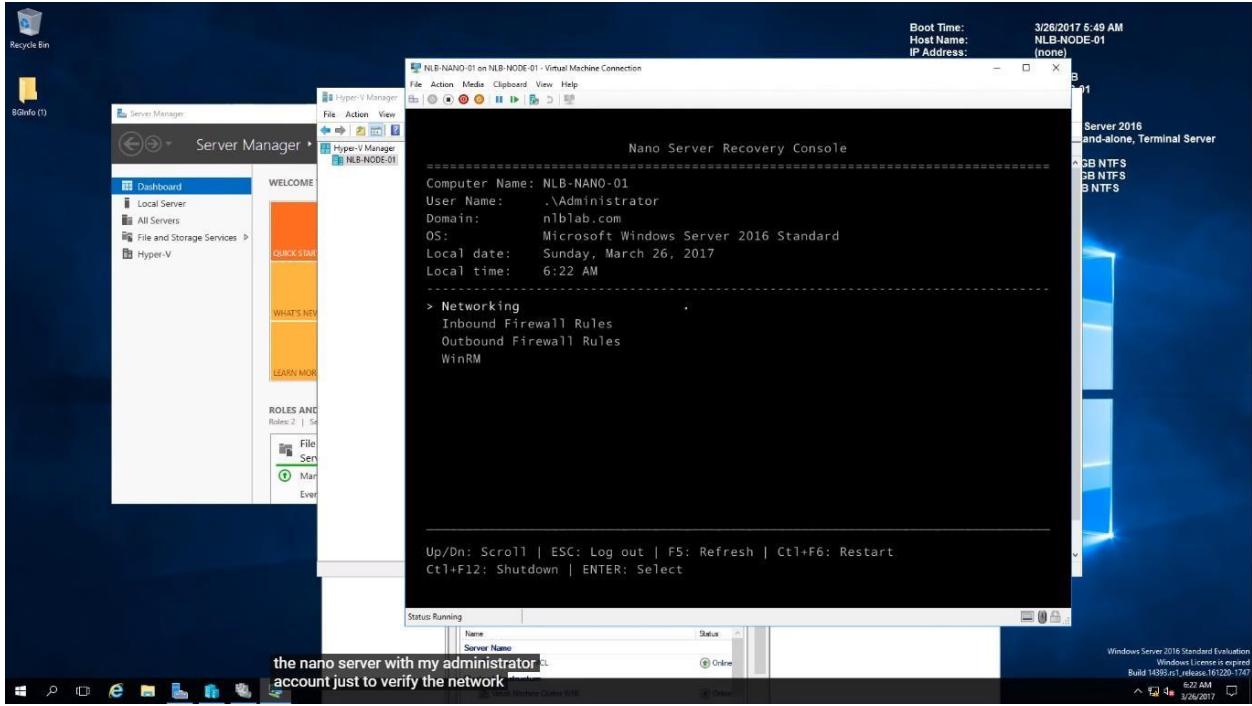
Step 5- Power on the virtual machine



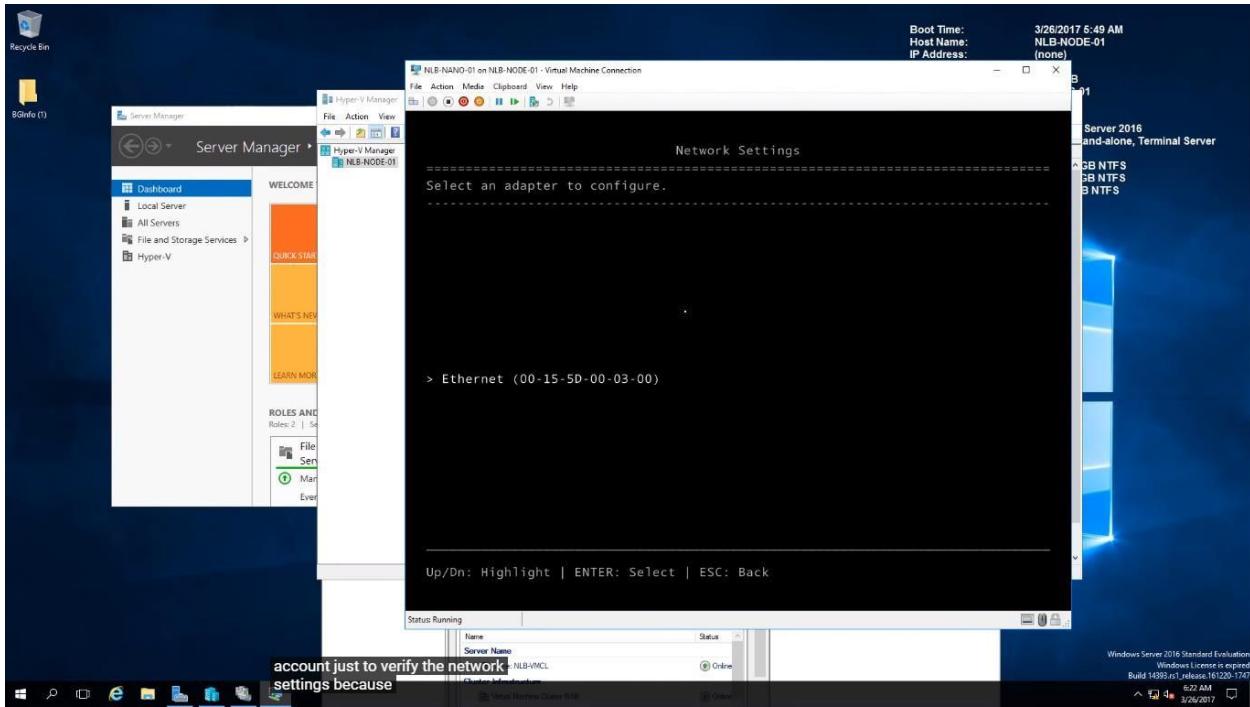
Step 6 Enter the username and password of the Administrator



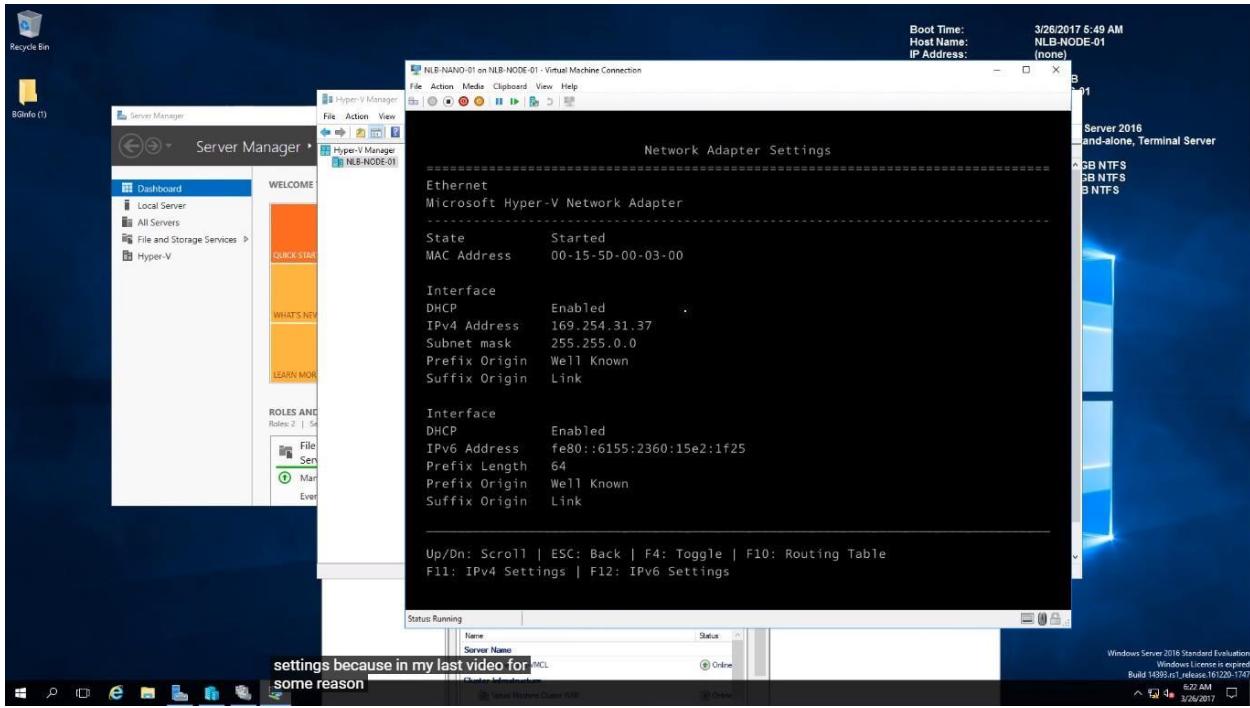
Step 7- Select Networking to check the connection settings



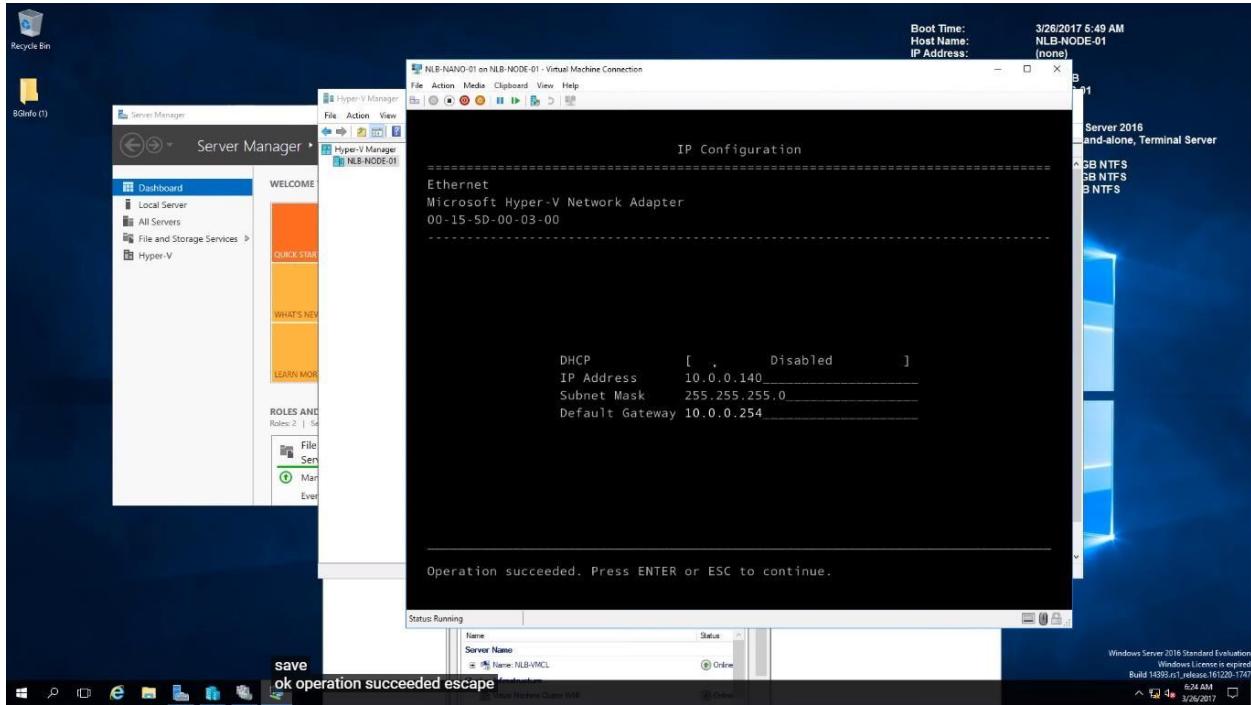
Step 8 Select Ethernet



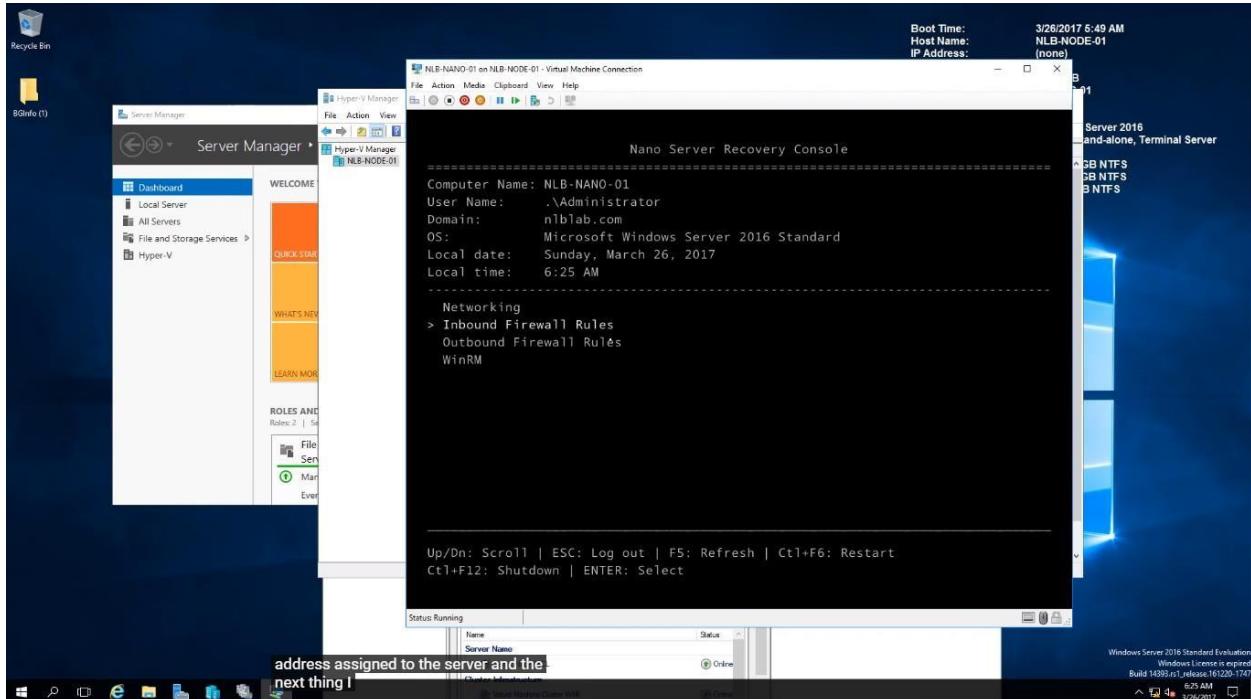
Step 9- Select the DHCP field



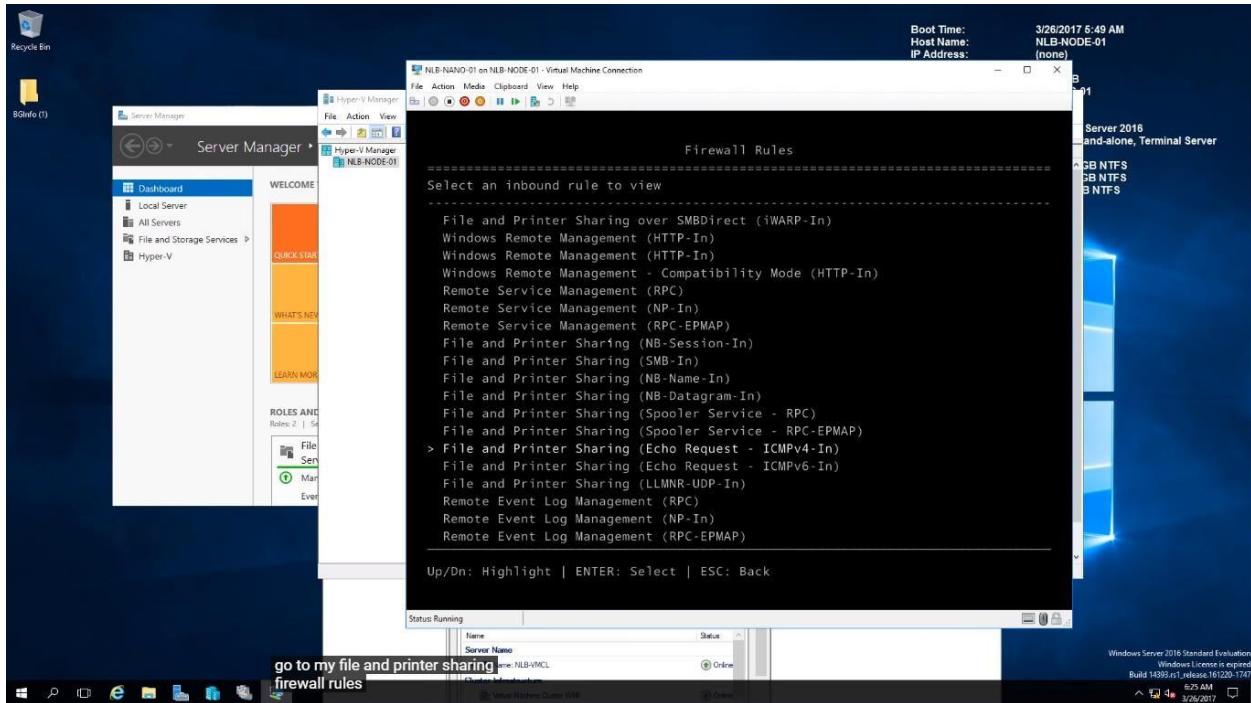
Step 10 Disable the DHCP and put any static IP address not used in the network with the subnet and the default gateway



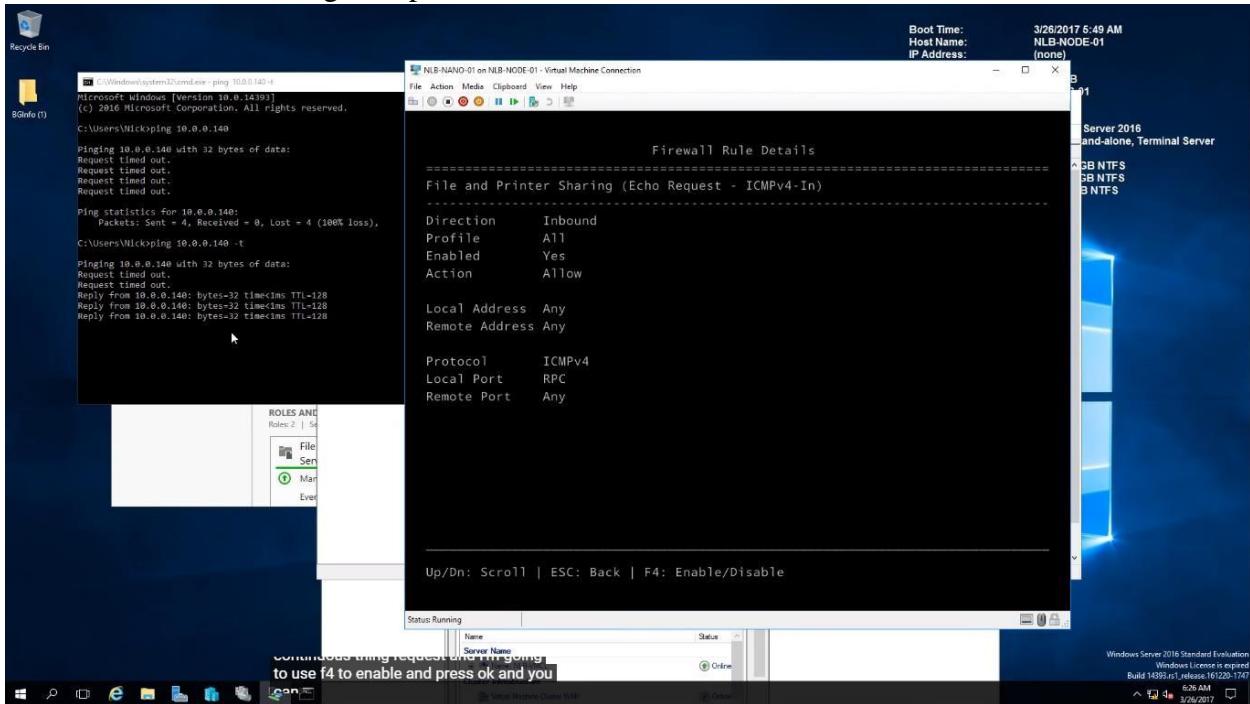
Step 11- Go back to the first screen and now go to Inbound Firewall rule to allow traffic



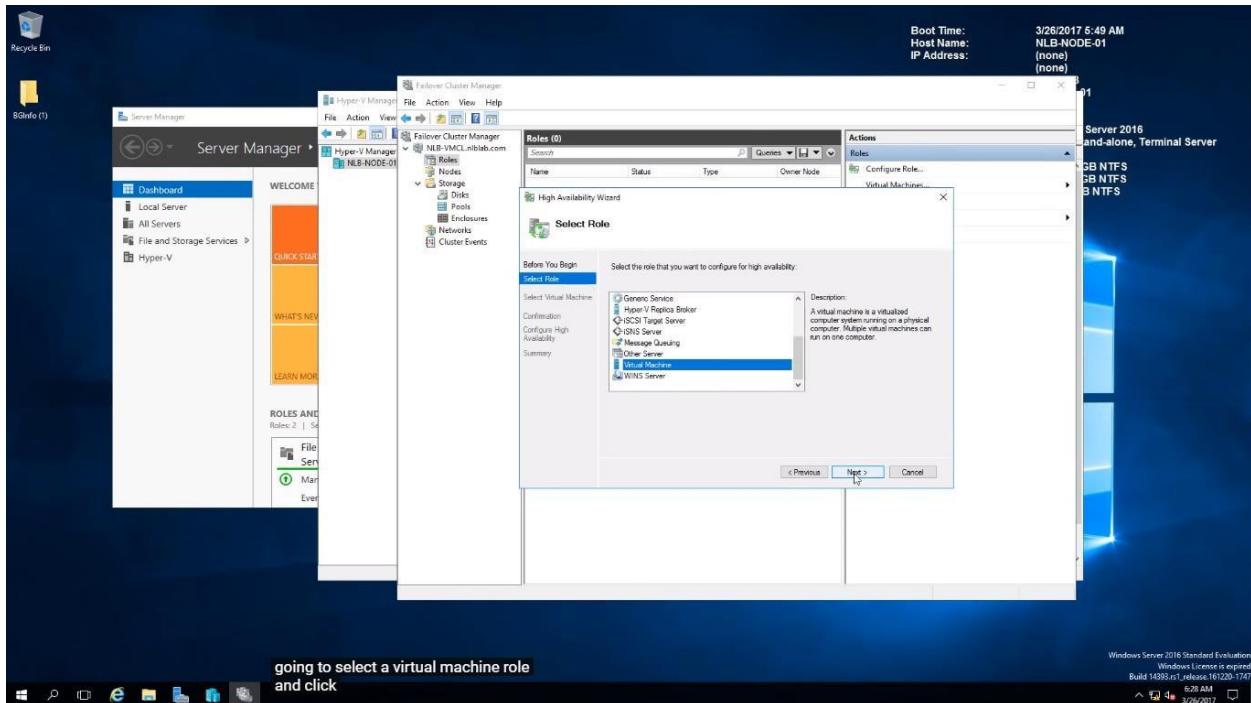
Step 12 Make sure File and Printing Sharing ICMPv4 is enabled



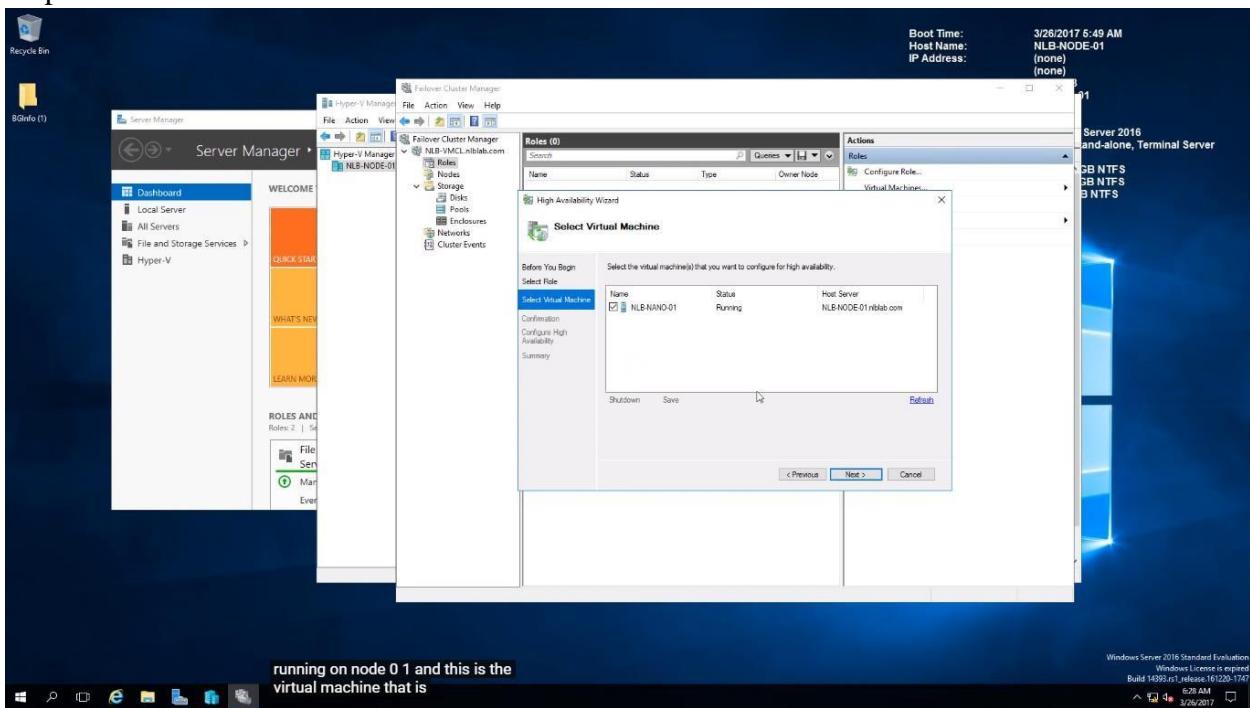
Step 13- After checking that it was disabled we enabled it and now we can see that the ping command is now showing us replies



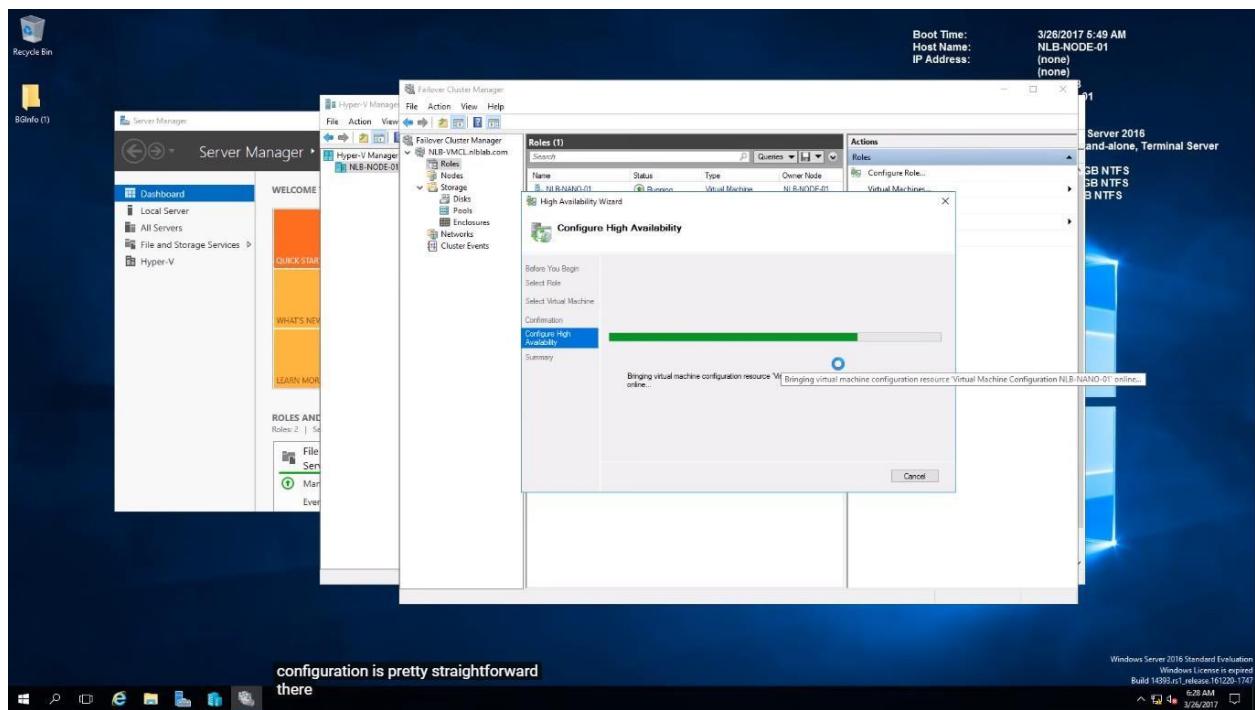
Step 14 Now that our virtual machine is connected we can add some roles to it so we go back to the Failover cluster Manager and select roles. And we want to add the Virtual Machine Role



Step 15- We select the virtual machine we created



Step 16 Confirm the role



Now we can see more details about our virtual machine the failover cluster manager and even configurate it.

Information for the Virtual Machine
pretty much the control for the virtual machine can

-Testing the high availability:

To test if our virtual machine is highly available, we're going to run this test:

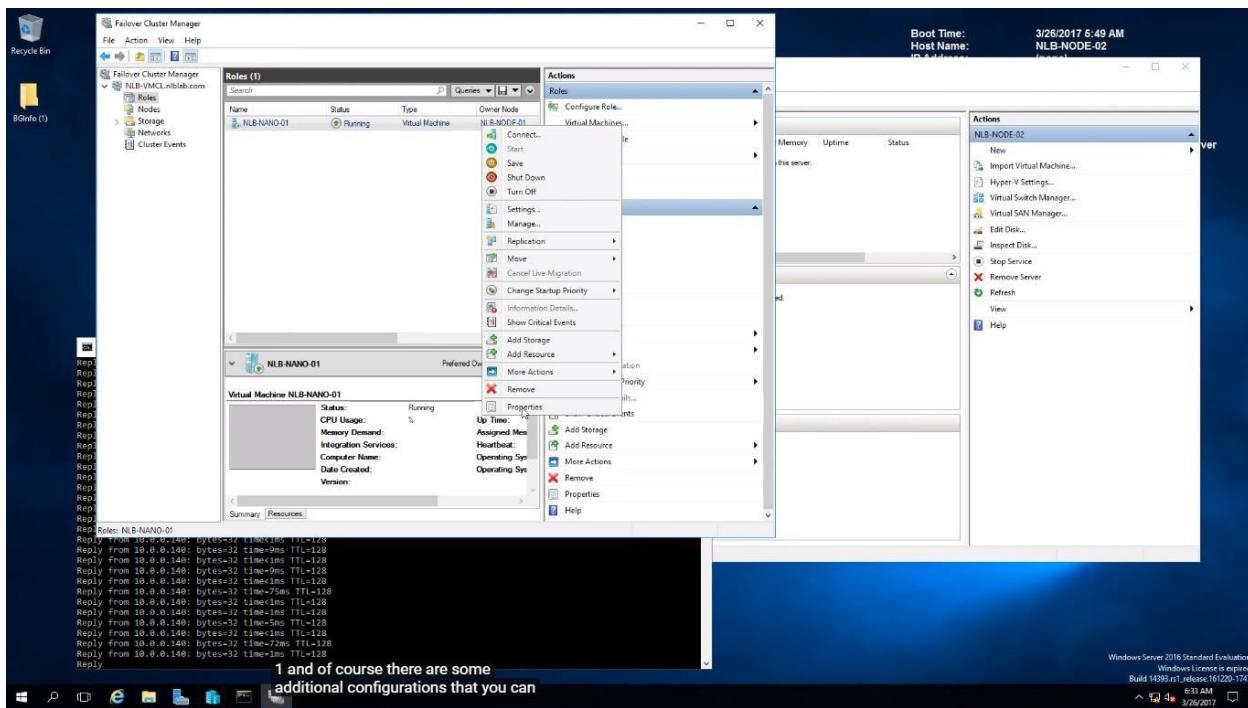
Perform Live migration: the virtual machine while running, will be switched from node 1 to node 2 without being restarted or having anything disrupted.

On the Node 2 we don't have any Virtual Machine running.

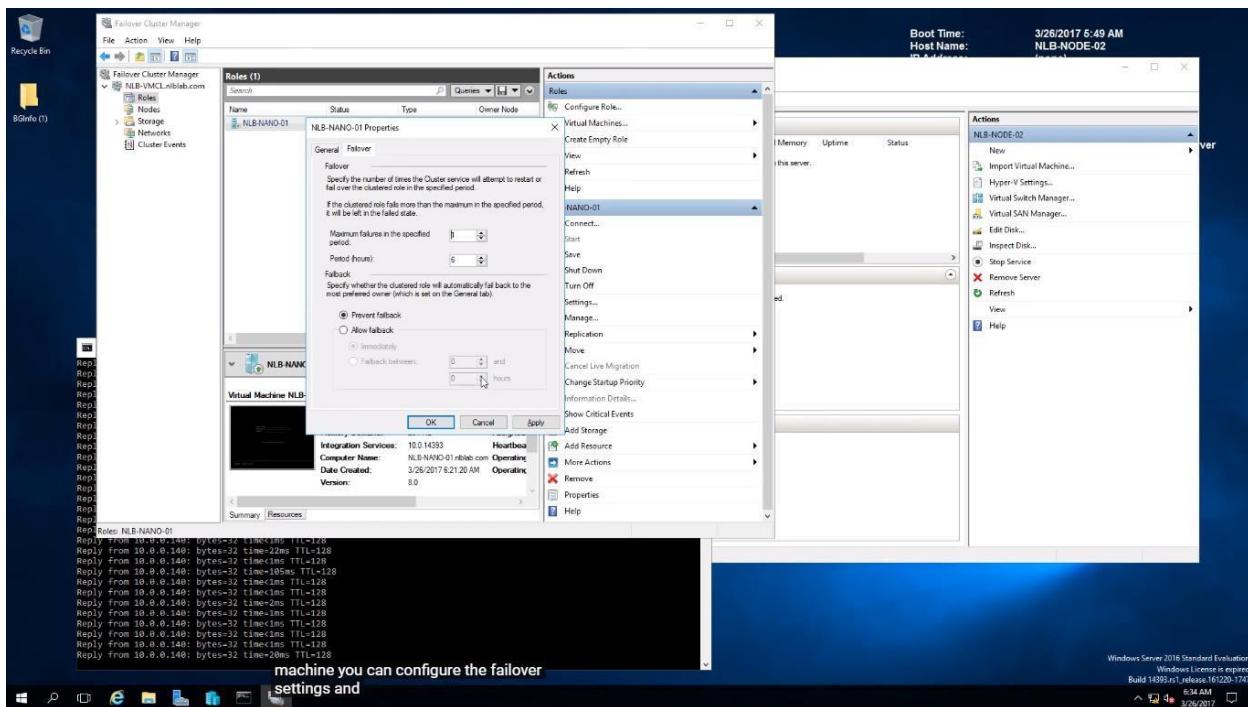
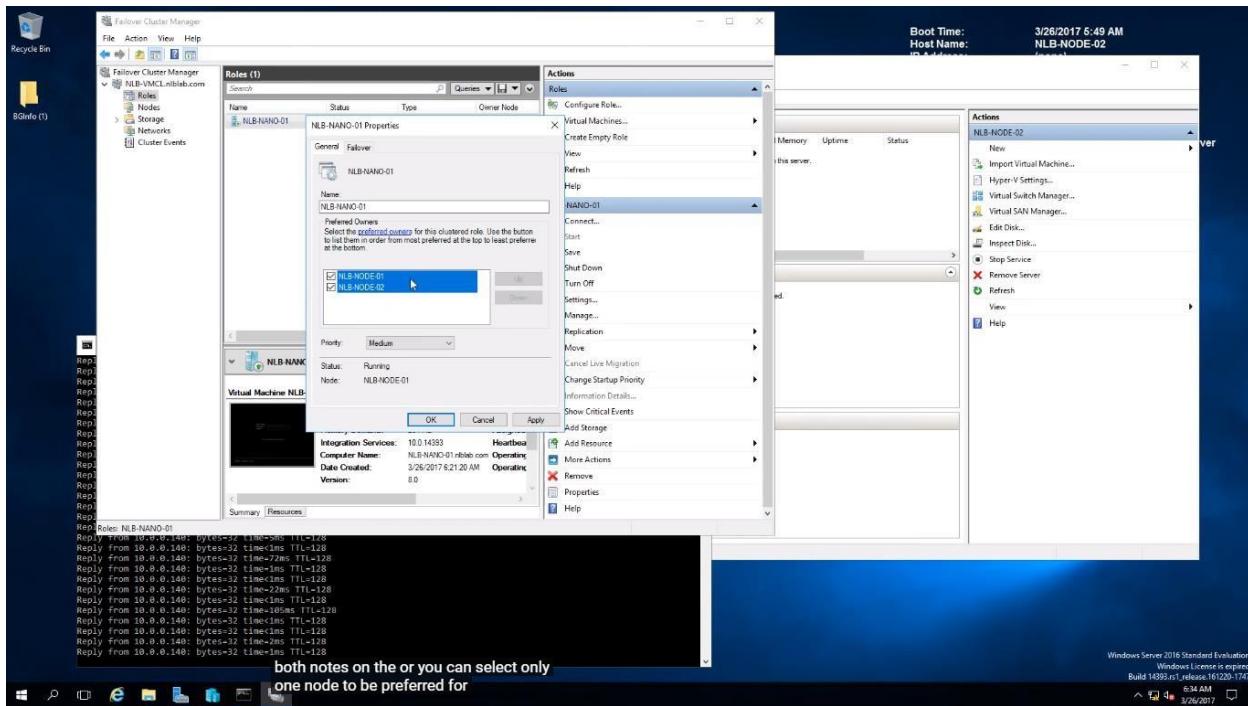
So, to do the test, we're going to run cmd, and ping the virtual machine with IP 10.0.0.140 continuously, and see if while the live migration is running, if only 1 package is lost on the cmd prompt.

Step 1- If we right click on the virtual machine and go to properties we can change the preferred nodes and configure the failover. In the case of this person, failover wasn't turned on but in the Project, it is required to turn it on.

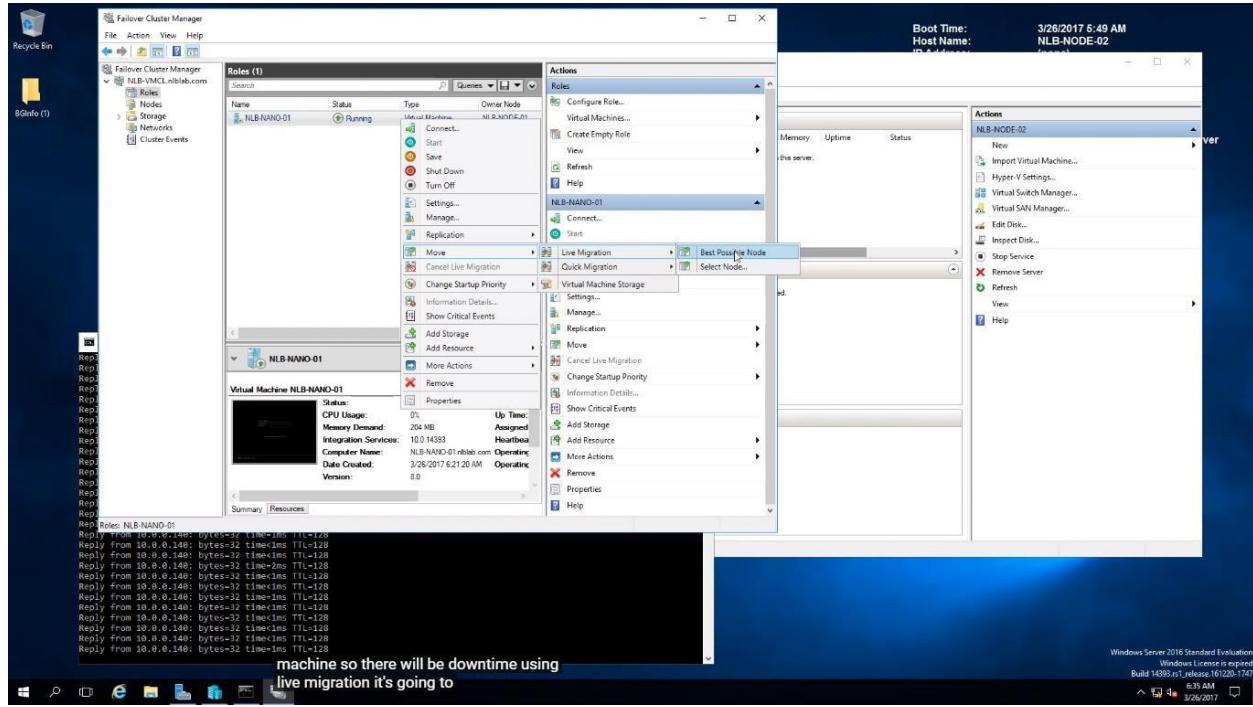
Failover is a simple concept, we choose a node to be the main one. Whenever this node becomes unavailable for any reason, the virtual machine (in this case) is transferred to the other node. Failover, is when we turn back the main node, the virtual machine will be automatically live transferred to the main node.



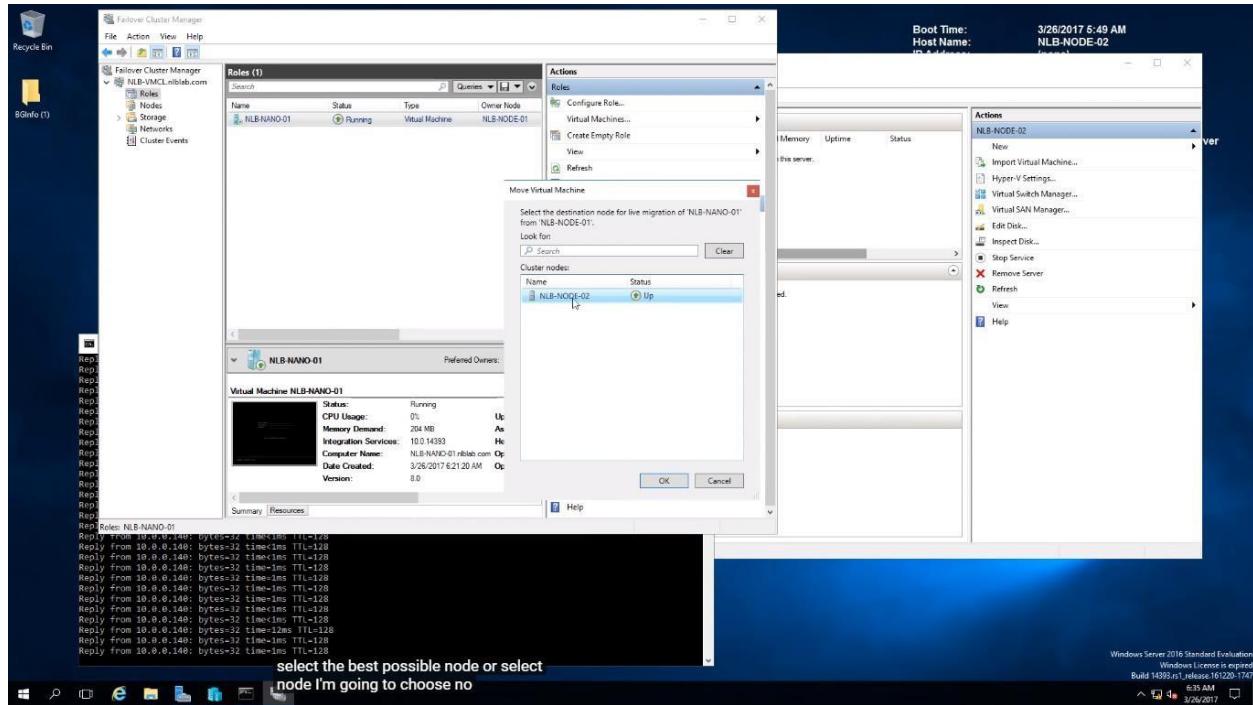
Step 2 Here we just selected the 2 nodes to be preferred



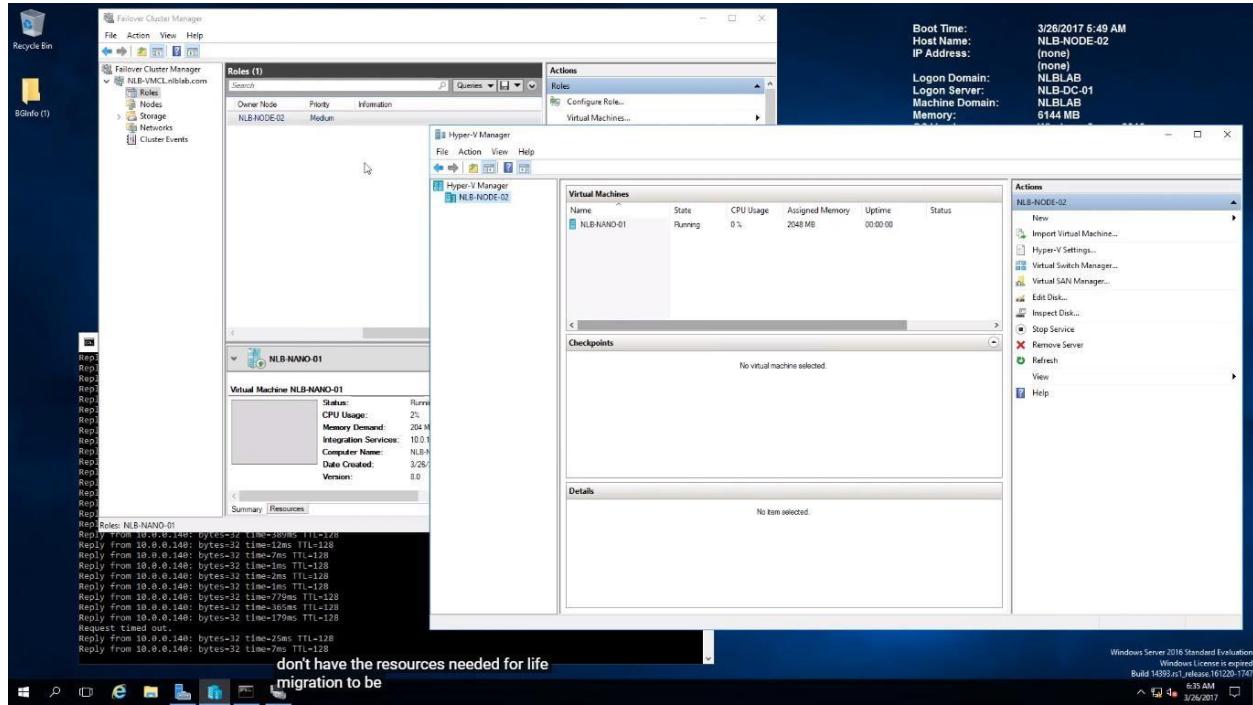
Step 3 Right click again on the virtual machine and select Move->Live Migration->Select Node



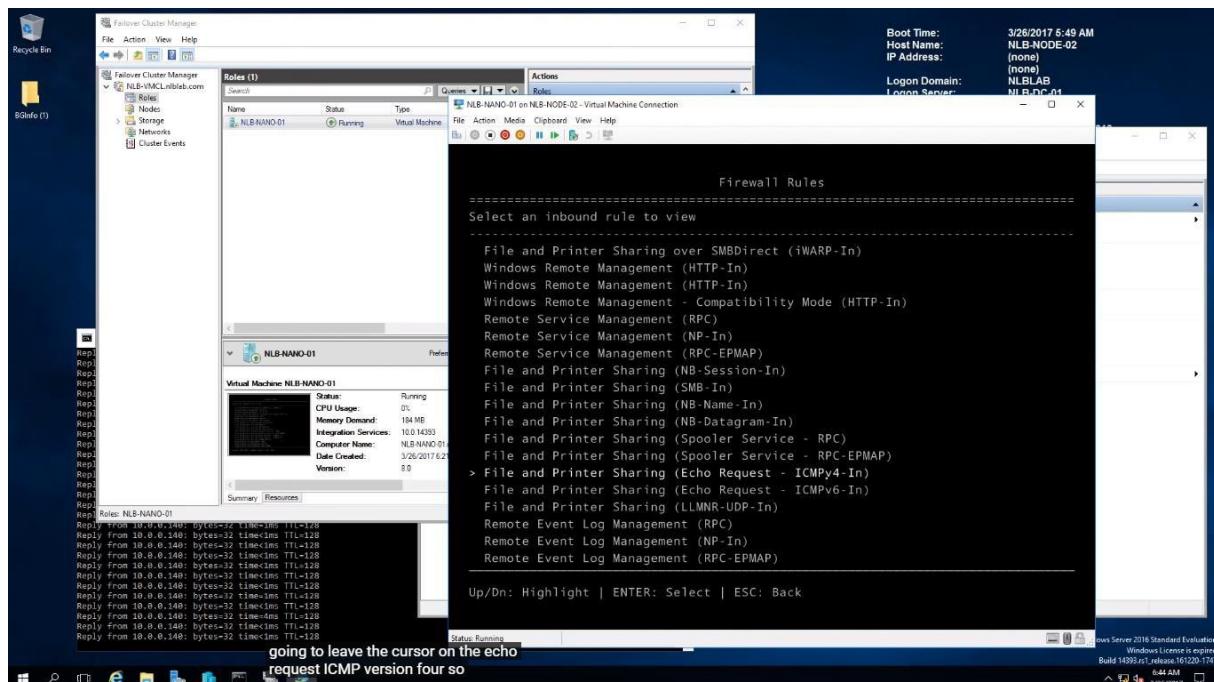
Step 4- Select the node 2 to Migrate the machine



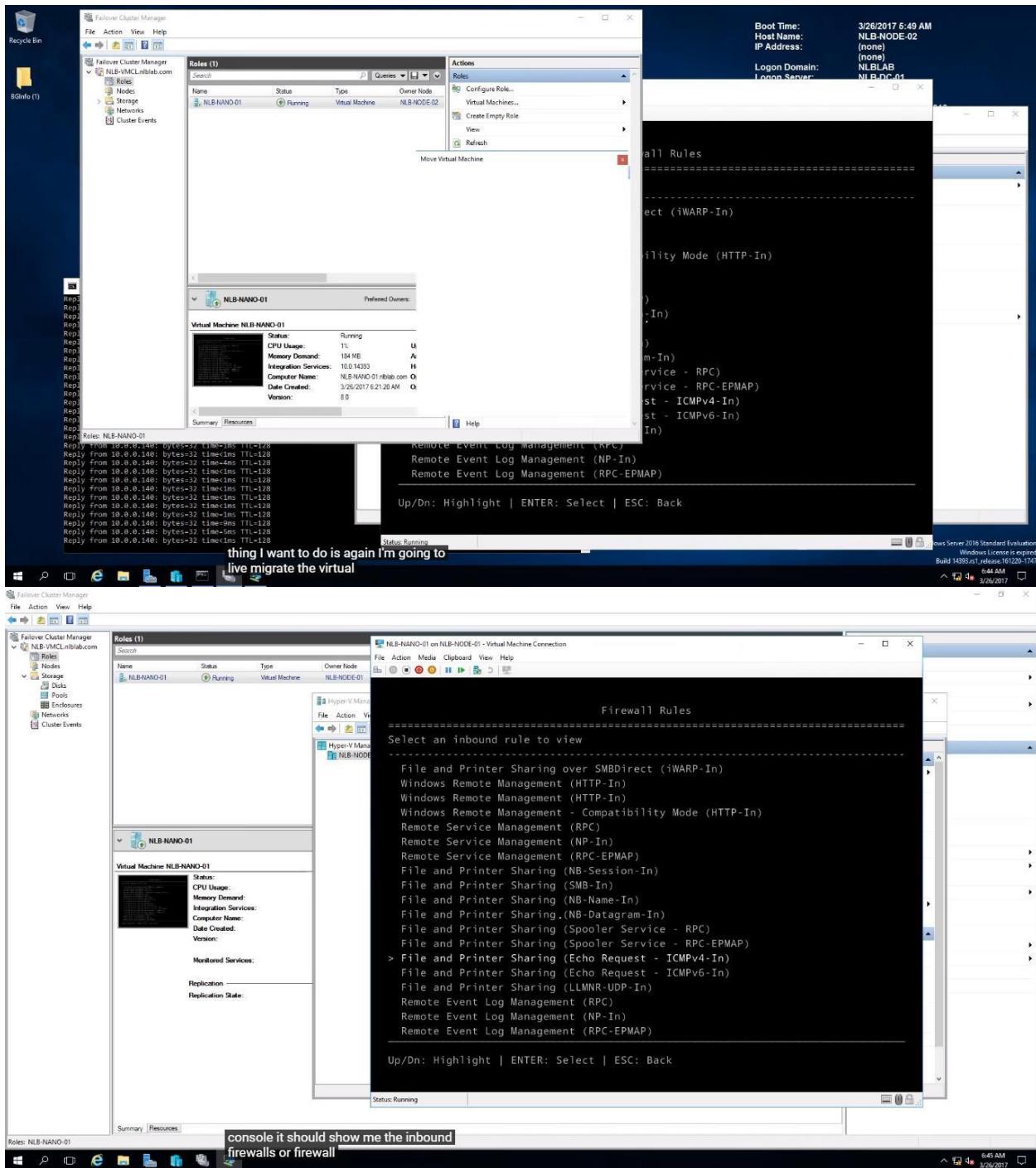
Step 5 We can notice in the continuous ping that while the virtual machine was transferring only one packet timed out



Step 6-We will run a second test to see if the virtual machine is still functional while migrating and not shut down by the process. So we login on our virtual machine and just keep the cursor in the network field



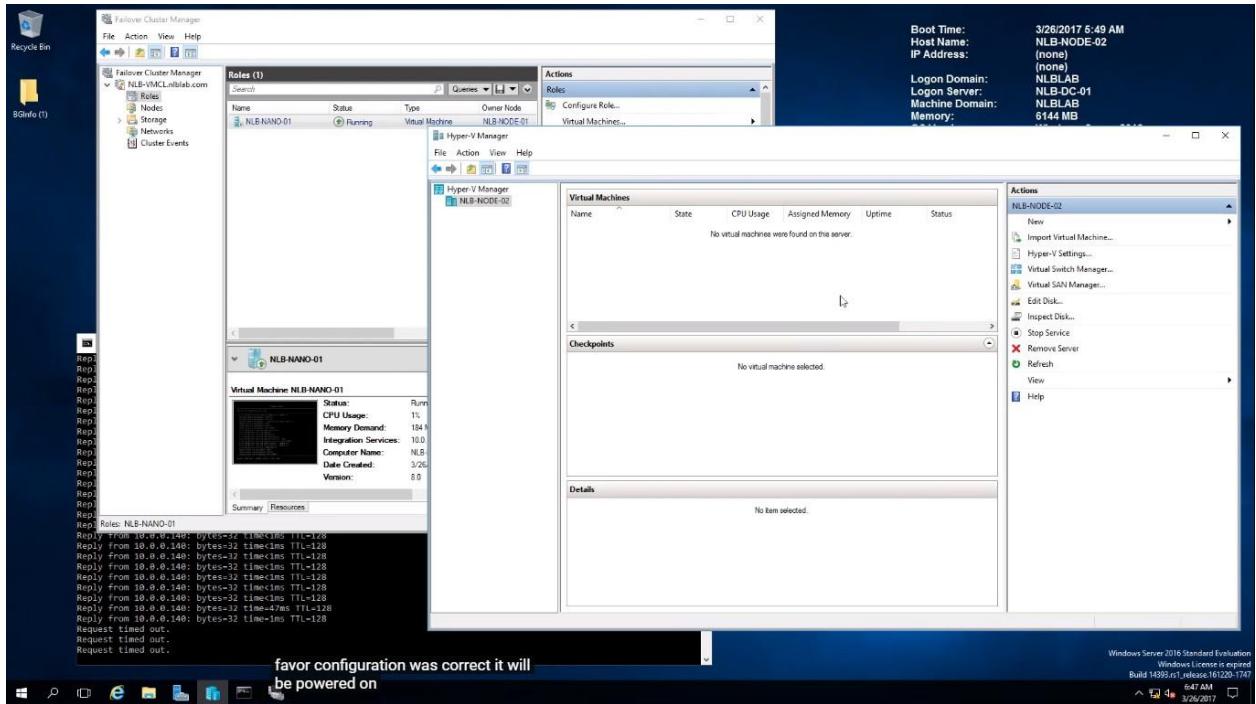
Step 7 After the migration the virtual machine is now back to node 1 and, still has its state.



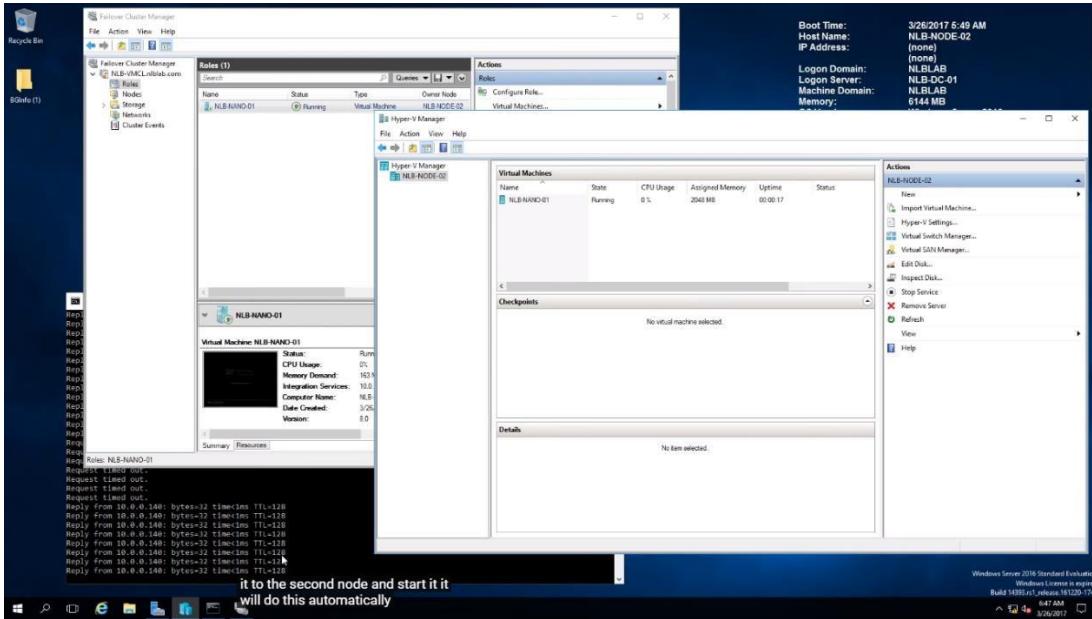
This Clustering and failover is most useful, when the failure of a server isn't planned. So to keep the (in this case) virtual machine running, and responding to users, and to minimize the down time of that (in this case) machine, hyper-v failover clustering is the best.

Now we are going to test the automatic failover by shutting down Node 1. We should see that the virtual machine is going to migrate to Node 2. A bigger down time will happen, because it's the time Node 2 will take to notice that Node 1 is down.

Step 1- We turned off Node 1 and we can see that the ping command is now showing us a request timeout.

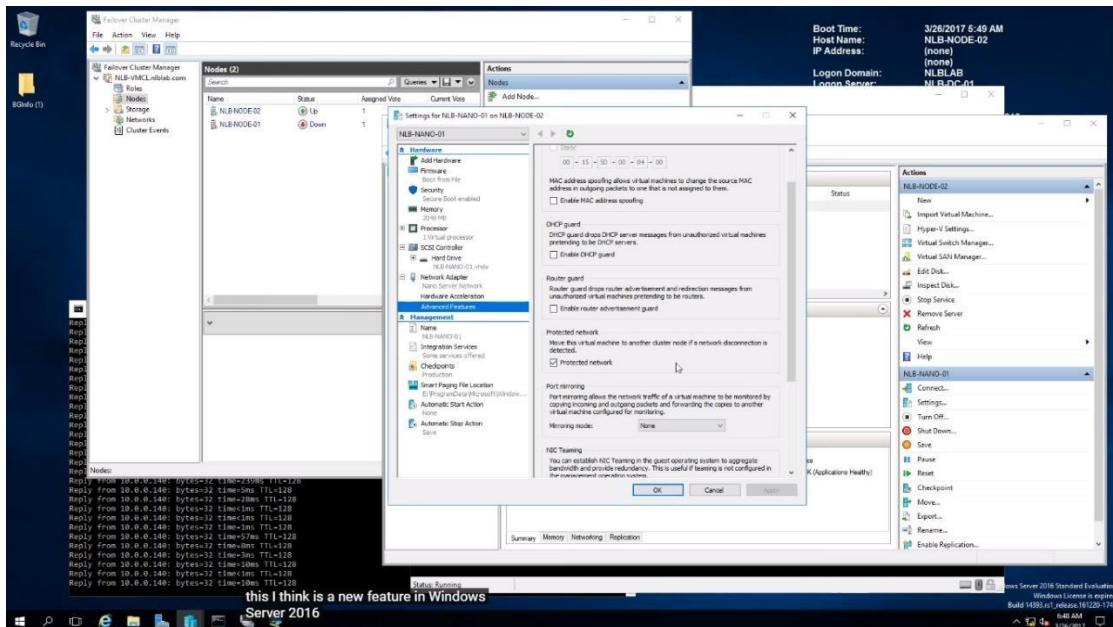


Now that Node 2 noticed that Node 1 is down, it started the process of migration of the virtual machine



We now get replies from the virtual machine as seen in the cmd.

There is also a feature in Clustering on 2016 server which is protected network in the advanced settings and this feature, if checked, will automatically migrate the virtual machine from the Node to the other if a network failure happens or the server goes offline EVEN if the server is still running.

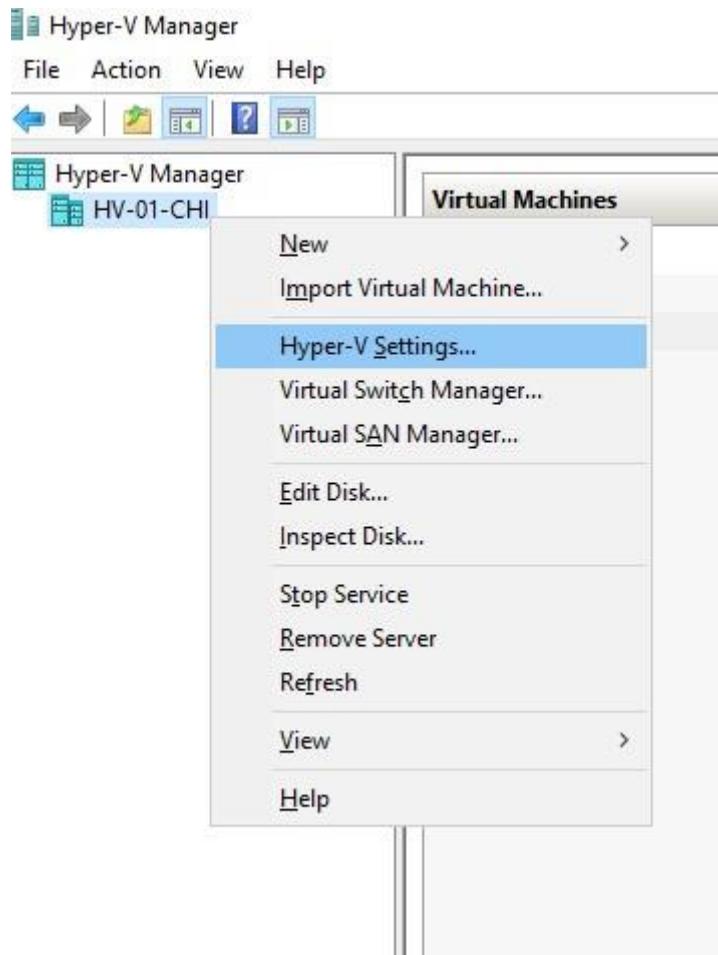


III-Hyper-V Replication:

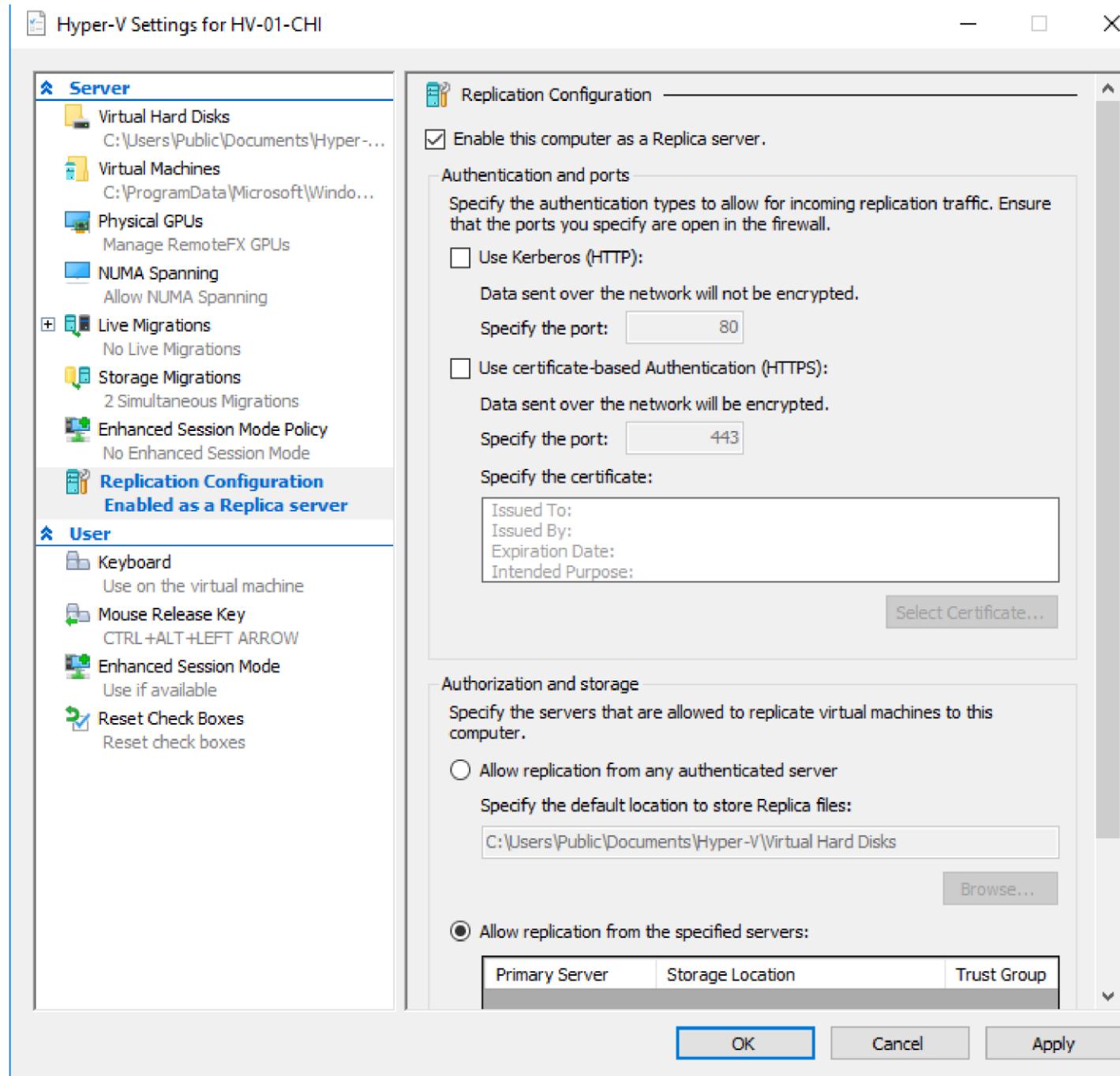
Hyper-V replication allow your environment to replicate from one virtual machine to another virtual machine without the need for additional cost of an appliance. Hyper-V Replication helps with both planned and unplanned fail over situations by having a fail over to protect the virtual machine.

-Creating The Cluster:

Step 1-On the Node 1 server, go to Hyper-V manager and right click on the server name then choose Hyper-V settings.

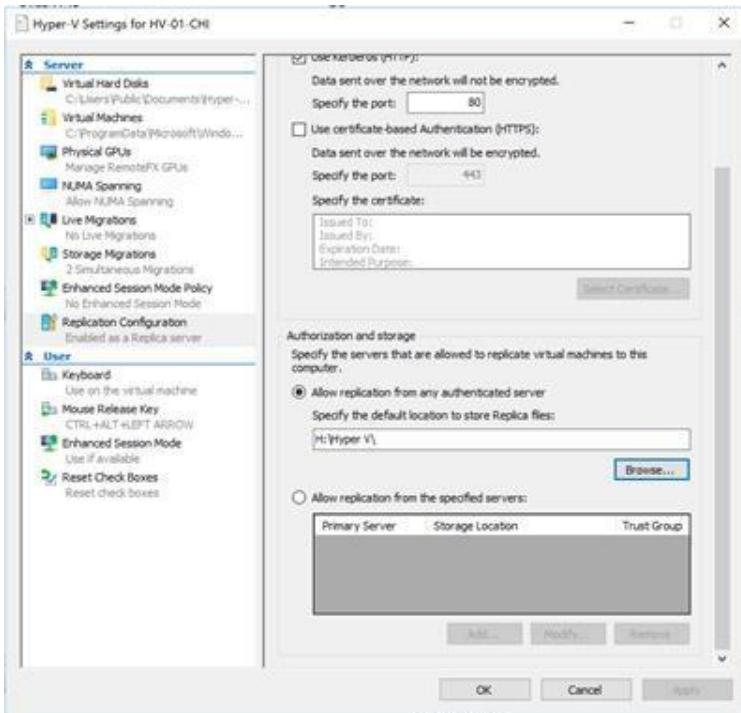


Step 2 Click on Replication Configuration then check “Enable this computer as a Replica Server”.

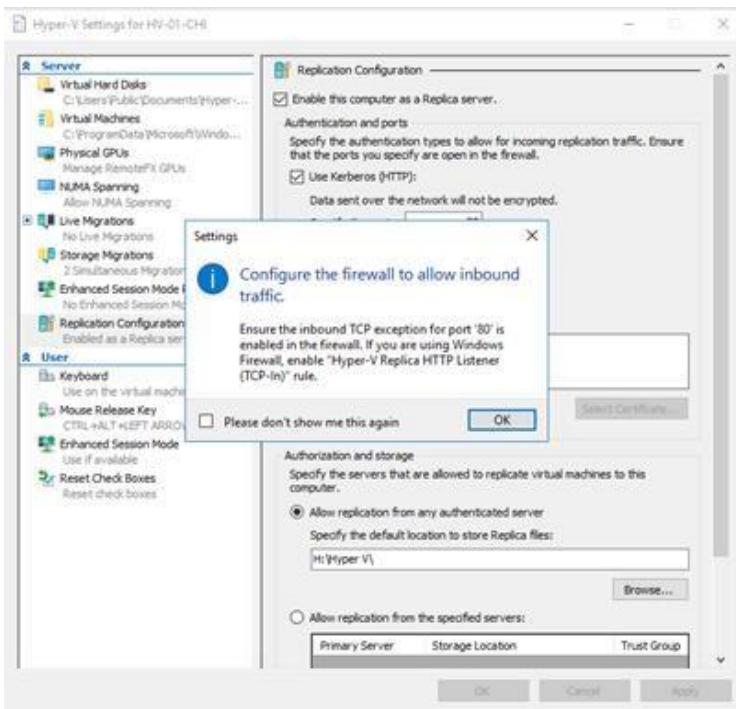


We have two choices of authentication and ports: Using HTTP over port 80, or use HTTPS over port 443 (HTTP with certification).

Step 3 Choose the default location where the replica files will be stored during Hyper V Replication.



Step 4- Click OK, a message will popout, telling us to enable allow inbound traffic on the firewall



Step 5 Go to Control Panel->System and Security->Windows Firewall->Advanced Settings>Inbound Rules and look for the rules:

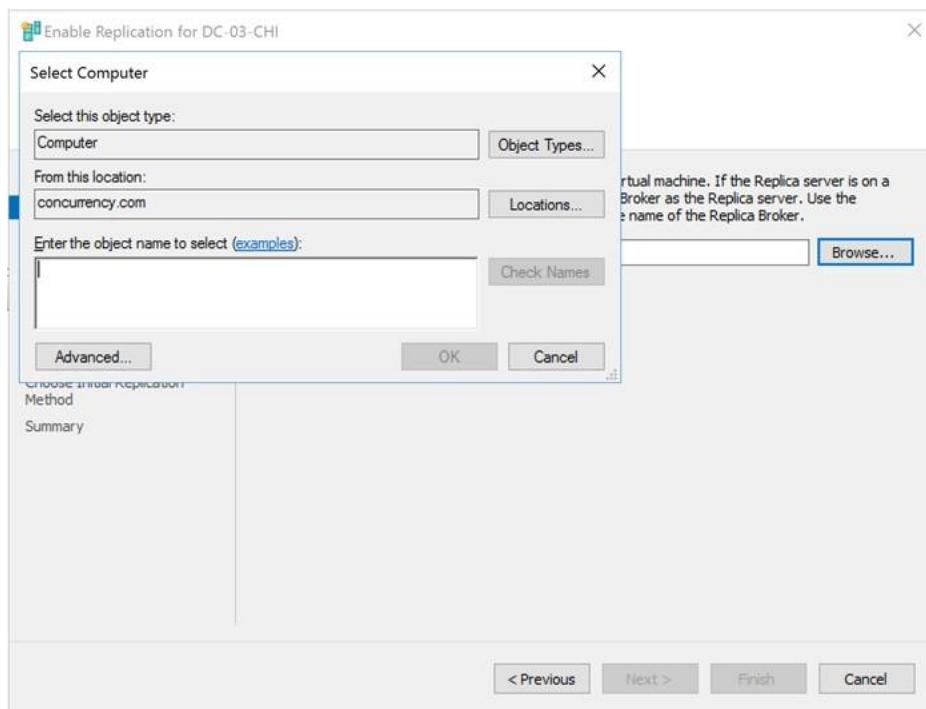
Hyper-V Replica HTTP Listener (TCP-In)
Hyper-V Replica HTTPS Listener (TCP-In)

Hyper-V Replica HTTP Listener (TCP-In)	Hyper-V Replica HTTPS Listener (TCP-In)	Hyper-V Replica HTTP	Domain	Yes	Allow
✓ Hyper-V Replica HTTP Listener (TCP-In)	✓ Hyper-V Replica HTTPS Listener (TCP-In)	Hyper-V Replica HTTPS	Domain	Yes	Allow

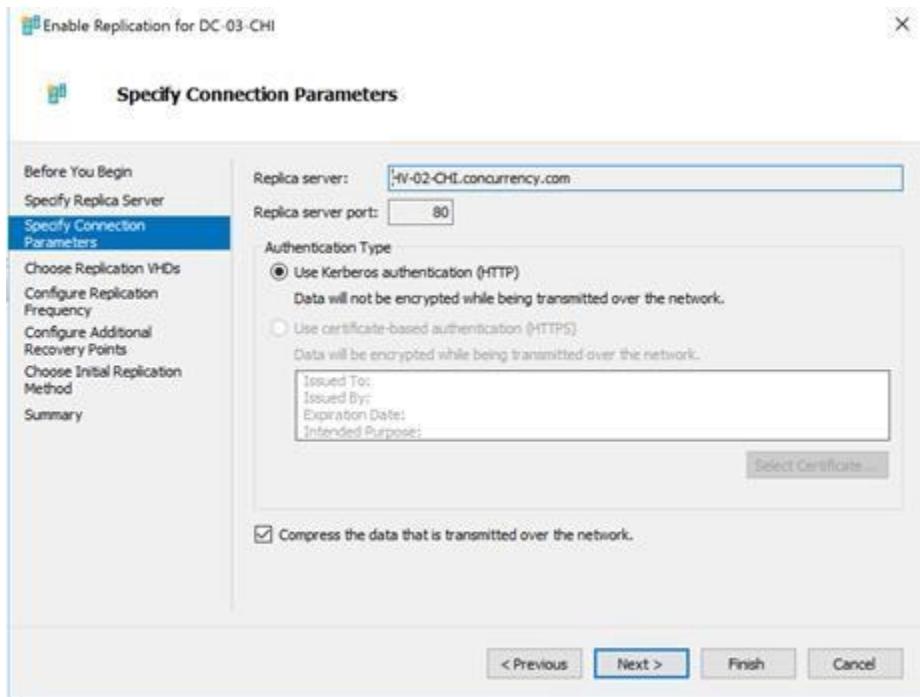
Step 6- Go back to Node1 server, open Hyper-V manager and right click on the Hyper-V server, and choose Enable Replication.

Step 7- Now that the wizard started, click next, and then choose the Replica server.

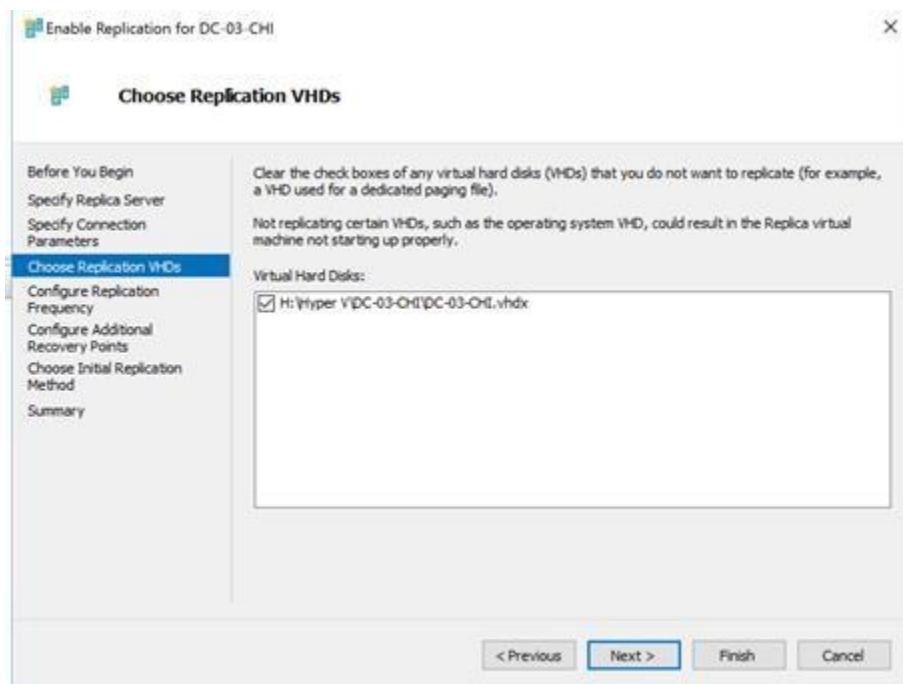
Step 8- Choose the the host where Hyper-V server should be replicated to.



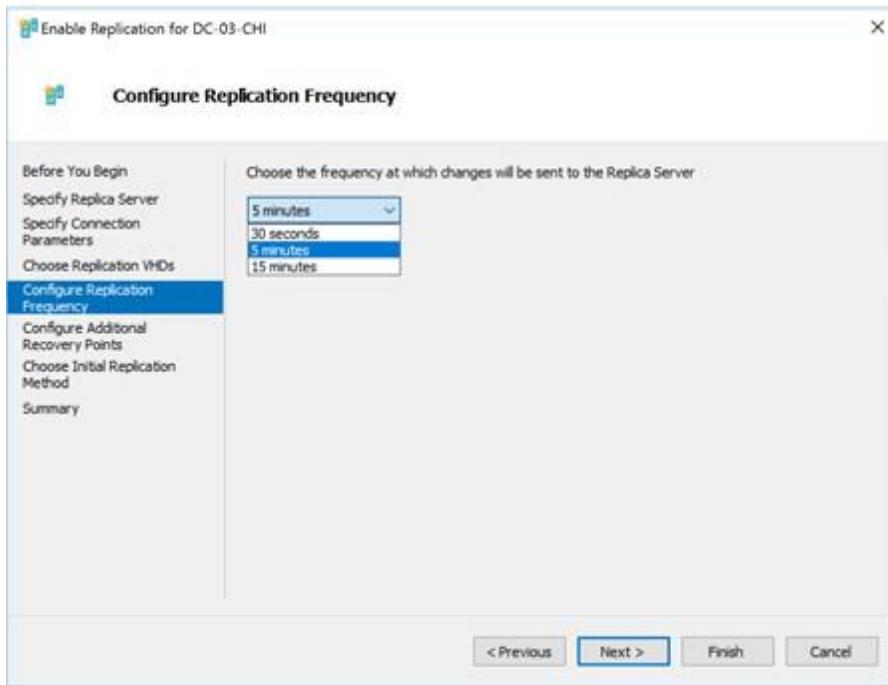
Step 9 Specify the connection between the servers (Use port 80 or 443(for certificate encryption)) and check the box to compress the data that is transmitted over the network.



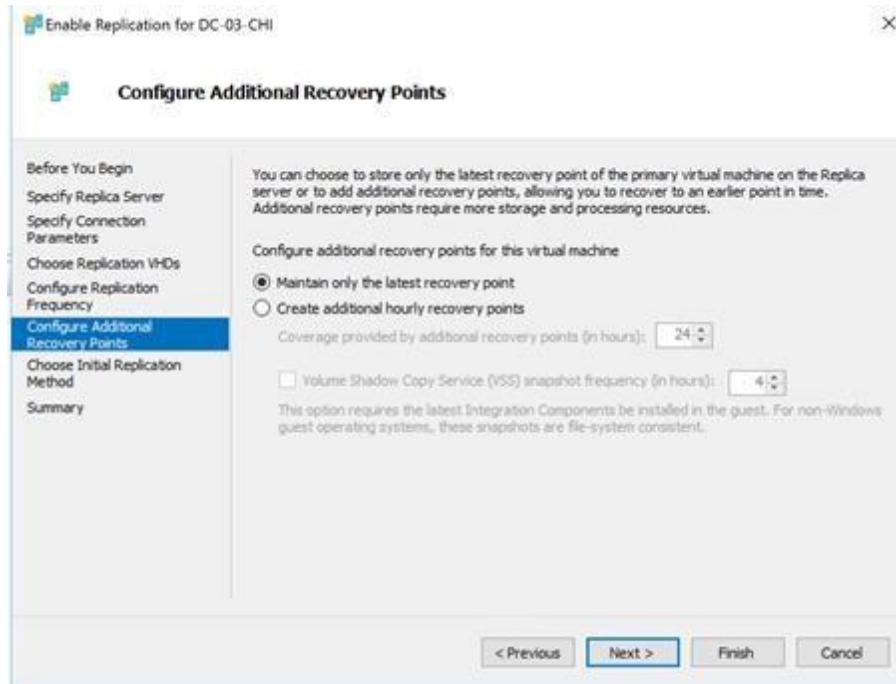
Step 10- If there is any unwanted VHD filw we don't want to replicate uncheck them



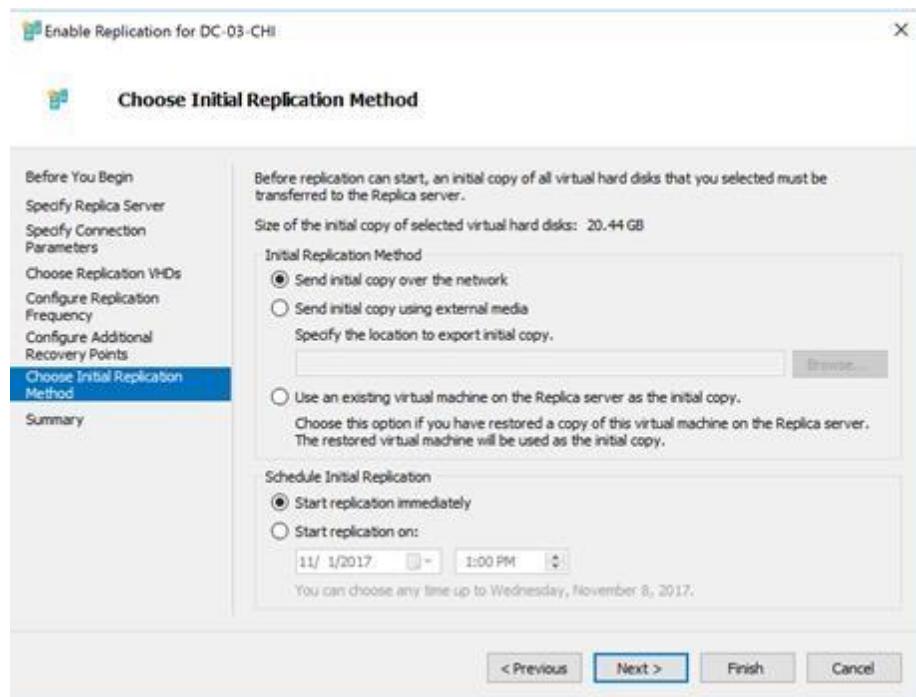
Step 11- Select the period of time between the updates of the changes



Step 12- You can choose additional recovery points to store the lastest recovery of the primary virtual machine on the replica server.



Step 13- Specify how the initial copy of the VHD will be transferred:



Step 14-Click finish to end the wizard.

IV-Installing 2019 features:

Install and Configure Active Directory Server on Server Windows 2019

Introduction

Probably the best component that makes Windows server to sparkle in the Enterprise circle is Active Directory. This single Sign-on item that consistently and effectively incorporates the majority of Microsoft items makes the client the executives among different errands very simple and fun. This guide is about how to introduce Active Directory Domain Services on a recently introduced Windows server 2019.

Stage 1: Hit the “Windows” key on your console and type “Server Manager” to scan for the application. When it is open as shown by the figure underneath, let us currently continue to the subsequent stage of introducing Active Directory Domain Services.

Stage 2: Right-click on “Oversee” on the “Server Manager” window and pick “Include Roles and Features”. This will open the “Include Roles and Features Wizard” which ushers us to the part where we introduce Active Directory Domain Services. Snap-on straightaway.



Dashboard



Manage Tools View Help

Dashboard

Local Server

All Servers

File and Storage Services ▾

WELCOME TO SERVER MANAGER

QUICK START

WHAT'S NEW

LEARN MORE

1 Configure this lo

2 Add roles and features

3 Add other servers to manage

4 Create a server group

5 Connect this server to cloud services

Hide



Before you begin

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website.

To remove roles, role services, or features:

[Start the Remove Roles and Features Wizard](#)

Before you continue, verify that the following tasks have been completed:

- The Administrator account has a strong password
- Network settings, such as static IP addresses, are configured
- The most current security updates from Windows Update are installed

If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again.

To continue, click Next.

Skip this page by default

< Previous

Next >

Install

Cancel

Stage 3:

On the “Installation Type”, leave “Role-based or feature-based installation” radio catch chose and click on the straightforward.

Select installation type

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

Role-based or feature-based installation

Configure a single server by adding roles, role services, and features.

Remote Desktop Services installation

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous

Next >

Install

Cancel

Stage 4:

On this stage titled “Select destination server”, select the server you are to introduce AD DS and snap straightaway. I will pick my neighborhood server.

Select destination server

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select a server or a virtual hard disk on which to install roles and features.

 Select a server from the server pool Select a virtual hard disk

Server Pool

Filter:

Name	IP Address	Operating System
WIN-UG5M08R1Q69	172.21.98.185	Microsoft Windows Server 2019 Standard

1 Computer(s) found

This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous

Next >

Install

Cancel

Stage 5:

The past advance will lead you to the following page as demonstrated as follows. Here, you will see numerous choices with a square agenda box against them. As you can figure, we will pick “Active Directory Domain Services”.

Select server roles

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select one or more roles to install on the selected server.

Roles

Description

- Active Directory Certificate Services
- Active Directory Domain Services
- Active Directory Federation Services
- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Device Health Attestation
- DHCP Server
- DNS Server
- Fax Server
- File and Storage Services (1 of 12 installed)
 - Host Guardian Service
 - Hyper-V
 - Network Policy and Access Services
 - Print and Document Services
 - Remote Access
 - Remote Desktop Services
 - Volume Activation Services
 - Web Server (IIS)
 - Windows Deployment Services
 - Windows Server Update Services

Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.

< Previous

Next >

Install

Cancel

Stage 6:

Quickly you pick that alternative, another part comes up. On the page, simply click on the “add Features” tab and hit “Next”.

Add Roles and Features Wizard

Select server role

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Add Roles and Features Wizard

DESTINATION SERVER
WIN-UG5MD8R1Q69

Add features that are required for Active Directory Domain Services?

You cannot install Active Directory Domain Services unless the following role services or features are also installed.

[Tools] Group Policy Management

▪ Remote Server Administration Tools

 ▪ Role Administration Tools

 ▪ AD DS and AD LDS Tools

 Active Directory module for Windows PowerShell

 ▪ AD DS Tools

 [Tools] Active Directory Administrative Center

 [Tools] AD DS Snap-Ins and Command-Line Tools

Include management tools (if applicable)

Add Features

Cancel

< Previous

Next >

Install

Cancel

Stage 7:

On the following page after Step 6 titled “Select features”, simply hit “Next” to lead you to establishments of AD DS.

Add Roles and Features Wizard

- □ X

Select features

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

Installation Type

Server Selection

Server Roles

Features

AD DS

Confirmation

Results

Select one or more features to install on the selected server.

Features

- .NET Framework 3.5 Features
- .NET Framework 4.7 Features (2 of 7 installed)
 - .NET Framework 4.7 (Installed)
 - ASP.NET 4.7
 - WCF Services (1 of 5 installed)
 - Background Intelligent Transfer Service (BITS)
 - BitLocker Drive Encryption
 - BitLocker Network Unlock
 - BranchCache
 - Client for NFS
 - Containers
 - Data Center Bridging
 - Direct Play
 - Enhanced Storage
 - Failover Clustering
 - Group Policy Management
 - Host Guardian Hyper-V Support
 - I/O Quality of Service
 - IIS Hostable Web Core

Description

.NET Framework 3.5 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to model a range of business processes.

< Previous

Next >

Install

Cancel

Stage 8:

As demonstrated as follows, you will be given the following page titled “Active Directory Domain Services”. Here, click on “Next”



Active Directory Domain Services

DESTINATION SERVER
WIN-UG5M08R1Q69[Before You Begin](#)[Installation Type](#)[Server Selection](#)[Server Roles](#)[Features](#)[AD DS](#)[Confirmation](#)[Results](#)

Active Directory Domain Services (AD DS) stores information about users, computers, and other devices on the network. AD DS helps administrators securely manage this information and facilitates resource sharing and collaboration between users.

Things to note:

- To help ensure that users can still log on to the network in the case of a server outage, install a minimum of two domain controllers for a domain.
- AD DS requires a DNS server to be installed on the network. If you do not have a DNS server installed, you will be prompted to install the DNS Server role on this machine.



Azure Active Directory, a separate online service, can provide simplified identity and access management, security reporting, single sign-on to cloud and on-premises web apps.

[Learn more about Azure Active Directory](#)

[Configure Office 365 with Azure Active Directory Connect](#)

[< Previous](#)[Next >](#)[Install](#)[Cancel](#)

Stage 9:

The following page is tied in with Confirming what you have to introduce before really introducing them. On the off chance that you make certain about what you have picked, click on introduce. You can alternatively pick the choice that restarts the server at whatever point required. Snap-on close once it is finished. .

Confirm installation selections

DESTINATION SERVER
WIN-UG5M08R1Q69

Before You Begin

To install the following roles, role services, or features on selected server, click Install.

Installation Type

 Restart the destination server automatically if required

Server Selection

Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

Server Roles

Features

AD DS

Confirmation

Results

- Active Directory Domain Services
- Group Policy Management
- Remote Server Administration Tools
- Role Administration Tools
- AD DS and AD LDS Tools
- Active Directory module for Windows PowerShell
- AD DS Tools
- Active Directory Administrative Center
- AD DS Snap-Ins and Command-Line Tools

Export configuration settings
Specify an alternate source path

< Previous

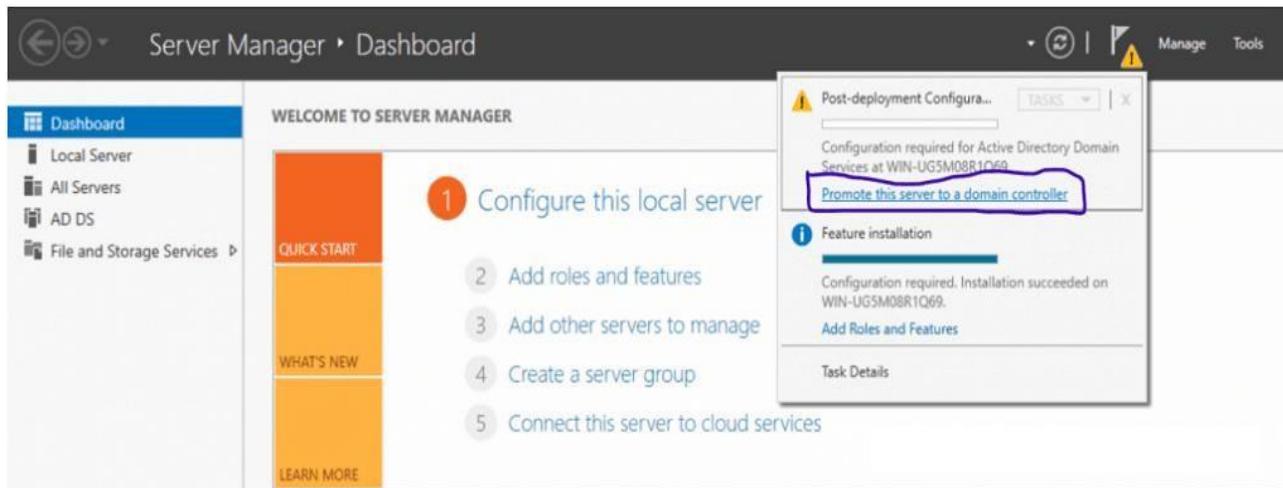
Next >

Install

Cancel

Stage 10:

After you have completed the process of introducing Active Directory Domain Services, the last advance is to elevate it to a Domain Controller. Head toward Server Manager where you will see a yellow shout warning next to the “Oversee” tab as demonstrated as follows. Snap-on it and pick “Promote this server to a domain controller”



Stage 11:

Another window titled “Dynamic Directory Domain Services Configuration Wizard” as appeared underneath will spring up. We are going to Add another Forest yet on the off chance that you would wish to accomplish something other than what’s expected in this Step, you are allowed to pick different choices. Include your association’s root space name. Snap-on “Next” after you pick your decision.

Deployment Configuration

TARGET SERVER
WIN-UG5M08RIQ69

Deployment Configuration

Domain Controller Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Select the deployment operation

- Add a domain controller to an existing domain
- Add a new domain to an existing forest
- Add a new forest

Specify the domain information for this operation

Root domain name:

computingforgeeks.com

[More about deployment configurations](#)

< Previous

Next >

Install

Cancel

Stage 12:

On the Domain Controller alternatives, leave the defaults checked and input your secret word. From that point onward, click “Next”.

Domain Controller Options

TARGET SERVER
WIN-UG5M08R1Q69

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Select functional level of the new forest and root domain

Forest functional level:

Windows Server 2016

Domain functional level:

Windows Server 2016

Specify domain controller capabilities

Domain Name System (DNS) server

Global Catalog (GC)

Read only domain controller (RODC)

Type the Directory Services Restore Mode (DSRM) password

Password:

Confirm password:

[More about domain controller options](#)

Stage 13: On the following page (DNS Options), you will most likely observe a mistake on top with the words “An appointment for this DNS server can’t be made in light of the fact that the legitimate parent zone nameserver can’t be found”. Ignore it and snap “Next”



DNS Options

TARGET SERVER
WIN-UG5M08R1Q69

⚠ A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found... [Show more](#) X

[Deployment Configuration](#)[Domain Controller Options](#)[DNS Options](#)[Additional Options](#)[Paths](#)[Review Options](#)[Prerequisites Check](#)[Installation](#)[Results](#)

Specify DNS delegation options

 Create DNS delegation[More about DNS delegation](#)[< Previous](#)[Next >](#)[Install](#)[Cancel](#)**Stage 14:**

On the following page, leave the NetBIOS area name as default or you can transform it as long as it isn't longer than 15 characters. Snap "Next" after that.



Additional Options

TARGET SERVER
WIN-UG5M08R1Q69

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Verify the NetBIOS name assigned to the domain and change it if necessary

The NetBIOS domain name:

worldofitech.com

[More about additional options](#)

< Previous

Next >

Install

Cancel

Stage 15:

Leave ways as default and snap “Next” as demonstrated as follows.



Paths

TARGET SERVER
WIN-UG5M08R1Q69

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

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

Database folder:

C:\Windows\NTDS



Log files folder:

C:\Windows\NTDS



SYSVOL folder:

C:\Windows\SYSVOL

[More about Active Directory paths](#)

< Previous

Next >

Install

Cancel

Stage 16:

In this progression, the server enables you to audit what you have done as such far. On the off chance that you are acceptable with the determinations, you have done. Hit “Next”.

The screenshot shows the "Review Options" step of the Active Directory Domain Services Configuration Wizard. The left sidebar lists steps: Deployment Configuration, Domain Controller Options, DNS Options, Additional Options, Paths, **Review Options**, Prerequisites Check, Installation, and Results. The main area displays the selected options:

- Review your selections:
 - Forest Functional Level: Windows Server 2016
 - Domain Functional Level: Windows Server 2016
 - Additional Options:
 - Global catalog: Yes
 - DNS Server: Yes
 - Create DNS Delegation: No
 - Database folder: C:\Windows\NTDS
 - Log file folder: C:\Windows\NTDS
 - SYSVOL folder: C:\Windows\SYSVOL

Below the list, a note says: "These settings can be exported to a Windows PowerShell script to automate additional installations" with a "View script" button. At the bottom, there are links for "More about installation options", "Previous", "Next > (highlighted)", "Install", and "Cancel".

Stage 17:

In this progression, requirements will be approved before Active Directory Domain Services is introduced. In the event that you get any mistakes here, it would be ideal if you take a gander at it and fix anything in the past advances. In the event that all is alright, click "Introduce".

Active Directory Domain Services Configuration Wizard

Prerequisites Check

TARGET SERVER
WIN-UG5M08R1Q69

All prerequisite checks passed successfully. Click 'Install' to begin installation.

Show more X

Deployment Configuration
Domain Controller Options
DNS Options
Additional Options
Paths
Review Options
Prerequisites Check
Installation
Results

Prerequisites need to be validated before Active Directory Domain Services is installed on this computer

Rerun prerequisites check

View results

! Windows Server 2019 domain controllers have a default for the security setting named "Allow cryptography algorithms compatible with Windows NT 4.0" that prevents weaker cryptography algorithms when establishing security channel sessions.

For more information about this setting, see Knowledge Base article 942564 (<http://go.microsoft.com/fwlink/?LinkId=104751>).

! A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found or it does not run Windows DNS server. If you are integrating with an existing DNS infrastructure, you should manually create a delegation to this DNS server in the parent zone to ensure reliable name resolution from outside the domain "computingforgeeks.com". Otherwise, no action is required.

! If you click Install, the server automatically reboots at the end of the promotion operation.

More about prerequisites

< Previous Next > **Install** Cancel

Installation

TARGET SERVER
WIN-UG5M08R1Q69

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Progress

Starting

[View detailed operation results](#)

! Windows Server 2019 domain controllers have a default for the security setting named "Allow cryptography algorithms compatible with Windows NT 4.0" that prevents weaker cryptography algorithms when establishing security channel sessions.

For more information about this setting, see Knowledge Base article 942564 (<http://go.microsoft.com/fwlink/?LinkId=104751>).

[More about installation options](#)

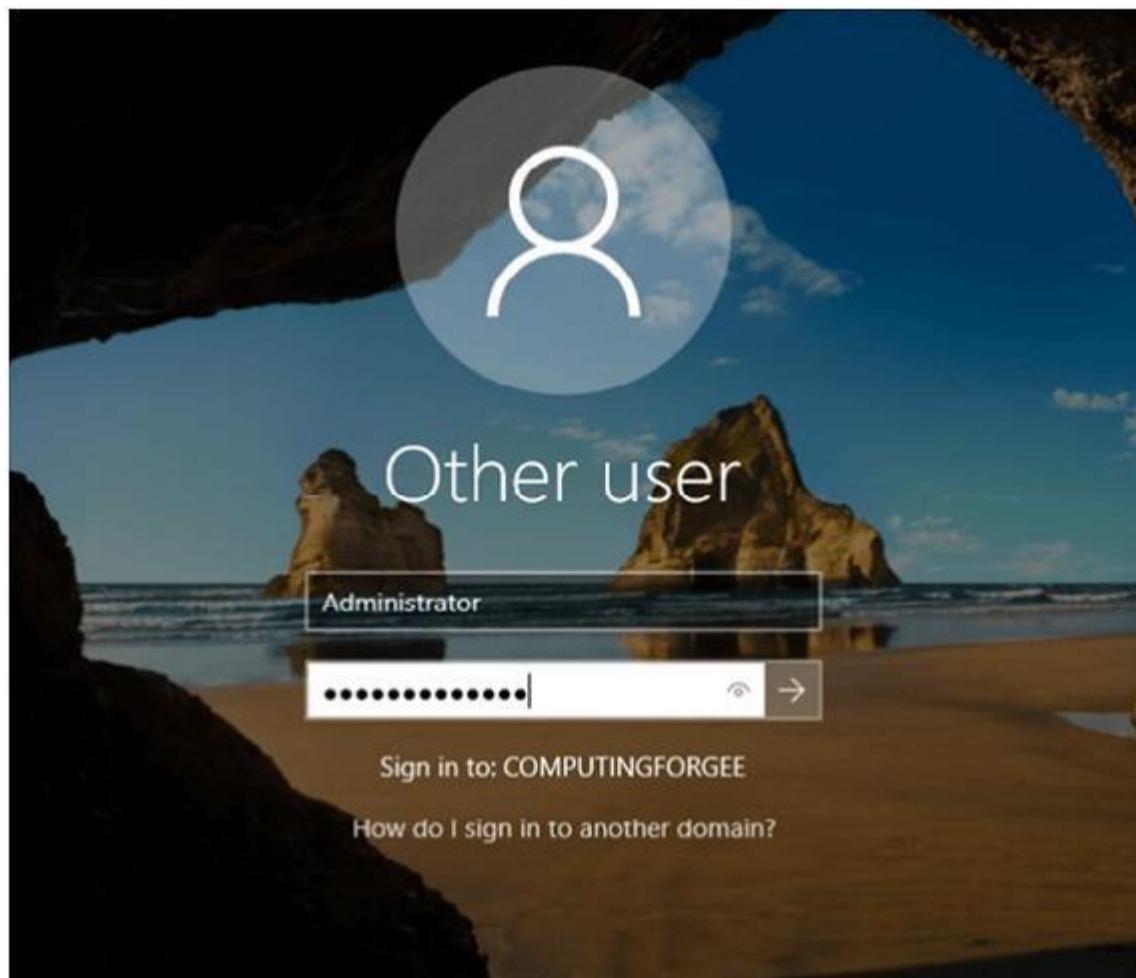
< Previous

Next >

Install

Cancel

From that point forward, the Server will reboot and you would then be able to sign into the Domain with the certifications you set in Step 12 as demonstrated as follows:



Conclusion:

You have Active Directory Domain Services Installed and can be managed by Active Directory Administrative Center. We hope it was informative and you enjoyed. Thank you for reading through.

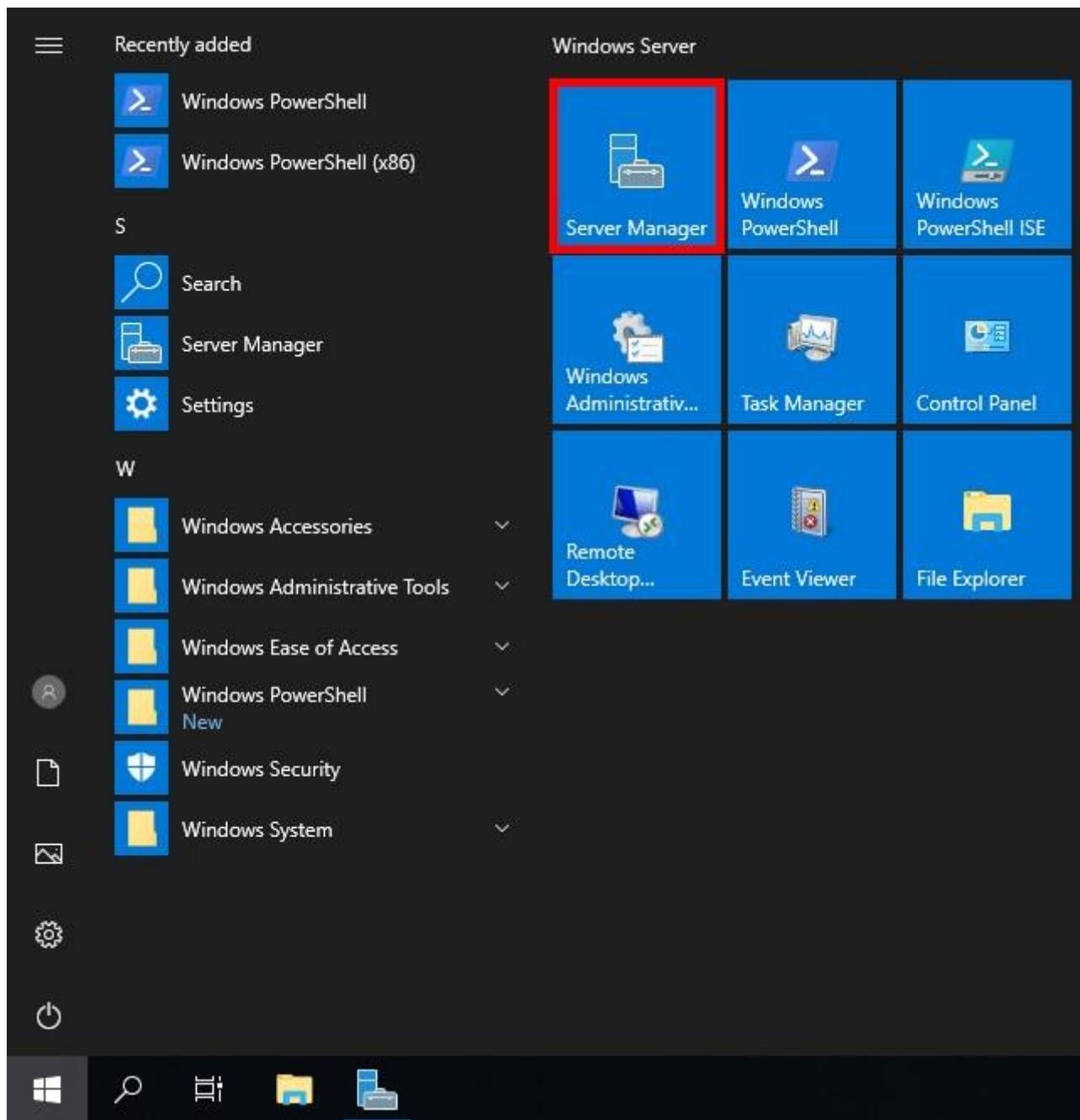
Install and Configure IIS Server on Server Windows 2019

Install IIS Through GUI

If your server has the graphical user interface component installed you can also install IIS by following these steps.

Stage 1:

Open Server Manager, this can be found in the start menu. If it's not there simply type “Server Manager” with the start menu open and it should be found in the search.



Stage 2:

Click the “Add roles and features” text.

Server Manager

Server Manager • Dashboard

Manage Tools View Help

Dashboard Local Server All Servers File and Storage Services

WELCOME TO SERVER MANAGER

QUICK START

WHAT'S NEW

LEARN MORE

1 Configure this local server

2 Add roles and features

3 Add other servers to manage

4 Create a server group

5 Connect this server to cloud services

Hide

ROLES AND SERVER GROUPS

Roles: 1 | Server groups: 1 | Servers total: 1

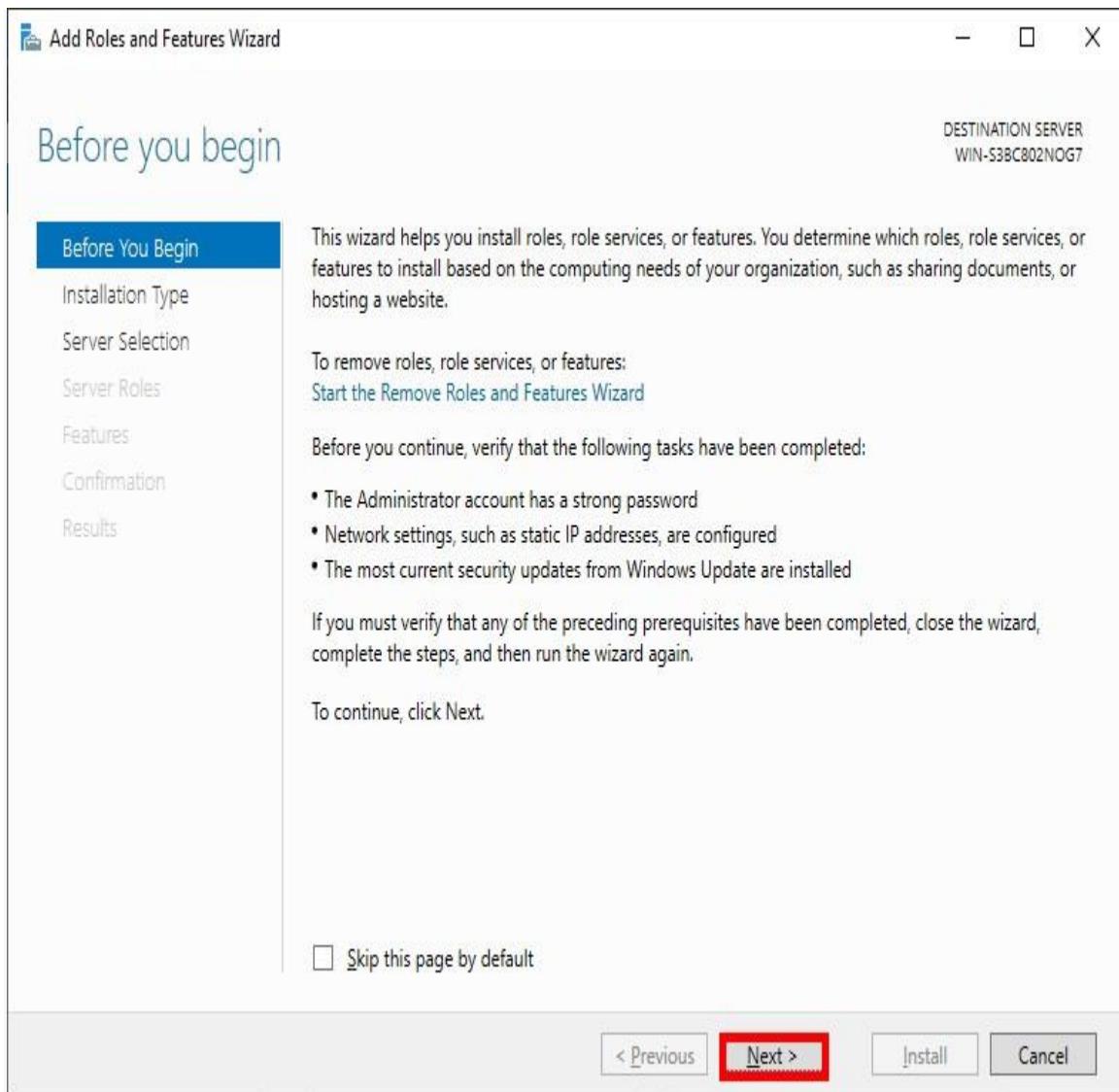
File and Storage Services	Local Server
1	1
Manageability	Manageability
Events	Events
Performance	Services
BPA results	Performance
	BPA results

17/10/2010 11:50 AM

The screenshot shows the Windows Server Manager dashboard. On the left, there's a navigation bar with links for Dashboard, Local Server, All Servers, and File and Storage Services. The main area is titled 'WELCOME TO SERVER MANAGER' and contains a 'QUICK START' section with five numbered steps: 1. Configure this local server, 2. Add roles and features (which is highlighted with a red rectangle), 3. Add other servers to manage, 4. Create a server group, and 5. Connect this server to cloud services. Below this is a 'ROLES AND SERVER GROUPS' section showing one role and one server group, each with a list of metrics like Manageability, Events, Performance, and BPA results. At the bottom right, there's a timestamp: 17/10/2010 11:50 AM.

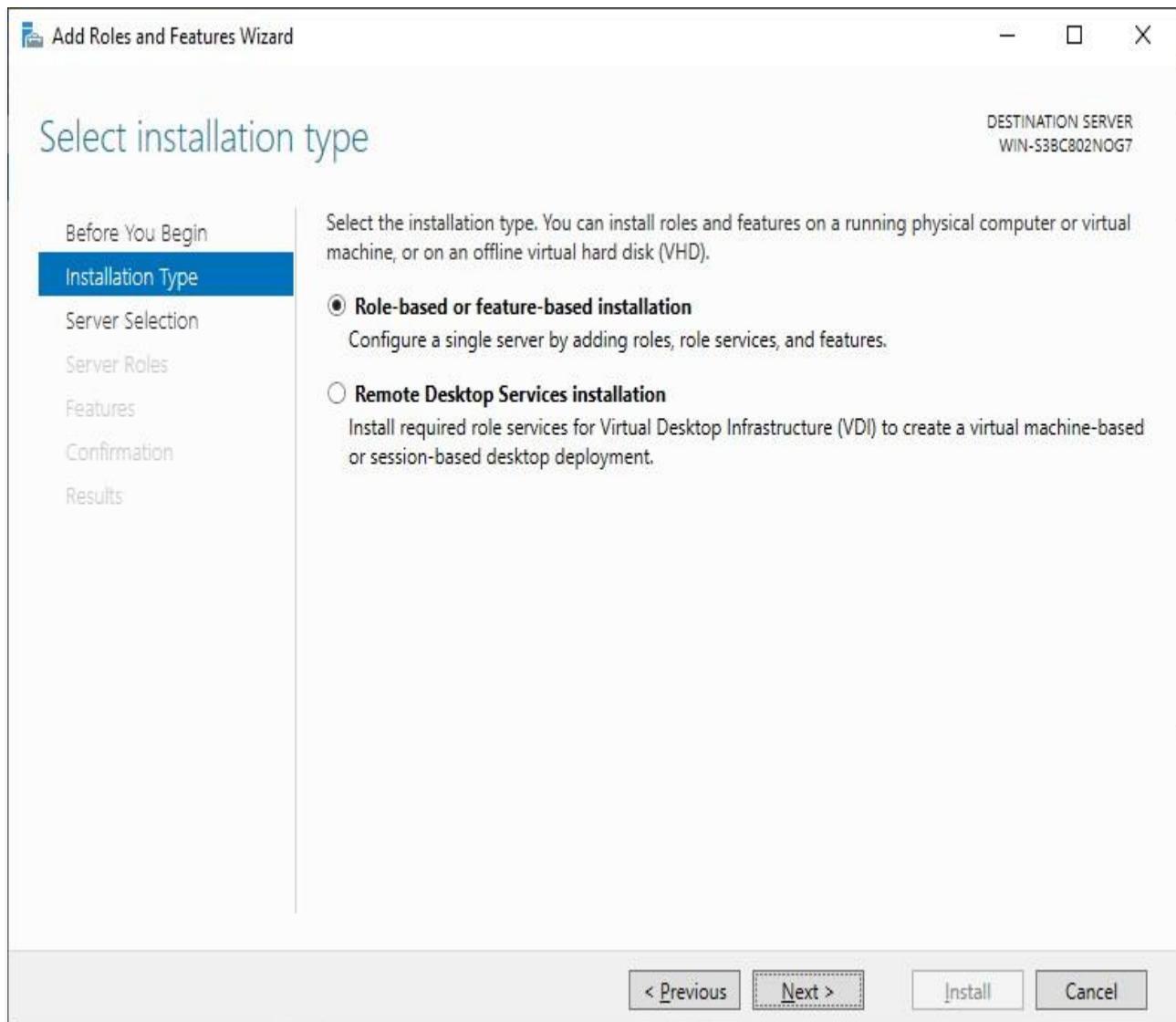
Stage 3:

On the “Before you begin” window, simply click the Next button.



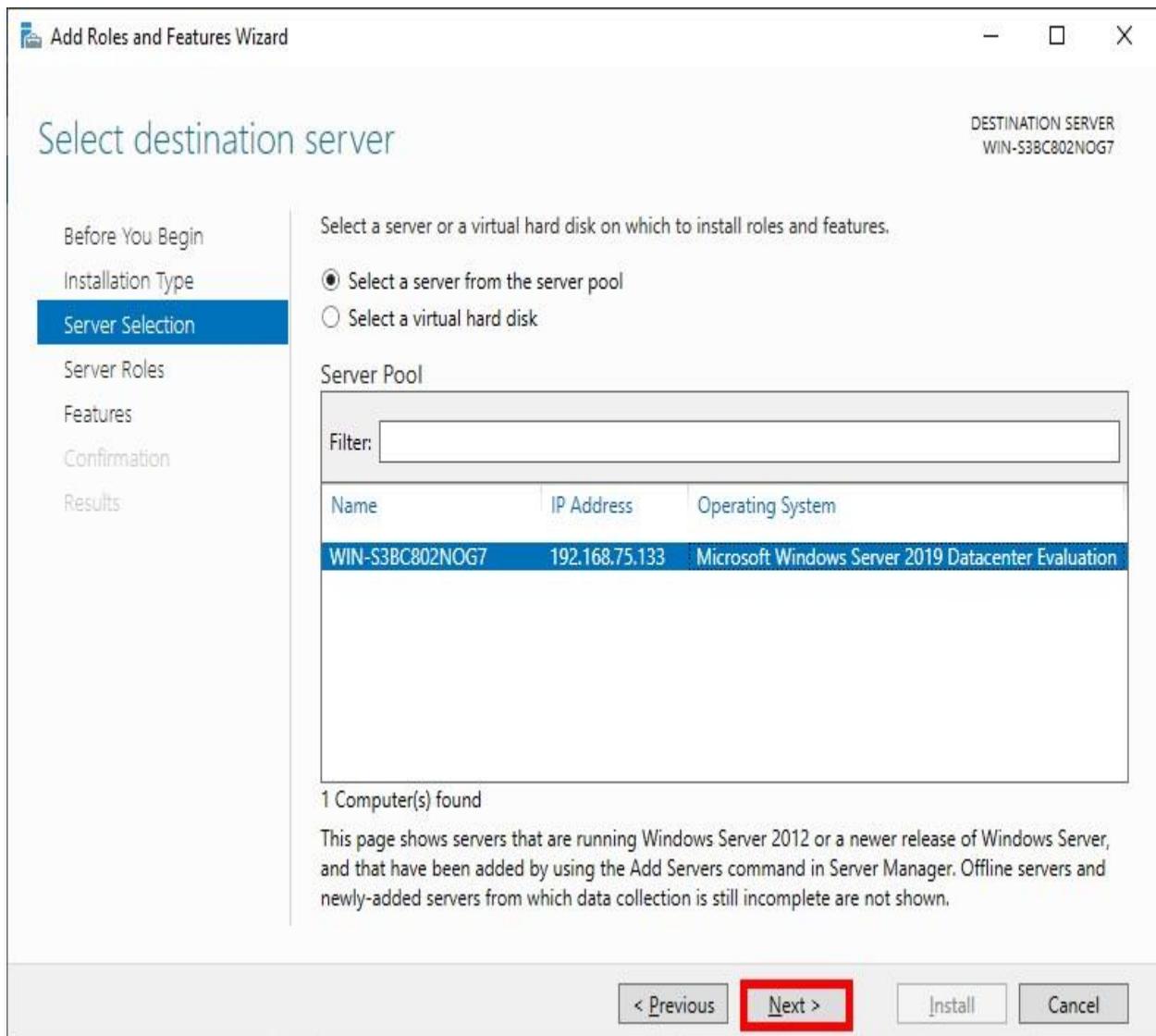
Stage 4:

On the “Select installation type” window, leave “Role-based or feature-based installation” selected and click Next.



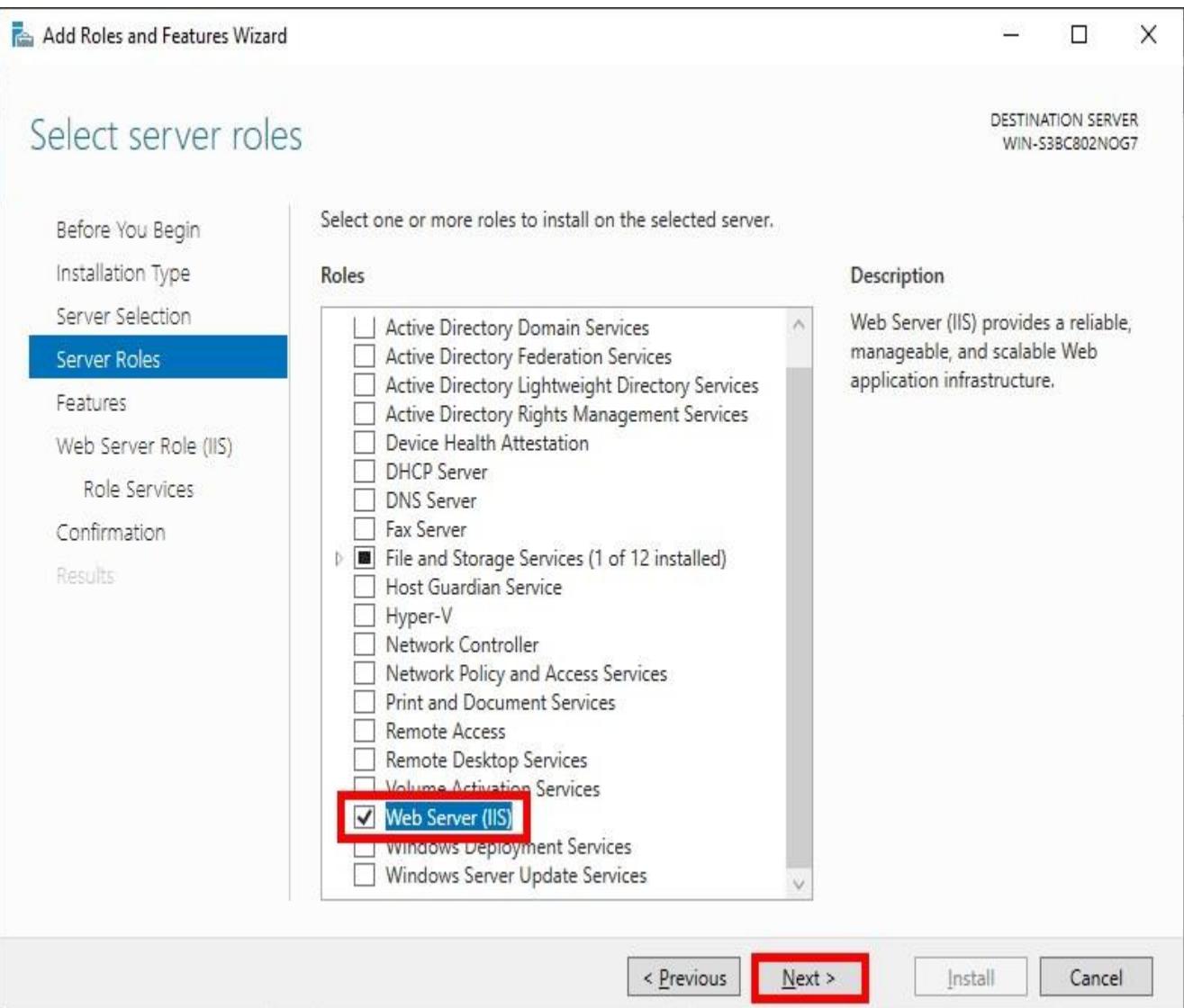
Stage 5:

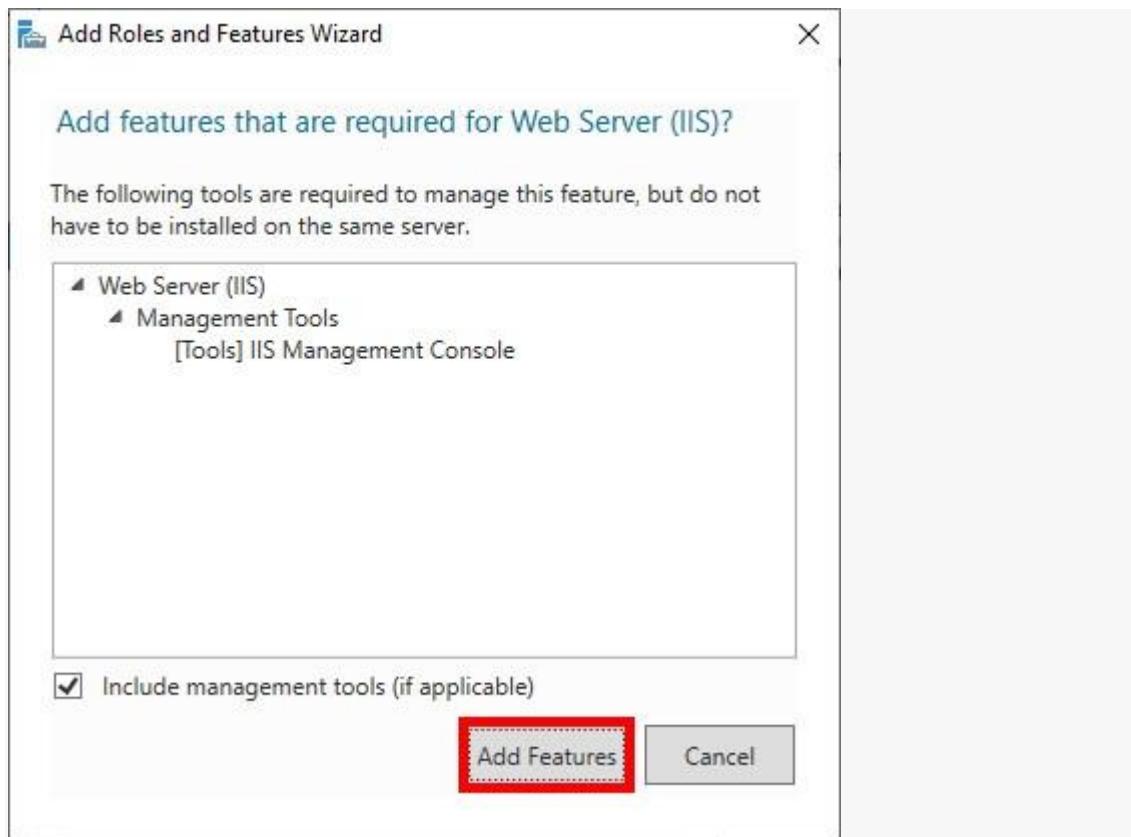
As we're installing to our local machine, leave "Select a server from the server pool" with the current machine selected and click Next. Alternatively you can select another server that you are managing from here, or a VHD.



Stage 6:

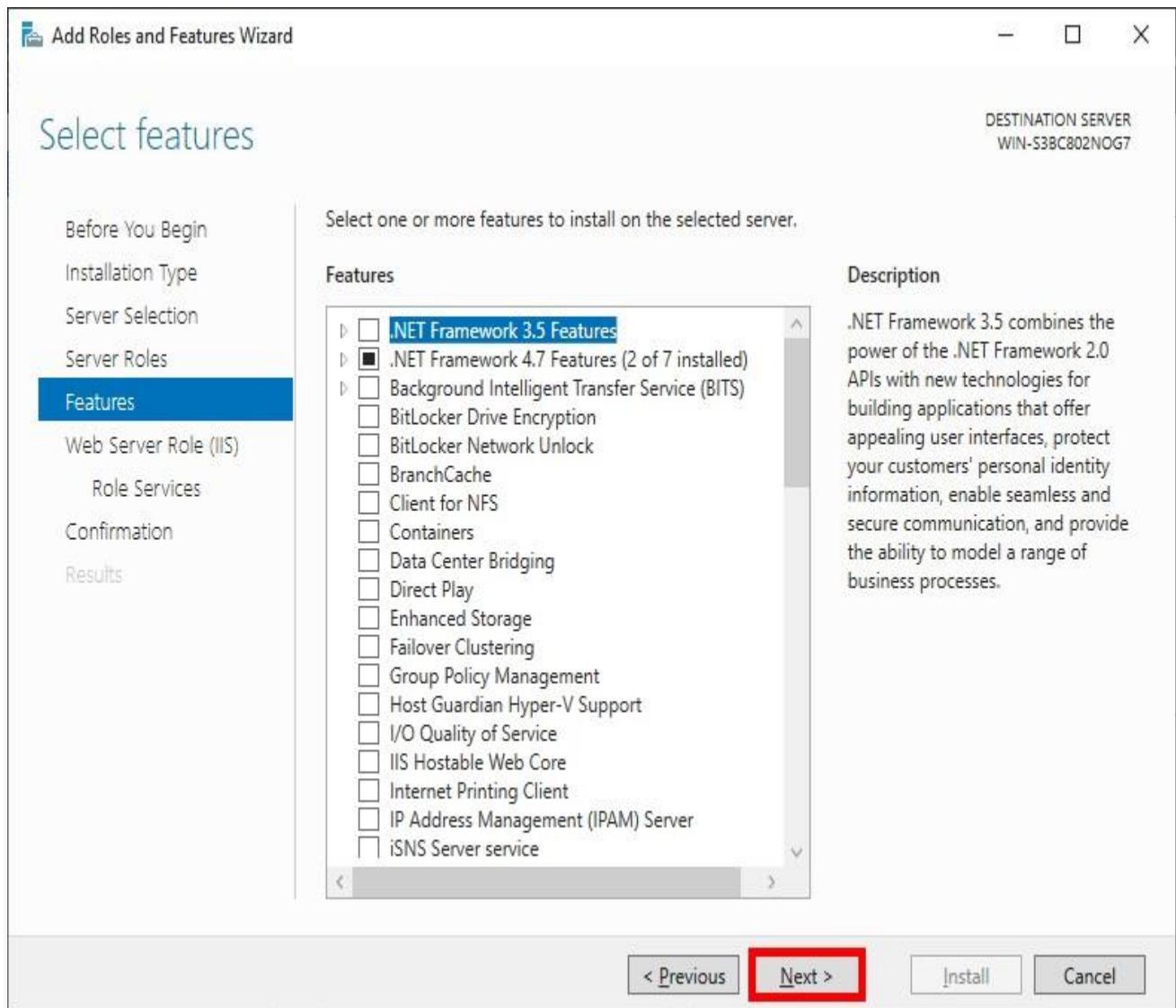
From the “Select server roles” window, check the box next to “Web Server (IIS)”. Doing this may open up a new window advising that additional features are required, simply click the “Add Features” button to install these as well. Click Next back on the Select server roles menu once this is complete.





Stage 7:

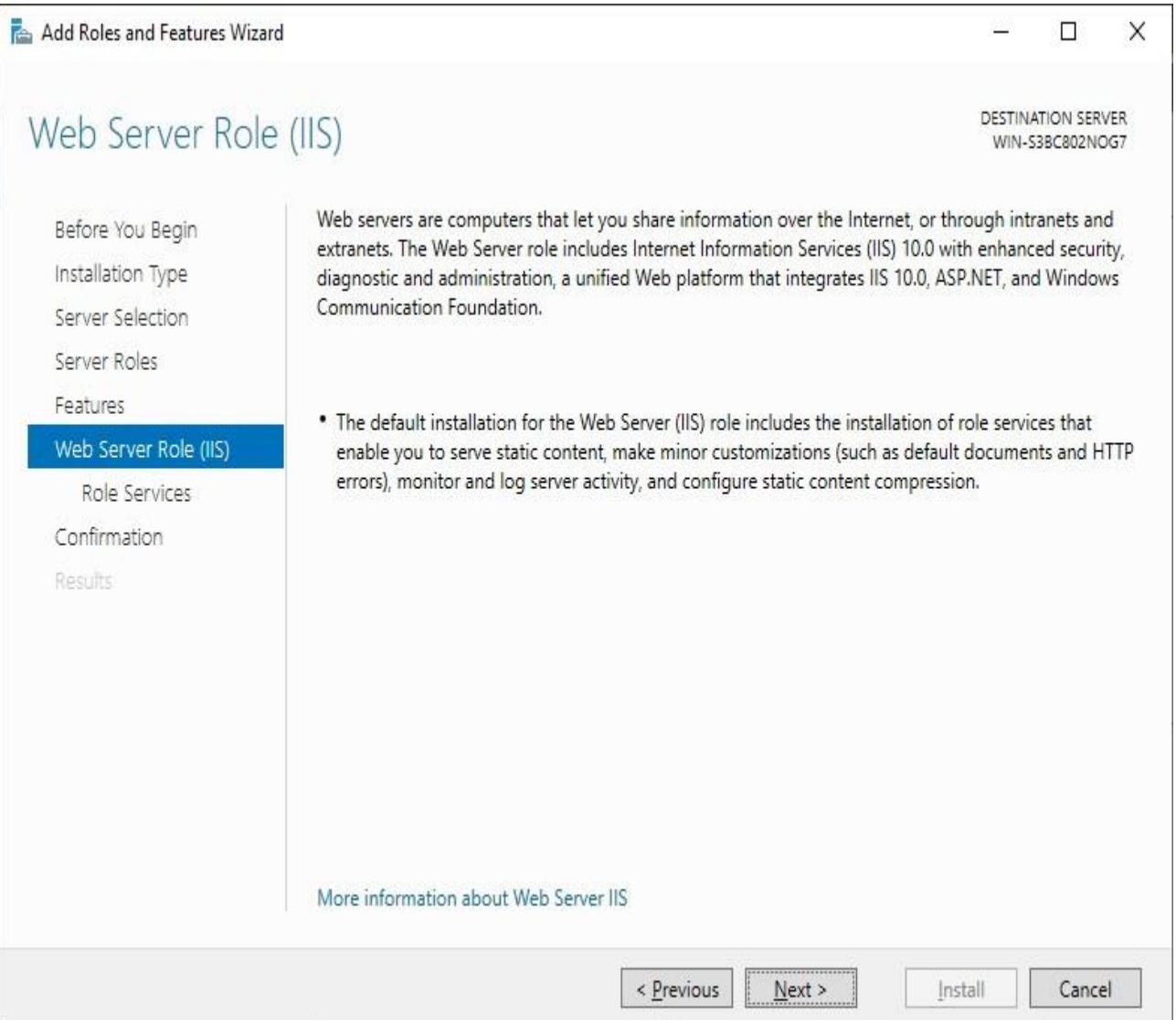
We will not be installing any additional features at this stage, so simply click Next on the “Select features” window.



Stage 8:

Click Next on the “Web Server Role (IIS)” window after reading the information provided.

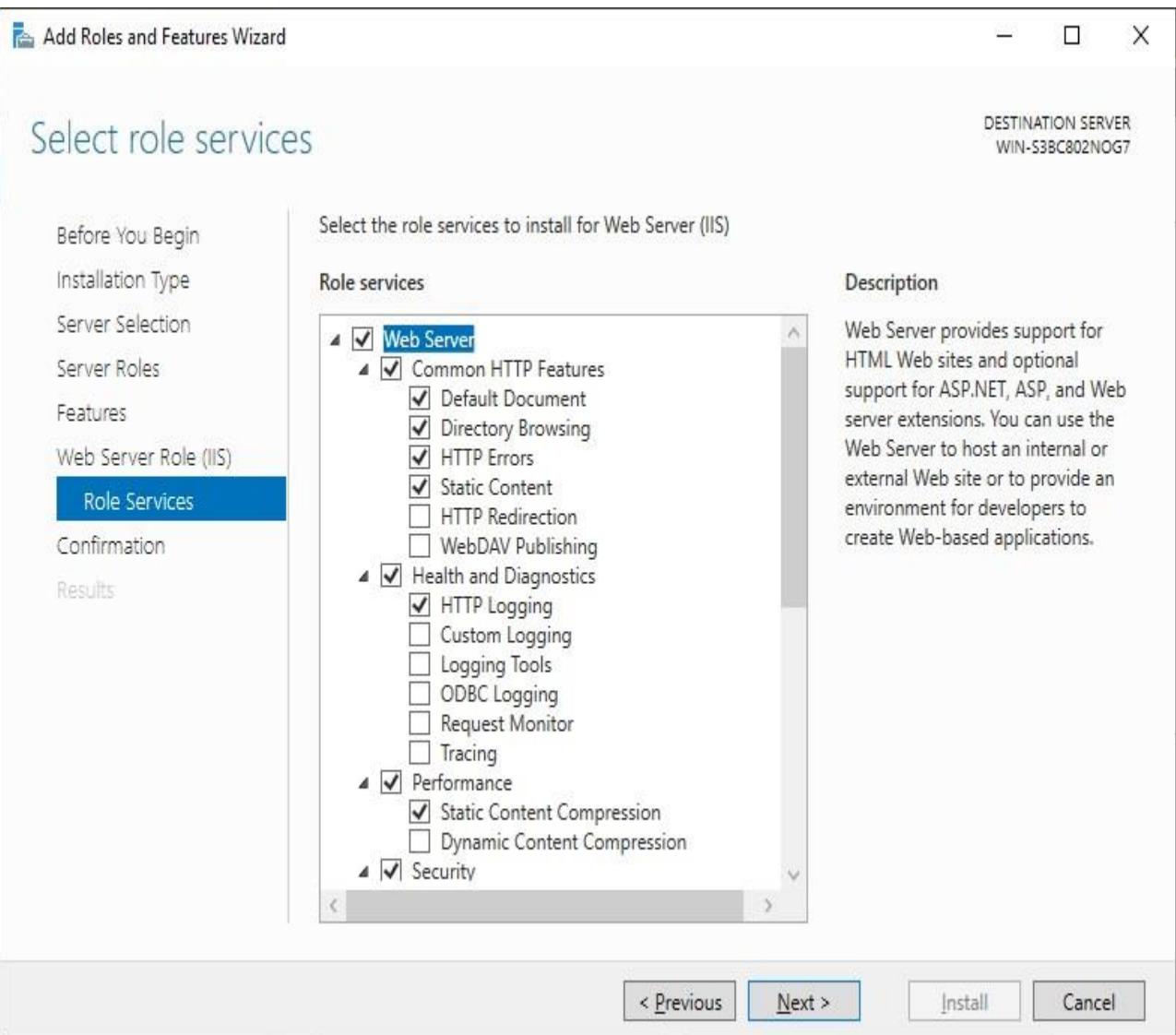
Stage 9:



Stage 10:

At this point on the “Select role services” window you can install additional services for IIS if required. You don’t have to worry about this now as you can always come back and add more later, so just click Next for now to install the defaults.

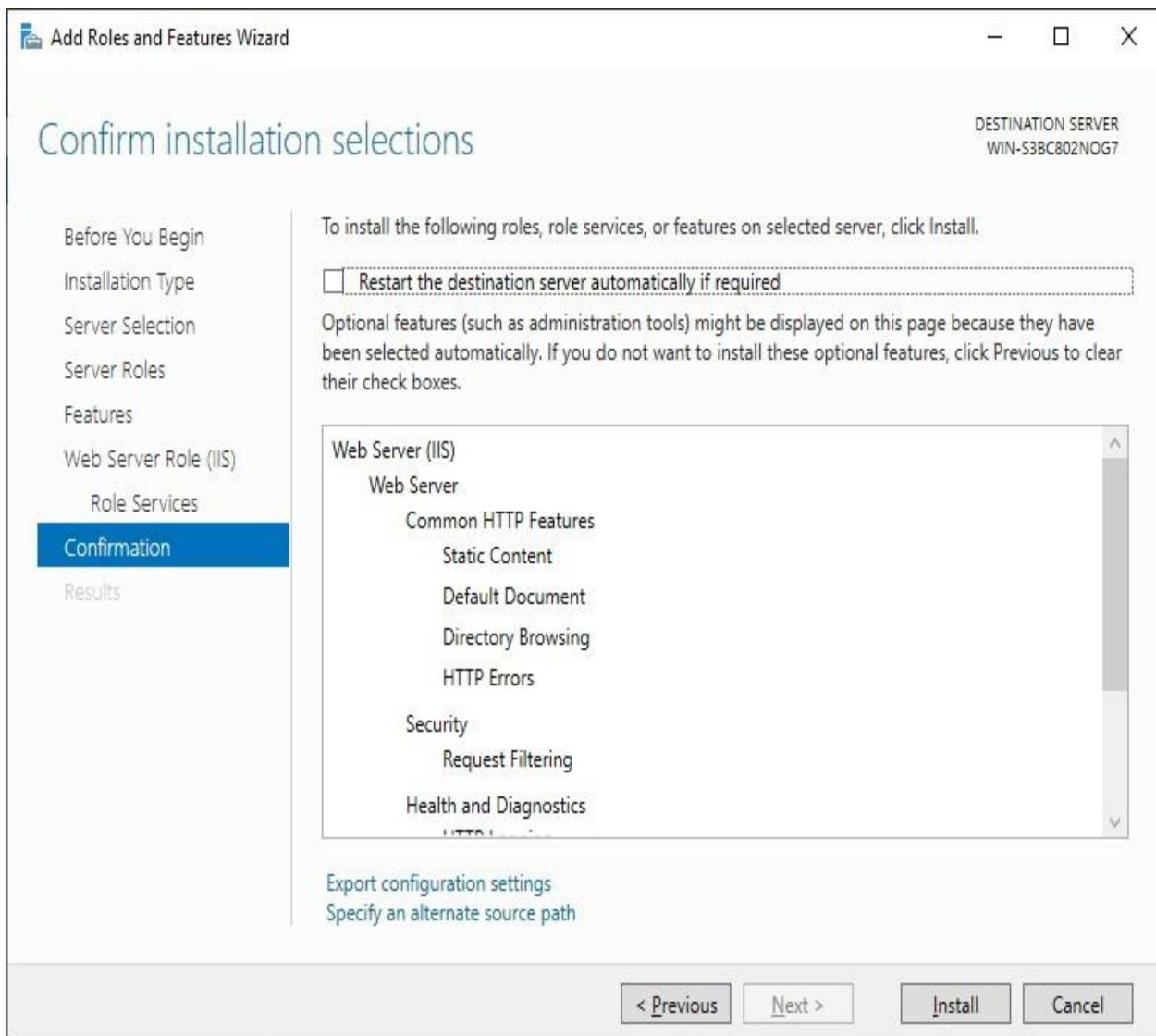
Stage 11:



Stage 12:

Finally on the “Confirm installation selections” window , review the items that are to be installed and click Install when you’re ready to proceed with installing the IIS web server.

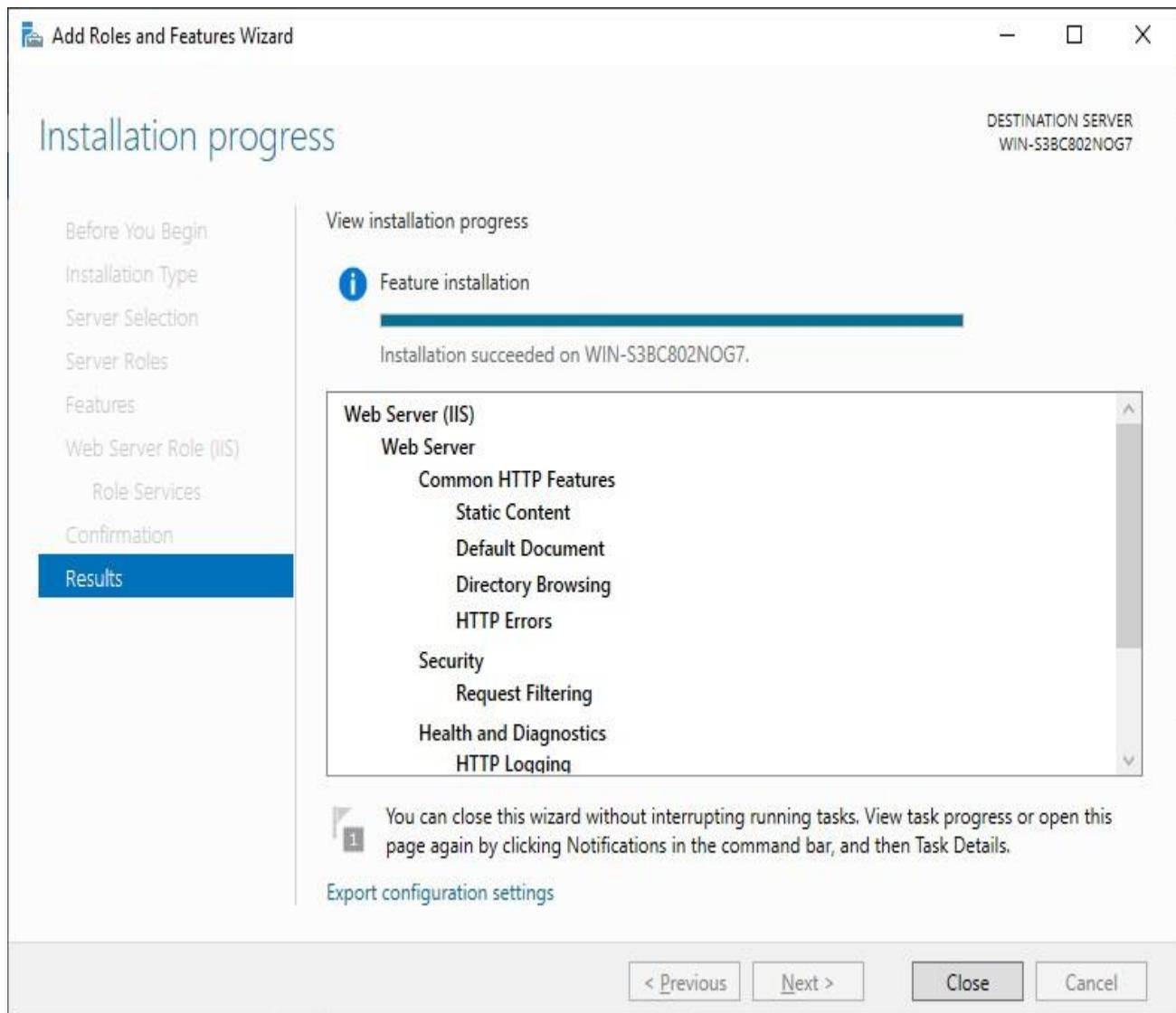
Stage 13:



No reboot should be required with a standard IIS installation, however if you remove the role a reboot will be needed.

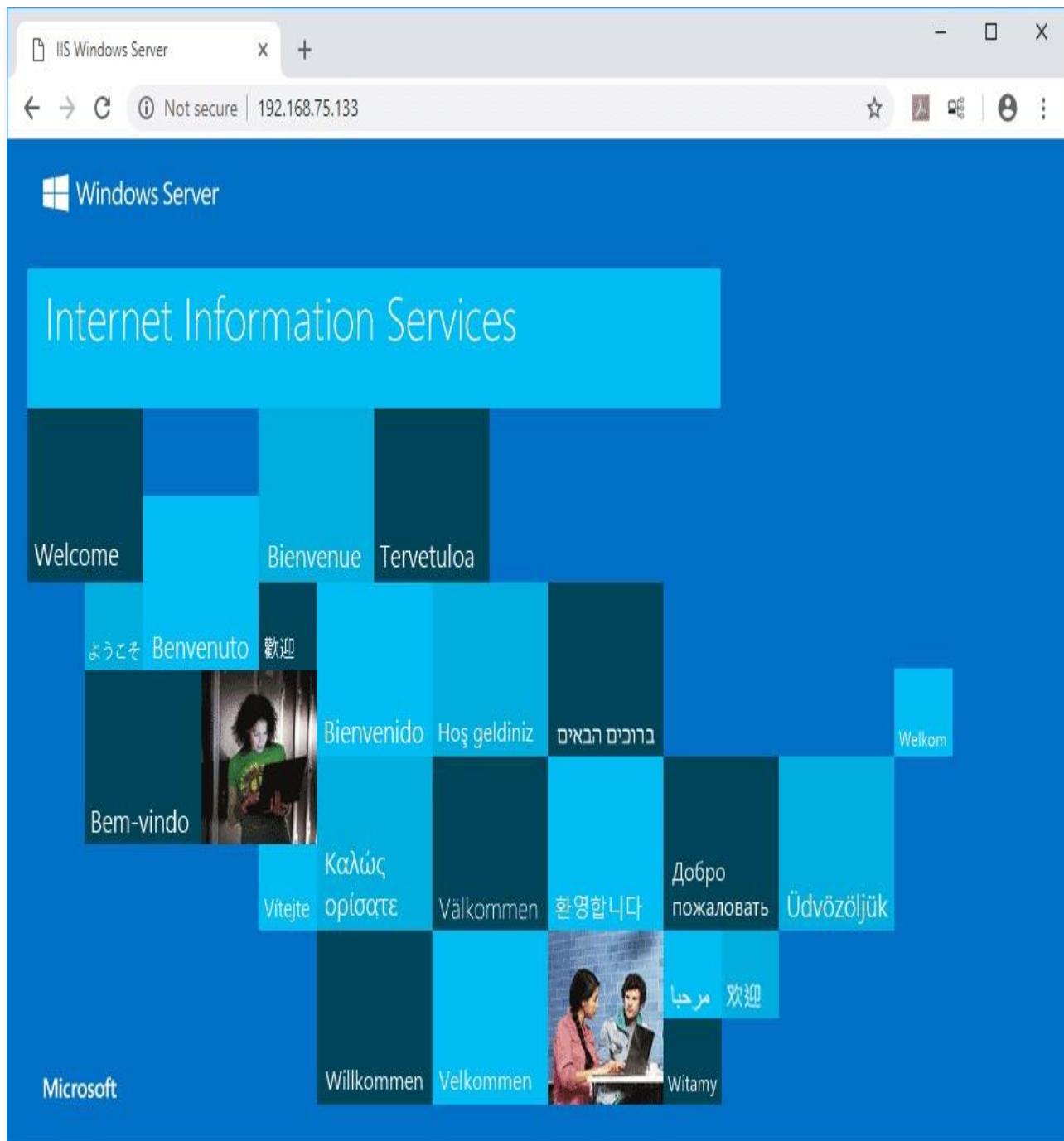
Stage 11:

Once the installation has succeeded, click the close button. At this point IIS should be running on port 80 by default with the firewall rule “World Wide Web Services (HTTP Traffic-In)” enabled in Windows firewall automatically.



Stage 12:

We can perform a simple test by opening up a web browser and browsing to the server that we have installed IIS on. You should see the default IIS page.



As you can hopefully see, it's quite a lot faster to use PowerShell to perform the same task.

Conclusion :

As shown we can easily install the IIS web server in Windows Server 2019 with both the PowerShell command line or the graphical user interface.

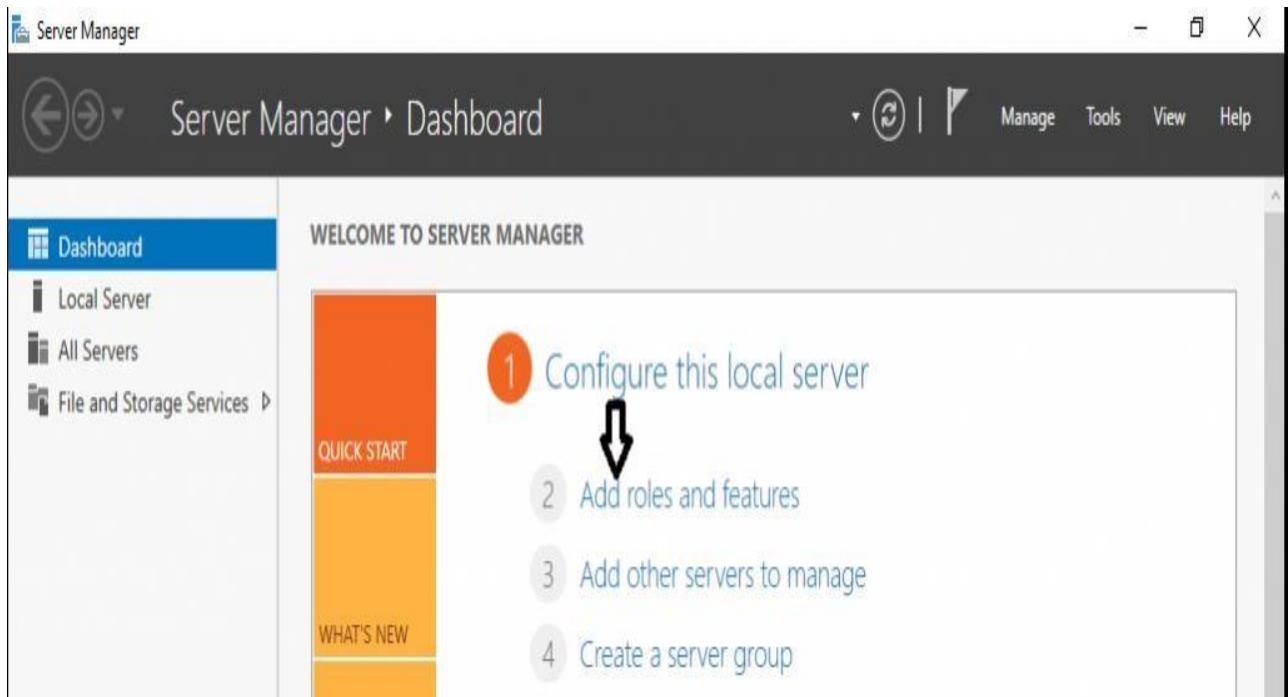
Install and Configure DNS Server on Server Windows 2019

Introduction

From [Microsoft](#), Domain Name System (DNS) is one of the industry-standard suites of protocols that comprise TCP/IP, and together the DNS Client and DNS Server provide computer name-to-IP address mapping name resolution services to computers and users. DNS is part of the application layer of the TCP/IP reference model and is very important in day to day operation of computers all over the world. We are going to install DNS Server on windows server 2019 and later do configurations such as adding PTR, A/AAAA records among others. Before proceeding, make sure you have configured static IP Address on your server.

Stage 1:

Open the server manager dashboard and Click add roles and features.



Stage 2:

Click on Next



Before you begin

DESTINATION SERVER
srv02

Before You Begin

[Installation Type](#)[Server Selection](#)[Server Roles](#)[Features](#)[Confirmation](#)[Results](#)

This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website.

To remove roles, role services, or features:

[Start the Remove Roles and Features Wizard](#)

Before you continue, verify that the following tasks have been completed:

- The Administrator account has a strong password
- Network settings, such as static IP addresses, are configured
- The most current security updates from Windows Update are installed

If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again.

To continue, click Next.

Skip this page by default

[< Previous](#)[Next >](#)[Install](#)[Cancel](#)

Stage 3:

Choose Role-based or feature-based installation and click Next.

Add Roles and Features Wizard

DESTINATION SERVER
srv02

Select installation type

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

Role-based or feature-based installation

Configure a single server by adding roles, role services, and features.

Remote Desktop Services installation

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.



< Previous

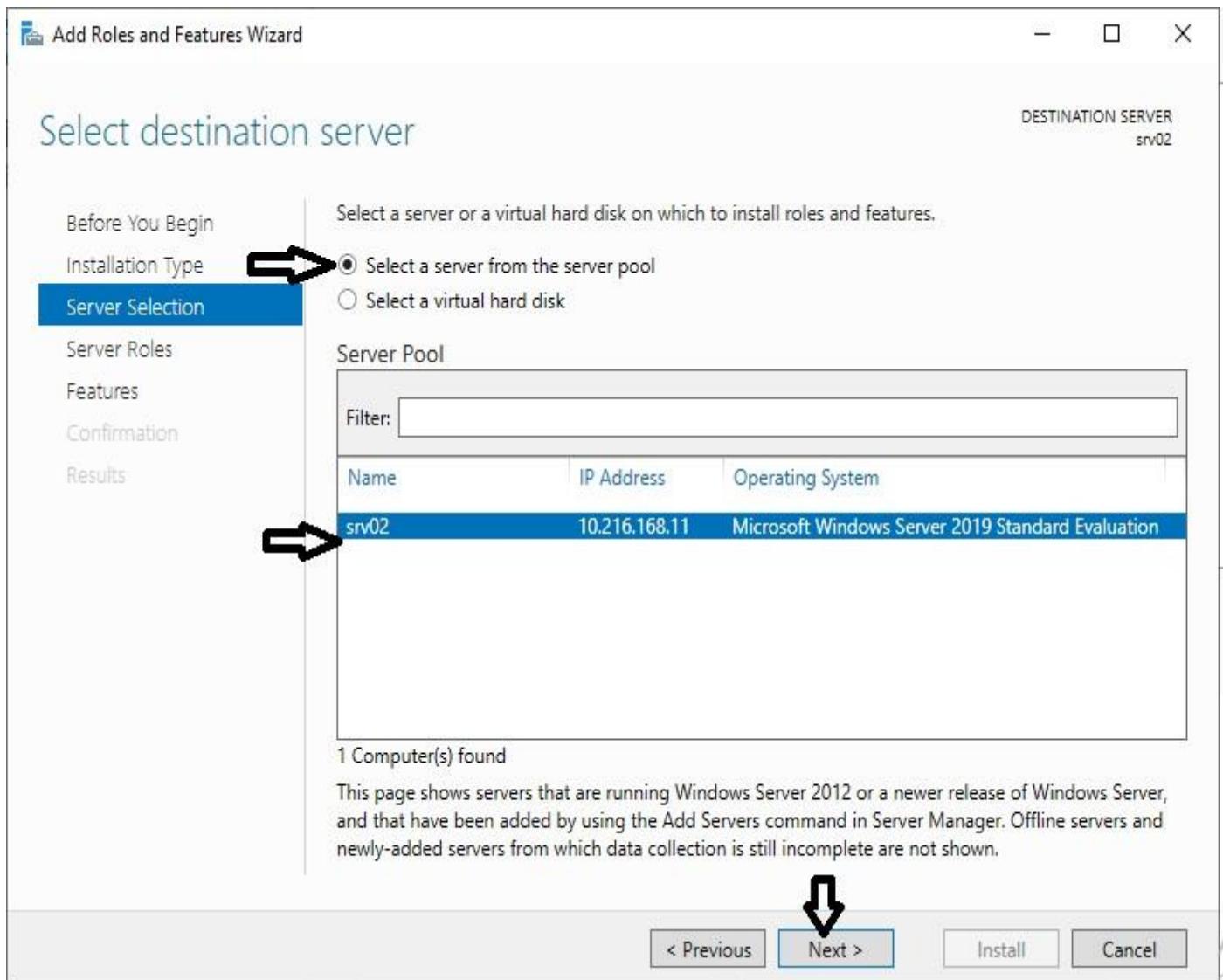
Next >

Install

Cancel

Stage 4:

: Choose destination server for DNS role and click Next



Stage 5:

Put the Check on the DNS server for DNS Server Role Installation

Add Roles and Features Wizard

- □ X

Select server roles

DESTINATION SERVER
srv02

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select one or more roles to install on the selected server.

Roles

- Active Directory Certificate Services
- Active Directory Domain Services
- Active Directory Federation Services
- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Device Health Attestation
- DHCP Server
- DNS Server
- Fax Server
- File and Storage Services (1 of 12 installed)
- Host Guardian Service
- Hyper-V
- Network Policy and Access Services
- Print and Document Services
- Remote Access
- Remote Desktop Services
- Volume Activation Services
- Web Server (IIS)
- Windows Deployment Services
- Windows Server Update Services

Description

Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.

< Previous

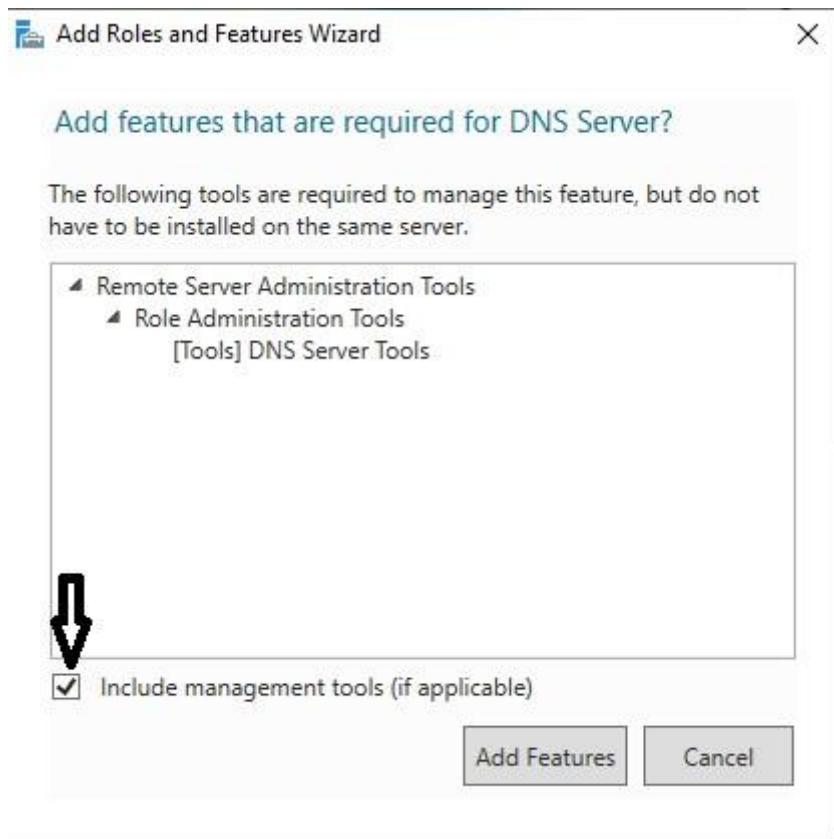
Next >

Install

Cancel

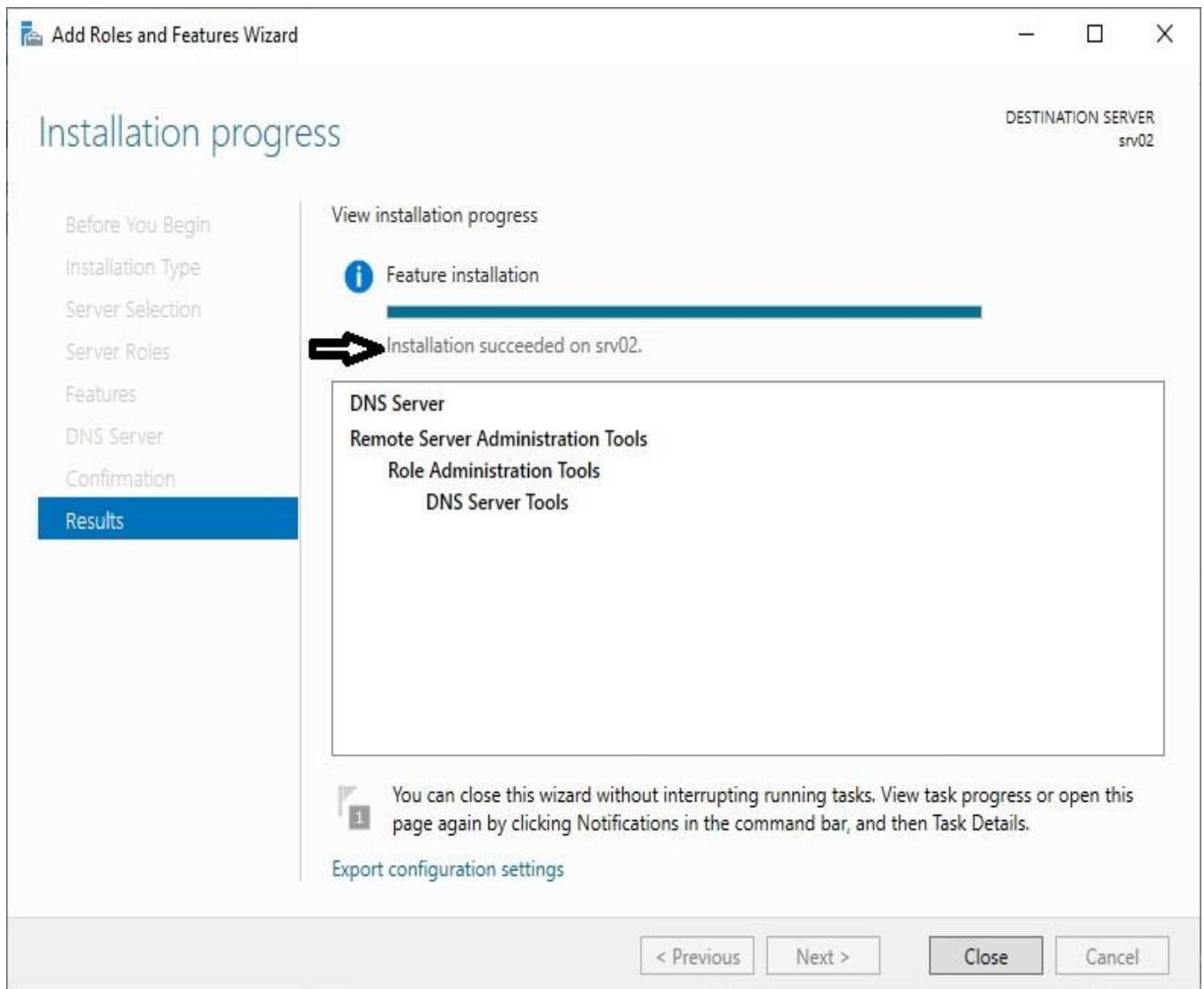
Stage 6:

: Add features that are required for the DNS server including management tools.



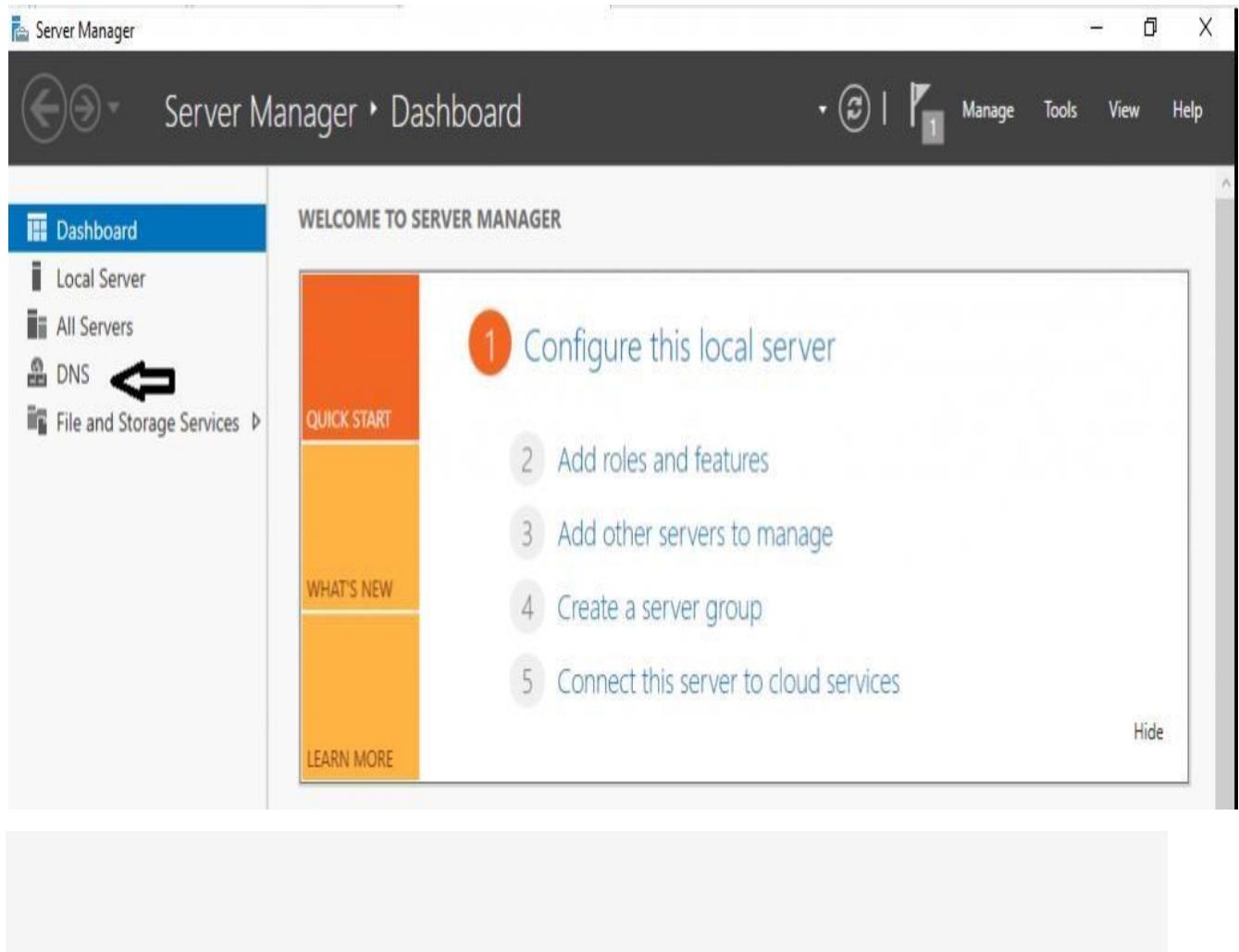
Stage 7:

After adding of required features it installs the DNS server with a succeeded message.



Stage 8:

: After DNS Server Installation you can access the DNS server from Server Manager or from Administrative Tools option in windows Program.



Conclusion

We now have our DNS Server installed and purring behind Windows Server 2019. Next, we are going to add records to it such as PTR, A(AAAA), Forward Lookup Zones among others. Stay tuned for this amazing treat. Meanwhile, there is a buffet of delicious and easy to digest guides below for you to enjoy. Thank you for passing by and getting acquainted with us.

This is in conclusion our project, unfortunately, the machines we were working on kept freezing and stop working, so we had to improvise and search on the internet.

Thank You for this very interesting course, for all your work, and for your teaching. We hope to have you as a teacher for forward courses.

Sincerely,

Karl Sarkis, Hussein Rammal, Hashem Mohse, Paul Mousallem, Elie Bou Seba, Roudy Younes, Hady Haidar Hassan, Nizar Baydoun