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Class# 202402 – 02

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Network Load Balancing

Table of Contents

Part 1 – Set up servers

Implement an NLB environment by first installing and configuring the Windows 2019 Servers.

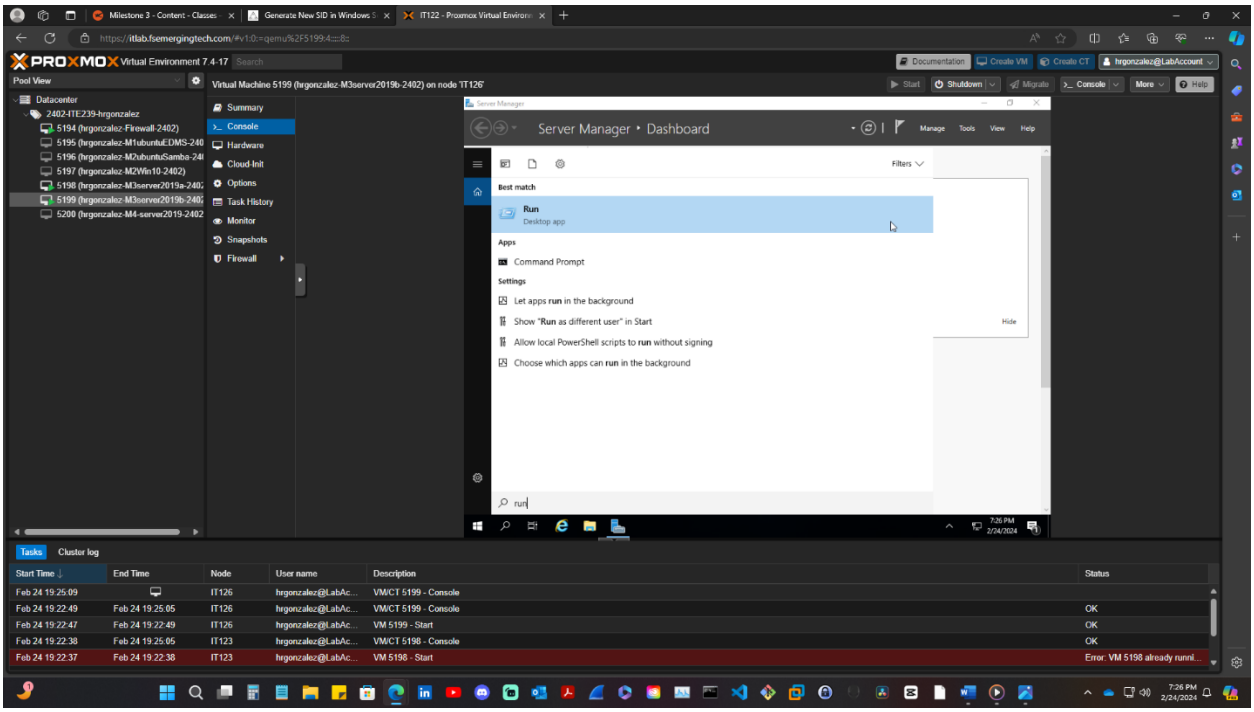
Windows 2019 Server is already installed on both machines. M3server2019a and M3server2019b have Windows Server 2019 installed.

If you run into a duplicate SID (Security Identifier) error with your two Servers, here is a place to information to help start troubleshooting: Remove Duplicate SID

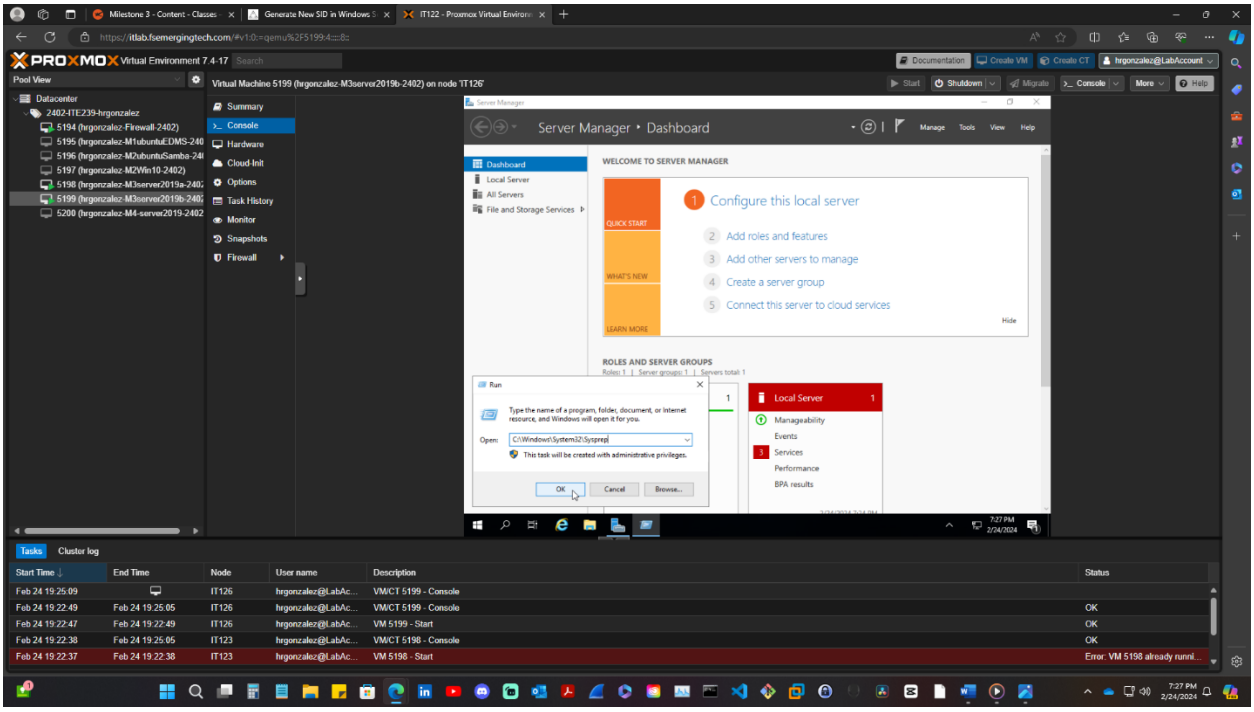
Generating a new SID

On the second Windows server (VM - M3server2019b)

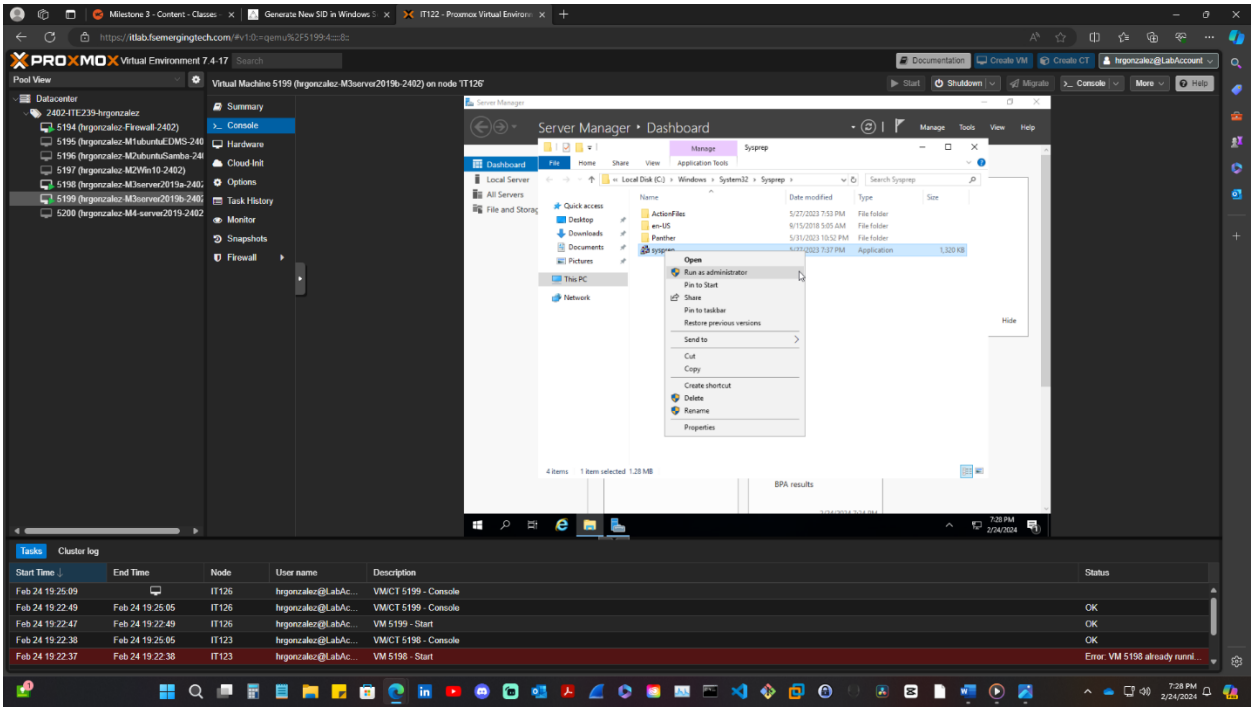
Let's click on the magnifying glass icon and the Search bar type "Run" (without ""). Next, select the Run desktop app icon.



In the box type C:\Windows\System32\Sysprep then click on OK.

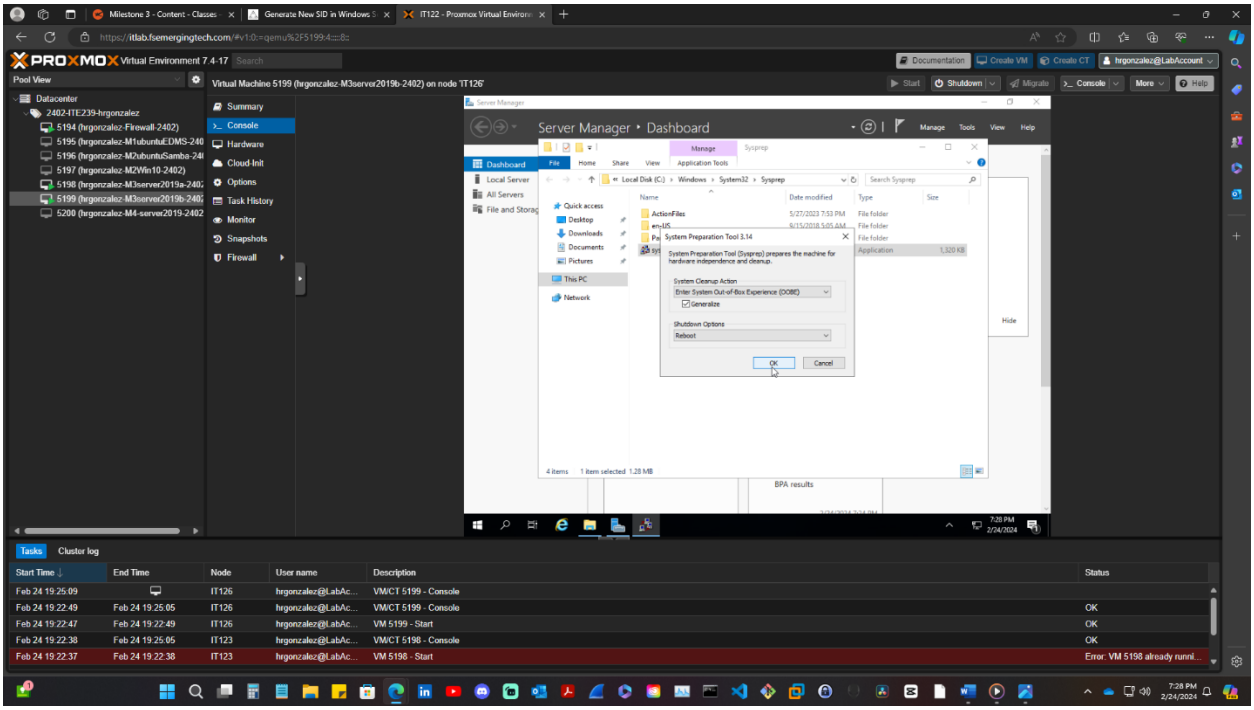


Now we are going to right-click on Sysprep and select Run as administrator.



System preparation tool window

In this window under the System Cleanup Action dropdown menu select Enter System Out-of-Box Experience (OOBE), now make sure to click on the Generalize box (this will remove specific settings, in our case SID). In the Shutdown Options dropdown menu select Reboot then click OK.



After Reboot

Once the machine reboots it will start you on an installation process. On the first Window click next > When prompted for the certificate number click on Do this later on the left bottom corner > In the following window click Accept > You are going to type in a password to log in and click finish.

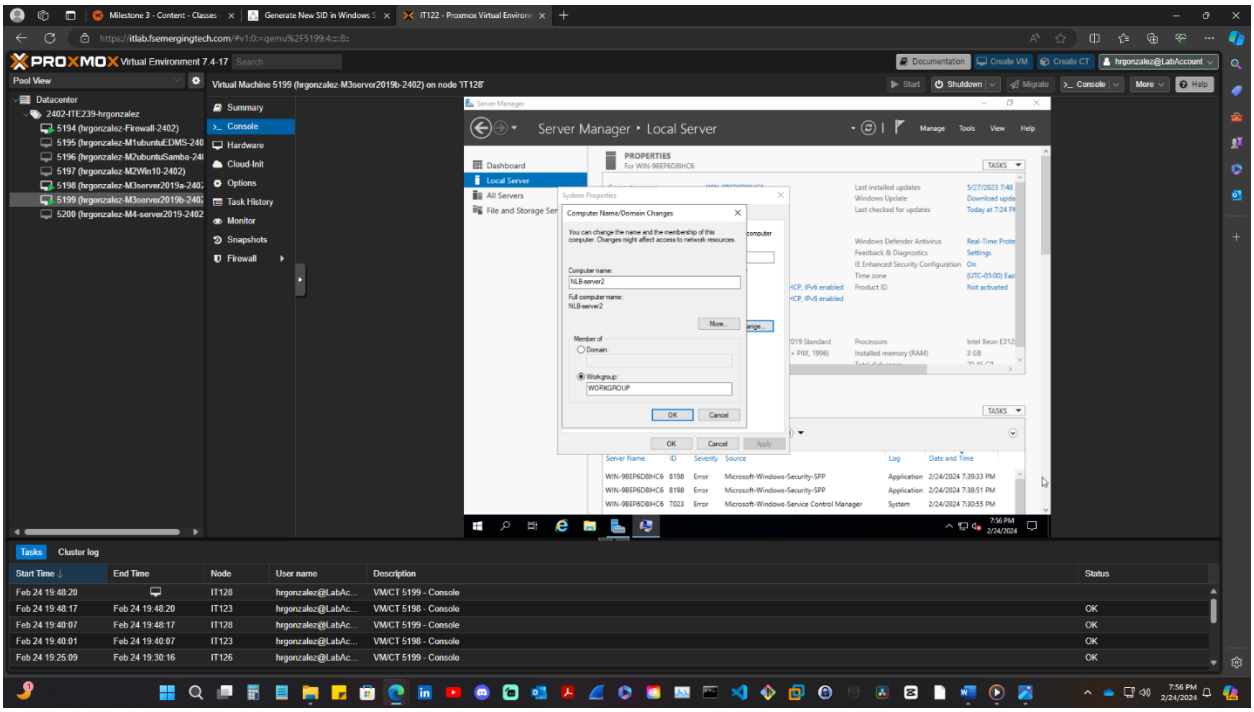
Changing Server Names

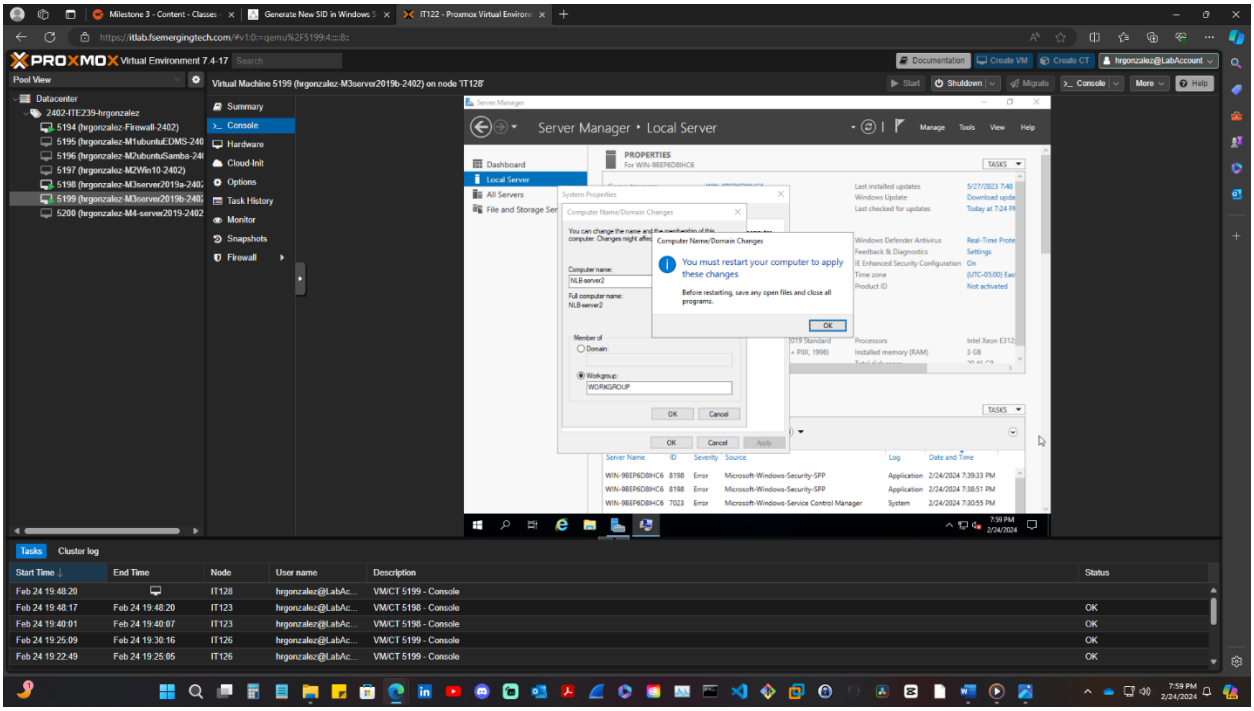
Machine M3server2019b & Machine M3server2019a

Name servers “NLB-server1” and “NLB-server2”

On VM M3server2019b open Server Manager and click on local server. Once you are in the local server dashboard click on the Computer Name > In the Computer Name window click on Change > The next window we are going to give our machine the name “NLB-server2” (without “”) then press OK > We are going to give the ok to Restart > Now, we close the remaining window and agree to Restart once again.

On VM – M3server2019a follow the same steps as above but name it NLB-server1

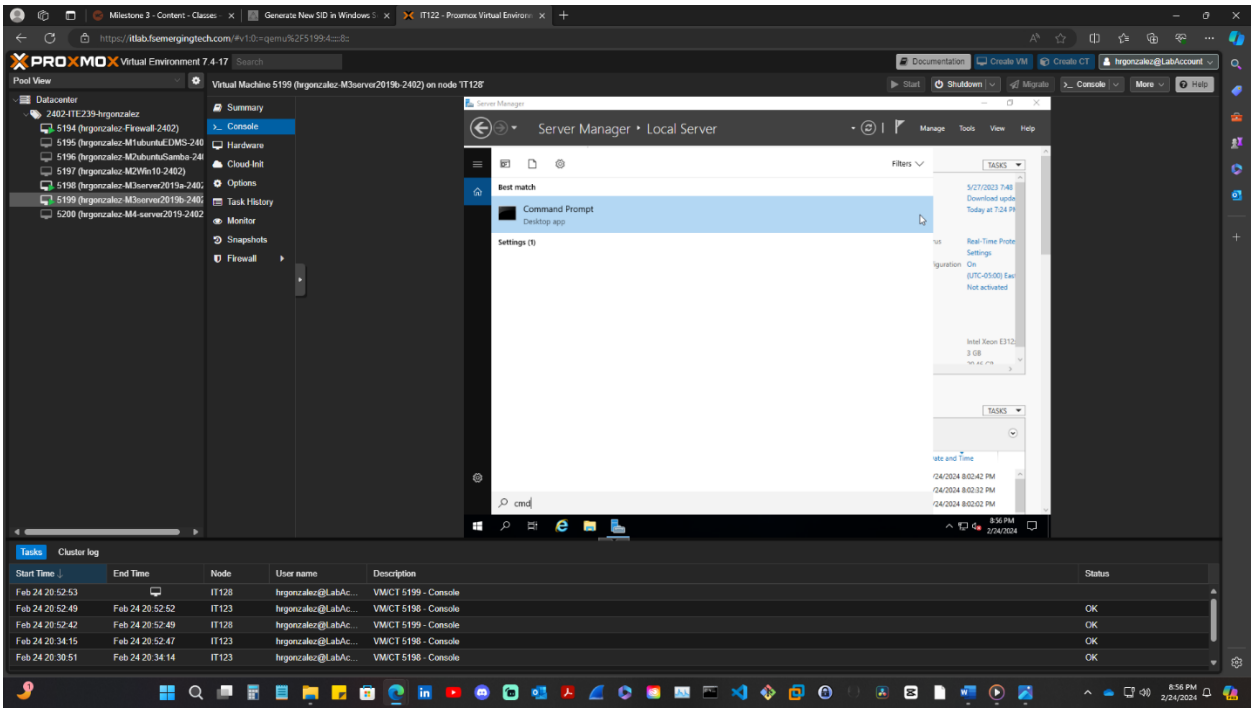


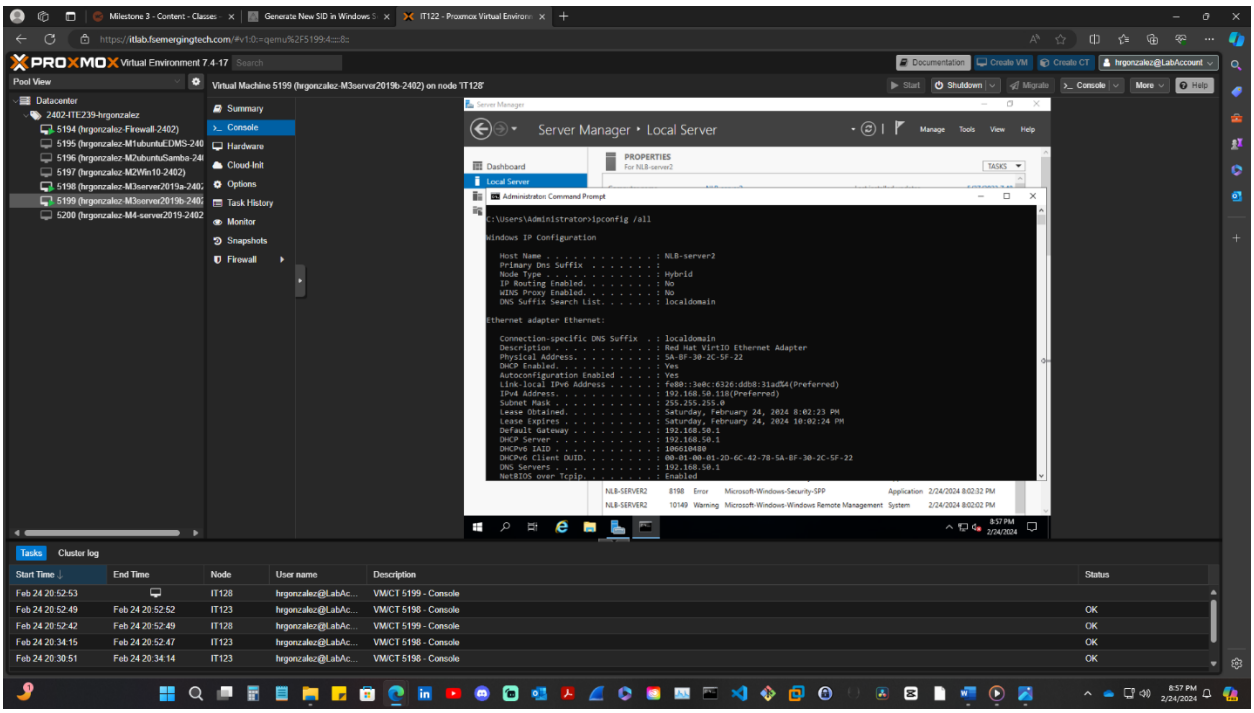


Configure Network settings

Checking IP Address

To check IP Addresses on any VM you can click on the magnifying glass icon type in cmd and click on the command prompt. In the command window use command prompt ipconfig /all.

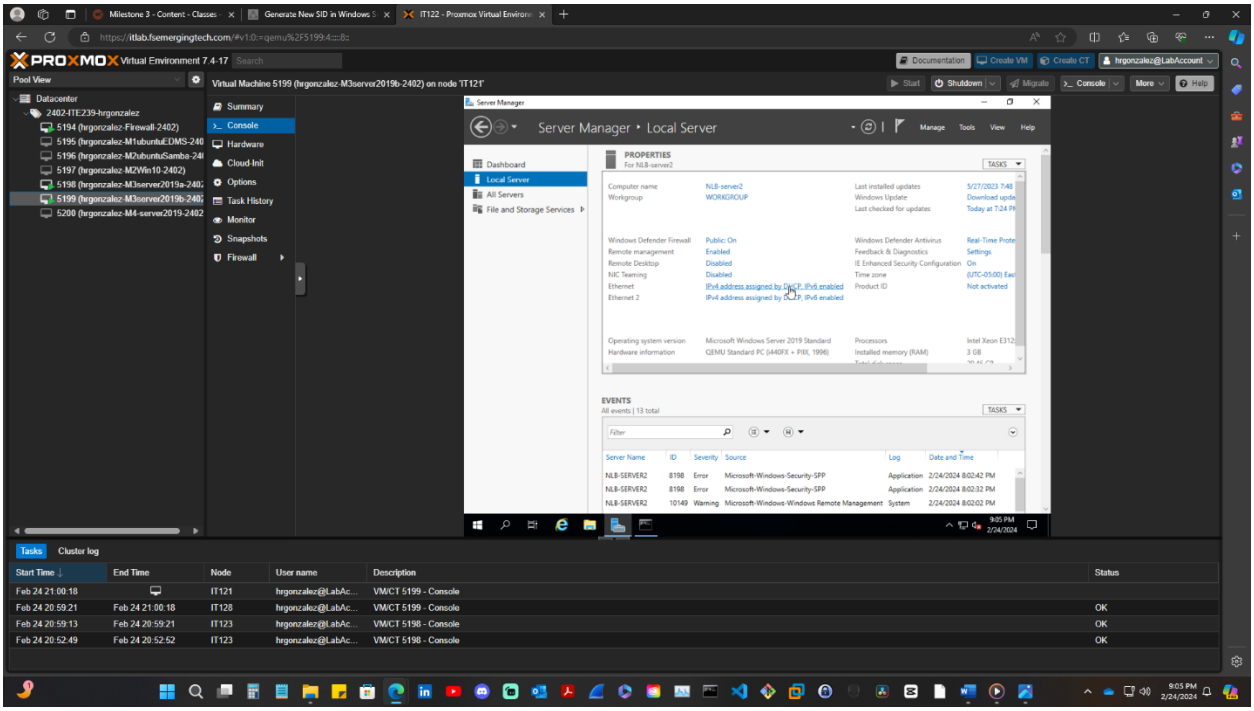


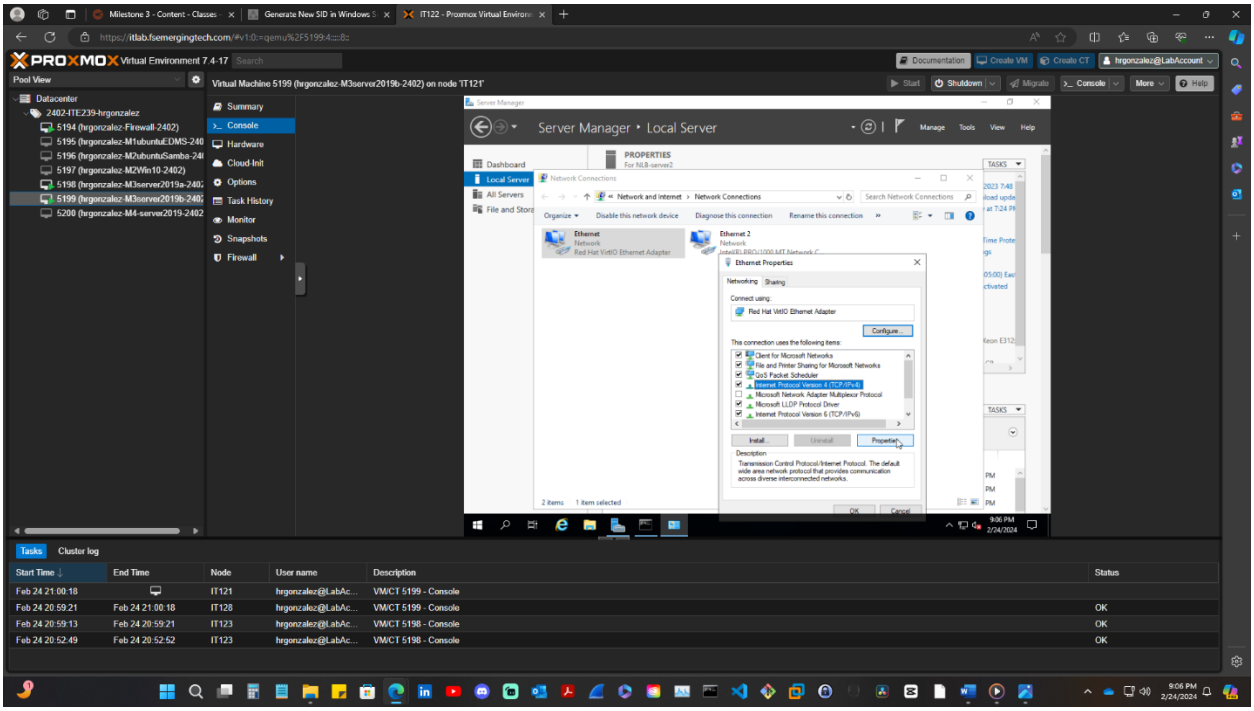


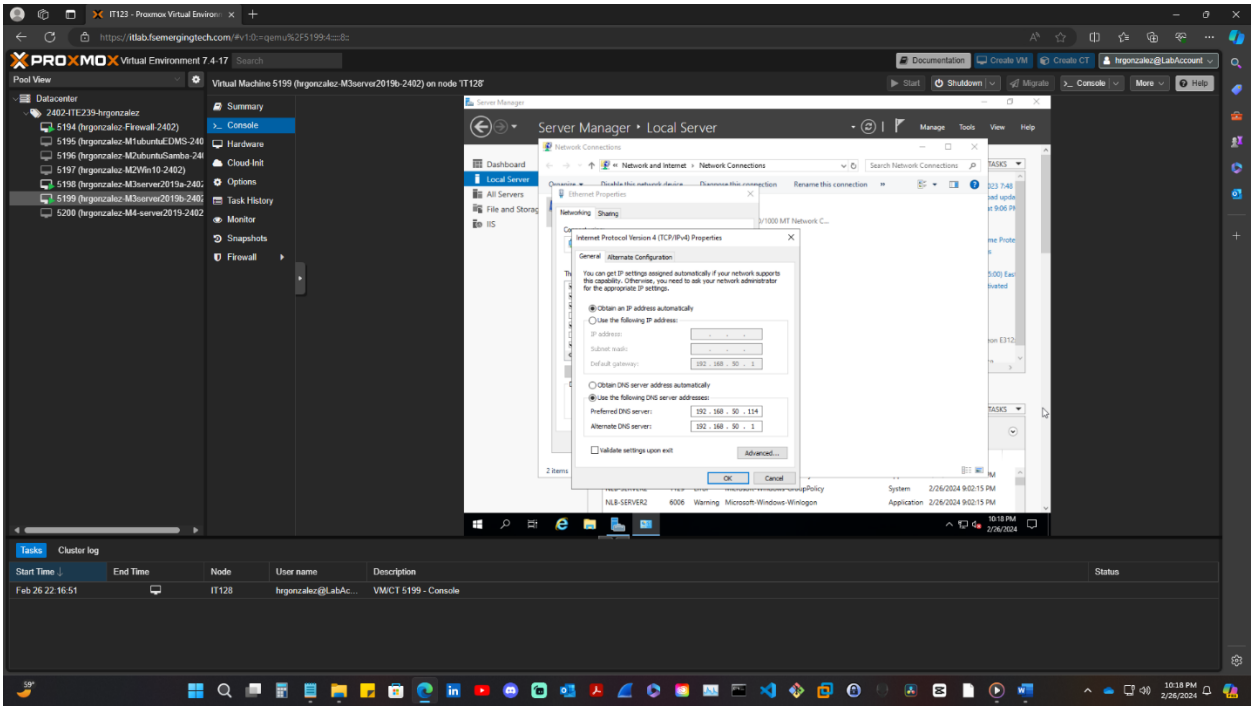
Setting Network Adapter for NLB-server2

Ethernet Adapter

On the local server click on Ethernet Adapter > Let's right-click on Ethernet adapter and click on Properties > Now let's look and click on Internet Protocol Version 4 (TCP/IPv4) then click on Properties. We are going to leave the normal network adapter at the default selection DCHP. Now, click on Use the following DNS server addresses and the Preferred DNS server has to be changed to the external server (NLB-server1) Ethernet IP address (look at NLB-server1 IP addresses). In the Alternate DNS server use the default Gateway IP Address, which is the same for both machines. We need to click ok and close the Ethernet Properties window. *Use pictures for reference*

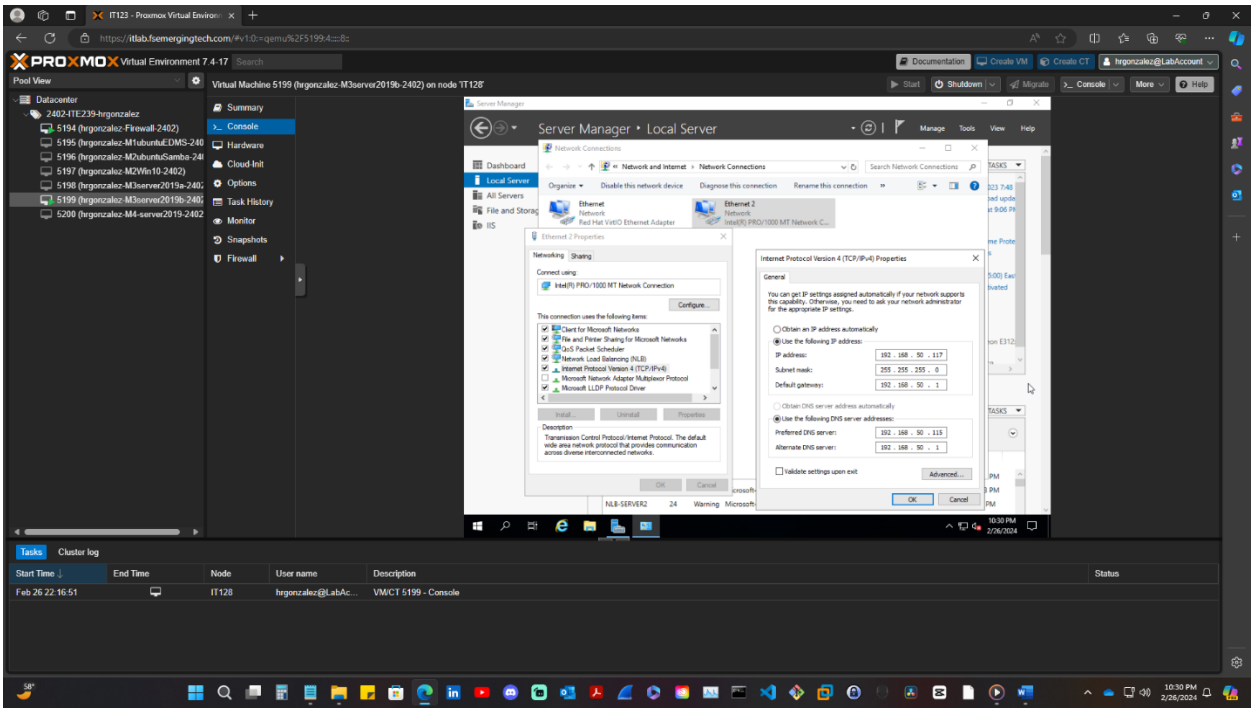






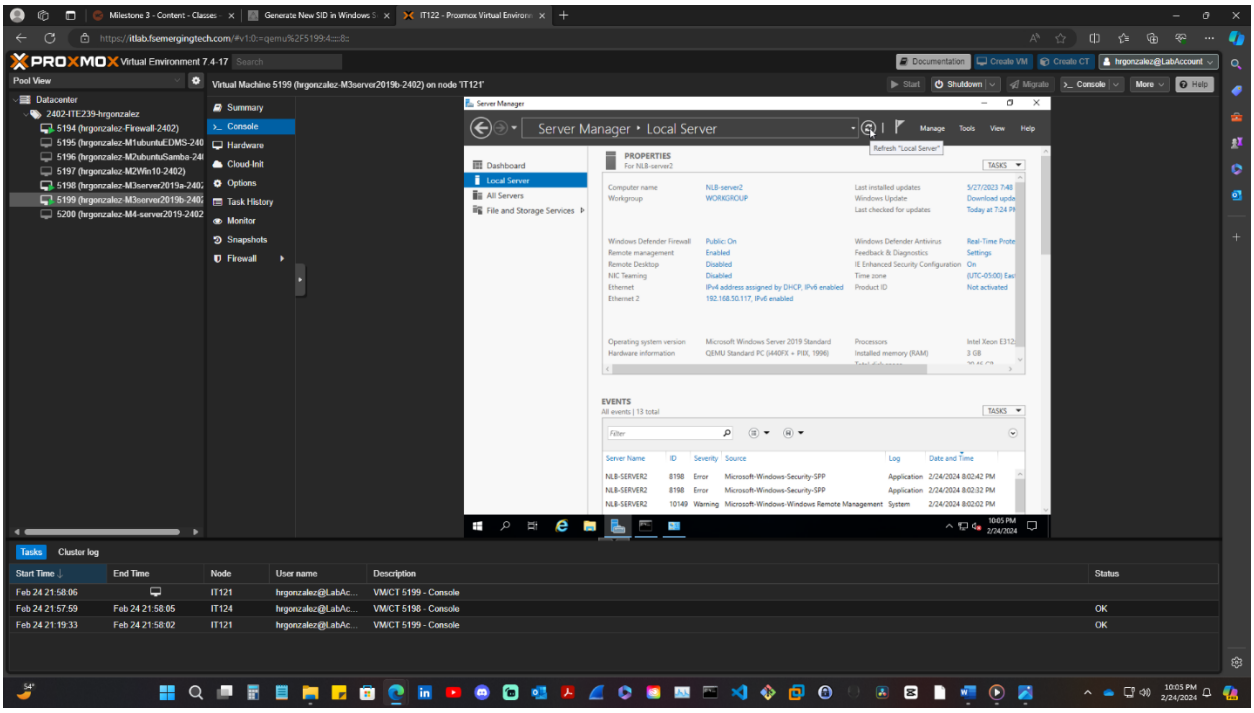
Ethernet Adapter 2

This will be our static NLB Cluster address. While on the Network Connections Window right click on Ethernet2 adapter > click on Properties > select Internet Protocol Version 4 (TCP/IPv4) > click on Properties > click on Use the following IP address and check cmd for Ethernet2 adapter IP Address for NLB-server2 machine and use that IP address on the IP address box > click Subnet mask box. It will automatically provide the Subnet > For the Default gateway use the defaulted gateway IP address > In the Preferred DNS server: use the external server (NLB-server1) ETH2 IP address > Alternate DNS server: same as default gateway > Click OK and close Ethernet Properties window. *Use pictures for reference*



Verify Changes

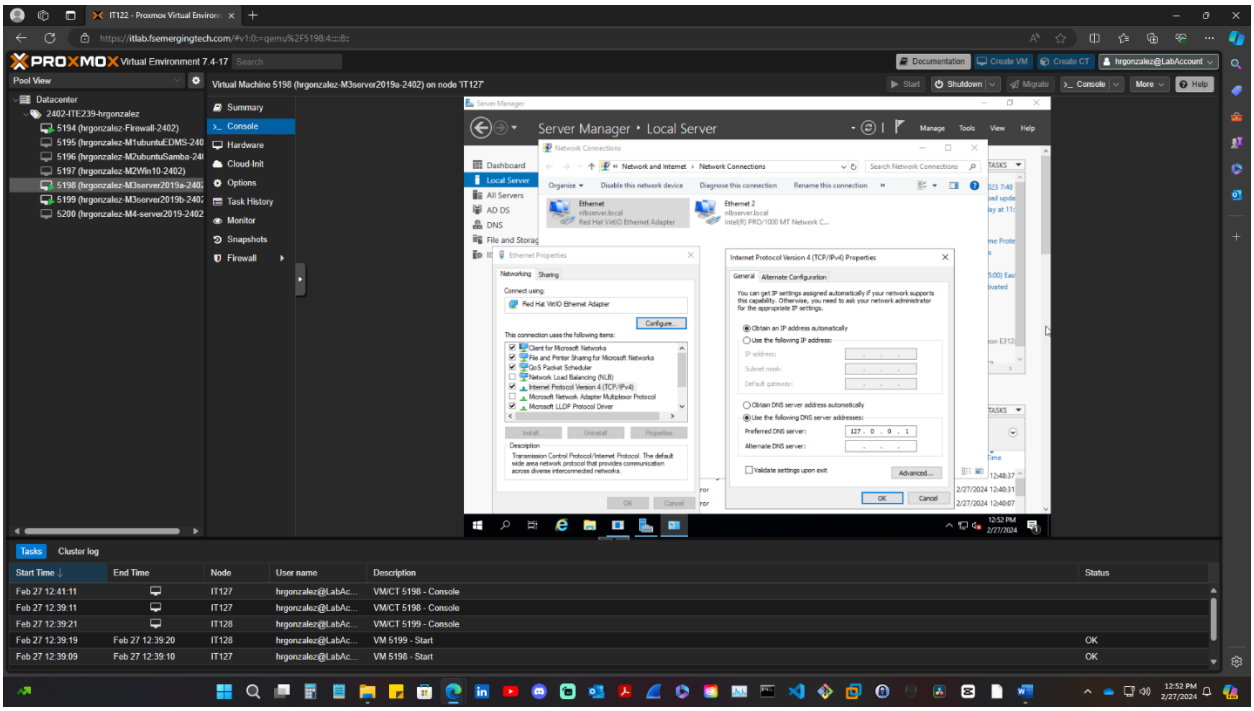
Return to the local server and check Ethernet and Ethernet2 for the changes. You should be able to see the static IP Address assigned.



Setting Network Adapter for NLB-server1

Ethernet Adapter

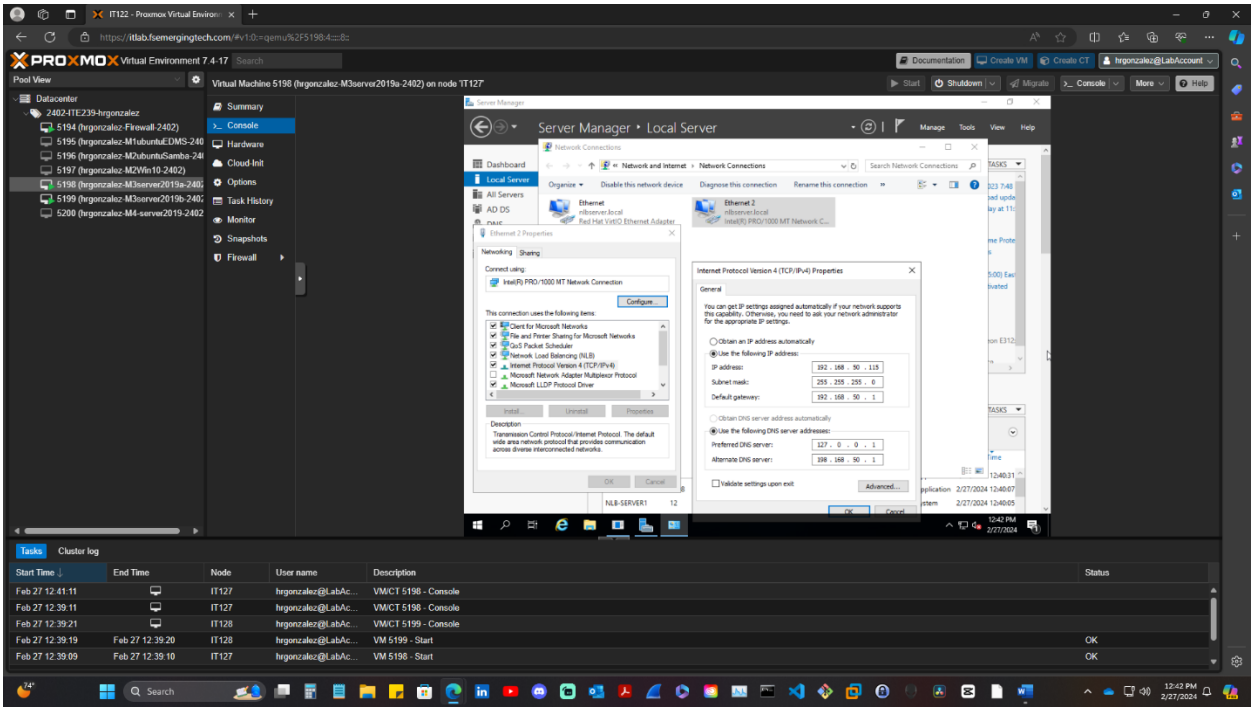
We are not touching this Ethernet adapter since it's a DCHP address and the IP address is already pointing back to itself, but we are going to modify the Ethernet adapter2.



Ethernet Adapter 2

This will be our NLB Cluster IP Address. We need to make this adapter static just like we did with the NLB-server2 machine.

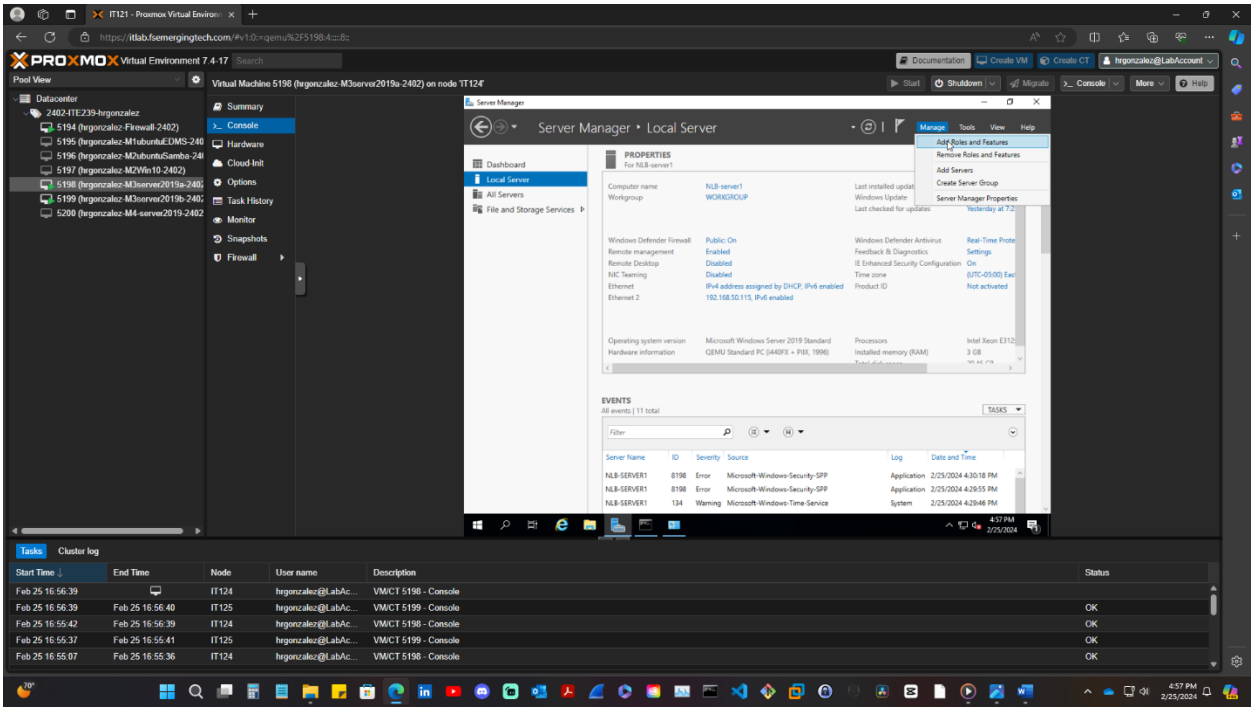
On the local server click on Ethernet2 > While on the Network Connections Window right click on Ethernet2 adapter > click on Properties > select Internet Protocol Version 4 (TCP/IPv4) > click on Properties > click on Use the following IP address (we are making this IP a Static Address) > check cmd for Ethernet2 adapter IP Address for NLB-server2 machine and use the same IP address provided on the IP address box > click Subnet mask box. It will automatically provide the Subnet > In the Preferred DNS server: Use the automatic one that was provided (loop IP Address). If one is not automatically configured then there is something wrong with the configurations), for the Default gateway use the default gateway IP address.



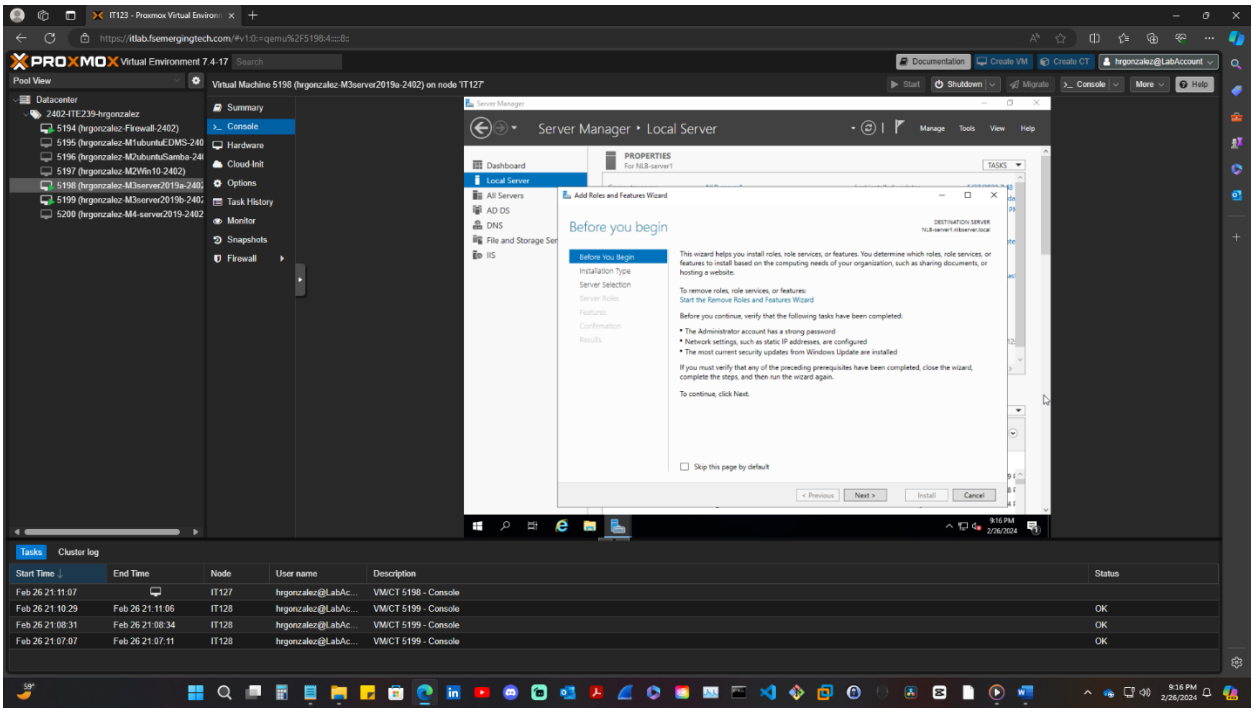
Installation of Roles and Services for Both Machines

Installing AD DS/IIS/Network Load Balancing on NLB-server1

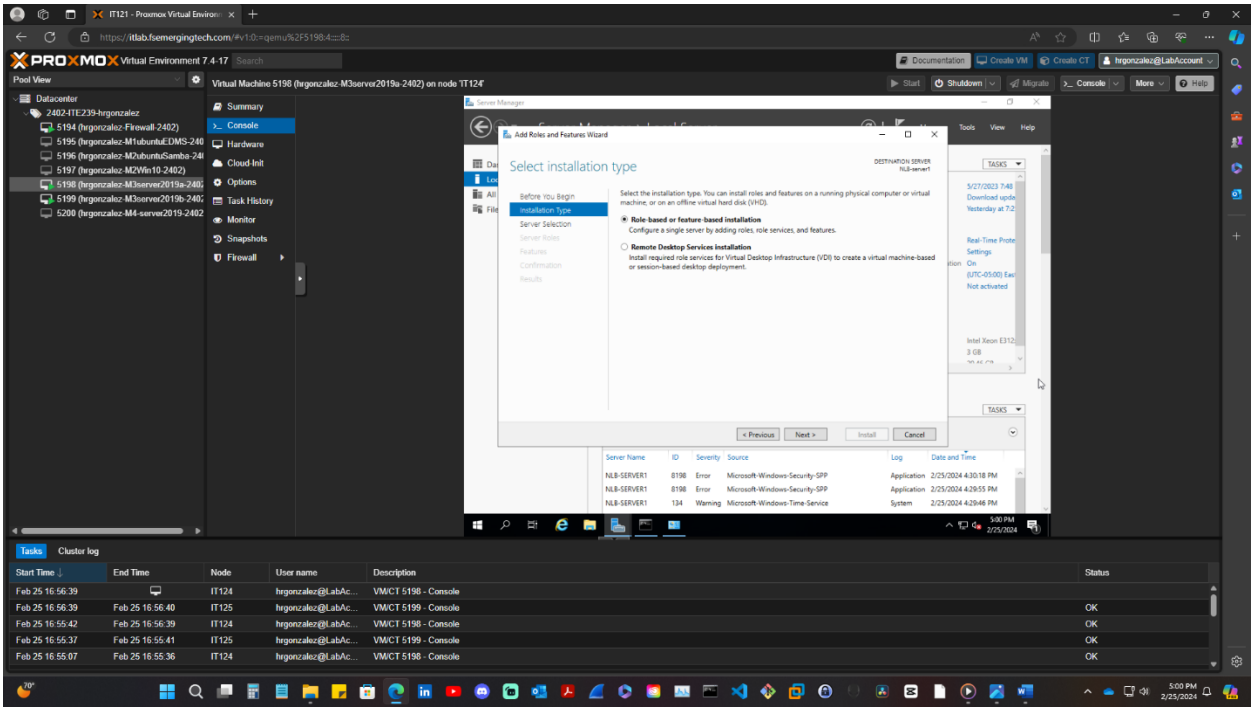
On machine NLB-server1 click on Manage then Add Roles and Features.



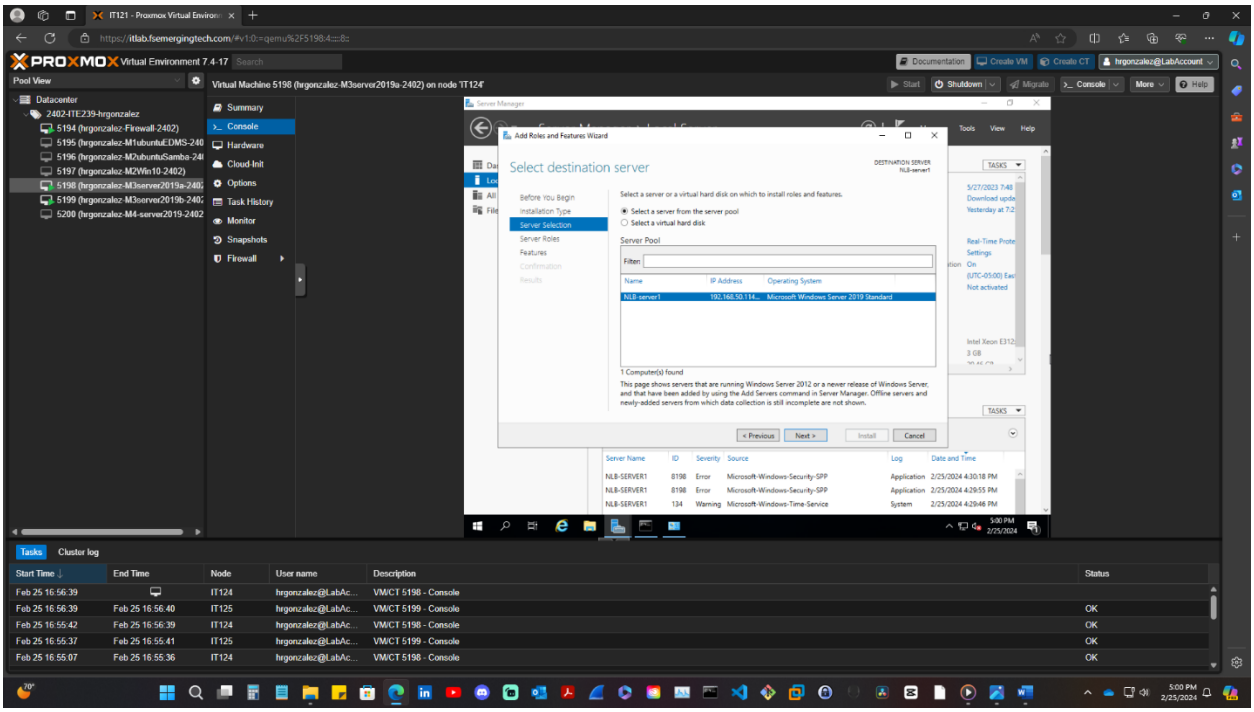
On the Before you Begin window click next.



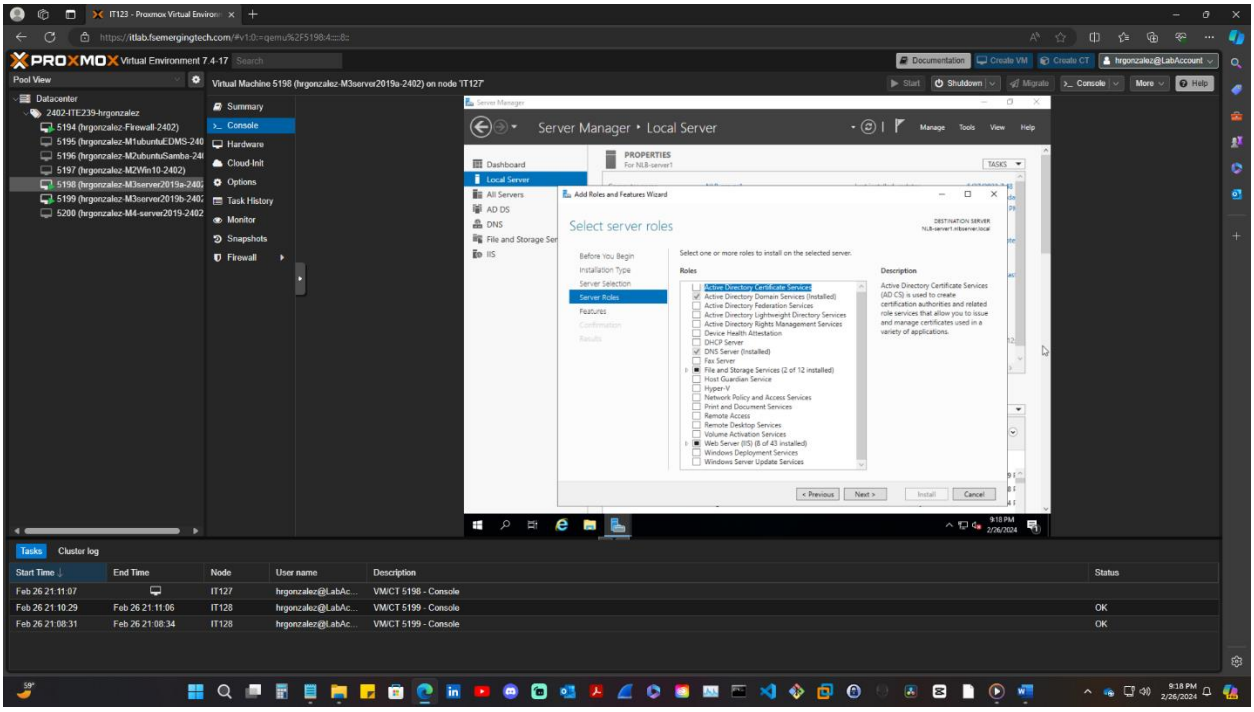
In the Select Installation Type window leave it at default and click Next.

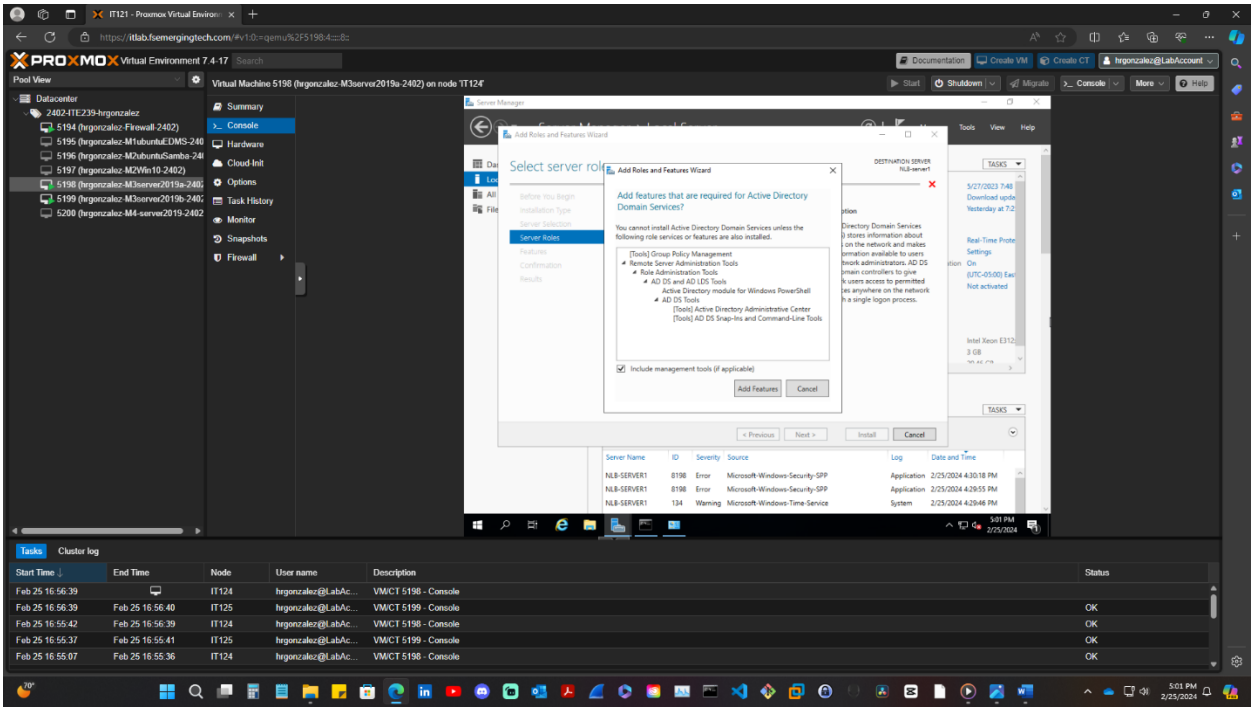


Let's leave the default IP address on the Select Destination Server window and click next.

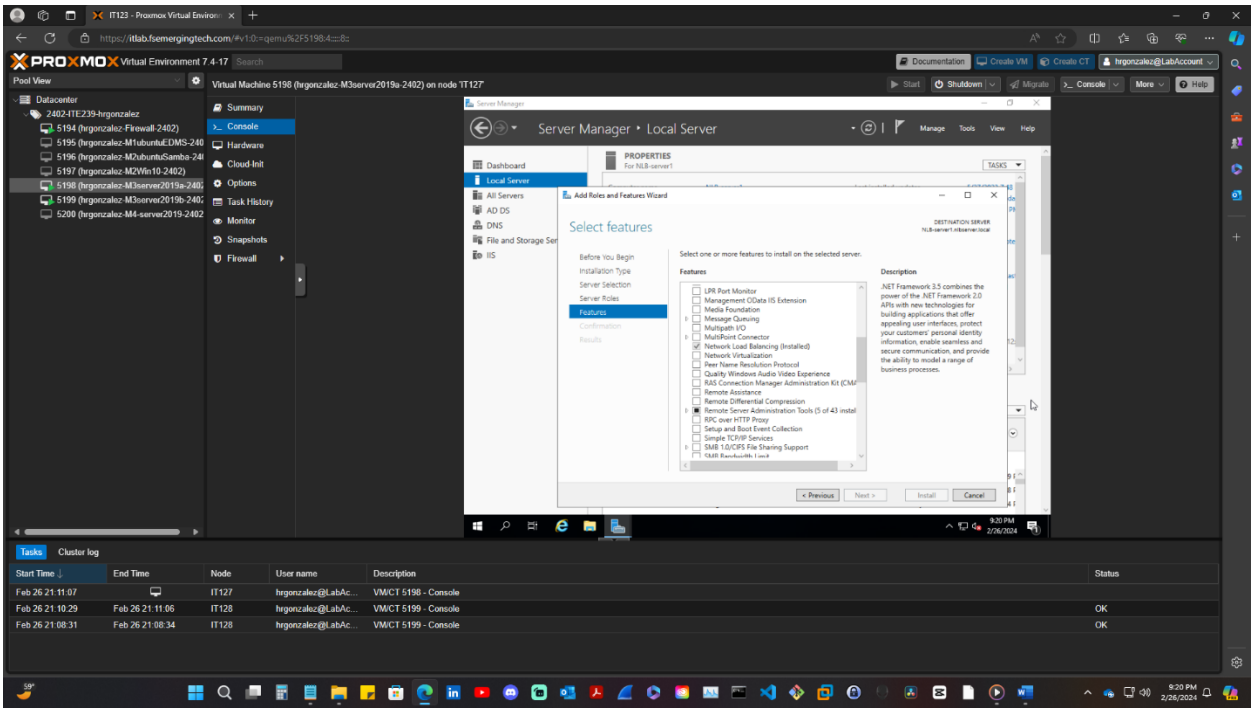


For roles click on AD DS (Active Directory Domain Service box, and on the pop-up window click on Add Features then next > Select DNS Server on the pop-up window click on Add Features then next > Now let's click on IIS Web Server, and the pop-up window click on Add Features then next.

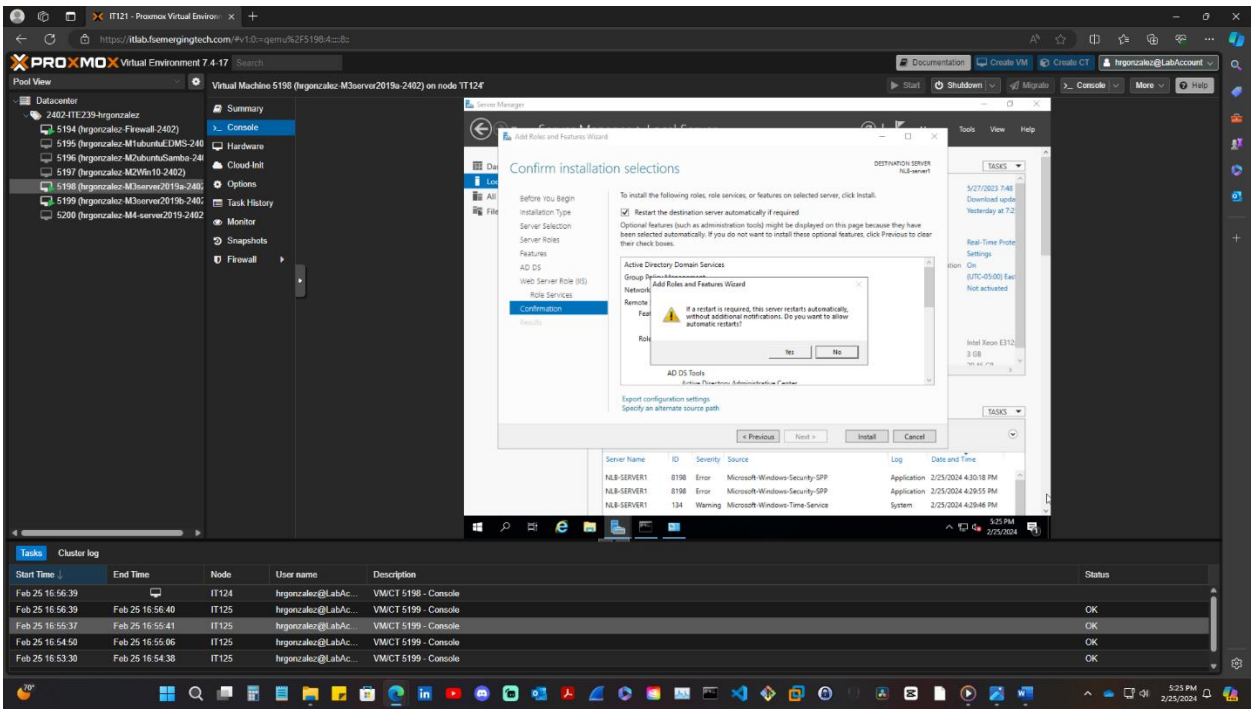




On the Features window, we are going to click on Network Load Balancing, and in the pop-up window click on Add Features then click Next.

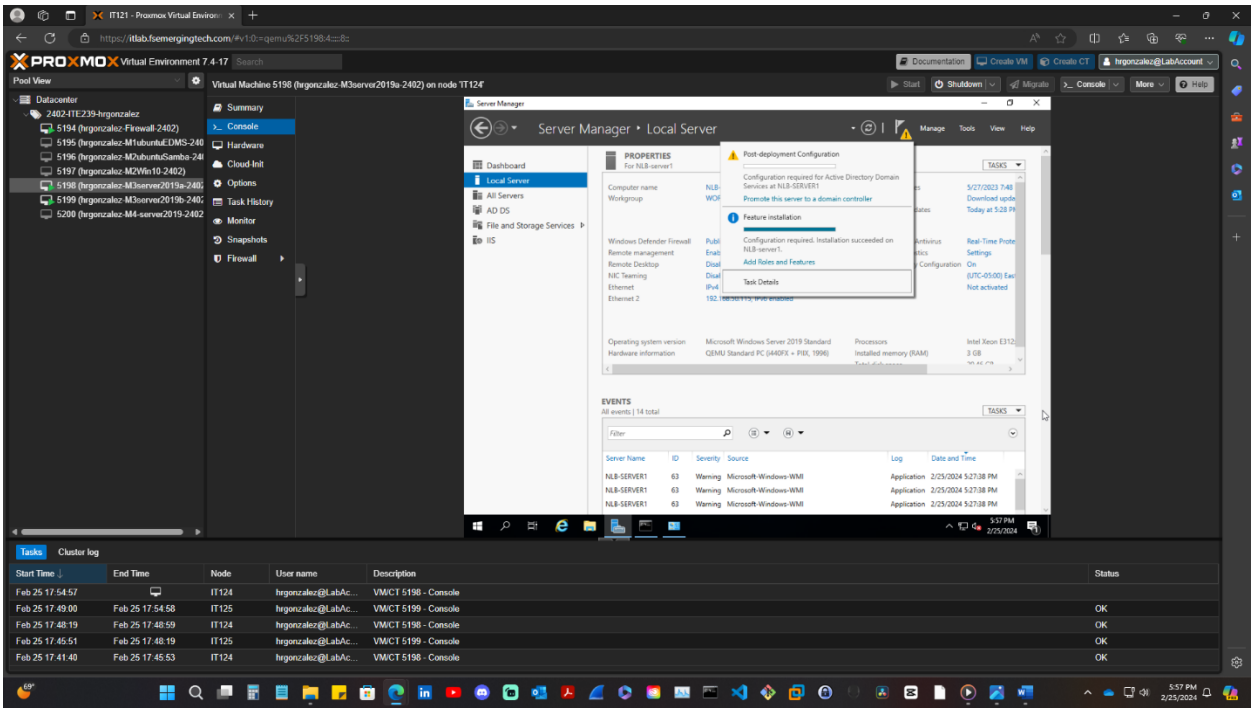


Now we need to confirm installation. Make sure to click the Restart box (look at the picture below) then click Install.



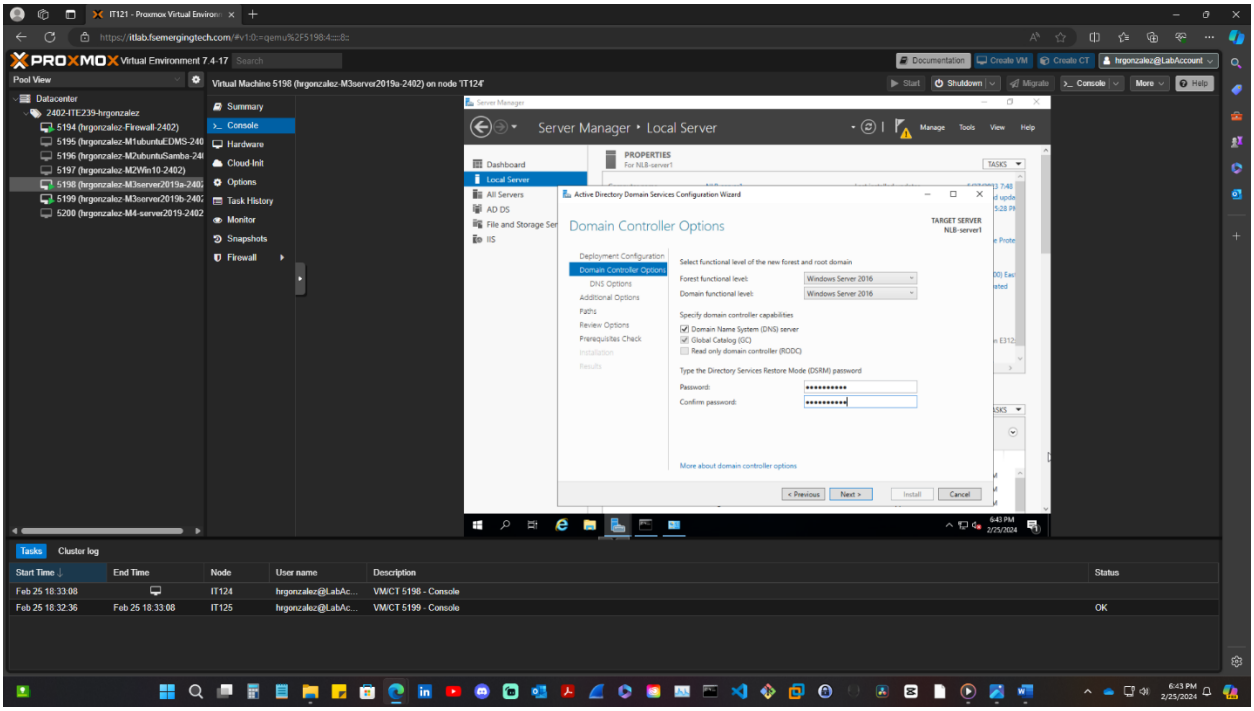
Promoting NLB-server1 to the domain controller

After installing Roles and Features, on the top right there is going to be a yellow triangle warning, you are going to click on the warning sign and click on Promote this server.



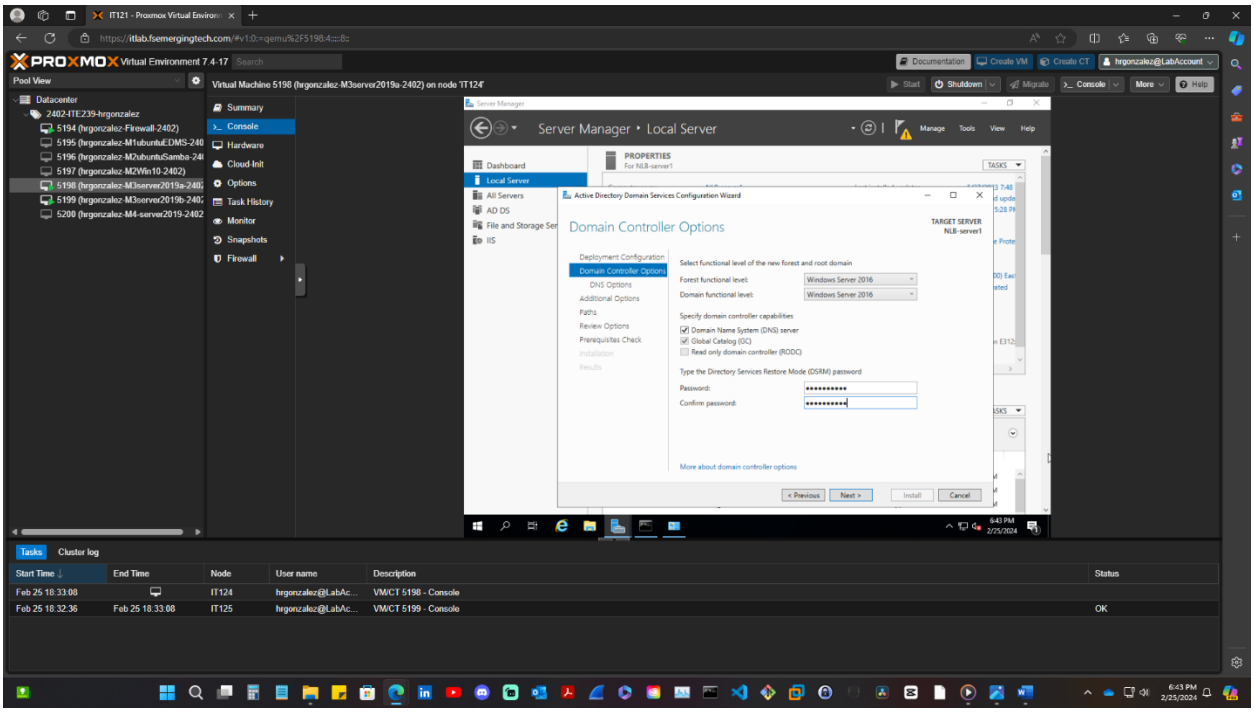
Deployment Configuration

Here you are going to add a new forest name “” (replace “” with your forest name).



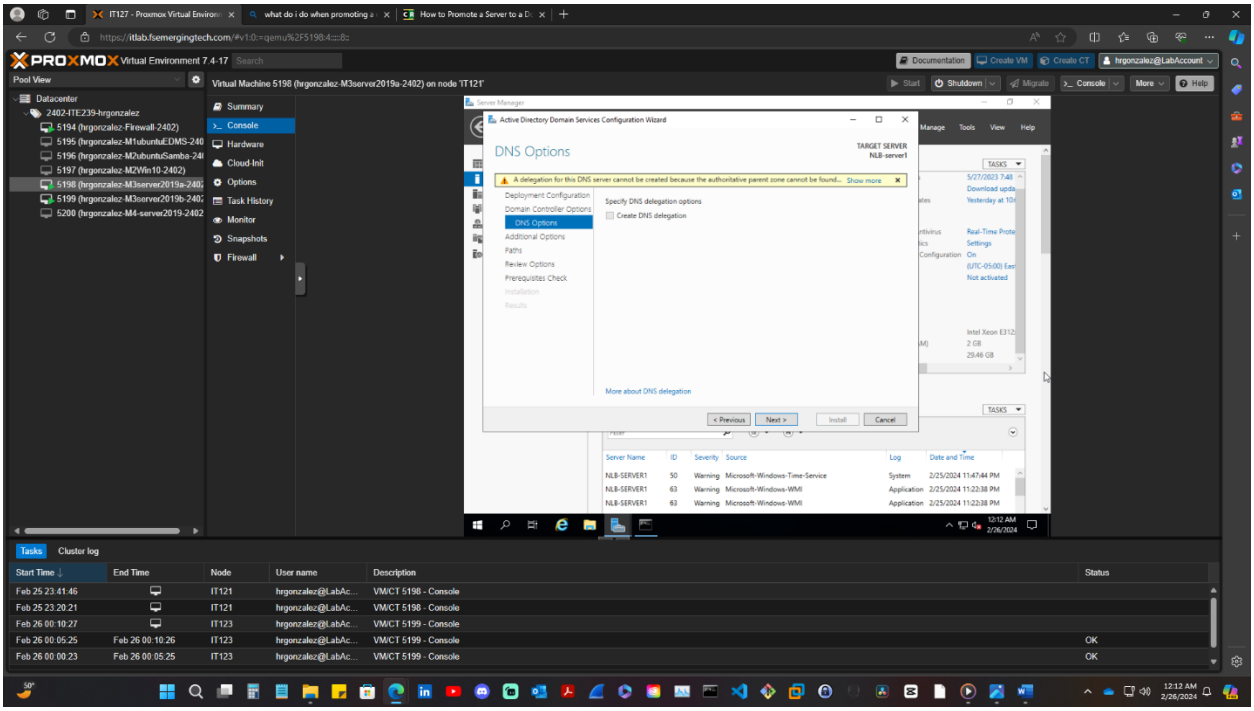
Domain Controller option

We are going to leave everything the same as the picture below, but you need to make a recovery password for the Directory.



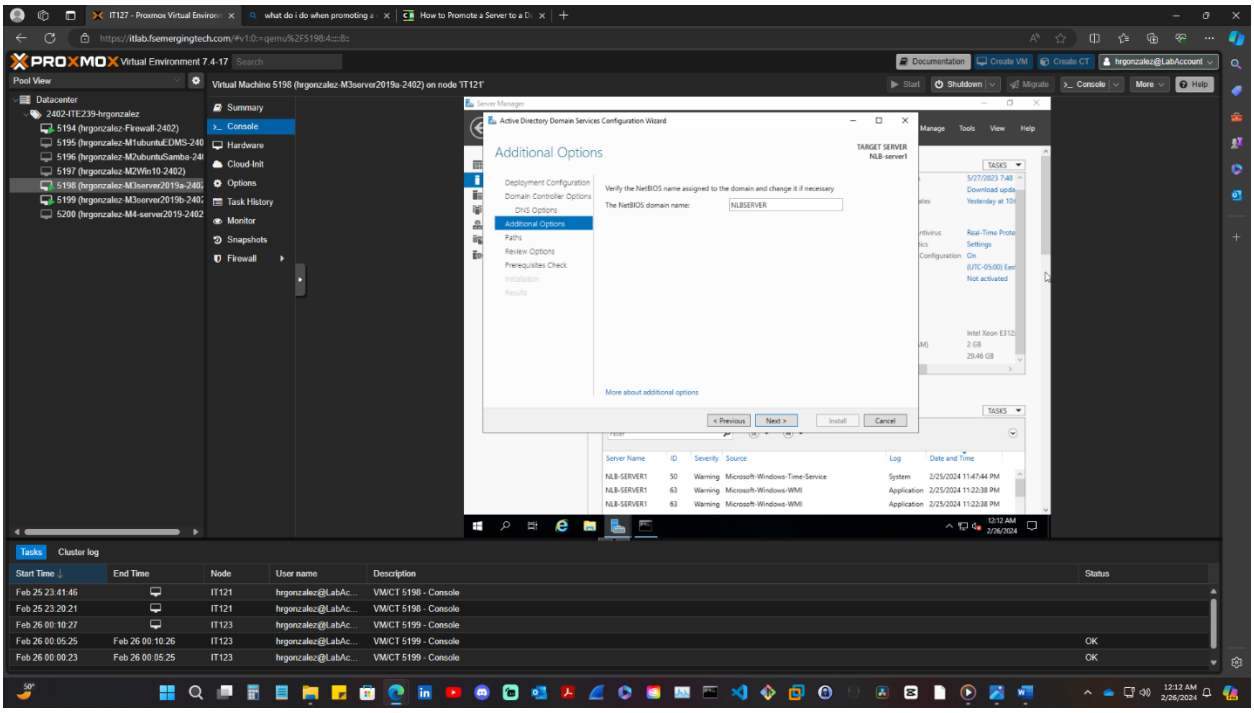
DNS Option

You are going to ignore the warning and click next.



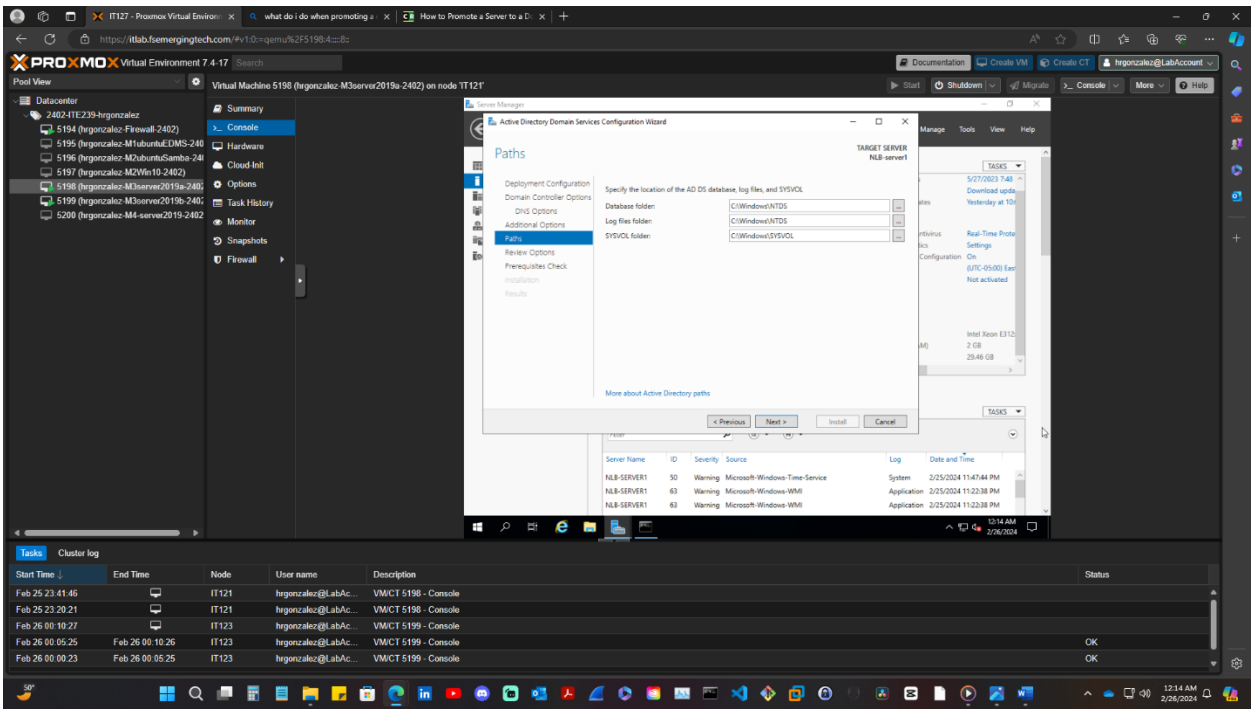
Additional Options

Let's leave this on the default configuration and click next.



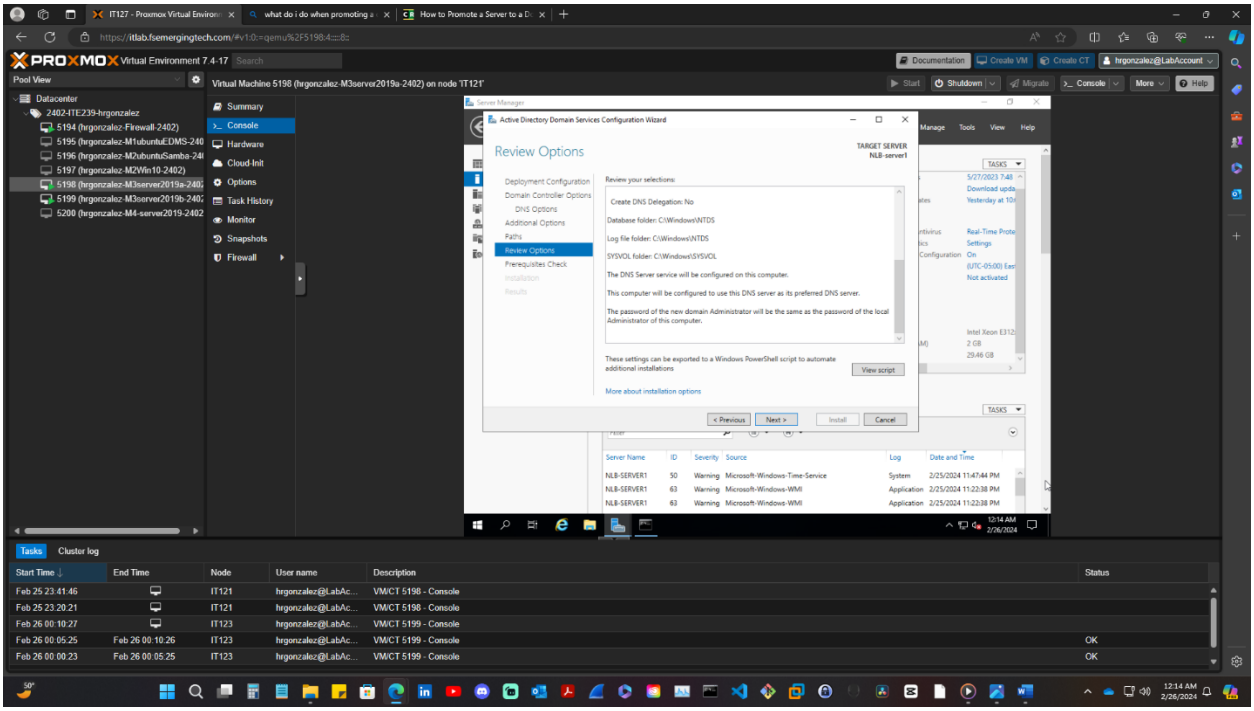
Paths

Let's leave this on the default configuration and click next.



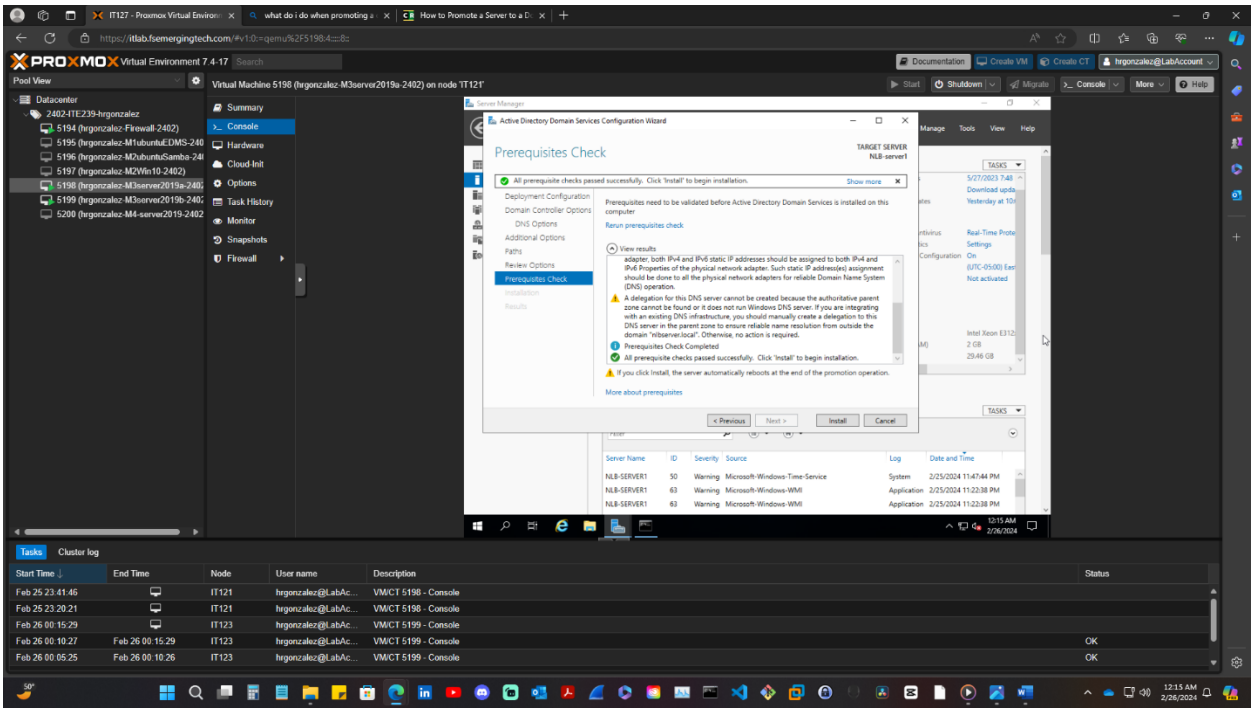
Review Options

On this window, we are going to click next.

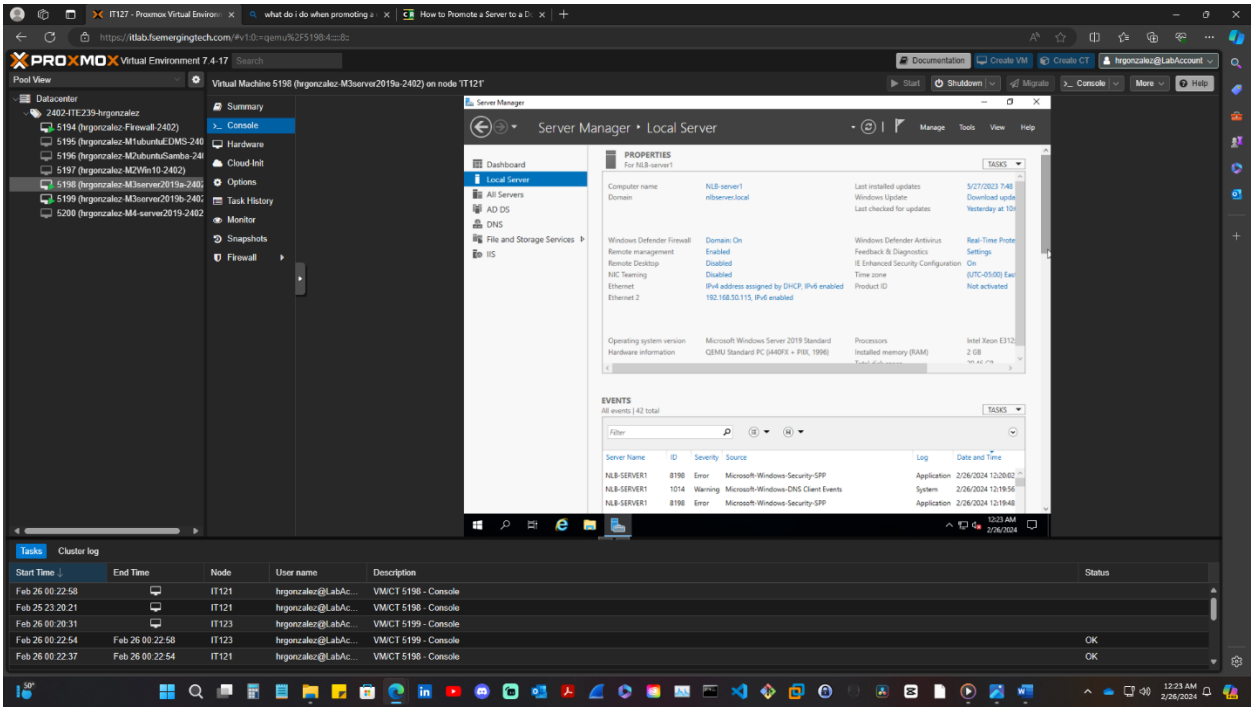


Prerequisites Check

In this window as long as you see a green checkmark below prerequisites, we are good to go and click install.



To verify that NLB-server1 got promoted just go into the local server dashboard and look at the domain. This domain name should be the domain name you used.



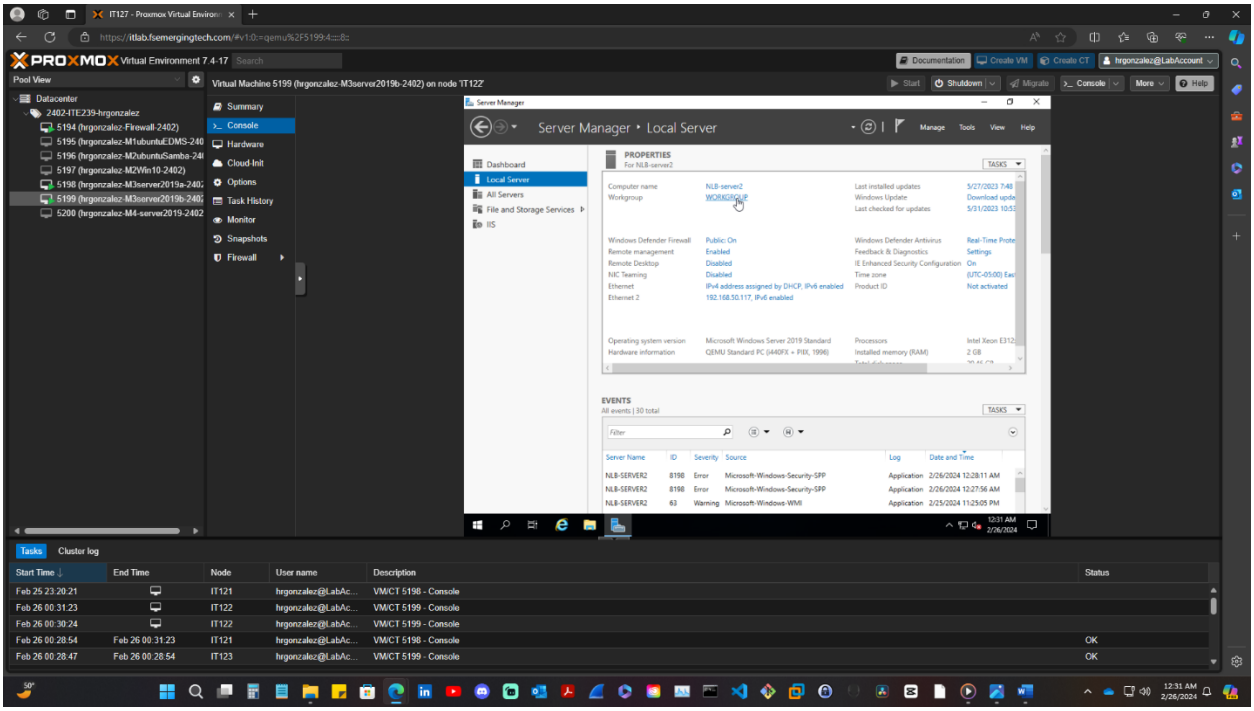
Installing IIS/Network Load Balancing on NLB-server2

Follow, Installing AD DS/IIS/Network Load Balancing on NLB-server1 instructions for guidance.

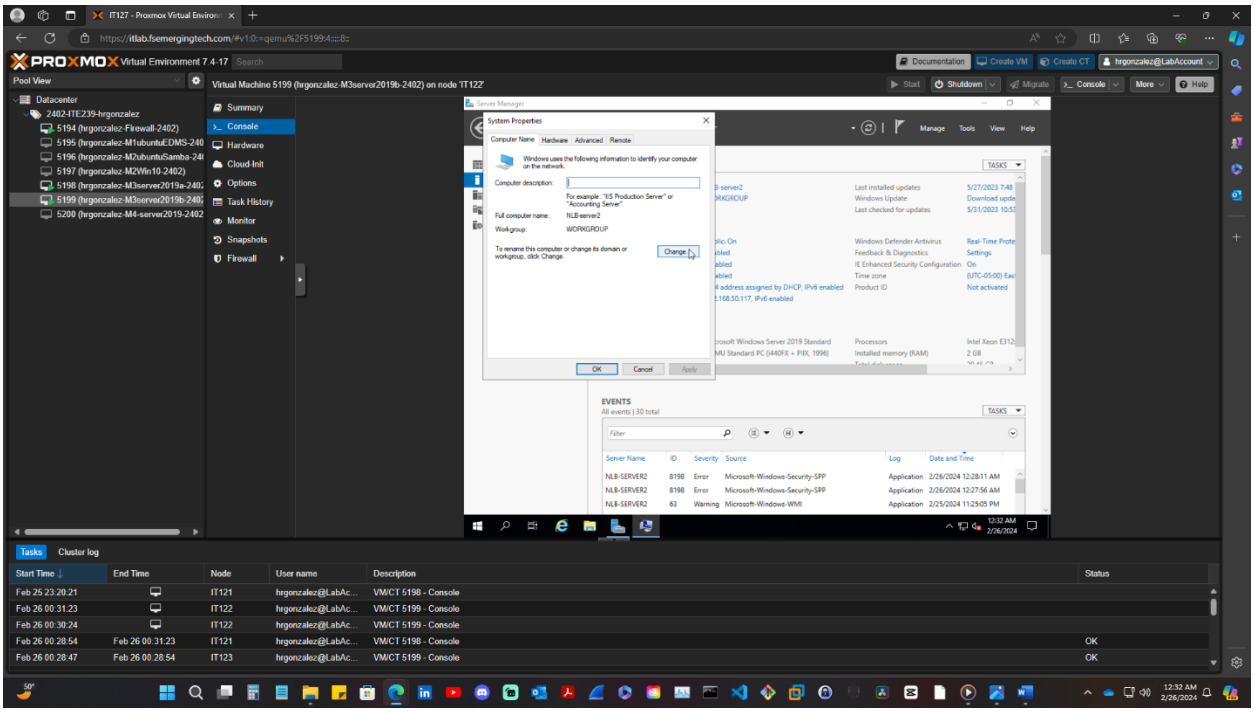
On machine NLB-server2 click on Manage > Add Roles and Features > On the Before you Begin window click next > In Select Installation Type window leave it at default and click Next > Let's leave the default IP address on the Select Destination Server window and click next > For roles click on IIS Web Server and the pop-up window click on Add Features then next > On the Features window we are going to click on Network Load Balancing and the pop-up window click on Add Features then click next > Confirm installation selections Window click on Restart box and yes on pop up window > Install (might take some time to finish installation).

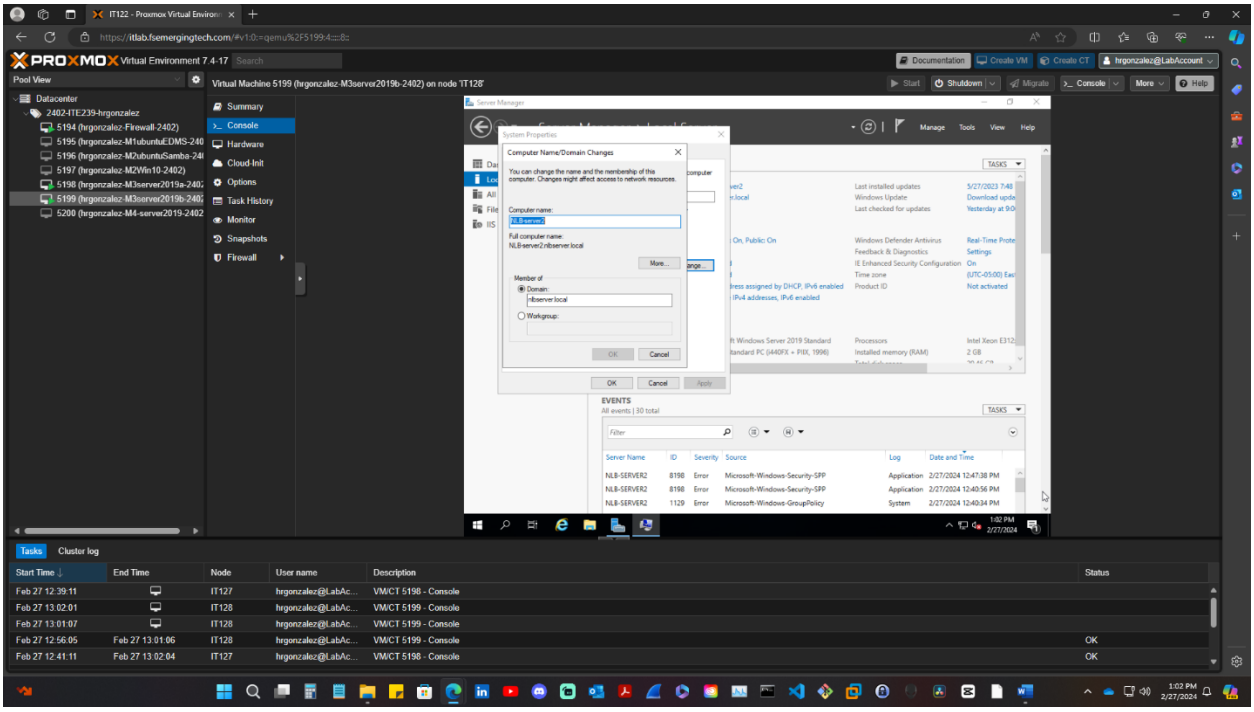
Adding NLB-server2 To Domain

On NLB-server2 click on Workgroup.

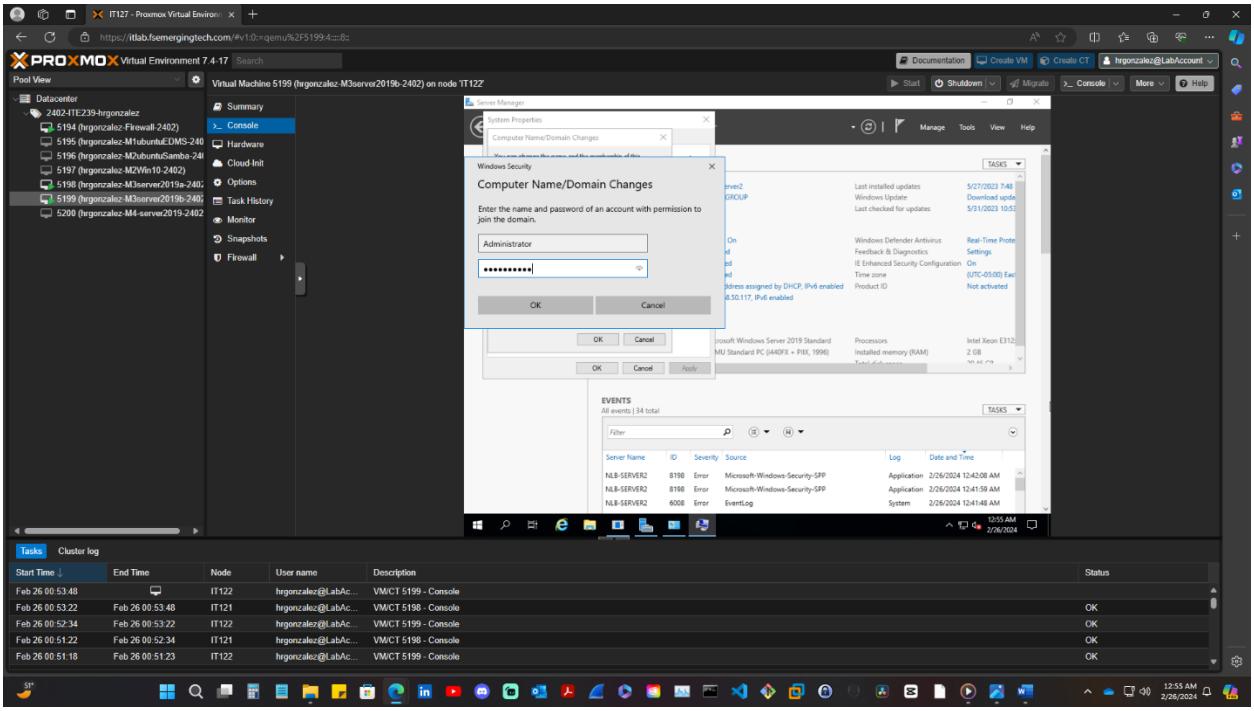


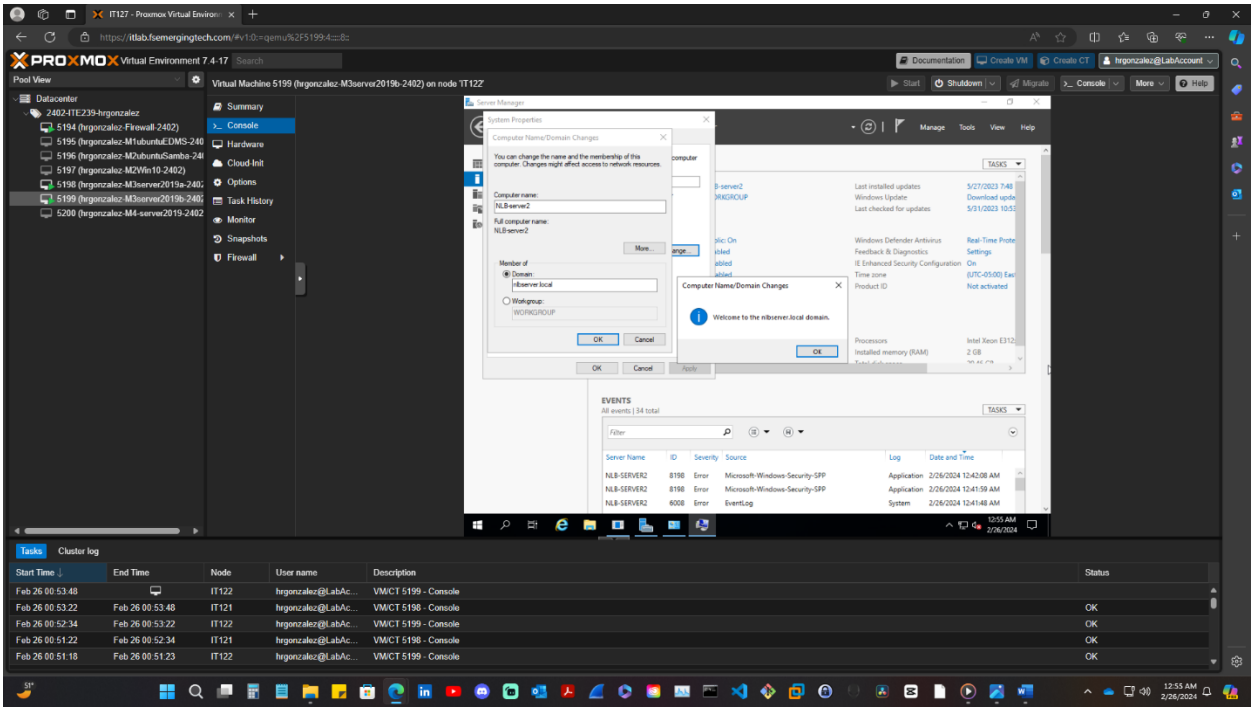
Now, let’s click on change and then click domain in the following window and type the domain name. Hit OK





If you are prompted for a username and password, you are on the right track. Now you are going to click on OK again and if successful you should see a welcome to the domain window.



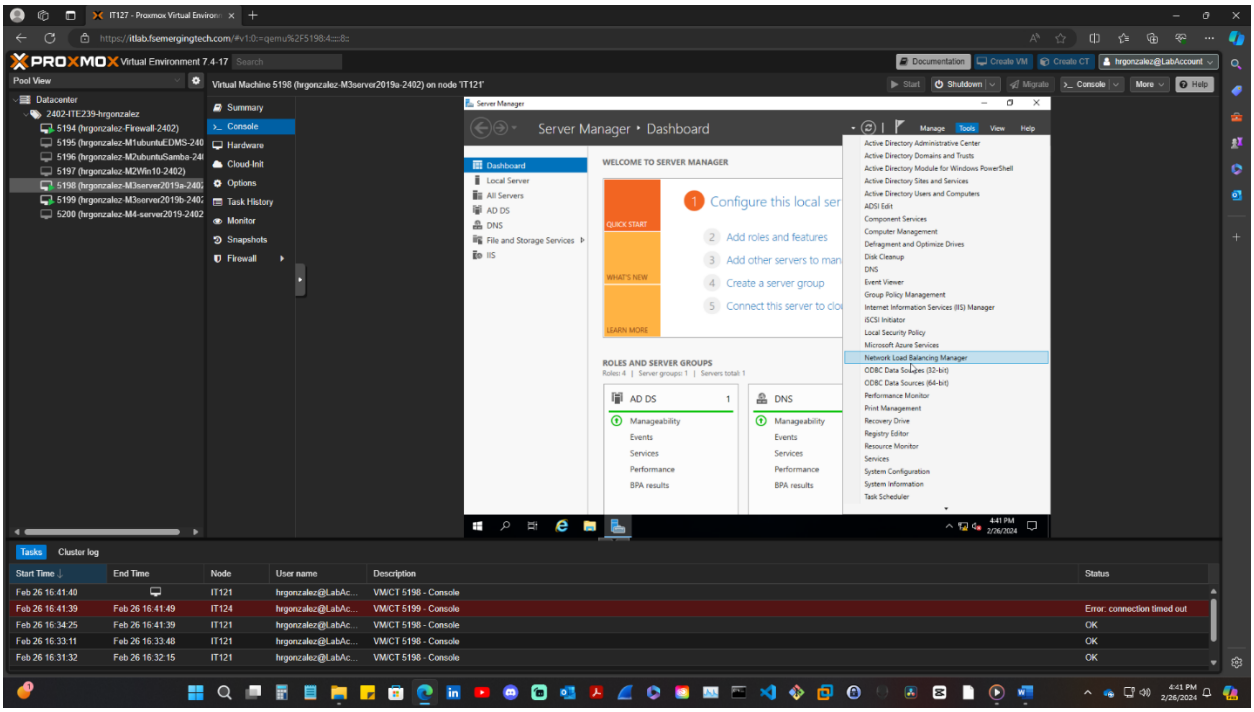


Part 2 – Set up a load balancer

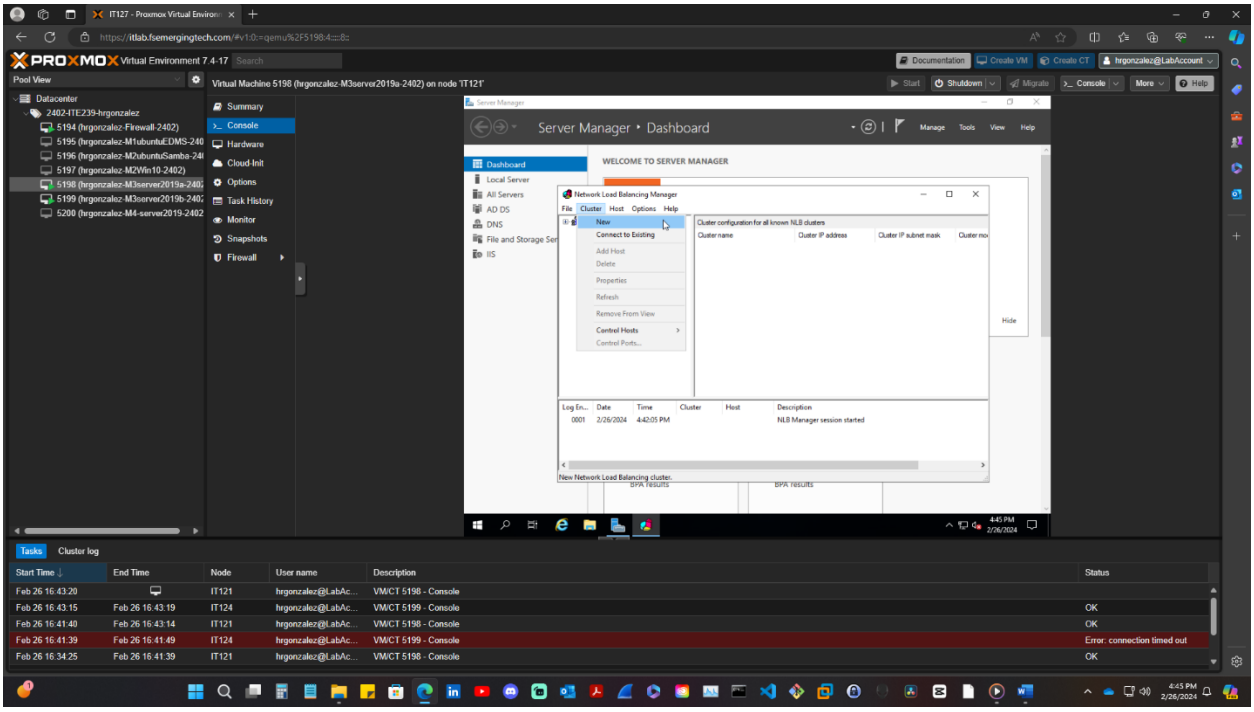
Creating NLB Clusters

NLB-server1

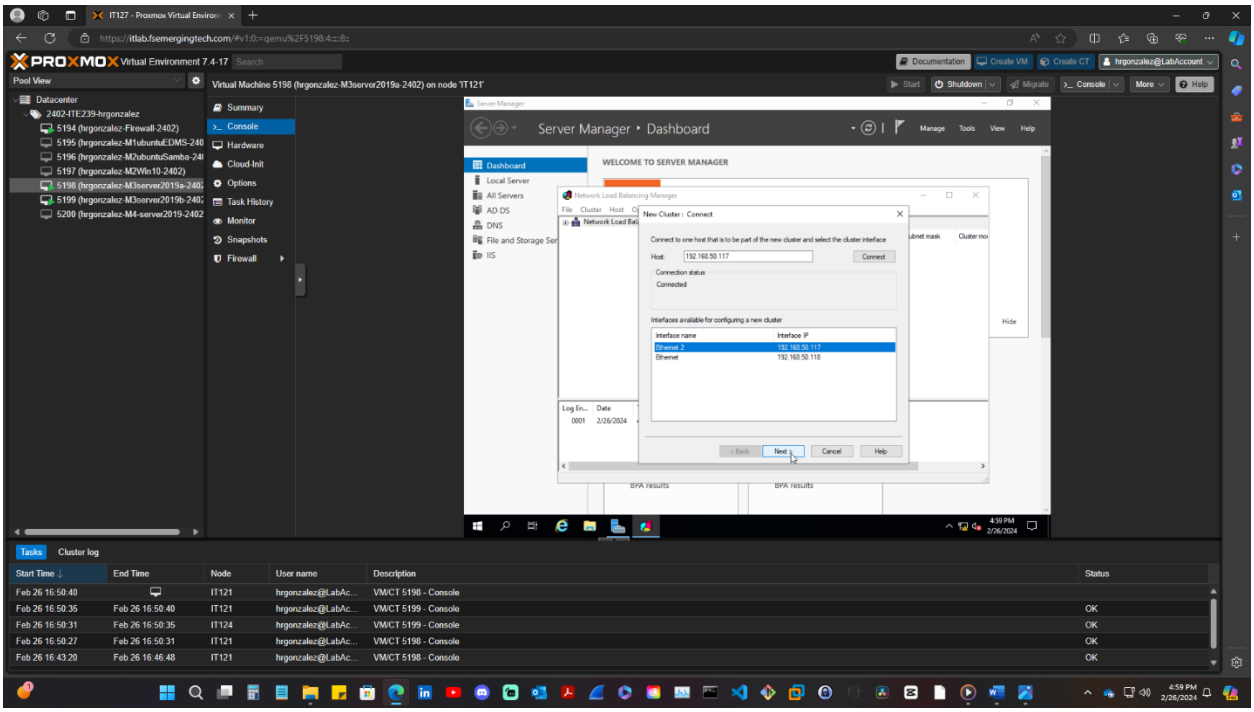
In NLB-server1 go to Tools > Then select Network Load Balancing Manager.

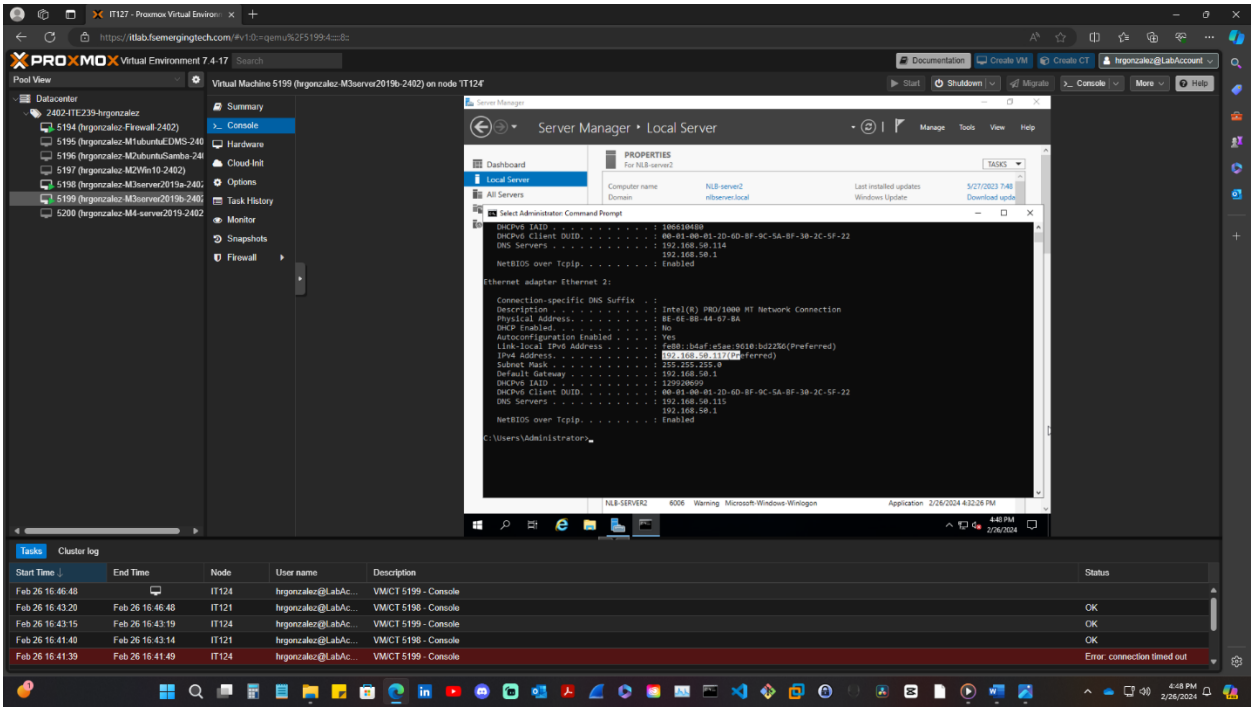


Now you need to click on Cluster > then click on New.

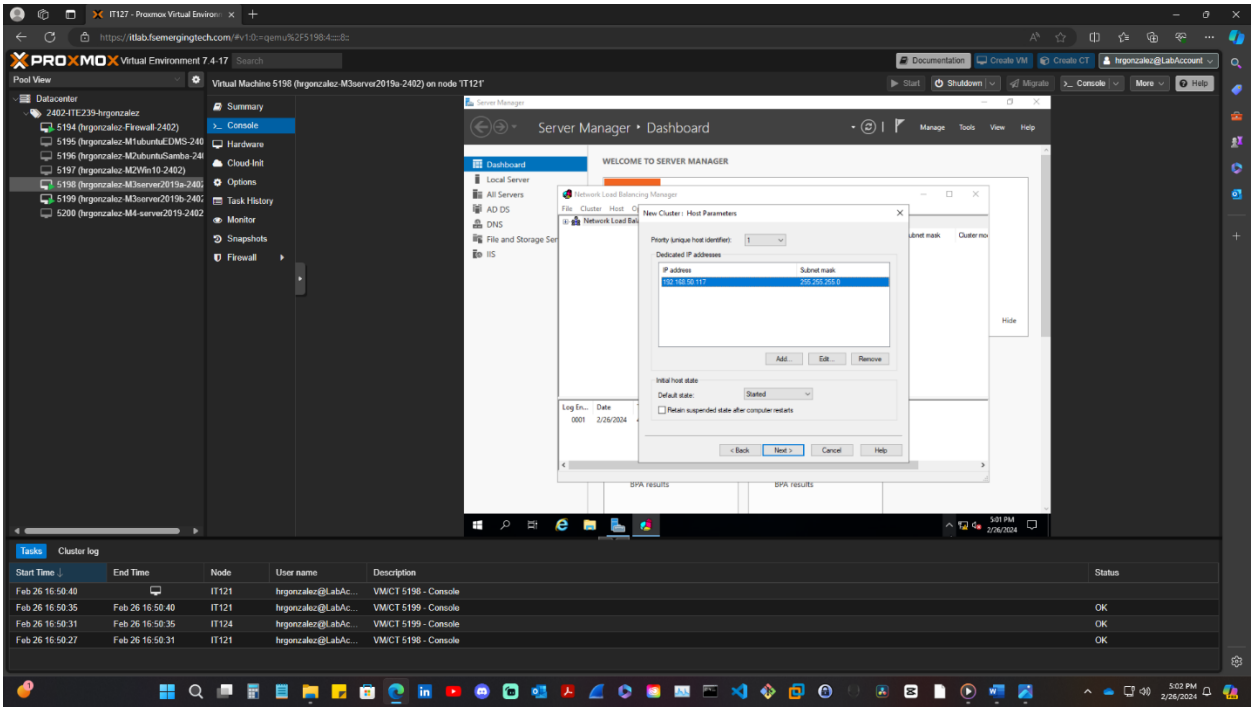


In the Host box use your NLB-server2 cluster IP address. This IP address should be your second ethernet adapter (Look at the cmd window below for reference). Click on Connect > After Cluster IP address shows up select Ethernet2 IP Address (the same one you input for HOST and click on Next.

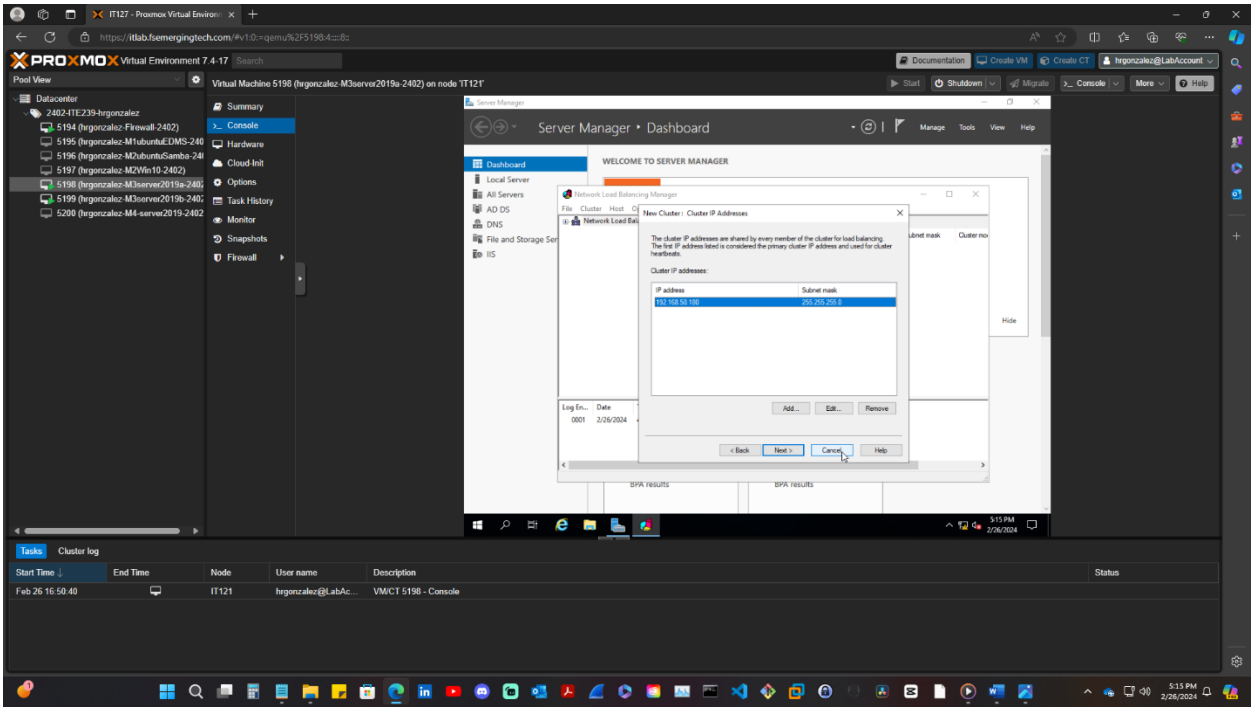




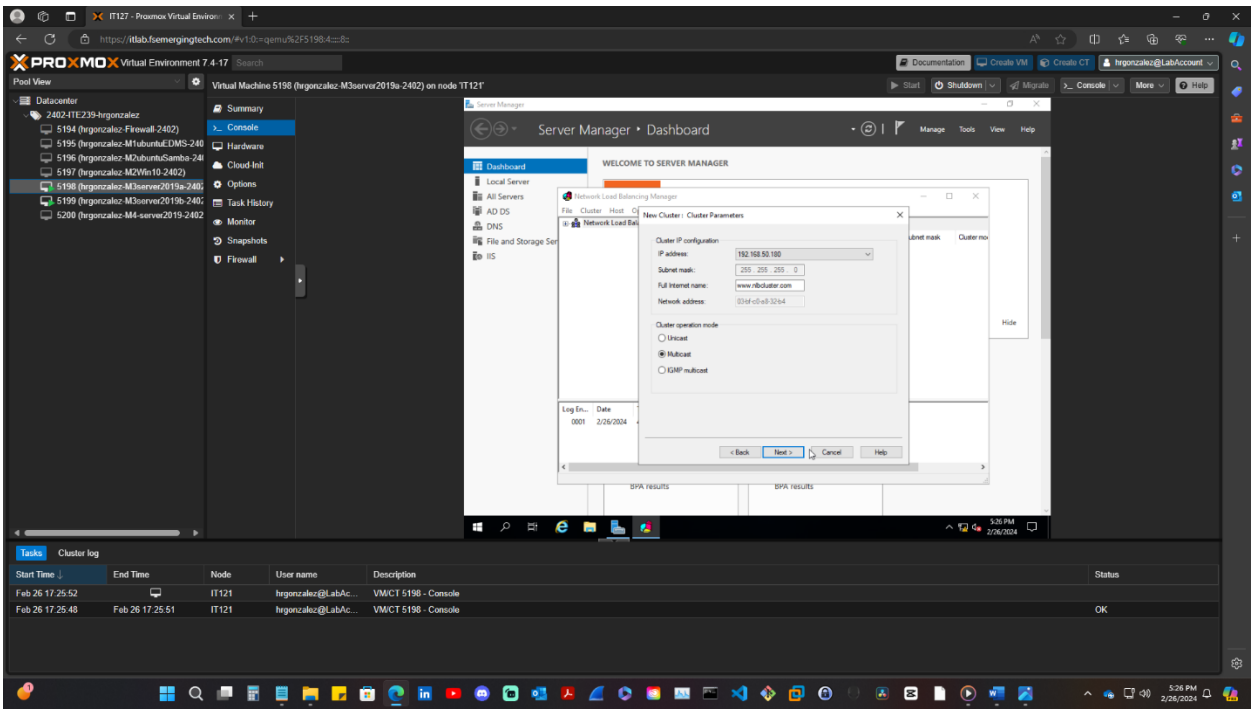
Check your IP address and click Next.



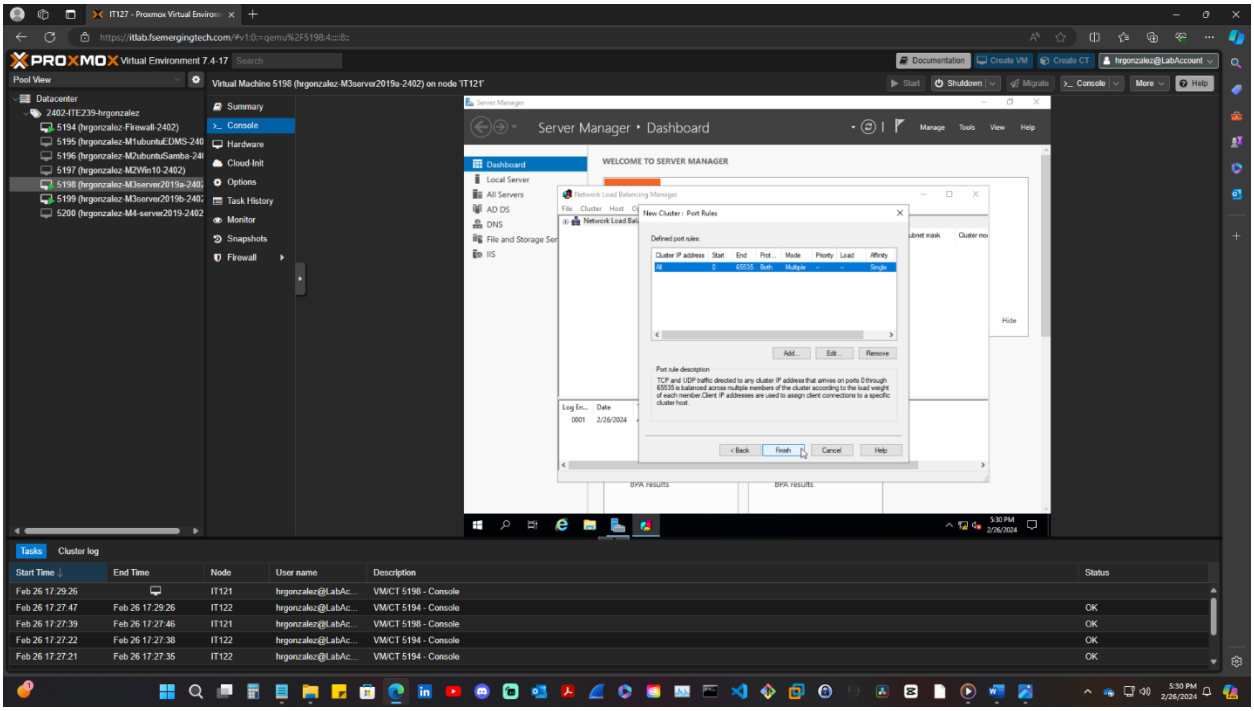
In the New Cluster: Cluster IP Addresses we are going to add a new virtual IP Address for our new cluster. This IP address can be anything that is not being utilized by the network. In my case the last IP Address that my network is using ends at 192.xxx.xx.118 so, in my case, I can utilize anything above that ending number. After you add your new Cluster IP Address click on Next.



In the Cluster Parameters window, we are going to assign the cluster a Full Internet Name “www.assignname.com” and replace “www.assignname.com” with your Internet name (this domain name is going to be associated with your new virtual cluster IP you created in the previous step) > Click on Multicast (this will enable the network to communicate with different points as needed) > Click Next.



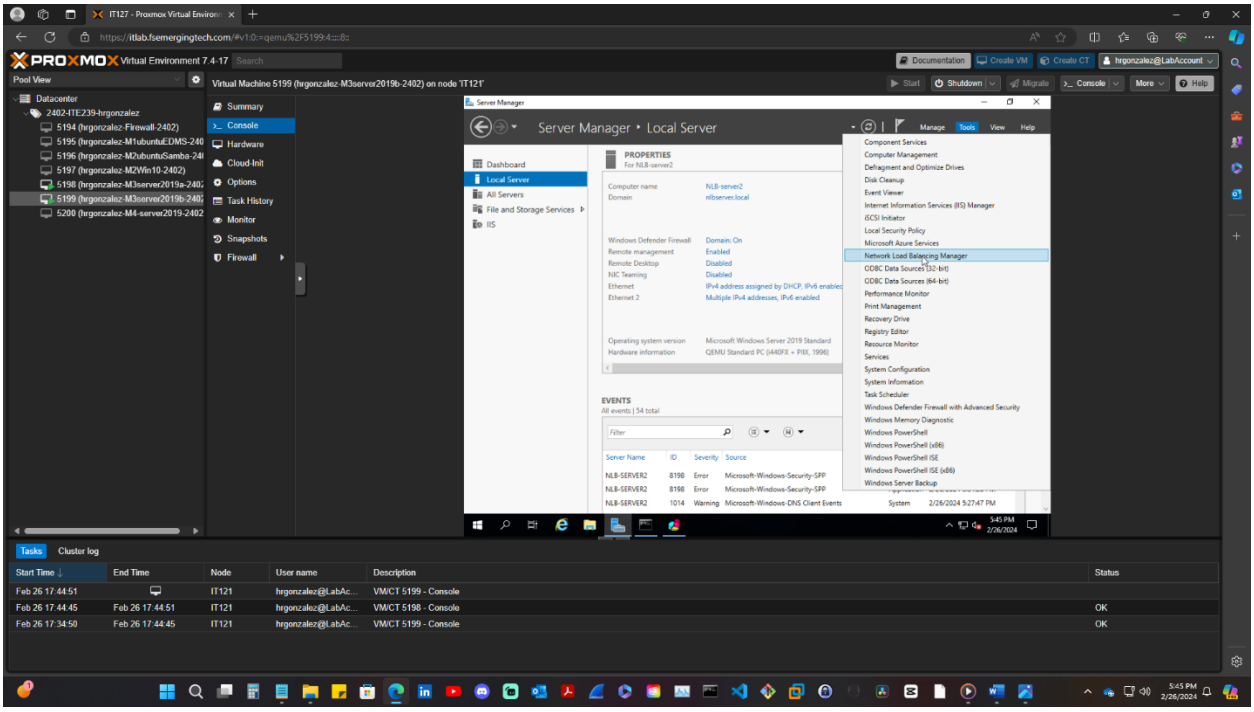
In the New Cluster Port Rules window, we are going to leave everything on default so we can click Finish.



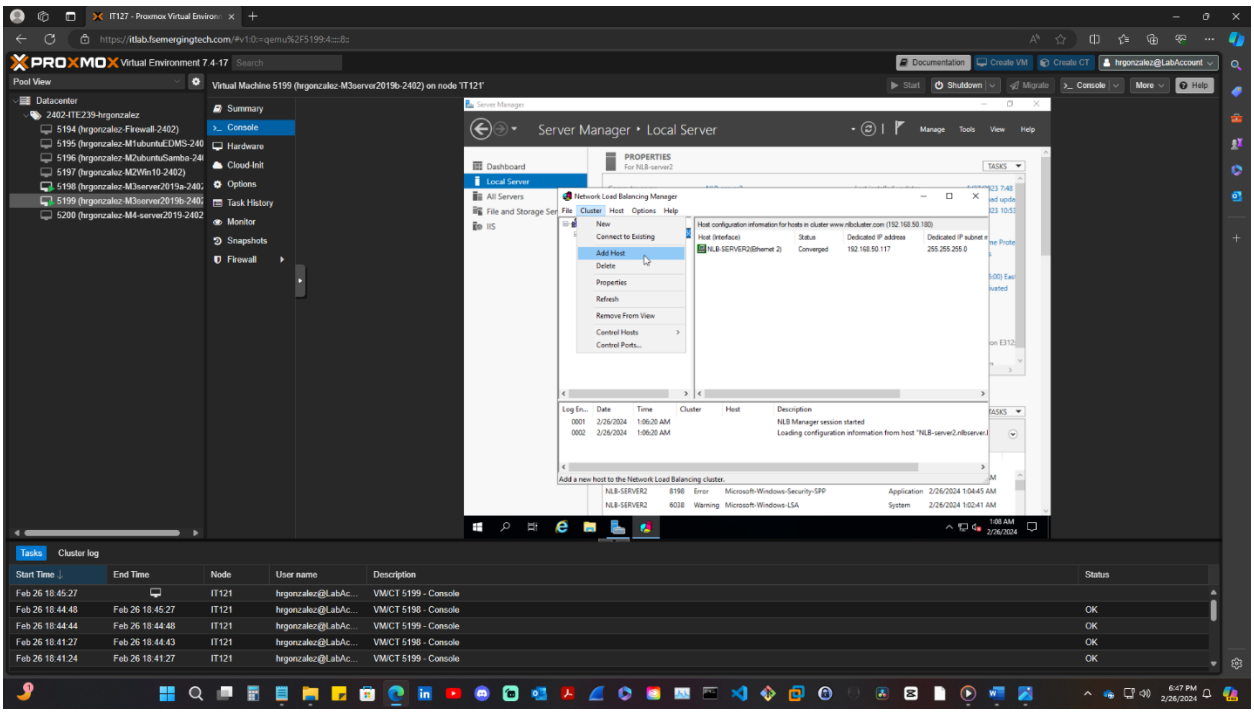
Adding NLB-server2 Machine to Cluster

Adding the NLB-server2 machine to the cluster can be done on Machine NLB-server1 or NLB-server2. We used NLB-server1 to create a New Cluster and added NLB-server1 to it. Here we are going to use NLB-server2 to add NLB-server2 to the Cluster.

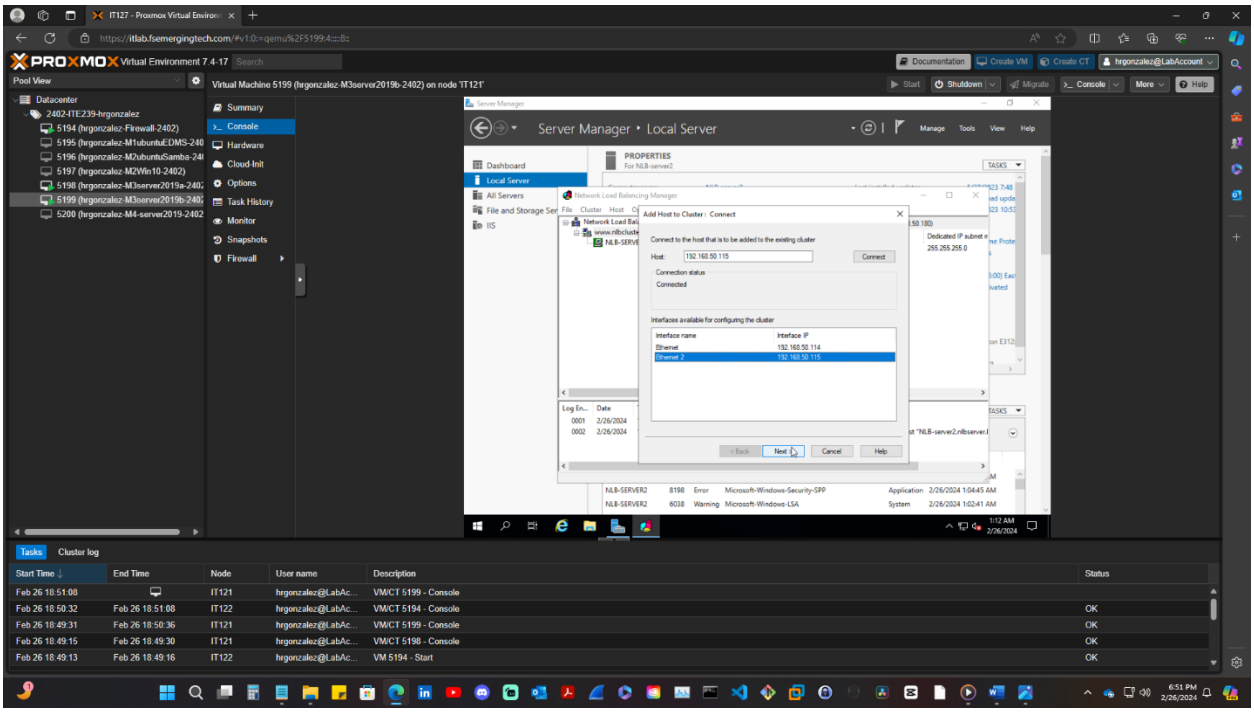
On NLB-server2 Window Server go to Tools > Network Load Balancing Manager.



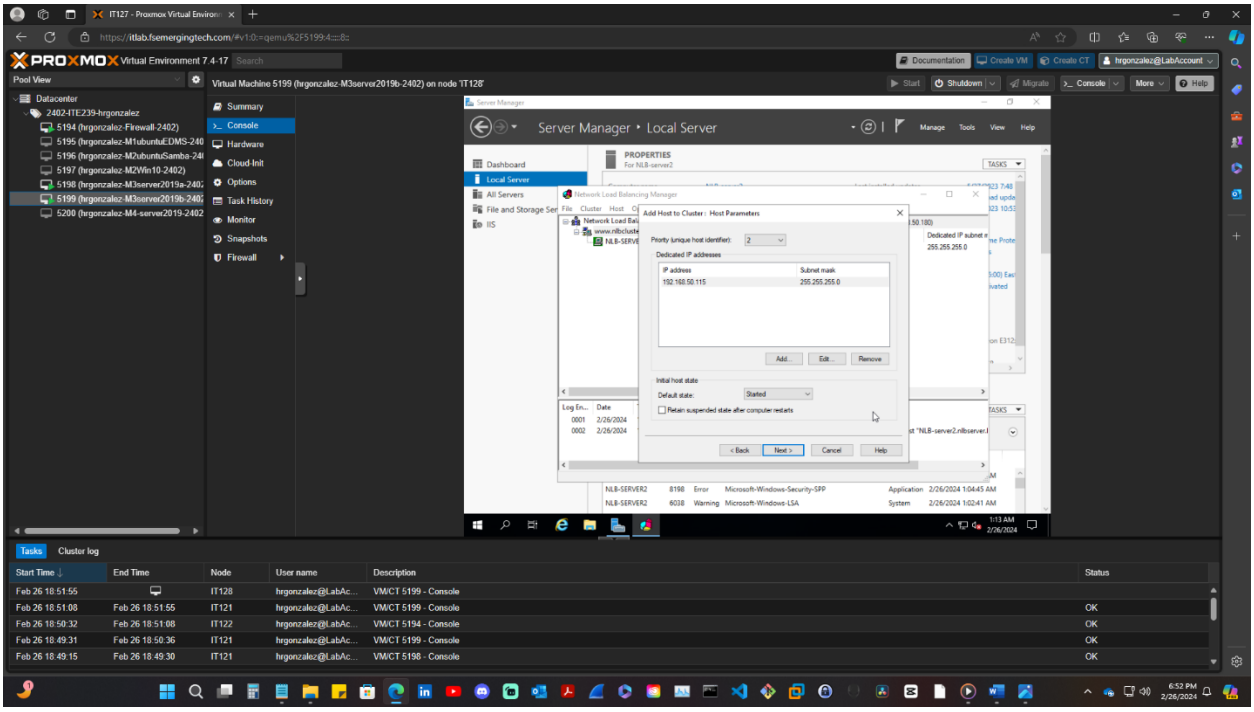
Now, you have to click on the domain name and then select Cluster tab > Add Host.



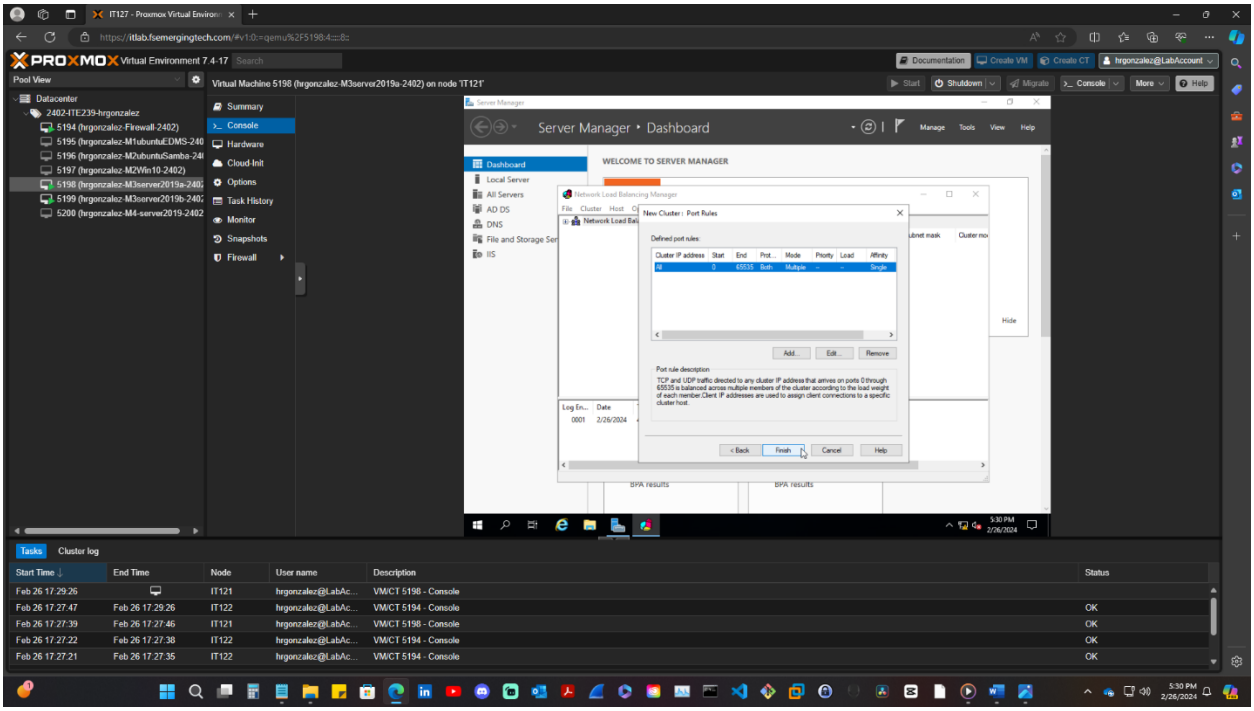
In the New Cluster Connect window host box enter the second cluster IP Address then click on Connect > We are going to select Ethernet2 just like we did in the previous step (this is our cluster IP Address) then click on Next.



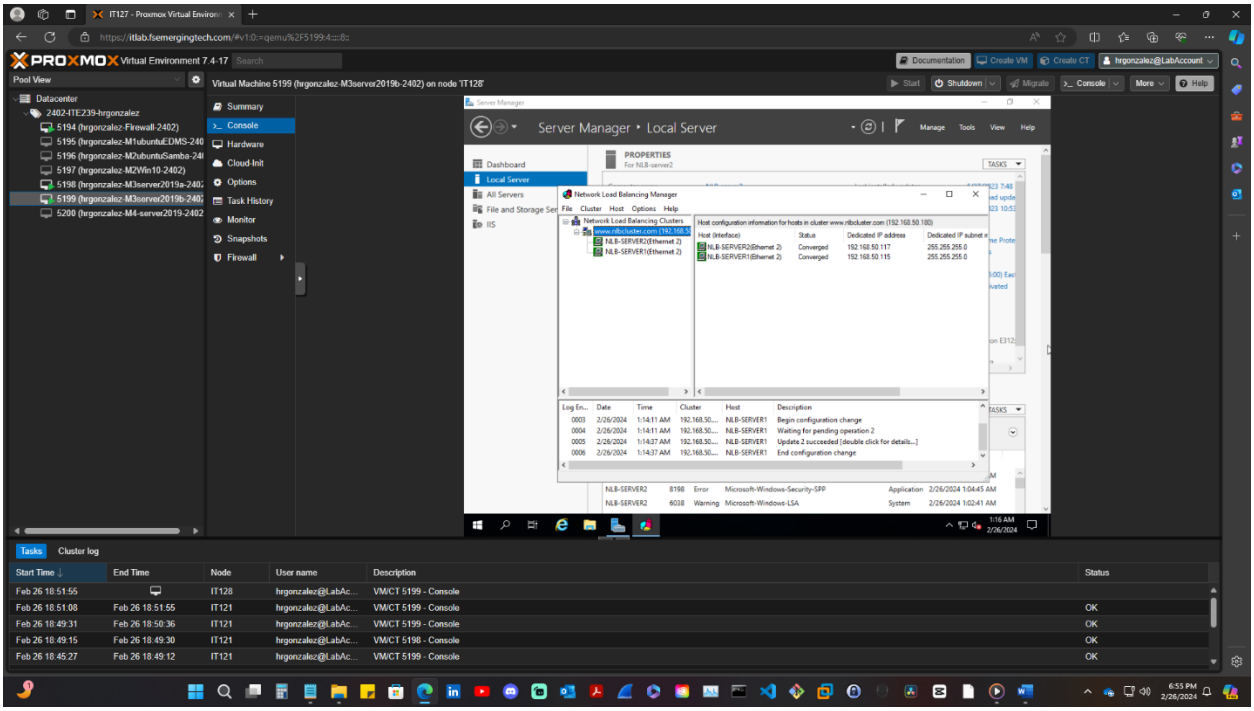
In the Host Parameters click on Next.



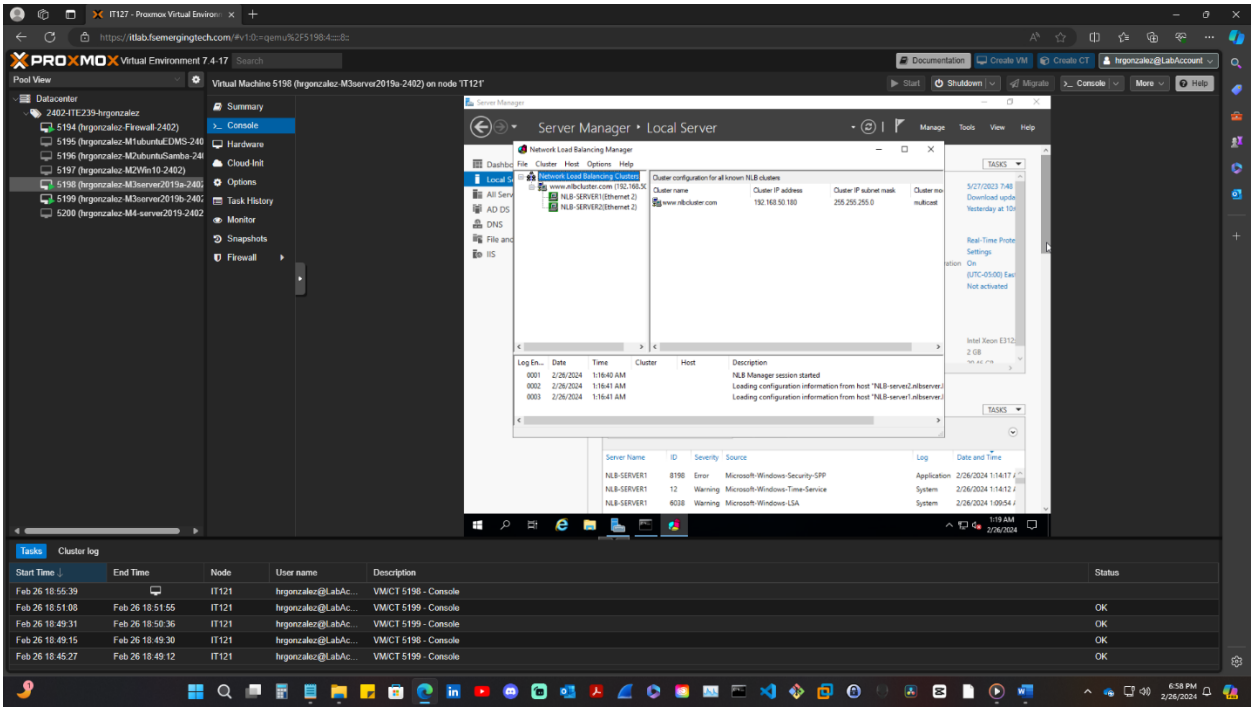
In the Port Rules window we are leaving it at default so, click Finish (use pic for reference).



If you see both the Cluster icon green and status Converged (picture below), then CONGRATULATIONS you successfully installed the Load Balancers.



You can now go over NLB-server1, close the current Network Load Balancing Manager window, and refresh the server. Once you do this go back into Network Load Balancing Manager and you should be able to see your newly created cluster just like in the pic below.

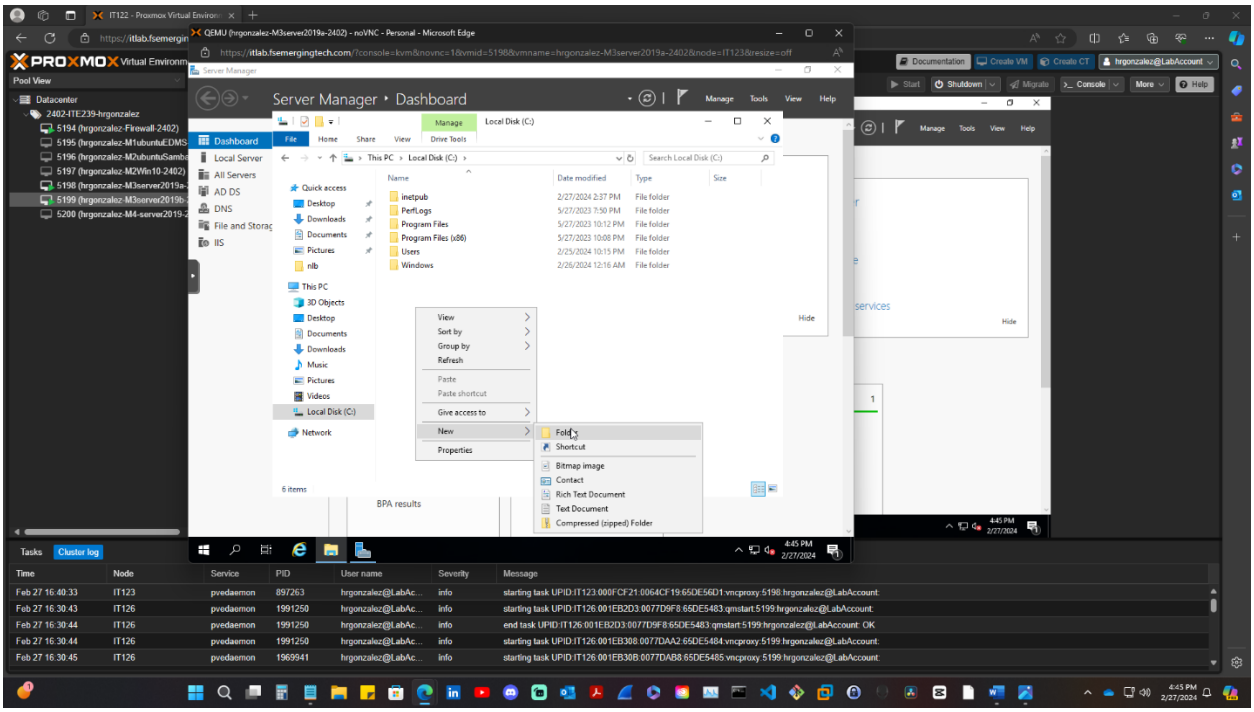


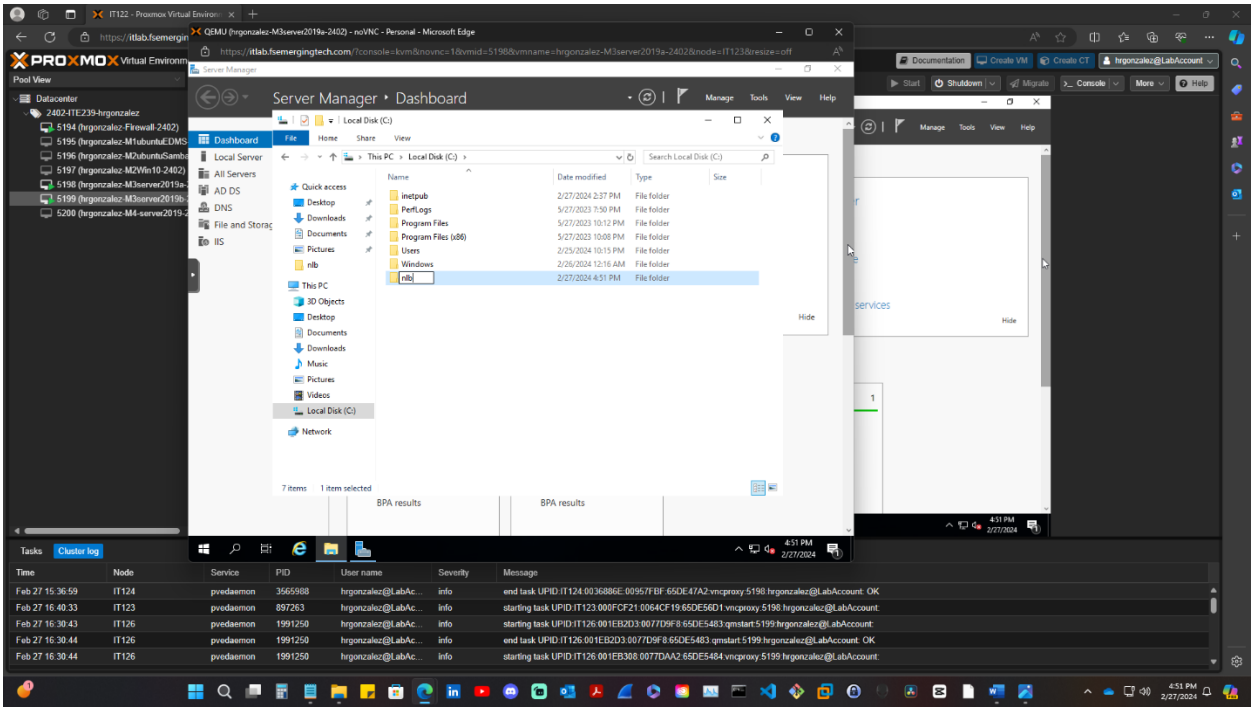
Part 3 – Set up the IIS site

Create folder nlb

The following steps will apply for both servers NLBserver-1 and NLBserver-2. You need to make sure you use the proper static cluster IP address given to each server

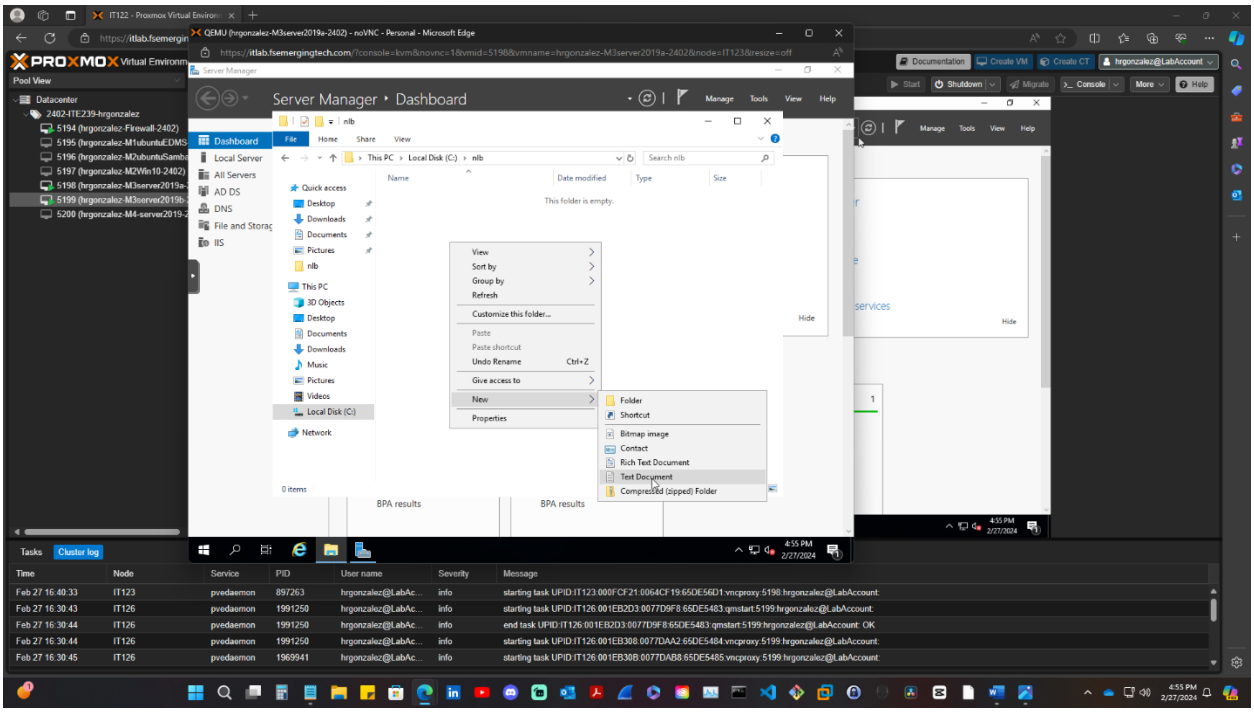
Let's create a folder named nlb on C: drive. Then you need to click on the File Explorer icon (the one that looks like a folder at the bottom of the taskbar). Next, click on the C: drive > Inside the C: drive window right-click on a space> scroll down to new and select Folder > Name the folder nlb



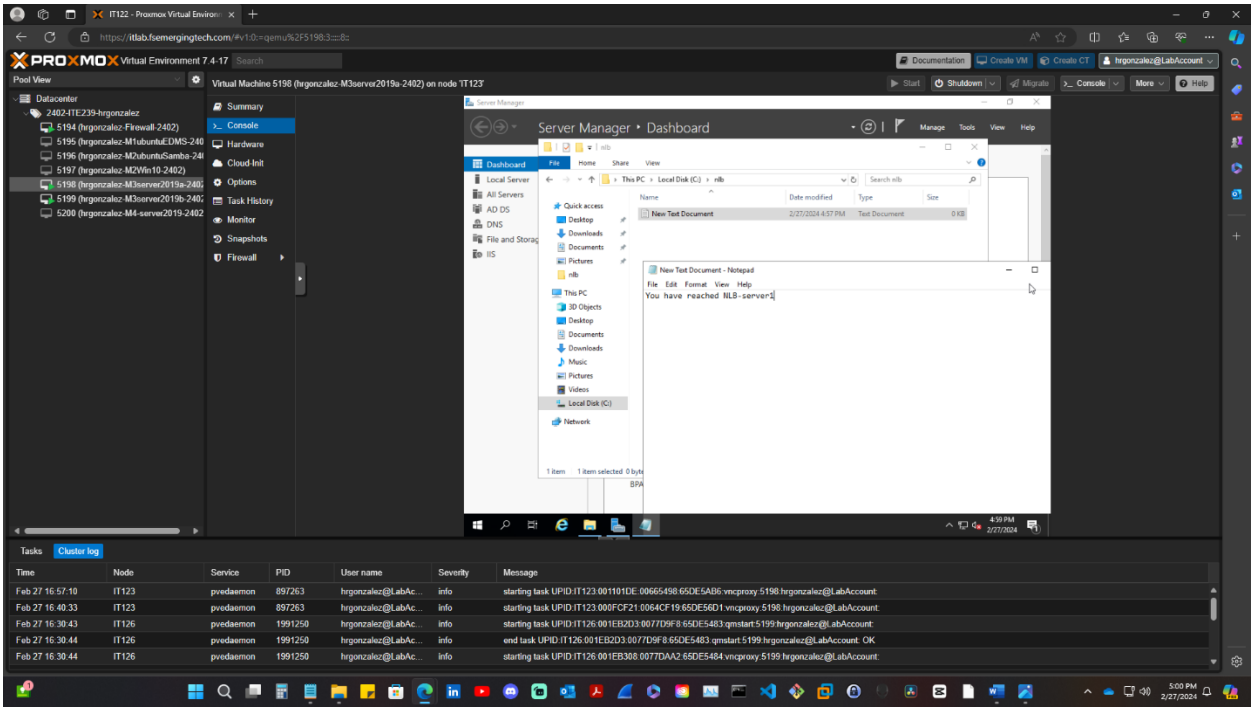


Adding an index.html file

Let’s create an index.html file to put in the folder. To do this we need to double-click on the nlb folder to get inside, once inside the nlb folder right-click anywhere in the space scroll down to New, and select Text Document.

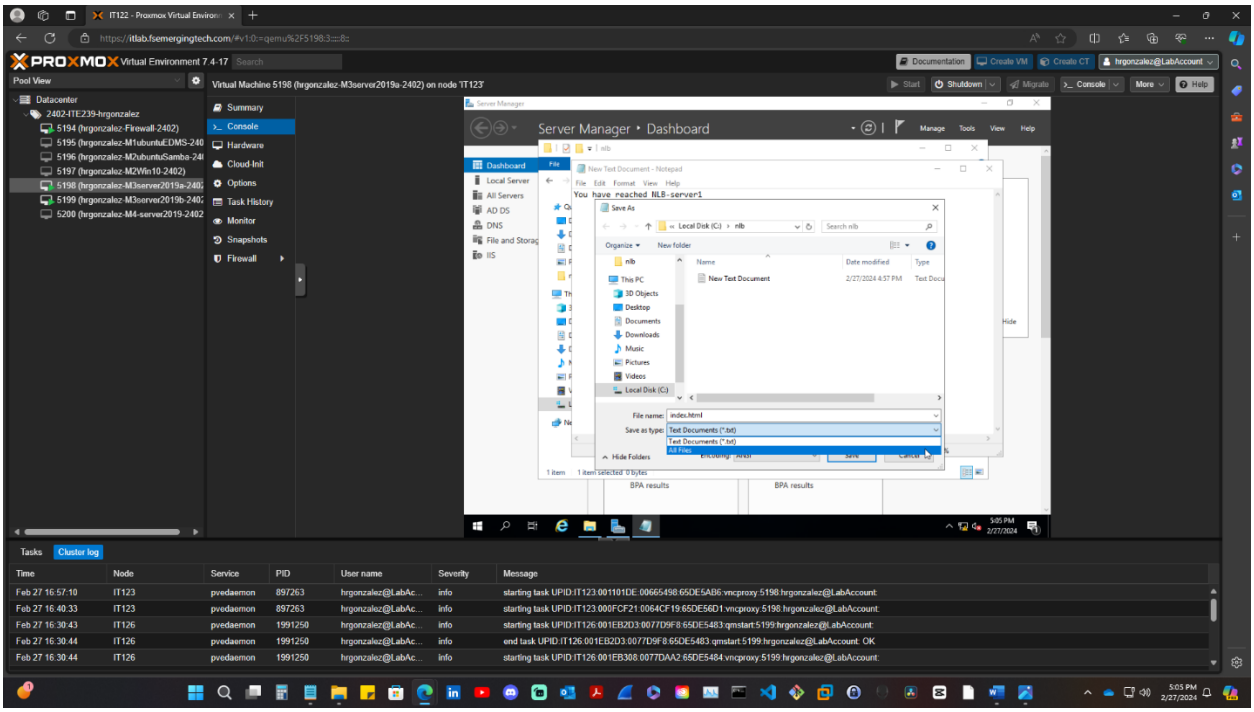


Double-click on the text document icon and in the notepad type “You have reached NLB-server1” (without”).

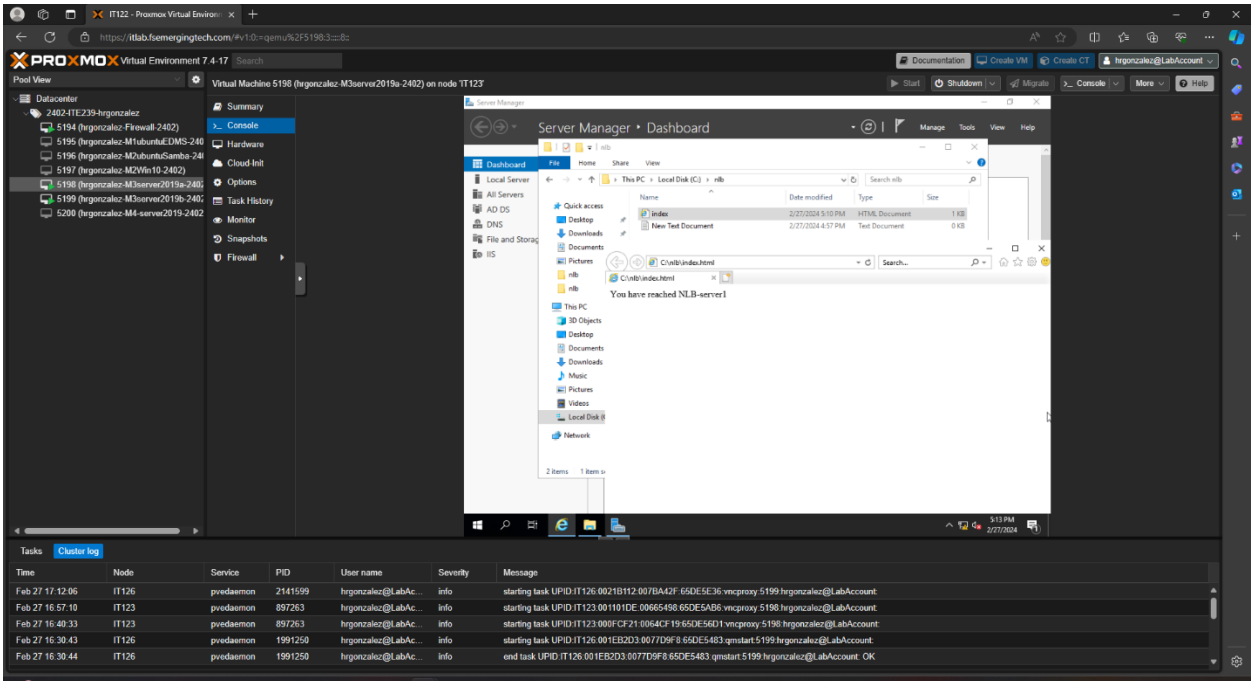


Saving Document as an HTML File

Now we need to save the text document as a .html file instead of a .txt file. To do this we need to click on the File tab on the notepad window > scroll and select Save as > in the Save as > in the File name we are going to type index.html and in the Save as type dropdown and select All Files > Now, click on Save and close notepad window.

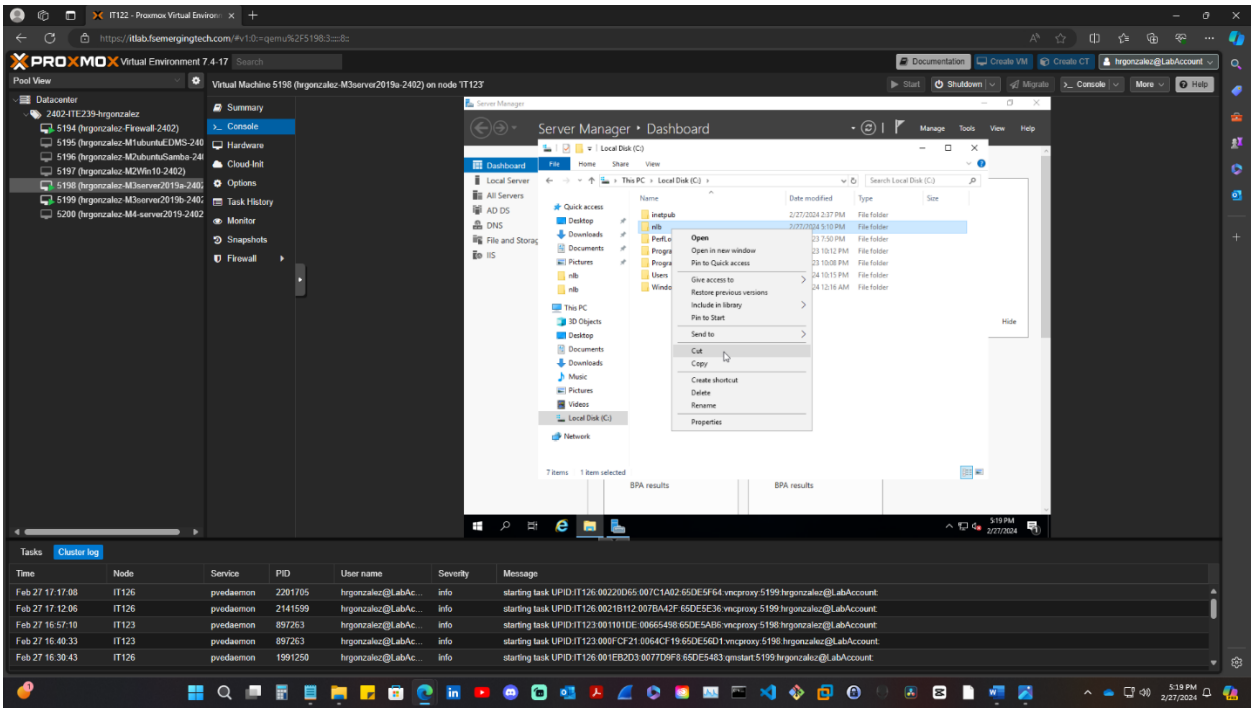


Once you close the notepad you should be able to see an index file. If you double-click that file, it will show the document text you just finished typing.

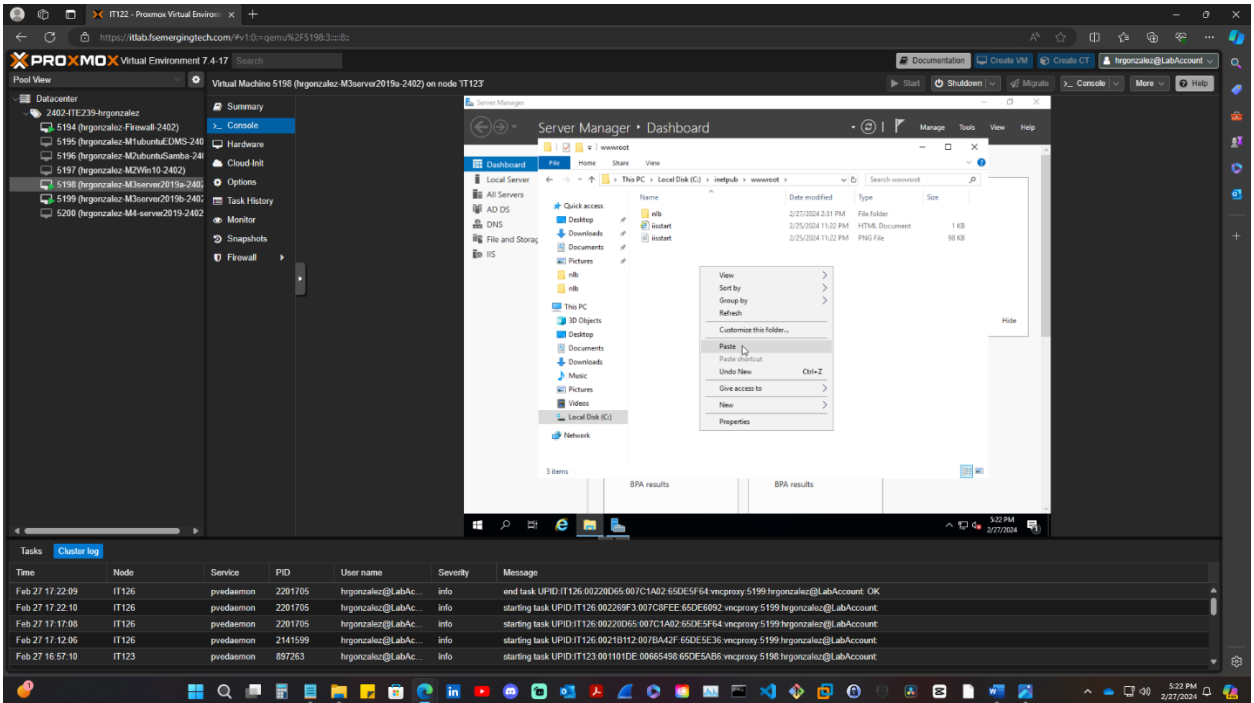


Moving the NLB folder to the IIS Folders

Now we need to move the created folder to the appropriate IIS folder. Let's click on C: drive and the nlb folder you created should be present. You are going to right-click on the nlb folder > scroll down and select Cut.

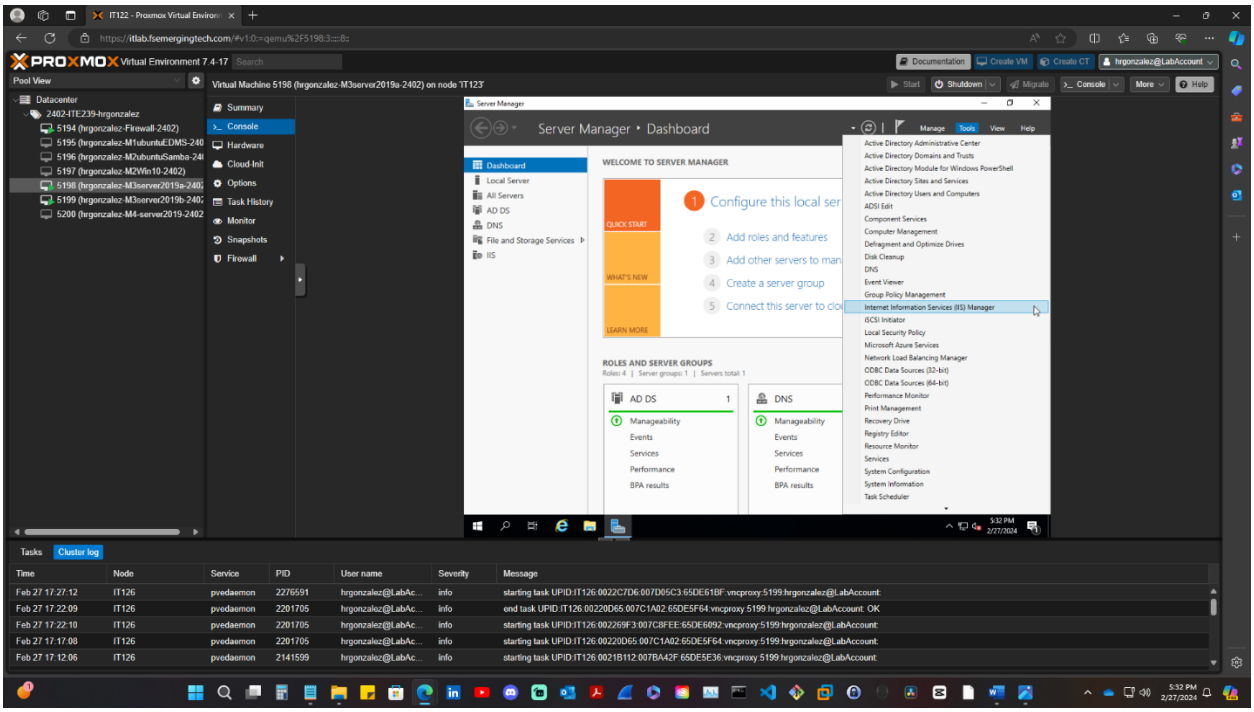


Now we are going to move this folder to the appropriate IIS folder which is wwwroot. In the current C: drive there should be a folder name inetpub. Double click inetpub > double click wwwroot and then right click anywhere in space and select Paste.

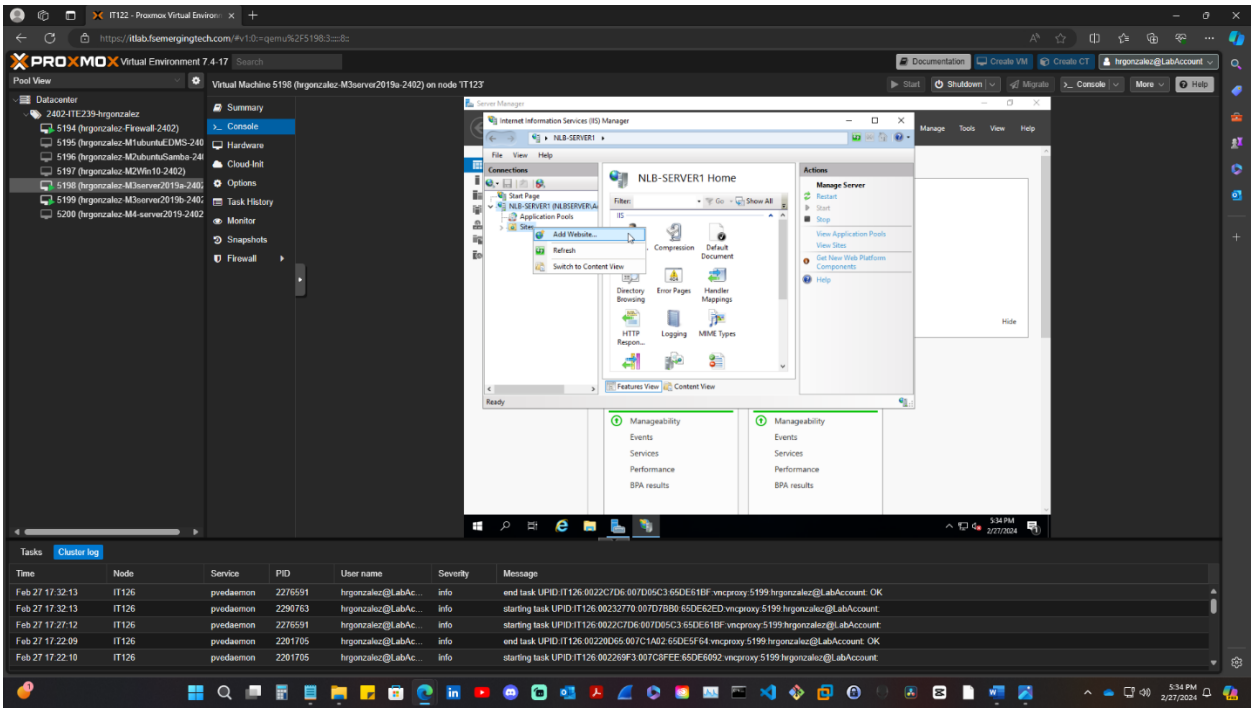


Adding New Sites In IIS To Point to index.html File

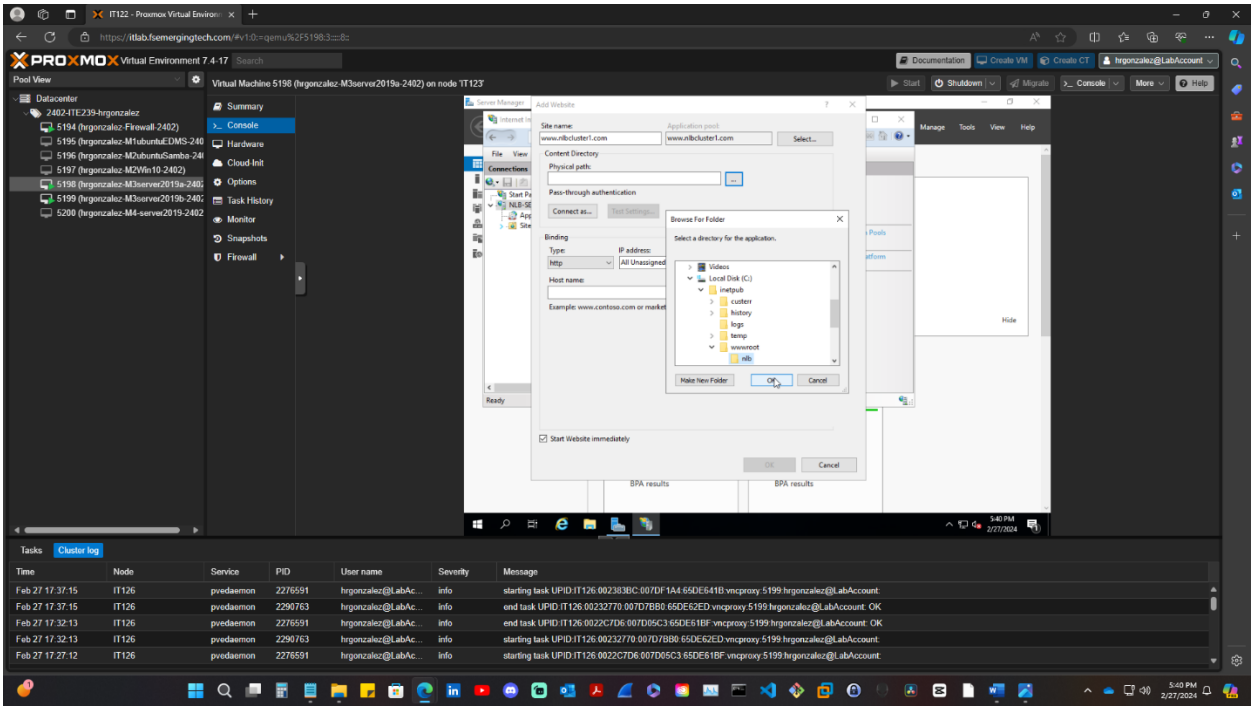
Now we need to add new sites for both servers and make sure that the default page points to index.html. We need to open Windows Server Manager click on Tools and select IIS Manager.



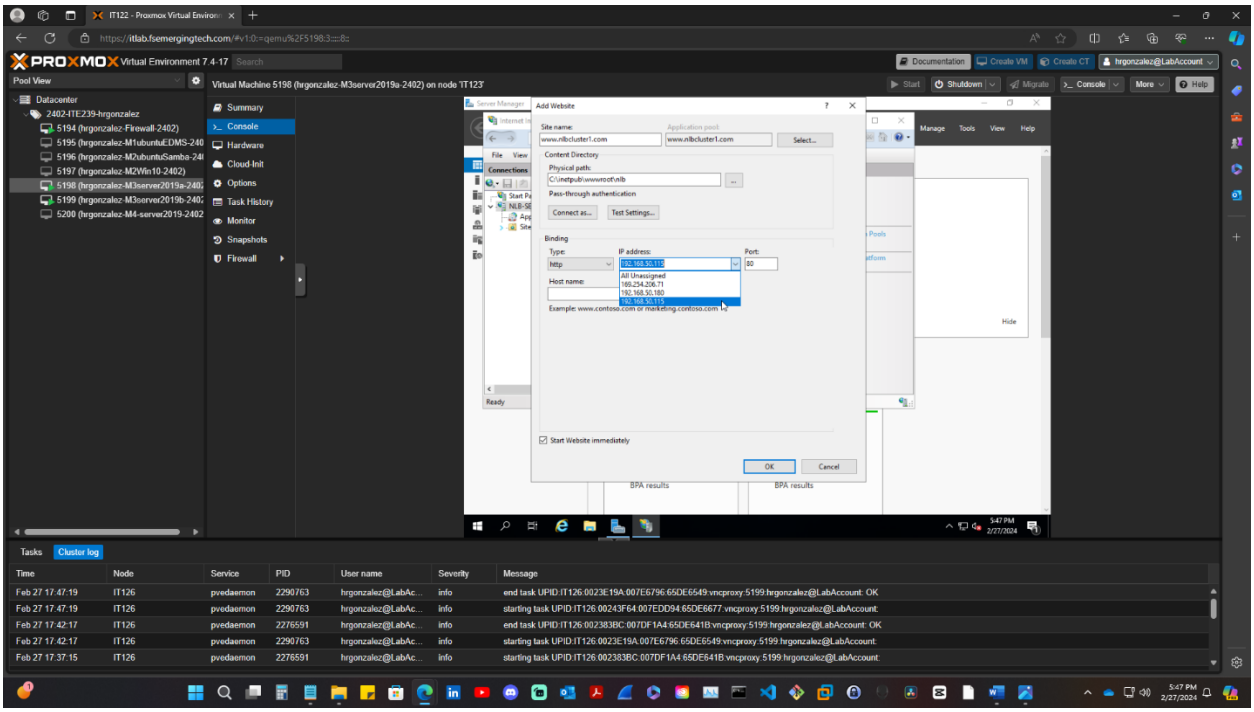
Once in the IIS Manager click the arrow next to NLB-SERVER1 > right-click on Sites > Add Website.



In the Add Website, we are going to give our site a name. The name can be anything you want (follow the picture for guidance). For the physical Path you need to click on the box with the dots and in here click on C: drive > click on the arrow on the inetpub folder > click on the arrow on the wwwroot folder > select nlb folder and hit OK.



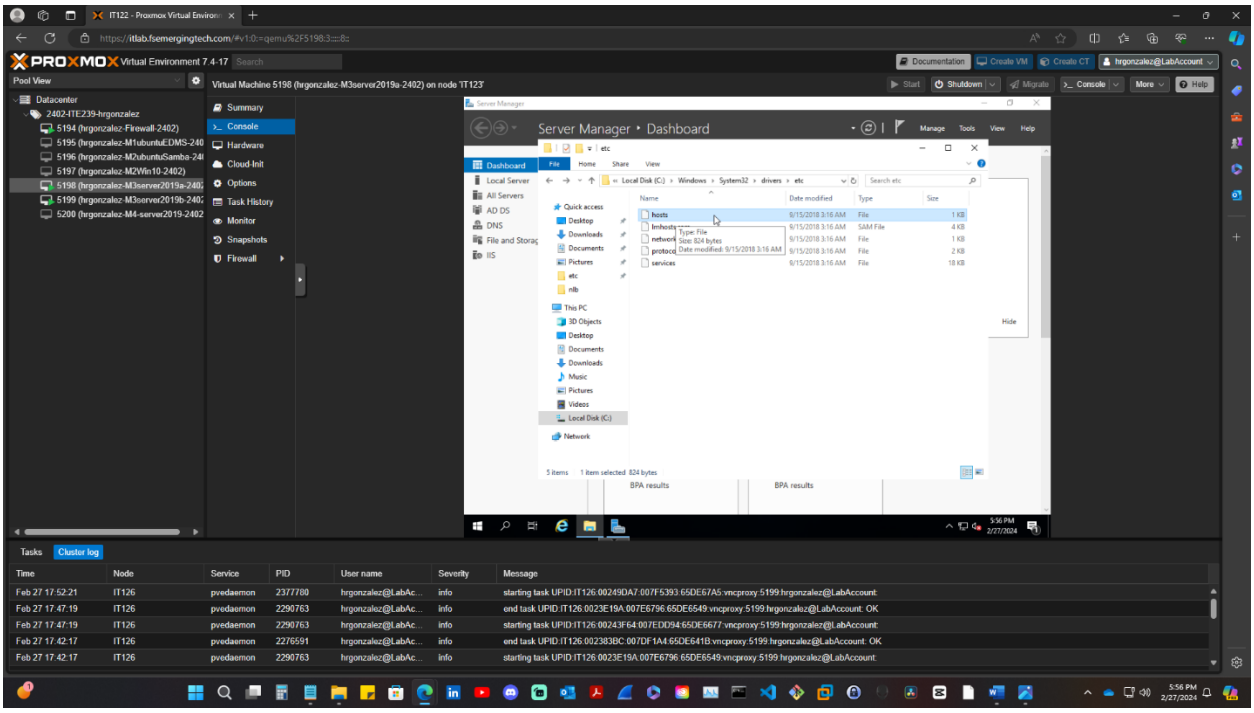
In the IP address box select the static IP address for your NLB-server1 cluster and hit OK.



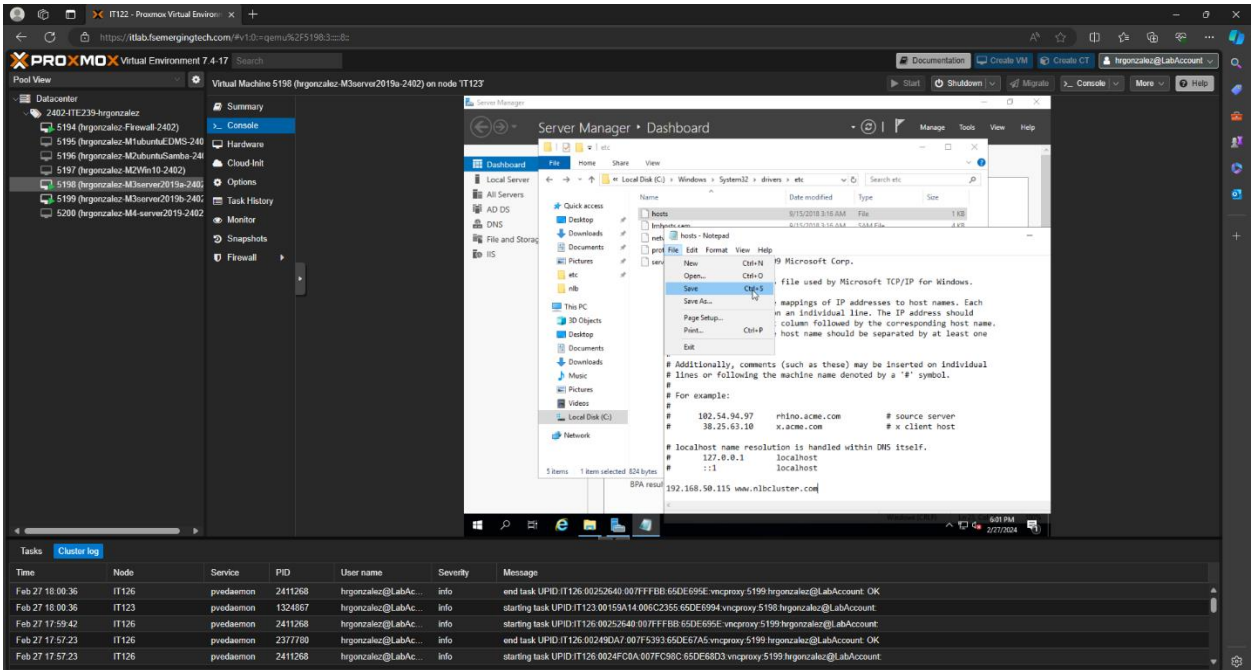
Linking New Site to Domain

Configuring hosts File

Now you need to make sure our site gets linked to our domain. This will enable you to see the site (index.html) when you browse into the domain. To do this we need to configure the hosts file. You need to open File Explorer and follow this path C:\Windows\System32\drivers\etc.

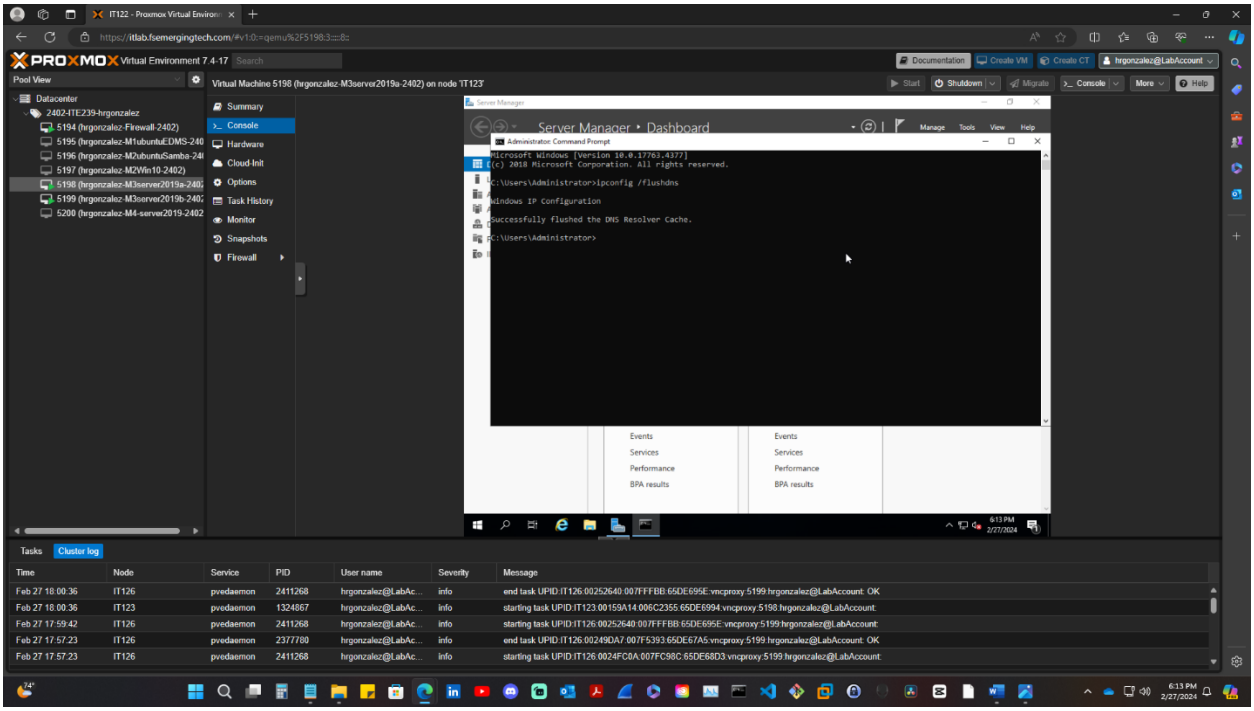


You are going to open the hosts file and when asked with what application select Notepad. Once inside the notepad go all the way down and type in your NLBserver1 static cluster IP address followed by the domain address www.nlbcluster.com (make sure to leave a space between IP address and domain. Go to the File tab on the notepad and select Save then close windows.



Flush DNS Cache

You may need to flush the DNS cache for changes to take effect. Let's open the cmd (command prompt window) and type in the command ipconfig /flushdns.



Accessing New IIS Site

It is time to verify our configurations work. Let's open up our web browser and type in http://www.nlbcluster.com If you are seeing your index.html file then CONGRATULATIONS!!!