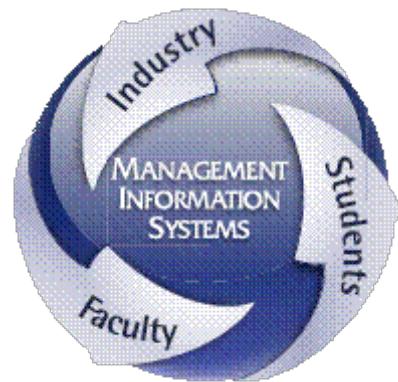


Security Lab

Lab 2: Virtualization

Systems Security Management



Document Sections

Lab Purpose – General discussion of the purpose of the lab

Lab Goal – What completing this lab should impart to you

Lab Instructions – Instructions for carrying out the lab

Lab Deliverables – What you have to submit to your instructor

Lab Rubric – How this assignment will be graded

Lab Resources – Any useful resources for completing the lab deliverables

Lab Purpose

In recent years, Virtualization has become more important to companies and institutions of all sizes. There are several companies who specialize in providing virtualization hypervisors which can be installed on servers to provide the necessary infrastructure. These companies include, but are not limited to, Microsoft, VMWare, and Citrix. For this course, we will specifically explore the use of VMWare's ESXi virtual server hypervisor through VMware's vCenter Server, an enterprise system that allows you to manage multiple physical servers from a single console.

The purpose of this lab is to familiarize you with the concept of virtualization and provide an environment for you to deploy and configure a virtual server. This lab has five (5) parts:

1. Creation of a Virtual Machine
2. Initial Server Configuration
3. Installation & Configuration of Domain Naming Services
4. Installation & Configuration of Active Directory Domain Services
5. Reporting the Pros and Cons of Virtualization

Creation of a Virtual Machine

The creation of a virtual machine (VM), a client server contained within the virtual server host, is a fairly simple matter. When deploying a small virtualization infrastructure, you would normally create VMs through the physical server's console. With VMware this is done through the use of a web-based application. However, in an enterprise environment (or smaller environments who spend the money on licensing) one would deploy VMware's vCenter Server software. This software allows you to take control of an entire server infrastructure through a single console. The nice part about this software is it allows you to simplify the process of creating and deploying new servers through the use of VM cloning. This is the preferred method of server deployment in enterprises because it is easier to deploy new servers and can be completed in far less time than building a server from scratch. This is the method you will use in this class for deploying your server to give you hands-on experience with the same tools used in enterprise environments.

Initial Server Configuration

The VM you will be cloning is an evaluation version of Windows Server 2019 Standard mostly configured for use in this course. After the cloning process completes, you will need to do some initial configuration and install Windows Updates to make sure the system is fully patched and protected.

Installation & Configuration of Domain Naming Services

All computer networks around the world use the TCP/IP protocol to communicate across the Internet. This process is facilitated through the use of domain naming services (DNS), which translates IP addresses to common names and vice versa. This means that DNS is a core network service used in networks world-wide, especially in Enterprise networks where the ability to customize a network to allow for communication between the Internet, a public network (or DMZ), and the private corporate network. Usually the responsibility for managing and maintaining a DNS server falls to the Network or System Administrator.

Installation & Configuration of Active Directory Domain Services

Microsoft's Active Directory Services platform is an Enterprise-level authentication platform that allows for complete customization to meet the needs of the organization. Active Directory allows an organization to adopt a solution for centralized administration of user accounts, passwords, and computers, among other options. Active Directory also provides an organization with the ability to utilize single sign-on services, making it easier for users to accomplish their daily work tasks. Finally, Active Directory provides scalability, allowing organizations to add Active Directory servers, objects, domains, and forests as necessary. This allows system administrators the ability to expand and contract the Active Directory as the organization changes over time.

Client computers absolutely must use DNS in order to see and communicate with Active Directory servers on the network (in general, client computers will need to use DNS in order to do anything on both a local network and the Internet). Without a defined DNS server on the network, client computers will not be able to access Active Directory resources, including authentication services. So, client computers would, in essence, be unusable in an Active Directory environment without the use of DNS. As the System Administrator for Fortune Automotive, it is your responsibility to ensure the DNS services and Active Directory services are installed and configured properly. Further customization of the Fortune Automotive Active Directory will be completed in Lab #3.

Reporting the Pros and Cons of Virtualization

Virtualization, while an amazing technology with a great number of benefits, may not be for everyone. When deciding to purchase a server for your organization, the systems administrator should explore the pros and cons of adopting virtualization technology. Researching the technology is extremely important, and a discussion of the positives and negatives of server infrastructure virtualization, specific to your organization, should be **described and explained**. Does it make sense for a business or organization to adopt the technology? Does the size of the

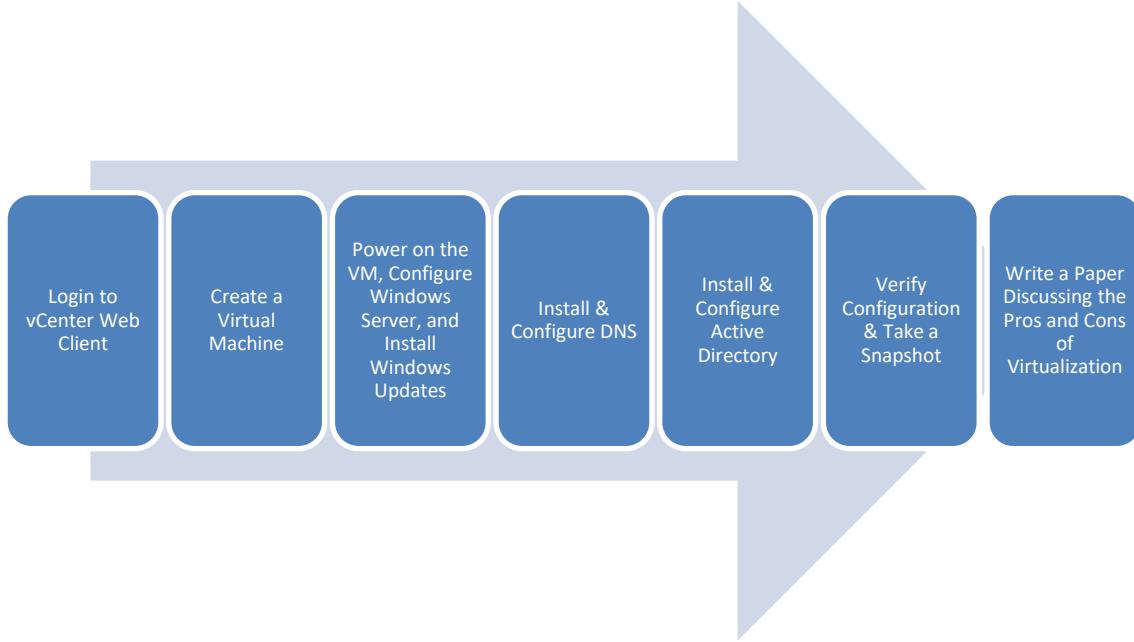
business or organization matter? How about costs (hardware, software, etc.)? All of these (and more) should be explored and answered, and this is what you will need to do.

Lab Goal

Upon completion of this lab, you should:

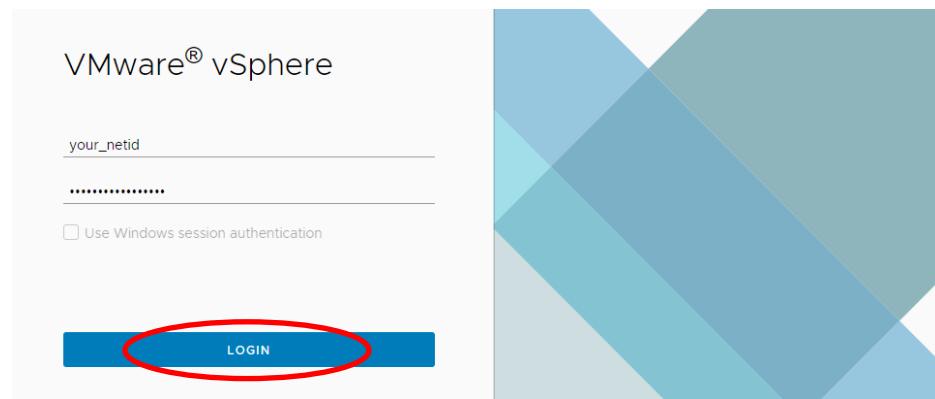
- Increase your understanding of Virtualization
- Understand how to create a Virtual Machine
- Understand the importance of DNS and its role in modern Microsoft networks.
- Understand how to install and configure DNS and Active Directory Services.
- Understand why the correct configuration of these tools is important.
- Be provided with an initial hands-on experience with an enterprise-level network authentication and security platform.
- Understand how Virtualization can help companies
- Understand the pros and cons of Server Infrastructure Virtualization technologies

Lab Instructions



1. Login to vCenter Web Client

- 1) Download and install the UA VPN software (Cisco AnyConnect). ***This is a requirement in order to access the servers for this course from any off-campus location.***
 - a. ***NOTE: If you are on the UA Campus in a lab or library, you DO NOT need to use the VPN; if you are off campus, this is required.***
 - b. First, setup your NetID+ here: <https://netid-plus.arizona.edu/> if you have not already completed this for another class.
 - c. Instructions are here for connecting to the UA VPN and downloading the Cisco AnyConnect software which you will be using for every lab in this course.
 - i. For Windows: <https://it.arizona.edu/documentation/ua-vpn-download-and-installation-instructions-windows>.
 - ii. For MacOS: <https://it.arizona.edu/documentation/ua-vpn-download-and-installation-instructions-macs>.
- 2) Once connected to the UA VPN, open your web browser and navigate to <https://plumvcsa.artg.arizona.edu/ui/>.



- 3) On the login page, you will enter your NetID and password.
- 4) Click **Login** to continue.

2. Create a Virtual Machine

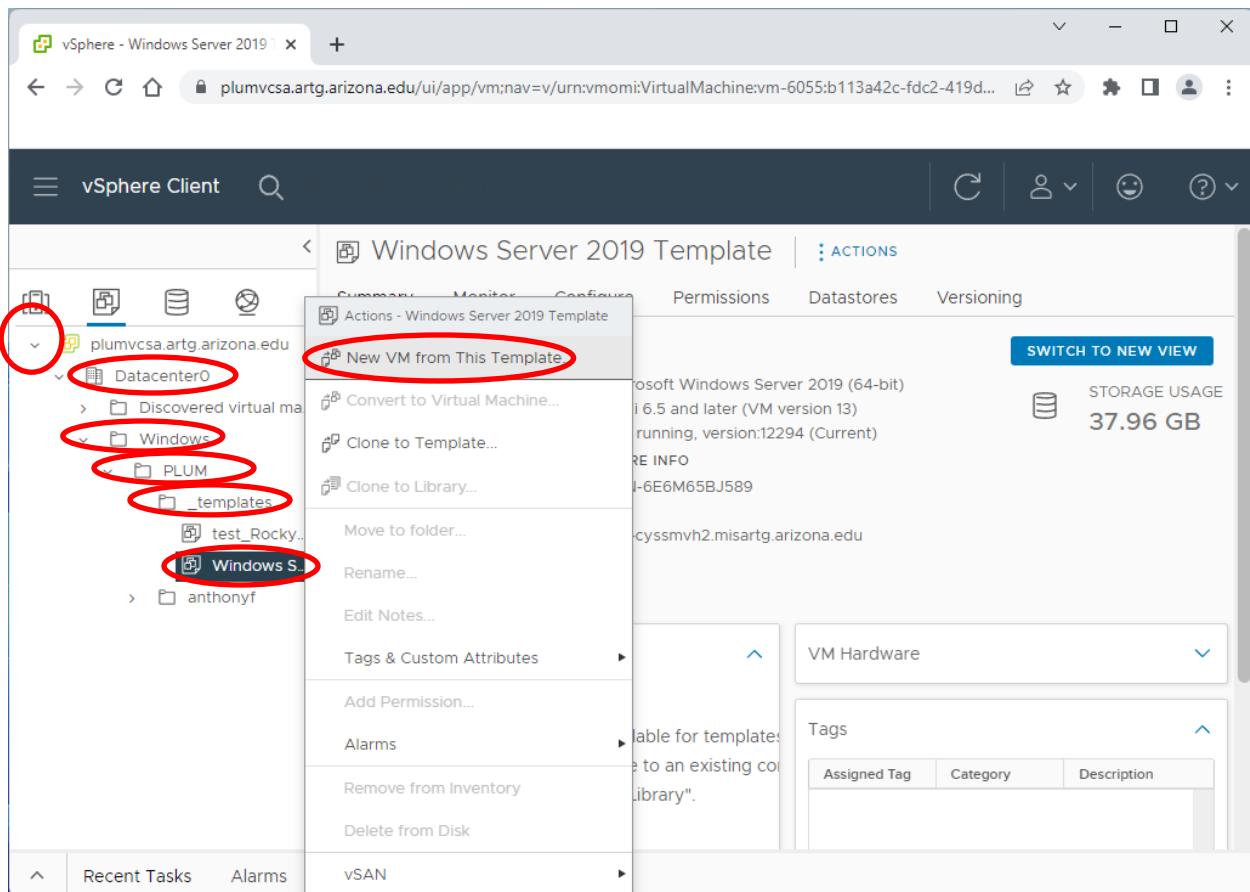
- 1) You now have access to the vSphere Web Client.

Attribute	Value
Version	7.0.3
Build	20150588
Clusters	1
Hosts	2
Virtual Machines	0

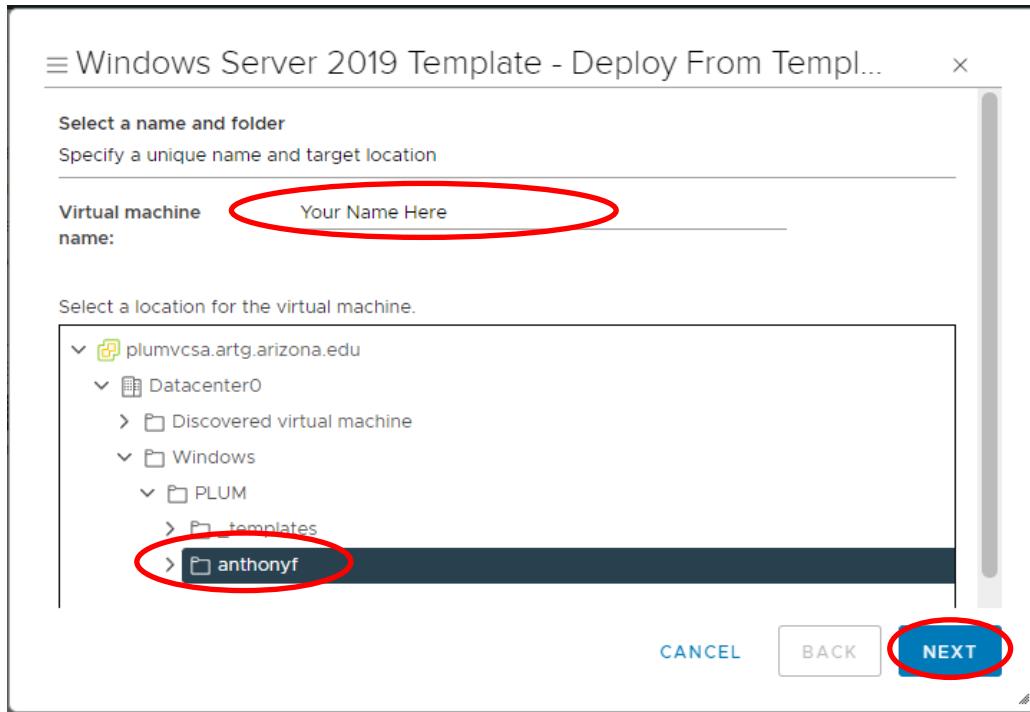
Health Status

- Overall Health: Good

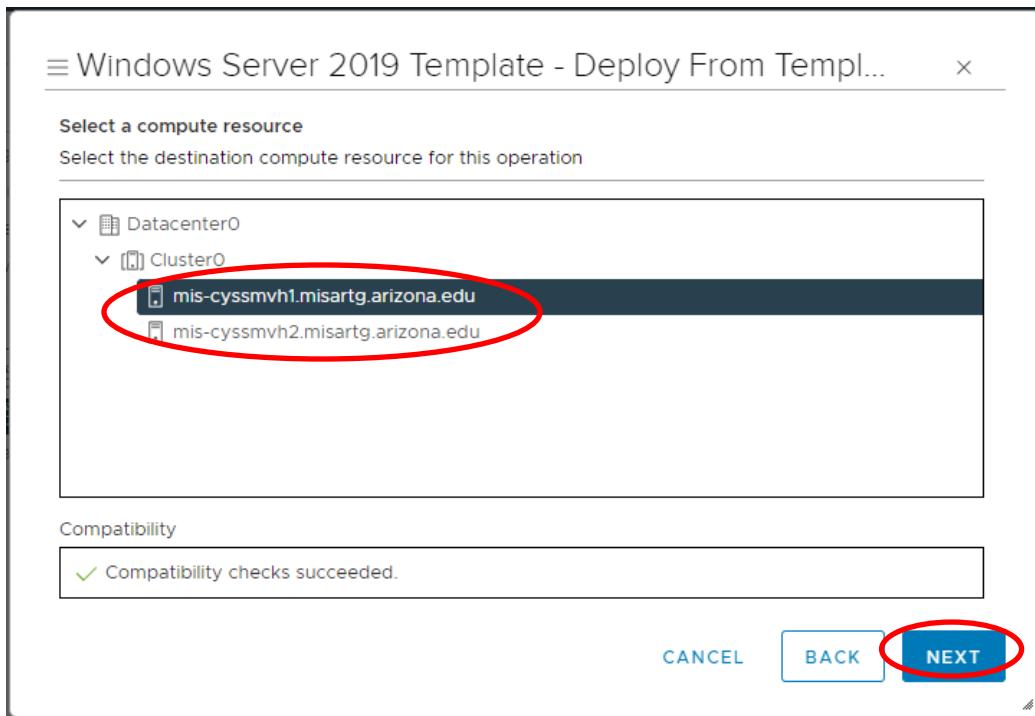
- 2) Click on the **VMs and Templates** option (looks like a page turning) in the left-side side of the screen as shown above.



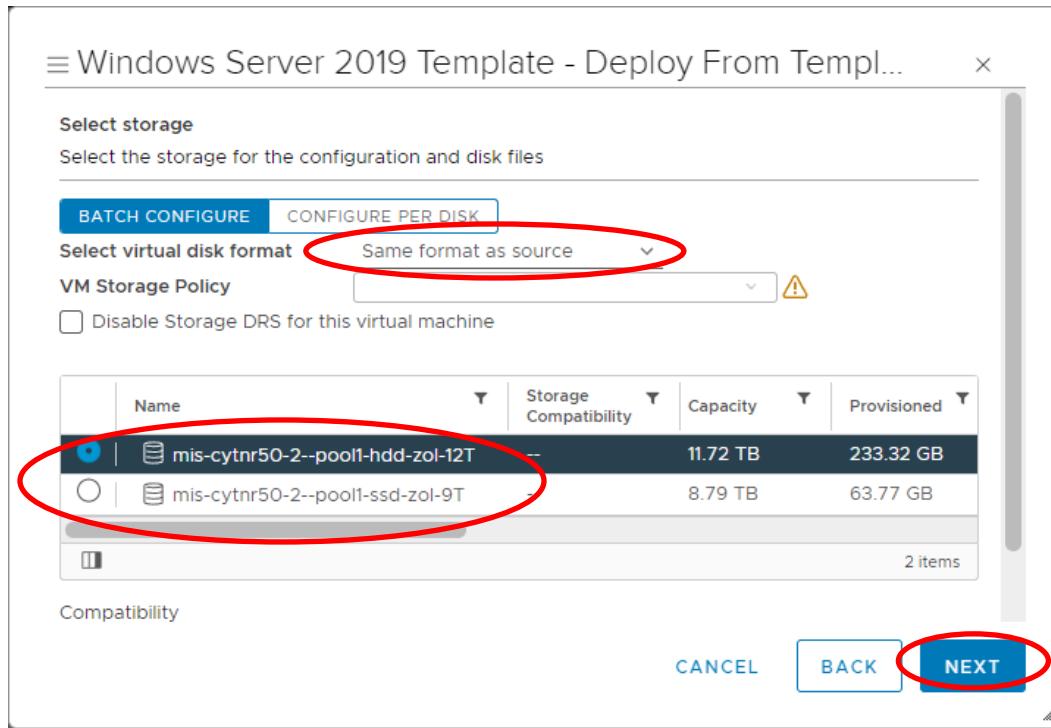
- 3) In the left-hand side of the screen, expand (by clicking on the arrow to the left of the wording) **plumvcsa.artg.arizona.edu**, then expand **Datacenter0**, **Windows**, **PLUM**, and finally expand **_templates**. To create a new Virtual Machine from the template shown, **right click on Windows Server 2019 Template** and choose **New VM from This Template...**



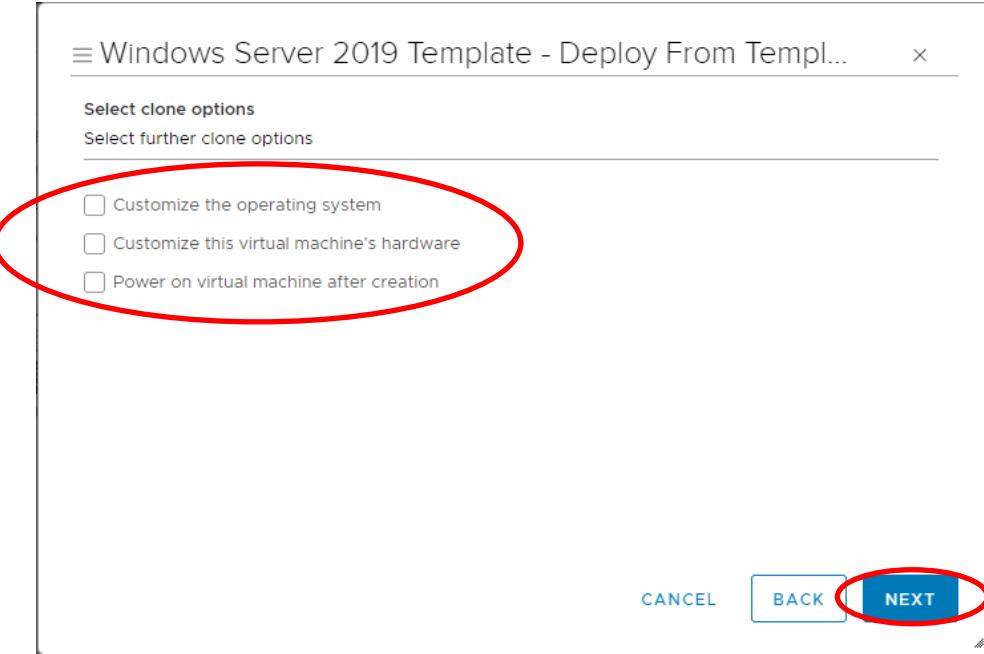
- 4) In the **Deploy From Template** wizard, type in the name of your Virtual Machine (Your first and last name), then expand the **Windows** folder until you find your NetID. **Select your NetID** and click **Next**.



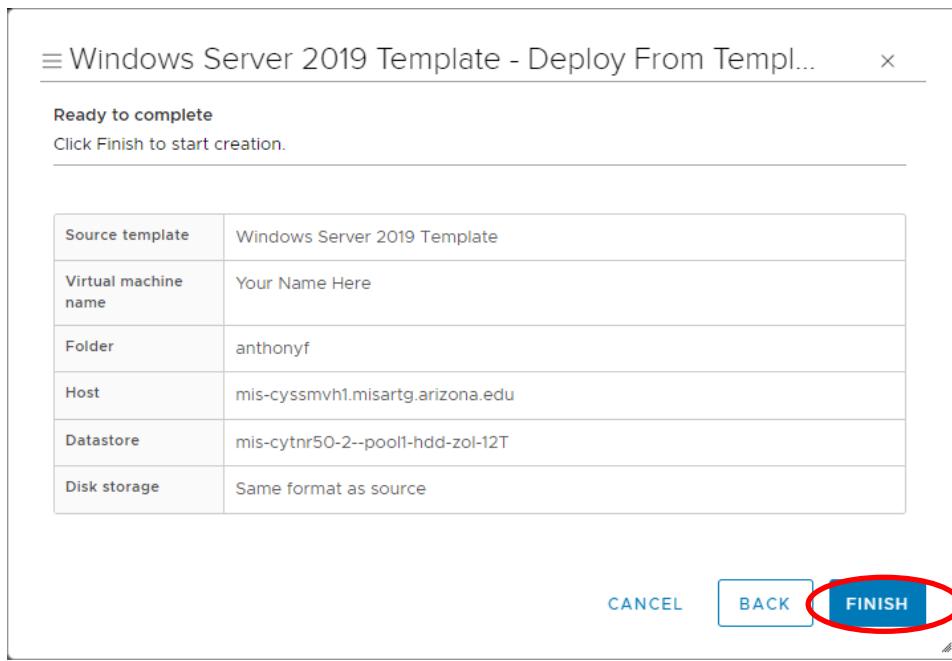
- 5) Now select your compute resource; Expand **Datacenter0**, **Cluster0**, then **select either of the two servers (it does not matter which)** and click **Next**.



- 6) Now you need to select the storage options. First, select **either of the two storage options (it does not matter which one)**, then make sure that that you leave the virtual disk format as **Same format as source**, then click **Next**. **DO NOT** make any other changes on this screen.



- 7) On the clone options page, **leave all three boxes unchecked** and click **Next**.



- 8) The final screen is a review of the settings you selected. Make sure they match the above (not including the virtual machine name) and click **Finish**.

The screenshot shows the vSphere Client interface with a red circle highlighting the 'Recent Tasks' section at the top. A specific task, 'Clone virtual machine' for 'Windows Server 201...', is listed with a progress bar showing 54% completion. The status is 'Copying Virtual Machine files' and the initiator is 'BLUECAT\anthonyf'. The rest of the interface includes a navigation bar with icons for search, refresh, user, and help.

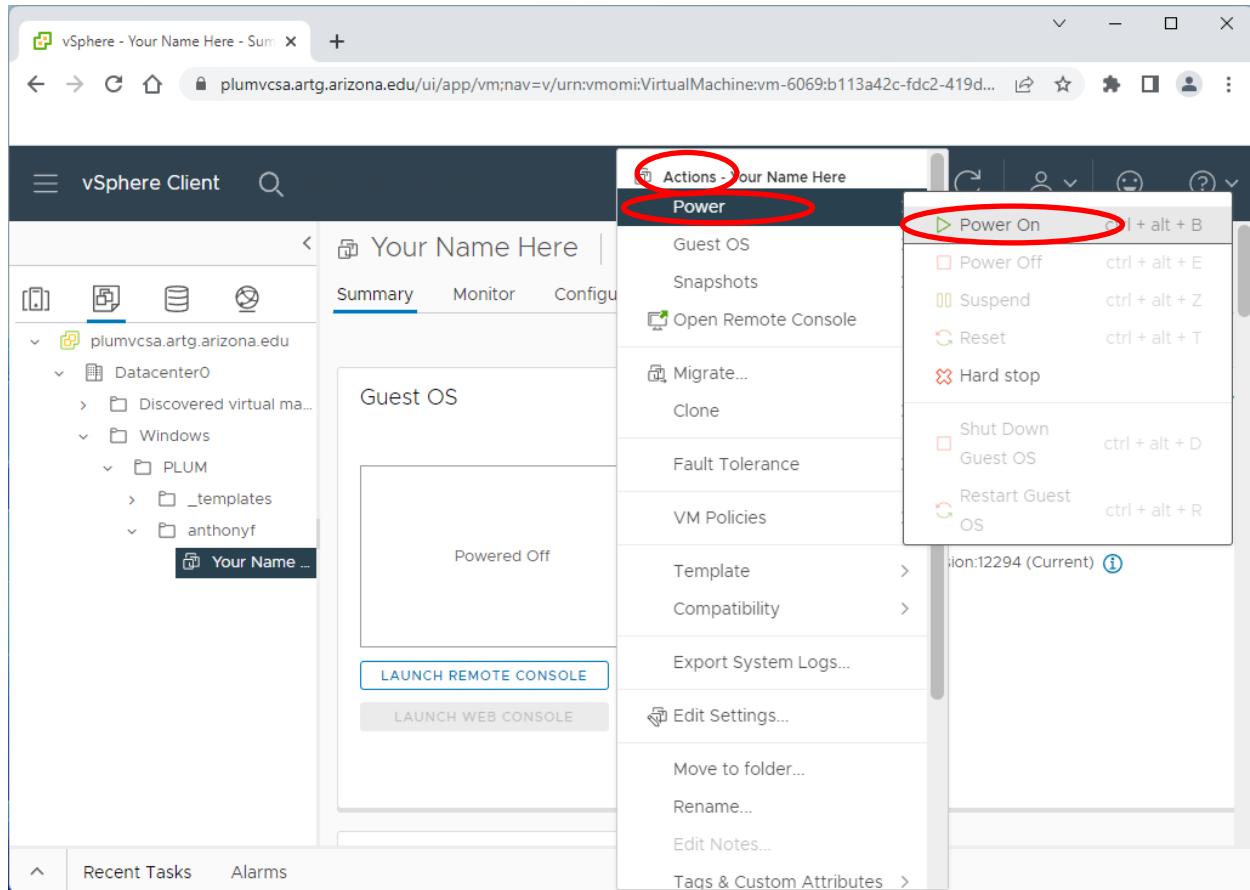
- 9) You will notice in the lower portion of the screen in the Recent Tasks area the server is now creating a Clone of the template for you to use. When completed this will have a green check mark to designate this process is finished. This should take no more than 5 minutes to complete.

The screenshot shows the vSphere Client interface with a red circle highlighting the newly created virtual machine 'Your Name Here' in the left sidebar under the 'Datacenter0' tree. The main pane displays the 'Summary' tab for this VM, showing it is 'Powered Off'. Other details include Guest OS as 'Microsoft Windows Server 2016 or later (64-bit)', VMware Tools as 'Not running, version:12294 (Current)', and Encryption as 'Not encrypted'. Buttons for 'LAUNCH REMOTE CONSOLE' and 'LAUNCH WEB CONSOLE' are visible at the bottom of the summary card.

- 10) You will now see your newly created virtual machine on the left-side menu. **Highlight** it to see the summary of your server settings.
11) Note that the server has been created automatically with the appropriate settings from the template (including 2 CPU, 4 GB of RAM, 40GB of storage, etc.).

3. Power on the VM, Configure Windows Server, and Install Windows Updates

- 1) Now we will power on the server and do some initial configuration.



- 2) Click on the **Actions** menu and choose **Power -> Power On**.

Your Name Here | ACTIONS

Summary Monitor Configure Permissions Datastores Networks Snapshots CUSTOMIZE VIEW ▾

Guest OS ACTIONS

Power Status: Powered On

Guest OS: Microsoft Windows Server 2016 or later (64-bit)

VMware Tools: Not running, version:12294 (Current) ⓘ

DNS Name:

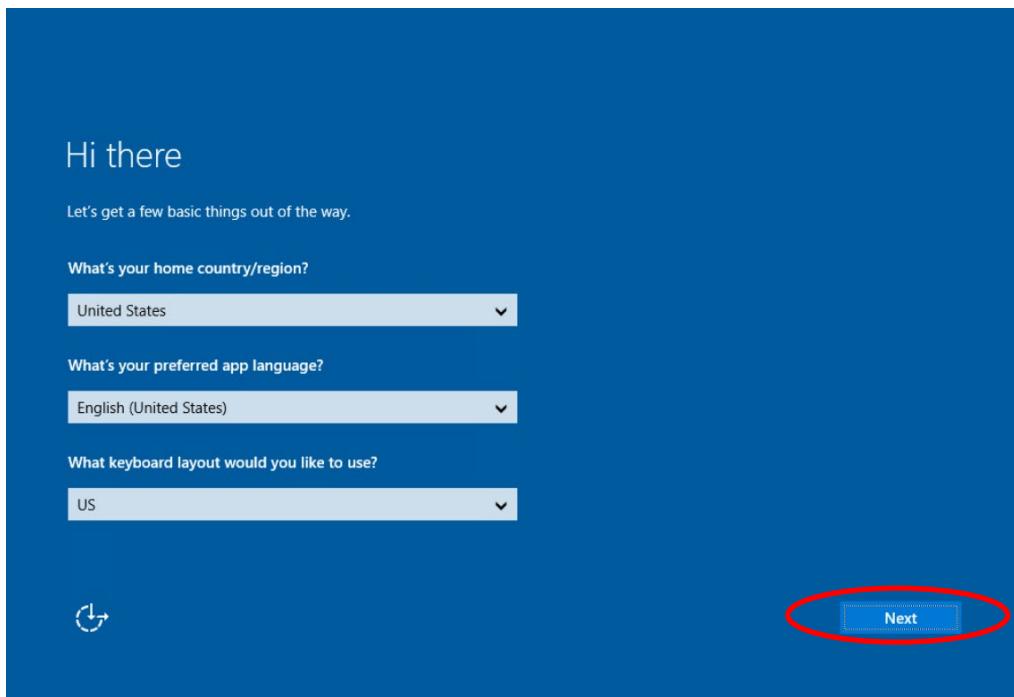
IP Addresses:

Encryption: Not encrypted

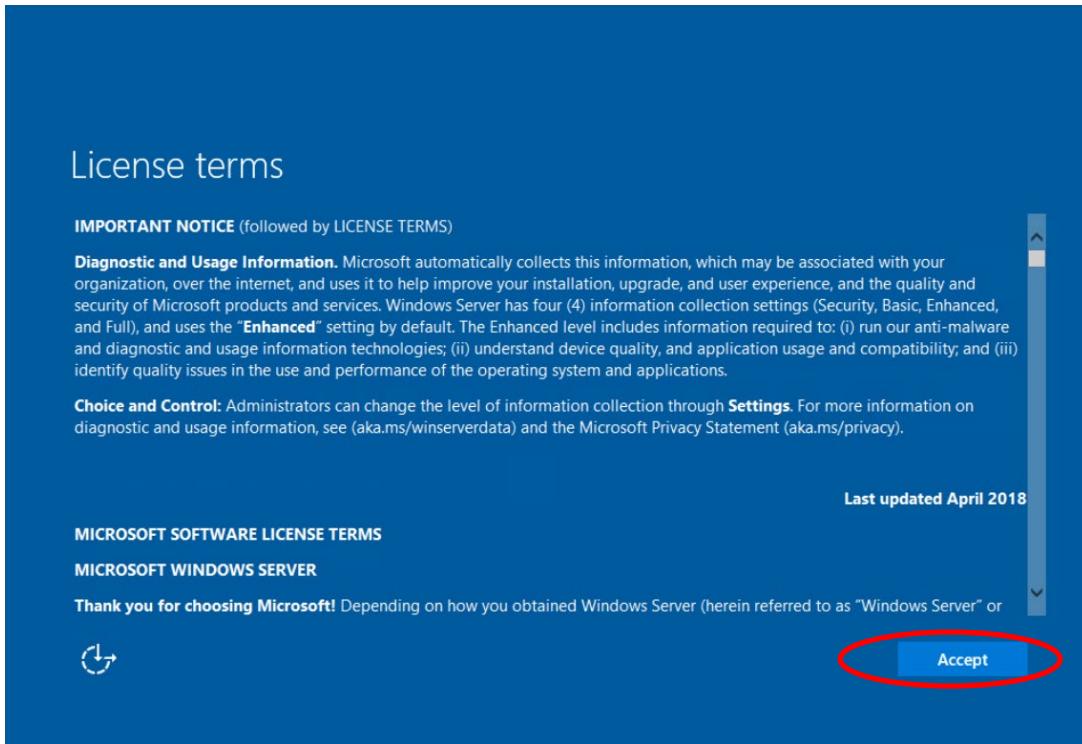
LAUNCH REMOTE CONSOLE ⓘ

LAUNCH WEB CONSOLE

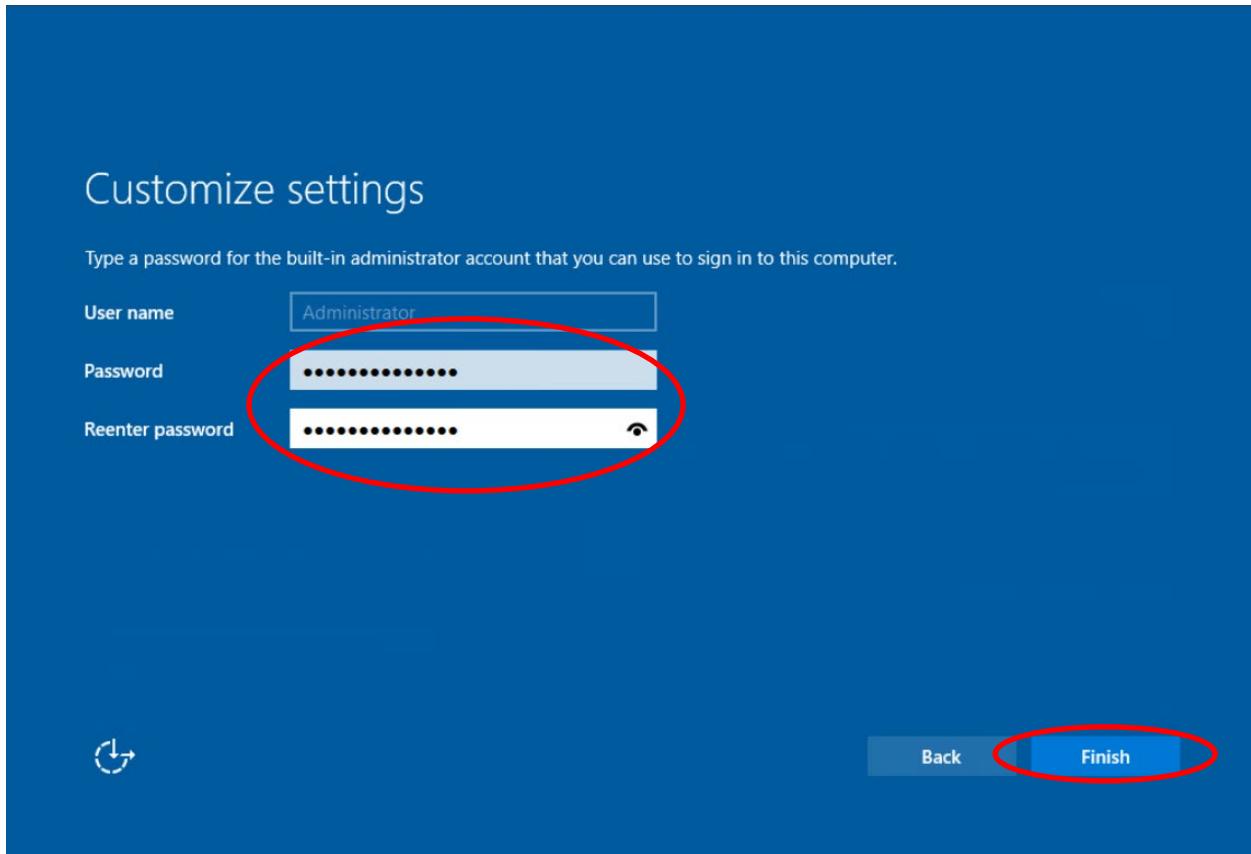
- 3) As your server is powering up, click on **Launch Web Console**. This will open the server console window in a new browser tab.



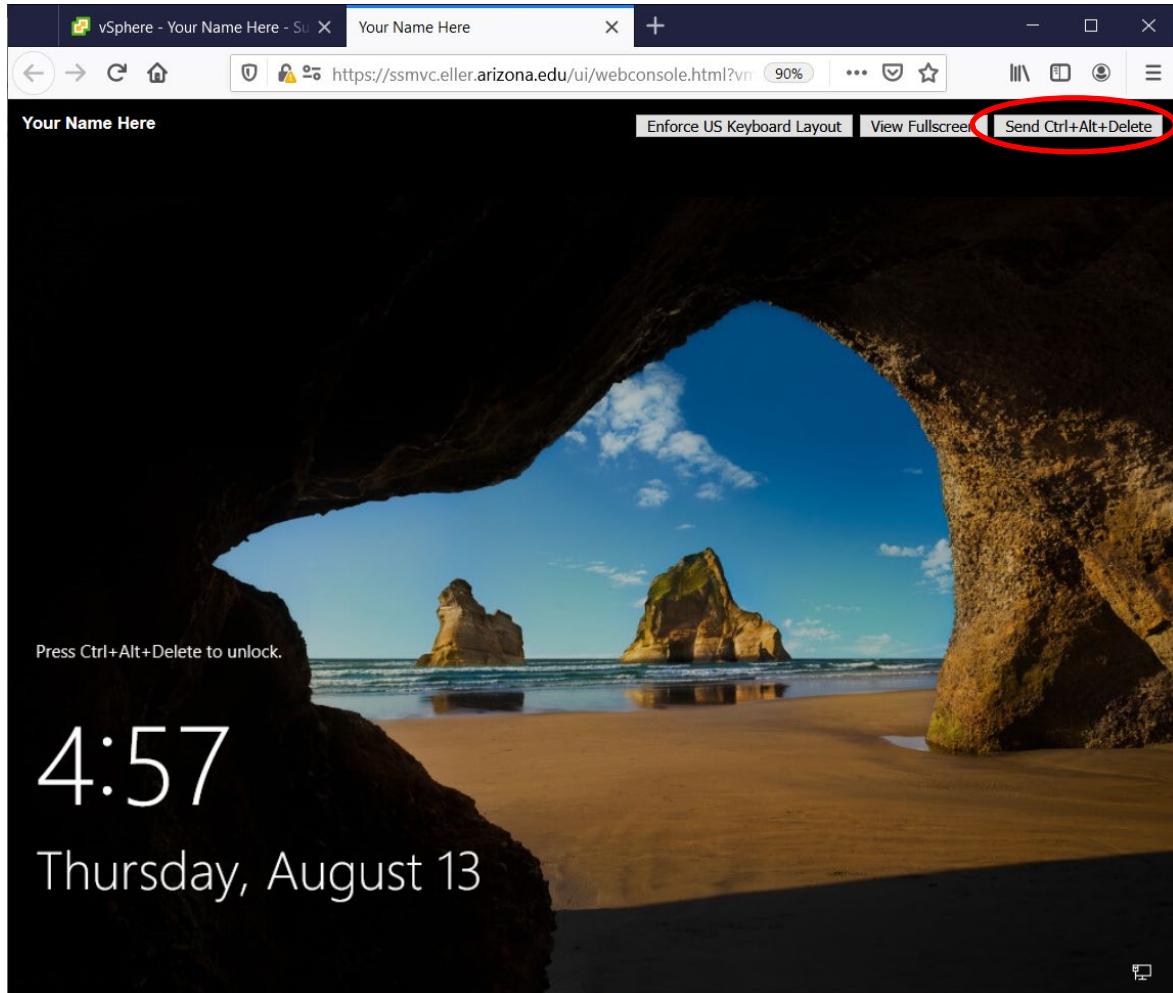
- 4) Once the server finishes booting up you will be asked to step through a few initial settings pages. Do not make any changes on the first screen and click **Next**.



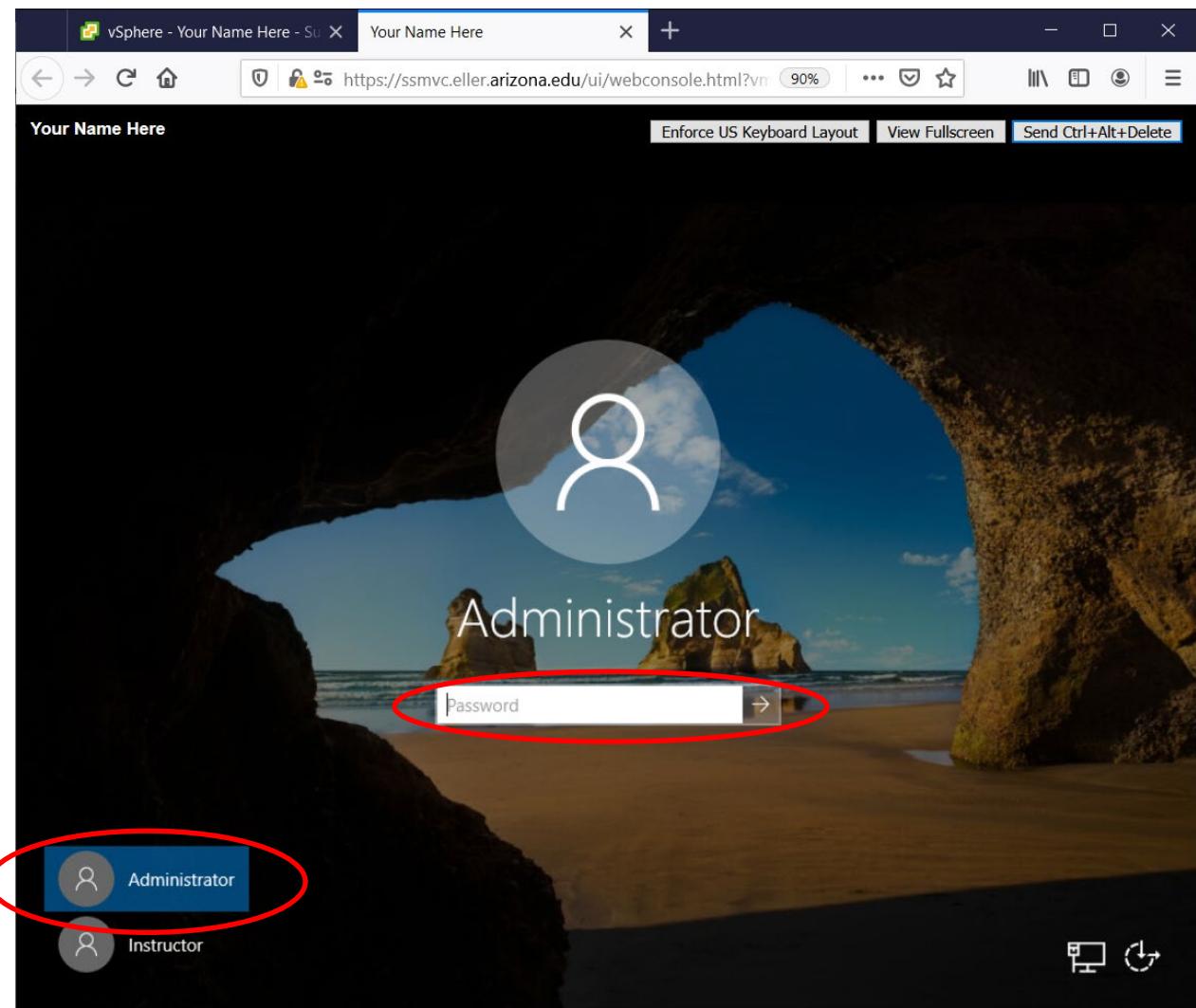
- 5) On the second screen you will find the Microsoft End User License Agreement (EULA). Click **Accept** to continue.



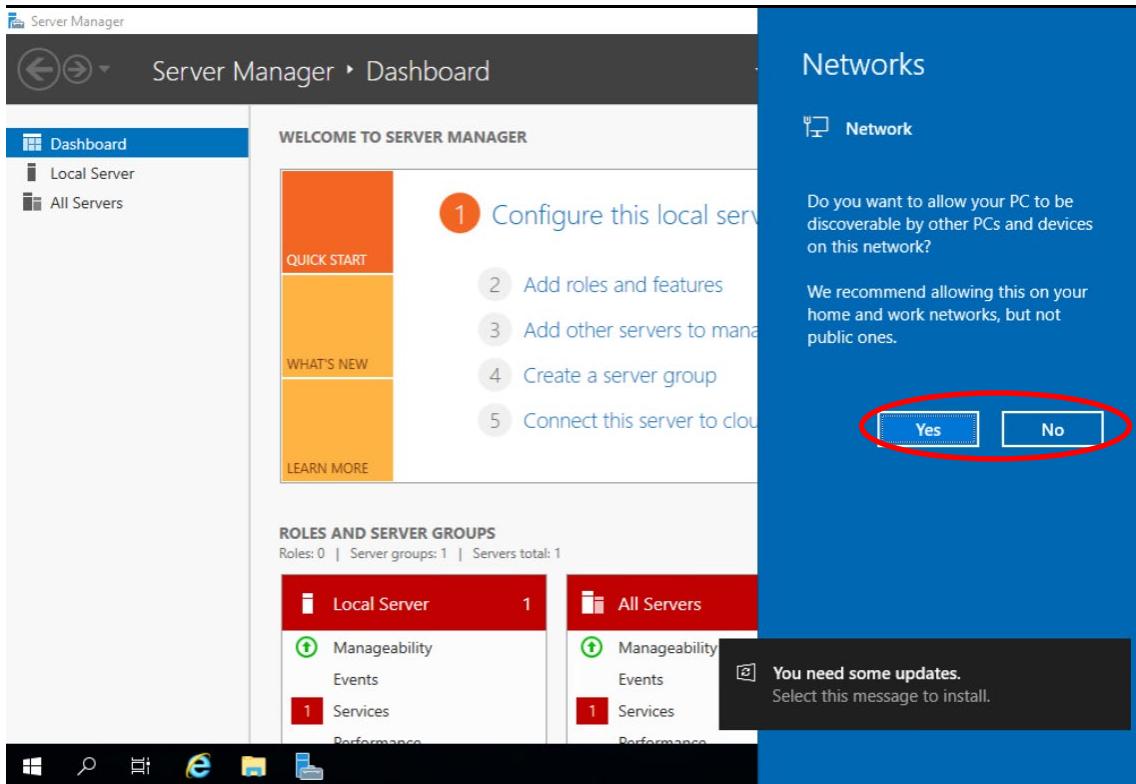
- 6) You will now create a password for the Administrator account. Enter the password you want to use twice then click **Finish**.



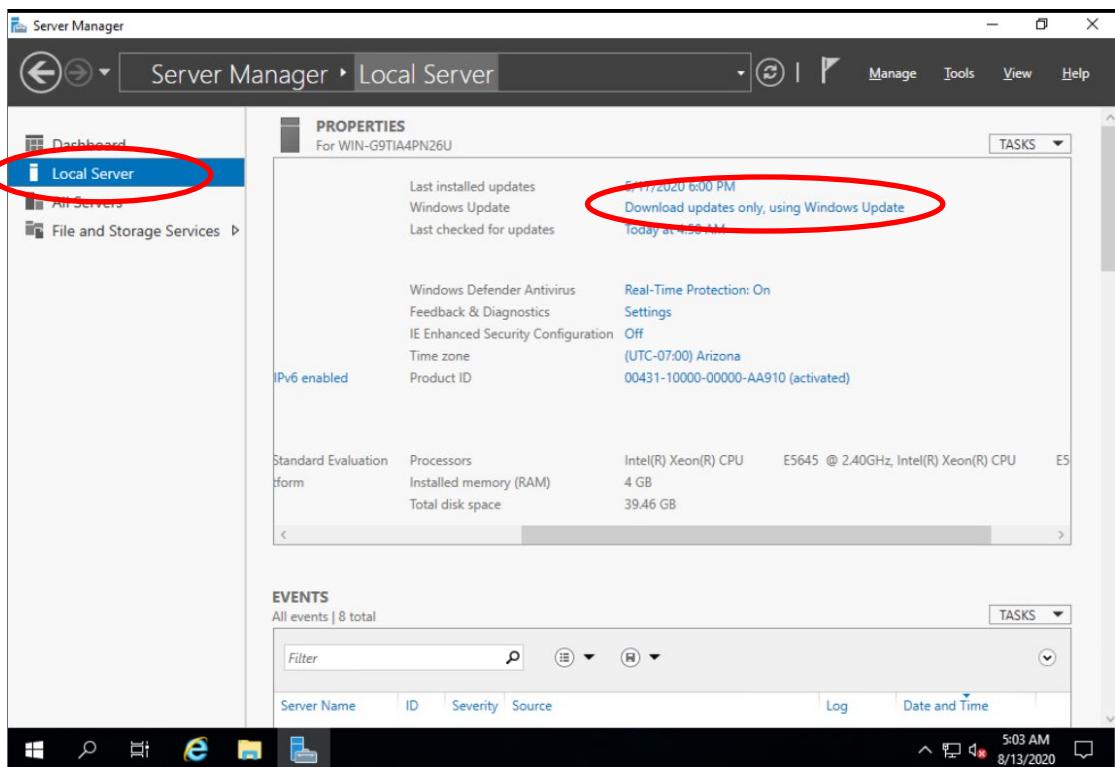
- 7) You will now need to login to your new server. Click on the **Send Ctrl+Alt+Delete** button in the upper right-hand portion of the browser window (highlighted above).



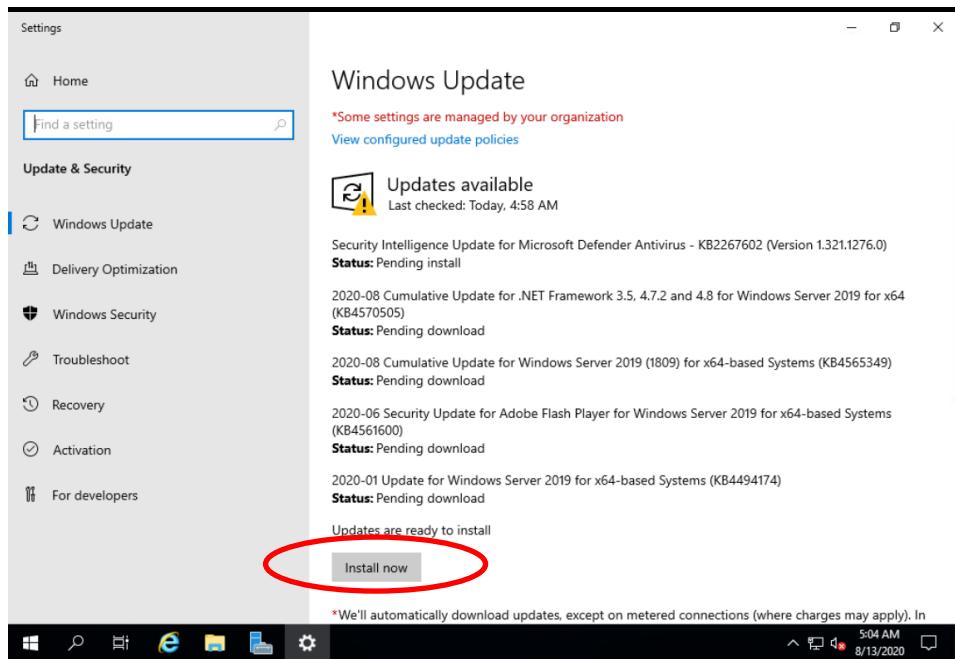
- 8) Now click on the **Administrator** user in the bottom left-hand corner of the screen.
- 9) Type in the password you just created for this account in step 6 and press the **Enter** key (**or click on the arrow**) to login.



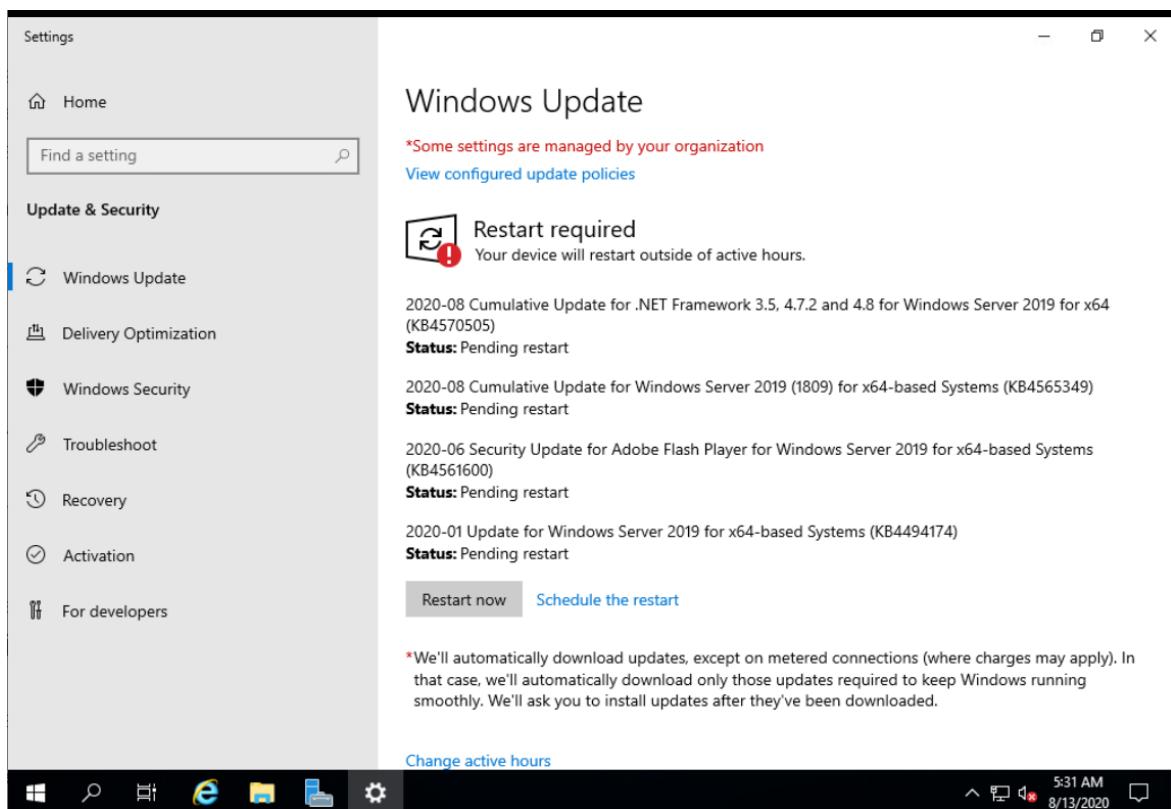
- 10) On your first login you will see a blue section on the right-side of the window asking if you want to find other PCs, etc. on the network. **You can select Yes or No, this selection does not matter for this lab.**
- 11) The window that opens automatically upon login is the Server Manager. If you accidentally close this window, you can reopen it by clicking on the icon next to the Start Menu button in the lower left-hand side of the taskbar.



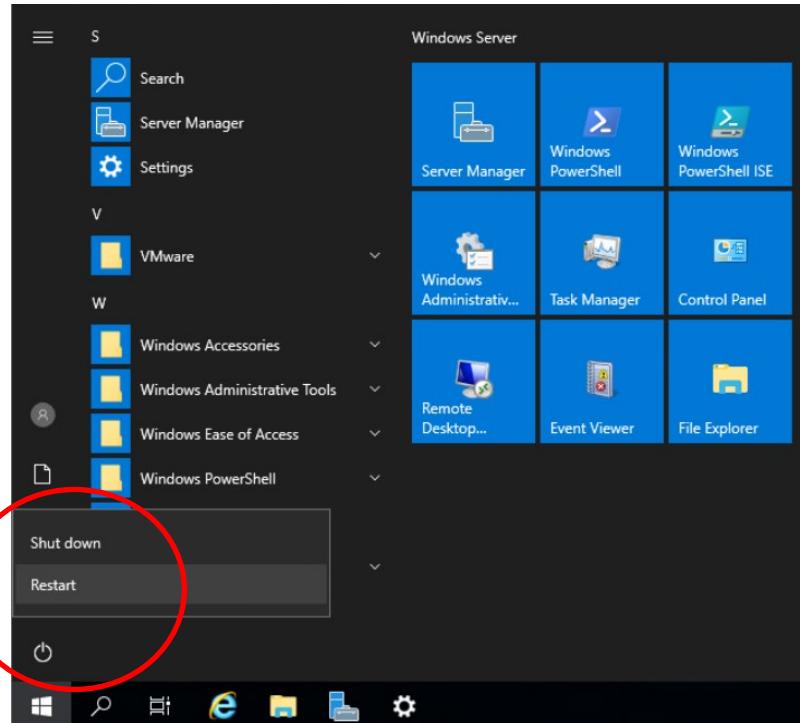
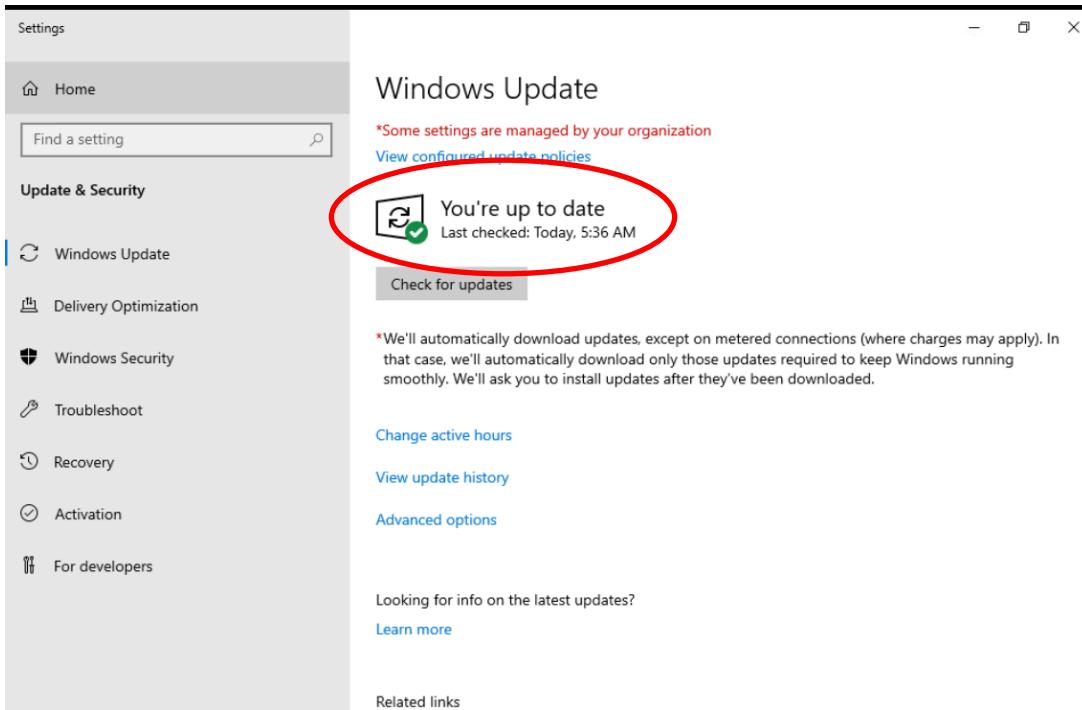
12) In Server Manager, click on **Local Server**. Once it loads you can scroll the center section to the right to see the Windows Updates area. Click on **Download updates only, using Windows Update** to open Windows Update.



13) In the Windows Update screen, click on **Install Now** to install the updates that have been already identified as being needed on your server.



- 14) Once all updates are installed you may be presented with the above screen showing it is finished and a reboot is required. Click on the **Restart Now** button to reboot your server and finish the updates.
- 15) When the server is back at the login screen, log back in and **repeat steps 12 through 15 until you are presented with a screen that says you have no further updates to install.**

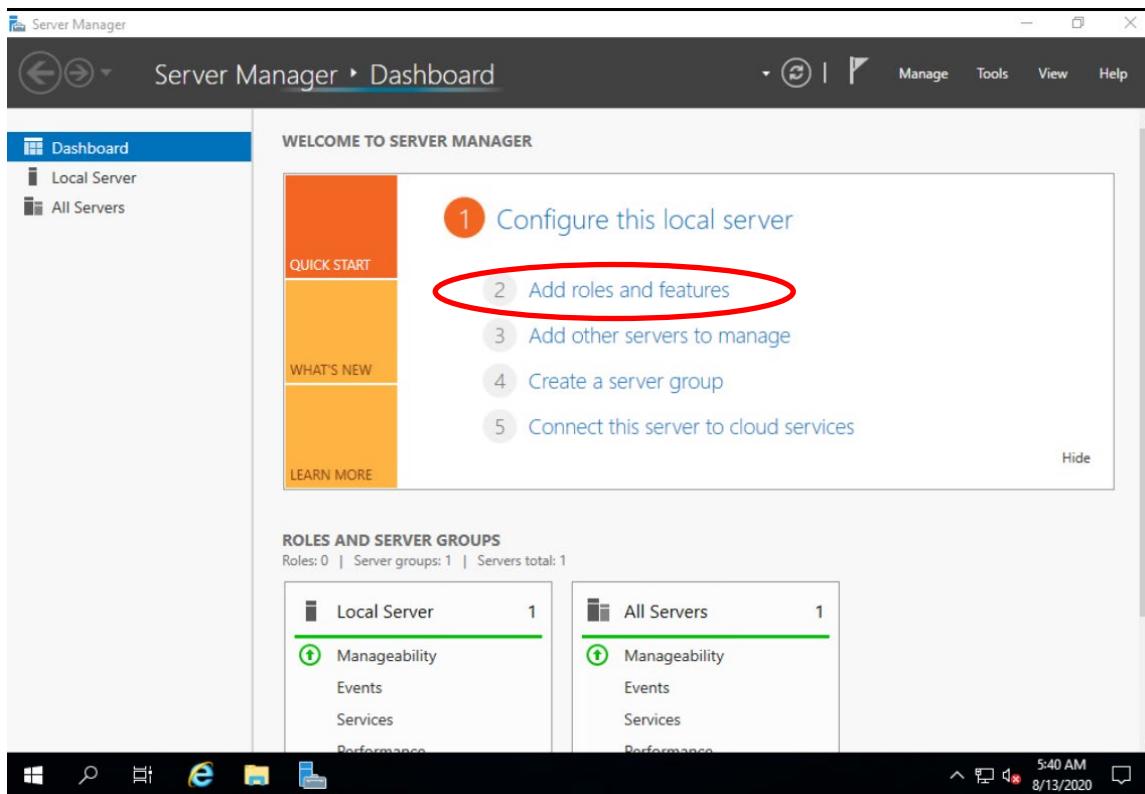


- 16) Once you have installed all Windows Updates, you should reboot your server anyway. The reason for this is some of the DNS and AD components may not install unless you reboot first. Click on the **Start** button in the lower left corner of

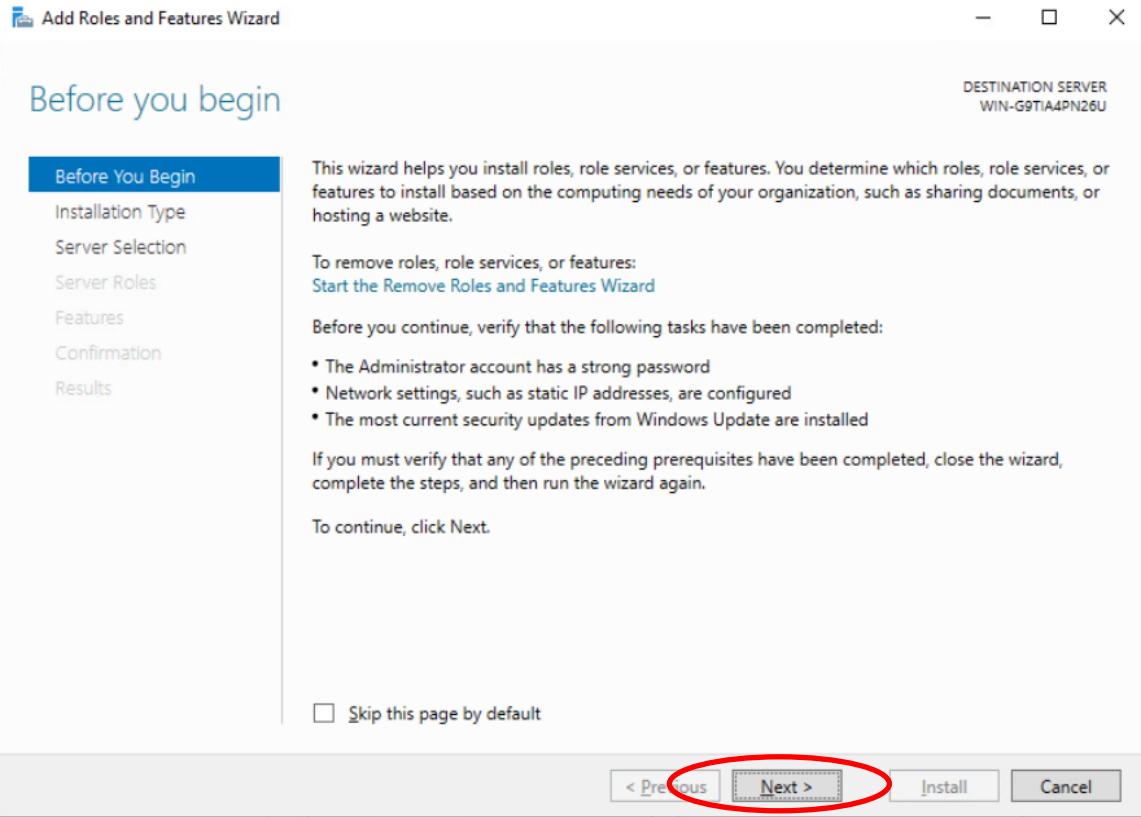
the screen to bring up the Start screen. Click on the **power button** and choose **Restart** from the menu.

4. Install & Configure DNS Services

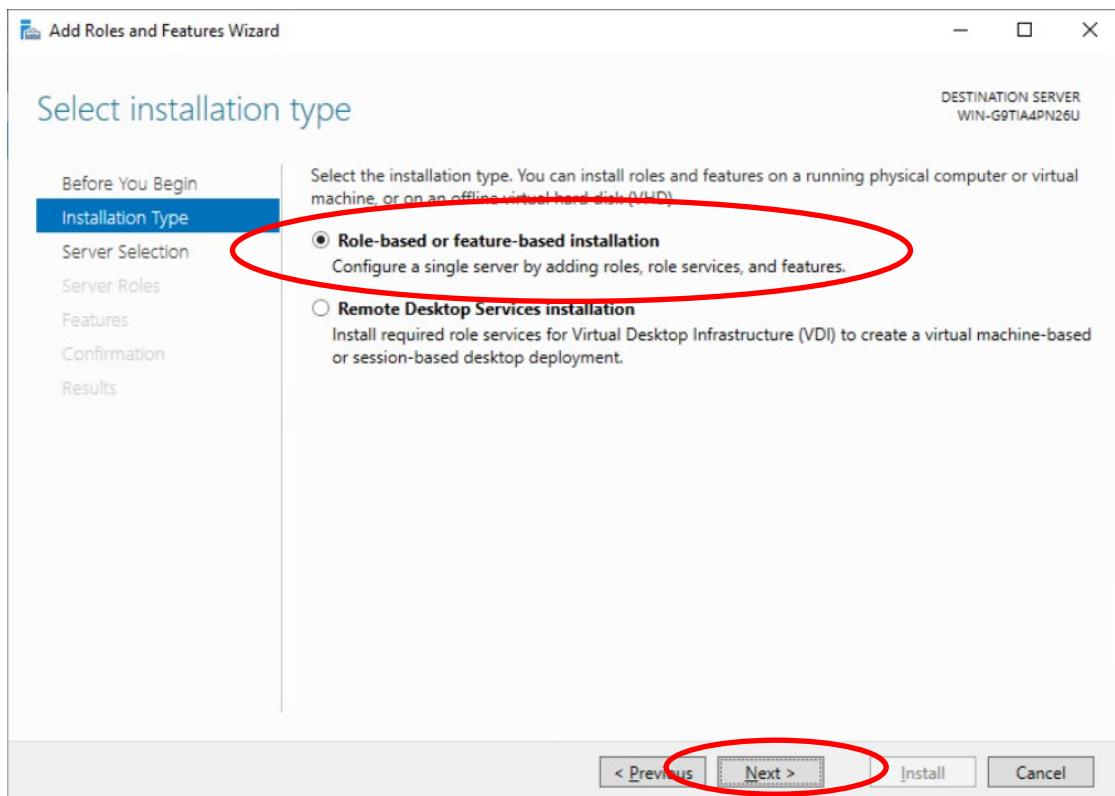
- 1) After the reboot, log back in and **open the Server Manager** (the first icon on the Taskbar) if it does not come up automatically.



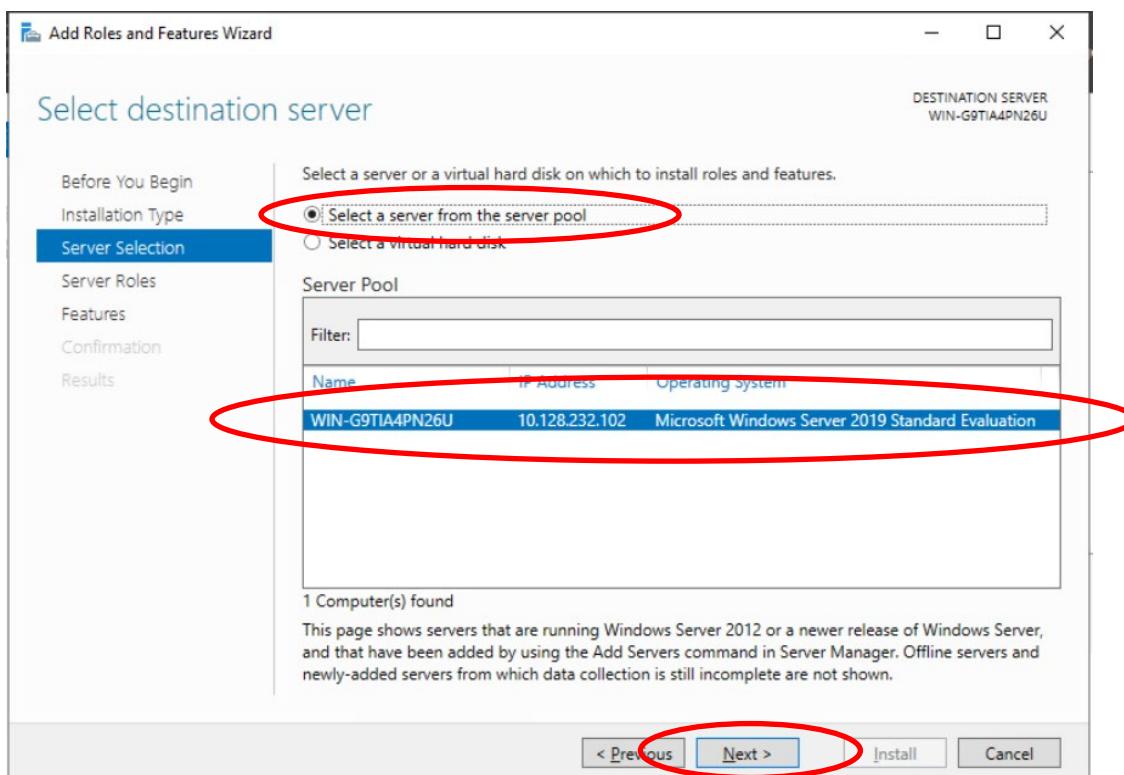
- 2) You should be presented with the Dashboard. Click on the option to **Add Roles and Features**.



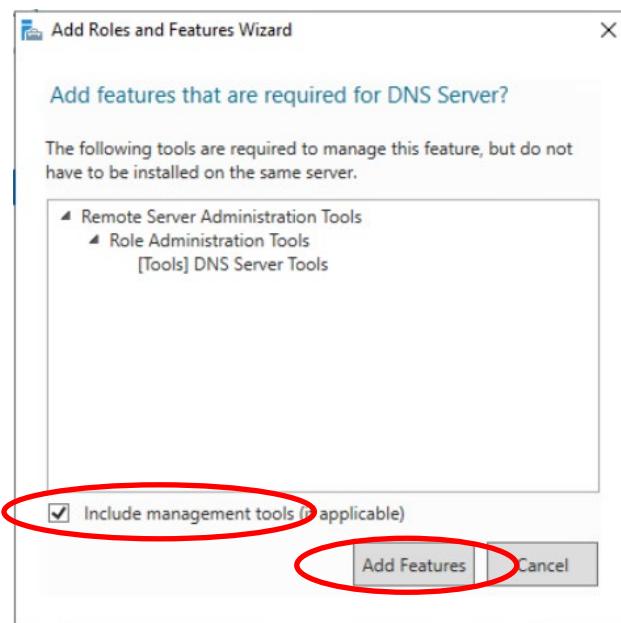
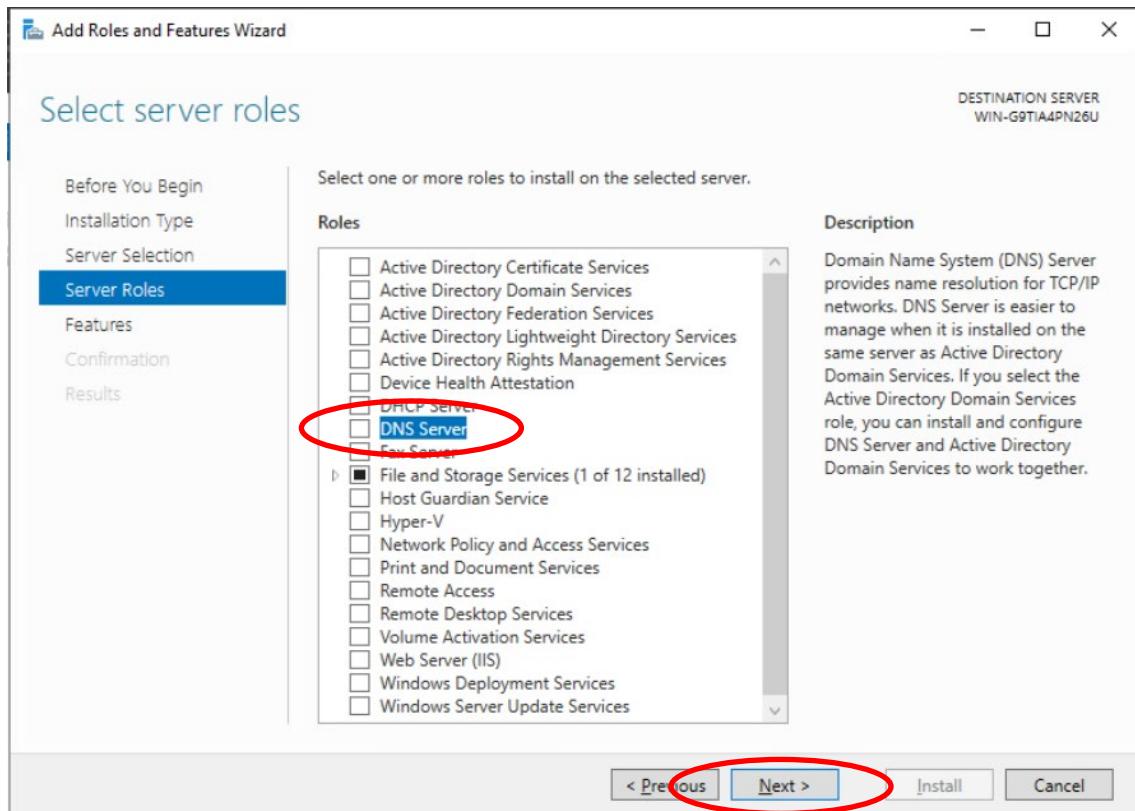
- 3) This will start the Add Roles and Features wizard. The first page is an overall explanation of the wizard. Click on the **Next** button to continue.



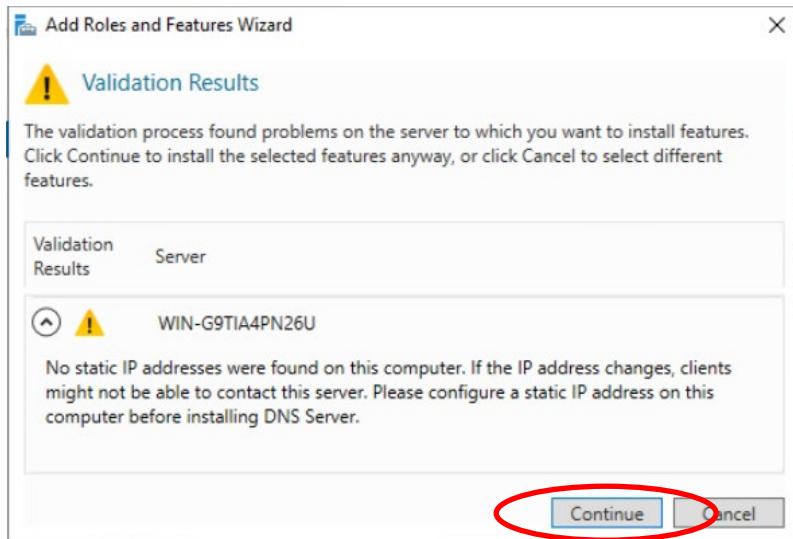
- 4) Select the option to do a **Role-based or Feature-based installation** and click **Next**.



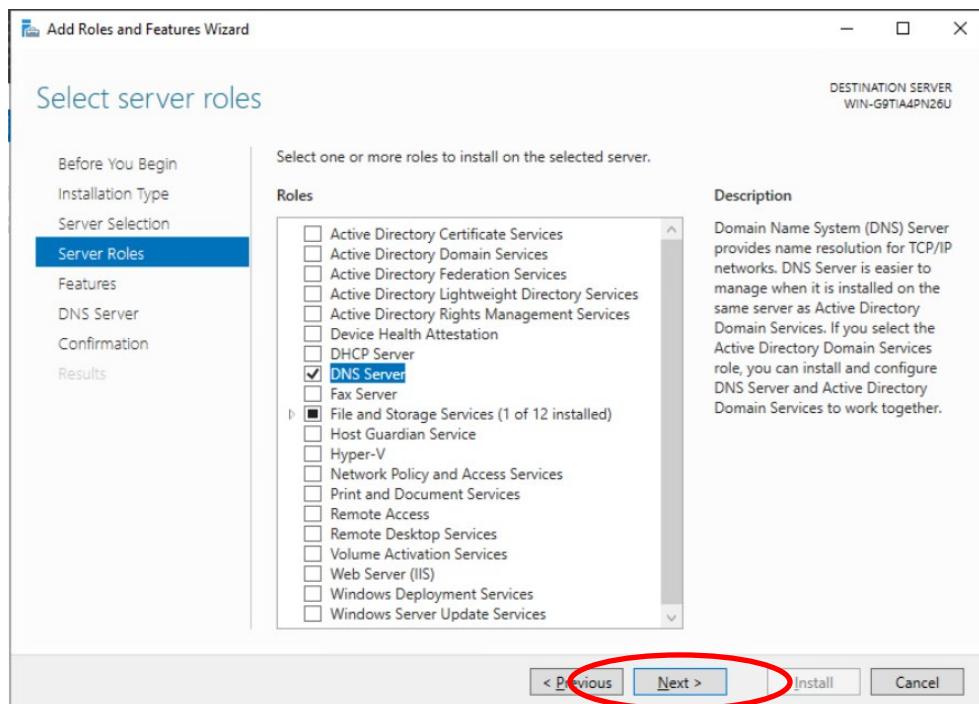
- 5) Select the destination server by choosing the radio button option to **Select a server from the server pool** and *make sure your server is highlighted*. Click **Next** to continue.



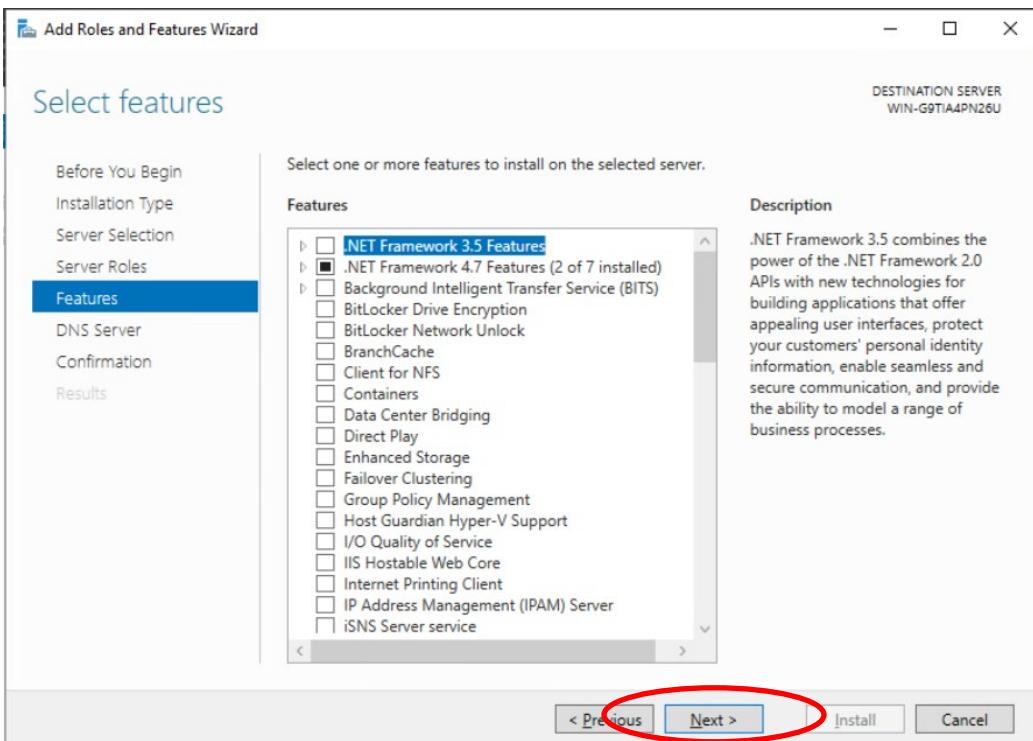
- 6) Check the option for a **DNS Server** role. Once you check this box, you will be presented with a box that tells you additional features will be required in order to install a DNS server. Make sure the **Include management tools** box is checked and click on the **Add Features** button.



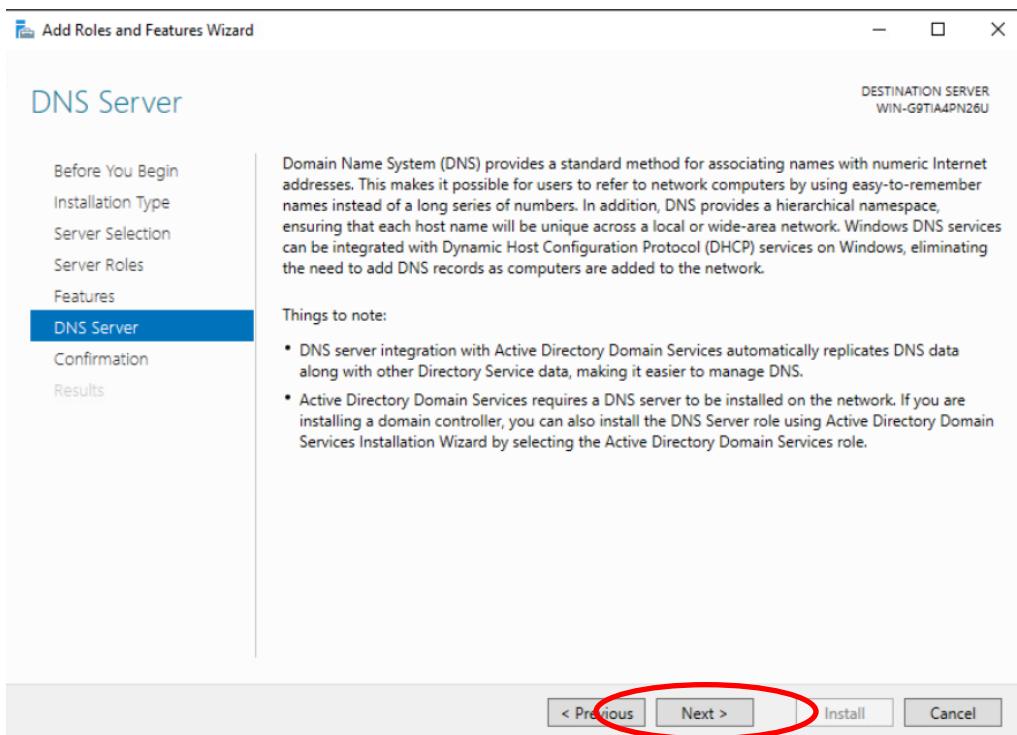
- 7) You will now be presented with a warning when the server is validating your selection. This error is letting you know that you are not currently using a static IP address. *This is OK*. For the purposes of the lab a static IP address is not required. Click **Continue** to proceed.



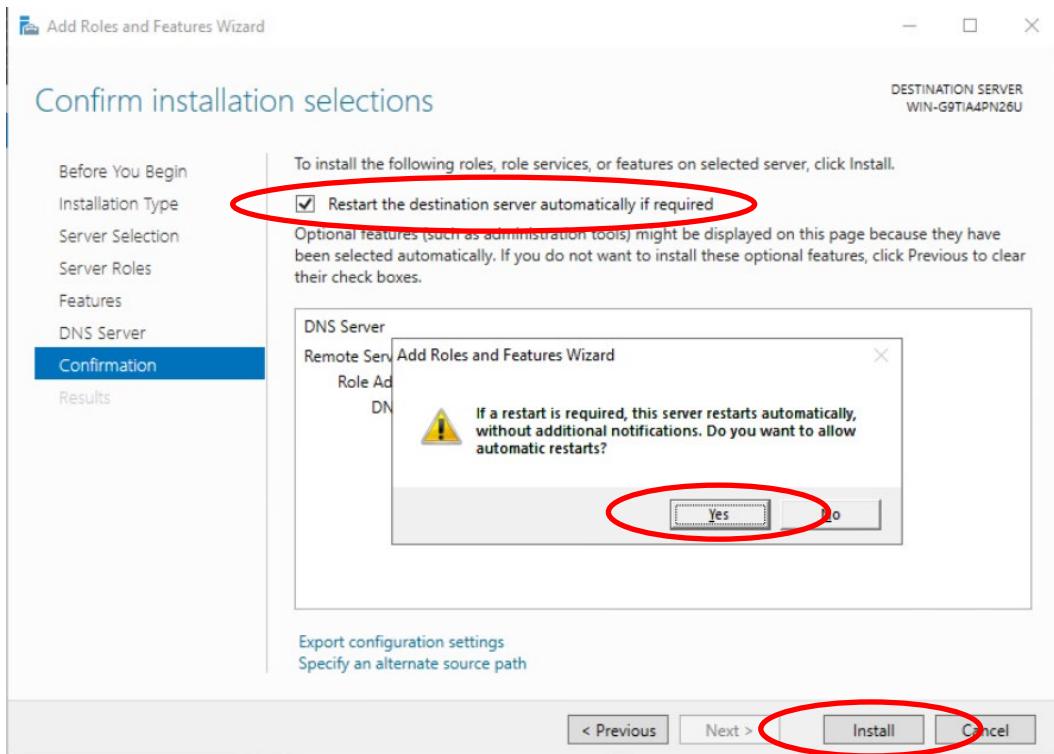
8) Click **Next** to continue.



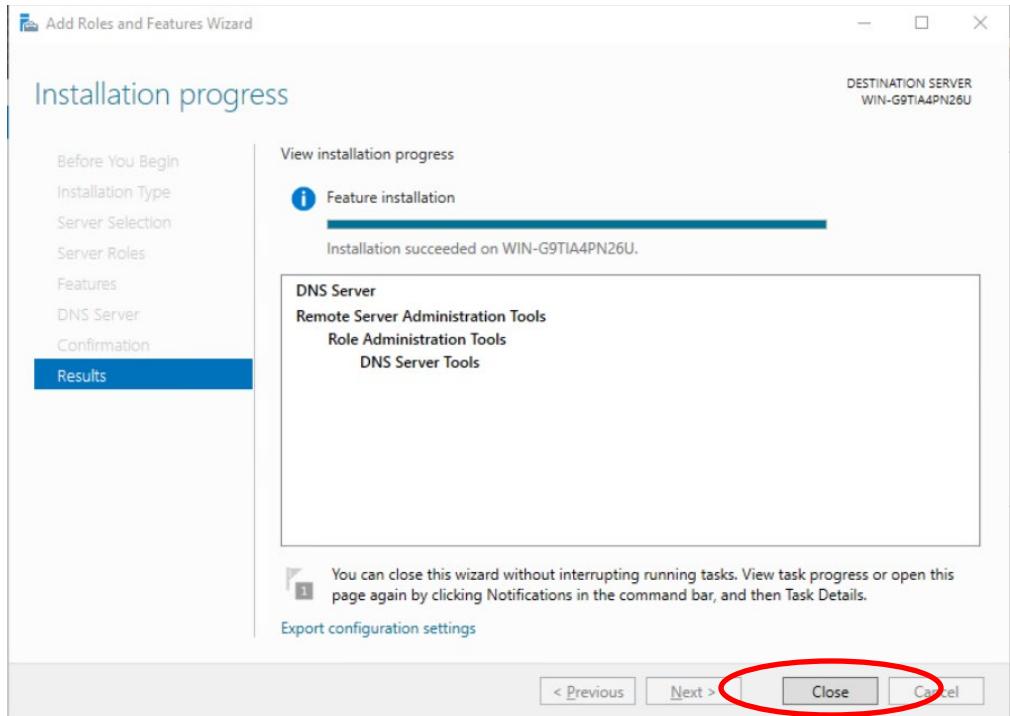
9) You can now select features you want to install on the server. None are required at this time, so click **Next** to continue.



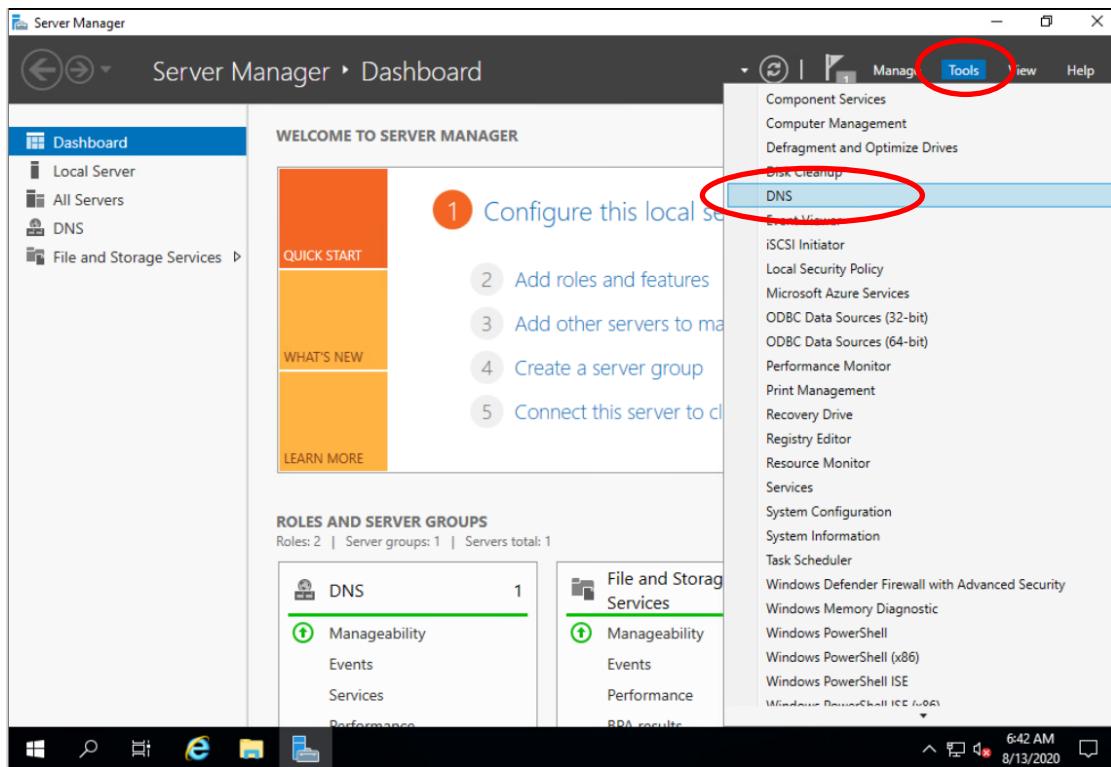
- 10) You are now presented with a page explaining what a DNS server is used for and some information on how it can be integrated with Active Directory. Click **Next** to continue.



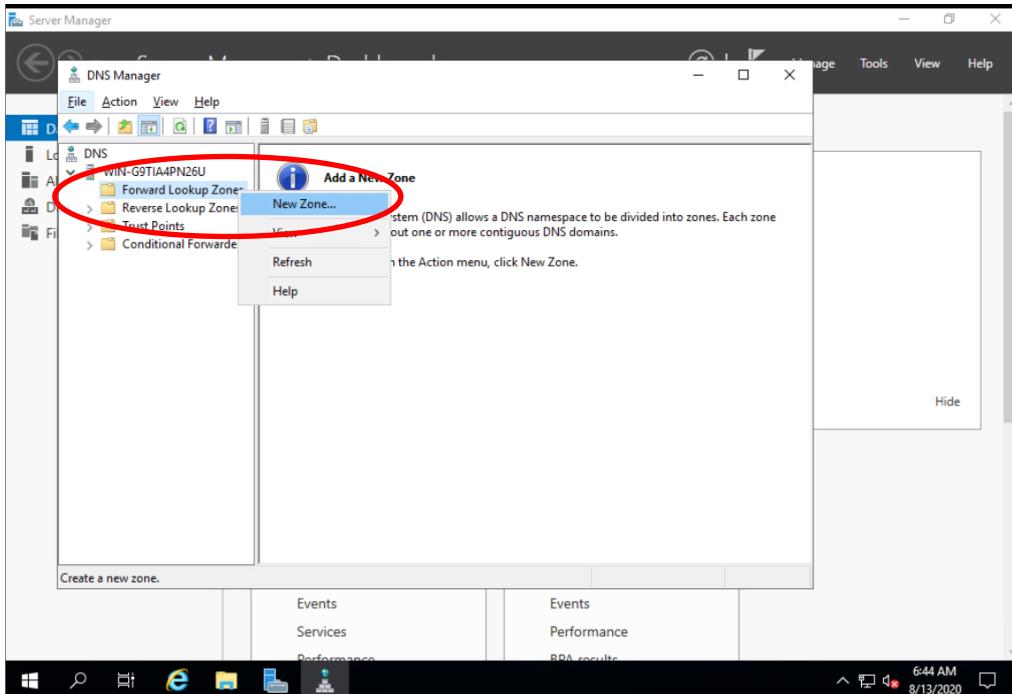
- 11) Now you need to confirm the installation. Check the box to **Restart the destination server automatically if required**. You will immediately see a pop-up window that asks you to confirm you want to automatically restart if necessary. Click **Yes** to continue, then click the **Install** button.



- 12) When the install finishes you will see a message on the screen under the progress bar that states the Installation succeeded. Click on the **Close** button to end the wizard.
- 13) With the DNS Role installed, you will now need to configure your DNS Server.



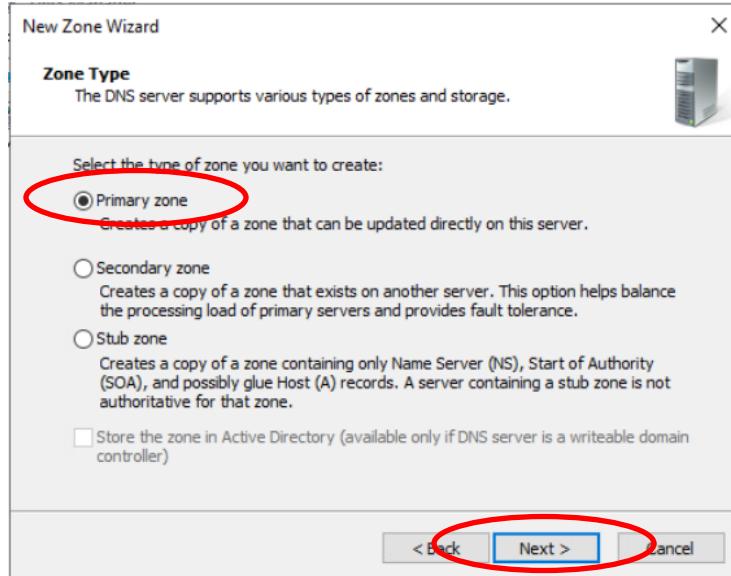
- 14) On the upper right-hand menu in Server Manager click on the **Tools** menu and click on **DNS** from the list.



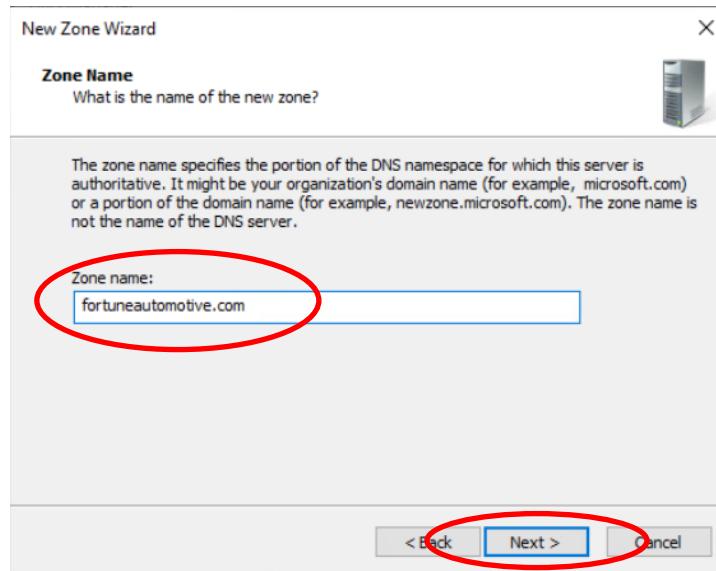
- 15) Once the DNS Manager loads you will need to setup several areas. Let's begin with creating a Forward Lookup Zone. A forward lookup zone maps server names to IP addresses, so when you point a web browser to a specific Uniform Resource Locator (URL), the DNS server tells the browser which IP Address to go to on the network. First left click on the **Forward Lookup Zone** to select it, then right click on the **Forward Lookup Zone** folder and choose **New Zone**.



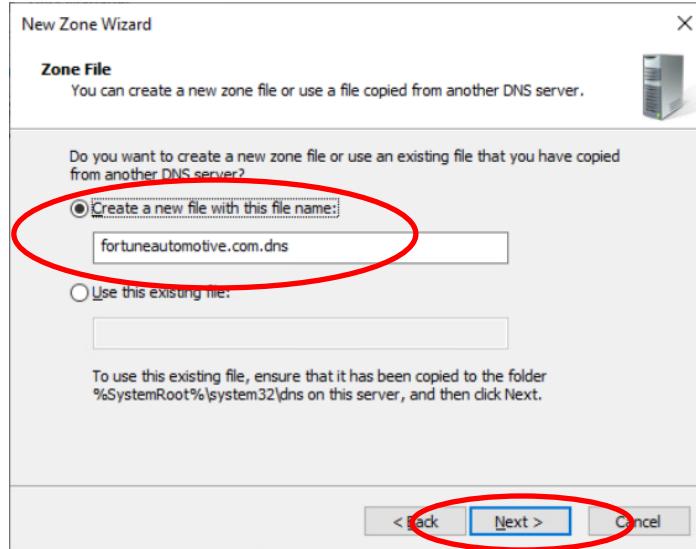
- a. On the **Welcome to the New Zone Wizard** screen, click **Next** to continue.



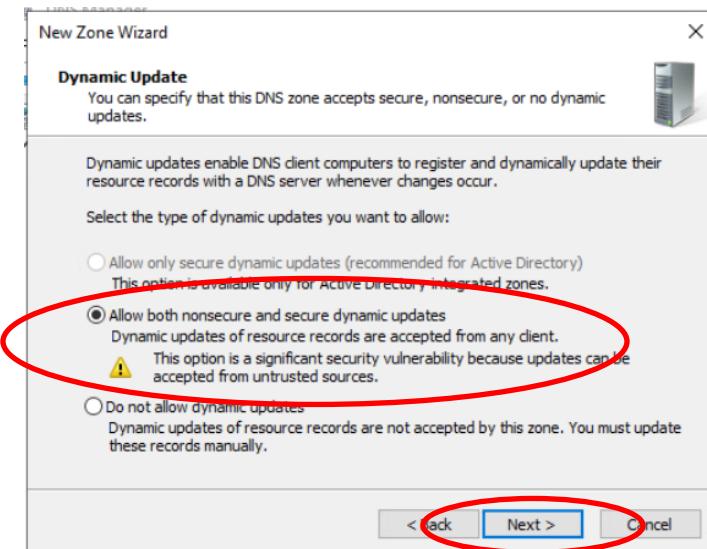
- b. You will need to create a **Primary Zone**. Make sure this option is selected and click **Next** to continue.



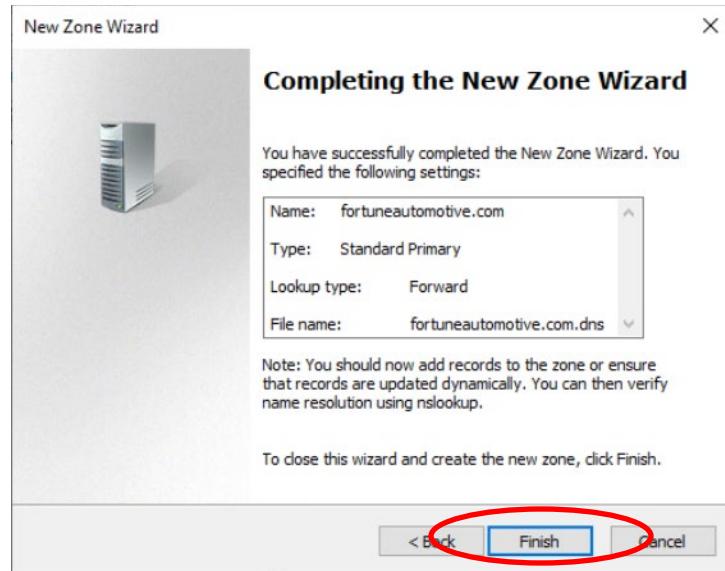
- c. For your zone name, use “fortuneautomotive.com” (no quotes) and click **Next** to continue.



- d. On the next page, make sure the wizard has automatically selected the option to **Create a new file with this file name**. The text box should be automatically filled in with “fortuneautomotive.com.dns.” Click **Next** to continue.

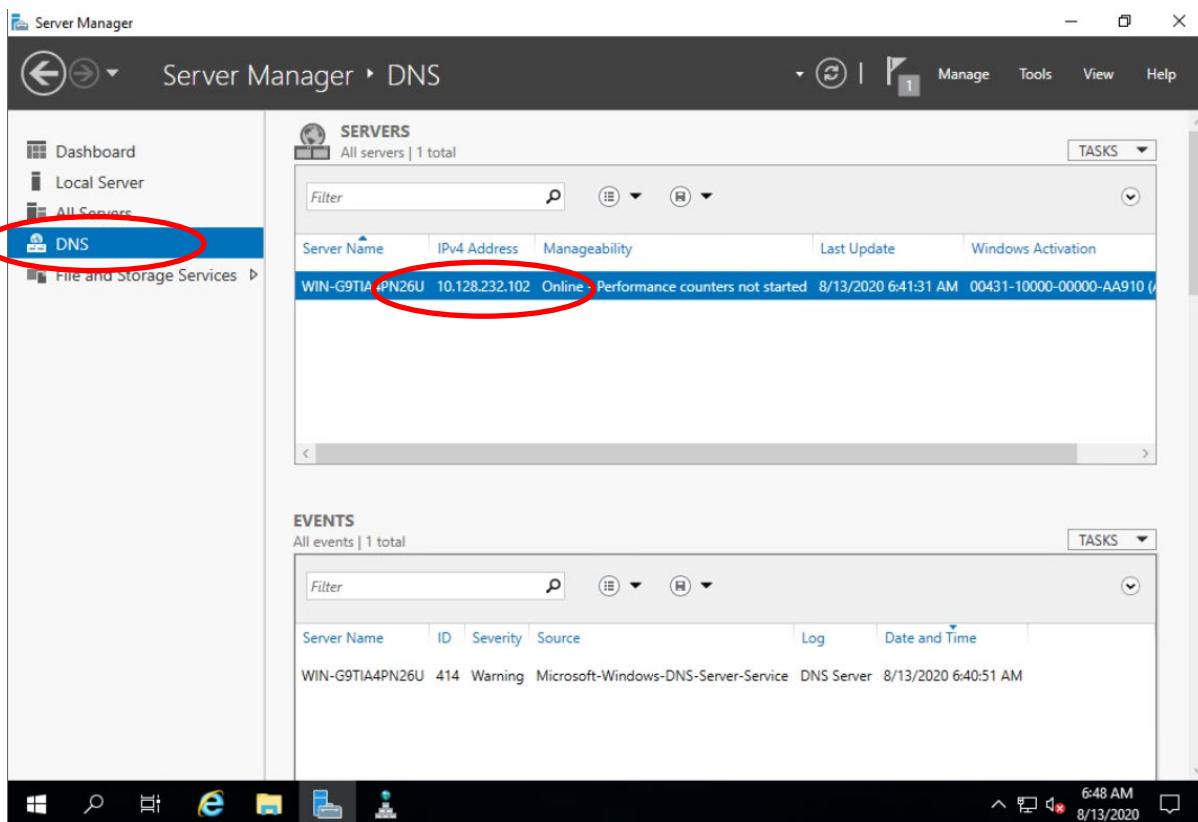


- e. On the Dynamic Update screen, select the option to **Allow both nonsecure and secure dynamic updates** and click **Next** to continue (this is required for new installs of active directory and can be changed later).

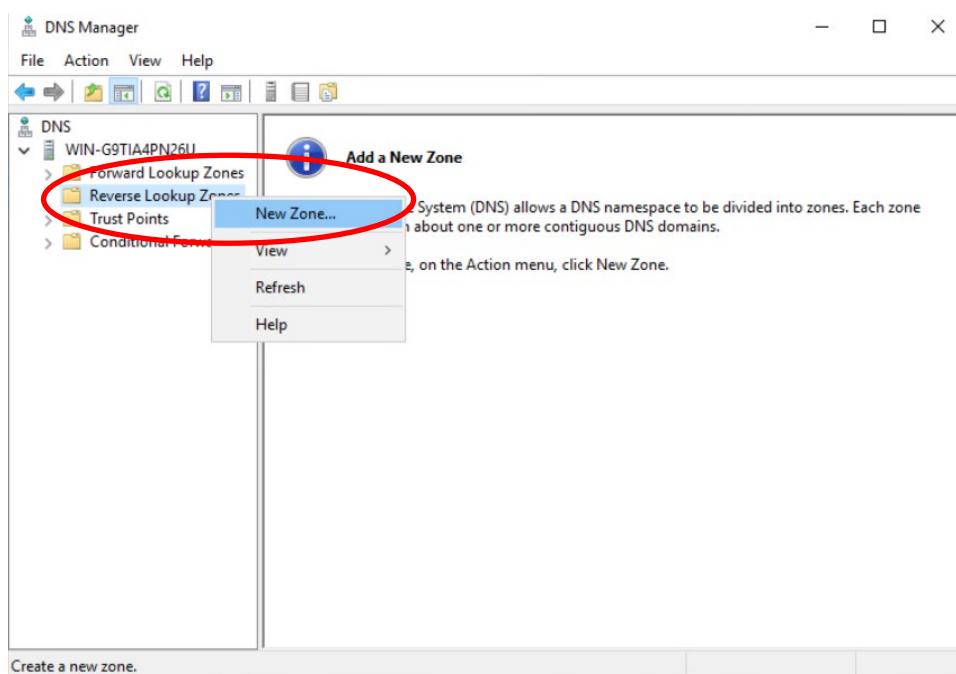


- f. This final screen will verify the options you selected. Click **Finish** to close the wizard and create the new forward lookup zone.

- 16) Next you need to create a Reverse Lookup Zone. This does the exact opposite of a forward lookup zone in that it maps IP Addresses to server names. This is necessary in order to provide complete information for clients.
 - a. When creating a reverse lookup zone, you need to know which IP subnet your server has obtained an IP Address on. To find this out, do the following:



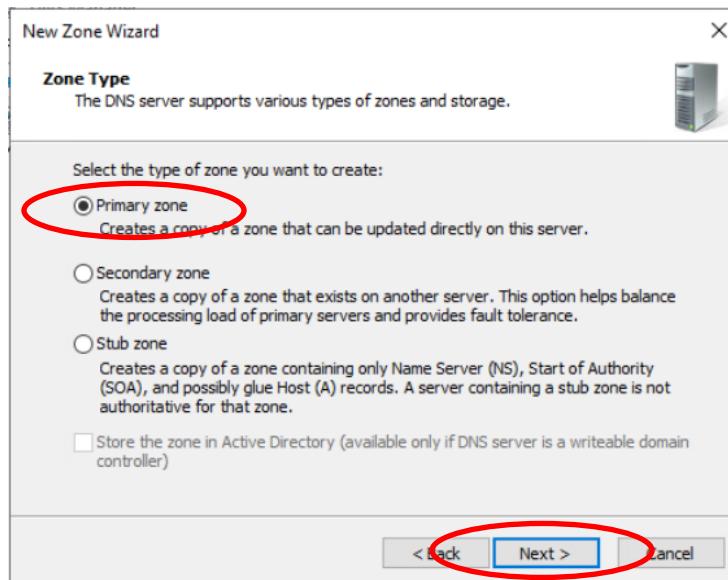
- i. In the Server Manager, click on the DNS option on the left-hand side of the window.
- ii. In the center of the window will be your server's name and the IPv4 address. **Write down the IP Address listed in this window.**



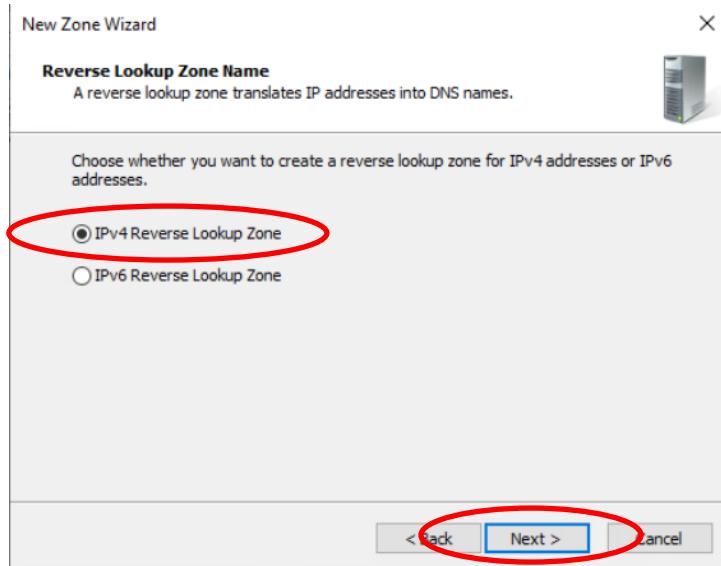
- b. Back in the DNS Manager, left click on the **Reverse Lookup Zone** folder to select it, then right click on the **Reverse Lookup Zone** folder and choose **New Zone**.



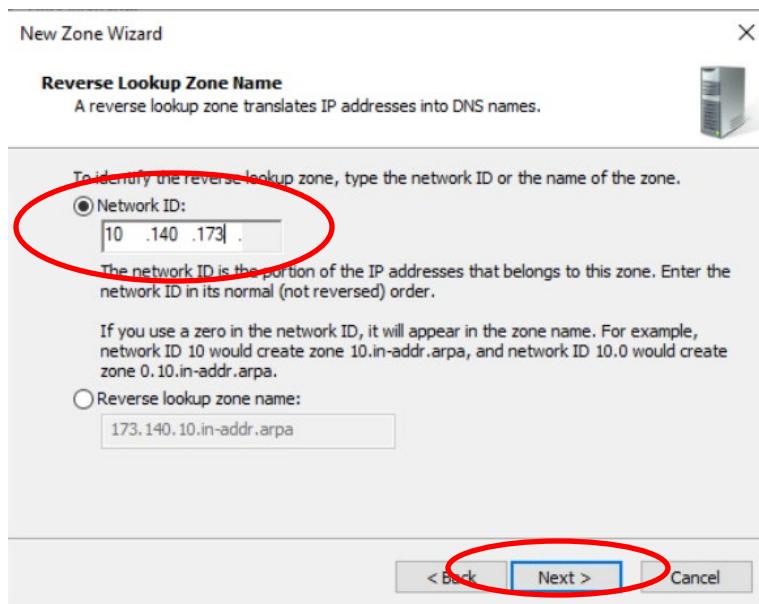
- c. On the **Welcome to the New Zone Wizard** screen, click **Next** to continue.



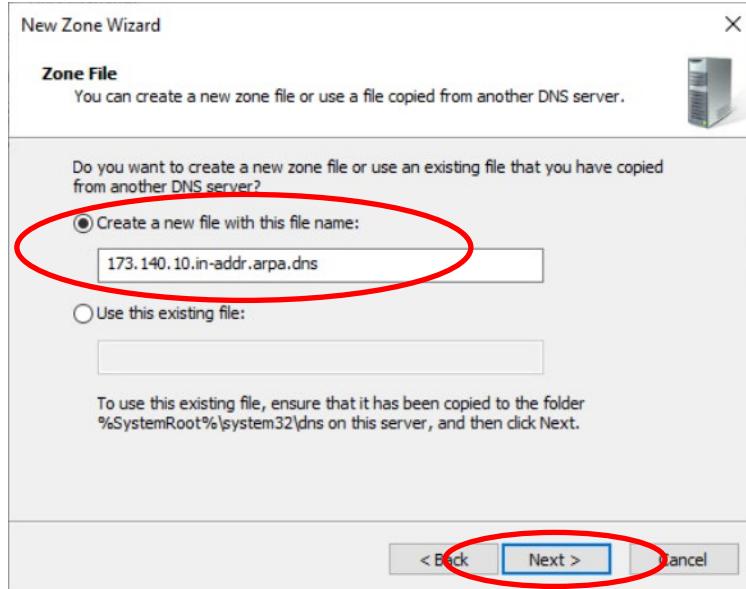
- d. You will need to create a **Primary Zone**. Make sure this option is selected and click **Next** to continue.



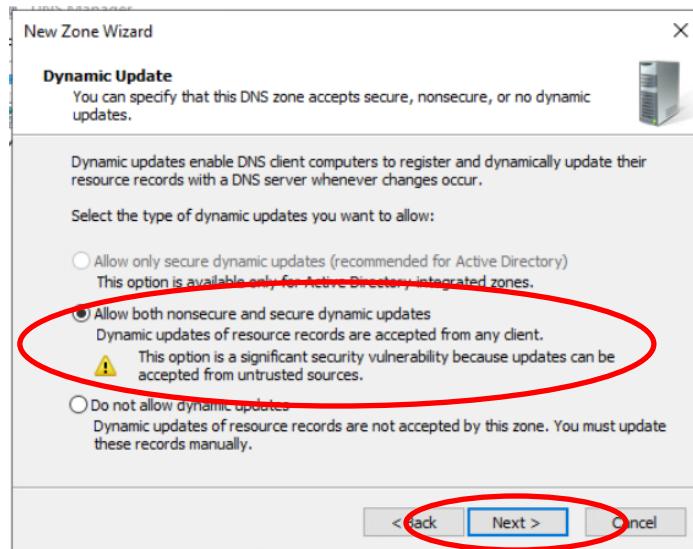
- e. Select the option to create an **IPv4 Reverse Lookup Zone** and click **Next** to continue.



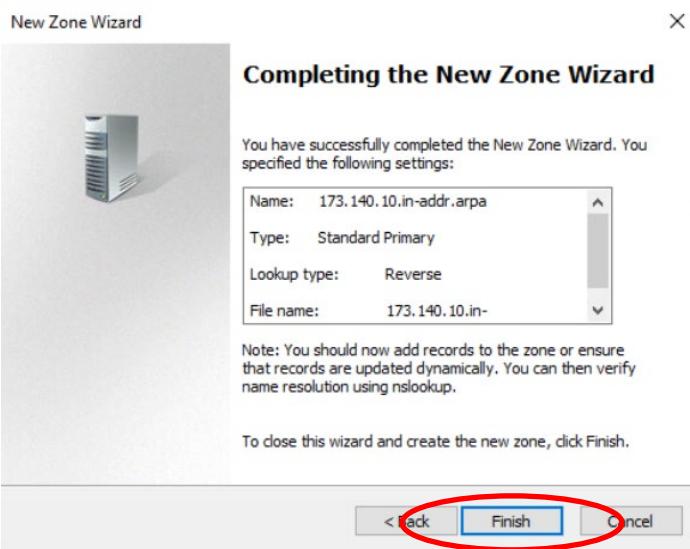
- f. On the Network ID screen, type in a Network ID using the first three octets in the IP Address you wrote down (e.g. if your IP Address was 10.140.173.27, your Network ID would be 10.140.173). Click **Next** to continue.



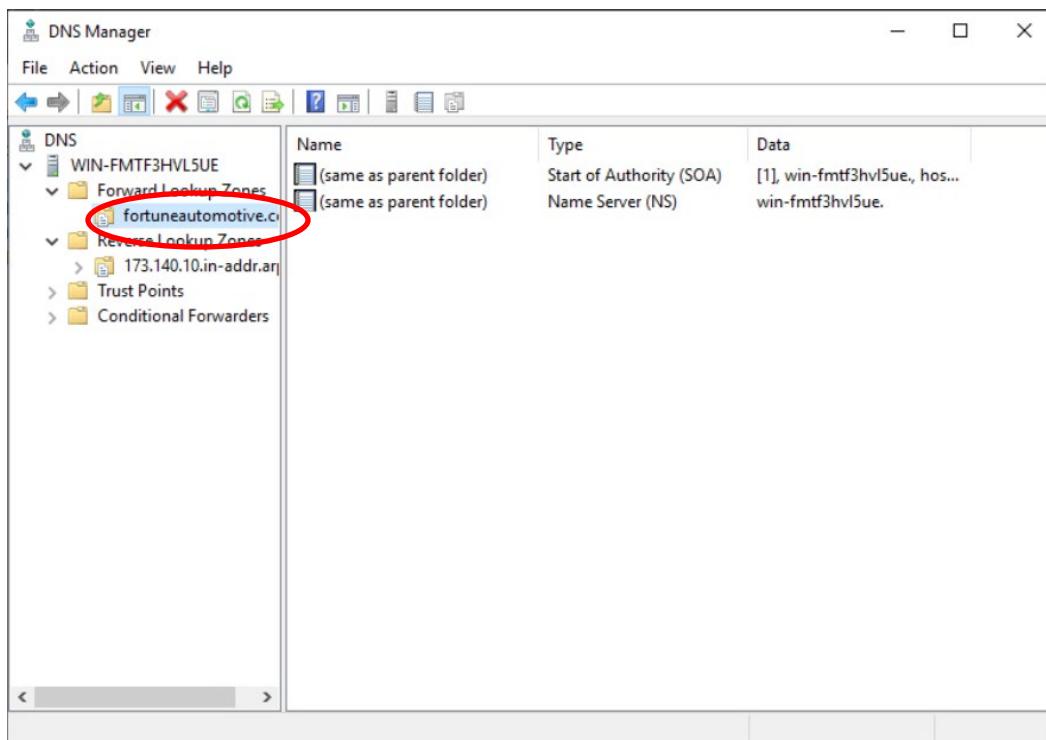
- g. On the Zone File screen, make sure the wizard has automatically selected the option to **Create a new file with this file name**. The text box should be automatically filled in (e.g. using the example above, "173.140.10.in-addr.arpa.dns"). Click **Next** to continue.



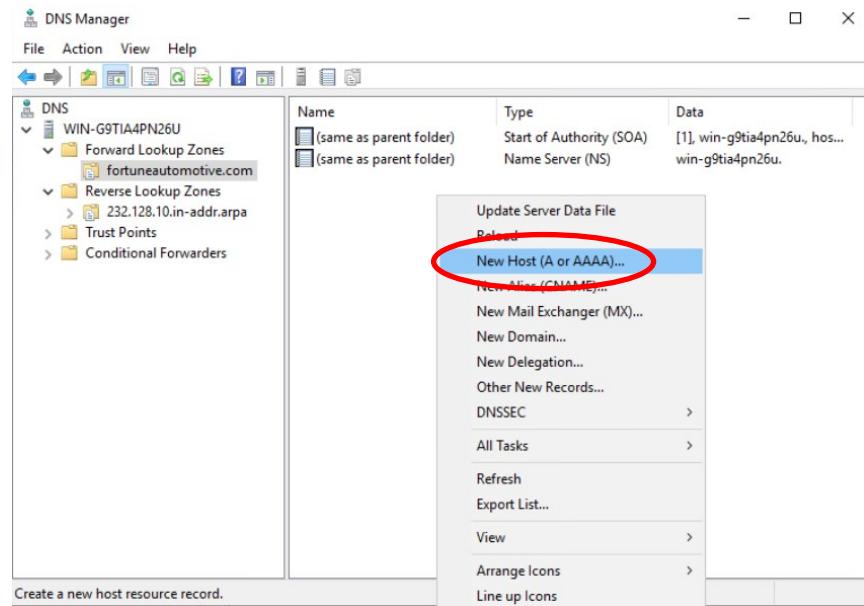
- h. On the Dynamic Update screen, select the option to **Allow both nonsecure and secure dynamic updates** and click **Next** to continue (this is required for new installs of active directory and can be changed later).



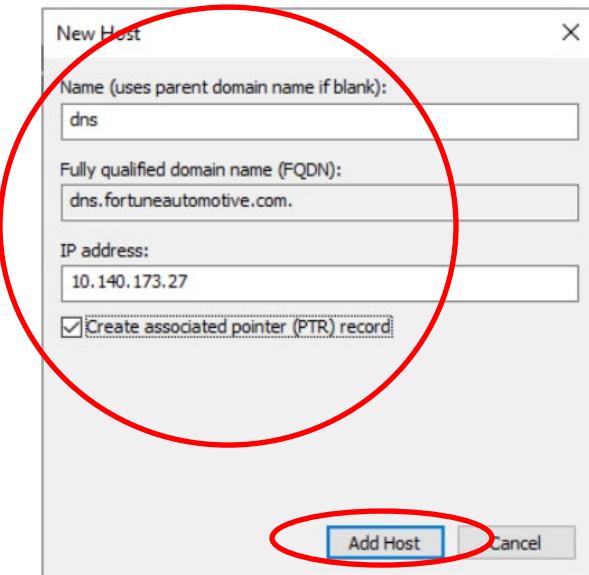
- i. This final screen will verify the options you selected. Click **Finish** to close the wizard and create the new forward lookup zone.



- 17) Now that both zones have been created, you should create a DNS entry for your server. Expand the Forward Lookup Zone folder and left click on your named zone (e.g. fortuneautomotive.com). In the right-hand window, do the following:

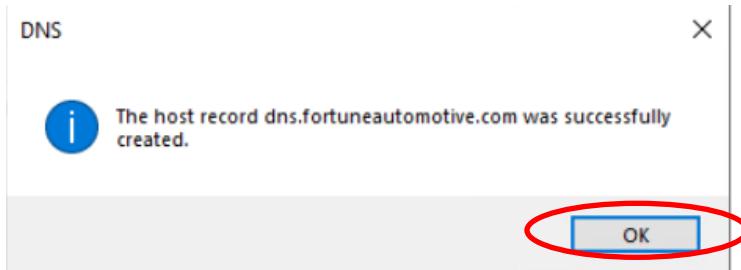


- a. Right click anywhere in the window and choose **New Host (A or AAAA)**.

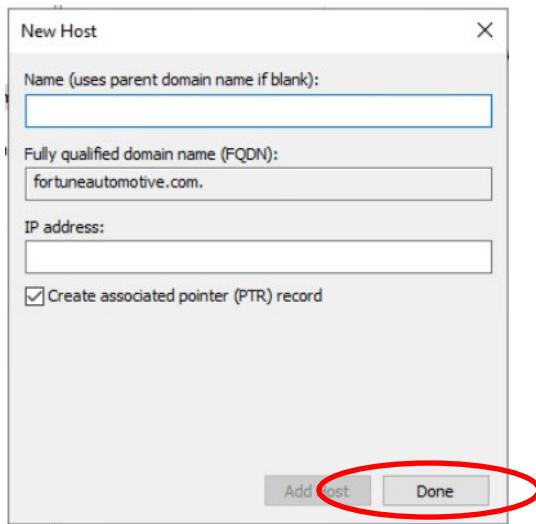


- b. For the **Name**, type in “dns” without the quotes. Note that the Fully Qualified Domain Name (FQDN) will change to “dns.fortuneautomotive.com”.
c. In the **IP Address** field, type in the address you wrote down earlier (e.g. 10.140.173.27).

- d. Check the box to **Create an Associated Pointer (PTR) Record**. This will automatically create an entry in the Reverse Lookup Zone folder. Click the **Add Host** button to continue.

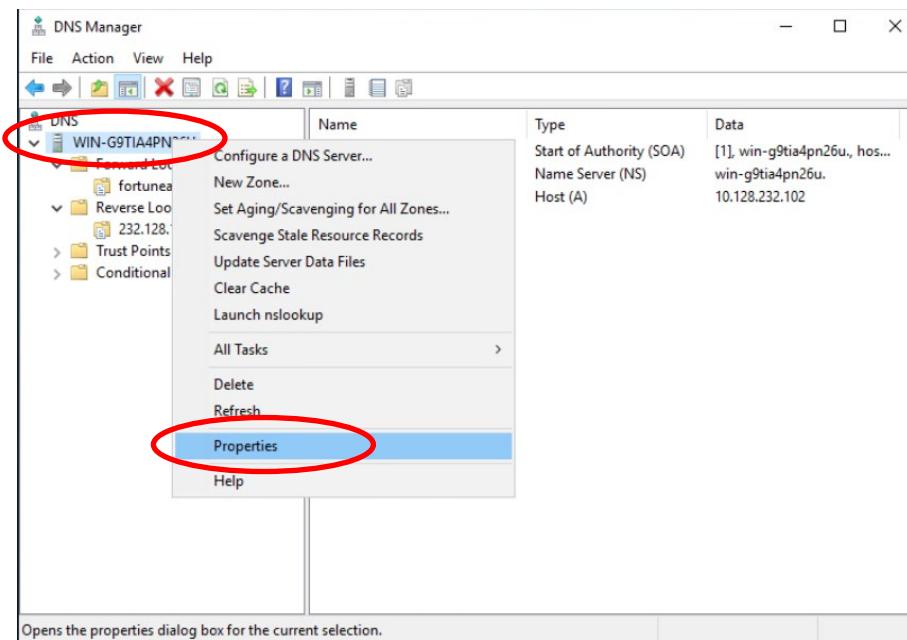


- e. A text box will appear confirming the creation of the new host entry. Click **OK** to continue.

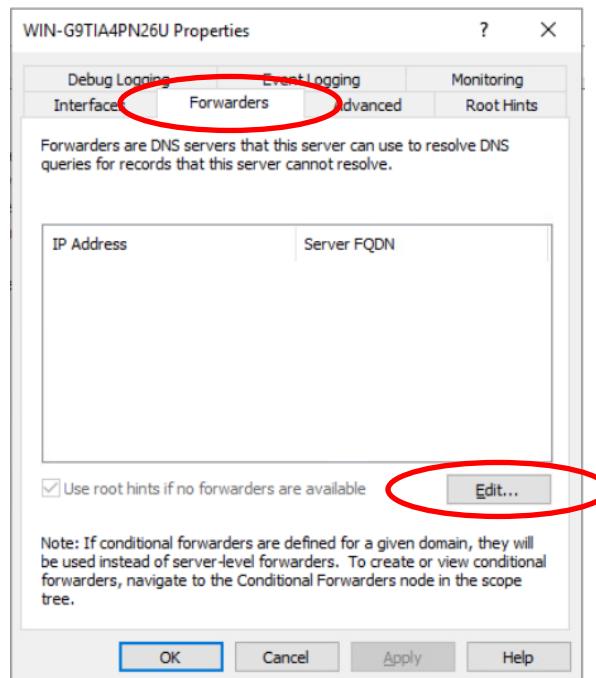


- f. Click **Done** to close the Add Host wizard.

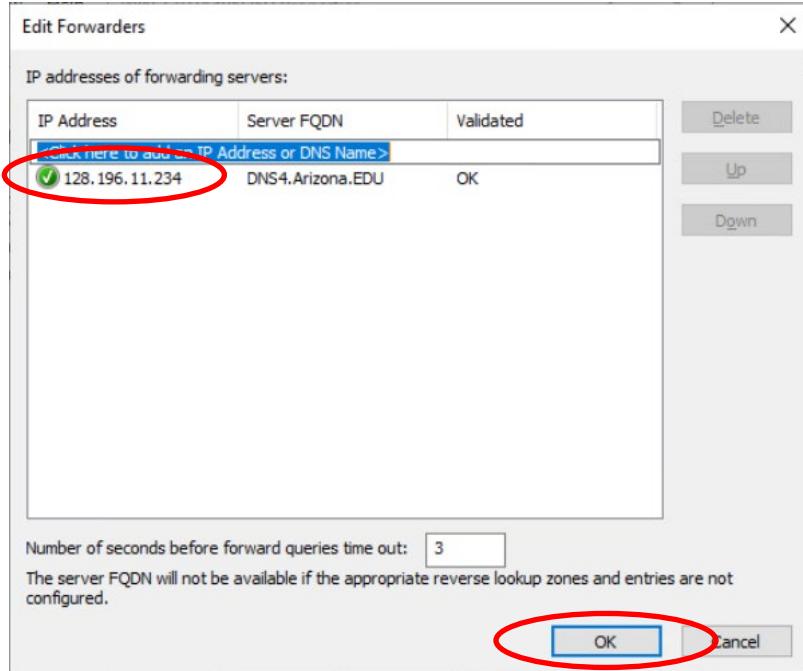
- 18) Next you need to configure the server's forwarder setting. What this does is tell the DNS server that if it should receive requests for a server name it does not know, then the server should forward the request to another DNS server. Do the following:



- In the left-hand window, right click on the Server name (just below DNS – should be something like “WIN-G9TIA4PN26U”) and choose **Properties** from the list.



- Click on the **Forwarders** tab and click the **Edit...** button.

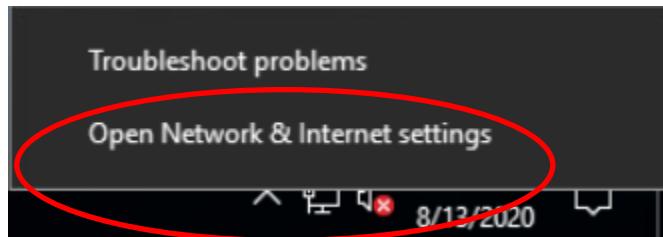


- c. Type in the following IP Address: **128.196.11.234** and hit the **Enter** key.
- d. You should now see the address with a green check mark next to it.

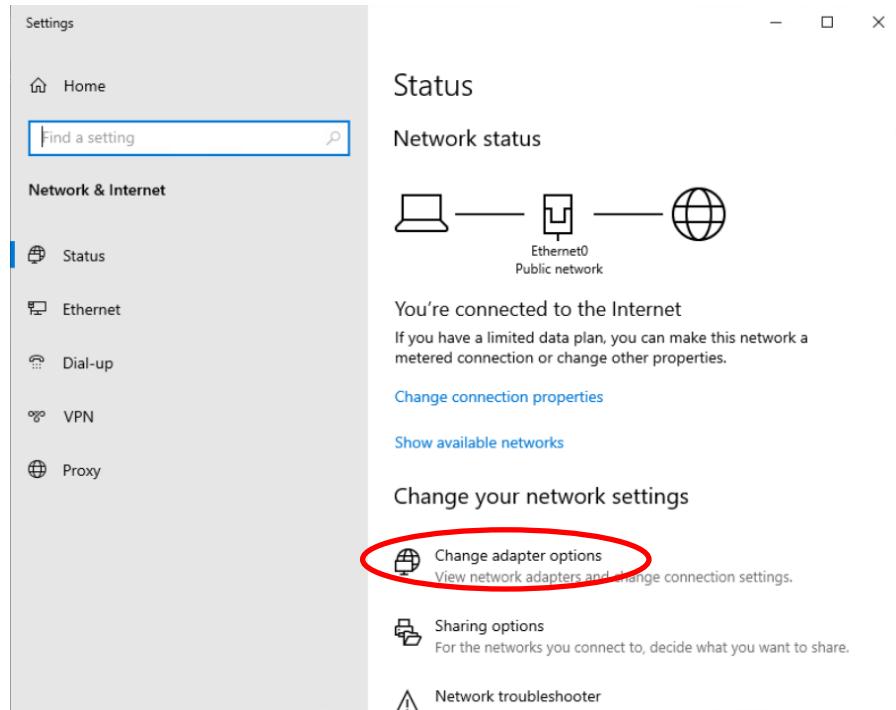
Click **OK** to close the Forwarders window.

- e. Click **OK** to close the Properties window.

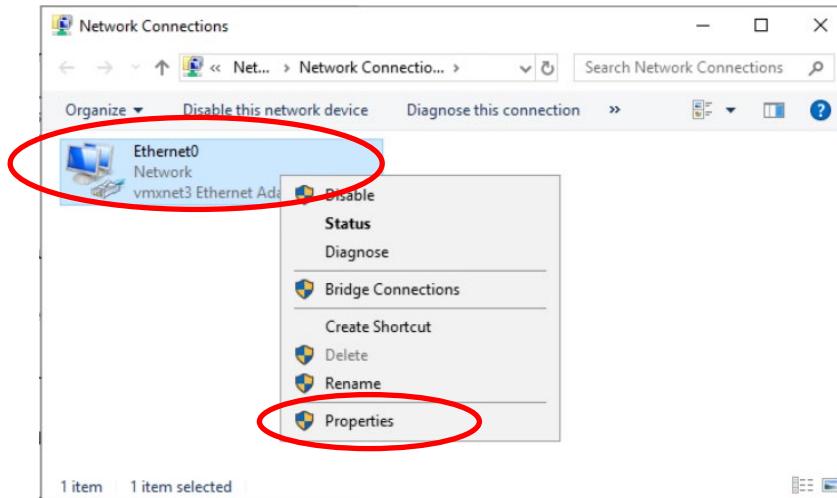
19) DNS Services have now been configured. In order to use this DNS you will need to reconfigure your server's network properties to use this DNS. Do the following:



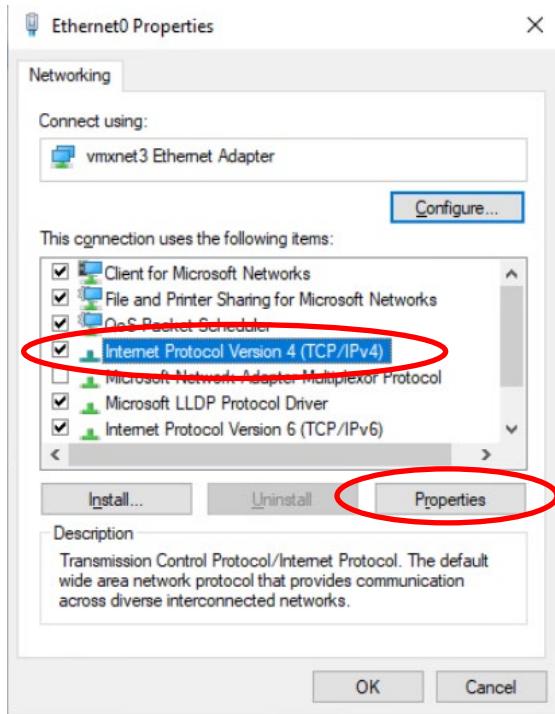
- a. In the lower right-hand corner of the server, next to the clock, you will see a computer monitor icon. This is the network icon. **Right click on the network icon** and select **Open Network & Internet Settings**.



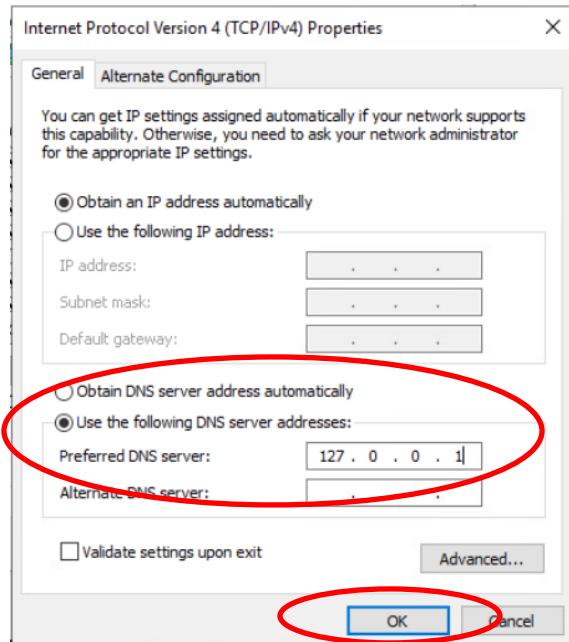
- b. Click on the **Change Adapter Options** on the right-hand side of the window.



- c. Right click on **Ethernet0** and choose **Properties**.



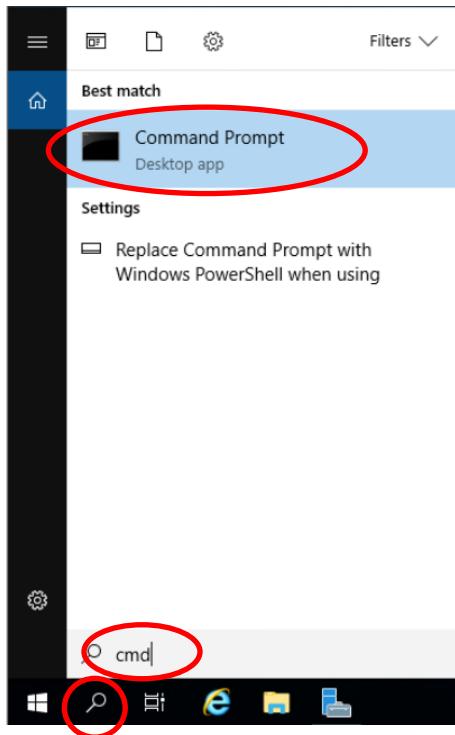
- d. In the Local Area Connection Properties window, highlight the option for **Internet Protocol Version 4 (TCP/IPv4)** and click on the **Properties** button.



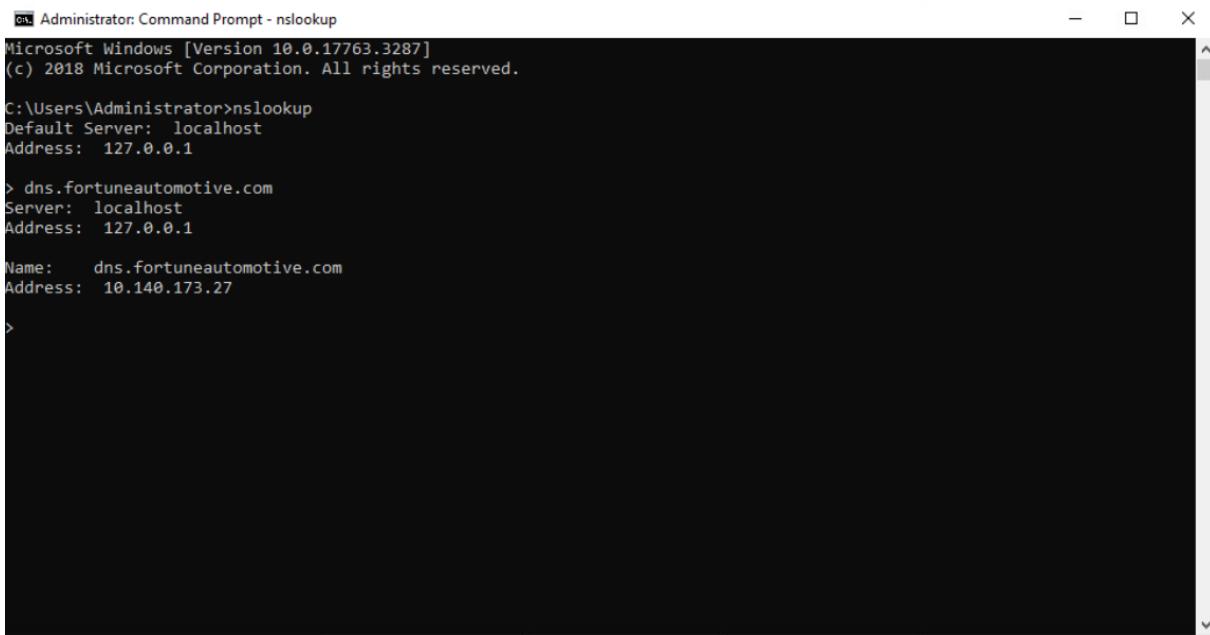
- e. At the bottom of this new window, select the radio button that says **Use the following DNS server address:** and type in the loopback IP Address of your server (127.0.0.1) in the **Preferred DNS Server** area.

- f. Click **OK** to close the TCP/IPv4 Properties window.
- g. Click **Close** to close the Local Area Network Properties window.

20) Finally, you should test your DNS configuration. You can do this by opening the **Command Prompt**.



- a. Click on the Search icon next to the Start Menu.
- b. In the search box type in “cmd” and hit Enter.
- c. When the Command Prompt appears in the top of the search window, click on it to open it.
- d. Once the Command Prompt opens, type “**nslookup**” and hit **Enter**. This will start the Name Server command.
- e. Type “**dns.fortuneautomotive.com**” and hit **Enter**.
- f. You should see something similar to the following:



```
Administrator: Command Prompt - nslookup
Microsoft Windows [Version 10.0.17763.3287]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>nslookup
Default Server: localhost
Address: 127.0.0.1

> dns.ventureautomotive.com
Server: localhost
Address: 127.0.0.1

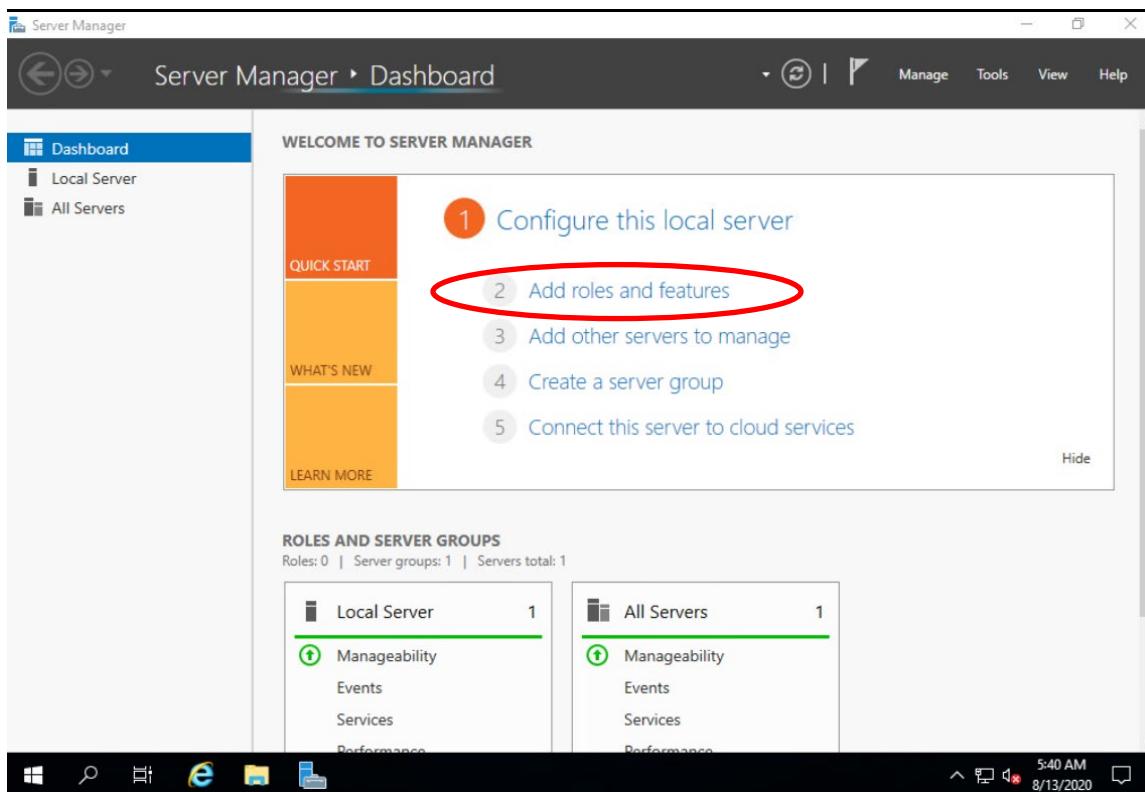
Name: dns.ventureautomotive.com
Address: 10.140.173.27

>
```

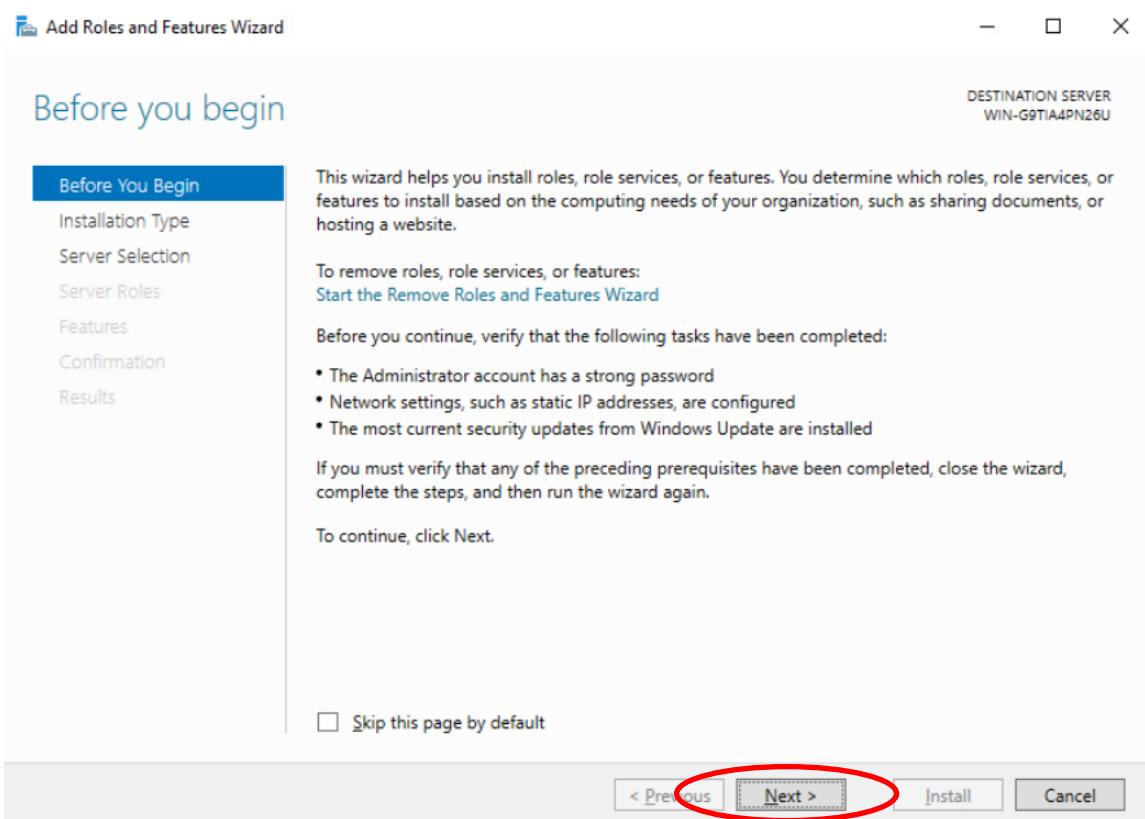
- g. As long as your command window looks similar to the above, your DNS Server has been configured properly. Type “**exit**” and hit **Enter** to terminate the nslookup command.
 - h. Type “**exit**” again and hit **Enter** to close the command window.
- 21) Now you will install and configure Active Directory Domain Services.

5. Install & Configure Active Directory Domain Services

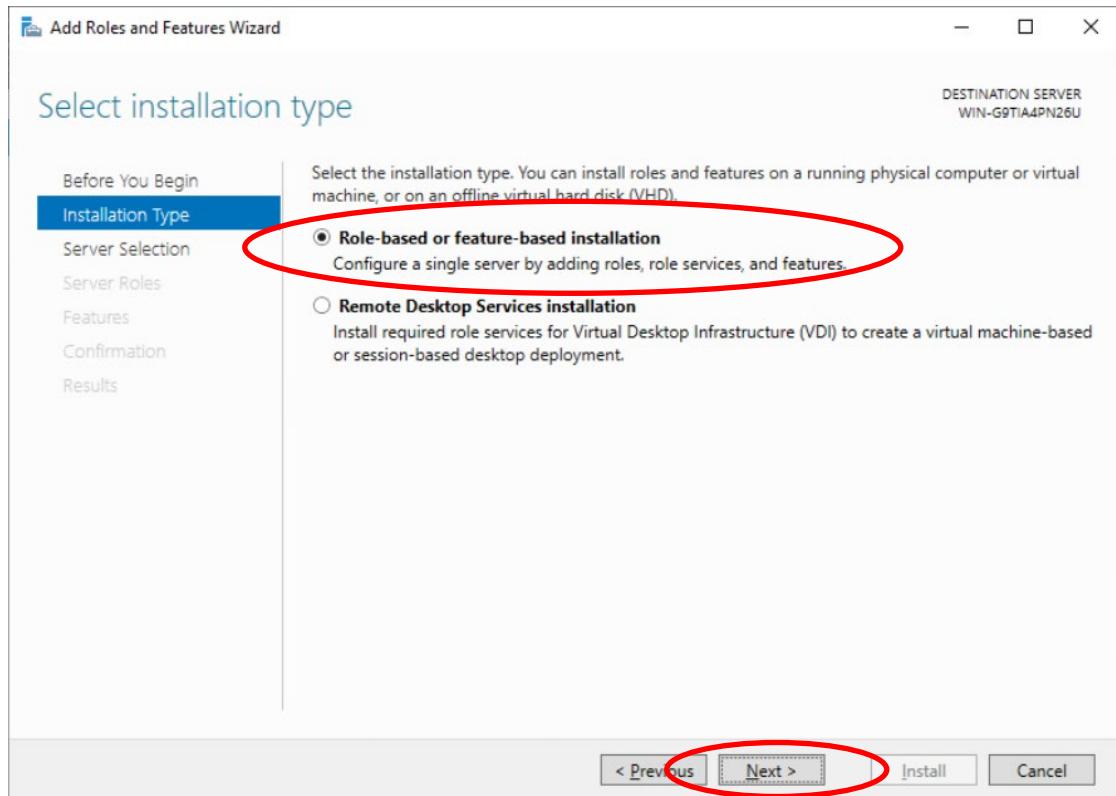
- 1) Open the **Server Manager** (the first icon on the Taskbar next to the Start button) if it is not still open.



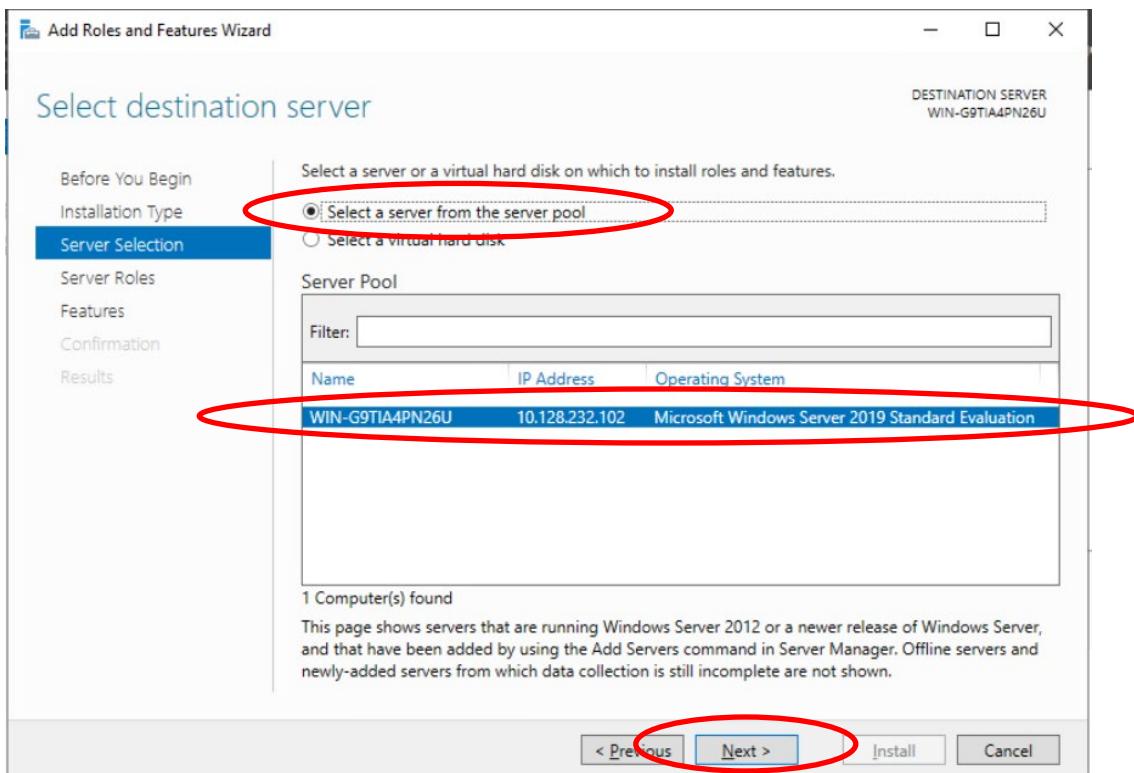
2) Click on the option to **Add Roles and Features**.



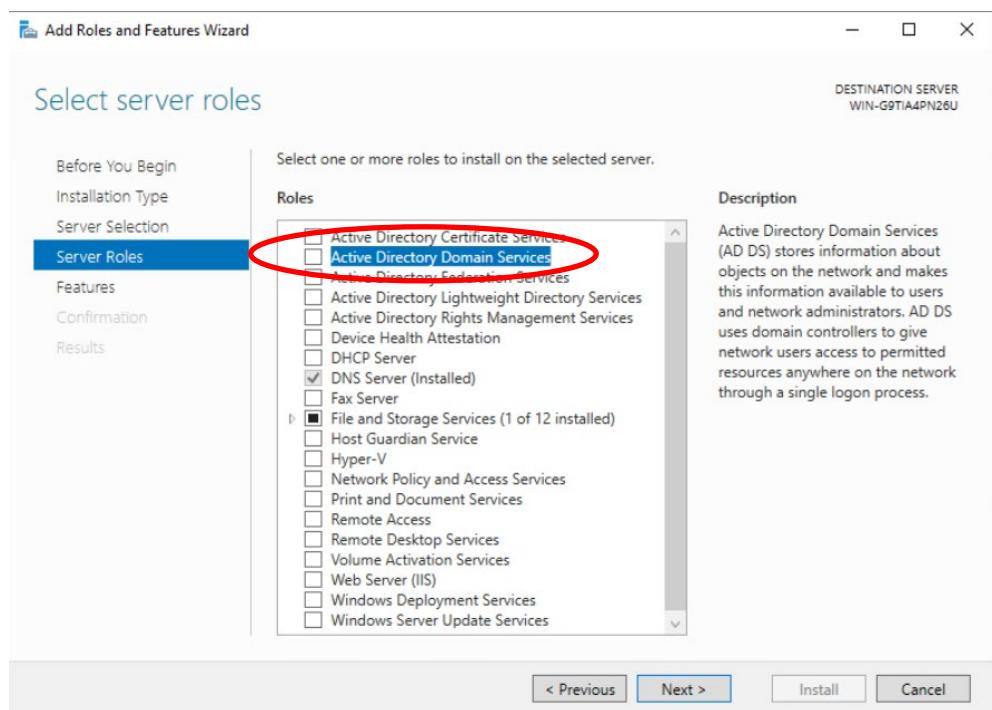
- 1) This will start the Add Roles and Features wizard. The first page is an overall explanation of the wizard. Click on the **Next** button to continue.



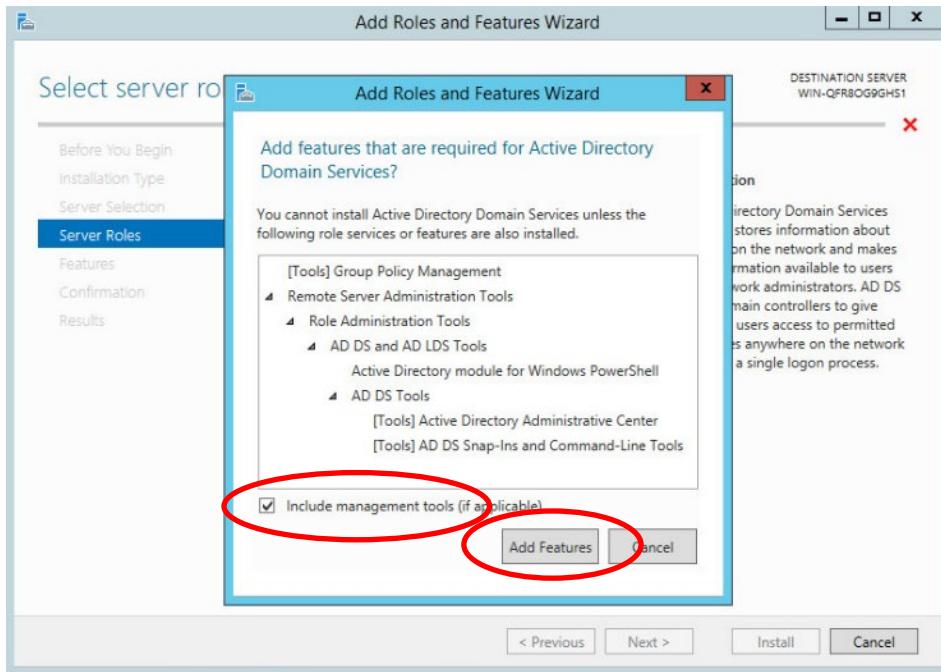
- 2) Select the option to do a **Role-based or Feature-based installation** and click **Next**.



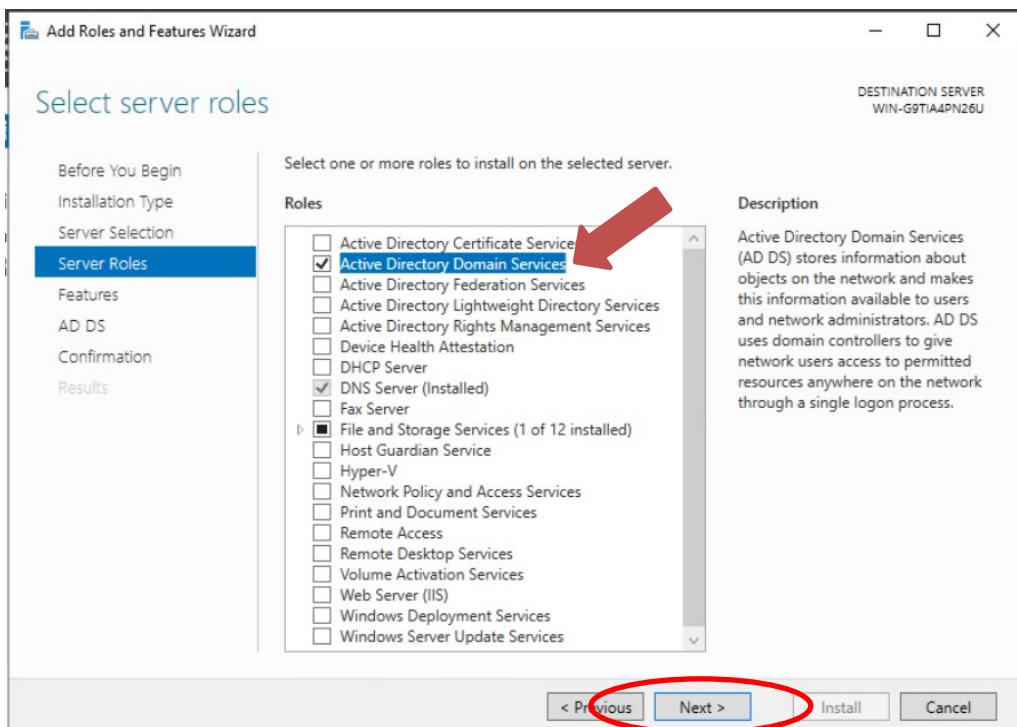
- 3) Select the destination server by choosing the radio button option to **Select a server from the server pool** and *make sure your server is highlighted*. Click **Next** to continue.



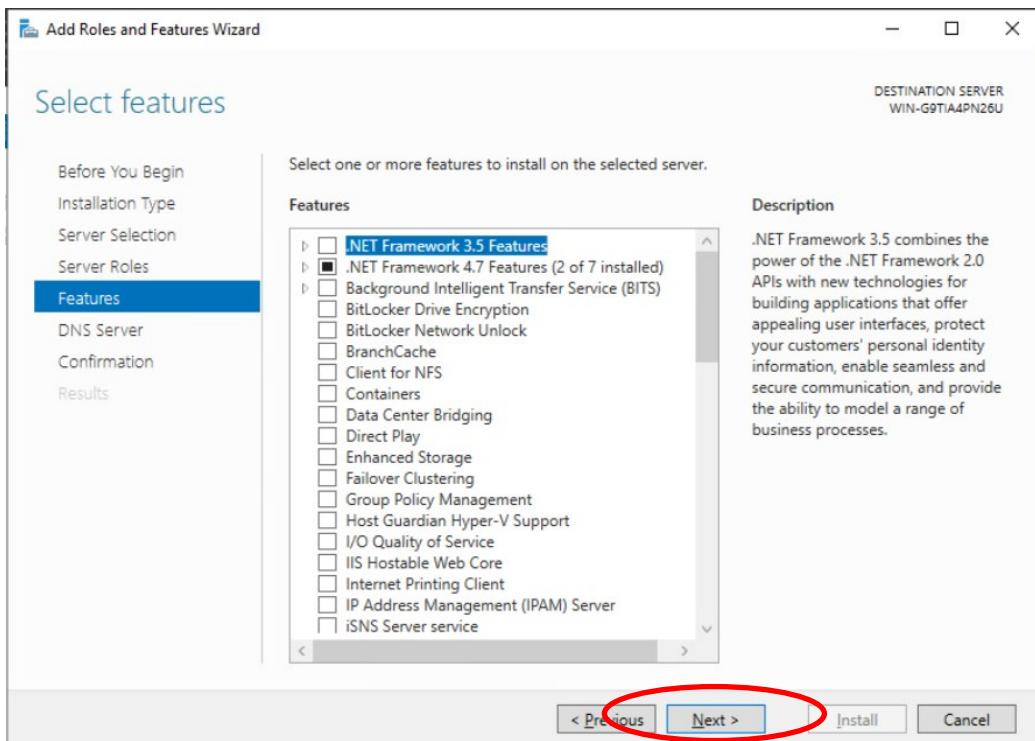
- 4) Check the option for the **Active Directory Domain Services** role.



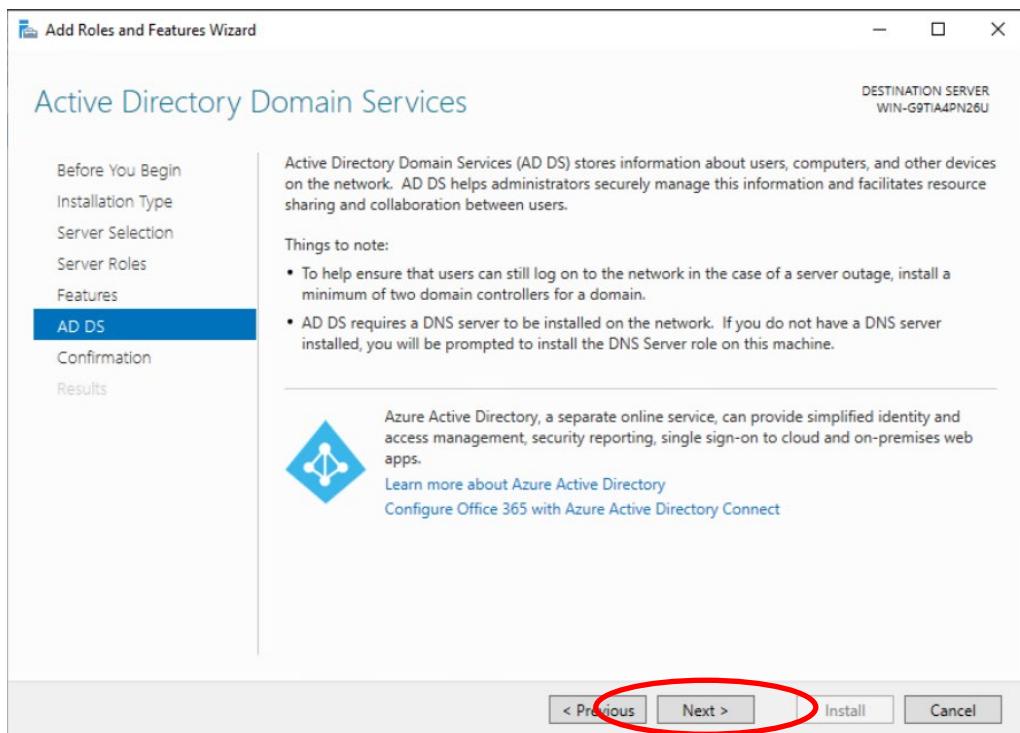
- 5) Once you check this box, you will be presented with a box that tells you additional features will be required to install active directory domain services. Make sure the **Include management tools** box is checked and click on the **Add Features** button.



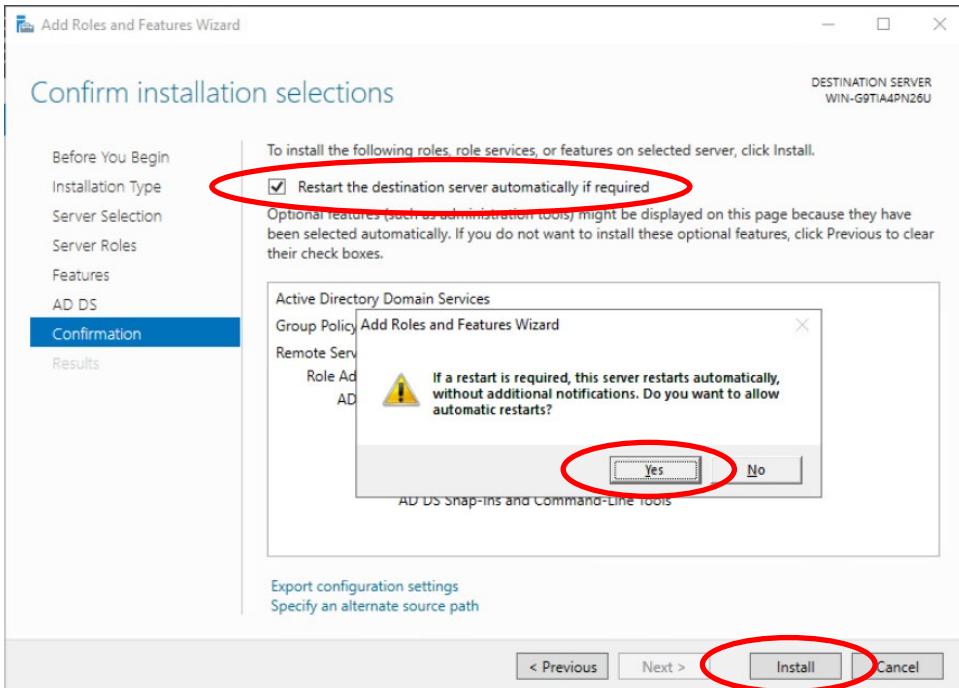
6) Click **Next** to continue.



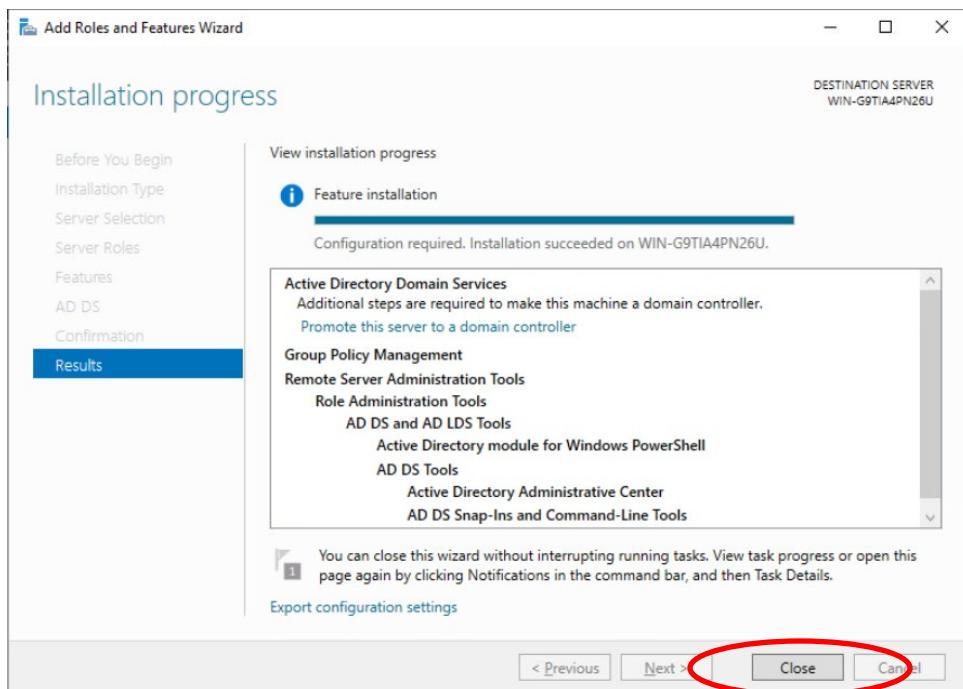
7) You can now select features you want to install on the server. None are required at this time, so click **Next** to continue.



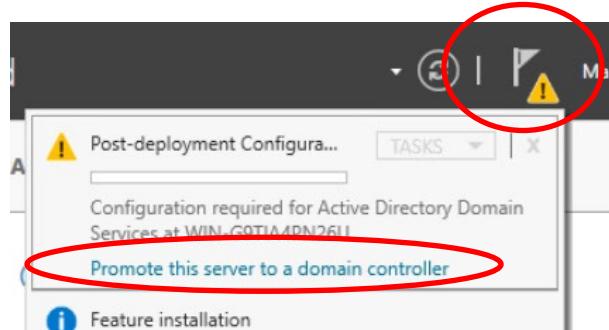
- 8) You are now presented with a page explaining what Active Directory Domain Services is used for and some information on Active Directory's best practices. Click **Next** to continue.



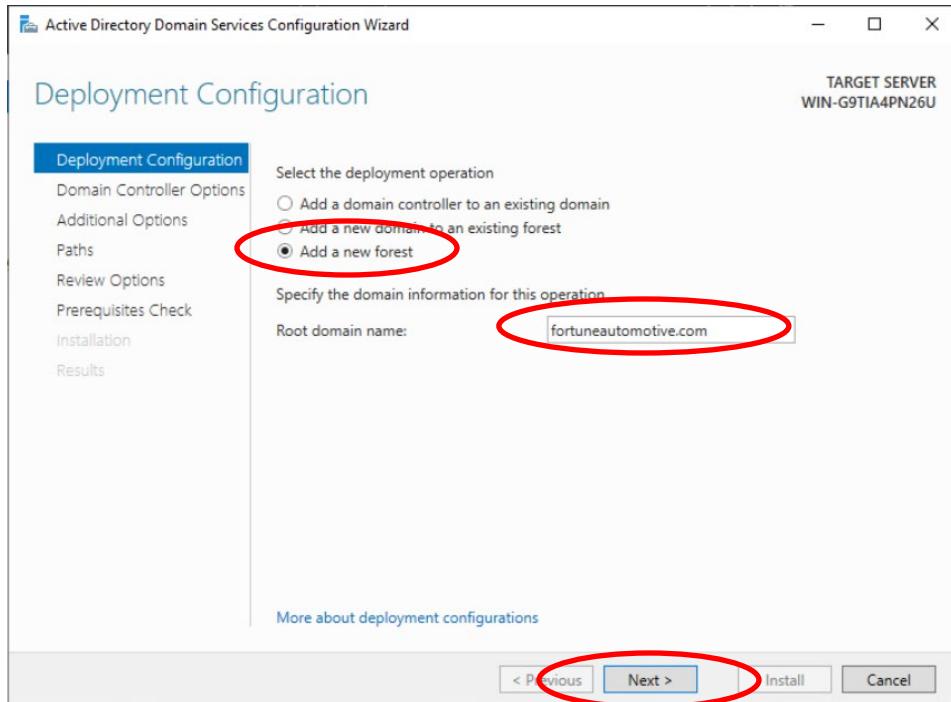
- 9) Now you need to confirm the installation. Check the box to **Restart the destination server automatically if required**. You will immediately see a pop-up window that asks you to confirm you want to automatically restart if necessary. Click **Yes** to continue, then click the **Install** button.



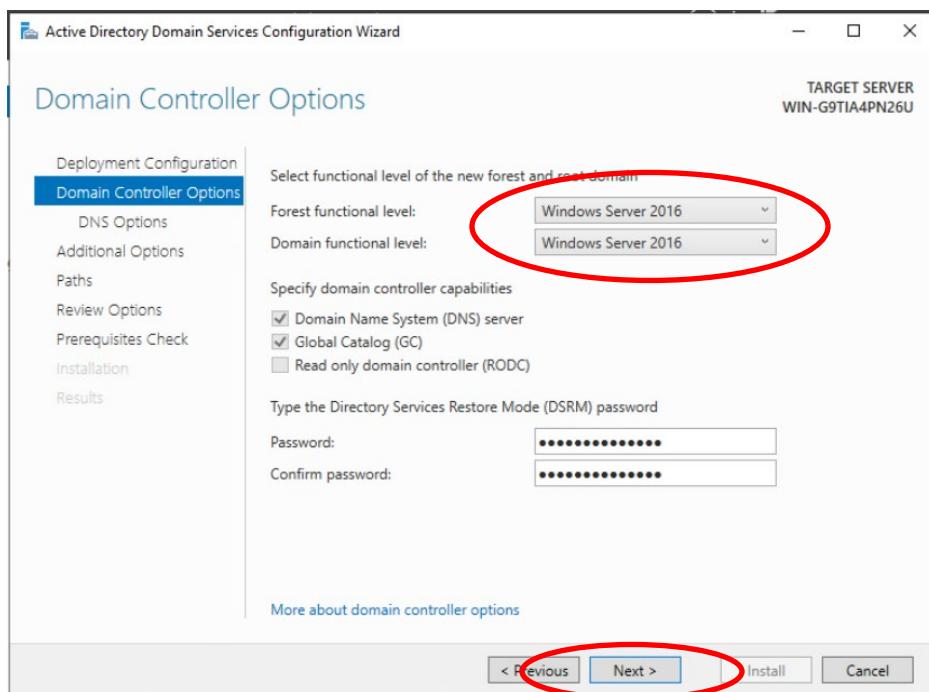
- 10) When the install finishes you will see a message on the screen under the progress bar that states configuration is required and the installation succeeded. Click on the **Close** button to end the wizard.



- 11) In Server Manager you will notice a flag icon next to the menu options in the upper right-hand corner of the window. This flag icon should have a yellow triangle with an exclamation point in it. Click on the **flag icon** and choose the option to **Promote this server to a domain controller**.



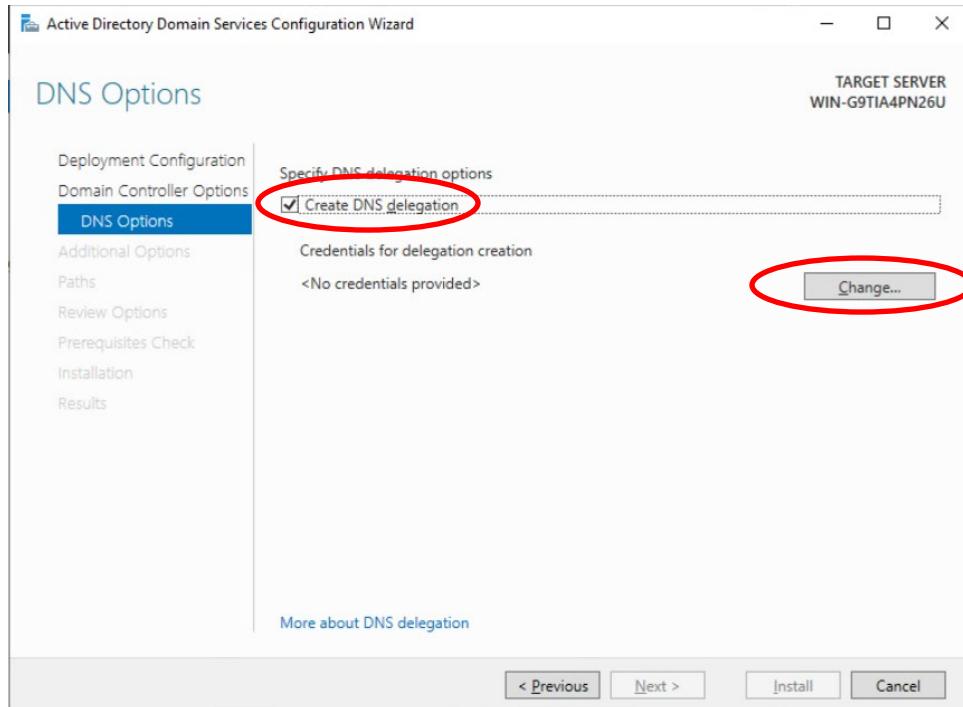
- 12) On the Deployment Configuration page, select the option to **Add a new forest**. In the Root domain name field, type: **fortuneautomotive.com**. Click **Next** to continue.



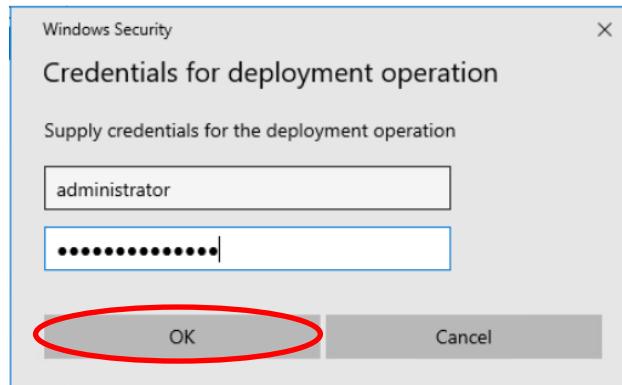
- 13) On the Domain Controller Options page, leave the Forest Functional Level and Domain Functional Level options set for **Windows Server 2016**. You will notice

the options under “Specify domain controller capabilities” are all greyed out. This is because you are installing a new domain controller in a new forest and these are required options you cannot change.

- 14) Type the **Directory Services Restore Mode (DSRM) password** twice (you must choose AND remember this password) to confirm the password. This is required in the event you need to restore or uninstall your active directory. Click **Next** to continue.

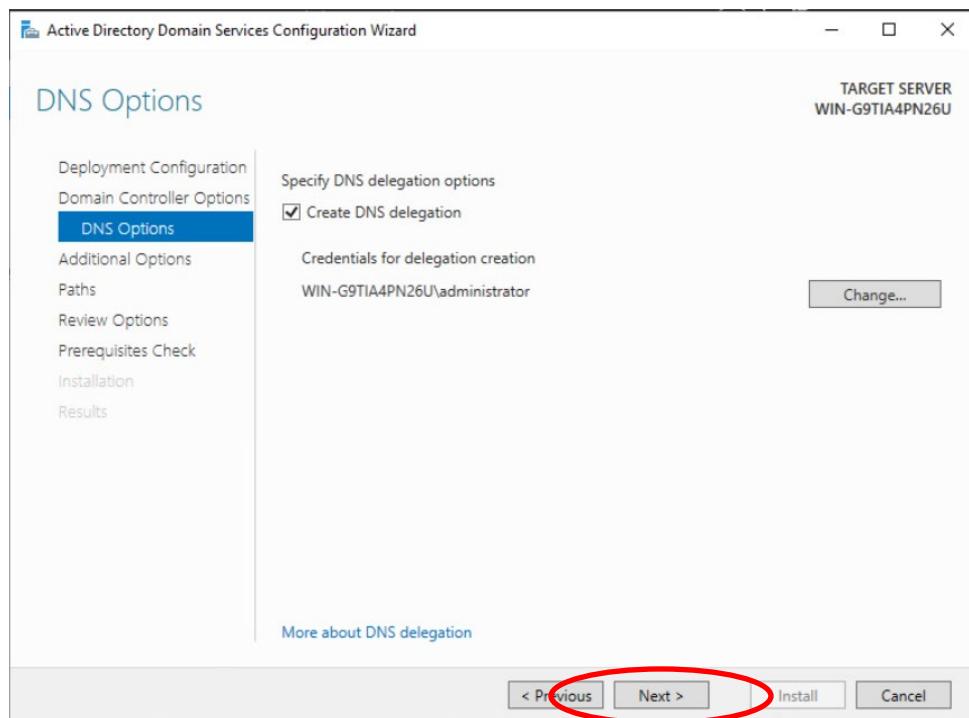


- 15) Next is the DNS Options page. Check the box that says **Create DNS Delegation** and click on the **Change** button to specify the user credentials the wizard should use.

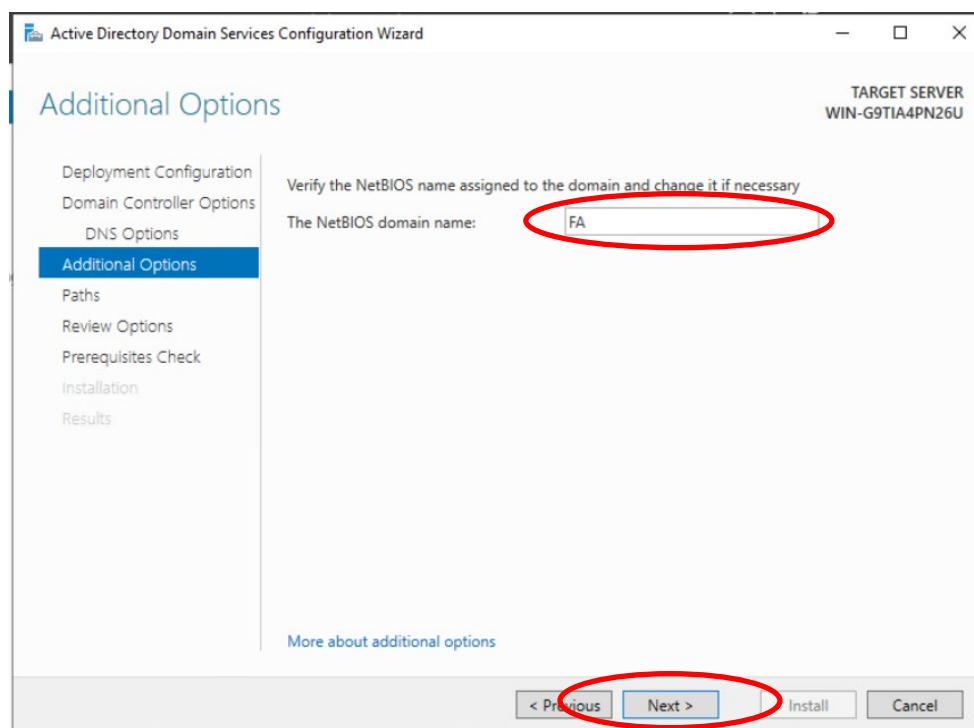


- a. The username should be **Administrator**.

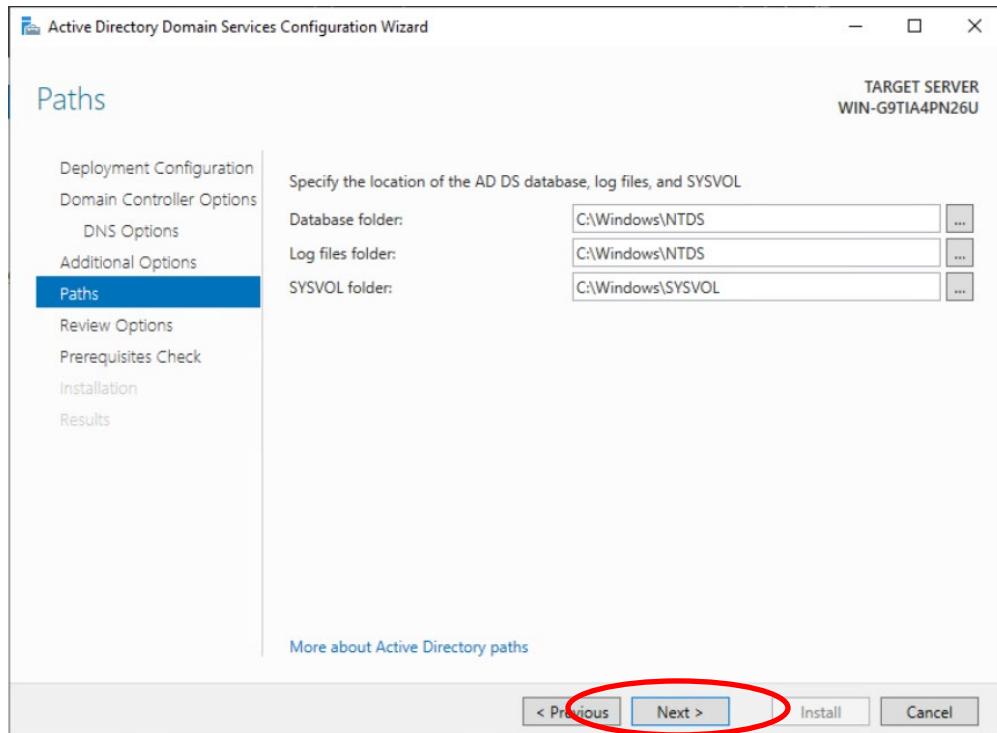
- b. The password will be the password you use to log in to the server.
- c. Click **OK** to save this information.



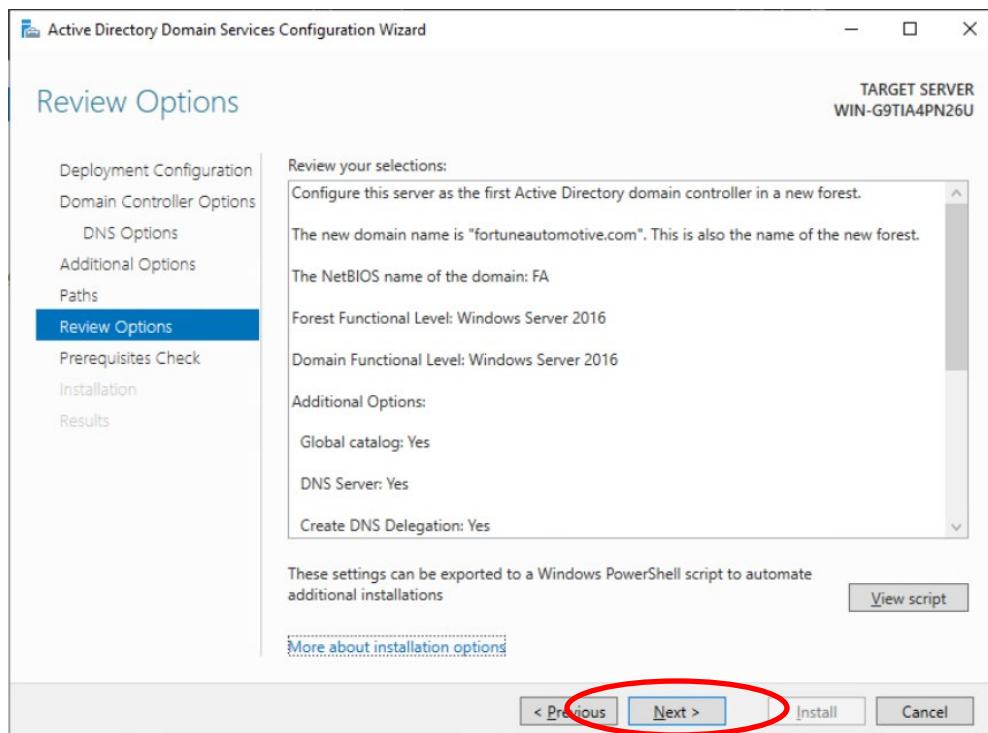
16) Click **Next** to continue the Active Directory configuration wizard.



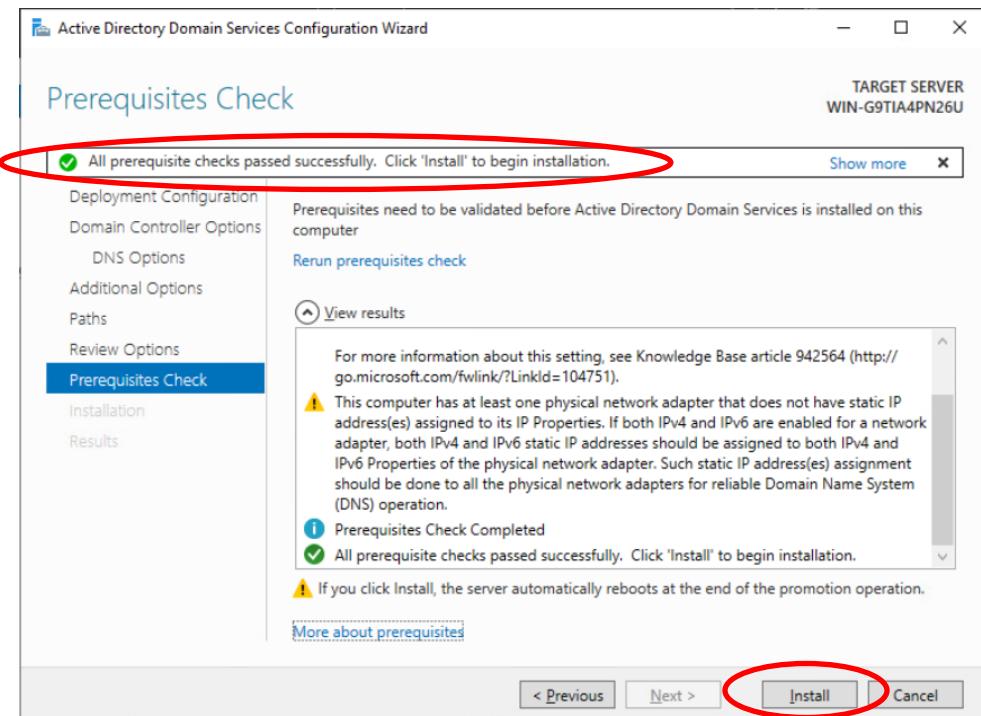
- 17) On the Additional Options page, the wizard will quickly search for the NetBIOS name assigned to the domain you are creating. You will need to change the default option. Erase the provided NetBIOS domain name and type “**FA**” (without the quotes). **NOTE:** If you receive a message that FA is not valid, enter FA_ plus your initials (e.g. FA_AF). Click **Next** to continue.



- 18) On the Paths screen, make note of the default locations of the Active Directory **database**, **log files**, and **SYSVOL**. Click **Next** to continue.



- 19) On the Review Options screen, you can review all of the options you have selected through this process so far. When ready, click **Next** to continue.



- 20) On the Prerequisites Check screen, you will see some warning results in the center of the window; however, you should see a green check mark with a note

that **All prerequisite checks passed successfully**. Click the **Install** button to continue.

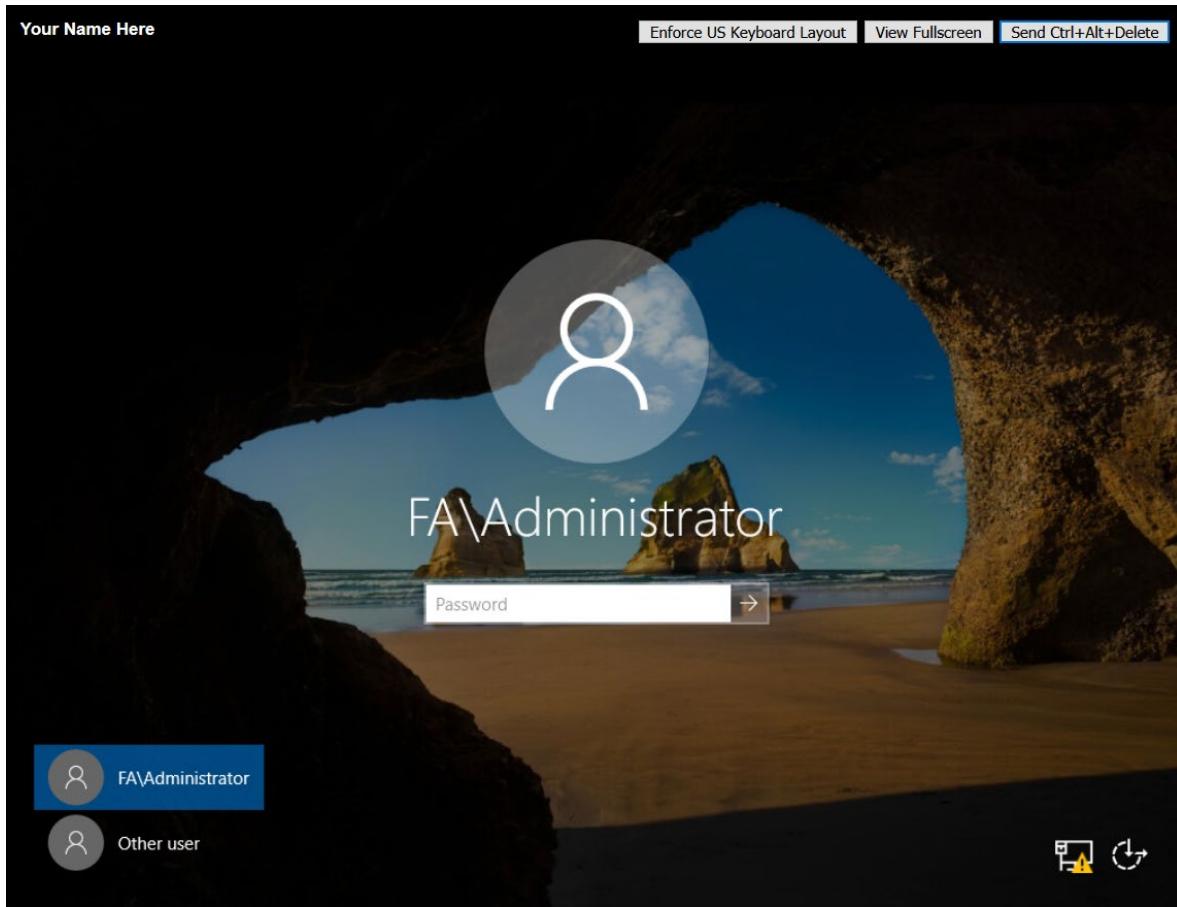
- 21) The installer will now proceed to install and configure Active Directory Domain Services. This will take approximately 10 minutes to complete. When the installation finishes, the server will reboot automatically.

6. Verify Configuration & Take a Snapshot

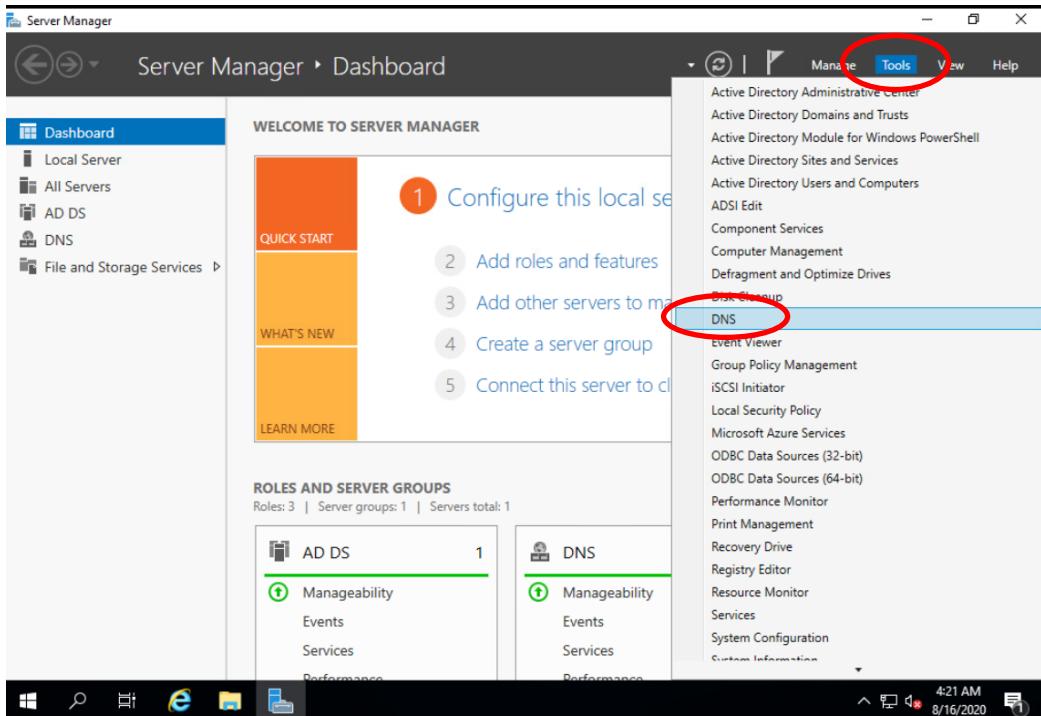
- 1) Once your server reboots, log back in to verify the configuration was a success.



- a. Press the **Send Ctrl+Alt+Delete** button.



- b. NOTE the username you now have on the server (FA\Administrator OR FA_YourInitials\Administrator). ***This will be important in lab 3.***
- c. Type in your password and hit **Enter** or **click the arrow pointing to the right**.

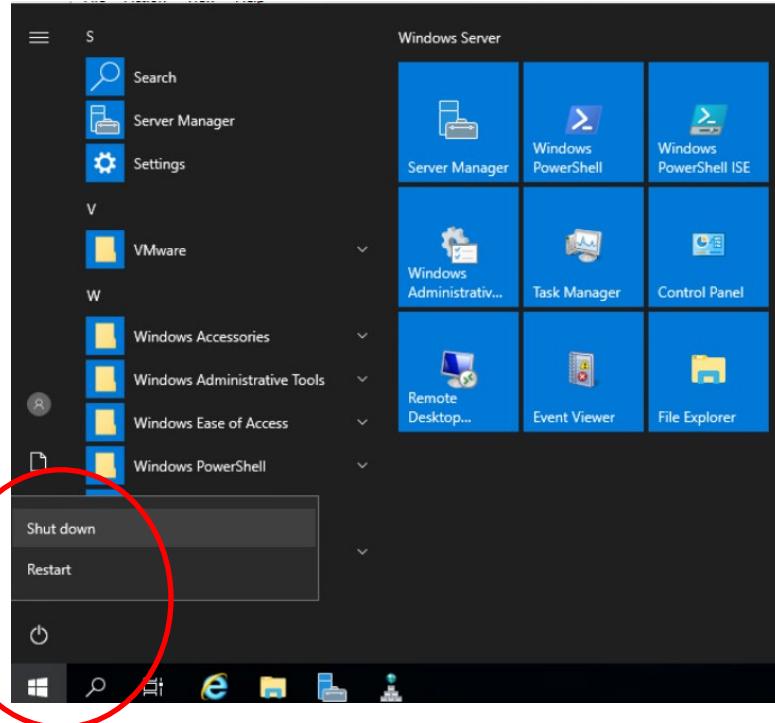


- 2) In Server Manager, click on the **Tools** menu in the upper right-hand corner and select **DNS** from the list.

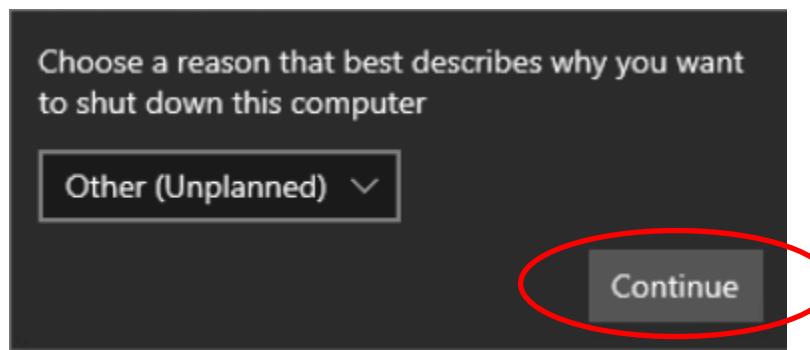
Name	Type	Data
_msdcs	Start of Authority (SOA)	[31], win-g9tia4pn26u.fort...
_sites	Name Server (NS)	win-g9tia4pn26u.fortunea...
_tcp	Host (A)	10.128.232.102
_udp	Host (A)	10.128.232.102
DomainDnsZones		
ForestDnsZones		
(same as parent folder)	Start of Authority (SOA)	[31], win-g9tia4pn26u.fort...
(same as parent folder)	Name Server (NS)	win-g9tia4pn26u.fortunea...
(same as parent folder)	Host (A)	10.128.232.102
dns	Host (A)	10.128.232.102
win-g9tia4pn26u	Host (A)	10.128.232.102

- 3) Expand **Forward Lookup Zones** (click the arrow next to the name) and expand the **fortuneautomotive.com zone**. If you see a bunch of additional information

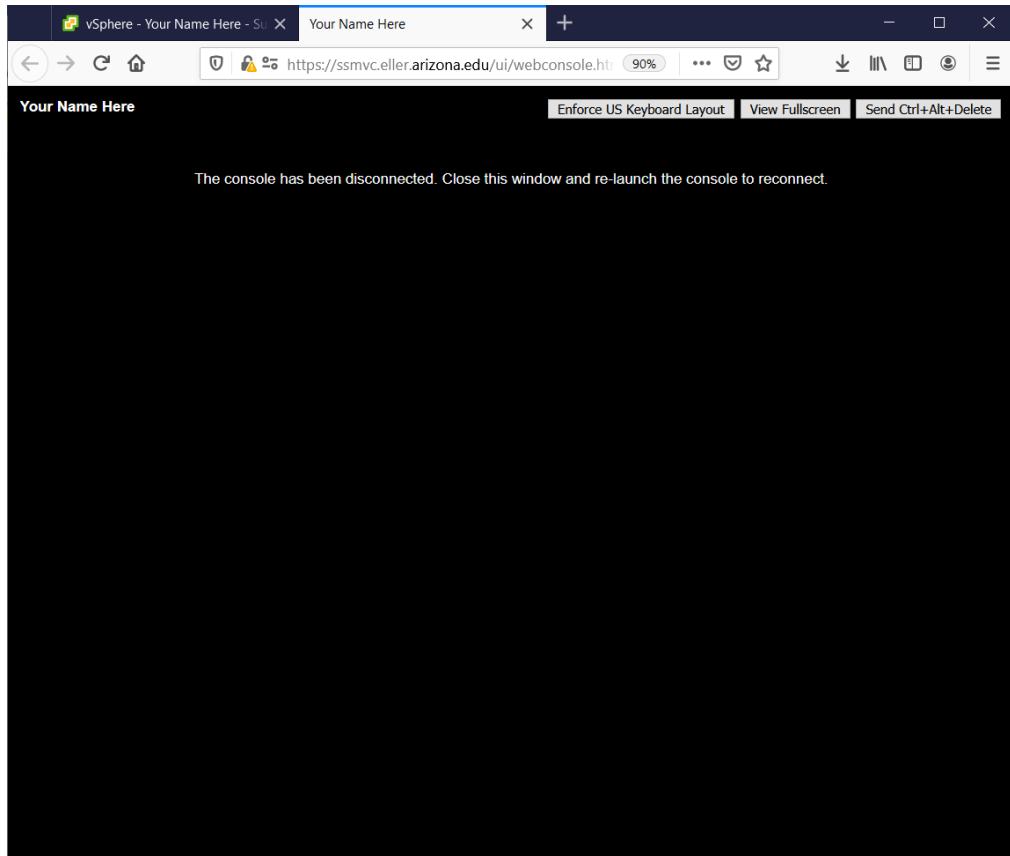
(folders, Host (A) records, etc.) that was not there earlier, this indicates your AD DS was configured correctly. Make note of this information.



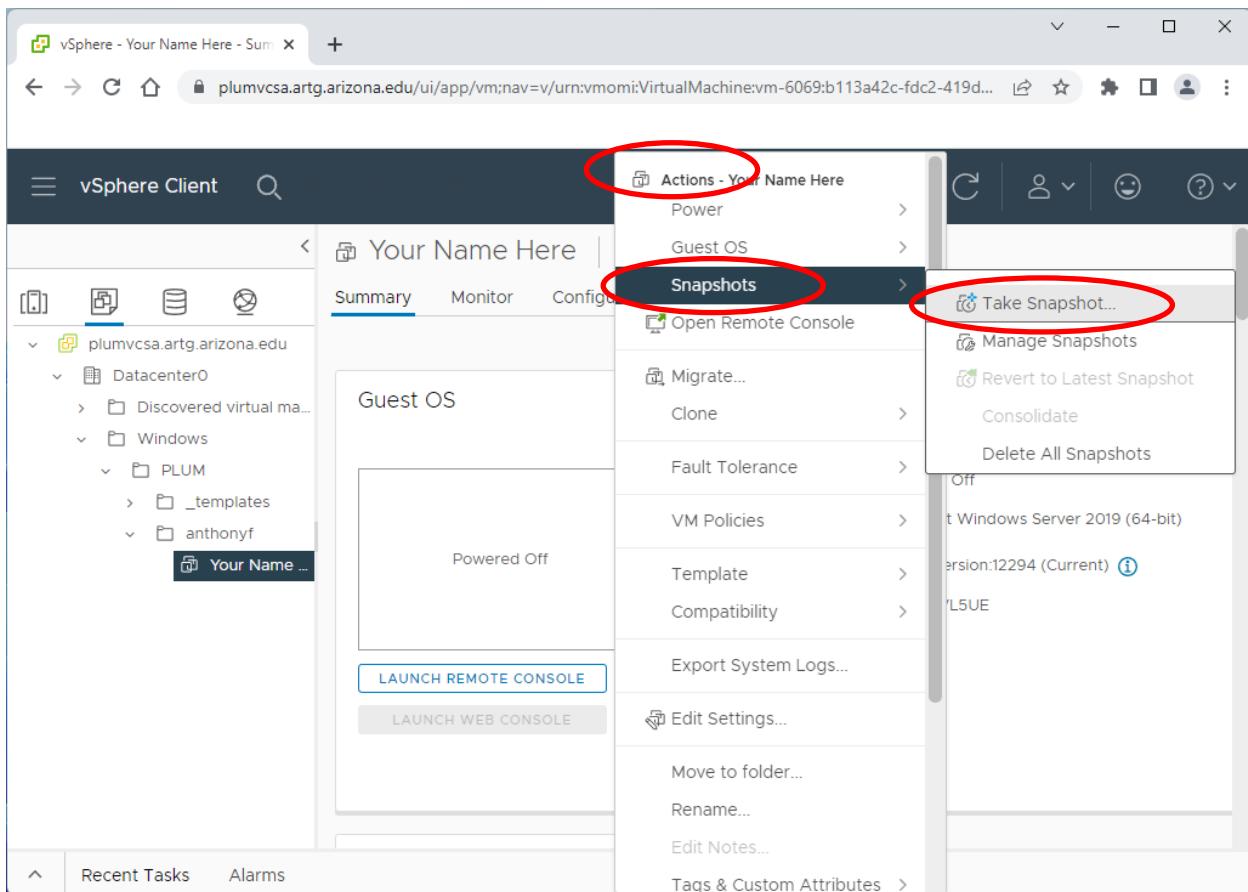
- 4) Now you can shut off your server. Click on the **Start** button in the lower left corner of the screen to bring up the Start screen. In the lower left corner you will see a power button. Click on the **power** button and choose **Shutdown** from the menu.



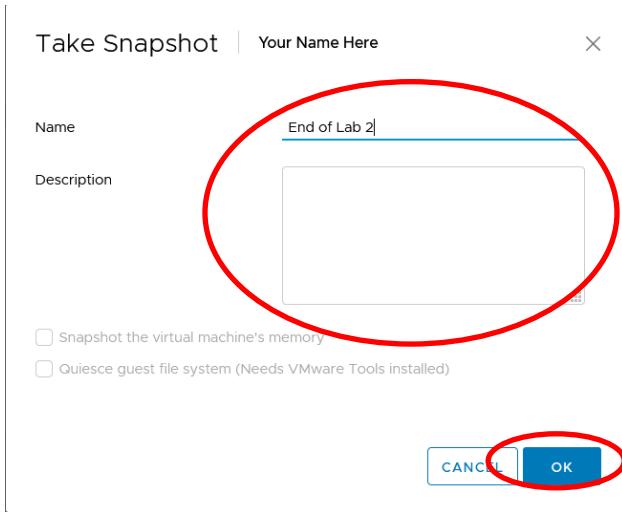
- 5) You will be asked to select a reason for the shutdown. **Choose any option** and click **Continue** to shut down the server.



- 6) When the server is completely shut down the screen will be black with the statement “The console has been disconnected”. Close the window for your server by clicking on the X in the upper right-hand corner of the open tab.



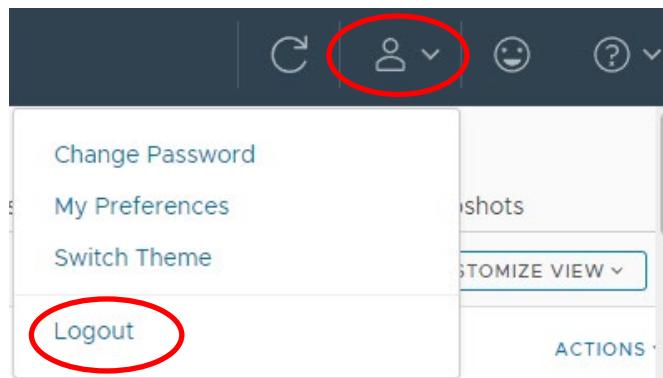
- 7) Now, go back to the web browser where the VMware web client is showing your server to take a snapshot of your server. This will create a point-in-time backup that will allow you to restore your server to the end of Lab 2 if you have problems when working on Lab 3 and beyond.
- 8) Click on the **Actions** button, highlight the **Snapshots** option, and select **Take snapshot** from the menu.



- 9) Type in a name for this snapshot (**End of Lab 2** is recommended), provide a description if desired, then click **OK**.

Recent Tasks		Alarms						
Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Ti...		
Create virtual machine snapshot	Your Name...	✓ Completed	VSPHERE.LOC...	5 ms	08/15/2020, 9:30:50 PM	08/15/2020, 9:30:50 PM		

- 10) In the bottom of the screen, under the Recent Tasks section you will see a green check mark with Completed next to Create virtual machine snapshot.



- 11) Congratulations, you have completed Lab 2! To log out of the vCenter Web Client, **click on your username** in the upper portion of the screen and select **Logout** from the menu.
- 12) Close your web browser.

7. Write a Paper Discussing the Pros and Cons of Virtualization

- 1) With a Virtual Server created, now you need to write a paper **discussing (NOT listing)** the pros and cons for implementing a virtual infrastructure.
- 2) ***See Deliverables section for more requirements.***

Lab Deliverables

At the completion of this lab you will have the following:

- a. A Virtual Machine created as instructed on the server with your name.
- b. An OS installed inside the VM (Windows Server 2019).
- c. A short paper **discussing (not listing)** the pros and cons for adopting a virtual server (not desktop) infrastructure.
 - i. **Answer this question in your paper:**
 1. Should all businesses/organizations adopt virtualization?
 - ii. Please use Times New Roman font, size 12, double spaced, include a cover page, and cite any references used. The cover page should include the document title, your name, and date.
 - iii. 2-3 pages of content minimum, plus cover and references pages, using the above formatting.
 - iv. A minimum of 2 properly cited references is required.

Submit the following via the D2L assignments section for the lab:

- Your paper. ☺

Lab Rubric

Lab #2 will be graded in two parts: your paper and your virtual machine. Here is the breakdown for your paper:

Sections	Additional Information
Following Instructions (25%)	Please make certain you follow the instructions for the Lab Deliverables. This includes formatting and length.
Content (50%)	The content of your paper is the most important piece. Some things to keep in mind: did you <u>discuss</u> the pros? The cons? Did you answer the question posed? Did you write about server infrastructure virtualization technologies?
References (15%)	Did you use any references to back up your conclusions? Make certain you properly cite any references used and provide a References page at the end of your paper.

Grammar (10%)	Does your paper contain any spelling or grammatical mistakes? Make sure you read through your paper before submission.
----------------------	--

For the virtual machine, you will be graded on the following criteria:

Sections	Additional Information
Following Instructions (25%)	Please make certain you follow the instructions contained throughout this document for creating your VM and installing the OS.
Virtual Machine Configuration (25%)	Did you create and configure your VM as instructed in this document? Did you create a snapshot for your VM after finishing with the OS? Did you turn off your VM?
Installing/Configuring DNS and AD (50%)	Did you install and configure DNS and AD properly? Did you fully patch your OS?

Lab Resources

- Link to the VMWare Server
- <https://plumvcsa.artg.arizona.edu/ui/>

Extra Credit

- Write a 1-2 page paper discussing the virtualization of desktop computers, including the pros and cons. ***Please note that desktop virtualization is different from server virtualization, so you will need to do some research to discuss this.***
- Use the same paper requirements as listed above.
- Submit the extra credit paper via the D2L Extra Credit section for this lab (***failure to submit this paper as instructed will result in no credit given***).