How to Setup an Active Directory Domain Homelab with VirtualBox

Overview

In this guide, we will be creating and setting up a virtual homelab environment which includes virtual machines (VM) to house Windows Server 2022 and Windows 10 Enterprise Evaluation edition. Windows Server will be acting as our domain controller which is where we will establish the rights, permissions, authentication, and authorisation for users in the domain we will build.

Inside our Windows Server VM we will become acquainted with Active Directory (AD), a tool which is widely used in Windows domain enterprises.

Homelab specifications:

Depending on your host computer specifications, you can determine how many VMs you would like to create for this task. I will be creating one Windows 10 Enterprise VM and one Windows Server 2022 VM. This gives us the minimum core functionality needed to create a Domain Controller and a Standard User account connected to the domain.

My PC specifications:

- Windows 11 Home
- Intel Core i5-10210U
- 8GB RAM
- 256GB SSD

Virtual Machine specifications:

- **Windows Server 2022 (2 CPU, 2.5GB RAM)**
  - **Download** - **https://www.microsoft.com/en-gb/evalcenter/evaluate-windows-server-2022/?filetype=Download the ISO**
- **Windows 10 Enterprise (1 CPU, 2GB RAM)**
  - **Download** - **https://www.microsoft.com/en-us/evalcenter/evaluate-windows-10-enterprise**

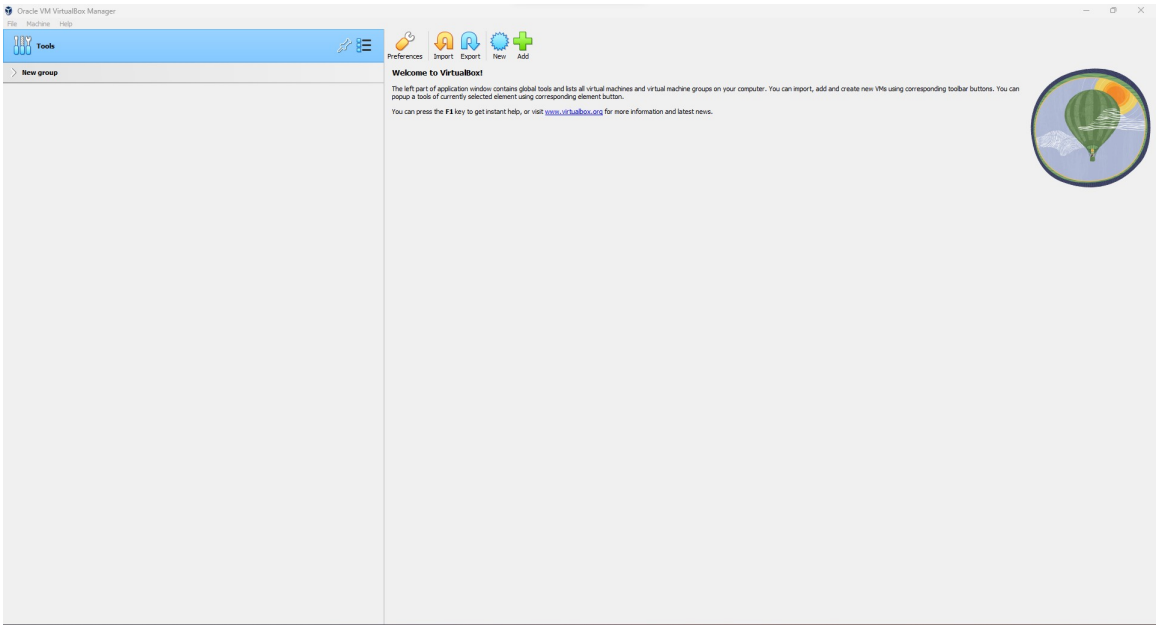
For my hypervisor (the program used to run the virtual machines on your host computer), I will be using **VirtualBox**. From the Downloads page, you can download the VirtualBox package you need according to the host you are using (Windows, MacOS, Linux etc). There are many other hypervisors available (e.g. VMware, Proxmox) online so please choose one you prefer. Follow their respective download steps and if you have not worked with a hypervisor before you could look on YouTube for guides on how to install a hypervisor.

Each of the steps below will be roughly the same for each hypervisor with the exception of where tools and buttons may be located in the graphical interface.

Task 1: Setting up your hypervisor

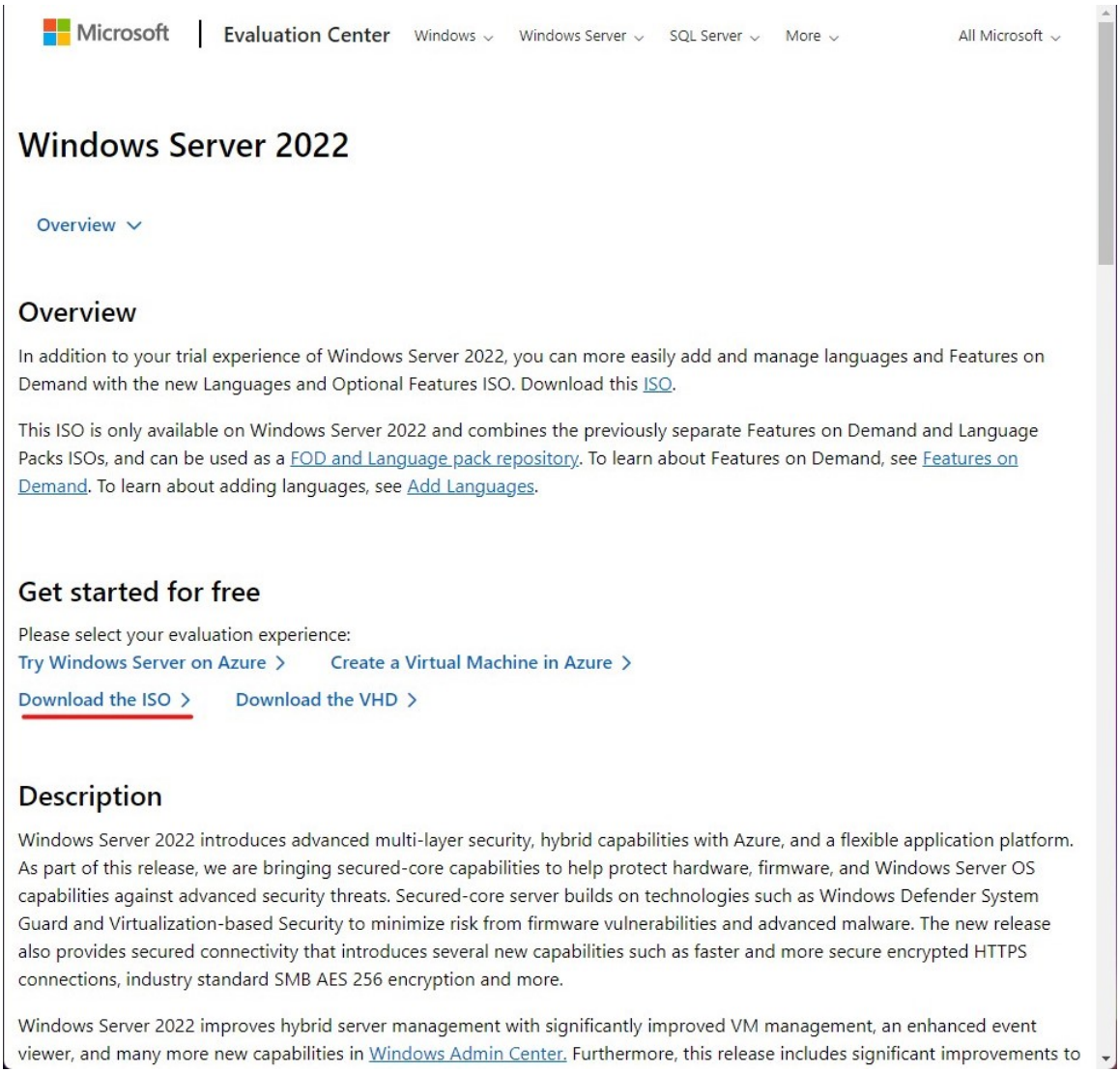
We are firstly going to run through how to configure the hypervisor for the Windows Server and Windows 10 Enterprise VMs.

1. Once you have downloaded and installed your chosen hypervisor, boot it up. As mentioned earlier, I will be using VirtualBox for configuring the VMs. You should be presented with a screen which looks similar to this:



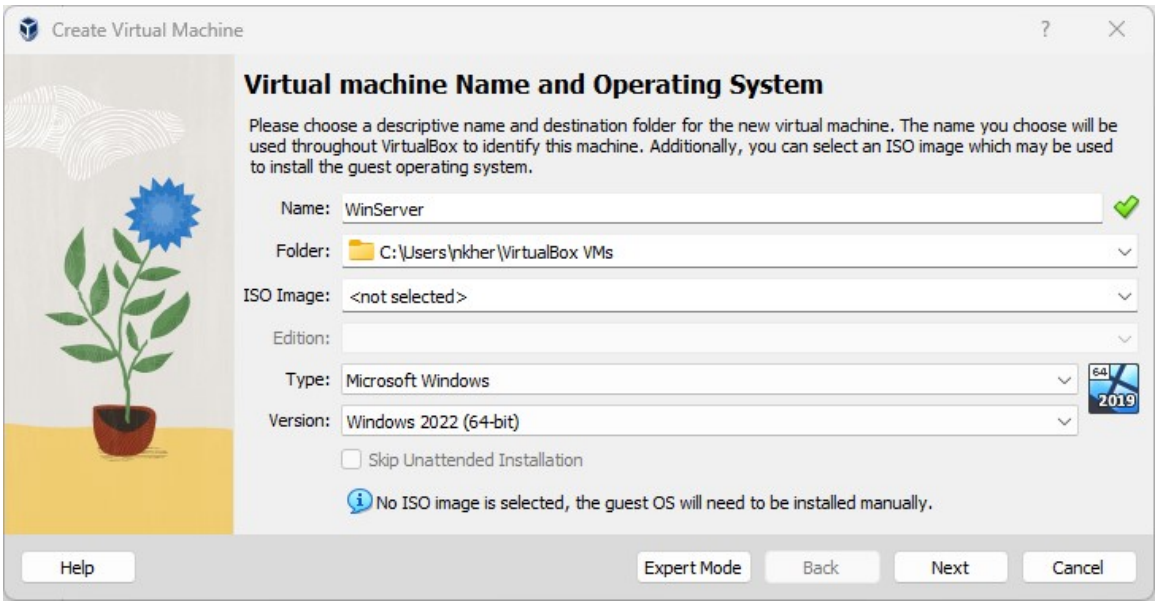
VirtualBox homepage

2. We are now going to install Windows Server 2022, please refer to the link under the **Virtual Machine specifications** section above. You will be greeted with this page:



Windows Server 2022 Download page

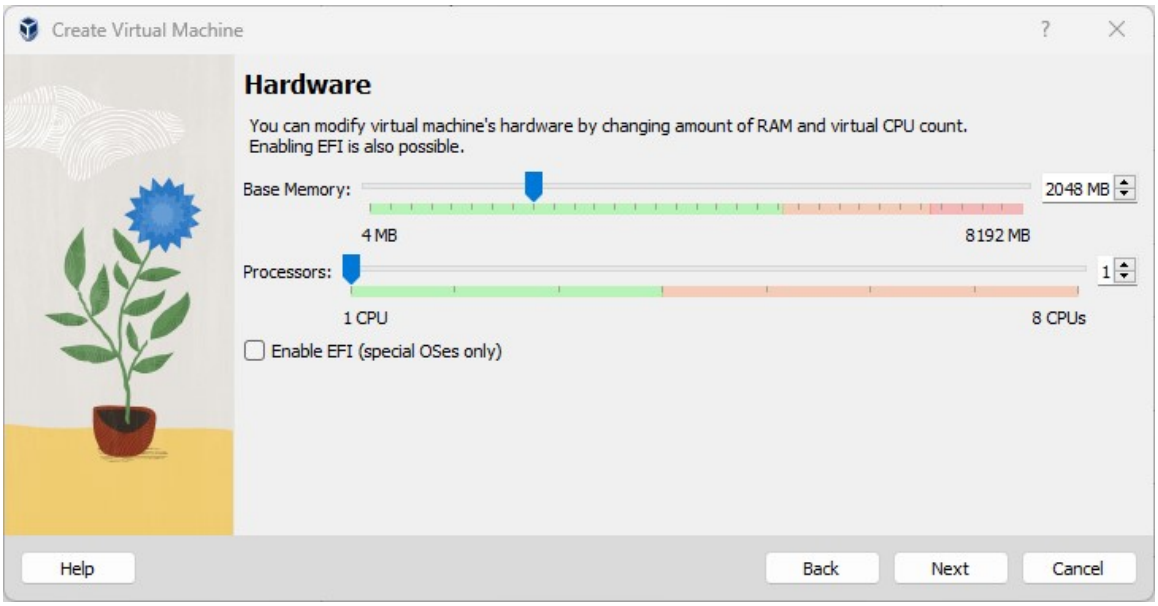
3. Click the **Download the ISO** link under the **Get started for free** section. On the next page you will need to register to receive the free trial so please complete the form then click **Download now**. The download will be around 5GB in size.
4. Whilst the Windows Server ISO file is downloading we can set up the Windows Server VM. Open your hypervisor and at the top of the page click **New**.
5. In the **Create Virtual Machine** window, provide a name and change the version to **Windows 2022 (64-bit)**, then click **Next**.



Windows Server VM setup

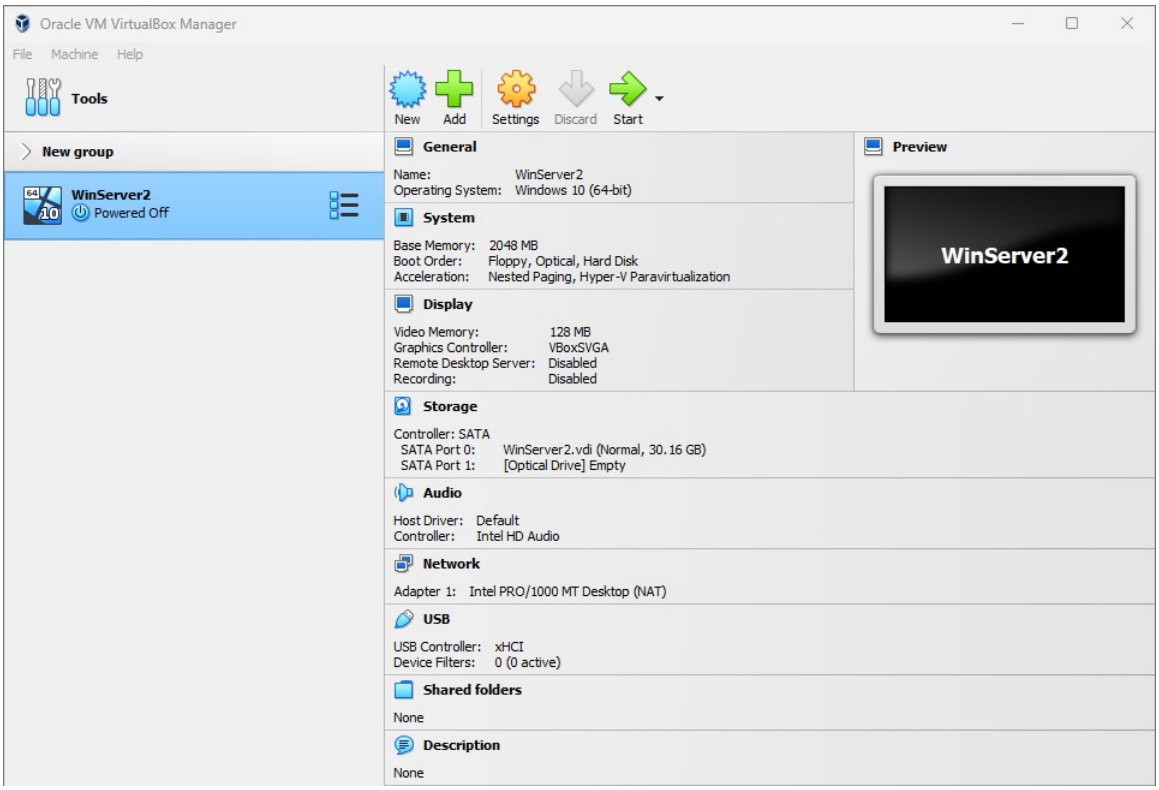
> **Note**: At this stage don't add the ISO download, we will add it after configuring the VM.

6. On the **Hardware** window allocate more RAM and CPUs if necessary but feel free to leave it as the default and for good performance don't go below 2GB RAM. Click **Next**.



Allocating RAM and number of CPUs to the VM

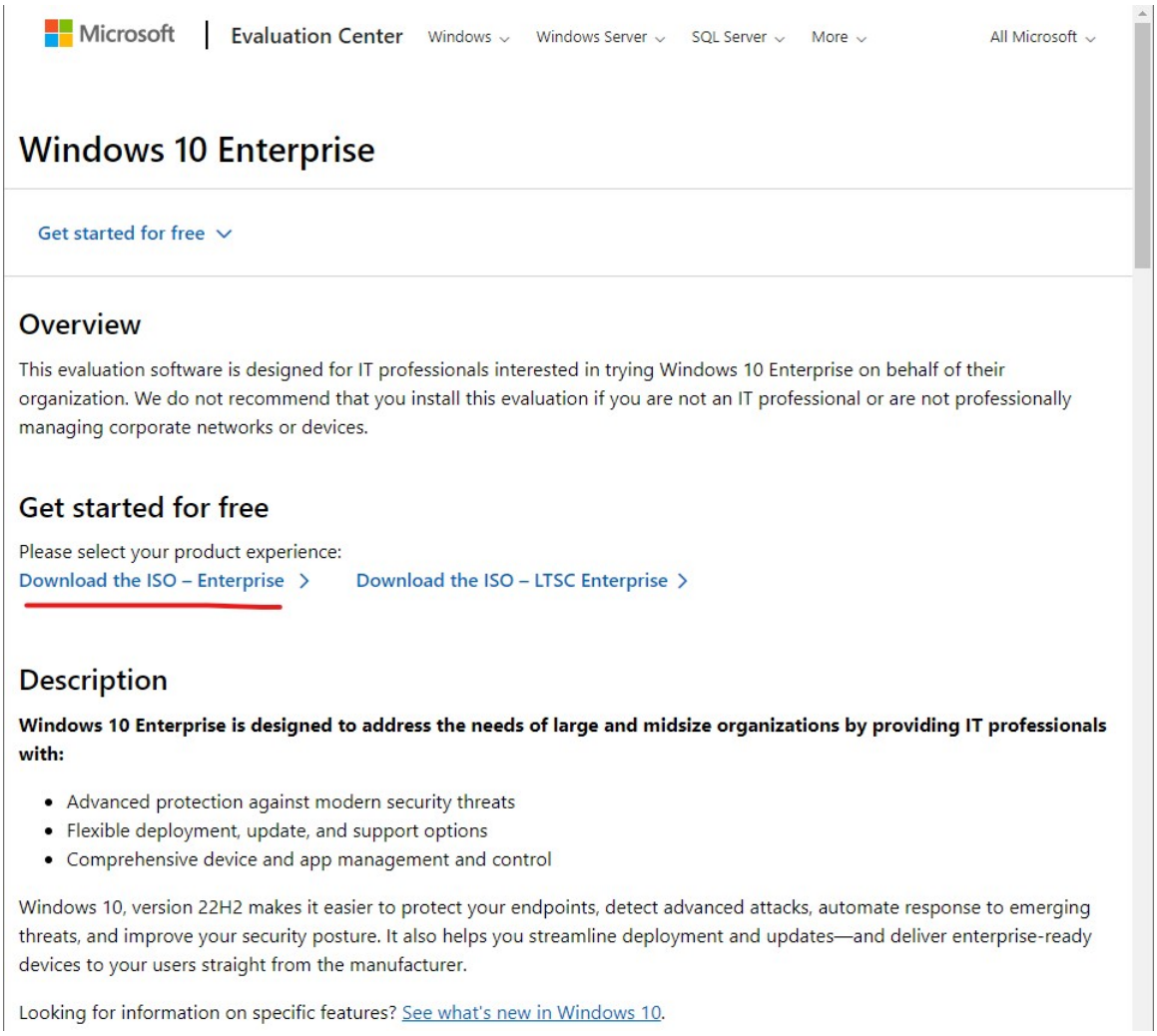
7. On the **Virtual Hard Disk** window ensure the **Create a Virtual Hard Disk** radio button is checked, allocate more disk space if you like then click **Next**.
8. On the **Summary** window review the information you have provided for the Windows Server VM then click **Finish**. You should now see your newly created VM populate on the left pane of VirtualBox (depending on your hypervisor).



Windows Server VM created

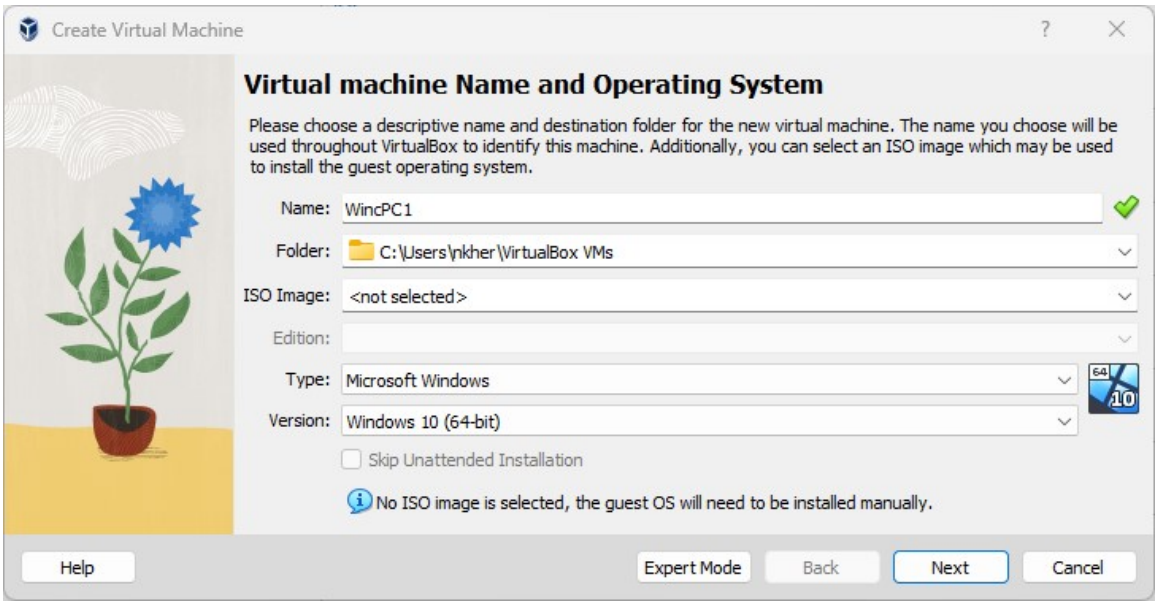
We will now setup our Windows 10 Enterprise VM. We will be repeating steps 2-8 with a few adjustments necessary for the Windows 10 Enterprise VM.

9. Click the **Windows 10 Enterprise** link under the **Virtual Machine specifications** section above. You will be greeted with this page:



Windows 10 Enterprise download page

10. Click the **Download the ISO - Enterprise** link under the **Get started for free** section. As with Windows Server, you will need to register to receive the free trial so please complete the form then click **Download now**.
11. On the next page, choose your respective language and click the **64-bit edition** under **ISO - Enterprise Downloads** - this download will also be around 5GB in size.
12. Whilst the Windows 10 Enterprise ISO file is downloading we can set up the Windows 10 Enterprise VM. Open your hypervisor and at the top of the page click **New**.
13. In the **Create Virtual Machine** window, provide a **name** and change the version to **Windows 10 (64-bit)**, then click **Next**.

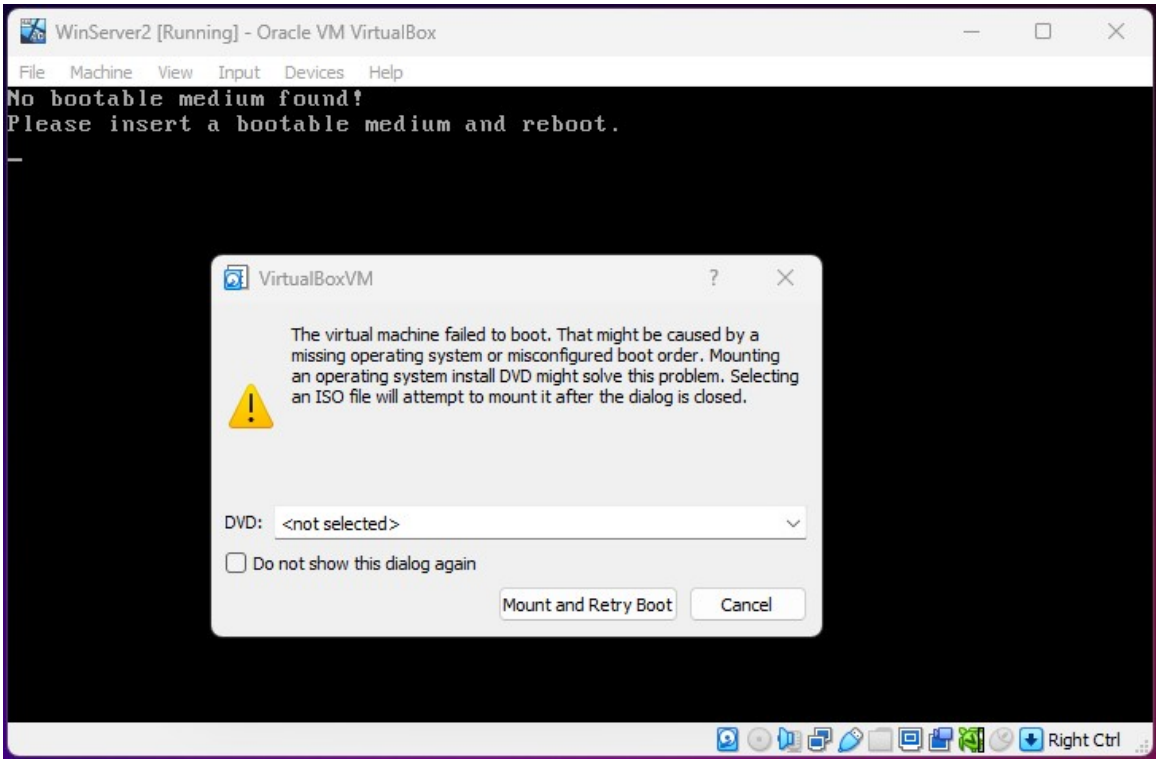


14. Allocate an amount of RAM and CPUs or keep to default on the **Hardware** window - ensure the **Create a Virtual Hard Disk** radio button is checked on the **Virtual Hard Disk** window, click **Next** - review the information on the **Summary** window then click **Finish**. It should now populate in your hypervisor.

Task 2: Windows Server Installation

15. Double-click the new Windows Server VM you created to boot it up. When it starts you will be presented with a window stating the “The virtual machine failed to boot” - here is where we will add our Windows Server ISO file.

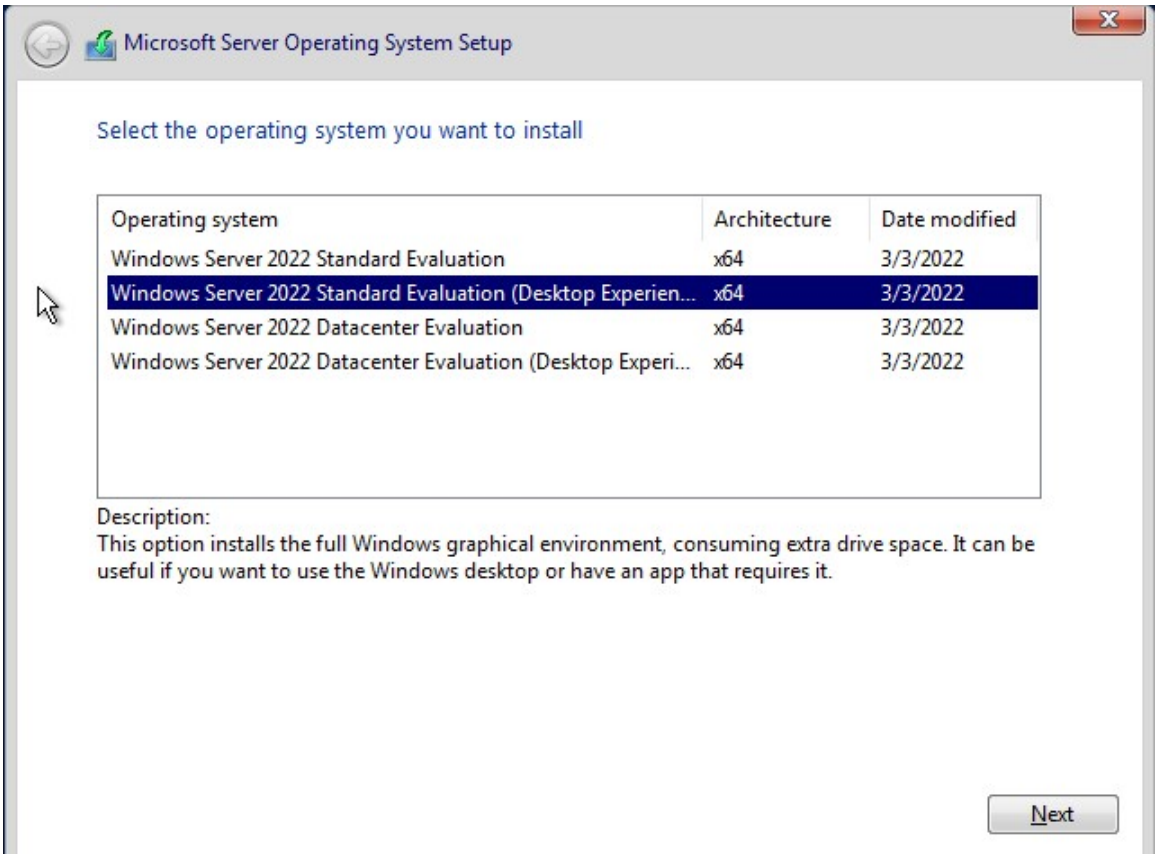
16. Click the down arrow next to the **DVD:** field and select **Other**. A file explorer window will open for you to locate the Windows Server ISO file. Choose the relevant file and click **Open**. In the VM window click **Mount and Retry Boot**.



VM window - retrieving the Windows Server ISO file to mount

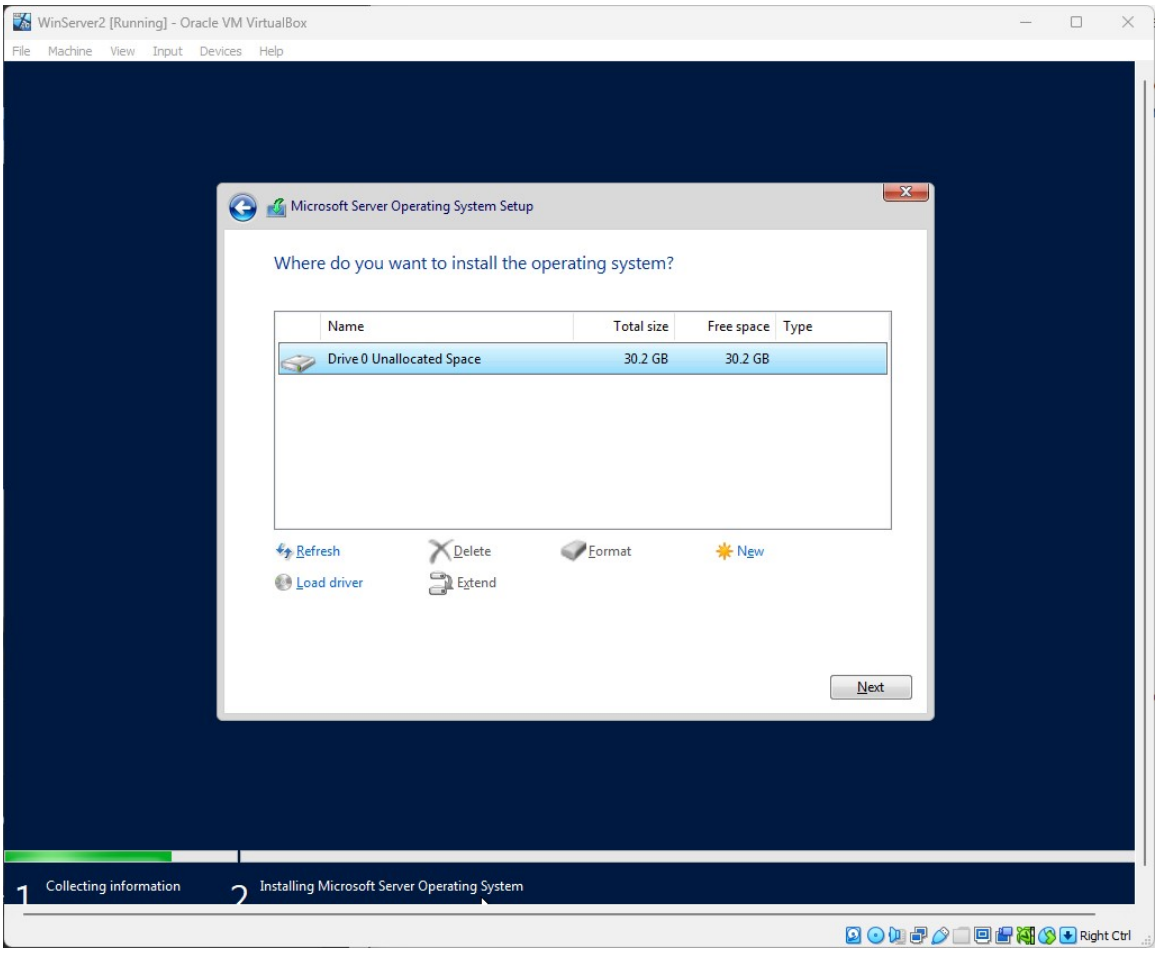
17. In the **Windows Setup** window you can change the language, time etc, then click **Next** and **Install Now**.

11. After you boot the installation you will see a **Microsoft Server Operating System Setup** window which asks you which operating system you want to install. Click **Windows Server 2022 Standard Evaluation (Desktop Experience)** then click **Next**.



Selecting the Windows Server 2022 Evaluation (Desktop Experience) to install

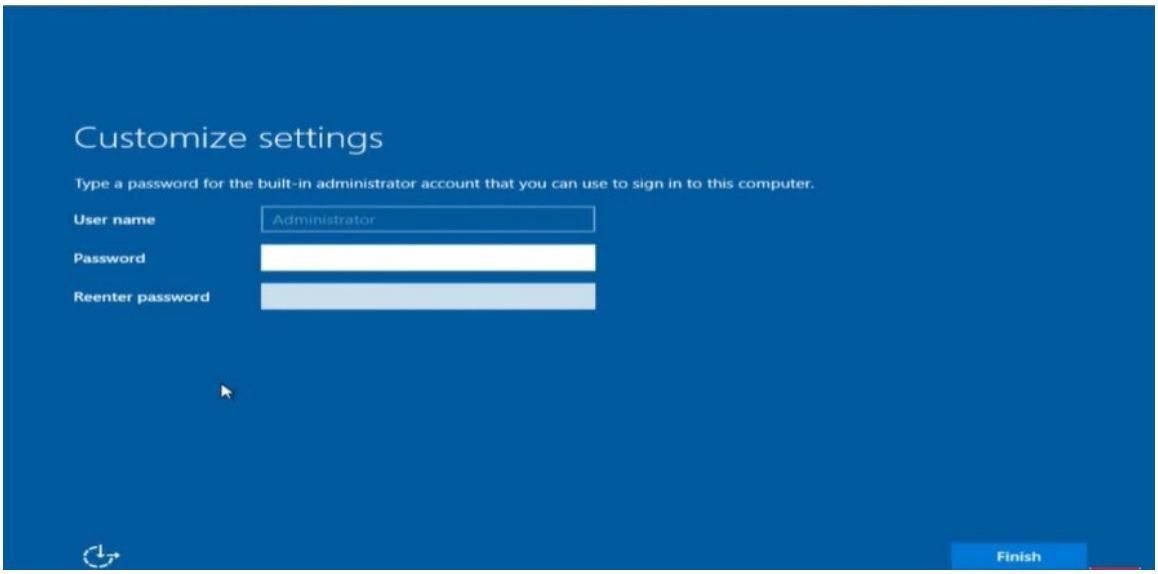
19. **Accept** the license terms in the **Applicable notice and license terms** window, click **Next**.
20. In the **Which type of installation do you want** window select **Custom: Install Windows only (advanced)**. On the **Where do you want to install the operating system** window choose the virtual drive we created earlier in the initial setup, then click **Next**.



Installing operating system on created virtual drive

> **Note**: The operating system will now install - it may take a while depending on the performance capabilities of your PC.

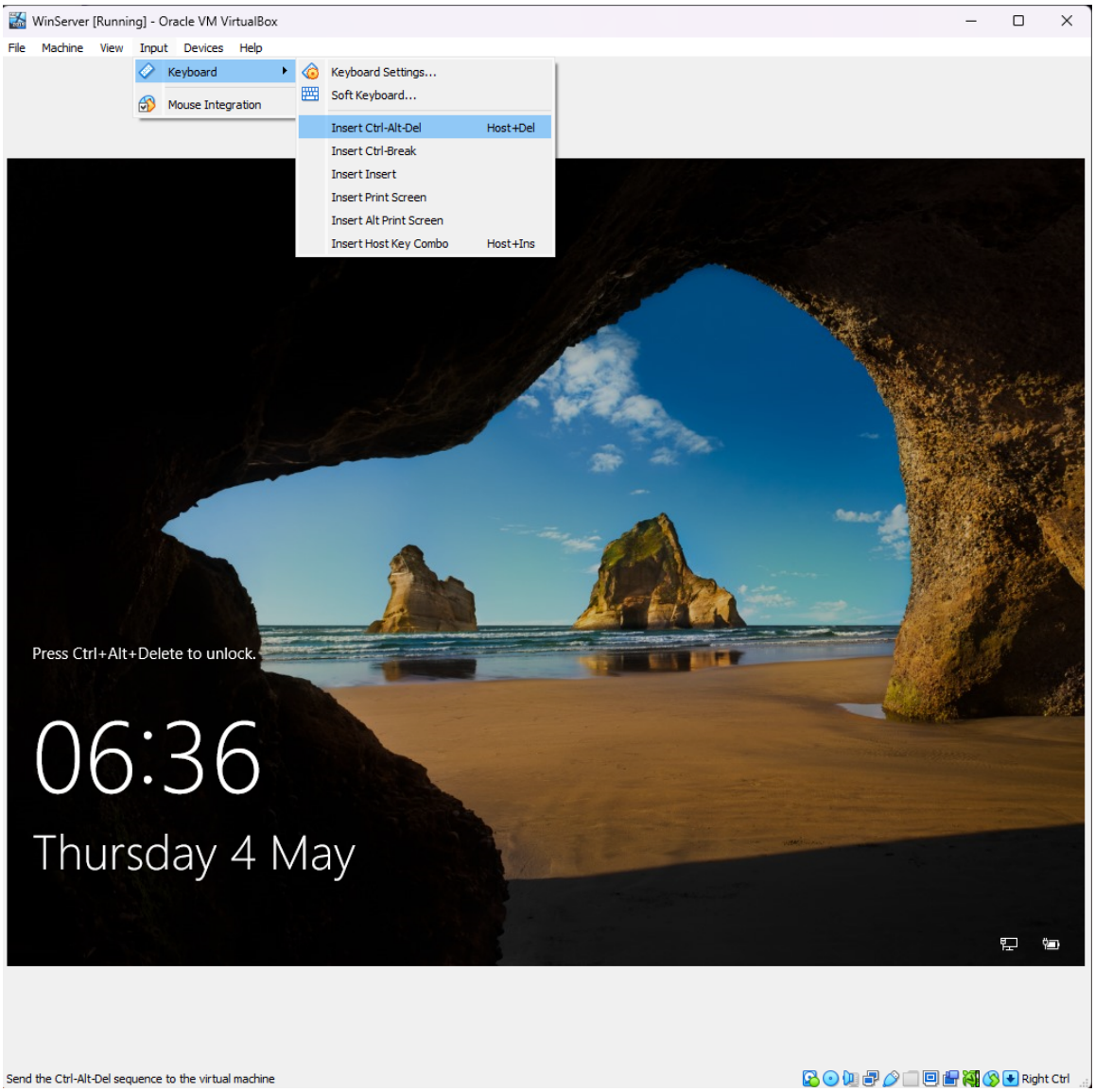
21. Once the operating system installation is complete assign an administrator password for the account, then click **Finish**. The administrator account for Windows Server is now created.



Enter a password for the administrator account

22. On your Windows Server VM you will now be presented with the usual logon screen for Windows. Please logon with the password you created for the administrator account.

> **Note**: You may find that keyboard/mouse input will not work between the host (your machine) and the guest (the VM) to unlock the screen. To get around this click **Input** > **Keyboard** > **Insert Ctrl + Alt + Delete**.

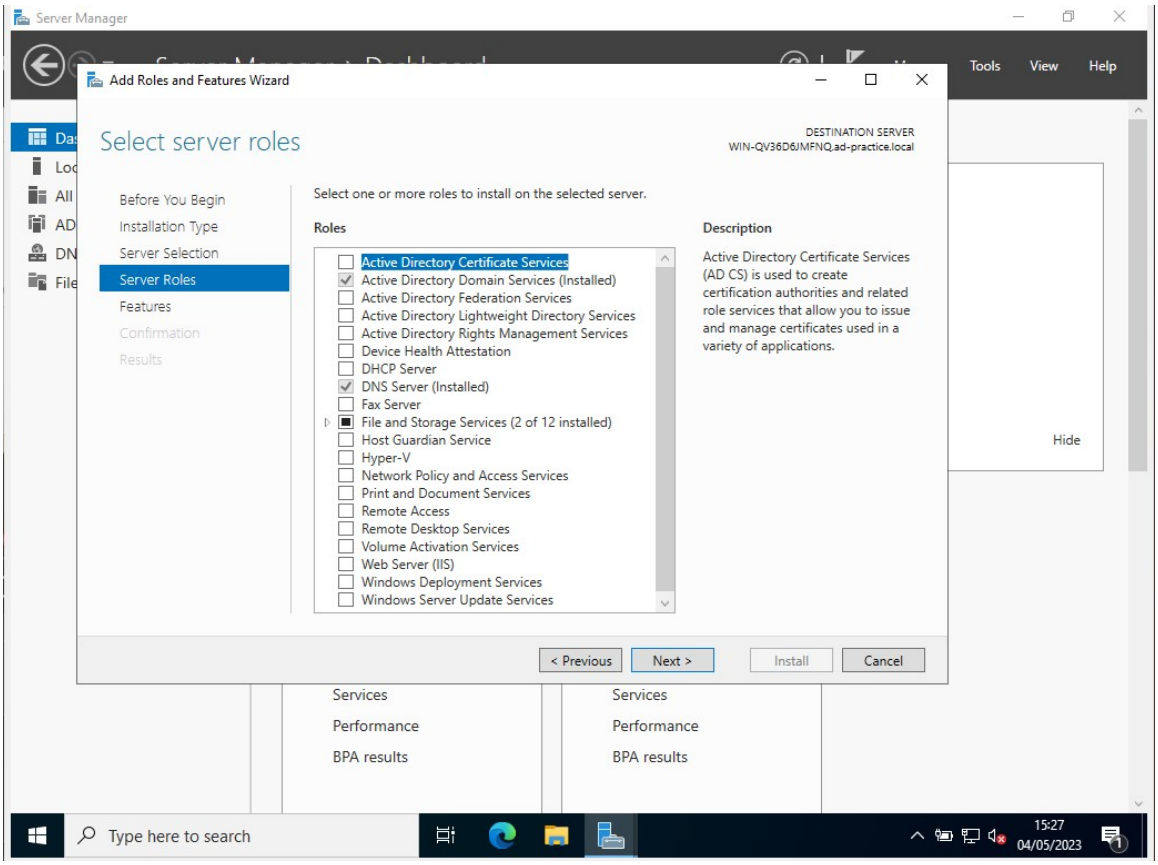


Inputting Ctrl + Alt + Delete to unlock the administrator account

Task 3: Configuring Active Directory Domain Services on your Windows Server 2022 VM

Once you are logged in, a **Server Manager** window will open automatically - here is where we are going to add **Active Directory Domain Services (AD DS)**.

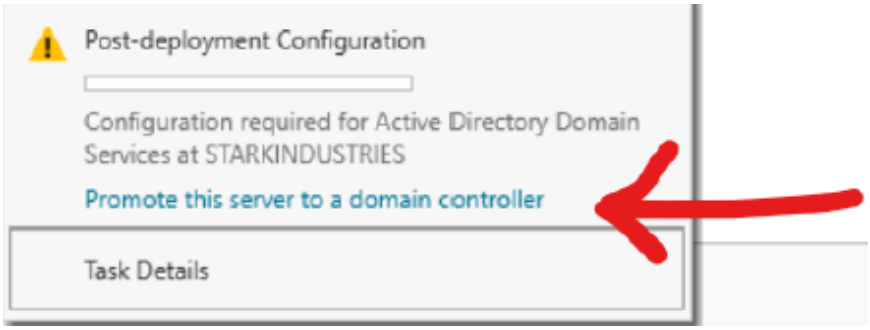
23. On the Server Manager window, click **Add roles and features**. In the **Add Roles and Features Wizard,** keep clicking **Next** until you reach the **Server Roles** page.



Add Roles and Features - installing AD DS

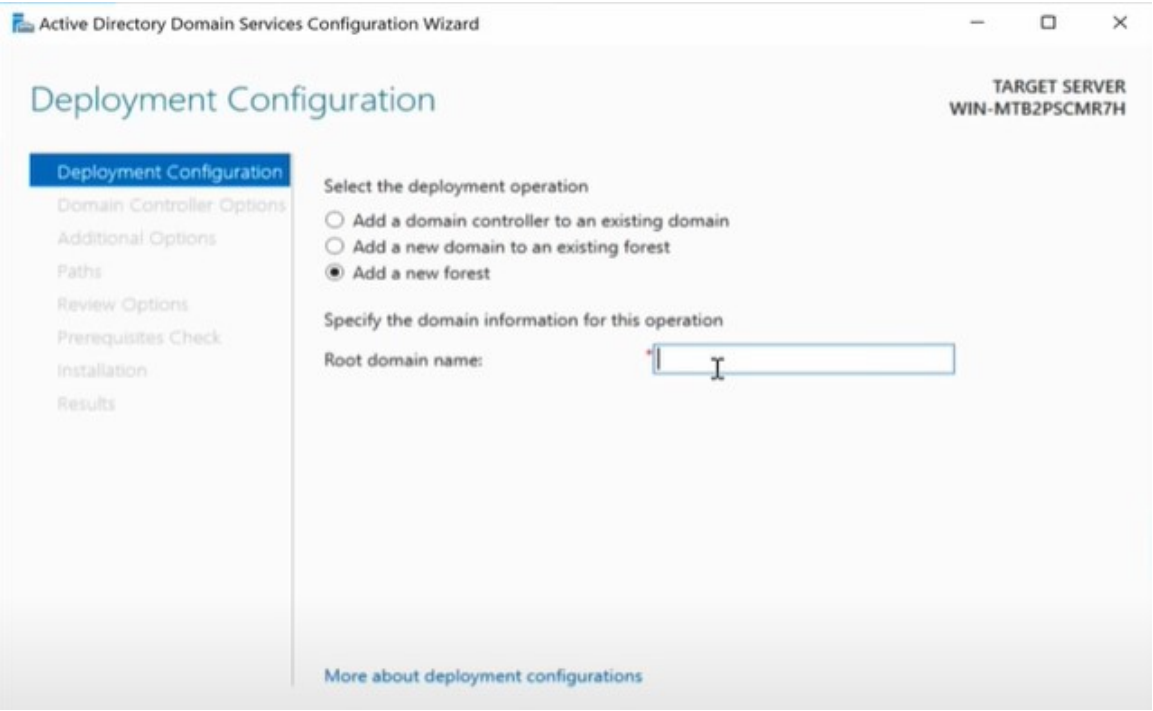
24. Tick the **Active Directory Domain Services** checkbox, click **Add Features** on the popup window, then keep clicking **Next** until you reach the **Confirmation** page then click **Install**.

25. Once the installation is complete click **Close** then in Server Manager click the **flag** at the top and choose **Promote this server to a domain controller**. The **Active Directory Domain Services Configuration Wizard** will appear which is where we can create our domain.



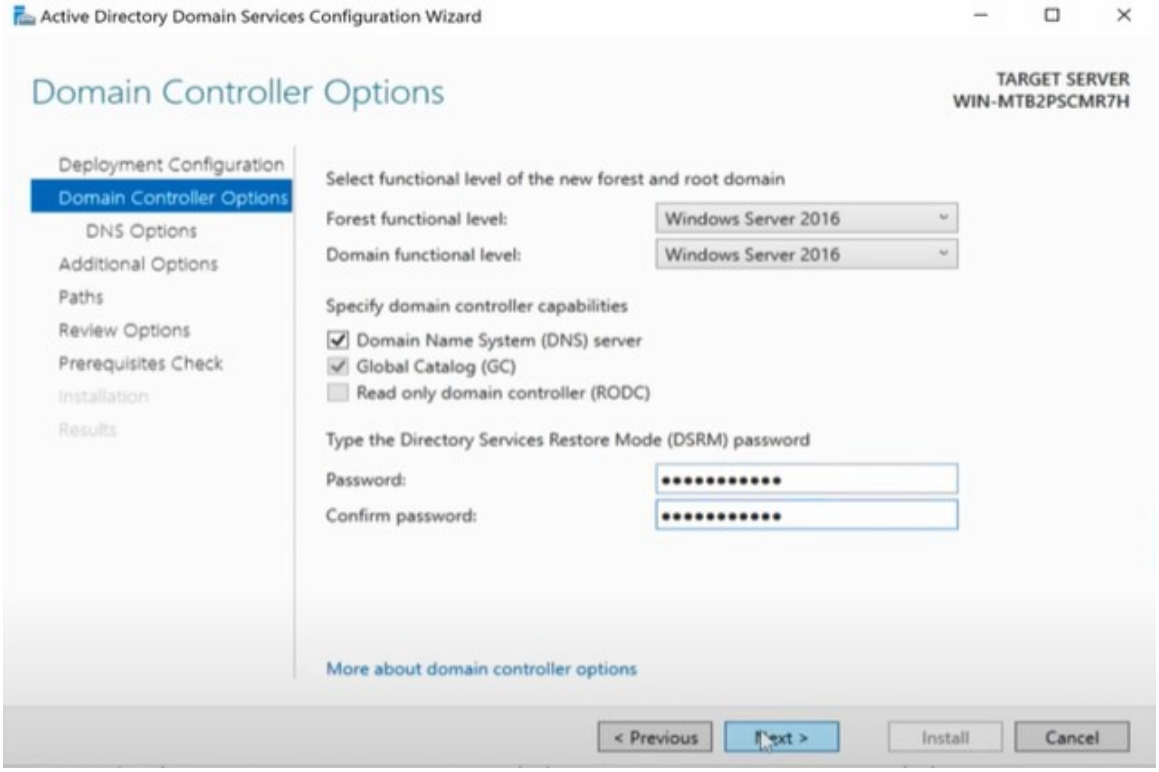
26. In the **Deployment Configuration** window click **Add a new forest** radio button, enter a name in the Domain: field with a **.local** suffix (e.g. AD-Practice.local), then click **Next**.

> A forest is a collection of domains. The **.local** suffix is good to use when working in a local test environment.



AD DS Configuration Wizard - providing a root domain name

27. On the **Domain Controller Options** page provide a password for the **Directory Services Restore Mode (DSRM)**, leave everything else as default, then click **Next** until you reach **Additional Options** page.



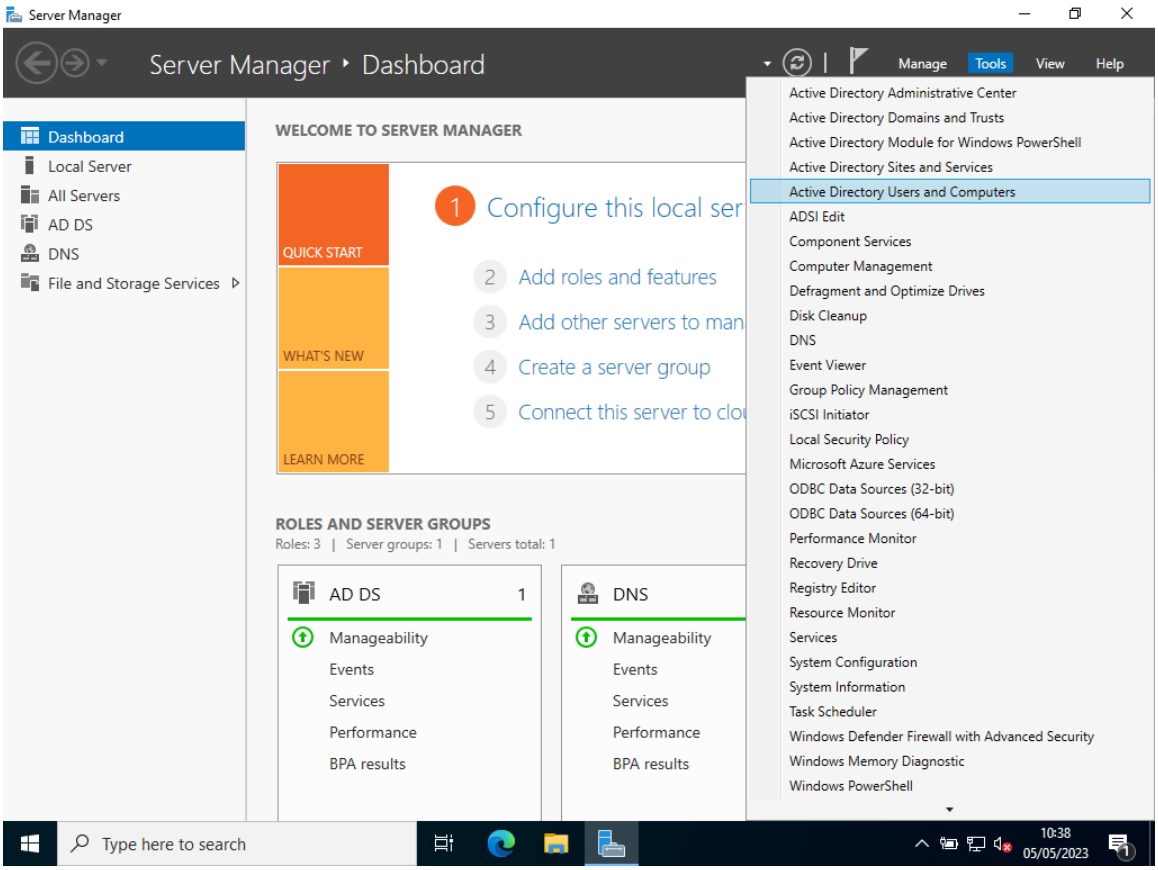
AD DS Configuration Wizard - providing a DSRM password

28. In the **Additional Options** page, the **NetBIOS domain name:** field will then populate with the name you provided for your domain excluding the .local suffix (e.g. AD-Practice). Keep clicking **Next** until you reach the **Prerequisites Check** page.
29. If successful there will be a message in the window saying ***All prerequisite checks passed successfully***…. then click **Install**. After the installation is complete, you will be signed out in order for the Windows Server to reboot with the newly add roles/features.

Task 4: Creating Users using Active Directory

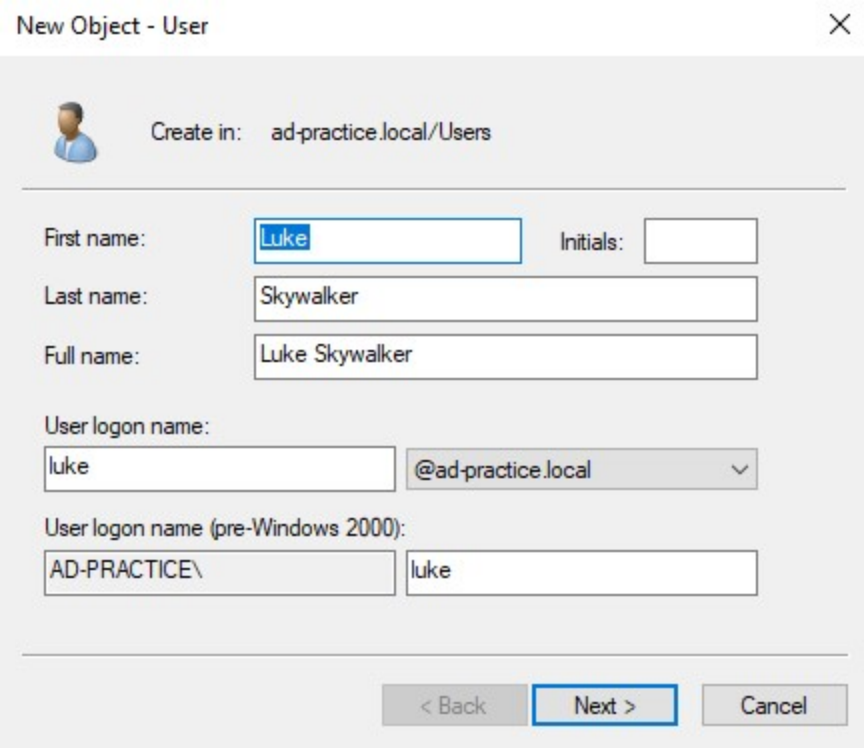
We will now create a user to in our Active Directory domain who will be the user account we create on our Windows 10 Enterprise VM.

30. Log back into your administrator account on your Windows Server VM and in **Server Manager** go to **Tools** > **Active Directory Users and Computers**.



31. In the **Active Directory Users and Computers** window, expand your **domain node** on the left pane > right-click **Users** > **New** > **User**.

32. In the **New Object - User** window, enter a **first**, **last**, **full name**, and have the **user login name** be the first name but all in **lowercase**.



33. Click **Next**, enter a password for the account (it may need a capital, number etc), untick **User must change password at next logon**, click **Next**, review the details then click **Finish**. You now have a user created in your Active Directory.

Task 5: Windows 10 Enterprise Installation

We will now set up the installation for your Windows 10 Enterprise VM.

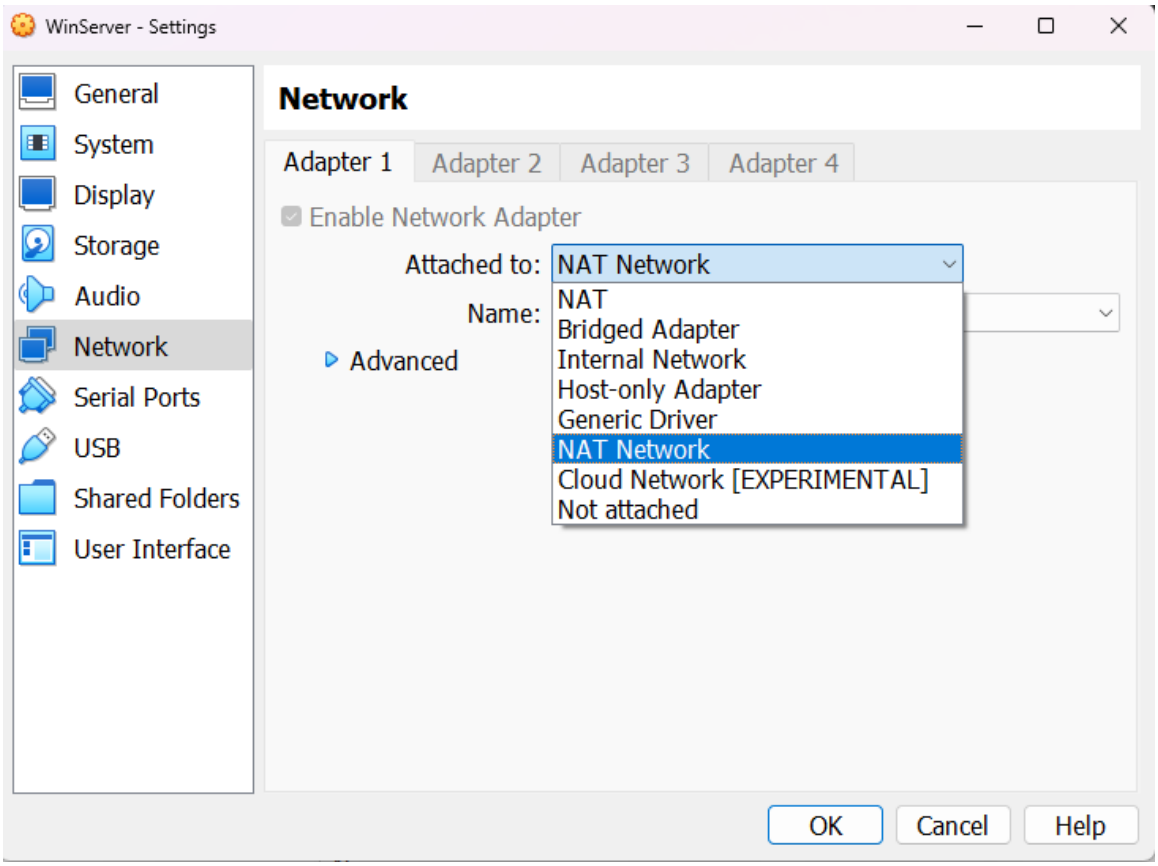
34. Open the Windows 10 VM in your hypervisor, **repeat steps 15-17 and steps 19-20** from Task 2 for Windows 10 as performed for Windows Server whilst choosing the Windows 10 Enterprise ISO file.

Whilst the operating system is being installed, we will now perform configurations so that are Windows Server VM and Windows 10 VM are on the same network.

Task 6: Configuring our Virtual Network

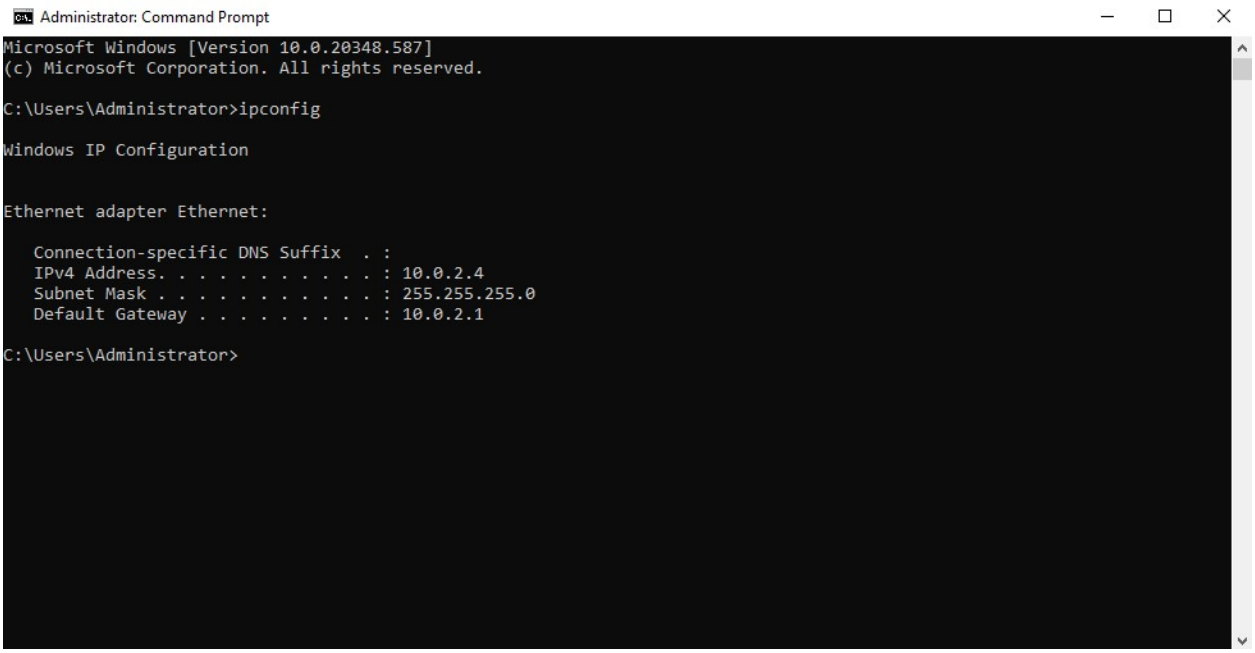
35. In the VirtualBox Manager window, click **File** > **Tools** > **Network Manager**. Under Network Manager click **NAT Networks** and copy the settings in the image below - if there isn't a NatNetwork already populated, click **Create**, then fill in the details.

36. In VirtualBox Manager, **right-click** your Windows Server VM > **Settings** > **Network** > click the **drop-down** in the Attached to: field > select **NAT Network**, click **OK** - r*epeat this process for your Windows 10 VM*.



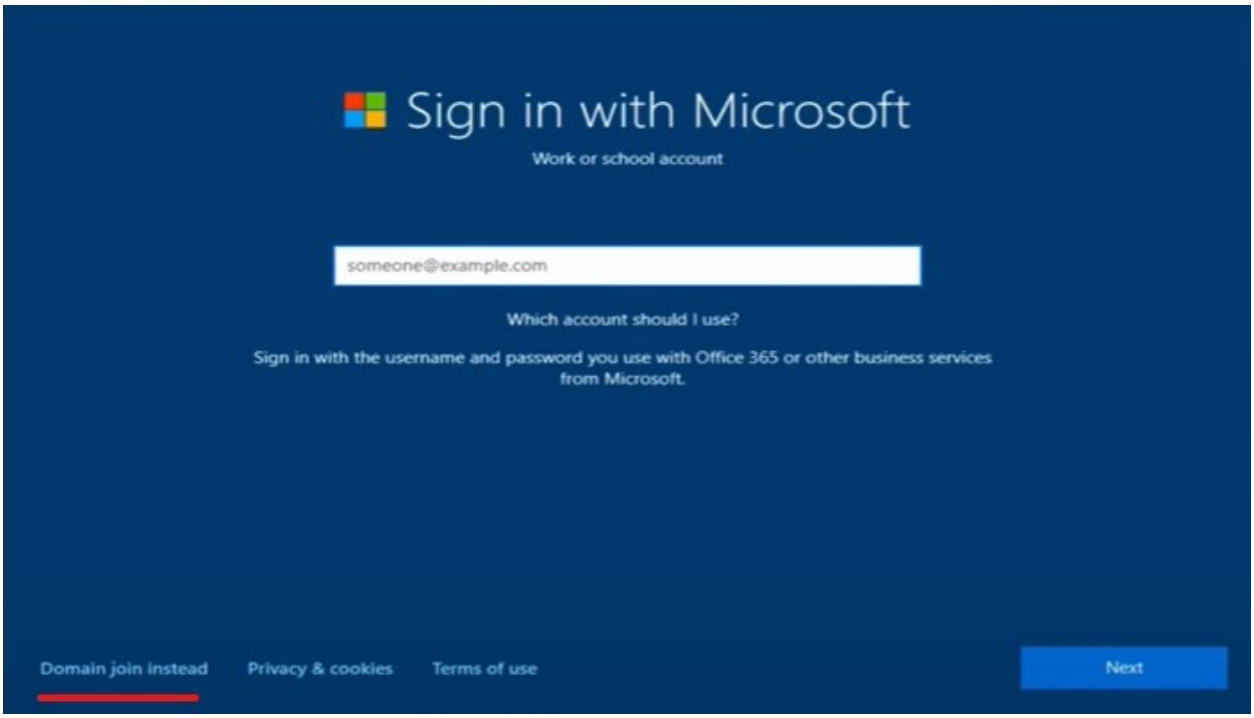
Configuring VMs onto a local virtual network

37. Open your Windows Server VM and login. Before joining our Windows 10 VM to the domain we need to **gather the IP address for our Windows Server VM**. In the search taskbar, type "**cmd**" to retrieve the **Command Prompt**. In the Command Prompt type **ipconfig** and press **enter** - make a note of your respective **IPv4 address** displayed.



Our Windows Server IPv4 address is used in the Windows 10 client as the Preferred DNS server so the client can communicate to the server on the network.

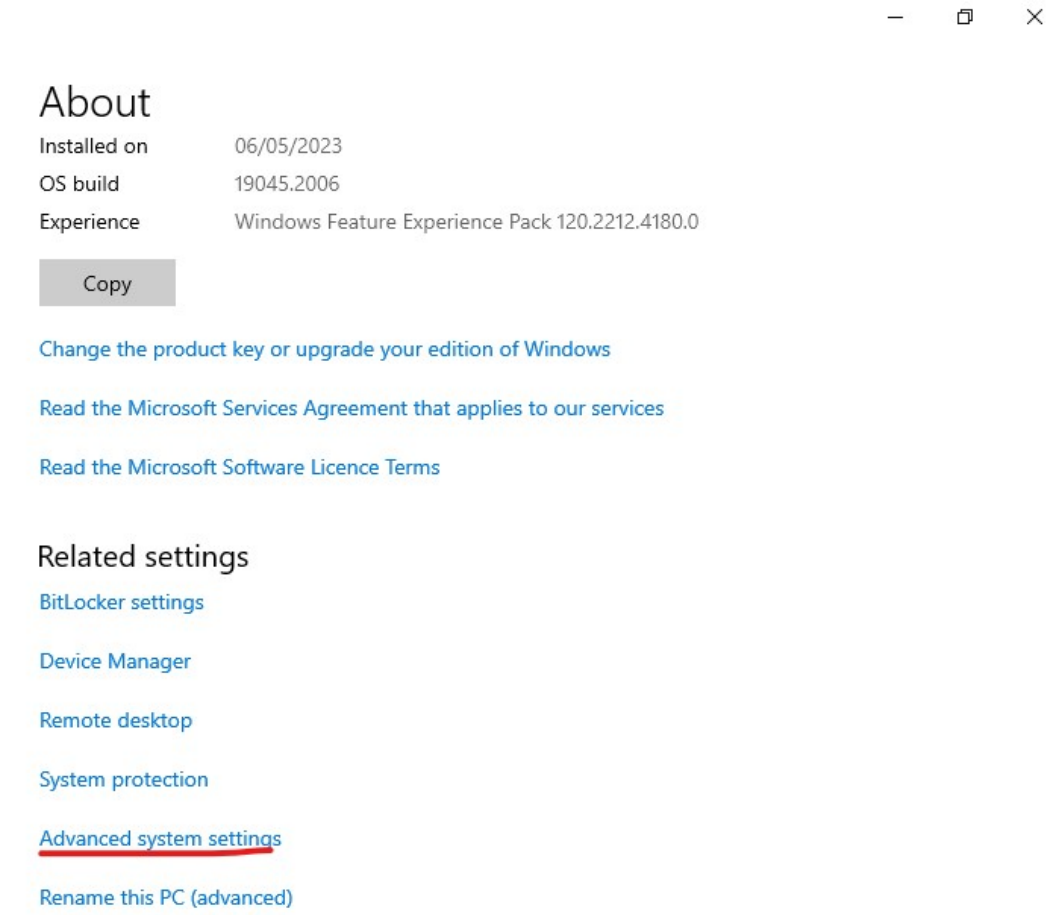
38. **Back on our Windows 10 VM** hopefully by now the installation has completed and you can go about creating the account. Go through the initial prompts (region, keyboard layout etc) until you reach the **Sign in with Microsoft** screen. In the bottom left, click **Domain Join Instead**.



Joining the account to the domain

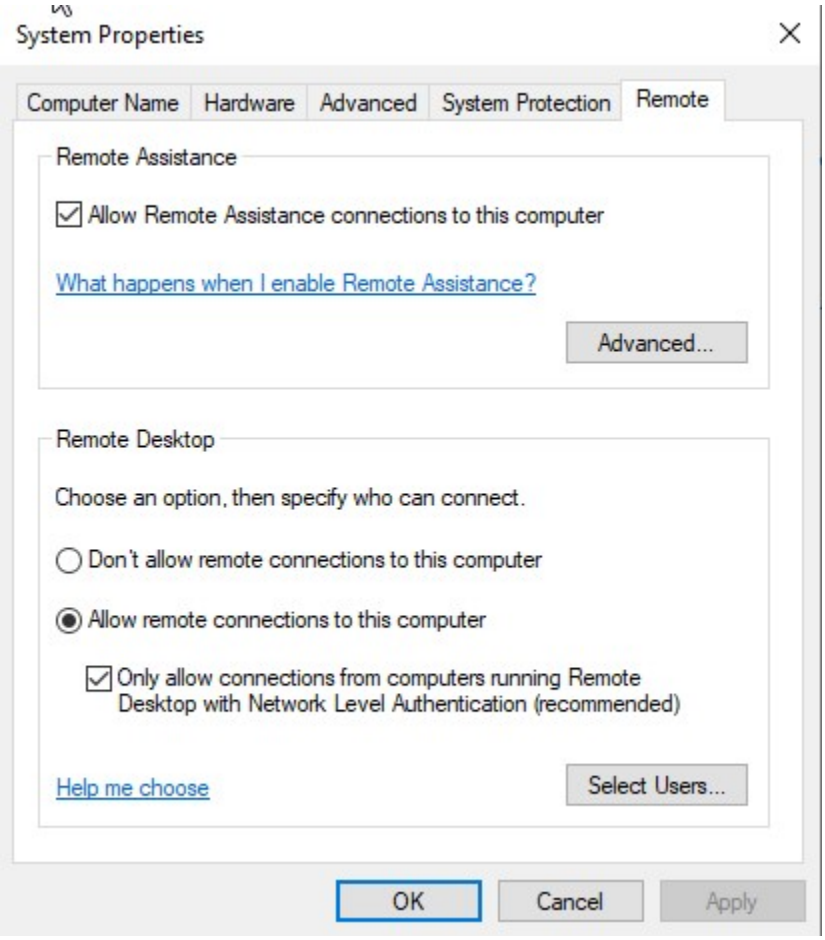
39. Choose the name you created in Active Directory, enter a password and fill out the security questions. Proceed through the rest of the steps to set up the Microsoft Account. Once the process is complete you will be logged into the Windows 10 Enterprise client.

42. Next in the search bar, type **This PC** then select **Properties**. On the **About** page scroll down and click **Advanced system settings**.



This PC - About - Advanced system settings

41. In the **System Properties** window, click the **Remote** tab and tick **Allow remote connections to this computer** under Remote Desktop.



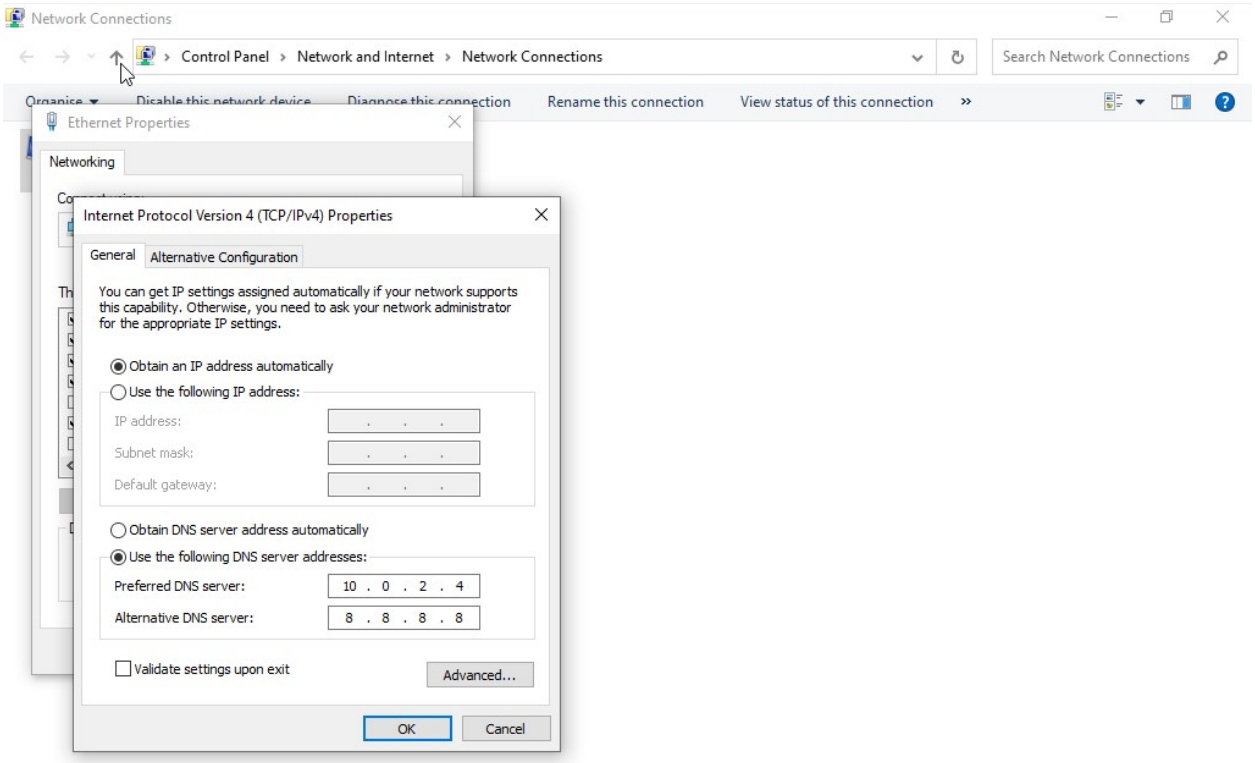
System Properties - Remote tab

42. Whilst still in the **System Properties** window, select the **Computer Name** tab and click **Change**. In the **Computer Name/Domain Changes** window, changed the Computer name to something more appropriate then click **OK**.

You will be prompted to restart the computer to apply the changes so click **Restart Now** when prompted. Log back in after the restart is complete.

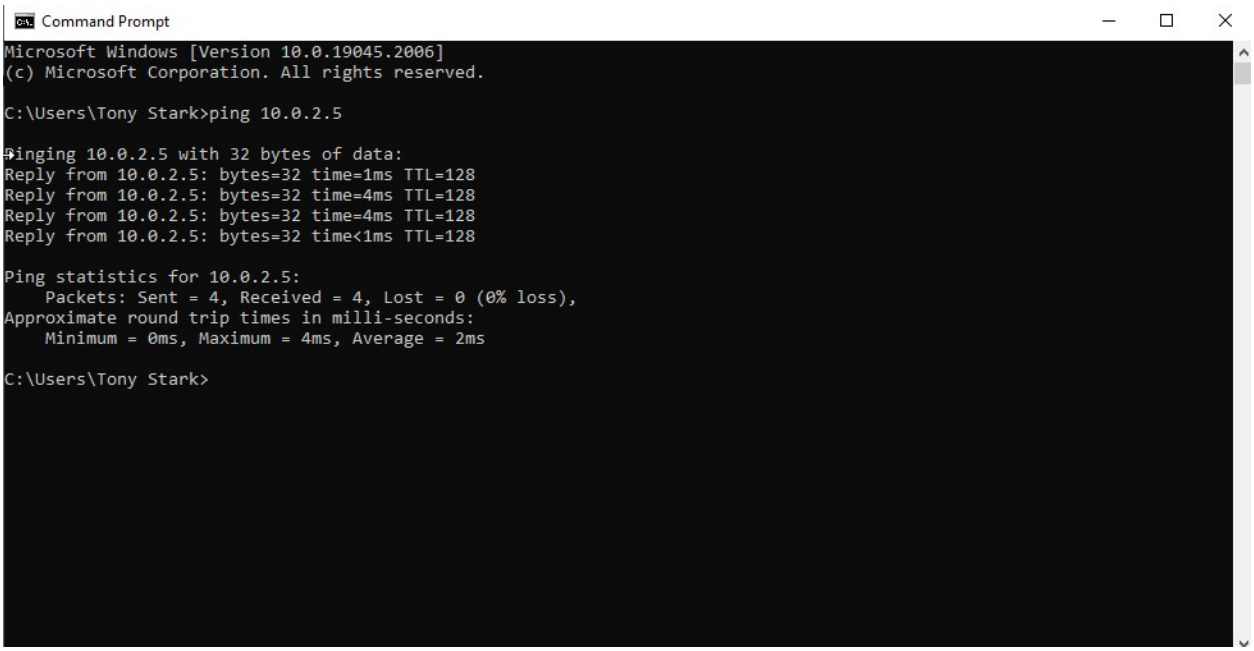
43. Next, on your desktop **right-click the network logo** in the bottom right-hand corner and click **Open Network and Internet Settings**. Click **Ethernet** on the left pane then **Change adapter options**.
44. In the **Network Connections** window, right-click **Ethernet** > **Properties**. In the **Ethernet Properties** window select **Internet Protocol Version 4 (TCP/IPv4)** in the **Ethernet Properties** window and click **Properties**.

45. In the IPv4 properties window, click **Use the following DNS server addresses:** and in **Preferred DNS server** enter the **IPv4 address of your Windows Server** - provide an Alternative DNS server if you wish, then click **OK**.



Windows 10 - configuring Windows Server IPv4 address as Preferred DNS server

46. You can then **ping** the Windows Server IP address from the Command Prompt in your Windows 10 VM to check the client is communicating with the domain server. A successful ping will look like the image below.



Pinging the domain server

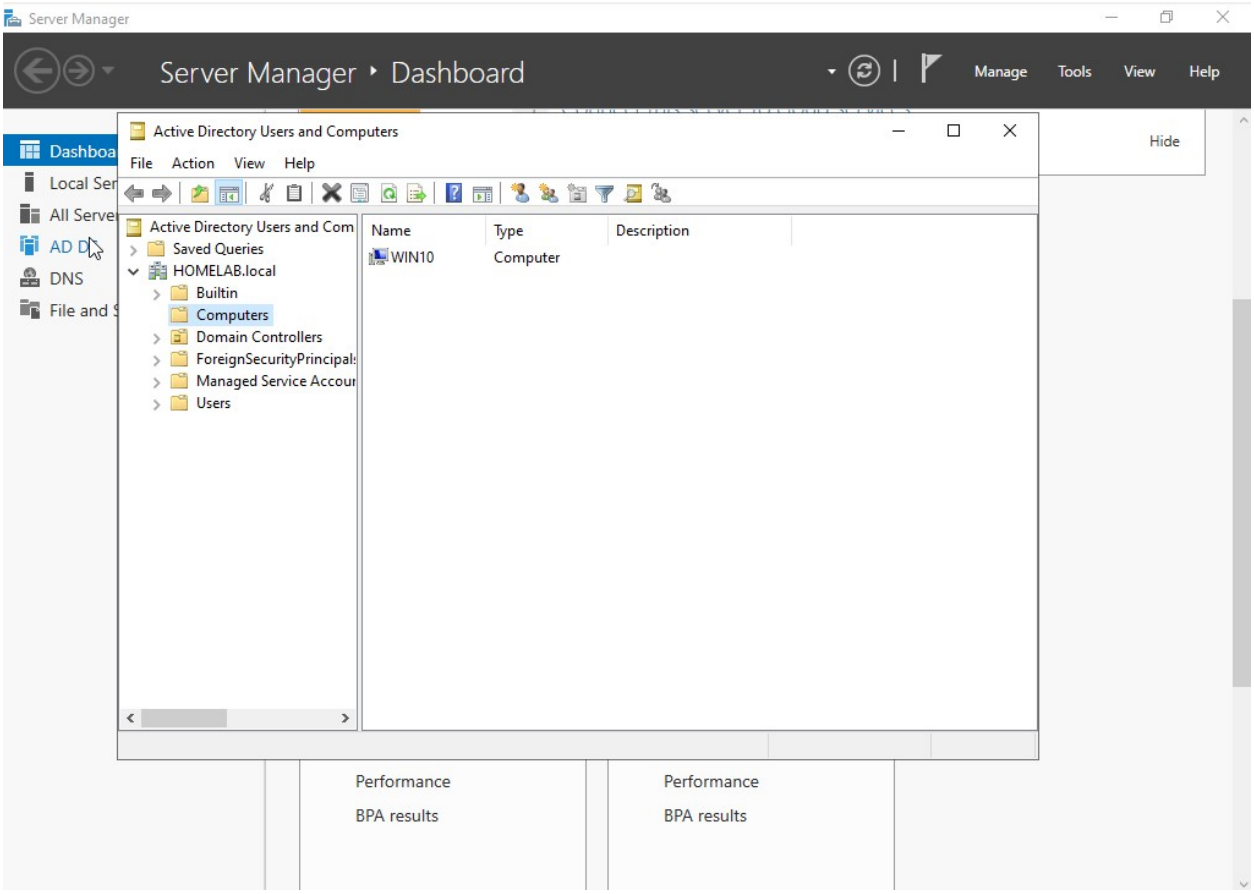
Task 6: Joining our Windows 10 client to the domain

We are now at the final stage of actually making our Windows 10 client join the domain we created.

47. **Repeat step 40** to open the **System Properties** window, then select the **Computer Name** tab, click **Change**, and in the **Computer Name/Domain Changes** window tick **Domain** under Member of: and enter your domain name (e.g. AD-PRACTICE.local). Click **OK**, it will then ask for credentials of an administrator account to allow the user to join the domain**.**

> 💡 If successful it will provide a ***Welcome to the AD-PRACTICE.local domain*** message and then prompt you to restart the computer.

48. Log back in to your Windows Server VM and open **Active Directory Users and Computers** from **Server Manager**. Expand the domain node, click **Computers** and you should see your Windows 10 VM populated indicating it is a part of the domain.



Win10 computer now joined to Windows Server domain

Conclusion

Congratulations, you have installed and configured Active Directory Domain Services. This guide was an introduction to the various tools needed to setup a virtual homelab using Windows Server, Active Directory, and Windows 10 Enterprise. From here the choices are endless for configuring users in Active Directory from assigning rights & privileges, creating shared folders, building logon scripts, structuring out your domain into various organisational units etc. So explore, change some settings, and go configure!