

Setting up a virtual home lab

I Built a Free Virtual IT Lab at Home. Here's How

Back in the early 2000s, setting up an IT lab meant buying expensive physical servers or digging up old computers to repurpose. It was a hands-on and valuable experience, but not the easiest or fastest route.

Today, with the power of open-source tools and virtualisation, anyone can build a fully functional IT lab right from their own computer and that is exactly what I did.

I built a completely free virtual IT lab from scratch on my home machine using open-source software. It's fast, flexible, and a great way to gain hands-on IT and cybersecurity skills without needing a stack of hardware.

Let me walk you through how I did it and how you can, too.

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Virtualization Overview

So, what exactly is virtualization?

In simple terms, virtualization is the process of emulating a computer system. Instead of needing multiple physical machines, you can create several virtual machines (VMs) that run as software on your main computer.

Imagine your main computer is the host, the one doing all the work. On this host, you can run one or more guest virtual machines, each acting like its own separate computer with its own operating system and settings.

Think of it as running a full computer *inside* your existing one, like opening up a new world on your desktop!



Virtual Machines — Your Own Computers Within a Computer

Virtual machines (VMs) behave just like real computers, but they run as software inside your main system. That means you can start, restart, shut down, and even install operating systems and applications, just like you would on a physical machine.

Because of this flexibility, virtual machines are ideal for creating your own IT lab, giving you a safe space to test, learn, and build without needing extra hardware.

Free Virtualisation Software

There's a wide range of virtualisation software out there, and it can get a bit overwhelming trying to choose the “best” one.

Here's the truth: there is no single “best” virtualisation software, it really depends on your operating system and your specific needs.

For this project, I'm using Oracle VM VirtualBox, mainly because it works seamlessly on both Windows and Linux systems. However, feel free to use any other virtualisation tool you prefer most of the setup steps will be very similar across platforms.

Downloading Your Operating System ISO(s)

While it's technically possible to install from a physical disc, the most common and convenient method is to use an **ISO file** a digital copy of the OS installation media.

To find an ISO file, the easiest approach is to search online. For example, if you're looking to install **Window Server**, simply search:

"Window Server ISO Download"

Make sure to download ISOs from official or trusted sources to avoid corrupted or unsafe files. Some operating systems like Ubuntu, Fedora, or Windows Evaluation Editions provide free, official ISOs on their websites.

You should ONLY download ISOs from official websites. This means you shouldn't download Windows Server from a website like "sneakyfreecdkeys.com"...

I will still provide links to the most common operating systems that people want to install below. Keep in mind if the link is dead you can just run a quick google search and easily find the download.

[Windows Server](#)

[Windows 10 \(requires a valid Windows 10 license to download\)](#)

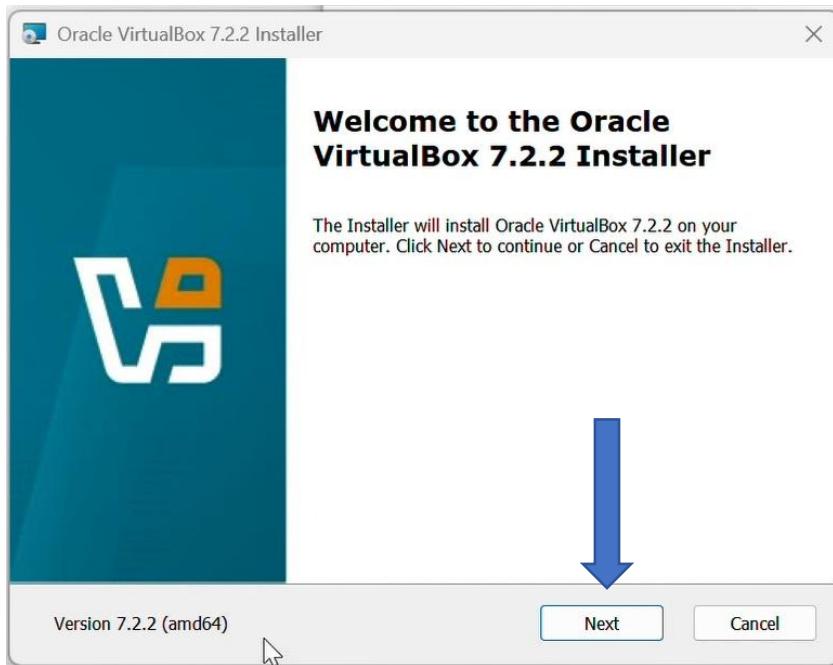
[Windows XP](#)

[Ubuntu](#)

[Kali Linux](#)

Downloading and Installing VirtualBox

Download Oracle VM VirtualBox by [clicking here](#). Once the download is completed, I launched the



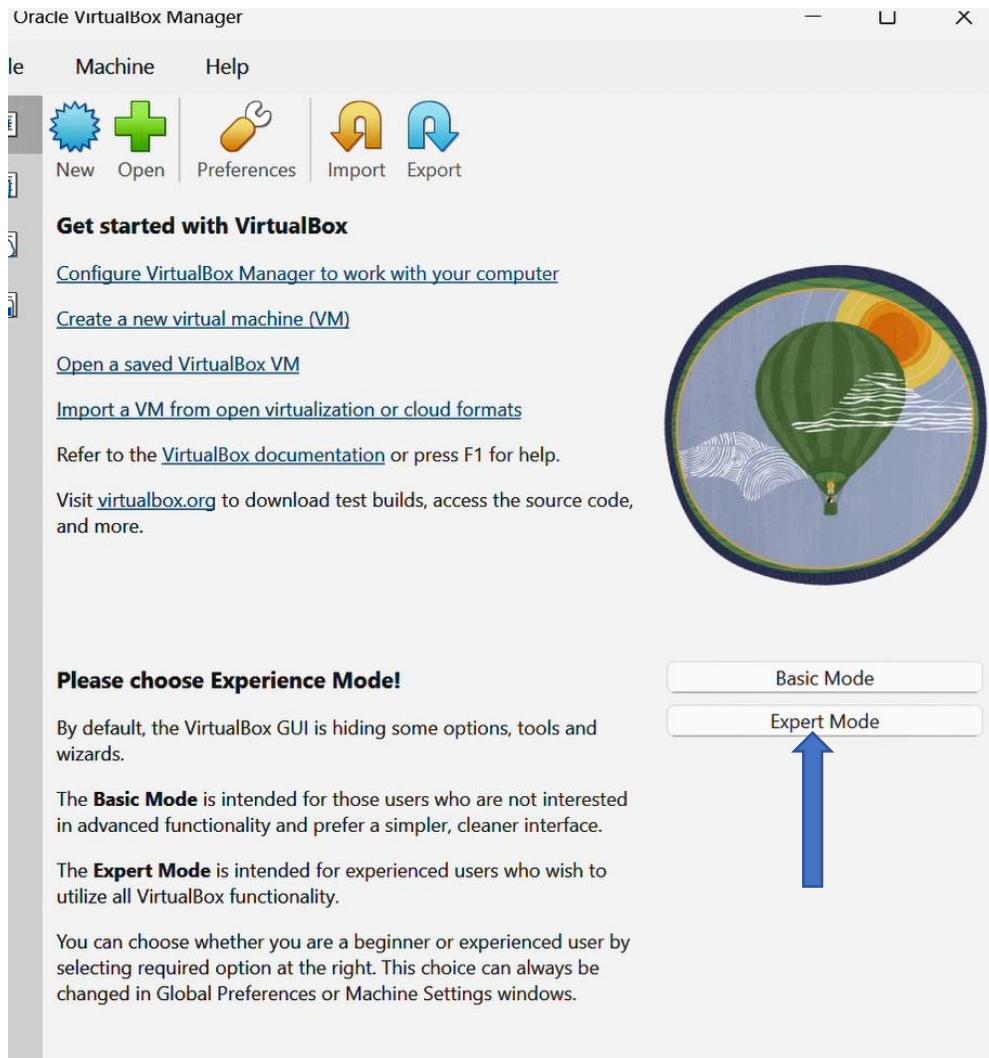
installation

I went through the installation using all the default options.

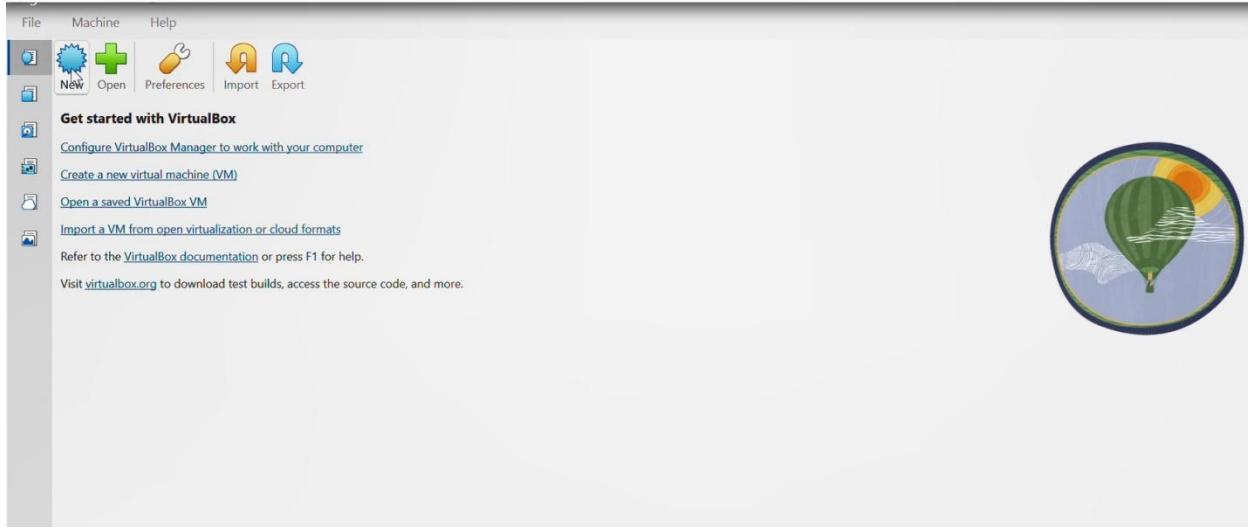
Whenever you're prompted with a yes/no question, simply choose "Yes" to continue.



Click Finish and launch VirtualBox.

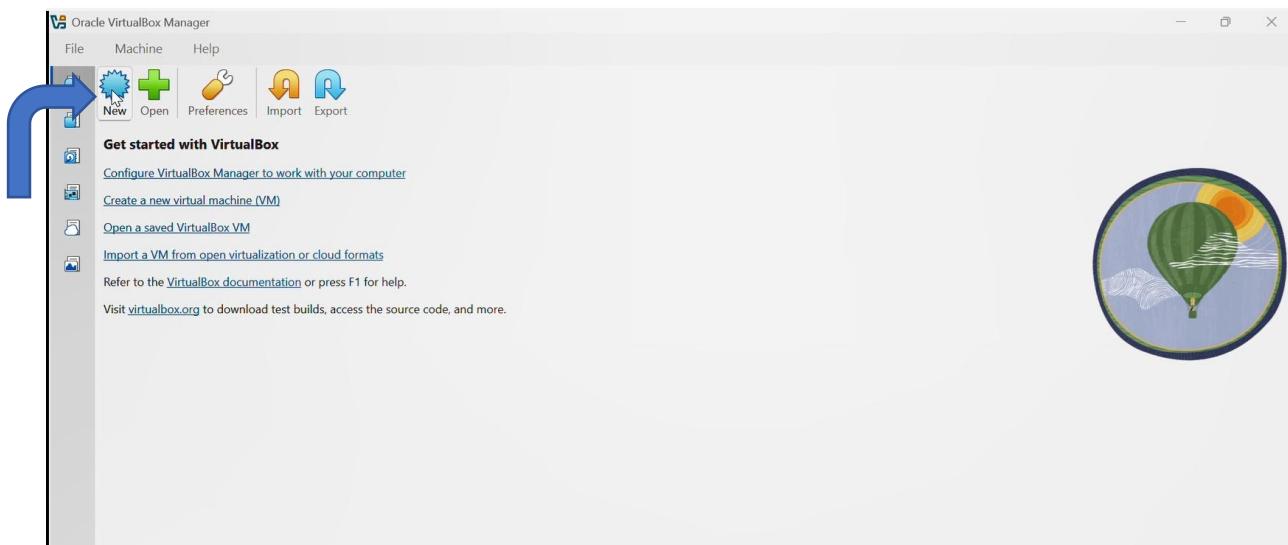


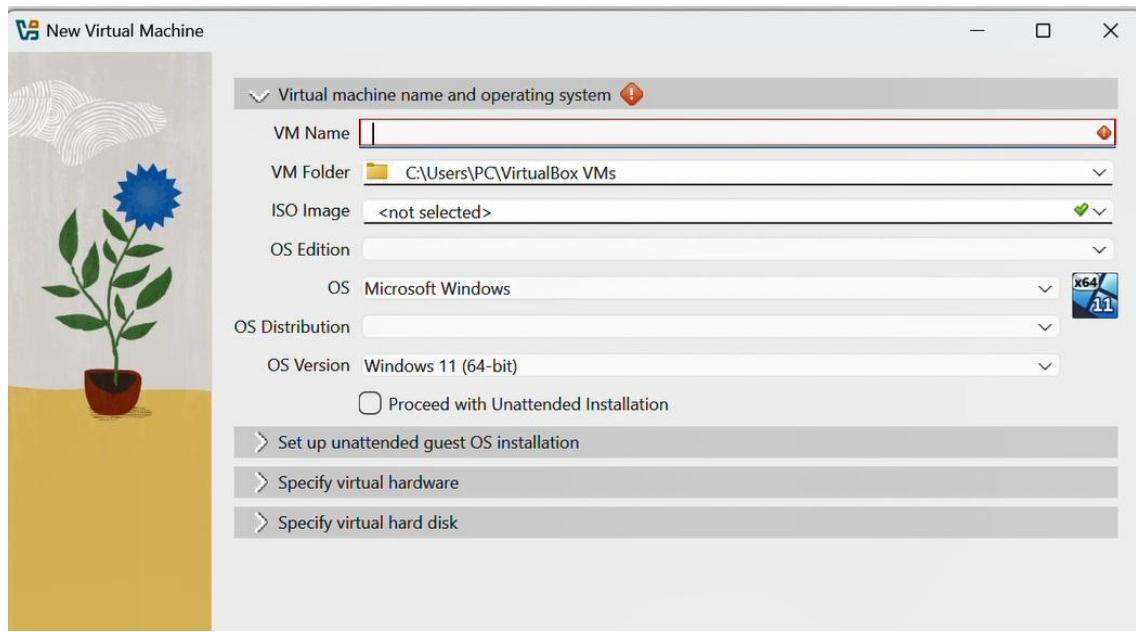
This will launch the new VM window. Click the *Expert Mode* button to proceed. Don't worry, it doesn't make the process harder. It simply streamlines the setup by reducing the number of steps.



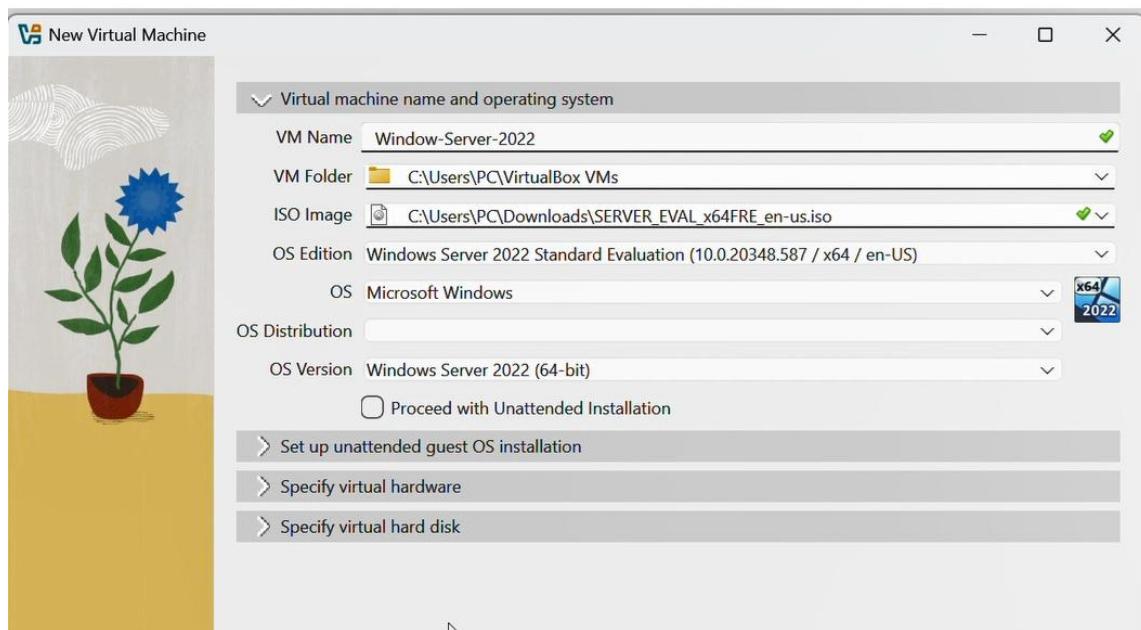
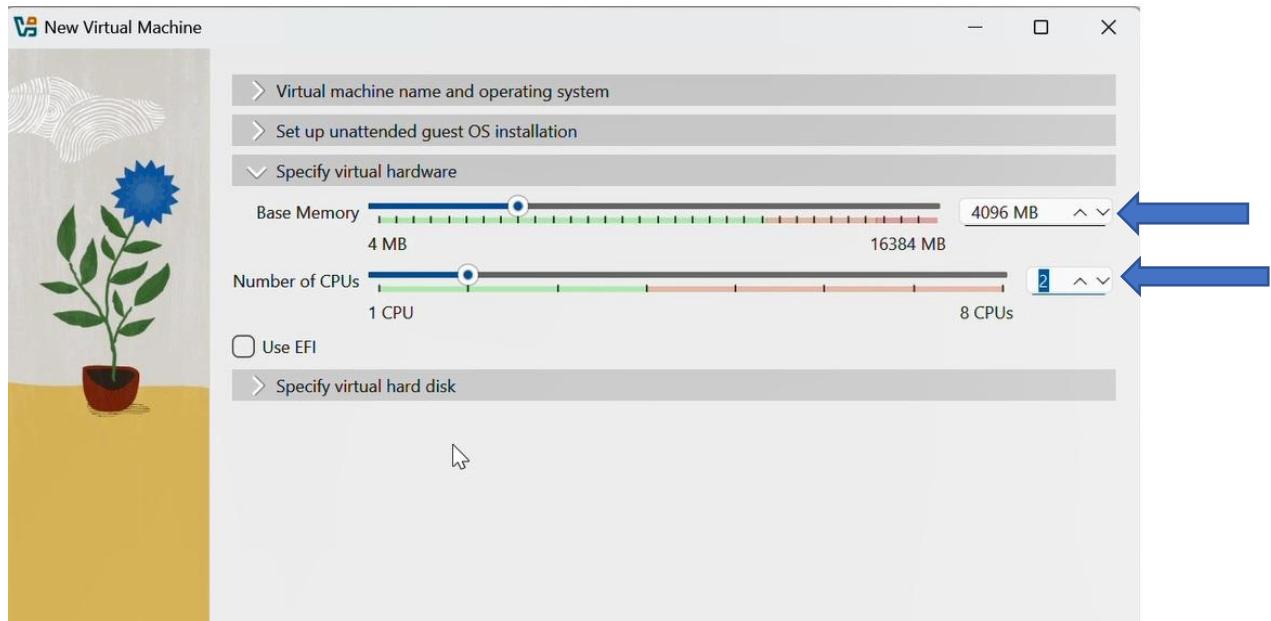
Creating a Virtual Machine

Now that we've decided on the type of virtual network to use, it's time to create a Virtual Machine (VM). You can do this by clicking the "New" button in the VirtualBox Manager.

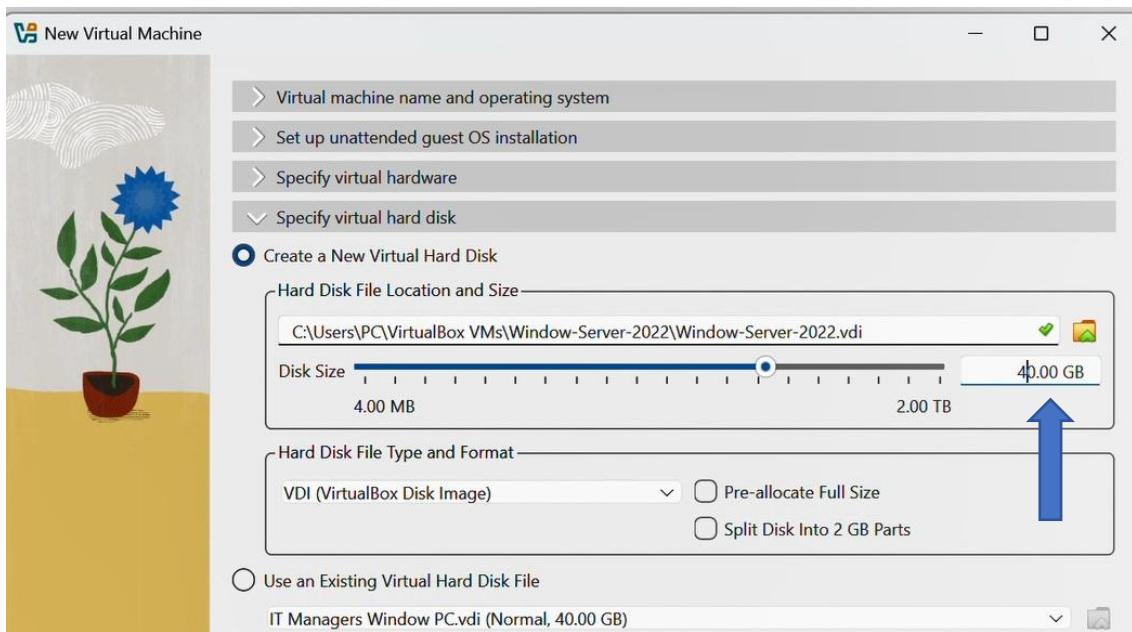


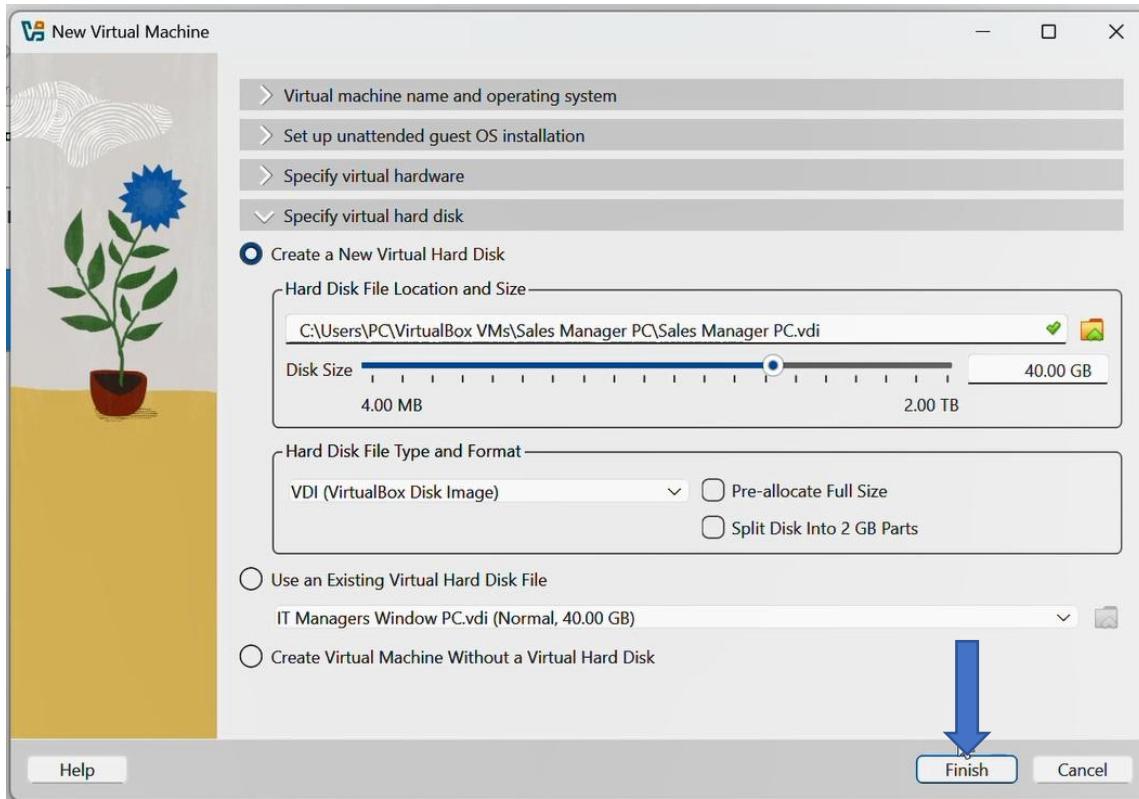


I am going to specify a name of "Windows-Server-2022" and 4096 MB (4gb) of RAM then I will click Finish.



This will open another window for creating the Virtual Hard Disk. The default options here are all fine except for the File Size. I am going to set my new HDD to 40GB and then choose Finish.





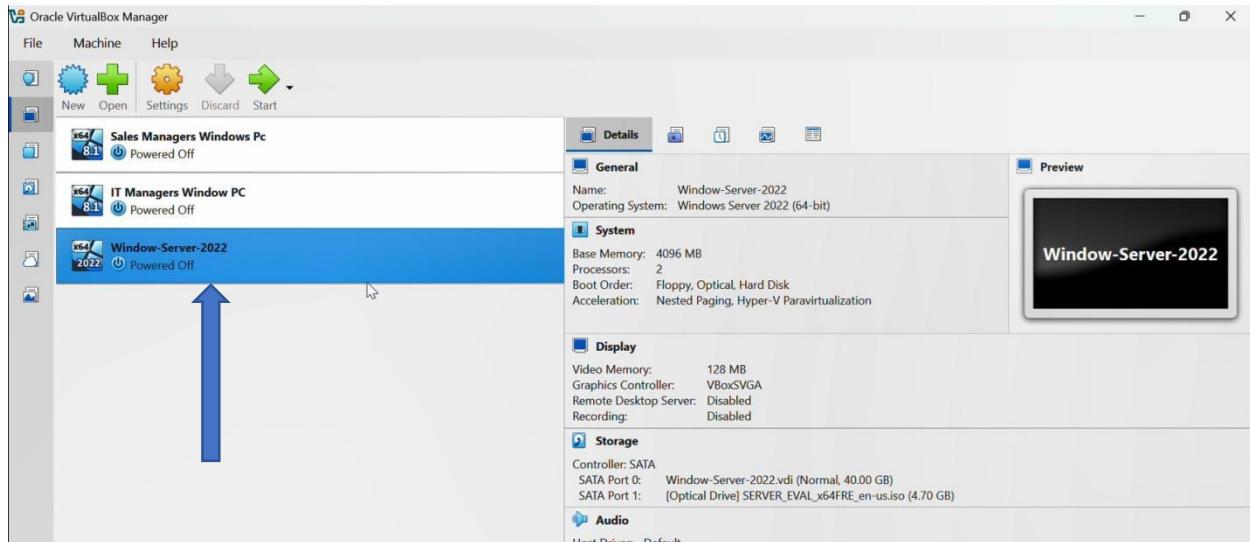
Since this hard disk drive (HDD) is set to be *dynamically allocated* (see the option on the middle-right of the screenshot above), the HDD file will only take up as much space as the data stored on it—up to a maximum of 40GB.

Now, you'll see Windows Server 2022 listed on the VirtualBox dashboard. Before starting the virtual machine (VM), you can modify its settings if needed. Typically, you might want to:

- Assign more processors
- Change the networking adapter
- Mount an ISO image

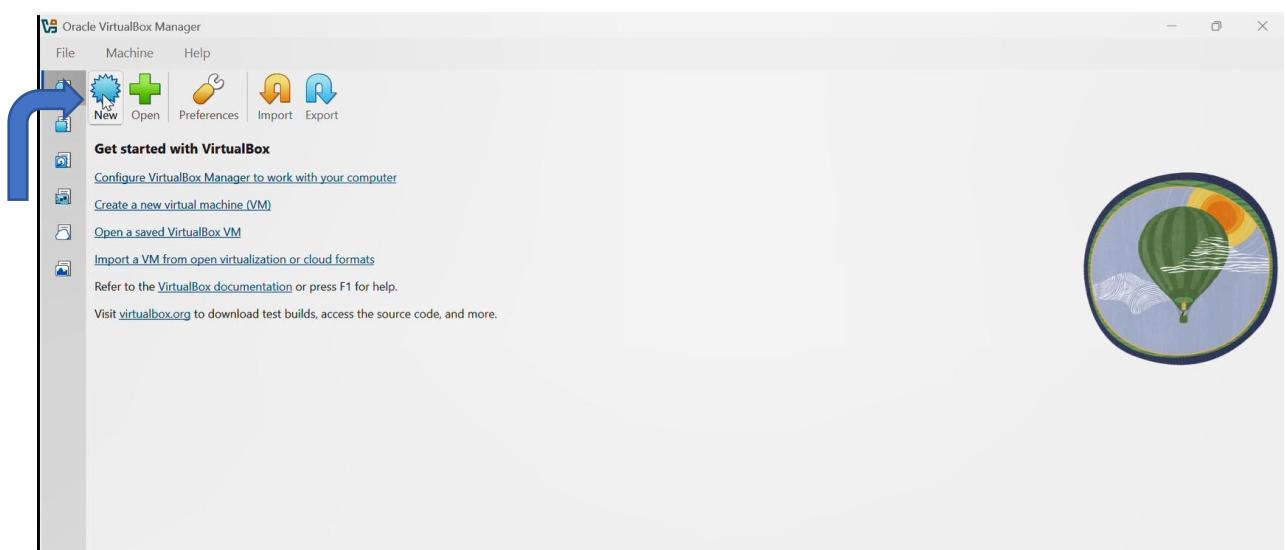
Increasing the number of CPU cores can significantly enhance your virtual machine's (VM) performance. If possible, set the number of CPUs to 2.

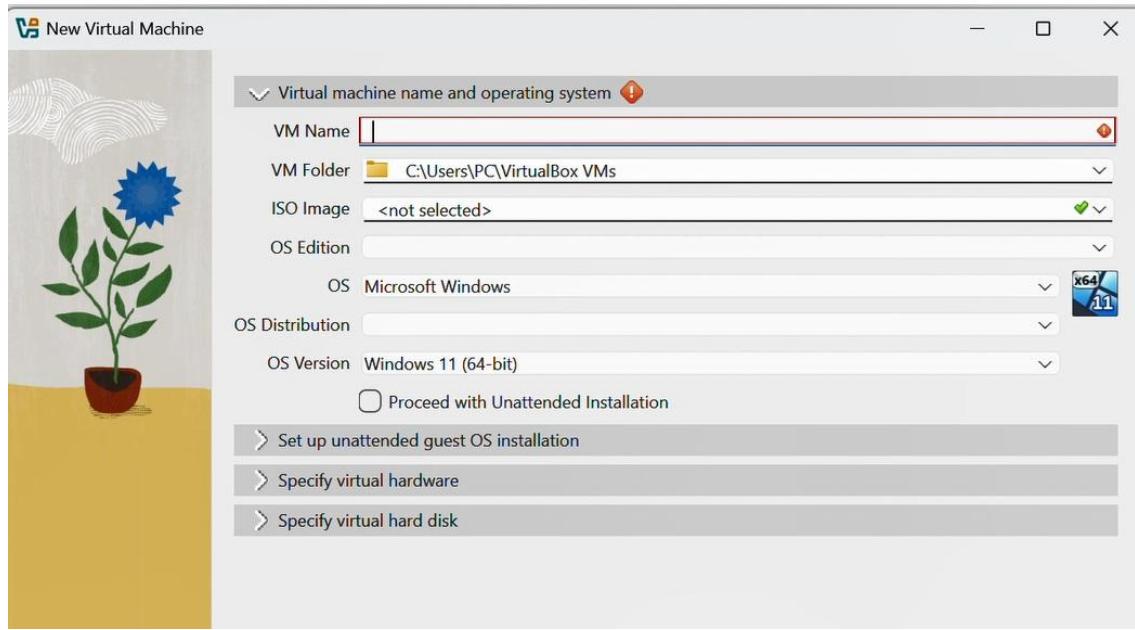
Pro tip: Storing the VM's virtual hard disk on a solid-state drive (SSD) can further improve performance, especially when running disk-intensive tasks.



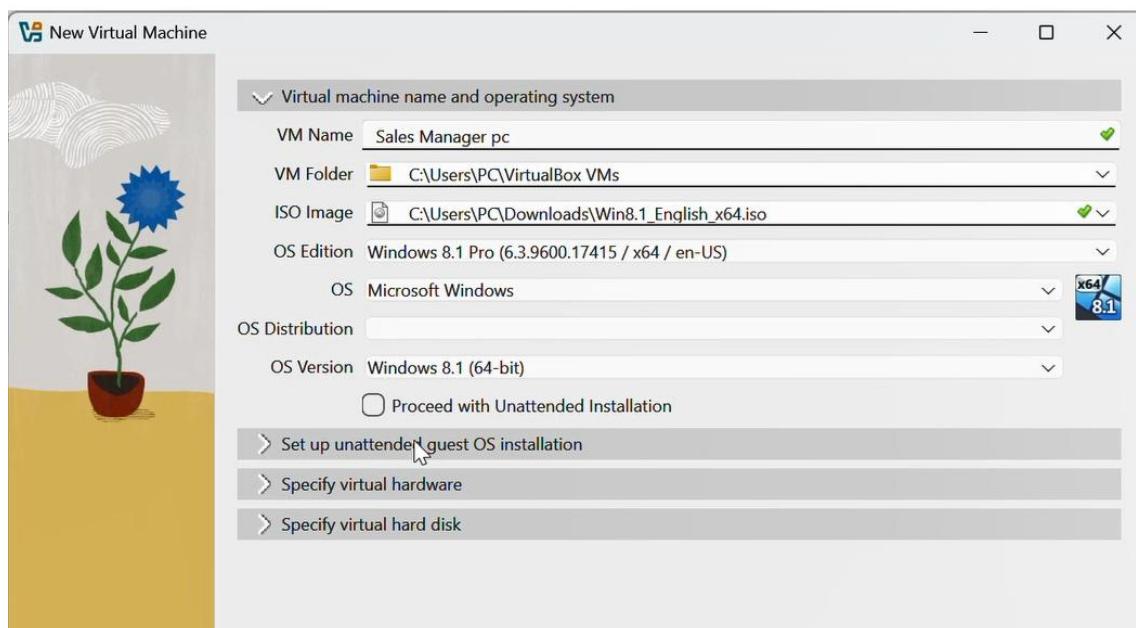
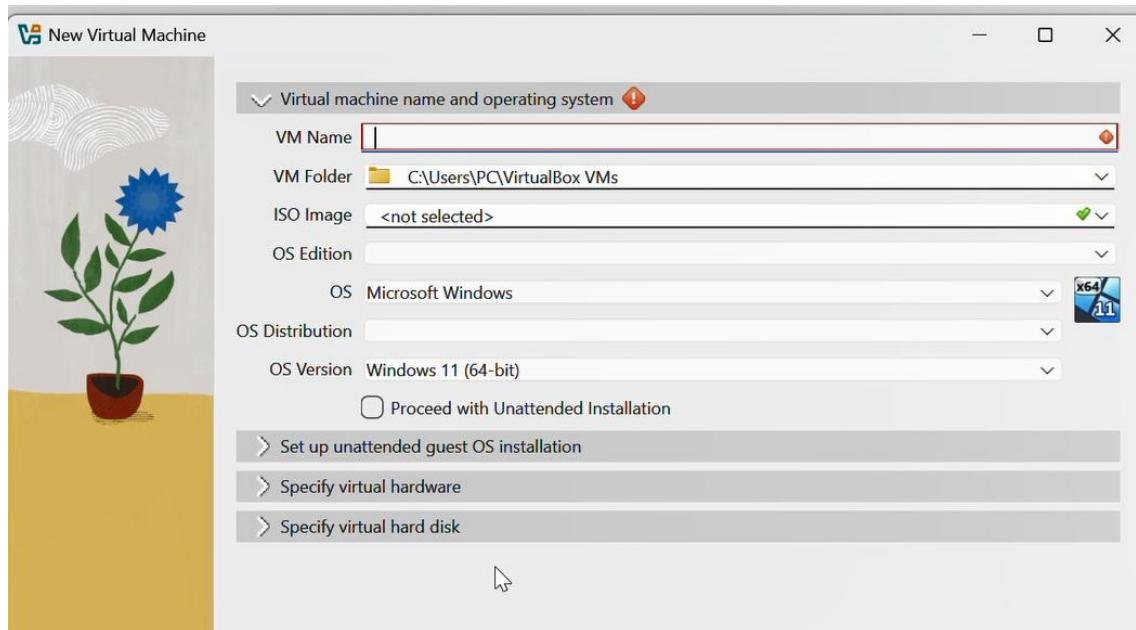
Now that the window server is mounted, its now time to mount the windows 8.1 a client machine

Click “New” or “Create a new virtual machine.”



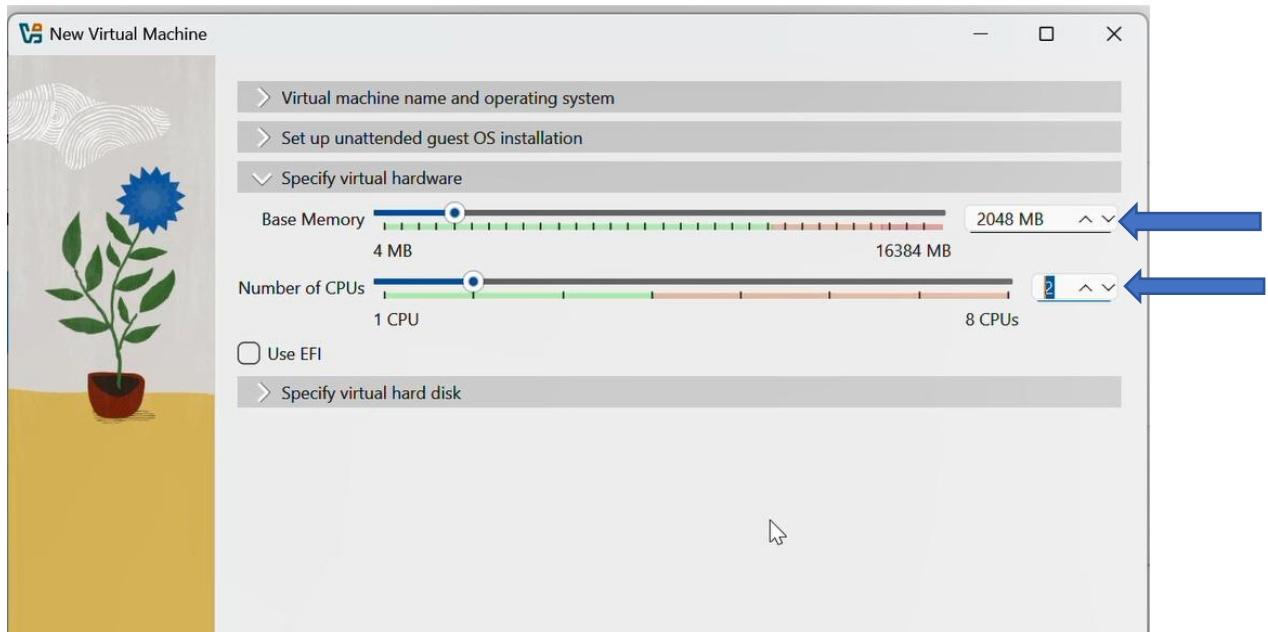


Enter a name, e.g Sale Manager PC. As illustrated below. Then choose the window 8.1 ISO file for the location where it was save (For the ISO Image). Ensure the proceed with unattended Installation is UNCHECKED

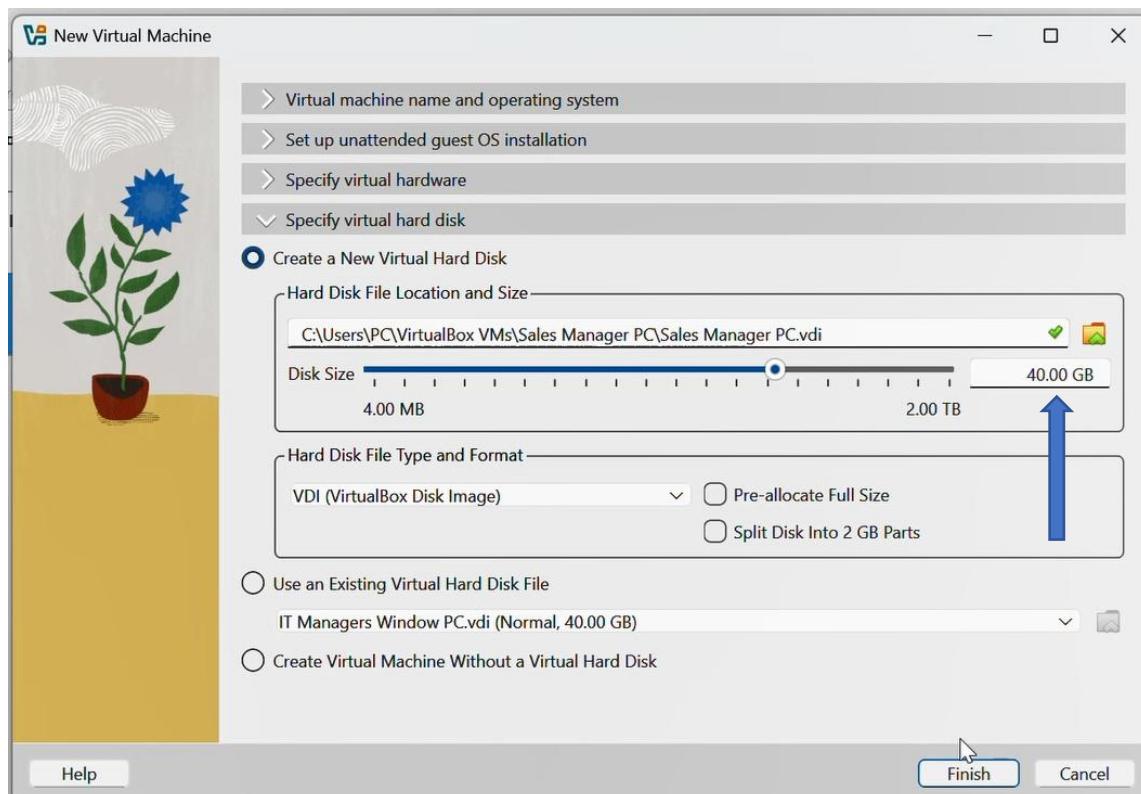
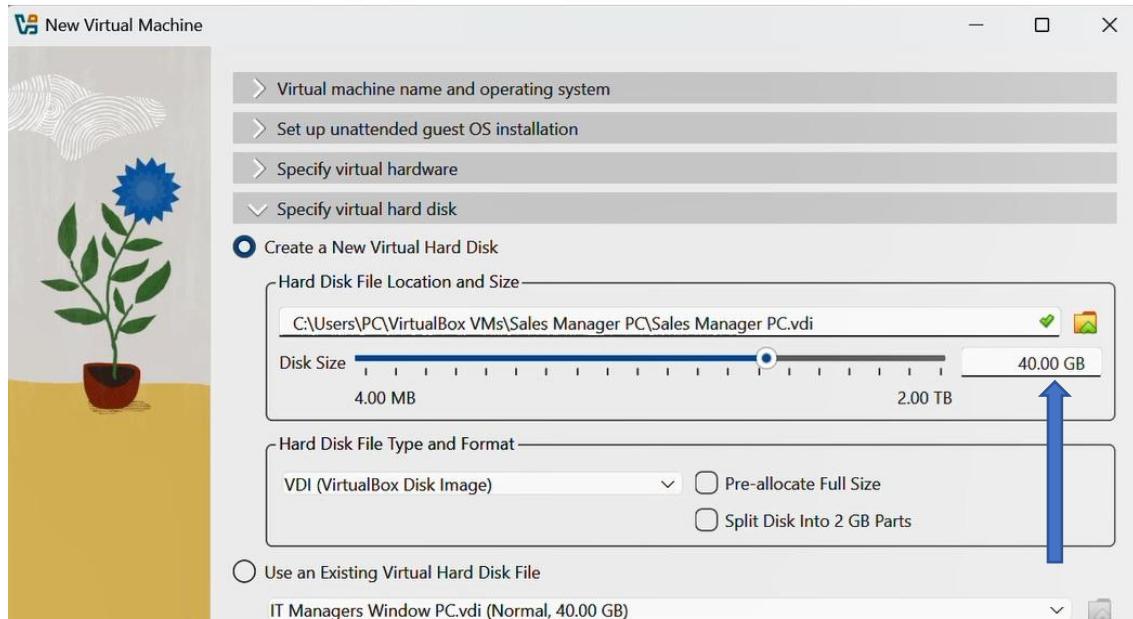


Assign System Resources

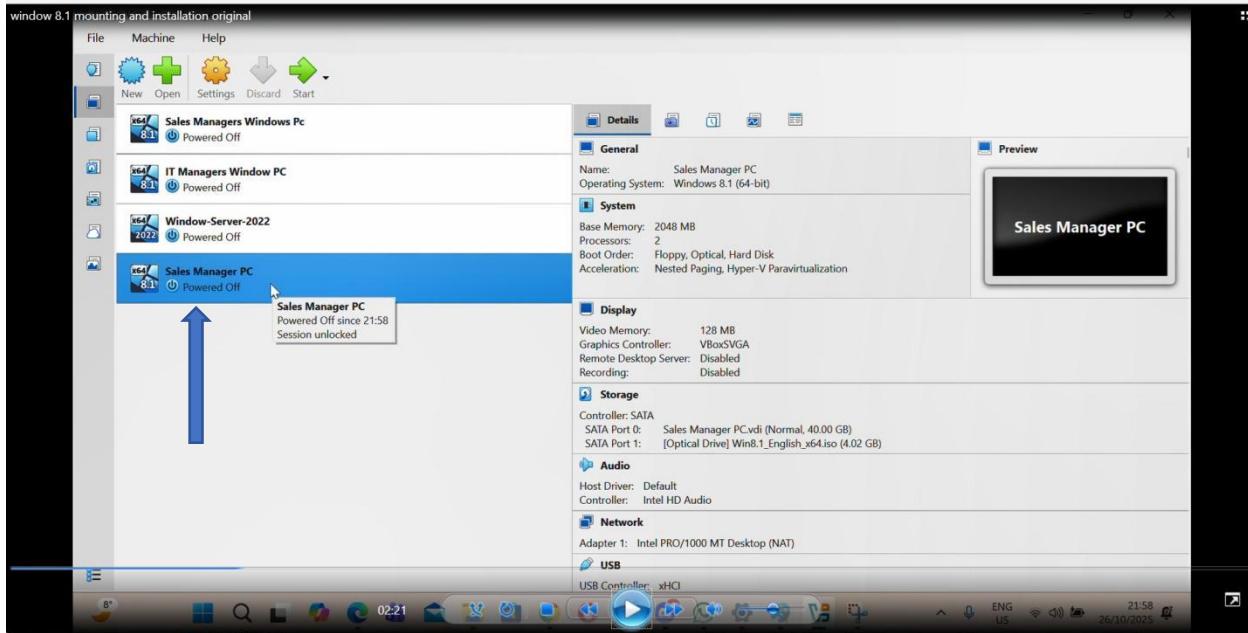
- Click on Specify Virtual Hardware and allocate at least 2 GB, preferably 4 GB for better performance. Assign atleast 2 CPU IF available. As seen Below



Create a Virtual Hard Disk by clicking on Specify virtual hard disk. Assign atleast 25 GB (recommended). As illustrated below, Then click Finish



Now the window 8.1 for the Sales Manager Pc would be listed in the virtualbox Dashboard.

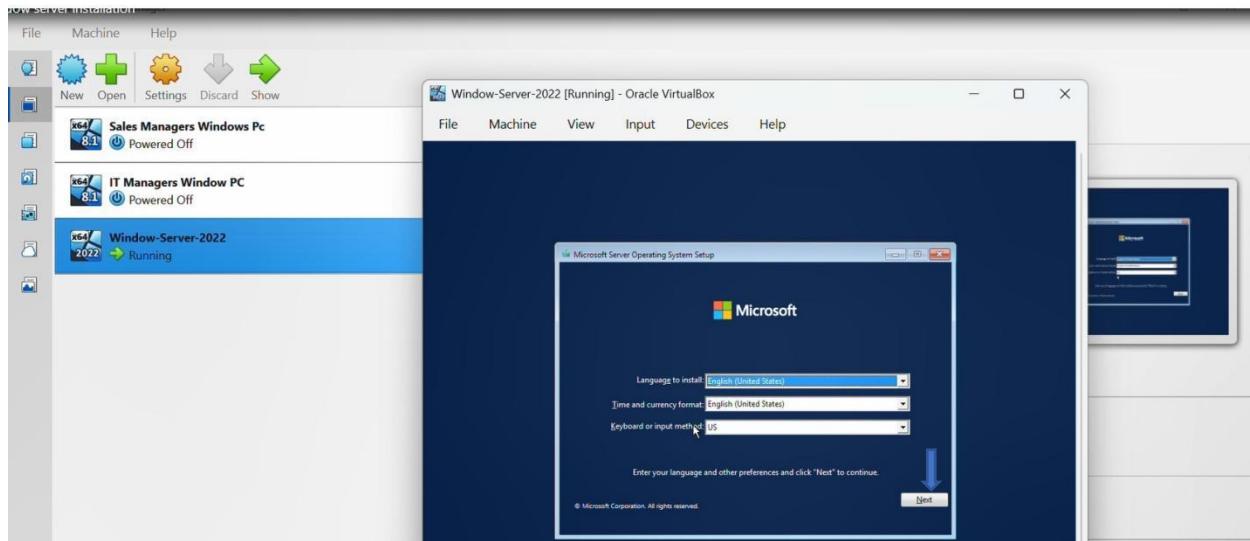


We can follow the same procedures to mount the window machine of the Sales Mnager window PC, IT Manager Window PC as seen in the virtualbox dashboard above

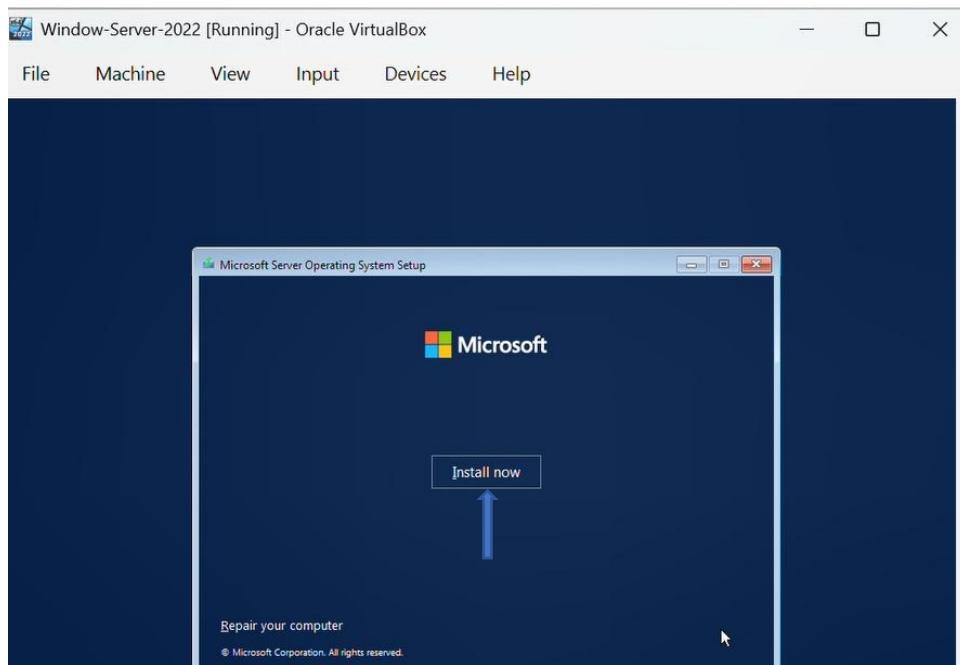
Installing an OS on Your Lab VMs

Now that we have mounted our window server 2022 and our windows 8.1 PCs and the are listed in the dashboard of our VM, then can start installing them one after the other by launching them by clicking on the machine to highlight it and then clicking the Start button. You will be able to begin your OS installation.

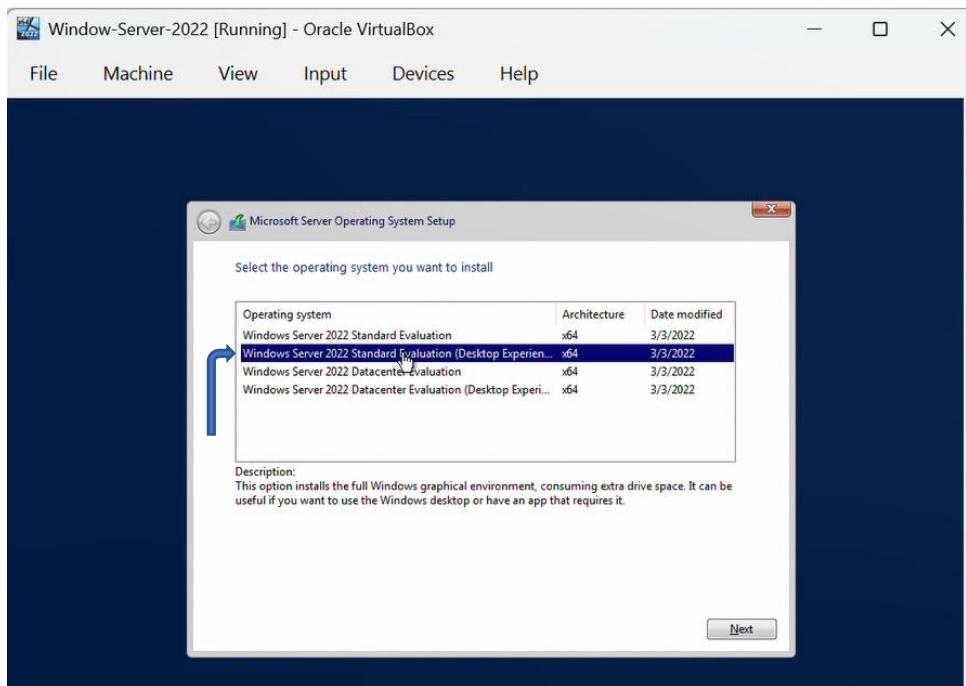
I mounted a Window Server ISO Already. So when I launch the VM I will see the installation screen for this OS. The Windows Server setup should begin.



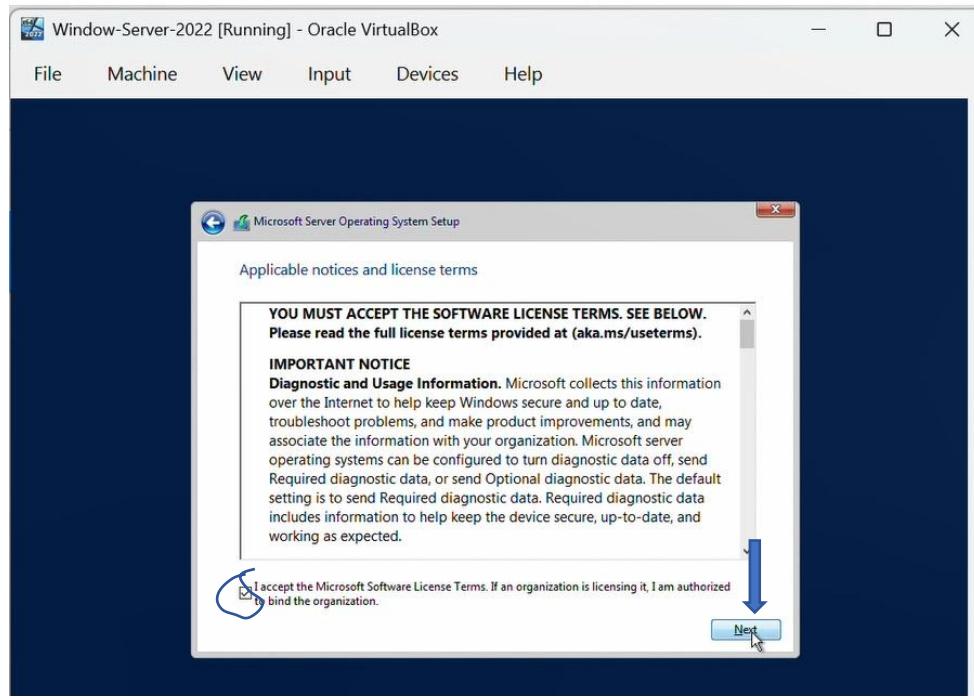
Follow the on-screen instructions. Choose your preferred language and click Next. Then a window pops up with an Install Now Button. Click install Now as shown below to start up the installation



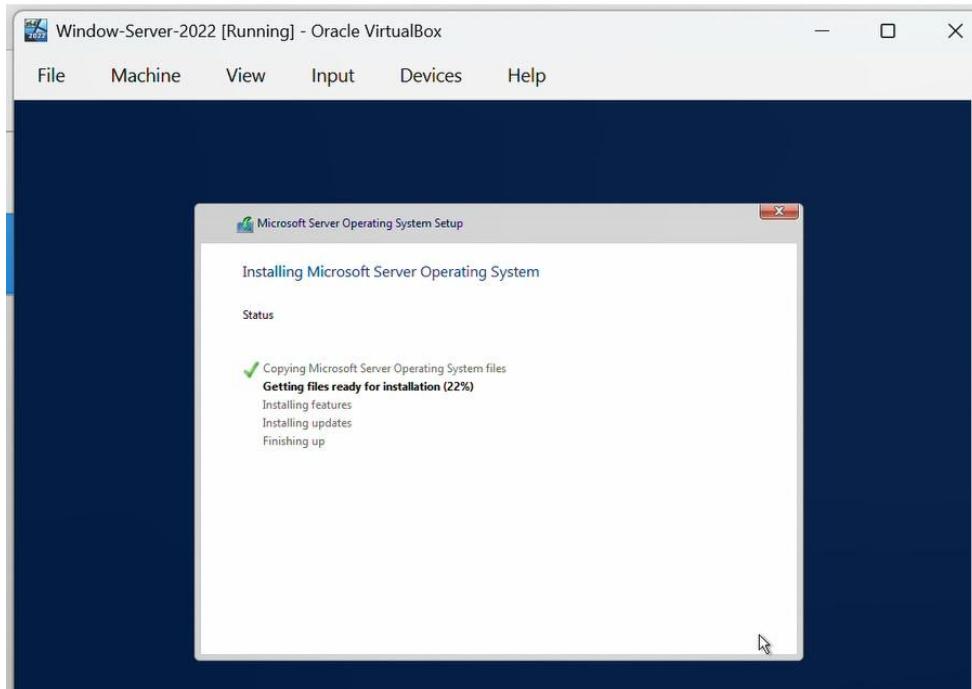
On Clicking the Install Now, You will be prompted to choose the edition you prefer working with. This totally depends on you but for a beginner it is recommended to choose WINDOW SERVER 2022 STANDARD EVALUATION/Desktop Experience) which is a GUI Experience as shown below



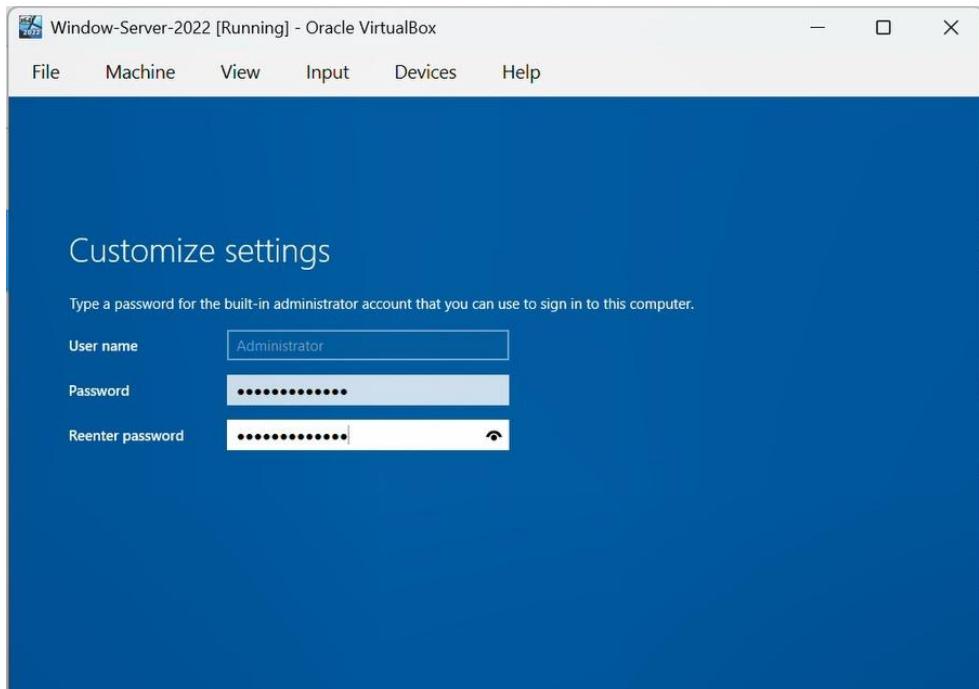
Click Next then accept the Microsoft Licensing term and proceed by clicking Next again



Then you install windows server operating system only by clicking on Custom. Then select the virtual Hard disk and click next to start installing files, features and updates as it is in the screenshot below. It takes a few minutes



After finishing up, Microsoft Server Operating System needs to restart to continue. After reboot, Set up Administrator password, confirm it and click finish. To see the locked GUI of the Window Server 2022. To unlock it, press down the right control key with delete key





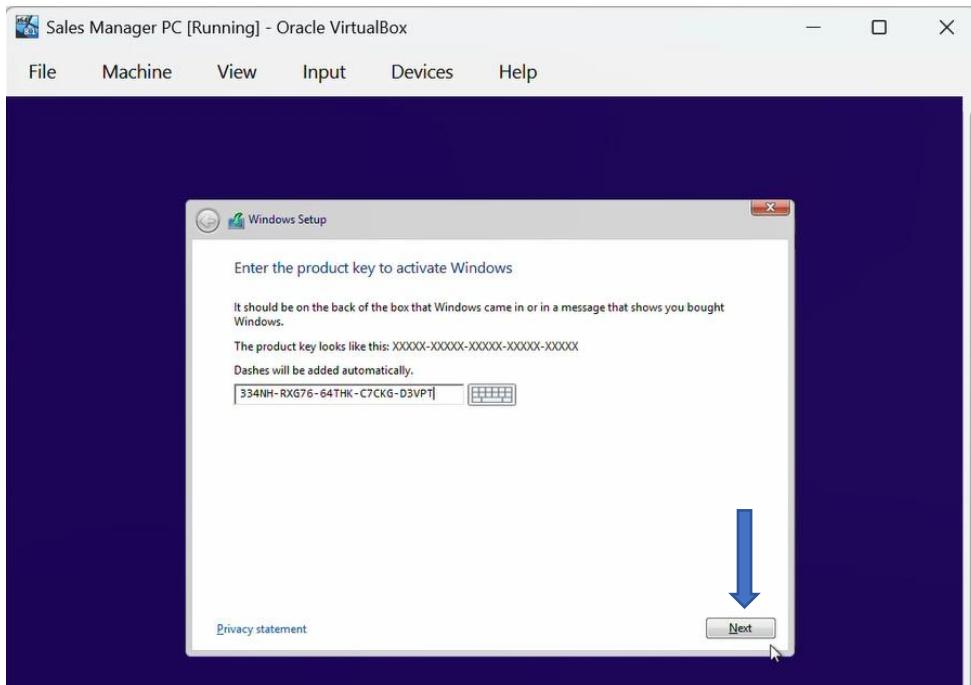
Similarly we can install our windows 8.1 machines too following the procedures below

Follow these setup steps:

Choose **Language, Time, and Keyboard** layout → **Next**

Click **Install now**

Enter product key (or skip if using evaluation)



Choose edition (Pro / Core)

Accept license terms

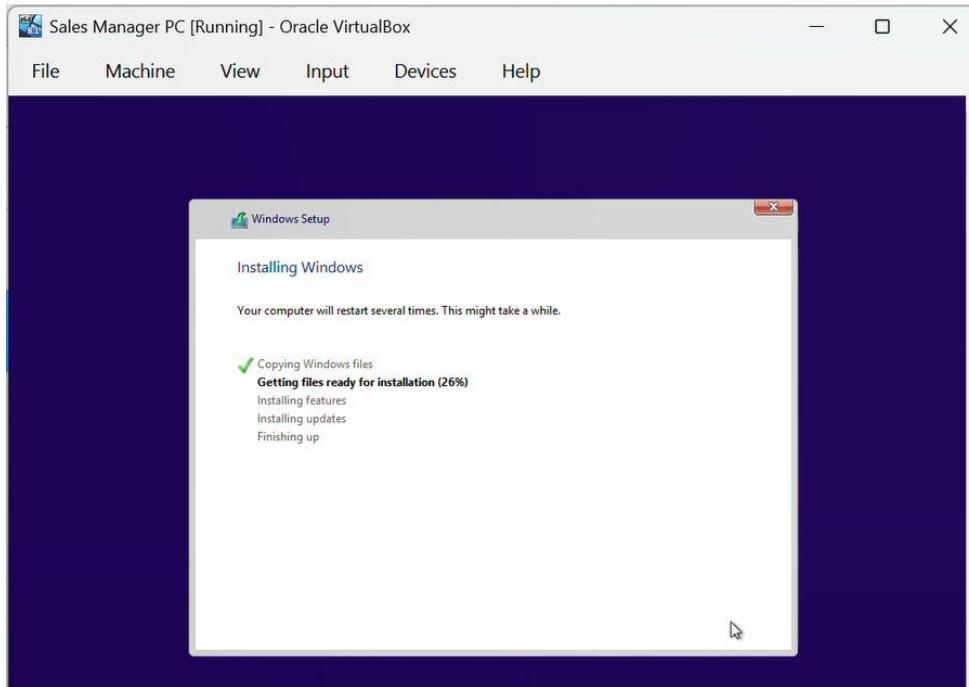
Choose **Custom: Install Windows only**

Select your virtual hard disk → **Next**

Windows will copy files and restart several times.

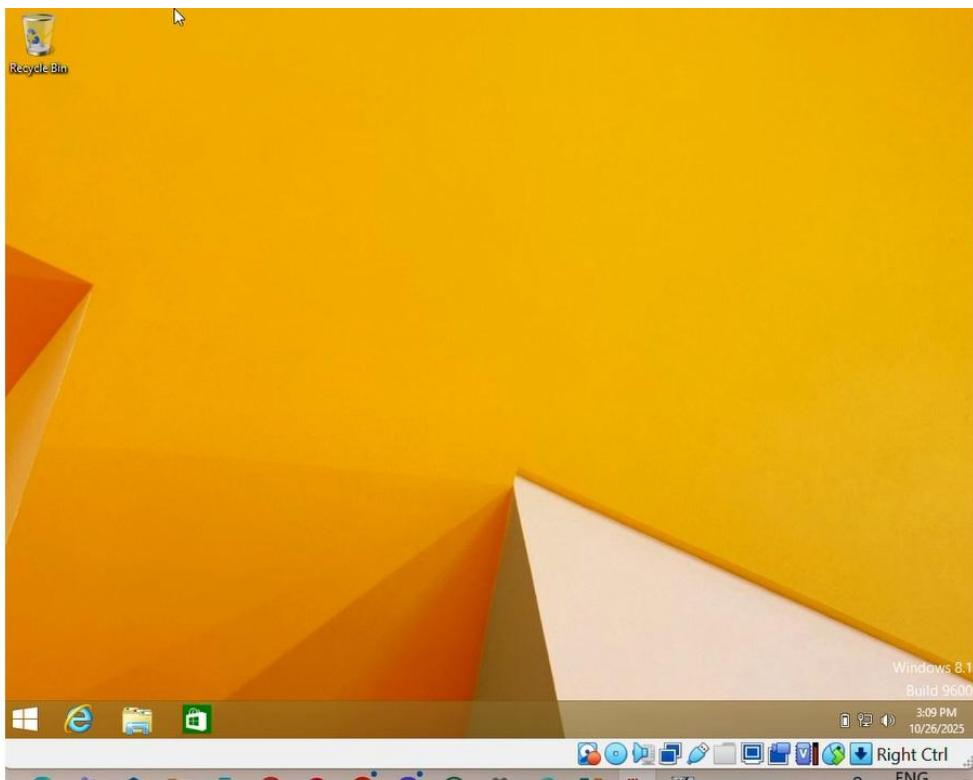
After setup:

Choose **Settings** (Express or Custom). click next then windows will start installing files, features and updates. Note that window needs to restart several times to continue



Then create a local Account

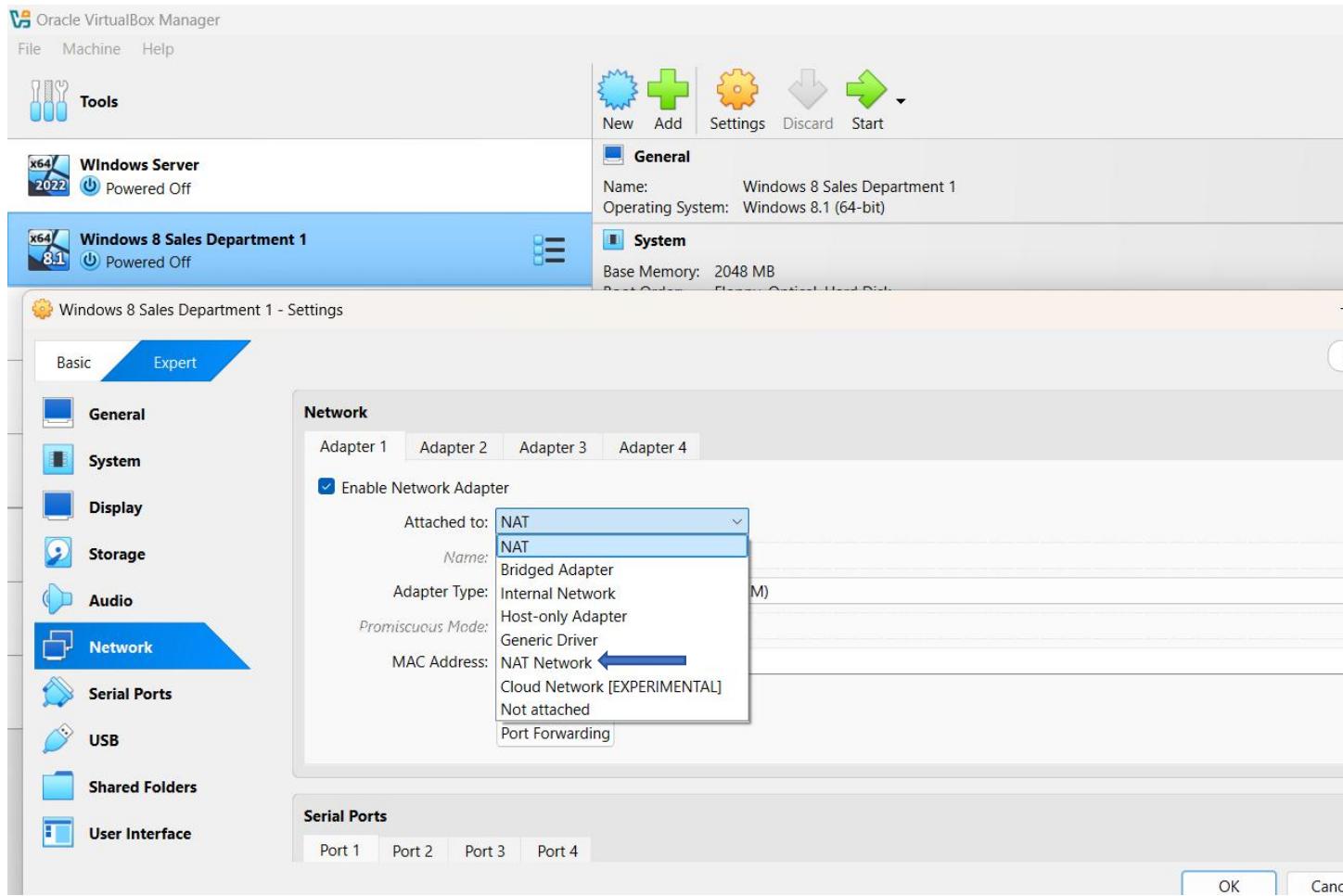
Wait for the desktop to load



Creating a Virtual Network with VirtualBox

Virtual networks allow your VMs to connect to each other, your host machine, or the internet depending on how you configure them. VirtualBox supports several types of virtual network configurations, and the one you choose will depend on your specific use case.

Note: Some network types can only be configured *after* a VM has been created, as they're managed within the VM's settings.



Network Types in VirtualBox

1. NAT (Network Address Translation)

This network type allows your VM to access the internet using the host computer's connection. However, it does not allow communication between the VM and the host or between multiple VMs.

Use this if: Your lab setup only includes one VM and it just needs internet access.

To enable NAT:

Right-click your VM

Select Settings

Go to the Network tab

Choose Attached to: NAT (see image above)

2. NAT Network

This option is similar to NAT but also allows VMs connected to the same NAT Network to communicate with each other, while still maintaining internet access.

Use this if: Your lab setup includes multiple VMs that need to talk to each other and access the internet.

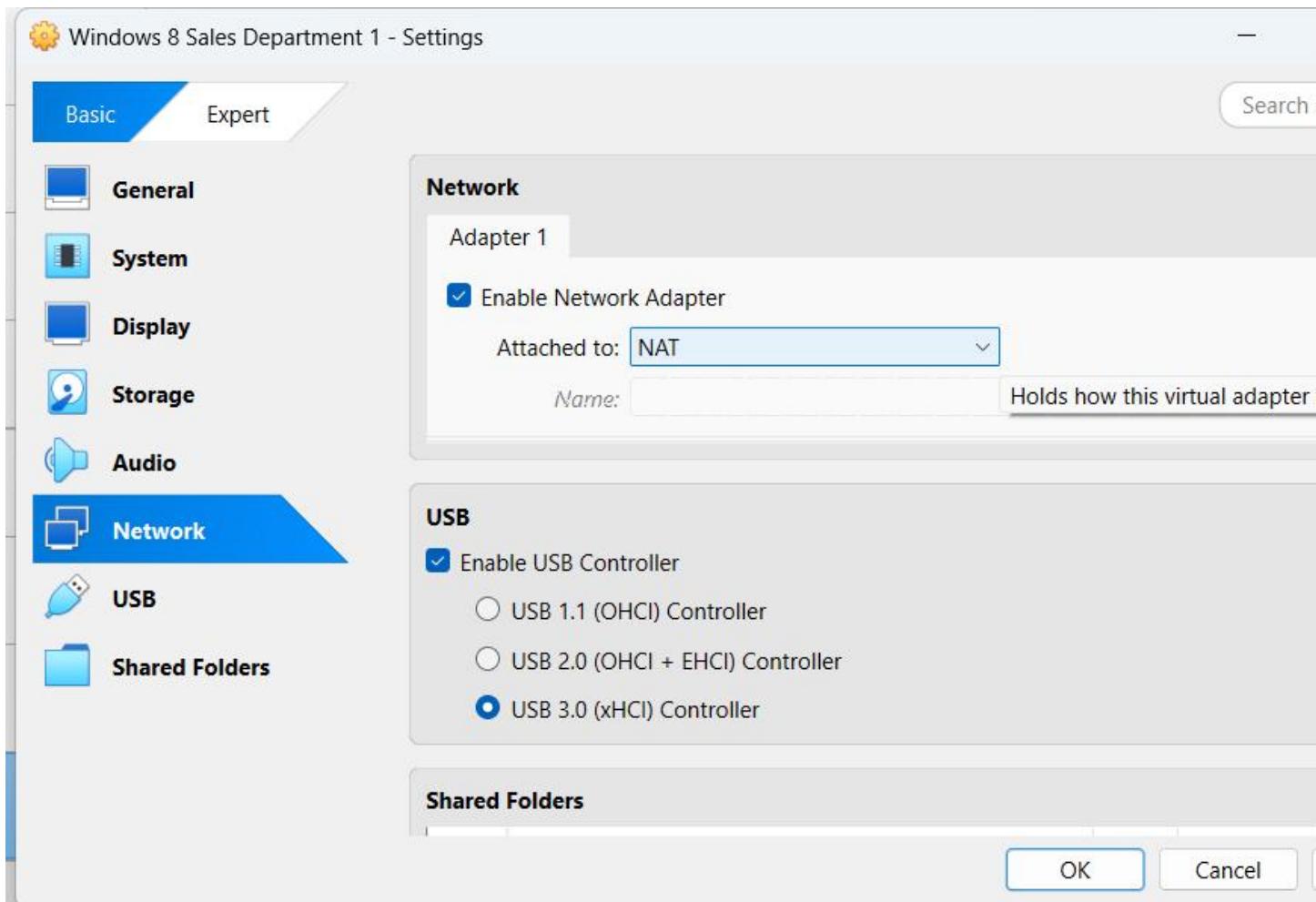
To create a NAT Network:

Go to File > Preferences

Select the Network tab

Click the plus (+) button to create a new NAT Network

Then, in your VM's settings, attach it to the NAT Network you just created



More Network Types in VirtualBox

3. Bridged Adapter

This network type makes your VM appear as a separate physical device on your local network. Your router will assign it an IP address, just like it would with any other device.

Use this if: You need your VM to be accessible from **other devices** on your local network (e.g., your host, other VMs, or even other physical computers).

To enable a Bridged Adapter:

Right-click your VM

Select **Settings**

Go to the **Network** tab

Choose **Attached to: Bridged Adapter**

4. Internal Network

This creates a completely **isolated** network shared only between VMs attached to the same internal network. There's **no internet access**, and your host computer cannot communicate with these VMs.

Use this if: You want a fully isolated lab environment for testing, malware analysis, or network simulation.

To use an Internal Network:

Right-click your VM

Select **Settings**

Go to the **Network** tab

Choose **Attached to: Internal Network**

5. Host-only Adapter

This setup is similar to an internal network but also gives the **host computer** a direct IP connection to the VM. The VM still doesn't have internet access unless combined with another adapter (e.g., NAT).

Use this if: You need to access the VM **directly from your host** (e.g., using RDP, SSH, ping, or file transfer). This is ideal for web development labs or local server testing.

To set up a Host-only Adapter:

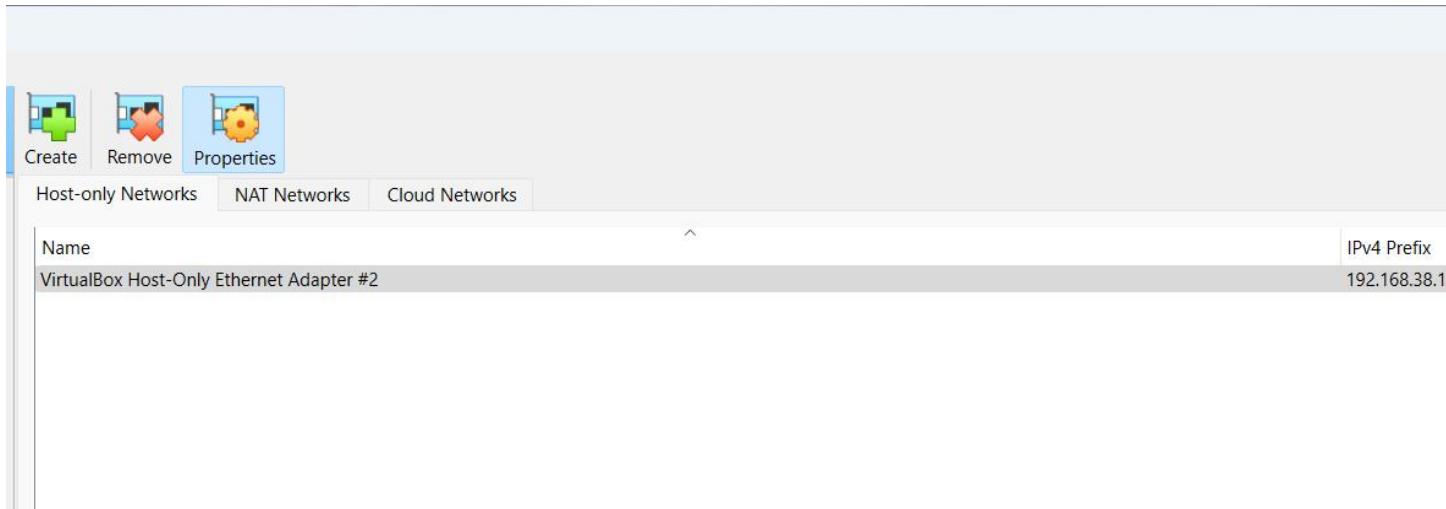
Right-click your VM

Select **Settings**

Go to the **Network** tab

Choose **Attached to: Host-only Adapter**

You can create a host-only network by select File > Host Network Manager

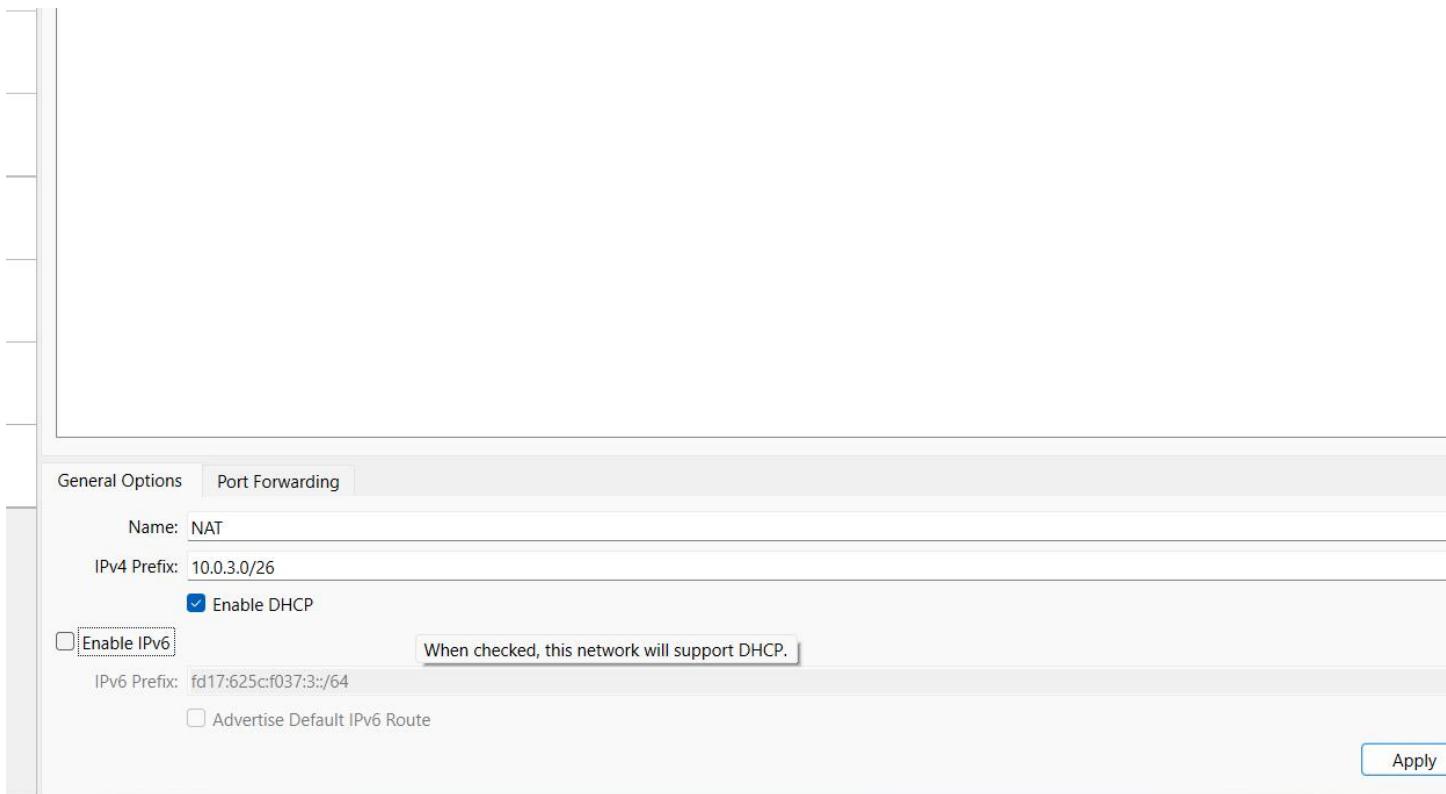


Generic Driver

According to Oracle's documentation:

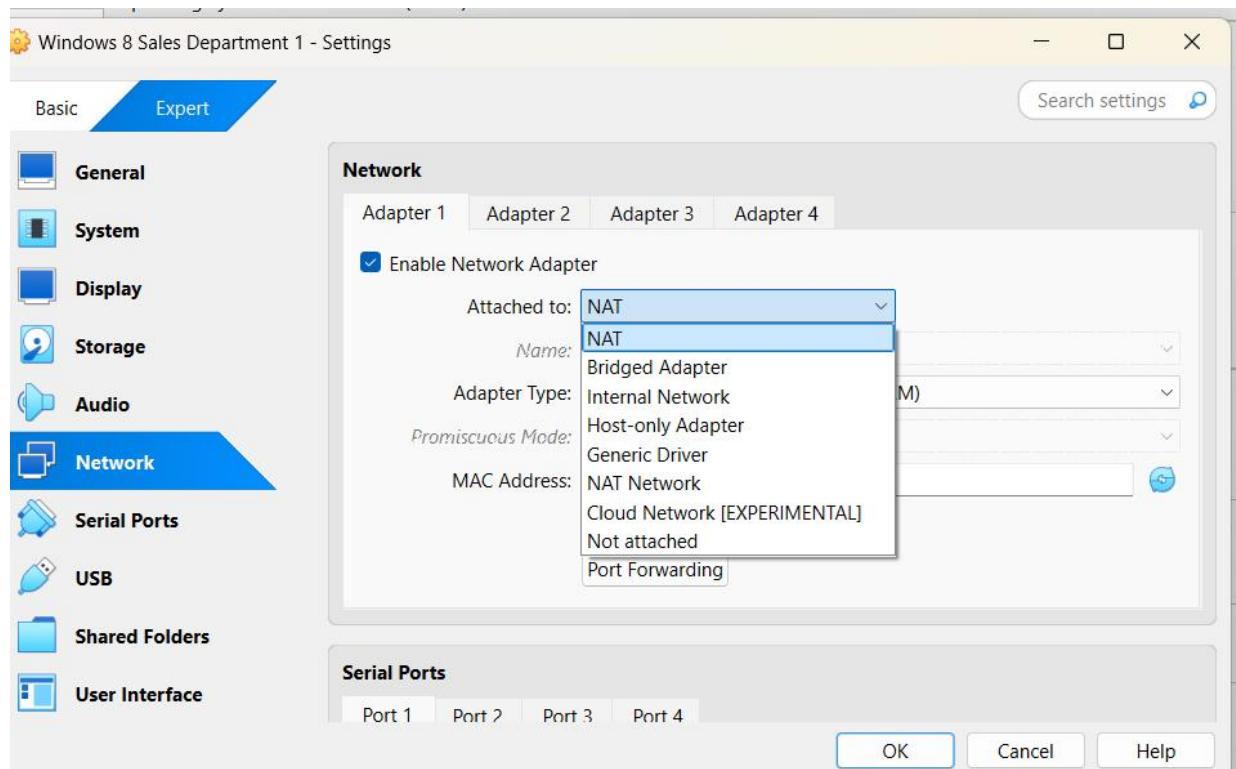
“The generic driver attachment is special and cannot be considered as an alternative to other attachment types.”

In most use cases, the **Generic Driver** is not commonly used and is intended for advanced or specialized networking scenarios. You typically won't need this unless you're working with custom or experimental networking configurations.



I'm going to leave all the NAT Network settings at their defaults so that is it! The **Virtual Network** is now set up and ready to use.

Now, go ahead and configure the **Networking** tab of your VM to match your chosen network type. As mentioned earlier, the **easiest and most flexible option** is to create and use a **NAT Network**, especially for multi-VM labs that require internet access.



Wrapping It Up...

That's it! You're now ready to run through your OS installation and complete your lab setup.

With your virtual machine, virtual network, and operating system in place, you have everything you need to start building hands-on **IT labs** and gaining **real-world experience** — right from your own machine.

What You've Accomplished:

Now go ahead and **create something awesome**. Whether you're studying for certifications, testing software, or building your own virtual network lab, you're well on your way to sharpening your IT skills.

