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.

Index

- Virtualization Overview
- Free Virtualization Software
- Downloading and Installing VirtualBox
- Creating a Virtual Network
- Creating a Virtual Machine
- Downloading Your operating systems ISO(s)
- Installing an OS on Your Lab VMs
- Conclusion

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

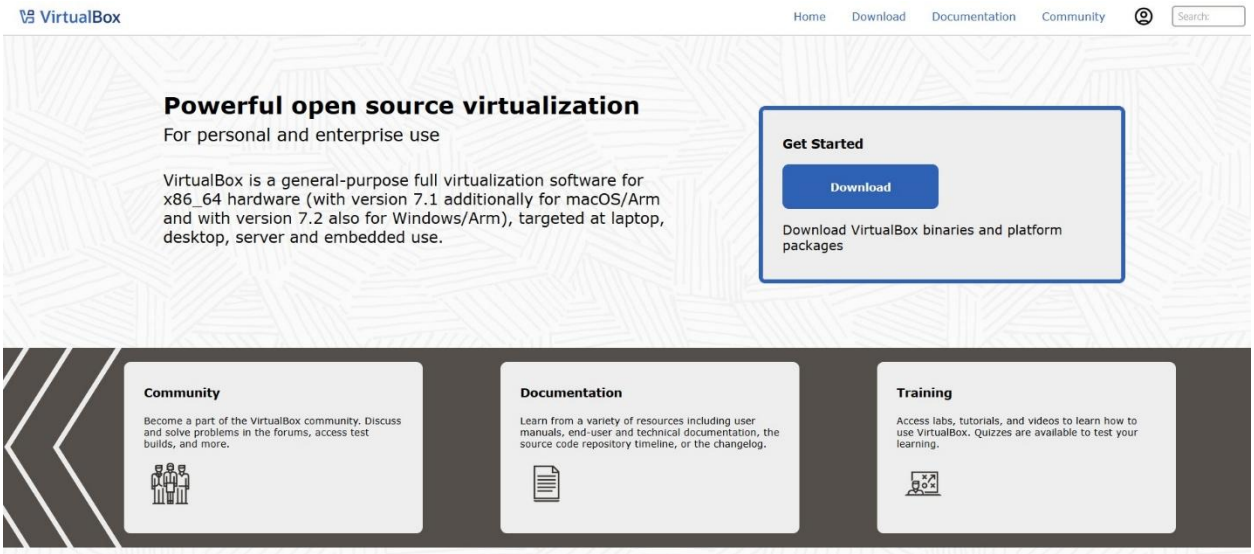
There's a wide range of virtualisation software out there, and it can get a bit overwhelming trying to choose the "best" one.

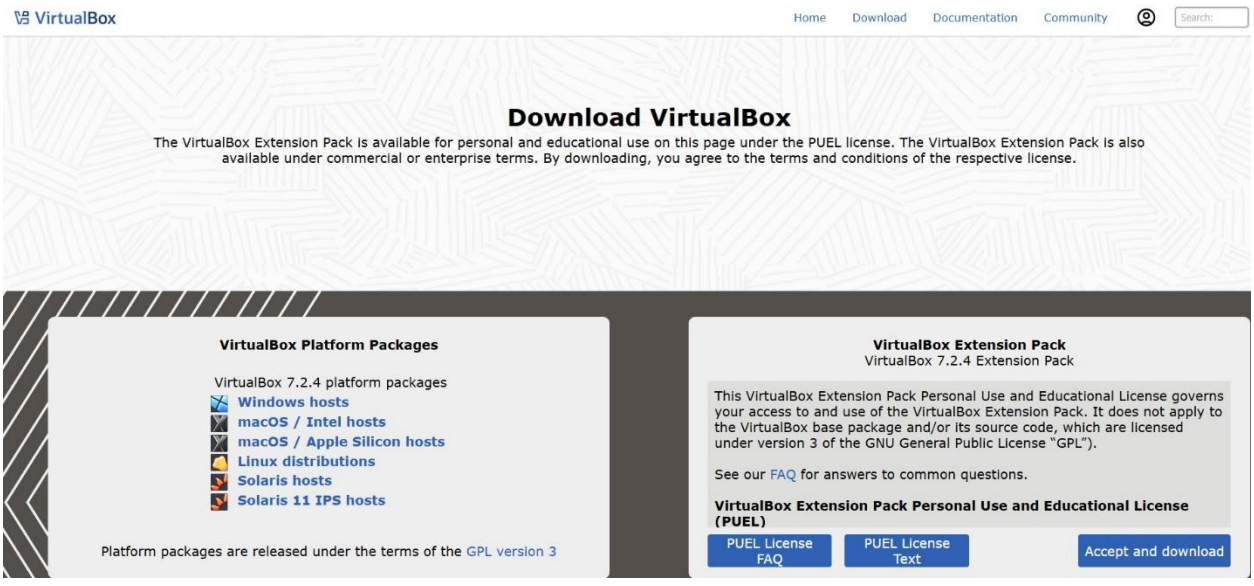
Here's the truth: **there is no single "best" virtualisation software**; it really depends on **your operating system** and your specific needs.

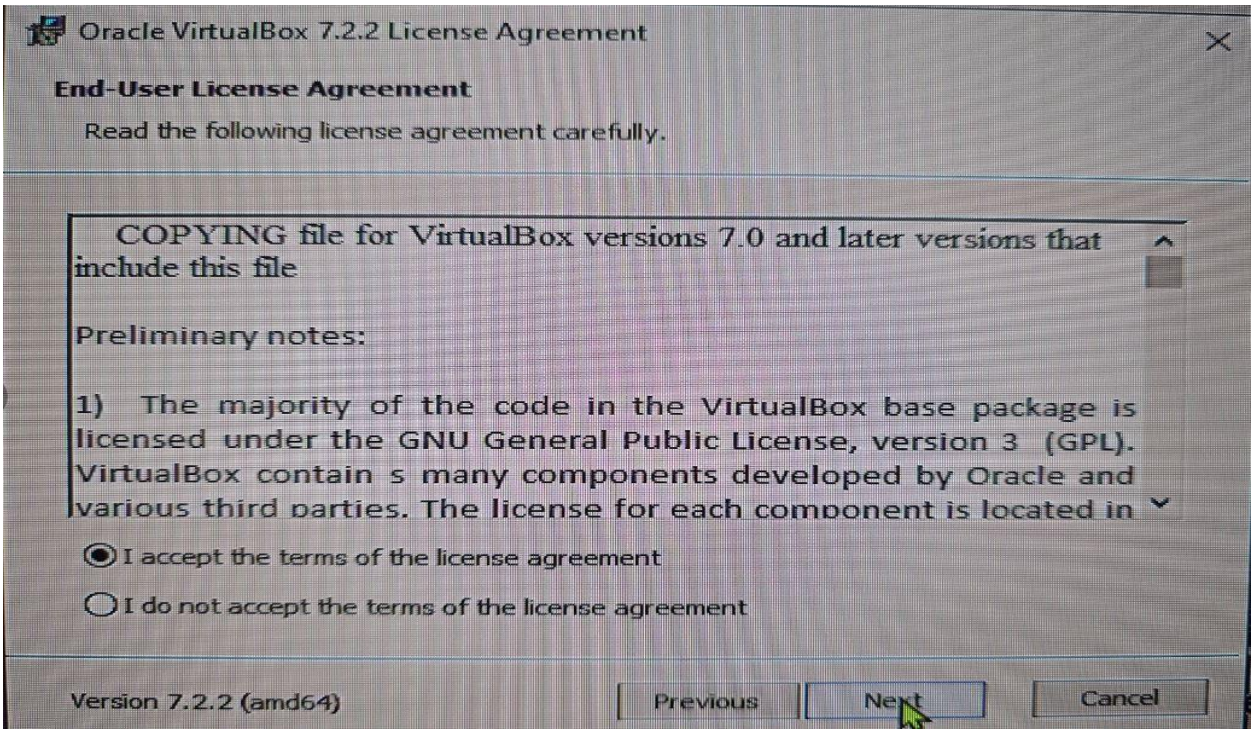
For this project, I'm using **Oracle VM VirtualBox**, mainly because it works seamlessly on both **Windows** and **Linux** systems. However, feel free to use any other virtualisation tool you prefer most of the setup steps will be very similar across platforms.

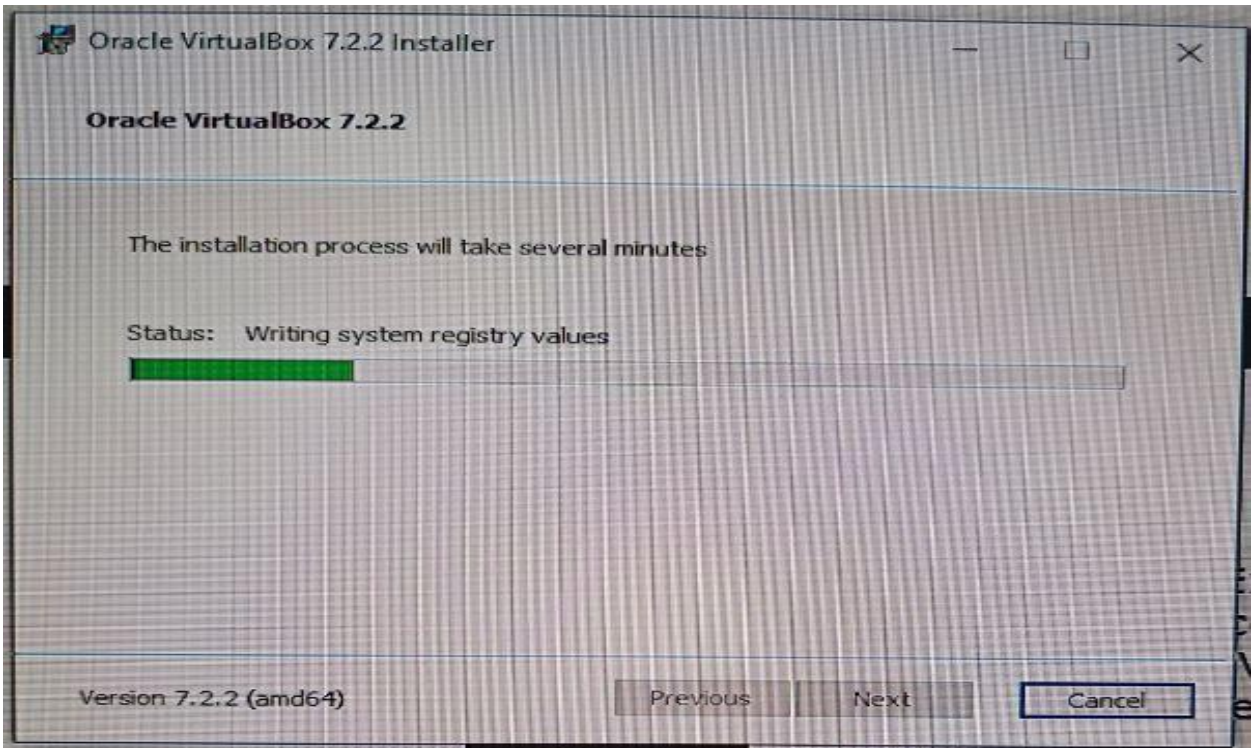
Downloading and Installing VirtualBox

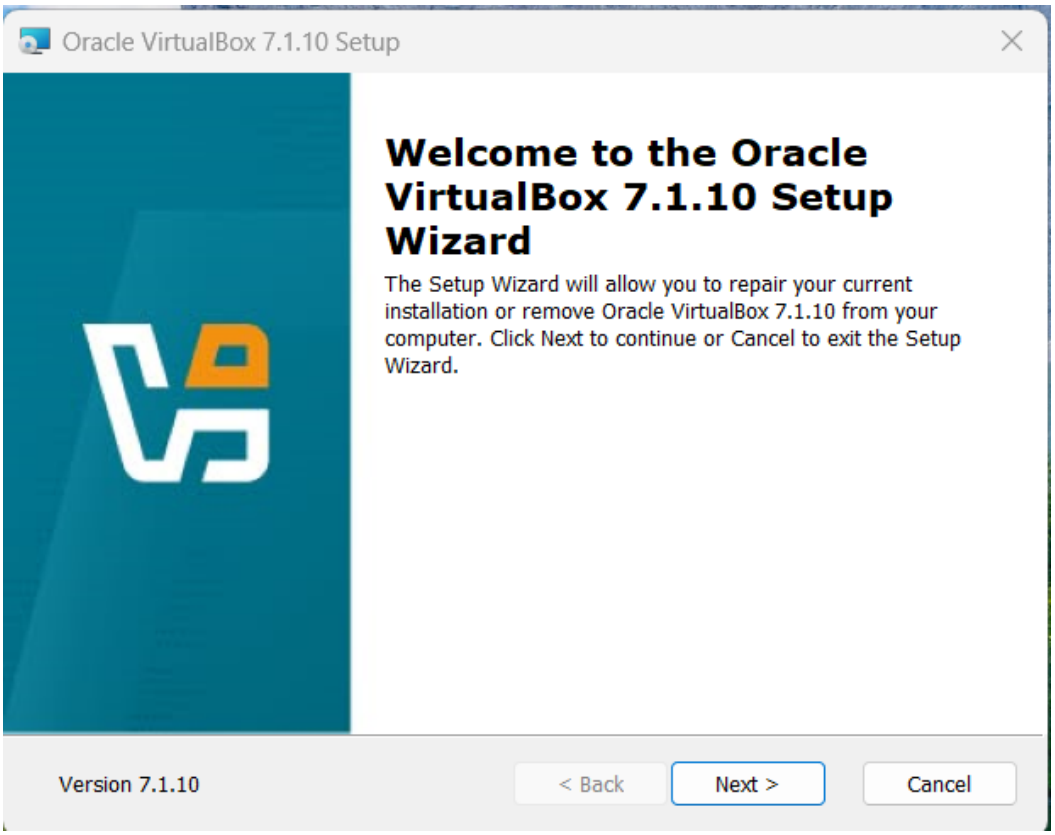
Download Oracle VM VirtualBox by clicking here. Once the download is completed, I launch the






Oracle VirtualBox 7.2.2 License Agreement
End-User License Agreement
Read the following license agreement carefully.
COPYING file for VirtualBox versions 7.0 and later versions that include this file
Preliminary notes:
1) The majority of the code in the VirtualBox base package is licensed under the GNU General Public License, version 3 (GPL). VirtualBox contain s many components developed by Oracle and various third parties. The license for each component is located in
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Version 7.2.2 (amd64)
Previous
Next
Cancel

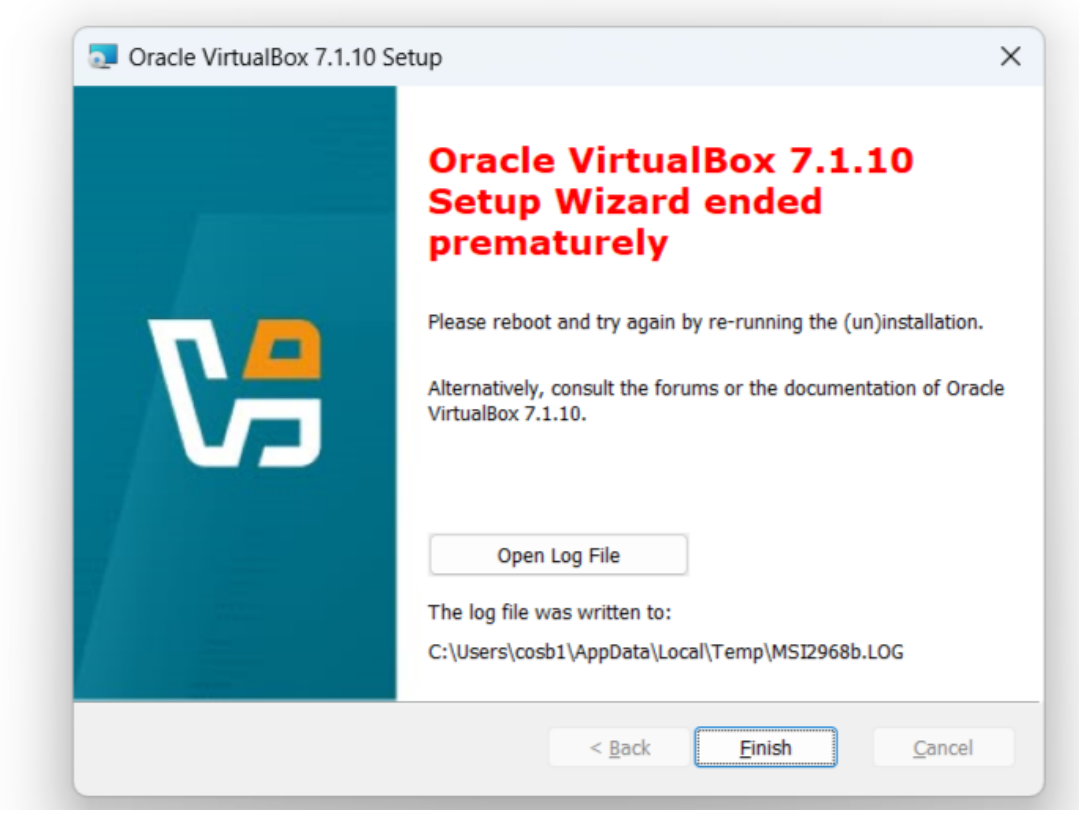

Oracle VirtualBox 7.2.2 Installer
Oracle VirtualBox 7.2.2
The installation process will take several minutes
Status: Writing system registry values
Version 7.2.2 (amd64)
Previous
Next
Cancel



installation

I went through the installation using **all the default options**.

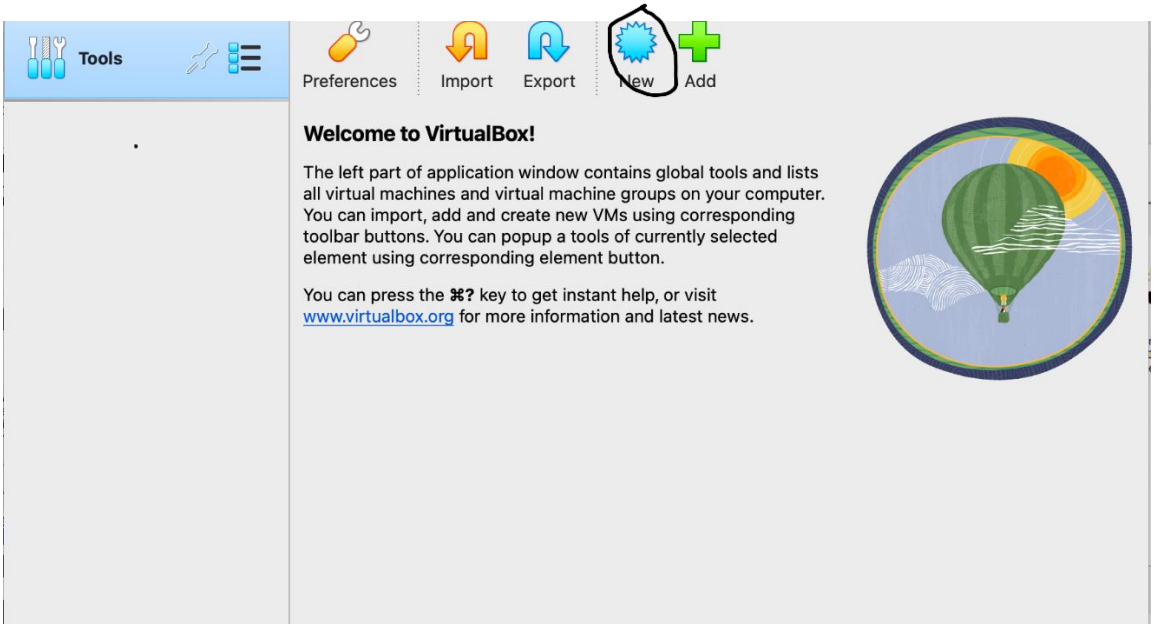
Whenever you're prompted with a **yes/no question**, simply choose **"Yes"** to continue.



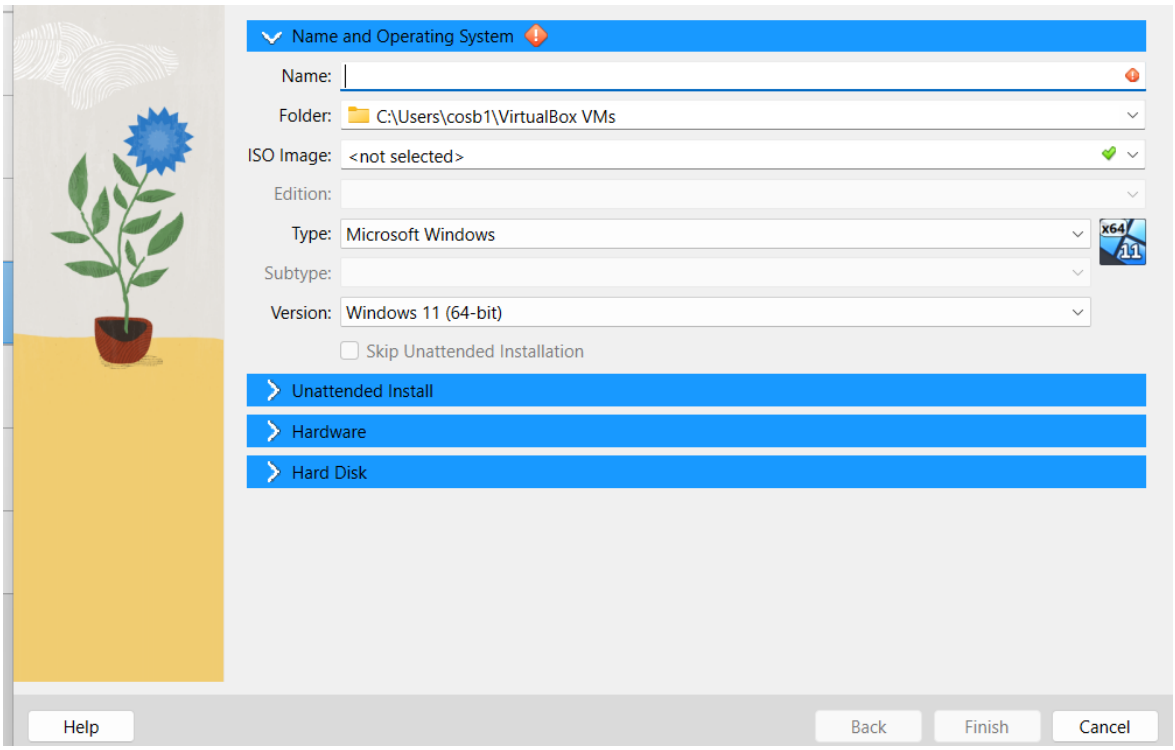
Click Finish and launch VirtualBox.

Creating a Virtual Machine

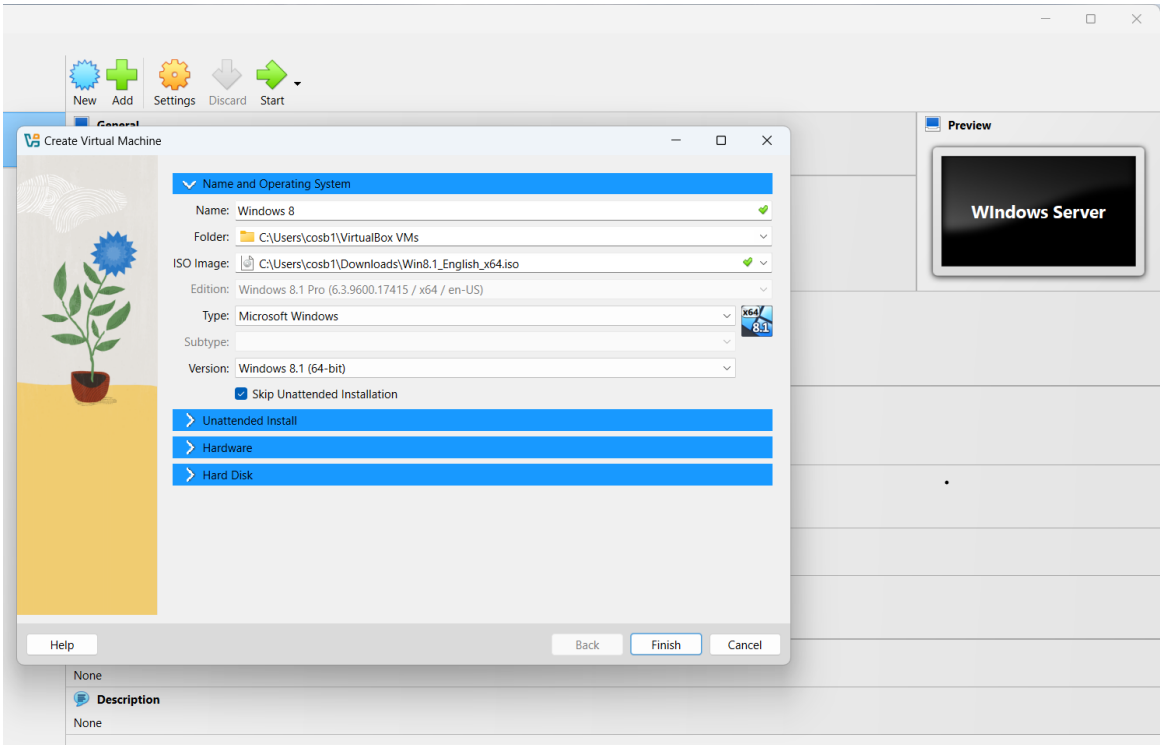
Now that we've decided on the type of virtual network to use, it's time to **create a Virtual Machine (VM)**. You can do this by clicking the **"New"** button in the VirtualBox Manager.



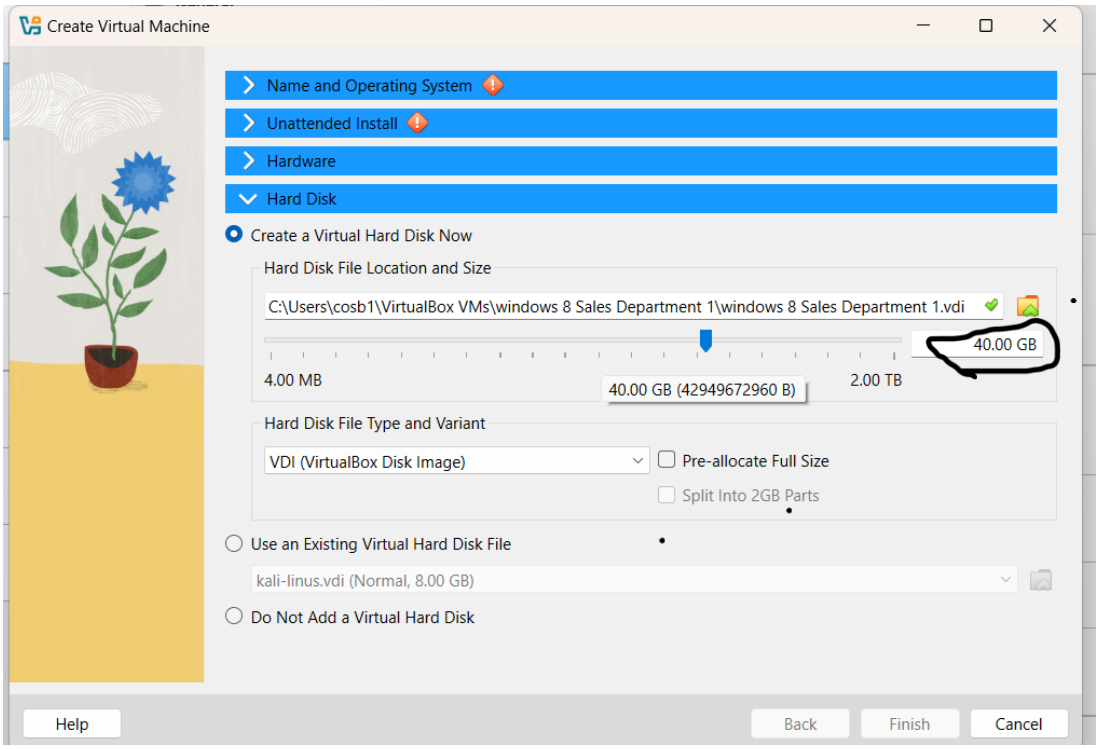
This will launch the new VM window. Click the *Expert Mode* button to proceed. Don't worry, it doesn't make the process harder. It simply streamlines the setup by reducing the number of steps.



I am going to specify a name of "Windows 8 Sales Department 1" and 2048 MB (2gb) of RAM then I will click Finish.



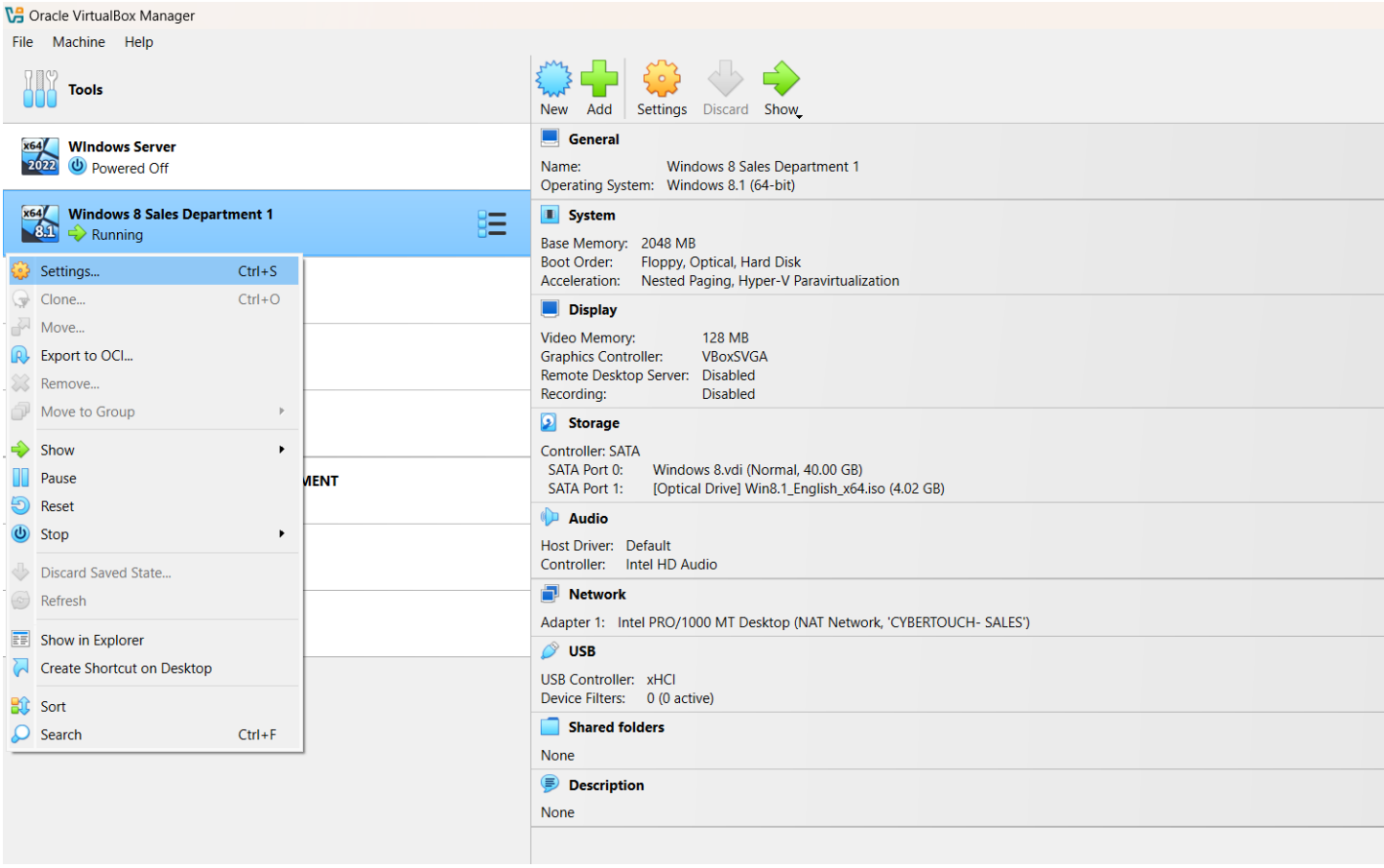
This will open another window for creating the Virtual Hard Disk. The default options here are all fine except for the File Size. I am going to set my new HDD to 40GB and then choose Finish.



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

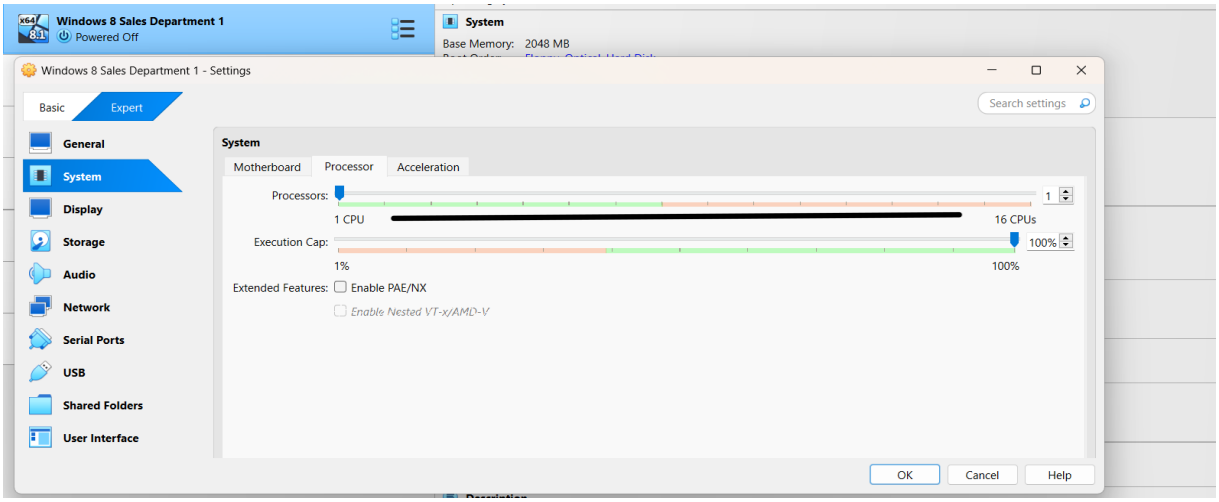
Now, you'll see Windows 8 Sales Department 1 listed on the VirtualBox dashboard. Before starting the virtual machine (VM), you can modify its settings if needed. Typically, you might want to:

- 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.

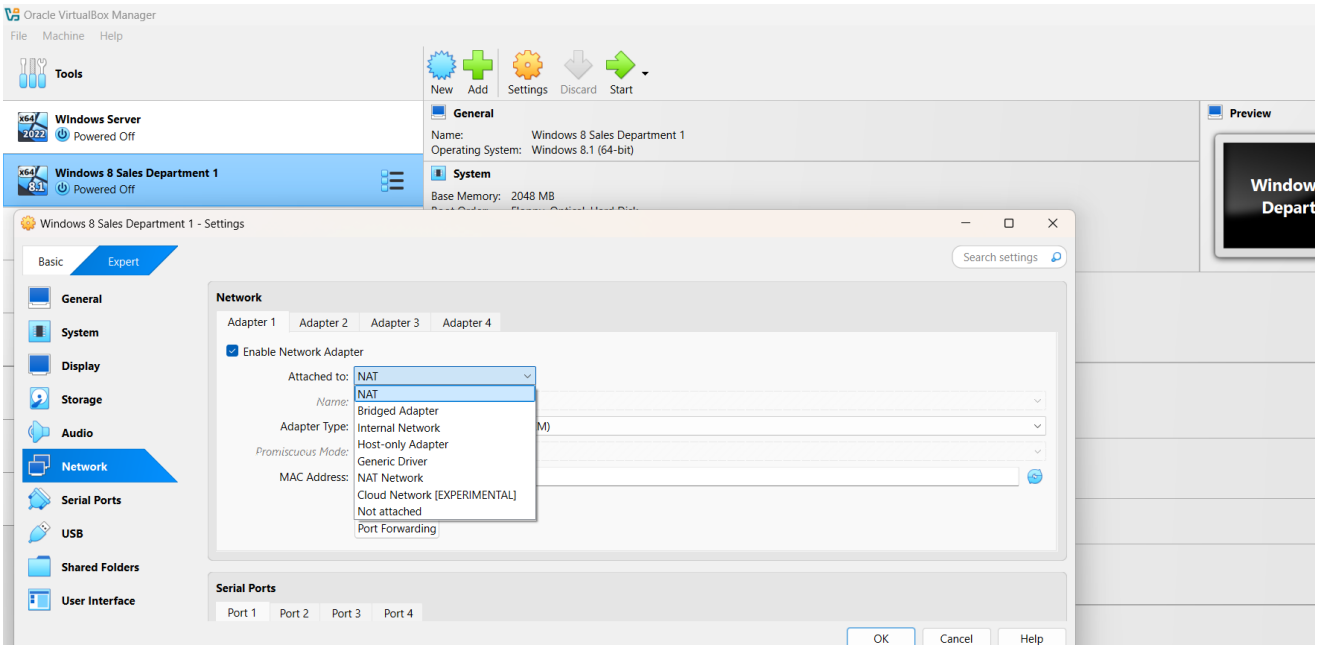


And that's all we need to do to create the virtual machine (VM). Of course, we can't start it just yet — we still need to download and attach an operating system ISO. But don't worry, we'll cover that in the next section.

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)

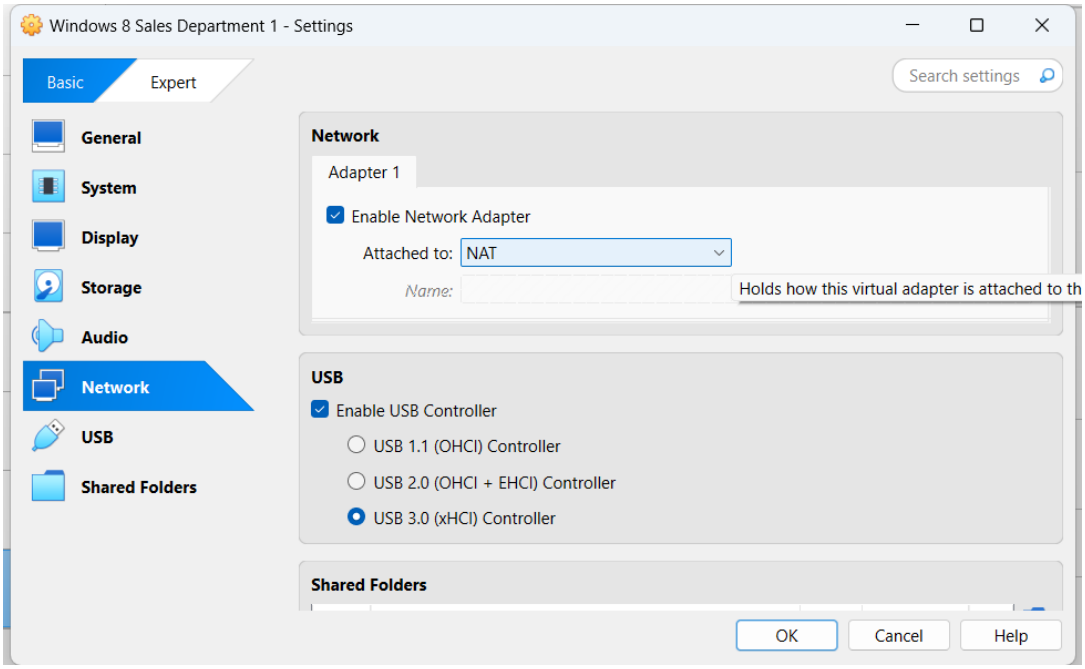
2. NAT Network

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

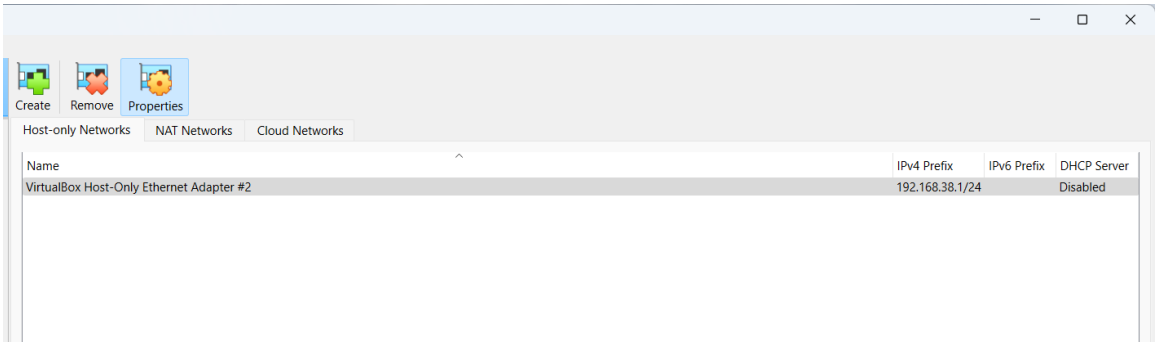
This setup is similar to an internal network but also gives the **host computer** a direct IP connection to the VM. The VM still doesn't have internet access unless combined with another adapter (e.g., NAT).

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

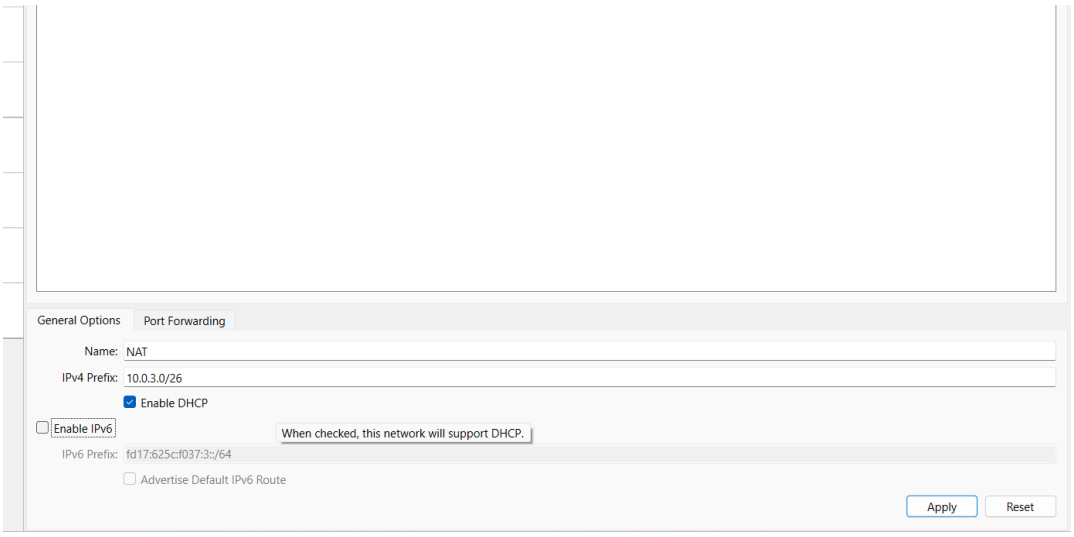


Generic Driver

According to Oracle's documentation:

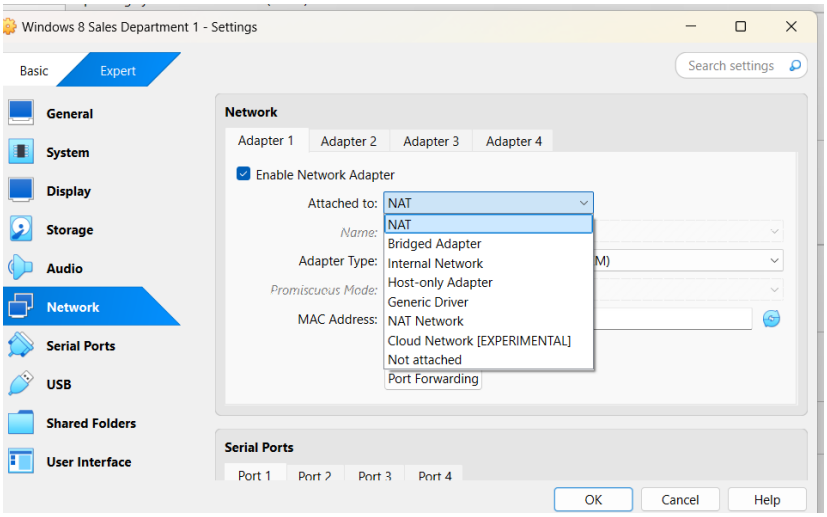
"The generic driver attachment is special and cannot be considered as an alternative to other attachment types."

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.



Downloading Your Operating System ISO(s)

Now that your virtual network is ready, the next step is to download an **operating system (OS)** to install on your virtual machine.

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 **Windows Server**, simply search:

"Windows 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 that 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

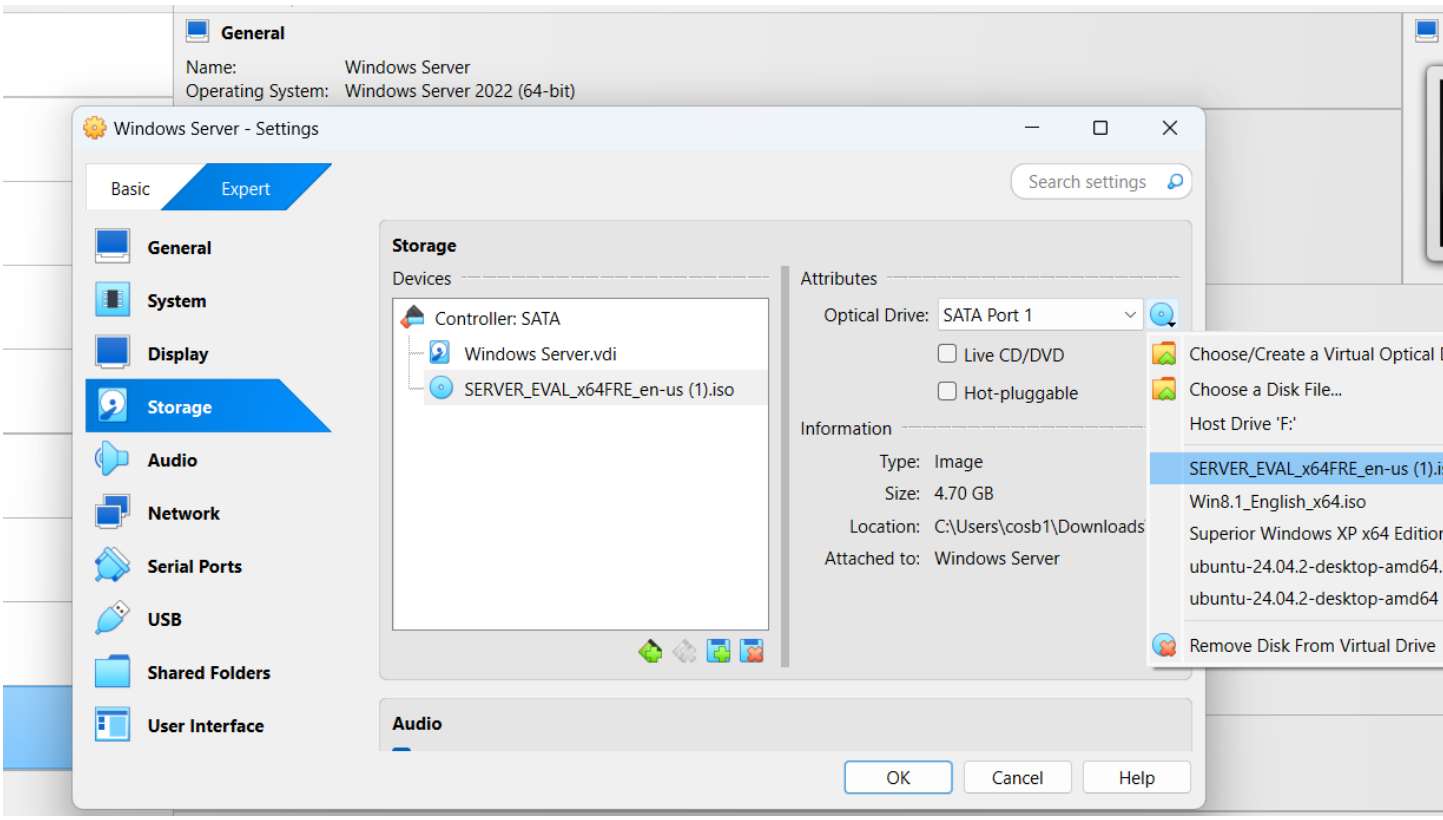
Ubuntu

Kali Linux

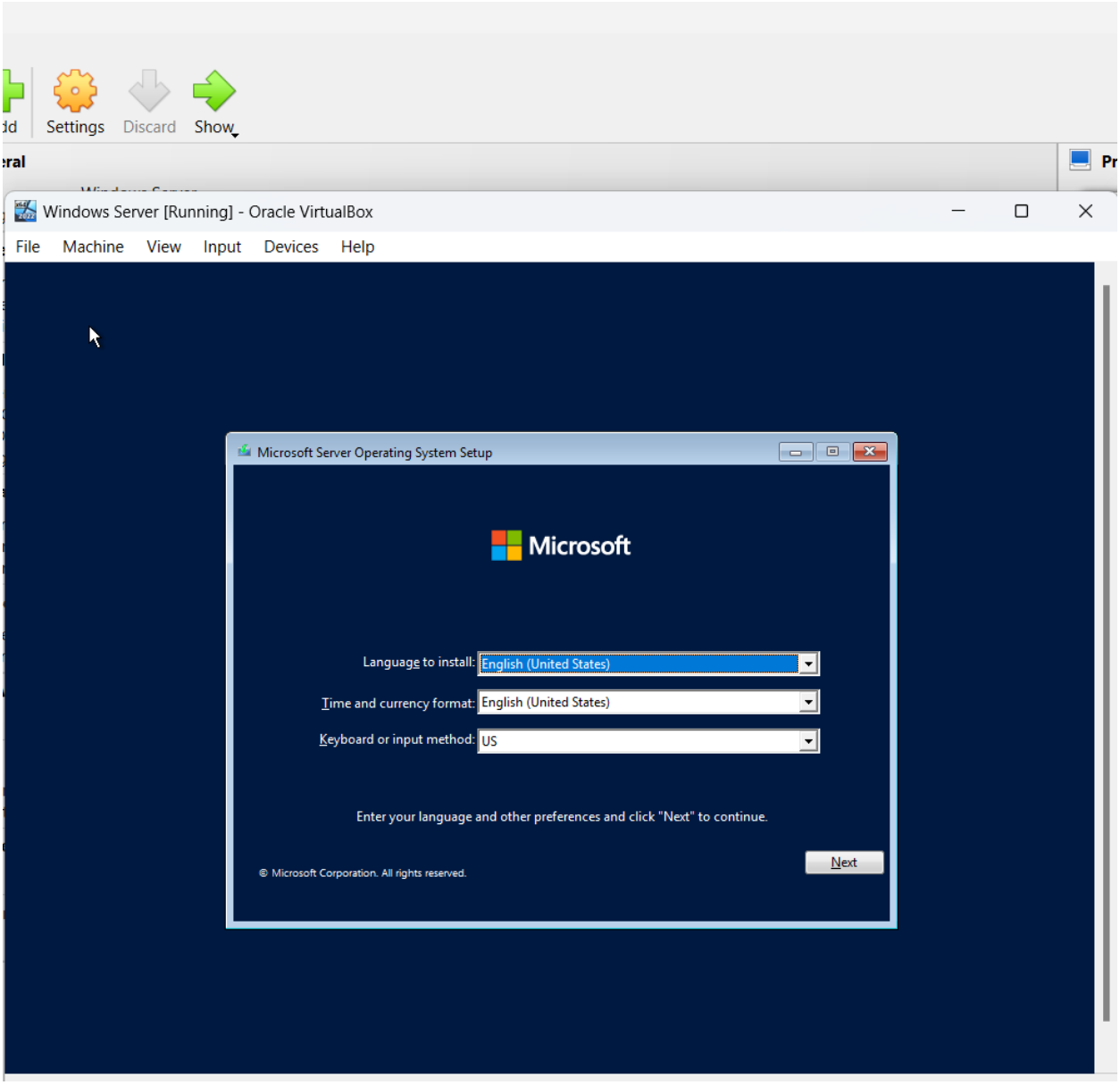
Installing an OS on Your Lab VMs

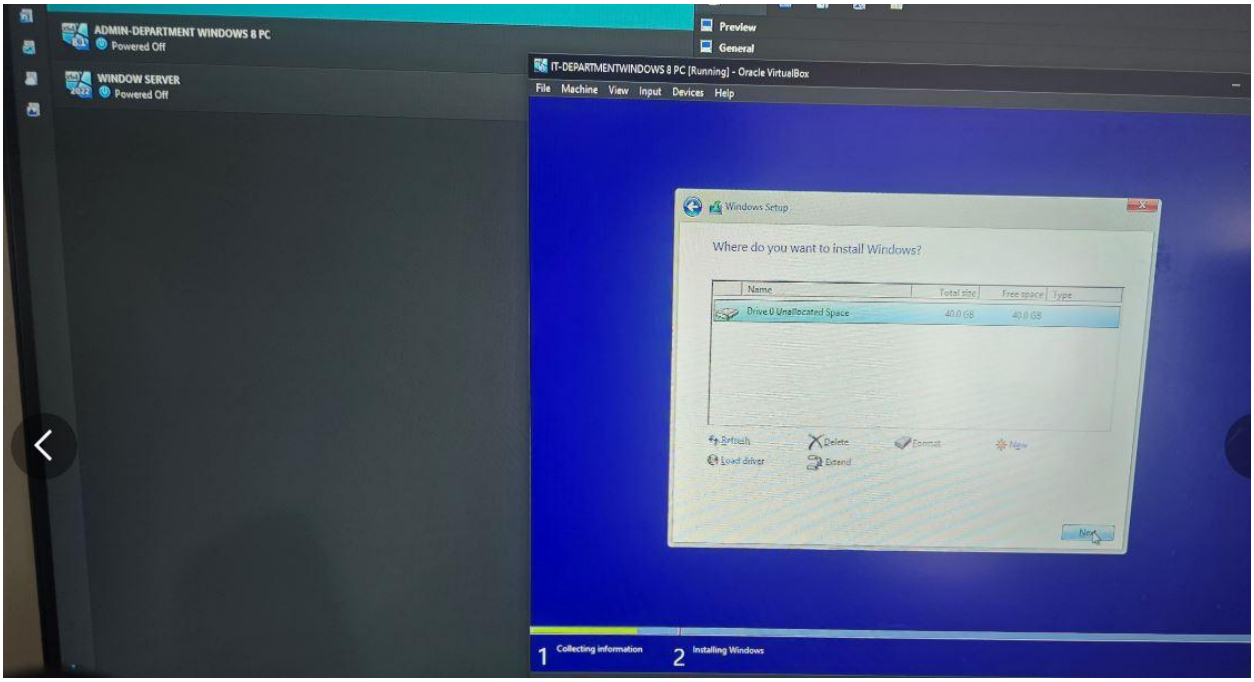
Once you have downloaded your ISO file, it's time to mount it to your VM in VirtualBox. Mounting a VM is essentially like virtually inserting a disc into a DVD drive of a computer.

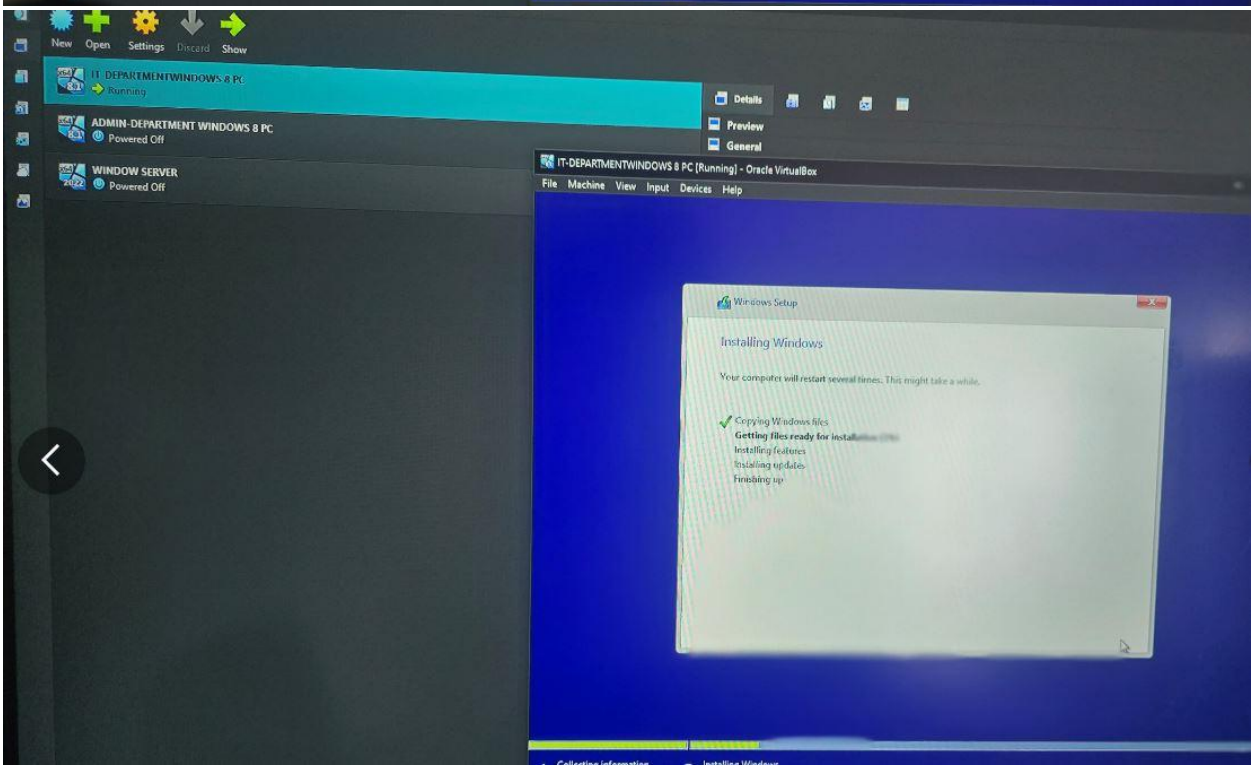
Right-click on your VM and select settings, then open the Storage tab. From there, click the Empty disc icon, then again, the disc icon under Attributes on the right-hand side of the window. Click the Choose Virtual Optical Disk File... and browse to and open your desired ISO.

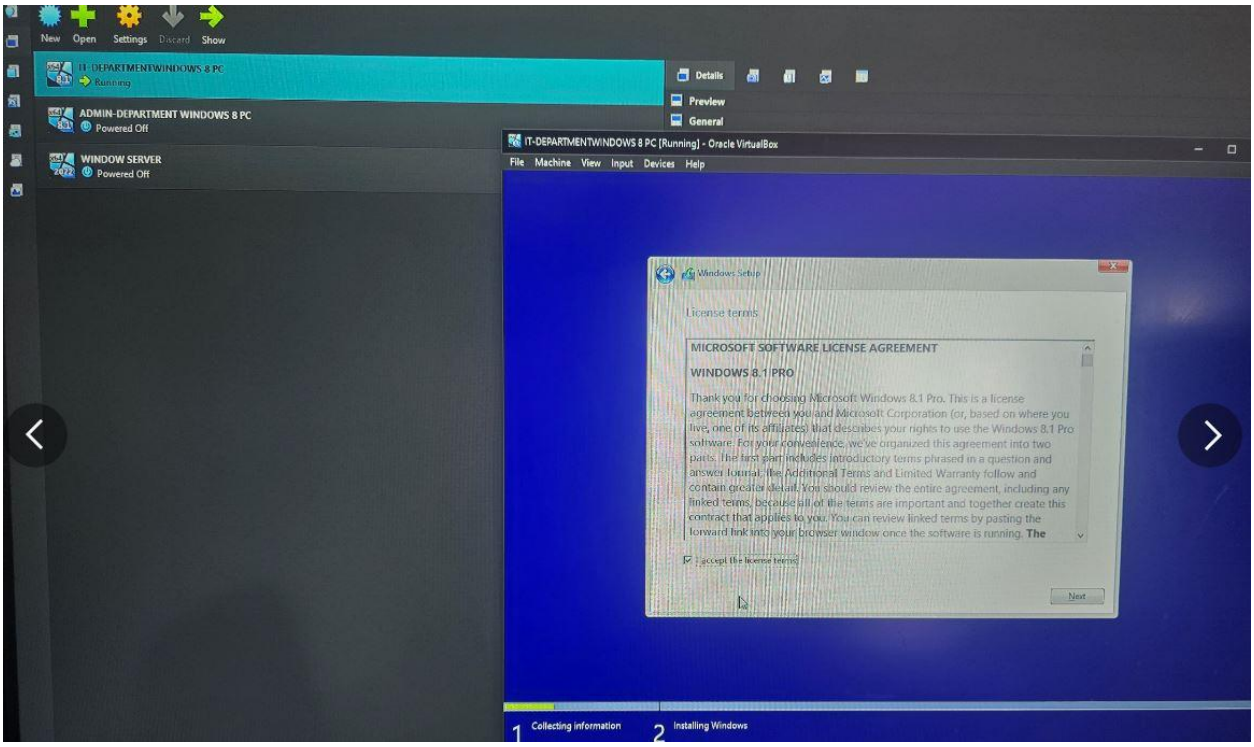


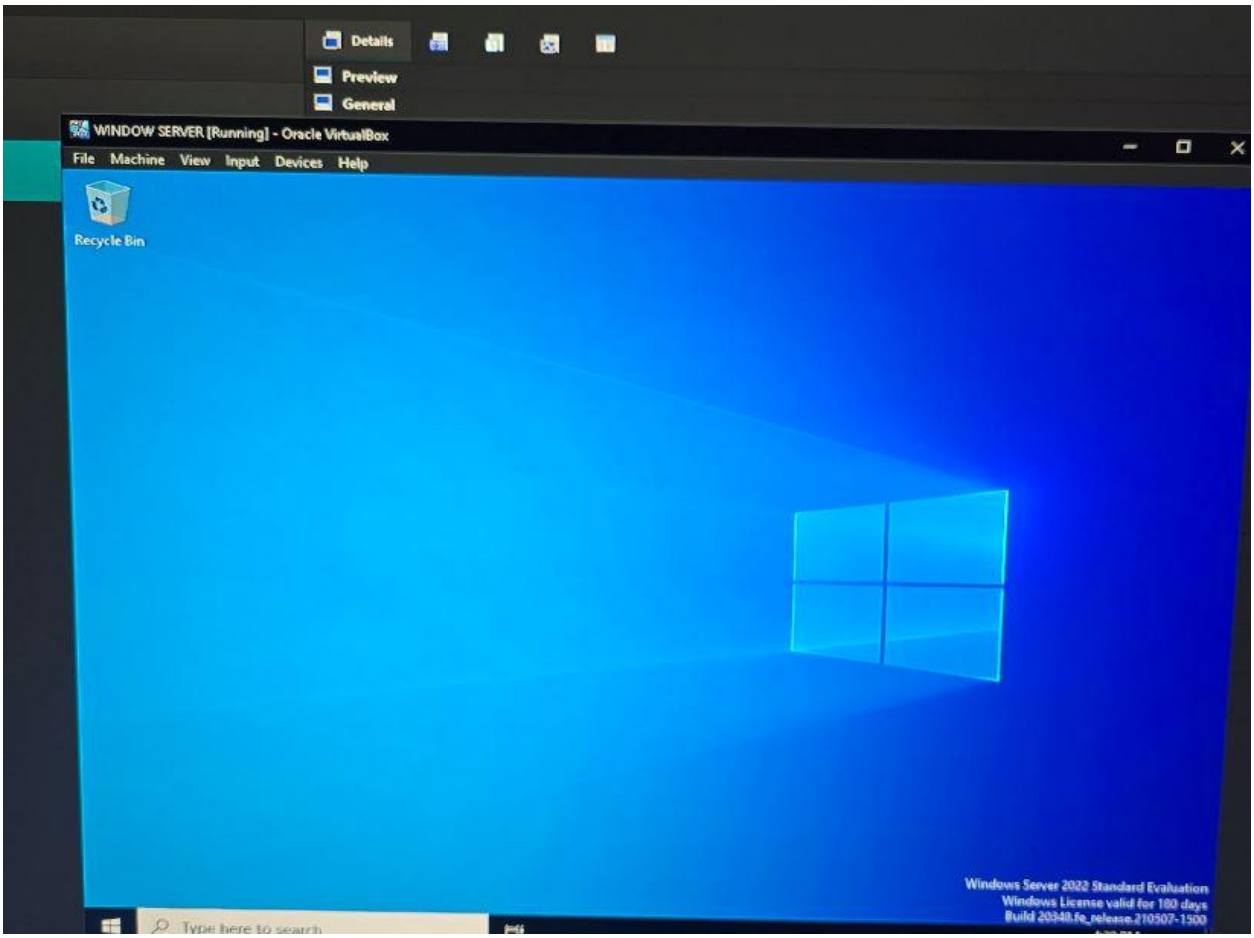
Click OK, and now when we launch the VM, you will be able to begin your OS installation. I mounted a Windows Server ISO, so when I launch the VM, I will see the installation screen for this OS

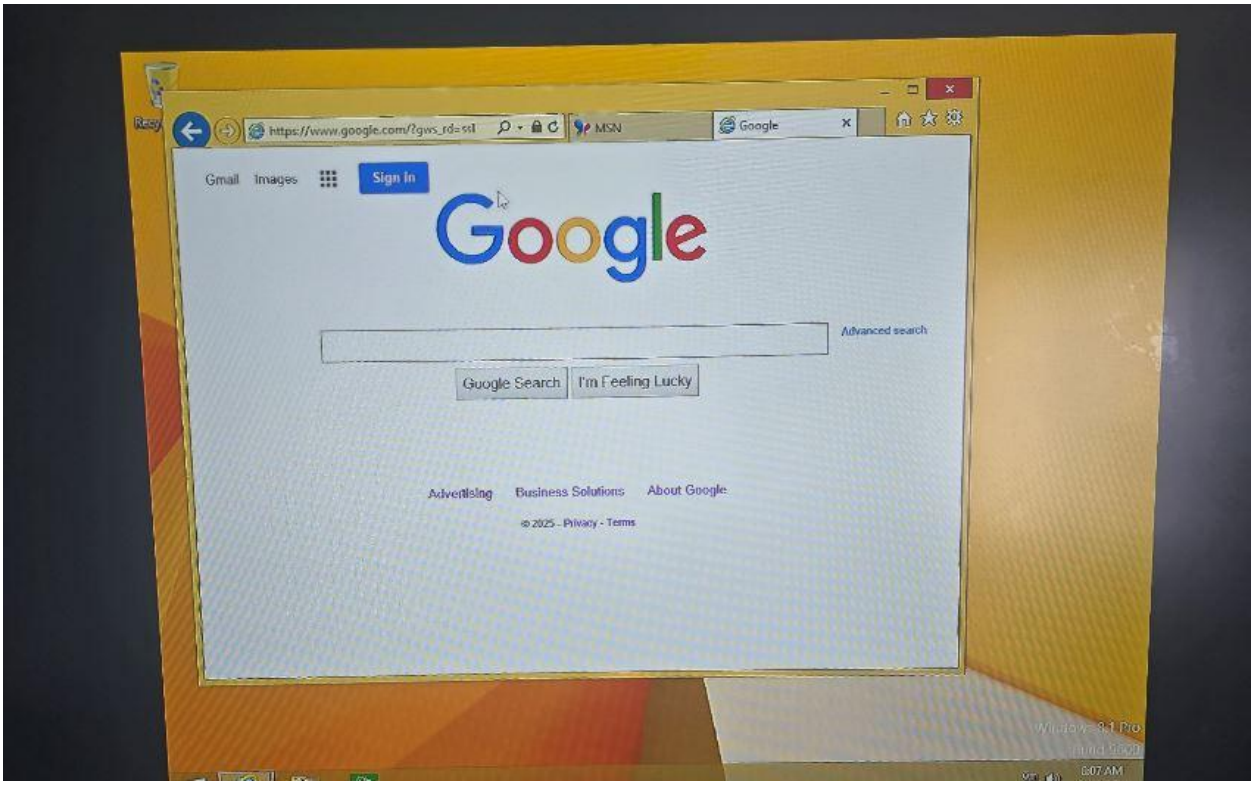



ADMIN-DEPARTMENT WINDOWS 8 PC
Powered Off
WINDOW SERVER
Powered Off
Preview
General
IT-DEPARTMENTWINDOWS 8 PC [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Windows Setup
Where do you want to install Windows?
Name
Total size
Free space
Type
Drive 0 Unallocated Space
40.0 GB
40.0 GB
Refresh
Delete
Format
New
Load driver
Extend
Next
1 Collecting information
2 Installing Windows


New
Open
Settings
Discard
Show
IT-DEPARTMENTWINDOWS 8 PC
Running
ADMIN-DEPARTMENT WINDOWS 8 PC
Powered Off
WINDOW SERVER
Powered Off
Details
Preview
General
IT-DEPARTMENTWINDOWS 8 PC [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Windows Setup
Installing Windows
Your computer will restart several times. This might take a while.
Copying Windows files
Getting files ready for install
Installing features
Installing updates
Finishing up


New
Open
Settings
Discard
Show
IT-DEPARTMENTWINDOWS 8 PC
Running
ADMIN-DEPARTMENT WINDOWS 8 PC
Powered Off
WINDOW SERVER
Powered Off
Details
Preview
General
IT-DEPARTMENTWINDOWS 8 PC [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Windows Setup
License terms
MICROSOFT SOFTWARE LICENSE AGREEMENT
WINDOWS 8.1 PRO
Thank you for choosing Microsoft Windows 8.1 Pro. This is a license agreement between you and Microsoft Corporation (or, based on where you live, one of its affiliates) that describes your rights to use the Windows 8.1 Pro software. For your convenience, we've organized this agreement into two parts. The first part includes introductory terms phrased in a question and answer format. The Additional Terms and Limited Warranty follow and contain greater detail. You should review the entire agreement, including any linked terms, because all of the terms are important and together create this contract that applies to you. You can review linked terms by pasting the forward link into your browser window once the software is running. The
I accept the license terms
Next
1 Collecting information
2 Installing Windows


Details
Preview
General
WINDOW SERVER [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Recycle Bin
Windows Server 2022 Standard Evaluation
Windows License valid for 180 days
Build 20348.fe_release.210507-1500
Type here to search



Wrapping It Up...

That's it! It is now ready to run through OS installation and complete lab setup.

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

What You've Accomplished:

- Created a virtual machine
- Set up a virtual network
- Chosen and downloaded an operating system ISO
- Prepared everything for your OS installation