I've created a free virtual IT lab from scratch using open-source software. It's fast, flexible, and a fantastic way to gain hands-on IT and cybersecurity skills without needing stacks of hardware. Let me walk you through how I did it and how you can do it too.

Index

Virtualization Overview

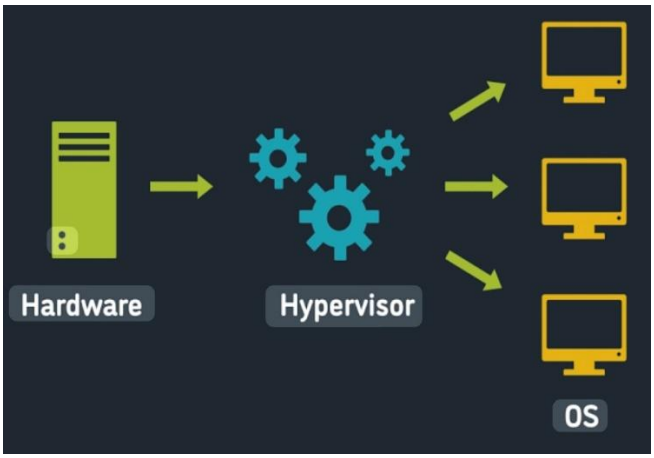
What is Virtualization?

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. Think of your main computer as the "host," and each VM as a "guest" operating independently.

Why Use Virtual Machines?

- Cost-Effective: No need for expensive hardware.
- Flexible: Easily create, modify, or delete VMs.
- Safe Environment: Test risky configurations without affecting your host system.
- Learning Tool: Gain hands-on experience with networking, cybersecurity, and server management.

Figure 1: Host vs Guest Machines in Virtualization



Free Virtualization Software

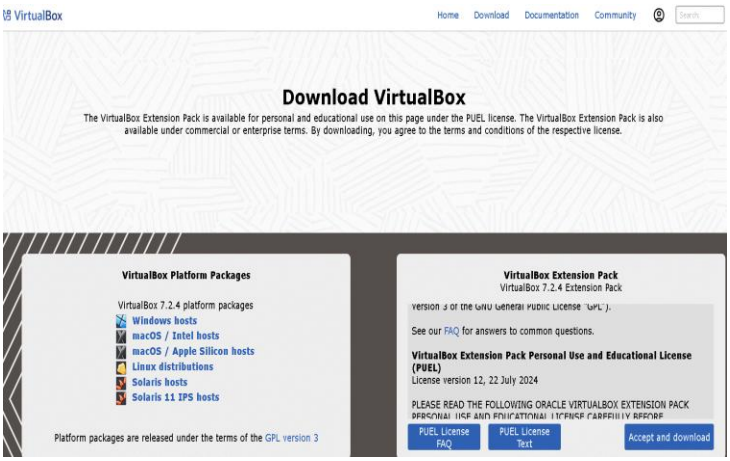
There are many virtualization tools available, but for this project, we'll use Oracle VM VirtualBox because:

- It's free and open-source.
- Works seamlessly on Windows, Linux, and macOS.
- Offers a user-friendly interface and advanced features.

Other popular options include VMware Workstation Player and Proxmox, but VirtualBox is ideal for beginners.

Downloading and Installing VirtualBox

1. Download VirtualBox:
    - Visit the official website: VirtualBox Downloads.
    - Choose the version compatible with your operating system.
2. Install VirtualBox:
    - Run the downloaded installer.
    - Accept all default settings during installation.
    - Click Finish to complete the setup.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macOS / Intel hosts
macOS / Apple Silicon hosts
Linux distributions
Solaris hosts
Solaris 11 IPS hosts
Platform packages are released under the terms of the GPL version 3
VirtualBox Extension Pack
VirtualBox 7.2.4 Extension Pack
See our FAQ for answers to common questions.
VirtualBox Extension Pack Personal Use and Educational License (PUEL)
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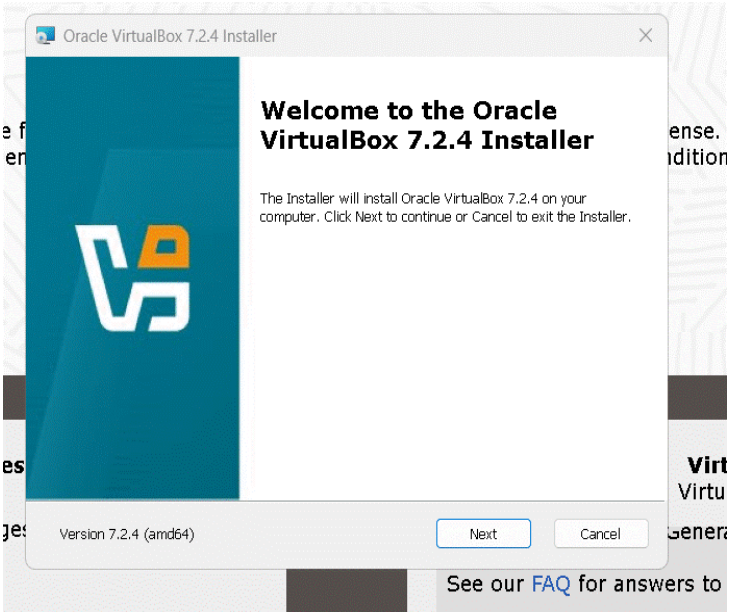
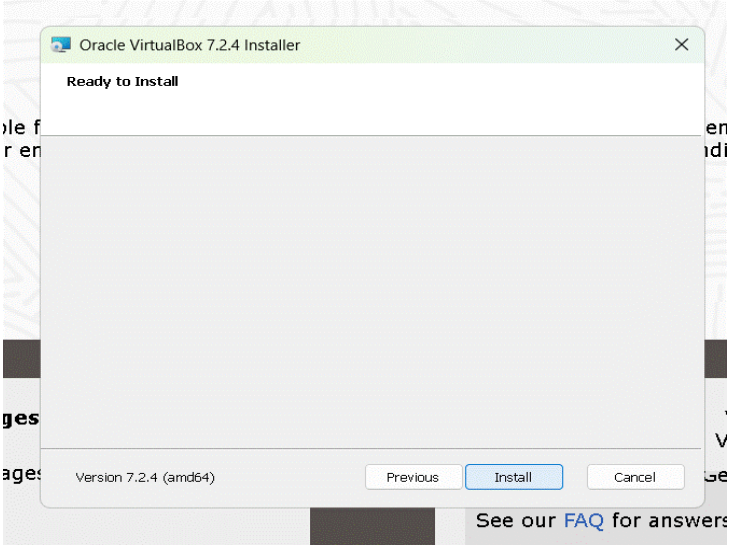
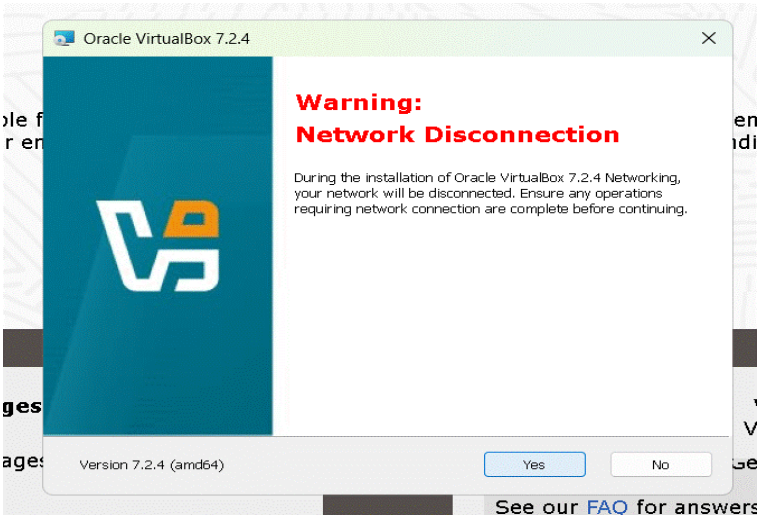
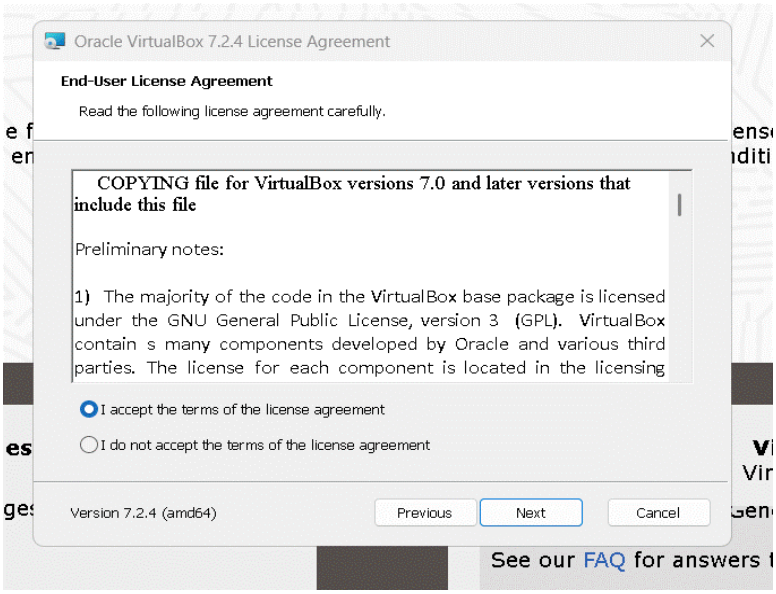
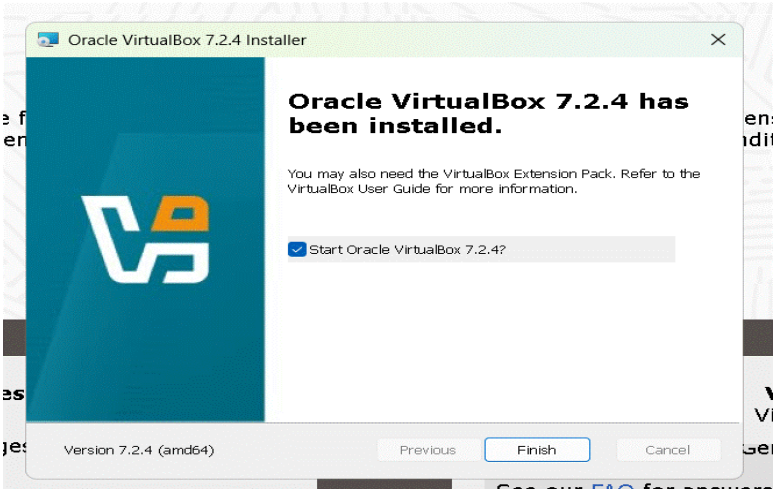
PUEL License FAQ
PUEL License Text
Accept and download


Oracle VirtualBox 7.2.4 Installer
Welcome to the Oracle VirtualBox 7.2.4 Installer
The Installer will install Oracle VirtualBox 7.2.4 on your computer. Click Next to continue or Cancel to exit the Installer.
Version 7.2.4 (amd64)
Next
Cancel
See our FAQ for answers to


Oracle VirtualBox 7.2.4 Installer
Ready to Install
Version 7.2.4 (amd64)
Previous
Install
Cancel
See our FAQ for answers


Oracle VirtualBox 7.2.4
Warning:
Network Disconnection
During the installation of Oracle VirtualBox 7.2.4 Networking, your network will be disconnected. Ensure any operations requiring network connection are complete before continuing.
Version 7.2.4 (amd64)
Yes
No
See our FAQ for answers

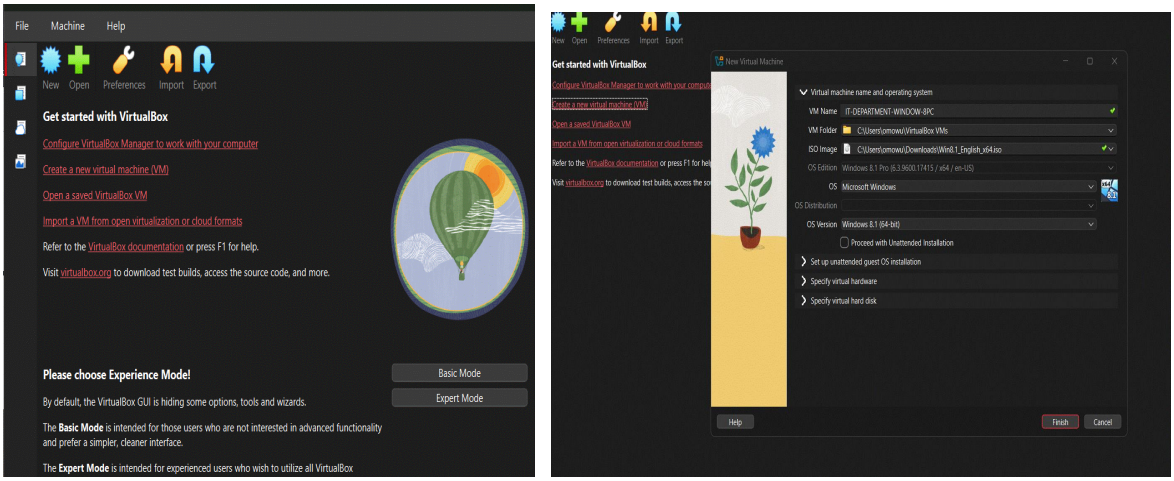

Oracle VirtualBox 7.2.4 License Agreement
End-User License Agreement
Read the following license agreement carefully.
COPYING file for VirtualBox versions 7.0 and later versions that include this file
Preliminary notes:
1) The majority of the code in the VirtualBox base package is licensed under the GNU 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 the licensing
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Version 7.2.4 (amd64)
Previous
Next
Cancel
See our FAQ for answers


Oracle VirtualBox 7.2.4 Installer
Oracle VirtualBox 7.2.4 has been installed.
You may also need the VirtualBox Extension Pack. Refer to the VirtualBox User Guide for more information.
Start Oracle VirtualBox 7.2.4?
Version 7.2.4 (amd64)
Previous
Finish
Cancel

Creating a Virtual Machine

1. Open VirtualBox and click New to create a new VM.
2. In Expert Mode, specify:
    - Name: e.g., "Windows Server Lab"
    - RAM: Allocate 2GB (2048MB) or more based on your system resources.
    - Hard Disk: Create a new virtual hard disk with 40GB of storage (dynamically allocated).
3. Adjust Advanced Settings:
    - Assign 2 CPU cores for better performance.
    - Store the virtual hard disk on an SSD if possible.

Figure 3: Creating a New Virtual Machine

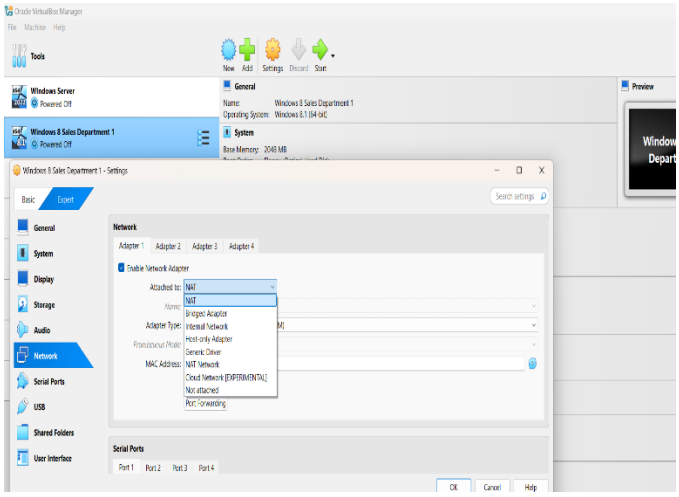


Creating a Virtual Network

Virtual networks allow VMs to communicate with each other, the host, or the internet. VirtualBox supports several network types:

Network Types in VirtualBox

1. NAT (Network Address Translation):
    - Allows VMs to access the internet via the host's connection.
    - Ideal for single-VM setups.
2. NAT Network:
    - Enables communication between multiple VMs while maintaining internet access.
    - Best for multi-VM labs.
3. Bridged Adapter:
    - Makes the VM appear as a separate device on your local network.
    - Useful for accessing VMs from other devices.
4. Internal Network:
    - Isolates VMs from the host and the internet.
    - Perfect for testing malware or simulating isolated environments.
5. Host-Only Adapter:
    - Allows direct communication between the host and VMs.
    - Great for local server testing.
    - *Figure 4: Configuring Virtual Network*

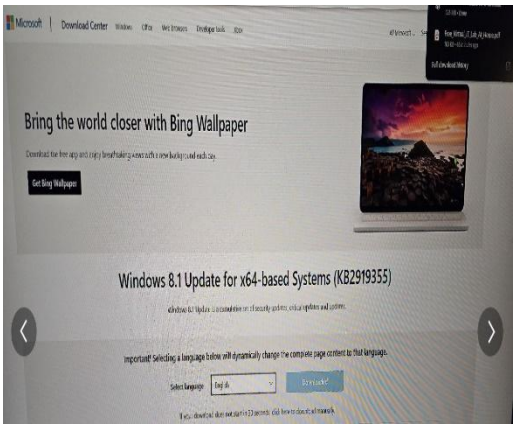


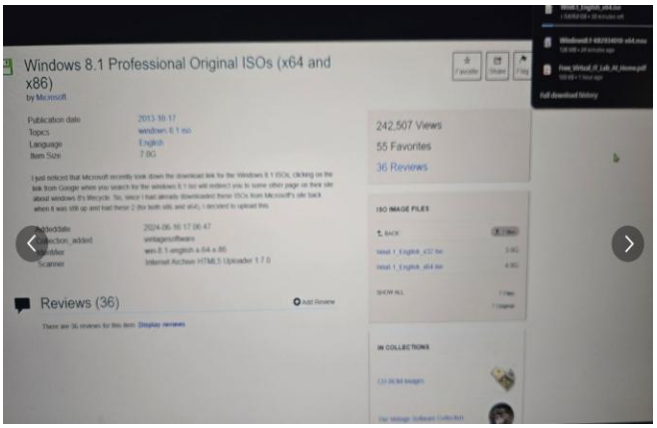
Downloading Your Operating System ISO(s)

To install an operating system on your VM, you'll need an ISO file a digital copy of the OS installation media. Download ISOs only from official sources:

- Windows Server: Microsoft Evaluation Center
- Ubuntu: Ubuntu Downloads
- Kali Linux: Kali Linux Downloads

Figure 5: Official ISO Download Page

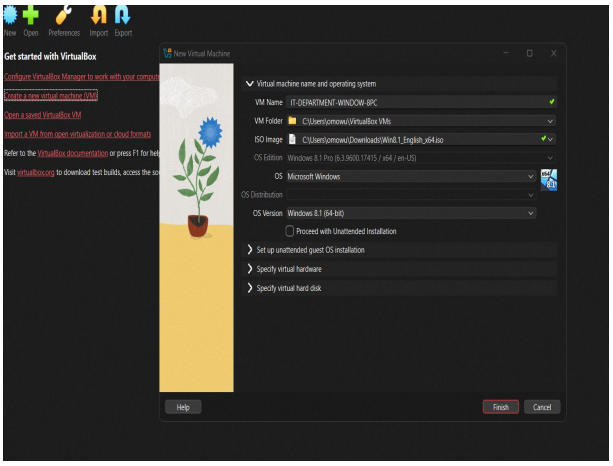


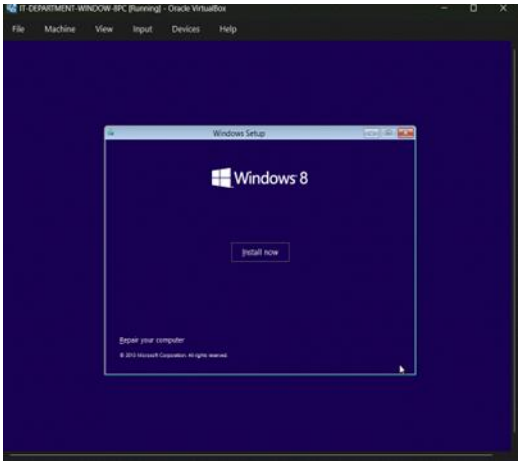


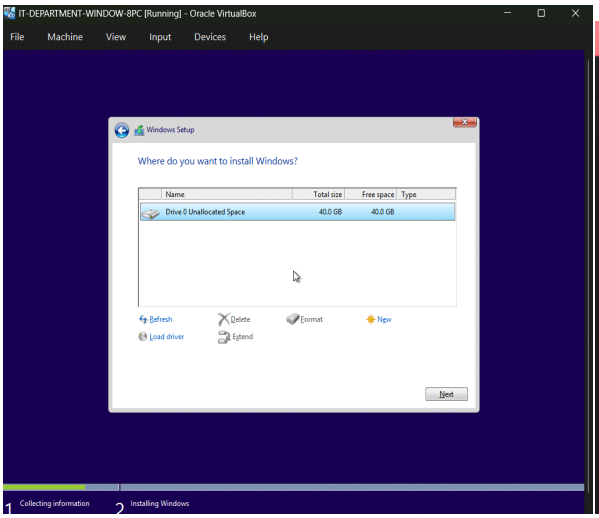
Installing an OS on Your Lab VMs

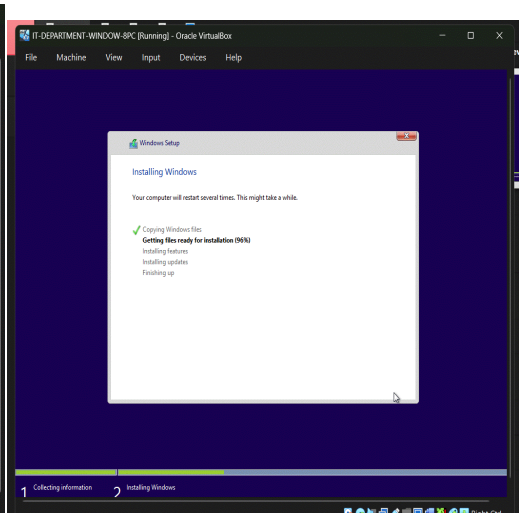
1. Right-click your VM in VirtualBox and select Settings > Storage.
2. Under Controller: IDE, click the disc icon and choose Choose Virtual Optical Disk File....
3. Browse to your downloaded ISO file and select it.
4. Start the VM to begin the OS installation process.
5. *Figure 6: Mounting an ISO File*

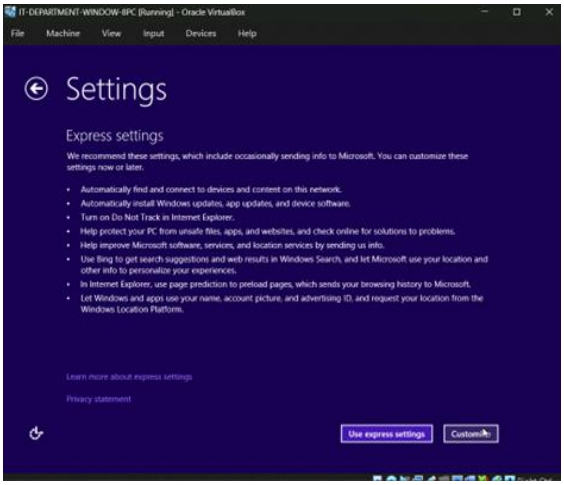
6.

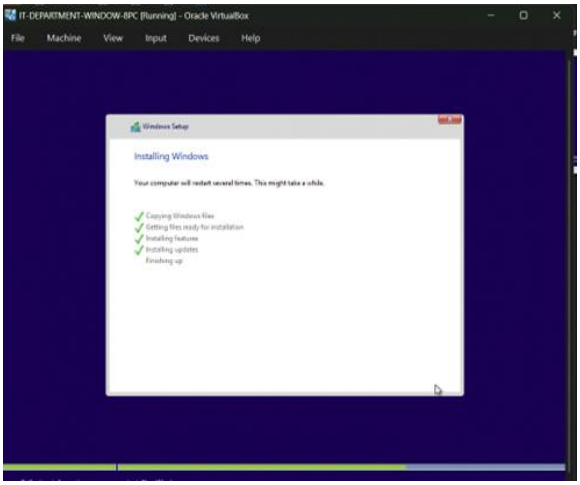

Get started with VirtualBox
New Virtual Machine
Virtual machine name and operating system
VM Name
IT-DEPARTMENT-WINDOW-8PC
Help
Finish
Cancel

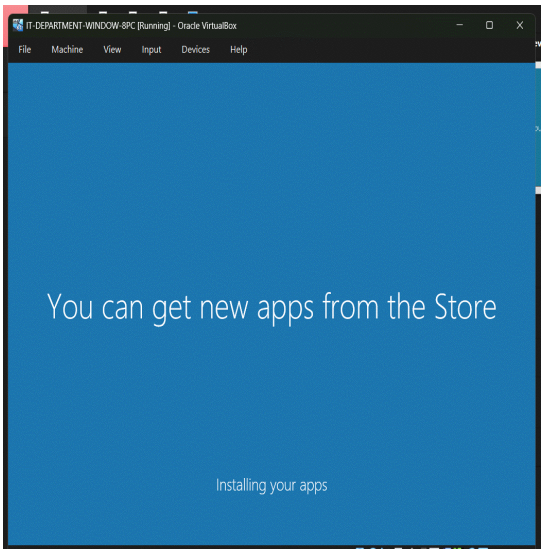

IT-DEPARTMENT-WINDOW-8PC [Running] - Oracle VirtualBox
File
Machine
View
Input
Devices
Help
Windows Setup
Windows 8
Install now
Repair your computer

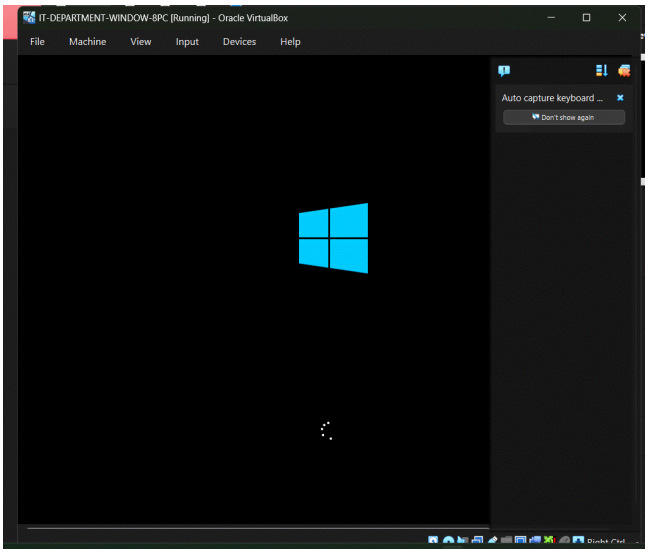

IT-DEPARTMENT-WINDOW-8PC [Running] - Oracle VirtualBox
File
Machine
View
Input
Devices
Help
Windows Setup
Where do you want to install Windows?
Name
Total size
Free space
Type
Drive 0 Unallocated Space
40.0 GB
40.0 GB
Refresh
Delete
Format
New
Load driver
Extend
Next
1 Collecting information
2 Installing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

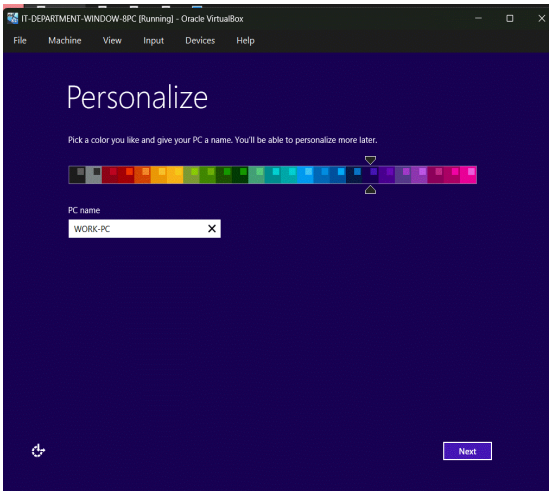

IT-DEPARTMENT-WINDOW-8PC [Running] - Oracle VirtualBox
File
Machine
View
Input
Devices
Help
Windows Setup
Installing Windows
Your computer will restart several times. This might take a while.
Copying Windows files
Getting files ready for installation (96%)
Installing features
Installing updates
Finishing up
1 Collecting information
2 Installing Windows


IT-DEPARTMENT-WINDOW-8PC [Running] - Oracle VirtualBox
File
Machine
View
Input
Devices
Help
Settings
Express settings
We recommend these settings, which include occasionally sending info to Microsoft. You can customize these settings now or later.
Automatically find and connect to devices and content on this network.
Automatically install Windows updates, app updates, and device software.
Turn on Do Not Track in Internet Explorer.
Help protect your PC from unsafe files, apps, and websites, and check online for solutions to problems.
Help improve Microsoft software, services, and location services by sending us info.
Use Bing to get search suggestions and web results in Windows Search, and let Microsoft use your location and other info to personalize your experiences.
In Internet Explorer, use page prediction to preload pages, which sends your browsing history to Microsoft.
Let Windows and apps use your name, account picture, and advertising ID, and request your location from the Windows Location Platform.
Learn more about express settings
Privacy statement
Use express settings
Customize


IT-DEPARTMENT-WINDOW-8PC [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 installation
Installing features
Installing updates
Finishing up







Conclusion

- Created a virtual machine.
- Set up a virtual network.
- Downloaded and installed an operating system.

With your virtual IT lab ready, you can now experiment with networking, cybersecurity, and software development. Whether you're studying for certifications or building your own projects, this lab will help you grow your IT skills.