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PROJECT REPORT ON INTRODUCTION TO VIRTUALIZATION WITH VIRTUAL BOX IN LINUX

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ABSTRACT

Virtualization is a critical technology in modern computing, enabling multiple operating systems (OS) to run simultaneously on a single hardware platform. This project, "Introduction to Virtualization with VirtualBox in Linux," explores the implementation and significance of virtualization using VirtualBox, an open-source, cross-platform virtualization software developed by Oracle. The focus of this project is on deploying Linux-based systems within VirtualBox to understand how virtualization functions and its applications in both development and testing environments.

The primary objective of this project is to demonstrate the process of setting up and configuring VirtualBox on a host machine, installing a Linux-based guest operating system (UBUNTU Linux), and exploring its capabilities. The project outlines the steps required to create virtual environments, manage resources efficiently, and enable seamless interaction between the host and guest OS. By simulating different environments, developers and system administrators can optimize software performance, test multiple OS configurations, and deploy applications in isolated virtual environments without requiring separate physical machines.

This project underscores the benefits of virtualization, including hardware resource optimization, isolation, and flexibility, which are vital for businesses, developers, and system administrators. VirtualBox offers key features such as snapshot management, shared folders, and seamless mode, making it an ideal tool for creating portable and manageable virtual environments.

The project also highlights the significance of virtualization in areas like cloud computing, development, testing, and network security. By using VirtualBox and Linux together, users can harness the power of both technologies to create secure, scalable, and efficient virtual machines.

This abstract provides a foundational overview of the practical aspects of virtualization with VirtualBox, demonstrating its potential for reducing costs, improving system efficiency, and enhancing software development workflows in Linux environments.



INDEX

S.NO.	CHAPTER	PAGE NO.
I	INTRODUCTION	1
II	SYSTEM REQUIREMENT	2
III	DOWNLOADING AND INSTALLING VIRTUALBOX	3-6
IV	DOWLOADING UBANTU LINUX ISO FILE	7-8
V	Creating a UBUNTU Linux Virtual Machine in VirtualBox	9-21
VI	REFERENCES	22



I. INTRODUCTION

With the advancement of technology, the requirement for flexible, secure, and isolated environments has become very important. Virtualization is a technique by which users create a multitude of simulated environments in just one physical hardware. Virtualization has transformed computing. In this, virtual space, testing, developing and, in some cases, actual usage can take place on the same system without the need to separately hardware. This approach, specially becomes beneficial in experimenting various Operating Systems, where in there's a desire to experience something like Ubuntu as alternative while not disturbing their initial OS.

VirtualBox is a very commonly used open-source application in virtualization. It gets installed and is used by users from all around the world because it is quite compatible with most operating systems and is easy to use. It provides an isolated setup, running an OS like Ubuntu on virtual environments without interfering with the primary operating systems for the risk-free exploration of new systems and applications.

Ubuntu is a free Linux distribution developed by Canonical Ltd. It is one of the most popular distributions used because of its simplicity, security, and community support. Based on the Debian architecture, Ubuntu brings in an easy-to-use interface that is appealing to users with both new and seasoned tastes. The OS has long been favored by developers, system administrators, and enthusiasts because of its open-source nature and customizable environment. Since its first edition in 2004, Ubuntu has become one of the most stable and used Linux distributions, applied in personal computing, servers, cloud, and IoT (Internet of Things).

Ubuntu compatibility with VirtualBox has opened new avenues for users interested in taking advantage of the unique features of Ubuntu while remaining on their current OS. For many users, learning about Linux, developing software in a Linux environment, or running specific Linux-based applications, using Ubuntu within VirtualBox has become very common and efficient for all these purposes.

II. SYSTEM REQUIREMENTS

Before installing VirtualBox and creating virtual machines on a Windows system, ensure that your hardware and software meet the following minimum requirements:

1. Host System Requirements:

- Operating System: Windows 10, Windows 8, Windows 7, or Windows Server (64-bit recommended).
- Processor: 64-bit Intel or AMD processor with virtualization support (Intel VT-x or AMD-V).
- RAM: Minimum of 4 GB (8 GB or more recommended for better performance).
- Hard Disk Space: At least 30 MB for VirtualBox installation, plus additional space for virtual machines (20 GB or more per VM is recommended).
- Graphics: Graphics card with support for hardware virtualization (optional but beneficial for 3D acceleration).

2. Guest Operating System Requirements:

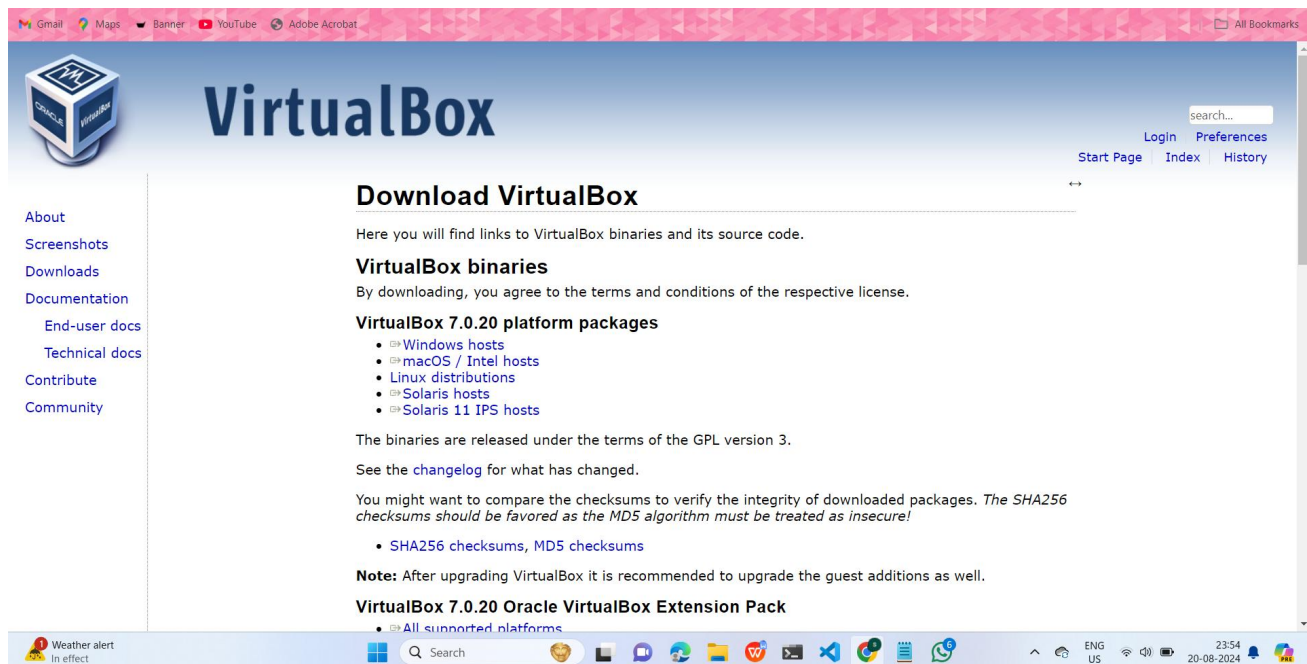
- Guest OS: VirtualBox supports various guest operating systems, including:
 - Linux distributions (e.g., Ubuntu, CentOS, Fedora, Kali Linux)
 - Windows versions (Windows 10, 8, 7)
 - Other operating systems (e.g., Solaris, FreeBSD)
- RAM for Guest OS: Allocate sufficient RAM based on the requirements of the guest OS being installed (e.g., at least 2 GB for Ubuntu).

3. Additional Software Requirements:

- Admin Rights: Administrator privileges on the Windows host system are required for installation.
- Internet Connection: An active internet connection is recommended for downloading VirtualBox and guest OS installation files.

III. DOWNLOADING AND INSTALLING VIRTUALBOX

1. Go to the [VirtualBox website](#) and download the latest version of VirtualBox for Windows.

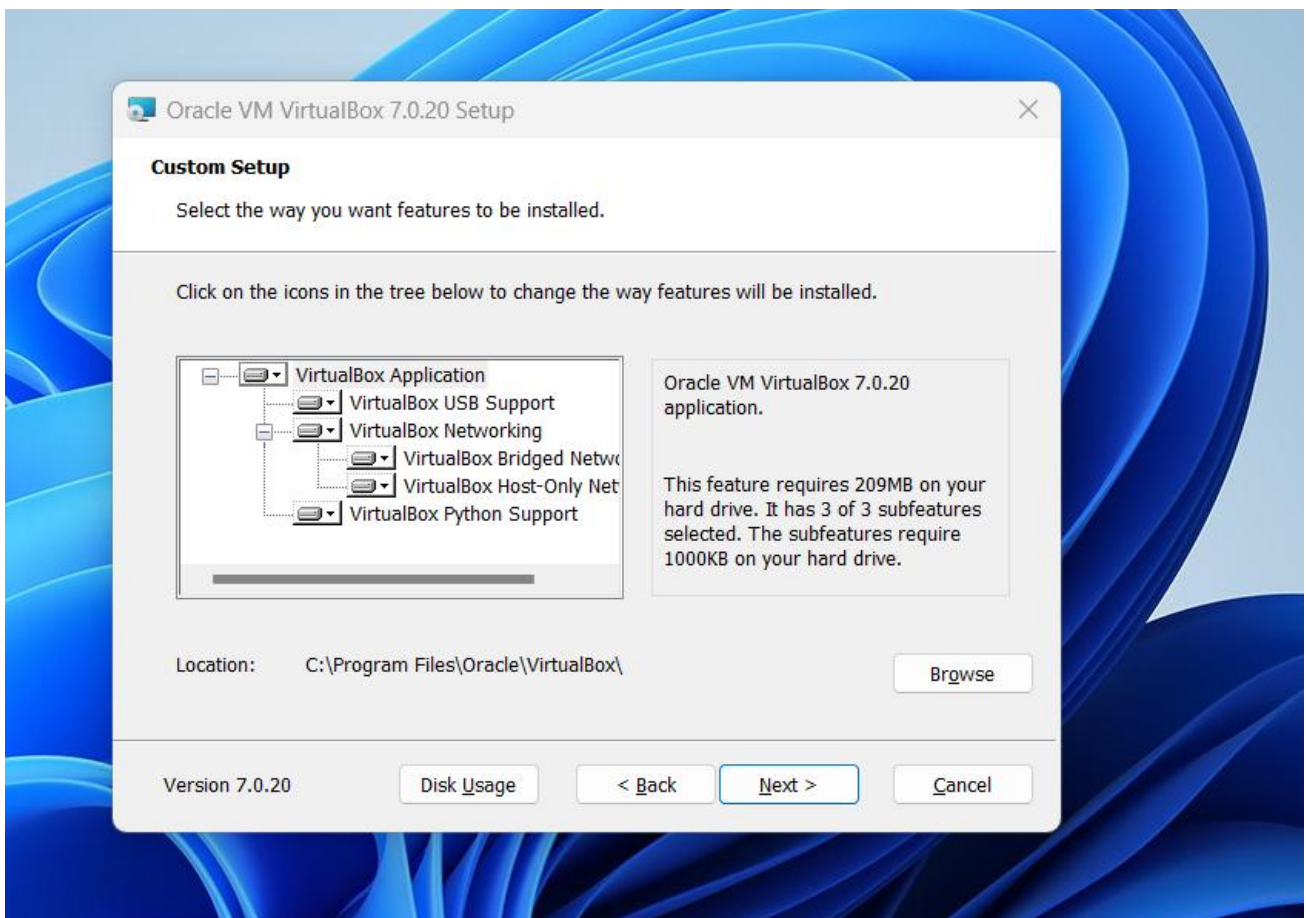


2. Run the installer you just downloaded (VirtualBox-x.x.x-xxxx-Win.exe).

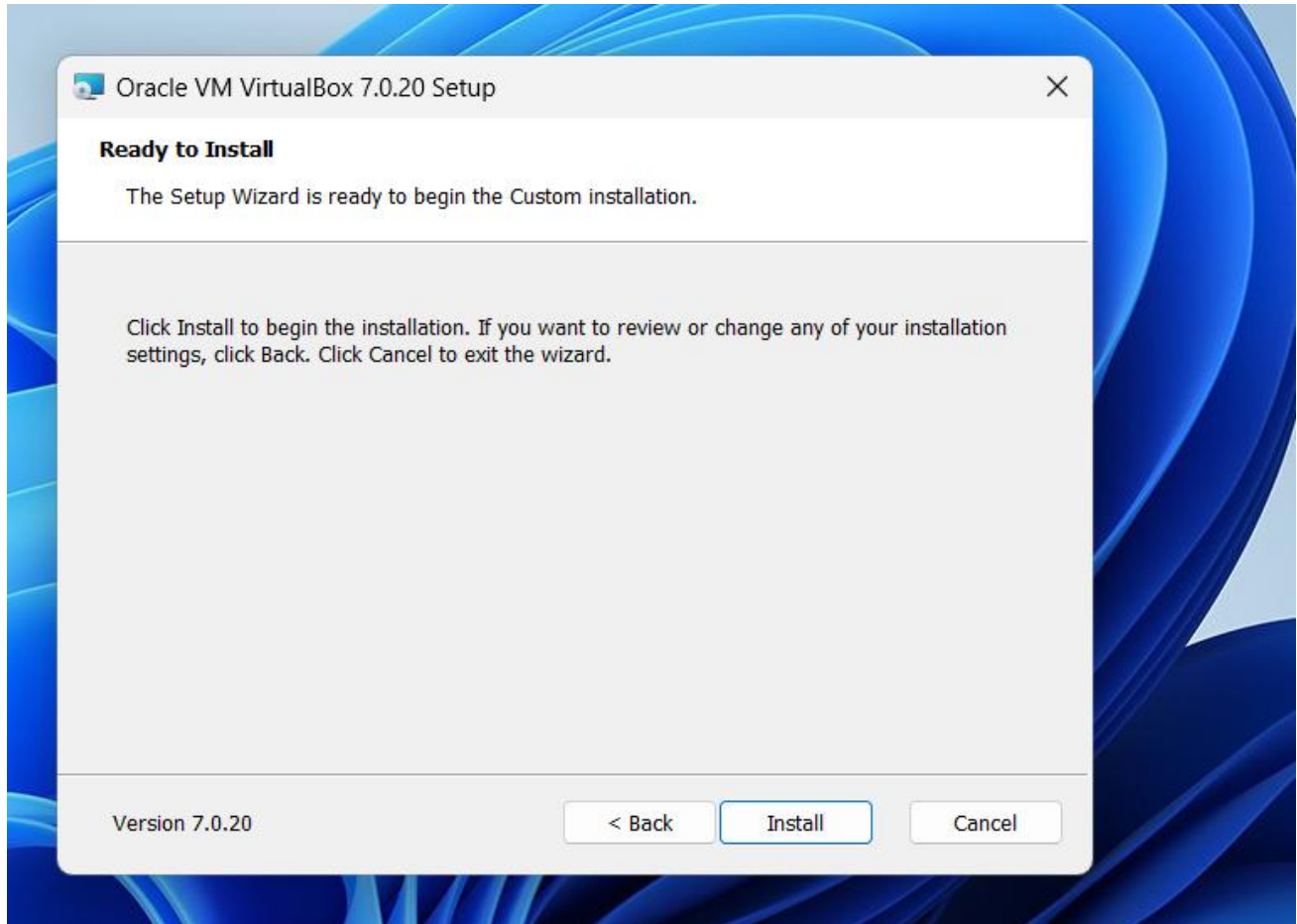
3. In the installation wizard, click Next on the welcome screen.

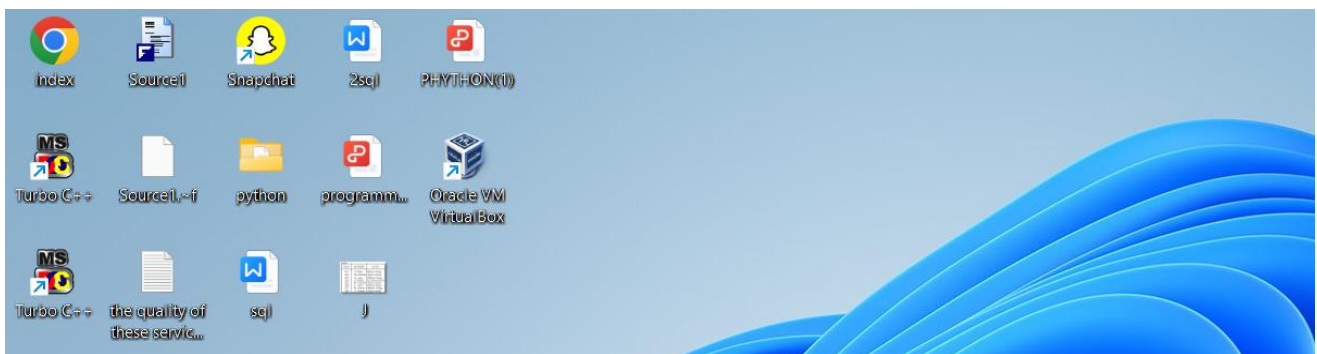
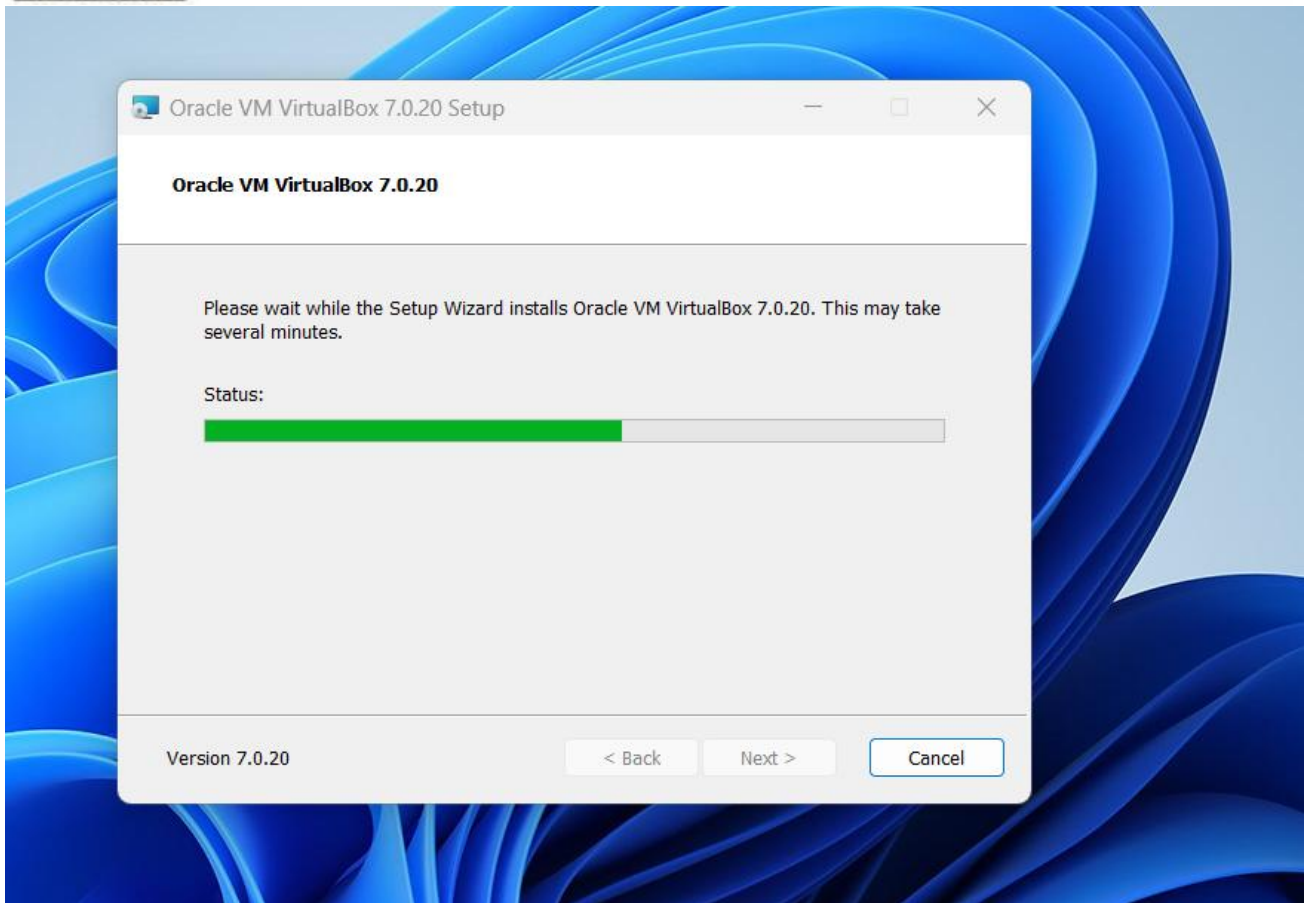
4. Select the installation location (default is fine), and click Next.

5. The next screen will show some options for creating shortcuts. You can leave them as default.



5. Click Yes to install network interfaces (this is required for VirtualBox networking).
7. Click Install and wait for the installation to complete.

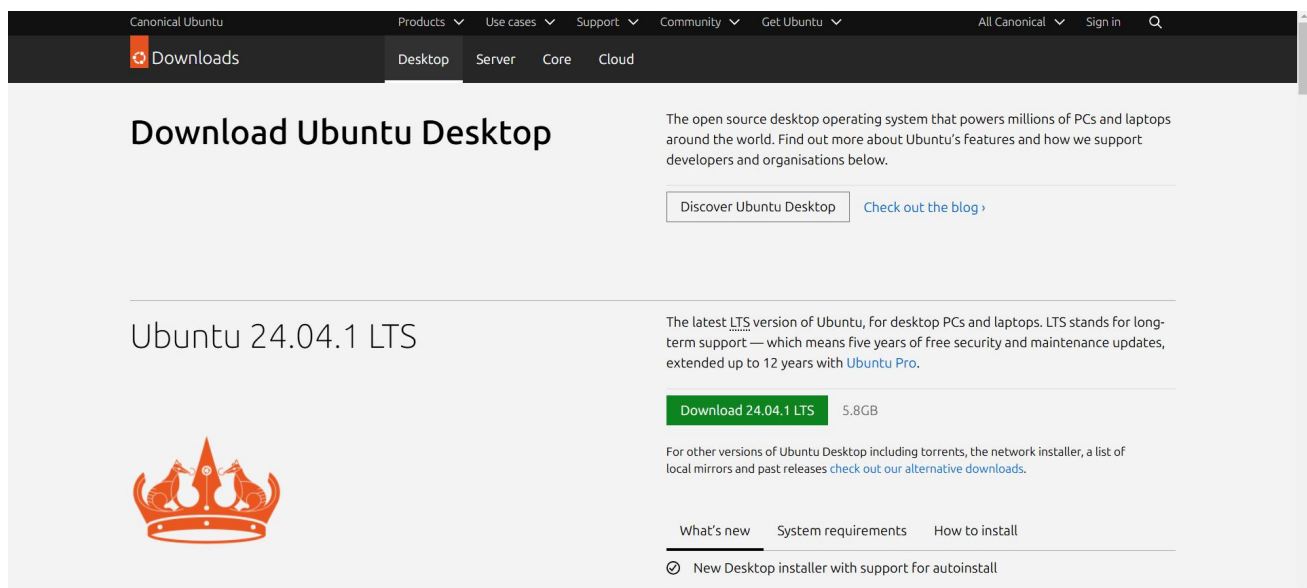




IV. DOWLOADING UBUNTU LINUX ISO FILE

Step 1: Visit the Official Ubuntu Website

Open your browser and go to the official [Ubuntu Downloads page](https://ubuntu.com/download).



Step 2: Choose the Ubuntu Version

On the Downloads page, you'll see different versions of Ubuntu (such as LTS and the latest release).

LTS (Long-Term Support): This version is recommended for most users because it receives long-term updates and stability support, typically for five years.

Latest Release: This version includes the latest features and updates but is supported for only nine months.

Click on the version you want to download, most commonly **Ubuntu Desktop LTS**.

Step 3: Select Download Option

On the selected version's page, you'll see an option to “Download.”



Click on the **Download** button to start downloading the ISO file.

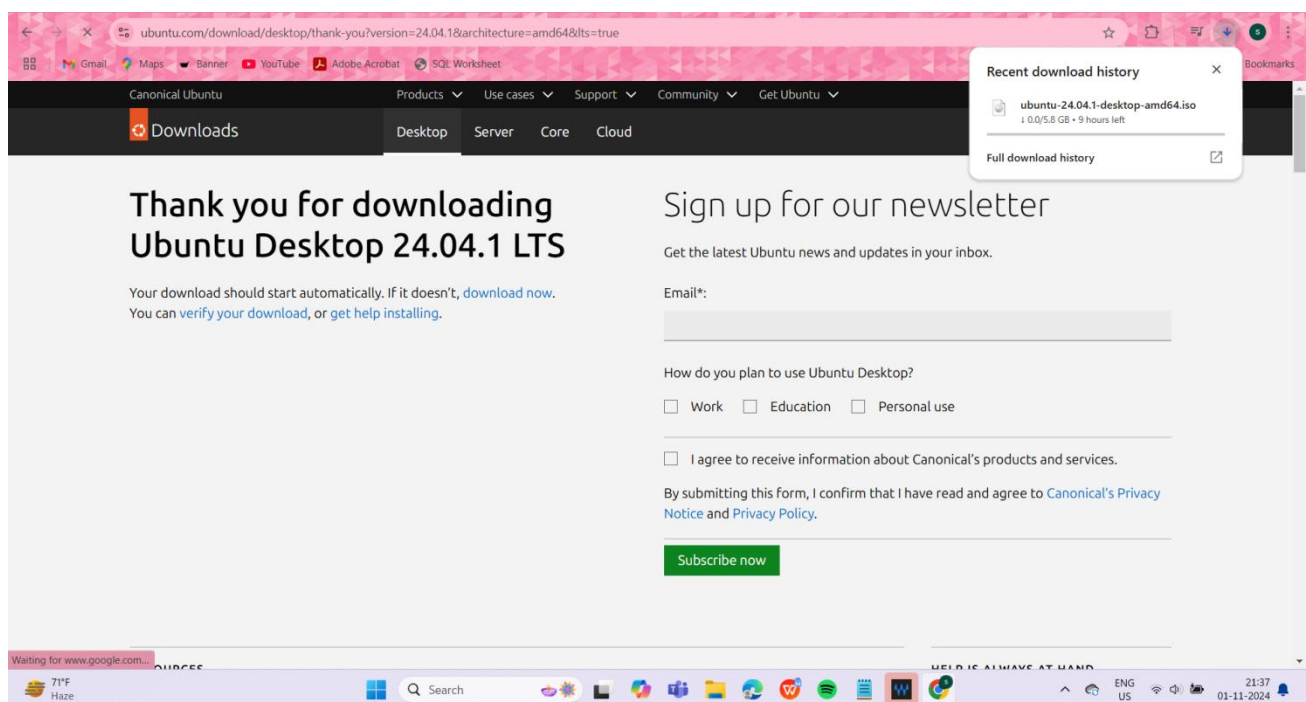
Step 4: Wait for the Download to Complete

The ISO file will begin downloading. This file size is typically around 2-3 GB, so download times may vary depending on your internet speed.

Once the download completes, the file will be saved in your system's default download folder.

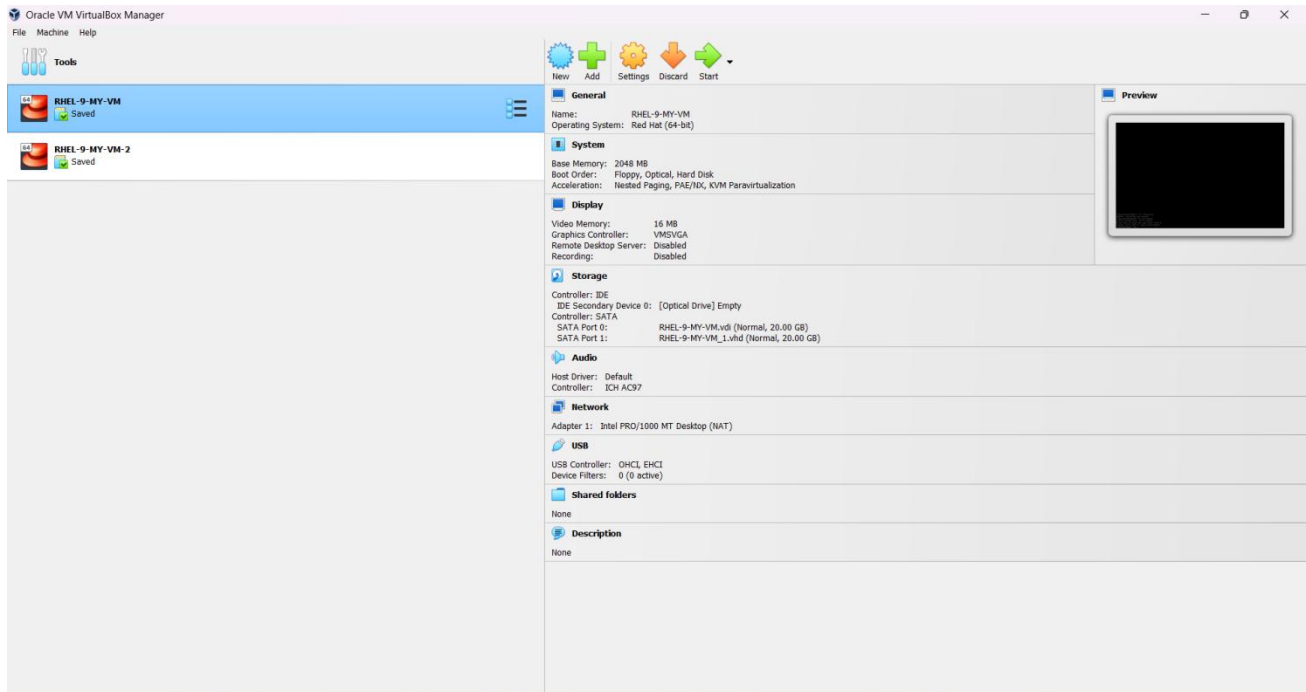
Step 5: Verify the Download (Optional)

Ubuntu offers checksums on its website to verify the integrity of the downloaded file. You can compare the checksum provided on the site with the one generated by your system to ensure there were no errors during the download.

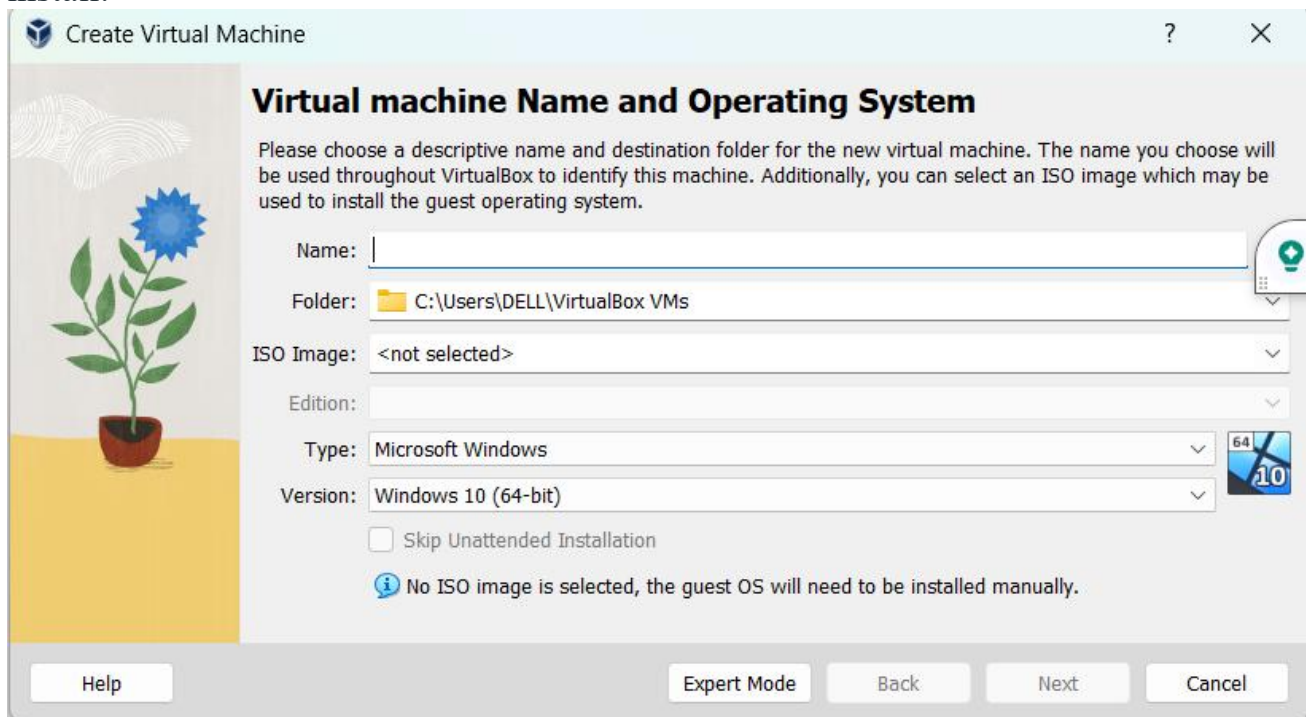


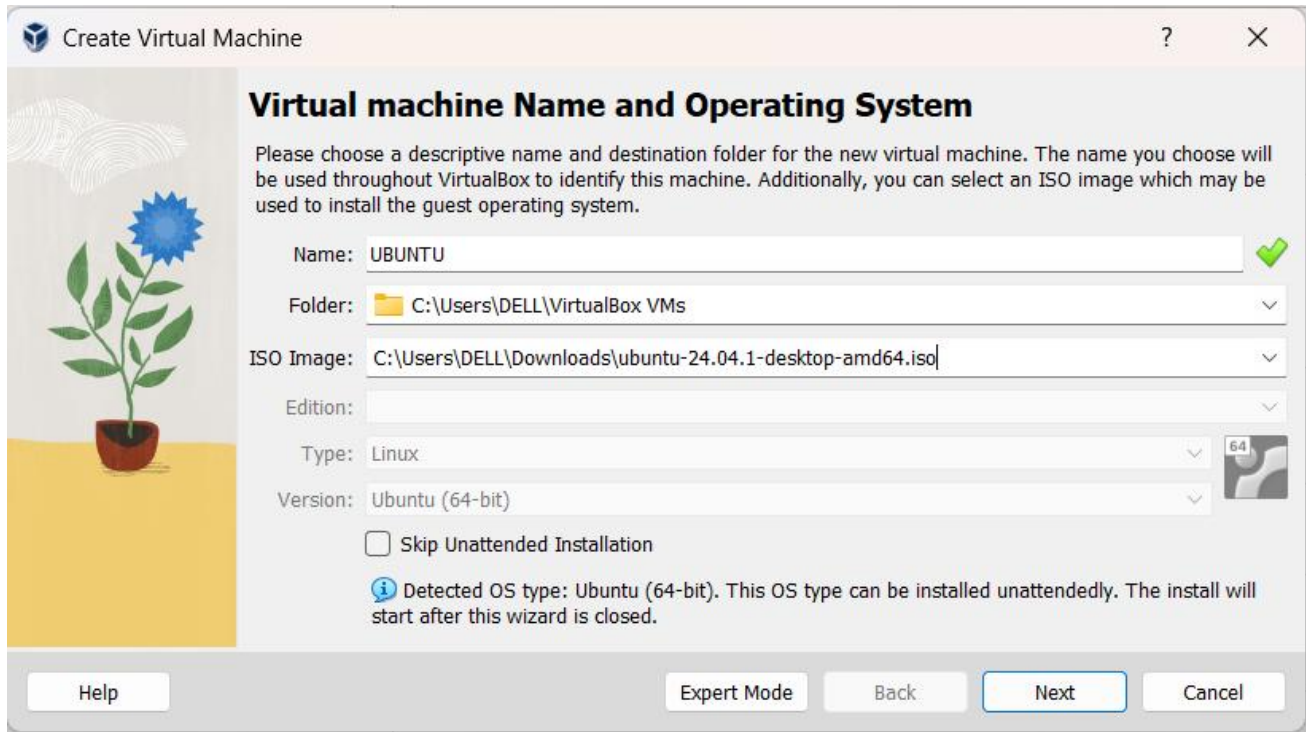
V. Creating a UBUNTU Linux Virtual Machine in VirtualBox

Step 1-Open [VirtualBox](#) and click on the New button.



Step 2-Give a **Name** to your **Virtual Machine** and select the **Location** for it to install.





Create Virtual Machine

Virtual machine Name and Operating System

Please choose a descriptive name and destination folder for the new virtual machine. The name you choose will be used throughout VirtualBox to identify this machine. Additionally, you can select an ISO image which may be used to install the guest operating system.

Name: ✓

Folder: ▼

ISO Image: ▼

Edition: ▼

Type: ▼

Version: ▼

☐ Skip Unattended Installation

Detected OS type: Ubuntu (64-bit). This OS type can be installed unattended. The install will start after this wizard is closed.

Help Expert Mode Back Next Cancel

Step 3-Give the Username , Password and Hostname.



Create Virtual Machine

Unattended Guest OS Install Setup

You can configure the unattended guest OS install by modifying username, password, and hostname. Additionally you can enable guest additions install. For Microsoft Windows guests it is possible to provide a product key.

Username and Password

Username: ✓

Password: ✓

Repeat Password: ✓

☐ Guest Additions

Guest Additions ISO: ▼

Additional Options

Product Key:

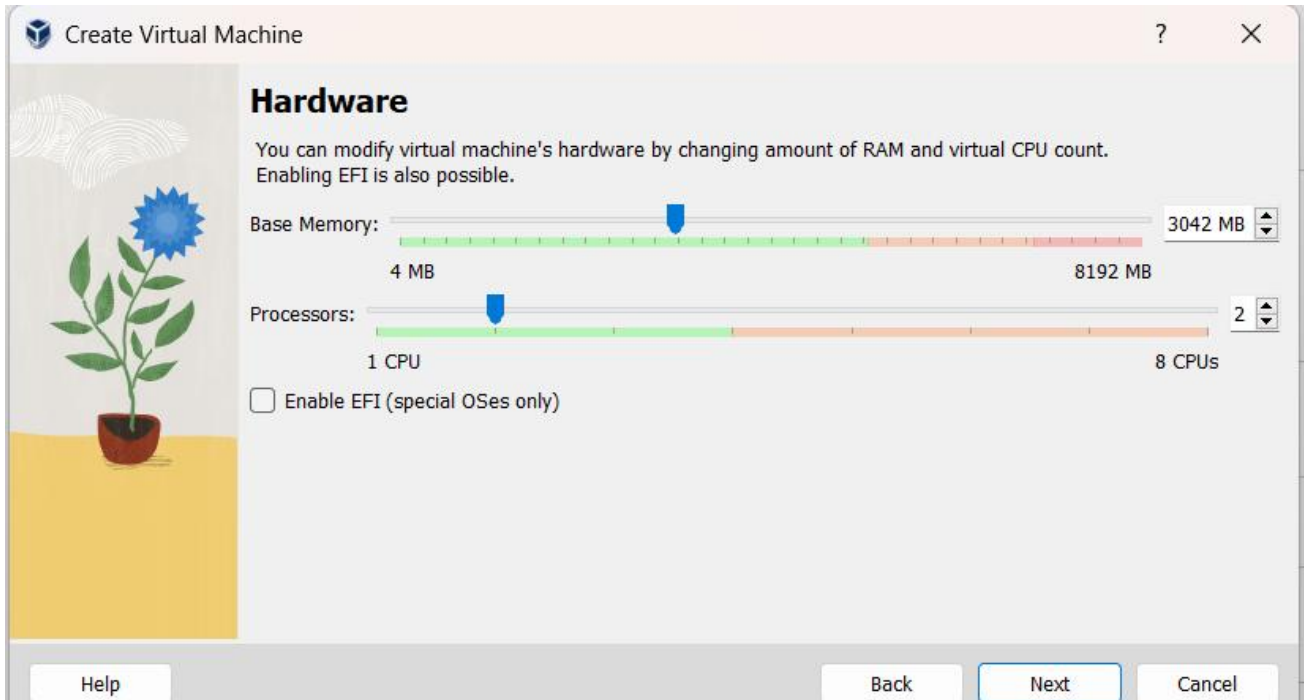
Hostname: ✓

Domain Name:

☐ Install in Background

Help Back Next Cancel

Step 4-Assign **RAM Size** to your Virtual Machine.



Step 5-Create a **Virtual Hard Disk** for the machine to store files.

Step 6-Select the type of Hard disk. Using **VDI** type is recommended.

Step 7-Either of the **Physical Storage** types can be selected. Using a **Dynamically Allocated Disk** is by default recommended.

Step 8-Select **Disk Size** and provide the **Destination Folder** to install.

Create Virtual Machine

Virtual Hard disk

If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select an existing one. Alternatively you can create a virtual machine without a virtual hard disk.

☒ Create a Virtual Hard Disk Now

Disk Size:

☐ Pre-allocate Full Size

☐ Use an Existing Virtual Hard Disk File

RHEL-9-MY-VM_1.vhd (Normal, 20.00 GB)

☐ Do Not Add a Virtual Hard Disk

Help Back Next Cancel

Create Virtual Machine

Summary

The following table summarizes the configuration you have chosen for the new virtual machine. When you are happy with the configuration press Finish to create the virtual machine. Alternatively you can go back and modify the configuration.

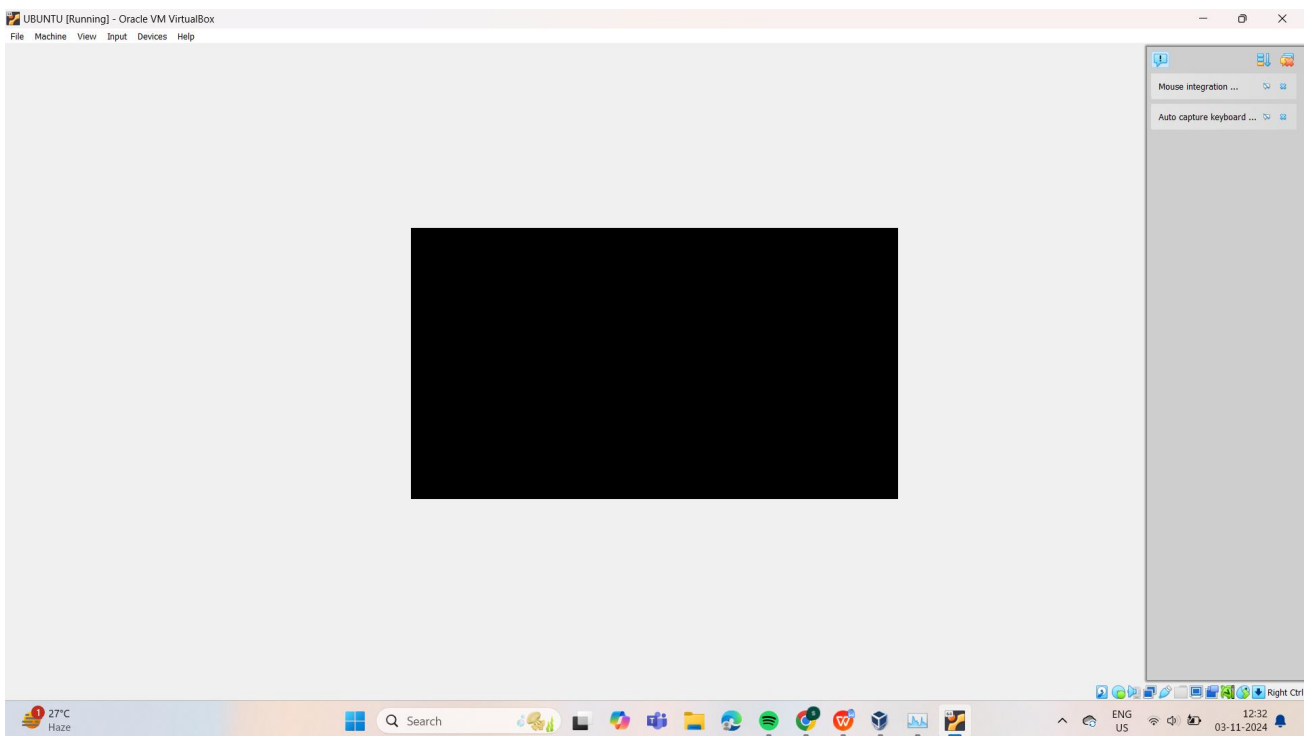
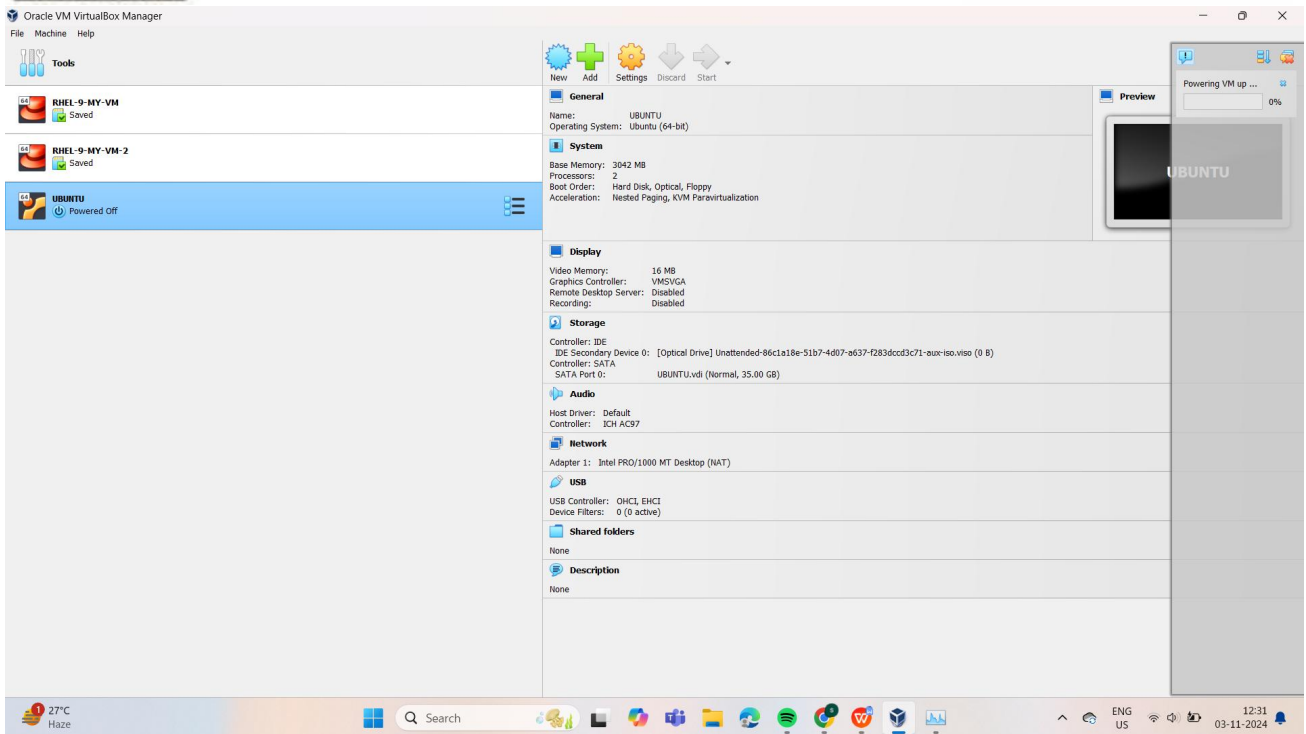
Machine Name and OS Type	
Machine Name	UBUNTU
Machine Folder	C:/Users/DELL/VirtualBox VMs/UBUNTU
ISO Image	C:/Users/DELL/Downloads/ubuntu-24.04.1-desktop-amd64.iso
Guest OS Type	Ubuntu (64-bit)
Skip Unattended Install	false

Unattended Install	
Username	vboxuser
Product Key	false
Hostname/Domain Name	UBUNTU.myquest.virtualbox.org
Install in Background	false
Install Guest Additions	false

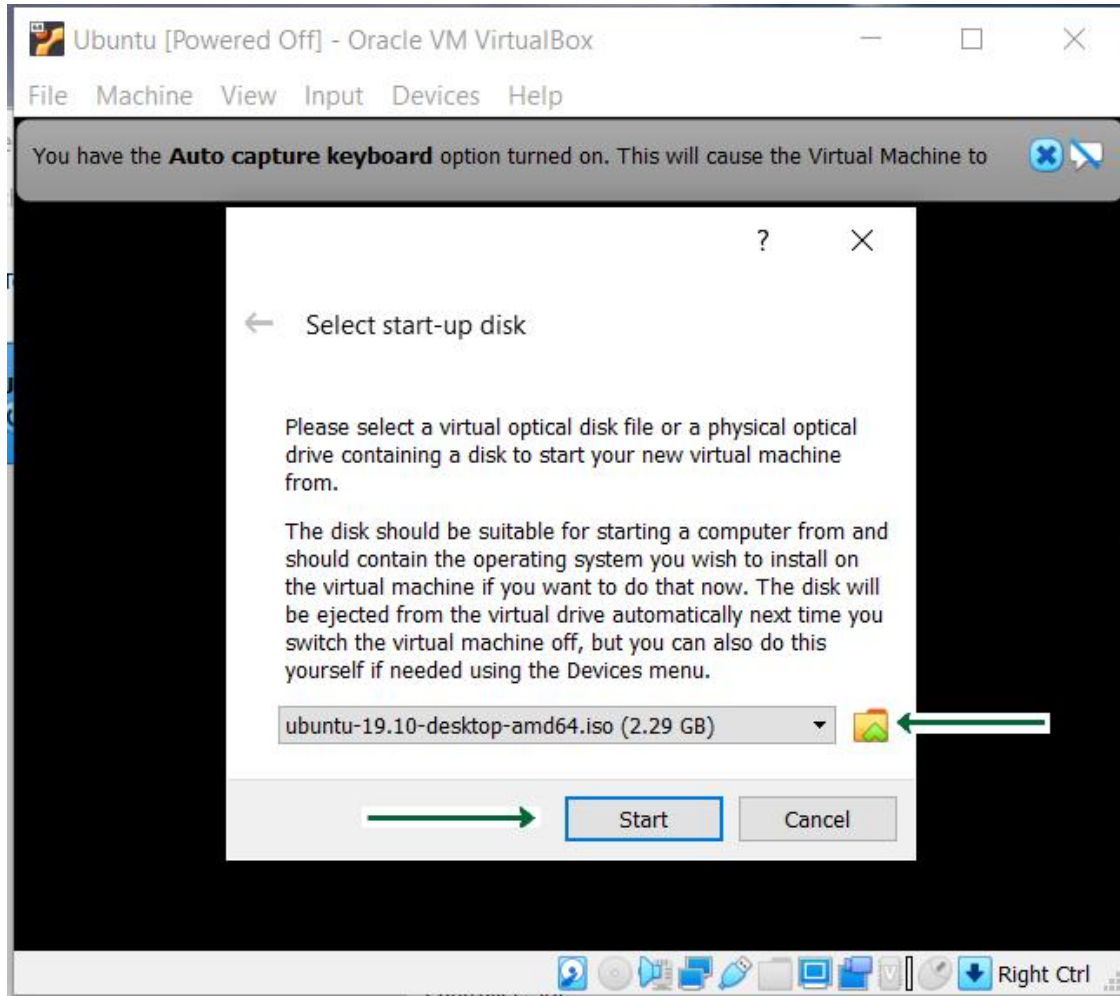
Hardware	
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Help Back Finish Cancel

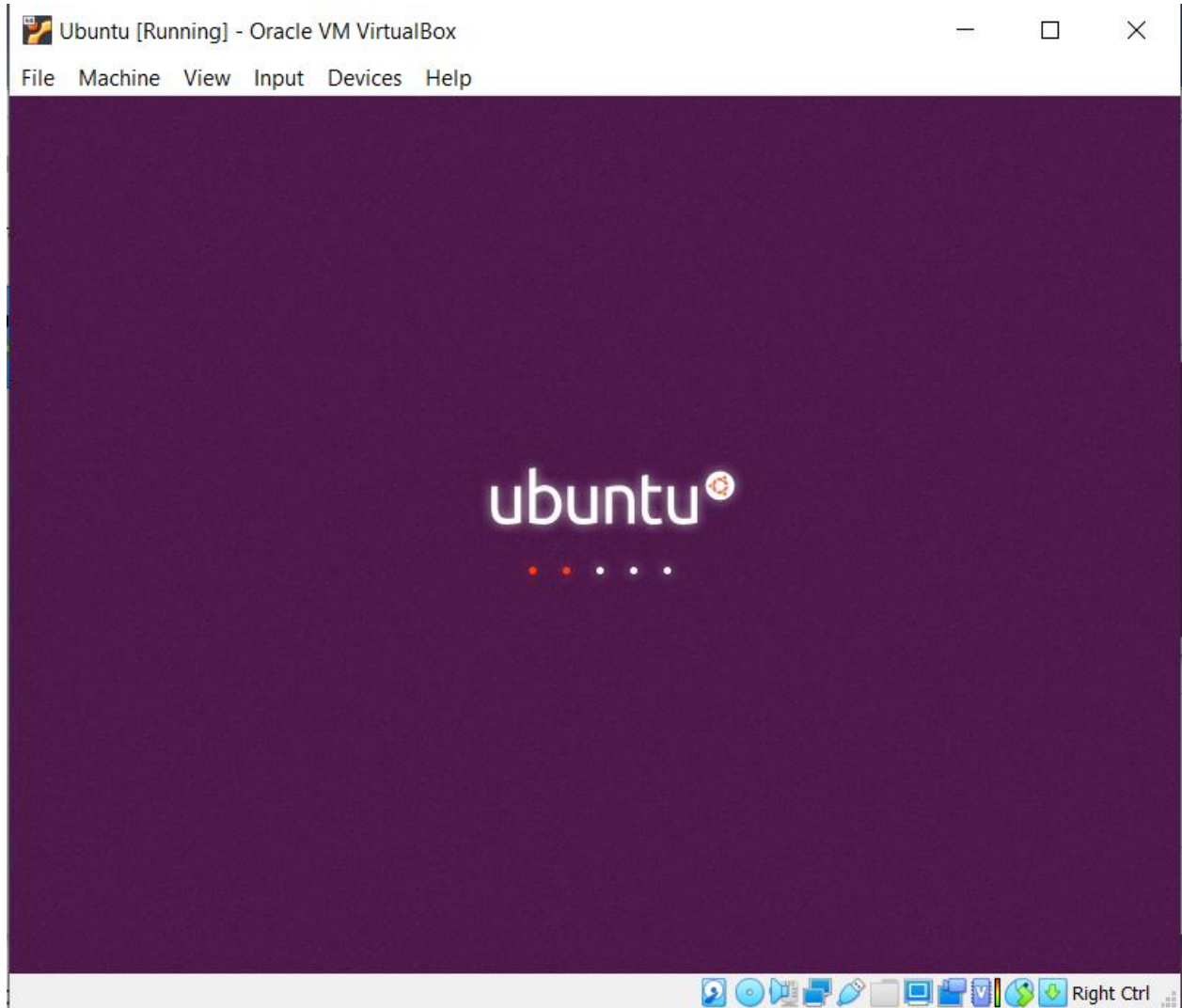
Step 9-After the Disk creation is done, boot the **Virtual Machine** and begin installing [Ubuntu](#).



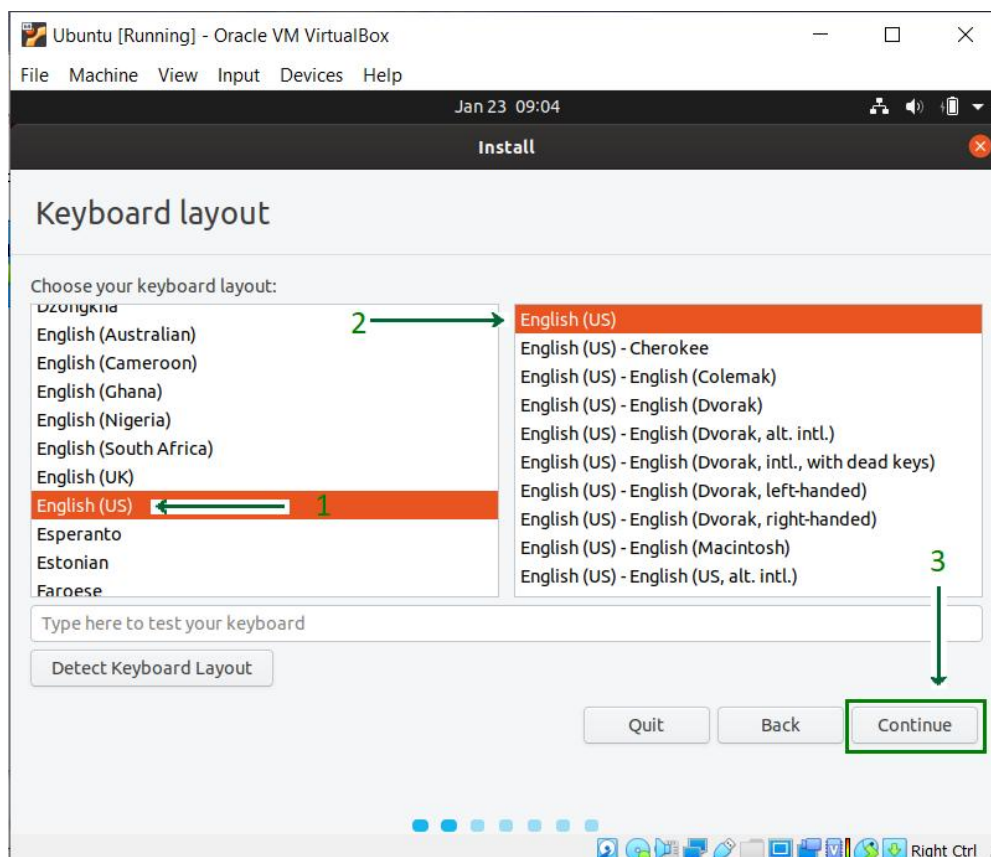
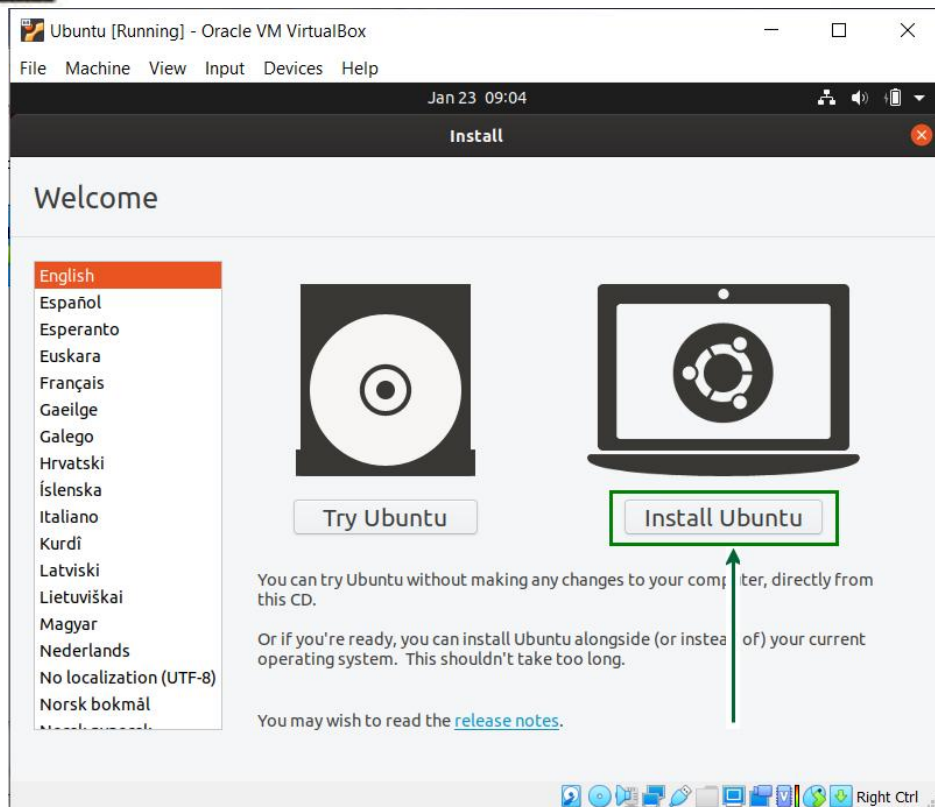
Step 10-If the installation disk is not automatically detected. Browse the file location and select the **ISO file for Ubuntu**.



Step 11: Proceed with the installation file and wait for further options.

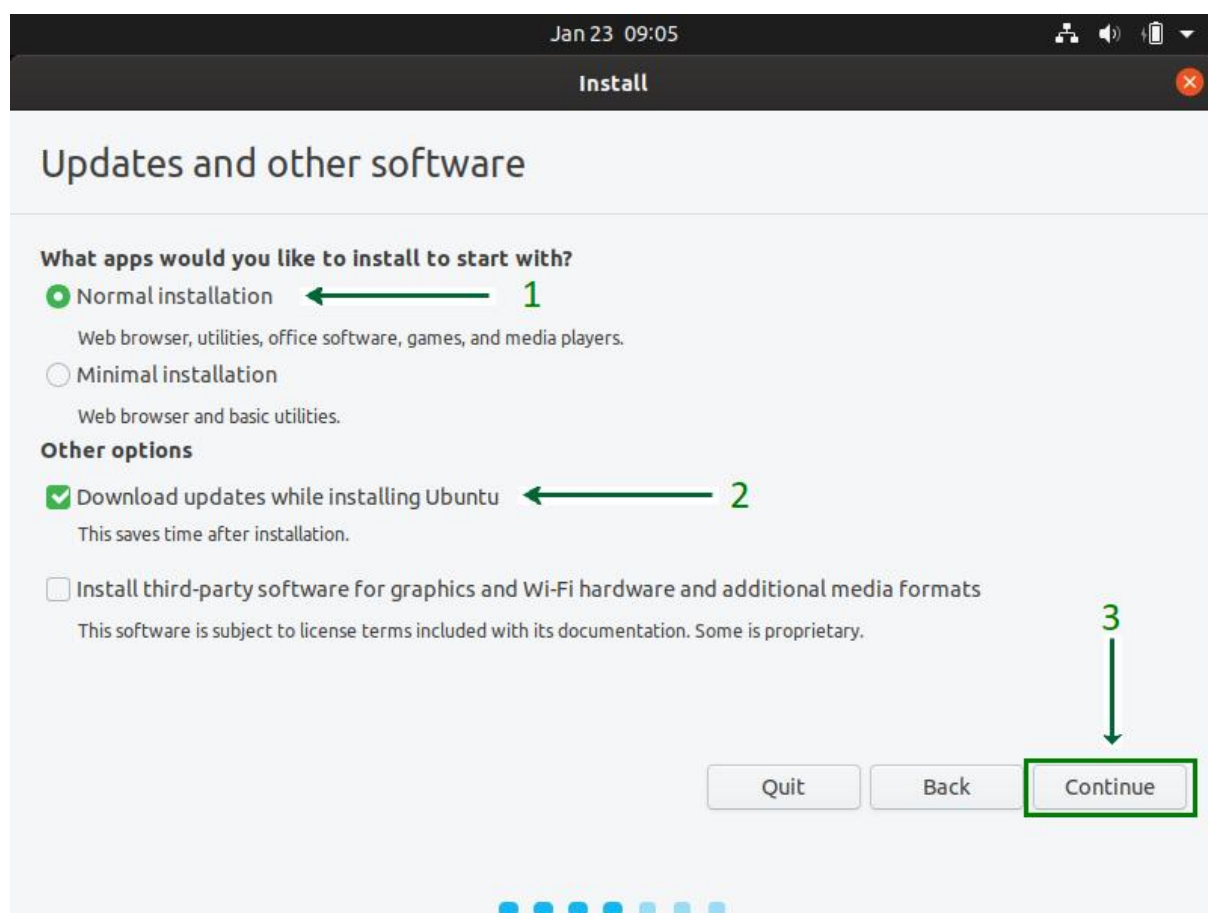


Step 12: Click on the **Install Ubuntu** option, this might look different for other Ubuntu versions.

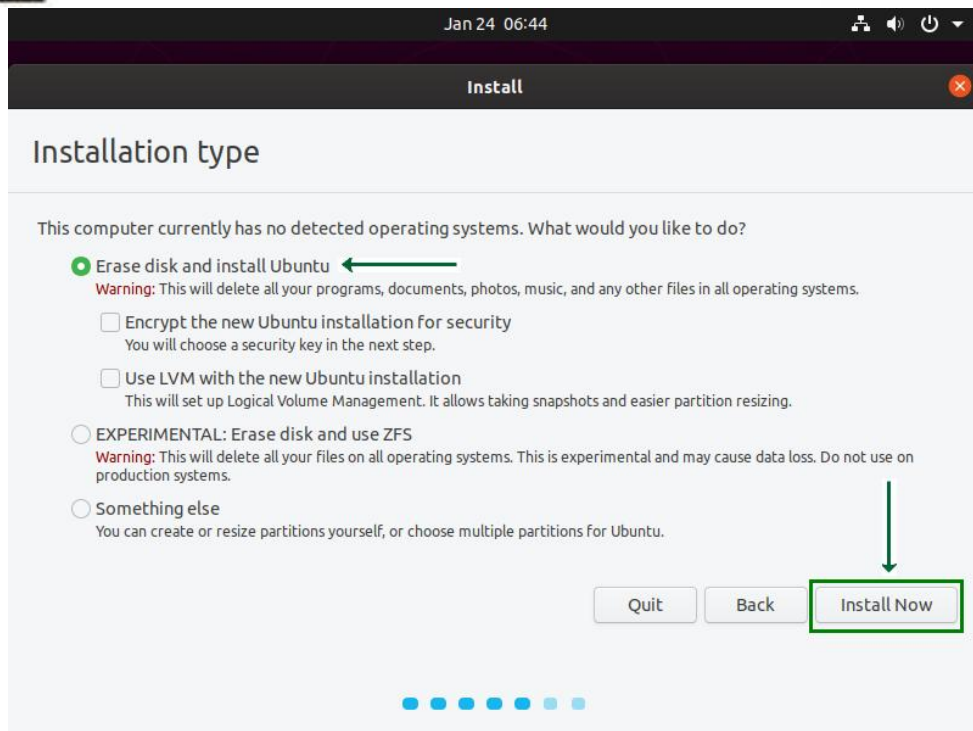


Step 13: Select **Keyboard Layout**, if the defaults are compatible, just click on the **Continue** button and proceed.

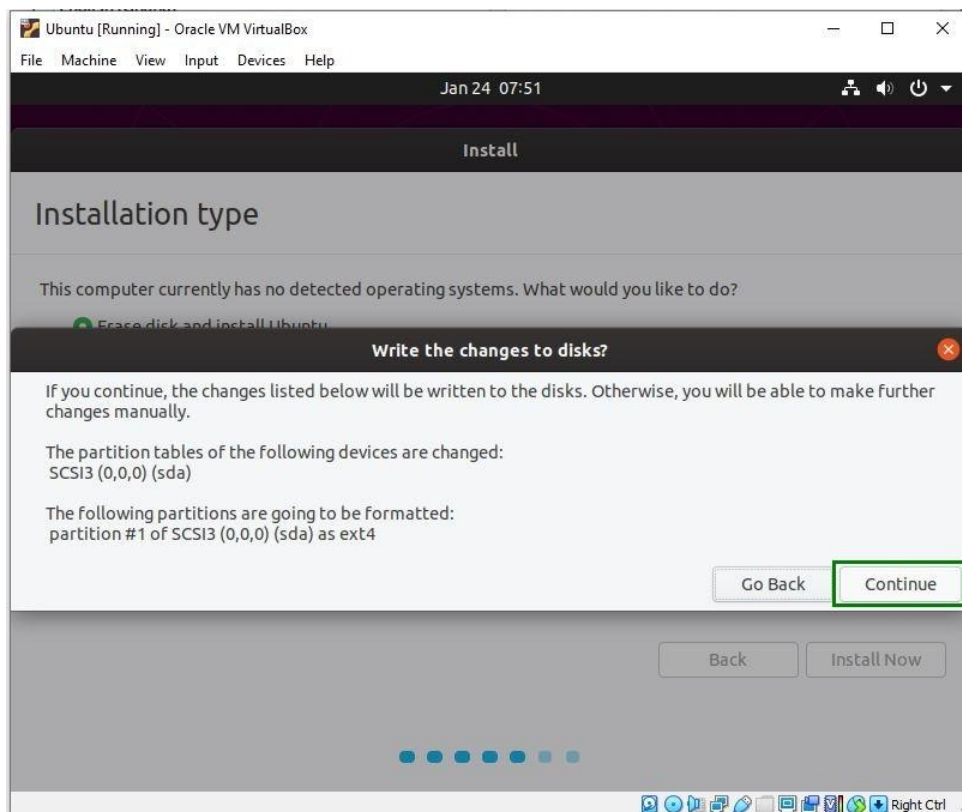
Step 14: Select **Installation Type**. By default, it is set to **Normal Installation**, which is recommended, but it can also be changed to **Minimal Installation** if there is no need for all Ubuntu features.



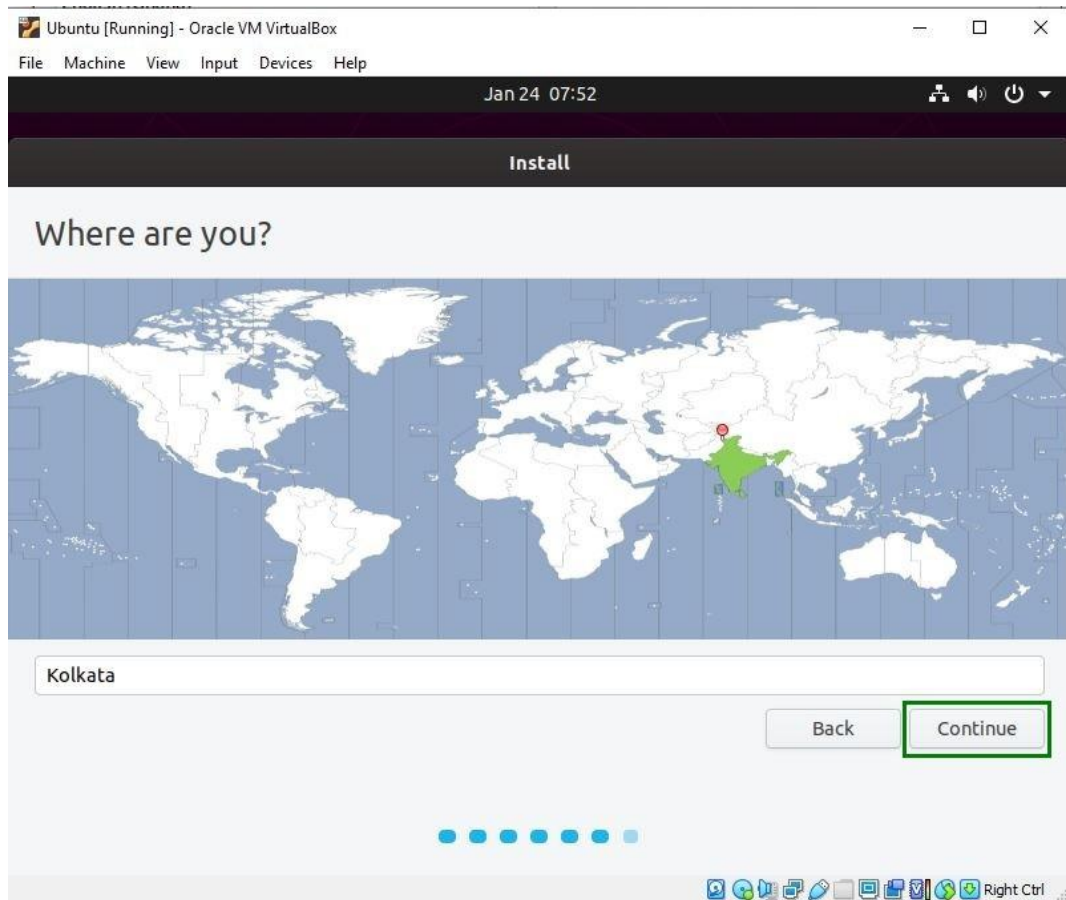
Step 15: Click on the **Install Now** button and carry on with the installation. Do not get worried about the **Erase disk** option, it will only be effective inside the virtual machine, and other system files outside the VirtualBox remain intact.



Step 16: Click on the **Continue** button, and proceed with writing changes on the disk.

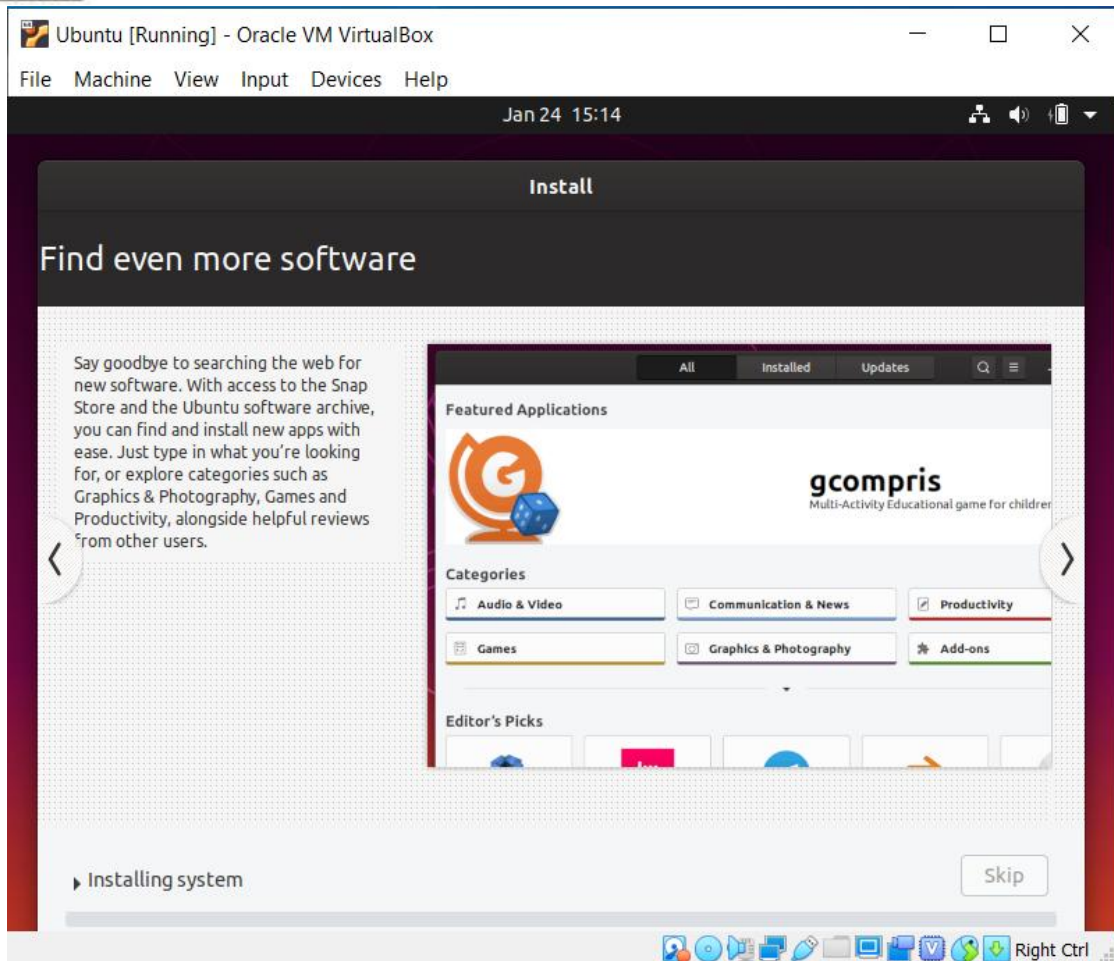


Step 17: Select your Location to set the **Time Zone**.

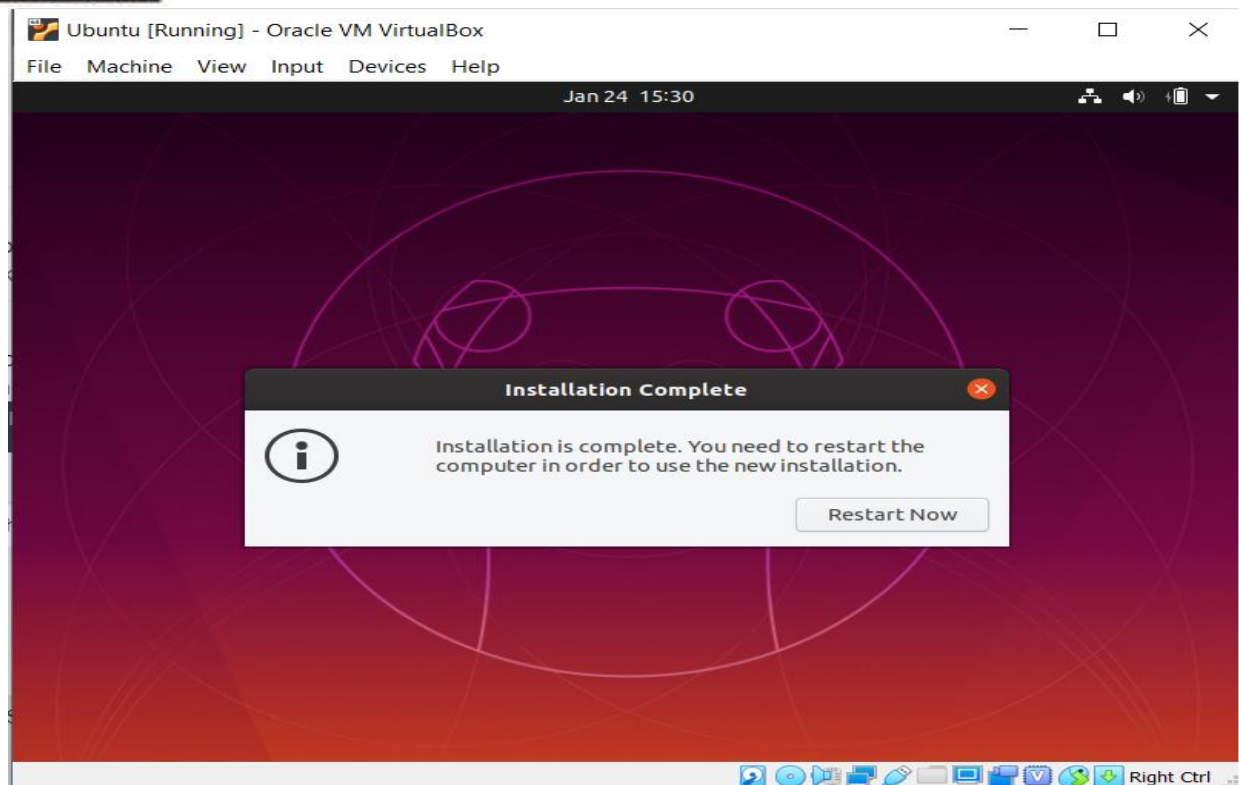


Step 18: Choose a **Name** for your computer and set a **Password** to secure login info.

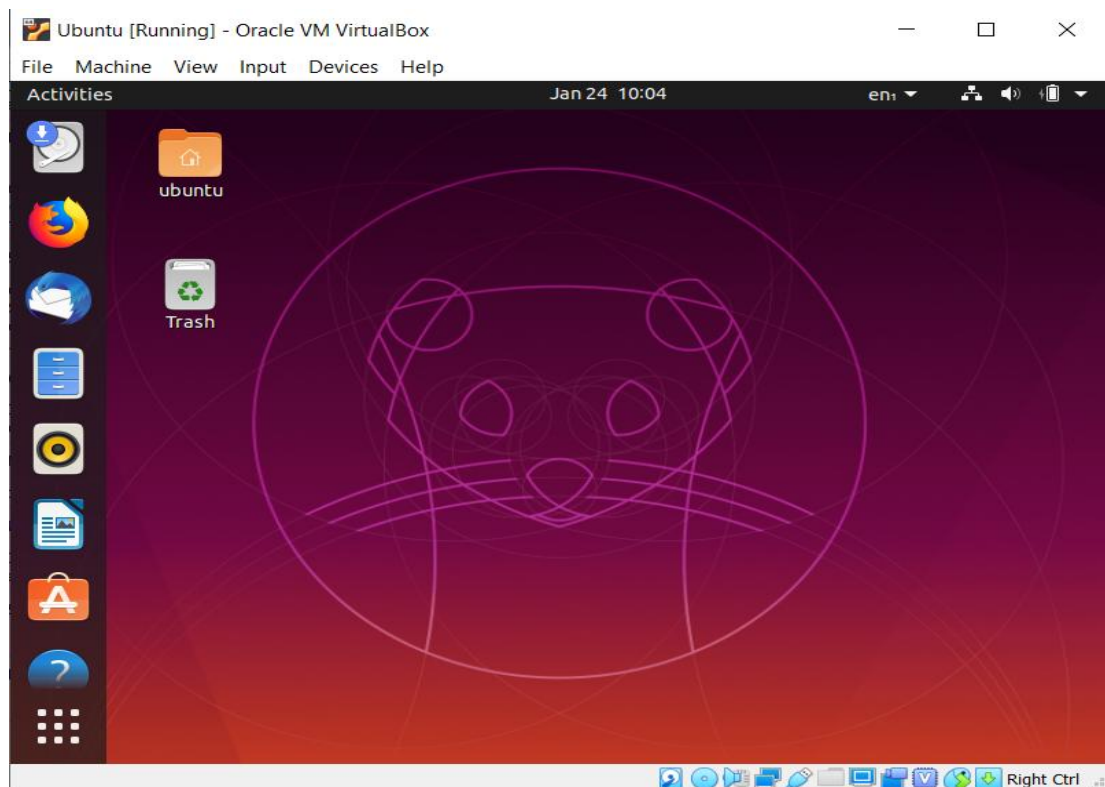
Step 19: Wait for the installation process to complete.



Step 20: Once the installation process is over, reboot your Virtual Machine.



Step 21: Finished with the installation process. Now you can use Ubuntu along with Windows, without creating a dual boot.





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VI. REFERENCES

Ubuntu Desktop Documentation - <https://help.ubuntu.com/>

Oracle VM VirtualBox User Manual - <https://www.virtualbox.org/manual/>

<https://ubuntu.com/download/desktop>

<https://www.virtualbox.org/>

<https://www.geeksforgeeks.org/>