DEPARTMENT OF
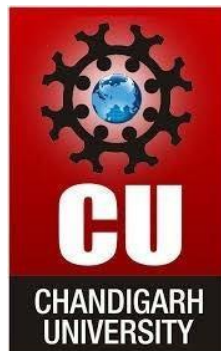
UNIVERSITY INSTITUTE OF COMPUTING

CHANDIGARH UNIVERSITY

PROJECT FILE On Installation Of Ubuntu Linux

Subject Name: LINUX LAB

Subject Code: 24CAP-607

Submitted by:
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Section : 24 MCD(2)-A

Submitted To :
Name : Mr. Rishabh Tomar
Designation: Ass. Professor

CERTIFICATE

Certified that the Ist Semester Minor Project in LINUX Entitled **"INSTALLATION OF UBUNTU"** carried out by **GAURAV KUMAR**, bearing **UID 24MCC20069** is submitted in partial fulfilment for the award of the **MASTERS IN CLOUD COMPUTING AND DEVOPS** from **Chandigarh University, Punjab** during the year 2024-2026. The LINUX Minor Project report has been approved as it satisfies the academic requirements in respect of the minor-project work prescribed for the said Degree.

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Acknowledgement

I would like to express my deep gratitude to Assistant Professor **Mr. Rishabh Tomar**, at Chandigarh University, for their invaluable guidance, encouragement, and support throughout the duration of this project. Their insightful feedback and expertise helped me to successfully complete this project on "Installation of Ubuntu Linux using VirtualBox".

I also extend my thanks to the **Department of MCA (Cloud Computing & Devops),UIC**, for providing the necessary resources and a conducive environment to carry out this project. Special thanks to who contributed their time and knowledge to assist me during the project work.

Name : Gaurav Kumar
UID   : 24MCC20069   **Date: 22-10-2024**

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1. Introduction

1.1 Overview of Ubuntu

Ubuntu is an ancient African word meaning 'humanity to others'. It is often described as reminding us that 'I am what I am because of who we all are'. We bring the spirit of Ubuntu to the world of computers and software. The Ubuntu distribution represents the best of what the world's software community has shared with the world. Linux was already established in 2004, but it was fragmented into proprietary and unsupported community editions, and free software was not a part of everyday life for most computer users. That's when Mark Shuttleworth gathered a small team of Debian developers who together founded Canonical and set out to create an easy-to-use Linux desktop called Ubuntu.

The mission for Ubuntu is both social and economic. First, we deliver the world's free software, freely, to everybody on the same terms. Whether you are a student in India or a global bank, you can download and use Ubuntu free of charge. Second, we aim to cut the cost of professional services - support, management, maintenance, operations - for people who use Ubuntu at scale, through a portfolio of services provided by Canonical which ultimately fund the improvement of the platform.

Ubuntu was the first operating system to commit to scheduled releases on a predictable cadence, every six months, starting in October 2004. In 2006 we decided that every fourth release, made every two years, would receive long-term support for large-scale deployments. This is the origin of the term LTS for stable, maintained releases. The commercial and community teams collaborate to produce a single, high-quality release, which receives ongoing maintenance for a defined period. Both the release and ongoing updates for core packages are freely available to all users. Commercial users engage with Canonical to gain access to support, consulting, management tools, managed services and expanded security maintenance.

Ubuntu today has many flavours and dozens of specialised derivatives. There are also special editions for servers, OpenStack clouds, and connected devices. All editions share common infrastructure and software, making Ubuntu a unique single platform that scales from consumer electronics to the desktop and up into the cloud for enterprise computing.

1.2 <u>Why Ubuntu</u>

There are several compelling reasons why Ubuntu is a popular choice for operating system installation, especially for developers, students, businesses, and general users. Here's a detailed explanation of **why to choose Ubuntu**:

i.   **Open-Source and Free**

- **No Cost**: Ubuntu is completely free to download, install, and use. There are no licensing fees or hidden costs associated with it, unlike proprietary operating systems like Windows or macOS.
- **Open Source**: Ubuntu is built on open-source software, which means its source code is publicly available for anyone to view, modify, and distribute. This openness encourages community-driven improvements and innovation.

ii. **User-Friendly**

- **Easy to Use**: Ubuntu is known for its simple and user-friendly interface. The GNOME desktop environment provides a clean, modern, and intuitive experience for beginners and experienced users alike.
- **Easy Installation**: Ubuntu's installation process is straightforward, making it ideal for first-time Linux users. It provides a graphical installer that guides users through each step of the installation.
- **Extensive Documentation**: Ubuntu's user base is vast, and there is a large amount of documentation available for all kinds of problems. Official Ubuntu documentation, community forums, and tutorials make it easy to find solutions.

iii. **Stable and Secure**

- **LTS Versions (Long-Term Support)**: Ubuntu offers Long-Term Support (LTS) releases, such as Ubuntu 22.04 LTS, which are supported with updates and security patches for up to 5 years. This ensures stability and reliability for long-term projects and enterprise environments.
- **Regular Security Updates**: Ubuntu is known for its regular security patches and updates, keeping systems secure against vulnerabilities.
- **Built-In Security Features**: Ubuntu includes built-in security features such as AppArmor and a robust permissions system. The software packages are also checked and verified before being added to the official repositories.

iv. **Large and Active Community**

- **Support Community**: Ubuntu has one of the largest and most active user communities in the Linux ecosystem. If users encounter issues, they can easily find help through forums, Reddit, Ask Ubuntu, Stack Overflow, and other online resources.
- **Development Support**: For developers, this means continuous updates, patches, and help from other developers globally. Ubuntu's forums and online communities are a great resource for troubleshooting and problem-solving.

v. Wide Range of Software

- **Pre-installed Software**: Ubuntu comes with a wide array of pre-installed software, such as Firefox (web browser), LibreOffice (office suite), and Thunderbird (email client). This makes it a ready-to-use operating system straight after installation.
- **Software Center**: Ubuntu has its own software store called the **Ubuntu Software Center** that allows users to easily search, install, and manage applications.
- **Package Managers**: Ubuntu uses **APT (Advanced Package Tool)**, which allows easy installation, updating, and removal of software from the command line. This is beneficial for both beginners and power users.

vi. Compatibility with Development Tools

- **Development Environment**: Ubuntu is widely recognized as a great platform for software development. It supports all the major programming languages and tools, including Python, Java, C++, Ruby, Node.js, and more.
- **Built-In Development Tools**: It comes pre-installed with common development tools like GCC, Git, and Make, allowing developers to quickly start working.
- **Cloud and Server-Friendly**: Ubuntu is widely used in server environments, particularly in cloud services and infrastructure. The compatibility with popular cloud providers (e.g., AWS, Azure, Google Cloud) and the easy availability of server images make it ideal for cloud development and deployment.

vii. Customizability and Flexibility

- **Highly Customizable**: Ubuntu allows users to customize nearly every aspect of their desktop experience, from the layout to the themes. This flexibility appeals to advanced users who want to personalize their environment to meet their needs.

- **Choice of Desktop Environments**: Apart from the default GNOME desktop, Ubuntu variants (called "flavors") offer other desktop environments, such as KDE (Kubuntu), Xfce (Xubuntu), and LXQt (Lubuntu), providing users with different user interface experiences.
- **Lightweight Option**: For users with older hardware, Ubuntu offers lightweight versions (e.g., Lubuntu or Xubuntu) that consume fewer system resources, making it suitable for running on machines with lower specifications.

viii. Performance

- **Efficient Resource Management**: Ubuntu is optimized to run efficiently even on low-end hardware. It consumes fewer system resources compared to other operating systems, making it a great choice for both old and new computers.
- **Faster Boot and Shutdown Times**: Ubuntu's boot and shutdown processes are often faster than those of Windows or macOS, contributing to an overall smoother user experience.
- **Less System Overhead**: With fewer background services and applications running by default, Ubuntu can allocate more resources to the tasks users care about, which makes it more responsive.

ix. Compatibility with Older Hardware

- **Lightweight Distributions**: For users with older or less powerful hardware, Ubuntu provides lightweight versions (such as Xubuntu and Lubuntu), ensuring the system runs smoothly on machines that might struggle with newer versions of Windows or macOS.
- **Long Hardware Support**: Ubuntu's kernel supports a wide range of hardware, and the system can run efficiently even on dated PCs.

x. Privacy and No Data Tracking

- **Focus on Privacy**: Unlike some proprietary operating systems, Ubuntu does not include intrusive data collection features. It respects user privacy and doesn't track personal data or user activities.
- **No Ads**: Ubuntu does not bombard users with advertisements, unlike some versions of Windows. The focus is on the user's experience and productivity.

xi. Versatility Across Devices

Desktop, Server, and IoT: Ubuntu is a versatile OS, with versions available for desktop PCs, servers, and IoT (Internet of Things) devices.

Cross-Platform Development: Developers can build applications on Ubuntu that can run on multiple platforms (desktop, cloud, server, IoT). This makes Ubuntu a universal choice for cross-platform development.

xii. Great for Learning Linux

- **Beginner-Friendly**: Ubuntu provides a smooth transition for people new to Linux, thanks to its intuitive interface, extensive community support, and documentaton.
- **Educational Resource**: For students, Ubuntu provides a free platform to explore Linux, learn programming, and work with development tools. Its open-source nature allows students to dig deeper into system processes and functionality.

xiii. Enterprise and Cloud Use

- **Cloud Compatibility**: Ubuntu is the leading operating system for cloud services, including platforms like AWS, Microsoft Azure, and Google Cloud. Ubuntu Server is optimized for cloud environments and supports scalable workloads.
- **Enterprise Support**: While Ubuntu is free, Canonical (the company behind Ubuntu) offers professional support for enterprises. This makes it an appealing choice for businesses seeking cost-effective but robust solutions for their infrastructure.

Ubuntu is a powerful, versatile, and user-friendly operating system with widespread use in development, education, enterprise, and personal computing. Its combination of being free, open-source, secure, customizable, and lightweight makes it an ideal choice for a broad range of users. Whether you're a student, developer, or enterprise user, Ubuntu offers a solid and reliable platform with great community support.

1.3 <u>Scope Of Ubuntu</u>

The scope of Ubuntu Linux in the future looks very promising due to its widespread adoption across various industries and its continuous development. Here are some key areas where Ubuntu's influence is expected to grow:

I. Cloud Computing and DevOps

- **Dominance in Cloud Environments**: Ubuntu is one of the most popular operating systems for cloud infrastructure, especially with major cloud service providers like **Amazon Web Services (AWS)**, **Microsoft Azure**, and **Google Cloud Platform (GCP)**. Its scalability, performance, and security make it ideal for cloud computing.
- **Containers and Kubernetes**: With the rise of containerized applications and orchestration platforms like **Docker** and **Kubernetes**, Ubuntu remains a key player in deploying, managing, and scaling applications. Ubuntu's support for Kubernetes (through **MicroK8s**) and Docker is expected to drive its growth in the DevOps space.
- **Multi-Cloud and Hybrid Cloud**: As companies move toward multi-cloud and hybrid cloud strategies, Ubuntu's flexibility and compatibility with various cloud environments will be crucial. Tools like Canonical's Juju and MAAS (Metal-as-a-Service) support these strategies, making Ubuntu a preferred OS for cloud environments.

II. Internet of Things (IoT)

- **Ubuntu Core**: Canonical, the company behind Ubuntu, has been focusing heavily on **Ubuntu Core**, a lightweight version of Ubuntu designed specifically for **IoT** devices. The demand for secure, scalable, and updatable IoT systems is growing, and Ubuntu Core provides a robust platform for building these systems.
- **IoT Security**: Ubuntu Core's focus on security through snaps (containerized applications) is becoming a key selling point, as security is critical in IoT devices. This could make Ubuntu a dominant player in IoT in the coming years.
- **Edge Computing**: Ubuntu is increasingly used in edge computing environments, where data processing is done closer to the data source (e.g., IoT devices). As edge computing grows, so will the role of Ubuntu in managing these decentralized systems.

III. Artificial Intelligence (AI) and Machine Learning (ML)

- **AI Development Environment**: Ubuntu is widely used as a platform for AI and ML development due to its compatibility with popular frameworks like TensorFlow, PyTorch, Keras, and others. Ubuntu's lightweight, customizable nature allows developers to set up environments that suit their needs for AI research and development.
- **AI in the Cloud**: Many cloud-based AI services, like those provided by AWS, Google, and Microsoft, run on Ubuntu-based servers. The continued expansion

of AI technologies in the cloud will likely increase Ubuntu's adoption as a preferred AI development and deployment platform.

IV. Enterprise Adoption and IT Infrastructure

- **Server Infrastructure**: Ubuntu has established itself as one of the leading server operating systems. As businesses move towards Linux-based server infrastructure for better security, stability, and cost-effectiveness, Ubuntu is expected to continue growing in the enterprise sector.
- **Professional Support**: Canonical offers paid support for enterprises through Ubuntu Advantage, which makes it appealing to companies seeking professional assistance while maintaining a cost-effective and scalable infrastructure.
- **Enterprise Solutions**: Ubuntu is already popular in large-scale enterprise environments, and with the growing reliance on automation, cloud-native technologies, and containerization, its usage will expand.

V. Desktop Use and Personal Computing

- **Linux Adoption**: While Linux has traditionally struggled to gain mass adoption on desktops compared to Windows and macOS, Ubuntu is the most popular Linux desktop distribution. As users become more privacy-conscious and look for
- alternatives to proprietary systems, Ubuntu's ease of use and growing application ecosystem may help it attract more desktop users.
- **Gaming on Linux**: With technologies like Proton from Valve's Steam, more games are becoming compatible with Linux-based systems, including Ubuntu. Gaming performance on Linux is improving, which could lead to more gamers switching to Ubuntu over the next few years.
- **Customizability**: Ubuntu's flexibility and open-source nature allow users to tailor their desktop environment to their needs, which could appeal to tech-savvy users looking for a highly customizable, secure, and lightweight alternative to other operating systems.

VI. Education and Research

- **Learning Linux**: Ubuntu's simplicity and accessibility make it a great platform for students and educators to learn about Linux, programming, system administration, and open-source software development.
- **Academic Research**: Universities and research institutions often rely on Ubuntu due to its strong support for scientific computing, especially in fields like physics, biology, and engineering, where open-source tools are essential.

- **Low-Cost Computing**: With many educational institutions and students seeking affordable computing solutions, Ubuntu provides a cost-effective platform for learning, coding, and research, especially in developing countries.

VII. Government and Public Sector Use

- **Government Adoption**: Ubuntu is increasingly being used by governments around the world due to its security, cost-effectiveness, and open-source nature. Countries looking to reduce their reliance on foreign, proprietary software may adopt Ubuntu as part of their digital infrastructure.
- **Digital Transformation**: As governments push for digital transformation, Ubuntu's low cost and flexibility make it an appealing option for large-scale IT projects, including public service platforms and infrastructure.

2. Requirments Analysis

2.1 Minimum Hardware Requirements:

These are the basic requirements to run Ubuntu in VirtualBox:

i. **Processor (CPU)**:
   - 2 GHz dual-core processor or better (64-bit required).
ii. **Memory (RAM)**:
   - Minimum: 2 GB (2048 MB).
   - Recommended: 4 GB (4096 MB) for smoother performance.
iii. **Storage (Hard Disk Space)**:
   - Minimum: 25 GB of free storage for Ubuntu installation.
   - Recommended: 30 GB or more for installing additional software and updates.
iv. **Graphics Card**:
   - VirtualBox provides a virtual GPU, but a graphics card that supports at least 1024x768 screen resolution is recommended.
   - Optional: Install VirtualBox Guest Additions for better display and graphics performance.
v. **Host System Requirements**:
   - Your host machine (the computer running VirtualBox) should have enough free resources to run both the host OS and the Ubuntu VM smoothly.
     - Recommended: At least 8 GB of total RAM (to allocate 4 GB to the VM and leave enough for the host OS).
     - Recommended: 40-50 GB free storage space on the host system.

2.2 Software Requirements

- **Windows**: Windows 8, 8.1, 10, or 11 (64-bit recommended).
- **macOS**: macOS 10.13 (High Sierra) or newer.
- **VirtualBox Software**: Latest version of Oracle VirtualBox. You can download it from the official website: https://www.virtualbox.org.

Ubuntu ISO

- **Ubuntu Version**: Latest 64-bit version of Ubuntu, such as Ubuntu 22.04 LTS (Long-Term Support) or Ubuntu 20.04 LTS.
  - Download the ISO image from the official Ubuntu website

3. **Installation Process of Ubuntu**

3.1 About VirtualBox

VirtualBox is a powerful open-source virtualization software developed by **Oracle Corporation** that allows users to run multiple operating systems (OS) simultaneously on a single physical machine. It is a popular tool for developers, IT professionals, testers, and learners to create and manage virtual machines (VMs). VirtualBox works by abstracting the hardware of the host system and creating a virtual environment for the guest OS. This virtual environment includes virtual CPUs, memory, hard disks, network interfaces, and more.

Key Components:

- **Virtual Machine Manager (VMM)**: This is the core component of VirtualBox that controls the creation and execution of virtual machines.
- **Virtual BIOS/UEFI**: VirtualBox provides a virtual BIOS or UEFI that acts like the real BIOS found on a physical computer. The guest OS uses this to interface with the virtual hardware.
- **Virtual Hard Disk (VDI, VHD, VMDK)**: VirtualBox uses virtual disk images (VDI) to emulate a hard drive. It also supports other formats like VHD (used by Microsoft Hyper-V) and VMDK (used by VMware).
- **Virtual CPUs**: VirtualBox uses the host machine's CPU to emulate a certain number of virtual CPUs, which the guest OS perceives as real hardware.
- **Virtual Memory**: Memory is allocated from the host system's RAM, and the guest OS believes it has its own dedicated memory.
- **Virtual Devices**: VirtualBox emulates hardware like network adapters, USB devices, graphics adapters, and storage controllers.

3.2 Steps of Installing VirtualBox

Step 1: Download VirtualBox

1. **Go to the Official Website**:
   - Open your web browser and go to the official VirtualBox download page: https://www.virtualbox.org.
2. **Select the Windows Version**:
   - On the downloads page, click on the **"Windows hosts"** link under the "VirtualBox platform packages" section. This will download the installer for Windows.
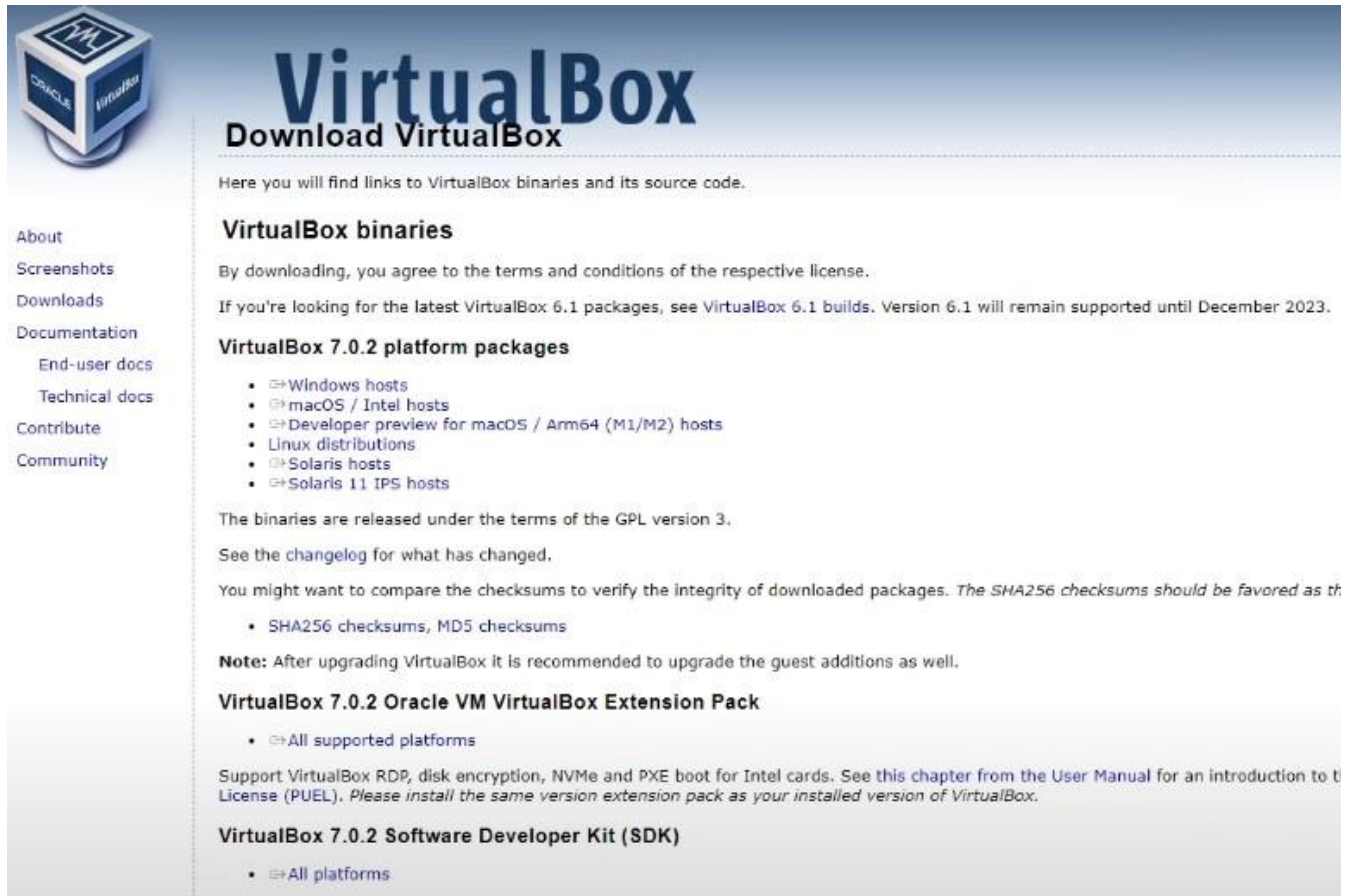
Step 2: Run the Installer

1. **Locate the Installer**:
   o After the download completes, go to your **Downloads** folder (or the location where the installer was saved).
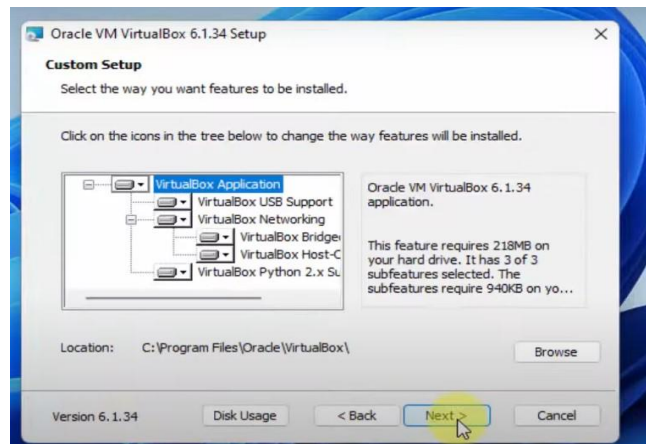2. **Run the Installer**:
   o Double-click the downloaded installer file to start the installation process.

Step 3: Start the Installation

1. **Welcome Screen**:
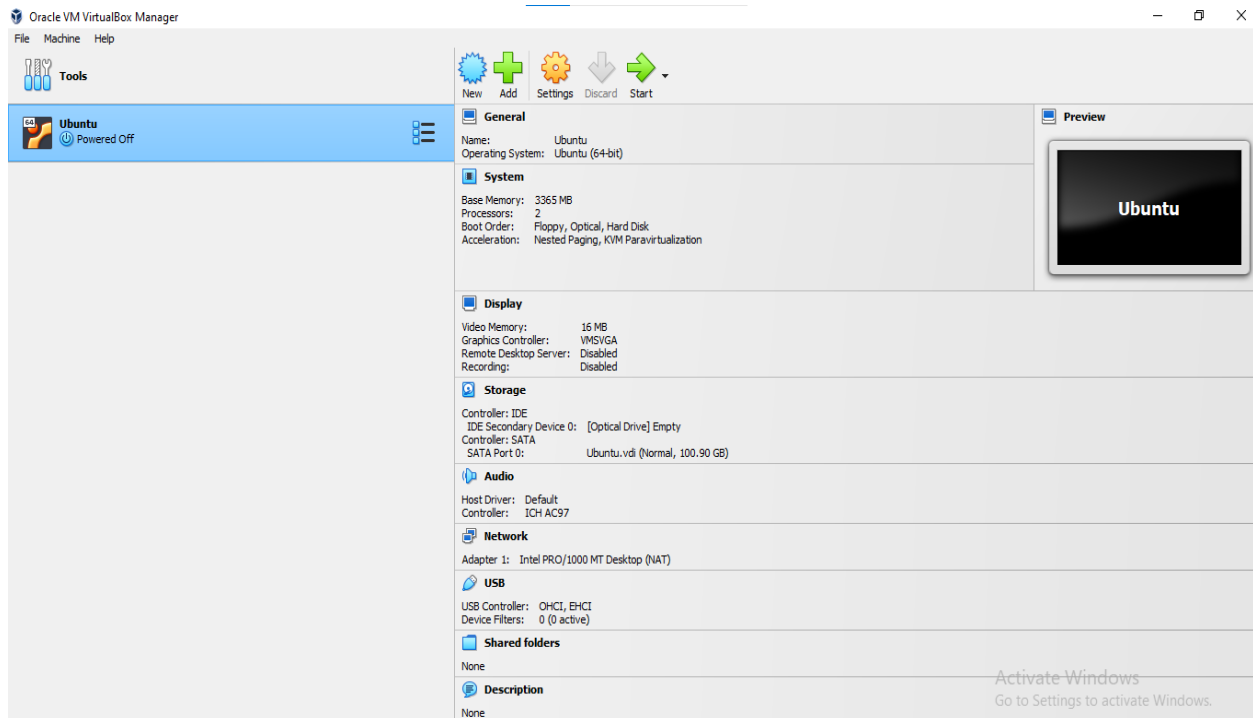   o You will see the **Welcome to the Oracle VM VirtualBox Setup Wizard**. Click **Next** to proceed.
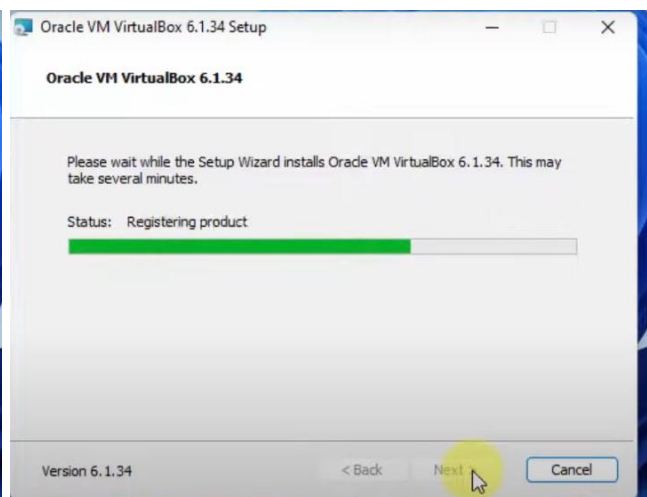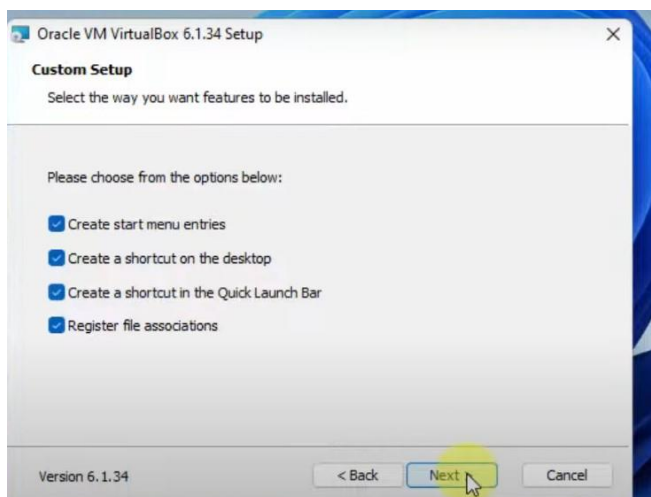
Step 7: Launch VirtualBox

1. **Start VirtualBox**:
   o If you left the "Start VirtualBox" option checked in the previous step, VirtualBox will launch automatically. If not, you can open it from the **Start Menu** or **Desktop shortcut**.

3.3 Step by Step guide for Installing Ubuntu

Step 1: Create a New Virtual Machine

i. **Open VirtualBox**: Launch the VirtualBox application on your computer.
ii. **Create a New VM**:
   • Click the **"New"** button in the toolbar.
   • A wizard will open.
iii. **Name and Operating System**:
   • **Name**: Enter a name for your VM (e.g., "Ubuntu 22.04").
   • **Type**: Select **Linux**.
   • **Version**: Select **Ubuntu (64-bit)** (or the appropriate version if you are using a different flavor).
   • Click **Next**.
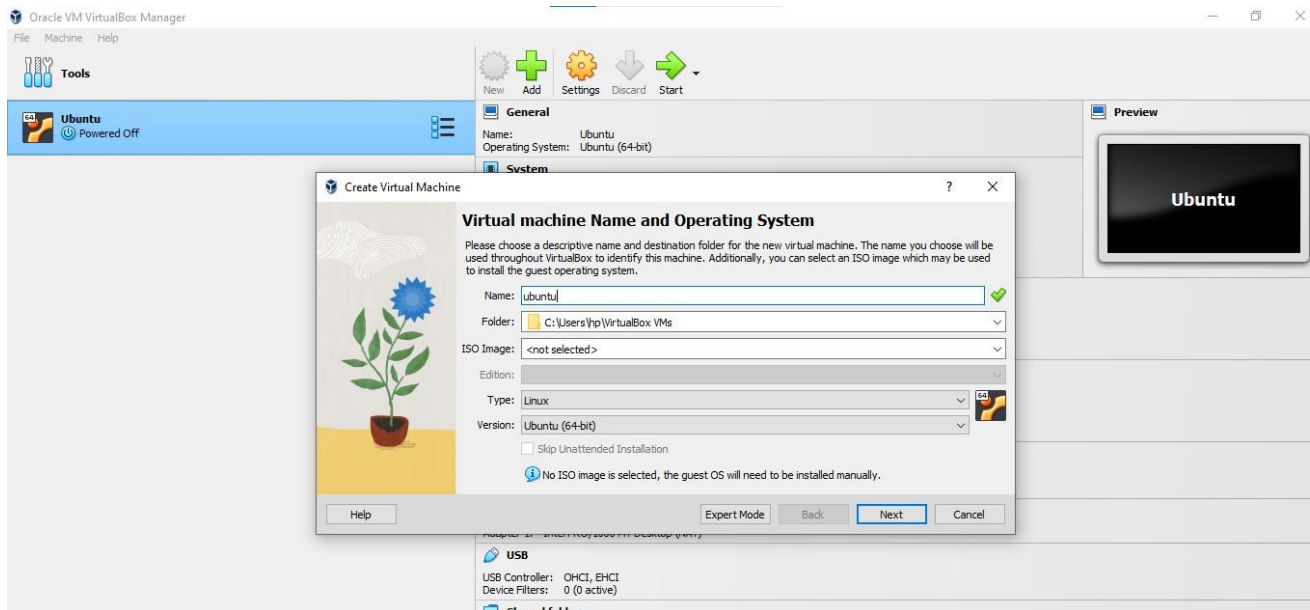
Step 2: Allocate Memory

1. **Memory Size**:
   o Choose the amount of RAM to allocate to the VM. A minimum of **2048 MB (2 GB)** is recommended for Ubuntu, but more is better if your host system allows it.
   o Click **Next**.
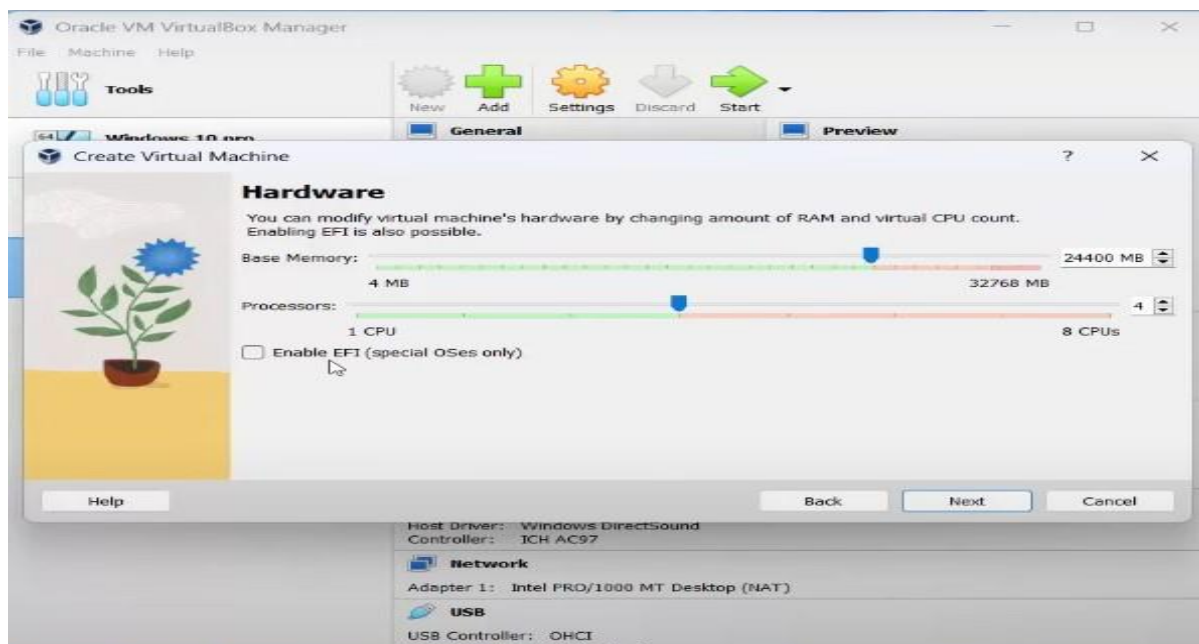
Step 3: Create a Virtual Hard Disk

i.   **Hard Disk**:   Choose "Create a virtual hard disk now" and click Create.
ii. **File Location and Size**:
- Specify the size of the virtual hard disk. A minimum of **20 GB** is recommended for Ubuntu.
- Click **Create** to finish creating the virtual machine.
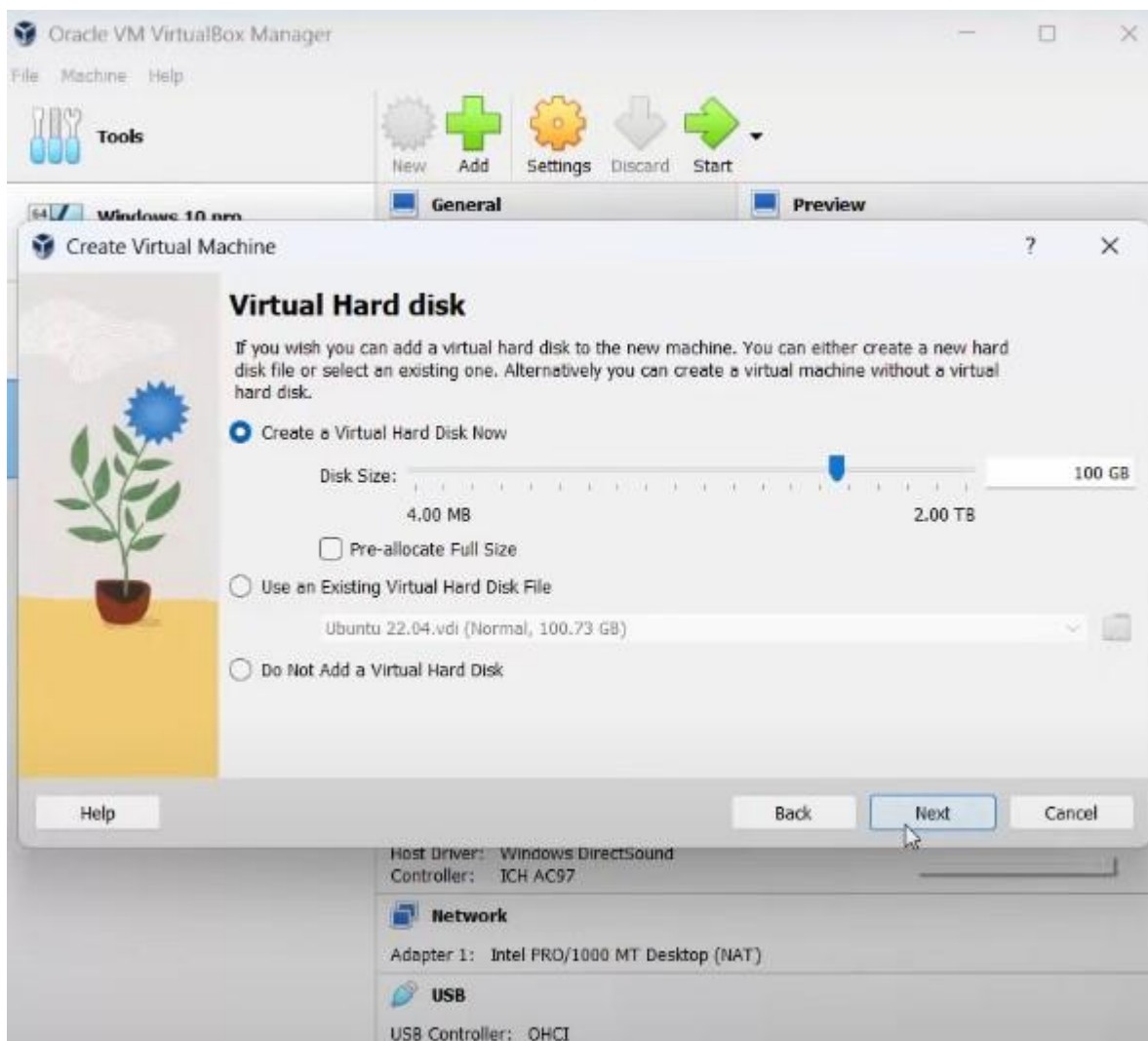
Step 4: Configure the Virtual Machine

i.   **Select the VM**: In the main VirtualBox interface, select the VM you just created.
ii. **Open Settings**: Click on the **"Settings"** button in the toolbar.

iii. **System Configuration**:
  - Go to the **System** tab.
  - Under the **Motherboard** tab, make sure the **"Enable EFI"** option is unchecked (unless you specifically want to use EFI).
  - Under the **Processor** tab, allocate at least **1 CPU** (more is better if your host supports it) and check the box for **"Enable PAE/NX"**.

iv. **Storage Configuration**:
  - Go to the **Storage** tab.
  - Under **Controller: IDE**, click on the empty disk icon (Empty).
  - Click on the disk icon on the right side and select **"Choose a disk file..."**.
  - Navigate to and select the downloaded **Ubuntu ISO** file.
  - Click **OK** to save the settings.
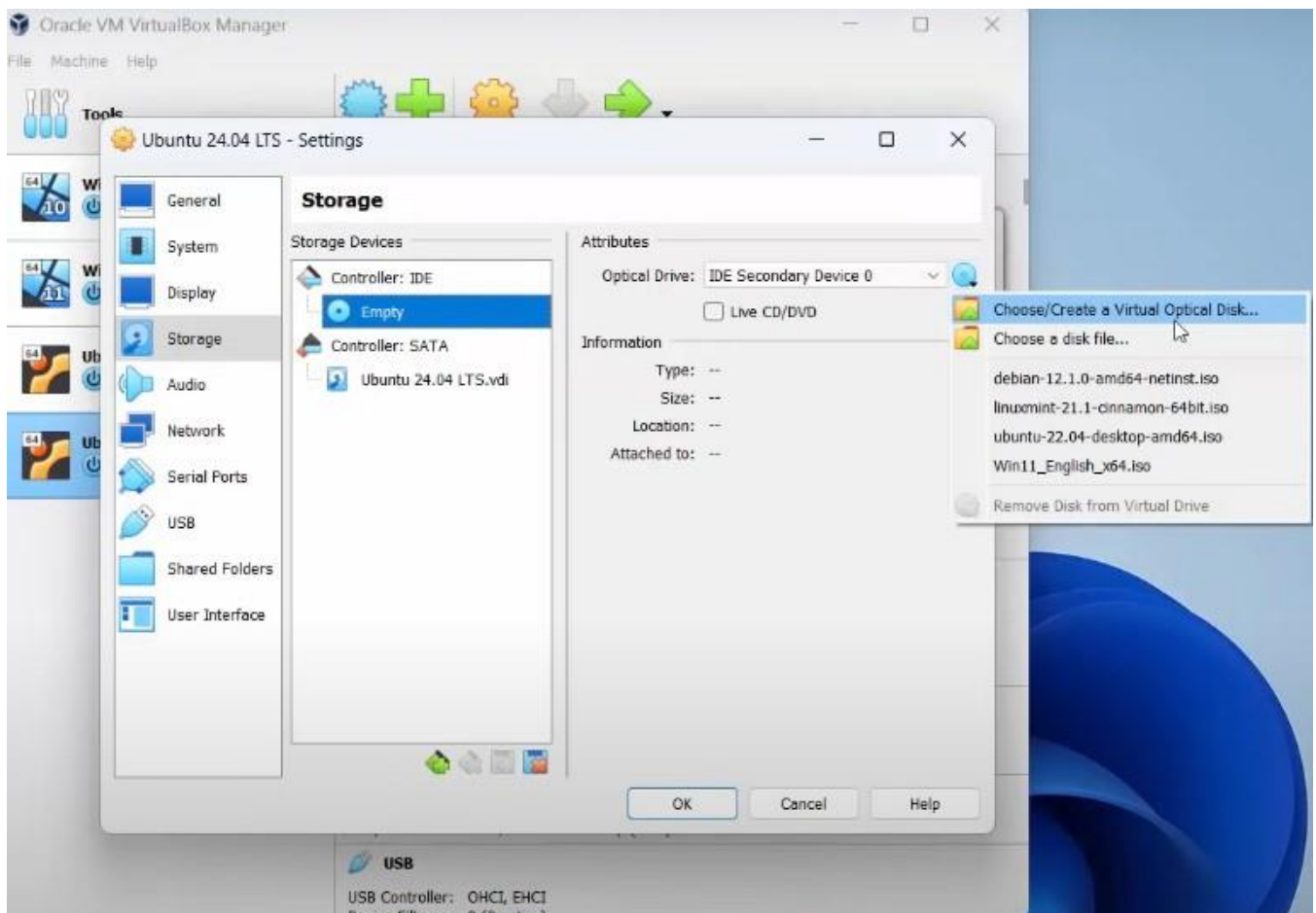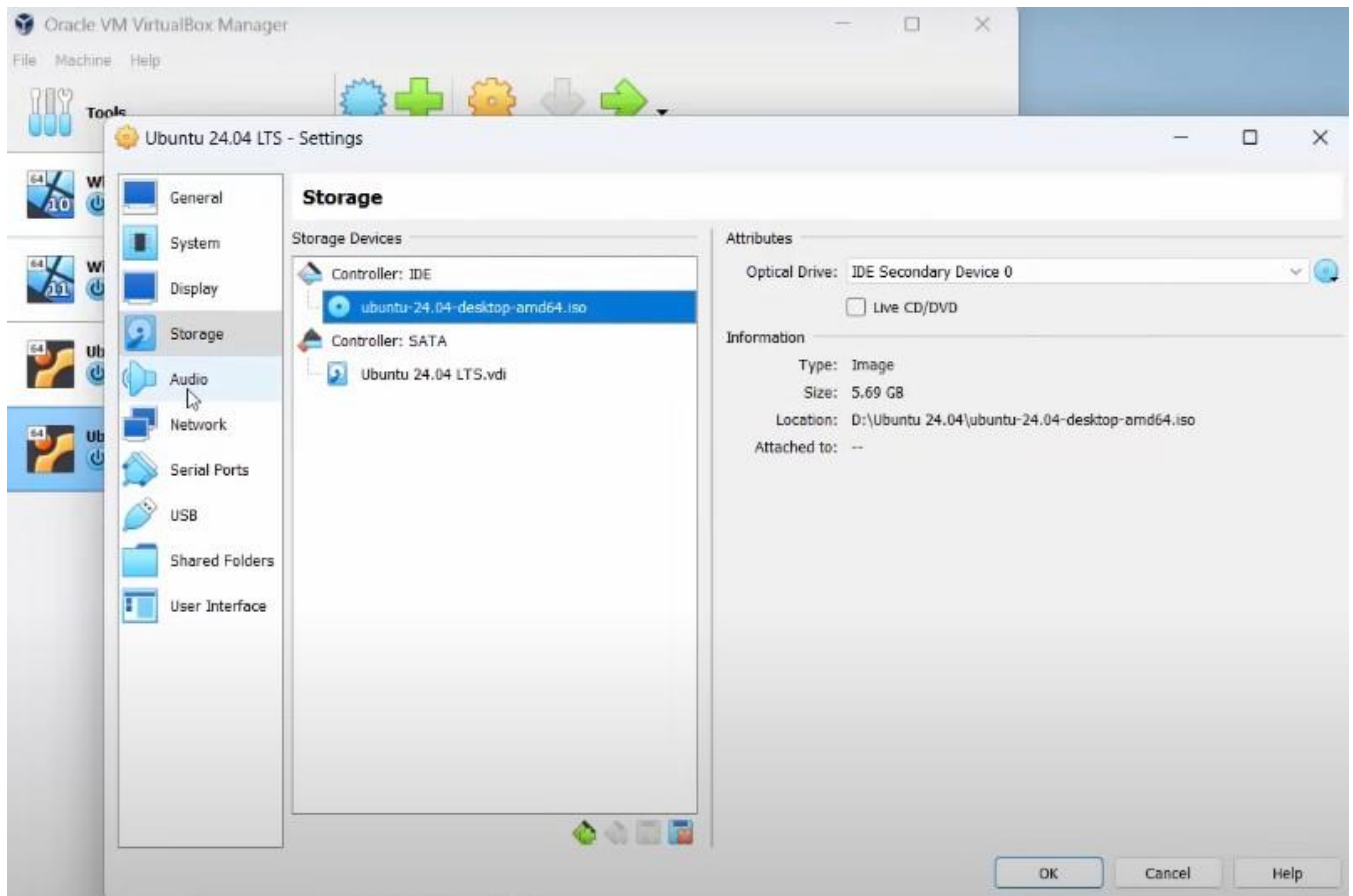
Step 5: Start the Virtual Machine

1. **Select the VM**: In the main VirtualBox interface, select the VM.
2. **Start the VM**: Click the **"Start"** button in the toolbar.
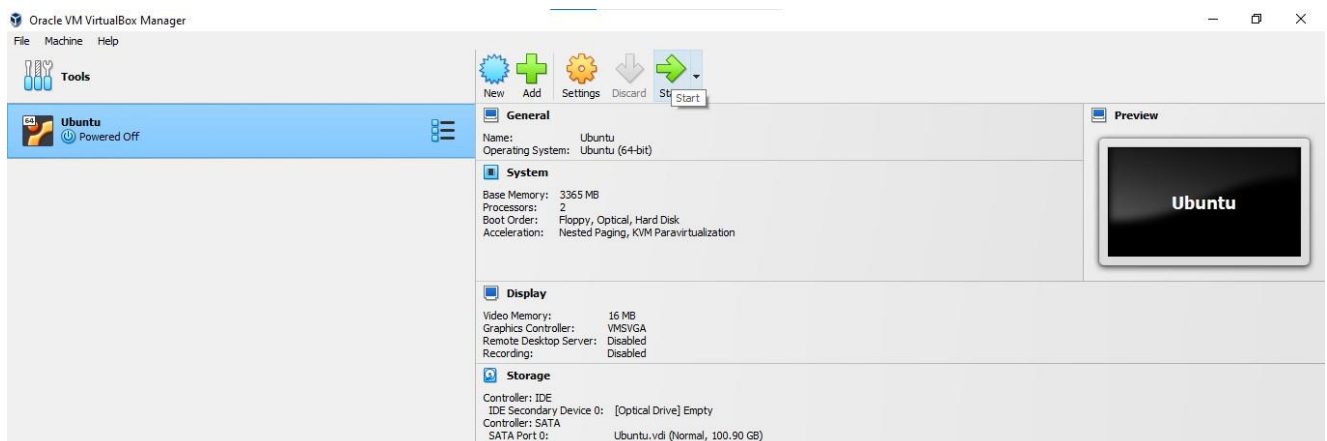
Step 6: Install Ubuntu

I. **Select Installation Option**:
- Choose **"Try Ubuntu"** or **"Install Ubuntu"**. If you select "Try Ubuntu", you can explore the OS before installation. If you choose "Install Ubuntu", it will guide you through the installation process.
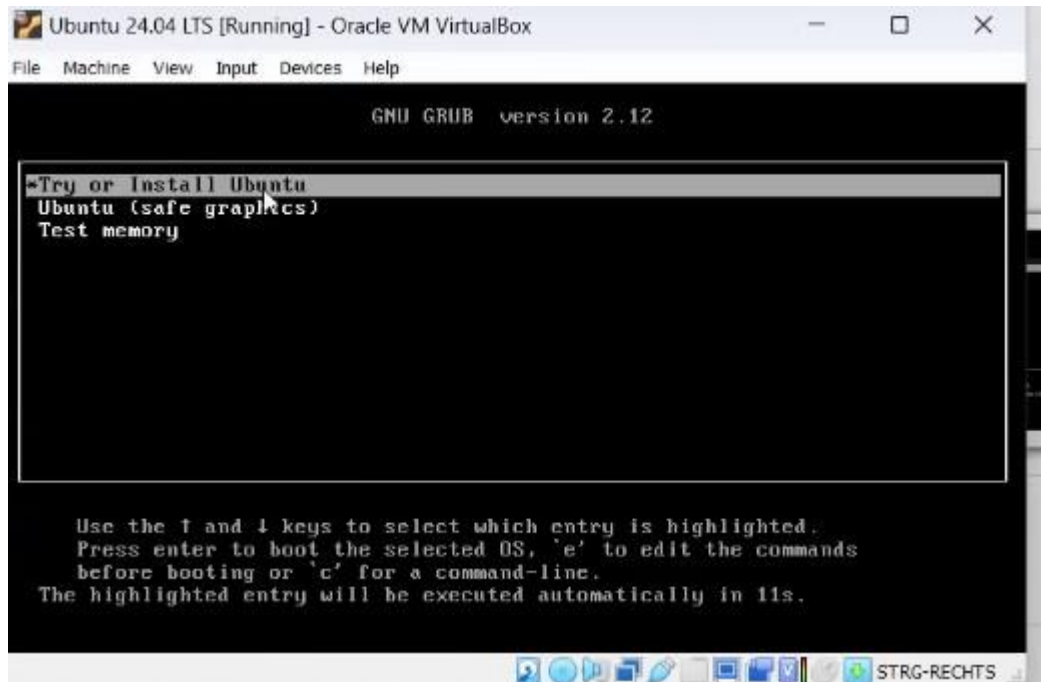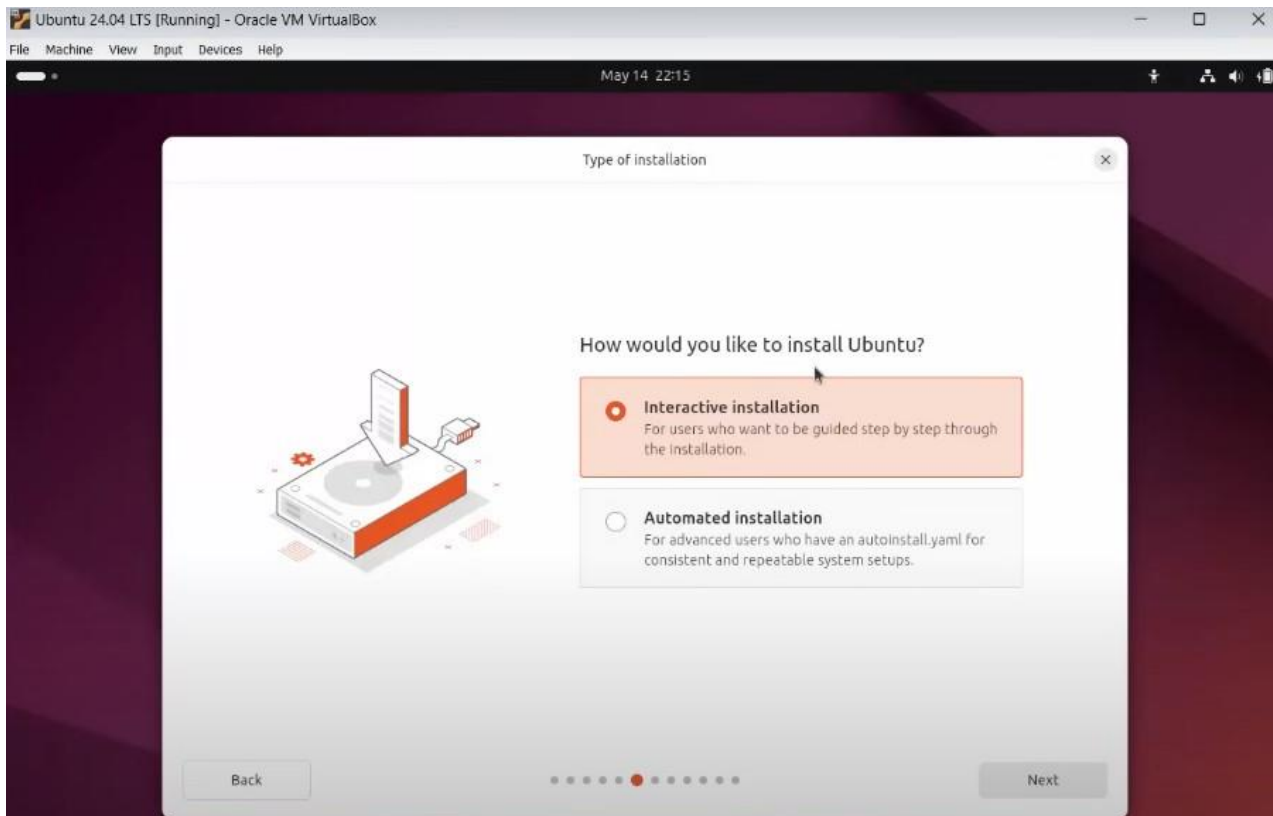

II. Choose Language: Select your preferred language and click **Continue.**
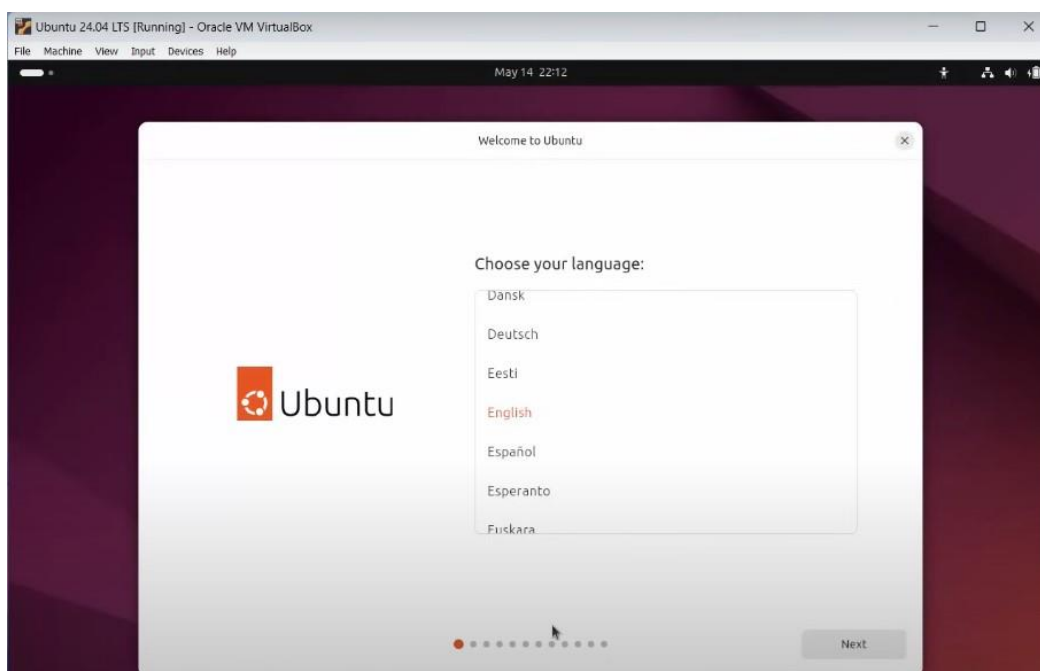
III.   Click in Next and choose Interactive Installation.

IV.   Click on Next and choose Default Selection.
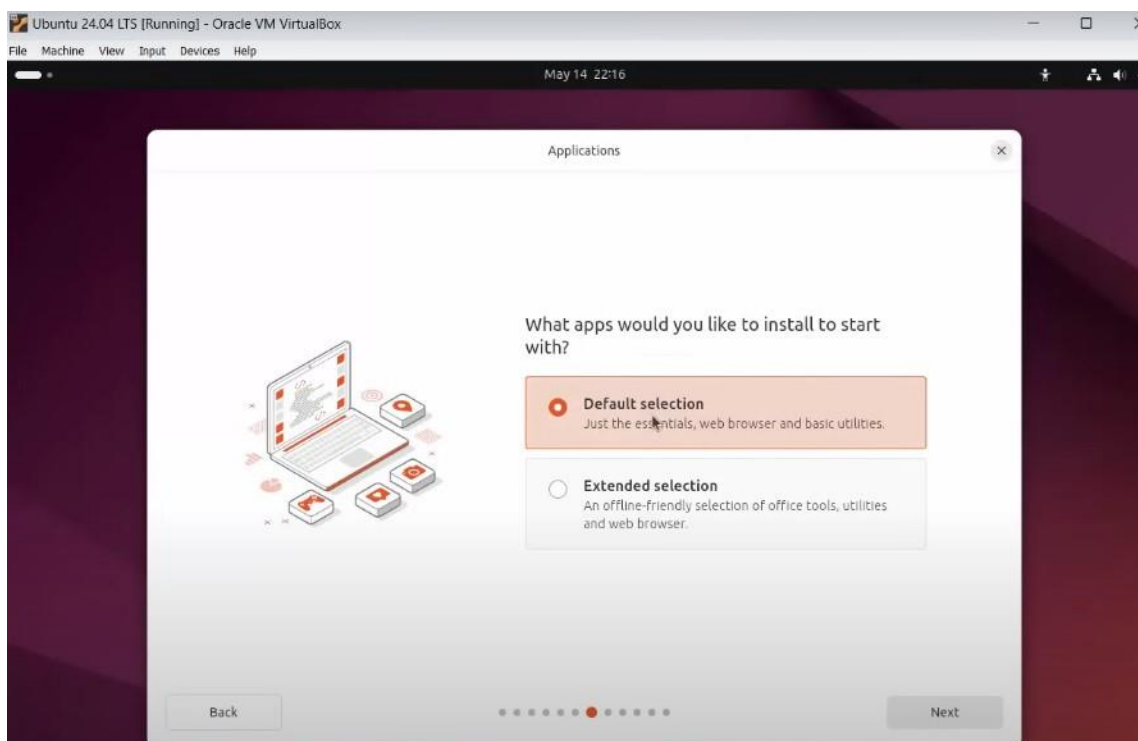
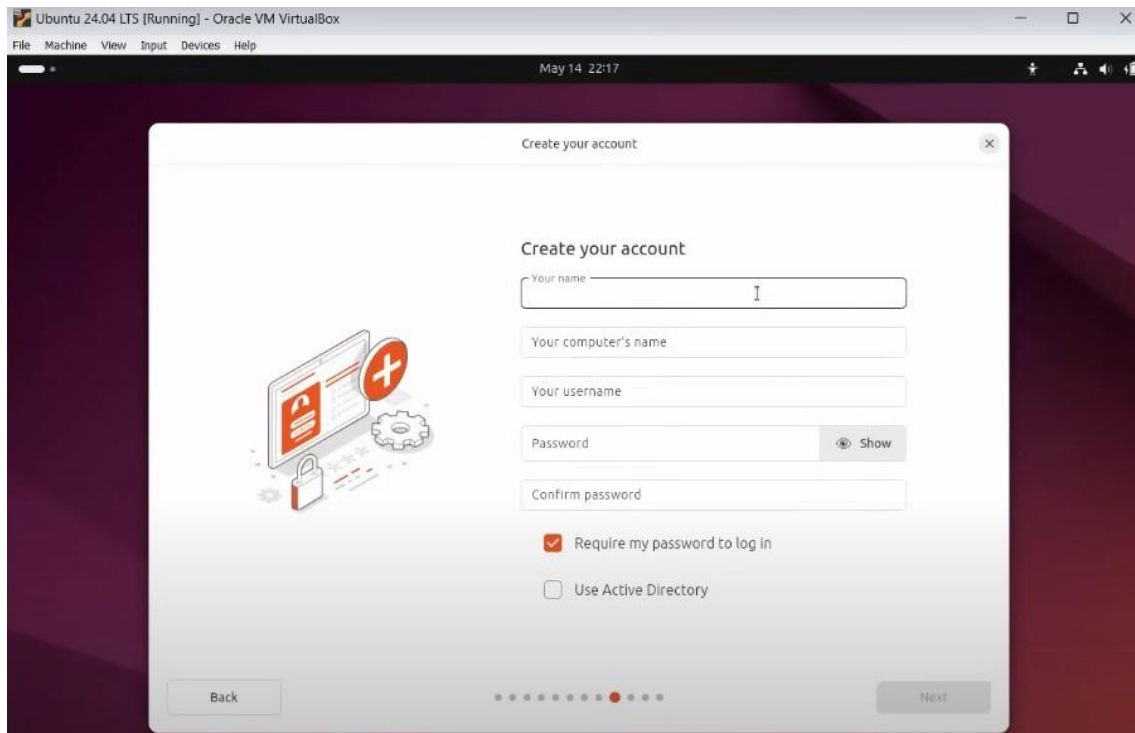V. Choose whether to download updates and install third-party software (recommended) and click **Continue**.
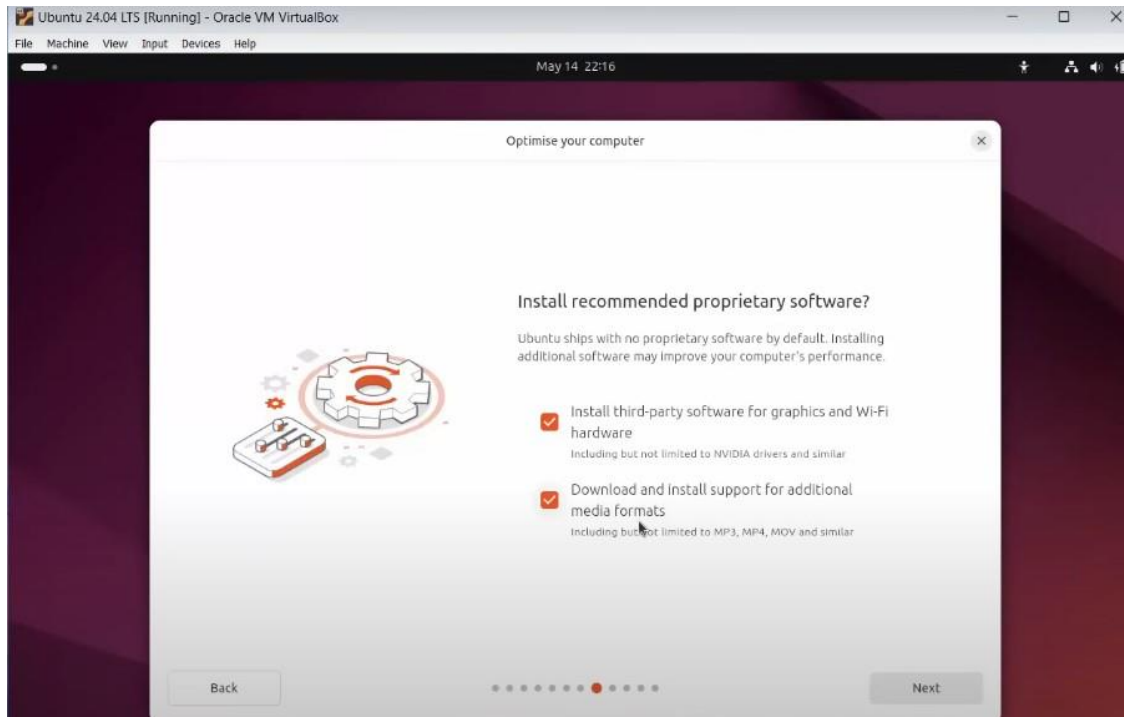
VI. Choose "Erase disk and install Ubuntu". (This option only affects the virtual hard disk created for this VM, not your host machine.)Click **Next** and confirm the changes.
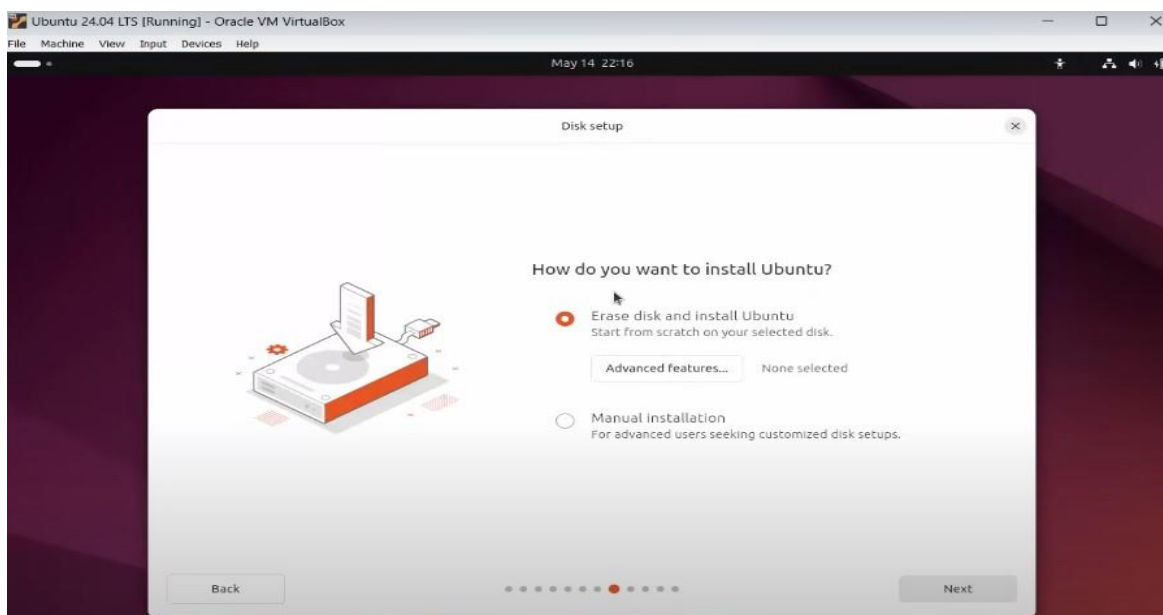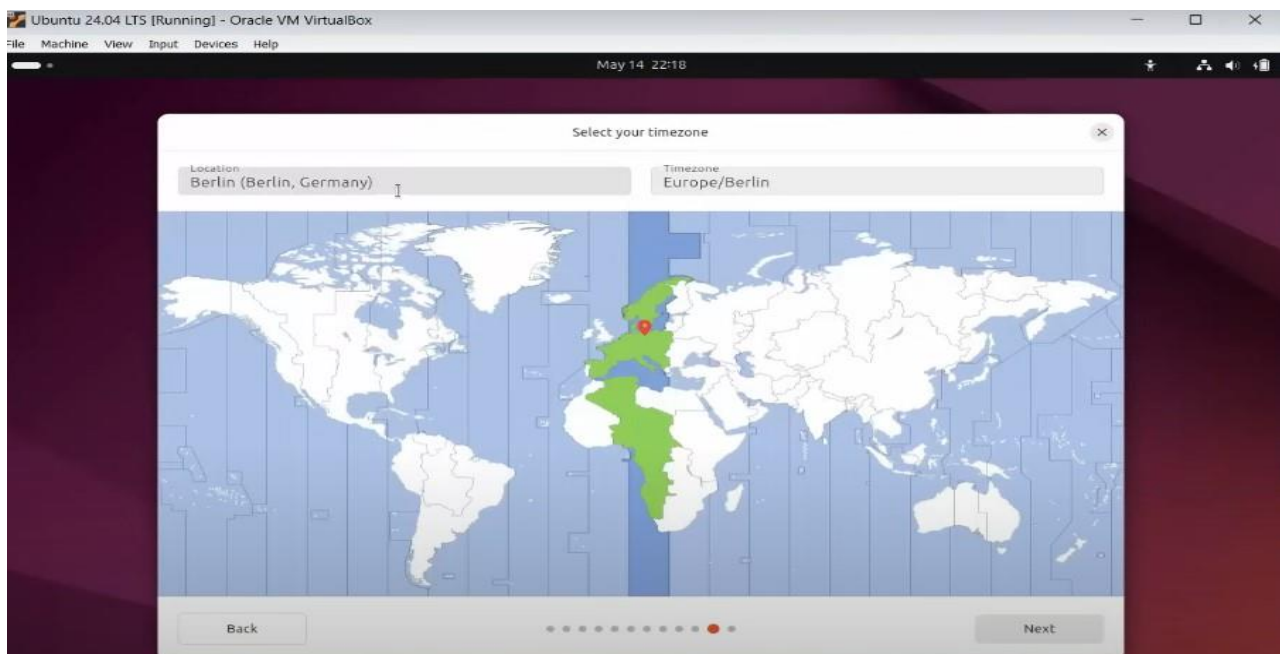
VII.   Fill in your name, computer name, username, and password. Decide whether you want to log in automatically or require a password. Click **Next**.

VIII.   Select your time zone and click **Continue**.

IX. In the review choice window , click on OK. The installation process will begin. It may take several minutes to complete. Once the installation is complete, you'll see a prompt asking you to restart the computer. Click **Restart Now**.
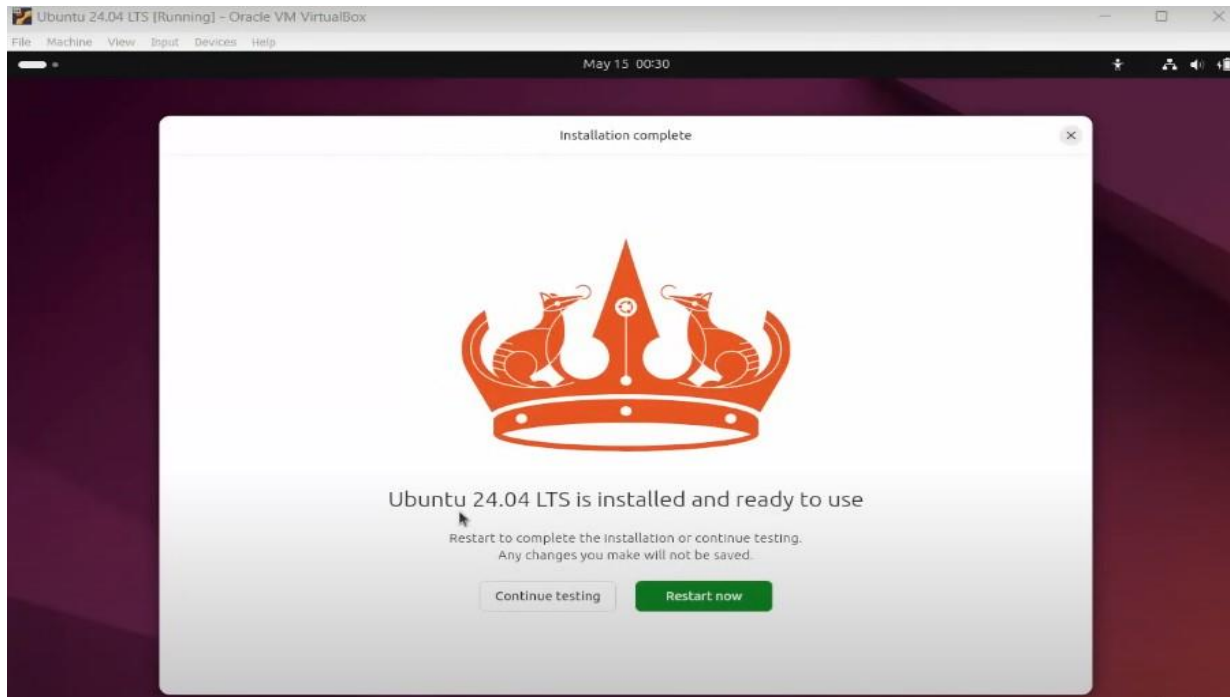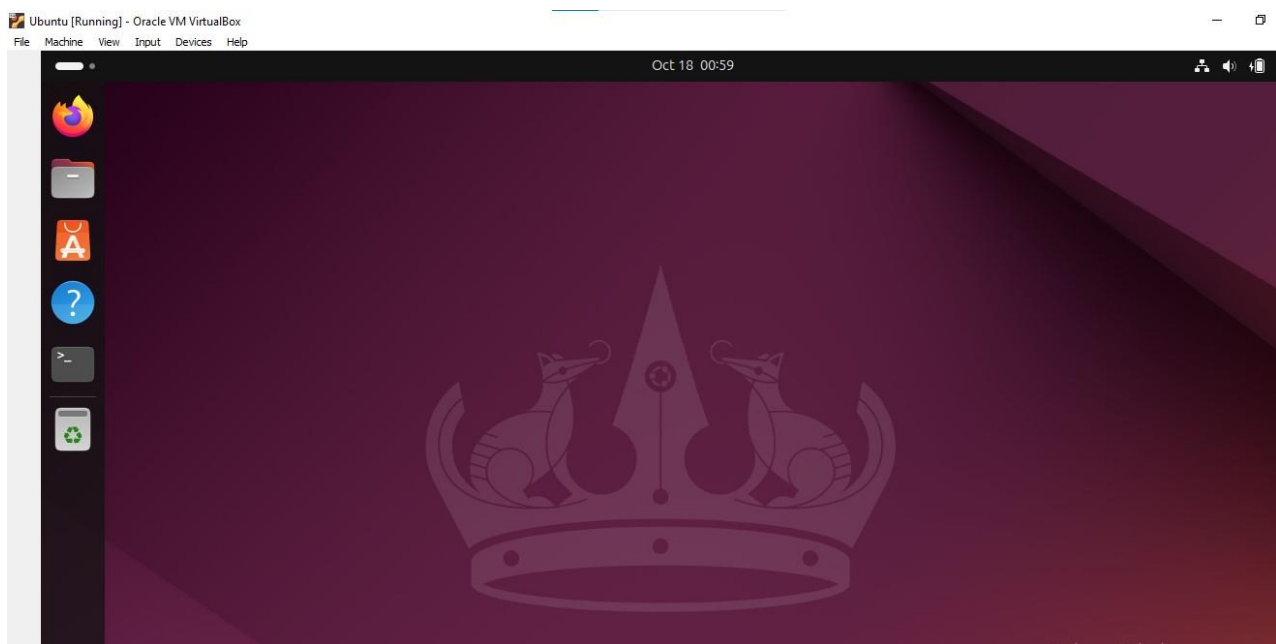

Step 8: First Boot

i. **Boot into Ubuntu**:
   - Your virtual machine will restart and boot into the newly installed Ubuntu OS.
ii. **Login**:
   - Enter the username and password you set during the installation process to log in. The login window will appear like this.
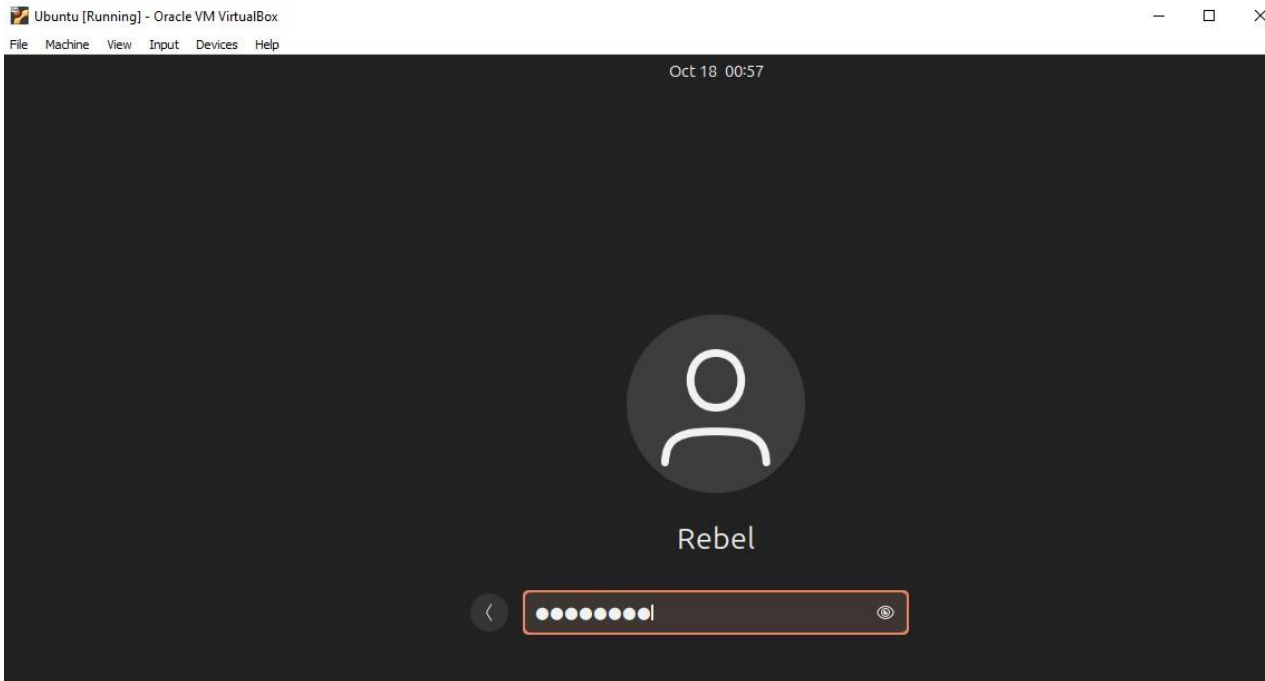
iii. After login the Ubuntu Window look like this.

4. Conclusion

Ubuntu is completely open-source and free to use. It receives regular updates and improvements from a global community of developers, ensuring security and innovation. Running Ubuntu in VirtualBox allows you to experiment with a full-fledged operating system without modifying your primary OS. Ubuntu is highly versatile, with applications for everyday use, software development, system administration, and more. Its efficiency in managing resources (CPU, RAM, disk space) makes it an ideal choice for virtual machines.

Ubuntu installed in VirtualBox provides a powerful, flexible, and secure platform that you can use for various tasks, from software development and cloud computing to everyday productivity. Its ease of use, robust security, and large community make it an ideal choice for both beginners and advanced users. By using VirtualBox, you can harness Ubuntu's features without the need for dedicated hardware, making it an excellent tool for testing, development, and learning purposes.