SYSTEM & NETWORK ADMINISTRATION

System and Network Administration Lab (DT-323L)

Lab: 01

Interacting with Linux Operating System

Content

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1.1 Virtualization and Hypervisors

Virtualization and Hypervisors are fundamental concepts in modern computing, enabling us to do more with less hardware and creating flexible, efficient computing environments.

Virtualization

Virtualization is the process of creating virtual versions of a physical resource, such as computers, hardware components, operating systems, or storage devices. This process optimizes hardware utilization by running multiple workloads on a single physical machine. It also enhances security by isolating each virtual machine from others, preventing software conflicts.

Virtualization offers numerous benefits, including easier control, inspection, flexible configuration, and the ability to move virtual machines between physical machines. It reduces costs by running multiple VMs on a single server, enhancing security.

Hypervisors

Hypervisors are software or firmware that manage and allocate resources efficiently between physical hardware and virtual machines. They act as a thin layer between the hardware and virtual machines, providing a layer of protection.
There are two main types of hypervisors:

- **Type 1** (**bare-metal hypervisors**) run directly on hardware, offering higher performance and security. Examples: VMware ESXi, Microsoft Hyper-V.
- **Type 2** (**hosted hypervisors**) run on top of an existing operating system, offering less performance and security. Examples: Oracle VM VirtualBox, VMware Workstation Player

Hypervisors offer numerous benefits, including reducing the number of physical servers needed, saving space, energy, and costs, improved server utilization, enhanced security, increased agility (quickly deploying and scaling applications by creating and managing virtual machines.), and enhanced disaster recovery.

1.2 Linux Distributions

A **Linux distribution**, or distro for short, is a collection of software that includes the Linux kernel, a package management system, and a set of pre-configured applications. It's basically a complete operating system built upon the core of Linux.
Following are the Different Linux distributions Software

1. FreeBSD
2. OpenSolaris
3. XINU
4. HP-UX
5. SunOS
6. Ubuntu
7. Linux
8. System V
9. Fedora
10. MINIX
11. XENIX
12. Arch Linux
13. NetBSD
14. PC-BSD
15. Linux Mint
16. SCO
17. OpenBSD
18. Manjaro
19. Solaris
20. Mac OS X (Darwin)

1.3 Installing Linux on Sun Virtual Box

Sun Virtual Box

Sun VirtualBox and Oracle VM VirtualBox are identical software, created by Sun Microsystems in 2007. Oracle acquired Sun Microsystems in 2008, and since then, Oracle has continued to develop and release VirtualBox under Oracle VM VirtualBox.

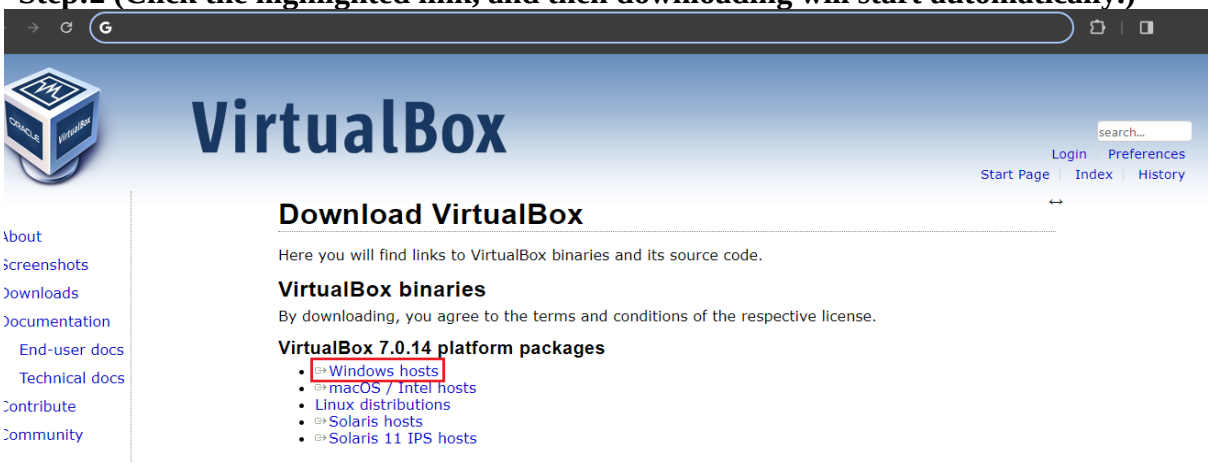
Downloading & Installing Oracle VM VirtualBox (Sun Virtual Box)

Downloading

Visit the Link for downloading Oracle VM VirtualBox
https://www.virtualbox.org/wiki/Downloads
Following are the steps for downloading Oracle VM VirtualBox

Step:1 (Click the above link and open the following page.)

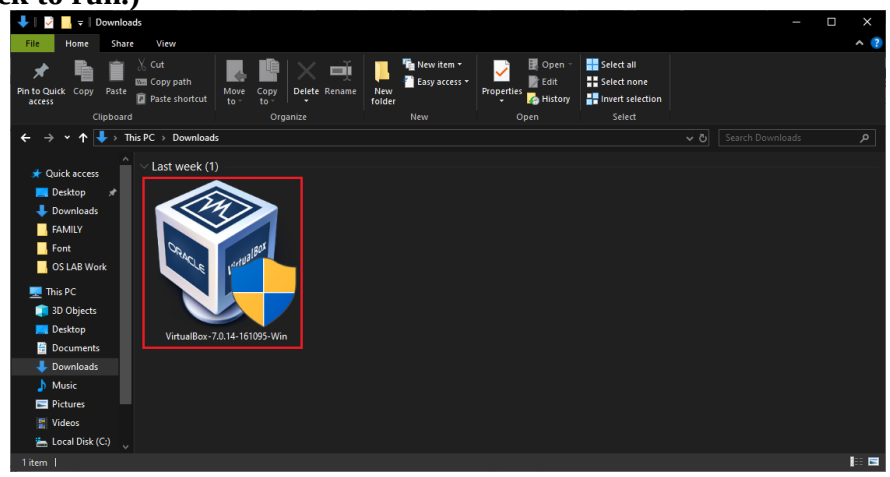
Step:2 (Click the highlighted link, and then downloading will start automatically.)



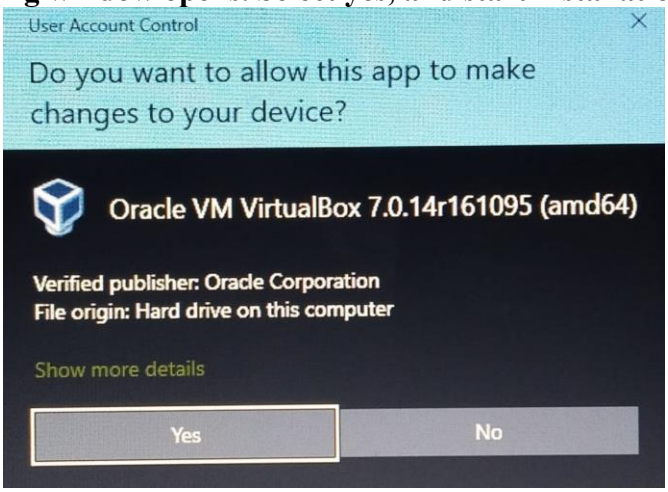
Installing

Following are the steps for Installing Oracle VM VirtualBox

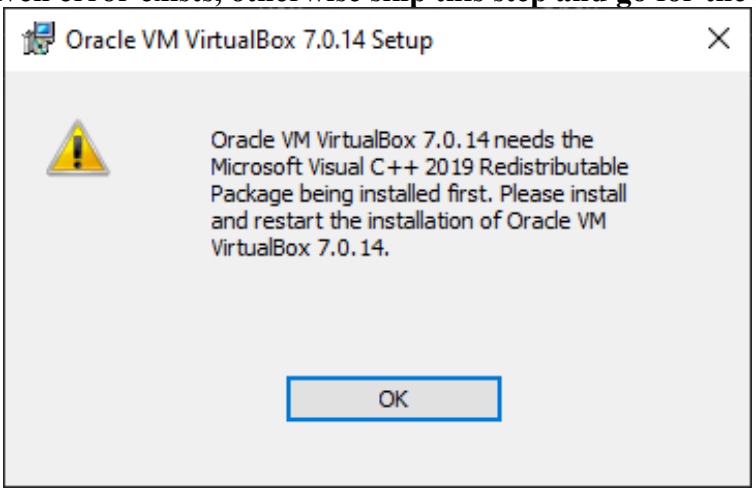
Step:1 (Locate the file (as shown in the image) where it will save on your device and double-click to run.)



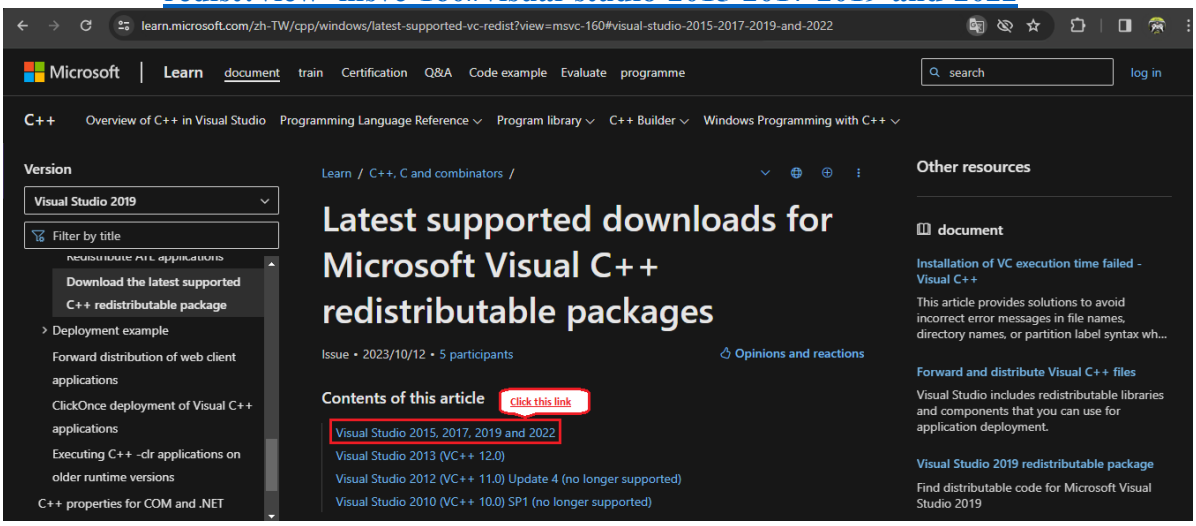
Step:2 (The following window opens. Select yes, and start installation)

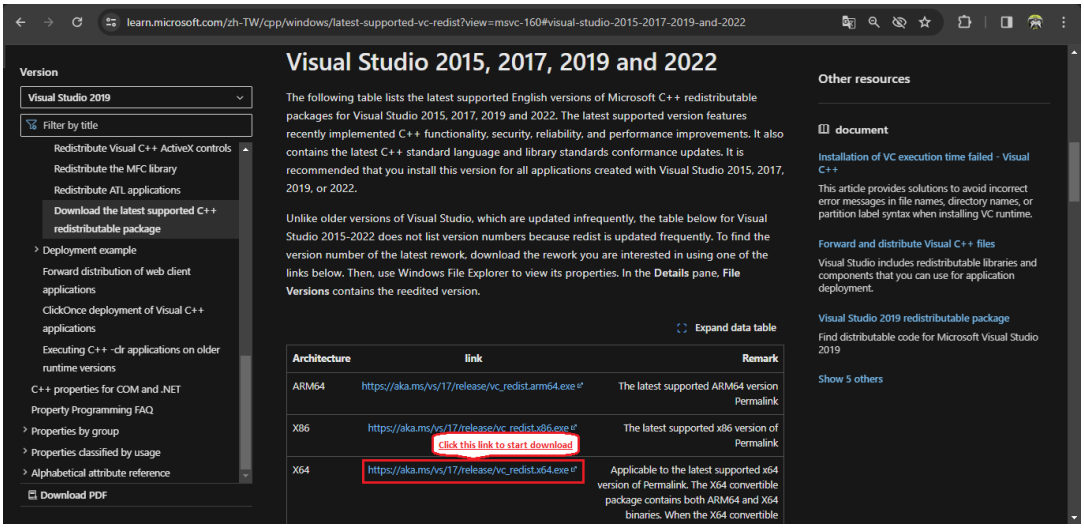


Step:3 (If the given error exists, otherwise skip this step and go for the next step.)

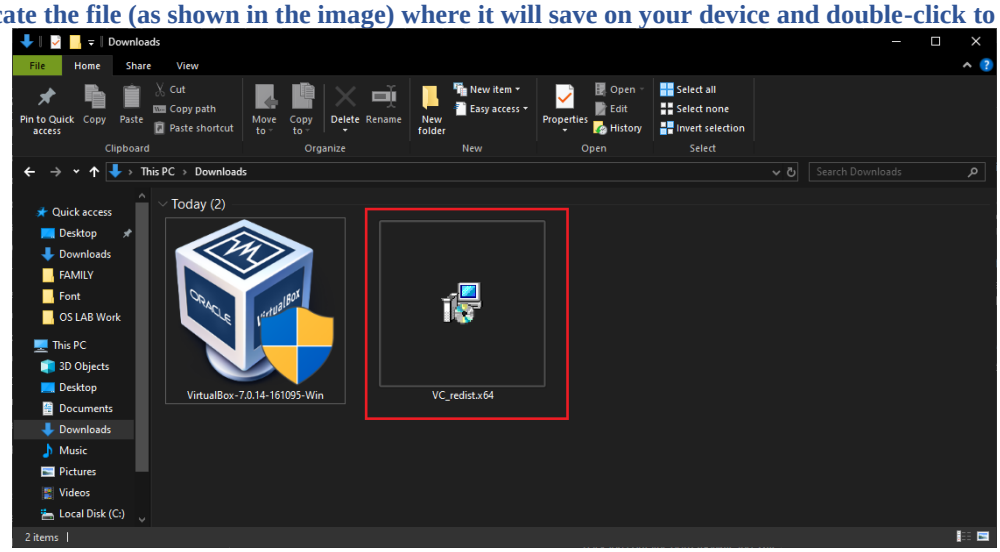


To solve the above error, visit the following link and download the file.
https://learn.microsoft.com/zh-TW/cpp/windows/latest-supported-vc-redist?view=msvc-160#visual-studio-2015-2017-2019-and-2022

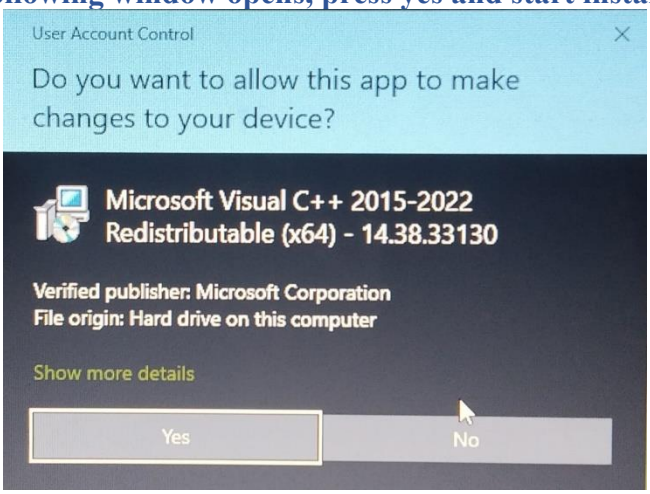


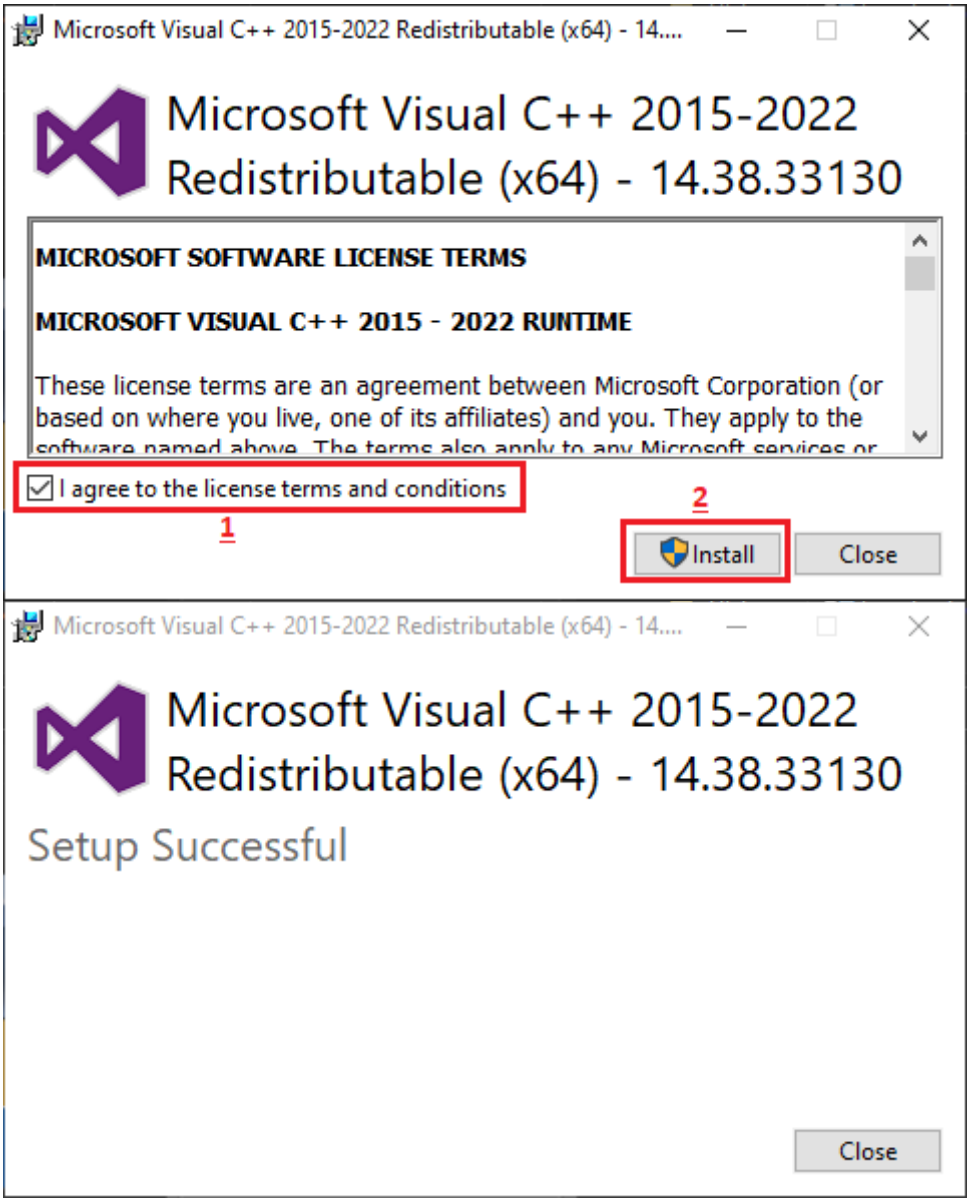


Locate the file (as shown in the image) where it will save on your device and double-click to run.



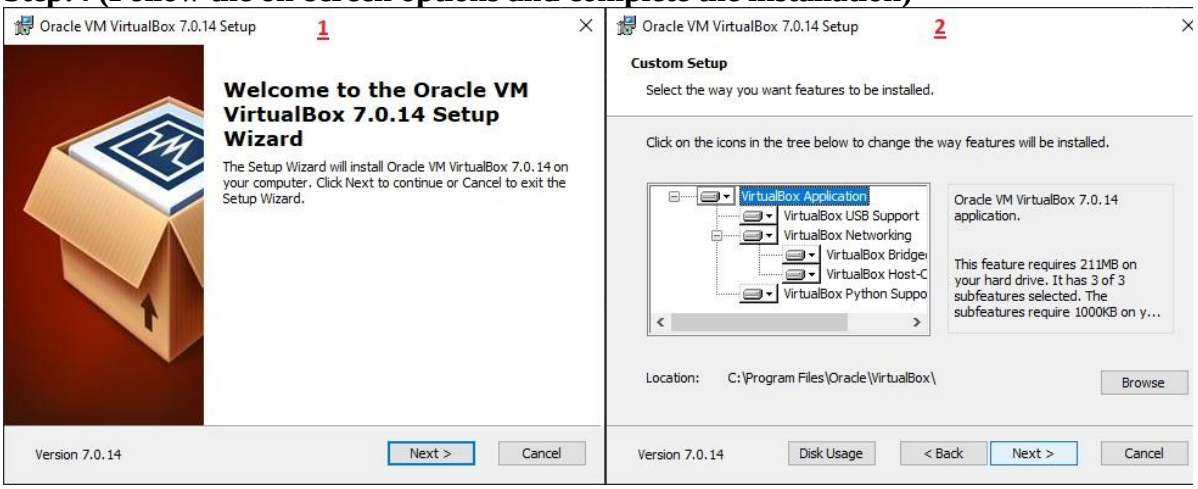
The following window opens, press yes and start installation

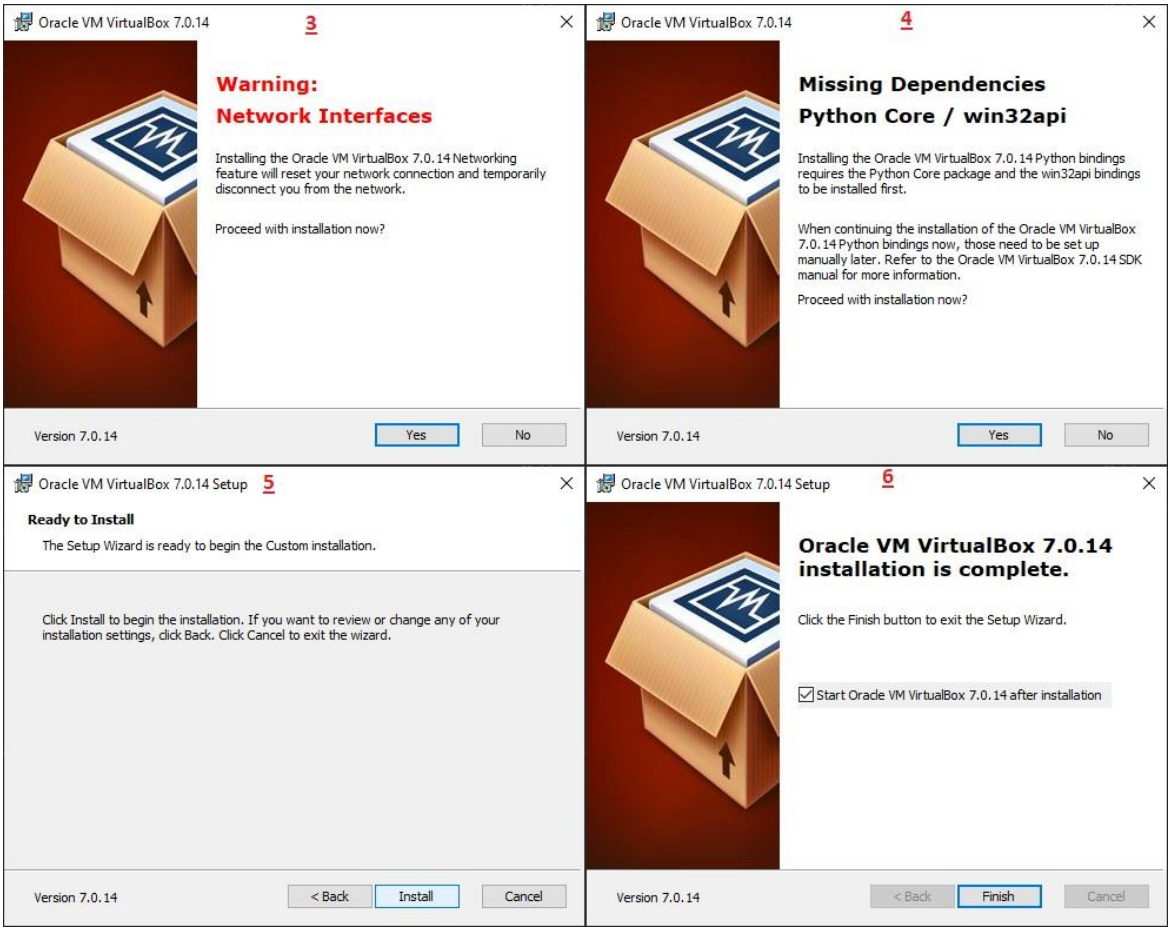




After Successful installation restart you PC and then start from "Step:1"

Step:4 (Follow the on-screen options and complete the installation)





Ubuntu

Ubuntu, a Linux distribution based on Debian, is a free and open-source software, released in multiple editions for desktop, server, and core for Internet of things devices and robots. Developed by Canonical's Mark Shuttleworth, it was initially released on October 20, 2004.

Downloading & Installing Ubuntu (Linux Distribution)

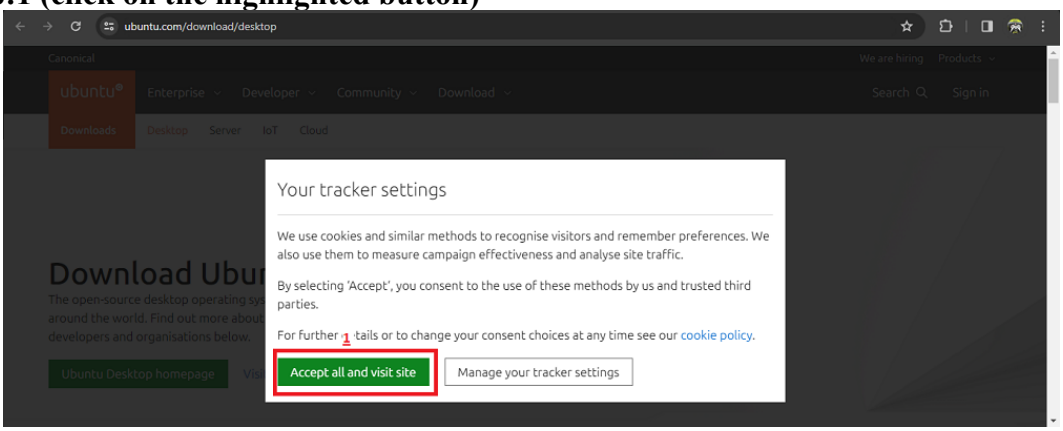
Downloading

Visit the Link for downloading Ubuntu

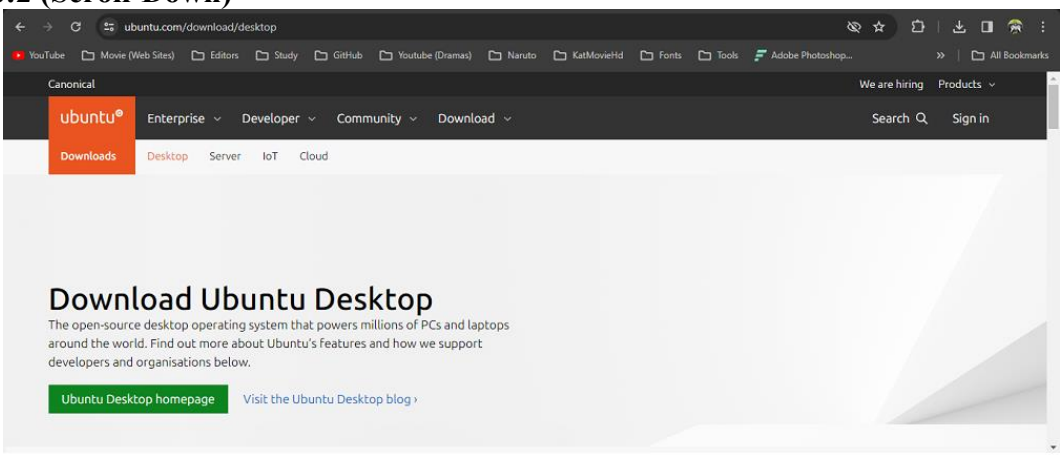
https://ubuntu.com/download/desktop

Following are the steps for downloading Oracle VM VirtualBox

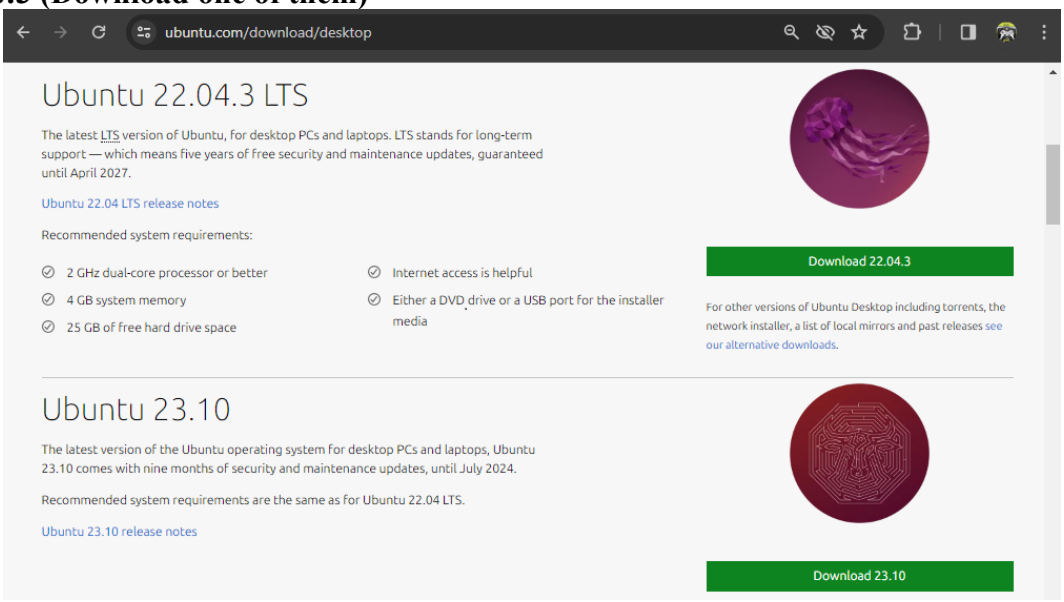
Step:1 (click on the highlighted button)



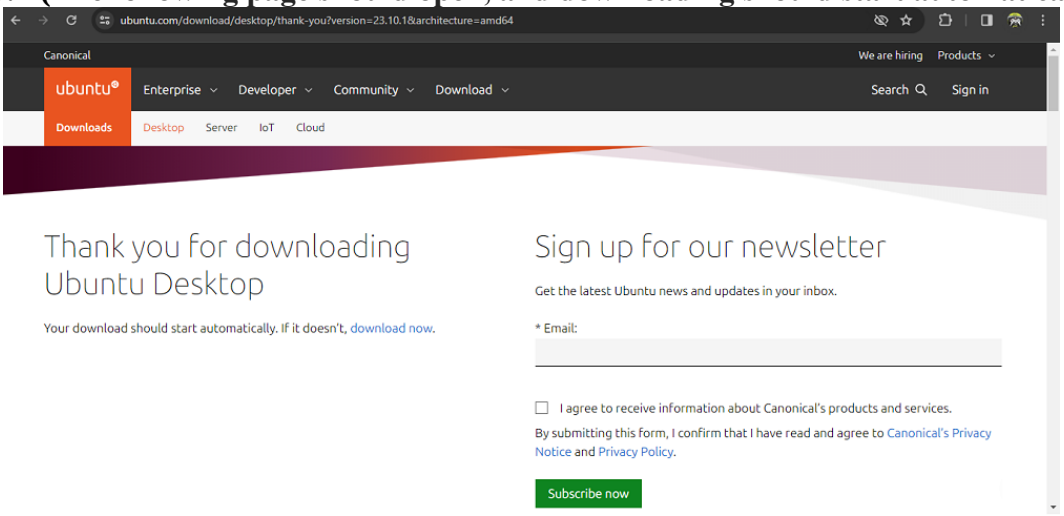
Step:2 (Scroll-Down)



Step:3 (Download one of them)



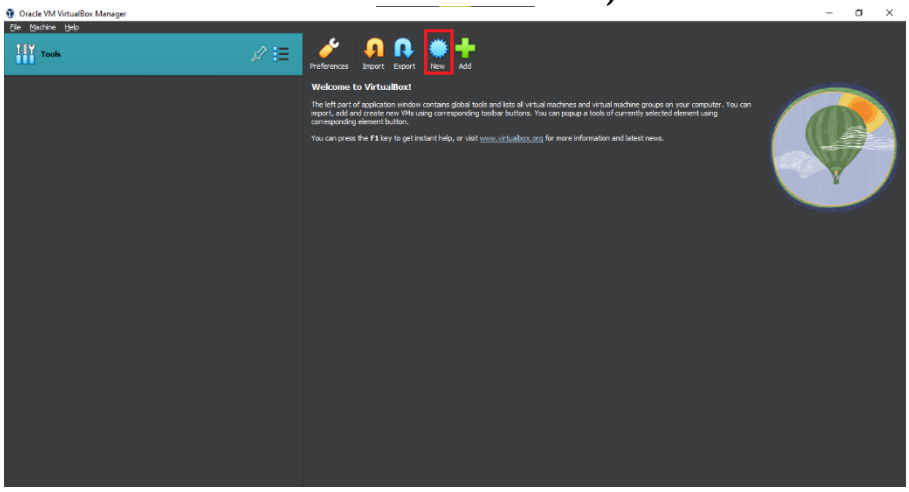
Step:4 (The following page should open, and downloading should start automatically.)



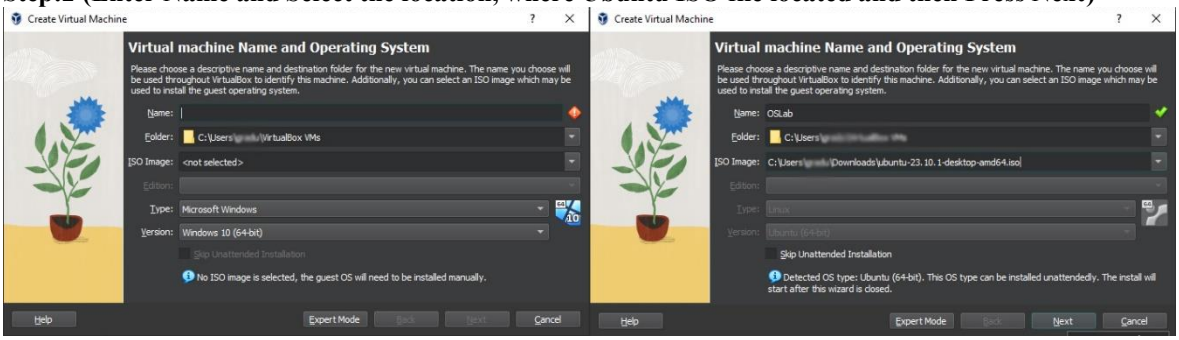
Installing

Following are the steps for Installing Ubuntu in Oracle VM VirtualBox

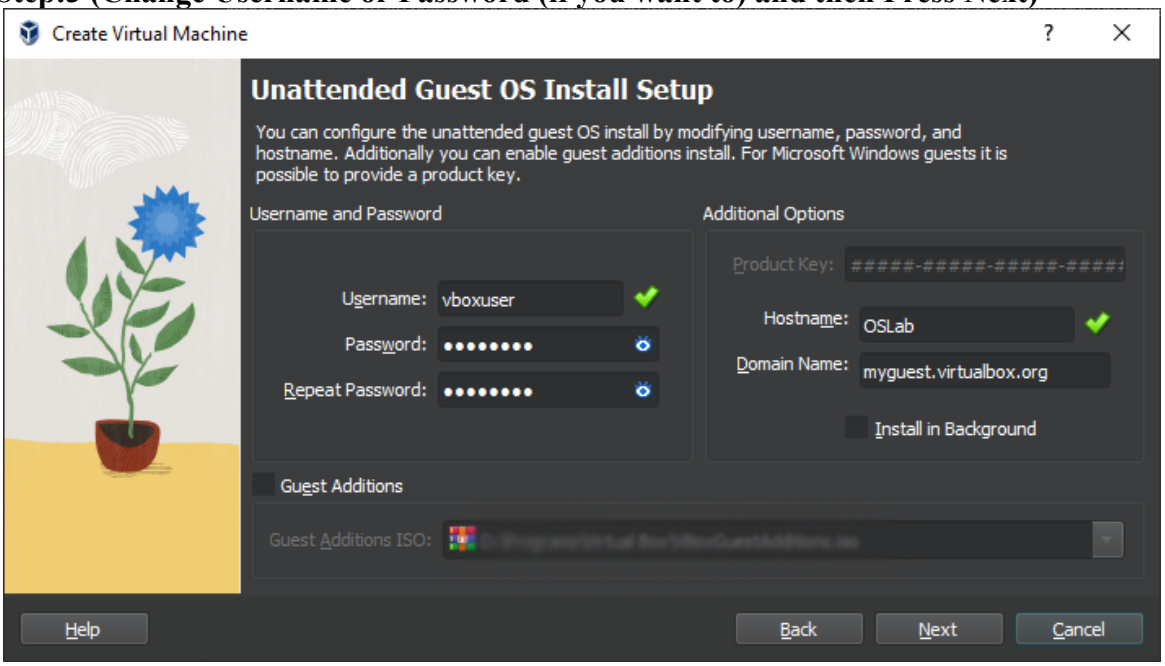
Step:1 (Start Oracle VM VirtualBox and click on New)



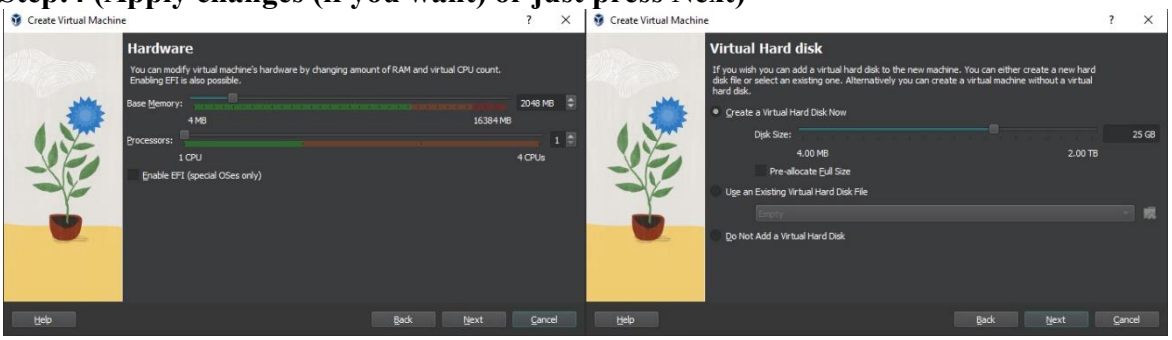
Step:2 (Enter Name and Select the location, where Ubuntu ISO file located and then Press Next)



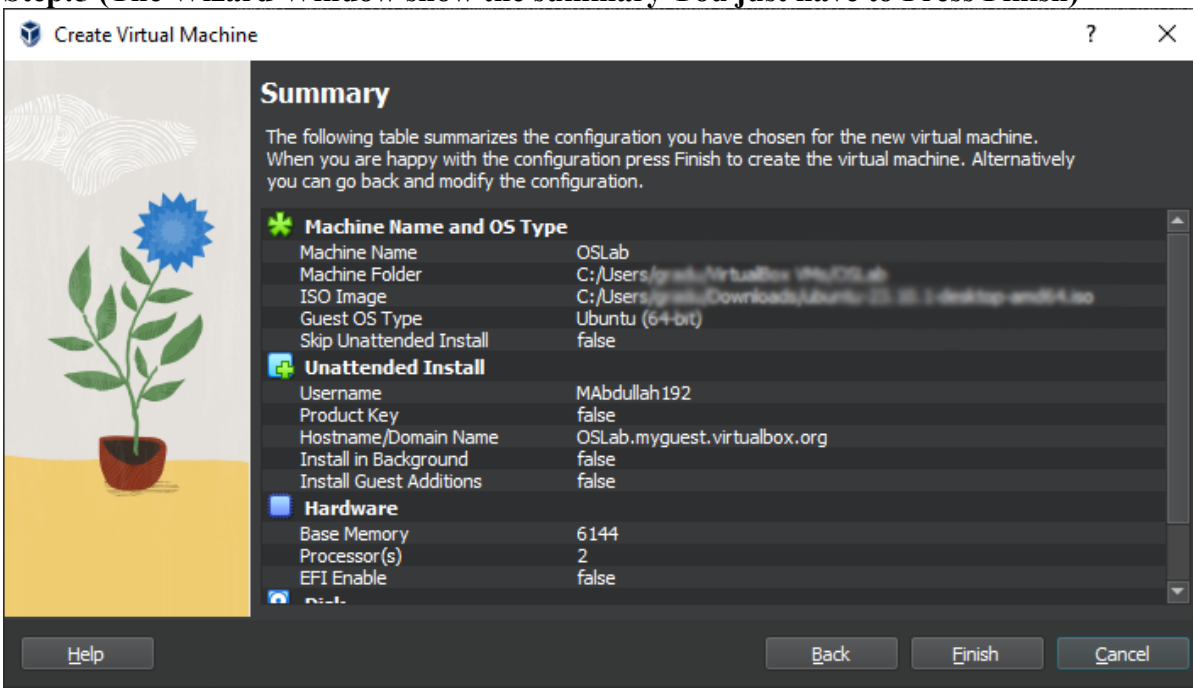
Step:3 (Change Username or Password (if you want to) and then Press Next)



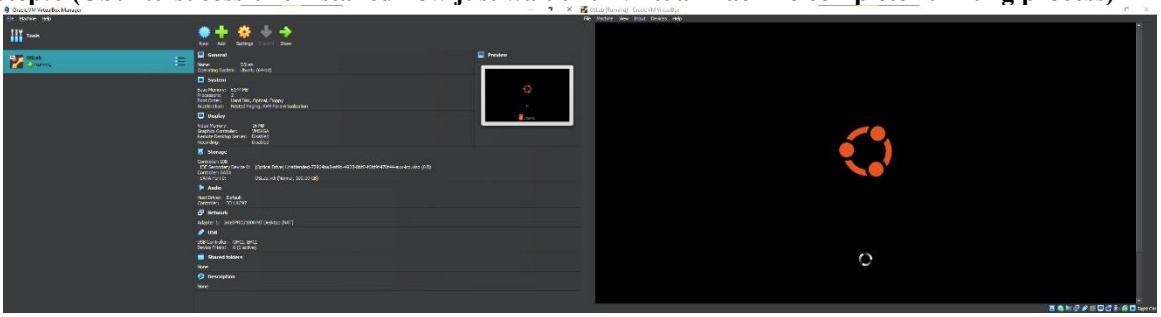
Step:4 (Apply changes (if you want) or just press Next)



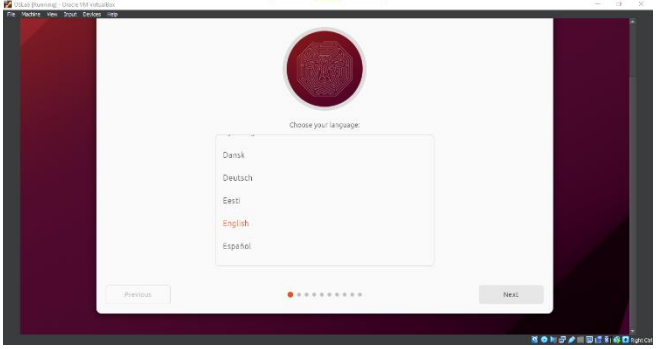
Step:5 (The Wizard Window show the summary You just have to Press Finish)

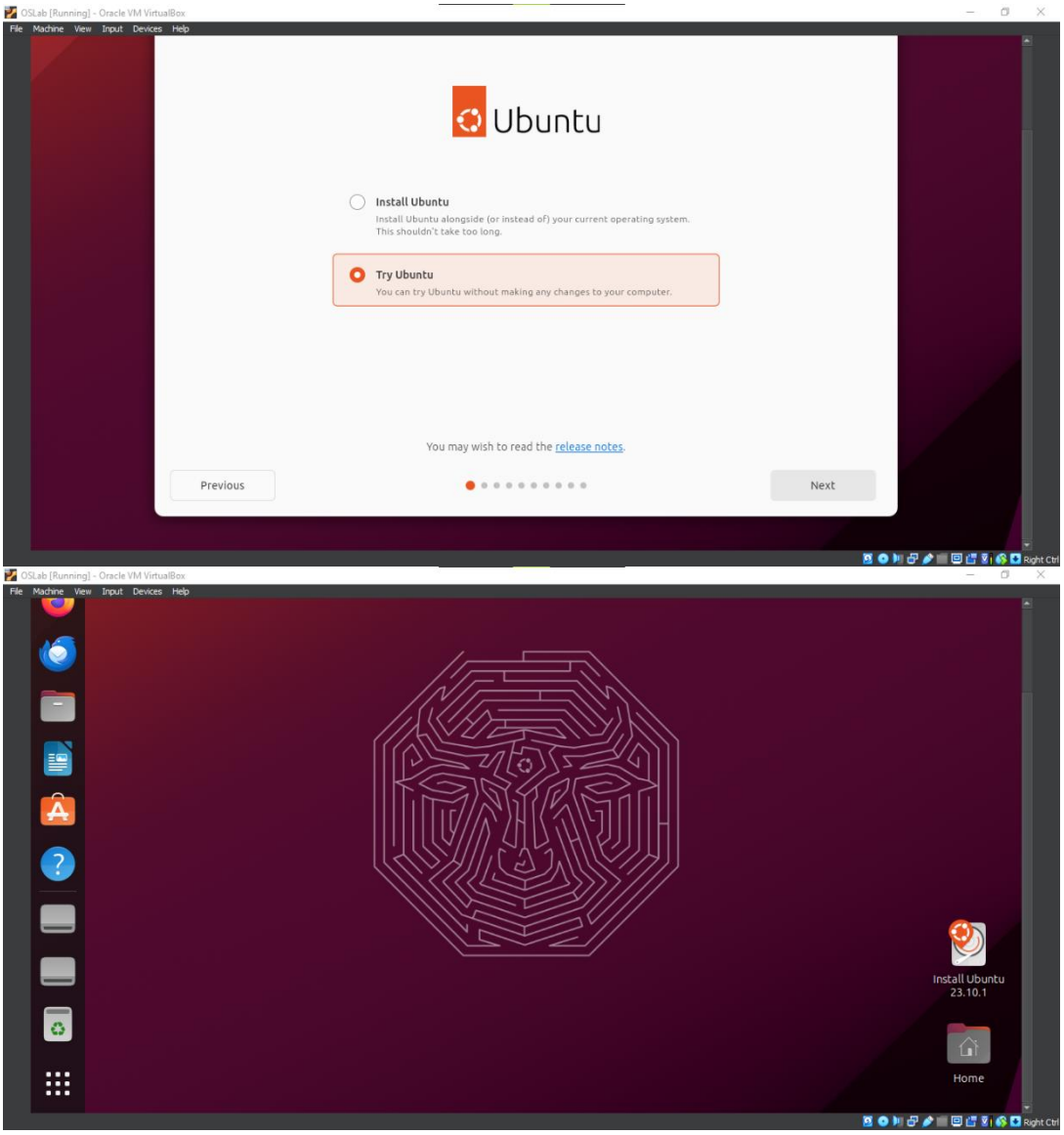


Step:6 (Ubuntu sucessfullt installed now just wait until virtual machine complete runnung process)



You have sucessfully installed Ubuntu in Oracle VM VirtualBox Apply Following Settings





1.4 Linux File Hierarchy Standard

The **Linux File Hierarchy Standard** (FHS) is a set of guidelines for the layout of directories and files on Unix-like operating systems, including Linux. It defines a common structure for where to find essential system files, user data, and application programs. This consistency makes it easier for users and administrators to find what they need, regardless of the specific Linux distribution they're using.

Here's a high-level overview of the FHS:

➢ Root directory (/):

- The starting point for the entire filesystem.
- Contains essential directories like `/bin`, `/boot`, `/etc`, `/home`, `/lib`, `/media`, `/mnt`, `/opt`, `/proc`, `/root`, `/sbin`, `/srv`, `/sys`, `/tmp`, `/usr`, and `/var`.

➢ Essential directories:

- **/bin** Contains most user programs and data, including libraries, executables, and documentation.
- **/boot** Used for variable data that changes over time, such as logs and temporary files.
- **/etc** Contains most user programs and data, including libraries, executables, and documentation.
- **/home** Used for variable data that changes over time, such as logs and temporary files.
- **/lib** Contains most user programs and data, including libraries, executables, and documentation.
- **/media** Used for variable data that changes over time, such as logs and temporary files.
- **/mnt** Contains most user programs and data, including libraries, executables, and documentation.
- **/opt** Used for variable data that changes over time, such as logs and temporary files.
- **/proc** Contains most user programs and data, including libraries, executables, and documentation.
- **/root** Used for variable data that changes over time, such as logs and temporary files.
- **/sbin** Contains most user programs and data, including libraries, executables, and documentation.
- **/srv** Used for variable data that changes over time, such as logs and temporary files.
- **/sys** Contains most user programs and data, including libraries, executables, and documentation.
- **/tmp** Used for variable data that changes over time, such as logs and temporary files.
- **/usr** Contains most user programs and data, including libraries, executables, and documentation.
- **/var** Used for variable data that changes over time, such as logs and temporary files.