Linux Report File

Report Title: All About Linux

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Introduction to Linux

Linux is a powerful, open-source operating system used across industries—from personal computers to servers and embedded systems. This report explores its history, features, installation methods, and practical usage and the Commands .

What is Linux?

- Linux is a **UNIX-like operating system kernel** developed by Linus Torvalds in 1991. It forms the core of many operating systems known as **Linux distributions**, which include the kernel plus software tools and interfaces.

Why is Linux Important?

- Powers 90%+ of web servers
- Backbone of Android OS
- Used in supercomputers, IoT devices, and cloud platforms
- Supports open-source development
- Offers security, stability, and flexibility

What will be covered in this report?

- Introduction to Linux
- History of Linux
- Features of Linux
- Installation of Linux
- Basic Commands and Usage

History of Linux

Origin (Linus Torvalds, 1991):.

Linux was started by **Linus Torvalds**, a Finnish computer science student, in **1991**. At that time, Linus wanted to create a free operating system similar to Unix, which could be used and modified by anyone. He announced his project in a newsgroup and released the **first Linux kernel version (0.01)** on the internet for free.

The **Linux Kernel** is the core part of the operating system. It manages the system's hardware (CPU, memory, input/output devices) and allows other software applications to run.

Is Linux Kernel or OS?

- The **Linux Kernel** is the core component of the operating system.
- Technically, Linux itself refers only to the kernel, responsible for interacting with the hardware and managing system processes.
- A full **Linux Operating System** includes the Linux kernel combined with essential software like the GNU tools, graphical interfaces (GNOME, KDE), file utilities, and package managers. Therefore, distributions like Ubuntu, Debian, and Fedora are often referred to as "Linux OS," but properly, they are **GNU/Linux Operating Systems**.

Evolution of Distributions (Ubuntu, Debian, Fedora, etc.)

After the Linux kernel was released, developers globally contributed to improving it.

Over time, many **distributions (distros)** were created to package the Linux kernel along with useful software, making Linux easy to install and use for different needs.
Some major distributions are:

- **Ubuntu:** A beginner-friendly distribution based on Debian, widely used for desktops and servers.

- **Debian:** Known for its stability and community support, often used as the base for other distributions.
- **Fedora:** Offers the latest open-source software and is sponsored by Red Hat.
- **CentOS:** A free alternative to Red Hat Enterprise Linux, popular for servers.

Each distribution has its own package management system, default desktop environment, and specialized software choices, providing flexibility and ease of use depending on the user's purpose. In the course we will be focusing on Ubuntu.

Role in the Open-Source Movement

- ✓ Linux is a cornerstone of the **open-source philosophy**, which promotes software freedom, collaboration, and transparency. Key aspects include:
  - Source code is open to everyone.
  - Developers can modify and redistribute the software.
  - The **GNU General Public License (GPL)** enforces that derivatives of Linux remain open-source.
- ✓ This model encouraged a massive global developer community to improve Linux continuously. Today, Linux is widely used in:
  - Web servers (Apache, NGINX)
  - Supercomputers
  - Embedded systems (routers, smart devices)
  - Development environments

Features Of Linux

►Open-Source

Linux is completely open-source software. Its source code is freely available for anyone to study, modify, and redistribute. This allows developers from all over the world to contribute to its development, fix bugs, and add new features. The open-source nature makes it transparent and helps improve security and stability.

► Multi-user Capability

Linux is designed as a multi-user system. This means multiple users can log into the system and run applications independently at the same time without affecting each other's work. Each user has a separate home directory, permissions, and settings, providing a secure and efficient environment.

►Security

Linux provides strong security features. It uses a permission-based system where files and directories have specific read, write, and execute permissions for the owner, group, and others.

- Regular security updates
- Strong community support to fix vulnerabilities
- Access control through users and groups

►Customizability

Linux is highly customizable. Users can choose different desktop environments (like GNOME, KDE, XFCE) according to their preferences. Additionally:

- Users can modify the kernel
- Add or remove system services

- Configure startup scripts and system behavior
  This makes Linux suitable for both simple desktops and complex server systems.

► Stability and Performance

Linux is known for its stability and performance. It rarely crashes, and it is capable of running for long periods without the need for a reboot.

- Suitable for servers running 24/7.
- Efficient use of system resources (CPU and RAM).
- Performs well on both high-end and low-end hardware

► Support for Programming and Development

Linux provides a rich environment for developers:

- Pre-installed compilers (GCC)
- Powerful text editors (vim, nano)
- Shell scripting support (Bash)
  It supports multiple programming languages such as C, C++, Python, Java, and more.

►Networking Capabilities

Linux comes with strong **networking features** by default.

- Allows setting up web servers (Apache, NGINX).
- Offers SSH, FTP, and Samba for remote access.
- Powerful tools for network monitoring and management.

Installation Of Linux

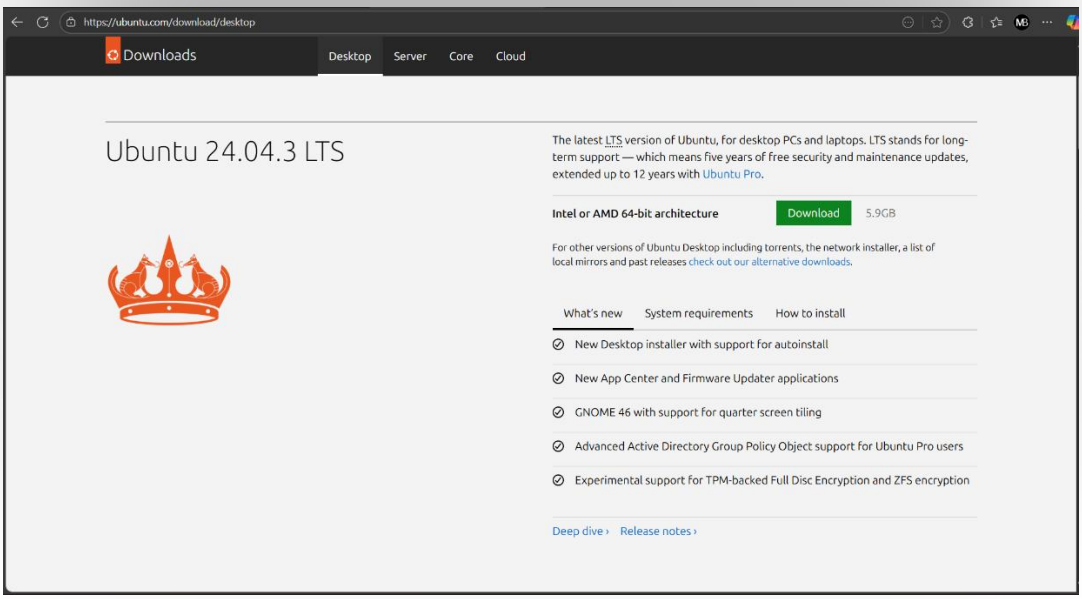
Linux can be installed in several different ways depending on the user's purpose, such as learning, software development, or running a server. The most commonly used methods are:

1} Dual boot Installation

A dual boot installation allows a computer to have both Windows and Linux operating systems installed. At the time of system start-up, the user can select which operating system to run.

***Steps for Installation*:**

1. Download the Ubuntu ISO file from the official website(https://ubuntu.com/download);



2. Create a bootable USB using a tool like **Rufus**.
3. Restart the computer and boot from the USB drive (change BIOS settings if necessary).
4. Choose the option "Install Ubuntu alongside Windows".
5. Partition the hard disk (automatic partitioning or manual partitioning).
6. Set up a username and password.
7. Complete installation and reboot the system.

8. At startup, a menu called **GRUB** will appear to choose between Ubuntu or Windows.

Advantages:

- Users can switch between Windows and Linux.
- Useful for learning and experimenting.

2} Virtual Machine Installation:

A virtual machine (VM) allows running Linux inside another operating system like Windows without affecting the host OS.

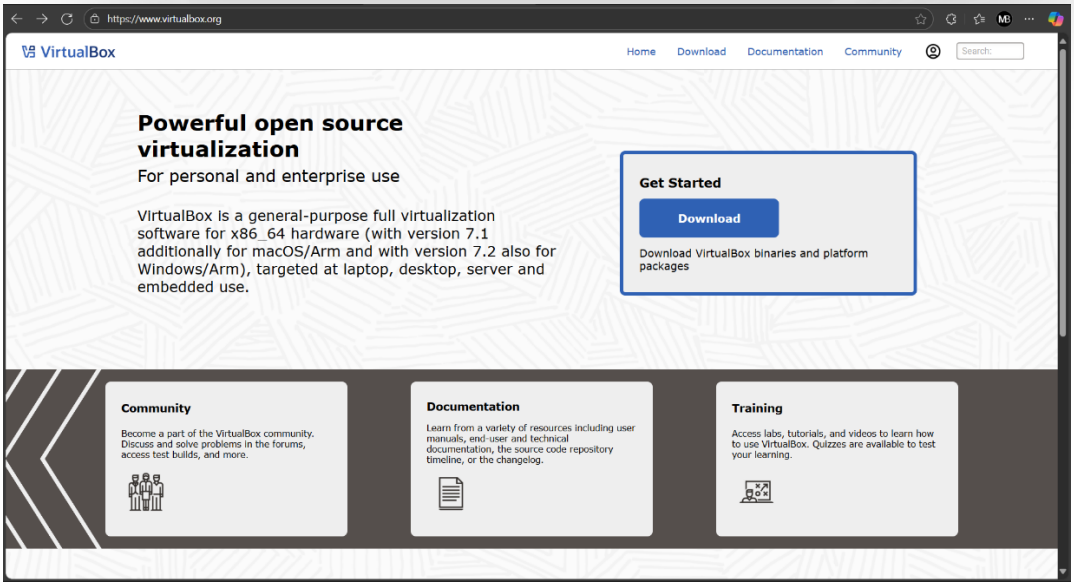
Popular VM Software:

- **VirtualBox** (Free and Open Source)
- **VMware Workstation Player**

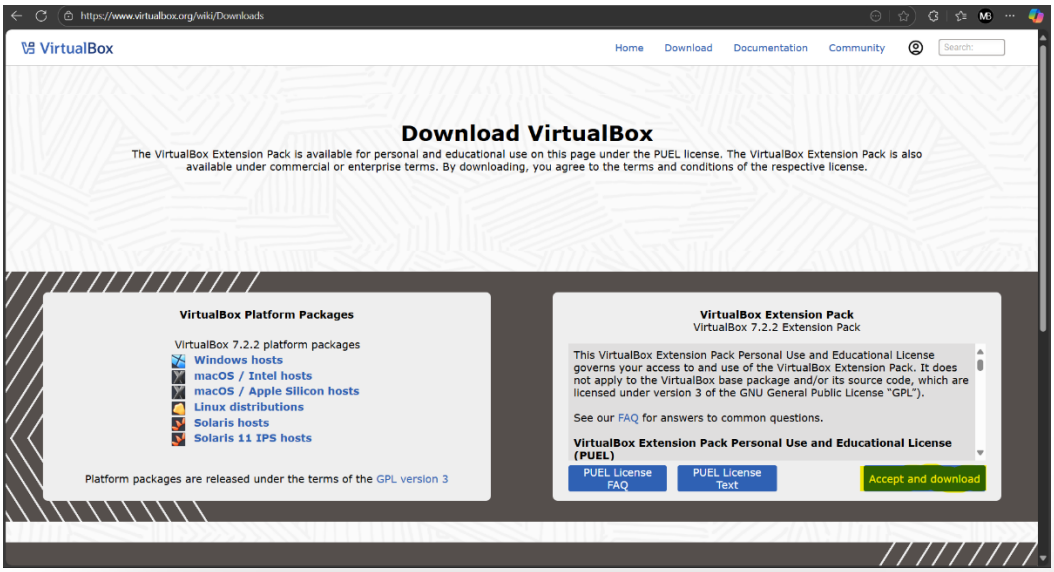
Steps Form Installation:(VirtualBox)

System Requirements: Minimum 2GHz dual-core processor, 4GB RAM and 25GB of Hard Disk space.

1. Install VirtualBox or VMware Workstation Player.
   - Search VirtualBox On your browser or copy the link on your browser – (https://www.virtualbox.org/wiki/Downloads)

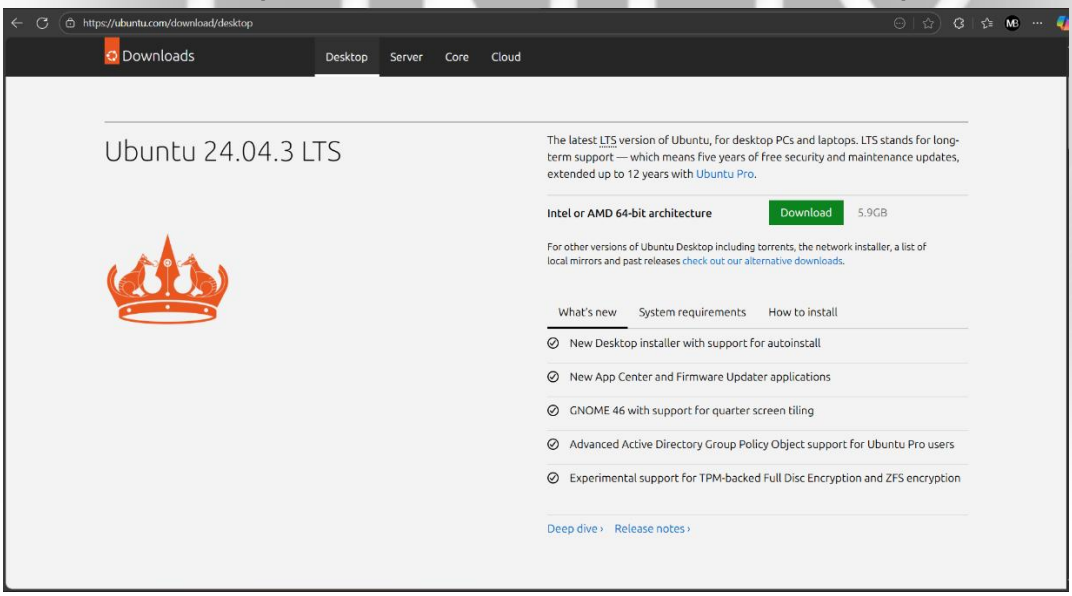


- Click On Download



- And then Click on Accept and Download

2. Download the Linux ISO file (e.g., Ubuntu).
   - Link - https://ubuntu.com/download/desktop



- Open the VirtualBox file on your PC
- Double-click to open the file

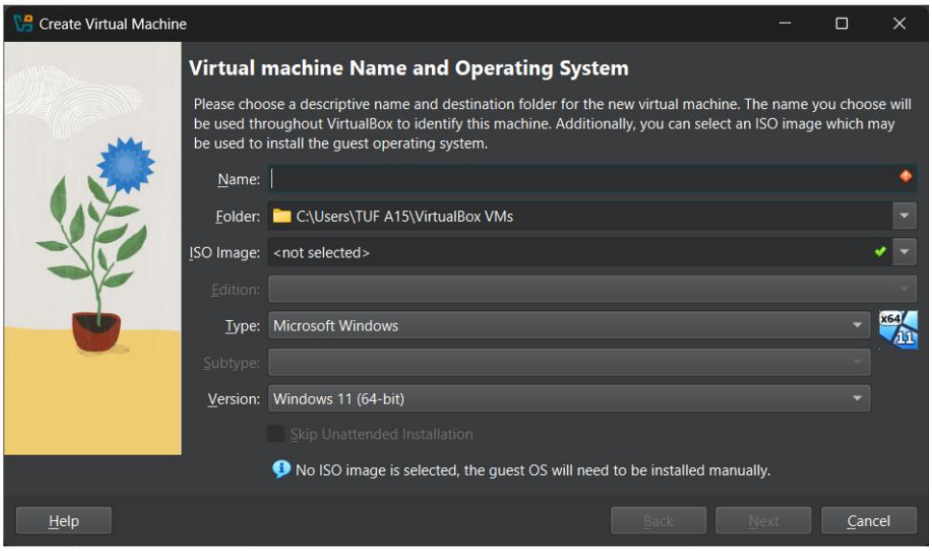
Set-up Guide

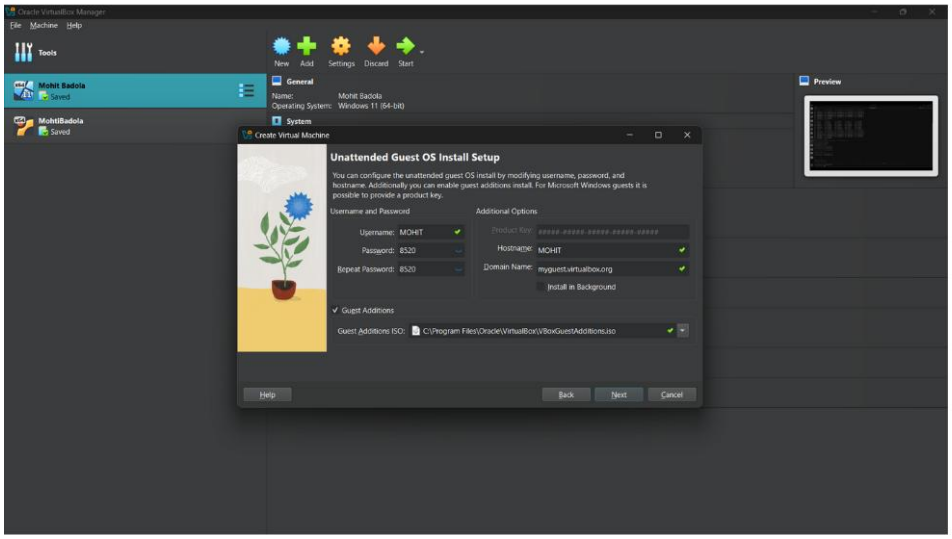
Step 1.

- Click on the new button after opening the VirtualBox

Step 2.

- Enter the folder name in Name column
- On ISO Image column select the Ubuntu file which you have downloaded earlier





Step 3.

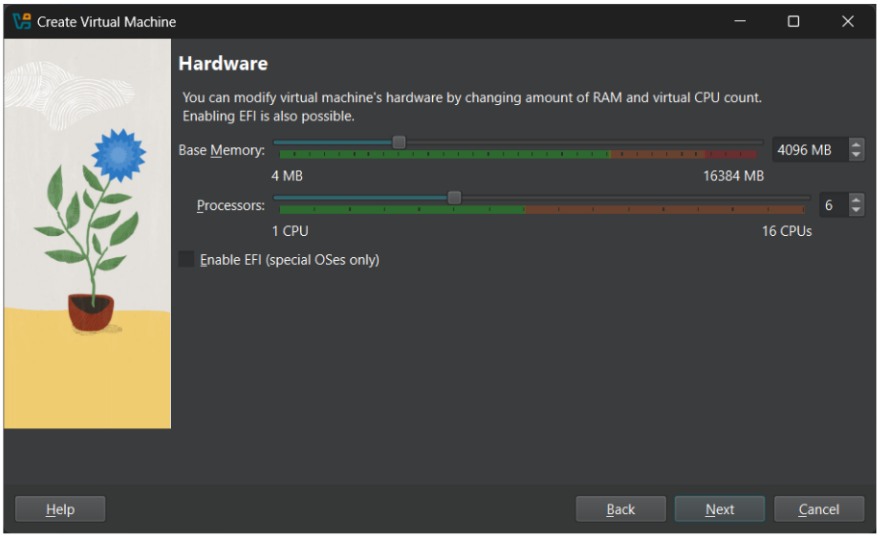
Enter the following

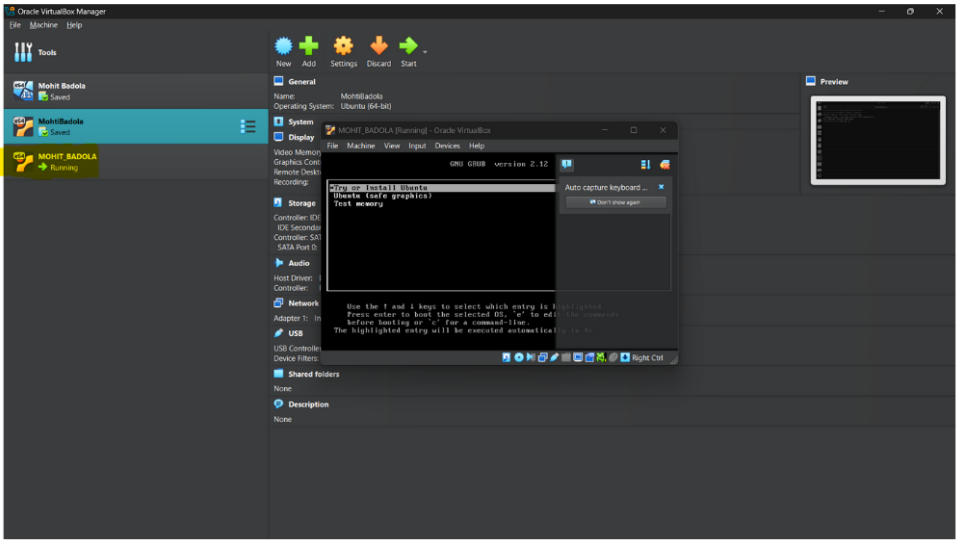
- Username
- Password
- Host Name

Step 4.

Give the Following as per your Reqirements.

- Base Memory(RAM)
- Processors (Number of Cores)



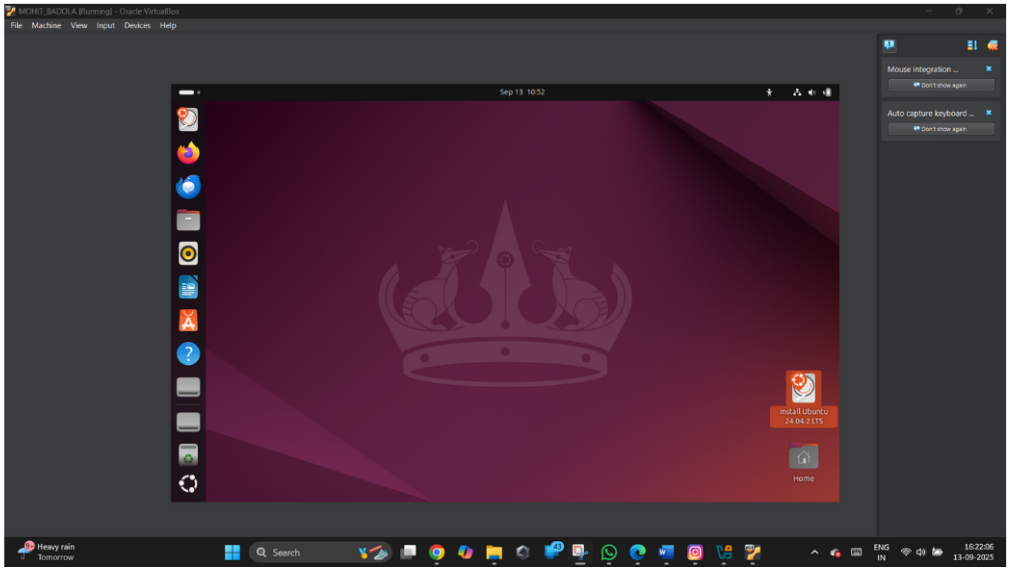


Step 5.

- Your Virtual Linux is ready
- Wait for few minute to load .

Step 6.

- Your Virtual Linux is ready to use



Commands

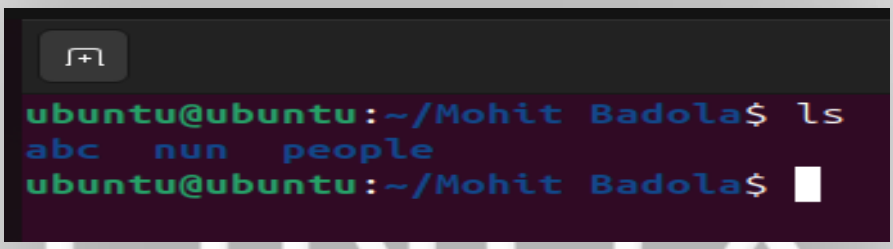
Linux is widely known for its powerful Command-Line Interface (CLI), which allows users to interact with the system using text-based commands.

Terminal Commands:

1) *ls (List Directory Contents):*

- The basic ls command displays the names of files and directories present in the current working directory.
- It shows file names in a simple list form without additional information.

SYNTAX: ls



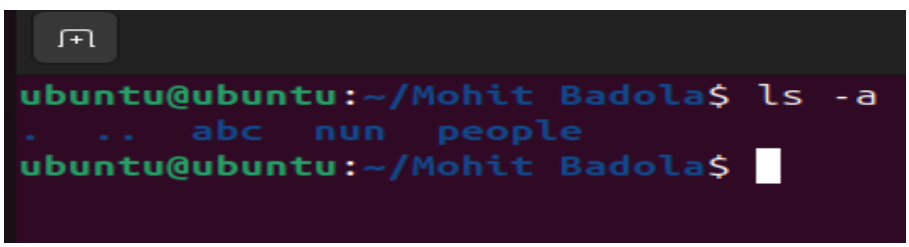
#Below is the commonly used option in *ls* command.

a) *ls -a (show al files):*

In Linux, files or directories whose names start with a **dot (.)** are considered **hidden files**.
These hidden files are used to store configuration settings and important system data, and they are not displayed by default when using the normal ls command.

- The command ***ls -a*** is used to list **all files and directories**, including hidden files.

Syntax: *ls -a*



USEFULL IN:

- The *ls -a* command shows **all files and directories**, including **hidden files** (those starting with a dot `.`), which are not shown by the regular *ls* command.
- For example, configuration files like **`.bashrc`** or **`.profile`** are hidden by default.
- Using *ls -a* helps users view these important hidden files, which are often used to store system or user settings.

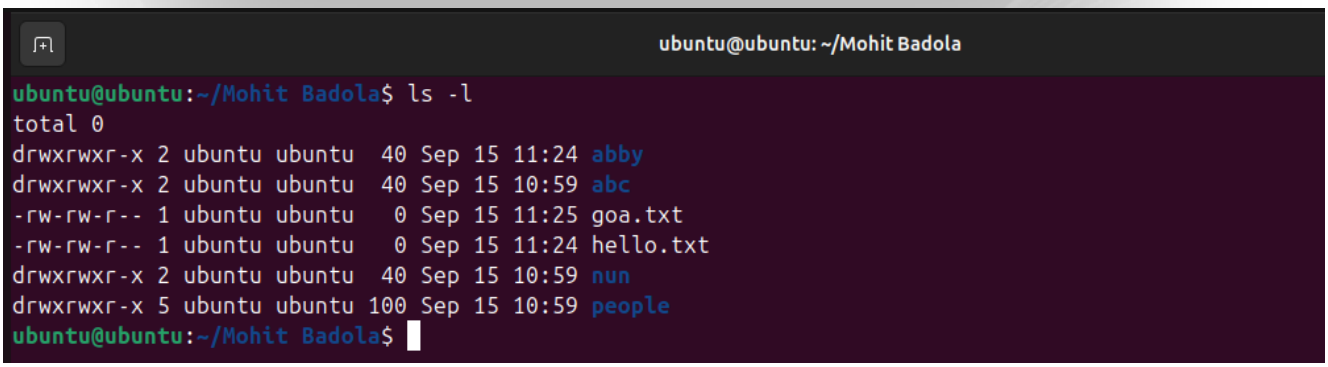
b) ls -l(Display Detailed List):

❖ The *ls -l* command is used to display files and directories in a **long (detailed) list format**.

❖ It shows important information about each file or directory such as:

- File type and permissions (e.g., -rw-r--r-- or drwxr-xr-x)
- Number of links
- Owner name
- Group name
- File size in bytes
- Last modification date and time
- File or directory name

Syntax: *ls -l*



- -rw-r--r-- → File permissions
- 1 → Number of links
- ubuntu → Owner name
- ubuntu → Group name
- 0 → File size (in bytes)
- Sep 15 11:24 → Last modification date and time

- hello.txt → File name

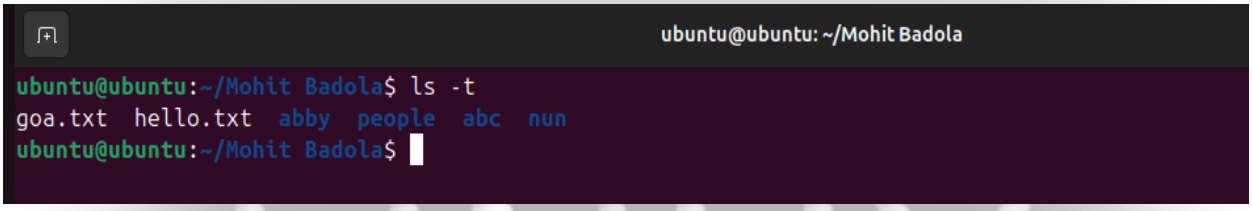
USEFUL IN:

- Helps to see file permissions and ownership.
- Shows file size and modification time.
- Useful for managing files securely.

c) ls -t (View in sorted form):

- The *ls -t* command is used to list files and directories sorted by modification time.
- It displays the most recently modified files or directories first.

Syntax: *ls -t*



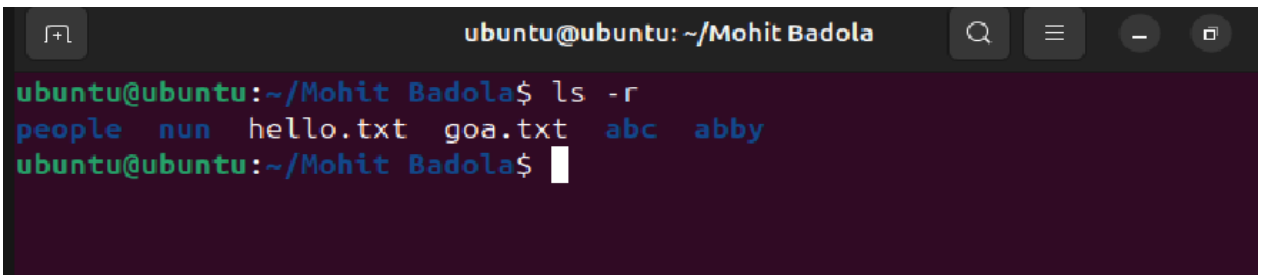
USEFUL IN:

- - Quickly see the files that were recently updated.
- Helpful in development or system administration to find the latest changes.
- Saves time when working with many files.

d) ls -r (list in reverse order)

- The *ls -r* command is used to **list files and directories in reverse order**.
- By default, the ls command lists files alphabetically.
- With the -r option, the order is reversed (Z to A instead of A to Z).

Syntax: *ls -r*



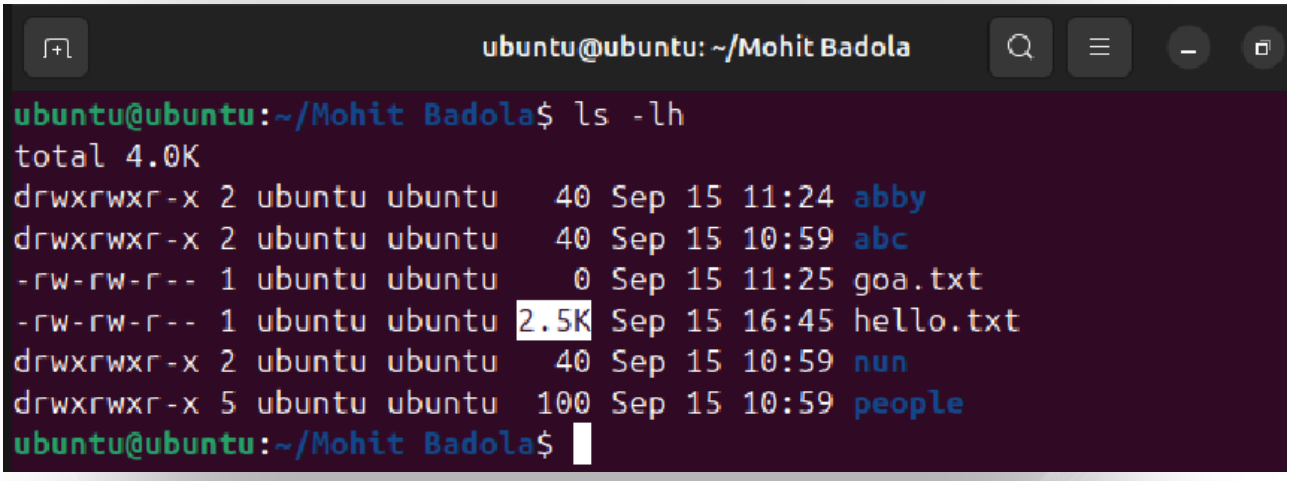
USEFUL IN:

- Useful when you want to view files starting from the last one alphabetically.
- Helps to quickly find the last file in a directory when dealing with many files.

e) ls -lh (Display file size in human readable form):

- The *ls -h* command is used with the -l option to display **file sizes in a human-readable format**.
- Instead of showing file sizes in bytes, it converts them into KB (Kilobytes), MB (Megabytes), or GB (Gigabytes).

Syntax: *ls -lh*



USEFUL IN:

- Makes file sizes easier to understand by showing in KB, MB, or GB.
- Useful when managing files and checking large files without manual conversion.

2) help(Provide information):

- The help command provides information about **shell built-in commands** in Linux.
- It shows a list of available commands along with a short description of each, which helps beginners understand how to use them.

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