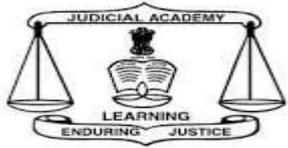# UBUNTU LINUX- AN OVERVIEW
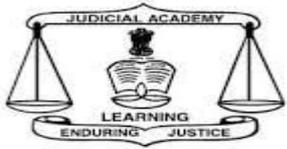
Ubuntu is a free and open-source operating system based on the Linux kernel. It is developed and maintained by Canonical Ltd. and is one of the most popular Linux distributions in the world.

- **Ubuntu is designed to be easy to use, secure, and stable, making it suitable for:**
    - Desktop computers
    - Servers
    - Cloud Systems
    - Government & Enterprise Environments

    It provides a complete operating system including a graphical interface, office software, internet tools, and thousands of free applications through the APT package management system.

KEY FEATURES

- **Open source and free to use.**

- **Regular updates and Long-Term Support (LTS) versions.**

- **Strong security and community support.**

- **Runs on desktops, servers, and embedded devices.**

Components of Ubuntu

- **Linux Kernel**
  - **Core of the operating system**
  - **Manages CPU, memory, devices, and processes**
  - **Acts as a bridge between hardware and software**
- **Bootloader (GRUB)-**
  - **Starts the operating system when the computer is powered on.**
  - **Loads the Linux kernel into memory**
- **System Libraries-**
  - **Provide essential functions for applications**
  - **Example: GNU C Library (glibc)**
- **System Services (Daemons)**
  - **Background programs that manage system tasks**
  - **Examples: networking, printing, login, power management**

Components of Ubuntu
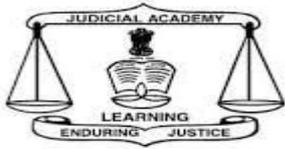
- **Shell**
  - **Command-line interface for interacting with the system.**
  - **Example: Bash shell**
- **Desktop Environment-**
  - **Graphical user interface.**
  - **Ubuntu's default is GNOME.**
  - **Includes windows, icons, menus, and settings tools.**
- **Package Management System-**
  - **APT and dpkg.**
  - **Used to install, update, and remove software.**
- **Applications-**
  - **Preinstalled software like Firefox, LibreOffice, Files, Terminal.**
  - **Thousands of applications available via Ubuntu Software Center.**

A CLI is a way to talk to your computer by typing commands instead of clicking buttons.
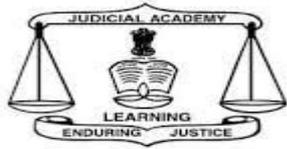
GUI (Graphical Interface): Click folders, icons, menus
CLI: Type instructions → computer obeys

Example: command ls - list the files

What is Bash?

Bash (Bourne Again SHell) A shell is a program that takes our commands

Talks to the operating system   Shows output on screen   Bash is just one type of shell. It's like a translator between you


```
~$echo $0
/bin/bash  Shell - Bash in this case
~$
~$
~$sh  Opening a new Shell
\w$echo $0
sh  Shell - Now sh
\w$exit
~$
~$
~$echo $0
/bin/bash
~$
```

The fact that we are typing in commands,
in the form of text,
and getting back results in the form of text,
makes this a **Command Line Interface**

The alternative is a GUI - A graphical user interface,
where we have graphical elements that the user can interact with,
like Buttons.

- **Package Management System-**
  - **APT and dpkg.**
  - **Used to install, update, and remove software.**

- **A package management system is how Ubuntu:**
  - **Installs software**
  - **Updates software**
  - **Removes software**
  - **Keeps everything compatible and secure.**
  - **Instead of downloading random .exe files like Windows, Ubuntu uses packages.**

- **dpkg — Debian Package Manager**
  - **Works with .deb files**
  - **Very basic & low-level**
  - **Does NOT handle dependencies automatically**
- **Common dpkg commands-**
  - **Install a .deb file:** **sudo dpkg -i file.deb**
  - **Remove a package:** **sudo dpkg -r package-name**
  - **List installed packages:** **dpkg -l**

- **Package Management System-**
  - **APT and dpkg.**
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- **Common APT commands (daily use)**
  - **Update package list:** sudo apt update
  - **Upgrade installed packages:** sudo apt upgrade
  - **Install software:** sudo apt install firefox
  - **Remove software:** sudo apt remove firefox
  - **Remove software + config files:** sudo apt purge firefox
  - **Search a package:** apt search postgres

- **Where software comes from ?**
  - **APT installs software from repositories:**
    - **Official Ubuntu servers**
    - **Signed & verified**
    - **Secure updates**

When our system is in a broken package state, like:
A package install failed halfway or Some dependencies are missing or
Version conflicts happened or we interrupted apt install or we installed a .deb manually with dpkg -i we often get errors.
- **Running this command- sudo apt -f install will - detect missing/broken dependencies- install whatever application needs and finish the installation cleanly.**

- **Package Management System-**
  - **APT and dpkg.**
  - **Used to install, update, and remove software.**

- sudo apt install firefox
  - # error happens here
    sudo apt -f install

- If it still doesn't work-
  - sudo dpkg --configure -a
  - sudo apt update
  - sudo apt -f install
    This will cover - half-installed packages
    - outdated package lists
    - unresolved dependencies

- APT is the smart package manager we use and
- dpkg is the low-level tool that actually installs files.

- APT (Advanced Package Tool) is smart because it automatically handles all the hard parts of software management that beginners (and admins!) don't want to deal with. It automatically resolves dependencies.
- For ex- sudo apt install vlc -   APT will figure out what VLC needs, download all required libraries and install them in the correct order