

## What is Linux Operating System

Linux is based on the **UNIX** operating system. **UNIX** is a powerful, multi-user, multitasking operating system originally developed in the **1970s at AT&T Bell Labs**. It laid the foundation for many modern operating systems, including Linux.

- Linux is free and open-source, accessible to everyone.
- Its source code can be inspected and modified by anyone.
- This promotes global collaboration and innovation.
- Linux offers efficient performance and strong security.
- It works well across many devices and industries.

The Linux Operating System is a Unix-like operating system that combines a wide range of open-source tools and components to form a complete computing environment. These components include file systems, user interfaces, system utilities, and application programs all working together to manage hardware and enable users to interact with their computer systems.

To create a full and functional system, the Linux is combined with a collection of software packages and utilities, which are together called Linux distributions.

## What is a “distribution?”

[Linux distribution](#) is an operating system that is made up of a collection of software based on Linux kernel or you can say distribution contains the Linux kernel and supporting libraries and software. And you can get Linux-based operating system by downloading one of the Linux distributions and these distributions are available for different types of devices like embedded devices, personal computers, etc.

Around **600 + Linux Distributions** are available and some of the popular Linux distributions are:

- [MX Linux](#)
- [Manjaro](#)
- [Linux Mint](#)
- elementary
- [Ubuntu](#)
- [Debian](#)
- [Solus](#)
- [Fedora](#)
- [openSUSE](#)
- [Deepin](#)

## Why use Linux?

Because it is free, open-source, and extremely flexible, Linux is widely utilized. For servers and developers, it is the ideal option because it offers strong security, stability, and performance. Generally interoperable hardware, a broad software library, and a vibrant community that offers support and regular updates are the many benefits of Linux. Due to its adaptability, users can customize the operating system

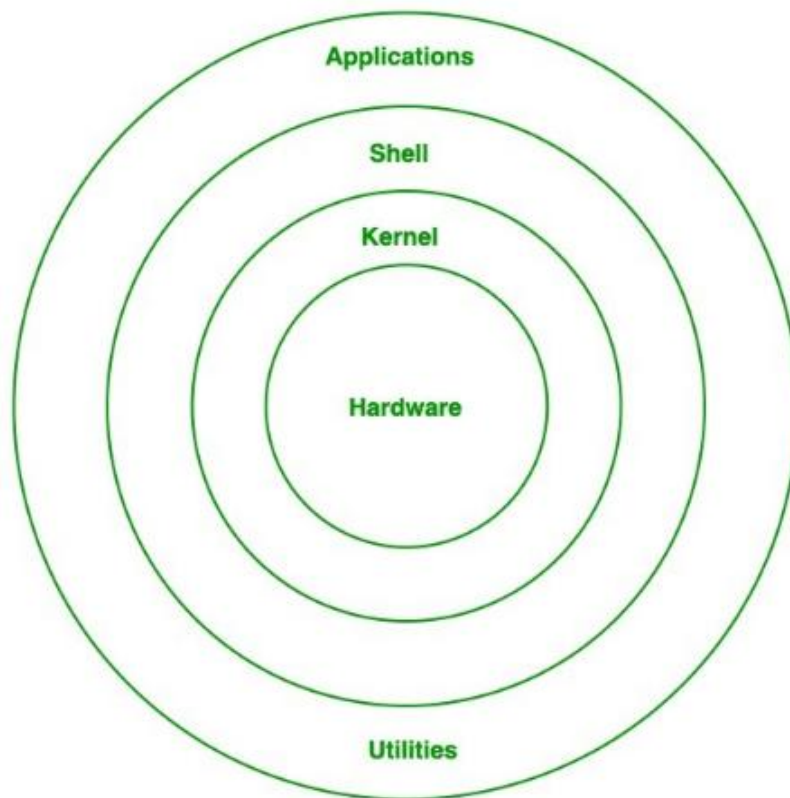
according to their own needs, whether they become for personal or large enterprise use.

## Architecture of Linux

[Linux architecture](#) has the following components:

### Linux Architecture

1. **Kernel:** [Kernel](#) is the core of the Linux based operating system. It virtualizes the common hardware resources of the computer to provide each process with its virtual resources. This makes the process seem as if it is the sole process running on the machine. The kernel is also responsible for preventing and mitigating conflicts between different processes. Different types of the kernel are:



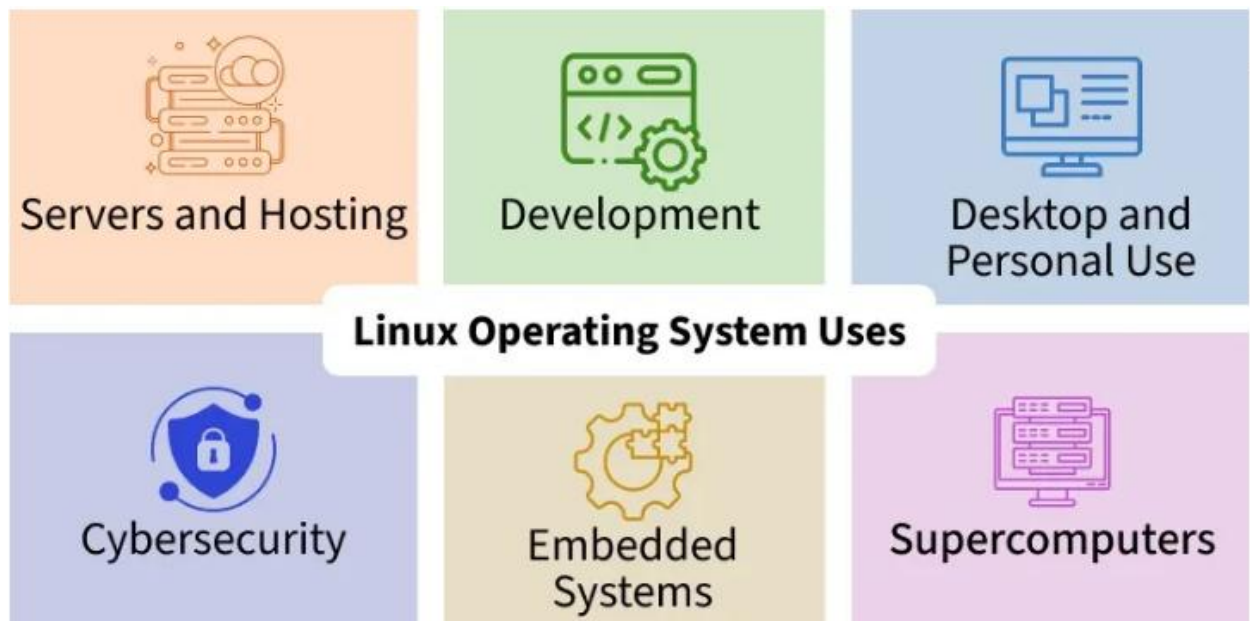
- Monolithic Kernel
  - Hybrid kernels
  - Exo kernels
  - Micro kernels
2. **System Library:** Linux uses system libraries, also known as shared libraries, to implement various functionalities of the operating system. These libraries contain pre-written code that applications can use to perform specific tasks. By using these libraries, developers can save time and effort, as they don't need to write the same code repeatedly. System libraries act as an interface between applications and the kernel, providing a standardized and efficient way for applications to interact with the underlying system.
  3. **Shell:** The shell is the user interface of the Linux Operating System. It allows users to interact with the system by entering commands, which the shell interprets and executes. The shell serves as a bridge between the user and the kernel, forwarding the user's requests to the kernel for processing. It provides a convenient way for users to perform various tasks, such as running programs, managing files, and configuring the system.
  4. **Hardware Layer:** The hardware layer encompasses all the physical components of the computer, such as [RAM \(Random Access Memory\)](#), [HDD \(Hard Disk Drive\)](#), CPU (Central Processing Unit), and input/output devices. This layer is responsible for interacting with the Linux Operating System and providing the necessary

resources for the system and applications to function properly. The [Linux kernel](#) and system libraries enable communication and control over these hardware components, ensuring that they work harmoniously together.

5. **System Utility:** System utilities are essential tools and programs provided by the Linux Operating System to manage and configure various aspects of the system. These utilities perform tasks such as installing software, configuring network settings, monitoring system performance, managing users and permissions, and much more. System utilities simplify system administration tasks, making it easier for users to maintain their Linux systems efficiently.

## How is the Linux Operating System Used

The Linux operating system is widely used across various domains due to its flexibility, security, and open-source nature



- **Servers and Hosting:** Powers web servers, cloud infrastructure, and database management systems.
- **Development:** Used by developers for coding, debugging, and running applications.
- **Desktop and Personal Use:** Provides secure and customizable desktop environments.
- **Cybersecurity:** Essential for ethical hacking, penetration testing, and security research.
- **Embedded Systems:** Runs lightweight devices like routers, IoT gadgets, and smart appliances.
- **Supercomputers:** Dominates high-performance computing for scientific research and simulations.
- **Education:** A cost-effective tool for teaching programming and system administration.

## **Which distribution is right for you?**

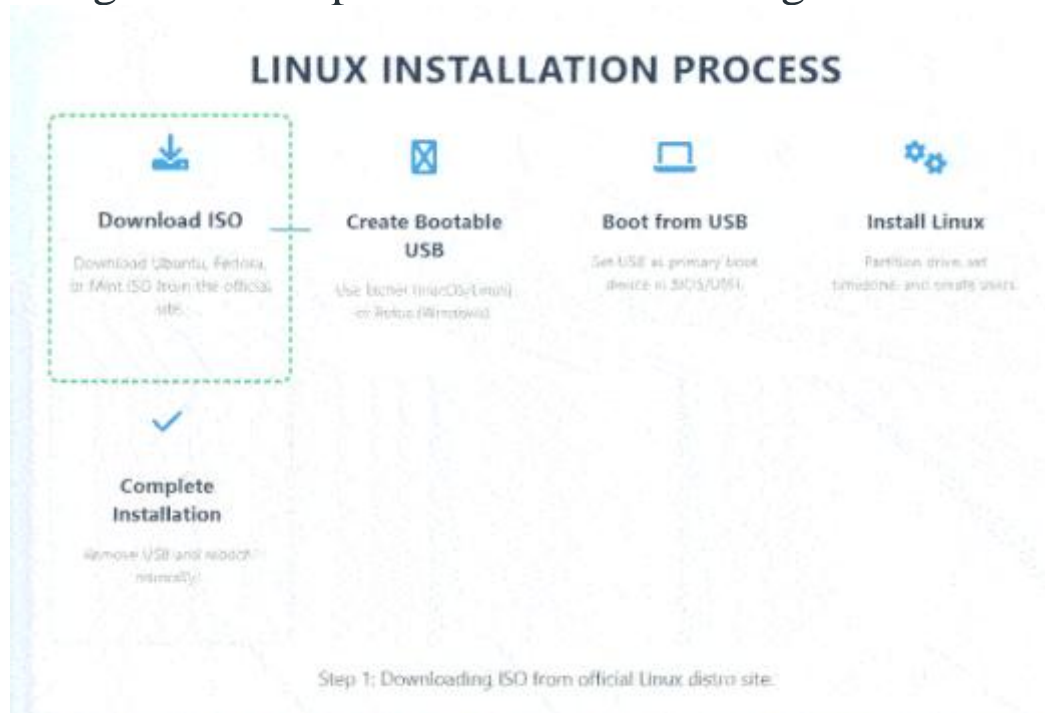
Choosing the right Linux distribution depends on your needs and experience level:

- **For Beginners:** Ubuntu is ideal for new users due to its user-friendly interface and strong community support. Linux Mint is another beginner-friendly option, offering a Windows-like experience.
- **For Advanced Users:** Arch Linux is favored for its minimalism and deep customization. Gentoo is another powerful option for users who want full control but are ready for a steep learning curve.
- **For Developers:** Fedora is popular for its cutting-edge tools and suitability for testing and development. Debian stands out for its stability and vast package repository, making it great for both development and production.

- **For Servers:** For server environments, [CentOS](#) is a powerful, community-maintained distribution that matches [Red Hat Enterprise Linux \(RHEL\)](#) quite somewhat. As an alternative, Ubuntu Server offers an extensive list of server applications in addition to strong community support and ease of use.
- **For Lightweight Systems:** Lubuntu is frequently picked by users either like lightweight operating systems or have outdated equipment due to its ability to utilize system resources efficiently while maintaining functionality. Another slim option is Puppy Linux, that is made to run well on outdated hardware while maintaining the essential functions and applications.

## Installing Linux

Selecting a Ubuntu, Fedora, or Linux Mint distribution which suits your needs is the initial step in the straightforward procedure for installing Linux.



## Installing Linux on bootable USB drive

- Download the ISO file first from the distribution's official website.
- Next, utilize an application like **Etcher** for macOS and Linux or **Rufus** for Windows to create a bootable USB drive.
- Following you insert the USB drive into your computer and restart it.
- After that you may set the USB drive as the primary boot device by traversing to the [BIOS or UEFI settings](#).
- Upon booting from the USB the hard drive, the Linux setup will show up.
- To partition the drive, choose your time zone, create user accounts, and change system settings.
- When the installation concludes, disconnect the USB drive and turn on your computer normally.
- For more detailed way to install the Linux Mint **Refer this [link](#)**.

## Installing Software on Linux

On Linux, installing software is simple.

- For **Debian**-based systems (like Ubuntu), use package managers like `apt`

```
sudo apt install package_name
```

- **For Fedora**, use `dnf`

```
sudo dnf install package_name
```

- Software centers are another source for a graphical application installation and searching interface.
- For Python installation specifics, detailed guidance can be found in the provided [link](#).

## Advantages of Linux

- The main advantage of Linux is it is an open-source operating system you can contribute, modify, and distribute the code freely.
- In terms of security, Linux is more secure than any other operating system and does not require any anti-virus software.
- The software updates in Linux are easy and frequent.
- Linux is freely available to use on the internet.
- It provides high stability it rarely slows down or freezes and there is no need to reboot it after a short time.

## **Disadvantages of Linux**

- It is not very user-friendly. So, it may be confusing for beginners.
- It has small peripheral hardware drivers as compared to windows.

## **Linux Commands**

Basic tools for utilizing the command line interface (CLI) to communicate with the operating system are Linux commands. Commonly used commands like:

- [ls](#) – Lists contents of directories
- [cd](#) – Changes the current directory
- [pwd](#) – Displays the current directory path
- [cp](#), [mv](#), [rm](#) – Used to copy, move, and delete files respectively
- [free](#) – Shows memory usage
- [df](#) – Checks disk space usage
- [top](#) – Monitors running processes
- [netstat](#), [ifconfig](#), [ping](#) – Help monitor and troubleshoot network connections

Package management differs depending on the distribution; Fedora-based machines use dnf, while Debian-based systems use apt. Commands like cat, grep, awk, and sed are required for editing text files. Knowing and performing these directions well enables. For clear understanding about the Linux commands refer this [link](#).

## **Linux History**

In 1991, Linus Torvalds created the Linux kernel, inspired by [UNIX operating system](#) and the MINIX operating system, to make a flexible and affordable system for personal computers. Developers around the world quickly joined in to improve it, leading to the creation of full Linux systems known as distributions.

Over the years, Linux has become known as a key component of modern computing, powering everything from servers and personal computers to supercomputers and smartphones. Due to its flexibility, durability, and strong community support, developers, businesses, and educational institutions frequently opt for it.