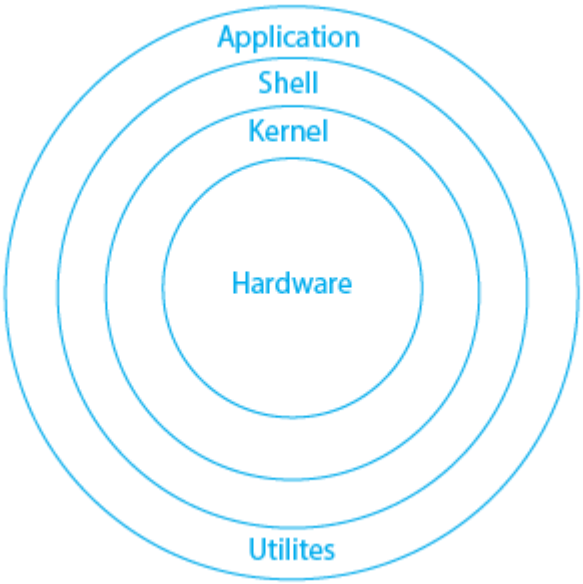
## Week 1: Linux operating system and vi commands

The Linux kernel, an open-source operating system that resembles Unix, was initially released on September 17, 1991, by **Linus Torvalds.** Linux is often packaged as the Linux distribution, which includes the kernel, system software, and supporting libraries, some of which are provided by the GNU Project. The Free Software Foundation uses the designation "GNU/Linux" to emphasize the importance of GNU software whereas many Linux distributions use the word "Linux"

### The Architecture of Linux Operating System



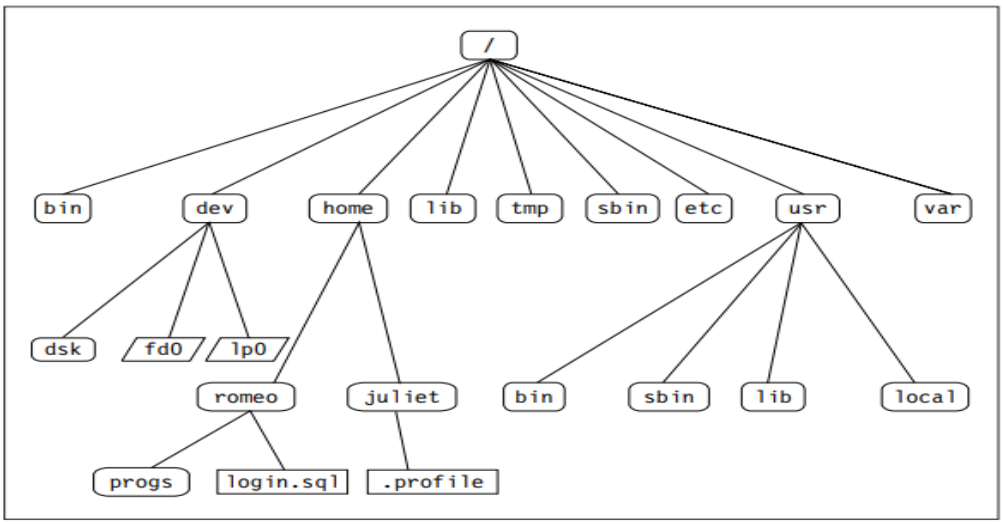

The architecture of Linux is based on the traditional Unix operating system, which is divided into several layers. The main layers of the Linux architecture are:

- **Hardware layer:** This is the bottommost layer and consists of the physical hardware components of the computer, such as the CPU, memory, and storage.
- **Kernel layer:** The kernel is the core of the Linux operating system and is responsible for managing the hardware resources and providing a consistent interface for the rest of the operating system. The kernel provides services such as process management, memory management, and file system management.
- **Shell and utilities layer:** This layer consists of the command-line interface (CLI) shell and a set of utilities that can be used to perform common tasks such as file management, text processing, and system administration.
- **Application layer:** The topmost layer of the Linux architecture consists of the user-facing applications such as web browsers, text editors, and office suites.

### Linux File System:

- The Linux file system is the structure that the Linux operating system uses to organize and store files and data on a computer. It is a hierarchical, tree-like structure that starts with the root directory, which contains all other directories and files. The Linux file system is based on the Unix file system, which was designed to be scalable, flexible, and easy to use.

FIGURE *The UNIX File System Tree*




**Linux Based Operating Systems**

Linux based Operating Systems, also known as a distribution that comprises the Linux kernel and accompanying libraries and software, is an operating system made up of a group of programs that are based on the Linux kernel. Additionally, you may obtain a Linux-based operating system by downloading one of the Linux distributions, which are offered for a variety of devices including embedded systems, personal computers, etc. There are more than 600 Linux distributions available, and some of the most well-known Linux based operating systems are listed below:

- Ubuntu Linux
- Linux Mint
- Puppy Linux
- Fedora
- Debian Linux
- SUSE Linux
- TAILS
- Red Hat Enterprise Linux (RHEL)
- Kali Linux

**What is Linux Used For?**

The Linux operating system is widely used and supports a wide range of use cases. These are some applications for using Linux Operating System:

- **Server OS:** Linux Operating system can be used as a Shared OS for shared servers of any kind, including web servers, database servers, file servers, email servers, etc. It was created to enable high-volume and multithreading applications.

- **Desktop OS:** It can also be used for computing for personal productivity. Linux is an open-source desktop environment that is free to use for those who prefer it to commercial operating systems.

- **Headless Server OS:** Systems without a graphical user interface (GUI) or a physically linked terminal and keyboard can utilize the Linux operating system as a headless server OS.

- **OS for Embedded Appliances:** OS for embedded devices or appliances is used in systems that only need basic computer capabilities. Linux Operating System is used as the embedded operating system in household appliances, automobile entertainment systems, and network file system devices.

- **Network OS:** It can also act as a Network operating system for switches, routers, DNS servers, home networking equipment, and more.

- **Cloud OS:** For cloud servers, desktops, and other services, major cloud computing companies have given access to instances running Linux.

**Features of Linux Operating System**

Linux Operating System has various features. Some of the features of Linux Operating System are specified below:

- **Open Source:** Linux Operating System is open-source software, which means that the source code is freely available for anyone to use, modify, and distribute. One of the biggest open-source initiatives in the world today is the Linux operating system, which is distributed under the GNU (General Public License).

- **Free to Use:** Since Linux Operating System is open source, so anyone anywhere in the world is free to modify, and analyze it without paying any amount.

- **Flexibility:** Linux can be integrated into devices including supercomputer servers, digital equipment, and watches. Installing a full Linux suite doesn't require any prerequisites.

- **Graphical User Interface (GUI):** Linux has a command-line interface by default, but it may be modified to utilize a graphical user interface like Windows. Installing packages is the main method for doing this. Logging into an Ubuntu server and installing its desktop environment is the most popular method for getting a GUI in a Linux system.

- **Portability:** Linux can run in any environment and is independent of how high- or low-end the hardware is. It may be used by many people at once on many different devices at any time. Linux Operating System is compatible with all types of hardware.

- **Updates available frequently:** The Linux operating system offers a large selection of easily available software updates that may be set up and utilized in accordance with needs. Users have the flexibility to select and apply updates as needed because they are updated more regularly.

- **Multi-User and Multi-Programming:** Linux Operating System allows Multi-Programming and also the facility of Multi-User which is not supported by Windows OS.

- **Hierarchical File Structure:** User files are organized in a clear directory structure in Linux, which has a well-defined file system. Binary directories, configuration directories, Data directories, memory directories, USR (Unix System Resources), var (variable directory), and non-standard directories are the different categories of folders based on the type of files they contain.

**Advantages of Linux Operating System**

There are several advantages of using the Linux operating system:

- **Open source:** Linux is open-source software, which means that the source code is freely available for anyone to use, modify, and distribute.
- **Stability:** Linux is known for its stability and reliability. It is less prone to crashes and errors than other operating systems, making it a good choice for servers and other mission-critical systems.
- **Security:** Linux has a reputation for being more secure than other operating systems. The open-source nature of Linux makes it easy for security experts to identify and fix vulnerabilities, and the use of strong permissions and user-access controls helps to prevent unauthorized access.
- **Customizability:** Linux is highly customizable. Users can easily modify and customize the operating system to suit their needs.
- **Large community:** Linux has a large and active community of developers and users who contribute to the development of the operating system and create software for it.

**Disadvantages of the Linux Operating System**

While Linux has many advantages, there are also some disadvantages to using the Linux operating system:

- **Compatibility issues:** Some software and hardware may not be fully compatible with Linux. This can make it difficult to run certain programs or use certain peripherals on a Linux-based system.
- **Learning curve:** Linux can have a steeper learning curve than other operating systems, especially for those who are not familiar with command-line interfaces.
- **Limited software availability:** Some popular software may not be available on Linux, or may only be available in a command-line version.
- **Fragmentation:** Linux is available in many different distributions, known as distros, which can make it difficult for software developers to ensure compatibility with all versions of the operating system.
- **Lack of standardization:** Linux distribution package are different from each other, and it can be hard for users to know what features and programs will be included in a distribution package.

## vi Commands

To Start vi

To use vi on a file, type in vi filename. If the file named filename exists, then the first page (or screen) of the file will be displayed; if the file does not exist, then an empty file and screen are created into which you may enter text.

vi filename edit filename starting at line 1

vi -r filename recover filename that was being edited when system crashed

To Exit vi

Usually the new or modified file is saved when you leave vi. However, it is also possible to quit vi without saving the file.

Note: The cursor moves to bottom of screen whenever a colon (:) is typed. This type of command is completed by hitting the <Return> (or <Enter>) key.

* :x <Return>  quit vi, writing out modified file to file named in original invocation
  :wq <Return> quit vi, writing out modified file to file named in original invocation
  :q <Return>  quit (or exit) vi
* :q! <Return>  quit vi even though latest changes have not been saved for this vi call

**A. Log into the system**
**B. Use 'vi" editor to create a file called myfile.txt which contains some text.**
**C. Correct typing errors during creation**
**D. Save the file**
**E. Logout of the system**

**a. Log into the system**
Login : Your HT Number
password: 123456
Then we get log into the commands.

**B. Use vi editor to create a file called myfile.txt which contains some text**
**$** vi file name
**Description:**
- Vi Command is used to create and editing a file;
- If we type "vi filename".

✓ If the file named filename exists, then the first page (or screen) of the file will be displayed;
✓ If the file does not exist, then an empty file and screen are created into which you may
enter text.
**$** vi myfile.text.

**C. Correct typing errors during creation**

**D. Save the File.**
To save the file created in vi editor we press esc ":wq"
It means that saves the file and Quits editing mode, then we come out from the vi editor.
**:wq** *quit vi, writing out modified file to file named in original invocation*
**:q!** *quit vi even though latest changes have not been saved for this vi call*

**E. Logout the system.**
$ exit
Description: In our current directory press exit to log out from the commands