**Ramdeobaba University, Nagpur**

**School of Computer Science and Engineering**

**Session: 2024-2025**

**Fundamentals of Linux OS I Semester**

**PRACTICAL NO. 1**

**Aim: Introduction to Linux OS and Execution of Basic Linux Commands.**

**Tasks:**

**(A) Research the history and development of Linux and Explore major Linux distributions and their differences.**

**(B) To implement basic linux commands**

**Theory:**

**Linux Introduction**

Linux is an open-source, Unix-like operating system kernel that serves as the core component of many operating systems. It was created by Linus Torvalds in 1991, initially as a personal project. Linux is known for its flexibility, stability, and security, making it popular in various environments, from personal computers and servers to mobile devices and embedded systems.

#### Key Features of Linux:

* **Open Source:** Linux is free and open-source, meaning anyone can view, modify, and distribute its source code. This has led to a large, active community of developers and contributors who continuously improve the system.
* **Multiuser Capability:** Linux supports multiple users simultaneously, ensuring that each user has a secure and isolated environment.
* **Multitasking:** Linux allows multiple processes to run concurrently without affecting each other's performance.
* **Portability:** Linux is highly portable and can run on a wide range of hardware, from desktops and laptops to embedded systems and supercomputers.
* **Security:** Linux has robust security features, including user permissions, firewalls, and SELinux, making it a preferred choice for environments requiring high security.
* **Customizability:** Users can customize every aspect of Linux, from the kernel to the graphical user interface, to suit their needs.

#### History of Linux:

* **Creation:** Linus Torvalds began developing Linux as a hobby project while studying at the University of Helsinki. The first version, Linux 0.01, was released in 1991.
* **Growth:** Linux quickly gained popularity due to its open-source nature and the contributions of developers worldwide. The kernel has since evolved through thousands of iterations.
* **Linux Foundation:** In 2000, the Linux Foundation was established to promote, protect, and standardize Linux. It plays a crucial role in the development and adoption of Linux across industries.

### Types of Linux Distributions

Linux itself is just the kernel, but various distributions (distros) build on it to create complete operating systems with pre-packaged applications, desktop environments, and tools. Each distribution serves different purposes and user needs.

#### 1. Ubuntu

* **Overview:** Ubuntu is one of the most popular and user-friendly Linux distributions, based on Debian. It is widely used for desktops, servers, and cloud computing.
* **Features:**
  + **Regular Updates:** Ubuntu is known for its regular release cycle, with updates every six months.
  + **User-Friendly:** It provides a polished user interface (GNOME by default) and extensive community support, making it ideal for beginners.
  + **Variants:** Ubuntu has several official flavors, including Kubuntu (KDE desktop), Xubuntu (XFCE desktop), and Ubuntu Server.

#### 2. Fedora

* **Overview:** Fedora is a cutting-edge distribution sponsored by Red Hat. It is known for incorporating the latest features and technologies in the Linux world.
* **Features:**
  + **Bleeding-Edge Software:** Fedora often includes the latest versions of software and technologies, making it a favorite among developers and tech enthusiasts.
  + **Focus on Innovation:** It serves as a testing ground for features that may eventually make their way into Red Hat Enterprise Linux (RHEL).
  + **Security:** Fedora emphasizes security, with features like SELinux (Security-Enhanced Linux) enabled by default.

#### 3. Debian

* **Overview:** Debian is one of the oldest and most stable Linux distributions. It is known for its reliability and extensive software repository.
* **Features:**
  + **Stability:** Debian prioritizes stability, making it a popular choice for servers and mission-critical systems.
  + **Large Software Repository:** It offers a vast selection of software packages, ensuring users have access to almost any application they need.
  + **Community-Driven:** Debian is maintained by a large community of developers and volunteers, and it is free from corporate influence.

#### 4. CentOS / Rocky Linux / AlmaLinux

* **Overview:** CentOS was a community-driven distribution derived from Red Hat Enterprise Linux (RHEL). After Red Hat shifted its focus, Rocky Linux and AlmaLinux emerged as alternatives.
* **Features:**
  + **Enterprise-Grade:** These distributions provide the stability and reliability of RHEL without the cost, making them popular in enterprise environments.
  + **Long-Term Support:** They offer long-term support and stability, ideal for servers and production environments.
  + **Compatibility:** CentOS, Rocky Linux, and AlmaLinux maintain binary compatibility with RHEL, ensuring that software designed for RHEL works seamlessly.

#### 5. Arch Linux

* **Overview:** Arch Linux is a lightweight and flexible distribution designed for users who prefer to build their system from the ground up.
* **Features:**
  + **Rolling Release:** Arch uses a rolling release model, meaning users always have access to the latest software versions.
  + **Minimalism:** It installs with only the essential components, allowing users to customize their system according to their needs.
  + **Advanced User Base:** Arch is favored by experienced Linux users who want complete control over their system configuration.

#### 6. Linux Mint

* **Overview:** Linux Mint is based on Ubuntu and designed to be user-friendly, especially for users transitioning from Windows.
* **Features:**
  + **Cinnamon Desktop:** Linux Mint’s flagship edition features the Cinnamon desktop, which offers a traditional desktop experience.
  + **Ease of Use:** It comes with multimedia codecs, pre-installed software, and a user-friendly interface, making it accessible to beginners.
  + **Stability:** Based on Ubuntu LTS (Long-Term Support) versions, Linux Mint emphasizes stability and reliability.

#### 7. OpenSUSE

* **Overview:** OpenSUSE is a community-driven distribution sponsored by SUSE, offering two main versions: Leap (stable) and Tumbleweed (rolling release).
* **Features:**
  + **YaST:** OpenSUSE’s powerful configuration tool, YaST, allows users to manage the system easily.
  + **Flexibility:** Users can choose between the stable Leap version or the cutting-edge Tumbleweed version, depending on their needs.
  + **Enterprise Connection:** OpenSUSE shares a close relationship with SUSE Linux Enterprise, providing enterprise-grade features.

#### 8. Kali Linux

* **Overview:** Kali Linux is a specialized distribution designed for cybersecurity professionals and ethical hackers.
* **Features:**
  + **Penetration Testing Tools:** Kali comes pre-installed with a vast array of security tools for penetration testing, forensics, and reverse engineering.
  + **Security-Focused:** It is designed with security in mind, allowing users to perform various security assessments.
  + **Customizable:** Kali is customizable to meet the specific needs of security professionals.

**BASIC COMMANDS**

* $ exit logout

$ <ctrl d >

* $ passwd create or to change password
* $ date check current date
* $ cal display current month’s calendar

$ cal *y* display complete calendar of year *y*

* $ clear clear the screen
* $ who find users logged in the system
* $ whoami find who you are
* $ man *commandname* display manual pages for a particular command
* $ echo *text*  displays the text on standard output
* $ tty print the filename of the terminal connected to

standard input.

* $ logname displays the user’s login name
* $ uname displays the name of the kernel

options : -i displays the system's hardware platform

-m displays the name of the hardware that the system is

running on

-n displays the machine's hostname

**date:** This command is used to display the current data and time.

a = Abbreviated weekday. A = Full weekday.

b = Abbreviated month.

B = Full month.

c = Current day and time.

C = Display the century as a decimal number. d = Day of the month.

D = Day in „mm/dd/yy‟ format

h = Abbrevated month day.

**Common Options:**

**a = Abbreviated weekday.**

**A = Full weekday.**

**b = Abbreviated month.**

**B = Full month.**

**c = Current day and time.**

**C = Display the century as a decimal number.**

**d = Day of the month.**

**D = Day in „mm/dd/yy‟ format**

**h = Abbrevated month day.**

**clear:** It is used to clear the screen  
$clear

**man**: It help us to know about the particular command and its options & working. It is like„help‟ command in windows

$man <command name>

**df** : is used to see the current amount of free space on your disk drives

$df

**free:** Likewise, to display the amount of free memory, enter the free command

$free

**exit**: We can end a terminal session by either closing the terminal emulator window, or by entering the exit command at the shell prompt.

$exit

**EXPERIMENTATION:**

**PART-1:** Execution of basic commands listed above and demonstrating their use.

**PART-2:**

**Do as Directed**

1. Display the current date
2. Display the calendar for the current month
3. Display the calendar of 2012
4. Display the calendar of Feb 2015
5. Display the amount of free storage on your machine
6. Display the amount of free memory on your machine
7. Display the user name of the current user
8. Open the man of date free command
9. Display text – Todays Date is <todays date> on command line