**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

$Date

1. Display the calendar for the current month

$cal

1. Display the calendar of 2012

$cal 2012

1. Display the calendar of Feb 2012

$cal feb 2012

1. Display the amount of free storage on your machine

$df

1. Display the amount of free memory on your machine

$free -m

1. Display the user name of the current user

$logname

1. Open the man of date free command

$man date

1. Display text – Todays Date is <todays date> on command line

$echo “Todays Date is $(date)”

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