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**SECTION C**

**Linux Programming: Assignment-1:**

1. **What is Linux Operating System (OS)? List three pros and cons of it**

* What is Linux?

Linux is a free computer system that helps your computer work. It’s

like Windows or Mac but you don’t have to pay for it.

3 Good Things About Linux

* Free to use
* Very safe from viruses
* Works on many computers, old or new

3 Bad Things About Linux

* Hard to learn for beginners
* Some programs and games don’t work
* Some devices like printers may not work well

1. **Differentiate between Linux, Mac, Android, and Windows OS with at least six unique features.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | **Linux** | **Mac** | **Android** | **Windows OS** |
| **Source Type** | Closed-source (proprietary, Apple only) | Open-source (AOSP) but modified by brands | Closed-source (proprietary, Microsoft) | Open-source (free to modify) |
| **Devices** | PCs, servers, mainframes, IoT | Apple devices only (MacBook, iMack | Smartphones, tablets, smart TVs | PCs, laptops, tablets |
| **Customization** | Highly customizable | Very limited customization | Customizable by manufacturers & users | Moderate customization (themes, settings) |
| **Stability & Security** | Very stable, secure, rarely targeted by malware | Secure and stable, fewer viruses than Windows | Secure but depends on manufacturer updates | Less secure, frequent target of malware |
| **User Interface** | Command-line + GUI options | Polished, premium graphical UI | Touchscreen, app-based UI | User-friendly graphical UI (Windows Desktop) |
| **Cost** | Free (most distros) | Expensive (comes with Apple devices) | Expensive (comes with Apple devices) | Paid license (pre-installed or purchased) |

1. **Why is Linux preferred for Mainframe Servers for legacy application? Give three out-of-the-box technical reasons.**

Three straightforward technical explanations:

* Excellent for virtualization

With mainframe virtualization tools, Linux performs incredibly well. It is ideal for older (legacy) systems because it can run thousands of apps simultaneously without experiencing any lag

* Moving Old Apps Is Simple

With minimal modifications, many outdated UNIX or other system applications can be transferred to Linux. Compared to rewriting the apps, this saves time and money.

* Robust Integrated Security

Linux works with data-protecting hardware on mainframes and has robust security tools like SELinux. Even if older apps weren't designed with security in mind, this keeps them safe.

1. **Using an appropriate diagram, describe the Linux file system's structure. Note: To find out, use the tree command**.

/ ├── bin → Programs (such as simple commands)

├── boot → Files required to boot up the system

├── dev → Device files (such as USB, hard drives)

├── etc. → Settings and configuration files

├── home → User folders (such as your personal files)

├── lib → Libraries (allow programs to run)

├── media → USB or CD when plugged in

├── root → The root user's home folder

├── sbin → System programs (used by the administrator)

├── tmp → Temporary files (automatically removed)

├── usr → Additional files and programs

├── var → Logs and evolving information

/ → The root folder at the top

/home → Your files are located here.

/etc → System configuration

/bin → Simple commands such as cp and ls

Temporary storage (/tmp)

/usr → Additional software

/var → System messages (log files)

1. **If Linux OS is open-source, how do companies like Red Hat still making money from it? Do a market study and answer properly**

Despite Linux's open-source and free nature, businesses like Red Hat profit from its services.

Instead of charging for the Linux code itself, they charge for subscriptions that provide users with:

certified stable versions that have been verified to function with

software and hardware , sustained upkeep

Additionally, they make money by providing training, certifications, and consulting to businesses on how to properly use Linux.

Red Hat provides additional tools that large companies pay for, such as OpenShift (for cloud and containers).

If Linux is free, why do businesses pay?

Because big companies (banks, telecoms, governments) require accountability, security, and dependability. They want a reliable business to fix anything that breaks fast, and Red Hat delivers on that promise.

Because of this, Red Hat became a multibillion dollar company despite the fact that Linux is free.

1. **Write the command to display today’s date and time (i.e., current System time).**

* In **Linux**, the command to display today’s **date and time (current system time)** is:

Inpute:

bash

date

outpute:

Mon Sep 22 19:15:05 IST 2025

**7. Which command is used to check how long the system has been running?**

In **Linux**, the command used to check **how long the system has been running (uptime)** is:

Input:

bash

uptime

output:

19:20:15 up 3 days ,5:42, 2 users, load average: 0.15, 0.10, 0.05

**8.What is the difference between shutdown -h now and halt?**

shut down -h now → This command instructs the system to safely shut down right away. After logging out users and stopping all open programs, it shuts down the computer.  
  
halt → This command rapidly shuts down the system, but it may not unmount filesystems or completely terminate all programs.

**9. Compare init 0 and shutdown -h. Which is safer? Why?**

init 0

* immediately puts the system in runlevel 0, or halt (power off).  
    
   It immediately shuts down the system and halts all processes.  
    
   It doesn't always guarantee that services are correctly terminated, so it's not very elegant.

shut down -h  
  
 The purpose of "Shutdown" is to gracefully and safely shut

down the system.

After alerting every user who is logged in, it synchronizes

disks, stops

services in the proper order, and shuts down the system.  
  
 significantly lower risk of file system corruption or data loss.

**10. A system administrator accidentally powers off a Server machine without shutting it**

**down properly. What problems can occur to the said Server?**

Turning off a server abruptly without completely shutting it down is similar to unplugging a running computer or television. There is no time for the server to save its work. Important data may be lost, files may become corrupted, and the hard drive may be damaged. Some programs may not work properly, or it may take longer to start the next time you turn it on. Therefore, it is always safer to shut it down properly.