LinuxProgramming– Assignment 1

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Sem: 3rd (2 year)

Section: 3c

USN: ENG25CY1005

Roll No: 65

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

Linux is a free and open-source operating system. It controls the computer hardware and lets us run programs. It is like Windows or Mac, but open for everyone.

Pros-

1. Free and open-source.

2. Very safe and stable.

3. Can be changed and customized easily.

Cons-

1. Some popular apps and games don't run on Linux.

2. New hardware may not always work well.

3. Beginners may find it hard to learn.

2. Difference between Linux, Mac, Android, and Windows

1. Kernel: Linux uses Linux kernel, Mac uses XNU, Android uses modified Linux kernel, Windows uses NT kernel.

2. License: Linux is open-source, Mac/Windows are paid, Android is partly open-source.

3. Use: Linux is for developers, Mac for creative and office work, Android for mobiles, Windows for desktops and gaming.

4. App store: Linux uses package managers, Mac has App Store, Android has Play Store, Windows uses Microsoft Store.

5. Customization: Linux is highly customizable, Android is partly customizable, Mac and Windows are less customizable.

6. Security: Linux is very secure, Mac is secure with Apple rules, Android has app permissions but some risks, Windows has most viruses but also strong protection.

3. Why Linux is preferred for Mainframe Servers?

1. It is very stable and can run for months/years without restart.
2. It supports big files and recovery tools to protect old data.
3. It works on many hardware types and can run old software in virtualization.

4. Structure of Linux File System

Linux has a tree-like structure starting with / (root).

```
/
├── bin (basic commands)
├── sbin (system commands)
├── etc (config files)
├── usr (user programs, libraries)
├── var (logs, cache, temporary data)
├── home (user folders)
├── root (root user home)
├── dev (device files)
├── proc (process info)
├── sys (system info)
├── tmp (temporary files)
└── opt (optional software)
```

5. How Red Hat makes money from free Linux?

Even though Linux is free, companies like Red Hat earn money by:
1. Selling support and updates for businesses.
2. Offering extra products like OpenShift (cloud) and Ansible

(automation).

3. Giving training and certifications.

4. Providing consulting services to help companies use Linux.

6. Command to show today's date and time

date

7. Command to check system uptime

uptime

8. Difference between shutdown -h now and halt

shutdown -h now stops services, saves data, unmounts files, then halts safely. halt just stops the system, sometimes without closing things properly…So, shutdown -h now is safer.

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

init 0 changes system to halt mode (runlevel 0).
shutdown -h cleanly shuts down with warnings and stops services.
Safer: shutdown -h because it does a complete and safe shutdown.

10. Problems if server is powered off without shutdown

1. Files may get corrupted.
2. Databases may break or lose data.
3. System will take longer to restart (needs file check).
4. Services may fail to start.
5. Hardware and disks may be stressed.

Brainstorming

a) Can we build our own OS using Linux kernel?
Yes, because Linux is open-source. Many groups make their own Linux distributions.(from research)

b) What are the hurdles?
- Need drivers for all hardware.
- Need to fix bugs and keep security updates.
- Packaging and testing is very difficult.
- Legal/licensing issues for software. (from research)

c) Is anyone in India working on this?
Yes. Engineers in India at companies like Red Hat India, IBM India, and Intel India work on Linux kernel and OS projects. Many open-source developers from India also contribute to Linux.(from research)