

LINUX PROGRAMMING

ASSIGNMENT-4

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1. A system has a file /etc/passwd. How would you use grep + tee to extract usernames and save them to a file while also displaying them on screen?

Command:

```
grep -E -o '^[^:]+' /etc/passwd | tee usernames.txt
```

Explanation:

- Extracts usernames (text before first ':').
- 'tee' displays results on screen and saves to file.
- Alternative: cut -d: -f1 /etc/passwd | tee usernames.txt

2. A binary isn't found in \$PATH. How would you use commands (which, find, locate) to troubleshoot and fix the issue?

Steps:

1. Use 'which mybinary' or 'command -v mybinary' to check if in PATH.
2. Use 'locate mybinary' for fast search (update DB with 'updatedb').
3. Use 'find / -type f -name mybinary 2>/dev/null' for real-time search.
4. Check permissions with 'ls -l'.
5. Add directory to PATH or move binary to /usr/local/bin.
6. If not installed, install via package manager (apt, yum, etc.).

3. Write a command pipeline that finds all .log files modified in the last 24 hours in /var/log and saves results into log_report.txt.

Command:

```
find /var/log -type f -name '*.log' -mmin -1440 -print | tee log_report.txt
```

`-mmin -1440` = modified within last 24 hours.

Alternative: `find /var/log -type f -name '*.log' -mtime -1 -print | tee log_report.txt`

4. What is the difference between shutdown -r now and reboot?

- 'shutdown -r now': graceful shutdown → stops services, unmounts filesystems, then reboots.
- 'reboot': historically direct reboot; on systemd both are equivalent.
- Use 'shutdown -r' when scheduling reboots or giving messages; 'reboot' is shorthand.

5. How can you use the tee command to debug a script that generates both standard output and error messages?

Capture both stdout and stderr:

```
./script.sh 2>&1 | tee debug.log
```

Separate stdout and stderr:

```
./script.sh > >(tee stdout.log) 2> >(tee stderr.log >&2)
```

'tee' allows monitoring in real-time while saving logs.

6. Explain any three real-world applications of Linux in industries.

1. Servers & Web Hosting: Linux powers Apache, Nginx, databases.
2. Cloud & Containers: foundation for Docker, Kubernetes, AWS.
3. Embedded & IoT: runs in routers, smart devices, automotive systems.

7. Differentiate application, system and utility software in the context of Linux environment.

- Application Software: End-user programs (Firefox, LibreOffice).
- System Software: Kernel, drivers, system libraries.
- Utility Software: Tools for tasks (ls, cp, grep, cron, tar).

8. What are the key differences between open-source and proprietary operating systems?

- Open-source: Source available, customizable, free (Linux).
- Proprietary: Closed-source, licensed, vendor-controlled (Windows).
- Open-source = community support, flexible; Proprietary = vendor support, lock-in risk.

9. Write the command to display the system's kernel version.

Command: uname -r

Other options: uname -a, cat /proc/version

10. What is the difference between head and tail commands in text processing?

- 'head': shows first N lines of a file (default 10).
- 'tail': shows last N lines (default 10), supports -f to follow.
- head useful for headers/previews; tail useful for recent logs.