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 the screen?

Ans : The /etc/passwd file contains user account information. Each line represents a user, with fields separated by colons (:). The username is the first field on each line. To extract only the usernames and simultaneously display them on the screen and save them to a file, we can use the following command:

cut -d':' -f1 /etc/passwd | tee usernames.txt

1. cut -d':' -f1 /etc/passwd
cut extracts sections of each line.
-d':' specifies : as the delimiter.
-f1 selects the first field (username).
2. | (pipe)

Sends the output of the cut command to the next command.
3. tee usernames.txt
tee writes the output to a file (usernames.txt) and displays it on the screen simultaneously.

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

Ans:
1. Use which to check if the binary is in the $PATH:
which binary_name
2. If not found, use find to search the filesystem:
find / -type f -name "binary_name" 2>/dev/null

3. Alternatively, use locate (after updating the database):
sudo updatedb
locate binary_name
4. Once the binary path is found, add it to $PATH:
export PATH=$PATH:/path/to/binary_directory
5. To make it permanent, add the above line to ~/.bashrc or ~/.profile.

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

Ans :
Command**:**
/var/log -name "*.log" -mtime -1 -print | tee log_report.txt

This locates .log files modified in the last 24 hours and saves results to log_report.txt

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

Ans :
i. shutdown -r now: Gracefully shuts down all processes, logs out users, and reboots immediately.
ii.reboot: Instantly restarts the system, may not handle active processes as gracefully.

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

Ans :
Command:
./script.sh 2>&1 | tee debug.log
2>&1 redirects standard error (file descriptor 2) to standard output (file descriptor 1).
| tee debug.log writes the combined output to the file debug.log and also shows it on the terminal
This combines stdout and stderr streams, saving them into debug_output.txt as well as displaying them.

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

Ans :
Google: Data centers and Android OS.
Amazon AWS: Cloud services and servers.

Netflix: Content delivery and streaming infrastructure.
Linux is used for scalability, reliability, and cost-efficiency in these industries.

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

Ans :

System software: Operates hardware and provides a platform for other software (e.g., Linux OS).
Application software: Helps users perform tasks (e.g., web browsers, editors).
Utility software: Supports system maintenance (e.g., backup tools, disk cleaners).

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

Ans :

Open-Source Operating Systems:
i.Source code is publicly available.
ii.Users can modify, customize, and redistribute the code.
iii.Usually free of cost.
iv.Supported by community contributions and forums.

Example: Linux, FreeBSD.

Proprietary Operating Systems:
i.Source code is closed and controlled by the company.

ii.Users cannot modify or redistribute the code.
iii.Usually requires purchasing a license.
iv.Support and updates are provided officially by the vendor.

Example: Windows, macOS.

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

Ans :
Command : **uname -r**
This command displays the system's kernel version.

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

Ans :
head command: Displays the first few lines of a file (default: first 10 lines).
head filename.txt

tail command: Displays the last few lines of a file (default: last 10 lines).
tail filename.txt

Key Difference:

i.head starts reading from the top of the file.
ii. tail starts reading from the bottom of the file.