Module: 1 - Linux server - Understand and use essential tools.

1. What is the minimum number of partitions you need to install Linux?

ANS: - The minimum number of partitions required to install Linux depends on the installation method and distribution. However, at the very least, two partitions are required:

- Root (`/`) Partition: This is where the operating system and all files reside.
- Swap Partition: Used as virtual memory when physical RAM is full (optional but recommended).

For basic installations, a single root (`/`) partition can be sufficient, but having a separate swap partition is recommended for better performance.

2. Explain About Chmod Command?

ANS: - The `chmod` command in Linux is used to change file and directory permissions. It can modify the read (`r`), write (`w`), and execute (`x`) permissions for the owner, group, and others.

Syntax:

```
chmod [options] mode file
```

Example:

```
chmod 755 myscript.sh
```

- 7 (Owner): Read (4) + Write (2) + Execute (1) = 7
- 5 (Group): Read (4) + Execute (1) = 5
- 5 (Others): Read (4) + Execute (1) = 5.

3. How to check Linux memory utilization?

ANS: -You can check memory usage in Linux using the following commands:

1. `free -m`

`free -m =` Shows memory usage in megabytes.

2. `top`

`Top =` Displays real-time memory usage along with CPU and process information.

3. `vmstat`

`vmstat 1 5 =` Shows memory, CPU, and I/O statistics every second for 5 intervals.

4. `cat /proc/meminfo`

`cat /proc/meminfo =` Displays detailed memory statistics.

4. Use grep to search for specific patterns in files ?

ANS: - The `grep` command is used to search for text patterns within files.

Syntax:

```
grep [options] "pattern" file
```

Example:

```
grep "error" /var/log/syslog
```

Searches for the word "error" in the file `/var/log/syslog`.

Case-insensitive search:

```
grep -i "error" file.txt
```

Recursive search in directories:

```
grep -r "pattern" /path/to/directory/
```

Display line numbers with matches:

```
grep -n "pattern" file.txt.
```

5. Get Connecting on a linux server by ssh ?

ANS: - SSH (Secure Shell) is used to securely connect to remote Linux servers.

Syntax:

```
ssh user@hostname_or_ip
```

Example:

```
ssh root@192.168.1.100
```

Logs into the server at 192.168.1.100 as root.

Using a specific port:

```
ssh -p 2222 user@hostname
```

Connects using port 2222 instead of the default 22.

Using SSH key authentication:

```
ssh -i /path/to/private_key user@hostname
```

6 . Create 5 files in the /tmp directory, and then use tar and gzip to bundle and compress the files ?

ANS: - Step 1: Create 5 files in `/tmp`

```
touch /tmp/file1 /tmp/file2 /tmp/file3 /tmp/file4 /tmp/file5
```

Step 2: Use `tar` to bundle the files into an archive

```
tar -cvf /tmp/myfiles.tar /tmp/file*
```

- c: Create an archive
- v: Verbose (show details)
- f: Specify filename

Step 3: Compress the archive using `gzip`

```
gzip /tmp/myfiles.tar
```

- This creates myfiles.tar.gz in `/tmp`.

Step 4: Verify the compressed file

`ls -lh /tmp/myfiles.tar.gz` To extract the files: `tar -xvzf /tmp/myfiles.tar.gz -C /tmp`

7. ·Describe the root account ?

ANS: -The root account in Linux is the superuser with the highest level of privileges. It has complete control over the system, including:

- Installing and removing software
- Modifying system files
- Managing users and permissions
- Configuring system settings

How to switch to the root user:

su -

Or use sudo for administrative tasks: sudo command

Since the root account has unlimited power, it should be used cautiously to avoid unintended system modifications.

8. What is a Shell?

ANS:- A shell is a command-line interpreter that allows users to interact with the operating system by executing commands. It acts as a bridge between the user and the kernel.

Examples of Linux shells:

- Bash (Bourne Again Shell) – Default shell for most Linux distributions
- Zsh (Z Shell) – Advanced features like improved autocompletion
- Fish (Friendly Interactive Shell) – User-friendly with better syntax highlighting
- Ksh (Korn Shell) – Enhanced scripting capabilities

To check the current shell: echo $SHELL

9. What is Linux?

ANS: -Linux is an open-source, Unix-like operating system kernel developed by Linus Torvalds in 1991. It serves as the foundation for various distributions (distros) like Ubuntu, CentOS, Fedora, and Debian.

Key Features:

- Multi-user, multitasking system
- Highly secure and stable
- Open-source and free to use
- Used in servers, desktops, and embedded systems

10. What is Bash?

ANS: -Bash (Bourne Again Shell) is the default command-line shell for most Linux distributions. It is an improved version of the Bourne Shell (sh) with added scripting capabilities.

Features:

- Command history
- Aliases and functions
- Scripting with loops, variables, and conditionals
- Tab completion for commands and file names

Example Bash script:

```
#!/bin/bash
echo "Hello, Linux!"
```

Run the script:

```
chmod +x script.sh
```

```
./script.sh
```

11. You have a new empty hard drive that you will use for Linux. What is the first step you use ?

ANS: -Before installing Linux on a new hard drive, you need to partition and format the disk.

Step 1: Identify the new disk

lsblk

fdisk -l This will list available disks (e.g., /dev/sdb).

Step 2: Partition the disk using fdisk

sudo fdisk /dev/sdb

Inside fdisk:

- Press n (new partition)
- Press p (primary partition)
- Choose partition size
- Press w (write changes)

Step 3: Format the partition

mkfs.ext4 /dev/sdb1

Step 4: Mount the partition

mkdir /mnt/newdisk

mount /dev/sdb1 /mnt/newdisk

12. Write the Linux command to show the current working directory ?

ANS:- Use the pwd command to display the full path of the current directory:pwd

Example output: arduino

/home/user

13. Linux Command to Get Help with Various Options?

ANS: -1. Using man (manual pages):
man command_name

Example:

man ls -Shows the manual for the ls command.

2. Using --help:
command_name --help

Example:

ls --help -Provides a quick overview of available options.

3. Using info:

info command_name

Example:

info cp -Gives detailed documentation similar to man.

4. Getting a list of available commands:
compgen -c | less -Displays all commands available on the system.

14. Write the linux comman! to display what all users are currently doing?

ANS:- Use the w command to see the currently logged-in users and their activities:

w

Example output:

```
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
user1    pts/0    192.168.1.10     10:15    1:23   0.03s  0.03s bash
user2    pts/1    192.168.1.12     10:20    2:10   0.02s  0.02s top
```

Alternative commands:

- who → Lists logged-in users
- whoami → Displays the current user
- users → Shows a simple list of logged-in users

15. . write the Linux command to get information about the operating system?

ANS:- 1. Using uname
uname -a Displays system information, including kernel version.

2. Using /etc/os-release
cat /etc/os-release Shows distribution details (works on most Linux distros).

3. Using hostnamectl
Hostnamectl Provides OS and hardware-related information.

4. Using lsb_release (For Debian-based distros like Ubuntu)
lsb_release -a

16. Write the Linux command to create a hard link of a file?

ANS:- ln /path/to/original_file /path/to/hard_link

Example: ln file1.txt hardlink_file1.txt

ln creates a hard link that points to the same inode as the original file. Hard links are not allowed for directories.

To verify: ls -li file1.txt hardlink_file1.txt.

Both files will have the same inode number.

17. Write the Linux command to create a soft link of a file as well as Directory?

ANS: - Soft Link (Symbolic Link) for a File
ln -s /path/to/original_file /path/to/symlink

Example:

ln -s file1.txt symlink_file1.txt Creates a symbolic link (symlink_file1.txt) pointing to file1.txt.

Soft Link for a Directory
ln -s /path/to/original_directory /path/to/symlink_directory

Example:

ln -s /home/user/documents /home/user/docs_link docs_link is now a shortcut to /home/user/documents.

To verify: ls -l

The output shows links with -> pointing to the original file/directory.

18. Write the Linux command! to search for specific pattern in a file?

ANS: -Use the grep command to search for text inside a file

grep "pattern" filename

Example: grep "error" /var/log/syslog

Searches for "error" in /var/log/syslog.

Case-insensitive search:
grep -i "pattern" filename

Display line numbers:
grep -n "pattern" filename

Recursive search in multiple files:
grep -r "pattern" /path/to/directory

19.Write the Linux command to show the use of basic regular expressions using grep command?

ANS:- Match lines starting with a word (^)
grep "^root" /etc/passwd

- Finds lines where "root" appears at the beginning.

Match lines ending with a word ($)
grep "bash$" /etc/passwd

- Finds lines that end with "bash".

Match any single character (.)
grep "h.t" filename

- Matches "hat", "hit", "hot", etc.

Match a specific number of occurrences ({})
grep -E "a{2,4}" filename

- Finds "aa", "aaa", or "aaaa" in the file.

Match words using \b
grep -w "error" filename

- Finds the exact word "error" (not "errors" or "error123").

Using egrep for extended regex
egrep "error|fail|warning" filename

- Matches any of "error", "fail", or "warning".