

Linux Programming: Assignment-3

Samriddhi Guha | ENG24CY0157 | 3-C (25)

1. Distinguish between man and whatis commands? Justify with proper example. (CO1)

The *man* command:

- Displays the *full manual page* for a command.
- Consists of description, syntax, options, and examples.
- Great for learning how the command works.

Example:

```
samriddhi@samriddhi:~$ man ls
```

This will display the entire manual for the 'ls' command.

The *whatis* command:

- Displays a *one-liner* for a command.
- Good *quick reference* for checking what the command does.
- Much faster, but less detail than 'man'.

Example:

```
samriddhi@samriddhi:~$ whatis ls
```

This will display 'ls (1) - list directory contents'

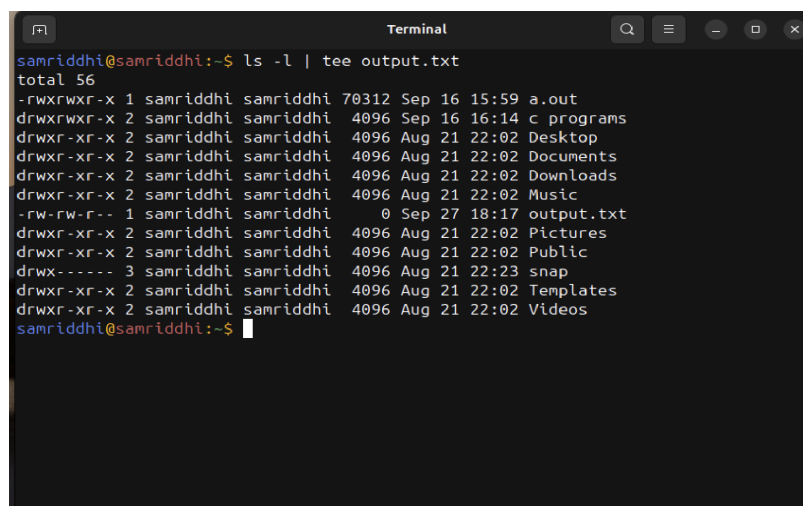
2. Use the tee command to save the output of ls -l into a file while also displaying it. (CO4)

The command will be entered as follows:

```
samriddhi@samriddhi:~$ ls -l | tee output.txt
```

This command can be broken down as:

- `ls -l` → Displays files in the current directory using a long format.
- `|` (pipe) → Sends the output of `ls -l` for input as the next command.
- `tee output.txt` → Writes the output to a file named `output.txt` and displays it on the terminal simultaneously.



```
Terminal
samriddhi@samriddhi:~$ ls -l | tee output.txt
total 56
-rwxrwxr-x 1 samriddhi samriddhi 70312 Sep 16 15:59 a.out
drwxrwxr-x 2 samriddhi samriddhi 4096 Sep 16 16:14 c programs
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Desktop
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Documents
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Downloads
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Music
-rw-rw-r-- 1 samriddhi samriddhi 0 Sep 27 18:17 output.txt
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Pictures
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Public
drwx----- 3 samriddhi samriddhi 4096 Aug 21 22:23 snap
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Templates
drwxr-xr-x 2 samriddhi samriddhi 4096 Aug 21 22:02 Videos
samriddhi@samriddhi:~$
```

3. Explain with an example how the tee command can be used in logging. (CO4)

The *tee* command is a useful utility for logging purposes since it enables the logging of a command's output while simultaneously displaying it on the terminal. This gives the user (or system admin) the ability to monitor the output in real-time while also having it saved as a permanent record.

Example:

```
ping -c 5 google.com | tee ping.log
```

- The output of the `ping` command is shown live on the terminal.
- At the same time, it is written to a log file named ping.log.

If you open the log file:

```
cat ping.log
```

The entire history of the ping results is displayed.

In short, the `tee` command is useful in logging because it can both monitor real-time command output while simultaneously saving it into a log file for later analysis. For example, `ping -c 5 google.com | tee ping.log` saves the ping results into `ping.log` while displaying them on the screen.

4. List the steps involved in installing Ubuntu 25.04 LTS on Oracle VirtualBox. (CO2)

The steps involved in installing Ubuntu 25.04 LTS Oracle VirtualBox are as follows:

1. Download Required Software:

- Install the Oracle VirtualBox from its official site.
- Download the Ubuntu 25.04 LTS ISO file from the Ubuntu website.

2. Create a New Virtual Machine:

- Launch VirtualBox, click New
- For name, enter, for example., Ubuntu 25.04; for Type, select Linux (for Version, select Ubuntu (64-bit)).
- For memory size, allocate 2–4 GB, or more if you have.

3. Create Virtual Hard Disk:

- Choose Create a virtual hard disk now.
- Select VDI (VirtualBox Disk Image), Dynamically allocated and pick size (e.g, 30–40 GB).

4. Attach Ubuntu ISO file:

- Navigate to Settings → Storage,
- In the Storage Settings window, select the empty disk under the Controller: IDE, and select the downloaded Ubuntu ISO file.

5. System Settings Configurations:

- Turn on EFI if desired.
- Assign more processors (if applicable) under System → Processor.
- Turn on 3D acceleration under Display

6. Start VM and Install Ubuntu:

- Click on the Start button.
- The VM will boot from the ISO file. Select 'Install Ubuntu'.
- Follow the instructions appearing on the screen: set the language, keyboard layout, network, installation type ('Erase disk and install Ubuntu' inside the VM), time zone, username and password.

7. Installation Completion:

- Wait for the installation to finish.
- Upon completion, when prompted, press Restart the VM. Remove the ISO file from the virtual drive.

8. Post-Installation Configurations:

- Use the username and password created to log in.
- Update packages using the following command: `sudo apt update && sudo apt upgrade`

5. During Ubuntu OS installation, you face a Kernel Panic Error. How would you troubleshoot it? (CO3)

A Kernel Panic occurs when the Linux kernel encounters an unrecoverable error. If you're seeing this during the installation of Ubuntu, it is likely due to hardware or boot parameters, or corrupted media. We can however troubleshoot the error using the following ways:

1. Check the installation media:

- Make sure the Ubuntu ISO file is not corrupted (compare the SHA256 checksum with the official Ubuntu site), and recreate the bootable ISO or VM disk as needed.

2. Check your virtual machine settings (if you are using Virtual Box / VMware / UTM):

- Make sure you have sufficient memory (≥ 2 GB) and CPU cores available.
- Ensure you also have VT-x/AMD-V enabled in your system BIOS or your VirtualBox settings.
- Try switching between EFI and non-EFI boot modes.

3. Boot into safe/recovery options:

- At the GRUB boot menu, select Advanced Options → boot in recovery mode, or add boot parameters like: `nomodeset`
- Either of these steps should allow the kernel to skip a kernel panic for a crash related to a GPU or driver.

4. Check hardware compatibility:

- If deploying on bare metal hardware make sure the system supports Ubuntu 25.04.
- Consider flashing the BIOS/UEFI firmware if it is out of date.

5. Reinstall / Try an older Kernel:

- If none of the troubleshooting works, try to reinstall using a stable LTS version of the Ubuntu system.
- When GRUB is displayed consider booting from an older kernel option.

6. Write the command to display the system's hostname? How to change hostname using sysctl command? (CO1)

To display the system's hostname, we can use the *hostname* command. This command shows us the current hostname of the Linux system.

Example:

```
samriddhi@samriddhi:~$ hostname
```

Alternatively, we can also use this command which shows the existing hostname that is stored in the system's configuration file:

```
samriddhi@samriddhi:~$ cat /etc/hostname
```

To change our hostname using the *sysctl* command:

1. For temporary change (will reset on reboot):

```
sudo sysctl kernel.hostname=newhostname
```

This command will replace newhostname with any hostname you like.

Example:

```
sudo sysctl kernel.hostname=ubuntu-vm
```

2. For permanent change:

Edit the */etc/hostname* and */etc/hosts* files manually:

```
sudo nano /etc/hostname
```

```
sudo nano /etc/hosts
```

And replace the old hostname with the new.

The system must be rebooted to make this permanent.

7. Which command is used to show the calendar of the year 1984 with August month? (CO1)

The *cal* command can be used to show the calendar of the year 1984 with August month.

```
samriddhi@samriddhi:~$ cal 08 1984
```

The command uses *cal* followed by *month number* and *year*.

```
Terminal
samriddhi@samriddhi:~$ cal 08 1984
      August 1984
Su Mo Tu We Th Fr Sa
                1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

samriddhi@samriddhi:~$
```

8. Write a command to display system uptime and logged-in users together. (CO3)

The *uptime* command can be used to display system uptime. If one wants to check the logged-in users along with the uptime, the command can be followed by ‘*who*’ keyword.

Here,

- ‘*uptime*’ → shows how long the system has been up for, the current time, how many users are logged into the system, and load averages.
- ‘*who*’ → lists all users who are currently logged into the system as well as their terminals and times.
- A semicolon ‘;’ will run both commands sequentially, with uptime info printed first and a list of users that are logged in.

```
Terminal
samriddhi@samriddhi:~$ uptime;who
19:06:38 up 16:58, 1 user, load average: 1.00, 1.00, 1.00
samriddhi seat0 2025-09-25 12:44 (login screen)
samriddhi tty2 2025-09-25 12:44 (tty2)
samriddhi@samriddhi:~$
```

9. Use the find command to list all “.c” files in /home/user. (CO1)

The command to list all ‘.c’ files in home/user will be:

find /home/samriddhi ".c"*

Here,

- `find` → searches for files and directories in a given path.
- `/home/user` → specifies the directory to search in.
- `-name "*.c"` → tells the system to find files ending with `.c`.
- The command will search recursively through /home/user and all its subdirectories.

10. How do you change file permissions to allow only the owner to read and write? (CO1)

To change file permissions to allow only the owner to read and write, we use the command

chmod 600 filename

In the command,

- `chmod` → Command used to change file permissions in Linux.
- `600` → Permission code meaning:

Furthermore,

- Owner: Read + Write (rw-)
- Group: No permissions (---)
- Others: No permissions (---)
- This means that only the owner of the file will be able to read and change a file, and nobody else will be able to access the file.