

DAYANANDA SAGAR UNIVERSITY

LINUX PROGRAMMING

ASSIGNMENTS-3

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

1. man command

- Shows the **detailed manual page** of a command.
- Includes **description, syntax, options, examples, authors, etc.**
- Useful when you need in-depth documentation.

✓ Example:

man ls

This opens a detailed manual about the ls command, spanning multiple pages.

2. whatis command

- Gives a **one-line description** of the command (from the man page).
- Much shorter, like a quick reference.

✓ Example:

whatis ls

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

The tee command is used to **read from standard input and write to both standard output (screen) and one or more files simultaneously.**

Command:

```
ls -l | tee filename.txt
```

Explanation:

- `ls -l` → lists files in long format.
- `|` → pipes the output to tee.
- `tee filename.txt` →
 - **Displays** the output on the terminal.
 - **Saves** the same output into filename.txt.

Variants:

1. **Overwrite the file (default):**

2. `ls -l | tee output.txt`

→ Replaces existing contents of output.txt.

3. **Append to the file:**

4. `ls -l | tee -a output.txt`

→ Adds output to the end of output.txt without overwriting.

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

Normally, if you run a command like:

```
my_program
```

The output just shows on the terminal, and you lose it once the session ends.

With tee, you can **see the output live** *and* save it into a log file for later reference.

Example 1: Logging system updates

```
sudo apt update | tee update.log
```

- Shows the update process on the screen.
- Saves the same output into update.log.

Example 2: Continuous logging with append (-a)

ping google.com | tee -a ping.log

- Displays live ping results on the screen.
- Appends them to ping.log, creating a running log of results.

Example 3: Logging errors and output

By default, tee logs only standard output. If you want to log **both stdout and stderr**, use:
command 2>&1 | tee logfile.log

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

◆ Steps to Install Ubuntu 25.04 LTS on VirtualBox

1. Download Required Software

1. Oracle VirtualBox:

- Go to VirtualBox website and download the latest version for your OS (Windows/Linux/Mac).
- Install it normally.

2. Ubuntu 25.04 ISO:

- Download the ISO from the official [Ubuntu releases page](#).
- This .iso file will be used as a virtual CD.

2. Create a New Virtual Machine

1. Open **VirtualBox** → Click **New**.
2. Enter a **Name** (e.g., *Ubuntu-25.04*).
3. Set **Type = Linux** and **Version = Ubuntu (64-bit)**.
4. Choose **Memory size (RAM)** → At least **4096 MB (4 GB)** (recommended: 8 GB if your host allows).
5. Create a **Virtual Hard Disk** → Choose **VDI (VirtualBox Disk Image)**, set it to **Dynamically allocated**, size **25–50 GB** depending on your needs.

3. Mount Ubuntu ISO

1. Select your VM → Click **Settings** → **Storage**.
2. Under "Controller: IDE", click the empty CD icon → **Choose a disk file** → select your **Ubuntu 25.04 ISO**.

4. Configure VM Settings (Recommended)

- **System → Processor:** Allocate at least **2 CPUs** (more if available).
- **Display → Video Memory:** Increase to **128 MB**; enable **3D Acceleration**.
- **Network:** Keep NAT (default) or use Bridged Adapter if you want direct access to your LAN.

5. Start the VM and Begin Installation

1. Select the VM → Click **Start**.
2. The VM will boot from the ISO.
3. You'll see the **Ubuntu installation menu** → Choose *Install Ubuntu*.

6. Follow Ubuntu Installation Steps

1. **Keyboard Layout** → Select appropriate layout.
2. **Updates & Other Software** → Choose *Normal installation* and check *Download updates while installing*.
3. **Installation Type** → Select *Erase disk and install Ubuntu* (this only affects the virtual disk, not your real machine).
4. **Timezone** → Set your location.
5. **User Setup** → Enter your **name, username, password**.

7. Complete Installation

- Ubuntu will copy files and install (takes ~10–20 min depending on system).
- When finished → Click **Restart Now**.
- Remove the ISO when prompted (VirtualBox usually ejects automatically).

8. Post-Installation Setup

1. Login with your username & password.
2. Open a terminal and update packages:
3. `sudo apt update && sudo apt upgrade -y`

4. Install **VirtualBox Guest Additions** for better performance (shared clipboard, drag & drop, screen resizing):
 - From the VirtualBox menu: **Devices** → **Insert Guest Additions CD image**.
 - Run the installer inside Ubuntu
5. During Ubuntu OS installation, you face a Kernel Panic Error. How would you troubleshoot it?.

◆ Steps to Troubleshoot Kernel Panic During Ubuntu Installation

1. Check Installation Media

- If the ISO is corrupted, the kernel may fail.
- Verify checksum:
 - sha256sum ubuntu-25.04-desktop-amd64.iso

Compare with official checksum from Ubuntu's website.

- If mismatched → re-download the ISO.

2. Verify VirtualBox Settings

Kernel panic is common in VMs if resources or settings are wrong.

- **System** → **Motherboard**: Enable **EFI** only if using Ubuntu EFI ISO.
- **Processor**: Assign at least **2 CPUs**, enable **PAE/NX**.
- **Acceleration**: Ensure **VT-x/AMD-V** and **Nested Paging** are enabled.
- **Display**: Allocate ≥ 64 MB video memory.

3. Modify Boot Parameters

Sometimes kernel options fix panic issues.

- At the GRUB menu, press **e** to edit boot entry.
- Add one of these parameters after quiet splash:
 - nomodeset → disables graphics drivers (helps with NVIDIA/AMD issues).
 - acpi=off or noapic → helps with hardware/BIOS conflicts.
 - irqpoll → helps with IRQ handling issues.

Then press **Ctrl+X** or **F10** to boot.

4. Check Virtual Hardware Compatibility

- Use the **64-bit ISO** only if host CPU supports 64-bit virtualization.
- Update VirtualBox to the latest version.
- If problem persists, try VMware Workstation or another hypervisor to confirm it's not a VirtualBox-specific issue

5. Update Host BIOS/UEFI

- Kernel panic can occur if virtualization features (Intel VT-x / AMD-V) are disabled in BIOS.
- Enable them in BIOS under **CPU/Virtualization settings**.

6. Try Safe Graphics or Minimal Installation

- At the boot menu, select **Safe Graphics** mode to bypass GPU driver issues.
- Use **Minimal installation** if system crashes during setup.

7. Review Logs for Clues

- If panic occurs, boot into **Recovery Mode** (from GRUB).
- Check logs:
- `cat /var/log/syslog | grep -i error`

`dmesg | less`

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

1. Display the System's Hostname

Command:

```
hostname
```

or

```
uname -n
```

Example output:

```
my-ubuntu-pc
```

2. Change Hostname using `sysctl`

The **kernel parameter** for hostname is `kernel.hostname`.

You can change it temporarily with:

```
sudo sysctl kernel.hostname=new-hostname
```

✅ Example:

```
sudo sysctl kernel.hostname=ubuntu25
```

Check:

```
hostname
```

Output → ubuntu25

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

You can do this using the **cal** command in Linux.

Command:

```
cal 8 1984
```

Explanation:

- cal → displays a calendar.
- First argument (8) → month (August).
- Second argument (1984) → year.

✅ Example output snippet:

```
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
```

Alternative: Show whole year 1984

```
cal 1984
```

- Displays all 12 months of 1984 in a single view.

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

Command:

uptime && who

Explanation:

- uptime → shows how long the system has been running, number of users, and load averages.
- && → runs the next command **only if the previous command succeeds**.
- who → lists all currently logged-in users.

✅ Example output:

```
19:35:01 up 3:42, 2 users, load average: 0.15, 0.10, 0.08
```

```
alice  tty1  Sep 27 16:12
```

```
bob    pts/0  Sep 27 18:45
```

Alternative (single command with w)

w

- Shows **uptime + logged-in users + what they are doing**.
- Combines the information of uptime and who in one output.

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

Command:

```
find /home/user -type f -name "*.c"
```

Explanation:

- /home/user → directory to start searching.
- -type f → restricts search to **files only** (not directories).
- -name "*.c" → matches files ending with .c.

✅ Example output:

```
/home/user/programs/main.c
```

```
/home/user/project/test.c
```

```
/home/user/code/utils.c
```

Optional Variants:

1. **Case-insensitive search** (.C or .c):


```
find /home/user -type f -iname "*.c"
```

2. **Execute a command on each found file** (e.g., list details):

```
find /home/user -type f -name "*.c" -exec ls -l {} \;
```

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

Permission Breakdown

- Owner → read + write → rw-
- Group → no permissions → ---
- Others → no permissions → ---

Permission string:

-rw-----

Numeric (octal) form:

600

Command

```
chmod 600 filename
```

✅ Example:

```
chmod 600 secret.txt
```

```
ls -l secret.txt
```

Output:

```
-rw----- 1 alice alice 1234 Sep 27 20:00 secret.txt
```

- Only **owner (alice)** can read/write.
- Group and others have **no access**.