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**SECTION C**

**Linux Programming: Assignment-3**

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

**Distinguish Between man and whatis Commands**

| **Feature** | **man Command** | **whatis Command** |
| --- | --- | --- |
| **Purpose** | Displays the **full manual** of a command | Shows a **brief one-line description** |
| **Detail Level** | Very detailed (syntax, options, examples) | Very brief (summary only) |
| **Usage** | man <command> | whatis <command> |
| **Output** | Multiple sections like NAME, SYNOPSIS, etc. | Just the NAME section (summary) |
| **Speed** | Slower (more content) | Faster (short output) |
| **Use Case** | Learn how to use a command in depth | Find out what a command is or does |

Example 1: Using man

bash

man cp

output

CP(1) User Commands CP(1)

NAME

cp - copy files and directories

SYNOPSIS

cp [OPTION]... [-T] SOURCE DEST

cp [OPTION]... SOURCE... DIRECTORY

cp [OPTION]... -t DIRECTORY SOURCE...

DESCRIPTION

Copy SOURCE to DEST, or multiple SOURCE(s) to DIRECTORY.

**Example 2: Using whatis**

bash

whatis cp

**Output:**

bash

cp (1) - copy files and directories

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

**Using the tee Command with ls -l**

The tee command is used to **read from standard input and write to both standard output and one or more files**. This makes it perfect for saving command output **while still displaying it** on the terminal.

**Command:**

**bash**

ls -l | tee output.txt

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

**Using tee Command for Logging — Explained with Example**

The tee command is **very useful in logging** because it allows you to:

* See the output on the screen **(stdout)**
* **Save it to a log file** at the same time

**Purpose in Logging:**

When running long scripts or commands, logging the output ensures that:

* You can monitor it **in real-time**
* You have a **record for later debugging or analysis**

**Example: Logging Ping Output**

bash

ping -c 4 google.com | tee ping.log

**Explanation:**

* ping -c 4 google.com: Pings Google 4 times.
* |: Pipes the output to tee.
* tee ping.log:
  + Writes the ping results to ping.log
  + Also displays them on the screen

**Sample Output:**

PING google.com (142.250.183.142): 56 data bytes

64 bytes from 142.250.183.142: icmp\_seq=0 ttl=115 time=23.4 ms

64 bytes from 142.250.183.142: icmp\_seq=1 ttl=115 time=22.8 ms

64 bytes from 142.250.183.142: icmp\_seq=2 ttl=115 time=23.0 ms

64 bytes from 142.250.183.142: icmp\_seq=3 ttl=115 time=22.5 ms

--- google.com ping statistics ---

4 packets transmitted, 4 received, 0% packet loss, time 3004ms

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

**Steps to Install Ubuntu 25.04 LTS on Oracle VirtualBox**

**1. Download Ubuntu 25.04 LTS ISO**

* Visit the official Ubuntu website: <https://ubuntu.com/download>
* Download the **Ubuntu 25.04 LTS** ISO file (make sure it’s the desktop version).

**2. Install Oracle VirtualBox**

* Download and install VirtualBox from https://www.virtualbox.org/
* Follow the installer instructions for your OS (Windows, macOS, Linux).

**3. Create a New Virtual Machine**

* Open VirtualBox and click **New**.
* Enter a name for your VM (e.g., Ubuntu 25.04).
* Set **Type** to Linux.
* Set **Version** to Ubuntu (64-bit).

**4. Allocate Memory (RAM)**

* Assign memory for the VM.  
  Recommended: **2048 MB (2 GB)** or more for smooth performance.

**5. Create a Virtual Hard Disk**

* Choose **Create a virtual hard disk now** and click **Create**.
* Select **VDI (VirtualBox Disk Image)** and click **Next**.
* Choose **Dynamically allocated** (so it grows as needed) and click **Next**.
* Set disk size (minimum **25 GB** recommended) and click **Create**.

**6. Attach Ubuntu ISO to VM**

* Select your VM and click **Settings**.
* Go to **Storage**.
* Under **Controller: IDE**, click the empty CD icon.
* Click the CD icon on the right side and choose **Choose a disk file**.
* Select the downloaded **Ubuntu 25.04 ISO** file.

**7. Start the Virtual Machine**

* Click **Start** to boot from the Ubuntu ISO.
* The Ubuntu installer will load.

**8. Install Ubuntu**

* Select **Install Ubuntu**.
* Choose your **language** and click **Continue**.
* Follow the prompts:
  + Keyboard layout
  + Updates and other software
  + Installation type (usually **Erase disk and install Ubuntu** within the VM)
* Set your **time zone**.
* Create your **user account** (username, password).
* Click **Install** and wait for the installation to complete.

**9. Restart the VM**

* After installation finishes, reboot the VM.
* When prompted, remove the installation media (unmount the ISO) by going to **Devices > Optical Drives** and uncheck the ISO.

**10. Start Using Ubuntu**

* The VM will boot into your fresh Ubuntu 25.04 LTS desktop.
* Install **VirtualBox Guest Additions** for better integration (optional but recommended).

**Steps to Troubleshoot Kernel Panic Error During Ubuntu Installation**

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

**1. Check Installation Media Integrity**

* The most common cause is a **corrupt or incomplete ISO**.
* Verify the downloaded ISO’s **checksum (MD5/SHA256)** against the official Ubuntu hashes.
* If it doesn’t match, re-download the ISO.

**2. Recreate Bootable Media**

* If using a USB drive, recreate the bootable USB using tools like **Rufus (Windows)**, **Etcher**, or **UNetbootin**.
* Ensure the USB is formatted correctly and the ISO is properly written.

**3. Try Different Boot Options**

* At the Ubuntu boot menu, press **e** to edit boot parameters.
* Modify or add kernel parameters such as:
  + nomodeset — disables some graphics drivers (common fix for GPU issues).
  + acpi=off — disables ACPI (power management) which sometimes causes problems.
  + noapic or nolapic — related to interrupt controllers.
* After adding parameters, press **Ctrl + X** or **F10** to boot.

**4. Check Virtual Machine Settings (If in VirtualBox)**

* Allocate sufficient RAM (at least 2GB).
* Enable **VT-x/AMD-V** virtualization extensions in BIOS and VirtualBox settings.
* Use the **latest VirtualBox version**.
* Change chipset or I/O APIC settings in VM settings:
  + Go to **Settings > System > Motherboard** and toggle **Enable I/O APIC**.
* Change graphics controller under **Display** (try VBoxVGA, VMSVGA, or VBoxSVGA).

**5. Test Hardware Compatibility**

* If installing on physical hardware, check Ubuntu’s hardware compatibility list.
* Try running **Ubuntu Live Mode** (Try Ubuntu without installing) to see if kernel panic happens there.
* If it works in Live mode, issue might be installation-specific.

**6. Update BIOS/Firmware**

* Sometimes kernel panic is caused by buggy or outdated BIOS/firmware.
* Check for updates from your motherboard or laptop manufacturer.

**7. Check Logs for Details**

* When panic happens, note the error messages.
* If possible, boot into recovery mode or Live environment and check logs in /var/log/ for clues.

**8. Try a Different Ubuntu Version**

* Try installing an older stable release or a different flavor (like Ubuntu Server or Ubuntu Desktop with GNOME/other DE).
* Sometimes latest versions have bugs with specific hardware.

**Quick Example: Adding nomodeset Parameter**

1. Boot from Ubuntu ISO.
2. When GRUB menu appears, highlight **Install Ubuntu**.
3. Press e to edit.
4. Find the line starting with linux and add nomodeset at the end.
5. Press Ctrl + X to boot
6. **Write the command to display the system’s hostname? How to change hostname using sysctl command?**

**1. Command to Display the System’s Hostname:**

Hostname

bash

This will print the current hostname of your system.

**2. How to Change Hostname Using sysctl Command:**

You can change the hostname temporarily by setting the kernel parameter kernel.hostname:

sudo sysctl kernel.hostname=newhostname

Replace newhostname with the desired hostname.

**Example:**

sudo sysctl kernel.hostname=mynewhost

hostname

# Output: mynewhost

**Note:**

* This change is **temporary** and will be reset after reboot.
* To make it permanent, you need to edit /etc/hostname and /etc/hosts.

1. Which command is used **to show the calendar of the year 1984** with **August** month?
   1. **Show the calendar for August 1984:**

bash

cal 8 1984

* 8 is the month (August)
* 1984 is the year
  1. **Show the calendar for the entire year 1984:**

bash

cal 1984

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

So, to show **both** — the calendar of August 1984 **with the entire year** — you would run these commands separately.

To display **system uptime** and **logged-in users** together, you can combine the uptime and who commands using a semicolon ; or with echo for clarity.

**Simple combined command:**

uptime; who

* uptime shows how long the system has been running.
* who lists all currently logged-in users.

**Example output:**

12:34:56 up 5 days, 3:22, 3 users, load average: 0.10, 0.05, 0.01

user1 tty7 2025-09-27 08:00 (:0)

user2 pts/0 2025-09-27 09:12 (192.168.1.10)

user3 pts/1 2025-09-27 10:15 (192.168.1.11)

**Bonus: Display with a label for clarity**

echo "System Uptime:"; uptime; echo; echo "Logged-in Users:"; who

This adds clear headings for each section.

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

To list all .c files in /home/user using the find command, use:

bash

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

**Explanation:**

* /home/user — starting directory for the search
* -type f — find files only (not directories)
* -name "\*.c" — match files ending with .c

This will recursively search through /home/user and list all files with .c extension.

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

To **allow only the owner to read and write** a file (and remove all permissions for group and others), use the chmod command:

bash

chmod 600 filename

**Explanation:**

* 6 for owner = read (4) + write (2) = 6
* 0 for group = no permissions
* 0 for others = no permissions

**Example:**

**bash**

chmod 600 myfile.txt

This makes myfile.txt readable and writable **only by the owner**.

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