# Assignment 1

How do you list all the processes running in Linux?

You can list all the processes running in Linux by using any of the following commands

- pesel: The ps command displays information about the currently running processes, including their process identification number (PID), terminal type, total CPU usage, and the name of the command that launched the process.

- ps aux: The ps aux command is used to display all processes in the system. The a option displays information about other users' processes as well as your own. The u option displays the processes owned by the specified usernames. The x option includes processes that do not have a controlling terminal.

- top: The top command task manager displays a real-time list of processes. The list is sorted by the processes that use the most memory or CPU. The top command can also be used to locate a specific process.

- htop: The htop command is similar to the top command. The htop command also displays a real-time list of processes sorted by their CPU usage. The htop command can be used to search, filter, and kill running processes. However, the htop command is not installed on Linux by default. To install the htop command, use the command sudo apt-get install htop.

- atop: The atop command is similar to the top and htop commands. The atop command displays the resource usage for the CPU, memory, swap, disks, and network.

# Assignment 2

what is top and htop Command:

top command:

- Displays a list of processes, sorted by CPU usage by default

- Shows information such as:

- PID (Process ID)

- USER (Username of the process owner)

- PR (Priority)

- NI (Nice value)

- VIRT (Virtual memory size)

- RES (Resident memory size)

- SHR (Shared memory size)

- S (Process status)

- %CPU (CPU usage)

- %MEM (Memory usage)

- TIME+ (Total CPU time)

- COMMAND (Command name)

- Allows interactive sorting and filtering of processes

- Can be used to kill or renice processes

htop command:

- Similar to top, but with additional features and a more user-friendly interface

- Displays a list of processes, sorted by CPU usage by default

- Shows information such as:

- PID (Process ID)

- USER (Username of the process owner)

- PR (Priority)

- NI (Nice value)

- VIRT (Virtual memory size)

- RES (Resident memory size)

- SHR (Shared memory size)

- S (Process status)

- %CPU (CPU usage)

- %MEM (Memory usage)

- TIME+ (Total CPU time)

- COMMAND (Command name)

- THREADS (Number of threads)

- PIDs (Process IDs)

- Allows interactive sorting and filtering of processes

- Can be used to kill or renice processes

- Has a more intuitive and customizable interface than top

# Assignment 3

What is the chmod command in Linux, and how do you use it?

The chmod command in Linux is used to change the permissions of a file or directory. Here's how you use it

- Who: Determine who you want to change permissions for. The options are:

o User: u

o Group: g

o Others: o

o All: a

- What: Determine what change you want to make. The options are:

o +: Add permission

o -: Remove permission

o =: Set permission and remove others

- Which: Determine which permissions you want to change. The options are:

o Read: r

o Write: w

o Execute: x

- Use the information from the who, what, and which sections to form a permissions statement. The statement will look like this: chmod [who][what][which] [file/directory name]

Example: chmod u+x examplefile.txt

- To set permissions for multiple files at once, you can use the chmod command in conjunction with the \* wildcard

Example: chmod u+x \*.txt

- To change permissions for directories and all the files in them, you can use the -R option

Example: chmod -R u+x \*

- Alternatively, you can use numerical shorthand to change permissions

o The leftmost digit represents the permissions for the owner

o The middle digit represents the permissions for the group

o The rightmost digit represents the permissions for others

o The digits correspond to the following permissions:

o 0: No permission

o 1: Execute permission

o 2: Write permission

o 3: Write and execute permissions

o 4: Read permission

o 5: Read and execute permissions

o 6: Read and write permissions

o 7: Read, write, and execute permissions

Example: chmod 774 examplefile.txt

# Assignment 4

How do you find the process ID (PID) of a running process?

The "pgrep" command can also search for the PID of a process based on the process name.

- The "ps" command can show all processes running on the system.

- The "tasklist" command can be used from a command prompt to display all processes, their PIDs and other details.

- The TList utility can be used to display the list of tasks or user-mode processes currently running on the local computer.

- The PowerShell Get-Process command can be used to specify a process name and see the process ID.

- The "top" command can be used to display current processes in real-time.

# Assignment 5

5.How do users create a symbolic link in Linux?

users can use the ln command with the -s option, followed by the original file or directory and the desired link name.

Here's the basic syntax:

ln -s <original\_file> <link\_name>

For example:

ln -s /usr/bin/vim /home/user/bin/vimlink

This creates a symbolic link named vimlink in the /home/user/bin directory that points to the original vim executable in /usr/bin.

Here's a breakdown of the options used:

-ln: The command for creating links.

- -s: The option for creating a symbolic link (also known as a soft link).

- <original\_file>: The path to the original file or directory that you want to link to.

- <link\_name>: The desired name for the symbolic link.

# Assignment 6

6.What is Swap Space?

- Swap space helps the computer's operating system in pretending that it has more RAM than it actually has.

- The purpose of swap space is to free up physical memory (RAM) so that it can be used for more important tasks, while still allowing the system to maintain the illusion of having more memory than it actually has.

- When a system runs out of physical memory, it will start moving pages of memory to the swap space, which is typically a dedicated partition on the hard disk.

- The pages that are moved to swap space are those that have not been accessed in a while or are not essential to the current operation of the system.

- Having sufficient swap files helps the system keep some physical memory free all the time.

# Assignment 7

7.What is a root account?

The root account is the highest-level user account in a Linux or Unix-like operating system. It has complete control and access to all files, directories, and system resources.

The root account is also known as the superuser or administrator account. It is used to perform system administration tasks, such as:

- Installing and configuring software

- Managing user accounts

- Setting permissions and access control

- Configuring system settings and options

- Troubleshooting and repairing system issues

The root account has unlimited privileges and can perform any action on the system, making it a powerful and potentially dangerous account if not used carefully. It's essential to use the root account responsibly and only when necessary, as it can also be a security risk if not properly managed.

# Assignment 8

Describe CLI and GUI in Linux.

CLI (Command-Line Interface)

- A text-based interface where commands are entered using a keyboard

- Users interact with the operating system by typing commands and receiving text-based output

- Uses a shell (e.g., Bash, Zsh) to interpret commands and execute tasks

- Fast and efficient way to perform tasks, especially for experienced users

- Essential for server administration, scripting, and automation

- Examples: Terminal, Console, Shell

GUI (Graphical User Interface)

A visual interface where users interact with the operating system using graphical elements

- Uses windows, icons, menus, and pointers (mouse) to interact with the system

- Provides a more intuitive and user-friendly experience, especially for beginners

- Supports desktop environments (e.g., GNOME, KDE, XFCE) and window managers

- Examples: Desktop environments, Window managers, Graphical applications

# Assignment 9

9.What is the Linux Kernel? Is it legal to edit it?

he Linux kernel is the core interface between computer hardware and programs, managing resources and providing a user interface . It is:

- Free and open-source

- Licensed under the GNU General Public License (GPL)

- Written in C and assembly language

- Used in many operating systems, including Android

# Assignment 10

Elaborate all the file permission in Linux.

. Owner permissions (u): Control access for the owner of the file.

2. Group permissions (g): Control access for the group that owns the file.

3. Other permissions (o): Control access for all other users.

Each type has three permissions:

1. Read (r): Ability to view the file's contents.

2. Write (w): Ability to modify or delete the file.

3. Execute (x): Ability to execute the file (if it's a program) or traverse the directory.

The permissions are represented in a three-digit code, like rwxr-xr--:

First digit (owner): rwx (read, write, execute)

- Second digit (group): r-x (read, execute)

- Third digit (other): r-- (read)

Here's a breakdown of the permissions:

- rwx (owner): Owner has read, write, and execute permissions.

- r-x (group): Group has read and execute permissions, but not write.

- r-- (other): Others have only read permission.

You can change permissions using the chmod command, like chmod u+x file to add execute permission for the owner.

# Assignment 11

11.How do you move a file from one directory to another using Linux commands?

mv [options] source\_file target\_directory

Here:

- mv is the command to move or rename files.

- options are additional flags to specify the behavior of the command.

- source\_file is the file you want to move.

- target\_directory is the directory where you want to move the file.

Some examples:

Move a file called file1.txt from the current directory to a directory called Documents:

mv file1.txt Documents/

- Move a file called file2.txt from the Downloads directory to the Documents directory:

mv Downloads/file2.txt Documents/

- Move a file called file3.txt from the current directory to a subdirectory called Subfolder within the Documents directory:

mv file3.txt Documents/Subfolder/

Note: If you want to move multiple files, you can specify them separated by spaces:

mv file1.txt file2.txt file3.txt Documents/

# Assignment 12

12.How would you check the network connectivity between your machine and a remote server using the Linux terminal?

Ping:

bash

ping <remote\_server\_IP\_or\_hostname>

This sends ICMP echo requests to the remote server and displays the response time.

1. Traceroute:

bash

traceroute <remote\_server\_IP\_or\_hostname>

This displays the network path (hops) taken to reach the remote server.

1. Telnet:

telnet <remote\_server\_IP\_or\_hostname> <port\_number>

This establishes a connection to the remote server on a specific port (e.g., 22 for SSH).

1. Netcat:

nc <remote\_server\_IP\_or\_hostname> <port\_number>

This establishes a connection to the remote server on a specific port (e.g., 80 for HTTP).

1. SSH:

ssh <remote\_server\_IP\_or\_hostname>

This establishes a secure connection to the remote server for remote access.

ssh <remote\_server\_IP\_or\_hostname>

This establishes a secure connection to the remote server for remote access.

1. MTR (My Traceroute):

mtr <remote\_server\_IP\_or\_hostname>

This combines the functionality of ping and traceroute to display network path and response times.

1. Nmap:

shell

nmap <remote\_server\_IP\_or\_hostname>

This scans the remote server's network ports and displays their status (open, closed, or filtered).

# Assignment 13

13.What Linux command could you use to display the list of users currently logged into the system?

who

This command displays a list of users currently logged in, including their username, terminal, login time, and process ID.

1. w:

w

This command displays a list of users currently logged in, including their username, terminal, login time, idle time, and process ID.

1. users:

users

This command displays a list of users currently logged in, with one user per line.

1. last:

last

This command displays a list of the last users who logged in, including their username, terminal, login and logout times, and process ID.

# Assignment 14

14.n Linux, what command would you use to monitor real-time changes in a log file?

In Linux, you can use the tail command with the -f option to monitor real-time changes in a log file. The tail command displays the last few lines of a file, and the -f option stands for "follow" which outputs the data as the file grows.

Here's an example:

tail -f /path/to/log/file.log

This command will display the last 10 lines of the log file and continue to display new lines as they are added to the file.

Other options:

- tail -F (capital F) is similar to -f but will keep following the file even if it gets rotated or replaced.

- tail --follow=name will follow the file by name, so if the file is rotated or replaced, it will continue to follow the new file with the same name.

You can also use less command with +F option to achieve similar result:

less +F /path/to/log/file.log

This will display the last few lines of the log file and continue to display new lines as they are added to the file.

# Assignment 15

15.What command would you use to compress and decompress files using the gzip tool?

Compress:

- gzip file.txt : This will compress the file file.txt and rename it to file.txt.gz

- gzip -k file.txt : This will compress the file file.txt and keep the original file

Decompress:

- gzip -d file.txt.gz : This will decompress the file file.txt.gz and rename it to file.txt

- gunzip file.txt.gz : This is equivalent to gzip -d and will decompress the file

Other options:

-1 to -9 : Specify the compression level, with -1 being the fastest and -9 being the most compressed

- -v : Display the compression ratio and other information

- -q : Suppress error messages

Examples:

- gzip -5 file.txt : Compress file.txt with a moderate compression level ( -5 )

- gzip -dv file.txt.gz : Decompress file.txt.gz and display the compression ratio and other information

# Assignment 16

16.How do you chain several commands together in Linux?

. Command Separation: Use a semicolon (;) to separate commands:

command1; command2; command3

This will execute each command in sequence, regardless of the outcome of the previous command.

1. Command Chaining: Use the pipe symbol (|) to pass the output of one command as input to the next:

command1 | command2 | command3

This will execute each command in sequence, with the output of each command becoming the input for the next command.

1. Conditional Execution: Use the && operator to execute a command only if the previous command succeeds:

command1 && command2 && command3

If any command in the chain fails, the execution will stop.

1. OR Operator: Use the || operator to execute a command only if the previous command fails:

command1 || command2 || command3

If any command in the chain succeeds, the execution will stop.

1.Subshells: Use parentheses to group commands and execute them in a subshell:

(command1; command2; command3)

This will execute the commands in a separate shell, and the output will not affect the current shell.

1. Shell Scripts: Write multiple commands in a file, make it executable, and run it as a script:

#!/bin/bash

command1

command2

command3

This will execute the commands in sequence when the script is run.

# Assignment 17

17.How do you format a disk in Linux?

fdisk: Used to partition the disk.

fdisk /dev/sdx

Replace /dev/sdx with the device name of the disk you want to format (e.g., /dev/sda, /dev/sdb, etc.).

1. mkfs: Used to create a file system on the partition.

mkfs.ext4 /dev/sdx1

Replace /dev/sdx1 with the partition name (e.g., /dev/sda1, /dev/sdb2, etc.). The .ext4 part specifies the file system type (ext4, ext3, xfs, etc.).

1. mkfs.ntfs: Used to create an NTFS file system (for compatibility with Windows).

mkfs.ntfs /dev/sdx1

1. wipefs: Used to erase all data on the disk (use with caution!).

wipefs -a /dev/sdx

1. dd: Used to write zeros to the entire disk (use with caution!).

dd if=/dev/zero of=/dev/sdx

Note:

-Always use the correct device name and partition number.

- Backup important data before formatting.

- Be cautious when using wipefs and dd, as they can irreversibly erase data.

# Assignment 18

18.What is the command to remove a directory in Linux?

rmdir (remove directory)

Example:

rmdir /path/to/directory

This command will remove the specified directory, but only if it is empty.

If the directory contains files or subdirectories, you can use the rm command with the -r option (recursive) to remove the directory and all its contents:

rm -r /path/to/directory

Be careful when using this command, as it permanently deletes files and directories without asking for confirmation.

Note:

- rmdir only removes empty directories.

- rm -r removes directories and their contents.

- Always use the correct path and directory name to avoid accidentally deleting the wrong directory.

# Assignment 19

19.How do you display the contents of a file in Linux?

cat: Displays the entire file contents.

cat filename

1. less: Displays the file contents one page at a time.

less filename

1. more: Similar to less, but with fewer features.

more filename

1. head: Displays the first few lines of the file.

head filename

1. tail: Displays the last few lines of the file.

tail filename

1. nano or vim: Displays the file contents in a text editor.

nano filename

or

vim filename

1. grep: Displays lines in the file that match a search pattern.

grep pattern filename

# Assignment 20

20.What is the command to find a specific file in a directory and its subdirectories in Linux?

find

Example:

find /path/to/directory -name "filename"

This command searches for the file "filename" in the specified directory and its subdirectories.

Options:

- -name specifies the file name to search for.

- -iname searches case-insensitively.

- -path searches for a specific path.

- -regex searches using regular expressions.

Other examples:

- find . -name "filename" searches in the current directory and its subdirectories.

- find / -name "filename" searches in the root directory and its subdirectories (be careful, as this can take a long time).

You can also use the locate command if you have the mlocate package installed:

locate filename

# Assignment 21

21.How do you use the "tar" command to compress and extract files in Linux?

Compress:

- tar -cvf archive.tar file1 file2 file3 : Creates a tar archive named "archive.tar" containing file1, file2, and file3.

- tar -czvf archive.tar.gz file1 file2 file3 : Creates a compressed tar archive named "archive.tar.gz" containing file1, file2, and file3 using gzip.

- tar -cjvf archive.tar.bz2 file1 file2 file3 : Creates a compressed tar archive named "archive.tar.bz2" containing file1, file2, and file3 using bzip2.

Extract:

tar -xvf archive.tar : Extracts the contents of "archive.tar" to the current directory.

- tar -xzvf archive.tar.gz : Extracts the contents of "archive.tar.gz" to the current directory using gzip.

- tar -xjvf archive.tar.bz2 : Extracts the contents of "archive.tar.bz2" to the current directory using bzip2.

Options:

- -c : Create a new archive.

- -x : Extract the archive.

- -v : Verbose mode, shows the progress.

- -f : Specify the archive file name.

- -z : Use gzip for compression.

- -j : Use bzip2 for compression.

- -W : Verify the integrity of the archive.

# Assignment 22

22.How do you configure a static IP address in Linux?

Identify the network interface you want to configure (e.g., eth0, ens33, wlan0).

2. Use the ip addr command to display current IP address settings:

ip addr show

1. Use the ip addr add command to add a new static IP address:

sudo ip addr add <IP address>/<subnet mask> dev <interface name>

Example:

sudo ip addr add (link unavailable) dev eth0

1. Use the ip link command to set the link up:

sudo ip link set eth0 up

1. Use the ip route command to set the default gateway:

sudo ip route add default via <default gateway IP>

Example:

sudo ip route add default via 192.168.1.1

1. Edit the network configuration file to make the changes persistent:

sudo nano /etc/network/interfaces

Add the following lines:

iface eth0 inet static

address 192.168.1.100

netmask 255.255.255.0

gateway 192.168.1.1