

## **LAB CYCLE:2**

### **EXPERIMENT NO: 3**

**Date:**

#### **TEXT EDITOR**

**Aim:** Study of a terminal based text editor such as Vim or Emacs.

There are many ways to edit files in Unix. Editing files using the screen-oriented text editor vi is one of the best ways. This editor enables you to edit lines in context with other lines in the file. An improved version of the vi editor which is called the VIM has also been made available now. Here, VIM stands for Vi IMproved. The vi editor was developed by William Joy as a more visual version of his own command line editor program called ex, which was becoming popular as a text editor.

The vi editor uses the terminal window for editing a file. For an example, run the following command to open a new file or an existing file of the same name:

`vi filename`

There are two ways of working in vi:

- **Insert Mode:** This mode enables you to insert text into the file. Everything that's typed in this mode is interpreted as input and placed in the file. To come out of the insert mode, press the Esc key, which will take you back to the command mode.
- **Command Mode:** This mode enables you to perform administrative tasks such as saving the files, executing the commands, moving the cursor, cutting (yanking) and pasting the lines or words, as well as finding and replacing. In this mode, whatever you type is interpreted as a command.

Commands and descriptions:

- `vi filename`  
#Creates a new file if it already does not exist, otherwise opens an existing file.
- `vi -R filename`  
#Opens an existing file in the read-only mode.
- `view filename`  
#Opens an existing file in the read-only mode.

Create a new file testfile if it already does not exist in the current working directory –

```
cec@mca:~$ vim filename.txt
```

The above command will generate the following output –



The tilde (~) on each line following the cursor. A tilde represents an unused line. If a line does not begin with a tilde and appears to be blank, there is a space, tab, newline, or some other non-viewable character present.

### a) Cursor operations

In command mode we can position the cursor anywhere in the file. Since you begin all basic edits (changing, deleting, and copying text) by placing the cursor at the text that you want to change, you want to be able to move the cursor to that place as quickly as possible.

There are vi commands to move the cursor:

- Up, down, left, or right—one character at a time.
- Forward or backward by blocks of text such as words, sentences, or paragraphs.
- Forward or backward through a file, one screen at a time.

An underscore marks the present cursor position. Circles show movement of the cursor from its current position to the position that would result from various vi commands.

### Single Movements

The keys h, j, k, and l, right under your fingertips, will move the cursor:

h: Left, one space

j: Down, one line

k: Up, one line

l: Right, one space

You can also use the cursor arrow keys (←, ↓, ↑, →), + and - to go up and down, or the ENTER and BACKSPACE keys.

## **b) Manipulate text**

1. Open a new or existing file with vim filename.
2. Type i to switch into insert mode so that you can start editing the file.  
Enter or modify the text with your file.
3. Once you're done, press the escape key Esc to get out of insert mode and back to command mode.
4. Type :wq to save and exit your file.

Vim commands for editing#:

Those who use Vim tend to use the term "yank" where most people would use the terms copy and paste. Therefore, the command for copying a word is yw, which stands for yank word, and the command for pasting whatever has been copied is p, meaning put. If you look up additional commands in the future, it can be confusing if you don't know what yank and put mean when using Vim.

You also have two options for how to select text. You can either use commands like dd, which deletes a single line, and yy, which copies a single line, or you can highlight text and then copy it to the unnamed register. The paste commands work the same whether you've highlighted text or used a command to automatically copy it.

As with movement commands, putting a number in front of the command can increase the number of times a task is completed. For instance, putting a number in front of yy will increase the number of lines copied, so 5yy will copy five lines.

yy - Copies a line

yw - Copies a word

y\$ - Copies from where your cursor is to the end of a line

v - Highlight one character at a time using arrow buttons or the h, k, j, l buttons

V - Highlights one line, and movement keys can allow you to highlight additional lines

p - Paste whatever has been copied to the unnamed register

d - Deletes highlighted text

dd - Deletes a line of text

dw - Deletes a word

D - Deletes everything from where your cursor is to the end of the line

. - Repeats the last action

one

Vim commands for working with multiple files#:

You can also edit more than one text file at a time. Vim gives you the ability to either split your screen to show more than one file at a time or you can switch back and forth between documents. As with other functions, commands make going between documents or buffers, as they're referred to with Vim, as simple as a few keystrokes.

:bn - Switch to next buffer

:bp - Switch to previous buffer

:bd - Close a buffer

:sp [filename] - Opens a new file and splits your screen horizontally to show more than one buffer

:vsp [filename] - Opens a new file and splits your screen vertically to show more than one buffer

:ls - Lists all open buffers

Ctrl + ws - Split windows horizontally

Ctrl + wv - Split windows vertically

Ctrl + ww - Switch between windows

Ctrl + wq - Quit a window

Ctrl + wh - Moves your cursor to the window to the left

Ctrl + wl - Moves your cursor to the window to the right

Ctrl + wj - Moves your cursor to the window below the one you're in

Ctrl + wk - Moves your cursor to the window above the one you're in

### **c) Search for patterns:**

Vim commands for searching text#:

Like many other text editors, Vim allows you to search your text and find and replace text within your document. If you opt to replace multiple instances of the same keyword or phrase, you can set Vim up to require or not require you to confirm each replacement depending on how you put in the command.

/[keyword] - Searches for text in the document where keyword is whatever keyword, phrase or string of characters you're looking for

?[keyword] - Searches previous text for your keyword, phrase or character string

n - Searches your text again in whatever direction your last search was

N - Searches your text again in the opposite direction

`:%s/[pattern]/[replacement]/g` - This replaces all occurrences of a pattern without confirming each one

`:%s/[pattern]/[replacement]/gc` - Replaces all occurrences of a pattern and confirms each

We can use the slash to search for a word, and then use the dot to replace it.

open the sample.txt file using the Vim editor:

```
$ vim sample.txt
```

we need to press the forward-slash(/) key, then search for the word “article”:

```
/article
```

This will highlight the first occurrence of the word “article” and we can press the Enter key to jump to it.

#### **d) Global search and replace**

We can use the slash to search for a word, and then use the dot to replace it.

open the file using the Vim editor:

```
$ vim filename
```

we need to press the forward-slash(/) key, then search for the word:

```
/word to be searched
```

This will highlight the first occurrence of the word and we can press the Enter key to jump to it.

We can then type in the cgn command combo:

```
cgn
```

This Vim editor command finds the last thing we searched for, deletes it, and then put us into insert mode.

We can then press the Esc key to return to normal mode.

Next, we need to press the “N” key to jump to the next occurrence of the word and press the Dot (.) key to auto-replace it with the word.

This is the simplest method to perform a basic search and replace in Vim editor.

Search and Replace Using the substitute Command

Basic syntax:

```
:s/<search_phrase>/<replace_phrase>/options
```

- All Occurrences  
:%s/article/tutorial/g
- Case-Insensitive  
:%s/vim/baeldung/gi
- With Confirmation  
:%s/article/tutorial/gc
- Within Specific Lines  
:start\_line\_number, end\_line\_number s/<search\_term>/<replace\_term>/g
- Whole Word  
:s/\<cover\>/go through/gi

**Result:**

Study of text editor has been done successfully.

## **LAB CYCLE:2**



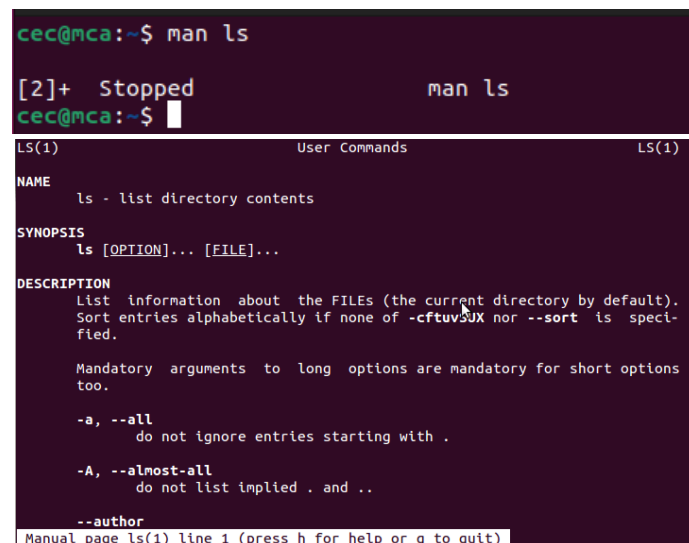
## EXPERIMENT NO:4

Date:

### BASIC LINUX COMMANDS

**Aim:** Basic Linux commands, familiarity with following commands/operations expected.

**1. man:** is used to display the user manual of any command that we can run on the terminal. It provides a detailed view of the command which includes NAME, SYNOPSIS, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUES, ERRORS, FILES, VERSIONS, EXAMPLES, AUTHORS and SEE ALSO.



```
cec@mca:~$ man ls
[2]+  Stopped                  man ls
cec@mca:~$
```

LS(1) User Commands LS(1)

**NAME**

ls - list directory contents

**SYNOPSIS**

ls [OPTION]... [FILE]...

**DESCRIPTION**

List information about the FILES (the current directory by default). Sort entries alphabetically if none of `-cftuvSX` nor `--sort` is specified.

Mandatory arguments to long options are mandatory for short options too.

`-a, --all`  
do not ignore entries starting with `.`

`-A, --almost-all`  
do not list implied `.` and `..`

`--author`

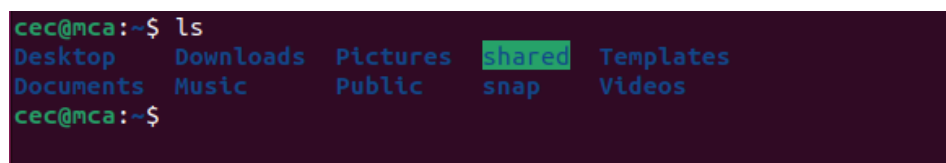
Manual page ls(1) line 1 (press h for help or q to quit)

### 2. ls, echo, read

**ls:** is a Linux shell command that lists directory contents of files and directories. Some practical examples of ls command are shown below.

Options:

- t: It sorts the file by modification time, showing the last edited file first.
- l: To show long listing information about the file/directory.
- lh: To display file size in easy-to-read format.
- a: To show all the hidden files in the directory.



```
cec@mca:~$ ls
Desktop  Downloads  Pictures  shared  Templates
Documents Music      Public    snap    Videos
cec@mca:~$
```

**echo:** used for displaying lines of text or string which are passed as arguments on the command line.

```
cec@mca:~$ echo "hello world"
hello world
cec@mca:~$
```

**read:** is used to read from a file descriptor.

```
cec@mca:~$ read -p "Enter name: " uname; echo $uname
Enter name: linux
linux
cec@mca:~$
```

### 3. more, less, cat

**more:** reads files and displays the text one screen at a time.

```
cec@mca:~$ more sampletext.txt
This is the first line of text.
This is the second line of text.
This is the third line of text.
This is the fourth line of text.
This is the fifth line of text.
This is the sixth line of text.
This is the seventh line of text.
This is the eighth line of text.
This is the ninth line of text.
This is the tenth line of text.
cec@mca:~$
```

**less:** used for filtering and viewing text files one screen page at a time.

```
cec@mca:~$ less sampletext.txt

[4]+  Stopped                  less sampletext.txt
cec@mca:~$
```

```
This is the first line of text.
This is the second line of text.
This is the third line of text.
This is the fourth line of text.
This is the fifth line of text.
This is the sixth line of text.
This is the seventh line of text.
This is the eighth line of text.
This is the ninth line of text.
This is the tenth line of text.
(END)
```

**cat:** used to display the content of a file, copy content from one file to another, concatenate the contents of multiple files, display the line number, display \$ at the end of the line, etc.

```
cec@mca:~$ cat > newfile.txt
this is a line of sample text
cec@mca:~$ cat newfile.txt
this is a line of sample text
cec@mca:~$
```

#### 4. cd, mkdir, pwd, find

**cd:** cd command in linux known as change directory command. It is used to change current working directory.

Syntax: cd [directory\_name]

```
cec@mca:~$ pwd
/home/cec
cec@mca:~$ cd ..
cec@mca:/home$ ls
cec  chn22mca2033
cec@mca:/home$
```

**mkdir:** mkdir command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once as well as set the permissions for the directories.

Syntax: mkdir [options...] [directories ...]

```
cec@mca:~$ mkdir newDir
cec@mca:~$ ls
Desktop  Downloads  newDir      Pictures  sampletext.txt  snap  Videos
Documents Music      newfile.txt Public     shared          Templates
cec@mca:~$
```

**pwd:** pwd stands for Print Working Directory. It prints the path of the working directory, starting from the root.

Syntax: pwd -L: Prints the symbolic path.

pwd -P: Prints the actual path.

```
cec@mca:~$ pwd
/home/cec
cec@mca:~$ cd newDir
cec@mca:~/newDir$ pwd
/home/cec/newDir
cec@mca:~/newDir$
```

**find:** The find command in UNIX is a command line utility for walking a file hierarchy. It can be used to find files and directories and perform subsequent operations on them. It supports searching by file, folder, name, creation date, modification date, owner and permissions.

Syntax: find [where to start searching from]

[expression determines what to find] [-options] [what to find]

```
cec@mca:~$ ls
Desktop  Downloads  newDir    Pictures  sampletext.txt  snap  Videos
Documents Music      newfile.txt Public    shared          Templates
cec@mca:~$ find newfile.txt
newfile.txt
cec@mca:~$
```

## 5. mv, cp, rm, tar

**mv:** mv stands for move. mv is used to move one or more files or directories from one place to another in a file system like UNIX. It has two distinct functions:

- (i) It renames a file or folder.
- (ii) It moves a group of files to a different directory.

Syntax: mv [Option] source destination

```
cec@mca:~$ ls
Desktop  Downloads  newDir    Pictures  sampletext.txt  snap  Videos
Documents Music      newfile.txt Public    shared          Templates
cec@mca:~$ mkdir WorkDir
cec@mca:~$ touch mvFile
cec@mca:~$ mv mvFile WorkDir/
cec@mca:~$ cd WorkDir/
cec@mca:~/WorkDir$ ls
mvFile
cec@mca:~/WorkDir$
```

**cp:** cp stands for copy. This command is used to copy files or group of files or directory. It creates an exact image of a file on a disk with different file name. cp command require at least two filenames in its arguments.

Syntax: cp [OPTION] Source Destination

```
cec@mca:~$ ls
Desktop  Music  newfile.txt  sampletext.txt  Templates
Documents newDir  Pictures     shared          Videos
Downloads newFile Public       snap            WorkDir
cec@mca:~$ cp newFile WorkDir
cec@mca:~$ cd WorkDir/
cec@mca:~/WorkDir$ ls
mvFile  newFile
cec@mca:~/WorkDir$
```

**rm:** rm stands for remove here. rm command is used to remove objects such as files, directories, symbolic links and so on from the file system like UNIX. To be more precise, rm removes references to objects from the filesystem, where those objects might have had multiple references.

Syntax: rm [OPTION]... FILE...

```
cec@mca:~$ rm -rfv WorkDir
removed 'WorkDir/newFile'
removed 'WorkDir/mvFile'
removed directory 'WorkDir'
```

**tar:** The Linux ‘tar’ stands for tape archive, is used to create Archive and extract the Archive files. tar command in Linux is one of the important commands which provides archiving functionality in Linux. We can use Linux tar command to create compressed or uncompressed Archive files and also maintain and modify them.

Syntax: tar [options] [archive-file] [file or directory to be archived]

```
cec@mca:~$ ls filesToBeArchived/
file1 file2 file3
cec@mca:~$ tar -czvf zipped.tar.gz filesToBeArchived
filesToBeArchived/
filesToBeArchived/file1
filesToBeArchived/file2
filesToBeArchived/file3
cec@mca:~$ ls
Desktop      Music        Pictures     shared       zipped.tar.gz
Documents    newDir       projectDir   snap
Downloads    newFile      Public       Templates
filesToBeArchived newfile.txt  sampletext.txt Videos
```

## 6.wc, cut, paste

**wc:** wc stands for word count. It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.

Syntax: wc [OPTION]... [FILE]...

```
cec@mca:~$ wc sampletext.txt
 10  70 325 sampletext.txt
cec@mca:~$ wc -l sampletext.txt
10 sampletext.txt
cec@mca:~$ wc -c sampletext.txt
325 sampletext.txt
cec@mca:~$ wc -w sampletext.txt
70 sampletext.txt
cec@mca:~$
```

**cut:** The cut command in UNIX is a command for cutting out the sections from each line of files and writing the result to standard output. It can be used to cut parts of a line by byte position, character and field.

Syntax: cut OPTION... [FILE]...

```
cec@mca:~$ cat sampletext.txt
This is the first line of text.
This is the second line of text.
This is the third line of text.
This is the fourth line of text.
This is the fifth line of text.
This is the sixth line of text.
This is the seventh line of text.
This is the eighth line of text.
This is the ninth line of text.
This is the tenth line of text.
cec@mca:~$ cut -c 1-4 sampletext.txt
This
This
This
This
This
This
This
This
This
This
```

**paste:** paste command is one of the useful commands in Unix or Linux operating system. It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.

Syntax: paste [OPTION]... [FILES]...

```
cec@mca:~$ paste -s appendedText.txt sampletext.txt
new line
This is the first line of text. This is the second line of text. This is
the third line of text. This is the fourth line of text. This is the fift
h line of text. This is the sixth line of text. This is the seventh line of text
. This is the eighth line of text. This is the ninth line of text.T
his is the tenth line of text.
cec@mca:~$
```

## 7. head, tail, grep, expr:

**head:** it prints the first 10 lines of the specified files. If more than one file name is provided then data from each file is preceded by its file name.

Syntax: head [OPTION]... [FILE]...

```
cec@mca:~$ head sampletext.txt
This is the first line of text.
This is the second line of text.
This is the third line of text.
This is the fourth line of text.
This is the fifth line of text.
This is the sixth line of text.
This is the seventh line of text.
This is the eighth line of text.
This is the ninth line of text.
This is the tenth line of text.
```

**tail:** it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name.

Syntax: tail [OPTION]... [FILE]...

```
cec@mca:~$ tail -5 sampletext.txt
This is the sixth line of text.
This is the seventh line of text.
This is the eighth line of text.
This is the ninth line of text.
This is the tenth line of text.
```

**grep:** the grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for global search for regular expression and print out).

Syntax: grep [options] pattern [files]

```
cec@mca:~$ grep -i "this is the first" sampletext.txt
This is the first line of text.
This is the first line of text.
```

## 8. chmod, chown:

**chmod:** the chmod command is used to change the access mode of a file. The name is an abbreviation of change mode.

Syntax: chmod [reference][operator][mode] file...

```
cec@mca:~/projectDir$ touch run.sh
cec@mca:~/projectDir$ ls
run.sh
cec@mca:~/projectDir$ chmod +x run.sh
cec@mca:~/projectDir$ ls
run.sh
cec@mca:~/projectDir$
```

**chown:** it is used to set read, write, execute permission for user. To protect and secure files and directory in Linux we use permissions to control what a user can do with a file or directory.

Syntax: `chown [OPTION]... [OWNER][:[GROUP]] FILE...`

`chown [OPTION]... --reference=RFILE FILE...`

```
cec@mca:~/projectDir$ touch run.sh
cec@mca:~/projectDir$ chown cec run.sh
cec@mca:~/projectDir$
```

## 9. Redirections & Piping:

**Redirection:** whenever an individual runs a command, it can take input, give output, or do both. Redirection helps us redirect these input and output functionalities to the files or folders we want, and we can use special commands or characters to do so.

Append redirection

“>>” standard output

“<<” standard input

```
cec@mca:~/projectDir$ ls -a >> output.txt
cec@mca:~/projectDir$ cat output.txt
.
..
output.txt
out.txt
run.sh
```

Overwrite Redirection

“>” standard output

“<” standard input

```
cec@mca:~/projectDir$ ls -a >out.txt
cec@mca:~/projectDir$ cat out.txt
.
..
out.txt
run.sh
```

**Piping:** Pipe is used to combine two or more commands, and in this, the output of one command acts as input to another command, and this command’s output may act as input to the next command and so on. It can also be visualized as a temporary connection between two or more commands/ programs/ processes. The command line programs that do the further processing are referred to as filters.

Syntax: `command_1 | command_2 | command_3 | .... | command_N`

```
cec@mca:~/projectDir$ ls -a | cat
.
..
output.txt
output.txtclear
out.txt
run.sh
```

## 10. useradd, usermod, userdel, passwd:

**useradd:** is a command in Linux that is used to add user accounts to your system. It is just a symbolic link to adduser command in Linux and the difference between both of them is that useradd is a native binary compiled with system whereas adduser is a Perl script which uses useradd binary in the background.

Syntax: useradd [options] name\_of\_the\_user

```
cec@mca:~$ sudo useradd -s /bin/bash -m -d /home/cecTMP/ cecTMP
cec@mca:~$
```

**usermod:** is a command in Linux that is used to change the properties of a user in Linux through the command line. After creating a user, we have to sometimes change their attributes like password or login directory etc. so in order to do that we use the Usermod command.

Syntax: sudo usermod -l newCEC cecTMP

```
cec@mca:~$ sudo usermod -l newCEC cecTMP
cec@mca:~$
```

**userdel:** is used to delete a user account and related files. This command basically modifies the system account files, deleting all the entries which refer to the username LOGIN. It is a low-level utility for removing the users.

Syntax: userdel [options] LOGIN

```
cec@mca:~$ sudo usermod -l newCEC cecTMP
cec@mca:~$ sudo userdel newCEC
cec@mca:~$
```

**passwd:** passwd command in Linux is used to change the user account passwords. The root user reserves the privilege to change the password for any user on the system, while a normal user can only change the account password for his or her own account.

Syntax: passwd [options] [username]

## 11. df,top, ps:

**df:** is used to display the amount of disk space available on the file system containing each file name argument.

Syntax: df [OPTION]...[FILE]...

```
cec@mca:~$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           488M  3.0M  485M   1% /run
/dev/sda3       20G   13G   6.6G  66% /
tmpfs           2.4G     0   2.4G   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
/dev/sda2       512M   6.1M  506M   2% /boot/efi
UbuntuCEC      238G  229G   9.2G  97% /media/sf_UbuntuCEC
tmpfs           488M  120K  488M   1% /run/user/1000
```



**top:** top command is used to show the Linux processes. It provides a dynamic real-time view of the running system. Usually, this command shows the summary information of the system and the list of processes or threads which are currently managed by the Linux Kernel.

```
top - 00:34:22 up 1:41, 3 users, load average: 0.11, 0.04, 0.06
Tasks: 216 total, 1 running, 209 sleeping, 6 stopped, 0 zombie
%Cpu(s): 2.4 us, 0.7 sy, 0.0 ni, 96.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 4872.7 total, 663.0 free, 1420.4 used, 2789.3 buff/cache
MiB Swap: 2240.0 total, 2227.9 free, 12.1 used. 3123.4 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1216	chn22mc+	20	0	4052128	352920	129288	S	2.3	7.1	4:58.04	gnome-s-
3901	chn22mc+	20	0	2789288	259844	108444	S	1.3	5.2	1:32.35	Isolate+
2804	chn22mc+	20	0	11.1g	405232	183488	S	0.7	8.1	3:26.74	firefox
406	systemd+	20	0	14824	6256	5460	S	0.3	0.1	0:04.45	systemd+
1795	chn22mc+	20	0	227516	1936	1572	S	0.3	0.0	0:10.10	VBoxCli+
1	root	20	0	168004	13472	8360	S	0.0	0.3	0:02.44	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par+
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_fl+
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker+
10	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_perc+
11	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tas+
14	root	20	0	0	0	0	S	0.0	0.0	0:00.98	ksoftir

**ps:** It allows multiple processes to operate simultaneously without interfering with each other. Process is one of the important fundamental concept of the Linux OS.

Syntax: ps [options]

```
cec@mca:~$ ps
```

PID	TTY	TIME	CMD
2281	pts/1	00:00:00	bash
2309	pts/1	00:00:00	vim
2356	pts/1	00:00:00	man
2364	pts/1	00:00:00	pager
4049	pts/1	00:00:00	less
4062	pts/1	00:00:00	less
4074	pts/1	00:00:00	less
25618	pts/1	00:00:00	ps

## 12. ssh, scp, ssh-keygen, ssh-copy-id:

**ssh:** stands for “Secure Shell”. It is a protocol used to securely connect to a remote server/system. ssh is secure in the sense that it transfers the data in encrypted form between the host and the client. It transfers inputs from the client to the host and relays back the output. ssh runs at TCP/IP port 22.

Syntax: `ssh user_name@host(IP/Domain_name)`

```
rec@mca:~$ ssh chn22mca2033@14.139.189.217
The authenticity of host '14.139.189.217 (14.139.189.217)' can't be established.
ED25519 key fingerprint is SHA256:PUPVGoeF7YaPtG6XqUw/n0QUokbcQJ7OWlsDFvungc.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '14.139.189.217' (ED25519) to the list of known hosts
.:
      |
  .--.-|-----|-----|
  /   /  G E N E R A T I C
  \   \  O S
   ---|-----|-----|
chn22mca2033@14.139.189.217's password:
Welcome to elementary OS 0.4.1 Loki (GNU/Linux 4.15.0-142-generic x86_64)

 * Website: http://elementary.io/

0 updates can be applied immediately.
```

**scp:** scp (secure copy) command in Linux system is used to copy file(s) between servers in a secure way. The SCP command or secure copy allows secure transferring of files in between the local host and the remote host or between two remote hosts. It uses the same authentication and security as it is used in the Secure Shell (SSH) protocol. SCP is known for its simplicity, security and pre-installed availability.

Syntax: scp [-346BCpqrTv] [-c cipher] [-F ssh\_config] [-i identity\_file] [-l limit] [-o ssh\_option] [-P port] [-S program] [[user@]host1:]file1 ... [[user@]host2:]file2

```
pratik@linuxbuzz:~$ scp -v /var/log/syslog root@10.4.3.201:/root/
Executing: program /usr/bin/ssh host 10.4.3.201, user root, command scp -v -t /root/
OpenSSH_8.2p1 Ubuntu-4ubuntu0.2, OpenSSL 1.1.1f 31 Mar 2020
```

**ssh-keygen:** Secure Shell(SSH) is a cryptographic network protocol used for operating remote services securely. It is used for remote operation of devices on secure channels using a client-server architecture that generally operates on Port 22. SSH is the successor of Telnet. SSH uses public and private keys to validate and authenticate users. ssh-keygen is used to generate these key pairs.

```
ubuntu@ubuntu-VirtualBox:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa): my_key
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in my_key.
Your public key has been saved in my_key.pub.
The key fingerprint is:
5d:48:47:39:3b:fd:64:75:b3:74:26:f8:04:81:91:7b ubuntu@ubuntu-VirtualBox
The key's randomart image is:
+--[ RSA 2048 ]-----+
|      .oo+ oo=|
|      ...*.o*|
|      ...E o.o|
|      S .. . +|
|              |
+-----+
ubuntu@ubuntu-VirtualBox:~$
```

**ssh-copy-id:** is a command that copies the public key of the local host to the authorized keys file of the remote host, allowing password-less and automatic login via SSH.

```
ubuntu01@linux:~$ ssh-copy-id kali@192.168.239.134
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter
out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are promp
ted now it is to install the new keys
kali@192.168.239.134's password:

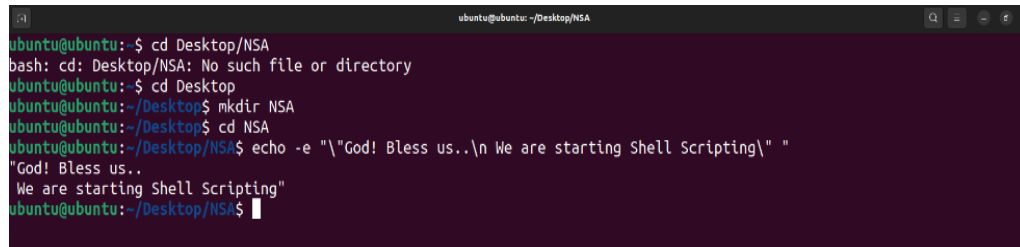
Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'kali@192.168.239.134'"
and check to make sure that only the key(s) you wanted were added.

ubuntu01@linux:~$
```

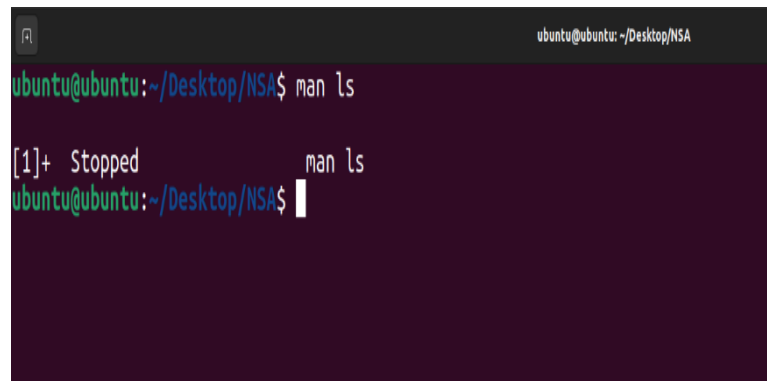
## Basic Linux commands activity questions

1. Command to display the following message as (Use “New line”).  
“God!Bless us.  
We are starting Shell Scripting”



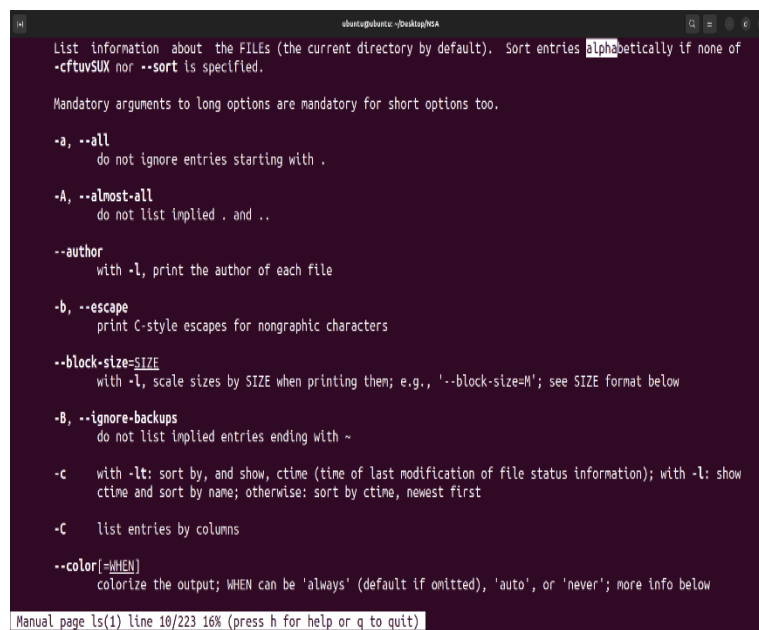
```
ubuntu@ubuntu:~$ cd Desktop/NSA
bash: cd: Desktop/NSA: No such file or directory
ubuntu@ubuntu:~$ cd Desktop
ubuntu@ubuntu:~/Desktop$ mkdir NSA
ubuntu@ubuntu:~/Desktop$ cd NSA
ubuntu@ubuntu:~/Desktop/NSA$ echo -e "\"God! Bless us..\n We are starting Shell Scripting\""
"God! Bless us..
 We are starting Shell Scripting"
ubuntu@ubuntu:~/Desktop/NSA$
```

2. Get the manual page of ‘ls’ command. Search for the word “alpha”. Find the next occurrence and then find the previous occurrence.



```
ubuntu@ubuntu:~/Desktop/NSA$ man ls

[1]+  Stopped                  man ls
ubuntu@ubuntu:~/Desktop/NSA$
```



```
ubuntu@ubuntu:~/Desktop/NSA$ man ls
List information about the FILES (the current directory by default). Sort entries alpha
-cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.

-a, --all
    do not ignore entries starting with .

-A, --almost-all
    do not list implied . and ..

--author
    with -l, print the author of each file

-b, --escape
    print C-style escapes for nongraphic characters

--block-size=SIZE
    with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE format below

-B, --ignore-backups
    do not list implied entries ending with ~

-c      with -lt: sort by, and show, ctime (time of last modification of file status information); with -l: show
        ctime and sort by name; otherwise: sort by ctime, newest first

-C      list entries by columns

--color[=WHEN]
    colorize the output; WHEN can be 'always' (default if omitted), 'auto', or 'never'; more info below

Manual page ls(1) line 10/223 16% (press h for help or q to quit)
```

```
ubuntu@ubuntu: ~/Desktop/NSA
-X sort alphabetically by entry extension
-Z, --context
    print any security context of each file

-l list one file per line. Avoid '\n' with -q or -b

--help display this help and exit

--version
    output version information and exit

The SIZE argument is an integer and optional unit (example: 10K is 10*1024). Units are K,M,G,T,P,E,Z,Y (powers
of 1024) or KB,MB,... (powers of 1000). Binary prefixes can be used, too: KiB=K, MiB=M, and so on.

The TIME_STYLE argument can be full-iso, long-iso, iso, locale, or +FORMAT. FORMAT is interpreted like in
date(1). If FORMAT is FORMAT1<newline>FORMAT2, then FORMAT1 applies to non-recent files and FORMAT2 to recent
files. TIME_STYLE prefixed with 'posix-' takes effect only outside the POSIX locale. Also the TIME_STYLE en-
vironment variable sets the default style to use.

Using color to distinguish file types is disabled both by default and with --color=never. With --color=auto,
ls emits color codes only when standard output is connected to a terminal. The LS_COLORS environment variable
can change the settings. Use the dircolors command to set it.

Exit status:
0 if OK,
1 if minor problems (e.g., cannot access subdirectory),
2 if serious trouble (e.g., cannot access command-line argument).

Manual page ls(1) line 175/223 91% (press h for help or q to quit)
```

3. Read your name from the keyboard and display it.

```
ubuntu@ubuntu: ~/Desktop/NSA
ubuntu@ubuntu:~/Desktop/NSA$ read -p "Enter your name:" n
Enter your name: Kelly
ubuntu@ubuntu:~/Desktop/NSA$ echo $n
Kelly
ubuntu@ubuntu:~/Desktop/NSA$
```

4. Create the directory structure dir1/dir4 and dir1/dir2/dir3 with a single command and then change directory to dir3.

```
ubuntu@ubuntu: ~/Desktop/NSA
ubuntu@ubuntu:~/Desktop/NSA$ mkdir -p dir1/dir4 dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA$ cd dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

5. Create some files using Vim.
  - Creating a file using vim:
  - Start vim by typing vim filename
  - To insert text press i
  - Now start editing text. Add new text or delete unwanted text.
  - One can press Esc and type :wq to save changes to a file and exit from vim]



```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -lr > lsoutput
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat lsoutput
total 12
-rw-rw-r-- 1 ubuntu ubuntu 25 May 27 02:08 test.py
-rw-rw-r-- 1 ubuntu ubuntu 0 May 27 02:14 lsoutput
-rw-rw-r-- 1 ubuntu ubuntu 275 May 27 02:07 avg.c
-rw-rw-r-- 1 ubuntu ubuntu 1012 May 27 02:05 a1.txt
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

9. Display the file

a. starting with the first 10 lines and

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ more -10 cal.c
#include <stdio.h>
#include <conio.h>
void main()
{
    int n1,n2,add,sub,prod,quot,remain;
    clrscr();
    printf("\nENTER NUMBER 1: ");
    scanf("%d",&n1);
    printf("\nENTER NUMBER 2: ");
    scanf("%d",&n2);
    --More-- (39%)
```

b. starting with the 10th line with provision for

i. Scrolling Up

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ ls
cal.c dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ more +10 cal.c
    scanf("%d",&n2);
    add=n1+n2;
    sub=n1-n2;
    prod=n1*n2;
    quot=n1/n2;
    remain=n1%n2;
    printf("\nADDITION OF THE NUMBERS: %d",add);
    printf("\nSUBTRACTION OF THE NUMBERS: %d",sub);
    printf("\nPRODUCTION OF THE NUMBERS: %d",prod);
    printf("\nQUOTIENT OF THE NUMBERS: %d",quot);
    printf("\nREMAINDER OF THE NUMBERS: %d",remain);
    getch();
}
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$
```

ii. Scrolling Up and Down

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ less +10 cal.c
[3]+ Stopped less +10 cal.c
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$
```

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ less +10 cal.c
    scanf("%d",&n2);
    add=n1+n2;
    sub=n1-n2;
    prod=n1*n2;
    quot=n1/n2;
    remain=n1%n2;
    printf("\nADDITION OF THE NUMBERS: %d",add);
    printf("\nSUBTRACTION OF THE NUMBERS: %d",sub);
    printf("\nPRODUCTION OF THE NUMBERS: %d",prod);
    printf("\nQUOTIENT OF THE NUMBERS: %d",quot);
    printf("\nREMAINDER OF THE NUMBERS: %d",remain);
    getch();
}
cal.c (END)
```

10. Execute **ls -l** and add the output to lsoutput, at the end.

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2$ cd dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l >> lsoutput
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat lsoutput
total 12
-rw-rw-r-- 1 ubuntu ubuntu 25 May 27 02:08 test.py
-rw-rw-r-- 1 ubuntu ubuntu 0 May 27 02:14 lsoutput
-rw-rw-r-- 1 ubuntu ubuntu 275 May 27 02:07 avg.c
-rw-rw-r-- 1 ubuntu ubuntu 1012 May 27 02:05 a1.txt
total 16
-rw-rw-r-- 1 ubuntu ubuntu 1012 May 27 02:05 a1.txt
-rw-rw-r-- 1 ubuntu ubuntu 275 May 27 02:07 avg.c
-rw-rw-r-- 1 ubuntu ubuntu 219 May 27 02:14 lsoutput
-rw-rw-r-- 1 ubuntu ubuntu 25 May 27 02:08 test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

11. Execute **ls -l** and feed the result to less command, to scroll through the directory listing.

```
ubuntu@ubuntu: ~/Desktop/NSA/dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l | less
[4]+  Stopped                  ls --color=auto -l | less
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

```
total 16
-rw-rw-r-- 1 ubuntu ubuntu 1012 May 27 02:05 a1.txt
-rw-rw-r-- 1 ubuntu ubuntu 275 May 27 02:07 avg.c
-rw-rw-r-- 1 ubuntu ubuntu 438 May 27 02:26 lsoutput
-rw-rw-r-- 1 ubuntu ubuntu 25 May 27 02:08 test.py
(END)
```

12. Copy the file file1 to newfile.

- a) If newfile already exists, it should be replaced.
- b) If newfile already exists, it should not be replaced.

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cd /home
ubuntu@ubuntu: /home$ cd /home/ubuntu/Desktop/NSA/dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
a1.txt avg.c file1 file2 lsoutput test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat file1
Hello,
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp file1 newfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat newfile
Hello,
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat >> file1
Good Morning
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat file1
Hello,
Good Morning
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -n file1 newfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat newfile
Hello,
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

- c) If newfile already exists, it should be replaced, but only with the consent of the user.
- d) If newfile already exists, it should be replaced only if its contents is older than that of file1.

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat file1
Hello,
Good Morning
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -i file1 newfile
cp: overwrite 'newfile'? y
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat newfile
Hello,
Good Morning
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat >> file1
to all
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -u file1 newfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat newfile
Hello,
Good Morning
to all
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

- e) Even if newfile is read only.
- f) Create a link instead of copying.

```
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod 444 newfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat file1
Students
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -f file1 newfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cat newfile
Hello,
Good Morning
to all
Students
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -s file1 newfile
cp: cannot create symbolic link 'newfile' to 'file1': File exists
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -S file1 newfile
cp: missing destination file operand after 'newfile'
Try 'cp --help' for more information.
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cp -s file1 newf
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
a1.txt avg.c file1 file2 lsoutput newf newfile test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l
total 28
-rw-rw-r-- 1 ubuntu ubuntu 1012 May 27 02:05 a1.txt
-rw-rw-r-- 1 ubuntu ubuntu 275 May 27 02:07 avg.c
-rw-rw-r-- 1 ubuntu ubuntu 37 May 27 02:43 file1
-rw-rw-r-- 1 ubuntu ubuntu 11 May 27 02:31 file2
-rw-rw-r-- 1 ubuntu ubuntu 438 May 27 02:26 lsoutput
lrwxrwxrwx 1 ubuntu ubuntu 5 May 27 02:46 newf -> file1
-rw-rw-r-- 1 ubuntu ubuntu 37 May 27 02:43 newfile
-rw-rw-r-- 1 ubuntu ubuntu 25 May 27 02:08 test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cd
ubuntu@ubuntu: $ cp -R dir1
```

g) Copy the entire directory tree from dir1 of Qn.4 to a new directory dir5

```
ubuntu@ubuntu: ~/Desktop/NSA
ubuntu@ubuntu:~/Desktop/NSA$ cd /home/ubuntu/Desktop/NSA/dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ cd
ubuntu@ubuntu:~/Desktop/NSA$ cp -R dir1 dir5
cp: cannot stat 'dir1': No such file or directory
ubuntu@ubuntu:~/Desktop/NSA$ cd NSA
ubuntu@ubuntu:~/Desktop/NSA$ cp -R dir1 dir5
ubuntu@ubuntu:~/Desktop/NSA$ ls
dir1  dir5
ubuntu@ubuntu:~/Desktop/NSA$
```

13. Create a new directory, dir6 inside dir1

- a) Move all files in dir5 into it.
- b) Delete all files where the name starts with a vowel character, upper or lower case.

```
ubuntu@ubuntu:~/Desktop/NSA$ mkdir -p dir1/dir6
ubuntu@ubuntu:~/Desktop/NSA$ mv dir5 dir1/dir6
ubuntu@ubuntu:~/Desktop/NSA$ cd dir1/dir6
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir6$ ls
dir5
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir6$ cd ..
ubuntu@ubuntu:~/Desktop/NSA/dir1$ cd dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ mv newfile oldfile
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
a.txt  avg.c  file1  file2  lsoutput  newf  oldfile  test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

- c) Delete all files where the name is at least 3 characters long.
- d) Delete all hidden folders, and files.

```
ubuntu@ubuntu:~/Desktop/NSA$ mv file1 dir1/dir6/file3
mv: cannot stat 'file1': No such file or directory
ubuntu@ubuntu:~/Desktop/NSA$ mv file1 dir1/dir6/file3
ubuntu@ubuntu:~/Desktop/NSA$ cd dir1/dir2/dir3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ rm [a,e,i,o,u,A,E,I,O,U]*
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
file1  file2  lsoutput  newf  test.py
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ rm ???*
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -A
cal.c
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -a
Command 'ls' not found, did you mean:
  command 'ls' from deb coreutils (8.32-4.1ubuntu1)
  command 'hls' from deb hfsutils (3.2.6-15build2)
  command 'lvs' from deb lvm2 (2.03.11-2.1ubuntu4)
Try: sudo apt install <deb name>
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -a
.  ..  cal.c
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ rm -rf .*
rm: refusing to remove '.' or '..' directory: skipping '.'
rm: refusing to remove '.' or '..' directory: skipping '..'
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -a
cal.c
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$
```

14. Create a file testfile1 using Vim

vim testfile1

- a) Set line number

vim testfile1

Press esc

Type :set number

```
1
2
3
4
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9
10
11
12
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14
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- iv. Add write to owner, revoke read from others and set read only to group.
- v. Set read and write to all.

```

ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ vim testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ vim testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls
cal.c testfile2 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l
total 12
-rw-rw-r-- 1 ubuntu ubuntu 607 May 27 02:19 cal.c
-rw-rw-r-- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
-rw-rw-r-- 1 ubuntu ubuntu 469 May 27 03:23 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod o+r testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod u+w testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-r--rw-r-- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod g+x testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-r--xr--r-- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod u+w,o-r,g+r testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-rw-rw-rw- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod a+r testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-rw-rw-rw- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$

```

- b. Modify the permissions of testfile3 using numeric mode
  - i. Set read and write to all.
  - ii. set read,write and execute to owner, read and execute to group and read only to others.

```

ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile3
-rw-rw-r-- 1 ubuntu ubuntu 469 May 27 03:23 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod 666 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile3
-rw-rw-rw- 1 ubuntu ubuntu 469 May 27 03:23 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod 754 testfile3
Command 'chmod' not found, did you mean:
  Command 'chmod' from deb coreutils (8.32-4.1ubuntu1)
Try: sudo apt install <deb name>
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod 754 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile3
-rwxr-xr-- 1 ubuntu ubuntu 469 May 27 03:23 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$

```

- c. Set the permissions of testfile2 the same as that of testfile3

```

ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile3
-rwxr-xr-- 1 ubuntu ubuntu 469 May 27 03:23 testfile3
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-rw-rw-rw- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ chmod --reference=testfile3 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$ ls -l testfile2
-rwxr-xr-- 1 ubuntu ubuntu 320 May 27 03:22 testfile2
ubuntu@ubuntu:~/Desktop/NSA/dir1/dir2/dir3$

```

16. Use **head** and **tail** piped with cat /etc/passwd to display the details of
  - a. The first 12 users in the system.
  - b. The last 7 users in the system.

```

ubuntu@ubuntu:~/Desktop/NSA/dir1$ cat /etc/passwd|head -12
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
ubuntu@ubuntu:~/Desktop/NSA/dir1$ cat /etc/passwd|tail -7
colord:x:123:130:colord colour management daemon,,/,var/lib/colord:/usr/sbin/nologin
geoclue:x:124:131:geoclue:/var/lib/geoclue:/usr/sbin/nologin
pulse:x:125:132:PulseAudio daemon,,/,run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:126:65534:run/gnome-initial-setup:/bin/false
hplip:x:127:7:HPLIP system user,,/,run/hplip:/bin/false
gdm:x:128:134:Gnome Display Manager:/var/lib/gdm3:/bin/false
ubuntu:x:999:999:Live session user,,/,home/ubuntu:/bin/bash
ubuntu@ubuntu:~/Desktop/NSA/dir1$

```

c. All but the first 3.

```
ubuntu@ubuntu: ~/Desktop/NSA/dir1$ cat /etc/passwd | tail +4
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105:/:nonexistent:/usr/sbin/nologin
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin
```

d. All but the last 5.

```
ubuntu@ubuntu: ~/Desktop/NSA/dir1$ cat /etc/passwd | head -n -5
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105:/:nonexistent:/usr/sbin/nologin
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
syslog:x:104:111:/:home/syslog:/usr/sbin/nologin
_lapt:x:105:65534:/:nonexistent:/usr/sbin/nologin
tss:x:106:112:TPM software stack,,:/var/lib/tpm:/bin/false
```

e. Only the 9 th.

```
ubuntu@ubuntu: ~/Desktop/NSA/dir1$ cat /etc/passwd | head -9|tail -1
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
ubuntu@ubuntu: ~/Desktop/NSA/dir1$
```

17. Use **grep** to

- Display all lines in a file that contains the string “abc”
- Display all lines in a file that *does not* contain the string “abc”

```

ubuntu@ubuntu:~/Desktop/NSA/dir1$ cat > txtfile
abc
abc is a string
these are english alphabets
ubuntu@ubuntu:~/Desktop/NSA/dir1$ grep abc txtfile
abc
abc is a string
ubuntu@ubuntu:~/Desktop/NSA/dir1$ grep -v abc txtfile
these are english alphabets

```

## 18. Using **expr**

- Read two integers X and Y. Display the sum, difference, product, quotient and remainder of these variables.
- Read a string, S, a position, p and a length l. Display the substring of length l starting at position p from the string S.

```

lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ read -p "enter two numbers: " x y
enter two numbers: 12 5
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "sum is : `expr $x + $y`"
sum is : 17
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "Difference is : `expr $x - $y`"
Difference is : 7
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "Product is : `expr $x \* $y`"
Product is : 60
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "Quotient is : `expr $x / $y`"
Quotient is : 2
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "Reminder is : `expr $x % $y`"
Reminder is : 2
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ read -p "enter a string: " s
enter a string: notebook
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ read -p "enter the position: " p
enter the position: 5
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ read -p "enter the length: " l
enter the length: 4
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$ echo "Substring: `expr substr $s $p $l`"
Substring: book
lab@lab-Lenovo-IdeaPad-Z400:~/dir1/dir6/dir5/dir2$

```

- Add a normal user, user1. Create (if it does not exist) the folder /user1 and set /user1 as the home directory of user1. Also set /bin/bash as the login shell (*Use a single command*).
- Modify the user account of user1, to expire it after a specific date.

```

user@user-VirtualBox: /
user@user-VirtualBox: $ sudo useradd -s /bin/bash -m -d /home/u_ser1 u_ser1
[sudo] password for user:
user@user-VirtualBox: $ sudo change -l u_ser1
sudo: change: command not found
user@user-VirtualBox: $ sudo chage -l u_ser1
Last password change           : Jun 06, 2023
Password expires                : never
Password inactive               : never
Account expires                 : never
Minimum number of days between password change : 0
Maximum number of days between password change : 99999
Number of days of warning before password expires : 7
user@user-VirtualBox: $ sudo change -E 2022-06-9 u_ser1
sudo: change: command not found
user@user-VirtualBox: $ sudo chage -E 2022-06-9 u_ser1
user@user-VirtualBox: $ sudo chage -l u_ser1
Last password change           : Jun 06, 2023
Password expires                : never
Password inactive               : never
Account expires                 : Jun 09, 2022
Minimum number of days between password change : 0
Maximum number of days between password change : 99999
Number of days of warning before password expires : 7
user@user-VirtualBox: $ sudo chown -R u_ser1:u_ser1 /home/Documents/dir1/dir2
chown: cannot access '/home/Documents/dir1/dir2': No such file or directory
user@user-VirtualBox: $ sudo chown -R u_ser1:u_ser1 /Documents/dir1/dir2
chown: cannot access '/Documents/dir1/dir2': No such file or directory
user@user-VirtualBox: $ sudo chown -R u_ser1:u_ser1 /home/user/Documents/dir1/
user@user-VirtualBox: $ cd ..
user@user-VirtualBox: /home$ ls -l
total 8
drwxr-xr-x  2 u_ser1 u_ser1 4096 Jun  6 21:22 user
drwxr-xr-x  2 u_ser1 u_ser1 4096 Jun  6 22:06 u_ser1
user@user-VirtualBox: /home$ cd Documents
bash: cd: Documents: No such file or directory
user@user-VirtualBox: /home$ cd ..
user@user-VirtualBox: $ cd Documents
bash: cd: Documents: No such file or directory
user@user-VirtualBox: $

```

- Change the owner and group of the directory tree from dir2 and all its contents to user1.

```
user@user-VirtualBox: ~/Documents
user@user-VirtualBox:~/Documents$ cd dir1
user@user-VirtualBox:~/Documents/dir1$ ls -l
total 12
drwxr-xr-x 3 u_ser1 u_ser1 4096 Jun 6 21:13 dir2
drwxr-xr-x 2 u_ser1 u_ser1 4096 Jun 6 21:12 dir3
drwxr-xr-x 3 u_ser1 u_ser1 4096 Jun 6 21:10 dir4
-rw-rw-r-- 1 u_ser1 u_ser1 0 Jun 6 21:11 sun.py
-rw-rw-r-- 1 u_ser1 u_ser1 0 Jun 6 21:08 test1.txt
user@user-VirtualBox:~/Documents/dir1$ cd dir2
user@user-VirtualBox:~/Documents/dir1/dir2$ ls -l
total 12
drwxr-xr-x 2 u_ser1 u_ser1 4096 Jun 6 21:15 dir3
-rw-rw-r-- 1 u_ser1 u_ser1 13 Jun 6 21:13 testfile1.txt
-rw-rw-r-- 1 u_ser1 u_ser1 21 Jun 6 21:14 testfile2.txt
user@user-VirtualBox:~/Documents/dir1/dir2$
```

- d. Delete the user account user1
- By retaining the home folder
  - By deleting the home folder

```
user@user-VirtualBox: ~/Documents
user@user-VirtualBox:~/Documents$ cd dir1
user@user-VirtualBox:~/Documents/dir1$ ls -l
total 12
drwxr-xr-x 3 u_ser1 u_ser1 4096 Jun 6 21:13 dir2
drwxr-xr-x 2 u_ser1 u_ser1 4096 Jun 6 21:12 dir3
drwxr-xr-x 3 u_ser1 u_ser1 4096 Jun 6 21:10 dir4
-rw-rw-r-- 1 u_ser1 u_ser1 0 Jun 6 21:11 sun.py
-rw-rw-r-- 1 u_ser1 u_ser1 0 Jun 6 21:08 test1.txt
user@user-VirtualBox:~/Documents/dir1$ cd dir2
user@user-VirtualBox:~/Documents/dir1/dir2$ ls -l
total 12
drwxr-xr-x 2 u_ser1 u_ser1 4096 Jun 6 21:15 dir3
-rw-rw-r-- 1 u_ser1 u_ser1 13 Jun 6 21:13 testfile1.txt
-rw-rw-r-- 1 u_ser1 u_ser1 21 Jun 6 21:14 testfile2.txt
user@user-VirtualBox:~/Documents/dir1/dir2$ sudo userdel u_ser1
lsudoj password for users:
user@user-VirtualBox:~/Documents/dir1/dir2$ sudo userdel u_ser1 -r u_ser1
Usage: userdel [options] LOGIN
Options:
  -f, --force                force some actions that would fail otherwise
                             e.g. removal of user still logged in
                             or files, even if not owned by the user
  -h, --help                display this help message and exit
  -r, --remove              remove home directory and mail spool
  -P, --prefix PREFIX_DIR  prefix directory where are located the /etc/* files
  -Z, --extrausers          use the extra users database
                             remove any SCLinux user mapping for the user
user@user-VirtualBox:~/Documents/dir1/dir2$
```

## 20. Miscellaneous

- a. Using **tar** create a tar.gz file of the folder dir1 of Qn.4 with the name mydir.tar.gz.

```
user-VirtualBox:~/Documents
user-VirtualBox:~/Documents/dir1$ cd
user-VirtualBox:~/Documents$ tar -czvf mydir.tar.gz dir1
dir1: Cannot stat: No such file or directory
Exiting with failure status due to previous errors
user-VirtualBox:~/Documents$ cd Documents
user-VirtualBox:~/Documents$ tar -czvf mydir.tar.gz dir1
sun.py
dir2/
dir2/dir3/
dir2/dir3/armstrong.c
dir2/testfile2.txt
dir2/testfile1.txt
test1.txt
dir4/
dir4/sample.c
dir4/average.c
user-VirtualBox:~/Documents$
```

- b. Extract the contents of mydir.tar.gz to dir6 of Qn.14.

```
user@user-VirtualBox: ~/Documents$ tar -xvzf mydir.tar.gz -C dir1/dir6
dir1/
dir1/sub.py
dir1/dir2/
dir1/dir2/dir3/
dir1/dir2/dir3/armstrong.c
dir1/dir2/testfile2.txt
dir1/dir2/testfile1.txt
dir1/test.txt
dir1/dir4/
dir1/dir4/sample.c
dir1/dir4/average.c
user@user-VirtualBox: ~/Documents$
```

a. Use **top** to display processes sorted on

i. Process id

1. Type top

2. Press N

```
top - 21:34:09 up 49 min, 2 users, load average: 0.09, 0.09, 0.09
Tasks: 231 total, 1 running, 230 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.3 us, 0.0 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
Mem Mem : 4685.0 total, 1654.5 free, 1713.1 used, 1612.8 buff/cache
Mem Swap: 4096.0 total, 4096.0 free, 0.0 used, 2971.8 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR   S  %CPU  %MEM     TIME+ COMMAND
 1642 user        20   0 5081956 525256 168664 S   1.7 10.9   2:36.78 gnome-shell
2259 user        39  19 7842444 327800 18944 S   0.3  0.7   0:01.05 tracker-miner-f
2782 user        20   0 643892 578984 46832 S   0.3  1.2   0:05.48 gnome-terminal-
5375 user        20   0 23024   5504   3328 R   0.3  0.1   0:00.02 top
   1 root         0   0 168440 12724  8884 S   0.0  0.3   0:01.77 systemd
   2 root         0   0      0      0      0 S   0.0  0.0   0:00.00 kthreadd
   3 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 rcu_gp
   4 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 rcu_par_gp
   5 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 slub_flushwq
   6 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 netns
   8 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 kworker/0:0H-events_highpri
  10 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 mm_percpu_wq
  11 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 rcu_tasks_kthread
  12 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 rcu_tasks_rude_kthread
  13 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 rcu_tasks_trace_kthread
  14 root         0 -20   0      0      0 S   0.0  0.0   0:00.03 ksoftirqd/0
  15 root         0 -20   0      0      0 I   0.0  0.0   0:00.78 rcu_preempt
  16 root         0  20   0      0      0 S   0.0  0.0   0:00.02 migration/0
  17 root        -51   0      0      0      0 S   0.0  0.0   0:00.00 idle_inject/0
  18 root         0 -20   0      0      0 I   0.0  0.0   0:00.18 kworker/0:1-events
  19 root         0 -20   0      0      0 S   0.0  0.0   0:00.00 cpuhp/0
  20 root         0 -20   0      0      0 S   0.0  0.0   0:00.00 cpuhp/1
  21 root        -51   0      0      0      0 S   0.0  0.0   0:00.00 idle_inject/1
  22 root         0  20   0      0      0 S   0.0  0.0   0:00.26 migration/1
  23 root         0 -20   0      0      0 S   0.0  0.0   0:00.03 ksoftirqd/1
  24 root         0 -20   0      0      0 I   0.0  0.0   0:00.02 kworker/1:0-events
  25 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 kworker/1:0H-events_highpri
  26 root         0 -20   0      0      0 S   0.0  0.0   0:00.00 cpuhp/2
  27 root        -51   0      0      0      0 S   0.0  0.0   0:00.00 idle_inject/2
  28 root         0  20   0      0      0 S   0.0  0.0   0:00.26 migration/2
  29 root         0 -20   0      0      0 S   0.0  0.0   0:00.03 ksoftirqd/2
  31 root         0 -20   0      0      0 I   0.0  0.0   0:00.00 kworker/2:0-events_highpri
  32 root         0 -20   0      0      0 S   0.0  0.0   0:00.00 cpuhp/3
  33 root        -51   0      0      0      0 S   0.0  0.0   0:00.00 idle_inject/3
```

ii.CPU%

1. Type top

2. Press P

```
top - 21:33:24 up 40 min, 2 users, load average: 0.09, 0.09, 0.10
Tasks: 229 total, 1 running, 228 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.3 us, 0.0 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
Mem Mem : 4685.0 total, 1652.0 free, 1716.6 used, 1611.8 buff/cache
Mem Swap: 4096.0 total, 4096.0 free, 0.0 used, 2968.3 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR   S  %CPU  %MEM     TIME+ COMMAND
5351 user        20   0 23024   5632  3456 R   0.3  0.1   0:00.03 top
5350 root         0   0 16884  2176  2048 S   0.0  0.0   0:00.00 anacron
5295 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/u12:4-ext4-rsv-conversion
5294 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/u12:1-flush-8:0
5258 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/4:1-events
5250 root         0   0      0      0      0 I   0.0  0.0   0:00.01 kworker/3:1-events
5248 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/1:2-cgroup_destroy
5191 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/u12:5-flush-8:0
5163 root         0   0      0      0      0 I   0.0  0.0   0:00.10 kworker/u12:0-events_power_efficient
5153 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/0:0-cgroup_destroy
5187 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/5:1-events
4230 user        20   0 2519536 242452 107860 S   0.0  5.1   0:24.80 gnome-text-edit
4219 root         0   0      0      0      0 I   0.0  0.0   0:00.18 kworker/u12:2-events_power_efficient
3539 user        20   0 868160 26368 14848 S   0.0  0.5   0:00.06 snap
3269 root         0   0      0      0      0 I   0.0  0.0   0:00.16 kworker/u12:3-events_unbound
3137 root         0   0      0      0      0 I   0.0  0.0   0:00.42 kworker/5:2-events
3133 root         0   0      0      0      0 I   0.0  0.0   0:00.00 kworker/2:0
2801 user        20   0 19604  4864  3584 S   0.0  0.1   0:00.06 bash
2782 user        20   0 642860 57676 46832 S   0.0  1.2   0:05.30 gnome-terminal-
2552 user        20   0 168652 2676 1792 S   0.0  0.0   0:00.01 gvfsd-recent
2672 user        20   0 3029392 64592 48508 S   0.0  1.3   0:00.87 gjs
2661 user        20   0 2673380 319420 124752 S   0.0  6.7   0:14.34 nautilus
2552 user        20   0 175372 24192 24196 S   0.0  0.7   0:00.31 update-notifier
2449 root         0   0 479412 33728 28232 S   0.0  0.7   0:00.62 fwupd
2373 user        20   0 244796 6480 5888 S   0.0  0.1   0:00.01 gvfsd-metadata
2302 user        20   0 168652 2676 1792 S   0.0  0.0   0:00.70 VBoxClient
2301 user        20   0 28548  1564 1280 S   0.0  0.0   0:00.00 VBoxClient
2299 user        20   0 227352 2824 2560 S   0.0  0.1   0:02.67 VBoxClient
2294 user        20   0 28548  1564 1280 S   0.0  0.0   0:00.00 VBoxClient
2288 user        20   0 226836 3080 2688 S   0.0  0.1   0:01.50 VBoxClient
2286 user        20   0 28548  1564 1280 S   0.0  0.0   0:00.00 VBoxClient
2246 user        20   0 1764112 86496 64868 S   0.0  1.8   0:00.65 mitter-x11-fram
2259 user        39  19 784244 33000 18944 S   0.0  0.7   0:00.99 tracker-miner-f
2251 user        20   0 275376 24700 18116 S   0.0  0.5   0:00.21 dbus-x11
```

- c. Use **ps** to display
- Processes associated with the current terminal.
  - All processes in the system.

```
user@user-VirtualBox: ~/Documents$ ps -T
  PID  SPID  TTY      TIME  CMD
 2801   2801 pts/0    00:00:00 bash
 5424   5424 pts/0    00:00:00 ps
user@user-VirtualBox: ~/Documents$ ps -A
  PID  TTY      TIME  CMD
   1  ?        00:00:01 systemd
   2  ?        00:00:00 kthreadd
   3  ?        00:00:00 rcu_gp
   4  ?        00:00:00 rcu_par_gp
   5  ?        00:00:00 slub_flushwq
   6  ?        00:00:00 netns
   8  ?        00:00:00 kworker/0:0H-events_highpri
  10  ?        00:00:00 mm_percpu_wq
  11  ?        00:00:00 rcu_tasks_kthread
  12  ?        00:00:00 rcu_tasks_rude_kthread
  13  ?        00:00:00 rcu_tasks_trace_kthread
  14  ?        00:00:00 ksoftirqd/0
  15  ?        00:00:00 rcu_preempt
  16  ?        00:00:00 migration/0
  17  ?        00:00:00 idle_inject/0
  18  ?        00:00:00 kworker/0:1-events
  19  ?        00:00:00 cpuhp/0
  20  ?        00:00:00 cpuhp/1
  21  ?        00:00:00 idle_inject/1
  22  ?        00:00:00 migration/1
  23  ?        00:00:00 ksoftirqd/1
  24  ?        00:00:00 kworker/1:0-events
  25  ?        00:00:00 kworker/1:0H-events_highpri
  26  ?        00:00:00 cpuhp/2
  27  ?        00:00:00 idle_inject/2
  28  ?        00:00:00 migration/2
  29  ?        00:00:00 ksoftirqd/2
  31  ?        00:00:00 kworker/2:0H-events_highpri
  32  ?        00:00:00 cpuhp/3
  33  ?        00:00:00 idle_inject/3
  34  ?        00:00:00 migration/3
  35  ?        00:00:00 ksoftirqd/3
  37  ?        00:00:00 kworker/3:0H-kblockd
  38  ?        00:00:00 cpuhp/4
  39  ?        00:00:00 idle_inject/4
  40  ?        00:00:00 migration/4
```

- d. Use **df** to display the storage available in each partition in human readable form.

```
user@user-VirtualBox: ~/Documents$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           469M   1.6M  467M   1% /run
/dev/sda2       25G    13G   11G  57% /
tmpfs           2.3G     0  2.3G   0% /dev/shm
tmpfs           5.0M   8.0K   5.0M   1% /run/lock
tmpfs           469M  116K  469M   1% /run/user/1000
user@user-VirtualBox: ~/Documents$
```

## Result:

Commands executed successfully and output is verified.