

20MCA 136-Networking & System Administration Lab

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Roll No : 26

BASIC LINUX COMMANDS

1. Pwd command

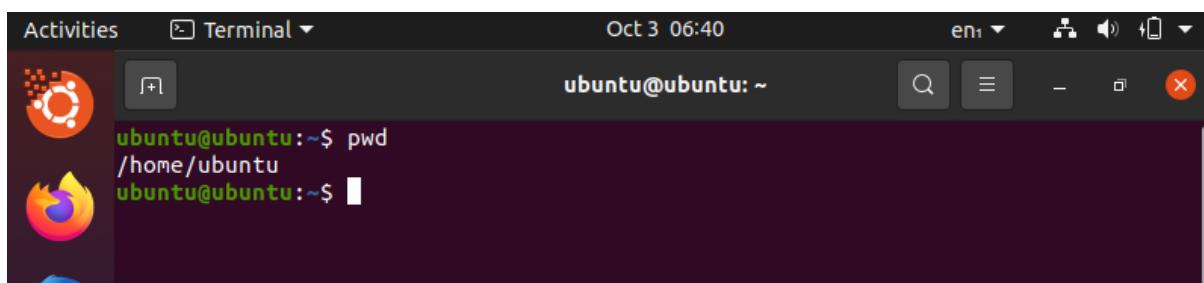
The `pwd` command stands for print working directory. It is one of the most basic and frequently used commands in Linux. When invoked the command prints the complete path of the current working directory.

- To find out what directory you are currently in, type `pwd` in your terminal:

```
$ pwd
```

- If you run the same command using the `-P` option:

```
$ pwd -p
```



2. mkdir command

`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. It is important to note that the user executing this command must have enough permission to create a directory in the parent directory, or he/she may receive a ‘permission denied’ error.

Syntax:

`mkdir [options...] [directories ...]`

- `-version`: It displays the version number, some information regarding the license and exits.

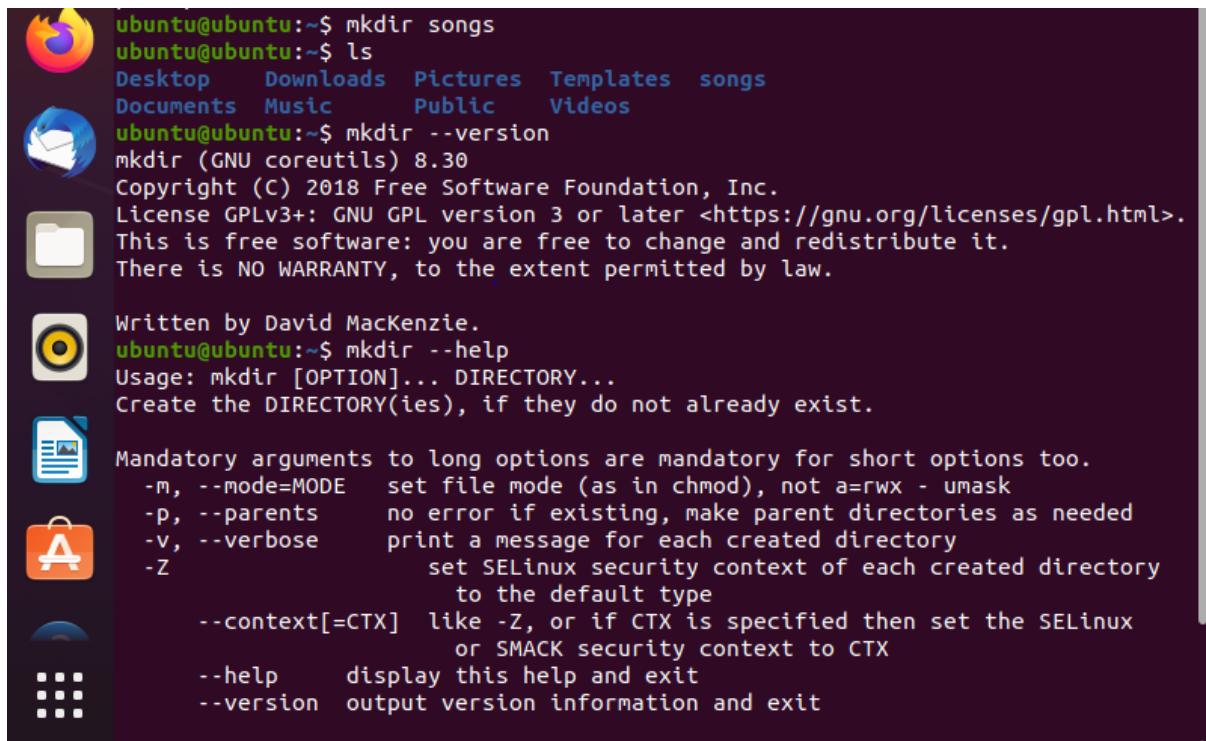
Syntax:

`mkdir -version`

- `-help`: It displays the help related information and exits.

Syntax:

`mkdir -help`



```
ubuntu@ubuntu:~$ mkdir songs
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  songs
Documents  Music  Public  Videos
ubuntu@ubuntu:~$ mkdir --version
mkdir (GNU coreutils) 8.30
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by David MacKenzie.
ubuntu@ubuntu:~$ mkdir --help
Usage: mkdir [OPTION]... DIRECTORY...
Create the DIRECTORY(ies), if they do not already exist.

Mandatory arguments to long options are mandatory for short options too.
 -m, --mode=MODE    set file mode (as in chmod), not a=rwx - umask
 -p, --parents      no error if existing, make parent directories as needed
 -v, --verbose      print a message for each created directory
 -Z                 set SELinux security context of each created directory
                   to the default type
 --context[=CTX]   like -Z, or if CTX is specified then set the SELinux
                   or SMACK security context to CTX
 --help            display this help and exit
 --version         output version information and exit
```

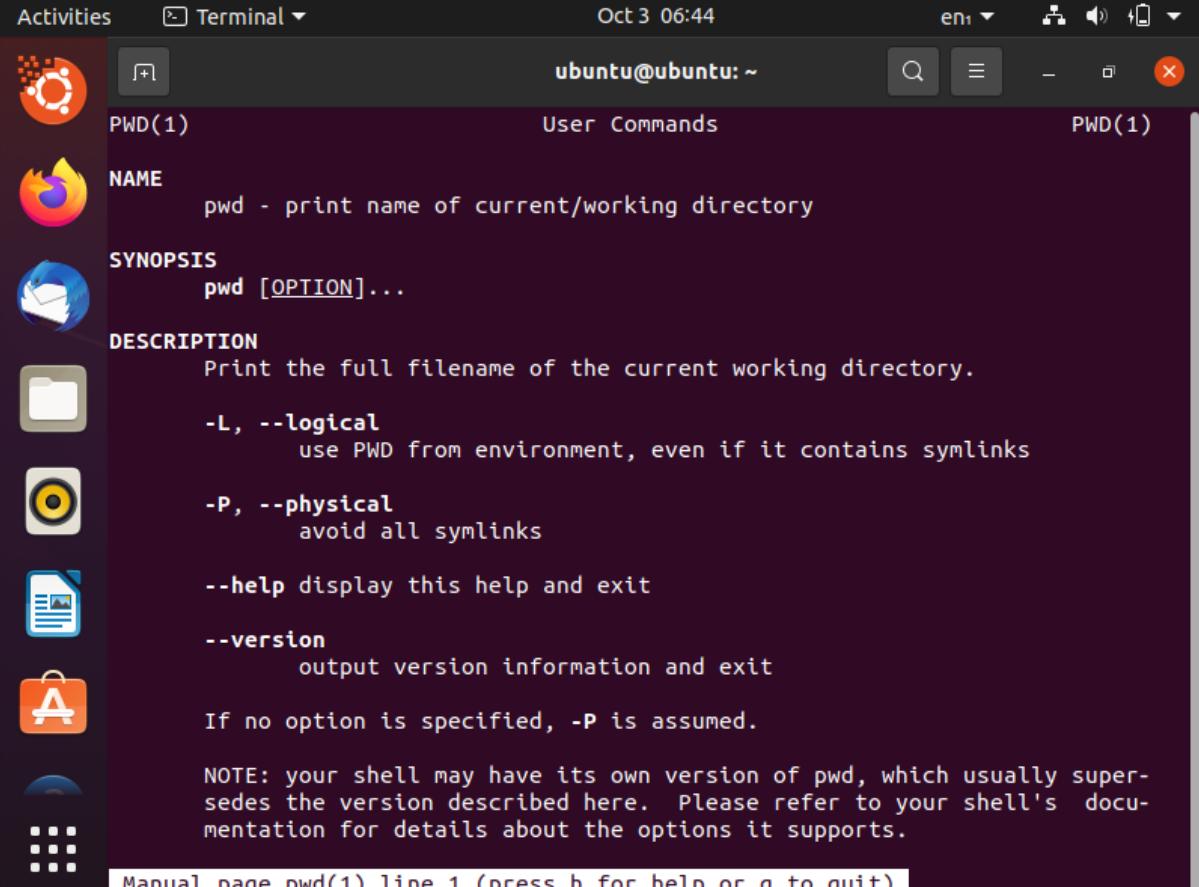
3. man command

man command in Linux 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.

Syntax :

\$man [OPTION]... [COMMAND NAME]...

➤ \$man pwd



The screenshot shows a terminal window on a Ubuntu desktop environment. The title bar says "Activities Terminal" and the status bar shows "Oct 3 06:44" and "en1". The terminal window displays the man page for the "pwd" command. The page includes sections for NAME, SYNOPSIS, DESCRIPTION, and options like -L, -P, --help, and --version. It also includes a note about the shell's own version of pwd.

```
Activities Terminal Oct 3 06:44 en1
ubuntu@ubuntu: ~ PWD(1) User Commands PWD(1)

PWD(1)
NAME
    pwd - print name of current/working directory
SYNOPSIS
    pwd [OPTION]...
DESCRIPTION
    Print the full filename of the current working directory.

    -L, --logical
        use PWD from environment, even if it contains symlinks

    -P, --physical
        avoid all symlinks

    --help display this help and exit

    --version
        output version information and exit

    If no option is specified, -P is assumed.

NOTE: your shell may have its own version of pwd, which usually super-
sedes the version described here. Please refer to your shell's docu-
mentation for details about the options it supports.

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

4. history command

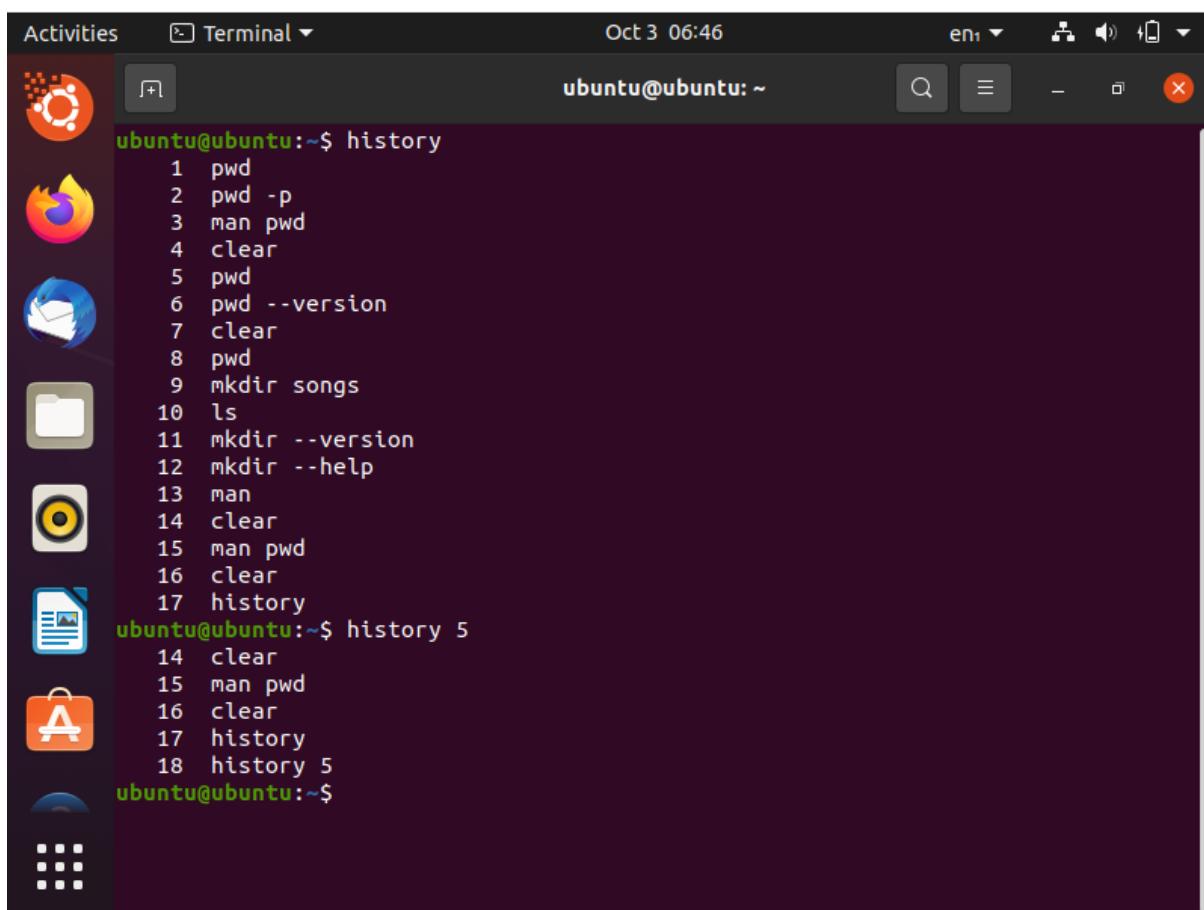
history command is used to view the previously executed command. This feature was not available in the Bourne shell. Bash and Korn support this feature in which every command executed is treated as the event and is associated with an event number using which they can be recalled and changed if required. These commands are saved in a history file. In Bash shell history command shows the whole list of the command.

Syntax:

```
$ history
```

- To show the limited number of commands that executed previously as follows:

```
$ history 5
```



The screenshot shows a terminal window titled "Terminal" with the command "history" run twice. The first run shows the full history of 18 commands, including pwd, man, clear, mkdir, ls, and history itself. The second run, with the argument "5", shows only the last 5 commands from the history list.

```
Activities Terminal Oct 3 06:46 en1
ubuntu@ubuntu:~$ history
1  pwd
2  pwd -p
3  man pwd
4  clear
5  pwd
6  pwd --version
7  clear
8  pwd
9  mkdir songs
10 ls
11 mkdir --version
12 mkdir --help
13 man
14 clear
15 man pwd
16 clear
17 history
ubuntu@ubuntu:~$ history 5
14  clear
15  man pwd
16  clear
17  history
18  history 5
ubuntu@ubuntu:~$
```

5. ls command

ls is a Linux shell command that lists directory contents of files and directories.

- Open Last Edited File Using ls -t

```
$ ls -t
```

➤ Display All Information About Files/Directories Using ls -l

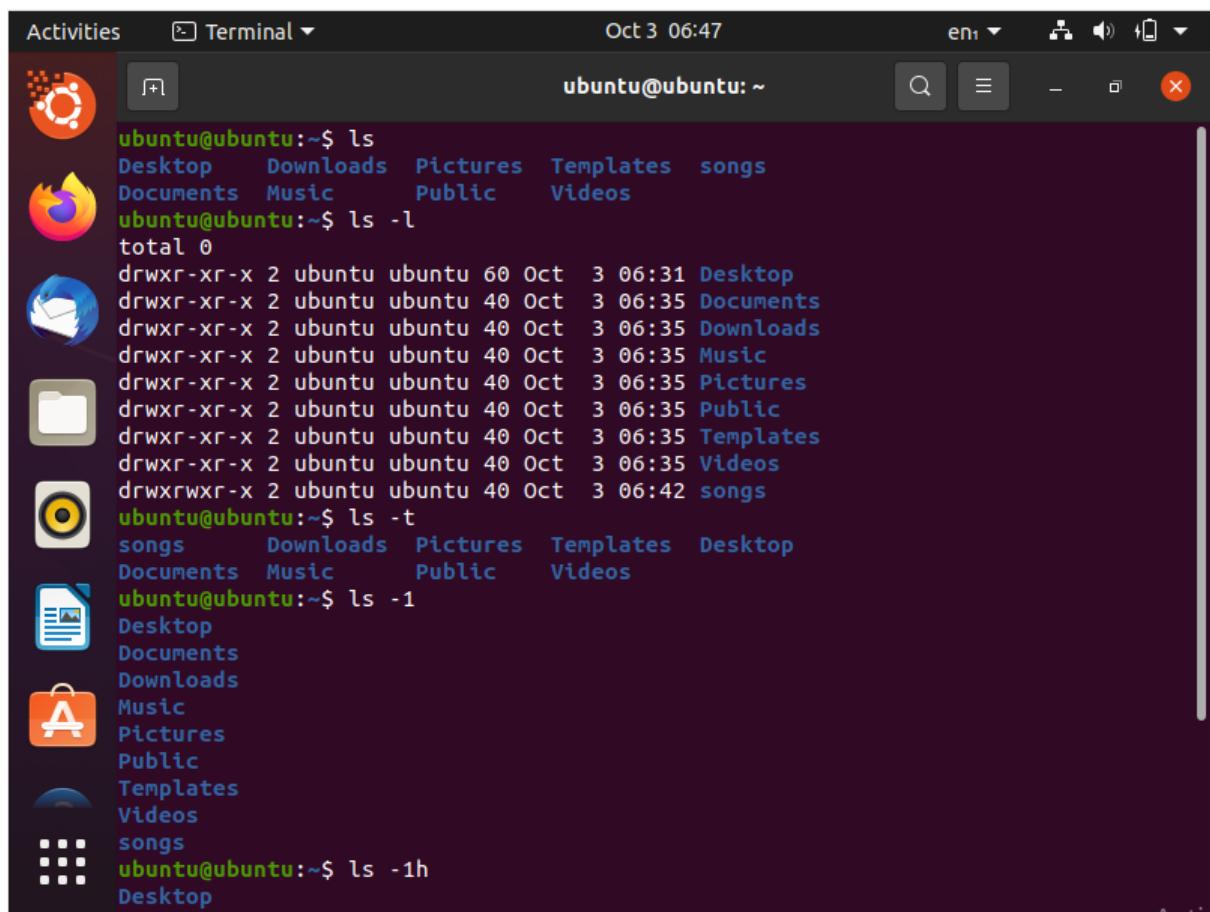
\$ ls -l

➤ Display One File Per Line Using ls -1

\$ ls -1

➤ Display File Size in Human Readable Format Using ls -lh

\$ ls -lh (h stands for human readable form) : To display file size in easy to read format. i.e i.e M for MB, K for KB, G for GB.



The screenshot shows a terminal window in the Unity desktop environment of Ubuntu. The terminal window title is "Terminal". The terminal content displays several commands and their outputs:

- \$ ls
Desktop Downloads Pictures Templates songs
Documents Music Public Videos
- \$ ls -l
total 0
drwxr-xr-x 2 ubuntu ubuntu 60 Oct 3 06:31 Desktop
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Documents
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Downloads
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Music
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Pictures
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Public
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Templates
drwxr-xr-x 2 ubuntu ubuntu 40 Oct 3 06:35 Videos
drwxrwxr-x 2 ubuntu ubuntu 40 Oct 3 06:42 songs
- \$ ls -t
songs Downloads Pictures Templates Desktop
Documents Music Public Videos
- \$ ls -1
Desktop
Documents
Downloads
Music
Pictures
Public
Templates
Videos
songs
- \$ ls -lh
Desktop

6. Cd command

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

Syntax:

```
$ cd [directory]
```

- To move inside a subdirectory : to move inside a subdirectory in linux we use

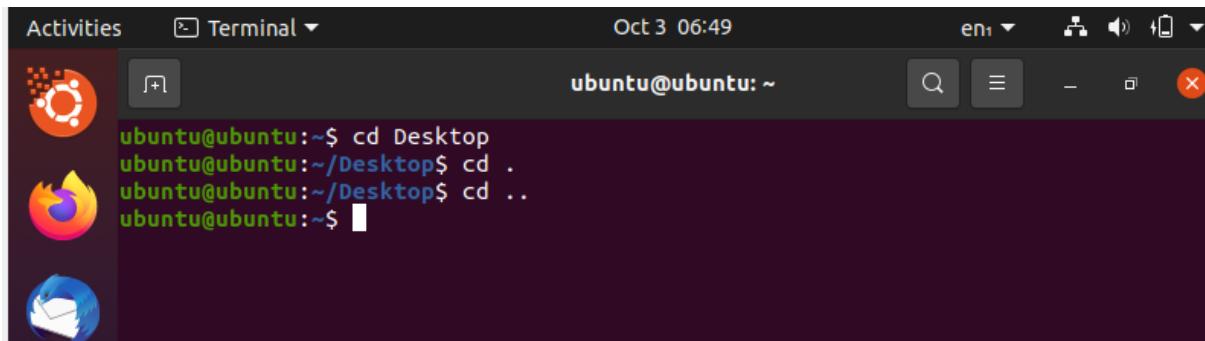
```
$ cd [directory_name]
```

- cd dir_1/dir_2/dir_3: This command is used to move inside a directory from a directory

```
$ cd dir_1/dir_2/dir_3
```

- cd ~ : this command is used to change directory to the home directory.

```
$ cd ~
```



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "Terminal". The terminal content shows the following command sequence:

```
Activities Terminal Oct 3 06:49 en1
ubuntu@ubuntu:~$ cd Desktop
ubuntu@ubuntu:~/Desktop$ cd .
ubuntu@ubuntu:~/Desktop$ cd ..
ubuntu@ubuntu:~$
```

7. touch command

The touch command is a standard command used in UNIX/Linux operating system which is used to create, change and modify timestamps of a file.

Touch command Syntax to create a new file: You can create a single file at a time using touch command.

Syntax:

\$ touch file_name

➤ Touch command to create multiple files: Touch command can be used to create the multiple numbers of files at the same time. These files would be empty while creation.

Syntax:

touch File1_name File2_name File3_name

➤ touch -a: This command is used to change access time only. To change or update the last access or modification times of a file touch -a command is used.

Syntax:

\$ touch -a filename

➤ touch -c : This command is used to check whether a file is created or not. If not created then don't create it. This command avoids creating files.

Syntax:

```
$ touch -c filename
```

➤ touch -c-d : This is used to update access and modification time.

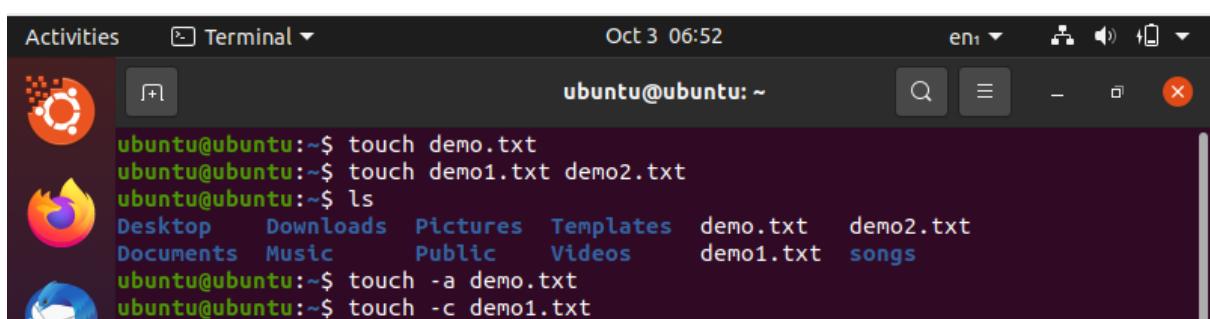
Syntax:

```
touch -c-d fileName
```

➤ touch -m : This is used to change the modification time only. It only updates last modification time.

Syntax:

```
touch -m filename
```



The screenshot shows a terminal window on an Ubuntu desktop environment. The terminal title is "Terminal". The session ID is "ubuntu@ubuntu:~". The date and time are "Oct 3 06:52". The window has standard Linux window controls at the top right. The terminal content is as follows:

```
Activities Terminal Oct 3 06:52 en1
[Ubuntu icon] [New Terminal] ubuntu@ubuntu:~ [Search] [Minimize] [-] [Maximize] [X]
ubuntu@ubuntu:~$ touch demo.txt
ubuntu@ubuntu:~$ touch demo1.txt demo2.txt
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  demo.txt  demo2.txt
Documents  Music  Public  Videos  demo1.txt  songs
ubuntu@ubuntu:~$ touch -a demo.txt
ubuntu@ubuntu:~$ touch -c demo1.txt
```

8. rmdir command

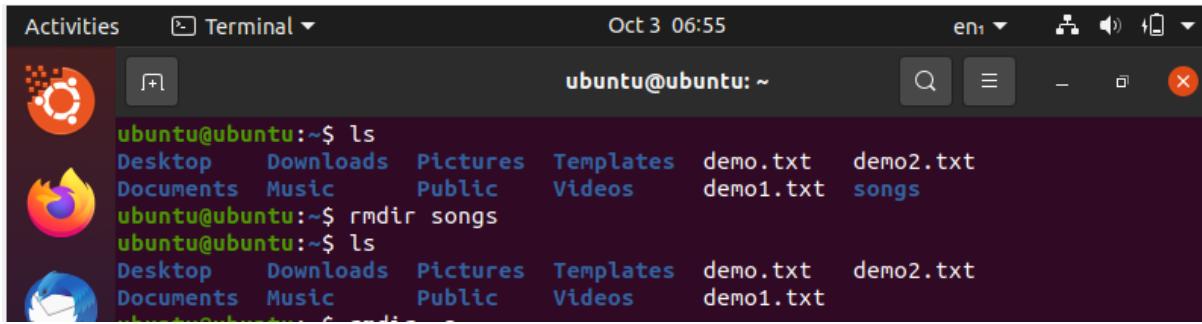
rmdir command is used remove empty directories from the filesystem in Linux. The rmdir command removes

each and every directory specified in the command line only if these directories are empty. So if the specified directory has some directories or files in it then this cannot be removed by rmdir command.

Syntax:

```
rmdir [-p] [-v | --verbose] [--ignore-fail-on-non-empty] directories ...
```

- **rmdir -p:** In this option each of the directory argument is treated as a pathname of which all components will be removed, if they are already empty, starting from the last component.
- **rmdir -v, --verbose:** This option displays verbose information for every directory being processed.
- **rmdir --ignore-fail-on-non-empty:** This option do not report a failure which occurs solely because a directory is non-empty. Normally, when rmdir is being instructed to remove a non-empty directory, it simply reports an error. This option consists of all those error messages.
- **rmdir --version:** This option is used to display the version information and exit.

A screenshot of an Ubuntu desktop environment. In the top left, there's an 'Activities' button and a 'Terminal' window icon. The terminal window is open and shows the following command-line session:

```
Activities Terminal ▾ Oct 3 06:55  
ubuntu@ubuntu:~$ ls  
Desktop Downloads Pictures Templates demo.txt demo2.txt  
Documents Music Public Videos demo1.txt songs  
ubuntu@ubuntu:~$ rmdir songs  
ubuntu@ubuntu:~$ ls  
Desktop Downloads Pictures Templates demo.txt demo2.txt  
Documents Music Public Videos demo1.txt
```

The terminal has a dark purple background with white text. Icons for the Dash, Home, and Help are visible in the top right corner.

9. Cat command

Cat(concatenate) command is very frequently used in Linux. It reads data from the file and gives their content as output. It helps us to create, view, concatenate files. So let us see some frequently used cat commands.

- To view a single file

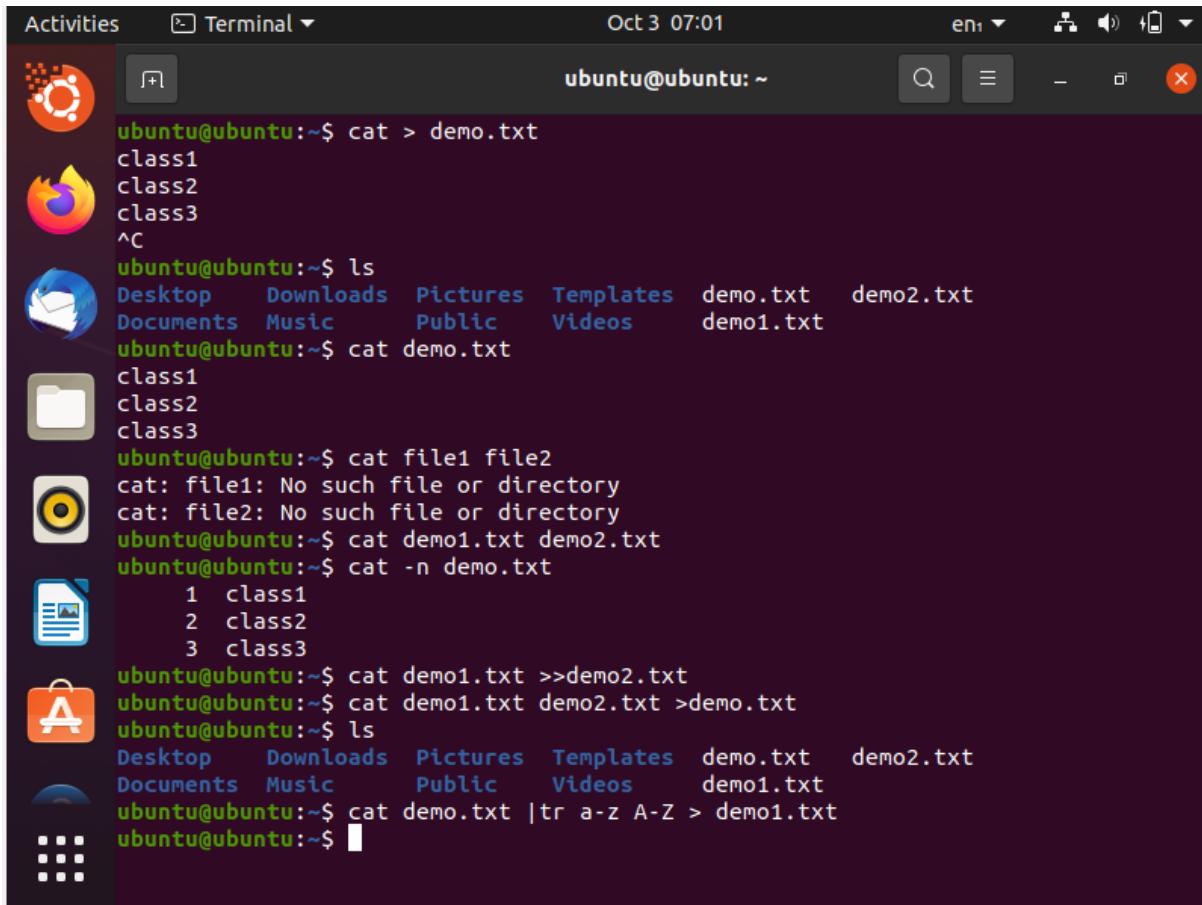
`$cat filename`

- To view multiple files

`$cat file1 file2`

- To view contents of a file proceeding with line numbers.

`$cat -n filename`

A screenshot of an Ubuntu desktop environment. On the left, there's a dock with icons for the Dash, Home, Activities, Terminal, Dash Home, and a file folder. The main area shows a terminal window titled 'Terminal'. The terminal window has a dark background and contains the following command-line session:

```
Activities Terminal Oct 3 07:01
ubuntu@ubuntu:~$ cat > demo.txt
class1
class2
class3
^C
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  demo.txt  demo2.txt
Documents  Music  Public  Videos  demo1.txt
ubuntu@ubuntu:~$ cat demo.txt
class1
class2
class3
ubuntu@ubuntu:~$ cat file1 file2
cat: file1: No such file or directory
cat: file2: No such file or directory
ubuntu@ubuntu:~$ cat demo1.txt demo2.txt
ubuntu@ubuntu:~$ cat -n demo.txt
      1  class1
      2  class2
      3  class3
ubuntu@ubuntu:~$ cat demo1.txt >>demo2.txt
ubuntu@ubuntu:~$ cat demo1.txt demo2.txt >demo.txt
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  demo.txt  demo2.txt
Documents  Music  Public  Videos  demo1.txt
ubuntu@ubuntu:~$ cat demo.txt |tr a-z A-Z > demo1.txt
ubuntu@ubuntu:~$
```

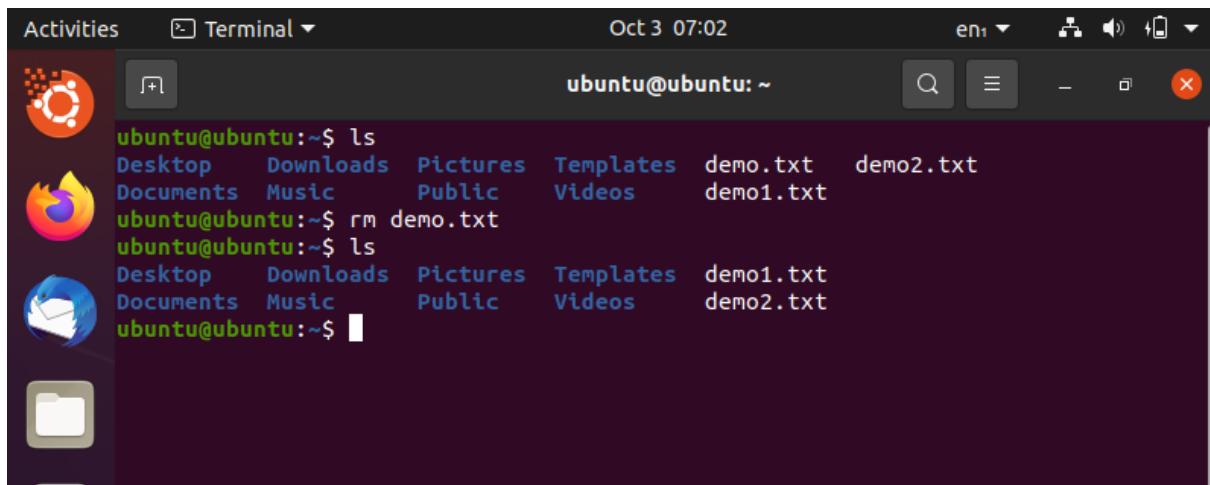
10. rm command

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 (for example, a file with two different names). By default, it does not remove directories.

Syntax:

rm [OPTION]... FILE...

Activities Terminal ▾ Oct 3 07:02 en ▾



The image shows a screenshot of an Ubuntu desktop environment. In the top left corner, there's a dock with icons for the Dash, Home, Activities overview, and Terminal. The Terminal window is open and has a dark theme. It displays a command-line session:

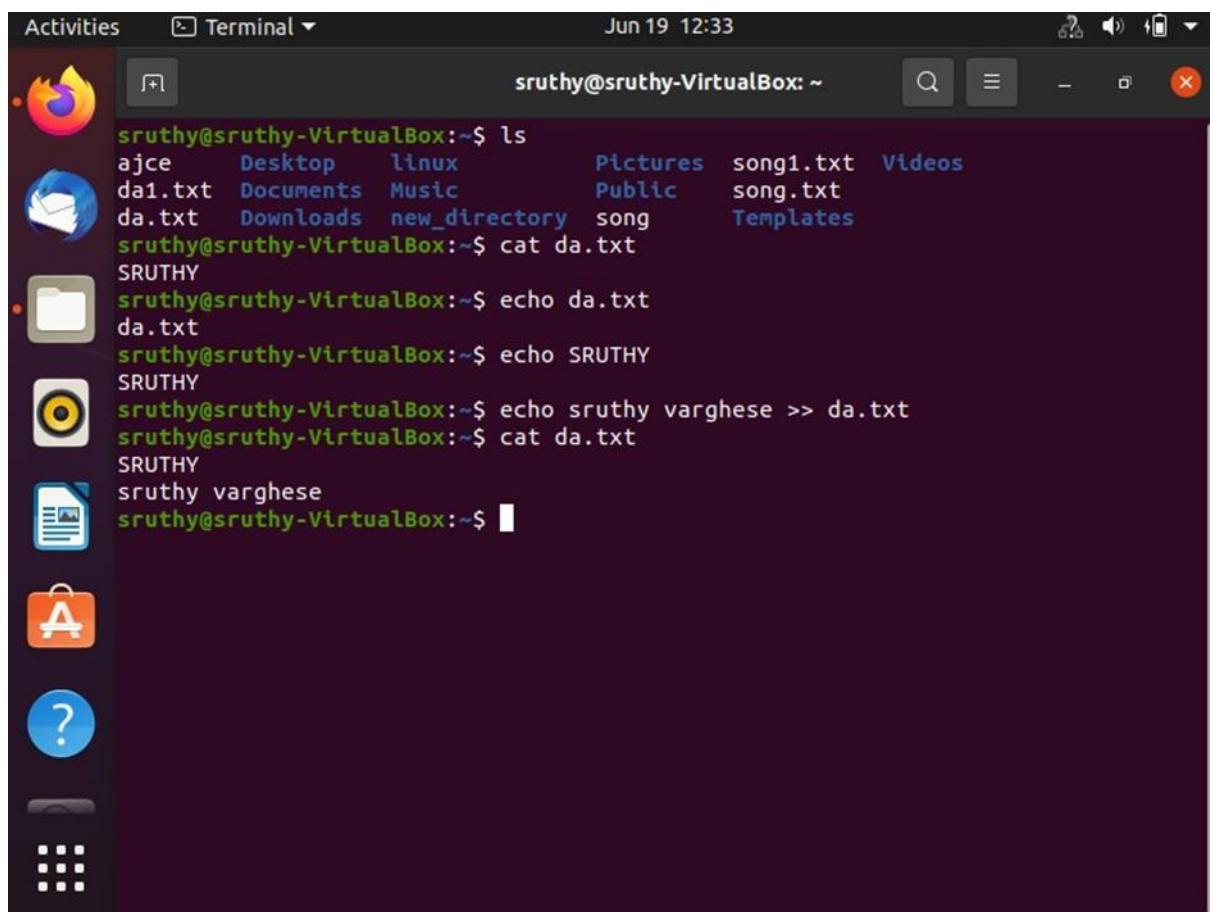
```
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  demo.txt  demo2.txt
Documents  Music    Public    Videos     demo1.txt
ubuntu@ubuntu:~$ rm demo.txt
ubuntu@ubuntu:~$ ls
Desktop  Downloads  Pictures  Templates  demo1.txt
Documents  Music    Public    Videos     demo2.txt
ubuntu@ubuntu:~$
```

11. Echo command

echo command in linux is used to display line of text/string that are passed as an argument . This is a built in command that is mostly used in shell scripts and batch files to output status text to the screen or a file.

Syntax :

echo [option] [string]

A screenshot of a Linux desktop environment, specifically Ubuntu, showing a terminal window. The terminal window is titled 'Terminal' and has the command 'sruthy@sruthy-VirtualBox: ~'. The terminal shows the following session:

```
sruthy@sruthy-VirtualBox:~$ ls
ajce  Desktop  linux      Pictures  song1.txt  Videos
da1.txt  Documents  Music      Public    song.txt
da.txt   Downloads  new_directory  song      Templates
sruthy@sruthy-VirtualBox:~$ cat da.txt
SRUTHY
sruthy@sruthy-VirtualBox:~$ echo da.txt
da.txt
sruthy@sruthy-VirtualBox:~$ echo SRUTHY
SRUTHY
sruthy@sruthy-VirtualBox:~$ echo sruthy vargheze >> da.txt
sruthy@sruthy-VirtualBox:~$ cat da.txt
SRUTHY
sruthy vargheze
sruthy@sruthy-VirtualBox:~$
```

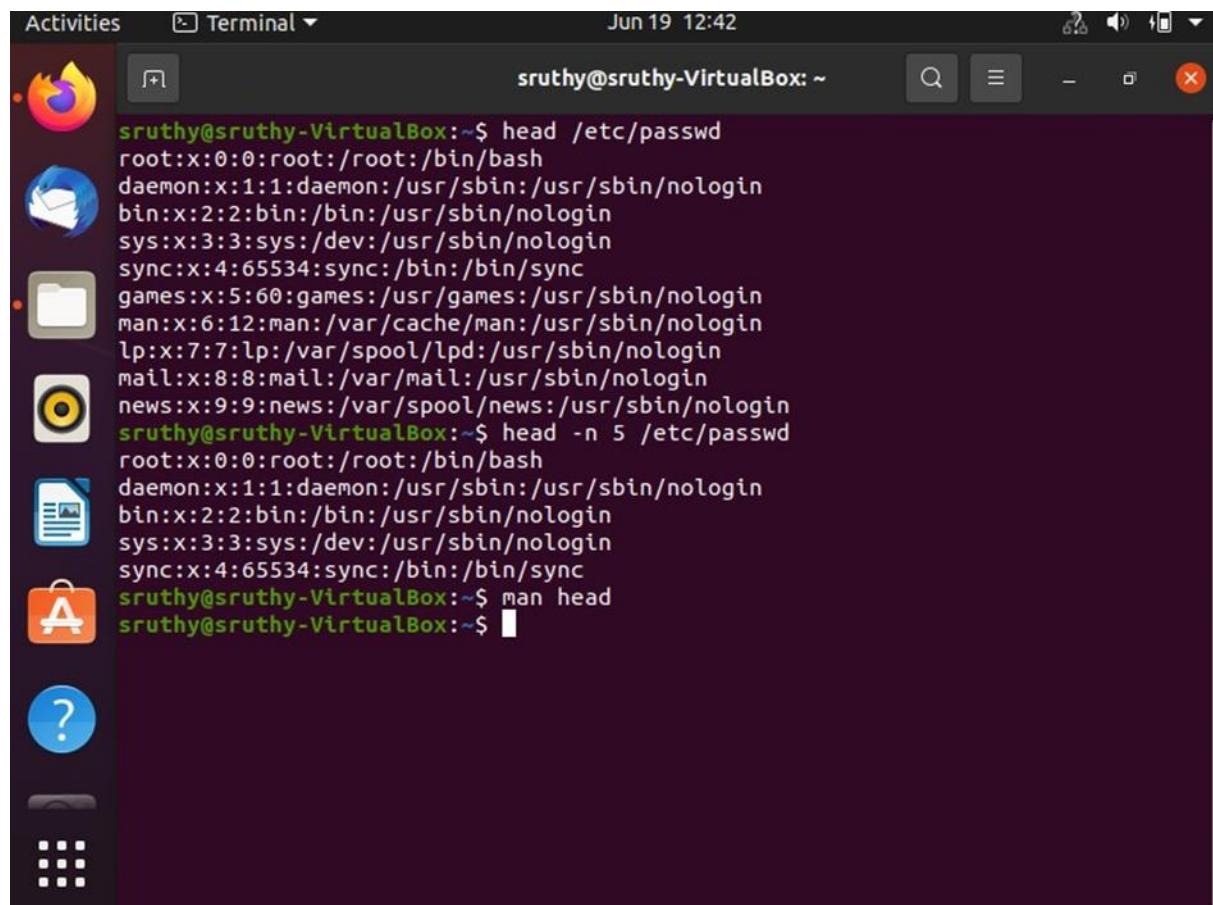
The desktop environment includes a dock with icons for various applications like a browser, file manager, and system tools.

12. Head command

The head command is used to display the content of a file. It displays the first n lines of a file.

Syntax:

head <file name>



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled 'sruthy@sruthy-VirtualBox: ~'. The user has run the command 'head /etc/passwd' which outputs the first few lines of the /etc/passwd file. Then, they ran 'head -n 5 /etc/passwd' to show the first 5 lines. Finally, they ran 'man head' to view the manual page for the head command. The desktop background shows a dark theme with various icons in the dock on the left.

```
sruthy@sruthy-VirtualBox:~$ head /etc/passwd
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:/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
sruthy@sruthy-VirtualBox:~$ head -n 5 /etc/passwd
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:/sync
sruthy@sruthy-VirtualBox:~$ man head
sruthy@sruthy-VirtualBox:~$
```

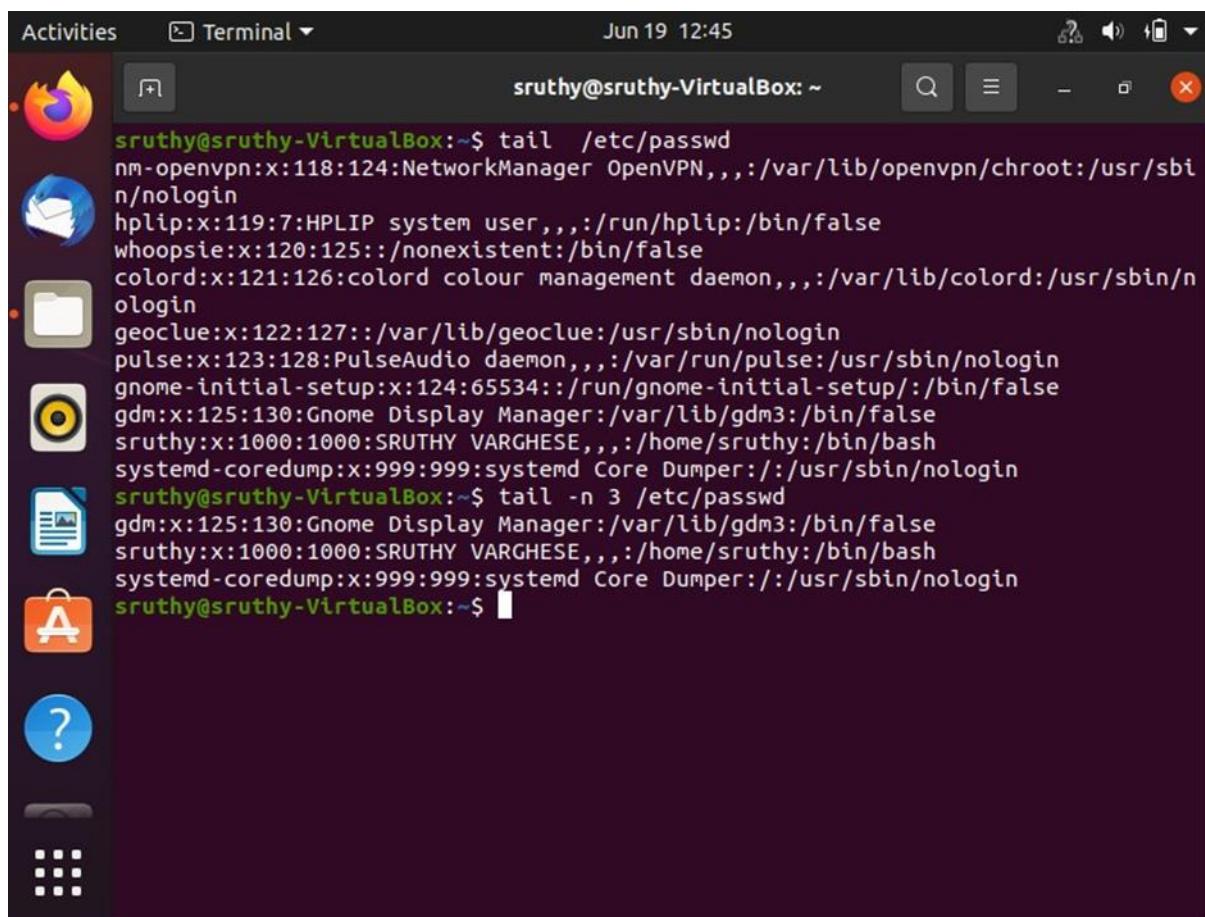
13. Tail command

The tail command is similar to the head command. The difference between both commands is that it displays the last ten lines of the filecontent. It is useful for reading the error message.

Syntax:

\$ tail<file

name>



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark background and light-colored text. At the top, it says "sruthy@sruthy-VirtualBox: ~". The terminal shows the output of the "tail" command on the "/etc/passwd" file. The output lists various system users and their details. Some lines are cut off at the bottom. The terminal window is part of a desktop interface with icons for a browser, file manager, and other applications visible on the left.

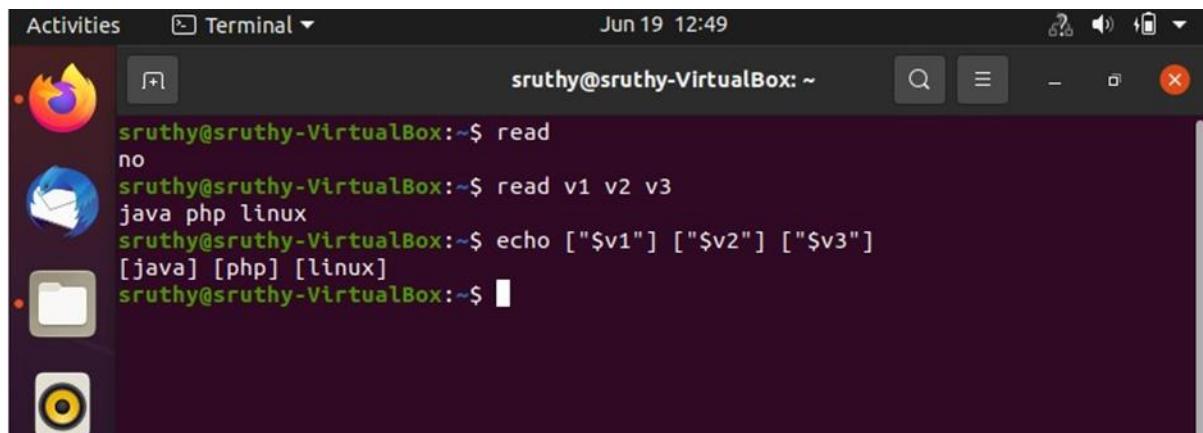
```
sruthy@sruthy-VirtualBox:~$ tail /etc/passwd
nm-openvpn:x:118:124:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
sruthy:x:1000:1000:SRUTHY VARGHESE,,,:/home/sruthy:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
sruthy@sruthy-VirtualBox:~$ tail -n 3 /etc/passwd
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
sruthy:x:1000:1000:SRUTHY VARGHESE,,,:/home/sruthy:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
sruthy@sruthy-VirtualBox:~$
```

14. Read command

read command in Linux system is used to read from a file descriptor. Basically, this command read up the total number of bytes from the specified file descriptor into the buffer. If the number or count is zero then this command may detect the errors. But on success, it returns the number of bytes read. Zero indicates the end of the file. If some errors found then it returns -1.

Syntax:

\$read



The screenshot shows a Linux desktop environment with a dark theme. A terminal window is open, titled 'Terminal'. The terminal window has a dark background with light-colored text. The terminal window is part of a larger interface with a dock on the left containing icons for a browser, file manager, and other applications. The terminal window shows the following session:

```
sruthy@sruthy-VirtualBox:~$ read
no
sruthy@sruthy-VirtualBox:~$ read v1 v2 v3
java php linux
sruthy@sruthy-VirtualBox:~$ echo ["$v1"] ["$v2"] ["$v3"]
[java] [php] [linux]
sruthy@sruthy-VirtualBox:~$
```

15. More command

The more command is quite similar to the cat command, as it is used to display the file content in the same way that the cat command does. The only difference between both commands is that, in case of larger files, the more command displays screenful output at a time.

In more command, the following keys are used to scroll the page:

- ENTER key: To scroll down page by line.
- Space bar: To move to the next page.
- b key: To move to the previous page

Syntax:

more <file name>

```
;;; gyp.el - font-lock-mode support for gyp files.  
;; Copyright (c) 2012 Google Inc. All rights reserved.  
;; Use of this source code is governed by a BSD-style license that can be  
;; found in the LICENSE file.  
;; Put this somewhere in your load-path and  
;; (require 'gyp)  
  
(require 'python)  
(require 'cl)  
  
(when (string-match "python-mode.el" (symbol-file 'python-mode 'defun))  
  (error (concat "python-mode must be loaded from python.el (bundled with "  
              "recent emacs), not from the older and less maintained "  
              "python-mode.el")))  
  
(defadvice python-indent-calculate-levels (after gyp-outdent-closing-parens  
                                              activate)  
  "De-indent closing parens, braces, and brackets in gyp-mode."  
  (when (and (eq major-mode 'gyp-mode)  
            (string-match "^ *[]})][[],){}* *$"  
            (buffer-substring-no-properties  
             (point-min) (point))))  
--More-- (7%)
```



16. Less command

The less command is similar to the more command. It also includes some extra features such as 'adjustment in width and height of the terminal.' Comparatively, the more command cuts the output in the width of the terminal.

Syntax:

less <file name>

```
;;; gyp.el - font-lock-mode support for gyp files.  
;; Copyright (c) 2012 Google Inc. All rights reserved.  
;; Use of this source code is governed by a BSD-style license that can be  
;; found in the LICENSE file.  
  
;; Put this somewhere in your load-path and  
;; (require 'gyp)  
  
(require 'python)  
(require 'cl)  
  
(when (string-match "python-mode.el" (symbol-file 'python-mode 'defun))  
  (error (concat "python-mode must be loaded from python.el (bundled with "  
              "recent emacs), not from the older and less maintained "  
              "python-mode.el")))  
  
(defadvice python-indent-calculate-levels (after gyp-outdent-closing-parens  
                                              activate)
```

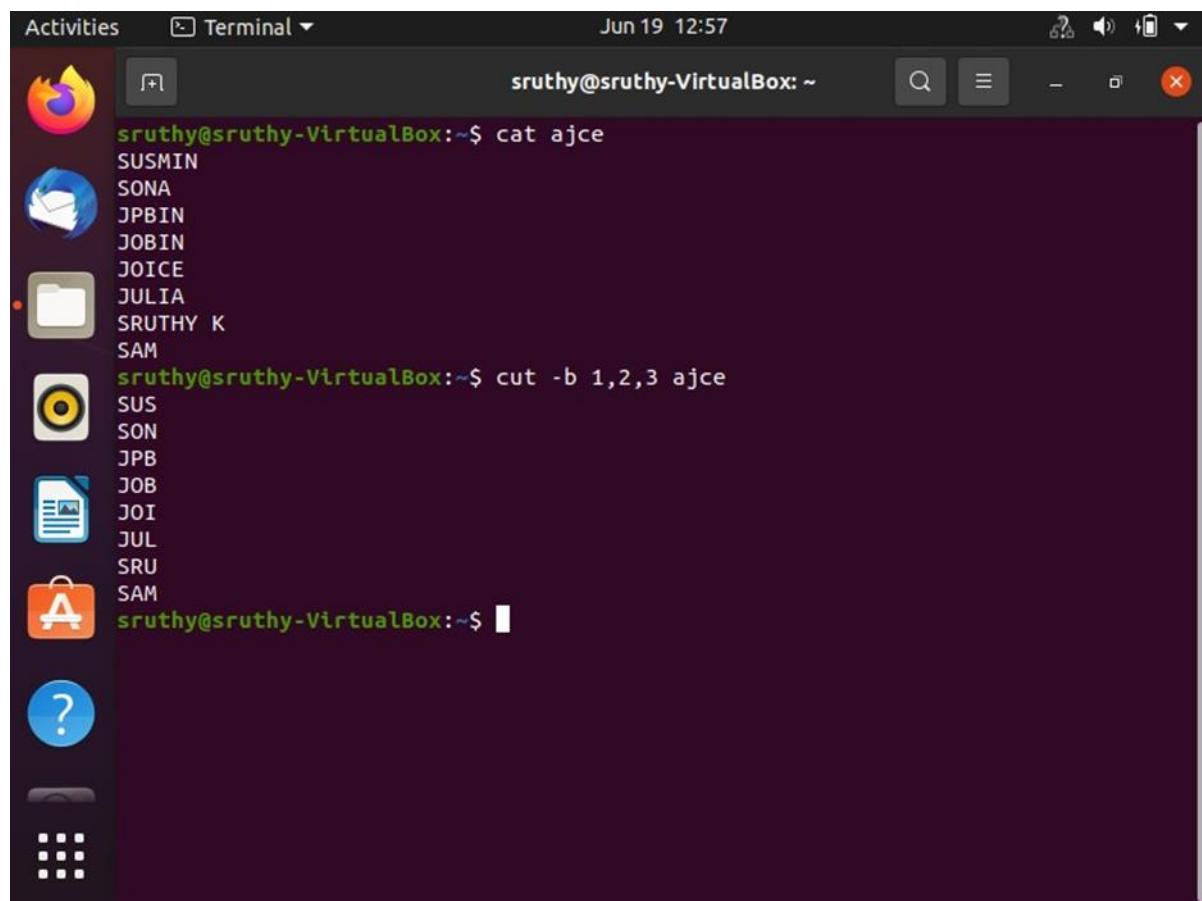


17. Cut command

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. Basically the cut command slices a line and extracts the text. It is necessary to specify option with command otherwise it gives error. If more than one file name is provided then data from each file is not preceded by its file name.

Syntax:

cut OPTION... [FILE]...

A screenshot of a Linux desktop environment. On the left, there's a dock with icons for a browser, file manager, terminal, and other applications. The terminal window is open and shows the following command-line session:

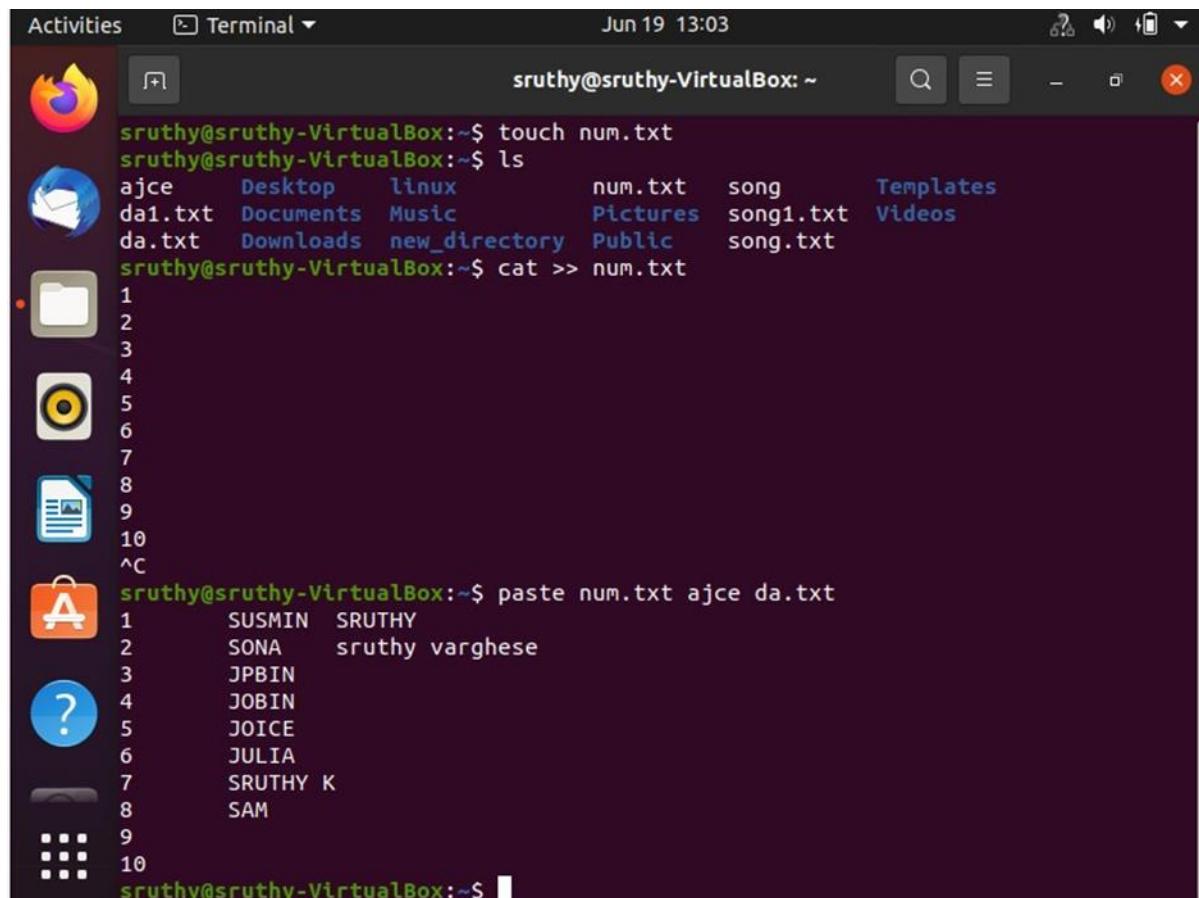
```
Activities Terminal Jun 19 12:57
sruthy@sruthy-VirtualBox:~$ cat ajce
SUSMIN
SONA
JPBIN
JOBIN
JOICE
JULIA
SRUTHY K
SAM
sruthy@sruthy-VirtualBox:~$ cut -b 1,2,3 ajce
SUS
SON
JPB
JOB
JOI
JUL
SRU
SAM
sruthy@sruthy-VirtualBox:~$
```

18. Paste command

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. When no file is specified, or put dash ("–") instead of file name, paste reads from standard input and gives output as it is until a interrupt command [Ctrl-c] is given.

Syntax:

paste [OPTION]... [FILES]...



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal". The terminal content is as follows:

```
Activities Terminal Jun 19 13:03
sruthy@sruthy-VirtualBox:~$ touch num.txt
sruthy@sruthy-VirtualBox:~$ ls
ajce  Desktop  linux      num.txt  song      Templates
da1.txt Documents  Music      Pictures  song1.txt  Videos
da.txt  Downloads new_directory  Public    song.txt
sruthy@sruthy-VirtualBox:~$ cat >> num.txt
1
2
3
4
5
6
7
8
9
10
^C
sruthy@sruthy-VirtualBox:~$ paste num.txt ajce da.txt
1      SUSMIN  SRUTHY
2      SONA    sruthy vargheze
3      JPBIN
4      JOBIN
5      JOICE
6      JULIA
7      SRUTHY K
8      SAM
9
10
sruthy@sruthy-VirtualBox:~$
```



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19. Uname command

The command ‘uname’ displays the information about the system.

Syntax:

`uname [OPTION]`

1. -a option: It prints all the system information in the following order: Kernel name, network node hostname, kernel release date, kernel version, machine hardware name, hardware platform, operating system.

Syntax:

`$uname -a`

2. -s option: It prints the kernel name. Syntax:

`$uname -s`

3. -n option: It prints the hostname of the network node(current computer).

Syntax:

`$uname -n`

4. -r option: It prints the kernel release date. Syntax:

`$uname -r`

5. -v option: It prints the version of the current kernel.

Syntax:

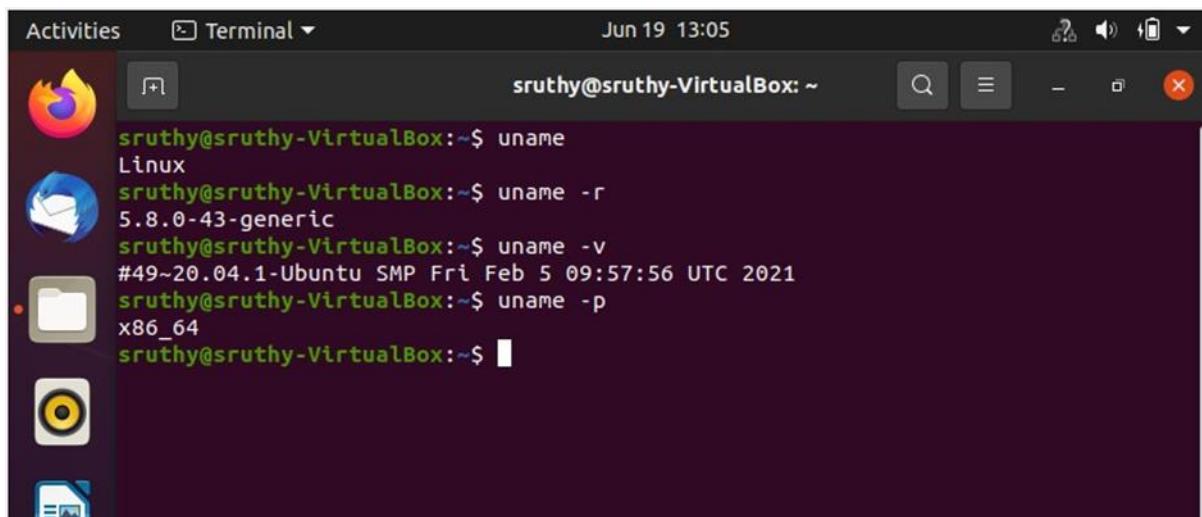
`$uname -v`



6. -m option: It prints the machine hardware name.

Syntax:

\$uname -m



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "sruthy@sruthy-VirtualBox: ~". The terminal shows the following command-line session:

```
sruthy@sruthy-VirtualBox:~$ uname
Linux
sruthy@sruthy-VirtualBox:~$ uname -r
5.8.0-43-generic
sruthy@sruthy-VirtualBox:~$ uname -v
#49~20.04.1-Ubuntu SMP Fri Feb 5 09:57:56 UTC 2021
sruthy@sruthy-VirtualBox:~$ uname -p
x86_64
sruthy@sruthy-VirtualBox:~$
```

20. Cp command

cp stands for copy. This command is used to copy files or group offiles 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.

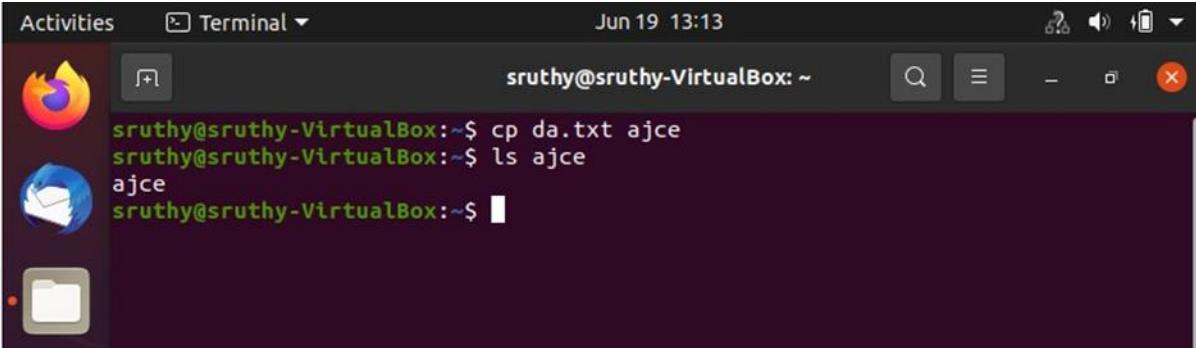
Syntax:

cp [OPTION] Source

Destinationcp [OPTION]

Source Directory

cp [OPTION] Source-1 Source-2 Source-3 Source-n Directory



```
sruthy@sruthy-VirtualBox:~$ cp da.txt ajce
sruthy@sruthy-VirtualBox:~$ ls ajce
ajce
sruthy@sruthy-VirtualBox:~$
```



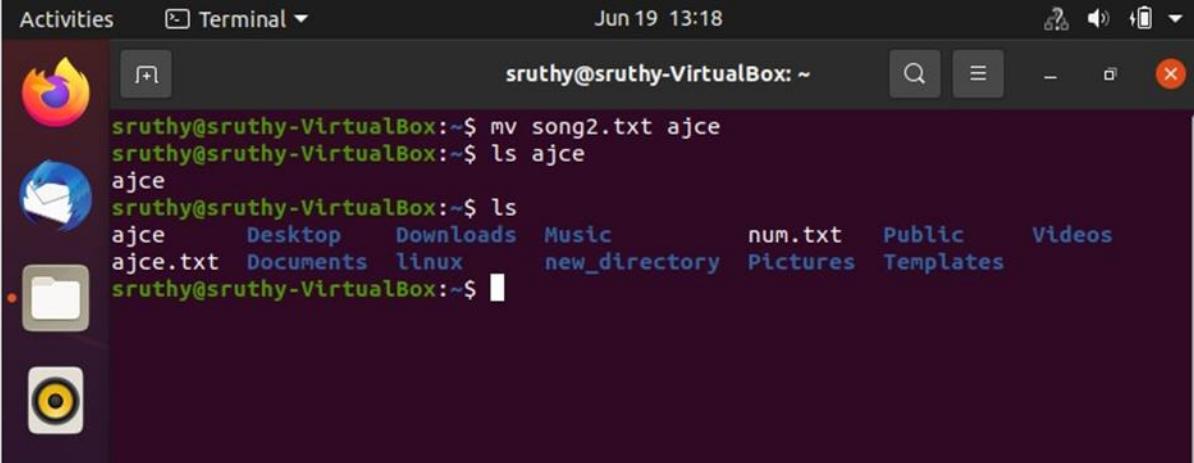
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21. mv command

The mv command is used to move a file or a directory from one location to another location.

Syntax:

```
mv <file name> <directory path>
```



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time "Jun 19 13:18" are displayed at the top right. The user "sruthy" is logged in. The terminal shows the following command and its output:

```
sruthy@sruthy-VirtualBox:~$ mv song2.txt ajce
sruthy@sruthy-VirtualBox:~$ ls ajce
ajce
sruthy@sruthy-VirtualBox:~$ ls
ajce      Desktop   Downloads  Music       num.txt  Public    Videos
ajce.txt  Documents linux     new_directory Pictures  Templates
sruthy@sruthy-VirtualBox:~$
```



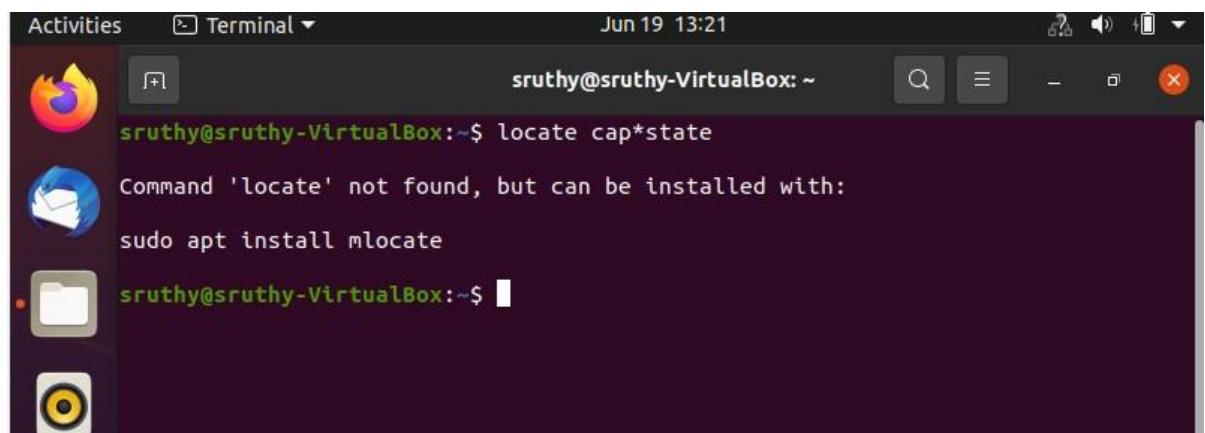
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22. Locate command

The locate command is used to search a file by file name. It is quite similar to find command; the difference is that it is a background process. It searches the file in the database, whereas the find command searches in the file system. It is faster than the find command. To find the file with the locate command, keep your database updated.

Syntax:

```
locate <file  
name>
```



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark theme with a light-colored title bar. The title bar displays "Activities", "Terminal", the date "Jun 19 13:21", and the user information "sruthy@sruthy-VirtualBox: ~". The main area of the terminal shows the following text:

```
sruthy@sruthy-VirtualBox:~$ locate cap*state
Command 'locate' not found, but can be installed with:
sudo apt install mlocate
sruthy@sruthy-VirtualBox:~$
```

23. Find command

The find command is used to find a particular file within a directory. It also supports various options to find a file such as byname, by type, by date, and more.

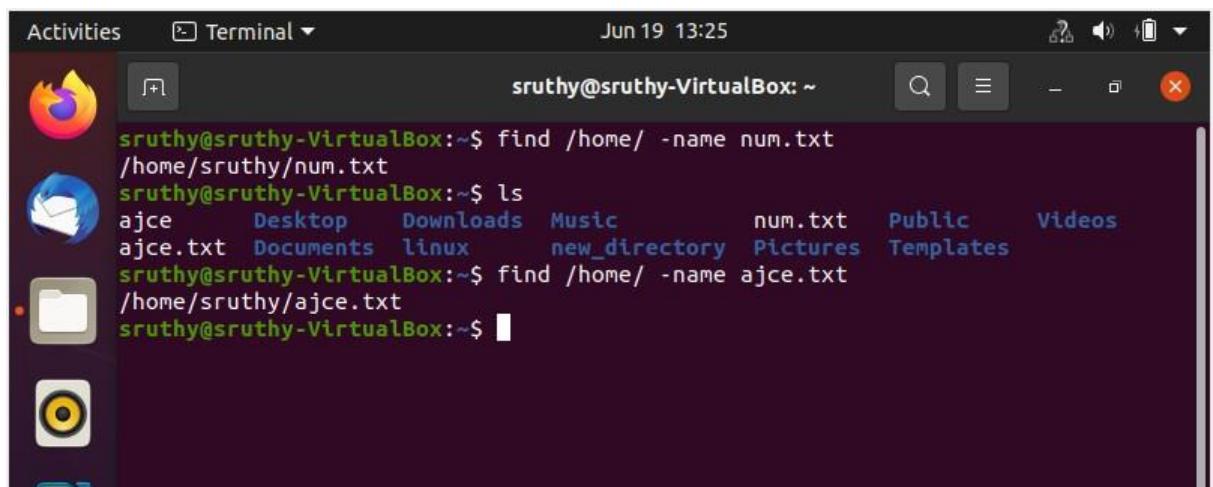
The following symbols are used after the find command:

- (.) : For current directory name
- (/) : For root

Syntax:

```
find . -name
```

"*.pdf" example:



A screenshot of a Linux desktop environment showing a terminal window. The terminal window has a dark theme with a light-colored title bar. The title bar shows "Activities", "Terminal", the date "Jun 19 13:25", and the user "sruthy@sruthy-VirtualBox: ~". The terminal window contains the following text:

```
sruthy@sruthy-VirtualBox:~$ find /home/ -name num.txt
/home/sruthy/num.txt
sruthy@sruthy-VirtualBox:~$ ls
ajce      Desktop   Downloads  Music       num.txt  Public    Videos
ajce.txt  Documents  linux     new_directory Pictures Templates
sruthy@sruthy-VirtualBox:~$ find /home/ -name ajce.txt
/home/sruthy/ajce.txt
sruthy@sruthy-VirtualBox:~$
```

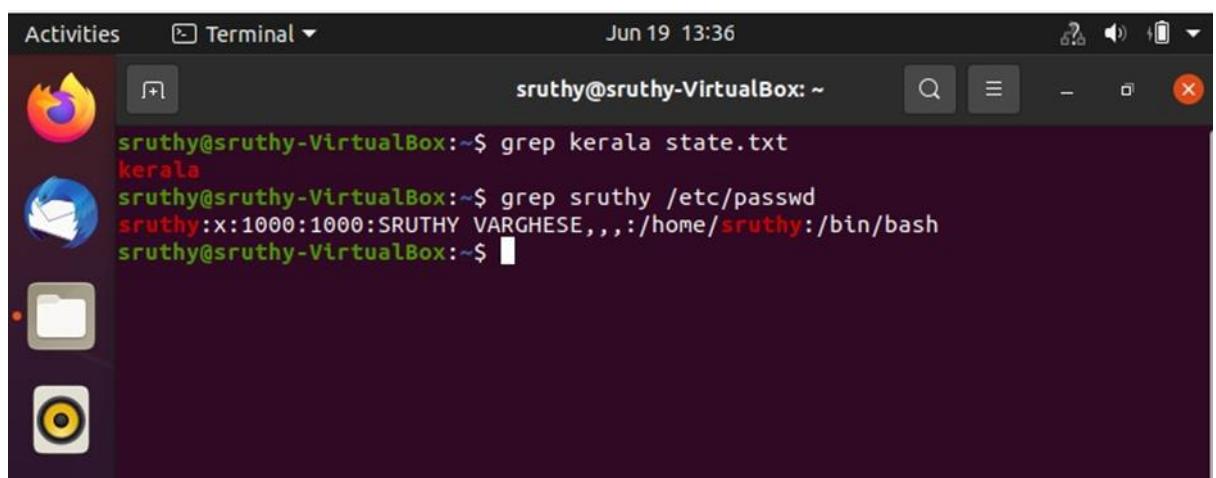


24. Grep command

The grep is the most powerful and used filter in a Linux system. The 'grep' stands for "global regular expression print. It useful for searching the content from a file. Generally, it is used with the pipe.

Syntax:

command | grep <searchWord>



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is 'Terminal'. The terminal content shows two examples of the grep command:

```
sruthy@sruthy-VirtualBox:~$ grep kerala state.txt
kerala

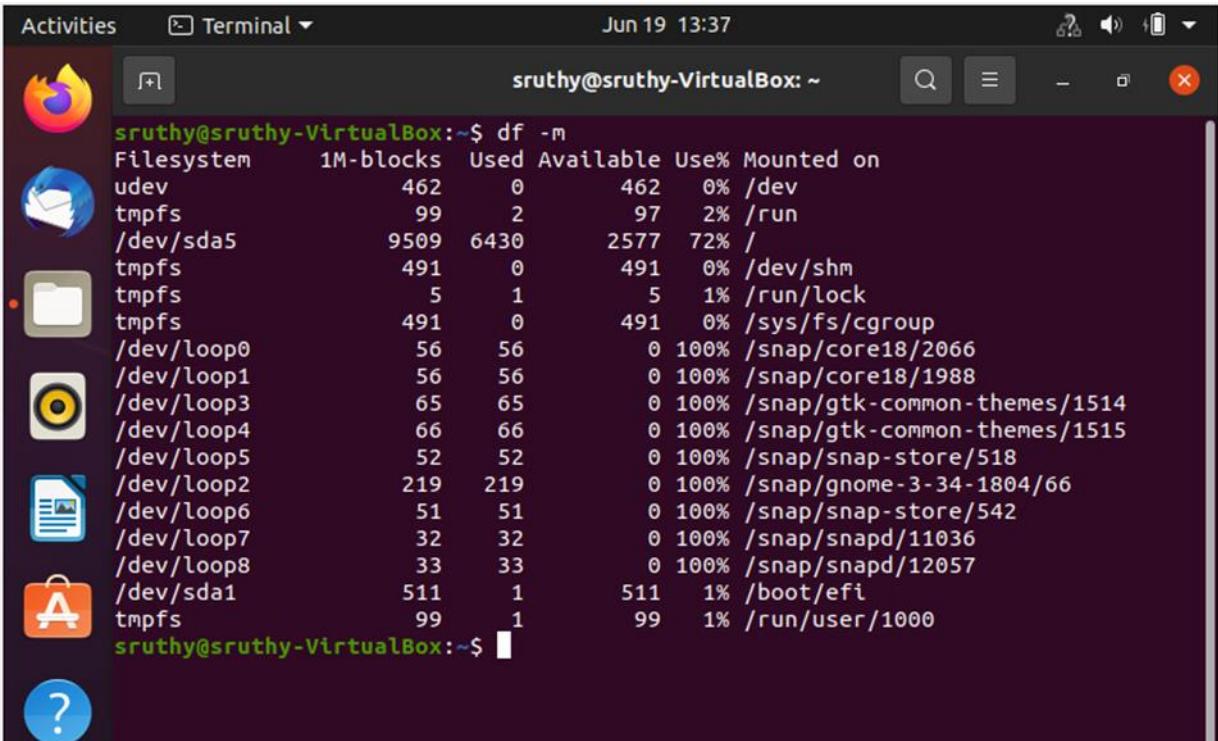
sruthy@sruthy-VirtualBox:~$ grep sruthy /etc/passwd
sruthy:x:1000:1000:SRUTHY VARGHESE,,,:/home/sruthy:/bin/bash
sruthy@sruthy-VirtualBox:~$
```

25. Df command

The df command is used to display the disk space used in the filesystem. It displays the output as in the number of used blocks, available blocks, and the mounted directory.

Syntax:

\$df



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "sruthy@sruthy-VirtualBox ~". The terminal content shows the output of the "df -m" command, which displays disk usage statistics. The output includes columns for Filesystem, 1M-blocks, Used, Available, Use%, and Mounted on. The terminal window has a dark theme and is part of a desktop interface with icons for various applications like a browser, file manager, and system monitor.

Filesystem	1M-blocks	Used	Available	Use%	Mounted on
udev	462	0	462	0%	/dev
tmpfs	99	2	97	2%	/run
/dev/sda5	9509	6430	2577	72%	/
tmpfs	491	0	491	0%	/dev/shm
tmpfs	5	1	5	1%	/run/lock
tmpfs	491	0	491	0%	/sys/fs/cgroup
/dev/loop0	56	56	0	100%	/snap/core18/2066
/dev/loop1	56	56	0	100%	/snap/core18/1988
/dev/loop3	65	65	0	100%	/snap/gtk-common-themes/1514
/dev/loop4	66	66	0	100%	/snap/gtk-common-themes/1515
/dev/loop5	52	52	0	100%	/snap/snap-store/518
/dev/loop2	219	219	0	100%	/snap/gnome-3-34-1804/66
/dev/loop6	51	51	0	100%	/snap/snap-store/542
/dev/loop7	32	32	0	100%	/snap/snapd/11036
/dev/loop8	33	33	0	100%	/snap/snapd/12057
/dev/sda1	511	1	511	1%	/boot/efi
tmpfs	99	1	99	1%	/run/user/1000

26. Du command

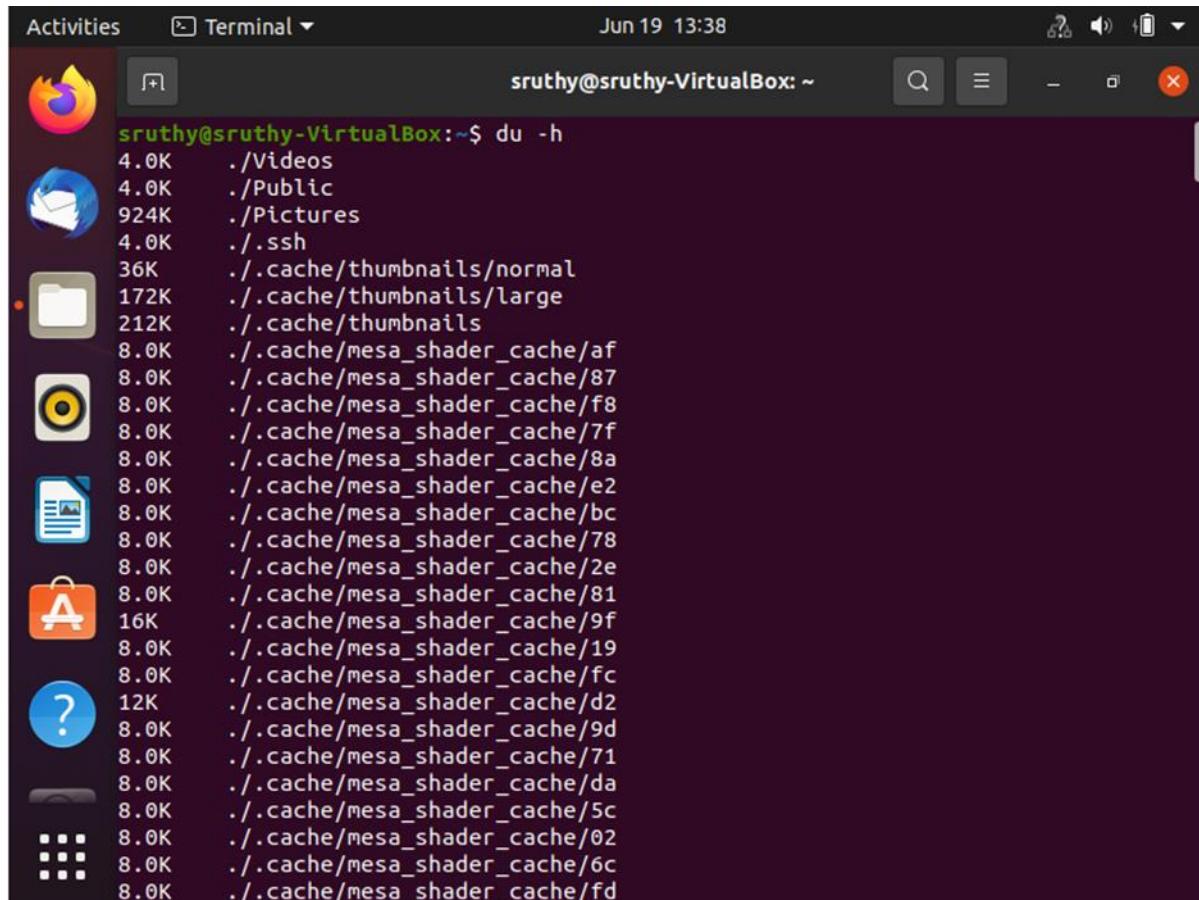
du command, short for disk usage, is used to estimate file space usage.

The du command can be used to track the files and directories which are consuming excessive amount of space on hard disk drive.

Syntax :

du [OPTION]... [FILE]...

du [OPTION]... --files0-from=F



```
sruthy@sruthy-VirtualBox:~$ du -h
4.0K    ./Videos
4.0K    ./Public
924K   ./Pictures
4.0K    ./ssh
36K    ./cache-thumbnails/normal
172K   ./cache-thumbnails/large
212K   ./cache-thumbnails
8.0K    ./cache/mesa_shader_cache/af
8.0K    ./cache/mesa_shader_cache/87
8.0K    ./cache/mesa_shader_cache/f8
8.0K    ./cache/mesa_shader_cache/7f
8.0K    ./cache/mesa_shader_cache/8a
8.0K    ./cache/mesa_shader_cache/e2
8.0K    ./cache/mesa_shader_cache/bc
8.0K    ./cache/mesa_shader_cache/78
8.0K    ./cache/mesa_shader_cache/2e
8.0K    ./cache/mesa_shader_cache/81
16K    ./cache/mesa_shader_cache/9f
8.0K    ./cache/mesa_shader_cache/19
8.0K    ./cache/mesa_shader_cache/fc
12K    ./cache/mesa_shader_cache/d2
8.0K    ./cache/mesa_shader_cache/9d
8.0K    ./cache/mesa_shader_cache/71
8.0K    ./cache/mesa_shader_cache/da
8.0K    ./cache/mesa_shader_cache/5c
8.0K    ./cache/mesa_shader_cache/02
8.0K    ./cache/mesa_shader_cache/6c
8.0K    ./cache/mesa_shader_cache/fd
```

27. Useradd command

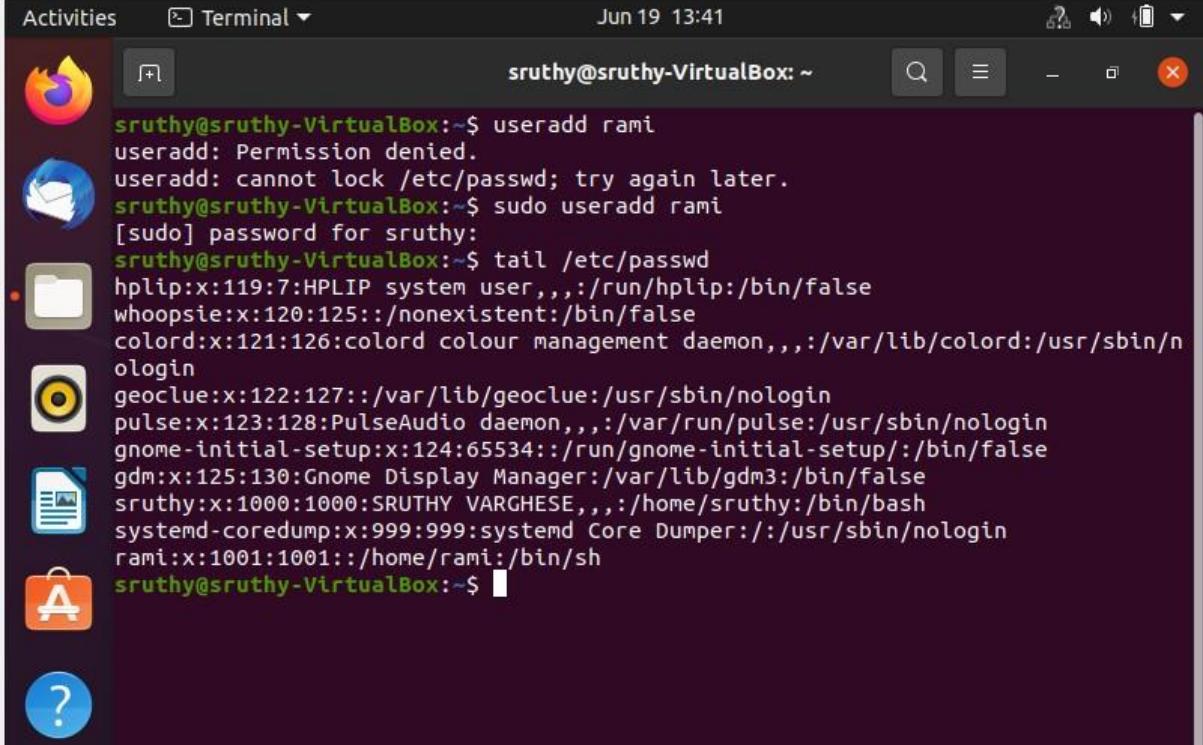
useradd is a command in Linux that is used to add user accounts to your system. It is just a symbolic link to adduser command in Linux and the difference between both of them is that useradd is a native binary compiled with system whereas adduser is a Perl script which uses useradd binary in the background.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

- /etc/passw
- /etc/shadow
- /etc/group
- /etc/gshadow

Syntax:

useradd [options] name_of_the_user



A screenshot of an Ubuntu desktop environment. In the top bar, there are icons for Activities, Terminal, and a date/time indicator (Jun 19 13:41). The main window is a terminal window titled "sruthy@sruthy-VirtualBox:~". The terminal shows the following command and its output:

```
sruthy@sruthy-VirtualBox:~$ useradd rami
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
sruthy@sruthy-VirtualBox:~$ sudo useradd rami
[sudo] password for sruthy:
sruthy@sruthy-VirtualBox:~$ tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
sruthy:x:1000:1000:SRUTHY VARGHESE,,,:/home/sruthy:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
rami:x:1001:1001::/home/rami:/bin/sh
sruthy@sruthy-VirtualBox:~$
```

28. Userdel command

userdel command in Linux system 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



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```
algoscale@algoscale-Lenovo-ideapad-330-15IKB:~$ ls /home/
algoscale kafka neuser rahul
algoscale@algoscale-Lenovo-ideapad-330-15IKB:~$ sudo userdel -f neuser
algoscale@algoscale-Lenovo-ideapad-330-15IKB:~$ ls /home/
algoscale kafka rahul
```

29. Passwd command

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]



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30. usermod

usermod is a command-line utility that allows you to modify a user's login information.

This article covers how to use the usermod command to add a user to a group, change a user shell, login name, home directory, and more.

Syntax:

`usermod [options] USER`

Only root or users with sudo access can invoke usermod and modify a user account. On success, the command does not display any output.

Add a User to a Group

The most typical use case of the usermod is adding a user to a group.

To add an existing user to a secondary group, use the -a -G options followed the group's name and the username:

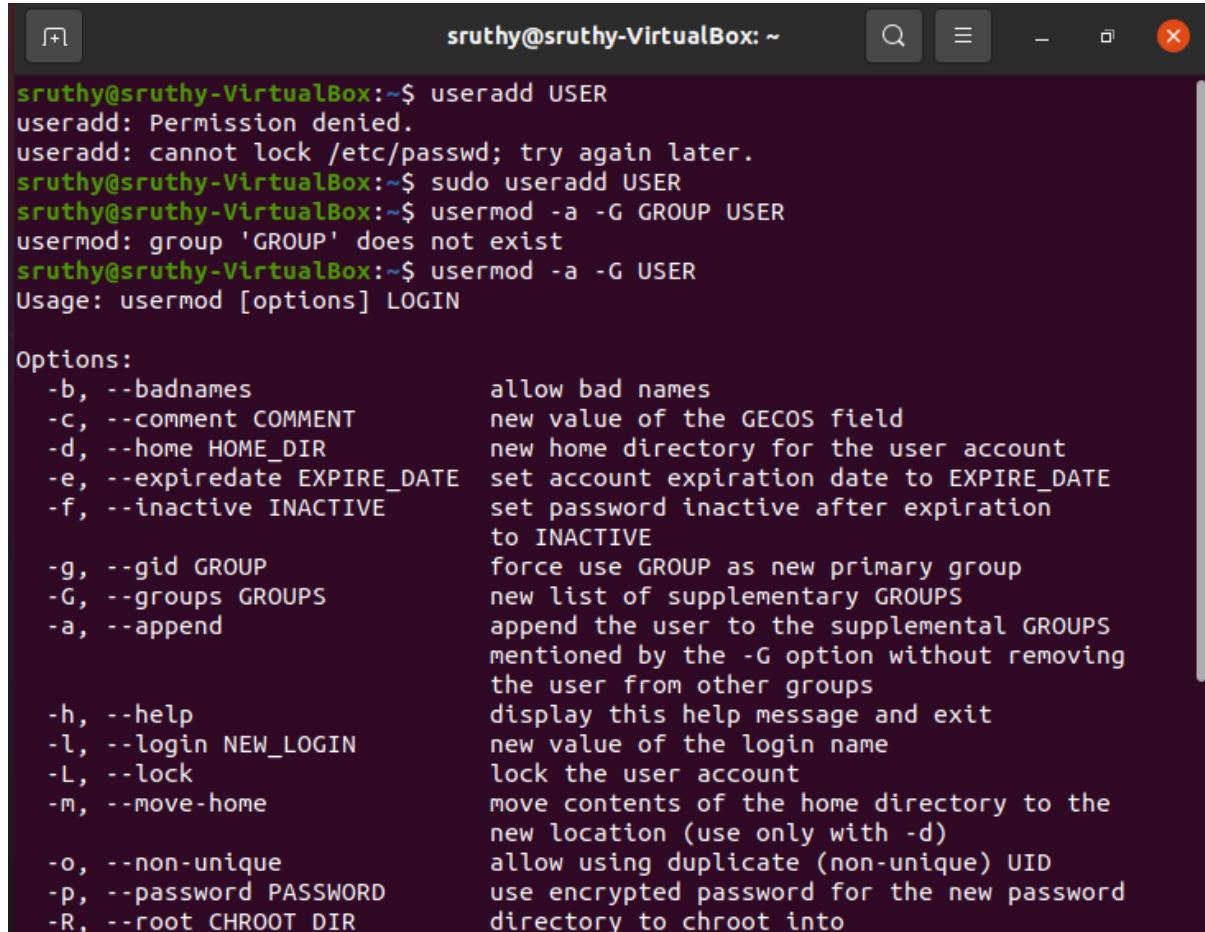
- `$ usermod -a -G GROUP USER`

If you want to add the user to multiple groups at once, specify the groups after the -G option separated with, (commas) with no intervening whitespace.

For example, to add the user linuxize to the games group, you would run the following command:

- `$ sudo usermod -a -G games linuxize`

Always use the -a (append) option when adding a user to a new group. If you omit the -a option, the user will be removed from the groups not listed after the -G option.



The screenshot shows a terminal window with the following text:

```
sruthy@sruthy-VirtualBox:~$ useradd USER
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
sruthy@sruthy-VirtualBox:~$ sudo useradd USER
sruthy@sruthy-VirtualBox:~$ usermod -a -G GROUP USER
usermod: group 'GROUP' does not exist
sruthy@sruthy-VirtualBox:~$ usermod -a -G USER
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT    new value of the GECOS field
  -d, --home HOME_DIR      new home directory for the user account
  -e, --expiredate EXPIRE_DATE set account expiration date to EXPIRE_DATE
  -f, --inactive INACTIVE   set password inactive after expiration
                            to INACTIVE
  -g, --gid GROUP          force use GROUP as new primary group
  -G, --groups GROUPS      new list of supplementary GROUPS
  -a, --append              append the user to the supplemental GROUPS
                            mentioned by the -G option without removing
                            the user from other groups
  -h, --help                display this help message and exit
  -l, --login NEW_LOGIN     new value of the login name
  -L, --lock                 lock the user account
  -m, --move-home           move contents of the home directory to the
                            new location (use only with -d)
  -o, --non-unique          allow using duplicate (non-unique) UID
  -p, --password PASSWORD    use encrypted password for the new password
  -R, --root CHROOT_DIR      directory to chroot into
```

Change User Primary Group

To change a user's primary group, invoke the usermod command with by the -g option followed the group's name and the username:

- \$ sudo usermod -g GROUP USER

In the following example, we are changing the primary group of the user linuxize to developers:

- `$ usermod -g developers linuxize`

Each user can belong to exactly one primary group and zero or more secondary groups.

Changing the User Information

To change the GECOS (the full name of the user) information, run the command with the `-c` option followed by the new comment and username:

- `$ usermod -c "GECOS Comment" USER`

Here is an example showing how to add additional information to the user `linuxize`:

- `$ usermod -c "Test User" linuxize`

This information is stored in the `/etc/passwd` file.

Changing a User Name

Although not very often, sometimes you may want to change the name of an existing user. The `-l` option is used to change the username:

- `$ usermod -l NEW_USER USER`

In the example below, we are renaming the user `linuxize` to `lisa` to “`1050`”:

- \$ sudo usermod -l linuxize lisa

When changing the username, you may also want to change the user's home directory to reflect the new username.

31. groupadd

The groupadd command creates a new group account using the values specified on the command line and the default values from the system. The new group will be entered into the system files as needed.

syntax :

groupadd [options] group

Create a new Linux group

The following command creates a new group called abc

- \$ groupadd mca1

32. Groups

Groups command prints the names of the primary and any supplementary groups for each given username, or the current process if no names are given.

If more than one name is given, the name of each user is printed before the list of that user's groups and the username is separated from the group list by a colon.

Syntax:

groups [username]...

```
sruthy@sruthy-VirtualBox:~$ sudo groupadd mca1
sruthy@sruthy-VirtualBox:~$ groups
sruthy adm cdrom sudo dip plugdev lpadmin lxd sambashare
sruthy@sruthy-VirtualBox:~$ groups ann
ann : ann
sruthy@sruthy-VirtualBox:~$ sudo usermod -G mca1
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT   new value of the GECOS field
  -d, --home HOME_DIR     new home directory for the user account
  -e, --expiredate EXPIRE_DATE
  -f, --inactive INACTIVE
  -g, --gid GROUP         force use GROUP as new primary group
  -G, --groups GROUPS    new list of supplementary GROUPS
  -a, --append             append the user to the supplemental GROUPS
                           mentioned by the -G option without removing
                           the user from other groups
  -h, --help               display this help message and exit
  -l, --login NEW_LOGIN   new value of the login name
  -L, --lock               lock the user account
  -m, --move-home          move contents of the home directory to the
                           new location (use only with -d)
  -o, --non-unique          allow using duplicate (non-unique) UID
  -p, --password PASSWORD  use encrypted password for the new password
  -R, --root CHROOT_DIR    directory to chroot into
  -P, --prefix PREFIX_DIR  prefix directory where are located the /etc/* f
```

```
sruthy@sruthy-VirtualBox:~$ groups
sruthy adm cdrom sudo dip plugdev lpadmin lxd sambashare
sruthy@sruthy-VirtualBox:~$ sudo usermod -g adm ann
sruthy@sruthy-VirtualBox:~$ groups ann
ann : adm
sruthy@sruthy-VirtualBox:~$ sudo groupadd plants
sruthy@sruthy-VirtualBox:~$ sudo gropadd flowers
```

```
sruthy@sruthy-VirtualBox:~$ sudo groupadd flowers
sruthy@sruthy-VirtualBox:~$ sudo groupadd trees
sruthy@sruthy-VirtualBox:~$ sudo usermod -G trees,flowers,plants,mca,adm
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT   new value of the GECOS field
  -d, --home HOME_DIR     new home directory for the user account
  -e, --expiredate EXPIRE_DATE
  -f, --inactive INACTIVE set password inactive after expiration
                           to INACTIVE
  -g, --gid GROUP          force use GROUP as new primary group
  -G, --groups GROUPS     new list of supplementary GROUPS
  -a, --append              append the user to the supplemental GROUPS
                           mentioned by the -G option without removing
                           the user from other groups
  -h, --help                display this help message and exit
  -l, --login NEW_LOGIN    new value of the login name
  -L, --lock                 lock the user account
  -m, --move-home           move contents of the home directory to the
                           new location (use only with -d)
  -o, --non-unique          allow using duplicate (non-unique) UID
  -p, --password PASSWORD   use encrypted password for the new password
  -R, --root CHROOT_DIR     directory to chroot into
  -P, --prefix PREFIX_DIR   prefix directory where are located the /etc/* f
                           iles
  -s, --shell SHELL         new login shell for the user account
  -u, --uid UID             new UID for the user account
```

33. groupdel

groupdel command is used to delete a existing group. It will delete all entry that refers to the group, modifies the system account files, and it is handled by superuser or root user.

Syntax:

groupdel [options] GROUP

```
sruthy@sruthy-VirtualBox:~$ sudo groupdel trees
sruthy@sruthy-VirtualBox:~$ groups ann
ann : adm
```

34. groupmod

groupmod command in Linux is used to modify or change the existing group on Linux system. It can be handled by superuser or root user. Basically, it modifies a group definition on the system by modifying the right entry in the database of the group.

Syntax:

groupmod [option] GROUP

groupmod -n group_new group_old

```
sruthy@srunthys-VirtualBox:~$ groupmod -n bca mca1
groupmod: Permission denied.
groupmod: cannot lock /etc/group; try again later.
sruthy@srunthys-VirtualBox:~$ sudo groupmod -n bca mca1
sruthy@srunthys-VirtualBox:~$ groups anna
anna : anna
```

35. 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...

- r Permission to read the file.
- w Permission to write (or delete) the file.
- x Permission to execute the file, or, in
 the case of a directory, search it.

```
sruthy@sruthy-VirtualBox:~$ mkdir books
sruthy@sruthy-VirtualBox:~$ ls -id books
4512 books
sruthy@sruthy-VirtualBox:~$ chmod g-w books
sruthy@sruthy-VirtualBox:~$ ls -id books
ls-id: command not found
sruthy@sruthy-VirtualBox:~$ chmod o+w books
sruthy@sruthy-VirtualBox:~$
```

36. chown

Linux chown command is used to change a file's ownership, directory, or symbolic link for a user or group. The chown stands for change owner. In Linux, each file is associated with a corresponding owner or group.

Syntax:

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

```
sudo chown <username> <File name>
```

```
sruthy@sruthy-VirtualBox:~$ mkdir books
sruthy@sruthy-VirtualBox:~$ ls -id books
4512 books
sruthy@sruthy-VirtualBox:~$ chmod g-w books
sruthy@sruthy-VirtualBox:~$ ls -id books
ls-id: command not found
sruthy@sruthy-VirtualBox:~$ chmod o+w books
sruthy@sruthy-VirtualBox:~$ sudo chown sruthy state.txt
sruthy@sruthy-VirtualBox:~$ ls
ajce Desktop linux num.txt state Videos
ajce.txt Documents Music Pictures state.txt
books Downloads new_directory Public Templates
sruthy@sruthy-VirtualBox:~$ ls -l test
```

37. id

id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user or any other user in the server.

```
sruthy@sruthy-VirtualBox:~$ id ann
uid=1004(ann) gid=4(adm) groups=4(adm)
sruthy@sruthy-VirtualBox:~$
```

```
sruthy@sruthy-VirtualBox:~$ id -u ann
1004
sruthy@sruthy-VirtualBox:~$ id -nG ann
adm
sruthy@sruthy-VirtualBox:~$
```

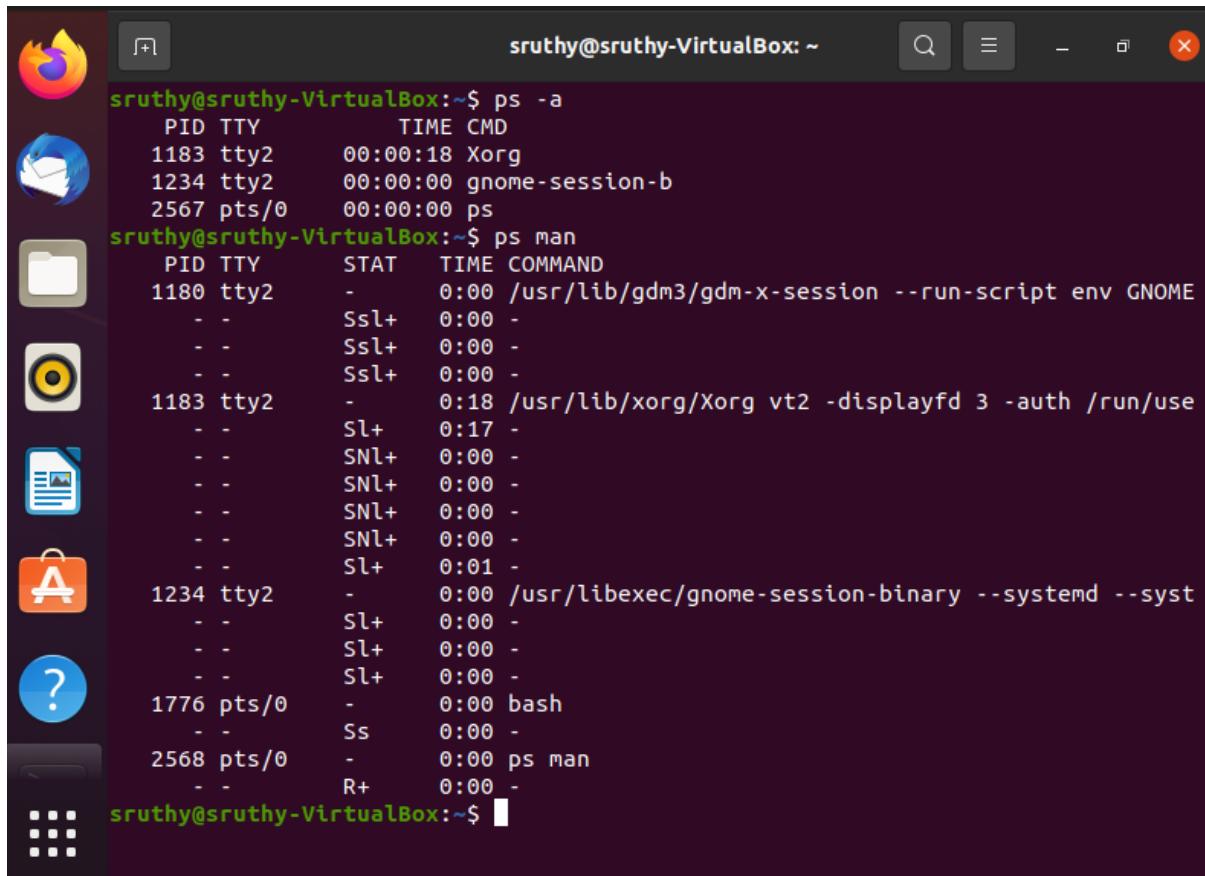
38. ps

Linux provides us a utility called ps for viewing information related with the processes on a system which stands as abbreviation for “Process Status”. ps command is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in /proc file-system. /proc contains virtual files, this is the reason it's referred as a virtual file system.

ps provides numerous options for manipulating the output according to our need.

Syntax –

ps [options]

A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark background and contains command-line output. The title bar of the terminal says "sruthy@sruthy-VirtualBox: ~". The terminal displays two "ps" commands: one for "ps -a" and one for "ps man". The "ps -a" command shows a list of processes including Xorg, gnome-session-b, ps, gdm3/gdm-x-session, Xorg vt2, gnome-session-binary, bash, and ps man. The "ps man" command shows the man pages for ps. The desktop environment includes a dock with icons for various applications like a browser, file manager, terminal, and system settings.

39. 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

top - 10:10:51 up 1:14, 1 user, load average: 0.31, 0.11, 0.04												
Tasks: 170 total, 1 running, 169 sleeping, 0 stopped, 0 zombie												
%Cpu(s): 12.4 us, 5.3 sy, 0.0 ni, 82.4 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st												
MiB Mem : 980.9 total, 83.8 free, 579.7 used, 317.4 buff/cache												
MiB Swap: 448.5 total, 283.4 free, 165.1 used. 255.5 avail Mem												
PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND	
1385	sruthy	20	0	3727776	278164	72832	S	4.3	27.7	1:06.67	gnome+-	
1183	sruthy	20	0	533728	26636	15748	S	2.6	2.7	0:19.95	Xorg	
1740	sruthy	20	0	823312	38796	26296	S	2.6	3.9	0:11.17	gnome+-	
2590	sruthy	20	0	20496	3624	3108	R	0.3	0.4	0:00.19	top	
1	root	20	0	167584	8284	6008	S	0.0	0.8	0:03.79	systemd	
2	root	20	0	0	0	0	S	0.0	0.0	0:00.02	kthrea+	
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_pa+	
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kwork+	
9	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_per+	
10	root	20	0	0	0	0	S	0.0	0.0	0:00.32	ksofti+	
11	root	20	0	0	0	0	I	0.0	0.0	0:02.57	rcu_sc+	
12	root	rt	0	0	0	0	S	0.0	0.0	0:00.06	migrat+	
13	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_i+	
14	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0	
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtm+	
16	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns	
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_ta+	
18	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_ta+	
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_ta+	
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd	
21	root	20	0	0	0	0	S	0.0	0.0	0:00.00	khungt+	

- \$ top -u ann

sruthy@sruthy-VirtualBox:~\$ top -u ann												
top - 10:12:37 up 1:15, 1 user, load average: 0.14, 0.10, 0.05												
Tasks: 170 total, 1 running, 169 sleeping, 0 stopped, 0 zombie												
%Cpu(s): 3.3 us, 1.0 sy, 0.0 ni, 95.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st												
MiB Mem : 980.9 total, 83.8 free, 579.7 used, 317.4 buff/cache												
MiB Swap: 448.5 total, 283.4 free, 165.1 used. 255.5 avail Mem												
PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND	

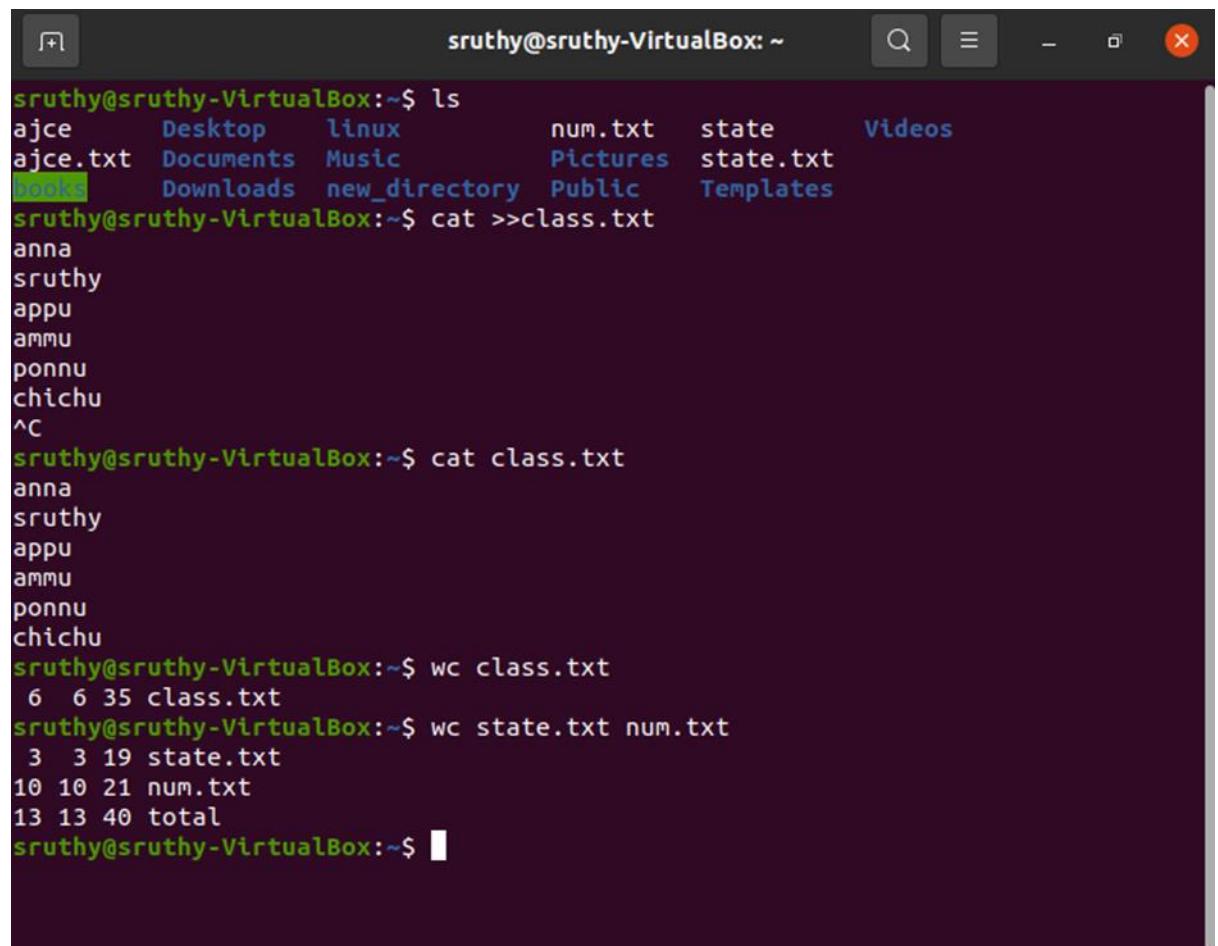
40. wc

wc stands for word count. As the name implies, it is mainly used for counting purpose.

- It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.
- By default it displays four-columnar output.
- First column shows number of lines present in a file specified, second column shows number of words present in the file, third column shows number of characters present in file and fourth column itself is the file name which are given as argument.

Syntax:

wc [OPTION]... [FILE]...



The screenshot shows a terminal window with the following session:

```
sruthy@sruthy-VirtualBox:~$ ls
ajce      Desktop   linux          num.txt  state      Videos
ajce.txt  Documents  Music         Pictures  state.txt
books     Downloads  new_directory Public    Templates
sruthy@sruthy-VirtualBox:~$ cat >>class.txt
anna
sruthy
appu
ammu
ponnu
chichu
^C
sruthy@sruthy-VirtualBox:~$ cat class.txt
anna
sruthy
appu
ammu
ponnu
chichu
sruthy@sruthy-VirtualBox:~$ wc class.txt
6 6 35 class.txt
sruthy@sruthy-VirtualBox:~$ wc state.txt num.txt
3 3 19 state.txt
10 10 21 num.txt
13 13 40 total
sruthy@sruthy-VirtualBox:~$
```

options:

1. -l: This option prints the number of lines present in a file.
With this option wc command displays two-columnar output, 1st column shows number of lines present in a file and 2nd itself represent the file name.
2. -w: This option prints the number of words present in a file.
With this option wc command displays two-columnar output, 1st column shows number of words present in a file and 2nd is the file name.
3. -c: This option displays count of bytes present in a file. With this option it display two-columnar output, 1st column shows number of bytes present in a file and 2nd is the file name.
4. -m: Using -m option ‘wc’ command displays count of characters from a file.
5. -L: The ‘wc’ command allow an argument -L, it can be used to print out the length of longest (number of characters) line in a file.
6. –version: This option is used to display the version of wc which is currently running on your system.

```
sruthy@sruthy-VirtualBox:~$ wc -l state.txt
3 state.txt
sruthy@sruthy-VirtualBox:~$ wc -w state.txt
3 state.txt
sruthy@sruthy-VirtualBox:~$ wc -c state.txt
19 state.txt
sruthy@sruthy-VirtualBox:~$ wc -m state.txt
19 state.txt
sruthy@sruthy-VirtualBox:~$ wc -L state.txt
9 state.txt
```

41. 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 command 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]`

- Creating an uncompressed tar Archive using option -cvf : This command creates a tar file called file.tar which is the Archive of all .c files in current directory.

```
$ tar cf file.tar
```

- Extracting files from Archive using option -xvf : This command extracts files from Archives.

```
$ tar xf file.tar
```

```
sruthy@sruthy-VirtualBox:~$ tar cf add.tar class.txt state.  
sruthy@sruthy-VirtualBox:~$ mkdir allfolder  
mkdir: cannot create directory 'allfolder': File exists  
sruthy@sruthy-VirtualBox:~$ mkdir addfolder  
sruthy@sruthy-VirtualBox:~$ tar xf add.tar  
sruthy@sruthy-VirtualBox:~$ sudo tar czf add.tar.gz /etc/
```

42. expr

The expr command in Unix evaluates a given expression and displays its corresponding output. It is used for:

- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.

- Evaluating regular expressions, string operations like substring, length of strings etc.

Syntax:

\$expr expression

Options:

- version : It is used to show the version information.

Syntax:

\$expr –version

- help : It is used to show the help message and exit.

Syntax:

\$expr –help

```
sruthy@srunthys-VirtualBox:~$ expr --version
expr (GNU coreutils) 8.30
Copyright (C) 2018 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by Mike Parker, James Youngman, and Paul Eggert.
sruthy@srunthys-VirtualBox:~$ expr --help
Usage: expr EXPRESSION
      or: expr OPTION

      --help      display this help and exit
      --version   output version information and exit

Print the value of EXPRESSION to standard output. A blank line below
separates increasing precedence groups. EXPRESSION may be:

      ARG1 | ARG2      ARG1 if it is neither null nor 0, otherwise ARG2
      ARG1 & ARG2      ARG1 if neither argument is null or 0, otherwise 0
      ARG1 < ARG2      ARG1 is less than ARG2
      ARG1 <= ARG2     ARG1 is less than or equal to ARG2
      ARG1 = ARG2      ARG1 is equal to ARG2
      ARG1 != ARG2     ARG1 is unequal to ARG2
      ARG1 >= ARG2     ARG1 is greater than or equal to ARG2
      ARG1 > ARG2      ARG1 is greater than ARG2
```

- Using expr for basic arithmetic operations

```
sruthy@sru...-VirtualBox:~$ expr 10 + 22
32
sruthy@sru...-VirtualBox:~$ expr 45 - 32
13
sruthy@sru...-VirtualBox:~$ expr 65 / 5
13
```

43. redirection & 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

1. Listing all files and directories and give it as input to more command.

```
$ ls -l
```

2. Use head and tail to print lines in a particular range in a file.

```
sruthy@sru...-VirtualBox:~$ cat state.txt|head -4|tail -2
tamilnadu
q
sruthy@sru...-VirtualBox:~$ cat class.txt|head -3|tail -1
appu
sruthy@sru...-VirtualBox:~$ █
```

```
sruthy@sruthy-VirtualBox:~$ ls -l
total 88
drwxrwxr-x 2 sruthy sruthy 4096 Aug 12 11:13 addfolder
-rw-rw-r-- 1 sruthy sruthy     45 Aug 12 11:17 add.tar
-rw-rw-r-- 1 sruthy sruthy      0 Jun 19 13:10 ajce
-rw-rw-r-- 1 sruthy sruthy    26 Jun 19 13:09 ajce.txt
drwxrwxr-x 2 sruthy sruthy 4096 Aug 12 11:01 allfolder
-rw-rw-r-- 1 sruthy sruthy 10240 Aug 12 10:56 all.tar
drwxr-xrwx 2 sruthy sruthy 4096 Aug 12 09:52 books
-rw-rw-r-- 1 sruthy sruthy    35 Aug 12 10:29 class.txt
drwxr-xr-x 3 sruthy sruthy 4096 Jun 12 11:34 Desktop
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Documents
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Downloads
drwxrwxr-x 2 sruthy sruthy 4096 Jun 12 11:47 linux
-rw-r--r-- 1 root  root     45 Aug 12 11:18 mca.tar
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Music
drwxrwxr-x 2 sruthy sruthy 4096 Jun 12 11:44 new_directory
-rw-rw-r-- 1 sruthy sruthy    21 Jun 19 13:00 num.txt
drwxr-xr-x 2 sruthy sruthy 4096 Jun 19 12:17 Pictures
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Public
-rw-rw-r-- 1 sruthy sruthy      0 Jun 19 13:32 state
-rw-rw-r-- 1 sruthy sruthy     19 Jun 19 13:57 state.txt
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Templates
drwxr-xr-x 2 sruthy sruthy 4096 Jun 12 11:09 Videos
sruthy@sruthy-VirtualBox:~$ ls -l|wc -l
23
```

44. ssh

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)
```

45. 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[option][user@]SRC_HOST:]file1[user@]DEST_HOST:]file2

46. ssh-keygen

Use the ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system without supplying a password. Keys must be generated for each user separately. If you generate key pairs as the root user, only the root can use the keys.

47. ssh_copy-id

The ssh-copy-id command is a simple tool that allows you to install an SSH key on a remote server's authorized keys. This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process. The ssh-copy-id command is part of OpenSSH, a tool for performing remote system administrations using encrypted SSH connections.

Syntax:

\$ ssh_copy_id username@remote-host

Qn) Managing files, creating users and groups using command –line tools

1. a. Create six files with name of the form songX.mp3
- b. Create six files with name of the form snapX.mp3
- c. create six files with name of the form filmX.mp3

```
sruthy@sruthy-VirtualBox:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5
.mp3 song6.mp3
sruthy@sruthy-VirtualBox:~$ ls
addfolder  allfolder  Desktop    mca.tar   Public     song4.mp3  state.txt
add.tar    all.tar    Documents  Music      song1.mp3  song5.mp3  Templates
ajce       books      Downloads  num.txt   song2.mp3  song6.mp3  Videos
ajce.txt   class.txt  linux     Pictures   song3.mp3  state
sruthy@sruthy-VirtualBox:~$ cd
sruthy@sruthy-VirtualBox:~$ pwd
/home/sruthy
sruthy@sruthy-VirtualBox:~$ touch snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5
.mp3 snap6.mp3
sruthy@sruthy-VirtualBox:~$ ls
addfolder  all.tar    Downloads  Pictures   snap4.mp3  song3.mp3  state.txt
add.tar    books      linux     Public     snap5.mp3  song4.mp3  Templates
ajce       class.txt  mca.tar   snap2.mp3  snap6.mp3  song5.mp3  Videos
ajce.txt   Desktop   Music     snap1.mp3  song1.mp3  song6.mp3
allfolder  Documents  num.txt   snap3.mp3  song2.mp3  state
sruthy@sruthy-VirtualBox:~$ touch film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5
.mp3 film6.mp3
sruthy@sruthy-VirtualBox:~$ ls
addfolder  books      film2.mp3  mca.tar   snap1.mp3  song2.mp3  state.txt
add.tar    class.txt  film3.mp3  Music     snap3.mp3  song3.mp3  Templates
ajce       Desktop   film4.mp3  num.txt   snap4.mp3  song4.mp3  Videos
ajce.txt   Documents  film5.mp3  Pictures   snap5.mp3  song5.mp3
allfolder  Downloads  film6.mp3  Public    snap6.mp3  song6.mp3
all.tar    film1.mp3  linux     snap2.mp3  song1.mp3  state
sruthy@sruthy-VirtualBox:~$ █
```

2. From your home directory, move the song files into your music subdirectory, the snapshot files into your pictures subdirectory, and the movie files into videos subdirectory.

```
sruthy@sruthy-VirtualBox:~$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp  
3 song6.mp3 Music  
sruthy@sruthy-VirtualBox:~$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp  
3 snap6.mp3 Pictures
```

```
sruthy@sruthy-VirtualBox:~$ mv film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5.mp  
3 film6.mp3 Videos  
sruthy@sruthy-VirtualBox:~$
```

3. In your home directory, create 3 subdirectories for organizing your files. Call these directories friends, family, and work. Create all 3 with one command.

```
sruthy@sruthy-VirtualBox:~$ mkdir friends family work  
sruthy@sruthy-VirtualBox:~$ ls  
addfolder allfolder Desktop friends num.txt state.txt  
add.tar all.tar Documents linux Pictures Templates  
ajce books Downloads mca.tar Public Videos  
ajce.txt class.txt family Music state work  
sruthy@sruthy-VirtualBox:~$
```

4. Copy song files to the friends folder and snap files to family folder.

```
Activities Terminal Aug 17 13:17  
sruthy@sruthy-VirtualBox:~$ cp /home/sruthyvarghese/Pictures snap1.mp3 snap2.mp  
3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 /home/family/
```

5. Attempt to delete both family and friends Projects with a single rmdir command.

```
sruthy@sruthy-VirtualBox:~/friends$ rmdir family friends
rmdir: failed to remove 'family': No such file or directory
rmdir: failed to remove 'friends': No such file or directory
sruthy@sruthy-VirtualBox:~/friends$
```

6. Use another command that will successes in deleting both the family and friends folder.

```
sruthy@sruthy-VirtualBox:~$ rm -r family friends
sruthy@sruthy-VirtualBox:~$ ls
addfolder ajce.txt books Documents mca.tar Pictures state.txt work
add.tar allfolder class.txt Downloads Music Public Templates
ajce all.tar Desktop linux num.txt state Videos
sruthy@sruthy-VirtualBox:~$
```

7. Redirect a long listing of all home directory files, including hidden, into a file named allfiles.txt. Confirm that the files contain the listing.

8. In the command window, display today's date with day of the week, month, date and year.

```
sruthy@sruthy-VirtualBox:~$ date
Tue 17 Aug 2021 12:17:34 PM WAT
sruthy@sruthy-VirtualBox:~$
```

9. Add the user Juliet

```
sruthy@sruthy-VirtualBox:~$ sudo useradd Juliet  
[sudo] password for sruthy:  
sruthy@sruthy-VirtualBox:~$ █
```

10. Confirm that Juliet has been added by examining the /etc /passwd file

```
sruthy@sruthy-VirtualBox:~$ cat /etc/passwd | grep Juliet  
Juliet:x:1005:1008::/home/Juliet:/bin/sh  
sruthy@sruthy-VirtualBox:~$ █
```

11. Use the passwd command to initialize Juliet's password.

```
sruthy@sruthy-VirtualBox:~$ passwd  
Changing password for sruthy.  
Current password:  
New password:  
Retype new password:  
Bad: new and old password must differ by more than just case  
New password:  
Retype new password:  
passwd: password updated successfully  
sruthy@sruthy-VirtualBox:~$ █
```

12. Create a supplementary group called Shakespeare with a group id is 30000.

```
sruthy@sruthy-VirtualBox:~$ sudo useradd shakespeare
sruthy@sruthy-VirtualBox:~$ id shakespeare
uid=1006(shakespeare) gid=1010(shakespeare) groups=1010(shakespeare)
sruthy@sruthy-VirtualBox:~$ sudo usermod -u 30000 shakespeare
sruthy@sruthy-VirtualBox:~$ id shakespeare
uid=30000(shakespeare) gid=1010(shakespeare) groups=1010(shakespeare)
sruthy@sruthy-VirtualBox:~$
```

13. Create a supplementary group called artists.

```
sruthy@sruthy-VirtualBox:~$ sudo groupadd artist
```

14. Confirm that Juliet user to the Shakespeare and artists have been added by examining the /etc/group file.

```
sruthy@sruthy-VirtualBox:~$ groups
sruthy adm cdrom sudo dip plugdev lpadmin lxd sambashare
sruthy@sruthy-VirtualBox:~$ cat /etc/group
root:x:0:

```

```
USER:x:1003:
ann:x:1004:
mca:x:1005:
plants:x:1007:
bca:x:1006:
Juliet:x:1008:
Shakespeare:x:1009:Juliet
shakespeare:x:1010:
artists:x:1011:
artist:x:1012:
```

15. Add the Juliet user to the Shakespeare group as a supplementary group.

```
sruthy@sruthy-VirtualBox:~$ sudo usermod -G Shakespeare Juliet
[sudo] password for sruthy:
sruthy@sruthy-VirtualBox:~$ █
```

16. Confirm that Juliet has been added using the id command

```
sruthy@sruthy-VirtualBox:~$ id Juliet
uid=1005(Juliet) gid=1008(Juliet) groups=1008(Juliet),1009(Shakespeare)
sruthy@sruthy-VirtualBox:~$ █
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
sruthy@sruthy-VirtualBox:~$ sudo useradd Romeo
[sudo] password for sruthy:
sruthy@sruthy-VirtualBox:~$ sudo useradd Hamlet
sruthy@sruthy-VirtualBox:~$ sudo usermod -G Shakespeare Romeo
sruthy@sruthy-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
sruthy@sruthy-VirtualBox:~$ █
```

```
Juliet:x:1008:
Shakespeare:x:1009:Juliet,Romeo,Hamlet
shakespeare:x:1010:
artists:x:1011:
artist:x:1012:
Romeo:x:30001:
Hamlet:x:30002:
sruthy@sruthy-VirtualBox:~$ █
```

18. Add Reba, Dolly and Elvis to the artists group.

```
sruthy@sruthy-VirtualBox:~$ sudo useradd Reba
sruthy@sruthy-VirtualBox:~$ sudo useradd Dolly
sruthy@sruthy-VirtualBox:~$ sudo useradd Elvis
sruthy@sruthy-VirtualBox:~$ sudo usermod -G artists Reba
sruthy@sruthy-VirtualBox:~$ sudo usermod -G artists Dolly
sruthy@sruthy-VirtualBox:~$ sudo usermod -G artists Elvis
sruthy@sruthy-VirtualBox:~$ cat /etc/group
```

```
Juliet:x:1008:  
Shakespeare:x:1009:Juliet,Romeo,Hamlet  
shakespeare:x:1010:  
artists:x:1011:Reba,Dolly,Elvis  
artist:x:1012:  
Romeo:x:30001:  
Hamlet:x:30002:  
Reba:x:30003:  
Dolly:x:30004:  
Elvis:x:30005:  
sruthy@sruthy-VirtualBox:~$
```

19. Verify the supplemental group memberships by examining the /etc/group file.

```
sruthy@sruthy-VirtualBox:~$ less /etc/group
```

```
cdrom:x:24:sruthy  
floppy:x:25:  
tape:x:26:  
sudo:x:27:sruthy  
audio:x:29:pulse  
dip:x:30:sruthy  
www-data:x:33:  
backup:x:34:  
operator:x:37:  
list:x:38:  
irc:x:39:  
:
```

20. Attempt to remove user Dolly.

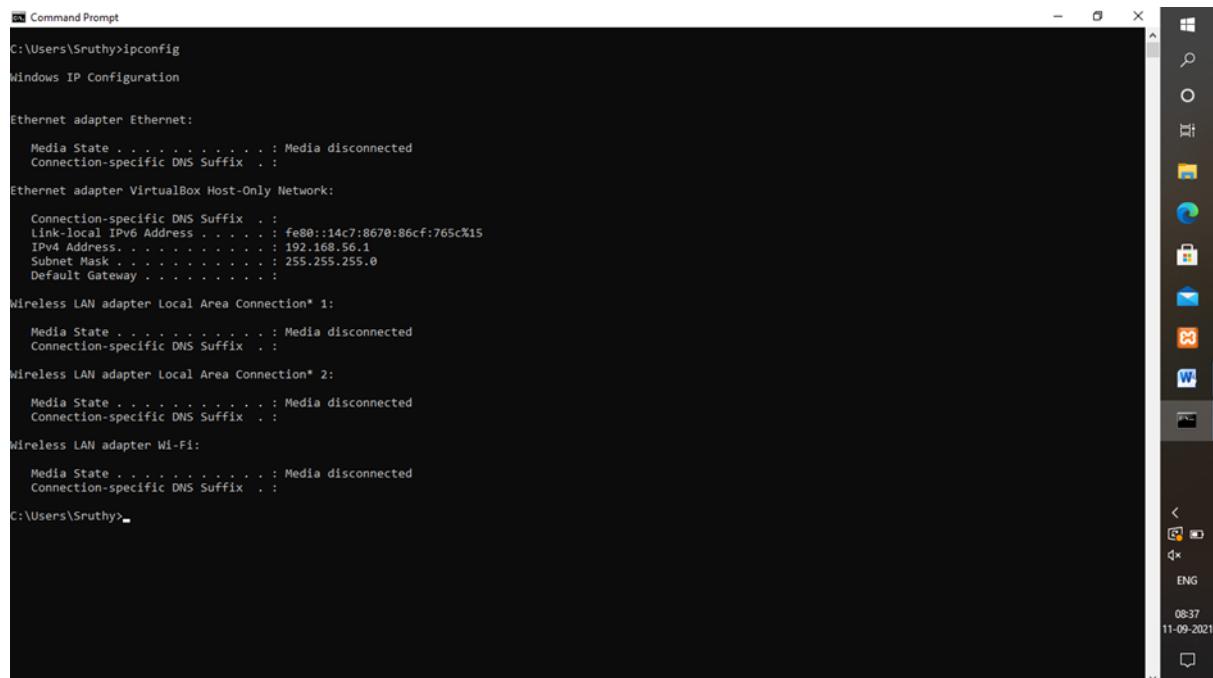
```
sruthy@sruthy-VirtualBox:~$ sudo userdel Dolly  
[sudo] password for sruthy:  
sruthy@sruthy-VirtualBox:~$
```

NETWORKING COMMAND-LINE TOOLS

1. Ipconfig command

ipconfig(standing for "Internet Protocol configuration") is a console application program of some computer operating systems that displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings.

■ ipconfig



```
Command Prompt
C:\Users\Sruthy>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :
  Ethernet adapter VirtualBox Host-Only Network:
    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::14c7:8670:86cf:765c%15
    IPv4 Address . . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :
  Wireless LAN adapter Local Area Connection* 1:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
  Wireless LAN adapter Local Area Connection* 2:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
  Wireless LAN adapter Wi-Fi:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

C:\Users\Sruthy>
```

- **ipconfig/all**- displays more information about the network setup on your systems including the MAC address.

```

C:\ Command Prompt
Connection-specific DNS Suffix . :
C:\Users\Sruthy>ipconfig/all

Windows IP Configuration

Host Name . . . . . : DESKTOP-Q5FKFR
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Realtek PCIe GBE Family Controller
Physical Address . . . . . : 68-F7-28-CC-90-35
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Ethernet adapter VirtualBox Host-Only Network:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : VirtualBox Host-Only Ethernet Adapter
Physical Address . . . . . : 0A-00-27-00-00-0F
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::14c7:8670:86cf:765c%15(Preferred)
    IPv4 Address . . . . . : 192.168.56.1(PREFERRED)
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :
    DHCPv6 IAID . . . . . : 688521255
    DHCPv6 Client DUID . . . . . : 00-01-00-01-27-E4-3A-9F-68-F7-28-CC-90-35
    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1
    NetBIOS over Tcpip. . . . . : Enabled

Wireless LAN adapter Local Area Connection* 1:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
Physical Address . . . . . : 34-E6-AD-31-C0-E6
DHCP Enabled. . . . . : Yes
  
```

- **ipconfig/release** –release the current IP address
- **ipconfig/?**- shows help

```

C:\ Command Prompt
C:\Users\Sruthy>ipconfig/??

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Wi-Fi while it has its media disconnected.

C:\Users\Sruthy>ipconfig/?

USAGE:
  ipconfig [/allcompartments] [/? | /all |
    /renew [adapter] | /release [adapter] |
    /renew6 [adapter] | /release6 [adapter] |
    /flushdns | /displaydns | /registerdns |
    /showclassid adapter |
    /setclassid adapter [classid] |
    /showclassid6 adapter |
    /setclassid6 adapter [classid] ]

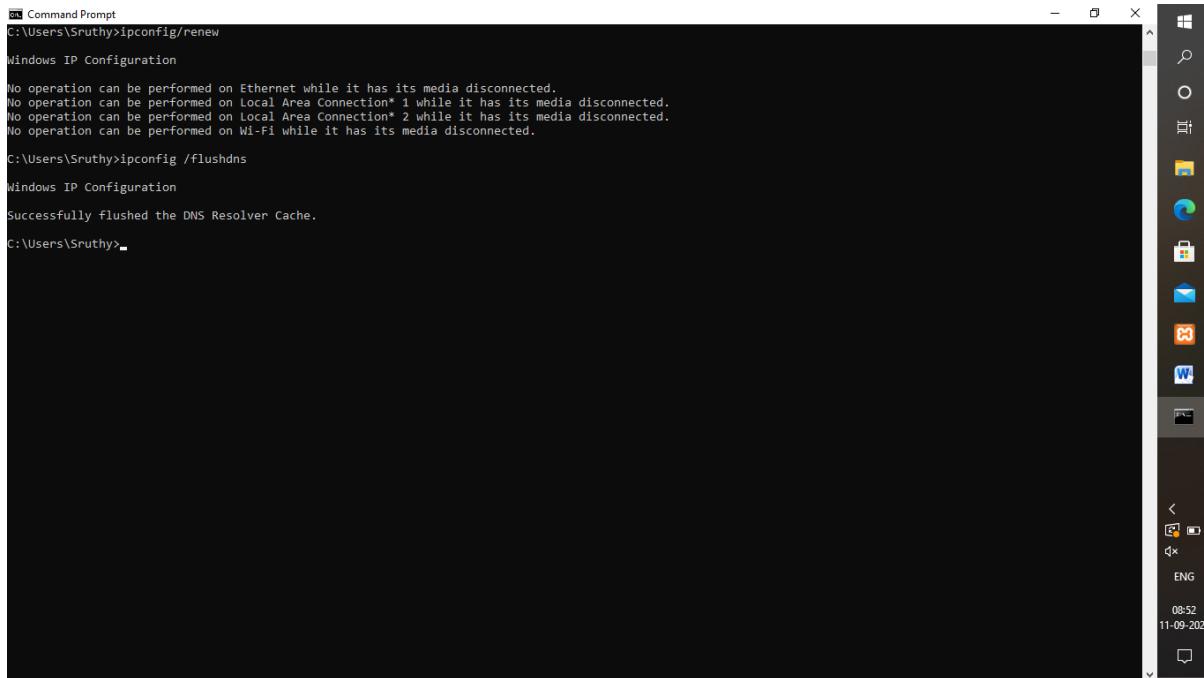
where
  adapter      Connection name
            (wildcard characters * and ? allowed, see examples)

Options:
  /?           Display this help message
  /all         Display full configuration information.
  /release    Release the IPv4 address for the specified adapter.
  /release6   Release the IPv6 address for the specified adapter.
  /renew     Renew the IPv4 address for the specified adapter.
  /renew6    Renew the IPv6 address for the specified adapter.
  /flushdns  Purges the DNS Resolver cache.
  /registerdns Refreshes all DHCP leases and re-registers DNS names
  /displaydns Display the contents of the DNS Resolver Cache.
  /showclassid Displays all the dhcp class IDs allowed for adapter.
  /setclassid Modifies the dhcp class id.
  /showclassid6 Displays all the IPv6 DHCP class IDs allowed for adapter.
  /setclassid6 Modifies the IPv6 DHCP class id.

The default is to display only the IP address, subnet mask and
default gateway for each adapter bound to TCP/IP.

For Release and Renew, if no adapter name is specified, then the IP address
leases for all adapters bound to TCP/IP will be released or renewed.
  
```

- **ipconfig/renew**-renew IP address
- **ipconfig/flushdns**-flush the dns cache



```
Command Prompt
C:\Users\Sruthy>ipconfig/renew
Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Wi-Fi while it has its media disconnected.

C:\Users\Sruthy>ipconfig /flushdns
Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

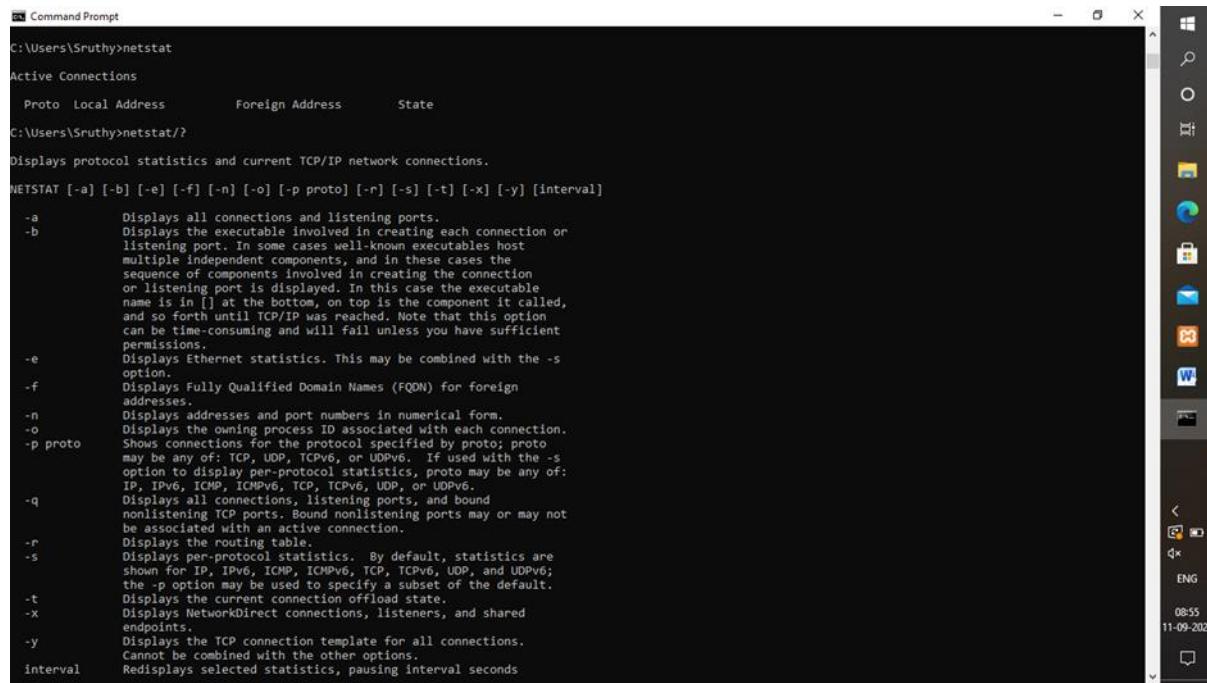
C:\Users\Sruthy>
```

2. netstat command

The network statistics (netstat) command is a networking tool used for troubleshooting and configuration, that can also serve as a monitoring tool for connections over the network. Both incoming and outgoing connections, routing tables, port listening, and usage statistics are common uses for this command.

- **netstat**

- **netstat/?** –Display help at the command prompt



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The command entered is "C:\Users\Sruthy>netstat?". The output displays the help information for the netstat command, listing various options and their descriptions. Key options include -a (all connections), -b (executables involved in connections), -e (Ethernet statistics), -f (FQDN for foreign addresses), -n (addresses and port numbers in numeric form), -o (process ID associated with each connection), -p (protocol), -q (all connections, listening ports, and bound nonlistening TCP ports), -r (routing table), -s (per-protocol statistics), -t (current connection offload state), -x (NetworkDirect connections), and -y (TCP connection template). The help text also describes the -interval option for redisplaying statistics.

```
C:\Users\Sruthy>netstat
Active Connections

 Proto Local Address          Foreign Address        State

C:\Users\Sruthy>netstat?/?

Displays protocol statistics and current TCP/IP network connections.

NETSTAT [-a] [-b] [-e] [-f] [-n] [-o] [-p proto] [-r] [-s] [-t] [-x] [-y] [interval]

-a           Displays all connections and listening ports.
-b           Displays the executable involved in creating each connection or
            listening port. In some cases well-known executables host
            multiple independent components, and in these cases the
            sequence of components involved in creating the connection
            or listening port is displayed. In this case the executable
            name is in [] at the bottom, on top is the component it called,
            and so forth until TCP/IP was reached. Note that this option
            can be time-consuming and will fail unless you have sufficient
            permissions.
-e           Displays Ethernet statistics. This may be combined with the -s
            option.
-f           Displays Fully Qualified Domain Names (FQDN) for foreign
            addresses.
-n           Displays addresses and port numbers in numerical form.
-o           Displays the owning process ID associated with each connection.
            Shows connections for the protocol specified by proto; proto
            may be any of: TCP, UDP, TCPv6, or UDPv6. If used with the -s
            option to display per-protocol statistics, proto may be any of:
            IP, IPv6, ICMP, ICMPv6, TCP, TCPv6, UDP, or UDPv6.
-q           Displays all connections, listening ports, and bound
            nonlistening TCP ports. Bound nonlistening ports may or may not
            be associated with an active connection.
-r           Displays the routing table.
-s           Displays per-protocol statistics. By default, statistics are
            shown for IP, IPv6, ICMP, ICMPv6, TCP, TCPv6, UDP, and UDPv6;
            the -p option may be used to specify a subset of the default.
-t           Displays the current connection offload state.
-x           Displays NetworkDirect connections, listeners, and shared
            endpoints.
-y           Displays the TCP connection template for all connections.
            Cannot be combined with the other options.
interval    Redisplays selected statistics, pausing interval seconds
```

- **netstat -n** –Display active TCP connections, however, addresses and port numbers are expressed numeric and no attempt is made to determine names.
- **netstat-e** –Display Ethernet statistics, such as the no. of bytes and packets sent and received. This parameter can be combined with -s.
- **netstat-o** –Display active TCP connectionless and includes the process ID(PID) for each connection.
- **netstat-p** – Shows connections for the protocol specified by protocol.

- **netstat -r** – Displays the contents of the IP routing table.

```
cmd Command Prompt
Microsoft Windows [Version 10.0.19042.1110]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Sruthy>netstat -n

Active Connections

 Proto Local Address          Foreign Address        State
 TCP   127.0.0.1:55440           127.0.0.1:55441      ESTABLISHED
 TCP   127.0.0.1:55441           127.0.0.1:55440      ESTABLISHED
 TCP   127.0.0.1:55445           127.0.0.1:55446      ESTABLISHED
 TCP   127.0.0.1:55446           127.0.0.1:55445      ESTABLISHED
 TCP   127.0.0.1:55450           127.0.0.1:55451      ESTABLISHED
 TCP   127.0.0.1:55451           127.0.0.1:55450      ESTABLISHED
 TCP   127.0.0.1:64267           127.0.0.1:64268      ESTABLISHED
 TCP   127.0.0.1:64268           127.0.0.1:64267      ESTABLISHED
 TCP   127.0.0.1:64310           127.0.0.1:64311      ESTABLISHED
 TCP   127.0.0.1:64311           127.0.0.1:64310      ESTABLISHED
 TCP   192.168.42.157:55498     52.139.168.125:443  ESTABLISHED
 TCP   192.168.42.157:64224     20.198.162.76:443  ESTABLISHED
 TCP   192.168.42.157:64236     138.199.14.84:80    ESTABLISHED
 TCP   192.168.42.157:64247     52.12.8.165:443    ESTABLISHED
 TCP   192.168.42.157:64253     142.250.194.36:443 ESTABLISHED
 TCP   192.168.42.157:64256     142.250.194.36:443 TIME_WAIT
 TCP   192.168.42.157:64266     172.217.167.35:443 TIME_WAIT
 TCP   192.168.42.157:64275     172.217.166.195:443 TIME_WAIT
 TCP   192.168.42.157:64277     35.244.181.201:443 TIME_WAIT
 TCP   192.168.42.157:64279     142.250.76.32:443 TIME_WAIT
 TCP   192.168.42.157:64280     172.217.163.162:443 ESTABLISHED
 TCP   192.168.42.157:64282     142.250.194.227:443 TIME_WAIT
 TCP   192.168.42.157:64284     172.217.163.163:443 TIME_WAIT
 TCP   192.168.42.157:64285     142.250.182.2:443 ESTABLISHED
 TCP   192.168.42.157:64287     142.250.194.2:443 TIME_WAIT
 TCP   192.168.42.157:64291     34.117.237.239:443 TIME_WAIT
 TCP   192.168.42.157:64300     54.198.205.249:443 TIME_WAIT
 TCP   192.168.42.157:64301     34.126.237.76:443 ESTABLISHED
 TCP   192.168.42.157:64302     54.198.205.249:443 TIME_WAIT
 TCP   192.168.42.157:64306     54.198.205.249:443 TIME_WAIT
 TCP   192.168.42.157:64308     172.217.166.195:443 ESTABLISHED
 TCP   192.168.42.157:64309     172.217.166.195:443 TIME_WAIT
 TCP   192.168.42.157:64313     172.217.163.194:443 ESTABLISHED
 TCP   192.168.42.157:64314     172.217.167.194:443 ESTABLISHED
 TCP   192.168.42.157:64315     142.250.77.142:443 ESTABLISHED
 TCP   192.168.42.157:64317     13.107.4.52:80    TIME_WAIT
 TCP   192.168.42.157:64320     13.107.4.52:80    TIME_WAIT
 TCP   192.168.42.157:64323     13.69.116.184:443 TIME_WAIT
```

```
cmd Command Prompt
Microsoft Windows [Version 10.0.19042.1110]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Sruthy>netstat -e

Interface Statistics

 Received          Sent
Bytes          100407993  29681397
Unicast packets 115367   82320
Non-unicast packets 0       175658
Discards         0       0
Errors          0       0
Unknown protocols 0

C:\Users\Sruthy>netstat -o

Active Connections

 Proto Local Address          Foreign Address        State      PID
TCP   127.0.0.1:55440           DESKTOP-05FKFR7:55441 ESTABLISHED 10228
TCP   127.0.0.1:55441           DESKTOP-05FKFR7:55440 ESTABLISHED 10228
TCP   127.0.0.1:55445           DESKTOP-05FKFR7:55446 ESTABLISHED 10244
TCP   127.0.0.1:55446           DESKTOP-05FKFR7:55445 ESTABLISHED 10244
TCP   127.0.0.1:55450           DESKTOP-05FKFR7:55451 ESTABLISHED 6852
TCP   127.0.0.1:55451           DESKTOP-05FKFR7:55458 ESTABLISHED 6852
TCP   127.0.0.1:64267           DESKTOP-05FKFR7:64268 ESTABLISHED 4916
TCP   127.0.0.1:64268           DESKTOP-05FKFR7:64267 ESTABLISHED 4916
TCP   127.0.0.1:64310           DESKTOP-05FKFR7:64311 ESTABLISHED 10764
TCP   127.0.0.1:64311           DESKTOP-05FKFR7:64310 ESTABLISHED 10764
TCP   192.168.42.157:55498     52.139.168.125:https ESTABLISHED 6008

C:\Users\Sruthy>netstat -p

Active Connections

 Proto Local Address          Foreign Address        State
C:\Users\Sruthy>netstat -r

=====
Interface List
14...68 f7 28 cc 90 35 .....Realtek PCIe GBE Family Controller
15...0a 00 27 00 00 0f .....VirtualBox Host-Only Ethernet Adapter
18...34 e6 ad 31 c0 e6 .....Microsoft Wi-Fi Direct Virtual Adapter #2
16...36 e6 ad 31 c0 e5 .....Microsoft Wi-Fi Direct Virtual Adapter #2
6...34 e6 ad 31 c0 e5 .....Intel(R) Dual Band Wireless-AC 3160
1.....Software Loopback Interface 1
=====
```

3. ping command

The ping command is a Command Prompt command used to test the ability of the source computer to reach a specified destination computer. It's usually used as a simple way to verify that a computer can communicate over the network with another computer or network device.

The general format is:

Ping hostname or ping IPaddress.

4. nslookup command

nslookup (stands for “Name Server Lookup”) is a useful command for getting information from DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS related problems.

5. Route command

The route command allows you to make manual entries into the network routing tables. The route command distinguishes between routes to hosts and routes to networks by interpreting the network

address of the Destination variable, which can be specified either by symbolic name or numeric address.

6. Tracert command

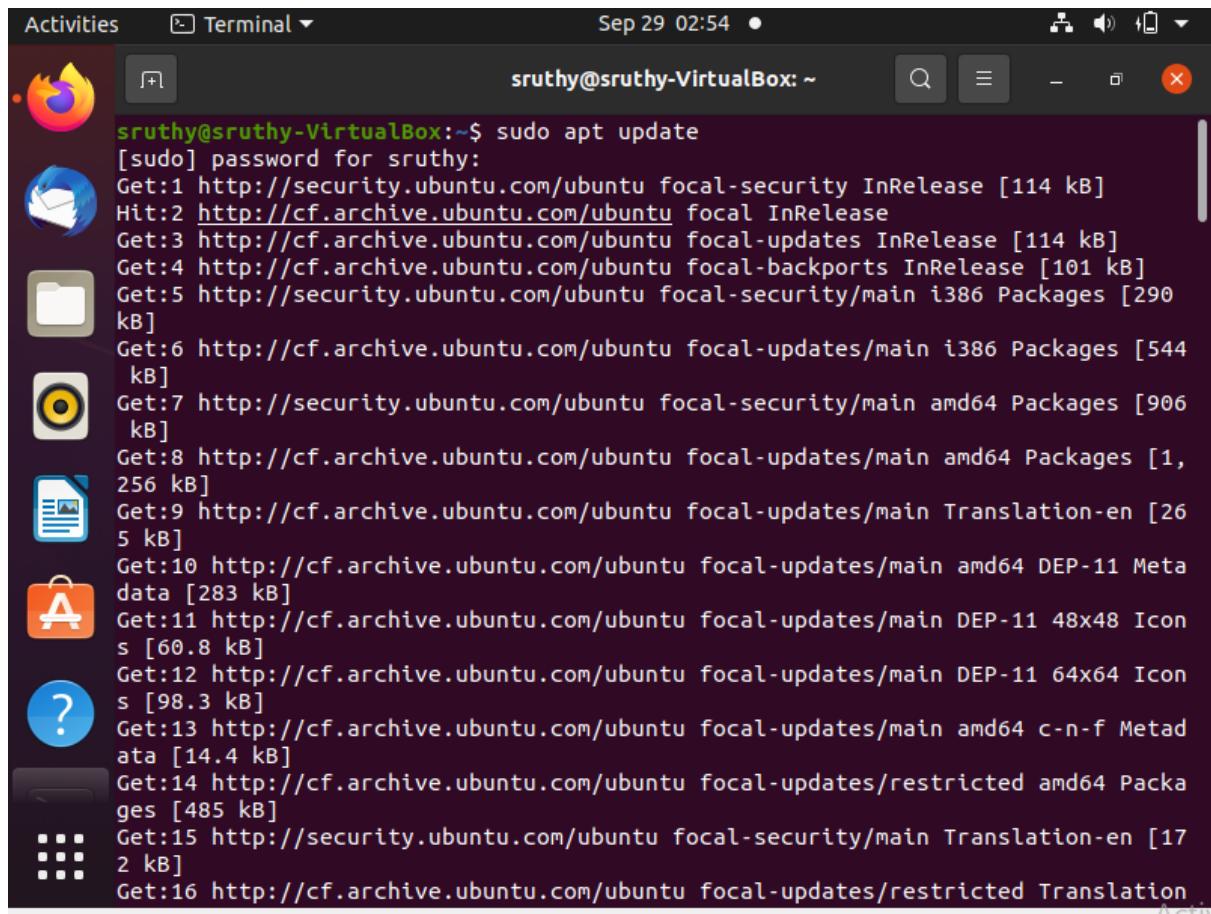
The tracert command (spelled traceroute in Unix/Linux implementations) is one of the key diagnostic tools for TCP/IP. It displays a list of all the routers that a packet must go through to get from the computer where tracert is run to any other computer on the Internet.

LAMP INSTALLATION IN UBUNTU

1. Install Apache2

Update your system:

sudo apt update

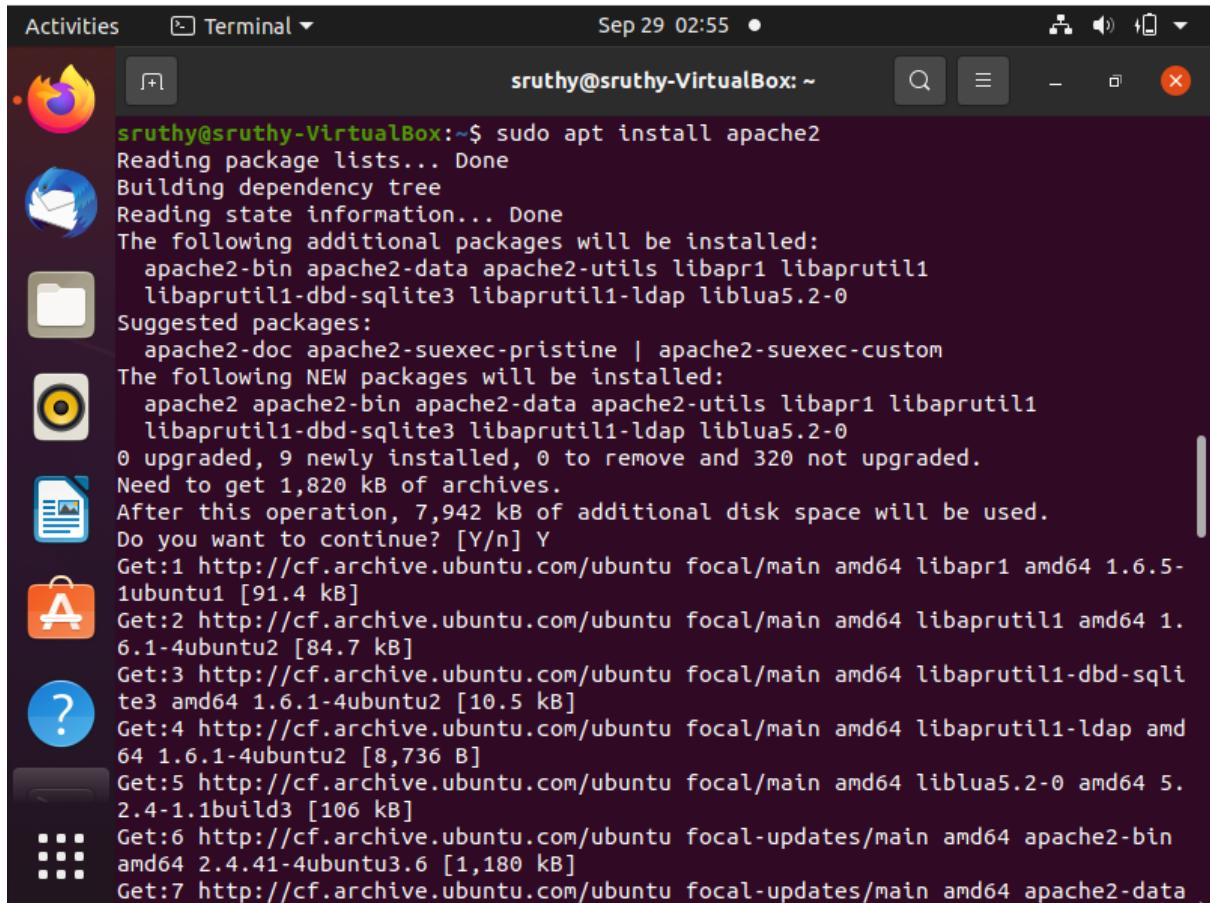


The image shows a screenshot of an Ubuntu desktop environment. In the top left corner, there's a dock with icons for the Dash, Home, Applications, and Help. The main window is a terminal window titled "sruthy@sruthy-VirtualBox: ~". The terminal shows the command "sudo apt update" being run, followed by a list of package downloads from various Ubuntu repositories. The output includes file names like "InRelease", "Translation-en", and "Icon", along with their sizes in kilobytes (e.g., 114 kB, 544 kB). The terminal window has a standard dark theme with white text and a light gray background. The status bar at the bottom of the window shows the date and time as "Sep 29 02:54".

```
sruthy@sruthy-VirtualBox:~$ sudo apt update
[sudo] password for sruthy:
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:2 http://cf.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://cf.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://cf.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [290 kB]
Get:6 http://cf.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [544 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [906 kB]
Get:8 http://cf.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,256 kB]
Get:9 http://cf.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [265 kB]
Get:10 http://cf.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Meta
data [283 kB]
Get:11 http://cf.archive.ubuntu.com/ubuntu focal-updates/main DEP-11 48x48 Icons [60.8 kB]
Get:12 http://cf.archive.ubuntu.com/ubuntu focal-updates/main DEP-11 64x64 Icons [98.3 kB]
Get:13 http://cf.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metad
ata [14.4 kB]
Get:14 http://cf.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packa
ges [485 kB]
Get:15 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [172 kB]
Get:16 http://cf.archive.ubuntu.com/ubuntu focal-updates/restricted Translation ..
```

Install Apache using apt:

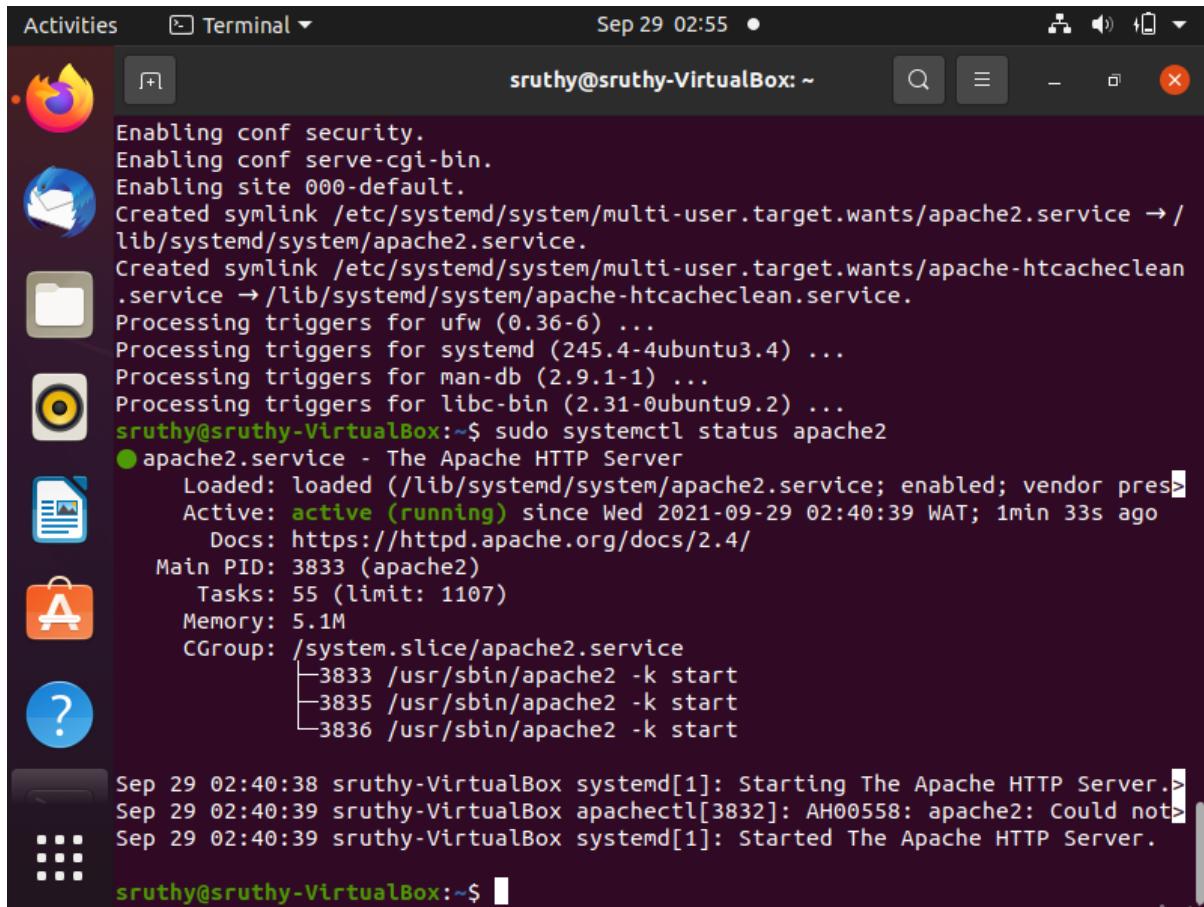
sudo apt install apache2



Activities Terminal Sep 29 02:55 sruthy@sruthy-VirtualBox:~\$ sudo apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
apache2-bin apache2-data apache2-utils libapr1 libaprutil1
libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
Suggested packages:
apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.2-0
0 upgraded, 9 newly installed, 0 to remove and 320 not upgraded.
Need to get 1,820 kB of archives.
After this operation, 7,942 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 libapr1 amd64 1.6.5-1ubuntu1 [91.4 kB]
Get:2 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 libaprutil1 amd64 1.6.1-4ubuntu2 [84.7 kB]
Get:3 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.1-4ubuntu2 [10.5 kB]
Get:4 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 libaprutil1-ldap amd64 1.6.1-4ubuntu2 [8,736 B]
Get:5 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 liblua5.2-0 amd64 5.2.4-1.1build3 [106 kB]
Get:6 http://cf.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-bin amd64 2.4.41-4ubuntu3.6 [1,180 kB]
Get:7 http://cf.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-data ..

Confirm that Apache is now running with the following

sudo systemctl status apache2



```
Activities Terminal Sep 29 02:55 sruthy@sruthy-VirtualBox: ~
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36-6) ...
Processing triggers for systemd (245.4-4ubuntu3.4) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
sruthy@sruthy-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
   Active: active (running) since Wed 2021-09-29 02:40:39 WAT; 1min 33s ago
     Docs: https://httpd.apache.org/docs/2.4/
 Main PID: 3833 (apache2)
    Tasks: 55 (limit: 1107)
   Memory: 5.1M
      CGrou[...]
Sep 29 02:40:38 sruthy-VirtualBox systemd[1]: Starting The Apache HTTP Server.>
Sep 29 02:40:39 sruthy-VirtualBox apachectl[3832]: AH00558: apache2: Could not>
Sep 29 02:40:39 sruthy-VirtualBox systemd[1]: Started The Apache HTTP Server.
sruthy@sruthy-VirtualBox:~$
```

If it is not working !

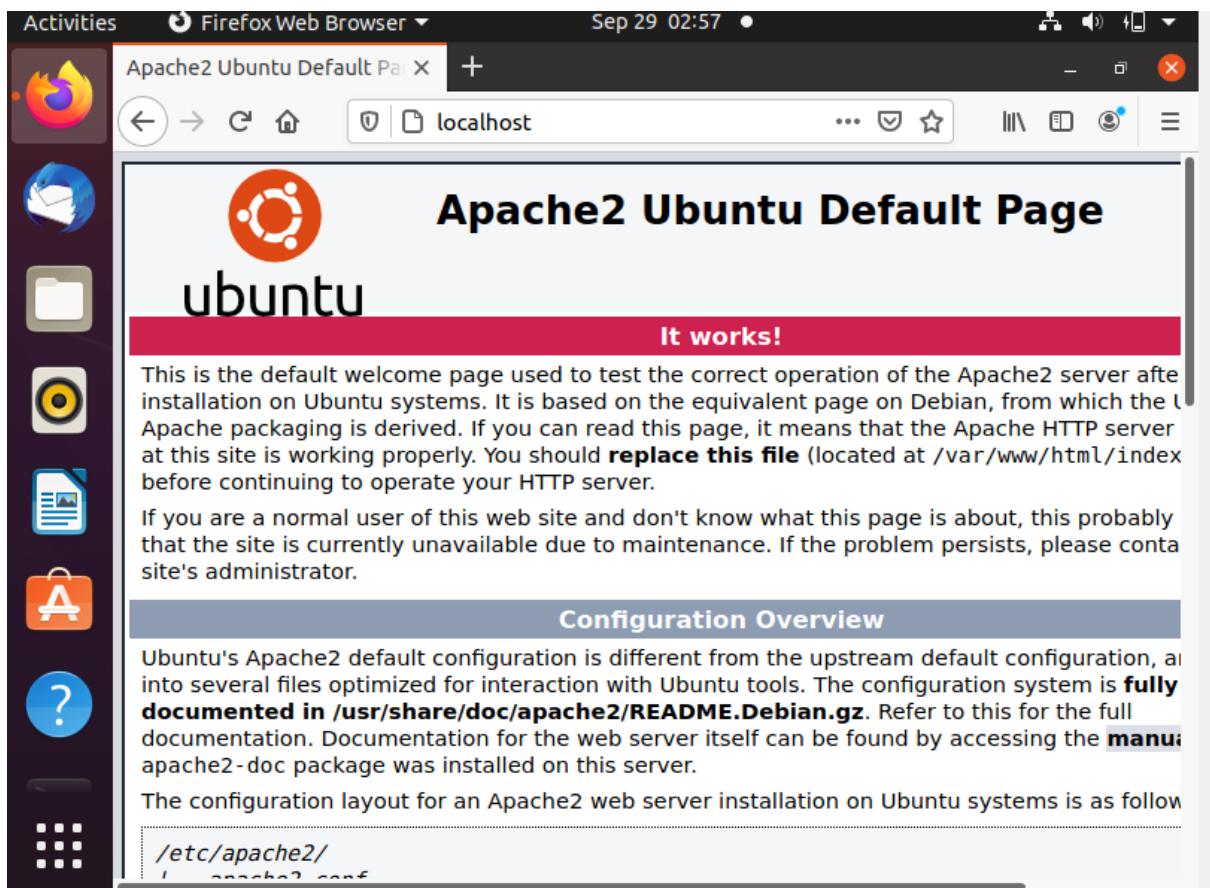
sudo systemctl stop apache2 # to stop if running

sudo systemctl start apache2 # to start if not running

Once installed, test by accessing your server's IP in your browser:

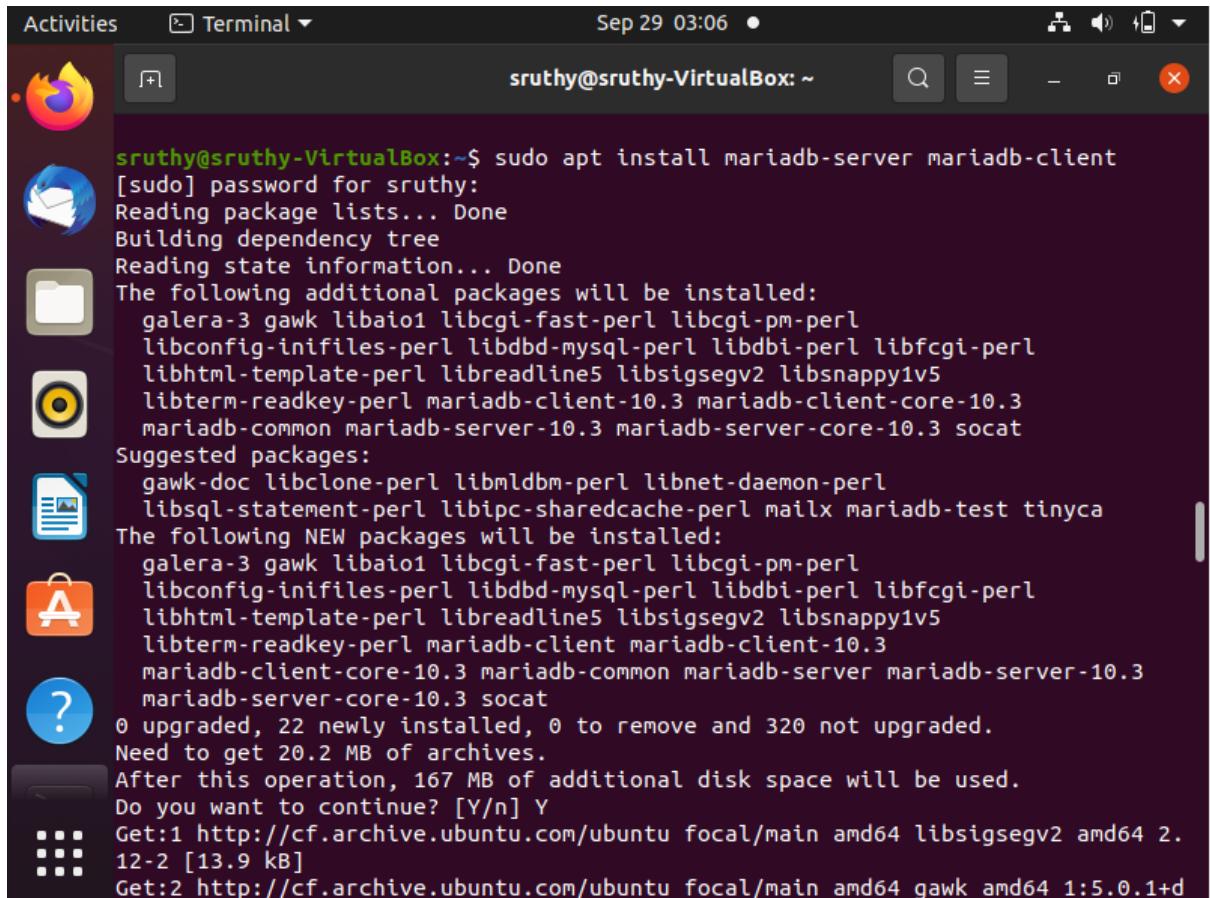
<http://127.0.0.1/>

<http://localhost/>



2. Install mariadb

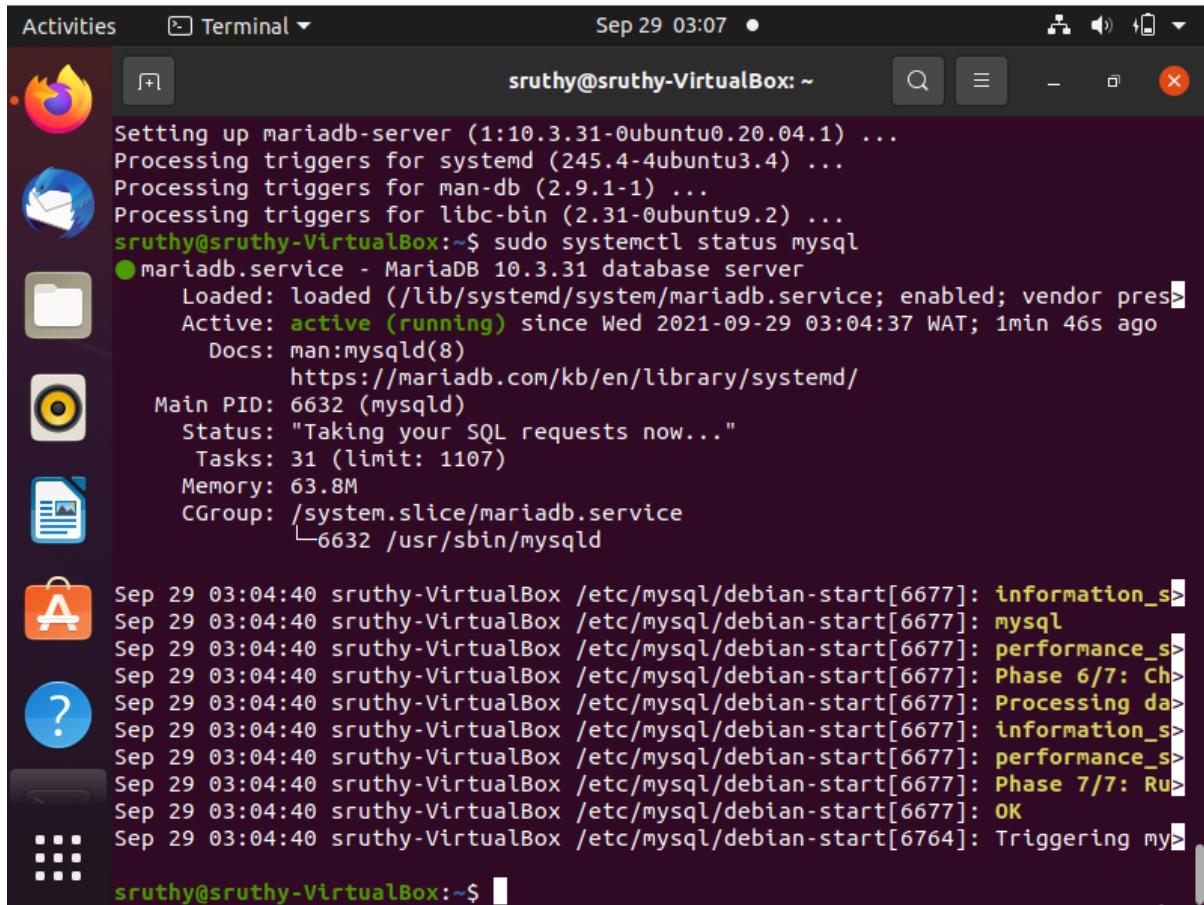
sudo apt install mariadb-server mariadb-client



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "Terminal" and the user is "sruthy@sruthy-VirtualBox". The terminal shows the command "sudo apt install mariadb-server mariadb-client" being run, along with the output of the package manager. The output includes dependency resolution, a list of packages to be installed (including galera-3, gawk, libaio1, etc.), suggested packages (gawk-doc, libclone-perl, etc.), and a summary of the operation. The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal.

```
sruthy@sruthy-VirtualBox:~$ sudo apt install mariadb-server mariadb-client
[sudo] password for sruthy:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
galera-3 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
libterm-readkey-perl mariadb-client-10.3 mariadb-client-core-10.3
mariadb-common mariadb-server-10.3 mariadb-server-core-10.3 socat
Suggested packages:
gawk-doc libclone-perl libmldb-perl libnet-daemon-perl
libsq1-statement-perl libipc-sharedcache-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
galera-3 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
libterm-readkey-perl mariadb-client mariadb-client-10.3
mariadb-client-core-10.3 mariadb-common mariadb-server mariadb-server-10.3
mariadb-server-core-10.3 socat
0 upgraded, 22 newly installed, 0 to remove and 320 not upgraded.
Need to get 20.2 MB of archives.
After this operation, 167 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 libsigsegv2 amd64 2.
12-2 [13.9 kB]
Get:2 http://cf.archive.ubuntu.com/ubuntu focal/main amd64 gawk amd64 1:5.0.1+d .
```

```
sudo systemctl status mysql # to check status
```



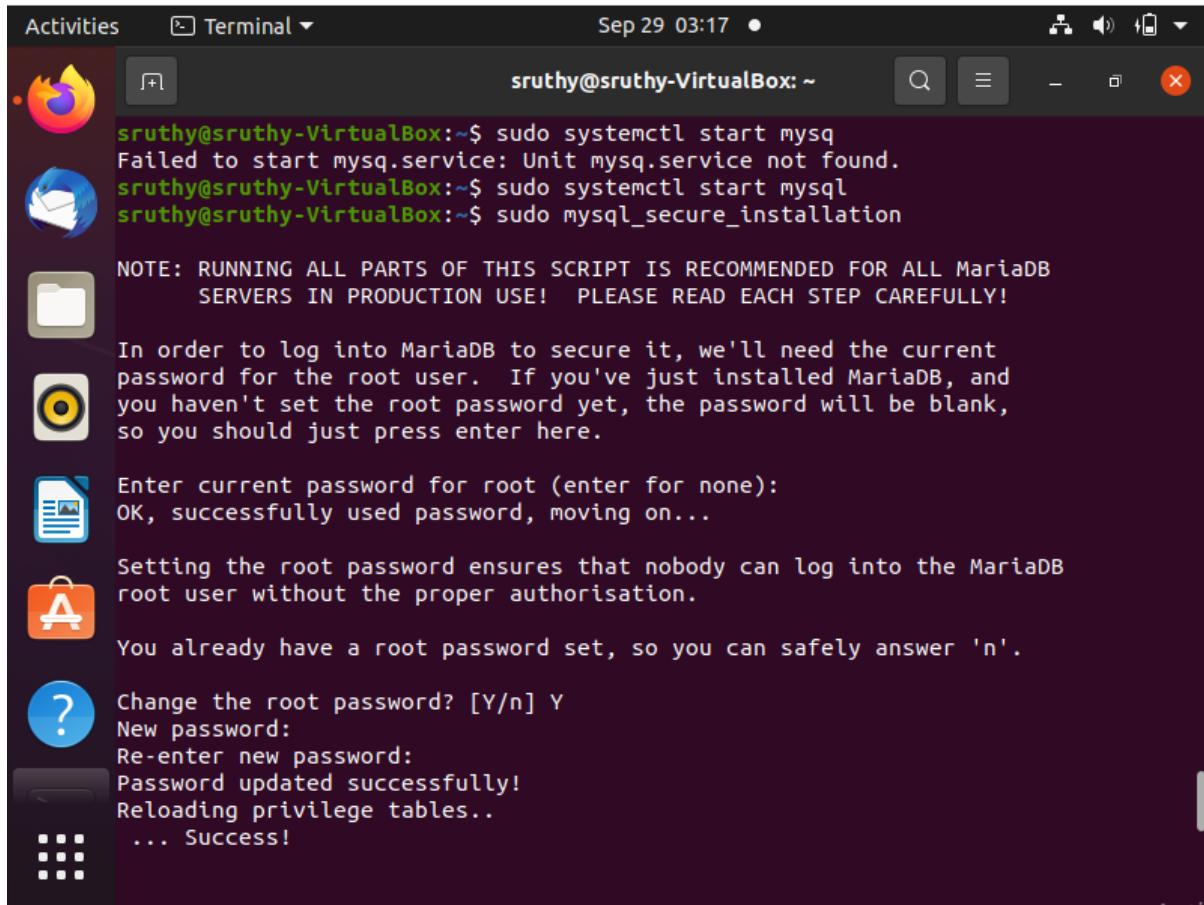
A screenshot of a Linux desktop environment, specifically Ubuntu, showing a terminal window. The terminal window title is "Terminal". The date and time at the top of the window are "Sep 29 03:07". The terminal content shows the output of the command "sudo systemctl status mysql". The output indicates that the mariadb.service is active (running) since Wed 2021-09-29 03:04:37 WAT; 1min 46s ago. It provides details about the service, including its main PID (6632), memory usage (63.8M), and the path to its cgroup (/system.slice/mariadb.service). Below this, there is a log of messages from the mysql service, showing it starting up and reaching the OK state. The terminal prompt at the bottom is "sruthy@sruthy-VirtualBox:~\$".

```
Setting up mariadb-server (1:10.3.31-0ubuntu0.20.04.1) ...
Processing triggers for systemd (245.4-4ubuntu3.4) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
sruthy@sruthy-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
  Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
  Active: active (running) since Wed 2021-09-29 03:04:37 WAT; 1min 46s ago
    Docs: man:mysqld(8)
          https://mariadb.com/kb/en/library/systemd/
      Main PID: 6632 (mysqld)
        Status: "Taking your SQL requests now..."
          Tasks: 31 (limit: 1107)
        Memory: 63.8M
       CGroup: /system.slice/mariadb.service
               └─6632 /usr/sbin/mysqld

Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: information_s>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: mysql
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: performance_s>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: Phase 6/7: Ch>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: Processing da>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: information_s>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: performance_s>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: Phase 7/7: Ru>
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6677]: OK
Sep 29 03:04:40 sruthy-VirtualBox /etc/mysql/debian-start[6764]: Triggering my>

sruthy@sruthy-VirtualBox:~$
```

```
sudo systemctl start mysql # if not running
```



The screenshot shows a terminal window titled "sruthy@sruthy-VirtualBox: ~" with the date "Sep 29 03:17". The terminal output is as follows:

```
sruthy@sruthy-VirtualBox:~$ sudo systemctl start mysql
Failed to start mysql.service: Unit mysql.service not found.
sruthy@sruthy-VirtualBox:~$ sudo systemctl start mysql
sruthy@sruthy-VirtualBox:~$ sudo mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
you haven't set the root password yet, the password will be blank,
so you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

You already have a root password set, so you can safely answer 'n'.

Change the root password? [Y/n] Y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables...
... Success!
```

```
sudo mysql_secure_installation # Secure your newly installed  
MariaDB service
```

Install PHP and commonly used modules

```
sudo apt install php libapache2-mod-php php-opcache php-cli  
php-gd php-curl php-mysql
```

Activities Terminal Sep 29 03:45

```
sruthy@sruthy-VirtualBox: ~
will take effect immediately.

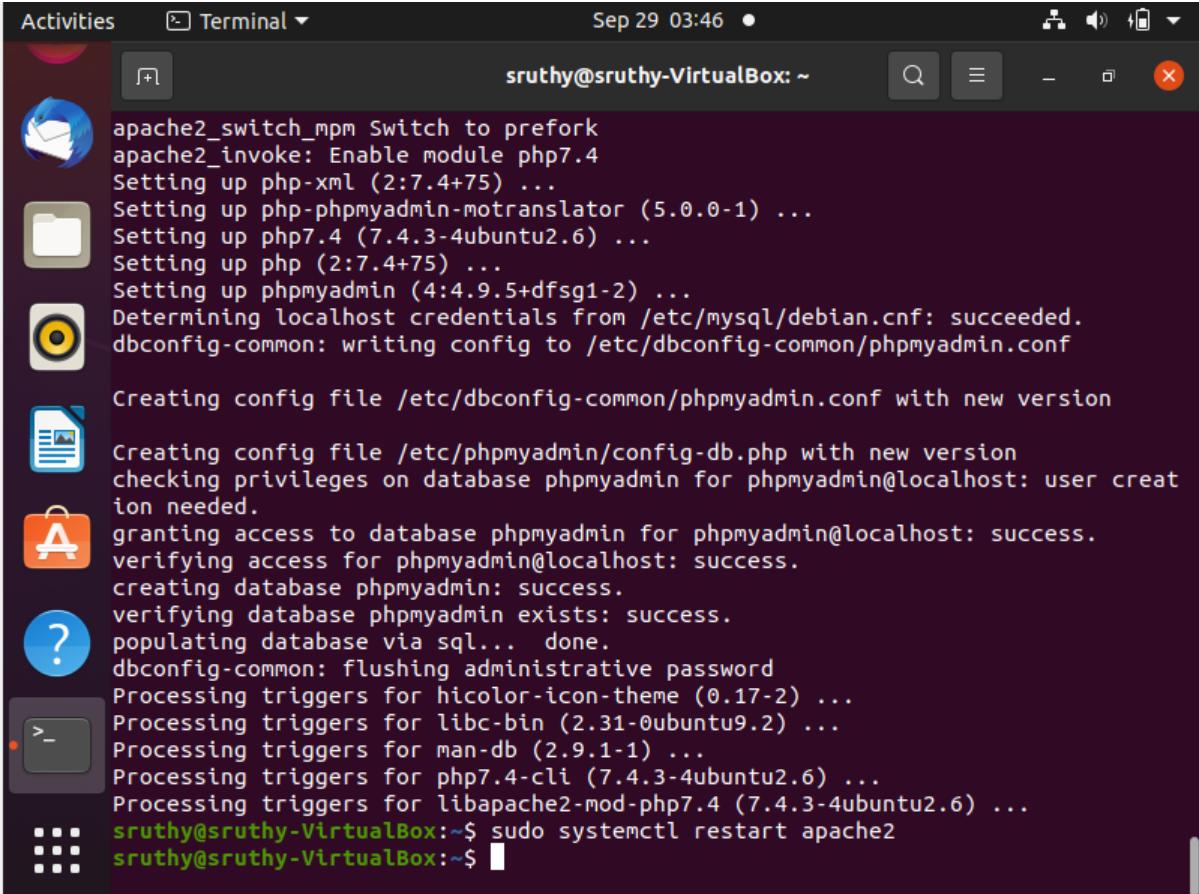
Reload privilege tables now? [Y/n] Y
... Success!

Cleaning up...

All done! If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
sruthy@sruthy-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocpache
php-cli php-gd php-curl php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package php-ocpachephp-cli
sruthy@sruthy-VirtualBox:~$ sudo systemctl restart apache2
sruthy@sruthy-VirtualBox:~$ sudo nano /var/www/html/phpinfo.php
sruthy@sruthy-VirtualBox:~$ <?php
bash: ?php: No such file or directory
sruthy@sruthy-VirtualBox:~$ sudo nano /var/www/html/phpinfo.php
sruthy@sruthy-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip ph
p-gd php-json php-curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
```

sudo systemctl restart apache2



```
Activities Terminal Sep 29 03:46 sruthy@sruthy-VirtualBox: ~
apache2_switch_mpm Switch to prefork
apache2_invoke: Enable module php7.4
Setting up php-xml (2:7.4+75) ...
Setting up php-phpmyadmin-motranslator (5.0.0-1) ...
Setting up php7.4 (7.4.3-4ubuntu2.6) ...
Setting up php (2:7.4+75) ...
Setting up phpmyadmin (4:4.9.5+dfsg1-2) ...
Determining localhost credentials from /etc/mysql/debian.cnf: succeeded.
dbconfig-common: writing config to /etc/dbconfig-common/phpmyadmin.conf

Creating config file /etc/dbconfig-common/phpmyadmin.conf with new version

Creating config file /etc/phpmyadmin/config-db.php with new version
checking privileges on database phpmyadmin for phpmyadmin@localhost: user creation needed.
granting access to database phpmyadmin for phpmyadmin@localhost: success.
verifying access for phpmyadmin@localhost: success.
creating database phpmyadmin: success.
verifying database phpmyadmin exists: success.
populating database via sql... done.
dbconfig-common: flushing administrative password
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for php7.4-cli (7.4.3-4ubuntu2.6) ...
Processing triggers for libapache2-mod-php7.4 (7.4.3-4ubuntu2.6) ...
sruthy@sruthy-VirtualBox:~$ sudo systemctl restart apache2
sruthy@sruthy-VirtualBox:~$
```

Test PHP Processing on Web Server

sudo nano /var/www/html/phpinfo.php

Inside the file, type in the valid PHP code:

```
<?php
```

```
phpinfo ();
```

```
?>
```

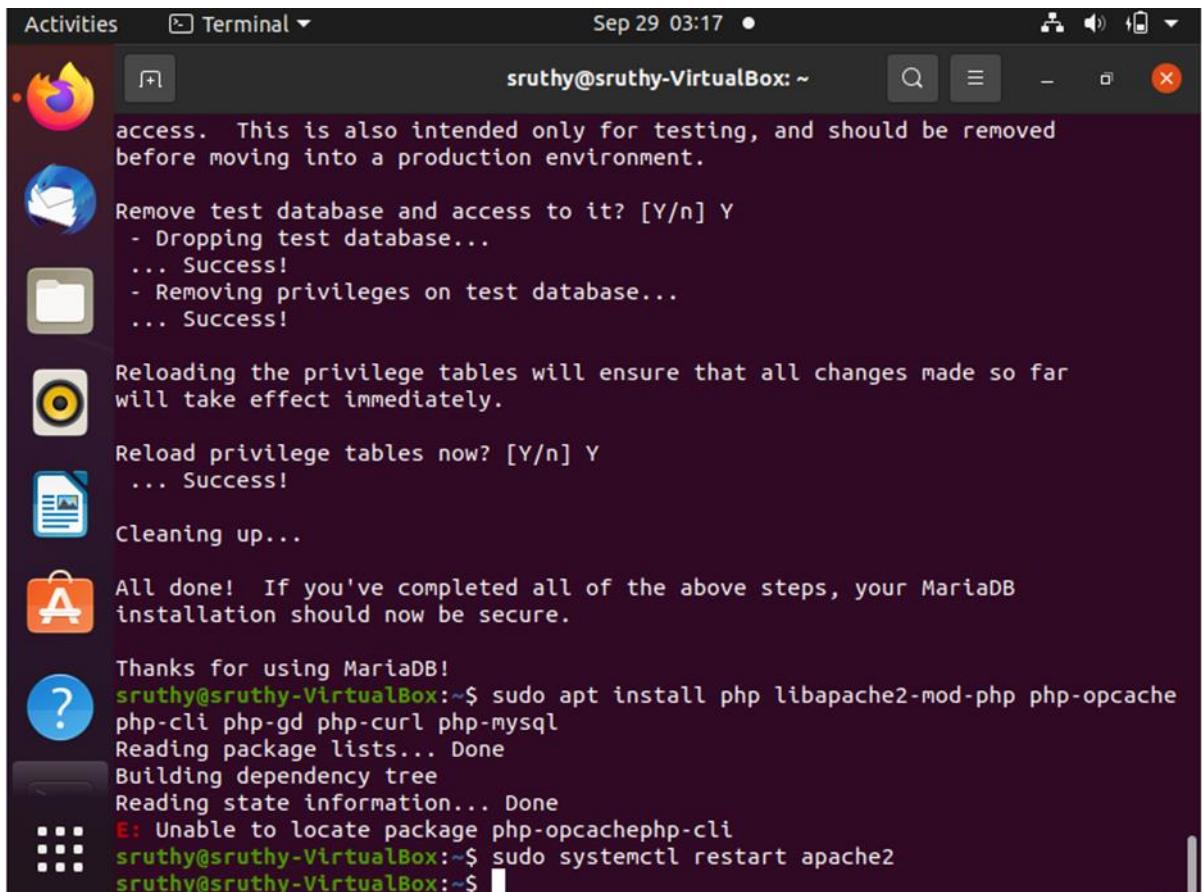
Open a browser and type in your IP address/phpinfo.php

<http://127.0.0.1/phpinfo.php>

3. Install phpmyadmin

```
sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl
```

```
sudo systemctl restart apache2
```



The screenshot shows a terminal window titled "sruthy@sruthy-VirtualBox: ~". The terminal output includes:

- MariaDB configuration steps:
 - Access removal: "access. This is also intended only for testing, and should be removed before moving into a production environment."
 - Test database removal: "Remove test database and access to it? [Y/n] Y
- Dropping test database...
... Success!
 - Privileges removal: "- Removing privileges on test database...
... Success!"
- Privilege table reload: "Reloading the privilege tables will ensure that all changes made so far will take effect immediately."
"Reload privilege tables now? [Y/n] Y
... Success!"
- Cleanup: "Cleaning up..."
- Completion message: "All done! If you've completed all of the above steps, your MariaDB installation should now be secure."
- PHP package installation:
"Thanks for using MariaDB!"

```
sruthy@sruthy-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocache
php-cli php-gd php-curl php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package php-ocache
sruthy@sruthy-VirtualBox:~$ sudo systemctl restart apache2
sruthy@sruthy-VirtualBox:~$
```

Open a browser : <http://localhost/phpmyadmin>

username : root

password : yourpassword

If phpmyadmin page not found :

```
nano /etc/apache2/apache2.conf
```

Add this line to last of the file.

Include /etc/phpmyadmin/apache.conf

restart apache2 - now try : http://localhost/phpmyadmin

sudo systemctl restart apache2

If any problem for login run the following command

sudo mysql

ALTER USER root@localhost IDENTIFIED BY "yourpassword";

ANSIBLE

Ansible is an open source IT automation engine that automates provisioning, configuration management, application deployment, orchestration, and many other IT processes.

Use Ansible automation to install software, automate daily tasks, provision infrastructure, improve security and compliance, patch systems, and share automation across your organization.

Ansible Playbooks

Ansible Playbooks are used to orchestrate IT processes. A playbook is a YAML file containing 1 or more plays, and is used to define the desired state of a system. This differs from an Ansible module, which is a standalone script that can be used inside an Ansible Playbook.

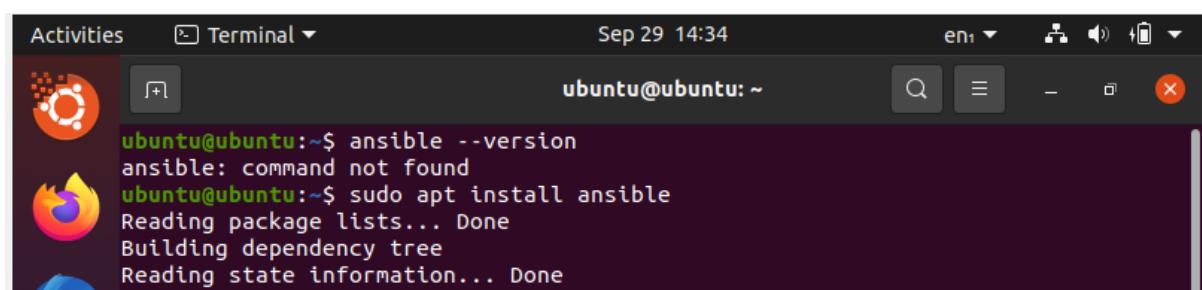
INSTALLATION ANSIBLE

install the Ansible software with:

```
$ sudo apt install ansible
```

To check ansible version:

```
$ ansible --version
```

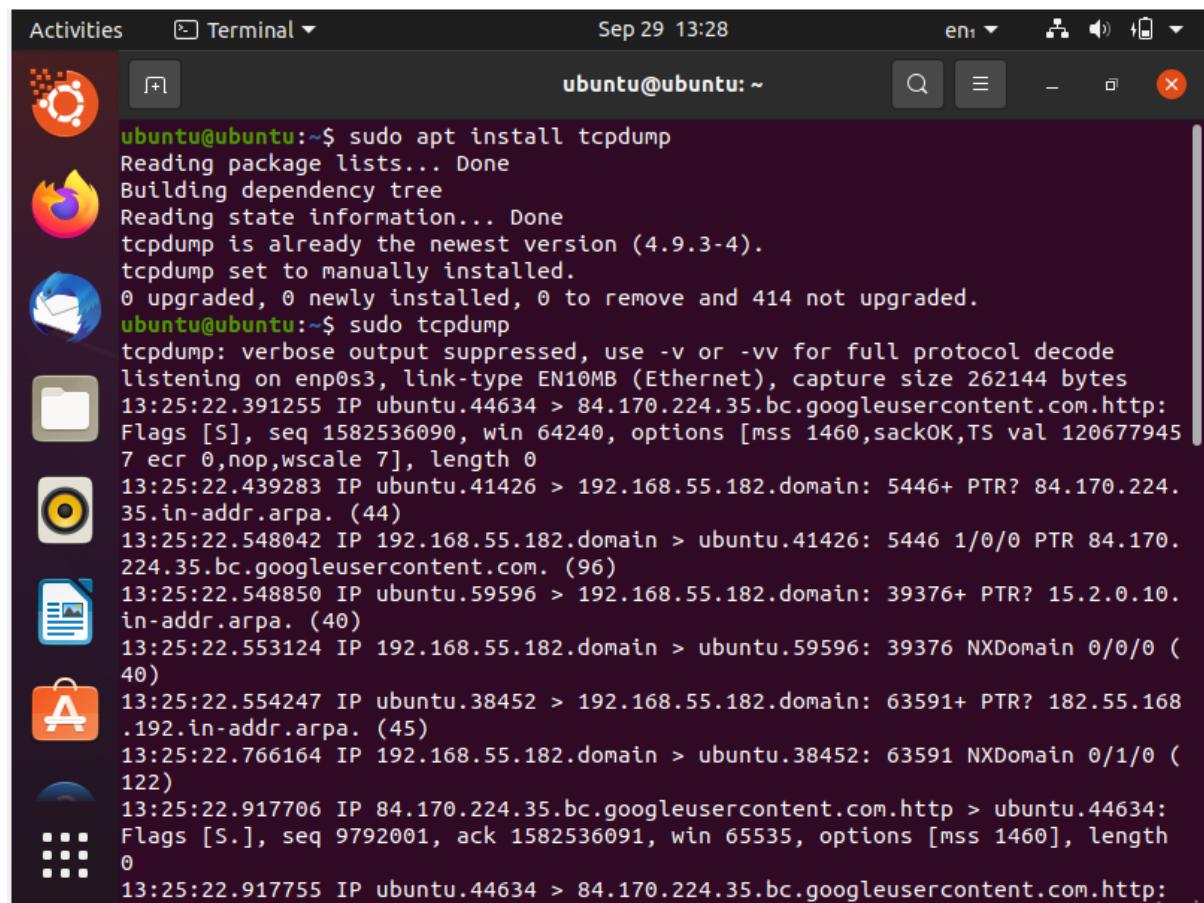


The screenshot shows a terminal window on a Ubuntu desktop environment. The terminal title is "Terminal". The window header includes the date and time (Sep 29 14:34), battery status, and network connection. The terminal content shows the following command sequence:

```
Activities Terminal Sep 29 14:34
ubuntu@ubuntu:~$ ansible --version
ansible: command not found
ubuntu@ubuntu:~$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

1. Tcpdump installation

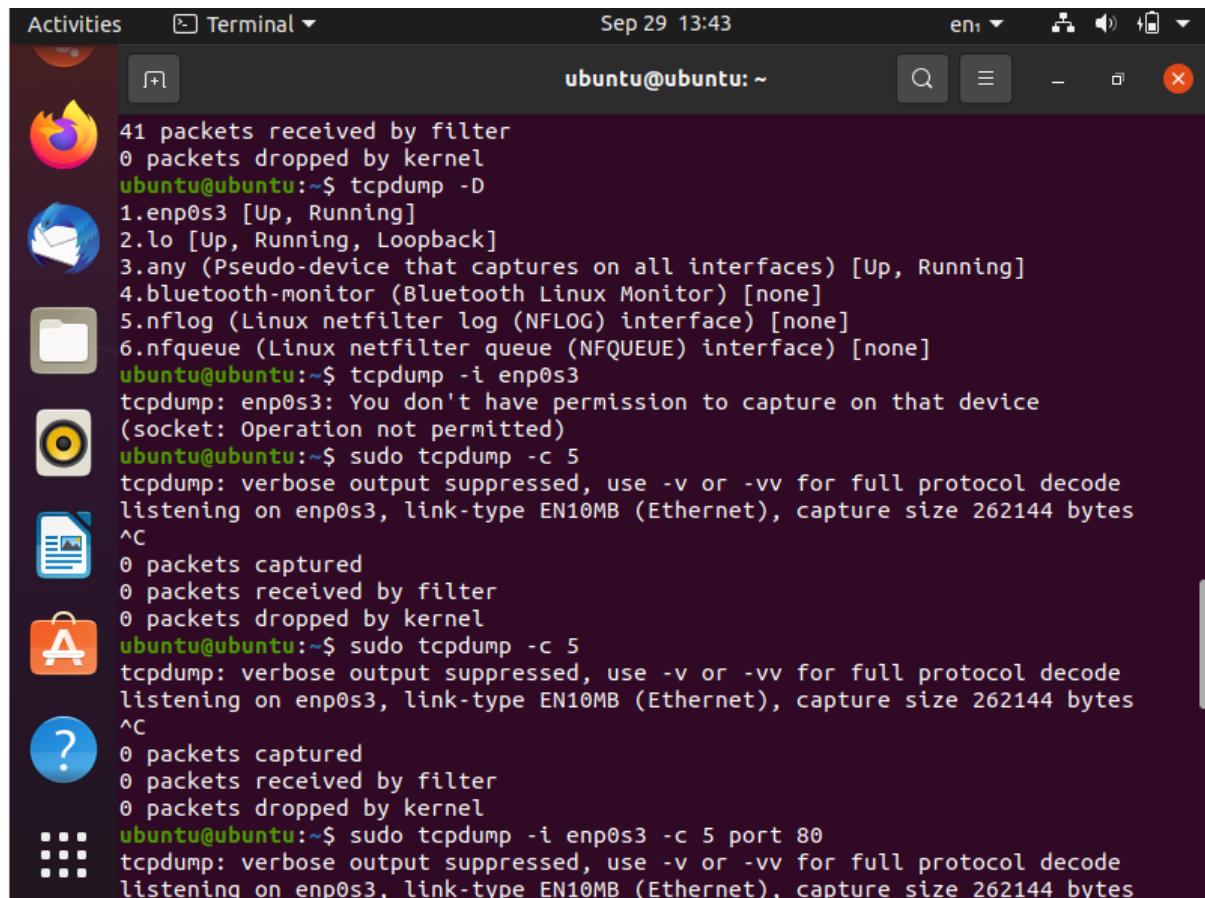
- Sudo apt install tcpdump
- Sudo tcpdump



A screenshot of an Ubuntu desktop environment. In the top left, there's an 'Activities' button and a 'Terminal' window icon. The terminal window is open and shows the following command and its output:

```
ubuntu@ubuntu:~$ sudo apt install tcpdump
Reading package lists... Done
Building dependency tree
Reading state information... Done
tcpdump is already the newest version (4.9.3-4).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 414 not upgraded.
ubuntu@ubuntu:~$ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
13:25:22.391255 IP ubuntu.44634 > 84.170.224.35.bc.googleusercontent.com.http:
Flags [S], seq 1582536090, win 64240, options [mss 1460,sackOK,TS val 120677945
7 ecr 0,nop,wscale 7], length 0
13:25:22.439283 IP ubuntu.41426 > 192.168.55.182.domain: 5446+ PTR? 84.170.224.
35.in-addr.arpa. (44)
13:25:22.548042 IP 192.168.55.182.domain > ubuntu.41426: 5446 1/0/0 PTR 84.170.
224.35.bc.googleusercontent.com. (96)
13:25:22.548850 IP ubuntu.59596 > 192.168.55.182.domain: 39376+ PTR? 15.2.0.10.
in-addr.arpa. (40)
13:25:22.553124 IP 192.168.55.182.domain > ubuntu.59596: 39376 NXDomain 0/0/0 (40)
13:25:22.554247 IP ubuntu.38452 > 192.168.55.182.domain: 63591+ PTR? 182.55.168
.192.in-addr.arpa. (45)
13:25:22.766164 IP 192.168.55.182.domain > ubuntu.38452: 63591 NXDomain 0/1/0 (122)
13:25:22.917706 IP 84.170.224.35.bc.googleusercontent.com.http > ubuntu.44634:
Flags [S.], seq 9792001, ack 1582536091, win 65535, options [mss 1460], length 0
13:25:22.917755 IP ubuntu.44634 > 84.170.224.35.bc.googleusercontent.com.http:
```

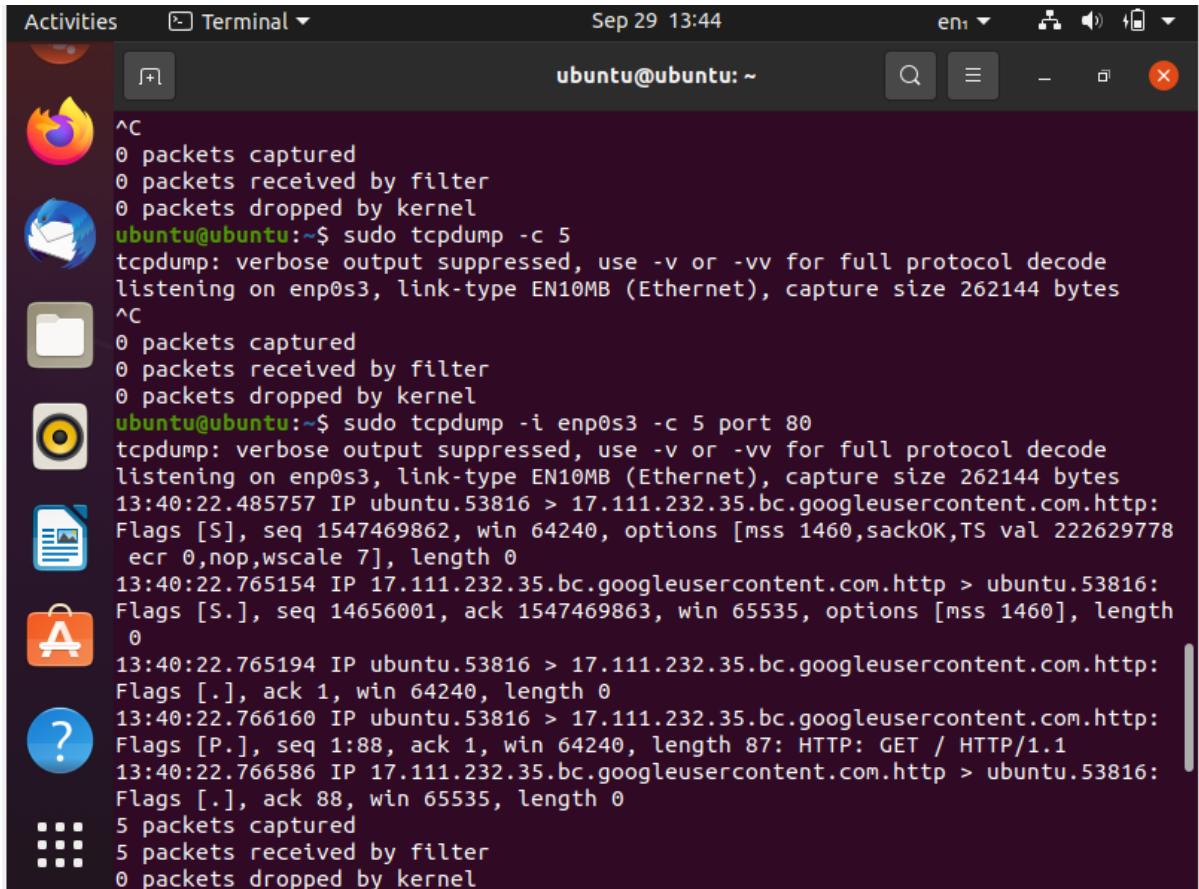
- tcpdump -D
- tcpdump -i enp0s3
- sudo tcpdump -c 5



A screenshot of a Ubuntu desktop environment. In the top left, there's an 'Activities' button and a 'Terminal' icon. The terminal window is open and shows the following text:

```
Activities Terminal Sep 29 13:43 en1 ▾ ubuntu@ubuntu: ~
41 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ tcpdump -D
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
ubuntu@ubuntu:~$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
ubuntu@ubuntu:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
```

- Sudo tcpdump -i enp0s3 -c 5 port 80



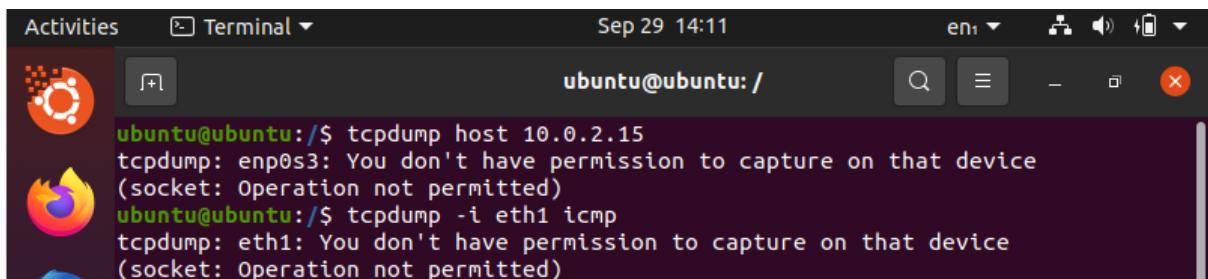
A screenshot of a Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, Applications, and Help. The main window is a terminal titled "Terminal" with the command "ubuntu@ubuntu: ~". The terminal output shows the user running "tcpdump -i enp0s3 -c 5 port 80" and capturing five packets. The captured traffic includes several HTTP requests from "ubuntu.53816" to "17.111.232.35.bc.googleusercontent.com" and responses back to the user.

```

^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
13:40:22.485757 IP ubuntu.53816 > 17.111.232.35.bc.googleusercontent.com.http:
Flags [S], seq 1547469862, win 64240, options [mss 1460,sackOK,TS val 222629778
ecr 0,nop,wscale 7], length 0
13:40:22.765154 IP 17.111.232.35.bc.googleusercontent.com.http > ubuntu.53816:
Flags [S.], seq 14656001, ack 1547469863, win 65535, options [mss 1460], length
0
13:40:22.765194 IP ubuntu.53816 > 17.111.232.35.bc.googleusercontent.com.http:
Flags [.], ack 1, win 64240, length 0
13:40:22.766160 IP ubuntu.53816 > 17.111.232.35.bc.googleusercontent.com.http:
Flags [P.], seq 1:88, ack 1, win 64240, length 87: HTTP: GET / HTTP/1.1
13:40:22.766586 IP 17.111.232.35.bc.googleusercontent.com.http > ubuntu.53816:
Flags [.], ack 88, win 65535, length 0
5 packets captured
5 packets received by filter
0 packets dropped by kernel

```

- tcpdump host 10.0.2.15
- tcpdump -l eth1 icmp



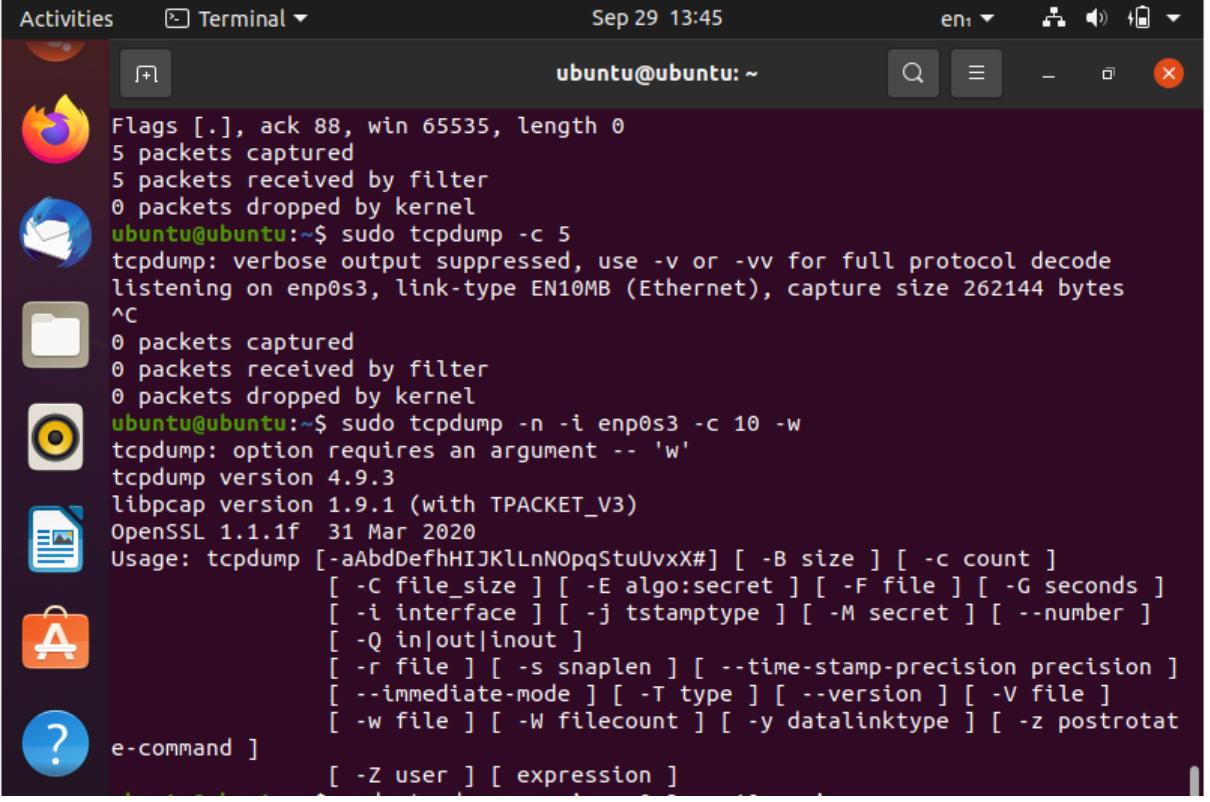
A screenshot of a Ubuntu desktop environment. The terminal window shows two failed attempts to run tcpdump. The first attempt, "tcpdump host 10.0.2.15", fails with the message "tcpdump: enp0s3: You don't have permission to capture on that device (socket: Operation not permitted)". The second attempt, "tcpdump -l eth1 icmp", also fails with the same message.

```

ubuntu@ubuntu:~/Desktop$ sudo tcpdump host 10.0.2.15
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
ubuntu@ubuntu:~/Desktop$ sudo tcpdump -l eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)

```

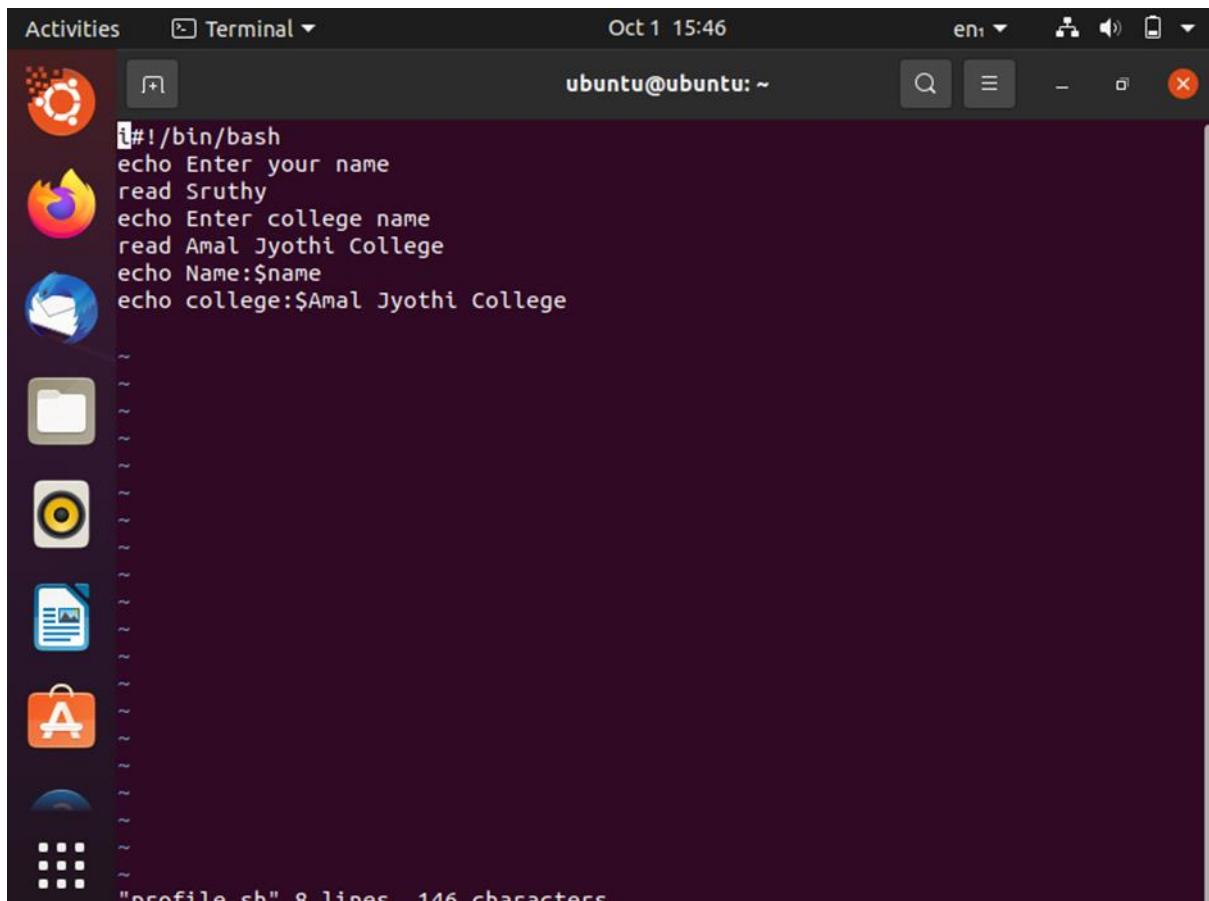
- Sudo tcpdump -n -i enp0s3 -c 10 -w icmp.pcap



```
Activities Terminal Sep 29 13:45 en1 ubuntu@ubuntu: ~
Flags [ . ], ack 88, win 65535, length 0
5 packets captured
5 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
ubuntu@ubuntu:~$ sudo tcpdump -n -i enp0s3 -c 10 -w
tcpdump: option requires an argument -- 'w'
tcpdump version 4.9.3
libpcap version 1.9.1 (with TPACKET_V3)
OpenSSL 1.1.1f 31 Mar 2020
Usage: tcpdump [-aAbdDefhHIJKLMNOPQRSTUVWXYZ] [ -B size ] [ -c count ]
          [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
          [ -i interface ] [ -j tstamptype ] [ -M secret ] [ --number ]
          [ -Q inout|inout ]
          [ -r file ] [ -s snaplen ] [ --time-stamp-precision precision ]
          [ --immediate-mode ] [ -T type ] [ --version ] [ -V file ]
          [ -w file ] [ -W filecount ] [ -y datalinktype ] [ -z postrotat
          [ -Z user ] [ expression ]
```

SHELL SCRIPT

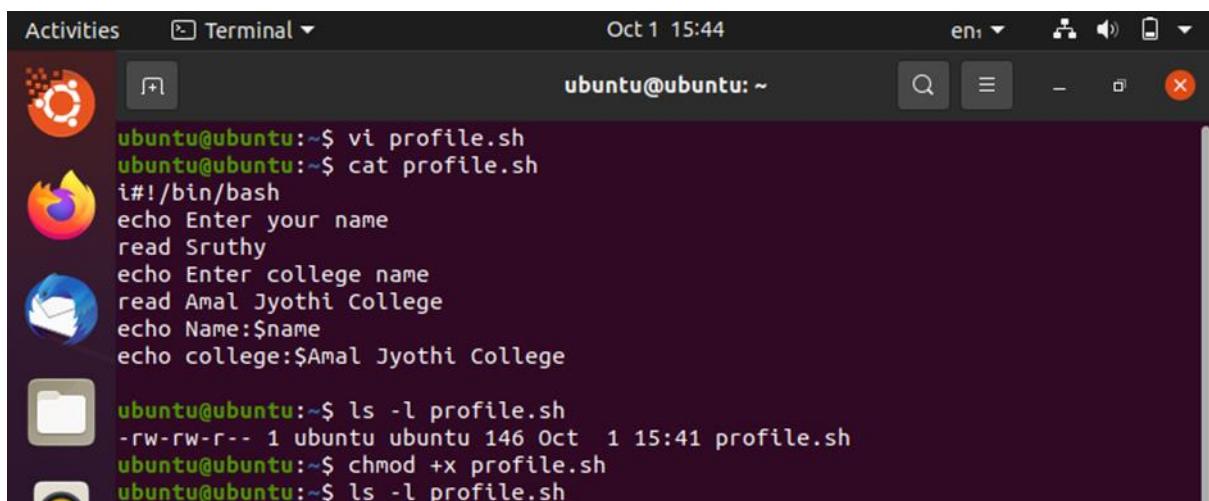
1. Write a shell script to ask your name and college name and print it on the screen.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the following shell script:

```
#!/bin/bash
echo Enter your name
read Sruthy
echo Enter college name
read Amal Jyothi College
echo Name:$name
echo college:$Amal Jyothi College
```

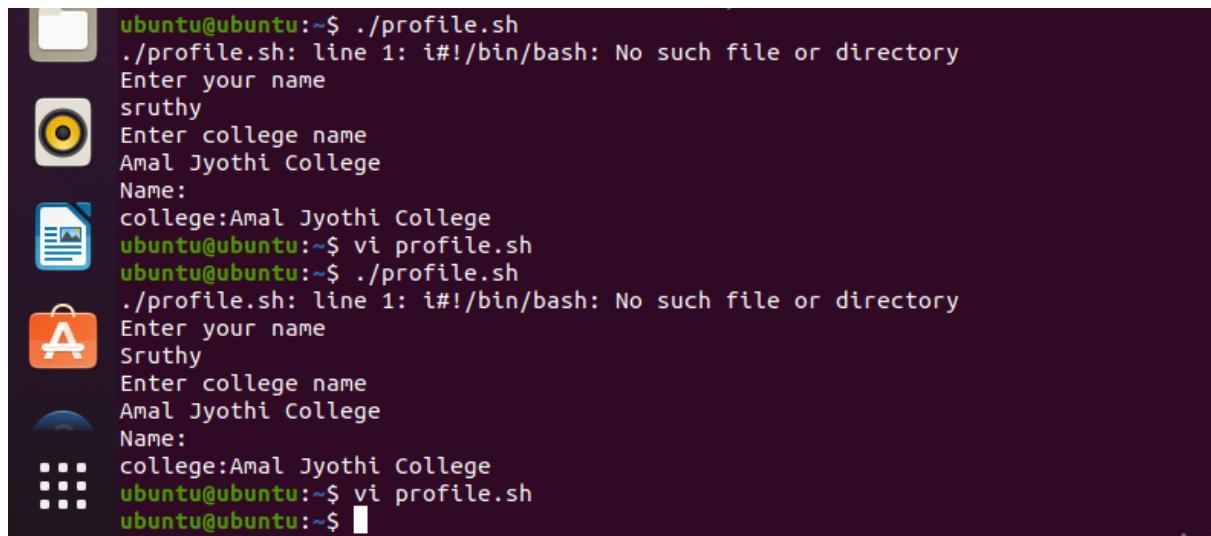
The terminal window also displays the message: "profile.sh" 8 lines, 146 characters.



A screenshot of an Ubuntu desktop environment. A terminal window titled "Terminal" is open, showing the following command history and file operations:

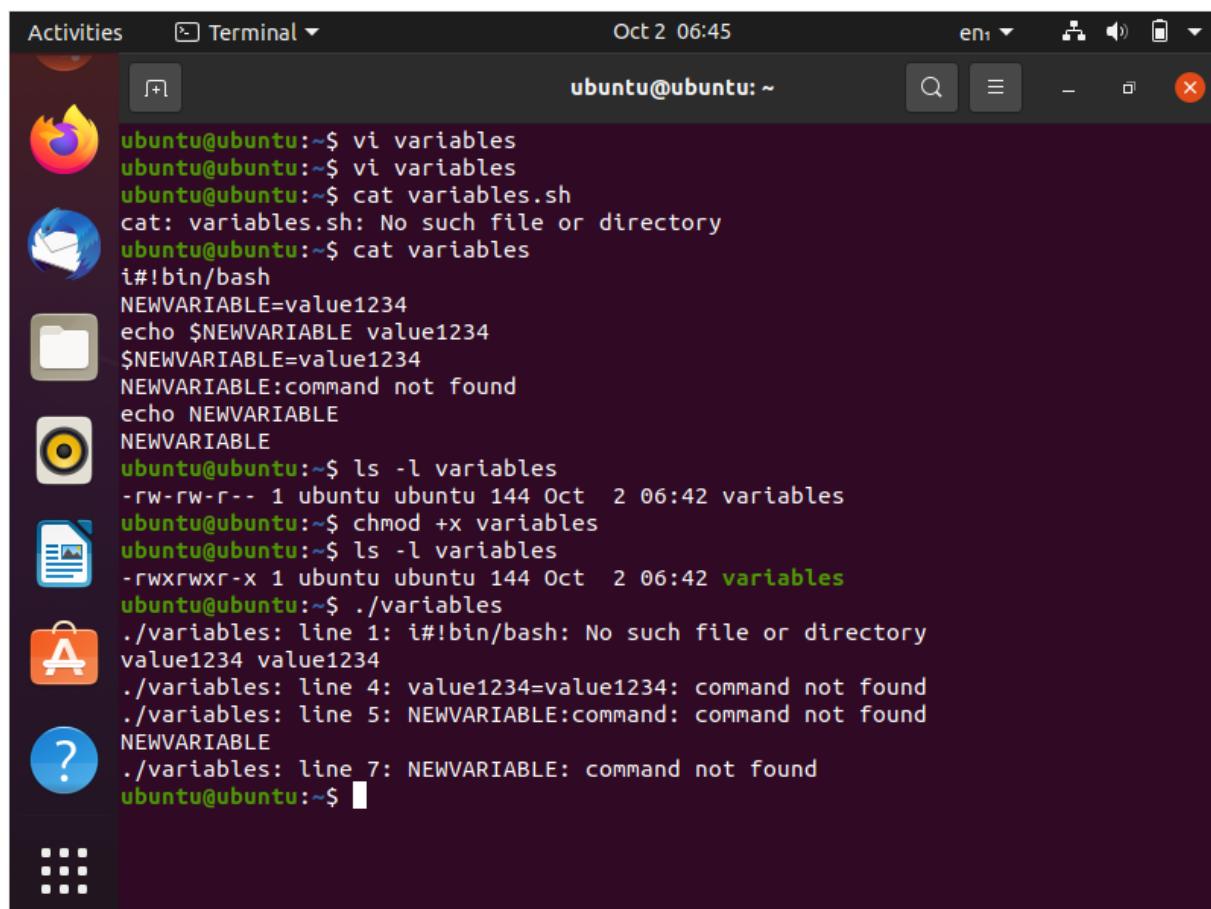
```
ubuntu@ubuntu:~$ vi profile.sh
ubuntu@ubuntu:~$ cat profile.sh
#!/bin/bash
echo Enter your name
read Sruthy
echo Enter college name
read Amal Jyothi College
echo Name:$name
echo college:$Amal Jyothi College

ubuntu@ubuntu:~$ ls -l profile.sh
-rw-rw-r-- 1 ubuntu ubuntu 146 Oct  1 15:41 profile.sh
ubuntu@ubuntu:~$ chmod +x profile.sh
ubuntu@ubuntu:~$ ls -l profile.sh
```

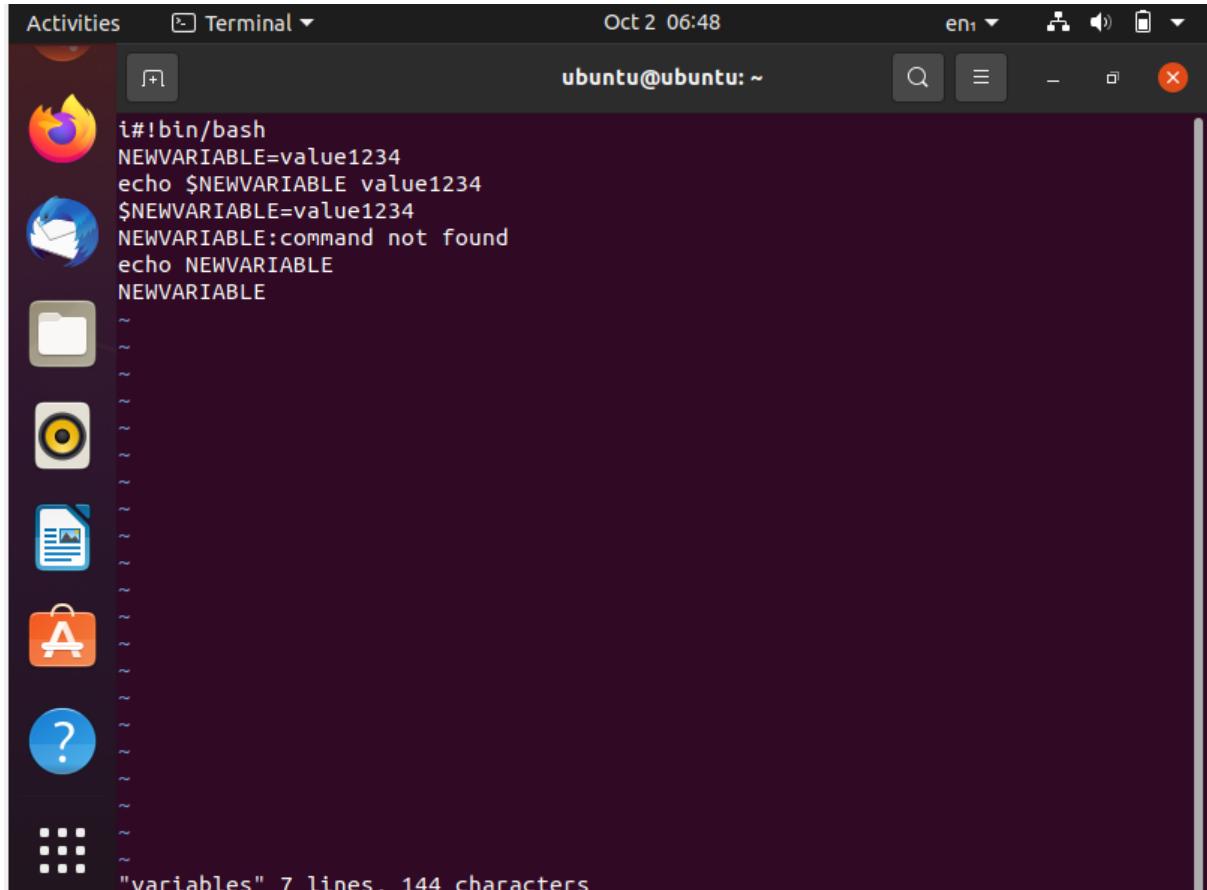


```
ubuntu@ubuntu:~$ ./profile.sh
./profile.sh: line 1: i#!/bin/bash: No such file or directory
Enter your name
sruthy
Enter college name
Amal Jyothi College
Name:
college:Amal Jyothi College
ubuntu@ubuntu:~$ vi profile.sh
ubuntu@ubuntu:~$ ./profile.sh
./profile.sh: line 1: i#!/bin/bash: No such file or directory
Enter your name
Sruthy
Enter college name
Amal Jyothi College
Name:
college:Amal Jyothi College
ubuntu@ubuntu:~$ vi profile.sh
ubuntu@ubuntu:~$
```

2. Write a shell script to set a value for a variable and display it on command line interface.



```
Activities Terminal ▾ Oct 2 06:45
ubuntu@ubuntu:~$ vi variables
ubuntu@ubuntu:~$ vi variables
ubuntu@ubuntu:~$ cat variables.sh
cat: variables.sh: No such file or directory
ubuntu@ubuntu:~$ cat variables
#!/bin/bash
NEWVARIABLE=value1234
echo $NEWWVARIABLE value1234
$NEWWVARIABLE=value1234
NEWWVARIABLE:command not found
echo NEWVARIABLE
NEWWVARIABLE
ubuntu@ubuntu:~$ ls -l variables
-rw-rw-r-- 1 ubuntu ubuntu 144 Oct  2 06:42 variables
ubuntu@ubuntu:~$ chmod +x variables
ubuntu@ubuntu:~$ ls -l variables
-rwxrwxr-x 1 ubuntu ubuntu 144 Oct  2 06:42 variables
ubuntu@ubuntu:~$ ./variables
./variables: line 1: i#!/bin/bash: No such file or directory
value1234 value1234
./variables: line 4: value1234=value1234: command not found
./variables: line 5: NEWVARIABLE:command: command not found
NEWWVARIABLE
./variables: line 7: NEWVARIABLE: command not found
ubuntu@ubuntu:~$
```



A screenshot of a terminal window titled "Terminal" running on an Ubuntu desktop environment. The window shows a command-line session where a user is attempting to run a shell script named "variables". The script contains the following code:

```
i#!bin/bash  
NEWVARIABLE=value1234  
echo $NEWWVARIABLE value1234  
$NEWWVARIABLE=value1234  
NEWWVARIABLE:command not found  
echo NEWVARIABLE  
NEWWVARIABLE
```

The terminal output indicates that the script failed to execute due to a command-not-found error for the line "\$NEWWVARIABLE=value1234". Following the error, the script continues to run successfully, printing the variable value and then exiting. The terminal status bar at the bottom shows the file name "variables" and its size.

```
"variables" 7 lines, 144 characters
```

- 3. Write a shell script to perform addition, substration, multiplication, division with two numbers that is accepted from user.**

Activities Terminal ▾ Oct 2 09:26 en1 ▾



```
i#!bin/bash
a=100
b=20

add=$((a + b))
echo $add

sub=$((a - b))
echo $sub

mul=$((a * b))
echo $mul

div=$((a / b))
echo $div

~

"operations.sh" 16 lines, 129 characters
```

Activities Terminal ▾ Oct 2 09:26 en1 ▾



```
ubuntu@ubuntu:~$ cat operations.sh
i#!bin/bash
a=100
b=20

add=$((a + b))
echo $add

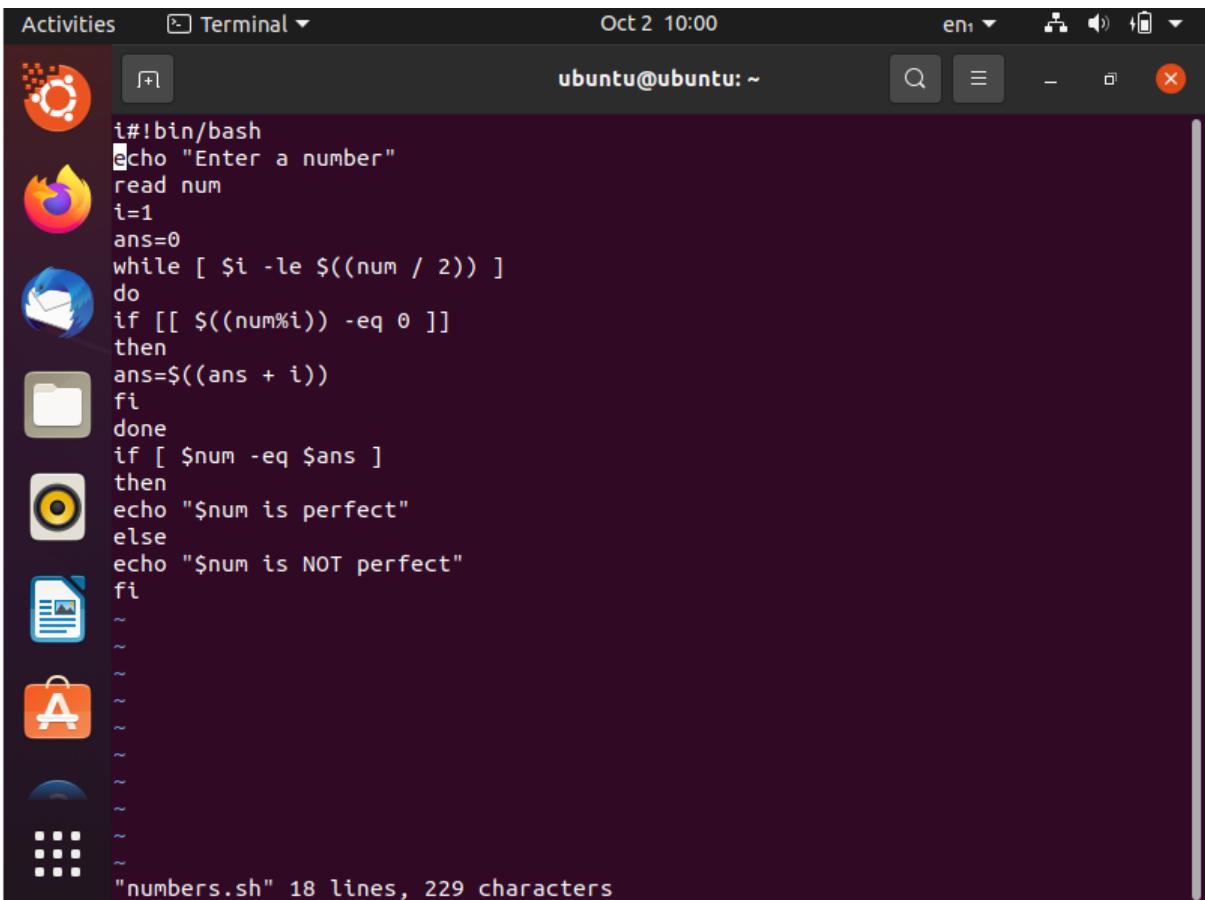
sub=$((a - b))
echo $sub

mul=$((a * b))
echo $mul

div=$((a / b))
echo $div

ubuntu@ubuntu:~$ ls -l operations.sh
-rw-rw-r-- 1 ubuntu ubuntu 129 Oct  2 09:24 operations.sh
ubuntu@ubuntu:~$ chmod +x operations.sh
ubuntu@ubuntu:~$ ls -l operations.sh
-rwxrwxr-x 1 ubuntu ubuntu 129 Oct  2 09:24 operations.sh
ubuntu@ubuntu:~$ ./operations.sh
./operations.sh: line 1: i#!bin/bash: No such file or directory
120
80
2000
5
ubuntu@ubuntu:~$
```

4. Write a shell script to check the value of a given number and display whether the number is found or not.



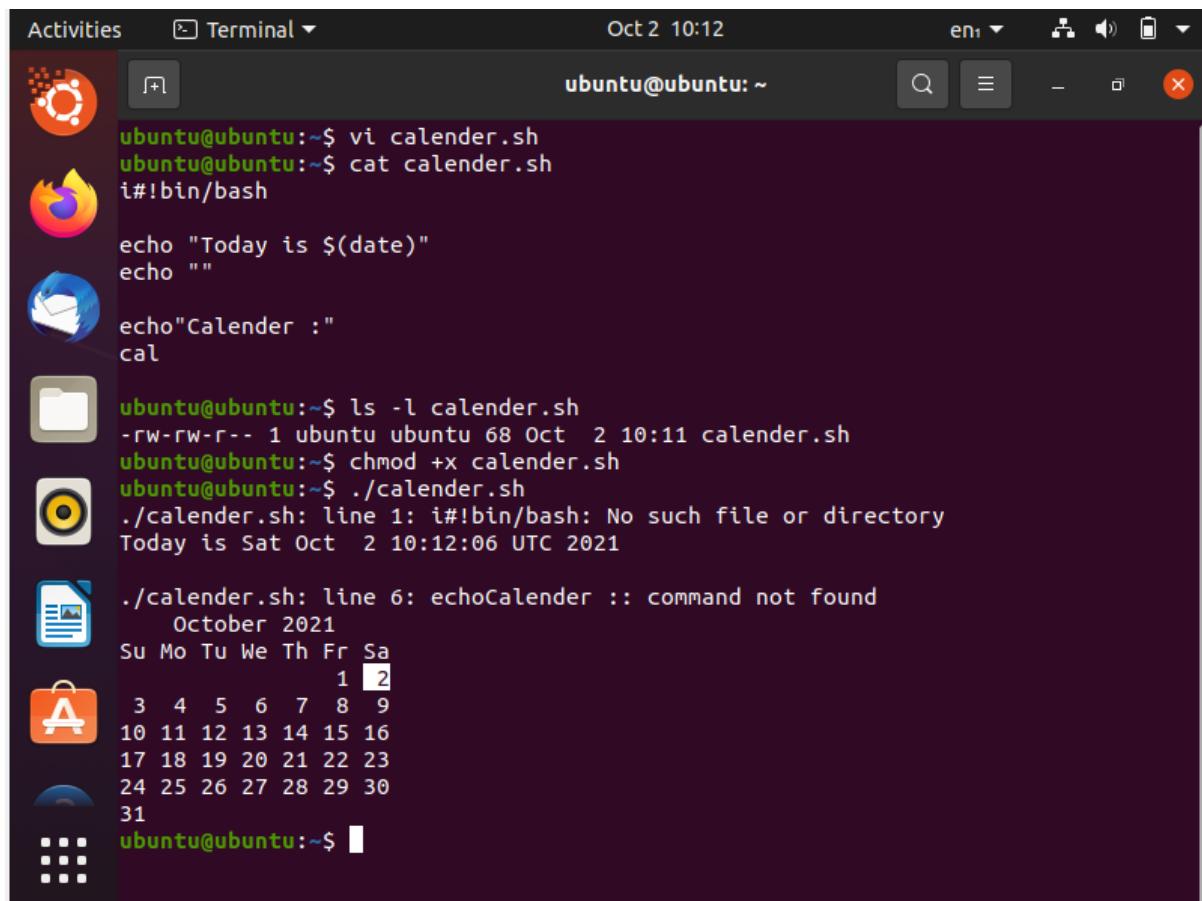
A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, and several application icons. The top bar shows the date and time as "Oct 2 10:00" and the user as "ubuntu@ubuntu: ~". Below the dock is a terminal window titled "Terminal". The terminal contains a shell script named "numbers.sh" which checks if a given number is perfect. The script uses a while loop to iterate from 1 to half of the input number, summing up factors. It then compares the sum with the original number to determine if it's perfect. The terminal also shows the file statistics at the bottom: "numbers.sh" has 18 lines and 229 characters.

```
i#!/bin/bash
echo "Enter a number"
read num
i=1
ans=0
while [ $i -le $((num / 2)) ]
do
if [[ $((num%i)) -eq 0 ]]
then
ans=$((ans + i))
fi
done
if [ $num -eq $ans ]
then
echo "$num is perfect"
else
echo "$num is NOT perfect"
fi
~
~
~
~
~
~
~
"numbers.sh" 18 lines, 229 characters
```

Activities Terminal ▾ Oct 2 10:05 en1 ▾

```
echo "Enter a number"
read no
i=1
ans=0
while [ $i -le $((no / 2))]
do
if [[ $((no%i)) -eq 0 ]]
then ans=$((ans + i))
fi
i=$((i +1))
done
if [ $no -eq $ans ]
then
echo "$no is perfect"
else
echo "no is not perfect"
fi
ubuntu@ubuntu:~$ ls -l number.sh
-rwxrwxr-x 1 ubuntu ubuntu 233 Oct  2 09:42 number.sh
ubuntu@ubuntu:~$ chmod +x number.sh
ubuntu@ubuntu:~$ ls -l number.sh
-rwxrwxr-x 1 ubuntu ubuntu 233 Oct  2 09:42 number.sh
ubuntu@ubuntu:~$ ./number.sh
./number.sh: line 1: i#!bin/bash: No such file or directory
Enter a number
7
./number.sh: line 6: [: missing ']'
no is not perfect
ubuntu@ubuntu:~$
```

5. Write a shell script to display current date, calendar.



The screenshot shows a terminal window on an Ubuntu desktop. The terminal title is "Terminal". The date and time at the top right are "Oct 2 10:12". The user is "ubuntu@ubuntu: ~". The terminal content is as follows:

```
Activities Terminal Oct 2 10:12 en1
ubuntu@ubuntu:~$ vi calender.sh
ubuntu@ubuntu:~$ cat calender.sh
#!/bin/bash
echo "Today is $(date)"
echo ""
echo"Calender :"
cal
ubuntu@ubuntu:~$ ls -l calender.sh
-rw-rw-r-- 1 ubuntu ubuntu 68 Oct  2 10:11 calender.sh
ubuntu@ubuntu:~$ chmod +x calender.sh
ubuntu@ubuntu:~$ ./calender.sh
./calender.sh: line 1: i#!bin/bash: No such file or directory
Today is Sat Oct  2 10:12:06 UTC 2021
./calender.sh: line 6: echoCalender :: command not found
          October 2021
Su Mo Tu We Th Fr Sa
      1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
ubuntu@ubuntu:~$
```

Activities Terminal ▾ Oct 2 10:12 en1 ⓘ



```
i#!bin/bash  
echo "Today is $(date)"  
echo ""  
echo"Calender :"  
cal  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
"calender.sh" 8 lines, 68 characters
```

6. Write a shell script to check a number is even or odd.

Activities Terminal ▾ Oct 2 10:21 en1 ⓘ



```
ubuntu@ubuntu:~$ vi even.sh  
ubuntu@ubuntu:~$ cat even.sh  
i#!bin/bash  
read -p "Enter a number: " number  
if [ $((number%2)) -eq 0 ]  
then  
echo "Number is even."  
else  
echo "Number is odd."  
fi  
ubuntu@ubuntu:~$ ls -l even.sh  
-rw-rw-r-- 1 ubuntu ubuntu 131 Oct  2 10:18 even.sh  
ubuntu@ubuntu:~$ chmod +x even.sh  
ubuntu@ubuntu:~$ ls -l even.sh  
-rwxrwxr-x 1 ubuntu ubuntu 131 Oct  2 10:18 even.sh  
ubuntu@ubuntu:~$ ./even.sh  
. ./even.sh: line 1: i#!bin/bash: No such file or directory  
Enter a number: 88  
Number is even.  
ubuntu@ubuntu:~$ 67  
67: command not found
```

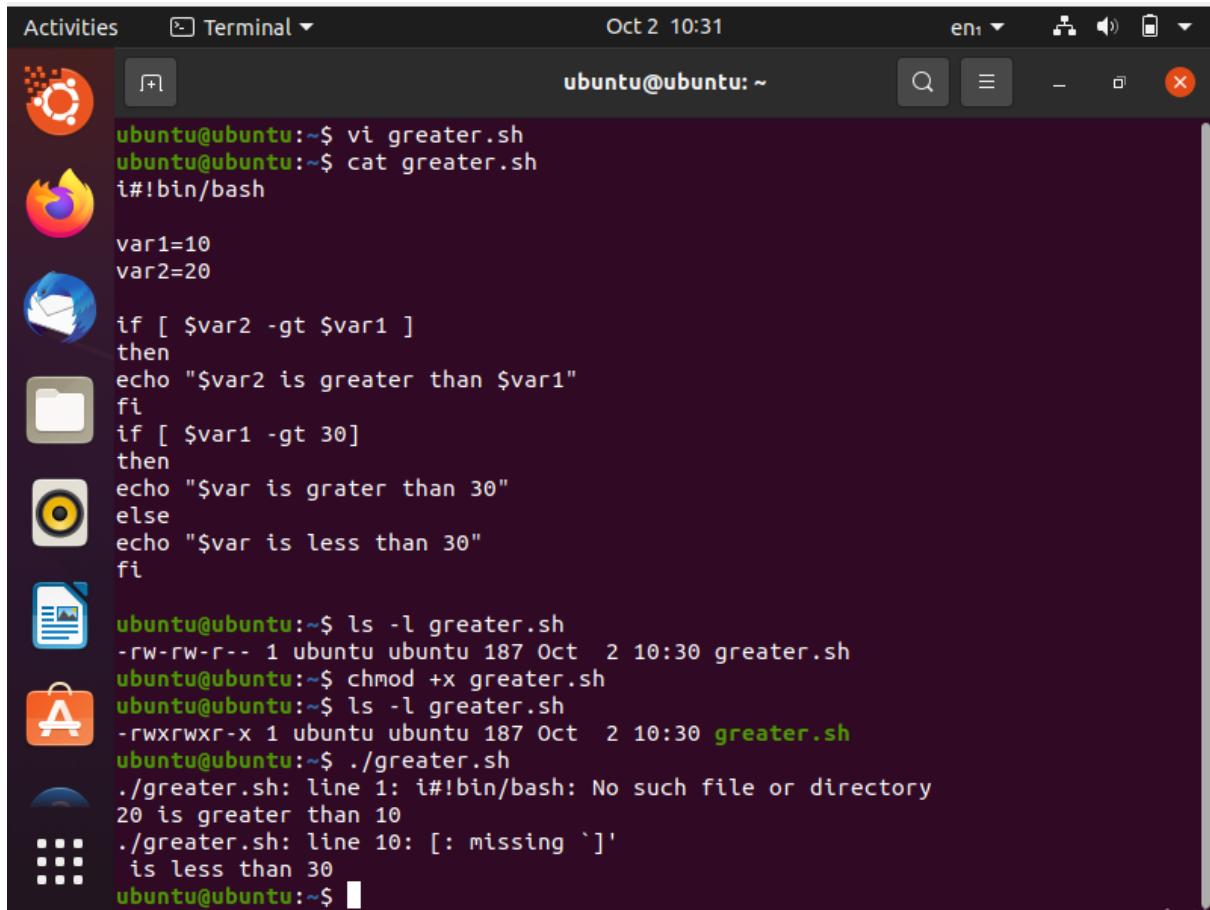
Activities Terminal Oct 2 10:22 en1



```
i#!/bin/bash
read -p "Enter a number: " number
if [ $((number%2)) -eq 0 ]
then
echo "Number is even."
else
echo "Number is odd."
fi
~
```

"even.sh" 8 lines, 131 characters

7. Write a shell script to check a number is greater than, less than or equal to another number.



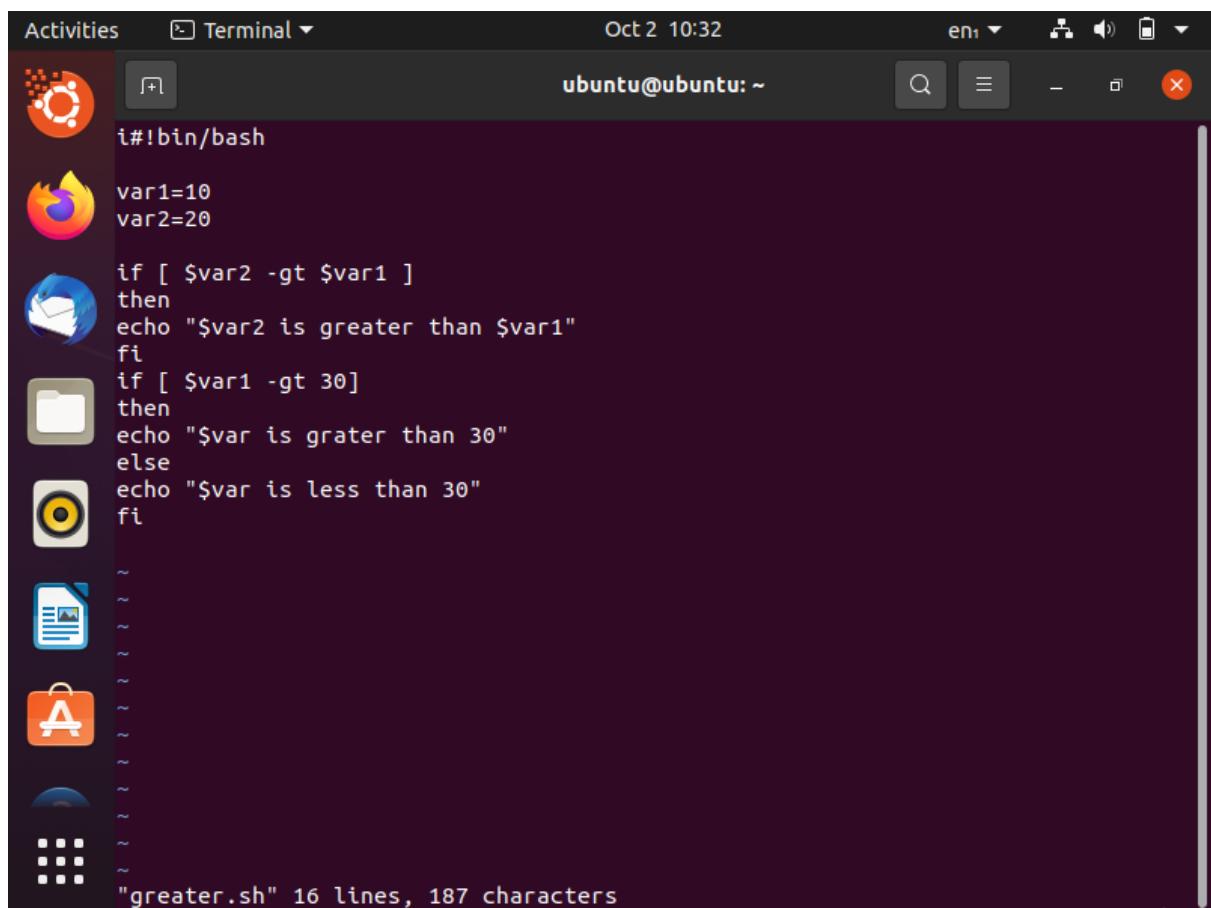
A screenshot of a Ubuntu desktop environment showing a terminal window. The terminal window title is "Terminal" and the status bar shows "Oct 2 10:31". The terminal content is as follows:

```
Activities Terminal Oct 2 10:31
ubuntu@ubuntu:~$ vi greater.sh
ubuntu@ubuntu:~$ cat greater.sh
#!/bin/bash

var1=10
var2=20

if [ $var2 -gt $var1 ]
then
echo "$var2 is greater than $var1"
fi
if [ $var1 -gt 30]
then
echo "$var is grater than 30"
else
echo "$var is less than 30"
fi

ubuntu@ubuntu:~$ ls -l greater.sh
-rw-rw-r-- 1 ubuntu ubuntu 187 Oct  2 10:30 greater.sh
ubuntu@ubuntu:~$ chmod +x greater.sh
ubuntu@ubuntu:~$ ls -l greater.sh
-rwxrwxr-x 1 ubuntu ubuntu 187 Oct  2 10:30 greater.sh
ubuntu@ubuntu:~$ ./greater.sh
./greater.sh: line 1: i#!bin/bash: No such file or directory
20 is greater than 10
./greater.sh: line 10: [: missing `]'
is less than 30
ubuntu@ubuntu:~$
```



A screenshot of a Ubuntu desktop environment. In the top bar, the 'Activities' button is selected, followed by a 'Terminal' icon with a downward arrow. The date 'Oct 2 10:32' and network status 'en1' are shown. On the right, there are icons for volume, brightness, battery, and a red 'X' button. The terminal window has a dark purple background. The command line shows:

```
i#!bin/bash  
var1=10  
var2=20  
  
if [ $var2 -gt $var1 ]  
then  
echo "$var2 is greater than $var1"  
fi  
if [ $var1 -gt 30]  
then  
echo "$var is grater than 30"  
else  
echo "$var is less than 30"  
fi  
  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
~  
"greater.sh" 16 lines, 187 characters
```

8. Write a shell script to find sum of first 10 numbers.

Activities Terminal ▾ Oct 2 10:42 en1 ▾

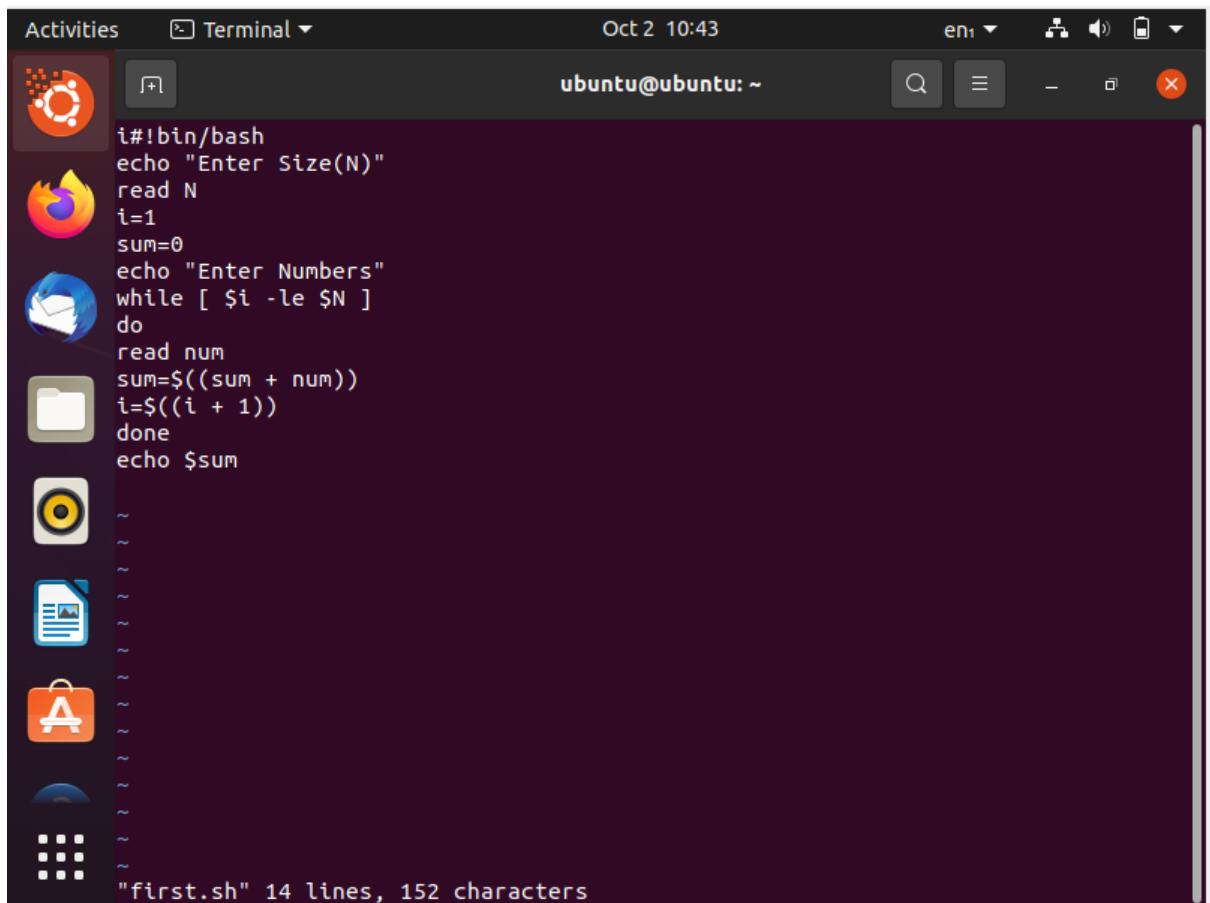
```
ubuntu@ubuntu:~$ vi first.sh
ubuntu@ubuntu:~$ cat first.sh
#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo $sum

ubuntu@ubuntu:~$ ls -l first.sh
-rw-rw-r-- 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ chmod +x first.sh
ubuntu@ubuntu:~$ ls -l first.sh
-rwxrwxr-x 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ ./first.sh
./first.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
10
Enter Numbers
1
2
3
```

Activities Terminal ▾ Oct 2 10:42 en1 ▾

```
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo $sum

ubuntu@ubuntu:~$ ls -l first.sh
-rw-rw-r-- 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ chmod +x first.sh
ubuntu@ubuntu:~$ ls -l first.sh
-rwxrwxr-x 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ ./first.sh
./first.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
10
Enter Numbers
1
2
3
4
5
6
7
8
9
10
55
```



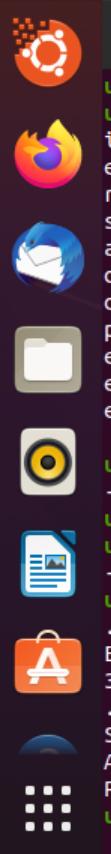
A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title bar says "Terminal". The terminal window contains the following text:

```
i#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
    read num
    sum=$((sum + num))
    i=$((i + 1))
done
echo $sum
```

At the bottom of the terminal window, the status message reads "first.sh" 14 lines, 152 characters.

9. Write a shell script to find the sum, average and the product of the four integers entered.

Activities Terminal ▾ Oct 2 11:02 en1 ▾



ubuntu@ubuntu:~\$ vi integers.sh
ubuntu@ubuntu:~\$ cat integers.sh

```
i#!bin/bash
echo Enter four integers with space between
read a b c d
sum='expr $a + $b + $c + $d'
avg ='expr $sum / 4'
dec='expr $sum % 4'
dec='expr \($a \* 1000 \) /4'
product='expr $a \* $b \* $c \* $d'
echo Sum=$sum
echo Average=$avg.$dec
echo Product=$product
```

ubuntu@ubuntu:~\$ ls -l integers.sh
-rwxrwxr-- 1 ubuntu ubuntu 268 Oct 2 10:59 integers.sh

ubuntu@ubuntu:~\$ chmod +x integers.sh
ubuntu@ubuntu:~\$ ls -l integers.sh
-rwxrwxr-x 1 ubuntu ubuntu 268 Oct 2 10:59 integers.sh

ubuntu@ubuntu:~\$./integers.sh
../integers.sh: line 1: i#!bin/bash: No such file or directory
Enter four integers with space between
3
./integers.sh: line 5: avg: command not found
Sum=expr \$a + \$b + \$c + \$d
Average=.expr \(\$a * 1000 \) /4
Product=expr \$a * \$b * \$c * \$d

ubuntu@ubuntu:~\$ █

Activities Terminal Oct 2 11:03 en1

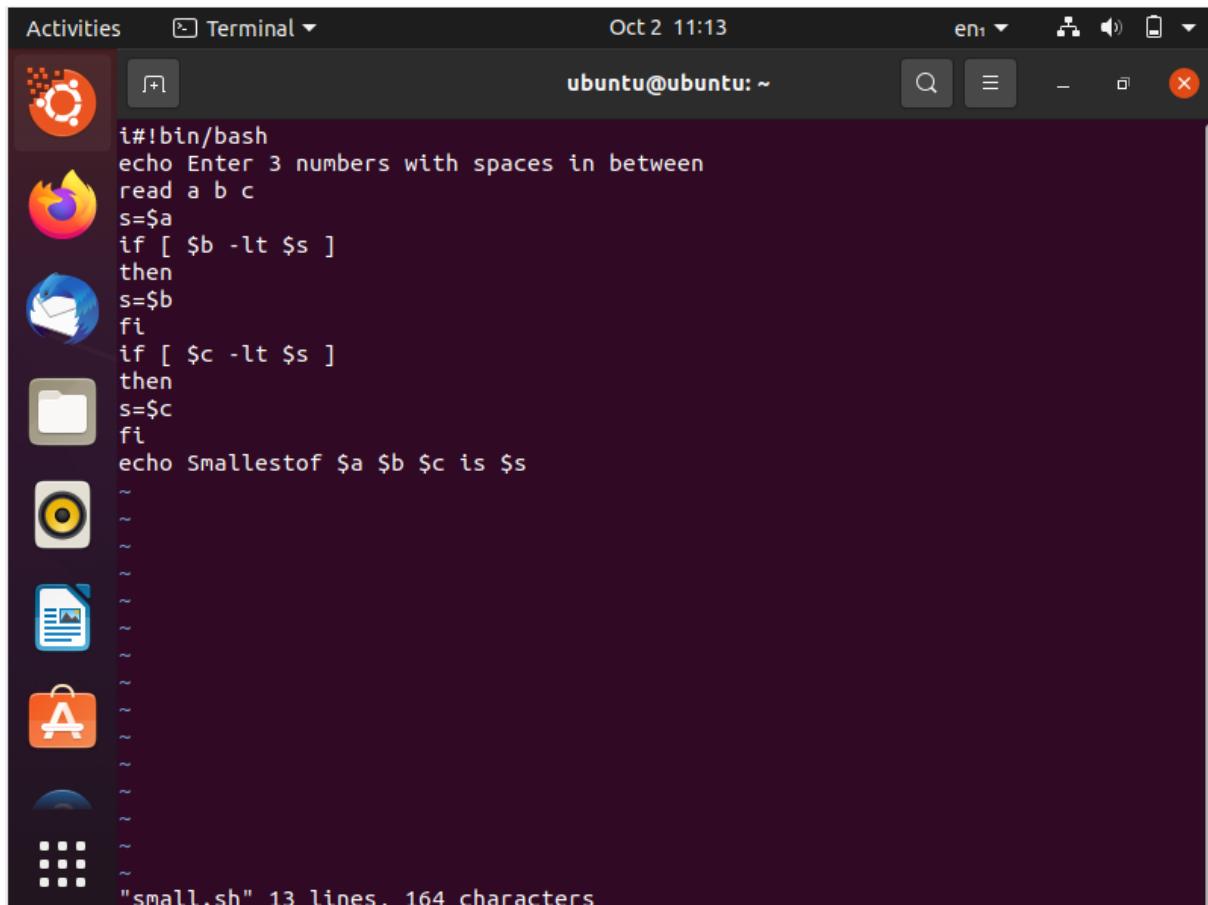
```
ubuntu@ubuntu: ~
#!/bin/bash
echo Enter four integers with space between
read a b c d
sum='expr $a + $b + $c + $d'
avg ='expr $sum / 4'
dec='expr $sum % 4'
dec='expr (( $a /* 1000 ) /4)'
product='expr $a /* $b /* $c /* $d'
echo Sum=$sum
echo Average=$avg.$dec
echo Product=$product

~
~
~
~
~
~
~
~
~
~
~
~
integers.sh" 12 lines, 268 characters
```

10. Write a shell program to find the smallest of three numbers.

Activities Terminal Oct 2 11:12 en1

```
ubuntu@ubuntu:~$ vi small.sh
ubuntu@ubuntu:~$ cat small.sh
#!/bin/bash
echo Enter 3 numbers with spaces in between
read a b c
s=$a
if [ $b -lt $s ]
then
s=$b
fi
if [ $c -lt $s ]
then
s=$c
fi
echo Smallestof $a $b $c is $s
ubuntu@ubuntu:~$ ls -l small.sh
-rw-rw-r-- 1 ubuntu ubuntu 164 Oct  2 11:10 small.sh
ubuntu@ubuntu:~$ chmod +x small.sh
ubuntu@ubuntu:~$ ls -l small.sh
-rwxrwxr-x 1 ubuntu ubuntu 164 Oct  2 11:10 small.sh
ubuntu@ubuntu:~$ ./small.sh
./small.sh: line 1: i#!bin/bash: No such file or directory
Enter 3 numbers with spaces in between
3
./small.sh: line 5: [: -lt: unary operator expected
./small.sh: line 9: [: -lt: unary operator expected
Smallestof 3 is 3
ubuntu@ubuntu:~$ ./small.sh
./small.sh: line 1: i#!bin/bash: No such file or directory
```



A screenshot of an Ubuntu desktop environment showing a terminal window. The terminal window title is "Terminal" and the command line shows the user is at "ubuntu@ubuntu: ~". The terminal content displays a shell script named "small.sh" which reads three numbers from the user and prints the smallest one. The script is as follows:

```
i#!/bin/bash
echo Enter 3 numbers with spaces in between
read a b c
s=$a
if [ $b -lt $s ]
then
s=$b
fi
if [ $c -lt $s ]
then
s=$c
fi
echo Smallest of $a $b $c is $s
```

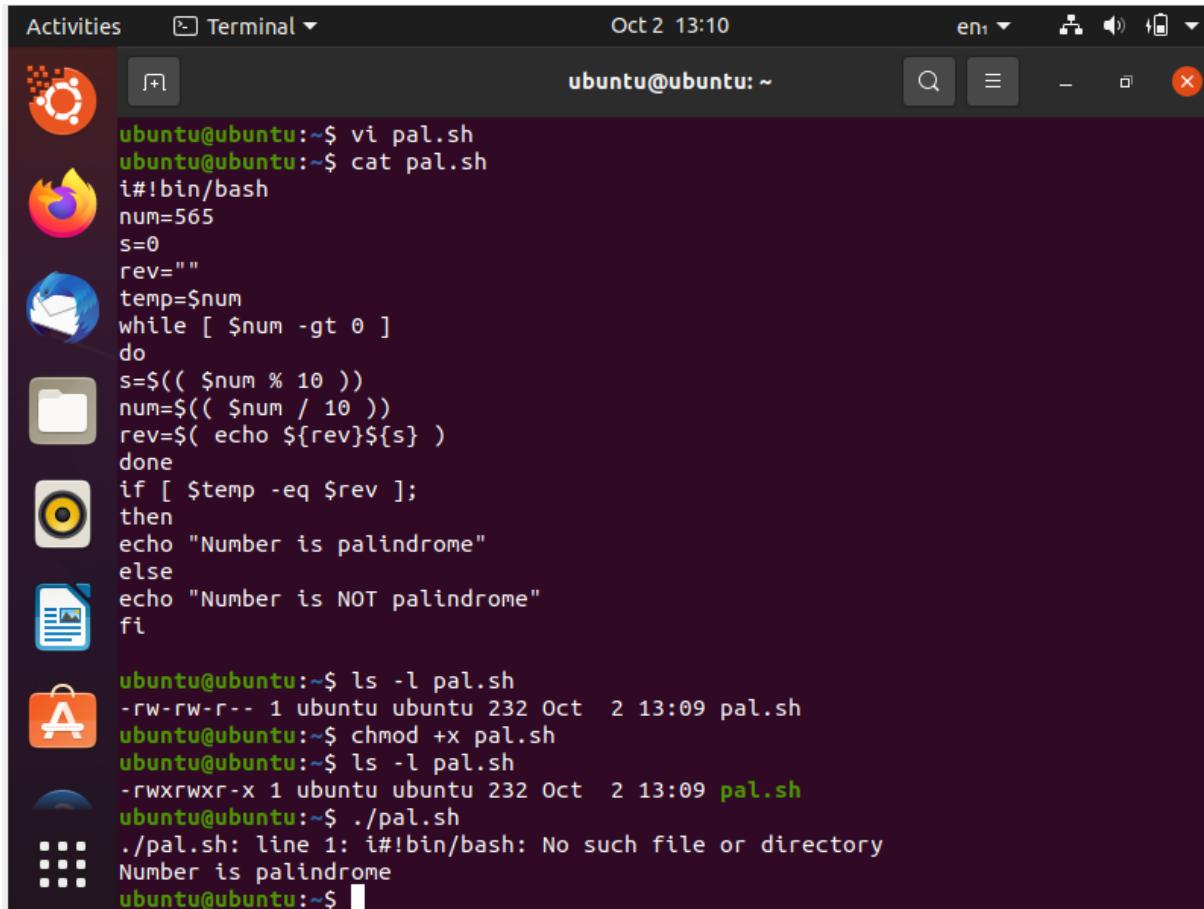
The terminal also shows several blank lines starting with a tilde (~) and the status message at the bottom: "'small.sh' 13 lines, 164 characters".

11. Write a shell program to find factorial of given number.

```
ubuntu@ubuntu:~$ vi fact.sh
ubuntu@ubuntu:~$ cat fact.sh
#!/bin/bash
echo "Enter a number"
read num
fact=1
while [ $num -gt 1 ]
do
fact=$((fact * num))
num=$((num -1))
done
echo $fact

ubuntu@ubuntu:~$ ls -l fact.sh
-rw-rw-r-- 1 ubuntu ubuntu 128 Oct  2 11:17 fact.sh
ubuntu@ubuntu:~$ chmod +x fact.sh
ubuntu@ubuntu:~$ ls -l fact.sh
-rwxrwxr-x 1 ubuntu ubuntu 128 Oct  2 11:17 fact.sh
ubuntu@ubuntu:~$ ./fact.sh
./fact.sh: line 1: i#!bin/bash: No such file or directory
Enter a number
6
720
ubuntu@ubuntu:~$
```

12. Write a shell program to check a number is palindrome or not.



The screenshot shows a terminal window on an Ubuntu desktop. The terminal title is "Terminal" and the date and time are "Oct 2 13:10". The user is "ubuntu@ubuntu:~". The terminal content is as follows:

```
ubuntu@ubuntu:~$ vi pal.sh
ubuntu@ubuntu:~$ cat pal.sh
#!/bin/bash
num=565
s=0
rev=""
temp=$num
while [ $num -gt 0 ]
do
s=$(( $num % 10 ))
num=$(( $num / 10 ))
rev=$( echo ${rev}${s} )
done
if [ $temp -eq $rev ];
then
echo "Number is palindrome"
else
echo "Number is NOT palindrome"
fi

ubuntu@ubuntu:~$ ls -l pal.sh
-rw-rw-r-- 1 ubuntu ubuntu 232 Oct  2 13:09 pal.sh
ubuntu@ubuntu:~$ chmod +x pal.sh
ubuntu@ubuntu:~$ ls -l pal.sh
-rwxrwxr-x 1 ubuntu ubuntu 232 Oct  2 13:09 pal.sh
ubuntu@ubuntu:~$ ./pal.sh
./pal.sh: line 1: i#!bin/bash: No such file or directory
Number is palindrome
ubuntu@ubuntu:~$
```

Activities Terminal Oct 2 13:11 en1

```
ubuntu@ubuntu: ~
#!/bin/bash
num=565
s=0
rev=""
temp=$num
while [ $num -gt 0 ]
do
s=$(( $num % 10 ))
num=$(( $num / 10 ))
rev=$( echo ${rev}${s} )
done
if [ $temp -eq $rev ];
then
echo "Number is palindrome"
else
echo "Number is NOT palindrome"
fi
~
~
~
~
~
~
~
~
"pal.sh" 18 lines, 232 characters
```

13. Write a shell script to find the average of the numbers entered in command line.

Activities Terminal Oct 2 13:24 en1

```
ubuntu@ubuntu: ~$ vi avg.sh
ubuntu@ubuntu: ~$ cat avg.sh
#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
avg=$(echo $sum / $N | bc -l)
echo $avg
ubuntu@ubuntu: ~$ ls -l avg.sh
-rw-rw-r-- 1 ubuntu ubuntu 181 Oct 2 13:22 avg.sh
ubuntu@ubuntu: ~$ chmod +x avg.sh
```

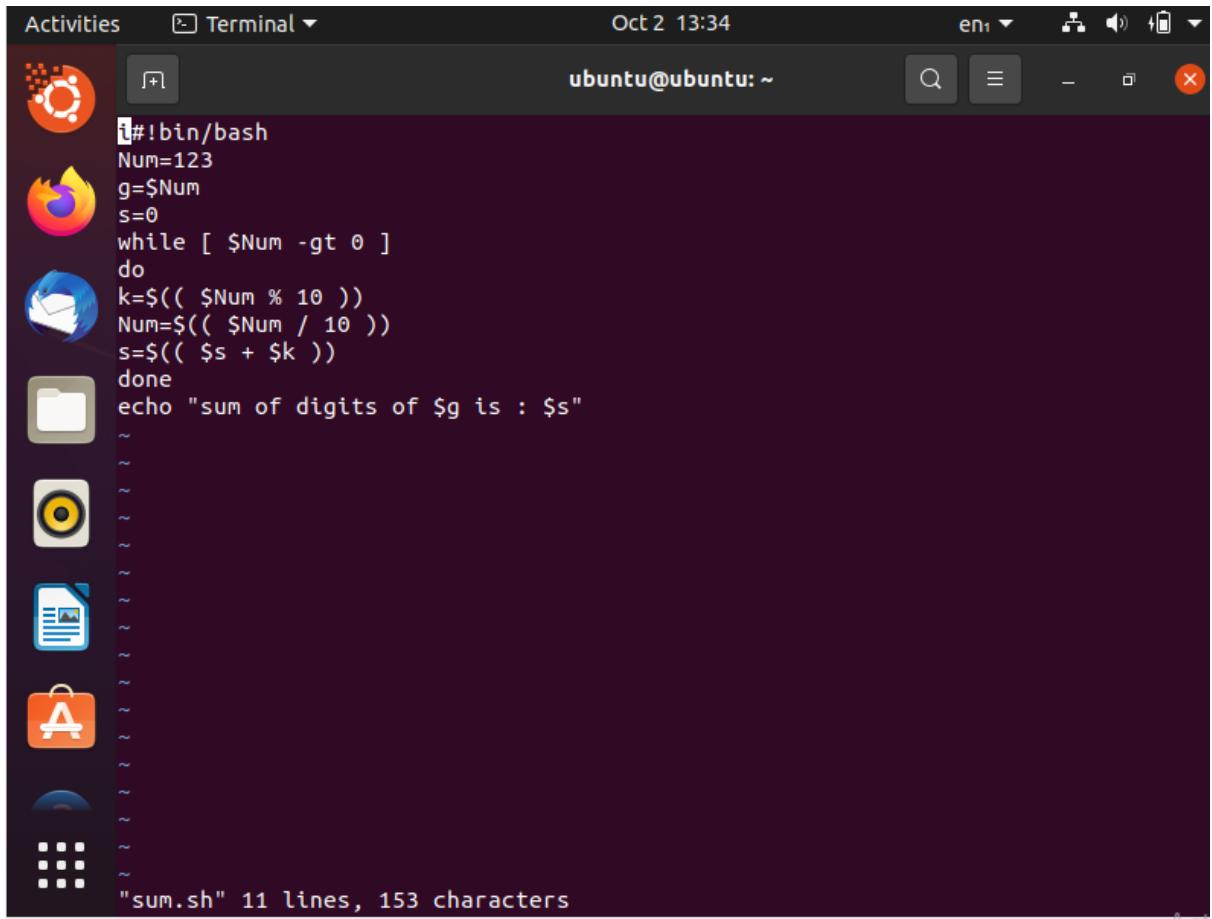
```
ubuntu@ubuntu:~/Desktop$ ./avg.sh
./avg.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
3
Enter Numbers
2
4
5
3.666666666666666666666666
ubuntu@ubuntu:~/Desktop$
```

```
Activities Terminal Oct 2 13:26 en1
Install Ubuntu 20.04.2.0 LTS ubuntu@ubuntu:~ Q X
#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
avg=$(echo $sum / $N | bc -l)
echo $avg
~
~
~
~
~
~
~
~
"avg.sh" 14 lines, 181 characters
```

14. Write a shell program to find the sum of all the digits in a number.

Activities Terminal Oct 2 13:33 en1

```
ubuntu@ubuntu:~$ vi sum.sh
ubuntu@ubuntu:~$ cat sum.sh
#!/bin/bash
Num=123
g=$Num
s=0
while [ $Num -gt 0 ]
do
k=$(( $Num % 10 ))
Num=$(( $Num / 10 ))
s=$(( $s + $k ))
done
echo "sum of digits of $g is : $s"
ubuntu@ubuntu:~$ ls -l sum.sh
-rw-rw-r-- 1 ubuntu ubuntu 153 Oct  2 13:32 sum.sh
ubuntu@ubuntu:~$ chmod +x sum.sh
ubuntu@ubuntu:~$ ls -l sum.sh
-rwxrwxr-x 1 ubuntu ubuntu 153 Oct  2 13:32 sum.sh
ubuntu@ubuntu:~$ ./sum.sh
./sum.sh: line 1: i#!/bin/bash: No such file or directory
sum of digits of 123 is : 6
ubuntu@ubuntu:~$
```

A screenshot of a Ubuntu desktop environment. In the top left, there's an 'Activities' button and a 'Terminal' button. The top right shows the date 'Oct 2 13:34', the user 'ubuntu@ubuntu: ~', and system icons for network, sound, and battery. The main area is a terminal window with a dark background. It contains a shell script named 'sum.sh' with the following content:

```
#!/bin/bash
Num=123
g=$Num
s=0
while [ $Num -gt 0 ]
do
k=$(( $Num % 10 ))
Num=$(( $Num / 10 ))
s=$(( $s + $k ))
done
echo "sum of digits of $g is : $s"
```

The terminal shows several blank lines starting with a tilde (~) and ends with the message "'sum.sh' 11 lines, 153 characters".

"sum.sh" 11 lines, 153 characters

15. Write a shell program to check whether given year is leap year or not.

Activities Terminal Oct 2 13:46 en -

```
ubuntu@ubuntu:~$ vi year.sh
ubuntu@ubuntu:~$ cat year.sh
#!/bin/bash
echo -n "Enter year (YYYY) : "
read y
a = 'expr $y%4'
b = 'expr $y%100'
c = 'expr $y%400'
if [${a} -eq 0 -a ${b} -ne 0 -o ${c} -eq 0 ]
then
echo "$y is leap year"
else
echo "$y is not leap year"
fi

ubuntu@ubuntu:~$ ls -l year.sh
-rw-rw-r-- 1 ubuntu ubuntu 206 Oct  2 13:45 year.sh
ubuntu@ubuntu:~$ chmod +x year.sh
ubuntu@ubuntu:~$ ls -l year.sh
-rwxrwxr-x 1 ubuntu ubuntu 206 Oct  2 13:45 year.sh
ubuntu@ubuntu:~$ ./year.sh
./year.sh: line 1: #!/bin/bash: No such file or directory
Enter year (YYYY) : 2024
./year.sh: line 4: a: command not found
./year.sh: line 5: b: command not found
./year.sh: line 6: c: command not found
./year.sh: line 7: [: too many arguments
2024 is not leap year
```

Docker installation on Windows 10

Step-I

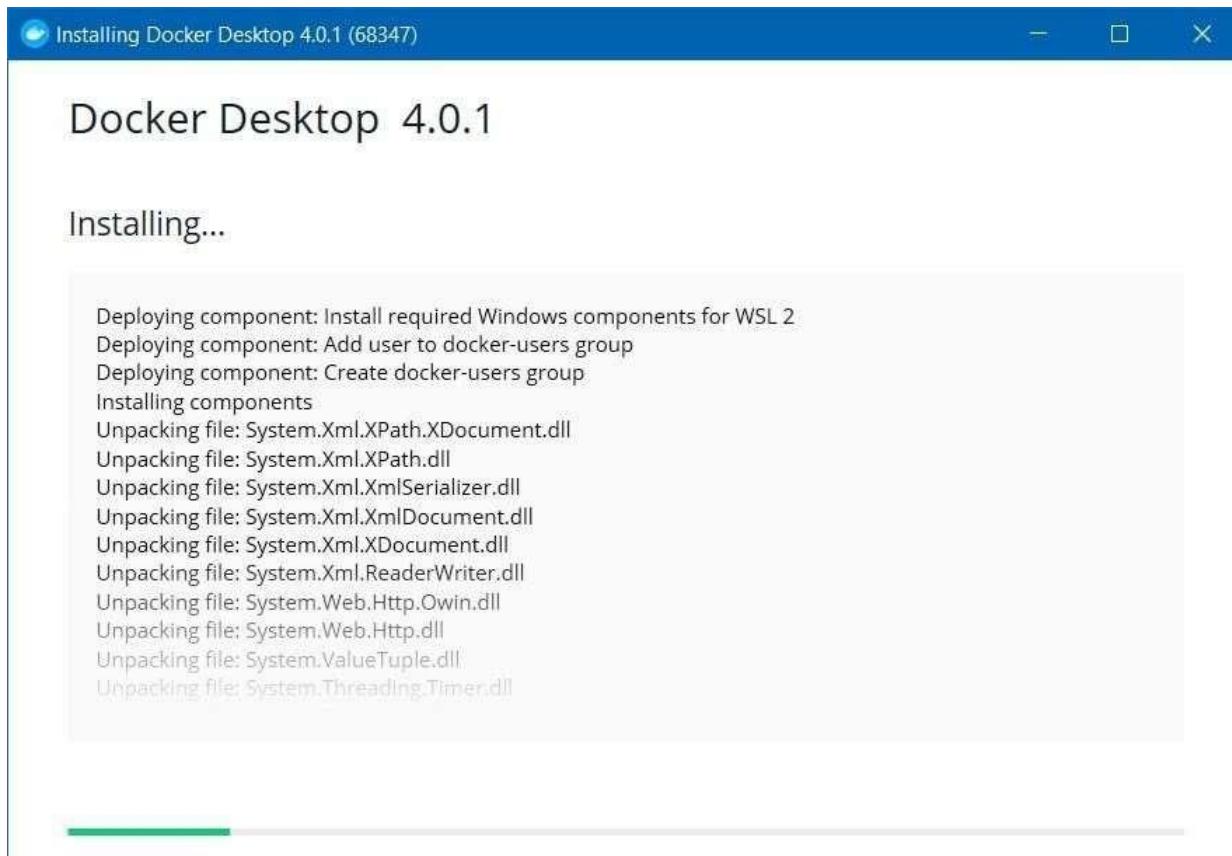
Download Docker desktop Installer for Windows from

<https://desktop.docker.com/win/main/amd64/Docker%20Desktop%20Installer.exe>



Step-II

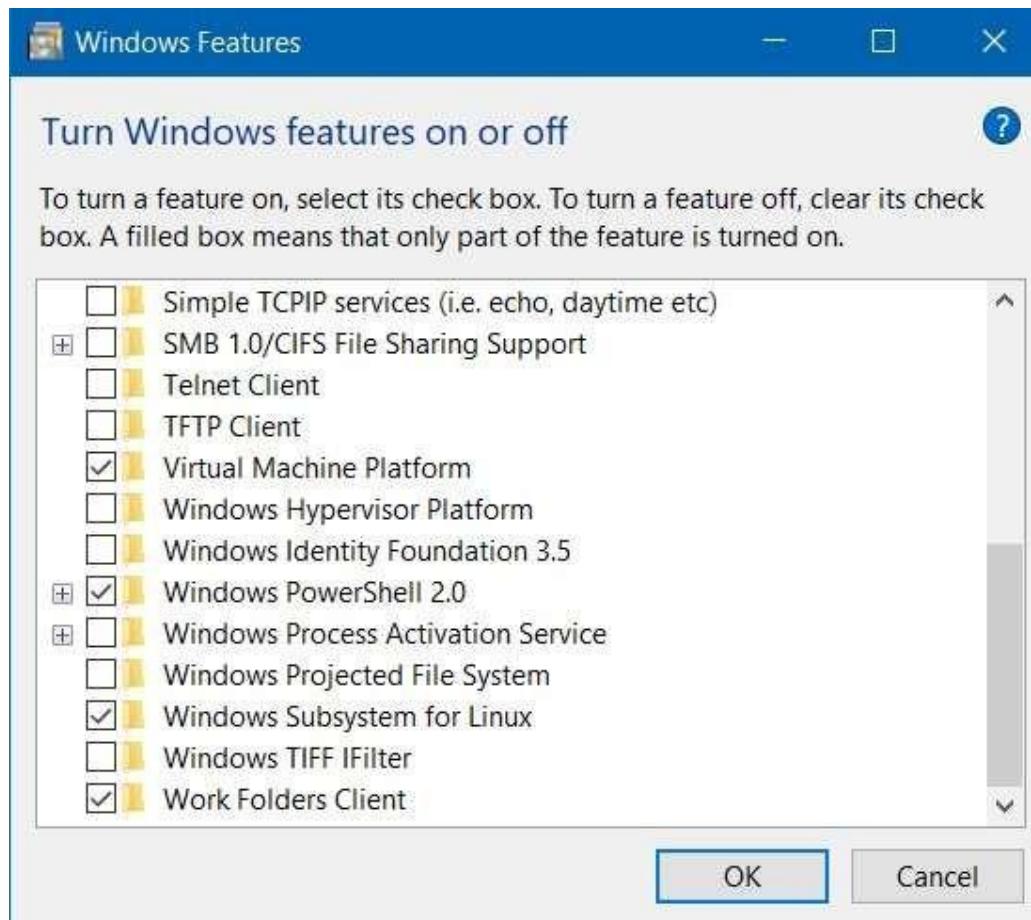
Open the .exe file and follow the steps after clicking install button.



Step-III

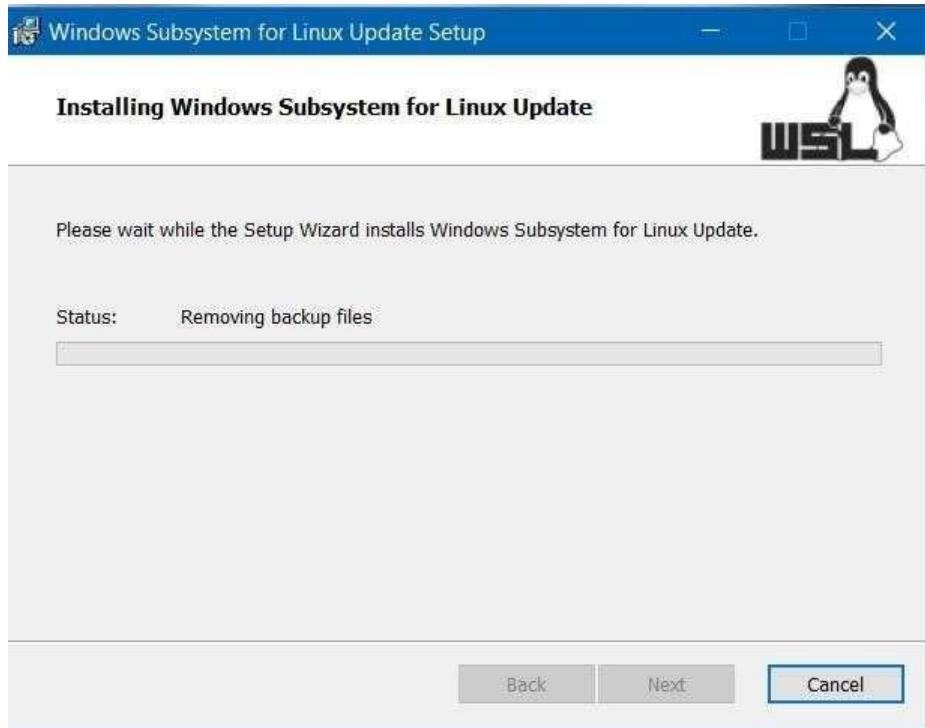
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



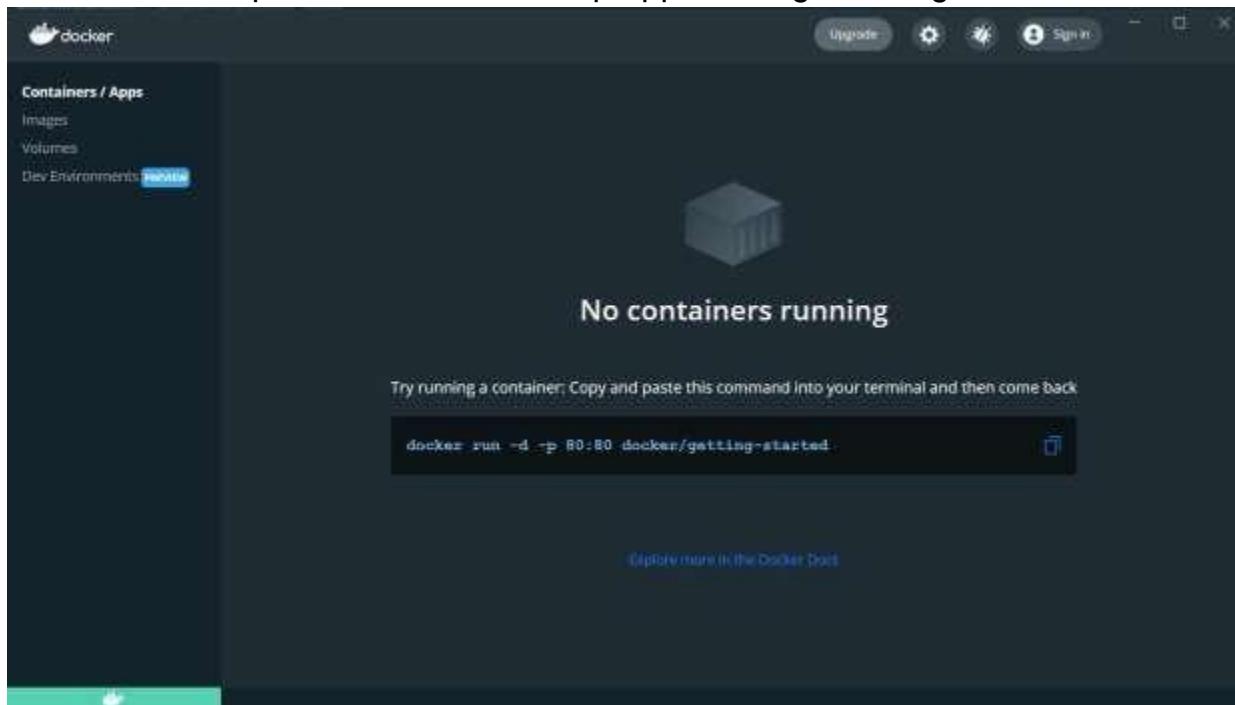
Step-IV

If any WSL 2 error occurs download windows subsystem for linux update package and install the .exe file, after the installation restart the windows device.



Step-V

Once installed, open the docker desktop app, and signin using the dockerID



Step-VI

Now pull any image from docker hub using the docker pull command in the command prompt (eg: docker pull ubuntu)

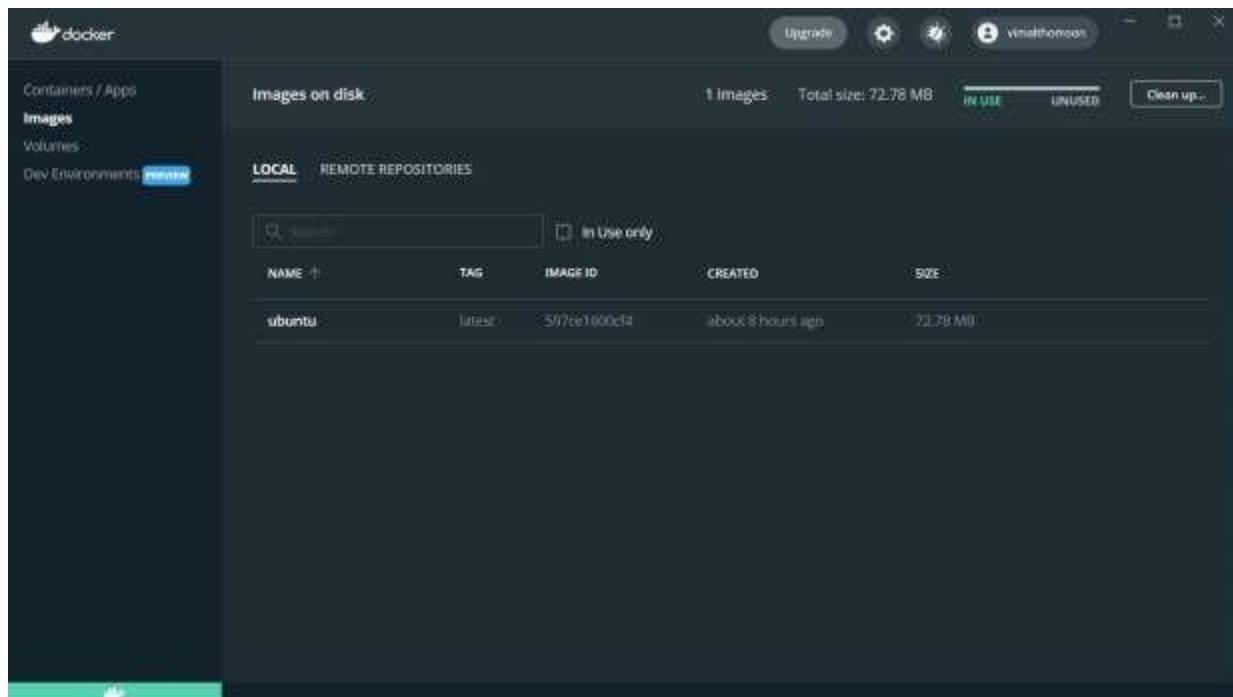
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.53: no such host.
See 'docker run --help'.

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
F3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

C:\Windows\system32>
```

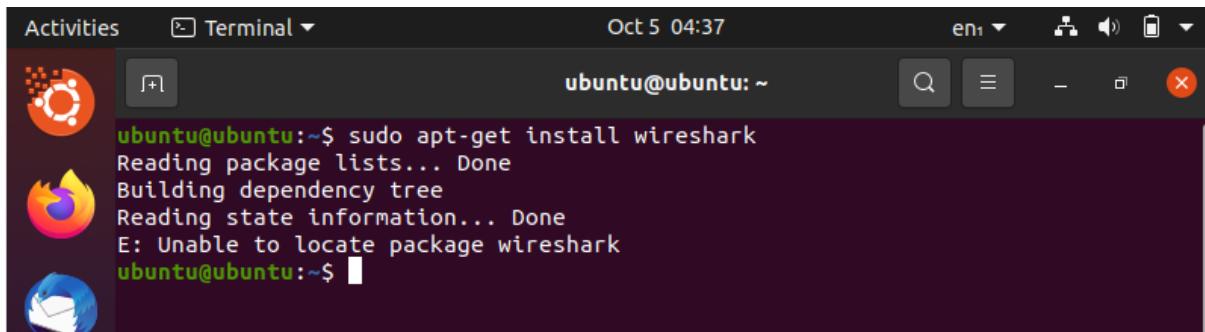
Now in the images tab an image of ubuntu will be displayed, we can run the ubuntu instance usin



Wireshark installation

1. Command:

sudo apt - get install wireshark



```
Activities Terminal Oct 5 04:37
ubuntu@ubuntu:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package wireshark
ubuntu@ubuntu:~$
```

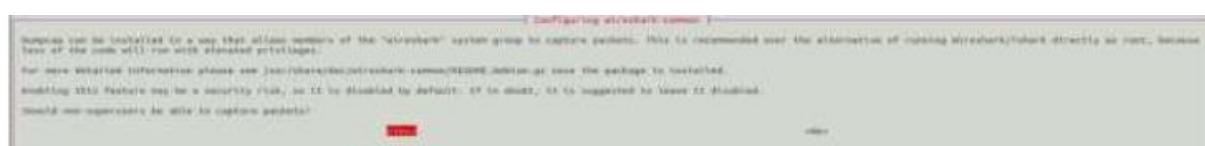
2. Command:

sudo dkpg - reconfigure wireshark - common

```
ubuntu@ubuntu:~$ sudo dkpg-reconfigure wireshark -common
```

3. Command:

Select Yes and press enter



4. Open wireshark from the applist

