

**SUBJECT CODE : 20MCA136**

**NETWORKING AND SYSTEM ADMINISTRATION  
LAB\_RECORD**

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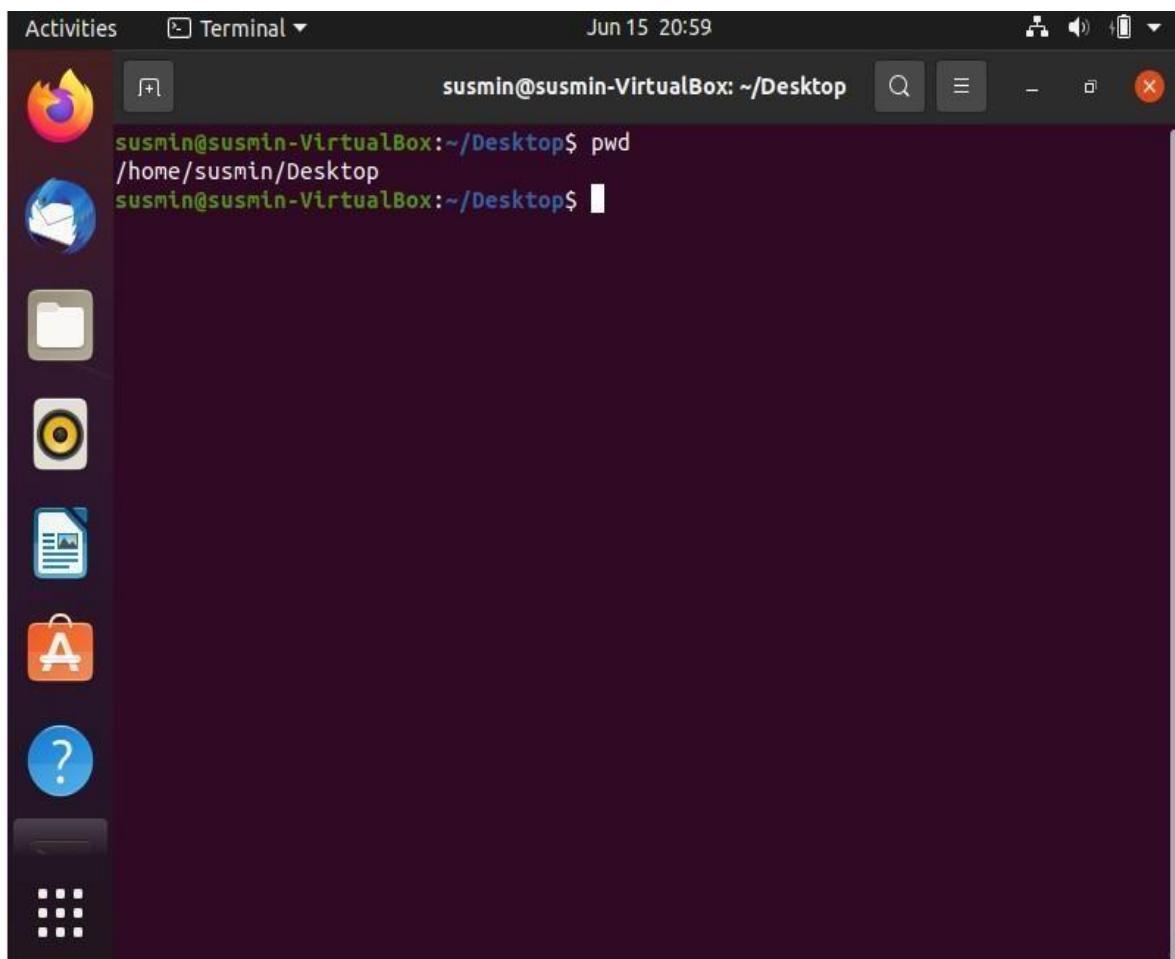
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## **BASIC LINUX COMMANDS PART-1**

### 1. pwd (Print Working Directory)

- Use the pwd command to find out the path of the current working directory (folder) you're in.
- The command will return an absolute (full) path, which is basically a path of all the directories that starts with a forward slash (/).

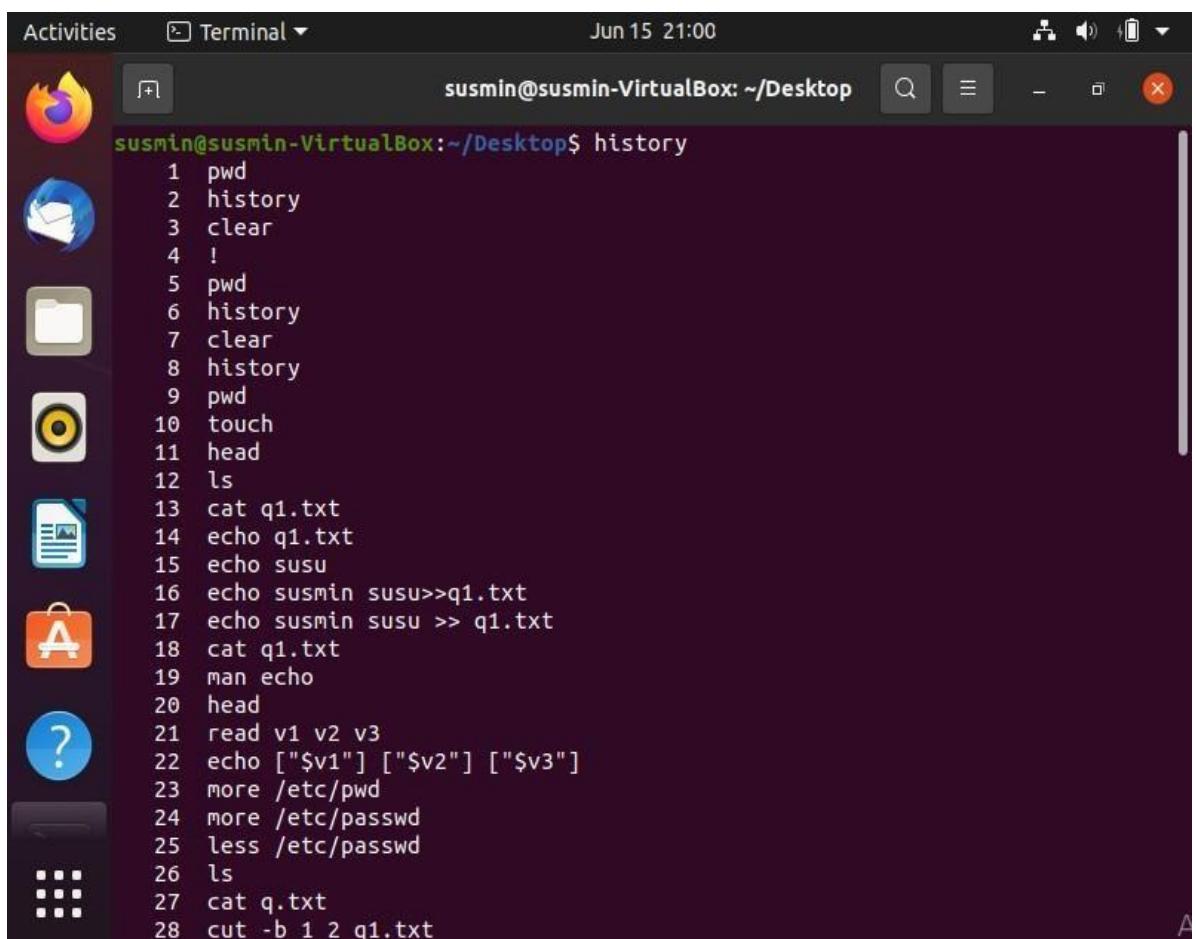


The screenshot shows a Linux desktop environment with a dark theme. On the left, there's a vertical dock containing icons for various applications: a browser (Firefox), a file manager, a terminal, a file browser, a media player, a document viewer, a file editor, and a help icon. The main area is a terminal window titled "Terminal". The terminal shows the following command-line session:

```
susmin@susmin-VirtualBox:~/Desktop$ pwd
/home/susmin/Desktop
susmin@susmin-VirtualBox:~/Desktop$
```

## 2. history

- When you have been using Linux for a certain period of time, you will quickly notice that you can run hundreds of commands every day. As such, running history command is particularly useful if you want to review the commands you have entered before.
  - #history
  - !command number to run a command from history

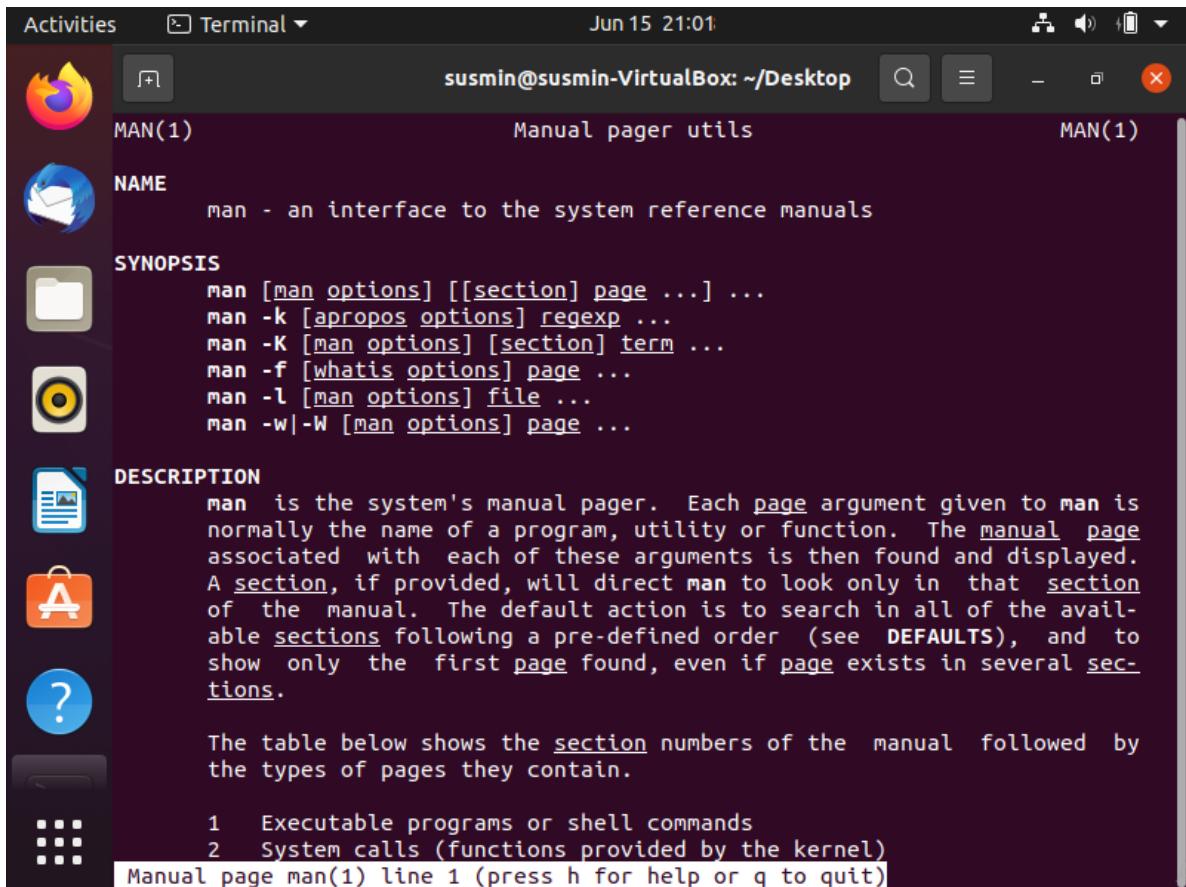


The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the command prompt is "susmin@susmin-VirtualBox: ~/Desktop\$". The window displays the output of the "history" command, which lists 28 previous commands. The commands include basic shell utilities like pwd, history, clear, touch, head, ls, cat, echo, and more, along with some file operations and command substitutions.

```
susmin@susmin-VirtualBox:~/Desktop$ history
 1  pwd
 2  history
 3  clear
 4  !
 5  pwd
 6  history
 7  clear
 8  history
 9  pwd
10  touch
11  head
12  ls
13  cat q1.txt
14  echo q1.txt
15  echo susu
16  echo susmin susu>>q1.txt
17  echo susmin susu >> q1.txt
18  cat q1.txt
19  man echo
20  head
21  read v1 v2 v3
22  echo ["$v1"] ["$v2"] ["$v3"]
23  more /etc/pwd
24  more /etc/passwd
25  less /etc/passwd
26  ls
27  cat q.txt
28  cut -b 1 2 q1.txt
```

### 3. man

- We can easily learn how to use them right from Linux's shell by using the man command.
- For instance, entering man tail will show the manual instruction of the tail command.
- Use the command: man to start learning about man utility.
- The man page (short for manual page) includes a command description, applicable options, flags, examples, and other informative sections.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal title is "Terminal" and the prompt is "susmin@susmin-VirtualBox: ~/Desktop". The terminal content displays the man page for the "man" command. The page includes sections for NAME, SYNOPSIS, and DESCRIPTION, along with usage examples and a note about section numbers. The terminal window has a dark background and light-colored text. A vertical scroll bar is visible on the right side of the terminal window.

```

Activities Terminal ▾ Jun 15 21:01
susmin@susmin-VirtualBox: ~/Desktop
MAN(1) Manual pager utils MAN(1)

NAME
      man - an interface to the system reference manuals

SYNOPSIS
      man [man options] [[section] page ...]
      man -k [apropos options] regexp ...
      man -K [man options] [section] term ...
      man -f [whatis options] page ...
      man -l [man options] file ...
      man -w|-W [man options] page ...

DESCRIPTION
      man  is the system's manual pager.  Each page argument given to man is
      normally the name of a program, utility or function.  The manual page
      associated with each of these arguments is then found and displayed.
      A section, if provided, will direct man to look only in that section
      of the manual.  The default action is to search in all of the available
      sections following a pre-defined order (see DEFAULTS), and to
      show only the first page found, even if page exists in several sections.

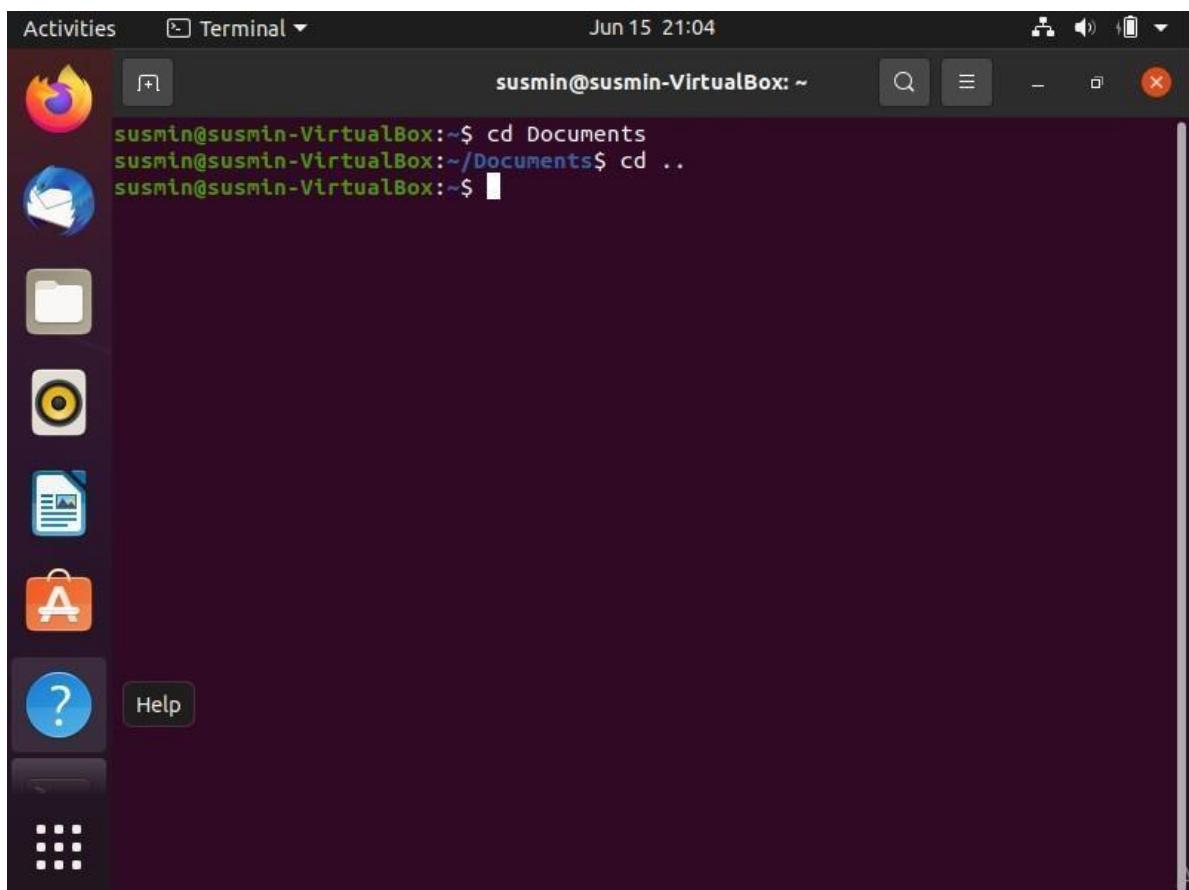
      The table below shows the section numbers of the manual followed by
      the types of pages they contain.

      1 Executable programs or shell commands
      2 System calls (functions provided by the kernel)
      Manual page man(1) line 1 (press h for help or q to quit)

```

#### 4. cd

- To navigate through the Linux files and directories, use the cd
- It requires either the full path or the name of the directory, depending on the current working directory that you're in.
- Let's say you're in /home/username/Documents and you want to go to Photos, a subdirectory of Documents. To do so, simply type the following command: cd Photos.
- Another scenario is if you want to switch to a completely new directory, for example,/home/username/Movies. In this case, you have to type cd followed by the directory's absolute path: cd /home/username/Movies.
- Shortcuts to help you navigate quickly:
  - cd .. (with two dots) to move one directory up
  - cd to go straight to the home folder
  - cd- (with a hyphen) to move to your previous directory.



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, email, file manager, terminal, system settings, and help. The main window is a terminal window titled "Terminal". The terminal shows the following command-line session:

```
susmin@susmin-VirtualBox:~$ cd Documents
susmin@susmin-VirtualBox:~/Documents$ cd ..
susmin@susmin-VirtualBox:~$
```

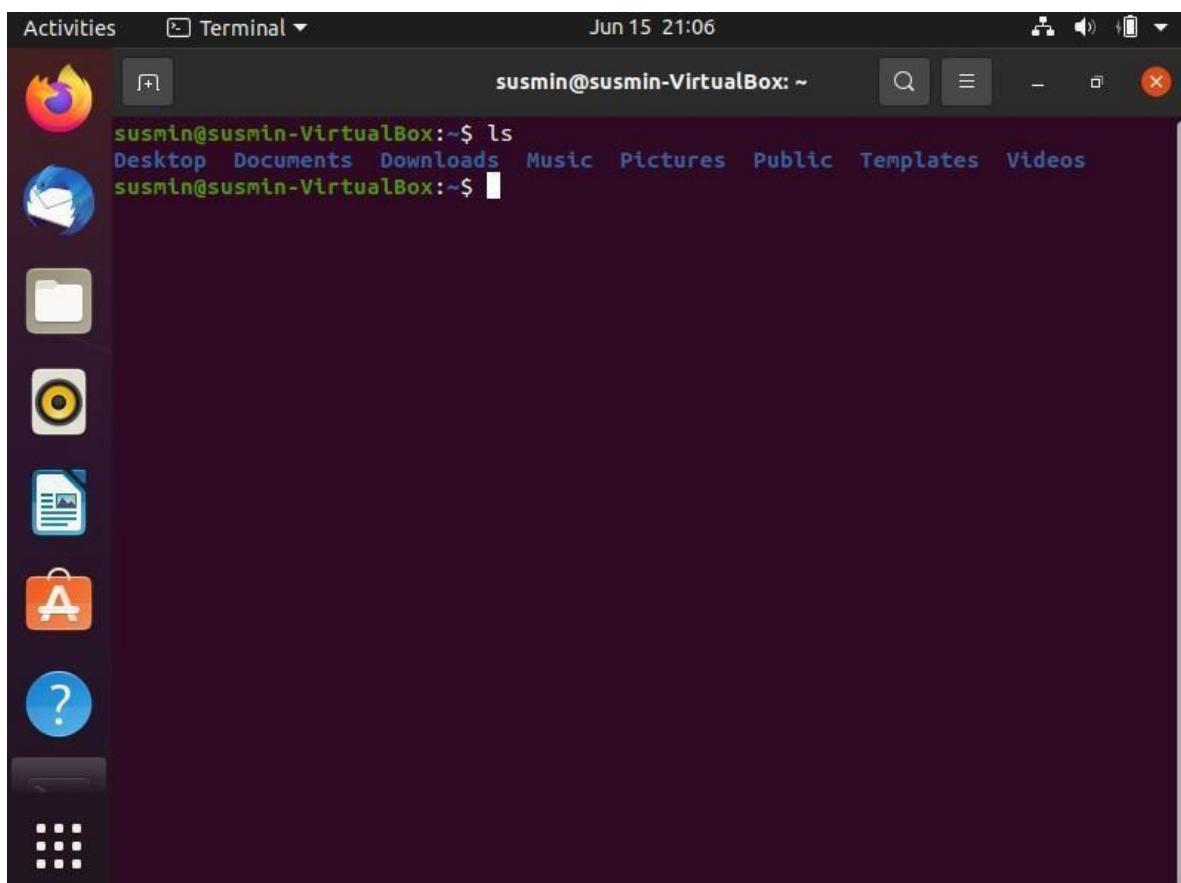
## 5. ls

- The ls command is used to view the contents of a directory. By default, this command will display the contents of your current working directory.

If you want to see the content of other directories, type ls and then the directory's path.

There are variations you can use with the ls command:

- ls -R will list all the files in the sub-directories as well
- ls -l – long listing
- ls -a will show the hidden files
- ls -al will list the files and directories with detailed information like the permissions, size, owner, etc.
- ls -t lists files sorted in the order of “last modified”.
- ls -r option will reverse the natural sorting order. Usually used in combination with other switches such as ls -tr.

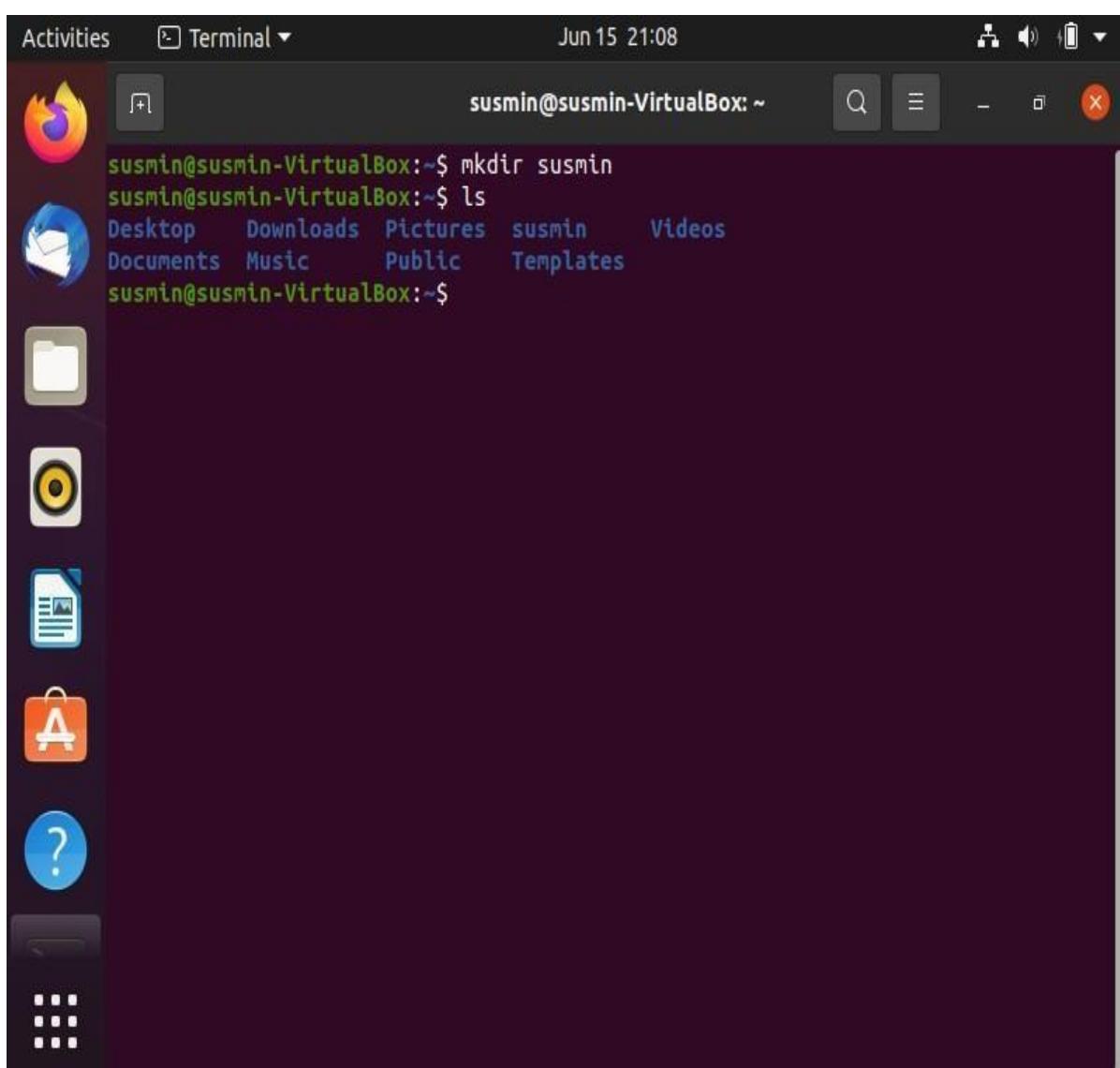


A screenshot of a Linux desktop environment. On the left, there is a vertical dock with icons for various applications: a browser (Firefox), a file manager (Nautilus), a terminal (Konsole), a file viewer (KDE File Manager), a text editor (Kate), a file manager (Thunar), and a help center (KHelpCenter). The main window is a terminal window titled "Terminal". The title bar also shows the date and time: "Jun 15 21:06". The terminal window displays the following command and output:  
susmin@susmin-VirtualBox:~\$ ls  
Desktop Documents Downloads Music Pictures Public Templates Videos  
susmin@susmin-VirtualBox:~\$ █

## 6. mkdir

- Use mkdir command to make a new directory — if you type mkdir Music it will create a directory called Music.
- To generate a new directory inside another directory, use this Linux basic command  
mkdir Music/Newfile
- Use the p (parents) option to create a directory in between two existing directories.

For example, mkdir -p Music/2020/Newfile will create the new “2020” file.

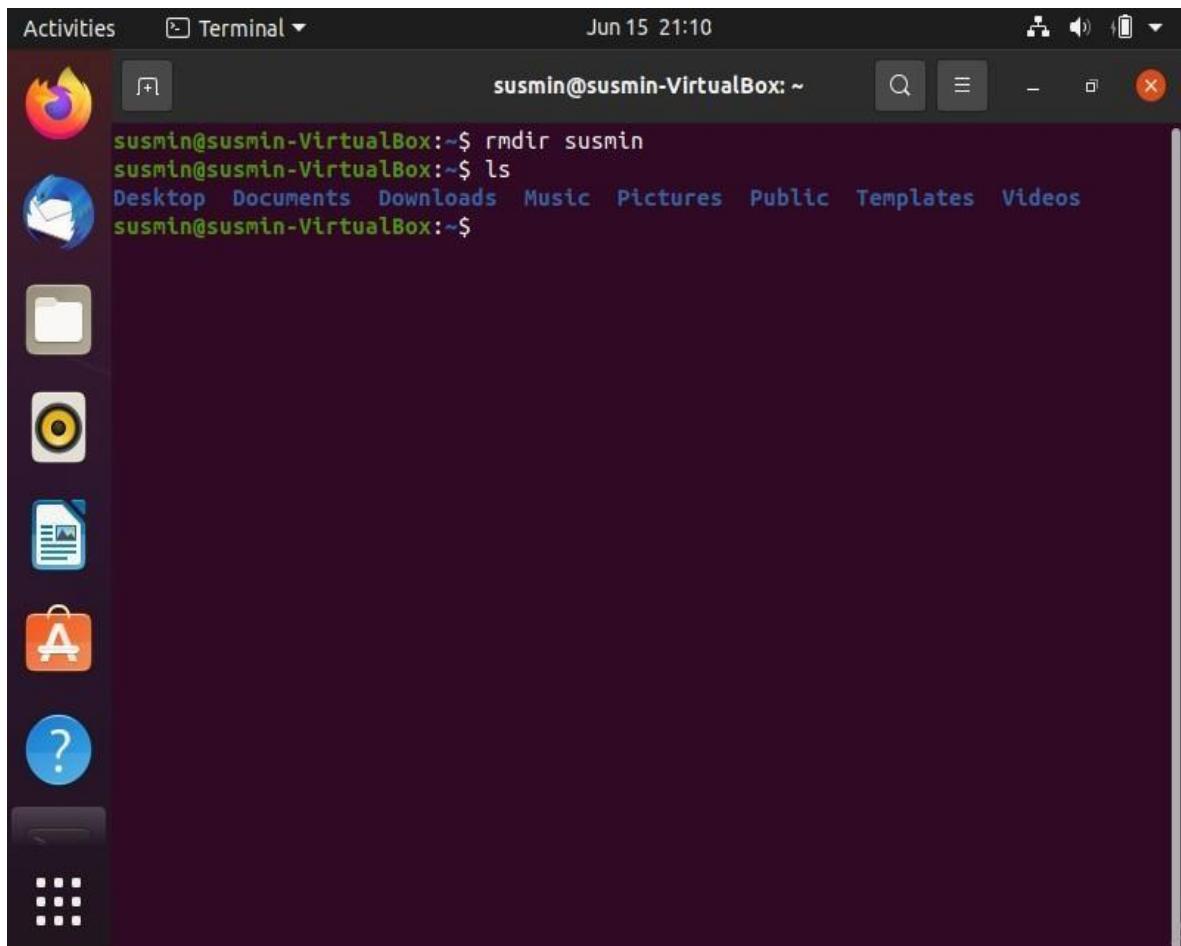


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for the Dash, Home, Applications, and Help. The main area is a terminal window titled "Terminal". The terminal output is as follows:

```
susmin@susmin-VirtualBox:~$ mkdir susmin
susmin@susmin-VirtualBox:~$ ls
Desktop  Downloads  Pictures  susmin  Videos
Documents  Music    Public    Templates
susmin@susmin-VirtualBox:~$
```

## 7. rmdir

- If you need to delete a directory, use the rmdir command. However, rmdir only allows you to delete empty directories.

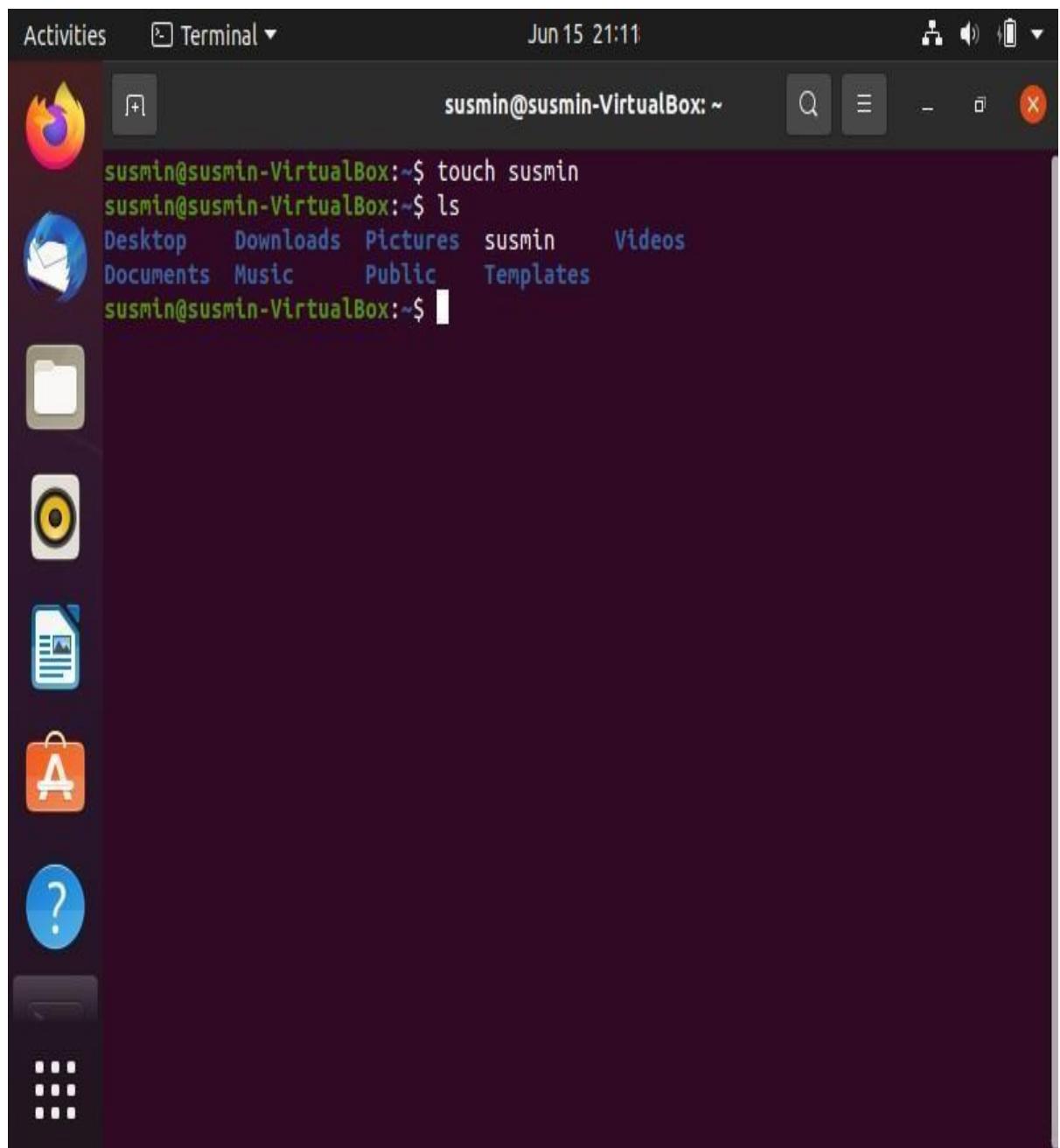


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, file manager, terminal, system settings, and help. The main window is a terminal titled "Terminal". The terminal window has a dark background with light-colored text. It displays the following command-line session:

```
susmin@susmin-VirtualBox:~$ rmdir susmin
susmin@susmin-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
susmin@susmin-VirtualBox:~$
```

## 8. touch

- The touch command allows you to create a blank new file through the Linux command line.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled 'Terminal' and has the date and time 'Jun 15 21:11' at the top right. The user 'susmin' is logged in at the prompt 'susmin@susmin-VirtualBox:~\$'. The user runs the command 'touch susmin' followed by 'ls' to list files. The terminal shows the following output:

```
susmin@susmin-VirtualBox:~$ touch susmin
susmin@susmin-VirtualBox:~$ ls
Desktop  Downloads  Pictures  susmin  Videos
Documents  Music    Public    Templates
susmin@susmin-VirtualBox:~$
```

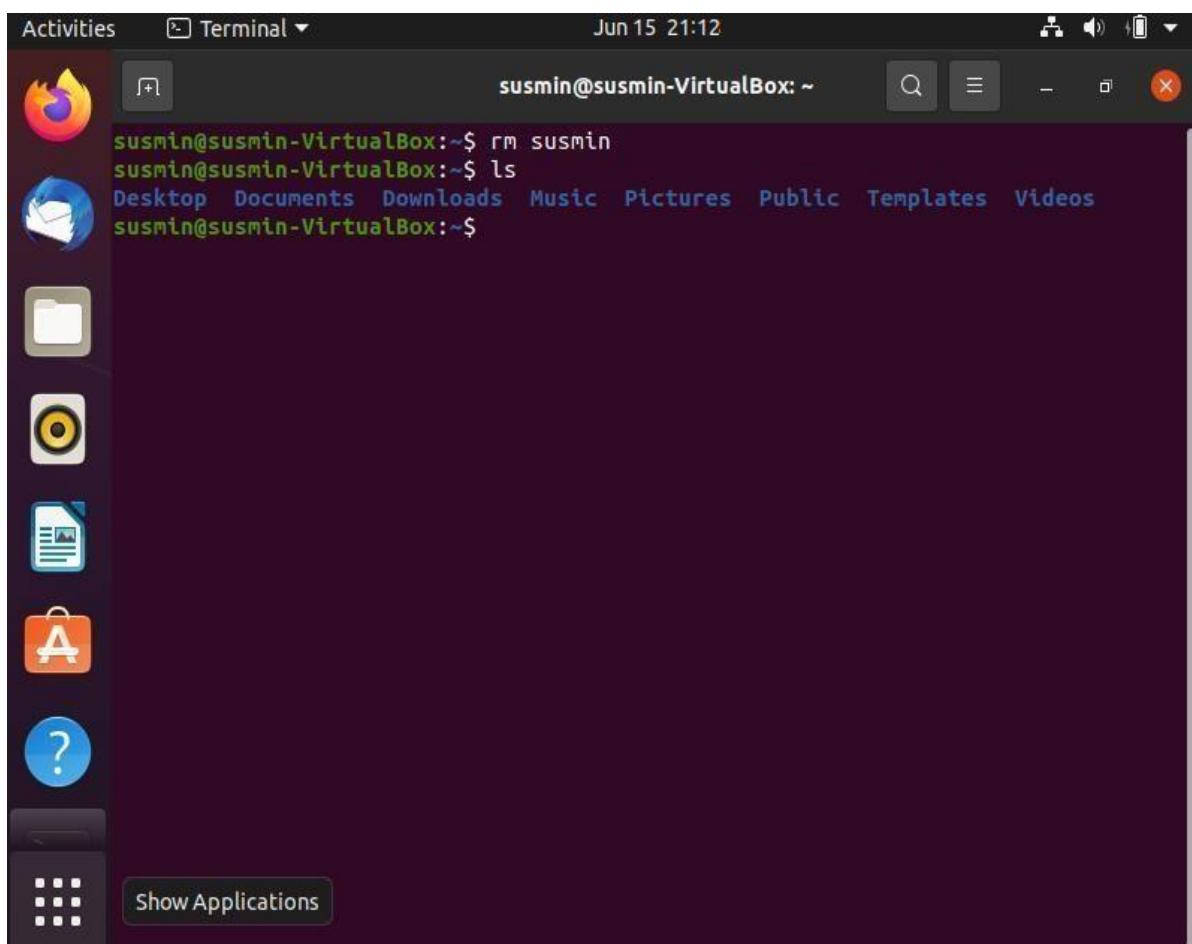
The desktop interface includes a dock on the left with icons for the Dash, Home, Applications, and Help. The desktop background is dark grey.

## 9. rm

- The rm command is used to delete directories and the contents within them.

If you only want to delete the directory — as an alternative to rmdir — use rm -r.

To remove a file use : rm filename



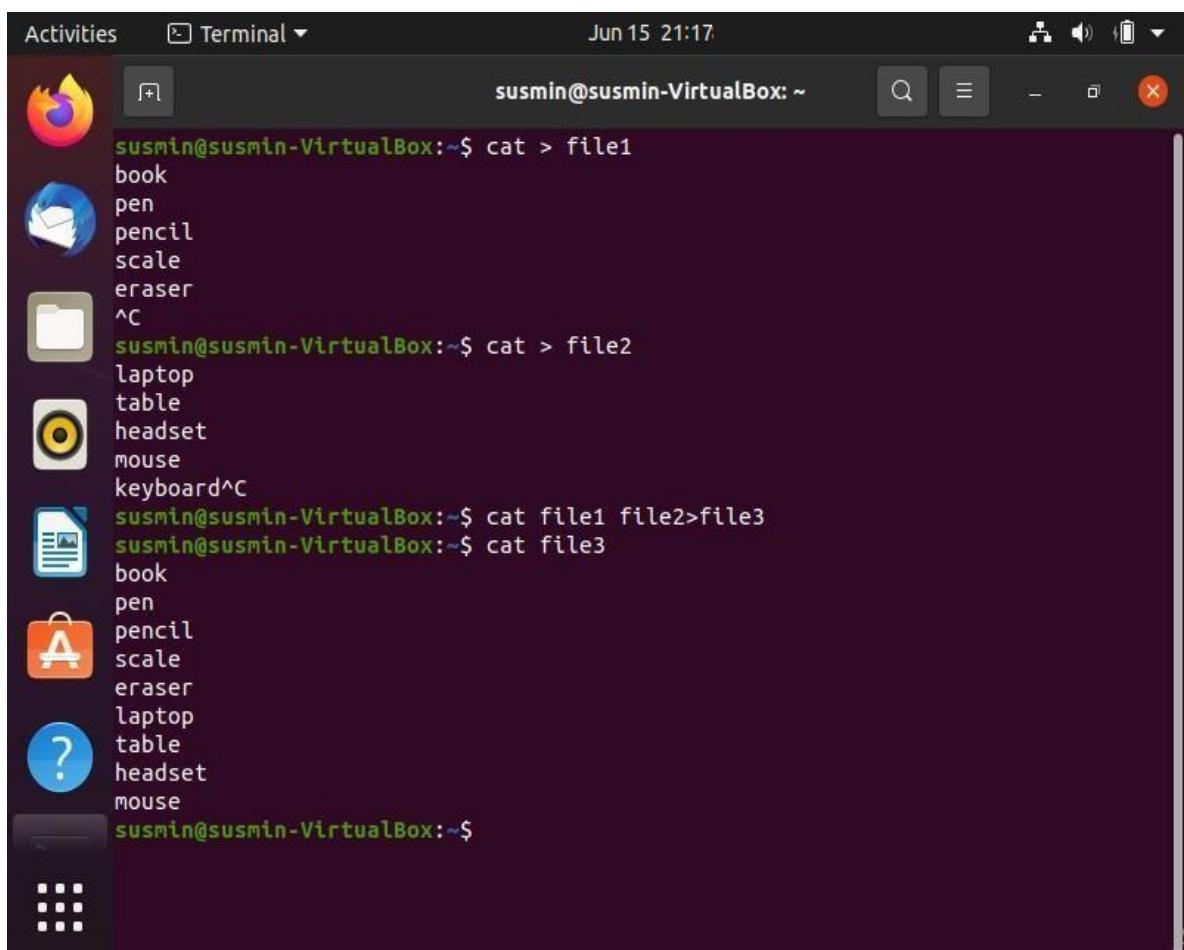
A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled 'Terminal' and has the command history:

```
susmin@susmin-VirtualBox:~$ rm susmin
susmin@susmin-VirtualBox:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
susmin@susmin-VirtualBox:~$
```

The desktop interface includes a dock on the left with icons for various applications like a browser, file manager, terminal, and system settings. A 'Show Applications' button is also visible at the bottom of the dock.

## 10. cat

- cat (short for concatenate) is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output stdout .
- To run this command, type cat followed by the file's name and its extension. For instance: cat file.txt.
- Here are other ways to use the cat command:
- cat > filename creates a new file
- cat filename1 filename2>filename3 joins two files (1 and 2) and stores the output of them in a new file (3)
- To convert a file to upper or lower case use, cat filename |tr a-z A-Z >output.txt
- cat >>myfile insert data to a file.



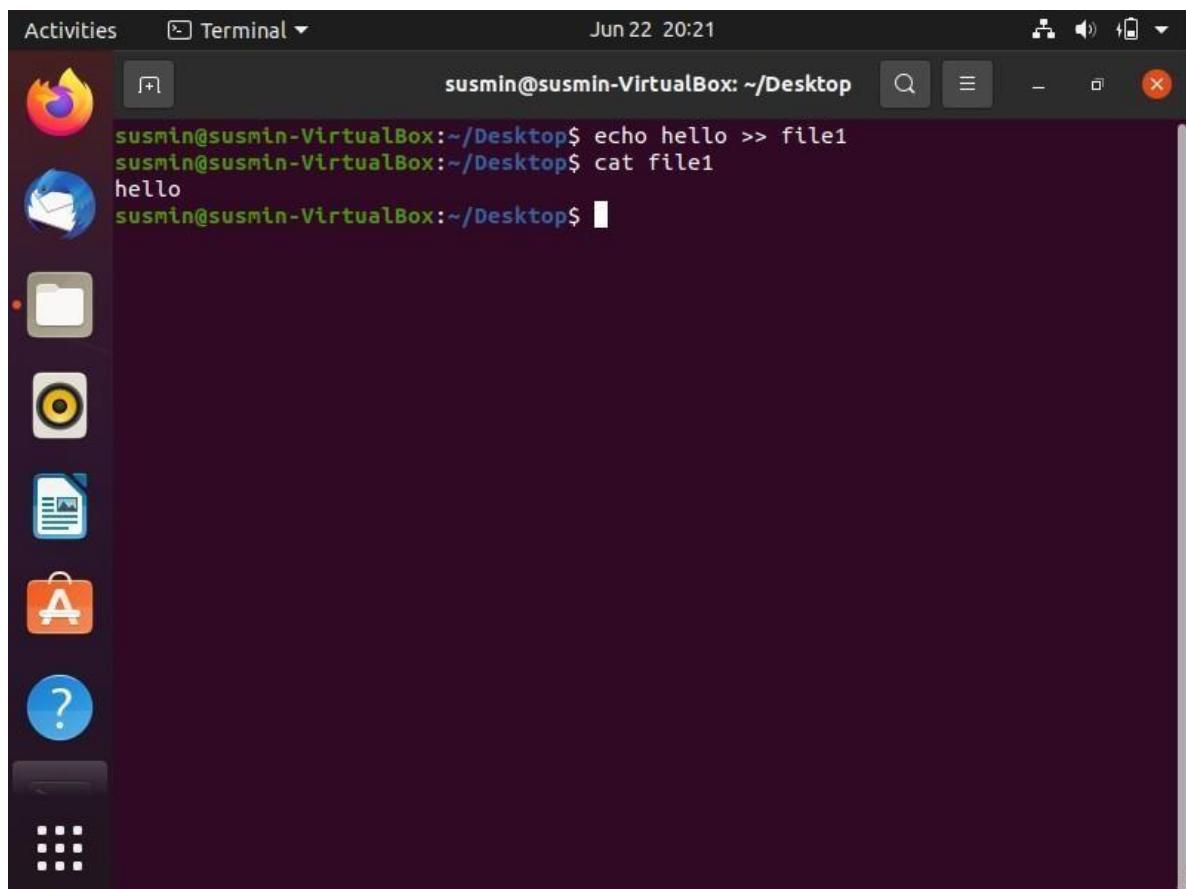
The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal". The terminal content shows the following sequence of commands and their outputs:

```
susmin@susmin-VirtualBox:~$ cat > file1
book
pen
pencil
scale
eraser
^C
susmin@susmin-VirtualBox:~$ cat > file2
laptop
table
headset
mouse
keyboard^C
susmin@susmin-VirtualBox:~$ cat file1 file2>file3
susmin@susmin-VirtualBox:~$ cat file3
book
pen
pencil
scale
eraser
laptop
table
headset
mouse
susmin@susmin-VirtualBox:~$
```

## **BASIC LINUX COMMANDS PART-2**

### **1. echo**

- echo command is used to move some data into a file.
- If you want to add the text, “Hello, my name is John” into a file called name.txt, you would type echo Hello, my name is John >> name.txt

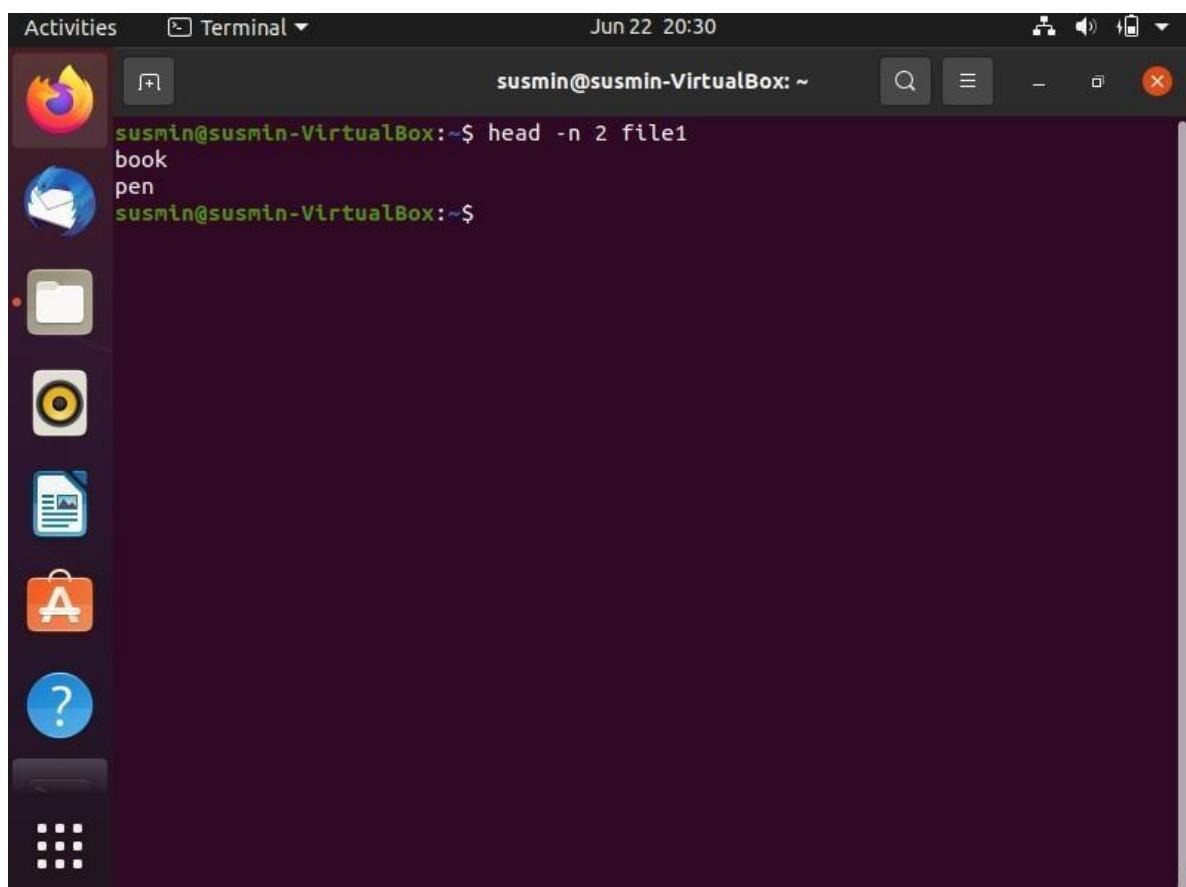


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, a file manager, a terminal, a file viewer, a package manager, and help/FAQ. The main window is a terminal titled "Terminal". The terminal window has a dark background and light-colored text. It displays the following command-line session:

```
susmin@susmin-VirtualBox:~/Desktop$ echo hello >> file1
susmin@susmin-VirtualBox:~/Desktop$ cat file1
hello
susmin@susmin-VirtualBox:~/Desktop$
```

## 2. head

- The head command is used to view the first lines of any text file.
- By default, it will show the first ten lines, but you can change this number to your liking.
- If you only want to show the first five lines, type head -n 5 filename.txt

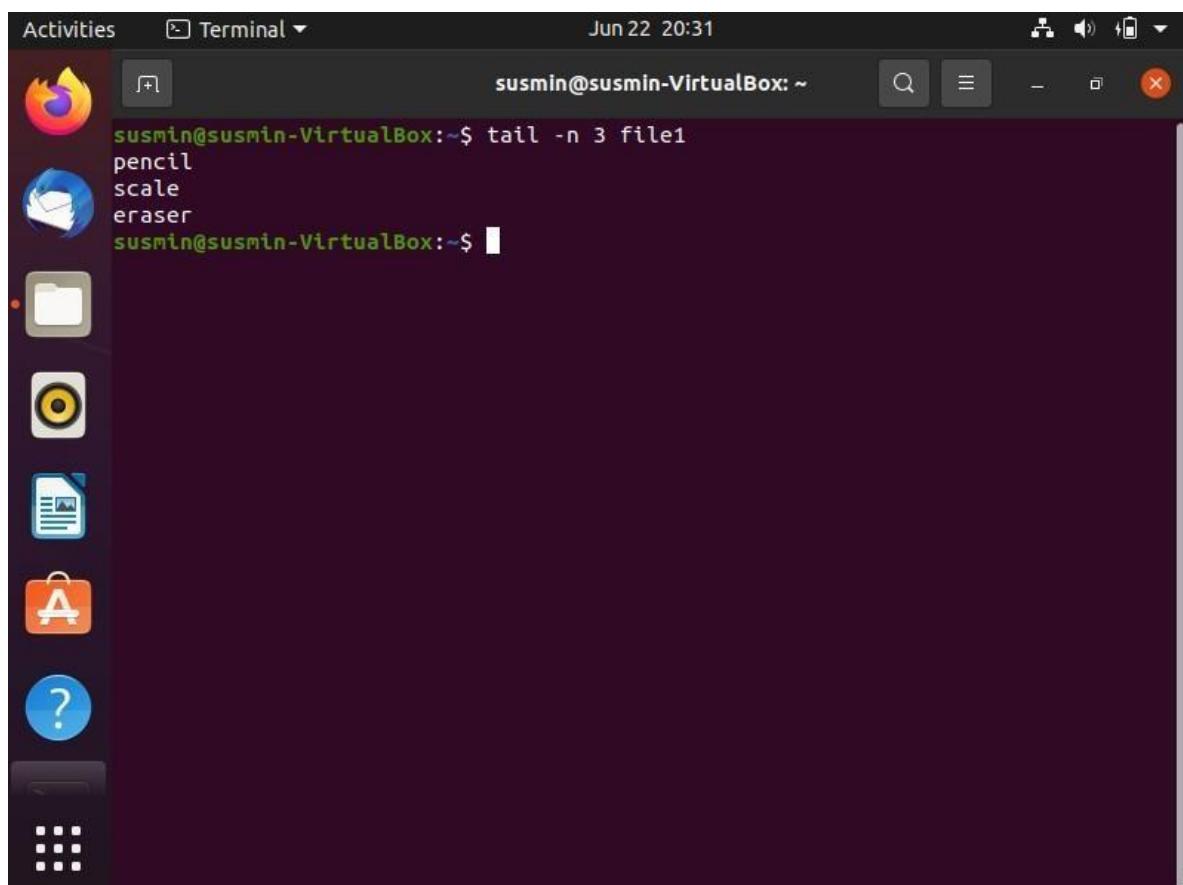


A screenshot of a Linux desktop environment. On the left is a vertical dock with icons for various applications: a browser (Firefox), a file manager, a terminal, a file browser, a system settings icon, a help icon, and a dash icon. The main window is a terminal window titled "Terminal". The terminal shows the command "head -n 2 file1" being run, followed by the output "book" and "pen". The terminal window has a dark background and light-colored text. The desktop background is also dark.

```
susmin@susmin-VirtualBox:~$ head -n 2 file1
book
pen
susmin@susmin-VirtualBox:~$
```

### 3. tail

- This one has a similar function to the head command, but instead of showing the first lines, the tail command will display the last ten lines of a text file.
- tail -n filename.txt

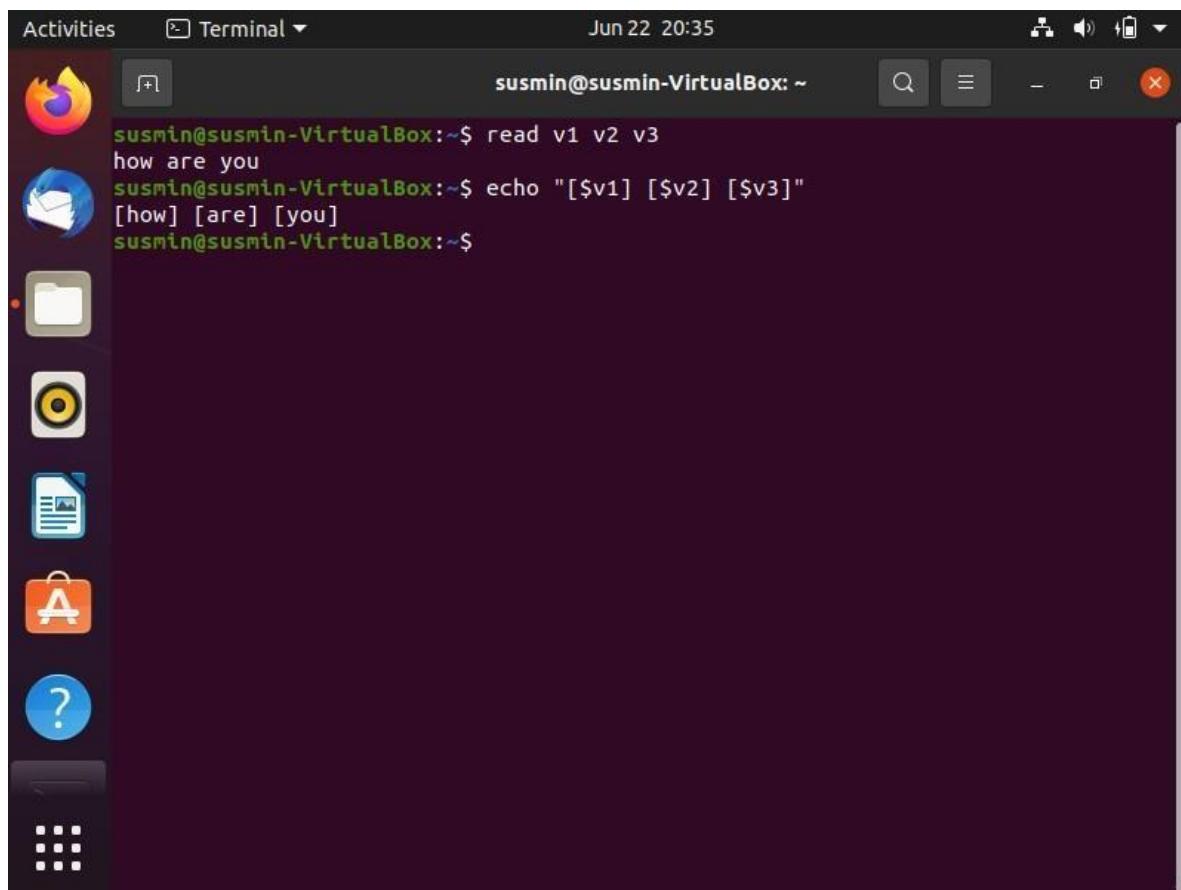


A screenshot of a Linux desktop environment. On the left is a dock with icons for various applications: a browser, a text editor, a file manager, a terminal, a file browser, a system settings icon, a help icon, and a terminal icon. The main window is a terminal window titled "Terminal". The terminal shows the command "tail -n 3 file1" being run, and the output is "pencil", "scale", and "eraser". The terminal window has a dark background and light-colored text. The desktop background is also dark.

```
susmin@susmin-VirtualBox:~$ tail -n 3 file1
pencil
scale
eraser
susmin@susmin-VirtualBox:~$
```

#### 4. read

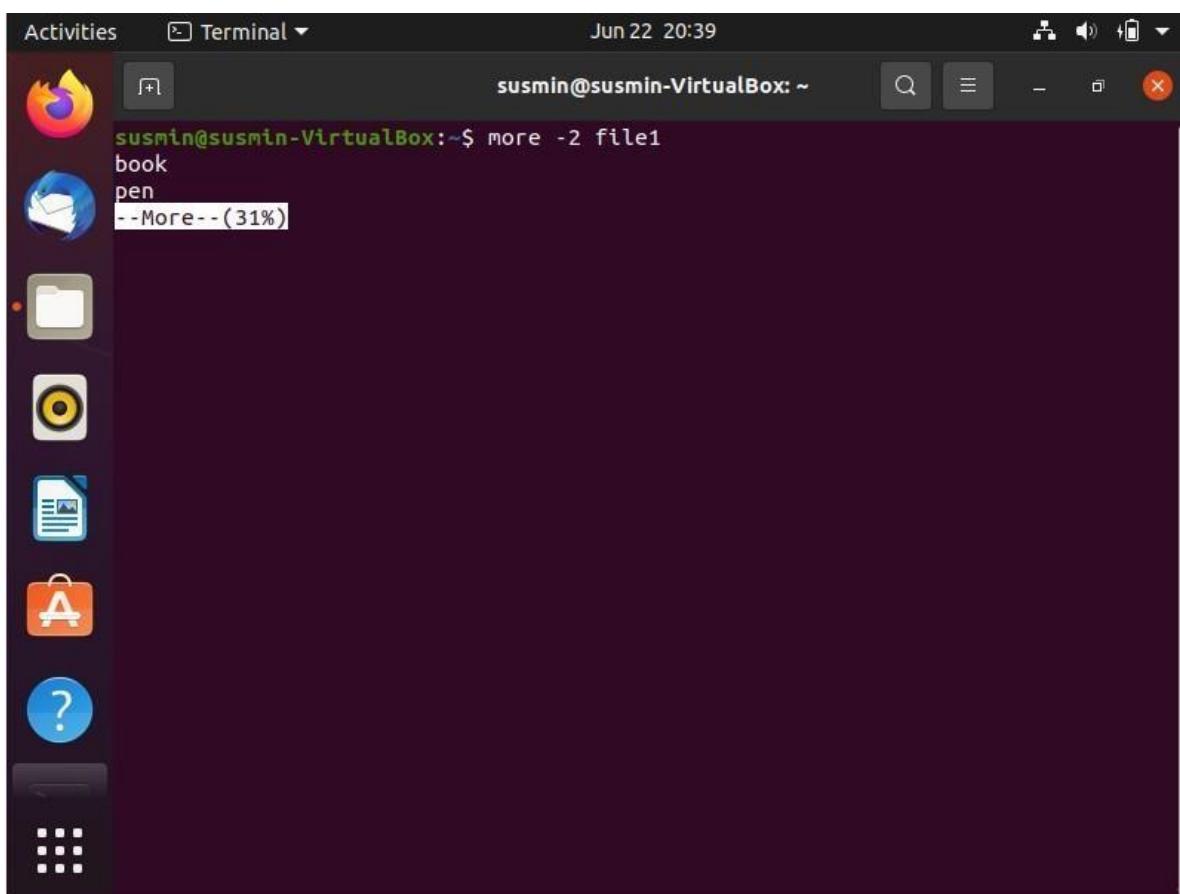
- read the contents of a line into a variable.
- The read command can be used with and without arguments
- read command is used to read [options] [name...]
- \$read
- \$read var1 var2 var3
- \$echo "[\${var1}] [\${var2}] [\${var3}]"



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser (Firefox), file manager, terminal, file browser, dash, system settings, and a help icon. The main window is a terminal window titled "Terminal". The terminal window has a dark background and light-colored text. It displays the following command and output:  
susmin@susmin-VirtualBox:~\$ read v1 v2 v3  
how are you  
susmin@susmin-VirtualBox:~\$ echo "[\${v1}] [\${v2}] [\${v3}]"  
[how] [are] [you]  
susmin@susmin-VirtualBox:~\$

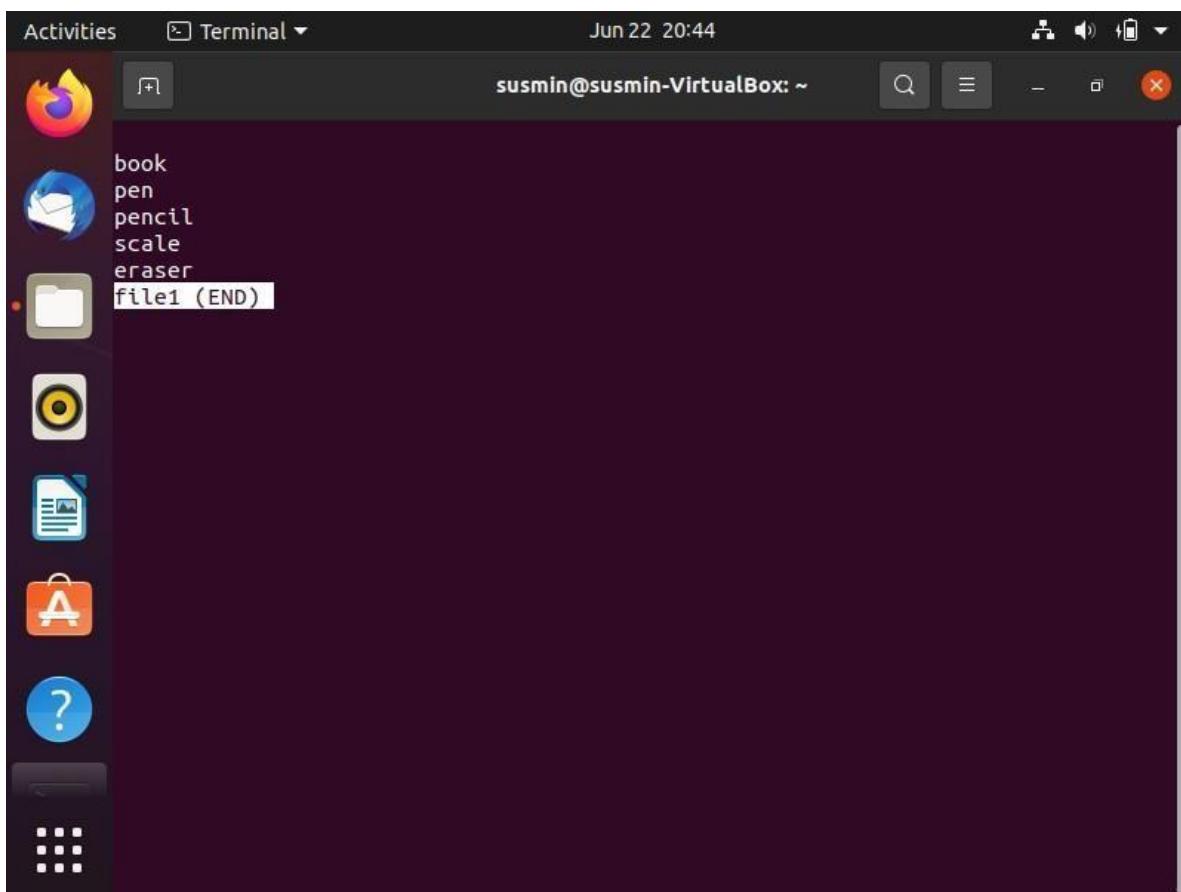
## 5. more

- Like cat command, more command displays the content of a file. Only difference is that, in case of larger files, 'cat' command output will scroll off your screen while 'more' command displays output one screenful at a time.
- Enter key: To scroll down page line by line.
- Space bar: To go to next page.
- b key: To go to the backward page.
- / key: Lets you search the string.
- Syntax: more
- more /etc/passwd



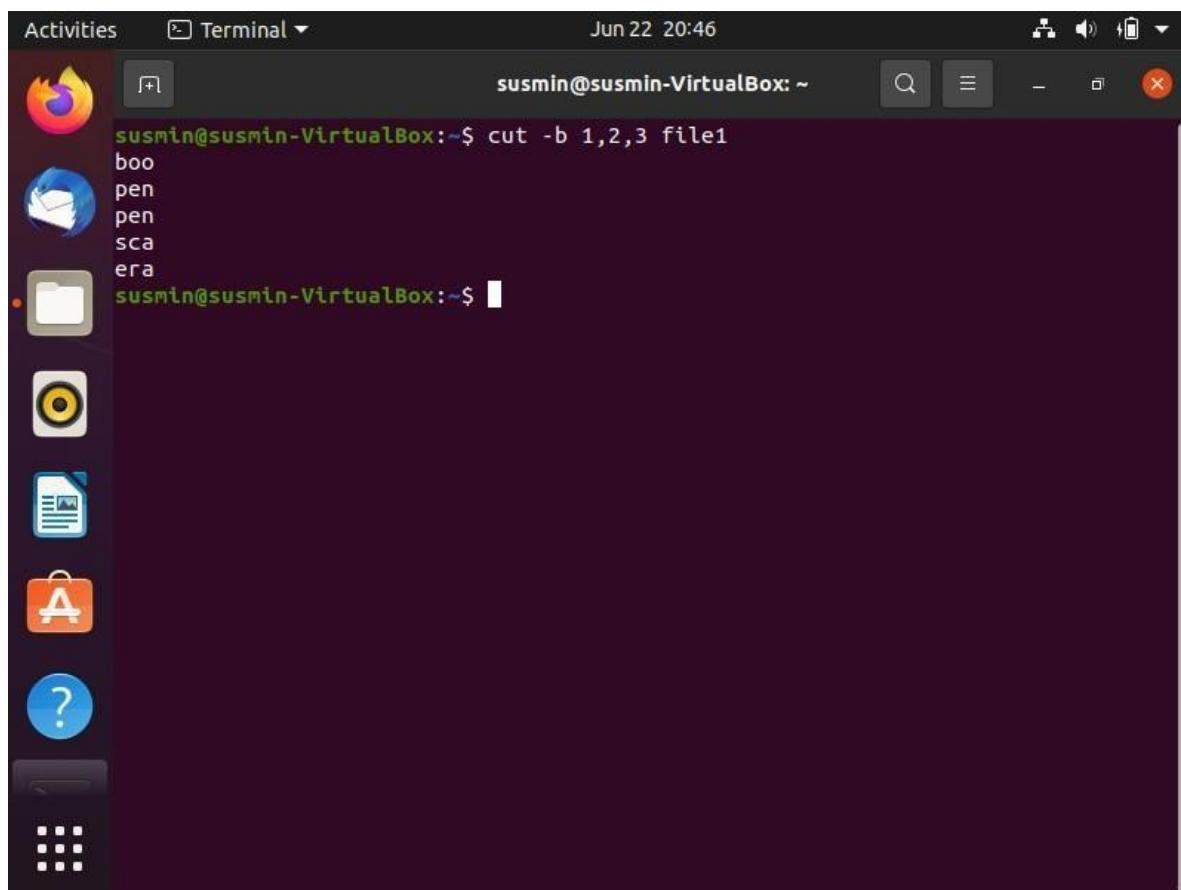
## 6. less

- The 'less' command is same as 'more' command but include some more features.
- It automatically adjust with the width and height of the terminal window, while 'more' command cuts the content as the width of the terminal window get shorter.
- less
- \$less /etc/passwd



## 7. cut

- The cut command is used 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.
- cut OPTION... [FILE]...
- \$cut -b 1,2,3 state.txt

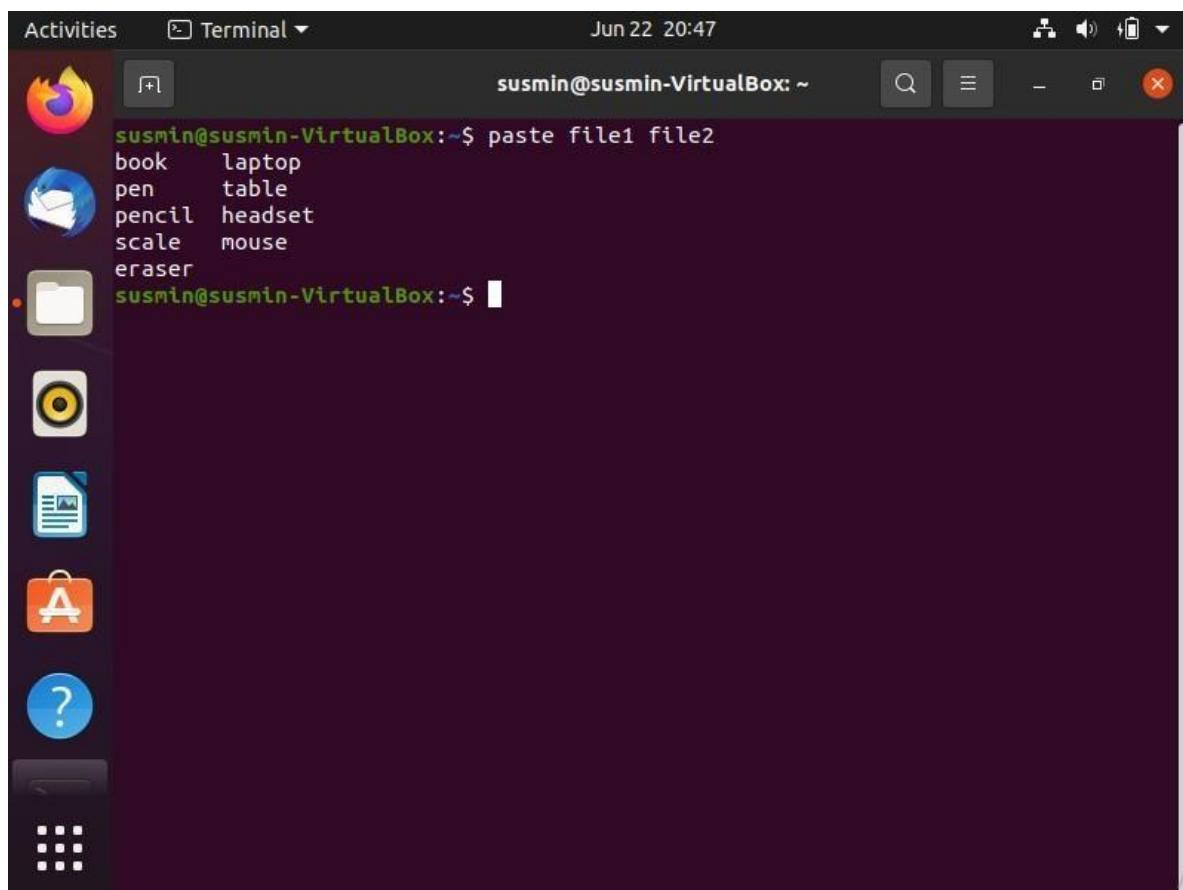


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser (Firefox), messaging (Thunderbird), file manager (Nautilus), system monitor (Gnome System Monitor), terminal (Terminal), and others. The main window is a terminal window titled 'Terminal' with the command 'susmin@susmin-VirtualBox: ~'. The terminal displays the output of the command 'cut -b 1,2,3 file1', which reads:

```
susmin@susmin-VirtualBox:~$ cut -b 1,2,3 file1
boo
pen
pen
sca
era
susmin@susmin-VirtualBox:~$
```

## 8. paste

- 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.
- `paste [OPTION]... [FILES]...`
- `$ paste state.txt capital.txt`



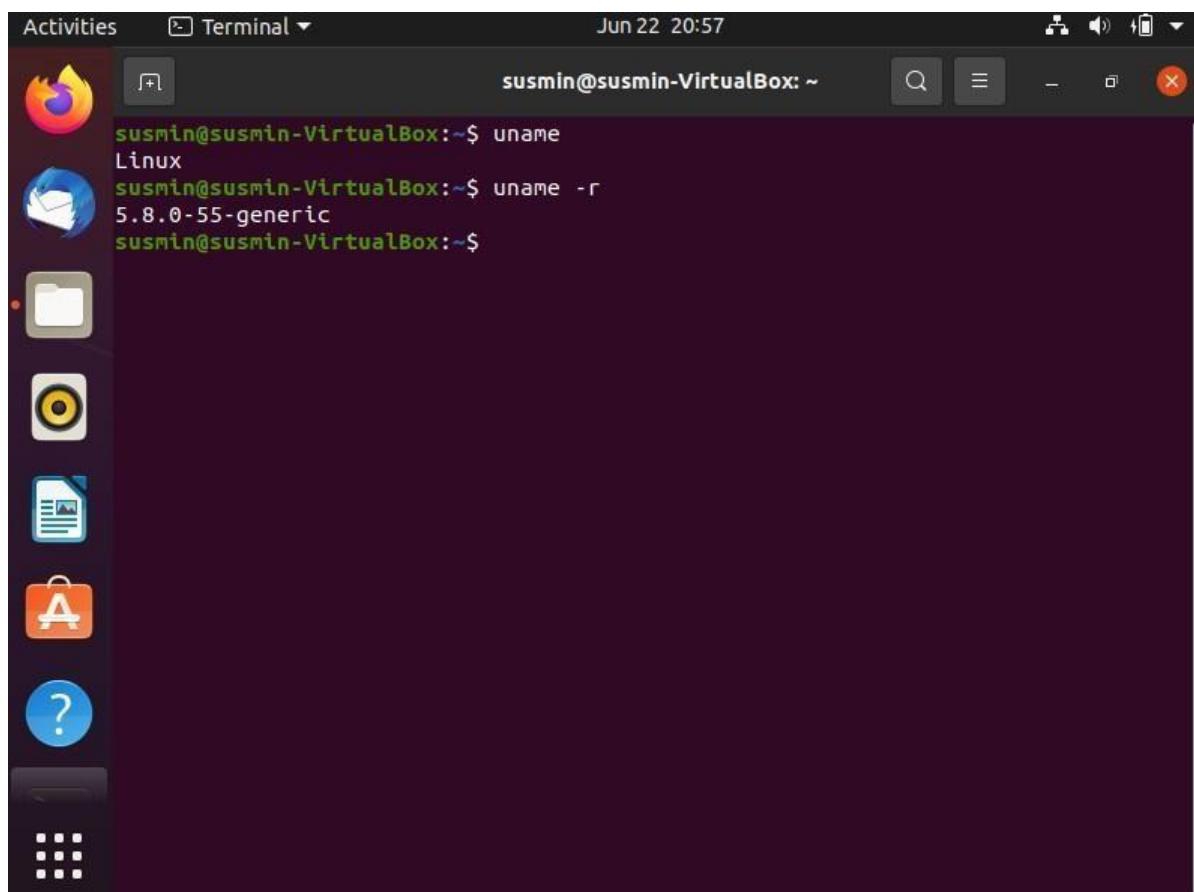
The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser (Firefox), a file manager, a terminal, a file browser, a system settings icon, a help icon, and a terminal icon. The main window is a terminal window titled "Terminal". The terminal window has a dark background and light-colored text. At the top of the terminal window, it says "Activities Terminal Jun 22 20:47 susmin@susmin-VirtualBox: ~". Inside the terminal window, the command `susmin@susmin-VirtualBox:~$ paste file1 file2` is entered, followed by the output:

```
book      laptop
pen       table
pencil    headset
scale     mouse
eraser
```

At the bottom of the terminal window, there is a prompt `susmin@susmin-VirtualBox:~$`.

## 9. uname

- The uname command, short for Unix Name, will print detailed information about your Linux system like the machine name, operating system, kernel, and so on.
- \$uname
- \$uname -r

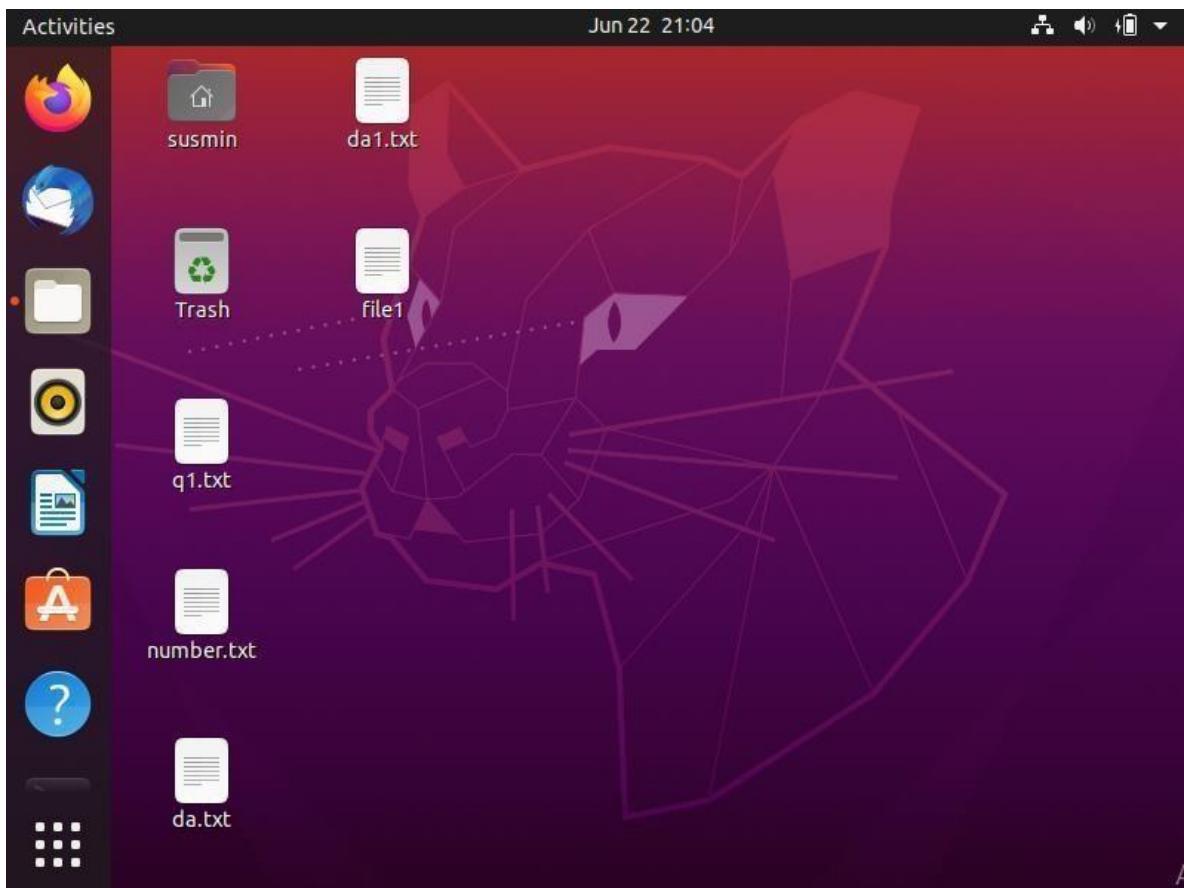


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled "Terminal" and has the command "susmin@susmin-VirtualBox: ~". The user runs the "uname" command, which outputs "Linux", and then runs "uname -r", which outputs "5.8.0-55-generic". The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal, and a vertical activities overview on the left.

```
susmin@susmin-VirtualBox:~$ uname
Linux
susmin@susmin-VirtualBox:~$ uname -r
5.8.0-55-generic
susmin@susmin-VirtualBox:~$
```

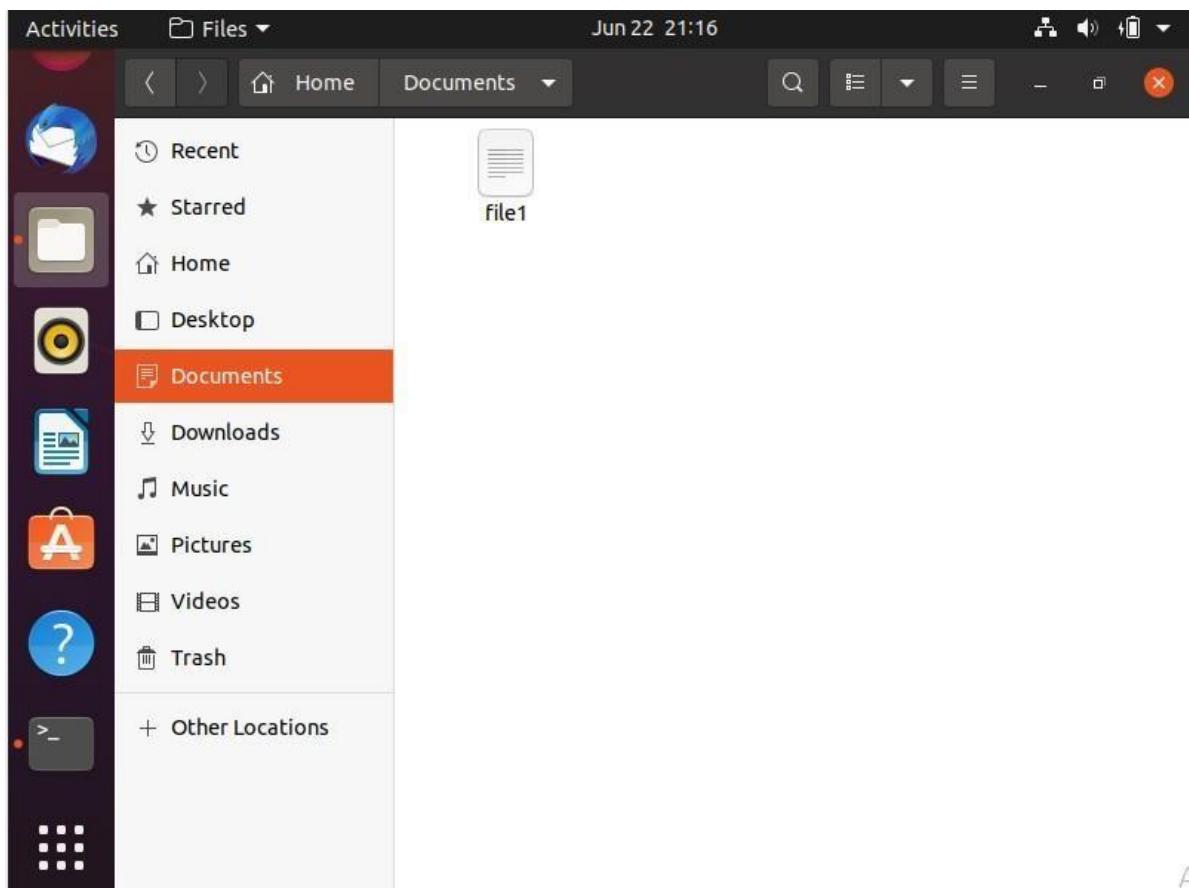
## 10. cp

- cp command is used to copy files from the current directory to a different directory. For instance, the command cp scenery.jpg /home/username/Pictures would create a copy of scenery.jpg (from your current directory) into the Pictures directory.
- cp -i will ask for user's consent in case of a potential file overwrite.
- cp -p will preserve source files' mode, ownership and timestamp.
- cp -r will copy directories recursively.
- cp -u copies files only if the destination file is not existing or the source file is newer than the destination file.



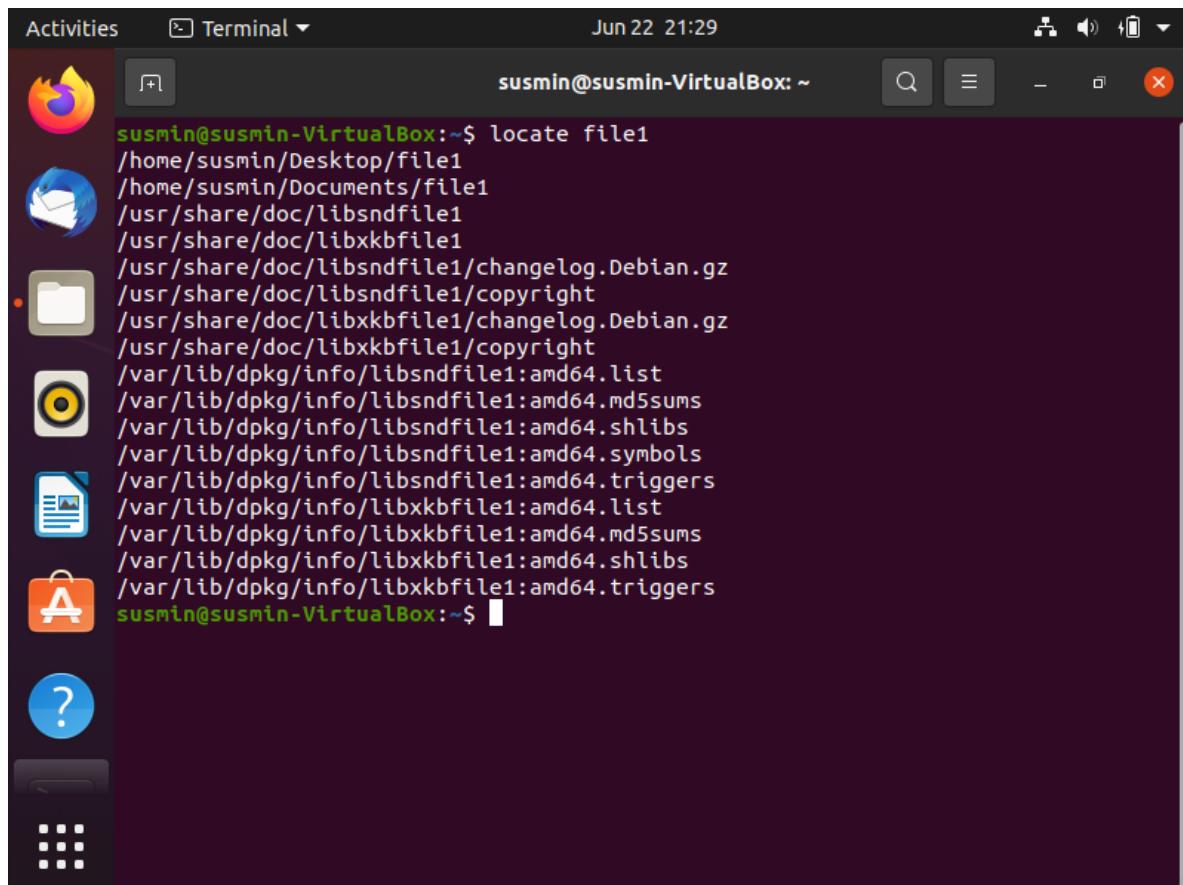
## 11. mv

- The primary use of the mv command is to move files, it can also be used to rename files. The arguments in mv are similar to the cp command. You need to type mv, the file's name, and the destination's directory.
- mv file.txt /home/username/Documents.
- To rename files, the Linux is mv oldname.ext newname.ext



## 12. locate

- To locate a file, just like the search command in Windows.
- To search for a file that contains two or more words, use an asterisk (\*).

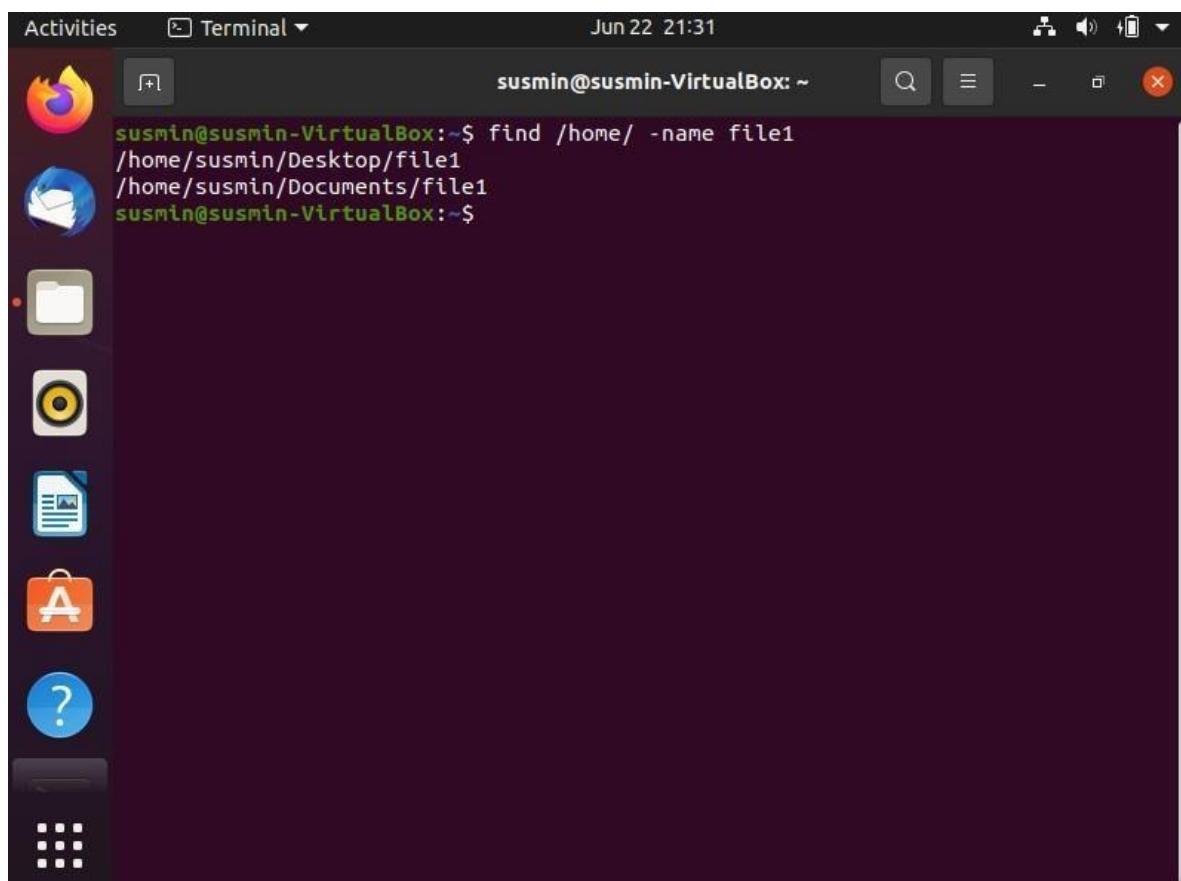


The screenshot shows a Linux desktop interface with a terminal window open. The terminal window title is "Terminal" and the user is "susmin@susmin-VirtualBox". The command "locate file1" has been run, and the output shows multiple paths where "file1" is found. The desktop environment includes a dock with various icons for applications like a browser, file manager, and system tools.

```
susmin@susmin-VirtualBox:~$ locate file1
/home/susmin/Desktop/file1
/home/susmin/Documents/file1
/usr/share/doc/libsndfile1
/usr/share/doc/libxkbfile1
/usr/share/doc/libsndfile1/changelog.Debian.gz
/usr/share/doc/libsndfile1/copyright
/usr/share/doc/libxkbfile1/changelog.Debian.gz
/usr/share/doc/libxkbfile1/copyright
/var/lib/dpkg/info/libsndfile1:amd64.list
/var/lib/dpkg/info/libsndfile1:amd64.md5sums
/var/lib/dpkg/info/libsndfile1:amd64.shlibs
/var/lib/dpkg/info/libsndfile1:amd64.symbols
/var/lib/dpkg/info/libsndfile1:amd64.triggers
/var/lib/dpkg/info/libxkbfile1:amd64.list
/var/lib/dpkg/info/libxkbfile1:amd64.md5sums
/var/lib/dpkg/info/libxkbfile1:amd64.shlibs
/var/lib/dpkg/info/libxkbfile1:amd64.triggers
susmin@susmin-VirtualBox:~$
```

### 13. find

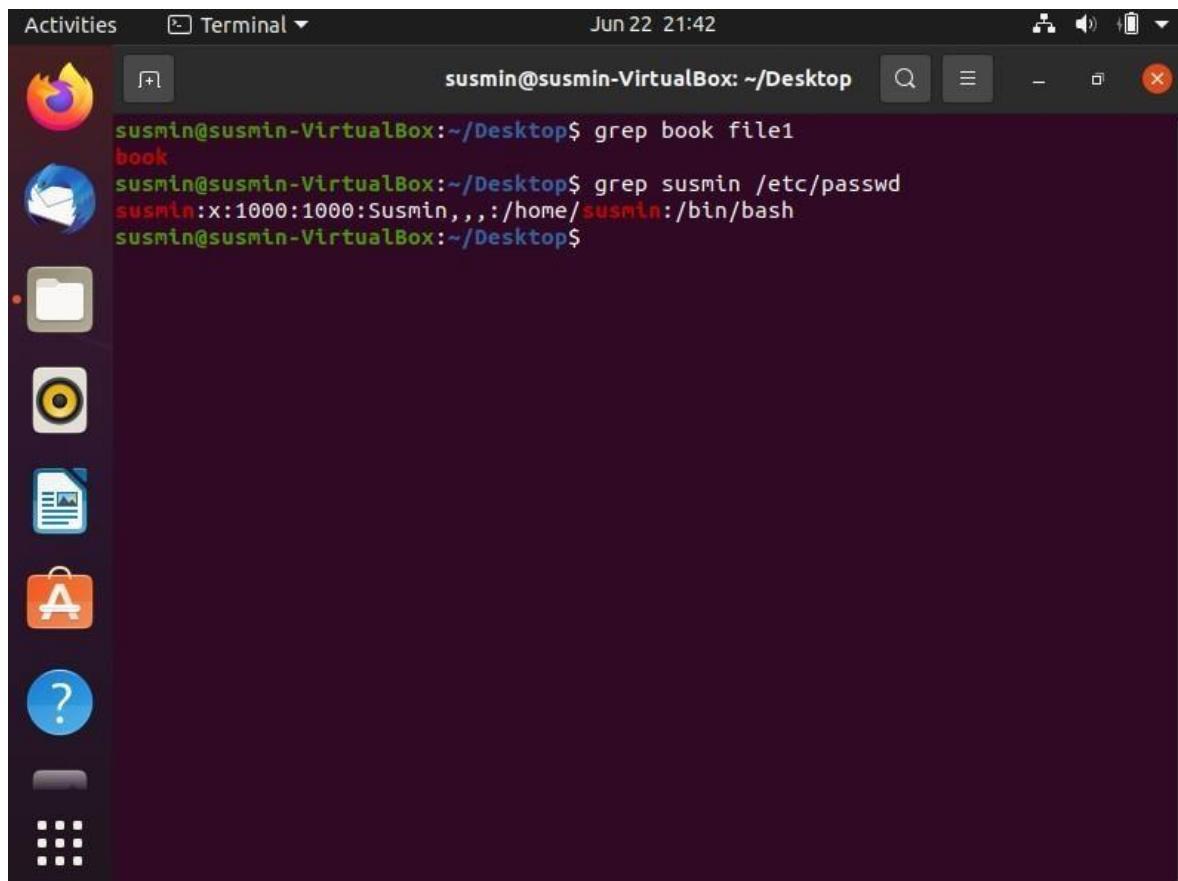
- find is used for searching files and directories.
- If we you use the find command to locate files within a given directory.
- As an example, find /home/ -name notes.txt command will search for a file called notes.txt within the home directory and its subdirectories.
- Other variations when using the find are:
- To find files in the current directory use, find . -name notes.txt
- To look for directories use, / -type d -name notes. txt



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser (Firefox), a file manager (Nautilus), a terminal (Terminal), a file viewer (Eye of GNOME), a text editor (gedit), and a help center (Ubuntu Help). The main window is a terminal window titled "Terminal". The title bar also shows the date and time: "Jun 22 21:31". The terminal window contains the following text:  
susmin@susmin-VirtualBox:~\$ find /home/ -name file1  
/home/susmin/Desktop/file1  
/home/susmin/Documents/file1  
susmin@susmin-VirtualBox:~\$

## 14. grep

- Another basic Linux command that is undoubtedly helpful for everyday use is grep. It lets you search through all the text in a given file.
- Lines that contain the searched word will be displayed fully.
- Usually output of a previous command is piped into the grep command.

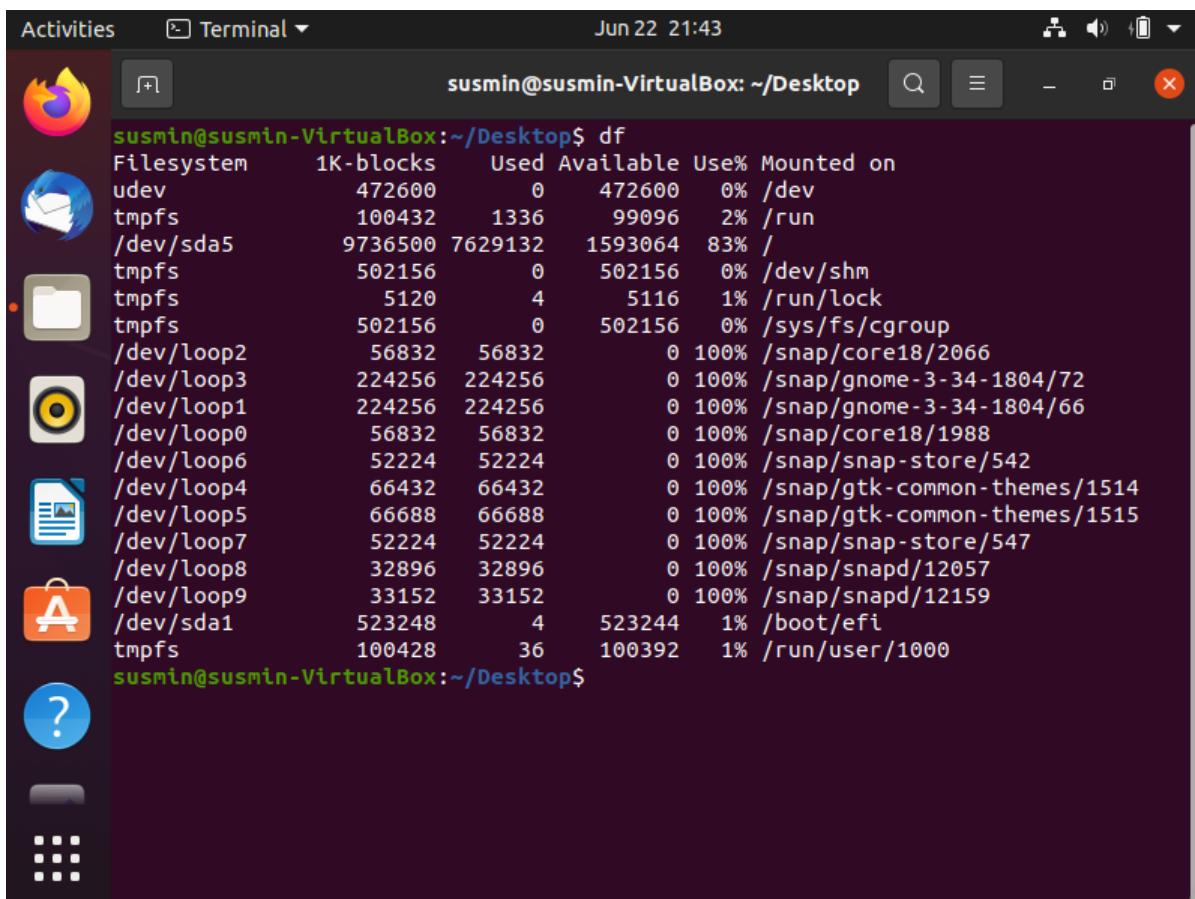


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a folder, a terminal, a file manager, a mail client, a browser, a document editor, and a help/FAQ icon. The main window is a terminal application titled "Terminal". The terminal window has a dark background and displays the following text:

```
susmin@susmin-VirtualBox:~/Desktop$ grep book file1
book
susmin@susmin-VirtualBox:~/Desktop$ grep susmin /etc/passwd
susmin:x:1000:1000:Susmin,,,:/home/susmin:/bin/bash
susmin@susmin-VirtualBox:~/Desktop$
```

## 15. df

- Use df command to get a report on the system's disk space usage, shown in percentage and KBs. If you want to see the report in megabytes, type df -m.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "susmin@susmin-VirtualBox: ~/Desktop". The terminal displays the output of the "df" command, which shows disk space usage for various file systems. The output is as follows:

```
susmin@susmin-VirtualBox:~/Desktop$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev              472600      0   472600   0% /dev
tmpfs             100432   1336   99096   2% /run
/dev/sda5       9736500 7629132  1593064  83% /
tmpfs             502156      0   502156   0% /dev/shm
tmpfs               5120      4    5116   1% /run/lock
tmpfs             502156      0   502156   0% /sys/fs/cgroup
/dev/loop2          56832    56832      0 100% /snap/core18/2066
/dev/loop3          224256   224256      0 100% /snap/gnome-3-34-1804/72
/dev/loop1          224256   224256      0 100% /snap/gnome-3-34-1804/66
/dev/loop0          56832    56832      0 100% /snap/core18/1988
/dev/loop6          52224    52224      0 100% /snap/snap-store/542
/dev/loop4          66432    66432      0 100% /snap/gtk-common-themes/1514
/dev/loop5          66688    66688      0 100% /snap/gtk-common-themes/1515
/dev/loop7          52224    52224      0 100% /snap/snap-store/547
/dev/loop8          32896    32896      0 100% /snap/snapd/12057
/dev/loop9          33152    33152      0 100% /snap/snapd/12159
/dev/sda1          523248      4   523244   1% /boot/efi
tmpfs             100428     36  100392   1% /run/user/1000
susmin@susmin-VirtualBox:~/Desktop$
```

16. du

- If we want to check how much space a file or a directory takes, the du (Disk Usage) command is the answer. However, the disk usage summary will show disk block numbers instead of the usual size format.
  - If you want to see it in bytes, kilobytes, and megabytes, add the -h argument to the command line.
  - \$du -h

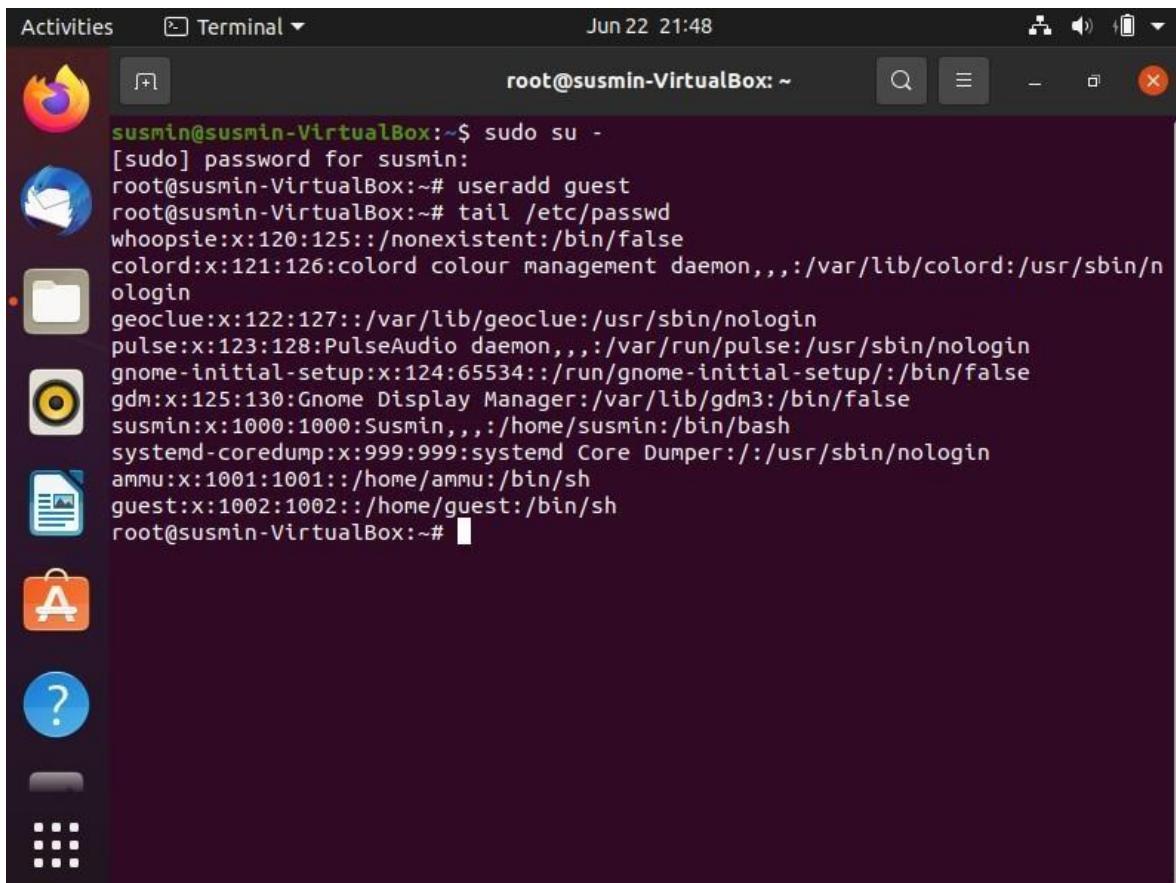
Activities Terminal Jun 22 21:45

susmin@susmin-VirtualBox:~\$ du

```
4      ./Music
4      ./cache/evolution/mail/trash
8      ./cache/evolution/mail
4      ./cache/evolution/addressbook/trash
8      ./cache/evolution/addressbook
4      ./cache/evolution/tasks/trash
8      ./cache/evolution/tasks
4      ./cache/evolution/memos/trash
8      ./cache/evolution/memos
4      ./cache/evolution/sources/trash
8      ./cache/evolution/sources
4      ./cache/evolution/calendar/trash
8      ./cache/evolution/calendar
52     ./cache/evolution
12     ./cache/update-manager-core
8      ./cache/mesa_shader_cache/61
8      ./cache/mesa_shader_cache/d8
8      ./cache/mesa_shader_cache/cb
12     ./cache/mesa_shader_cache/1b
8      ./cache/mesa_shader_cache/5a
8      ./cache/mesa_shader_cache/a8
16     ./cache/mesa_shader_cache/9f
16     ./cache/mesa_shader_cache/c0
8      ./cache/mesa_shader_cache/e3
12     ./cache/mesa_shader_cache/c1
16     ./cache/mesa_shader_cache/2b
8      ./cache/mesa_shader_cache/6c
8      ./cache/mesa_shader cache/7e
```

## 17. useradd

- This is available only to system admins.
- useradd is used to create a new user, while passwd is adding a password to that user's account.
- Eg : To add a new person named John type, useradd John and then to add his password type, passwd 123456789

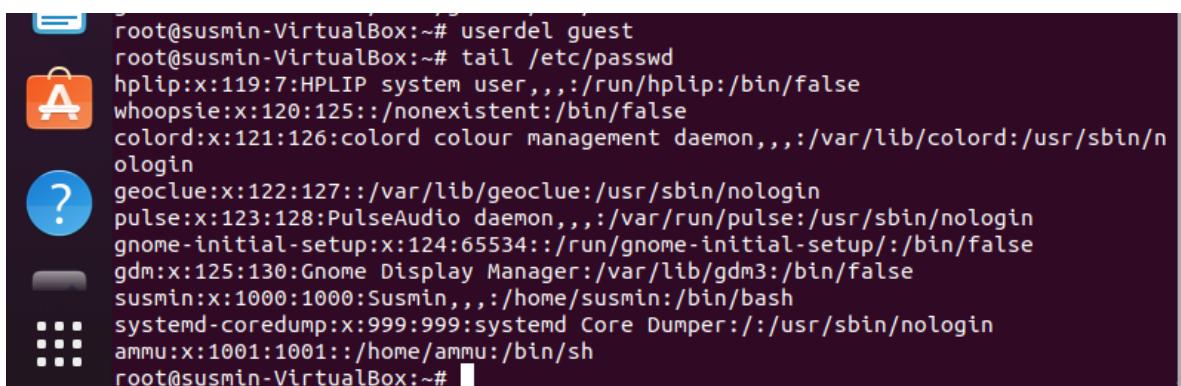


The screenshot shows a terminal window titled "Terminal" with the command "root@susmin-VirtualBox: ~". The terminal displays the following output:

```
susmin@susmin-VirtualBox:~$ sudo su -
[sudo] password for susmin:
root@susmin-VirtualBox:~# useradd guest
root@susmin-VirtualBox:~# tail /etc/passwd
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
susmin:x:1000:1000:Susmin,,,:/home/susmin:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
guest:x:1002:1002::/home/guest:/bin/sh
root@susmin-VirtualBox:~#
```

## 18. userdel

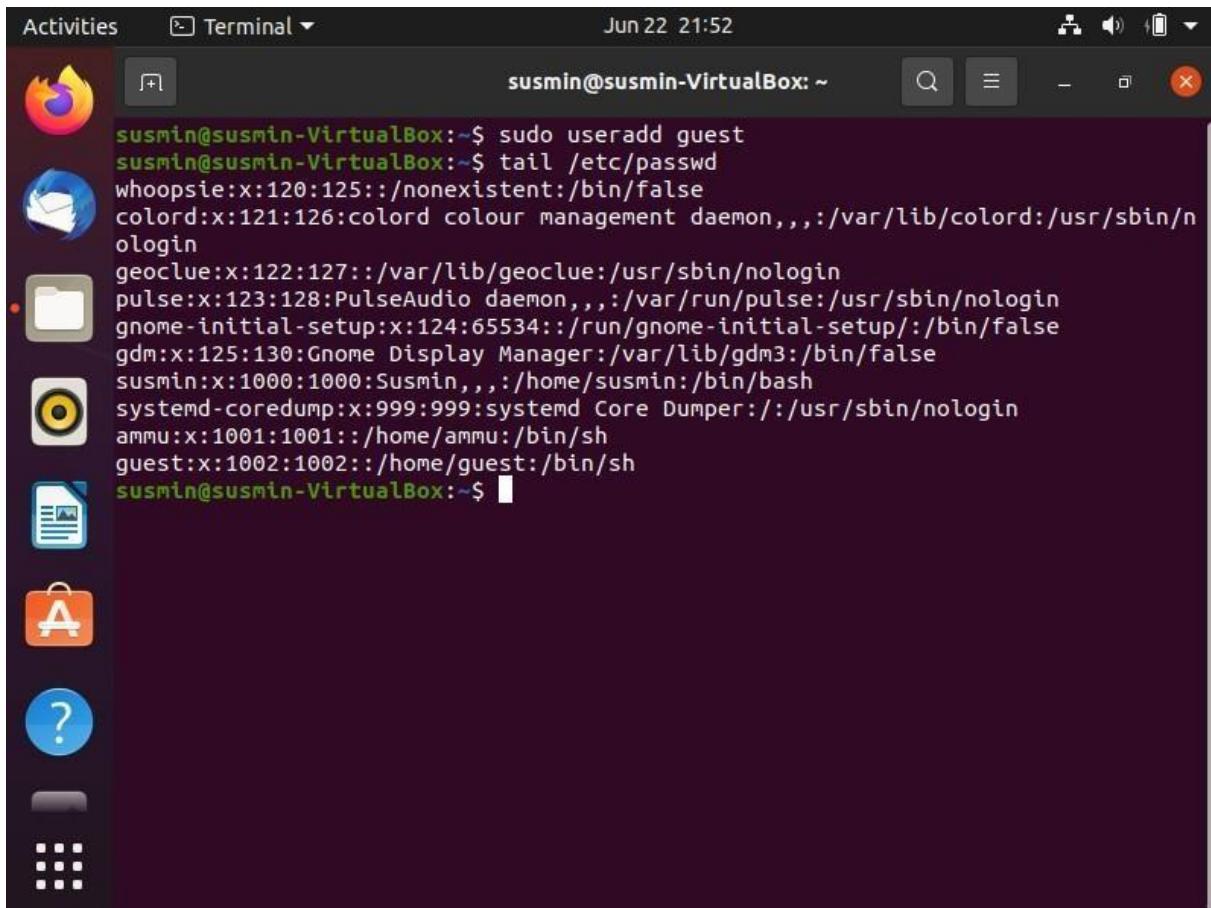
- Remove a user is very similar to adding a new user. To delete the users account type, userdel UserName



```
root@susmin-VirtualBox:~# userdel guest
root@susmin-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
susmin:x:1000:1000:Susmin,,,:/home/susmin:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
root@susmin-VirtualBox:~#
```

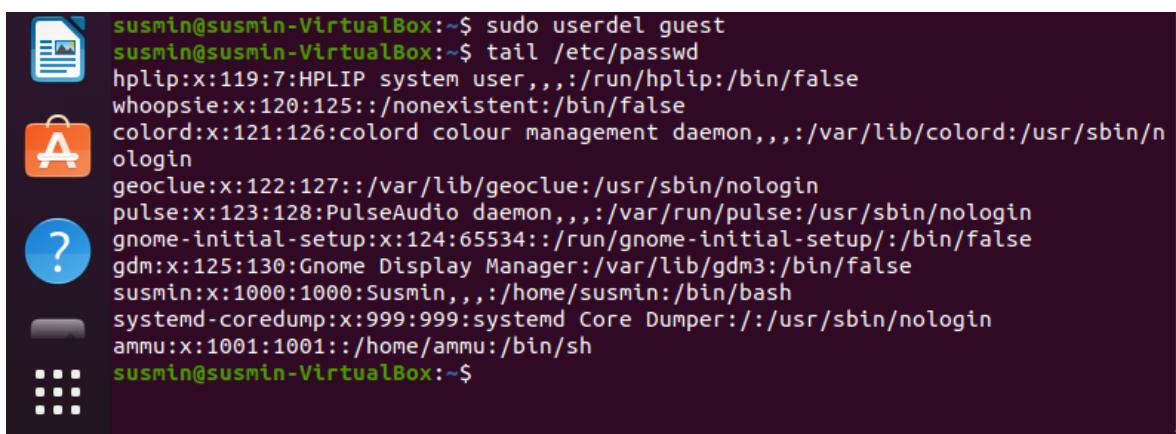
## 19. sudo

- Short for “SuperUser Do”, this command enables you to perform tasks that require administrative or root permissions. You must have sufficient permissions to use this command.
- Eg : sudo useradd maria



The screenshot shows a standard Ubuntu desktop interface with a dark theme. On the left is a dock containing icons for the Dash, Home, Applications, Help, and a terminal. A terminal window titled "Terminal" is open in the top panel, showing the command "sudo useradd guest" followed by the output of "tail /etc/passwd". The output lists various system users and their details. The terminal prompt "susmin@susmin-VirtualBox:~\$" is visible at the bottom.

```
susmin@susmin-VirtualBox:~$ sudo useradd guest
susmin@susmin-VirtualBox:~$ tail /etc/passwd
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
susmin:x:1000:1000:Susmin,,,:/home/susmin:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
guest:x:1002:1002::/home/guest:/bin/sh
susmin@susmin-VirtualBox:~$
```

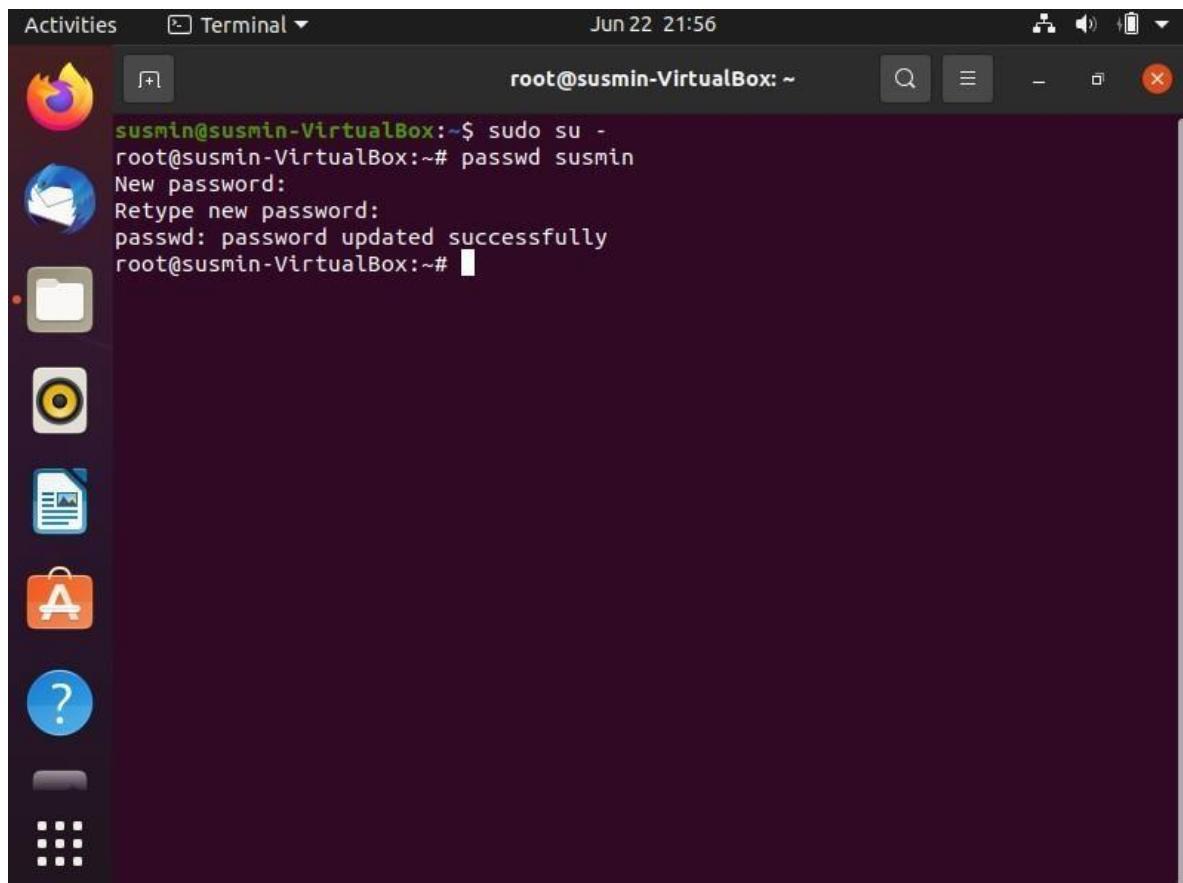


This screenshot shows the same Ubuntu desktop environment as the previous one. A terminal window is open, displaying the command "sudo userdel guest" and its output from "tail /etc/passwd". The output shows the user "guest" has been removed from the system. The terminal prompt "susmin@susmin-VirtualBox:~\$" is at the bottom.

```
susmin@susmin-VirtualBox:~$ sudo userdel guest
susmin@susmin-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
susmin:x:1000:1000:Susmin,,,:/home/susmin:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
susmin@susmin-VirtualBox:~$
```

## 20. passwd

- Changes passwords for user accounts.
- A normal user may only change the password for their own account, while the superuser may change the password for any account.
- passwd[option] [username]
- passwd
- passwd user1



The screenshot shows a terminal window titled "Terminal" in the top bar. The window title bar also displays the date and time: "Jun 22 21:56". The terminal window itself has a dark background and contains the following text:

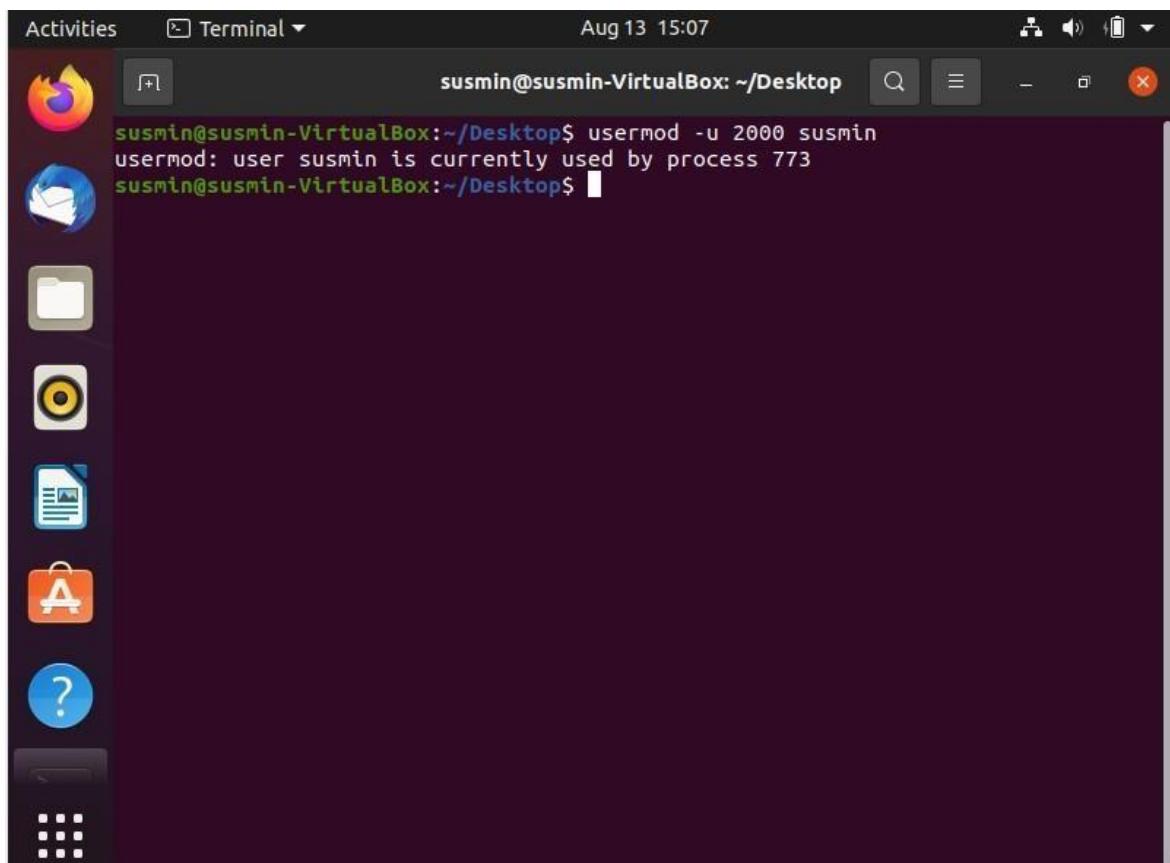
```
susmin@susmin-VirtualBox:~$ sudo su -
root@susmin-VirtualBox:~# passwd susmin
New password:
Retype new password:
passwd: password updated successfully
root@susmin-VirtualBox:~#
```

The terminal window includes standard Linux terminal interface elements like a search bar, a maximize/minimize button, and a close button.

## **BASIC LINUX COMMANDS PART-3**

### **1. usermod**

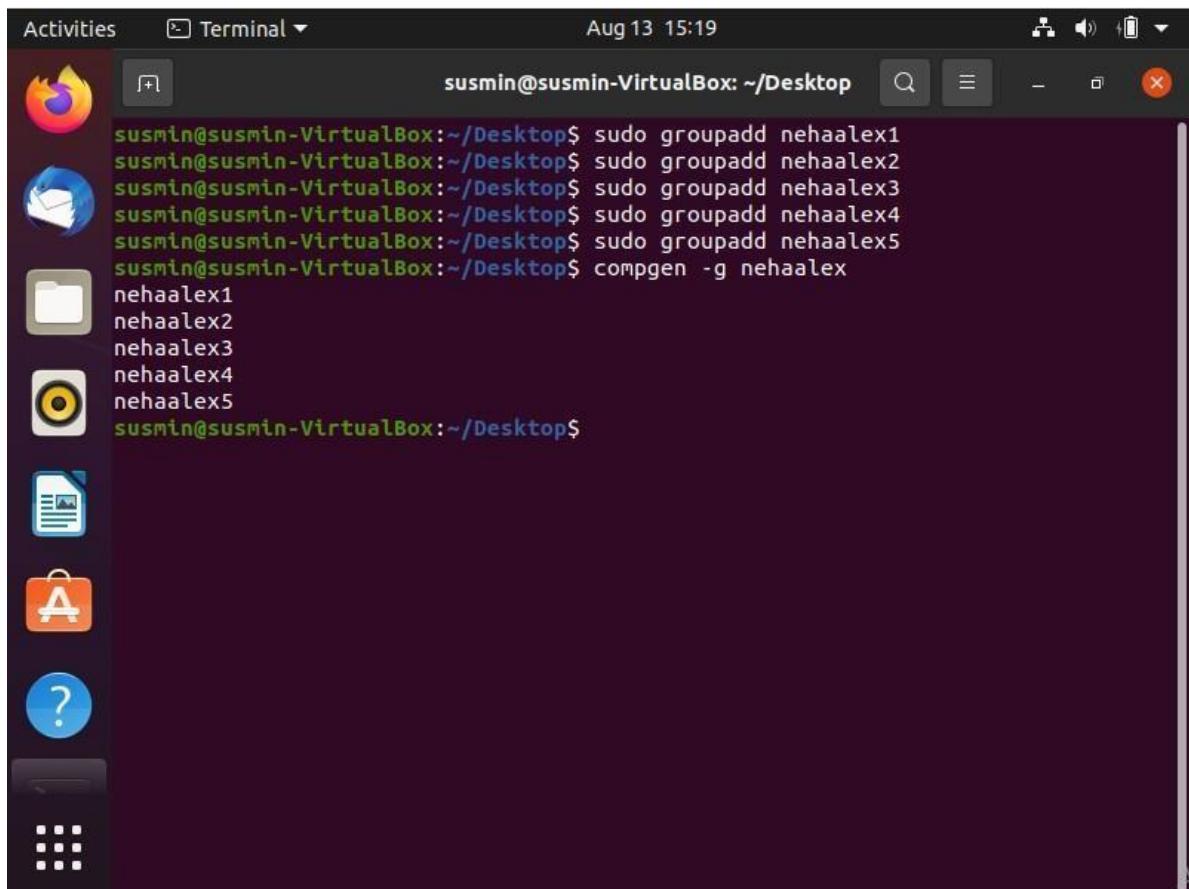
- usermod command is used to change the properties of a user in Linux through the command line.
- After creating a user we have to sometimes change their attributes like password or login directory.



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser (Firefox), a file manager (Nautilus), a terminal (Konsole), a file browser (File Explorer), a media player (KDE Connect), a document viewer (LibreOffice Writer), a file manager (File Manager), a help center (Help Center), and a system tray icon. The main window is a terminal window titled "Terminal". The title bar also shows the user's name, "susmin@susmin-VirtualBox", and the current working directory, "~/Desktop". The date and time, "Aug 13 15:07", are displayed at the top right of the title bar. The terminal window contains the following text:  
susmin@susmin-VirtualBox:~/Desktop\$ usermod -u 2000 susmin  
usermod: user susmin is currently used by process 773  
susmin@susmin-VirtualBox:~/Desktop\$

## 2. groupadd

- groupadd command creates a new group account using the values specified on the command line and the default values from the system.
- It can be handled by superuser or root user.

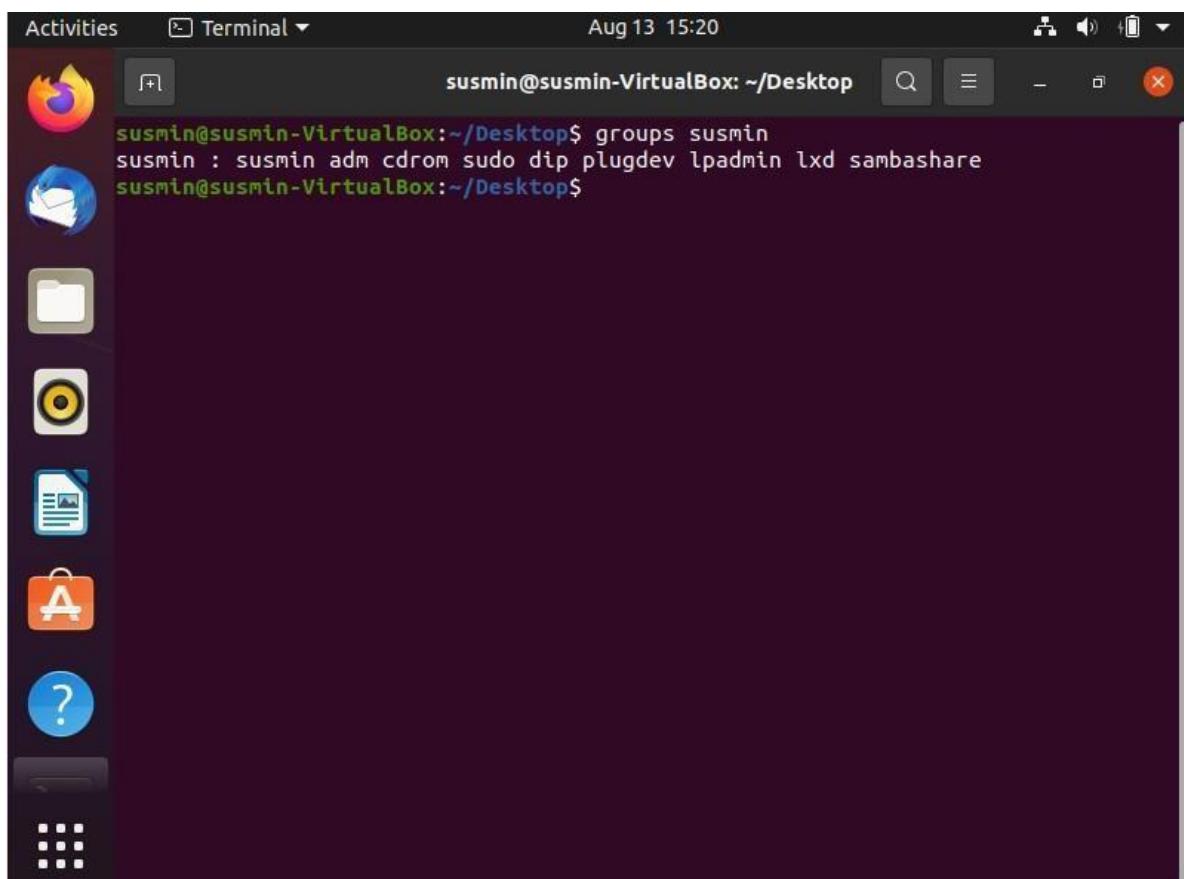


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, file manager, terminal, messaging, calendar, and others. The main window is a terminal titled "Terminal" with the command line "susmin@susmin-VirtualBox ~". The terminal window displays the following command history:

```
susmin@susmin-VirtualBox:~/Desktop$ sudo groupadd nehaalex1
susmin@susmin-VirtualBox:~/Desktop$ sudo groupadd nehaalex2
susmin@susmin-VirtualBox:~/Desktop$ sudo groupadd nehaalex3
susmin@susmin-VirtualBox:~/Desktop$ sudo groupadd nehaalex4
susmin@susmin-VirtualBox:~/Desktop$ sudo groupadd nehaalex5
susmin@susmin-VirtualBox:~/Desktop$ compgen -g nehaalex
nehaalex1
nehaalex2
nehaalex3
nehaalex4
nehaalex5
susmin@susmin-VirtualBox:~/Desktop$
```

### 3. groups

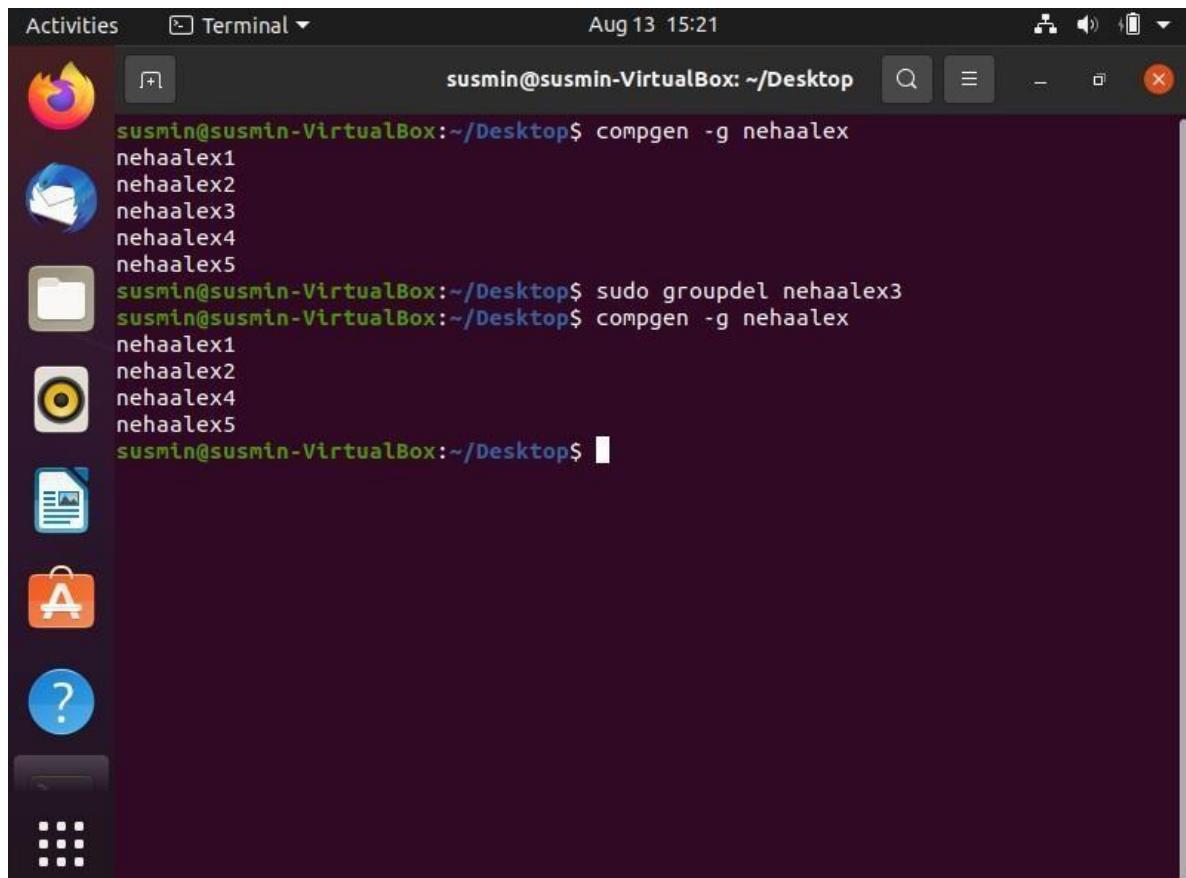
- It prints the groups a user is in.
- Groups make it easy to manage users with the same security and access privileges.



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, a file manager, a terminal, a file browser, a system settings icon, a document viewer, a package manager, and a help icon. The main window is a terminal titled "susmin@susmin-VirtualBox: ~/Desktop". The terminal window has a dark background and displays the command "groups susmin" followed by the output "susmin : susmin adm cdrom sudo dip plugdev lpadmin lxd sambashare". The status bar at the bottom of the terminal window shows the date and time as "Aug 13 15:20".

#### 4. groupdel

- groupdel command modifies the system account files, deleting all entries that refer to group and it is handled by super or root user.

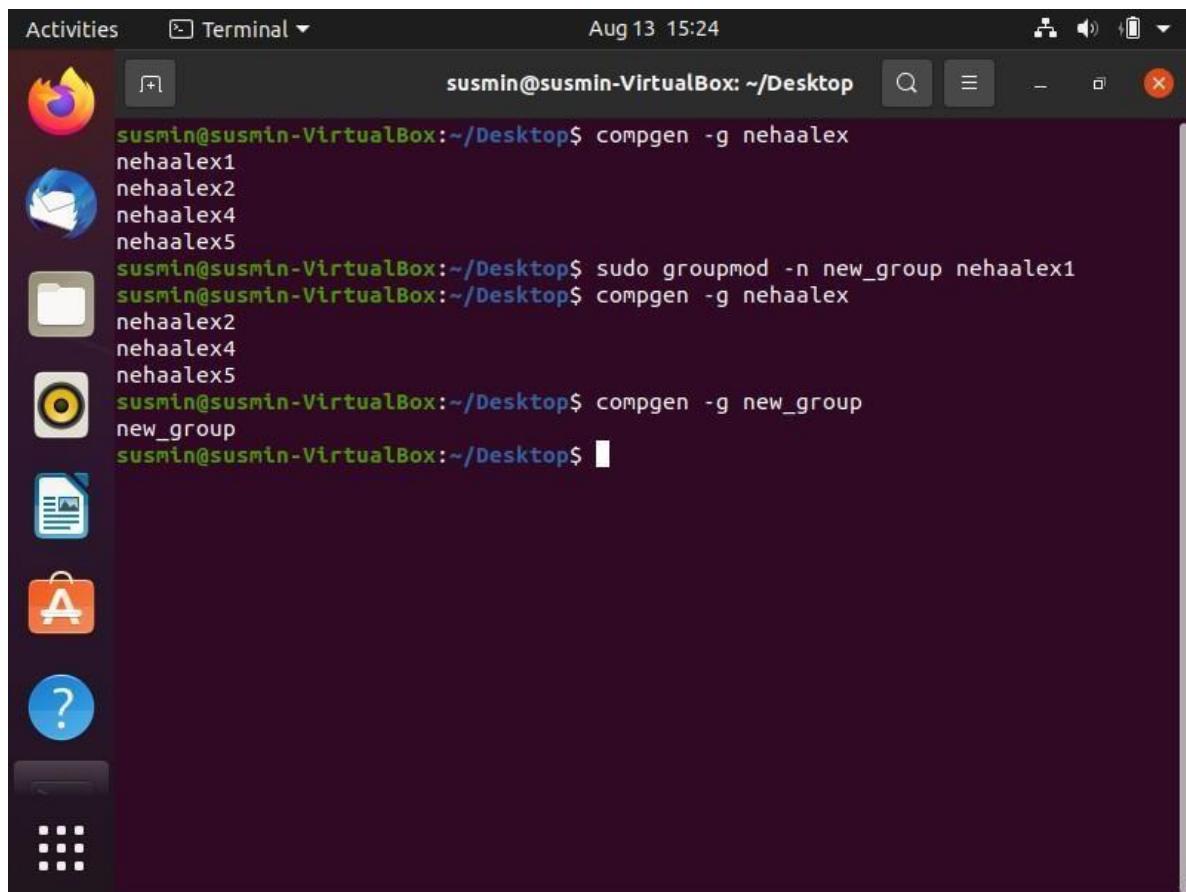


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, a file manager, a mail client, a folder, a target, a document, a package, a question mark, and a terminal. The main window is a terminal titled "Terminal" with the command line "susmin@susmin-VirtualBox ~\$". The terminal output shows the following sequence of commands and their results:

```
susmin@susmin-VirtualBox:~/Desktop$ compgen -g nehaalex
nehaalex1
nehaalex2
nehaalex3
nehaalex4
nehaalex5
susmin@susmin-VirtualBox:~/Desktop$ sudo groupdel nehaalex3
susmin@susmin-VirtualBox:~/Desktop$ compgen -g nehaalex
nehaalex1
nehaalex2
nehaalex4
nehaalex5
susmin@susmin-VirtualBox:~/Desktop$
```

## 5. groupmod

- The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.

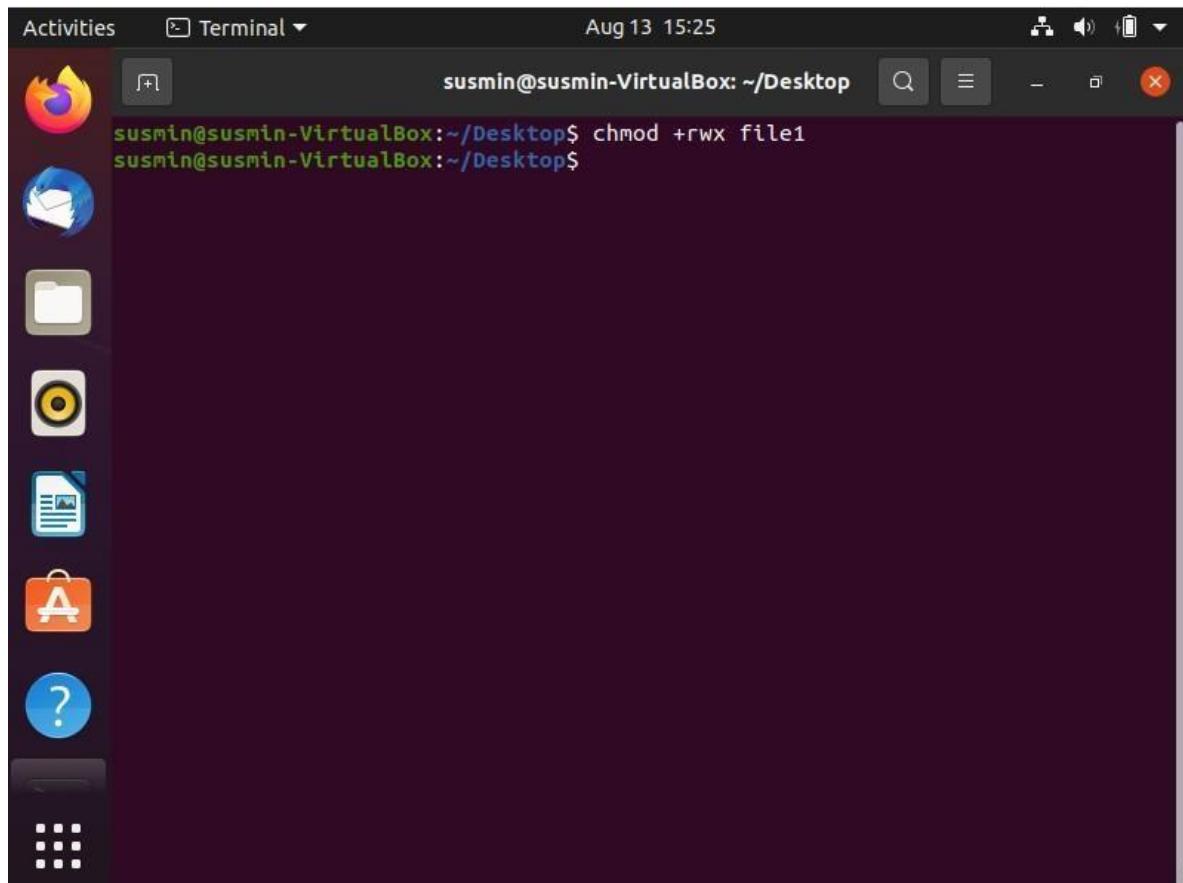


A screenshot of an Ubuntu desktop environment. On the left, there's a dock with icons for the Dash, Home, Applications, and Help. The main area shows a terminal window titled 'Terminal' with the following content:

```
susmin@susmin-VirtualBox:~/Desktop$ compgen -g nehaalex
nehaalex1
nehaalex2
nehaalex4
nehaalex5
susmin@susmin-VirtualBox:~/Desktop$ sudo groupmod -n new_group nehaalex1
susmin@susmin-VirtualBox:~/Desktop$ compgen -g nehaalex
nehaalex2
nehaalex4
nehaalex5
susmin@susmin-VirtualBox:~/Desktop$ compgen -g new_group
new_group
susmin@susmin-VirtualBox:~/Desktop$
```

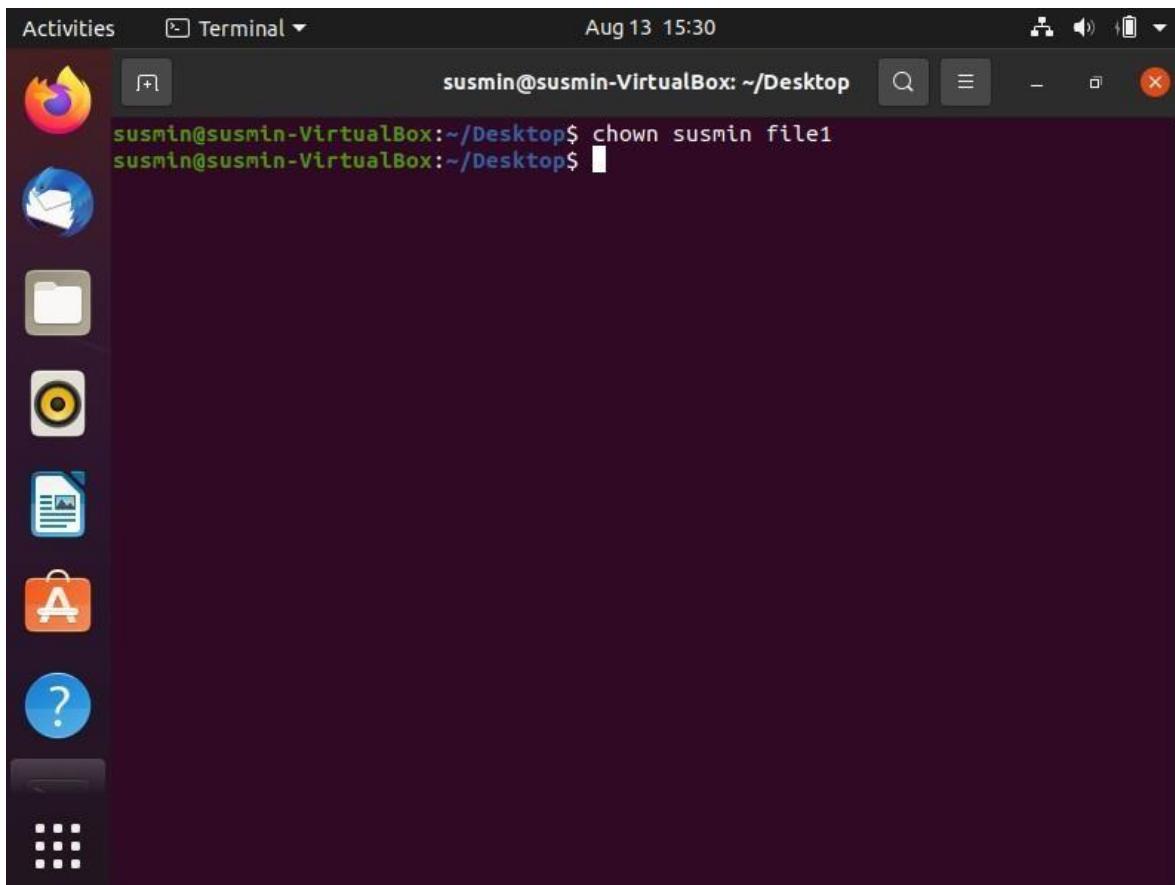
## 6. chmod

- Stands for change mode.
- To change directory permissions of file or directory in Linux.



## 7. chown

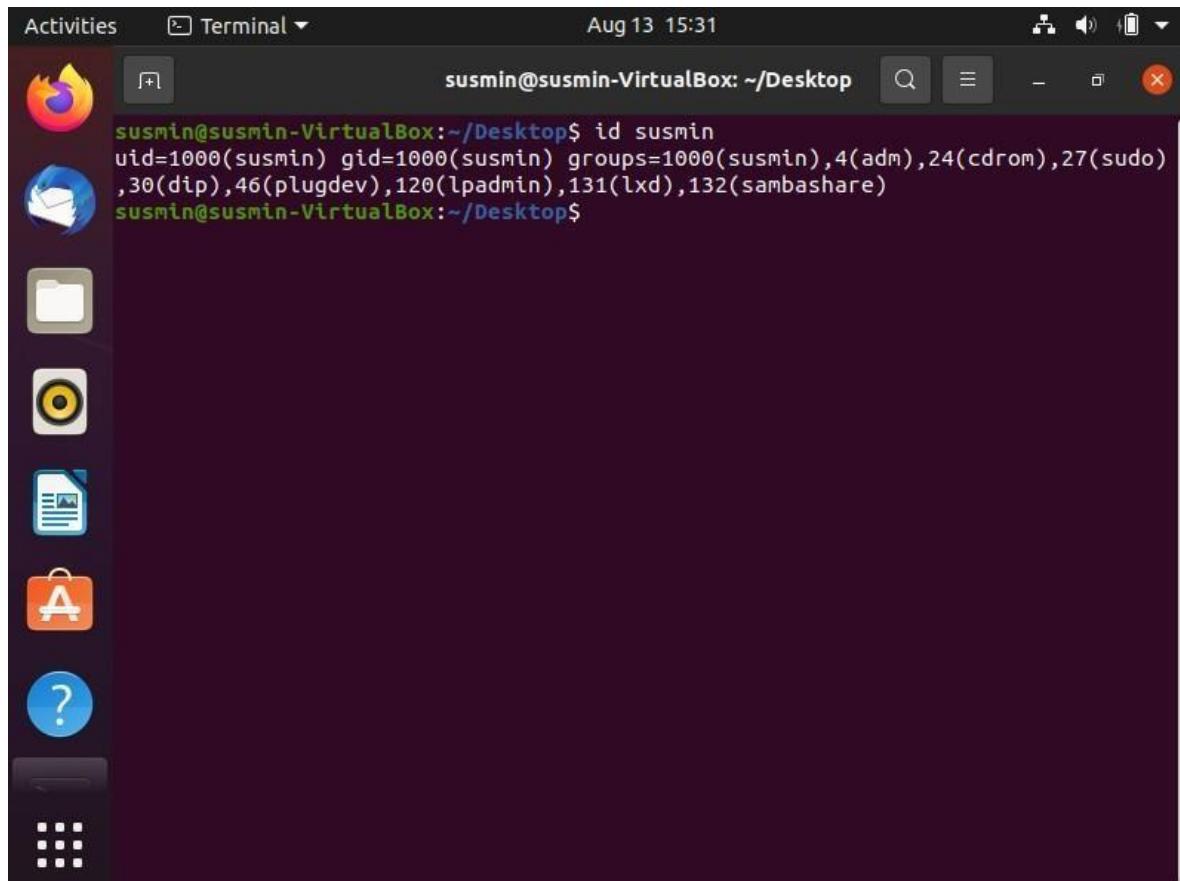
- The chown command allows you to change the user and/or group ownership of a given file, directory.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled "Terminal" and has the status bar "susmin@susmin-VirtualBox: ~/Desktop". The date and time "Aug 13 15:30" are also displayed. The terminal content shows the command "chown susmin file1" being run, with the output "susmin@susmin-VirtualBox:~/Desktop\$". To the left of the terminal is a vertical dock containing icons for various applications: a browser (Firefox), a file manager (Nautilus), a terminal (Konsole), a file viewer (Thunar), a file editor (gedit), a help center (Ubuntu Help), and a system settings icon (Dash). The desktop background is a solid dark color.

## 8. 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.

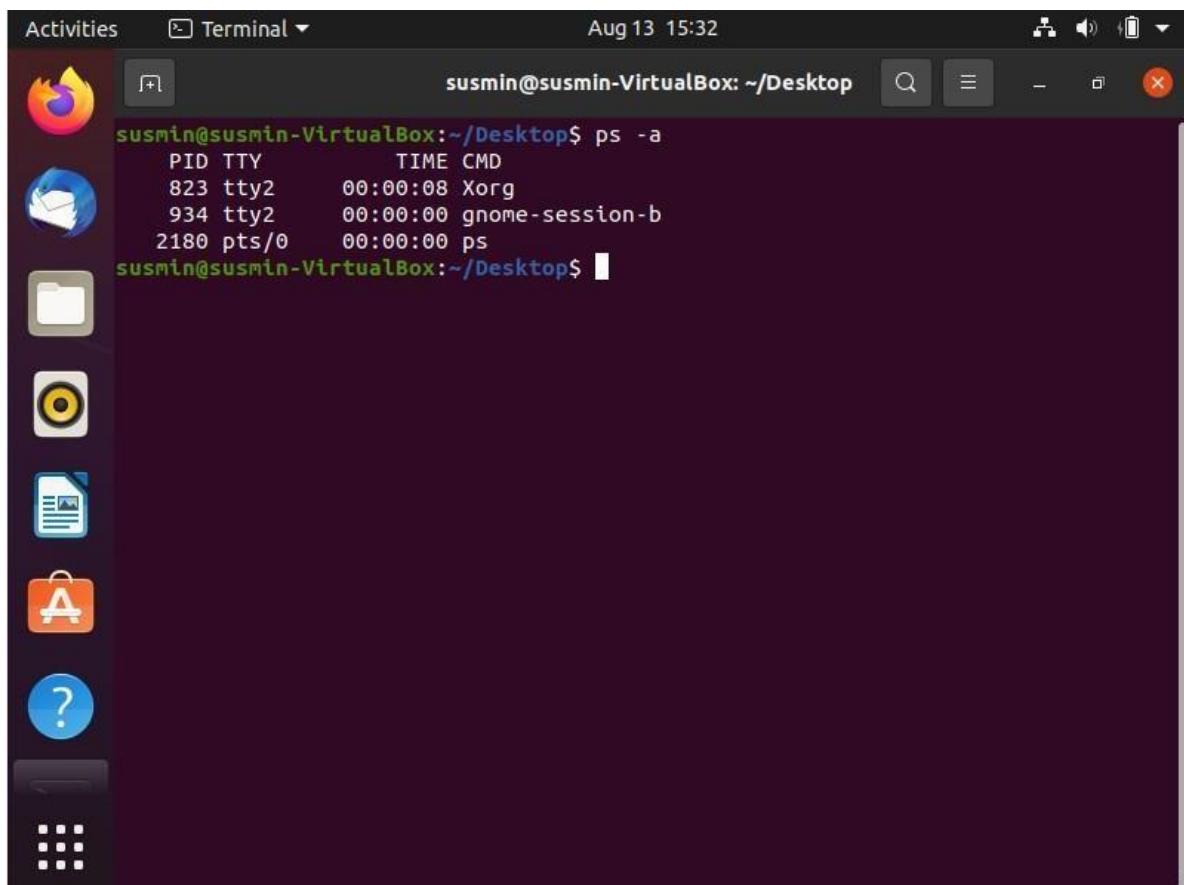


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled "susmin@susmin-VirtualBox: ~/Desktop" and displays the output of the "id" command. The output shows the user information: uid=1000(susmin) gid=1000(susmin) groups=1000(susmin),4(adm),24(cdrom),27(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare). The desktop interface includes a dock with icons for the Dash, Home, Applications, Help, and a terminal icon, and a vertical application menu on the left.

```
susmin@susmin-VirtualBox:~/Desktop$ id susmin
uid=1000(susmin) gid=1000(susmin) groups=1000(susmin),4(adm),24(cdrom),27(sudo),
,30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
susmin@susmin-VirtualBox:~/Desktop$
```

## 9. ps

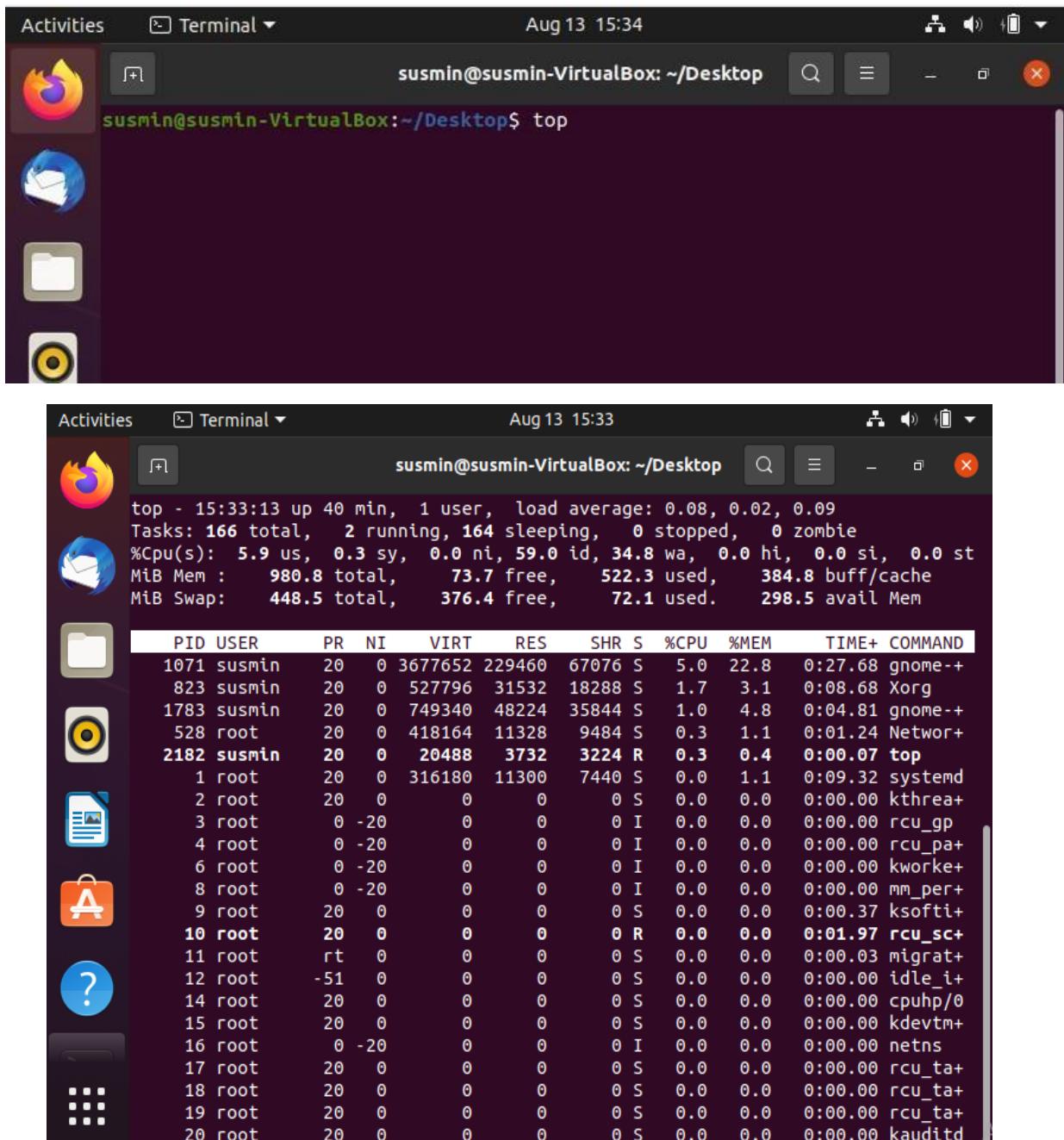
- Stands for Process Status.
- It is a command line utility that is used to display or view information related to the processes running in a Linux system.



The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, a file manager, a terminal, a file browser, a system settings icon, a help icon, and a terminal icon. The main window is a terminal window titled "susmin@susmin-VirtualBox: ~/Desktop". The terminal displays the following command and its output:  
susmin@susmin-VirtualBox:~/Desktop\$ ps -a  
PID TTY TIME CMD  
823 tty2 00:00:08 Xorg  
934 tty2 00:00:00 gnome-session-b  
2180 pts/0 00:00:00 ps  
susmin@susmin-VirtualBox:~/Desktop\$

## 10. top

- top command is used to show the Linux processes.
- It provides a dynamic real-time view of the running system.



```

susmin@susmin-VirtualBox: ~/Desktop$ top
top - 15:33:13 up 40 min,  1 user,  load average: 0.08, 0.02, 0.09
Tasks: 166 total,   2 running, 164 sleeping,   0 stopped,   0 zombie
%Cpu(s):  5.9 us,  0.3 sy,  0.0 ni, 59.0 id, 34.8 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  980.8 total,    73.7 free,   522.3 used,   384.8 buff/cache
MiB Swap:  448.5 total,   376.4 free,    72.1 used.   298.5 avail Mem

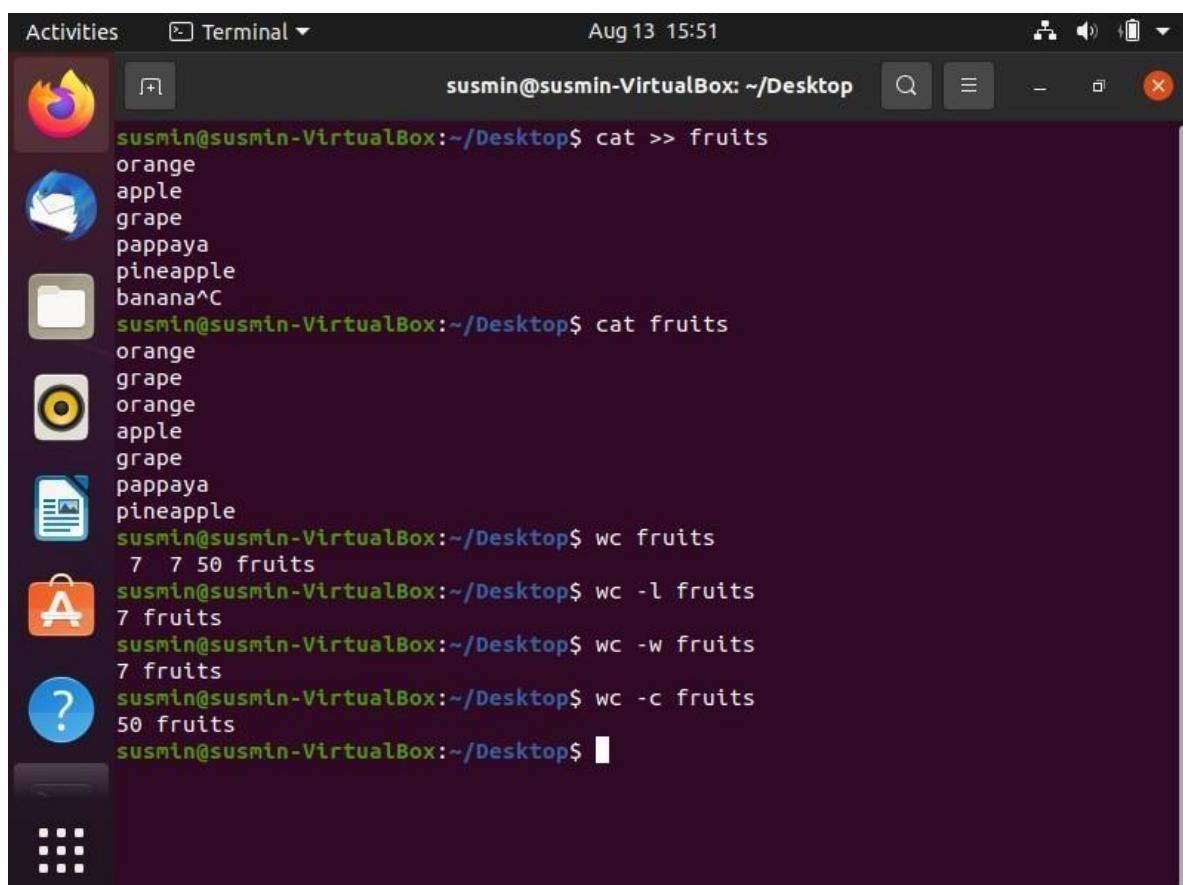
PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM TIME+ COMMAND
1071 susmin    20   0 3677652 229460  67076 S  5.0 22.8  0:27.68 gnome-
 823 susmin    20   0 527796  31532 18288 S  1.7  3.1  0:08.68 Xorg
1783 susmin    20   0 749340  48224 35844 S  1.0  4.8  0:04.81 gnome-
 528 root      20   0 418164 11328  9484 S  0.3  1.1  0:01.24 Network+
2182 susmin    20   0 20488   3732 3224 R  0.3  0.4  0:00.07 top
  1 root      20   0 316180 11300  7440 S  0.0  1.1  0:09.32 systemd
  2 root      20   0      0     0    0 S  0.0  0.0  0:00.00 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 kworker+
  8 root      0 -20      0     0    0 I  0.0  0.0  0:00.00 mm_per+
  9 root      20   0      0     0    0 S  0.0  0.0  0:00.37 ksofti+
 10 root     20   0      0     0    0 R  0.0  0.0  0:01.97 rcu_sc+
 11 root     rt   0      0     0    0 S  0.0  0.0  0:00.03 migrat+
 12 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

```

## **BASIC LINUX COMMANDS PART-4**

### **1. wc**

- Stands for word count.
- 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.



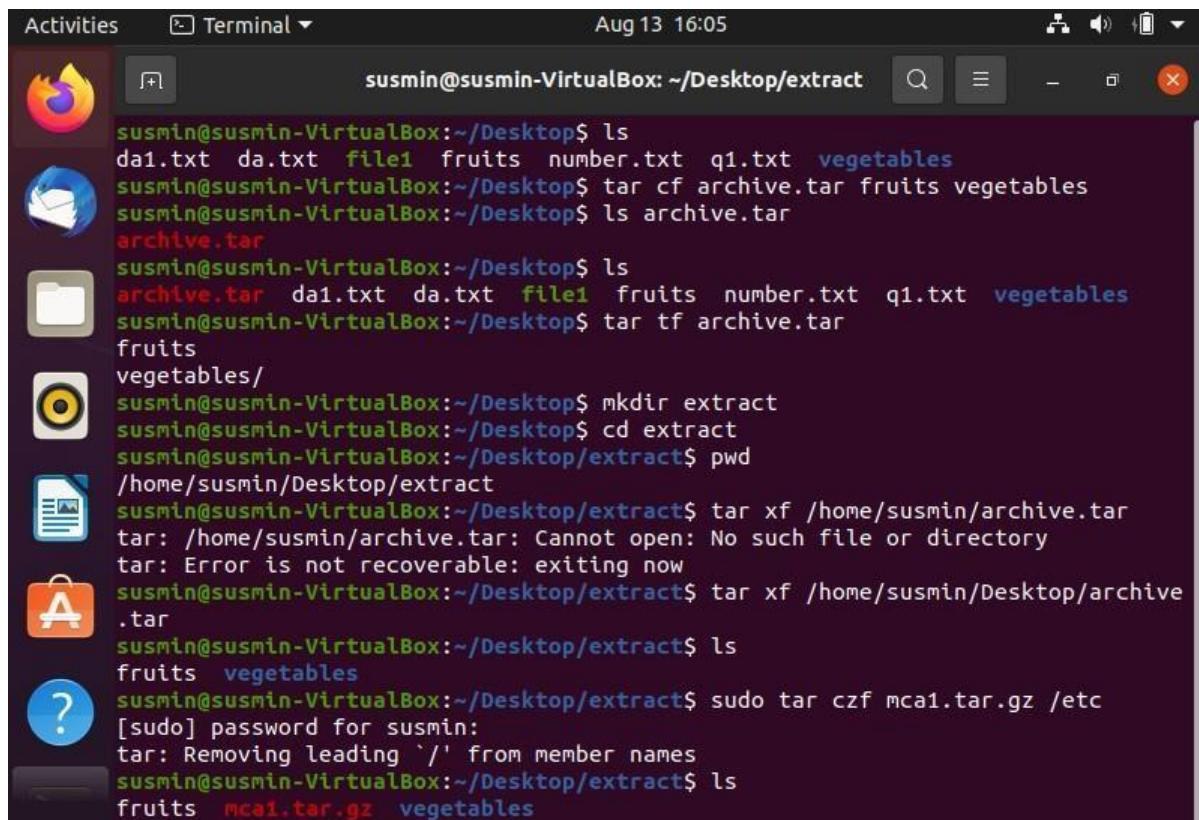
The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the date and time are "Aug 13 15:51". The terminal content is as follows:

```
susmin@susmin-VirtualBox:~/Desktop$ cat >> fruits
orange
apple
grape
pappaya
pineapple
banana^C
susmin@susmin-VirtualBox:~/Desktop$ cat fruits
orange
grape
orange
apple
grape
pappaya
pineapple
susmin@susmin-VirtualBox:~/Desktop$ wc fruits
    7  7 50 fruits
susmin@susmin-VirtualBox:~/Desktop$ wc -l fruits
7 fruits
susmin@susmin-VirtualBox:~/Desktop$ wc -w fruits
7 fruits
susmin@susmin-VirtualBox:~/Desktop$ wc -c fruits
50 fruits
susmin@susmin-VirtualBox:~/Desktop$
```

## 2. tar

- Stands for tape archive.
- It is used to create Archive and extract the Archive files.
- Linux tar command to create compressed or uncompressed Archive files.

tar command:

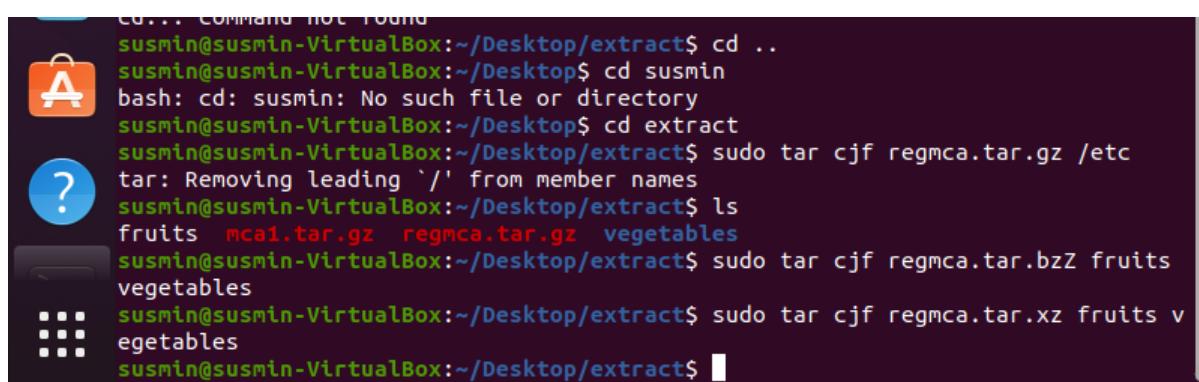


```

Activities Terminal Aug 13 16:05
susmin@susmin-VirtualBox:~/Desktop/extract
susmin@susmin-VirtualBox:~/Desktop$ ls
da1.txt da.txt file1 fruits number.txt q1.txt vegetables
susmin@susmin-VirtualBox:~/Desktop$ tar cf archive.tar fruits vegetables
susmin@susmin-VirtualBox:~/Desktop$ ls archive.tar
archive.tar
susmin@susmin-VirtualBox:~/Desktop$ ls
archive.tar da1.txt da.txt file1 fruits number.txt q1.txt vegetables
susmin@susmin-VirtualBox:~/Desktop$ tar tf archive.tar
fruits
vegetables/
susmin@susmin-VirtualBox:~/Desktop$ mkdir extract
susmin@susmin-VirtualBox:~/Desktop$ cd extract
susmin@susmin-VirtualBox:~/Desktop/extract$ pwd
/home/susmin/Desktop/extract
susmin@susmin-VirtualBox:~/Desktop/extract$ tar xf /home/susmin/archive.tar
tar: /home/susmin/archive.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
susmin@susmin-VirtualBox:~/Desktop/extract$ tar xf /home/susmin/Desktop/archive.tar
susmin@susmin-VirtualBox:~/Desktop/extract$ ls
fruits vegetables
susmin@susmin-VirtualBox:~/Desktop/extract$ sudo tar czf mca1.tar.gz /etc
[sudo] password for susmin:
tar: Removing leading `/' from member names
susmin@susmin-VirtualBox:~/Desktop/extract$ ls
fruits mca1.tar.gz vegetables

```

Compressing file using gz,bzZ,xz:

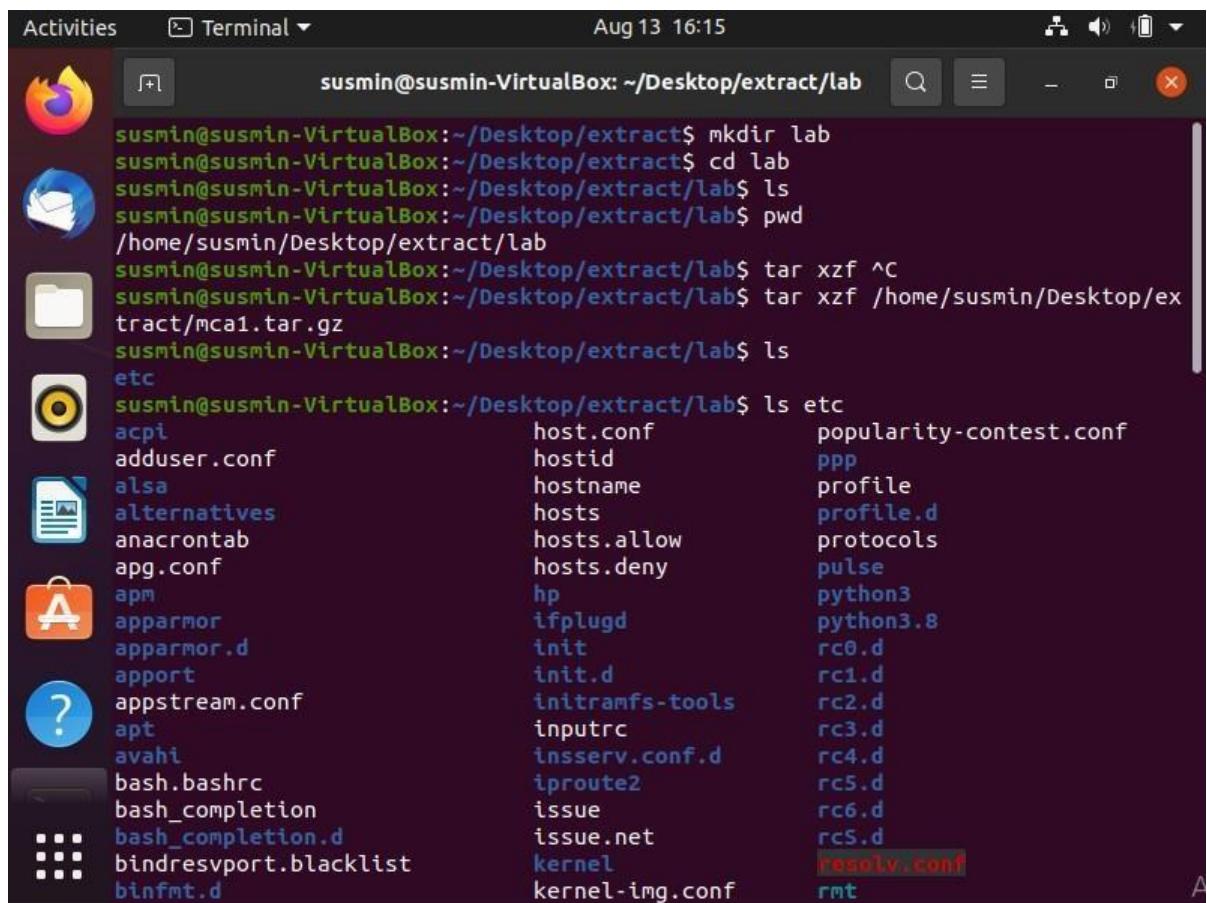


```

cd... command not found
susmin@susmin-VirtualBox:~/Desktop/extract$ cd ..
susmin@susmin-VirtualBox:~/Desktop$ cd susmin
bash: cd: susmin: No such file or directory
susmin@susmin-VirtualBox:~/Desktop$ cd extract
susmin@susmin-VirtualBox:~/Desktop/extract$ sudo tar cjf regmca.tar.gz /etc
tar: Removing leading `/' from member names
susmin@susmin-VirtualBox:~/Desktop/extract$ ls
fruits mca1.tar.gz regmca.tar.gz vegetables
susmin@susmin-VirtualBox:~/Desktop/extract$ sudo tar cjf regmca.tar.bzz fruits vegetables
susmin@susmin-VirtualBox:~/Desktop/extract$ sudo tar cjf regmca.tar.xz fruits vegetables
susmin@susmin-VirtualBox:~/Desktop/extract$ 

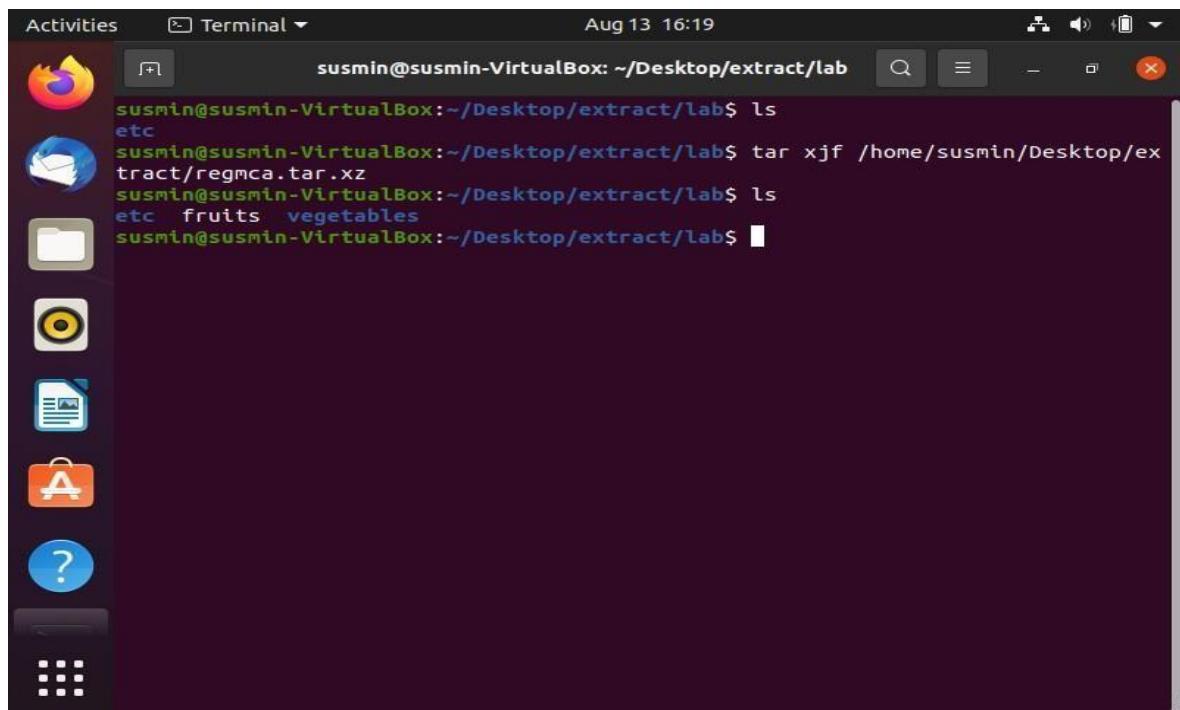
```

extracting using gz:



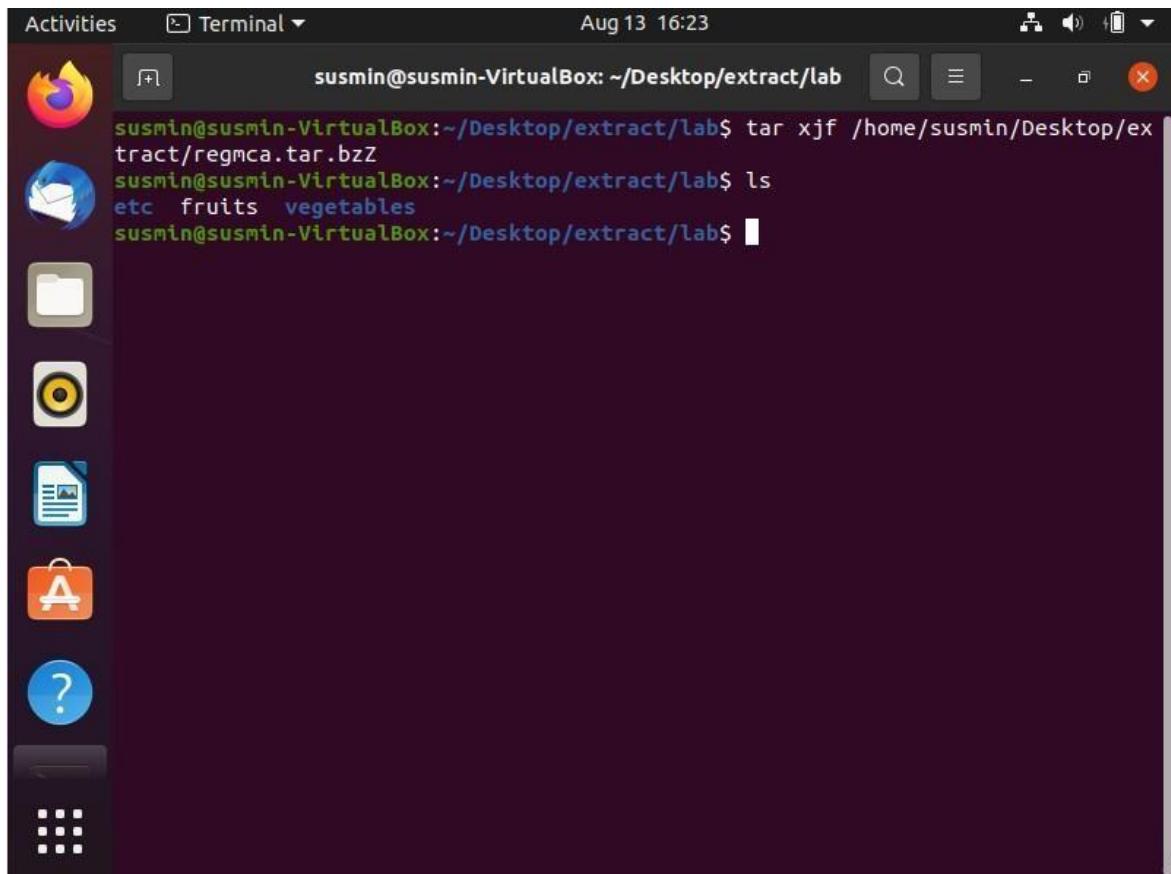
```
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ mkdir lab
susmin@susmin-VirtualBox: ~/Desktop/extract$ cd lab
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ ls
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ pwd
/home/susmin/Desktop/extract/lab
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ tar xzf ^C
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ tar xzf /home/susmin/Desktop/ex
tract/mca1.tar.gz
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ ls
etc
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ ls etc
acpi          host.conf      popularity-contest.conf
adduser.conf   hostid        PPP
alsa          hostname      profile
alternatives   hosts         profile.d
anacrontab    hosts.allow   protocols
apg.conf      hosts.deny   pulse
apm           hp            python3
apparmor      ifplugd       python3.8
apparmor.d    init          rc0.d
apport         init.d        rc1.d
appstream.conf initramfs-tools rc2.d
apt           inittab       rc3.d
avahi          inserv.conf.d rc4.d
bash.bashrc    iproute2     rc5.d
bash_completion issue         rc6.d
bash_completion.d issue.net   rcS.d
bindresvport.blacklist kernel      resolv.conf
binfmt.d      kernel-img.conf rmt
```

extracting using xz:



```
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ ls
etc
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ tar xjf /home/susmin/Desktop/ex
tract/regmca.tar.xz
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$ ls
etc fruits vegetables
susmin@susmin-VirtualBox: ~/Desktop/extract/lab$
```

extracting using bz2:

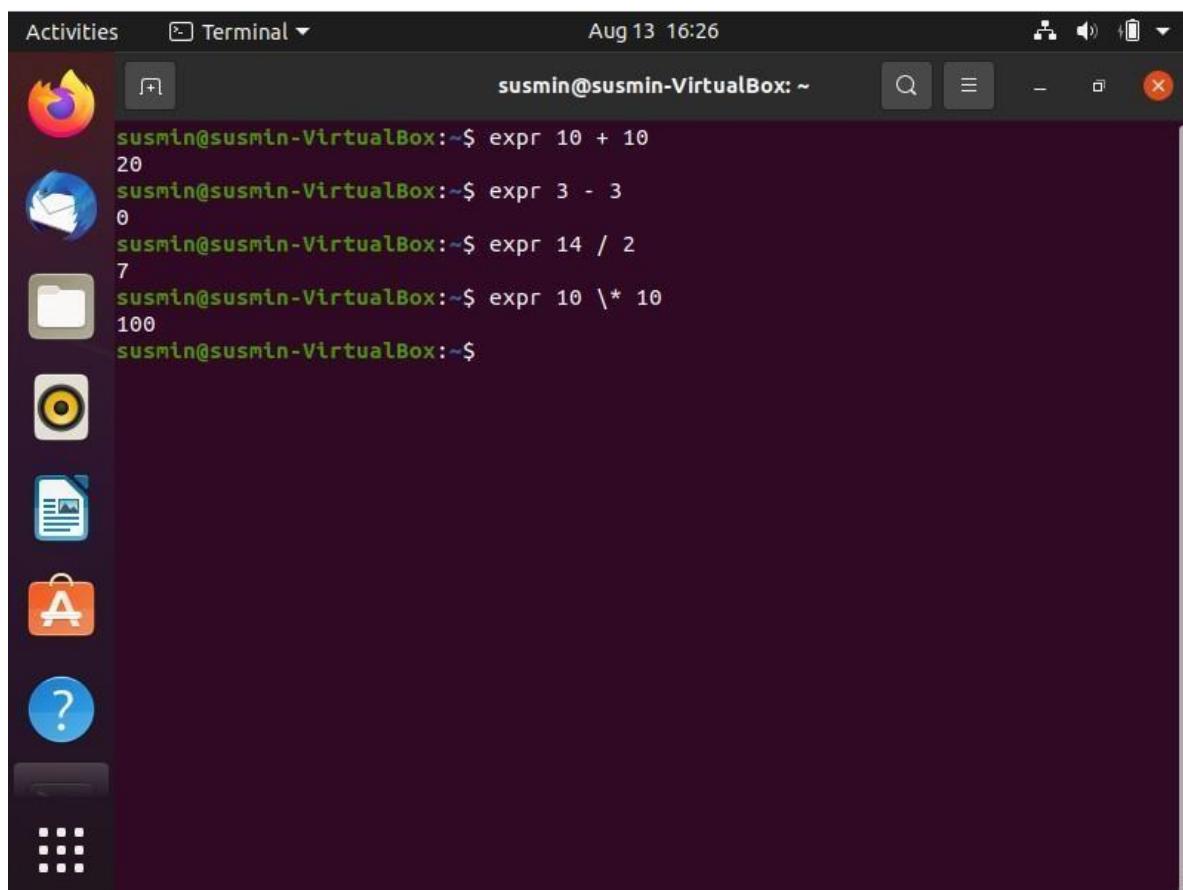


The image shows a screenshot of an Ubuntu desktop environment. On the left, there is a vertical dock with several icons: a folder, a target, a document, a package, and a question mark. In the center, a terminal window is open with the command `tar xjf /home/susmin/Desktop/extract/regmca.tar.bz2` and its output. Below the terminal, a file manager window is open, showing a directory structure with subfolders `etc`, `fruits`, and `vegetables`. The top bar shows the date and time as Aug 13 16:23.

```
susmin@susmin-VirtualBox:~/Desktop/extract/lab$ tar xjf /home/susmin/Desktop/extract/regmca.tar.bz2
susmin@susmin-VirtualBox:~/Desktop/extract/lab$ ls
etc fruits vegetables
susmin@susmin-VirtualBox:~/Desktop/extract/lab$
```

### 3. expr

- The expr command 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.
- Performing operations on variables inside a shell script.

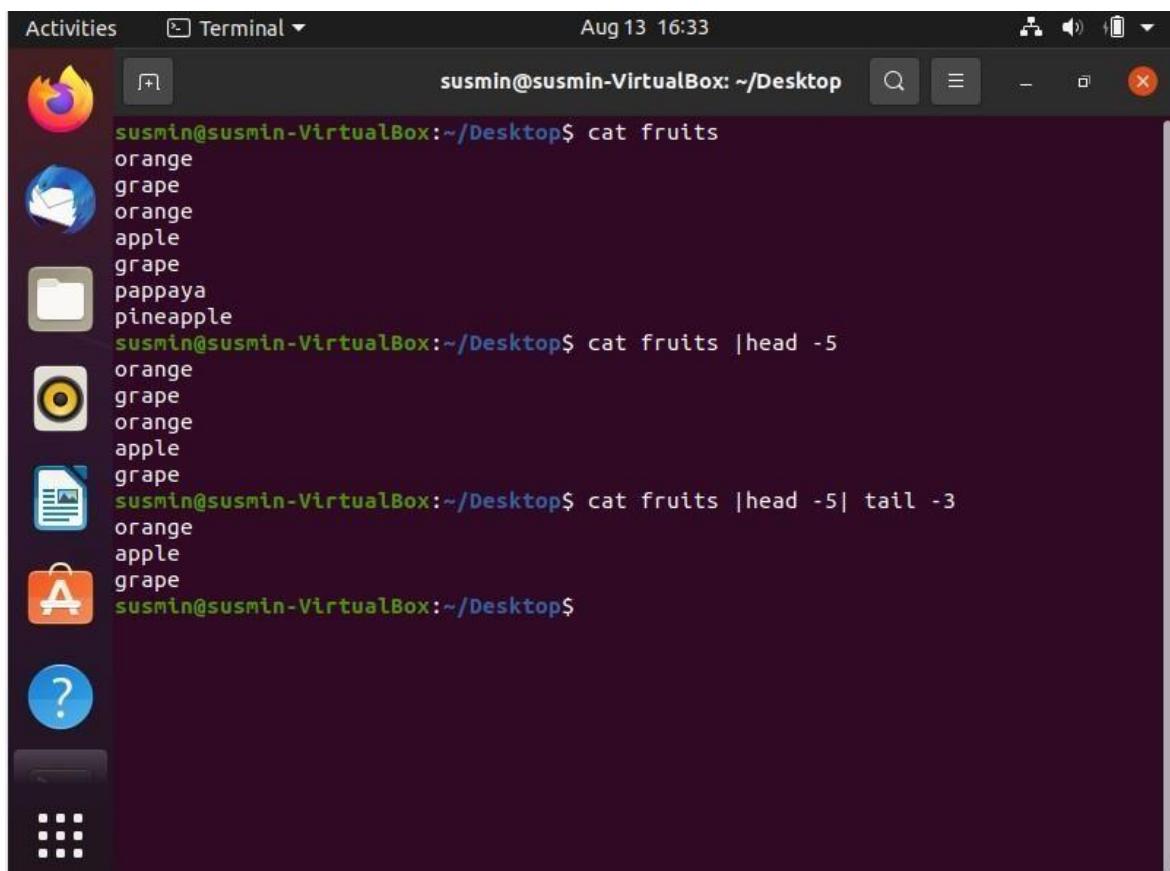


The screenshot shows a Linux desktop environment with a dark theme. On the left is a vertical dock containing icons for various applications: a browser, file manager, terminal, system settings, and others. The main window is a terminal window titled "Terminal". The terminal window has a dark background and light-colored text. It displays the following commands and their outputs:

```
susmin@susmin-VirtualBox:~$ expr 10 + 10
20
susmin@susmin-VirtualBox:~$ expr 3 - 3
0
susmin@susmin-VirtualBox:~$ expr 14 / 2
7
susmin@susmin-VirtualBox:~$ expr 10 \* 10
100
susmin@susmin-VirtualBox:~$
```

## 4. redirections & piping

- A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing.
- Pipe is used to combine two or more commands, 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.

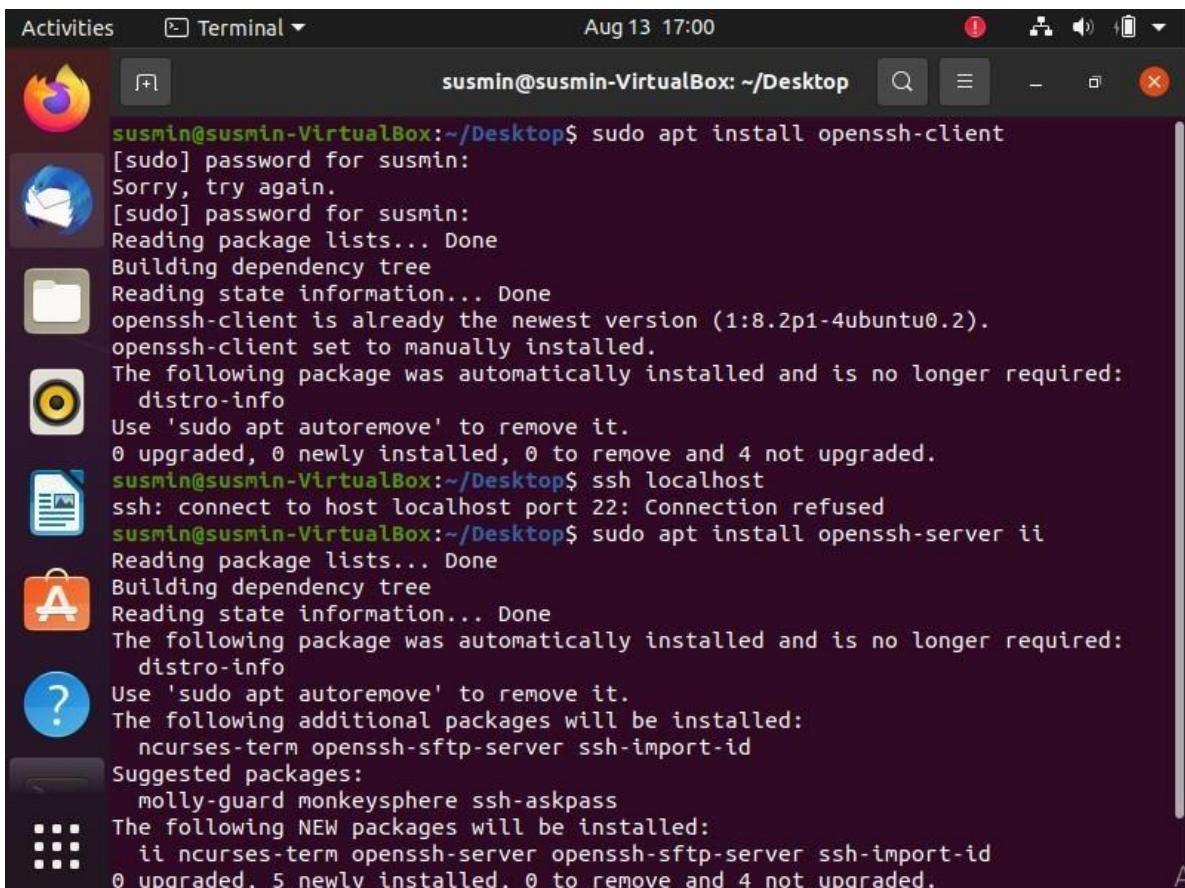


The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the date and time are "Aug 13 16:33". The terminal content demonstrates the use of redirection and piping:

```
susmin@susmin-VirtualBox:~/Desktop$ cat fruits
orange
grape
orange
apple
grape
pappaya
pineapple
susmin@susmin-VirtualBox:~/Desktop$ cat fruits |head -5
orange
grape
orange
apple
grape
susmin@susmin-VirtualBox:~/Desktop$ cat fruits |head -5| tail -3
orange
apple
grape
susmin@susmin-VirtualBox:~/Desktop$
```

## 5. ssh

- Stands for “Secure Shell”.
- It is a protocol used to securely connect to a remote server/system.
- It 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.

A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window is titled 'Terminal' and shows the command 'sudo apt install openssh-client' being run. The user is prompted for a password twice. The terminal then displays the package manager's output, indicating that 'openssh-client' is already the newest version and is set to manually installed. It also lists packages that were automatically installed and no longer required, such as 'distro-info'. The user then attempts to connect to 'localhost' via SSH, which fails with a 'Connection refused' error. Finally, the user runs 'sudo apt install openssh-server' and the terminal shows the process of installing the server, including suggested packages like 'molly-guard' and 'monkeysphere'. The terminal window has a dark background with light-colored text.

```
susmin@susmin-VirtualBox:~/Desktop$ sudo apt install openssh-client
[sudo] password for susmin:
Sorry, try again.
[sudo] password for susmin:
Reading package lists... Done
Building dependency tree
Reading state information... Done
openSSH-client is already the newest version (1:8.2p1-4ubuntu0.2).
openSSH-client set to manually installed.
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
susmin@susmin-VirtualBox:~/Desktop$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
susmin@susmin-VirtualBox:~/Desktop$ sudo apt install openssh-server i
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  openssh-server
  ncurses-term openssh-sftp-server ssh-import-id
0 upgraded, 5 newly installed, 0 to remove and 4 not upgraded.
```

## 6. scp

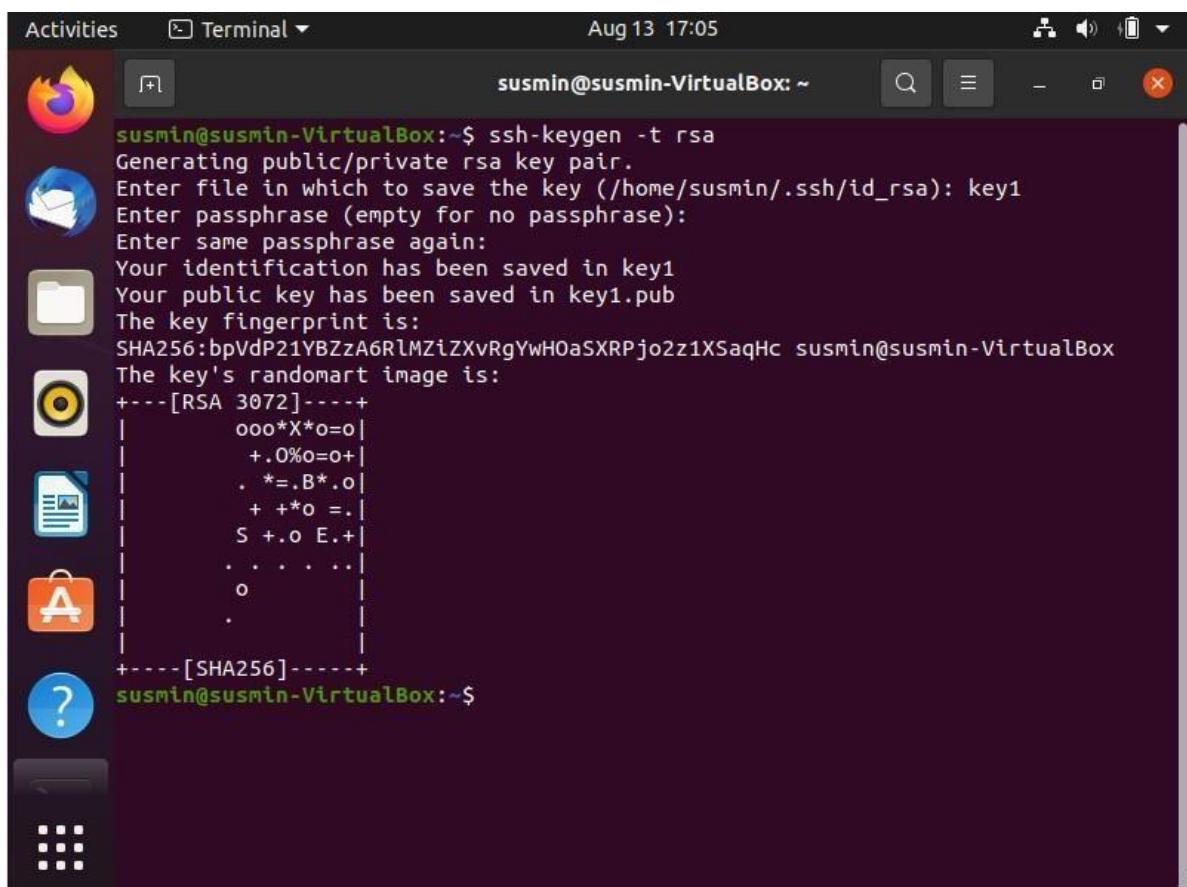
- Stands for secure copy is a command-line utility that allows you to securely.

Copy files and directories between two locations.

- With scp, you can copy a file or directory from your local system to a remote system.
- Between two remote systems from your local system.
- Remote file system locations are specified in format.

## 7. ssh-keygen

- 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.
- \$ssh-keygen -t rsa



The screenshot shows a terminal window in an Ubuntu desktop environment. The terminal title is "susmin@susmin-VirtualBox: ~". The command entered is "ssh-keygen -t rsa". The output shows the generation of a public/private key pair named "key1". It asks for a passphrase and prints the key fingerprint and randomart image. The terminal window is part of the Unity interface, with icons for various applications like the Dash, Home, and Dash to Dock visible on the left.

```
susmin@susmin-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/susmin/.ssh/id_rsa): key1
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in key1
Your public key has been saved in key1.pub
The key fingerprint is:
SHA256:bpVdP21YBZzA6RlMZiZXvRgYwHOaSXRPjo2z1XSaqHc susmin@susmin-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
|   ooo*X*o=o|
|   +.0%o=o+|
|   . *.=B*.o|
|   + +*o =.||
|   S +.o E.+|
|   . . . . .|
|   o          |
|   .          |
+---[SHA256]----+
susmin@susmin-VirtualBox:~$
```

## 8. ssh-copy-id

- The ssh-copy-id command 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.
- \$ssh-copy-id username@remote\_host

## LAB EXERCISES

1. a. Create six files with name of the form songX.mp3.

```
susmin@susmin-VirtualBox:~$ touch song1.mp3
susmin@susmin-VirtualBox:~$ touch song2.mp3
susmin@susmin-VirtualBox:~$ touch song3.mp3
susmin@susmin-VirtualBox:~$ touch song4.mp3
susmin@susmin-VirtualBox:~$ touch song5.mp3
susmin@susmin-VirtualBox:~$ touch song6.mp3
susmin@susmin-VirtualBox:~$ ls
Desktop    file2    key1      Pictures   song2.mp3  song5.mp3  Videos
Documents  file3    key1.pub   Public     song3.mp3  song6.mp3
Downloads  fruits   Music     song1.mp3  song4.mp3  Templates
susmin@susmin-VirtualBox:~$
```

- b. Create six files with name of the form snapX.mp3.

```
susmin@susmin-VirtualBox:~$ touch snap1.mp3
susmin@susmin-VirtualBox:~$ touch snap2.mp3
susmin@susmin-VirtualBox:~$ touch snap3.mp3
susmin@susmin-VirtualBox:~$ touch snap4.mp3
susmin@susmin-VirtualBox:~$ touch snap5.mp3
susmin@susmin-VirtualBox:~$ touch snap6.mp3
susmin@susmin-VirtualBox:~$ ls
Desktop    file3    Music      snap2.mp3  snap6.mp3  song4.mp3  Videos
Documents  fruits   Pictures   snap3.mp3  song1.mp3  song5.mp3
Downloads  key1     Public     snap4.mp3  song2.mp3  song6.mp3
file2      key1.pub  snap1.mp3  snap5.mp3  song3.mp3  Templates
susmin@susmin-VirtualBox:~$
```

- c. Create six files with name of the form filmX.mp3 (In each set, replace X with the numbers 1 through 6).

```
susmin@susmin-VirtualBox:~$ touch film1.mp3
susmin@susmin-VirtualBox:~$ touch film2.mp3
susmin@susmin-VirtualBox:~$ touch film3.mp3
susmin@susmin-VirtualBox:~$ touch film4.mp3
susmin@susmin-VirtualBox:~$ touch film5.mp3
susmin@susmin-VirtualBox:~$ touch film6.mp3
susmin@susmin-VirtualBox:~$ ls
Desktop    film1.mp3  film6.mp3  Pictures   snap4.mp3  song3.mp3  Videos
Documents  film2.mp3  fruits     Public     snap5.mp3  song4.mp3
Downloads  film3.mp3  key1      snap1.mp3  snap6.mp3  song5.mp3
file2      film4.mp3  key1.pub   snap2.mp3  song1.mp3  song6.mp3
file3      film5.mp3  Music     snap3.mp3  snap2.mp3  Templates
susmin@susmin-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.

```
susmin@susmin-VirtualBox:~$ mv song1.mp3 ./Music/
susmin@susmin-VirtualBox:~$ mv song2.mp3 ./Music/
susmin@susmin-VirtualBox:~$ mv song3.mp3 ./Music/
susmin@susmin-VirtualBox:~$ mv song4.mp3 ./Music/
susmin@susmin-VirtualBox:~$ mv song5.mp3 ./Music/
susmin@susmin-VirtualBox:~$ mv song6.mp3 ./Music/
susmin@susmin-VirtualBox:~$ ls -R Music
Music:
film1.mp3  film4.mp3  snap1.mp3  snap4.mp3  song1.mp3  song4.mp3
film2.mp3  film5.mp3  snap2.mp3  snap5.mp3  song2.mp3  song5.mp3
film3.mp3  film6.mp3  snap3.mp3  snap6.mp3  song3.mp3  song6.mp3
susmin@susmin-VirtualBox:~$
```

```
susmin@susmin-VirtualBox:~$ mv snap1.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ mv snap2.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ mv snap3.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ mv snap4.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ mv snap5.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ mv snap6.mp3 ./Pictures
susmin@susmin-VirtualBox:~$ ls -R Pictures
Pictures:
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3
susmin@susmin-VirtualBox:~$
```

```
susmin@susmin-VirtualBox:~$ mv film1.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ mv film2.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ mv film3.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ mv film4.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ mv film5.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ mv film6.mp3 ./Videos/
susmin@susmin-VirtualBox:~$ ls -R Videos
Videos:
film1.mp3  film2.mp3  film3.mp3  film4.mp3  film5.mp3  film6.mp3
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ mkdir {friends,family,work}
susmin@susmin-VirtualBox:~$ ls
Desktop   family  fiml1.mp3  fruits    Music      Templates
Documents  file2  fiml2.mp3  key1     Pictures   Videos
Downloads  file3  friends   key1.pub  Public    work
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ cp Music/song1.mp3 friends
susmin@susmin-VirtualBox:~$ cp Music/song2.mp3 friends
susmin@susmin-VirtualBox:~$ cp Music/song3.mp3 friends
susmin@susmin-VirtualBox:~$ cp Music/song4.mp3 friends
susmin@susmin-VirtualBox:~$ cp Music/song5.mp3 friends
susmin@susmin-VirtualBox:~$ cp Music/song6.mp3 friends
susmin@susmin-VirtualBox:~$ ls -R friends
friends:
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
susmin@susmin-VirtualBox:~$
```

```
susmin@susmin-VirtualBox:~$ cp Pictures/snap1.mp3 family
susmin@susmin-VirtualBox:~$ cp Pictures/snap2.mp3 family
susmin@susmin-VirtualBox:~$ cp Pictures/snap3.mp3 family
susmin@susmin-VirtualBox:~$ cp Pictures/snap4.mp3 family
susmin@susmin-VirtualBox:~$ cp Pictures/snap5.mp3 family
susmin@susmin-VirtualBox:~$ cp Pictures/snap6.mp3 family
susmin@susmin-VirtualBox:~$ ls -R family
family:
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3  song1.mp3
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ rmdir {family,friends}
rmdir: failed to remove 'family': Directory not empty
rmdir: failed to remove 'friends': Directory not empty
susmin@susmin-VirtualBox:~$ rmdir family,friends
rmdir: failed to remove 'family,friends': No such file or directory
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ rm -r family friends
susmin@susmin-VirtualBox:~$ ls
Desktop   file2    fml2.mp3  key1.pub  Public    work
Documents  file3    fruits    Music     Templates
Downloads  fml1.mp3  key1    Pictures  Videos
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ ls -al>allfiles.txt
susmin@susmin-VirtualBox:~$ ls
allfiles.txt  Downloads  fiml1.mp3  key1      Pictures   Videos
Desktop       file2      fiml2.mp3  key1.pub  Public     work
Documents     file3      fruits    Music     Templates
susmin@susmin-VirtualBox:~$ ls -al
total 112
drwxr-xr-x  17 susmin susmin 4096 Aug 17 21:13 .
drwxr-xr-x  3 root   root   4096 Jun  8 16:16 ..
-rw-rw-r--  1 susmin susmin 1646 Aug 17 21:13 allfiles.txt
-rw-----  1 susmin susmin 5558 Aug 17 20:51 .bash_history
-rw-r--r--  1 susmin susmin 220 Jun  8 16:16 .bash_logout
-rw-r--r--  1 susmin susmin 3771 Jun  8 16:16 .bashrc
drwx----- 12 susmin susmin 4096 Aug 13 17:02 .cache
drwx----- 14 susmin susmin 4096 Aug 13 15:33 .config
drwxr-xr-x  4 susmin susmin 4096 Aug 13 16:00 Desktop
drwxr-xr-x  2 susmin susmin 4096 Jun 22 21:16 Documents
drwxr-xr-x  2 susmin susmin 4096 Jun  8 16:49 Downloads
-rw-rw-r--  1 susmin susmin 27 Jun 15 21:16 file2
```

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

```
susmin@susmin-VirtualBox:~$ date
Tuesday 17 August 2021 09:15:22 PM IST
susmin@susmin-VirtualBox:~$ █
```

9. Add the user Juliet.

```
susmin@susmin-VirtualBox:~$ sudo useradd juliet2
[sudo] password for susmin:
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ cat /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
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106::/nonexistent:/usr/sbin/nologin
juliet2:x:1006:1018::/home/juliet2:/bin/sh
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ sudo passwd juliet2
New password:
Retype new password:
passwd: password updated successfully
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ sudo groupadd -g 30000 shakespeare
susmin@susmin-VirtualBox:~$
```

13. Create a supplementary group called artists.

```
susmin@susmin-VirtualBox:~$ sudo groupadd -g 4000 artists2
susmin@susmin-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,susmin
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
```

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

```
susmin@susmin-VirtualBox:~$ sudo groupadd -g 50000 artists3
susmin@susmin-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,susmin
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:susmin
floppy:x:25:
tape:x:26:
sudo:x:27:susmin
audio:x:29:pulse
dip:x:30:susmin
www-data:x:33:
backup:x:34:
```

```
neha:x:1003:
neha1:x:1004:
neha2:x:1005:
neha3:x:1006:
neha4:x:1007:
nehaa:x:1008:
nehaalex2:x:1010:
nehaalex4:x:1012:
nehaalex5:x:1013:
new_group:x:1009:
juliet:x:1014:
Juliet:x:1015:
Juliett:x:1016:
juliet1:x:1017:
juliet2:x:1018:
shakespeare:x:3000:
artists:x:5000:
artists2:x:4000:
artists3:x:50000:
susmin@susmin-VirtualBox:~$
```

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

```
susmin@susmin-VirtualBox:~$ sudo usermod -a -G shakespeare juliet2
susmin@susmin-VirtualBox:~$ groups juliet2
juliet2 : juliet2 shakespeare
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ id juliet2
uid=1006(juliet2) gid=1018(juliet2) groups=1018(juliet2),3000(shakespeare)
susmin@susmin-VirtualBox:~$ █
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
susmin@susmin-VirtualBox:~$ sudo useradd Romeo
susmin@susmin-VirtualBox:~$ sudo useradd Hamlet
susmin@susmin-VirtualBox:~$ sudo usermod -a -G shakespeare Romeo
susmin@susmin-VirtualBox:~$ sudo usermod -a -G shakespeare Hamlet
susmin@susmin-VirtualBox:~$ groups Romeo
Romeo : Romeo shakespeare
susmin@susmin-VirtualBox:~$ groups Hamlet
Hamlet : Hamlet shakespeare
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ sudo useradd Reba
susmin@susmin-VirtualBox:~$ sudo useradd Dolly
susmin@susmin-VirtualBox:~$ sudo useradd Elvis
susmin@susmin-VirtualBox:~$ sudo usermod -a -G artists2 Reba
susmin@susmin-VirtualBox:~$ sudo usermod -a -G artists2 Dolly
susmin@susmin-VirtualBox:~$ sudo usermod -a -G artists2 Elvis
susmin@susmin-VirtualBox:~$ groups Reba
Reba : Reba artists2
susmin@susmin-VirtualBox:~$ groups Dolly
Dolly : Dolly artists2
susmin@susmin-VirtualBox:~$ groups Elvis
Elvis : Elvis artists2
susmin@susmin-VirtualBox:~$ █
```

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

```
susmin@susmin-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,susmin
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
Romeo:x:50001:
Hamlet:x:50002:
Reba:x:50003:
Dolly:x:50004:
Elvis:x:1011:
susmin@susmin-VirtualBox:~$ █
```

20. Attempt to remove user Dolly.

```
susmin@susmin-VirtualBox:~$ sudo userdel Dolly
susmin@susmin-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,susmin
tty:x:5:syslog
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:susmin
floppy:x:25:
tape:x:26:
sudo:x:27:susmin
shakespeare:x:3000:juliet2,Romeo,Hamlet
artists:x:5000:
artists2:x:4000:Reba,Elvis
artists3:x:50000:
Romeo:x:50001:
Hamlet:x:50002:
Reba:x:50003:
Elvis:x:1011:
susmin@susmin-VirtualBox:~$
```

## LAB EXERCISES

### Q1. ping route traceroute, nslookup, Ip Config, NetStat .

#### LINUX

##### 1. ping

ping is the primary TCP/IP command used to troubleshoot connectivity, reachability, and name resolution. Used without parameters, this command displays Help content.

```
susmin@susmin-VirtualBox:~$ ping www.facebook.com
PING star-mini.c10r.facebook.com (157.240.228.35) 56(84) bytes of data.
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=1 ttl=51 time=58.9 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=2 ttl=51 time=60.2 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=3 ttl=51 time=59.6 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=4 ttl=51 time=58.3 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=5 ttl=51 time=66.3 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=6 ttl=51 time=65.6 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=7 ttl=51 time=63.7 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=8 ttl=51 time=63.0 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=9 ttl=51 time=69.2 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
q=10 ttl=51 time=90.7 ms
64 bytes from edge-star-mini-shv-01-tir2.facebook.com (157.240.228.35): icmp_se
```

##### 2. traceroute

Traceroute is a network diagnostic tool used to track in real-time the pathway taken by a packet on an IP network from source to destination, reporting the IP addresses of all the routers it pinged in between. Traceroute also records the time taken for each hop the packet makes during its route to the destination. The difference between **tracert(windows)** and **traceroute(linux)** is that: tracert(windows) will only use ICMP echo requests. traceroute(linux) [and somewhat dependent on linux distro] default to UDP echo requests.\

```
susmin@susmin-VirtualBox:~$ traceroute www.facebook.com
traceroute to star-mini.c10r.facebook.com (157.240.228.35), 64 hops max
 1  10.0.2.2  0.250ms  0.193ms  0.163ms
```

### 3. nslookup

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.

```
susmin@susmin-VirtualBox:~$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.77.110
Name:   google.com
Address: 2404:6800:4007:816::200e
```

### 4. netstat

The netstat command symbolically **displays the contents of various network-related data structures for active connections**. The Interval parameter, which is specified in seconds, continuously displays information regarding packet traffic on the configured network interfaces.

```
susmin@susmin-VirtualBox:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:mysql          0.0.0.0:*
tcp      0      0 localhost:domain        0.0.0.0:*
tcp      0      0 0.0.0.0:ssh            0.0.0.0:*
tcp      0      0 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*
tcp6     0      0 [::]:ssh               [::]:*
tcp6     0      0 ip6-localhost:ipp       [::]:*
udp      0      0 localhost:domain        0.0.0.0:*
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 0.0.0.0:40087          0.0.0.0:*
udp      0      0 0.0.0.0:mdns           0.0.0.0:*
udp6     0      0 [::]:48702             [::]:*
udp6     0      0 [::]:mdns              [::]:*
raw6    0      0 [::]:ipv6-icmp         [::]:*
```

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## 5. route

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.

```
susmin@susmin-VirtualBox:~$ sudo route
Kernel IP routing table
Destination      Gateway          Genmask        Flags Metric Ref  Use Iface
default         _gateway        0.0.0.0       UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0        255.255.255.0   U     100    0        0 enp0s3
link-local      0.0.0.0        255.255.0.0    U     1000   0        0 enp0s3
susmin@susmin-VirtualBox:~$
```

## 2. ipconfig

- 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.
- Ifconfig (interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.
- The ifconfig command is supported by Unix-based operating systems. Functionality: The ipconfig command **displays all the currently connected network interfaces whether they are active or not**. On the other hand, the ifconfig command displays only the enabled network interfaces that are connected to the system.

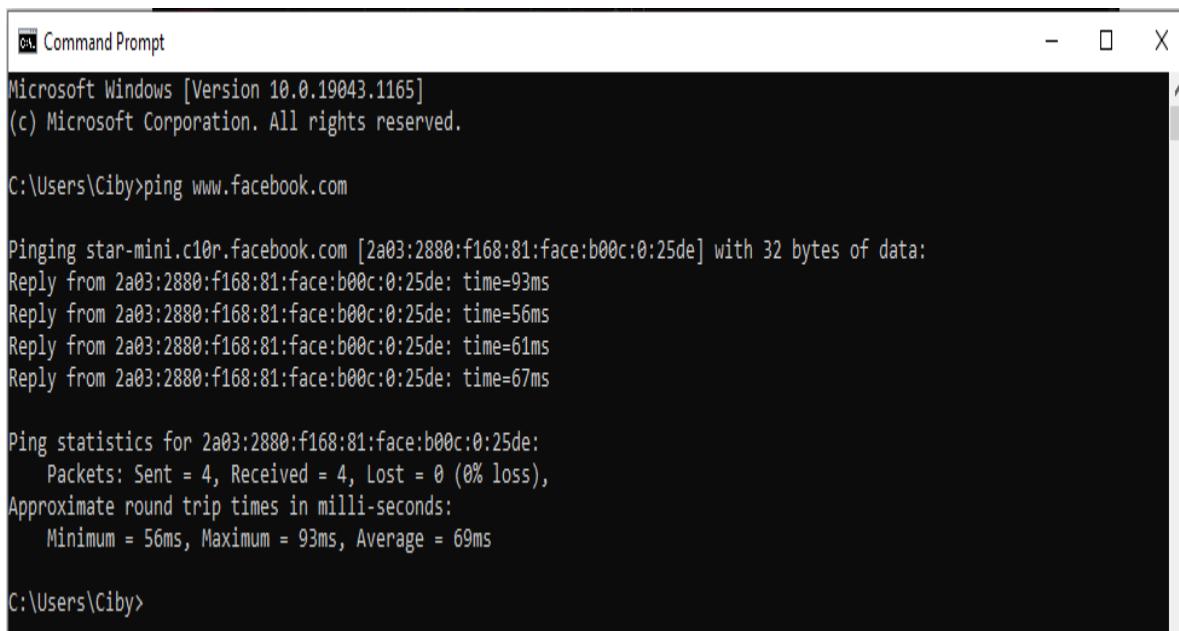
```
susmin@susmin-VirtualBox:~$ sudo ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::1a7a:ba0f:f462:ebf5 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:2d:04:e5 txqueuelen 1000 (Ethernet)
            RX packets 10689 bytes 14673018 (14.6 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 3445 bytes 239752 (239.7 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 233 bytes 20461 (20.4 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 233 bytes 20461 (20.4 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

susmin@susmin-VirtualBox:~$
```

## WINDOWS

### 1. ping



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The title bar also displays "Microsoft Windows [Version 10.0.19043.1165]" and "(c) Microsoft Corporation. All rights reserved.". The main area of the window shows the following command and its output:

```
C:\Users\Ciby>ping www.facebook.com

Pinging star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de] with 32 bytes of data:
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=93ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=56ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=61ms
Reply from 2a03:2880:f168:81:face:b00c:0:25de: time=67ms

Ping statistics for 2a03:2880:f168:81:face:b00c:0:25de:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 56ms, Maximum = 93ms, Average = 69ms

C:\Users\Ciby>
```

## 2. route

```
C:\Users\Ciby>route www.facebook.com

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
      [MASK netmask] [gateway] [METRIC metric] [IF interface]

-f      Clears the routing tables of all gateway entries. If this is
       used in conjunction with one of the commands, the tables are
       cleared prior to running the command.

-p      When used with the ADD command, makes a route persistent across
       boots of the system. By default, routes are not preserved
       when the system is restarted. Ignored for all other commands,
       which always affect the appropriate persistent routes.

-4      Force using IPv4.

-6      Force using IPv6.
```

## 3.tracert

```
C:\Users\Ciby>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]
over a maximum of 30 hops:

 1  4 ms    3 ms    3 ms  jiofi.local.html [2409:4073:214:da6f:d449:c4a0:4ad1:e136]
 2  *        *        * Request timed out.
 3  60 ms   49 ms   49 ms  2405:200:314:1501::2
 4  73 ms   79 ms   58 ms  2405:200:801:1100::46a
 5  54 ms   *        54 ms  2405:200:801:1100::453
 6  67 ms   57 ms   87 ms  ae14.pr01.tir1.tfbnw.net [2620:0:1cff:dead:beee::148]
 7  68 ms   70 ms   64 ms  ae14.pr01.tir1.tfbnw.net [2620:0:1cff:dead:beee::148]
 8  76 ms   62 ms   63 ms  po101.psw02.tir2.tfbnw.net [2620:0:1cff:dead:bef0::795]
 9  51 ms   61 ms   67 ms  po2.msw1an.01.tir2.tfbnw.net [2a03:2880:f06d:ffff::4f]
10  57 ms   73 ms   66 ms  edge-star-mini6-shv-01-tir2.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]

Trace complete.

C:\Users\Ciby>
```

## 4. netstat

```
C:\Users\Ciby>netstat -a

Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    0.0.0.0:135         DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:445         DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:5040        DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:7680        DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49664       DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49665       DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49666       DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49667       DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49668       DESKTOP-0L9ESC4:0  LISTENING
  TCP    0.0.0.0:49672       DESKTOP-0L9ESC4:0  LISTENING
  TCP    127.0.0.1:27017     DESKTOP-0L9ESC4:0  LISTENING
  TCP    127.0.0.1:49671     DESKTOP-0L9ESC4:0  LISTENING
  TCP    192.168.56.1:139    DESKTOP-0L9ESC4:0  LISTENING
  TCP    192.168.225.80:139   DESKTOP-0L9ESC4:0  LISTENING
  TCP    192.168.225.80:49544 MITV:8009          ESTABLISHED
  TCP    192.168.225.80:50131 117.18.237.29:http  CLOSE_WAIT
  TCP    192.168.225.80:52781 20.198.162.78:https ESTABLISHED
  TCP    [::]:135             DESKTOP-0L9ESC4:0  LISTENING
  TCP    [::]:445             DESKTOP-0L9ESC4:0  LISTENING
  TCP    [::]:7680            DESKTOP-0L9ESC4:0  LISTENING
```

Activate

## 5. ipconfig

```
C:\Users\Ciby>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::e5fe:62c2:45b0:14e6%3
  IPv4 Address. . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Wireless LAN adapter WiFi:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 11:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :
```

Activate

## 6. nslookup

```
C:\Users\Ciby>nslookup google.com
Server: UnKnown
Address: fe80::e072:e0ff:fe19:1d3f

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4007:811::200e
           142.250.67.46

C:\Users\Ciby>
```

**Q2. Identify and perform 5 more network commands and it's working.****1. hostname**

A very simple command that displays the host name of your machine. This is much quicker than going to the control panel>system route.

```
C:\Users\Ciby>hostname  
DESKTOP-0L9ESC4  
  
C:\Users\Ciby>
```

**2. getmac**

Another very simple command that shows the MAC address of your network interfaces.

```
C:\Users\Ciby>getmac  
  
Physical Address      Transport Name  
=====  =====  
CC-52-AF-98-32-48  Media disconnected  
2C-27-D7-CD-63-90  Media disconnected  
D0-37-45-D3-C9-F0  \Device\Tcpip_{416ACD82-EBC9-4457-A2E2-D23B7882962A}  
0A-00-27-00-00-03  \Device\Tcpip_{0DAC9CDF-1AFD-470D-BE9F-865420989E6F}  
  
C:\Users\Ciby>
```

Activator

### 3. arp

This is used for showing the **address resolution cache**. This command must be used with a command line switch **arp -a** is the most common.

```
C:\Users\Ciby>arp -a

Interface: 192.168.56.1 --- 0x3
Internet Address      Physical Address      Type
 192.168.56.255        ff-ff-ff-ff-ff-ff    static
 224.0.0.2              01-00-5e-00-00-02    static
 224.0.0.22             01-00-5e-00-00-16    static
 224.0.0.251            01-00-5e-00-00-fb    static
 224.0.0.252            01-00-5e-00-00-fc    static
 239.255.255.250        01-00-5e-7f-ff-fa    static
 239.255.255.251        01-00-5e-7f-ff-fb    static
 255.255.255.255        ff-ff-ff-ff-ff-ff    static

Interface: 192.168.225.80 --- 0xb
Internet Address      Physical Address      Type
 192.168.225.1          e2-72-e0-1c-20-42    dynamic
 192.168.225.156        ac-5d-5c-30-3d-ce    dynamic
 192.168.225.255        ff-ff-ff-ff-ff-ff    static
 224.0.0.2              01-00-5e-00-00-02    static
 224.0.0.22             01-00-5e-00-00-16    static
 224.0.0.251            01-00-5e-00-00-fb    static
 224.0.0.252            01-00-5e-00-00-fc    static
 239.255.255.250        01-00-5e-7f-ff-fa    static
 239.255.255.251        01-00-5e-7f-ff-fb    static
 255.255.255.255        ff-ff-ff-ff-ff-ff    static

C:\Users\Ciby> Activate
```

### 4. nbtstat

The nbtstat command is a **diagnostic tool for NetBIOS over TCP/IP**. Its primary design is to help troubleshoot NetBIOS name resolution problems. The command is included in several versions of Microsoft Windows. When a network is functioning normally, NetBIOS over TCP/IP (NetBT) resolves NetBIOS names to IP addresses.

```
C:\Users\Ciby>nbtstat -r

NetBIOS Names Resolution and Registration Statistics
-----

Resolved By Broadcast      = 0
Resolved By Name Server   = 0

Registered By Broadcast   = 20
Registered By Name Server = 0

C:\Users\Ciby>
```

## 5. pathping

The pathping command which provides a combination of the best aspects of Tracert and Ping. This command takes 300 seconds to gather statistics and then returns reports on latency and packet loss statistics at intermediate hops between the source and the target in more detail than those reports provided by Ping or Tracert commands.

```
C:\Users\Ciby>pathping www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]
over a maximum of 30 hops:
 0 DESKTOP-0L9ESC4 [2409:4073:214:da6f:9db7:396a:8786:ad3a]
 1 jiofi.local.html [2409:4073:214:da6f:d449:c4a0:4ad1:e136]
 2 * * *
Computing statistics for 25 seconds...
          Source to Here  This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
 0                  DESKTOP-0L9ESC4 [2409:4073:214:da6f:9db7:396a:8786:ad3a]
 1    3ms    0/ 100 = 0%    0/ 100 = 0%  jiofi.local.html [2409:4073:214:da6f:d449:c4a0:4ad1:e136]

Trace complete.

C:\Users\Ciby>
```

# LAMP INSTALLATION

## Install apache

- Update your system

```
sudo apt update
```

- Install Apache using apt:

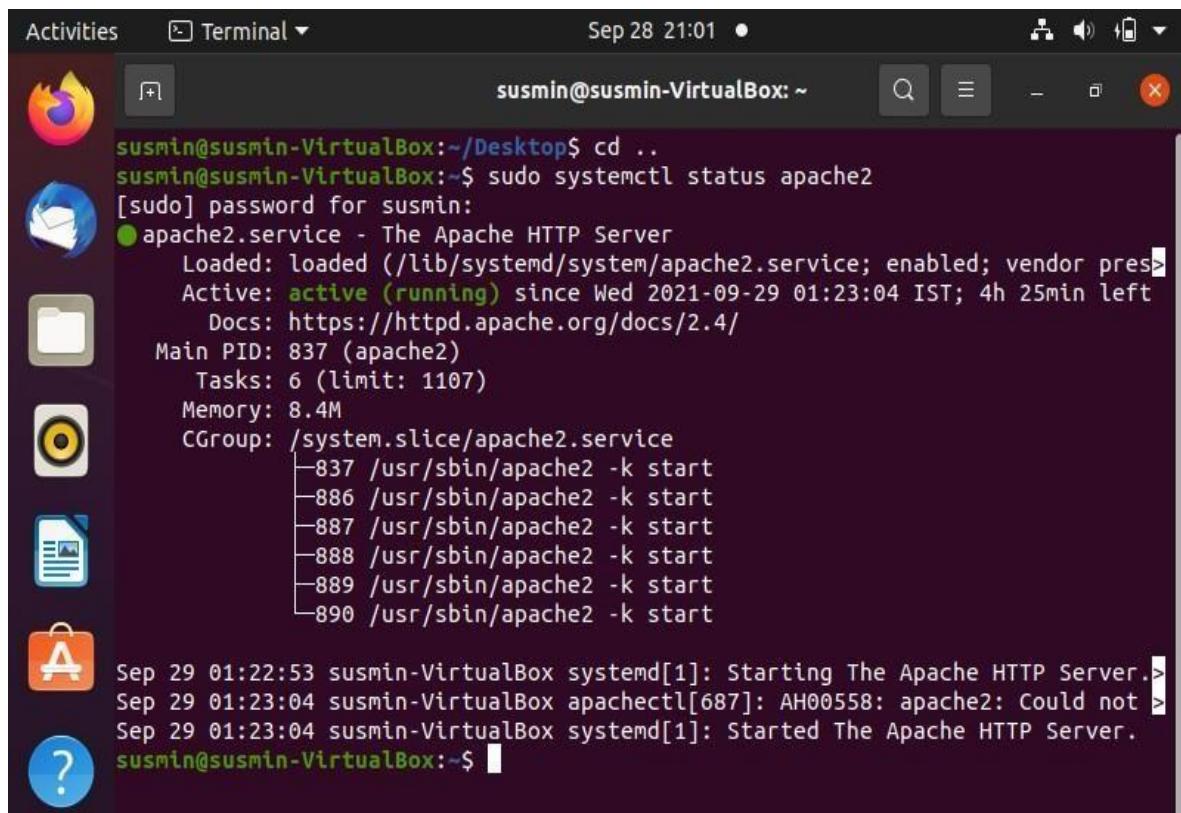
```
sudo apt install apache2
```

- Confirm that Apache is now running with the following command:

```
sudo systemctl status apache2
```

- if it is not working

```
sudo systemctl start apache2
```



```
susmin@susmin-VirtualBox:~/Desktop$ cd ..  
susmin@susmin-VirtualBox:~$ sudo systemctl status apache2  
[sudo] password for susmin:  
● apache2.service - The Apache HTTP Server  
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres  
  Active: active (running) since Wed 2021-09-29 01:23:04 IST; 4h 25min left  
    Docs: https://httpd.apache.org/docs/2.4/  
   Main PID: 837 (apache2)  
     Tasks: 6 (limit: 1107)  
    Memory: 8.4M  
      CGroup: /system.slice/apache2.service  
              └─837 /usr/sbin/apache2 -k start  
                  ├─886 /usr/sbin/apache2 -k start  
                  ├─887 /usr/sbin/apache2 -k start  
                  ├─888 /usr/sbin/apache2 -k start  
                  ├─889 /usr/sbin/apache2 -k start  
                  └─890 /usr/sbin/apache2 -k start  
  
Sep 29 01:22:53 susmin-VirtualBox systemd[1]: Starting The Apache HTTP Server.  
Sep 29 01:23:04 susmin-VirtualBox apachectl[687]: AH00558: apache2: Could not  
Sep 29 01:23:04 susmin-VirtualBox systemd[1]: Started The Apache HTTP Server.  
susmin@susmin-VirtualBox:~$
```

## Install mariadb

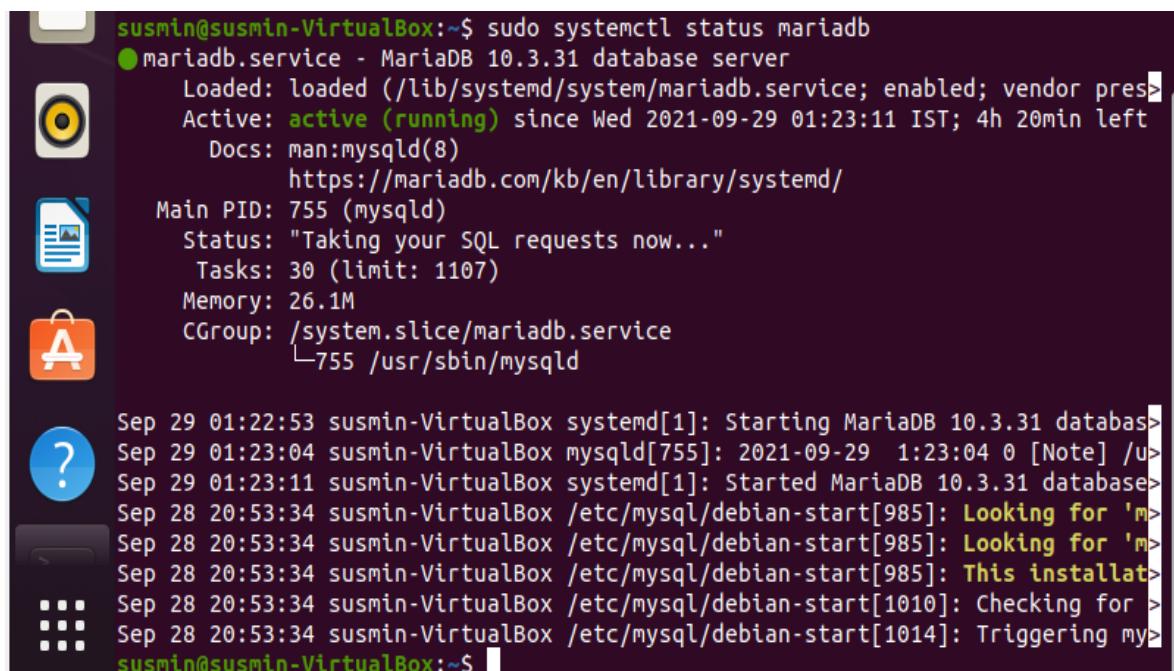
- **Install mariaDB**

```
sudo apt install mariadb-server mariadb-client
```

- **Check mariadb Installation**

```
sudo systemctl status mysql
```

(if it is not working sudo systemctl start mysql )



```
susmin@susmin-VirtualBox:~$ sudo systemctl status mariadb
● 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 01:23:11 IST; 4h 20min left
     Docs: man:mysqld(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 755 (mysqld)
     Status: "Taking your SQL requests now..."
      Tasks: 30 (limit: 1107)
    Memory: 26.1M
   CGroup: /system.slice/mariadb.service
           └─755 /usr/sbin/mysqld

Sep 29 01:22:53 susmin-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database...
Sep 29 01:23:04 susmin-VirtualBox mysqld[755]: 2021-09-29  1:23:04 0 [Note] /u>
Sep 29 01:23:11 susmin-VirtualBox systemd[1]: Started MariaDB 10.3.31 database...
Sep 28 20:53:34 susmin-VirtualBox /etc/mysql/debian-start[985]: Looking for 'm>
Sep 28 20:53:34 susmin-VirtualBox /etc/mysql/debian-start[985]: Looking for 'm>
Sep 28 20:53:34 susmin-VirtualBox /etc/mysql/debian-start[985]: This installat>
Sep 28 20:53:34 susmin-VirtualBox /etc/mysql/debian-start[1010]: Checking for >
Sep 28 20:53:34 susmin-VirtualBox /etc/mysql/debian-start[1014]: Triggering my>
susmin@susmin-VirtualBox:~$
```

## Install PHP

- **Install PHP**

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

- **Restart apache2**

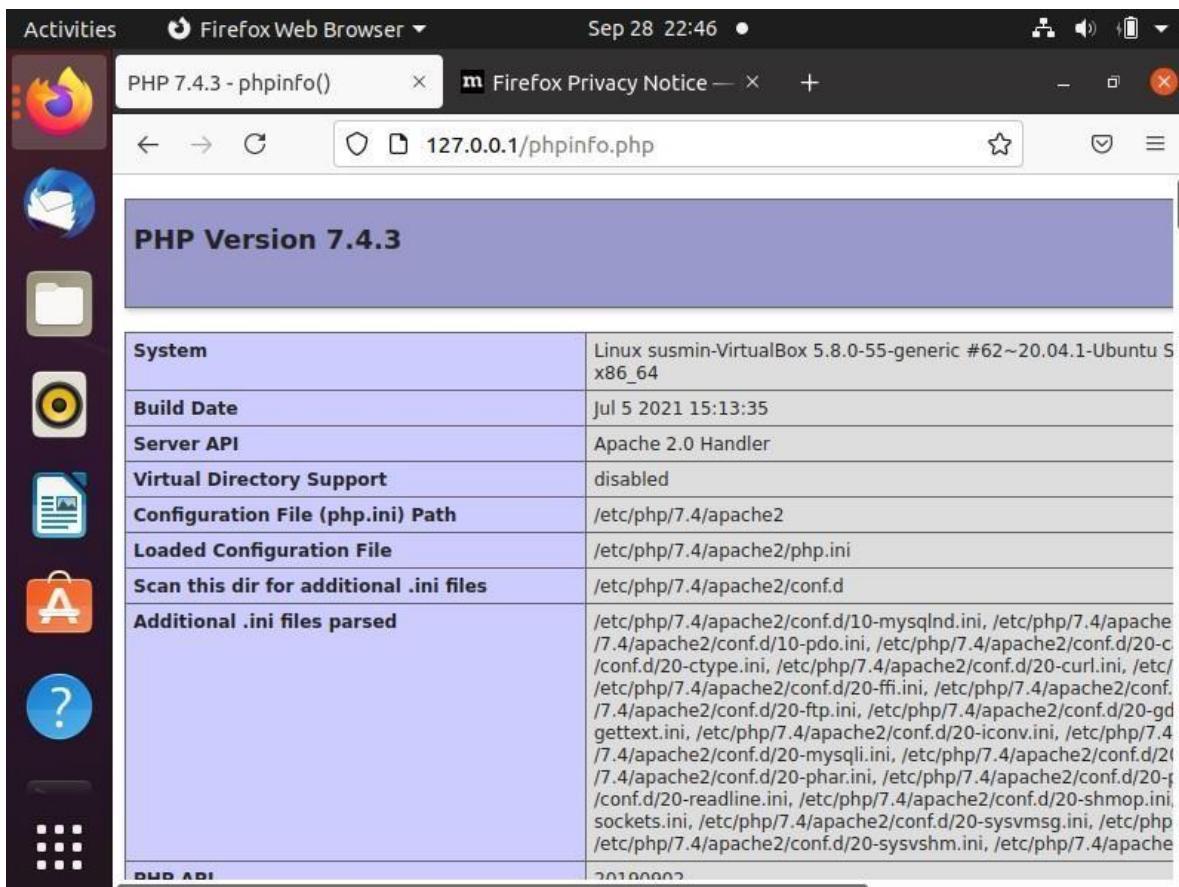
```
sudo systemctl restart apache2
```

- **Now you can check php installation**

```
sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/html/phpinfo.php >/dev/null
```

- **Open a browser**

<http://127.0.0.1/phpinfo.php>



## Install phpmyadmin

- **Install phpmyadmin**

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

( It ask for webserver select apache2, select db configuration and set password )

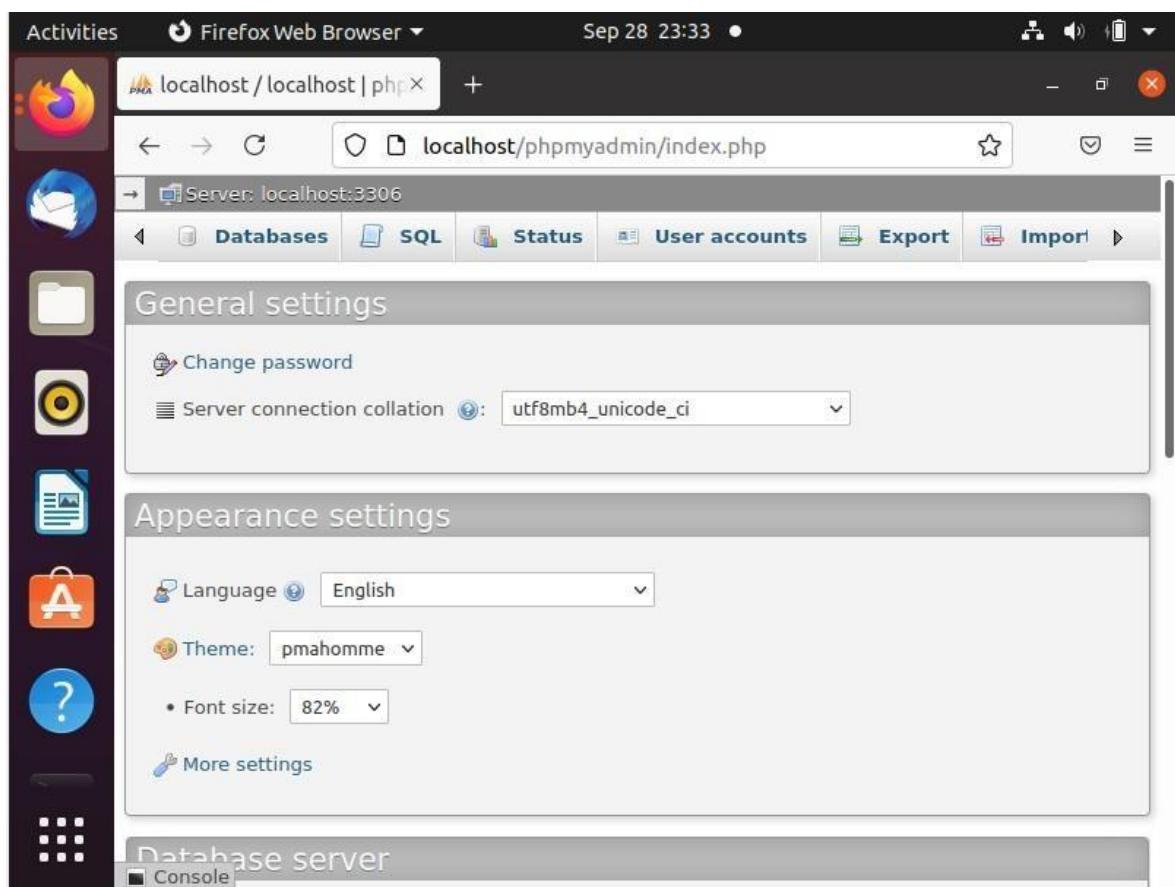
- **Restart apache2**

```
sudo systemctl restart apache2
```

- **Check phpmyadmin**

- **Open a browser**

<http://localhost/phpmyadmin>



## ANSIBLE INSTALLATION

### Step 1: sudo apt install ansible

```
susmin@susmin-VirtualBox:~$ sudo apt install ansible
[sudo] password for susmin:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmltodict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmltodict
0 upgraded, 17 newly installed, 0 to remove and 165 not upgraded.
Need to get 9,865 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
.10.1-2 [95.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64 A
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible (2.9.6+dfsg-1) ...
Processing triggers for man-db (2.9.1-1) ...
susmin@susmin-VirtualBox:~$
```

## INSTALLATION CHECK

### Step 2: sudo ansible --version

```
susmin@susmin-VirtualBox:~$ sudo ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/root/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.5 (default, May 27 2021, 13:30:53) [GCC 9.3.0]
susmin@susmin-VirtualBox:~$
```

## ANALYZING NETWORK PACKET STREAM USING tcpdump

### tcpdump installation:

- **sudo apt install tcpdump**

```
susmin@susmin-VirtualBox:~$ 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).
0 upgraded, 0 newly installed, 0 to remove and 210 not upgraded.
susmin@susmin-VirtualBox:~$
```

- **sudo tcpdump**

```
susmin@susmin-VirtualBox:~$ 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
11:58:47.623746 IP susmin-VirtualBox.53164 > 192.168.43.1.domain: 1586+ AAAA? connectivity-check.ubuntu.com. (47)
11:58:47.628262 IP 192.168.43.1.domain > susmin-VirtualBox.53164: 1586 0/0/0 (47)
11:58:47.797365 IP susmin-VirtualBox.44876 > 192.168.43.1.domain: 10557+ PTR? 1.43.168.192.in-addr.arpa. (43)
11:58:47.801064 IP 192.168.43.1.domain > susmin-VirtualBox.44876: 10557 NXDomain 0/0/0 (43)
11:58:47.802264 IP susmin-VirtualBox.33494 > 192.168.43.1.domain: 61384+ PTR? 1.5.2.0.10.in-addr.arpa. (40)
11:58:47.805790 IP 192.168.43.1.domain > susmin-VirtualBox.33494: 61384 NXDomain 0/0/0 (40)
11:58:47.811472 IP susmin-VirtualBox.49761 > 192.168.43.1.domain: 33361+ AAAA? connectivity-check.ubuntu.com. (47)
11:58:47.815963 IP 192.168.43.1.domain > susmin-VirtualBox.49761: 33361 0/0/0 (47)
11:58:49.017886 IP susmin-VirtualBox.60414 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 3956053449, win 64240, options [mss 1460,sackOK,TS val 3866071936 ecr 0,nop,wscale 7], length 0
11:58:49.019056 IP susmin-VirtualBox.36852 > 192.168.43.1.domain: 34520+ PTR? 3.2.121.122.34.in-addr.arpa. (44)
11:58:49.128092 IP 192.168.43.1.domain > susmin-VirtualBox.36852: 34520 1/0/0 PTR 32.121.122.34.bc.googleusercontent.com. (96)
70 packets captured
70 packets received by filter
0 packets dropped by kernel
susmin@susmin-VirtualBox:~$
```

- **tcpdump -D**

```
susmin@susmin-VirtualBox:~$ 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]
susmin@susmin-VirtualBox:~$ █
```

- **sudo tcpdump -i enp0s3**

```
susmin@susmin-VirtualBox:~$ sudo tcpdump -i enp0s3
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:43:47.454283 IP susmin-VirtualBox.46527 > jiofi.local.html.domain: 4481+ AAA
A? connectivity-check.ubuntu.com. (47)
12:43:47.456316 IP susmin-VirtualBox.59012 > jiofi.local.html.domain: 6469+ PTR
? 1.225.168.192.in-addr.arpa. (44)
12:43:47.460434 IP jiofi.local.html.domain > susmin-VirtualBox.59012: 6469* 1/0
/0 PTR jiofi.local.html. (74)
12:43:47.460465 IP jiofi.local.html.domain > susmin-VirtualBox.46527: 4481 0/0/
0 (47)

12 packets captured
12 packets received by filter
0 packets dropped by kernel
susmin@susmin-VirtualBox:~$
```

- **sudo tcpdump -c 5**

```
susmin@susmin-VirtualBox:~$ 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
susmin@susmin-VirtualBox:~$
```

- **sudo tcpdump -I enp0s3 -c 5 port 80**

```
susmin@susmin-VirtualBox:~$ 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
12:14:16.042677 IP susmin-VirtualBox.47238 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [S], seq 2443242225, win 64240, options [mss 1460,sackOK,TS va
l 2678861433 ecr 0,nop,wscale 7], length 0
12:14:16.392629 IP 17.111.232.35.bc.googleusercontent.com.http > susmin-Virtual
Box.47238: Flags [S.], seq 56384001, ack 2443242226, win 65535, options [mss 14
60], length 0
12:14:16.392694 IP susmin-VirtualBox.47238 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [.], ack 1, win 64240, length 0
12:14:16.393024 IP susmin-VirtualBox.47238 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [P.], seq 1:88, ack 1, win 64240, length 87: HTTP: GET / HTTP/
1.1
12:14:16.393361 IP 17.111.232.35.bc.googleusercontent.com.http > susmin-Virtual
Box.47238: Flags [.], ack 88, win 65535, length 0
5 packets captured
5 packets received by filter
0 packets dropped by kernel
susmin@susmin-VirtualBox:~$
```

- **sudo tcpdump host 10.0.2.15**

```
susmin@susmin-VirtualBox:~$ sudo tcpdump host 10.0.2.15
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:18:47.453750 IP susmin-VirtualBox.33434 > jiofi.local.html.domain: 55345+ AA
AA? connectivity-check.ubuntu.com. (47)
12:18:47.455293 IP susmin-VirtualBox.44653 > jiofi.local.html.domain: 2512+ PTR
? 1.225.168.192.in-addr.arpa. (44)
12:18:47.459610 IP jiofi.local.html.domain > susmin-VirtualBox.44653: 2512* 1/0
/0 PTR jiofi.local.html. (74)
12:18:47.460403 IP susmin-VirtualBox.51709 > jiofi.local.html.domain: 48168+ PT
R? 15.2.0.10.in-addr.arpa. (40)
12:18:47.592100 IP jiofi.local.html.domain > susmin-VirtualBox.51709: 48168 NXD
domain* 0/1/0 (99)
12:18:47.592128 IP jiofi.local.html.domain > susmin-VirtualBox.33434: 55345 0/1
/0 (108)
12:18:47.595393 IP susmin-VirtualBox.58183 > jiofi.local.html.domain: 63102+ AA
AA? connectivity-check.ubuntu.com. (47)
12:18:47.600949 IP jiofi.local.html.domain > susmin-VirtualBox.58183: 63102 0/0
/0 (47)
12:18:52.528012 ARP, Request who-has _gateway tell susmin-VirtualBox, length 28
12:18:52.528757 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng A
26 packets captured
26 packets received by filter
0 packets dropped by kernel
susmin@susmin-VirtualBox:~$
```

- **tcpdump -i eth1 icmp**

```
susmin@susmin-VirtualBox:~$ tcpdump -i eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
susmin@susmin-VirtualBox:~$
```

- **sudo tcpdump -n -i enp0s3 -c 10 -w**

```
susmin@susmin-VirtualBox:~$ 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 timestamptype ] [ -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 postrotate
e-command ]
          [ -Z user ] [ expression ]
susmin@susmin-VirtualBox:~$
```

## **SHELL SCRIPTING**

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

```
echo "enter details and view"
echo enter your name
read name
echo enter your college name
read c
clear
echo Details you entered
echo Name:$name
echo College:$c
```

### **OUTPUT:**

```
user@user-VirtualBox:~$ bash 1.sh
enter details and view
enter your name
susmin
enter your college name
amal jyothi college

Details you entered
Name:susmin
College:amal jyothi college
```

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

```
echo "Display value of a variable"
a=50
echo $a
```

### **OUTPUT:**

```
user@user-VirtualBox:~$ bash 2.sh
Display value of a variable
50
```

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

```
echo enter a number
read a
echo enter another number
read b
echo enter operation
echo "\n1.addition \n2.subtraction \n3.multiplication \n4.division"
read op
case "$op" in
"1") echo "a+b=\"$((a+b))";;
"2") echo "a-b=\"$((a-b))";;
"3") echo "a*b=\"$((a*b))";;
"4") echo "a/b=\"$((a/b))";;
esac
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 3.sh
enter a number
7
enter another number
8
enter operation
\n1.addition \n2.subtraction \n3.multiplication \n4.division
2
a-b=-1
```

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

```
echo enter a number
read a
if [ $a -eq 10 ];
then
echo "number found"
else
echo "not found"
fi
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 4.sh
enter a number
9
not found
```

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

```
echo "Today is $(date)"
echo "calender:"
cal
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 5.sh
Today is Saturday 02 October 2021 05:53:45 PM IST
calender:
      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
```

**6.** Write a shell script to check a number is even or odd. #!/bin/bash

```
echo enter a number
read n
x=$(( $n % 2 ))
if [ $x -eq 0 ];
then
echo "number is even"
else
echo "number is odd"
fi
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 6.sh
enter a number
4
number is even
```

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

```
echo enter first number
read a
echo enter second number
read b
if [ $a -gt $b ];
then
echo "$a is larger"
elif [ $b -gt $a ];
then
echo "$b is larger"
else
echo "both are equal"
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 7.sh
enter first number
54
enter second number
34
54 is larger
```

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

```
s=0
for ((i=0;i<=10;i++))
do
s=`expr $s + $i`
done
echo "sum of first 10 numbers=$s"
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 8.sh
sum of first 10 numbers=55
```

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

```
echo please enter your first number
read a
echo please enter your second number
read b
echo please enter your third number
read c
echo please enter your fourth number
read d
sum=$(($a + $b + $c + $d))
prod=$(($a * $b * $c * $d))
avg=$(echo $sum/4 | bc -l)
echo "the sum is:$sum"
echo "the average is:$avg"
echo "the product is:$prod"
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 9.sh
please enter your first number
1
please enter your second number
2
please enter your third number
3
please enter your fourth number
4
the sum is:10
the average is:2.5000000000000000000000000000000
the product is:24
```

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

```
echo enter first number
read a
echo enter second number
read b
echo enter third number
read c
if [ $a -lt $b ];
then
if [ $a -lt $c ];
then
echo "$a is smallest"
fi
elif [ $b -lt $c ];
```

```
then
echo "$b is smallest"
else
echo "$c is smallest";
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 10.sh
enter first number
5
enter second number
2
enter third number
6
2 is smallest
```

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

```
echo enter a number
read n
f=1
for ((i=2;i<=n;i++))
do
f=$((f*i))
done
echo "factorial is $f"
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 11.sh
enter a number
5
factorial is 120
```

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

```
echo enter a number
read n
rev=$(echo $n | rev)
if [ $n -eq $rev ];
then
echo "number is palindrome"
else
echo "number is not palindrome"
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 12.sh
enter a number
1221
number is palindrome
```

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

```
echo enter size
read n
i=1
s=0
echo "enter numbers"
while [ $i -le $n ]
do
read num
s=$((s+num))
i=$((i+1))
done
avg=$(echo $s/$n | bc -l)
echo "average is $avg"
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 13.sh
enter size
5
enter numbers
6
7
8
9
4
average is 6.8000000000000000000000000000000
```

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

```
echo enter a number
read n
s=0
while [ $n -gt 0 ]
do
mod=$((n%10))
s=$((s+mod))
n=$((n/10))
done
echo "sum of digit is $s"
```

**OUTPUT:**

```
user@user-VirtualBox:~$ bash 14.sh
enter a number
678
sum of digit is 21
```

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

```
echo enter year
read y
a=$((y%4))
b=$((y%100))
c=$((y%400))
if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];
then
echo "$y is leap year"
else
echo "$y is leap year"
fi
```

## OUTPUT:

```
user@user-VirtualBox:~$ bash 15.sh
enter year
1994
1994 is leap year
```

## **DOCKER INSTALLATION**

### **Step 1:**

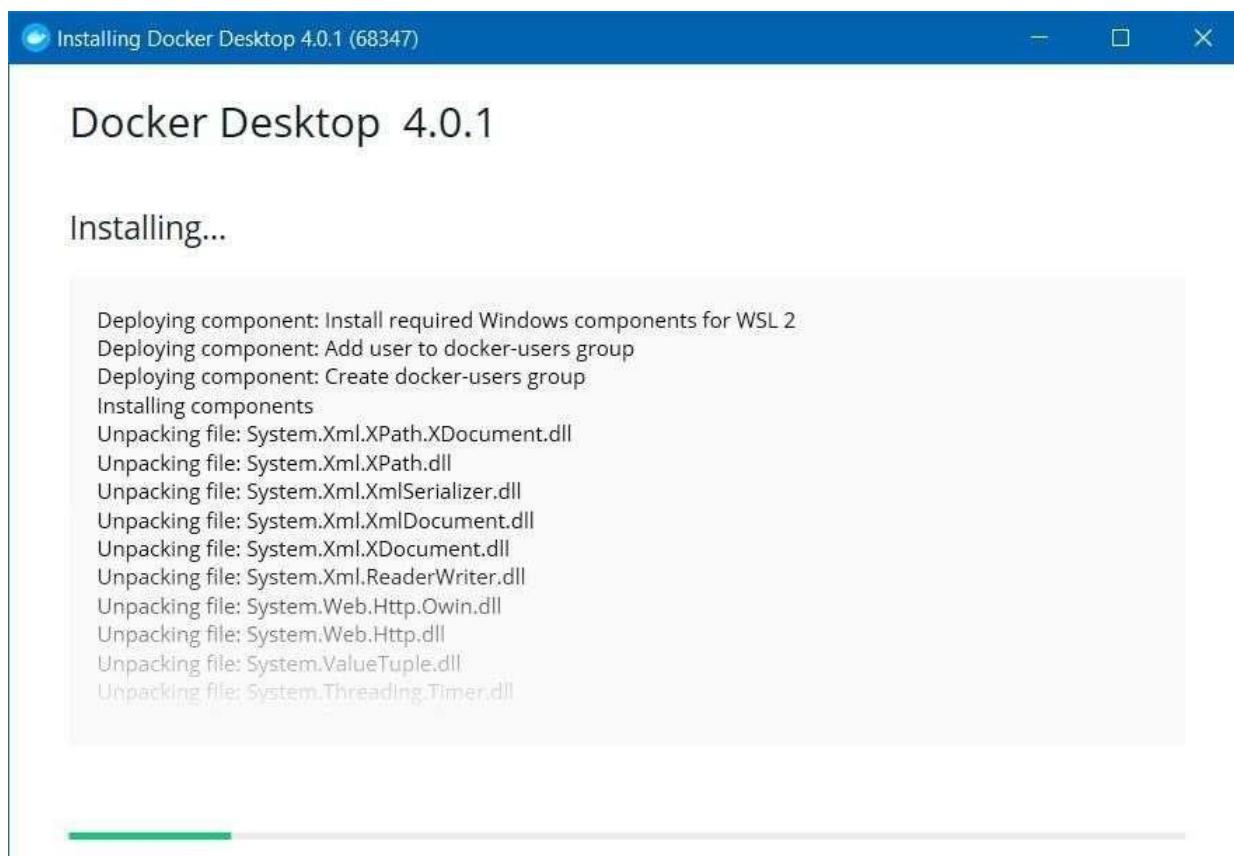
Download Docker desktop Installer for Windows from

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



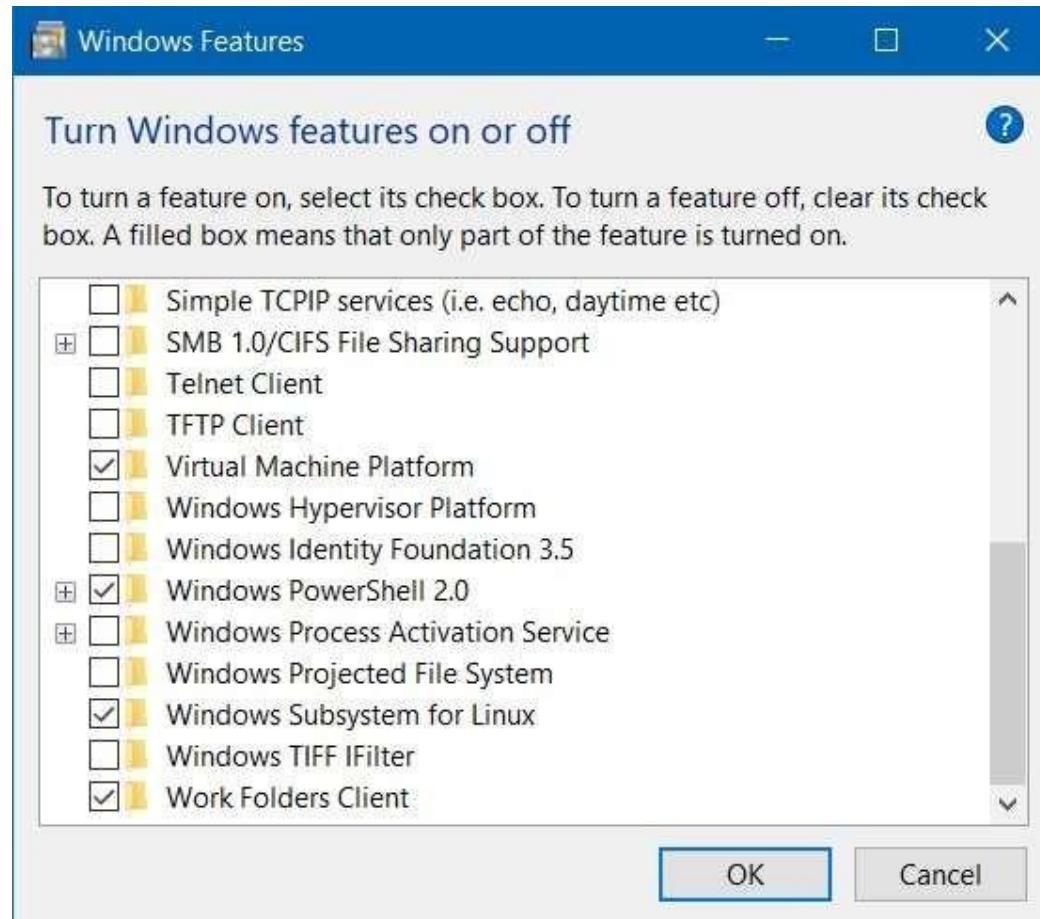
### **Step 2:**

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



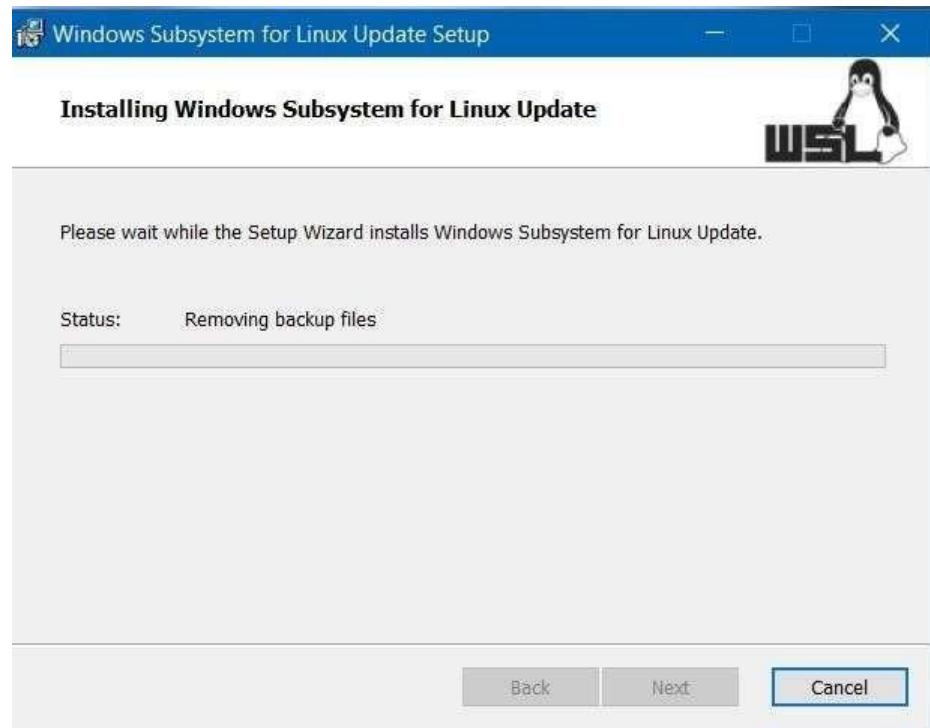
### Step 3:

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.



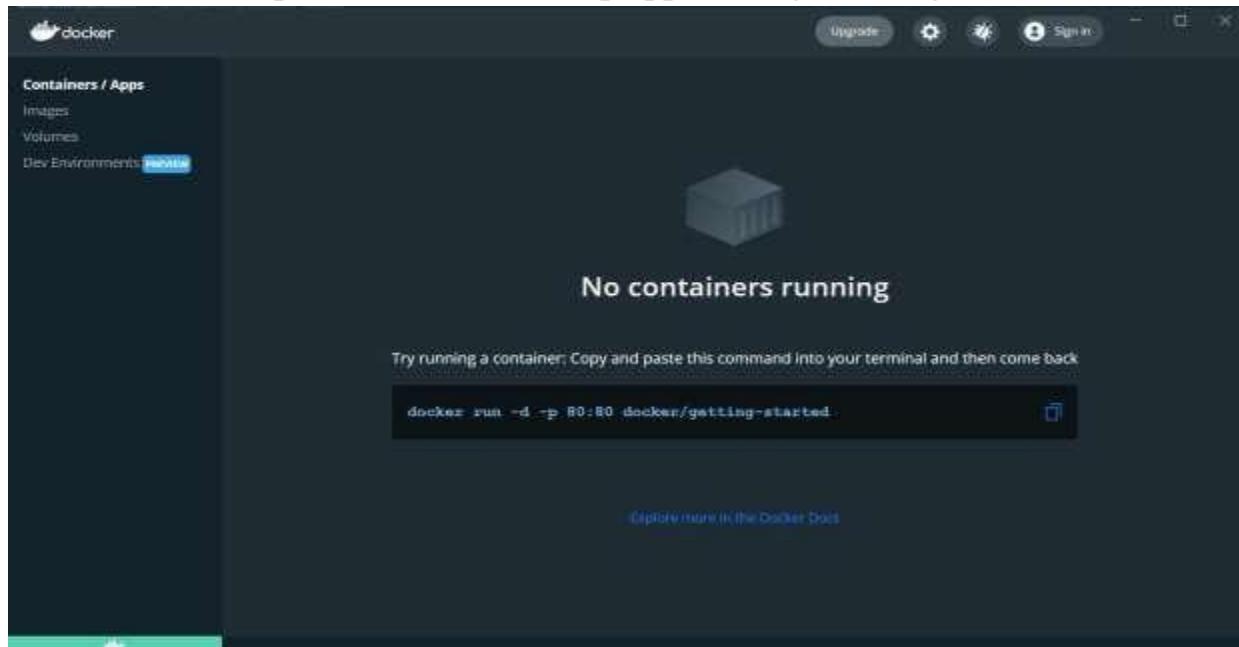
## Step 4:

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.



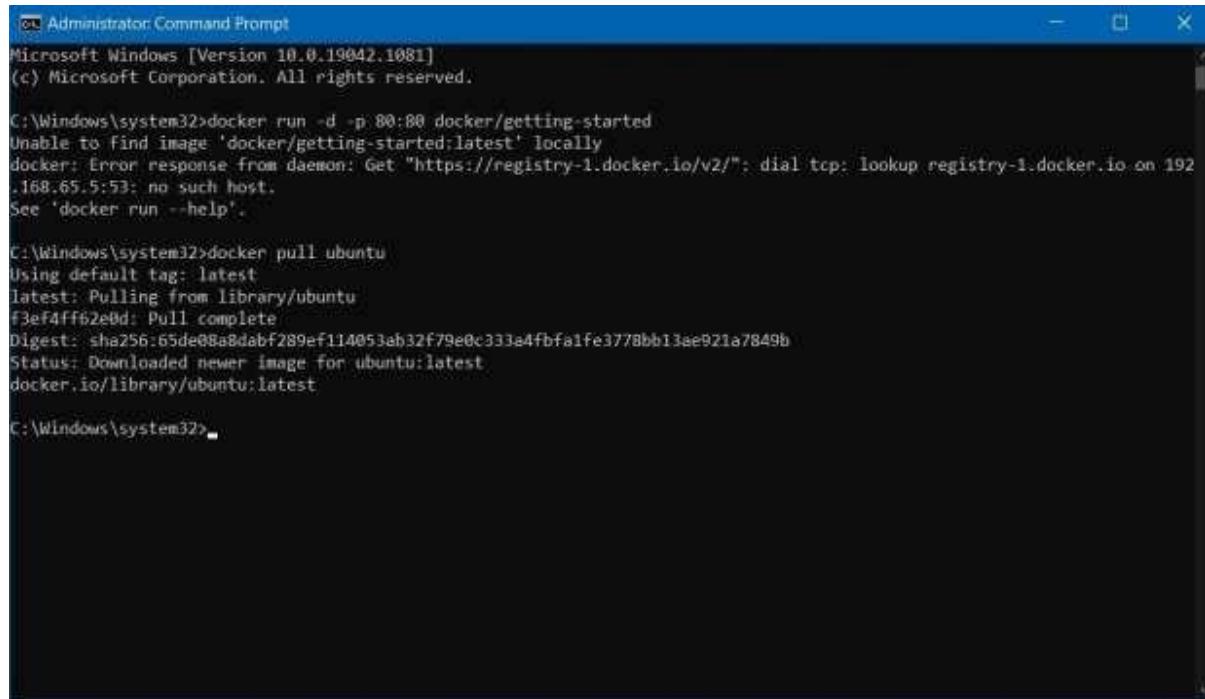
## Step 5:

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



## Step 6:

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



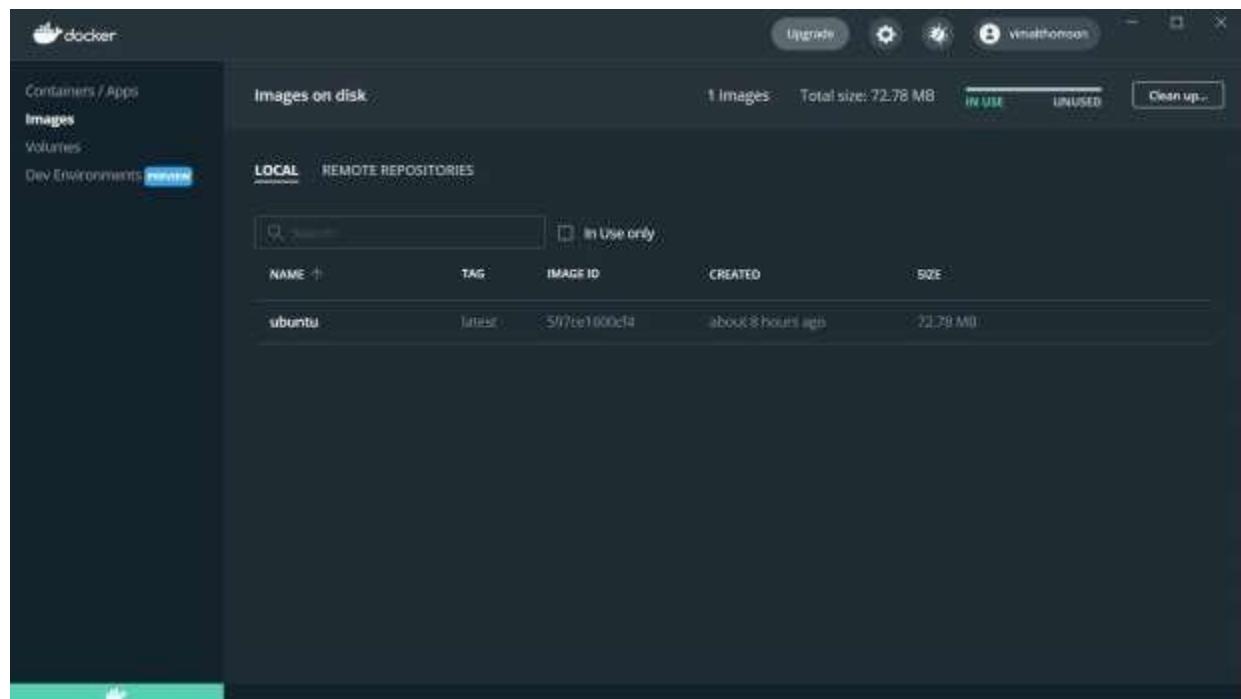
```
Administrator Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

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 192.168.65.5:53: 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 using the cli.



## WIRESHARK INSTALLATION

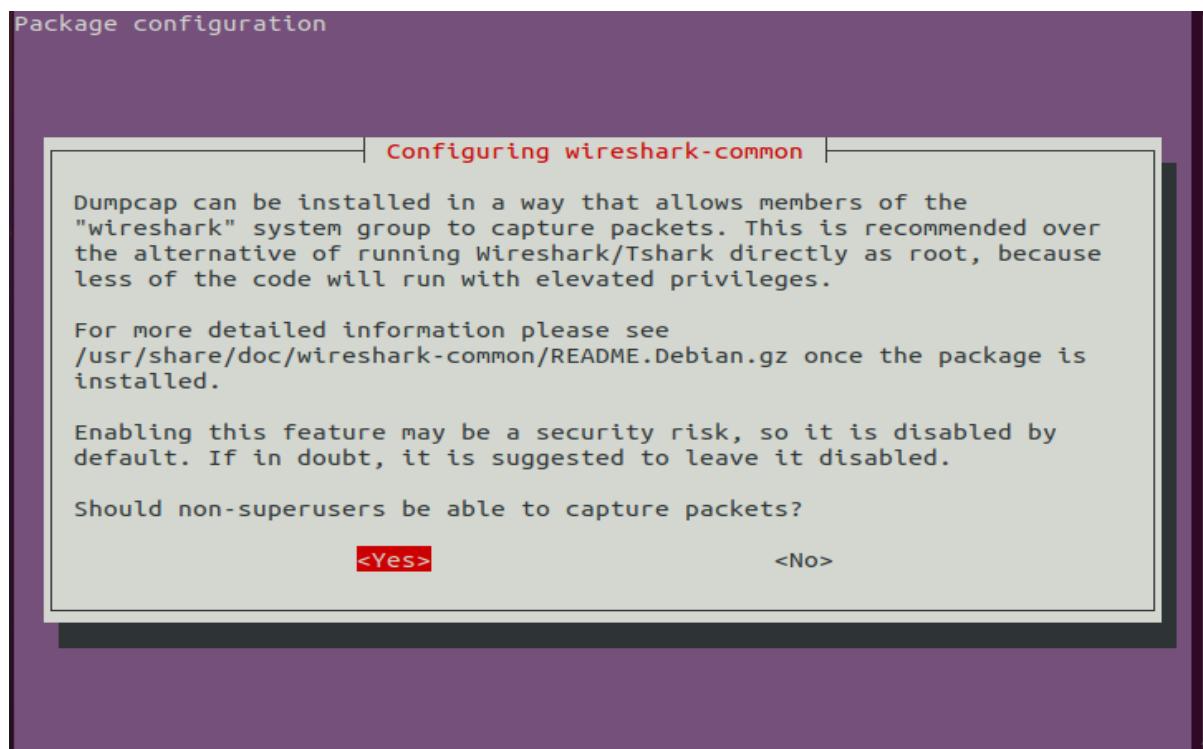
### Step 1: sudo apt-get install wireshark

```
susmin@susmin-VirtualBox:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasupports5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
  qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate
  geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasupports5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 29 newly installed, 0 to remove and 210 not upgraded.
Need to get 32.8 MB of archives.
After this operation, 163 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 libdouble-conver A
```

### Step 2: sudo dpkg-reconfigure wireshark-common

```
susmin@susmin-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
susmin@susmin-VirtualBox:~$
```

### Step 3: Select Yes and press Enter



### Step 4: Open wireshark from the applist

