

20MCA136-Networking & System Administration Lab

RECORD

TOM JOSEPH

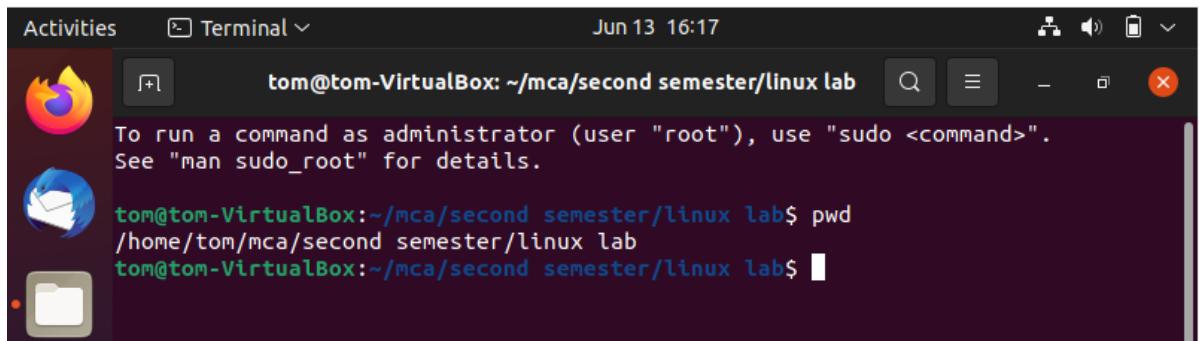
ROLL NO : 36

S2-REG-MCA-B

Linux commands

1) pwd command

PWD stands for ‘Present Working Directory’. It prints the directory path where user is currently working starting from root



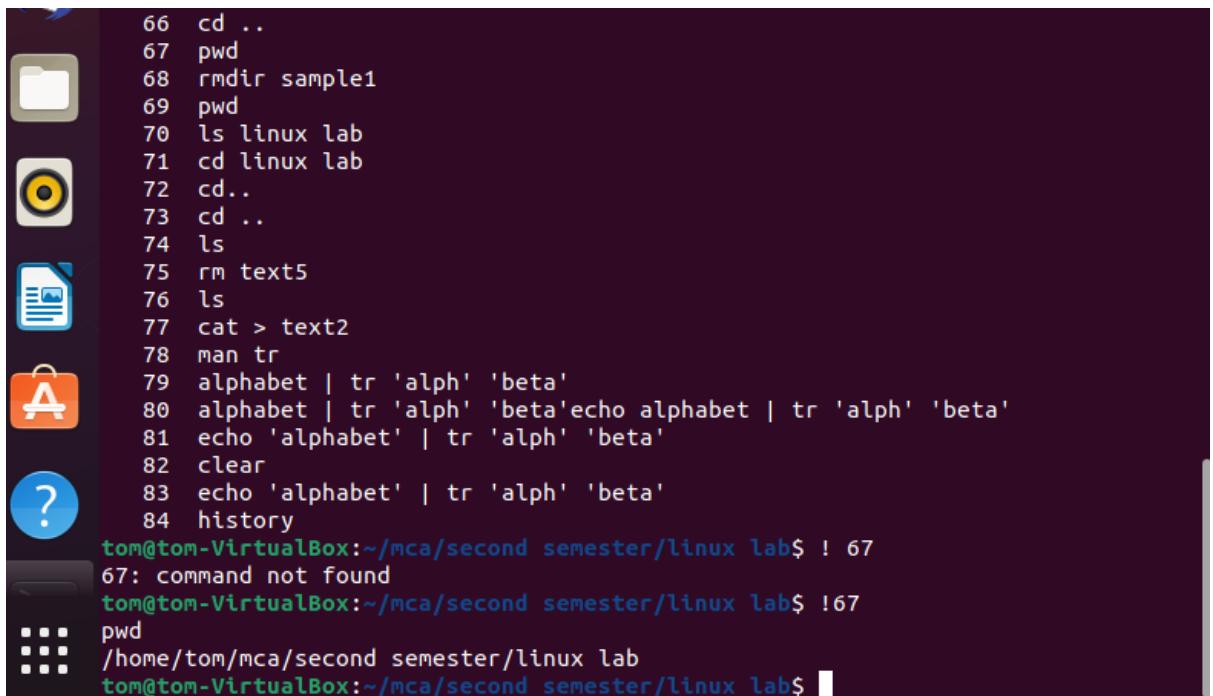
A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal" and the date and time are "Jun 13 16:17". The terminal window contains the following text:

```
tom@tom-VirtualBox: ~/mca/second semester/linux lab$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

2) history command

Linux history command is used to display the history of the commands executed by the user. It is a handy tool for auditing the executed commands along with their date and time

```
tom@tom-VirtualBox:~/mca/second semester/linux lab$ history
 1  text
 2  new text.text
 3  cat command.text
 4  cat > commands.text
 5  cd
 6  cd..
 7  cd
 8  pwd
 9  history
10  clear
11  pwd
12  history
13  clear
14  pwd
15  history
16  pwd
17  man pwd
18  man history
19  cd
20  cd document
21  cd documents
22  cd -
23  cd Document
24  ls
25  cd ..
```



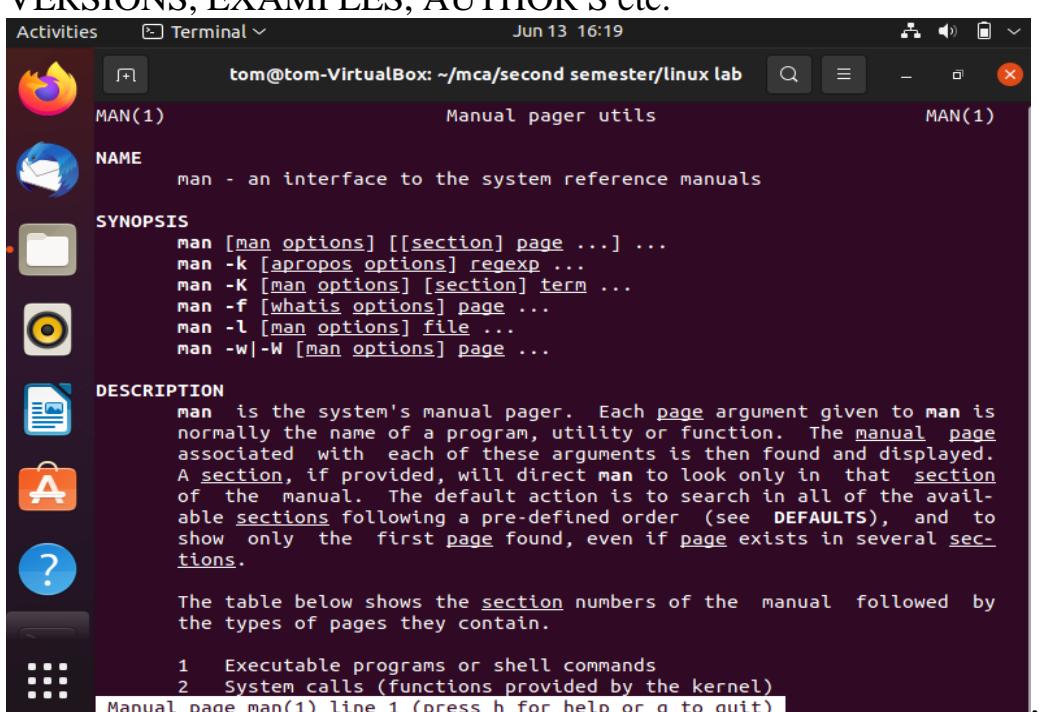
```

66 cd ..
67 pwd
68 rmdir sample1
69 pwd
70 ls linux lab
71 cd linux lab
72 cd..
73 cd ..
74 ls
75 rm text5
76 ls
77 cat > text2
78 man tr
79 alphabet | tr 'alph' 'beta'
80 alphabet | tr 'alph' 'beta'echo alphabet | tr 'alph' 'beta'
81 echo 'alphabet' | tr 'alph' 'beta'
82 clear
83 echo 'alphabet' | tr 'alph' 'beta'
84 history
tom@tom-VirtualBox:~/mca/second semester/linux lab$ !67
67: command not found
tom@tom-VirtualBox:~/mca/second semester/linux lab$ !67
pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ 

```

3) man command

man command in Linux is used to display the user manual of any command that we can run on the terminal. It provides a detailed view of the command which includes NAME, SYNOPSIS, DESCRIPTION, OPTIONS, EXIT STATUS, RETURN VALUES, ERRORS, FILES, VERSIONS, EXAMPLES, AUTHOR S etc.



```

Activities Terminal Jun 13 16:19
tom@tom-VirtualBox: ~/mca/second semester/linux lab
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.

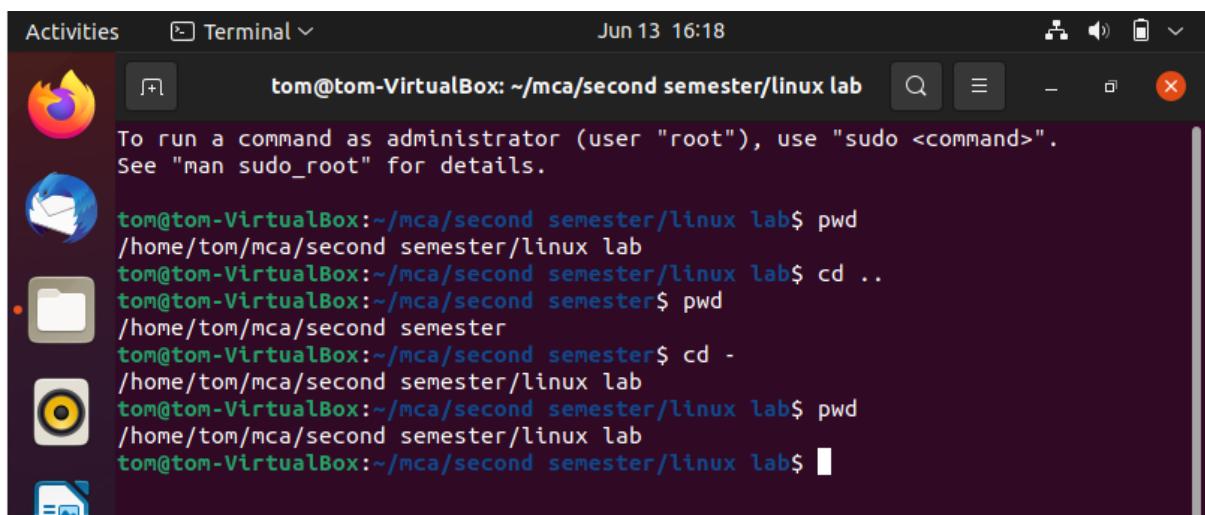
      The table below shows the section numbers of the manual followed by
      the types of pages they contain.

      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 command

What is cd command in Linux? Command cd is used to navigate between directories in Linux. In fact, cd stands for ‘change directory’. It enables you to change the working directory from the current directory to the desired directory that you wish to navigate to.

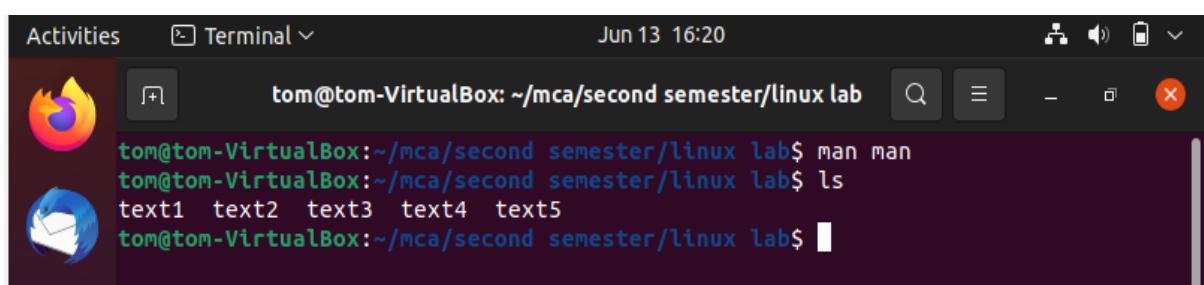


```
Activities Terminal Jun 13 16:18
tom@tom-VirtualBox: ~/mca/second semester/linux lab
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

tom@tom-VirtualBox:~/mca/second semester/linux lab$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ cd ..
tom@tom-VirtualBox:~/mca/second semester$ pwd
/home/tom/mca/second semester
tom@tom-VirtualBox:~/mca/second semester$ cd -
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

5) ls command

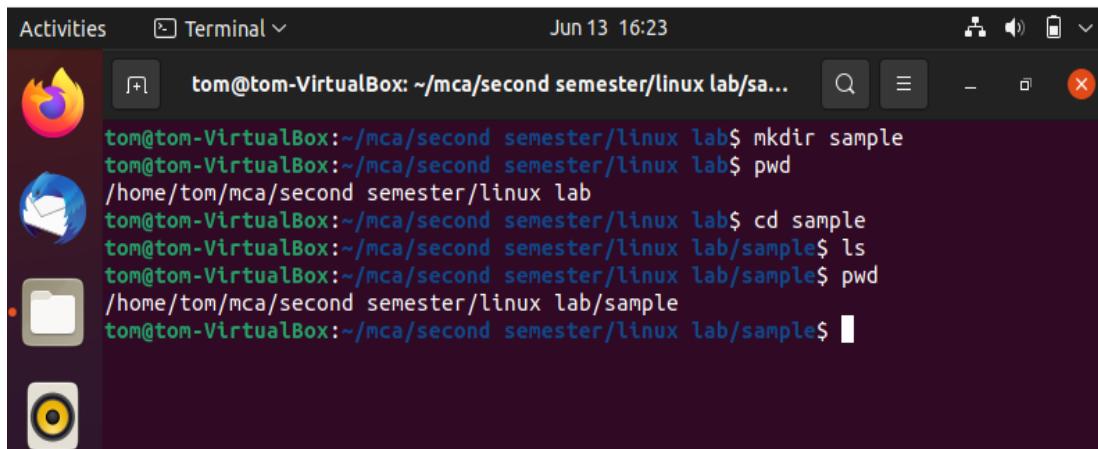
The ls is the list command in Linux. It will show the full list or content of your directory.



```
Activities Terminal Jun 13 16:20
tom@tom-VirtualBox: ~/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ man man
tom@tom-VirtualBox:~/mca/second semester/linux lab$ ls
text1 text2 text3 text4 text5
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

6) mkdir command

mkdir command in Linux allows the user to create directories . This command can create multiple directories at once as well as set the permissions for the directories.

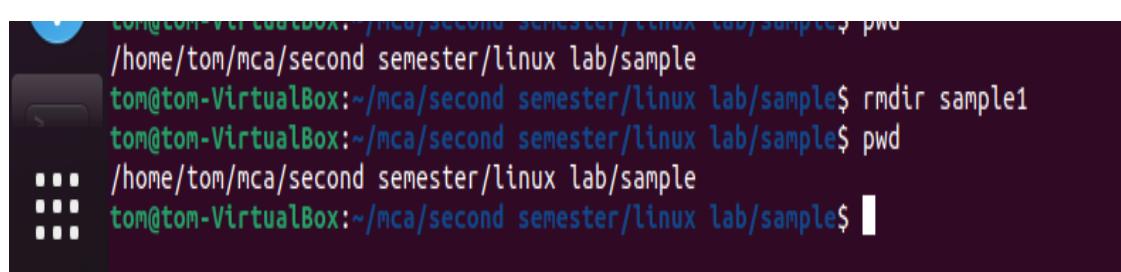


A screenshot of a Linux desktop environment showing a terminal window. The terminal window is titled "Terminal" and has the command line "tom@tom-VirtualBox: ~/mca/second semester/linux lab\$". The terminal shows the following session:

```
tom@tom-VirtualBox:~/mca/second semester/linux lab$ mkdir sample
tom@tom-VirtualBox:~/mca/second semester/linux lab$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ cd sample
tom@tom-VirtualBox:~/mca/second semester/linux lab/sample$ ls
tom@tom-VirtualBox:~/mca/second semester/linux lab/sample$ pwd
/home/tom/mca/second semester/linux lab/sample
tom@tom-VirtualBox:~/mca/second semester/linux lab/sample$
```

7) rmdir command

rmdir command is used remove empty directories from the filesystem in Linux. The rmdir command removes each and every directory specified in the command line only if these directories are empty. So if the specified directory has some directories or files in it then this cannot be removed by rmdir command.

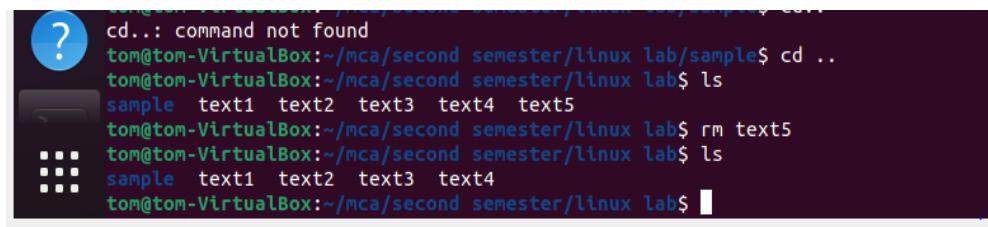


A screenshot of a Linux desktop environment showing a terminal window. The terminal window is titled "Terminal" and has the command line "tom@tom-VirtualBox: ~/mca/second semester/linux lab\$". The terminal shows the following session:

```
tom@tom-VirtualBox:~/mca/second semester/linux lab$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ sample$ rmdir sample1
tom@tom-VirtualBox:~/mca/second semester/linux lab$ sample$ pwd
/home/tom/mca/second semester/linux lab
tom@tom-VirtualBox:~/mca/second semester/linux lab$ sample$
```

8) rm command

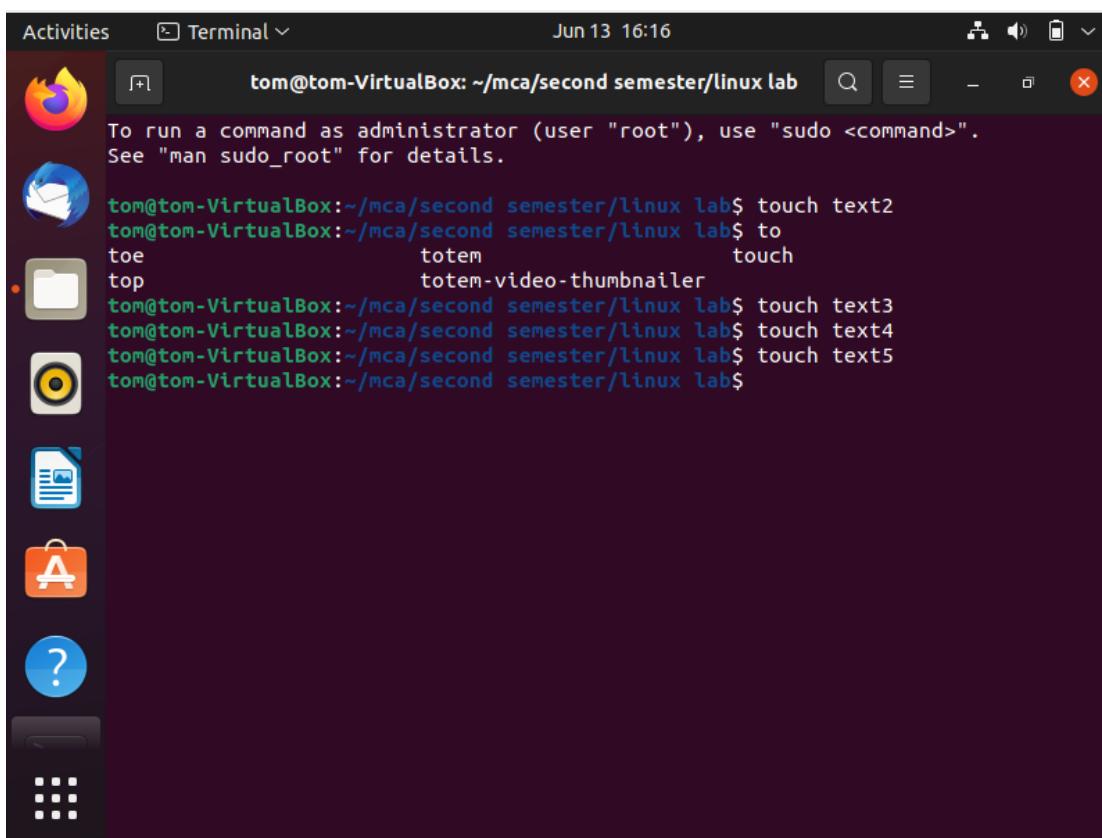
The rm command is used to remove files and directories in Linux.



```
cd..: command not found
tom@tom-VirtualBox:~/mca/second semester/linux lab$ cd ..
tom@tom-VirtualBox:~/mca/second semester/linux lab$ ls
sample text1 text2 text3 text4 text5
tom@tom-VirtualBox:~/mca/second semester/linux lab$ rm text5
tom@tom-VirtualBox:~/mca/second semester/linux lab$ ls
sample text1 text2 text3 text4
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

9) touch command

Touch command in Linux. Touch command in Linux is used for changing file timestamps however one of the most common usages of touch command includes creating a new empty file.



```
Activities Terminal Jun 13 16:16
tom@tom-VirtualBox: ~/mca/second semester/linux lab
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

tom@tom-VirtualBox:~/mca/second semester/linux lab$ touch text2
tom@tom-VirtualBox:~/mca/second semester/linux lab$ to
toe          totem          touch
top          totem-video-thumbnailer
tom@tom-VirtualBox:~/mca/second semester/linux lab$ touch text3
tom@tom-VirtualBox:~/mca/second semester/linux lab$ touch text4
tom@tom-VirtualBox:~/mca/second semester/linux lab$ touch text5
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

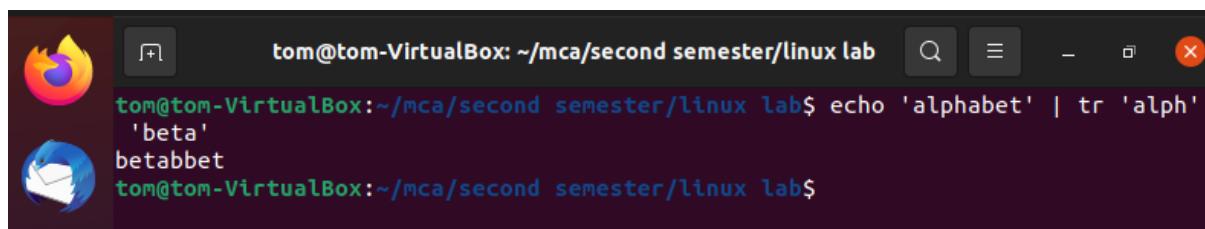
10) cat command

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

```
tom@tom-VirtualBox:~/mca/second semester/linux lab$ cat > text2
this is sample text from terminal
^C
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

11) tr command

The tr (translate) command is used in Linux mainly for translating and deleting characters. It can be used to convert uppercase to lowercase, squeeze repeating characters and deleting characters.



```
tom@tom-VirtualBox:~/mca/second semester/linux lab$ echo 'alphabet' | tr 'alpha' 'beta'
betabbet
tom@tom-VirtualBox:~/mca/second semester/linux lab$
```

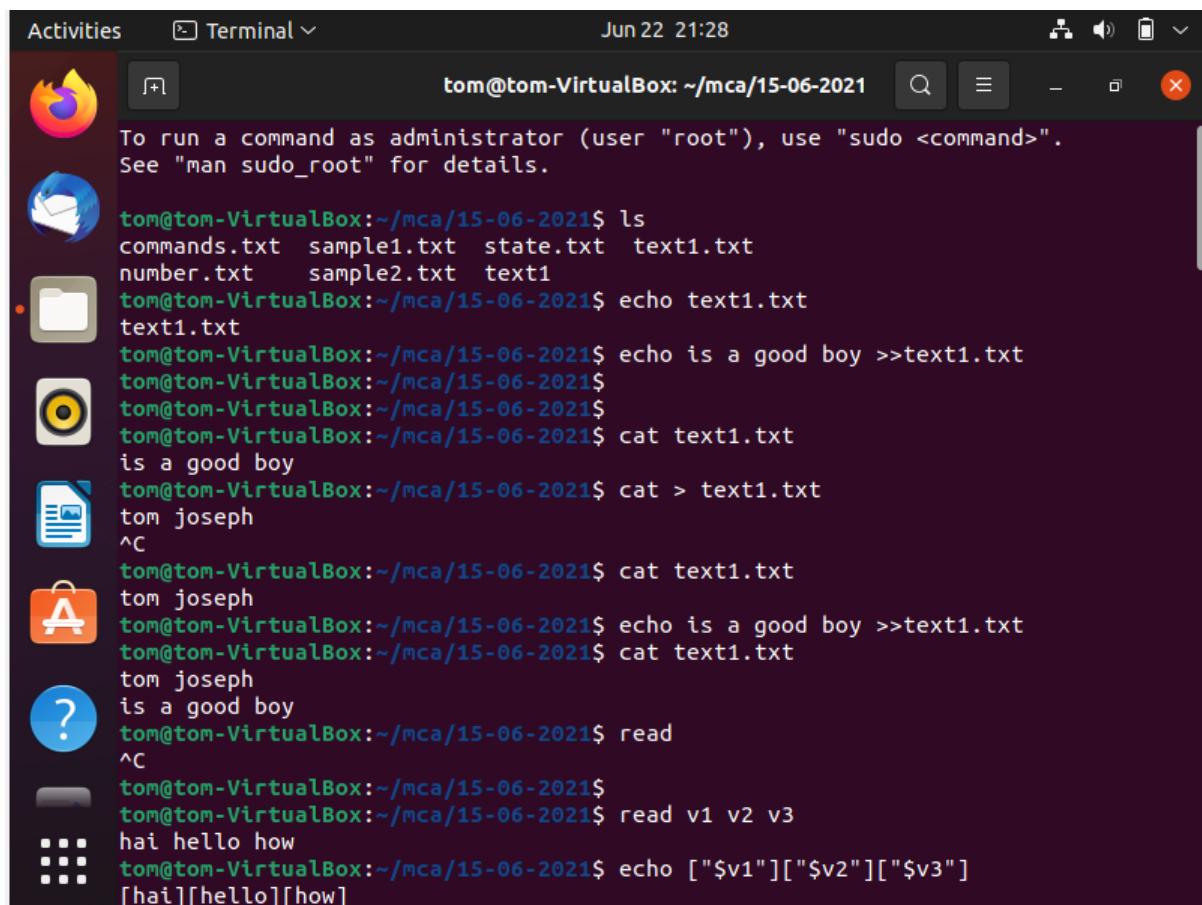
12) echo

echo command in linux is used to display line of text/string that are passed as an argument.

This is a built in command that is mostly used in shell scripts and batch files to output status text to the screen or a file.

13) read

The read command in Linux is a way for the users to interact with input taken from the keyboard, which you might see referred to as stdin (standard input) or other similar descriptions. In other words, if you want that your bash script takes input from the user, you'll have to use the read command.



```

Activities Terminal Jun 22 21:28
tom@tom-VirtualBox: ~/mca/15-06-2021
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

tom@tom-VirtualBox:~/mca/15-06-2021$ ls
commands.txt sample1.txt state.txt text1.txt
number.txt sample2.txt text1
tom@tom-VirtualBox:~/mca/15-06-2021$ echo text1.txt
text1.txt
tom@tom-VirtualBox:~/mca/15-06-2021$ echo is a good boy >>text1.txt
tom@tom-VirtualBox:~/mca/15-06-2021$ 
tom@tom-VirtualBox:~/mca/15-06-2021$ 
tom@tom-VirtualBox:~/mca/15-06-2021$ cat text1.txt
is a good boy
tom@tom-VirtualBox:~/mca/15-06-2021$ cat > text1.txt
tom joseph
^C
tom@tom-VirtualBox:~/mca/15-06-2021$ cat text1.txt
tom joseph
tom@tom-VirtualBox:~/mca/15-06-2021$ echo is a good boy >>text1.txt
tom@tom-VirtualBox:~/mca/15-06-2021$ cat text1.txt
tom joseph
is a good boy
tom@tom-VirtualBox:~/mca/15-06-2021$ read
^C
tom@tom-VirtualBox:~/mca/15-06-2021$ 
tom@tom-VirtualBox:~/mca/15-06-2021$ read v1 v2 v3
hai hello how
tom@tom-VirtualBox:~/mca/15-06-2021$ echo ["$v1"]["$v2"]["$v3"]
[hai][hello][how]

```

14) tail

The tail command in unix or linux system is used to print the last N lines from the file on the terminal.

Tail command is especially used with log files to read the last few lines to know about the error messages.

15) head

The head command, as the name implies, print the top N number of data of the given input. By default, it prints the first 10 lines of the specified files.

If more than one file name is provided then data from each file is preceded by its file name.

16) more

more command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large (For example log files).

The more command also allows the user do scroll up and down through the page.

17) less

The 'less' command is same as 'more' command but include some more features.

It automatically adjust with the width and height of the teminal window, while 'more' command cuts the content as the width of the terminal window get shorter.

18) cut

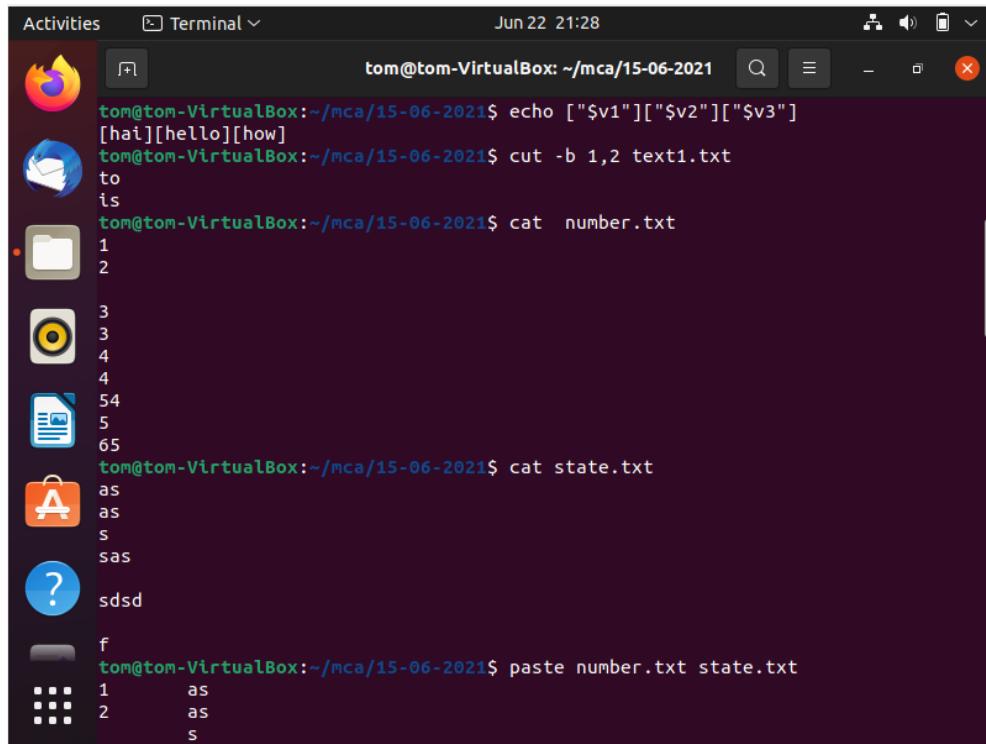
The cut command is a command-line utility for cutting sections from each line of a file. It writes the result to the standard output.

It's worth noting that it does not modify the file, but only works on a copy of the content.

19) paste

Paste command is one of the useful commands in Linux operating system.

It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by tab as delimiter, to the standard output.



A screenshot of a Ubuntu desktop environment. On the left is a dock with icons for Dash, Home, Applications, and Help. A terminal window is open in the center, showing command-line history:

```

Activities Terminal Jun 22 21:28
tom@tom-VirtualBox: ~/mca/15-06-2021$ echo ["$v1"]["$v2"]["$v3"]
[hai][hello][how]
tom@tom-VirtualBox:~/mca/15-06-2021$ cut -b 1,2 text1.txt
to
is
tom@tom-VirtualBox:~/mca/15-06-2021$ cat number.txt
1
2
3
3
4
4
54
5
65
tom@tom-VirtualBox:~/mca/15-06-2021$ cat state.txt
as
as
s
sas
sdsd
f
tom@tom-VirtualBox:~/mca/15-06-2021$ paste number.txt state.txt
1      as
2      as
s

```

20) uname

uname command is used to display the software and hardware information in current running Linux system.

21) cp

cp command is used to copy the files and directories from one local place to another using command line. cp command is available in Linux like operating systems

22) mv

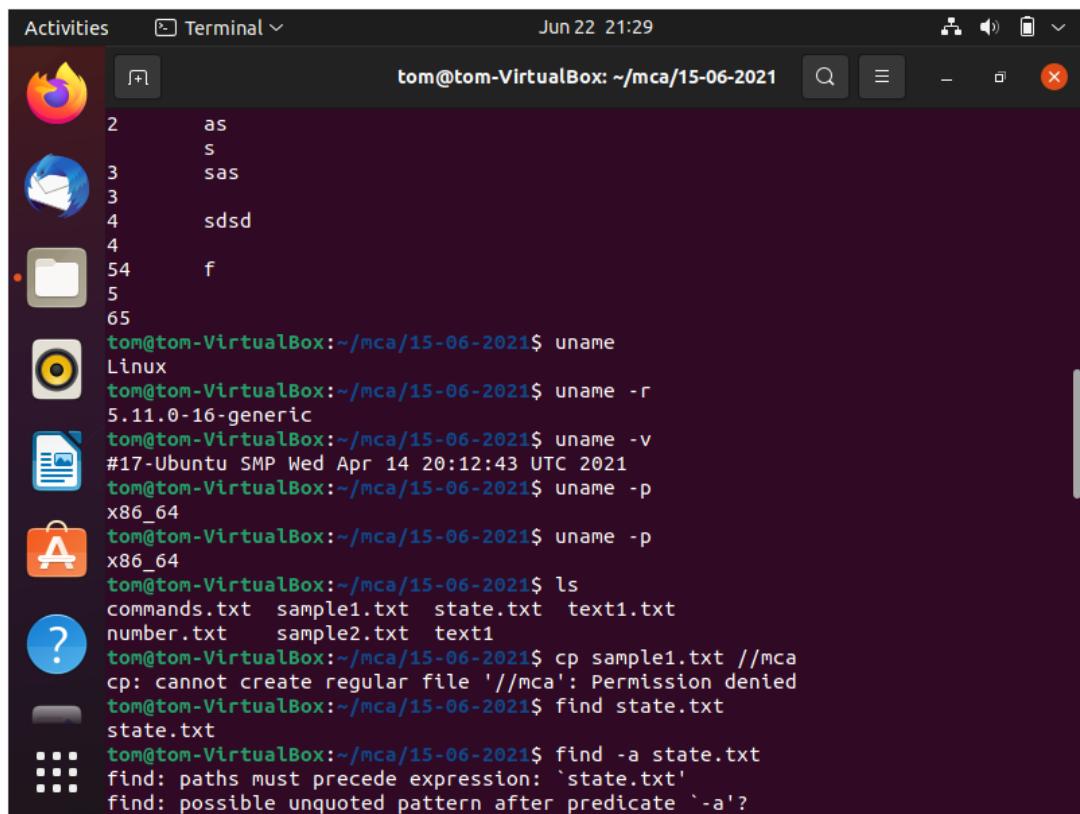
mv is one of the must known commands in Linux. mv stands for move and is essentially used for moving files or directories from one location to another.

23) locate

locate command in Linux is used to find the files by name. There are two most widely used file searching utilities accessible to users are called find and locate.

24) find

The find command is the best command for searching your filesystem for files, based on a variety of attributes.



```
Activities Terminal ~ Jun 22 21:29
tom@tom-VirtualBox: ~/mca/15-06-2021
2      as
3      s
3      sas
3      sdsd
4      f
5
65
tom@tom-VirtualBox:~/mca/15-06-2021$ uname
Linux
tom@tom-VirtualBox:~/mca/15-06-2021$ uname -r
5.11.0-16-generic
tom@tom-VirtualBox:~/mca/15-06-2021$ uname -v
#17-Ubuntu SMP Wed Apr 14 20:12:43 UTC 2021
tom@tom-VirtualBox:~/mca/15-06-2021$ uname -p
x86_64
tom@tom-VirtualBox:~/mca/15-06-2021$ uname -p
x86_64
tom@tom-VirtualBox:~/mca/15-06-2021$ ls
commands.txt sample1.txt state.txt text1.txt
number.txt sample2.txt text1
tom@tom-VirtualBox:~/mca/15-06-2021$ cp sample1.txt //mca
cp: cannot create regular file '//mca': Permission denied
tom@tom-VirtualBox:~/mca/15-06-2021$ find state.txt
state.txt
tom@tom-VirtualBox:~/mca/15-06-2021$ find -a state.txt
find: paths must precede expression: `state.txt'
find: possible unquoted pattern after predicate `-a'? 
```

25) grep

Grep is a Linux / Unix command-line tool used to search for a string of characters in a specified file.

The text search pattern is called a regular expression. When it finds a match, it prints the line with the result.

26) df

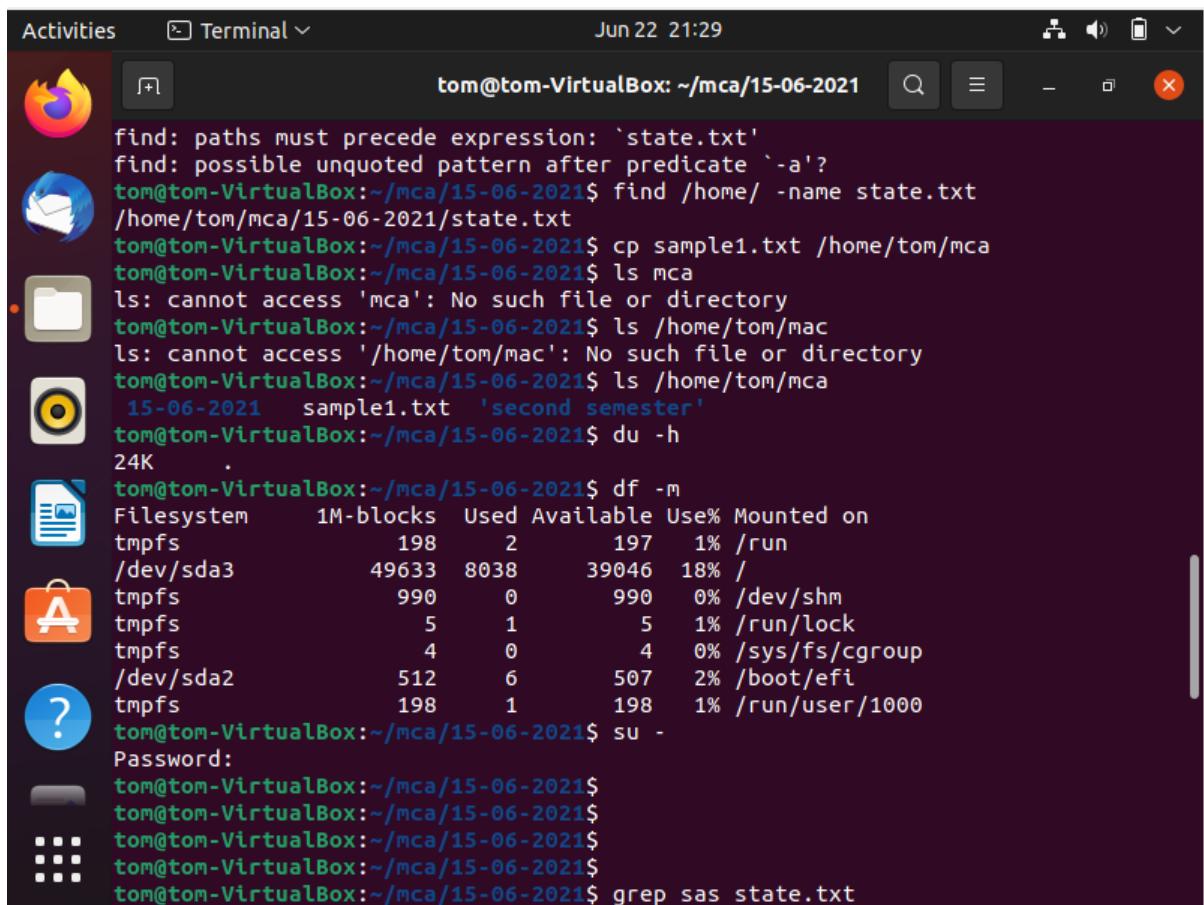
Linux df command is used to display the disk space used in the file system. The 'df' stands for "disk filesystem."

It defines the number of blocks used, the number of blocks available, and the directory where the file system is mounted.

27) du

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

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



```

Activities Terminal Jun 22 21:29
tom@tom-VirtualBox: ~/mca/15-06-2021
find: paths must precede expression: 'state.txt'
find: possible unquoted pattern after predicate `-a'?
tom@tom-VirtualBox:~/mca/15-06-2021$ find /home/ -name state.txt
/home/tom/mca/15-06-2021/state.txt
tom@tom-VirtualBox:~/mca/15-06-2021$ cp sample1.txt /home/tom/mca
tom@tom-VirtualBox:~/mca/15-06-2021$ ls mca
ls: cannot access 'mca': No such file or directory
tom@tom-VirtualBox:~/mca/15-06-2021$ ls /home/tom/mac
ls: cannot access '/home/tom/mac': No such file or directory
tom@tom-VirtualBox:~/mca/15-06-2021$ ls /home/tom/mca
 15-06-2021  sample1.txt 'second semester'
tom@tom-VirtualBox:~/mca/15-06-2021$ du -h
24K .
tom@tom-VirtualBox:~/mca/15-06-2021$ df -m
Filesystem 1M-blocks Used Available Use% Mounted on
tmpfs        198     2      197   1% /run
/dev/sda3    49633  8038    39046  18% /
tmpfs        990     0      990   0% /dev/shm
tmpfs         5     1       5   1% /run/lock
tmpfs         4     0       4   0% /sys/fs/cgroup
/dev/sda2     512     6      507   2% /boot/efi
tmpfs        198     1      198   1% /run/user/1000
tom@tom-VirtualBox:~/mca/15-06-2021$ su -
Password:
tom@tom-VirtualBox:~/mca/15-06-2021$
tom@tom-VirtualBox:~/mca/15-06-2021$
tom@tom-VirtualBox:~/mca/15-06-2021$
tom@tom-VirtualBox:~/mca/15-06-2021$
tom@tom-VirtualBox:~/mca/15-06-2021$ grep sas state.txt

```

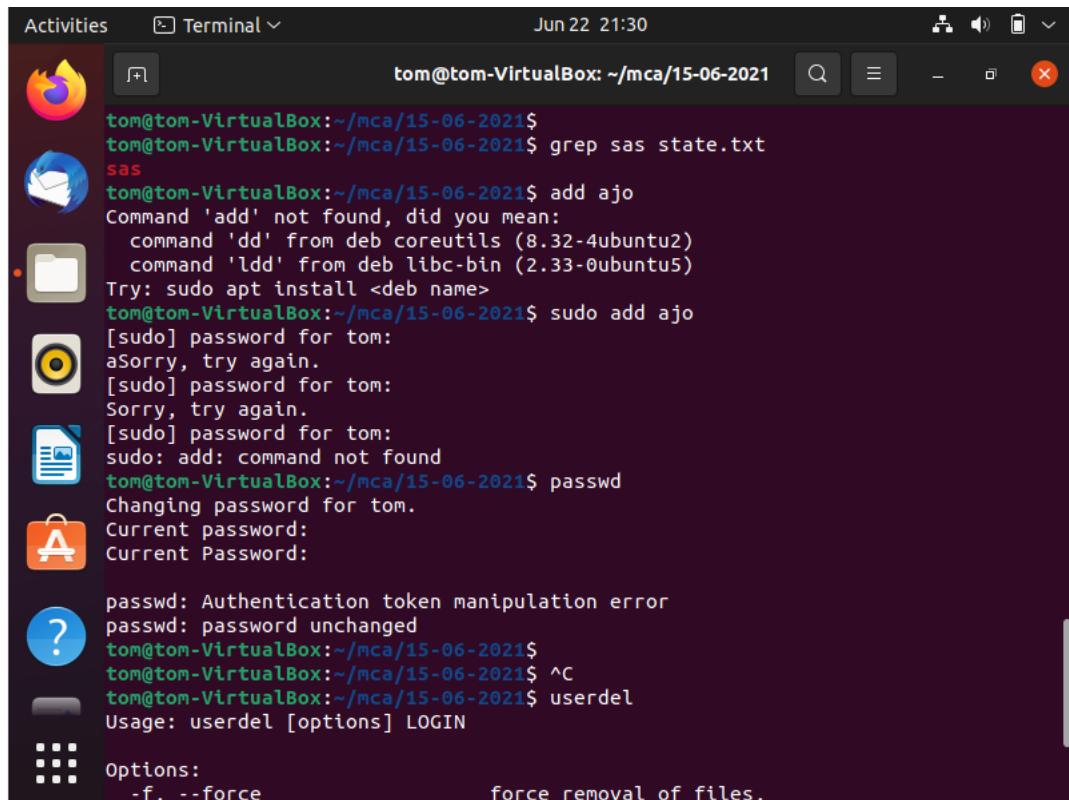
28) useradd

useradd is a command in Linux that is used to add user accounts to your system.

29) userdel

userdel command in Linux system is used to delete a user account and related files.

This command basically modifies the system account files, deleting all the entries which refer to the username LOGIN.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal" and the path is "tom@tom-VirtualBox: ~/mca/15-06-2021". The terminal output is as follows:

```

tom@tom-VirtualBox:~/mca/15-06-2021$ grep sas state.txt
sas
tom@tom-VirtualBox:~/mca/15-06-2021$ add ajo
Command 'add' not found, did you mean:
  command 'dd' from deb coreutils (8.32-4ubuntu2)
  command 'ldd' from deb libc-bin (2.33-0ubuntu5)
Try: sudo apt install <deb name>
tom@tom-VirtualBox:~/mca/15-06-2021$ sudo add ajo
[sudo] password for tom:
aSorry, try again.
[sudo] password for tom:
Sorry, try again.
[sudo] password for tom:
sudo: add: command not found
tom@tom-VirtualBox:~/mca/15-06-2021$ passwd
Changing password for tom.
Current password:
Current Password:

passwd: Authentication token manipulation error
passwd: password unchanged
tom@tom-VirtualBox:~/mca/15-06-2021$ ^C
tom@tom-VirtualBox:~/mca/15-06-2021$ userdel
Usage: userdel [options] LOGIN
Options:
  -f, --force           force removal of files,

```

30) sudo

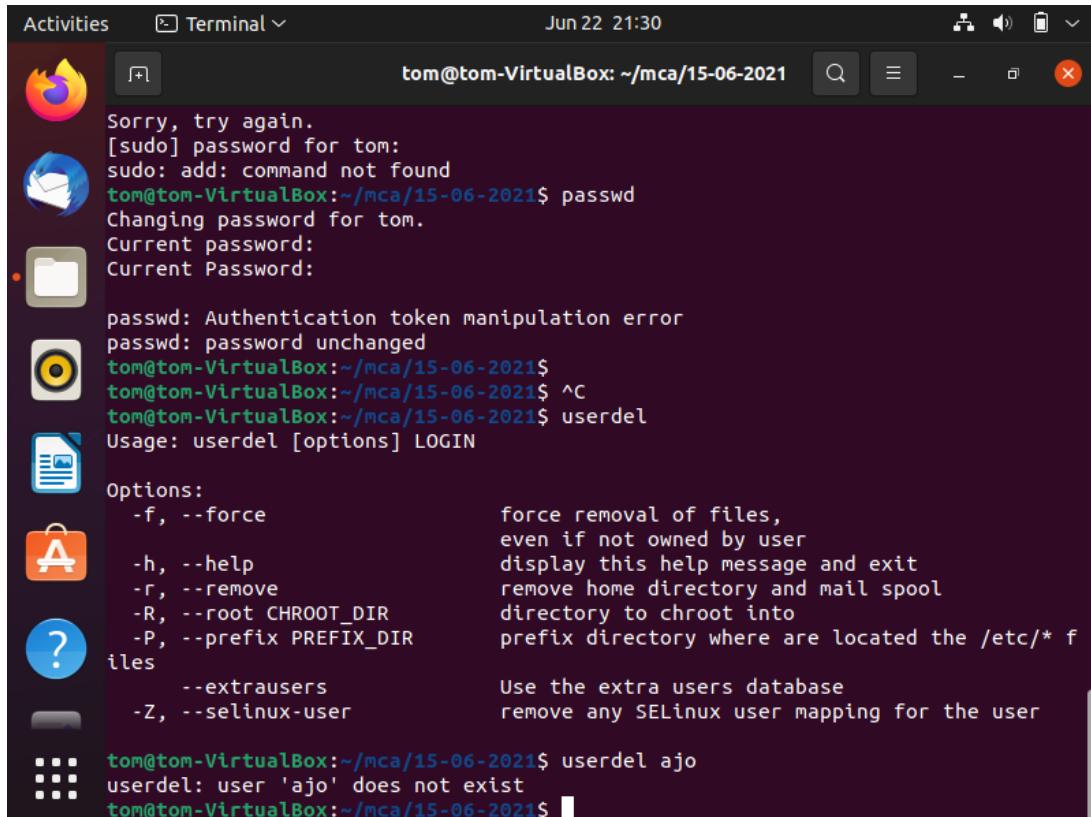
Sudo stands for SuperUser DO and is used to access restricted files and operations. By default, Linux restricts access to certain parts of the system preventing sensitive files from being compromised.

The sudo command temporarily elevates privileges allowing users to complete sensitive tasks without logging in as the root user.

31) passwd

passwd command in Linux is used to change the user account passwords.

The root user reserves the privilege to change the password for any user on the system, while a normal user can only change the account password for his or her own account.



```

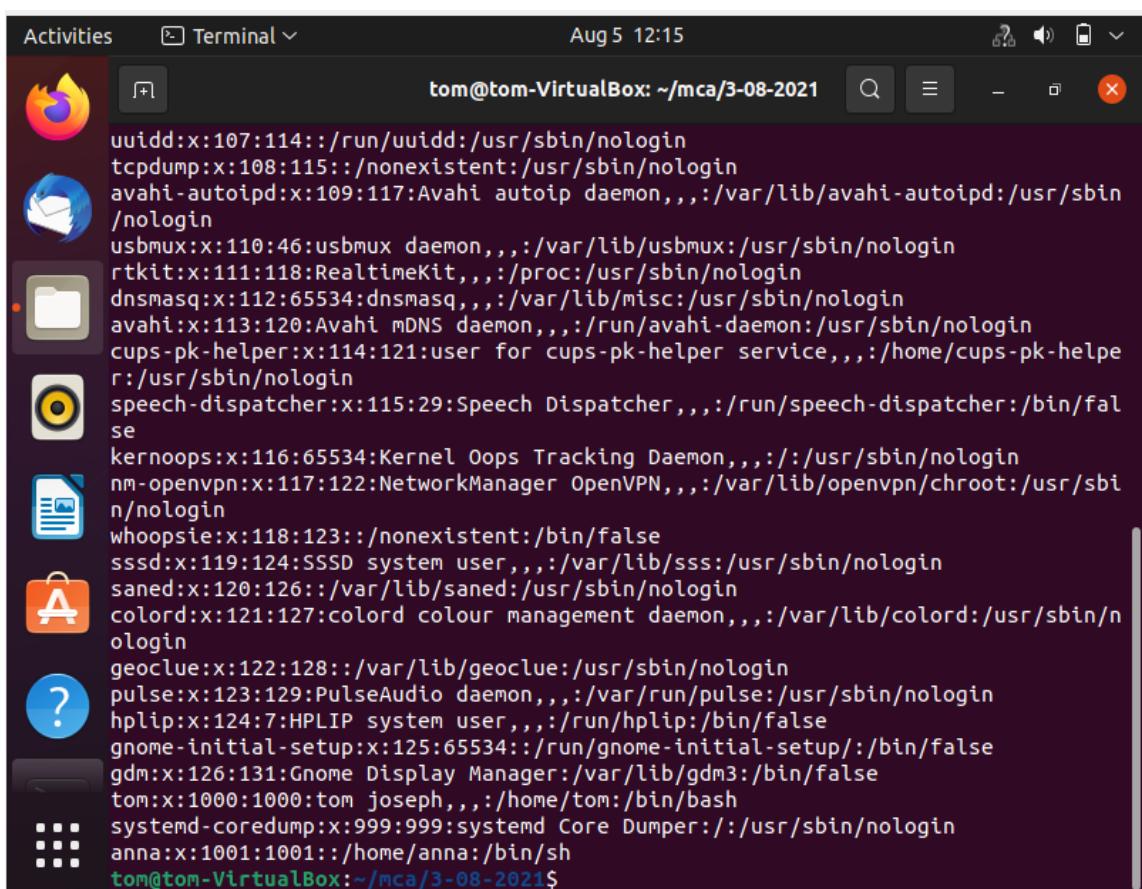
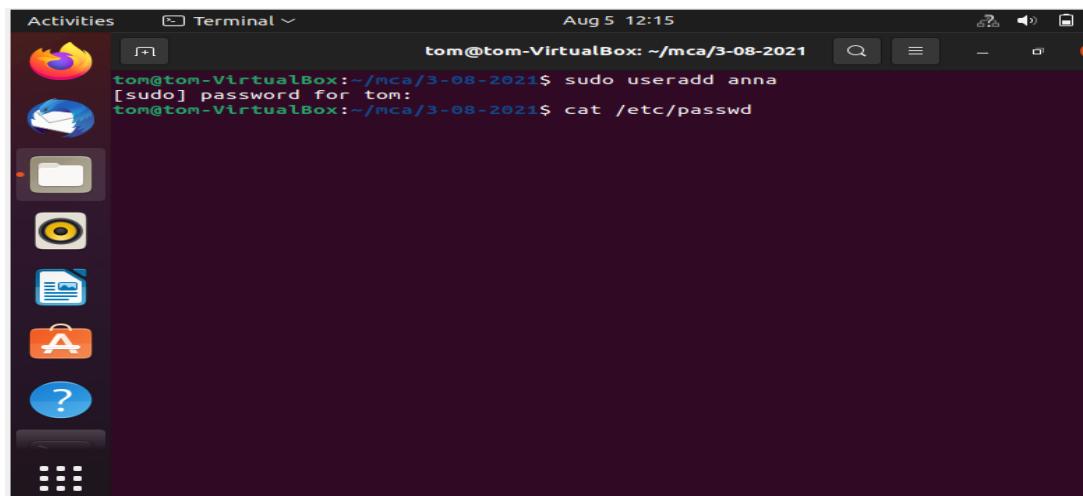
Activities Terminal Jun 22 21:30
tom@tom-VirtualBox: ~/mca/15-06-2021
tom@tom-VirtualBox:~/mca/15-06-2021$ passwd
Changing password for tom.
Current password:
Current Password:
passwd: Authentication token manipulation error
passwd: password unchanged
tom@tom-VirtualBox:~/mca/15-06-2021$ 
tom@tom-VirtualBox:~/mca/15-06-2021$ ^C
tom@tom-VirtualBox:~/mca/15-06-2021$ userdel
Usage: userdel [options] LOGIN

Options:
  -f, --force           force removal of files,
                        even if not owned by user
  -h, --help            display this help message and exit
  -r, --remove          remove home directory and mail spool
  -R, --root CHROOT_DIR
  -P, --prefix PREFIX_DIR
                        prefix directory where are located the /etc/* files
  --extrausers          Use the extra users database
  -Z, --selinux-user    remove any SELinux user mapping for the user

tom@tom-VirtualBox:~/mca/15-06-2021$ userdel ajo
userdel: user 'ajo' does not exist
tom@tom-VirtualBox:~/mca/15-06-2021$ 
```

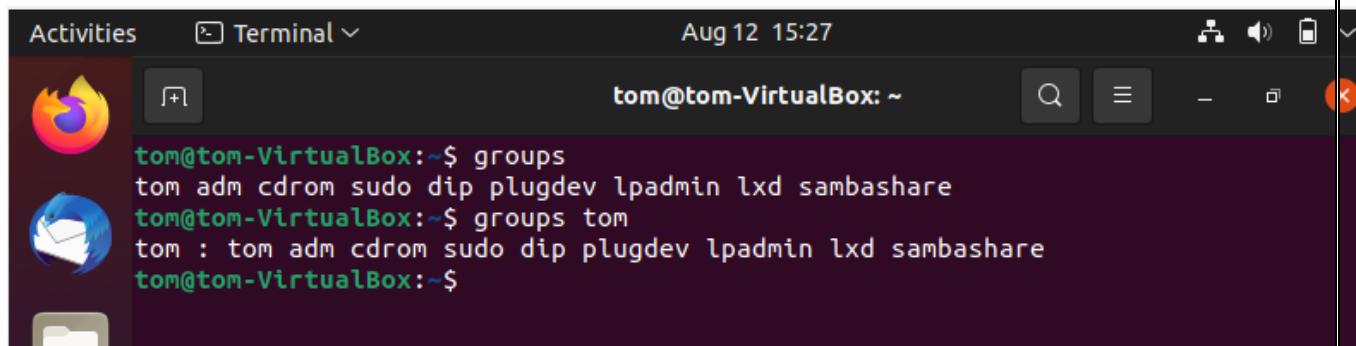
31 usermode

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



32 group

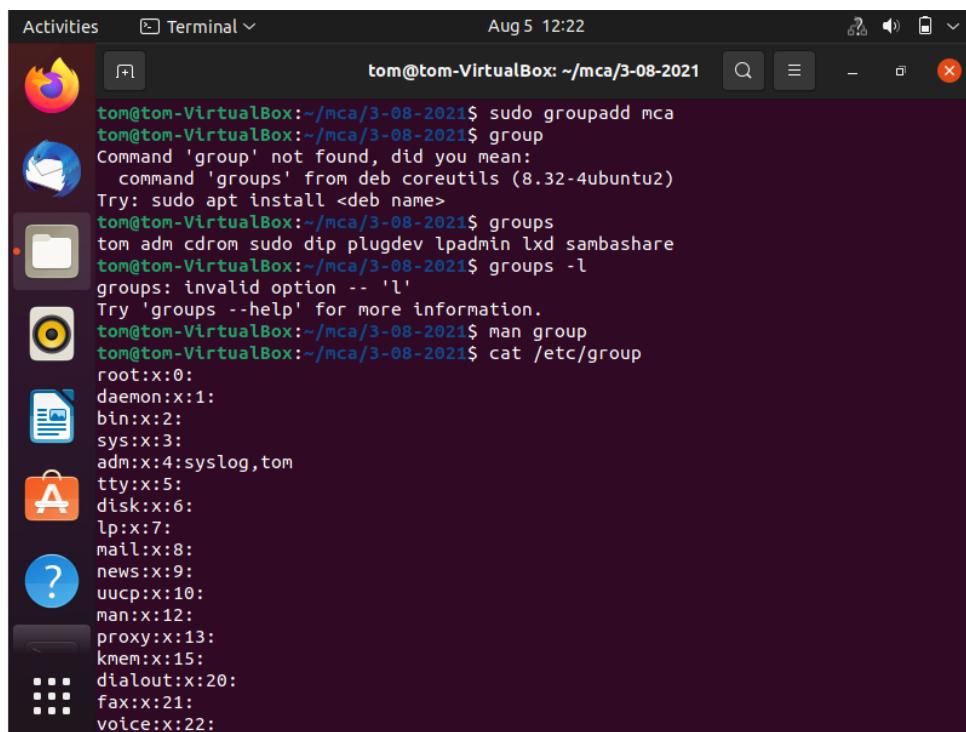
The groups command prints the names of the primary and any supplementary groups for each given username, or the current process if no names are given. If more than one name is given, the name of each user is printed before the list of that user's groups and the username is separated from the group list by a colon.



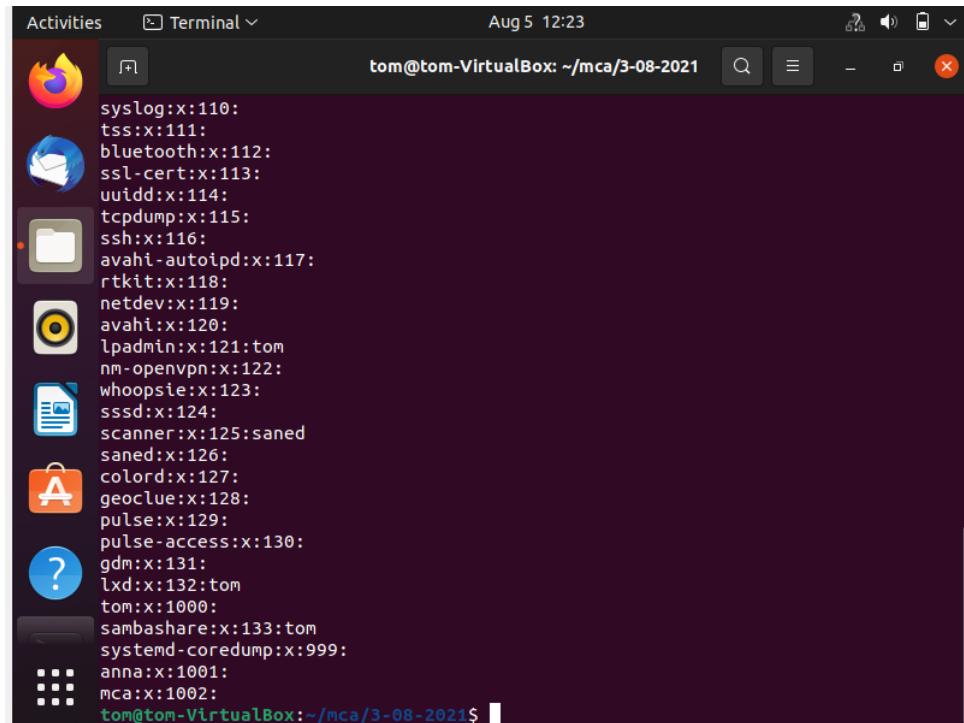
```
Activities Terminal Aug 12 15:27
tom@tom-VirtualBox:~$ groups
tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~$ groups tom
tom : tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~$
```

33 groupadd

The groupadd command is used for create a new group to create a new group in Linux



```
Activities Terminal Aug 5 12:22
tom@tom-VirtualBox:~/mca/3-08-2021$ sudo groupadd mca
tom@tom-VirtualBox:~/mca/3-08-2021$ group
Command 'group' not found, did you mean:
  command 'groups' from deb coreutils (8.32-4ubuntu2)
Try: sudo apt install <deb name>
tom@tom-VirtualBox:~/mca/3-08-2021$ groups
tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~/mca/3-08-2021$ groups -l
groups: invalid option -- 'l'
Try 'groups --help' for more information.
tom@tom-VirtualBox:~/mca/3-08-2021$ man group
tom@tom-VirtualBox:~/mca/3-08-2021$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,tom
tty:x:5:
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:
```

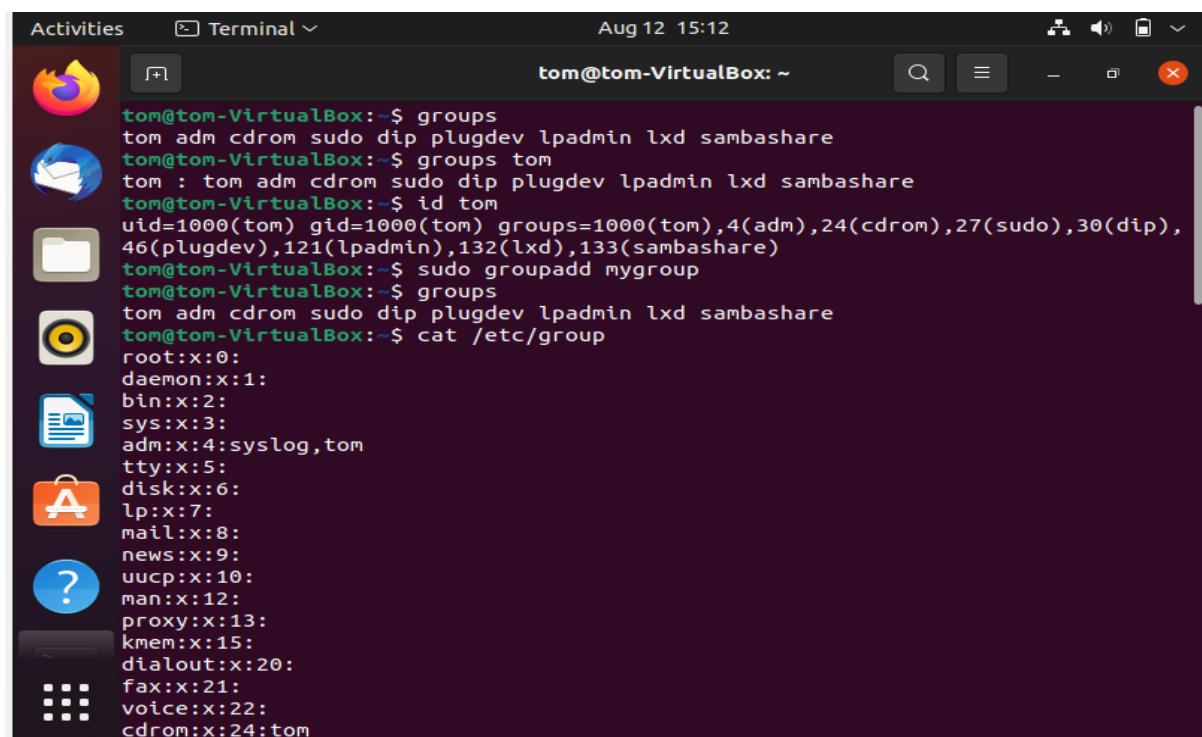


A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. A terminal window is open in the center, showing a list of groups on the system. The output of the command 'groups' is as follows:

```
syslog:x:110:
tss:x:111:
bluetooth:x:112:
ssl-cert:x:113:
uuidd:x:114:
tcpdump:x:115:
ssh:x:116:
avahi-autopid:x:117:
rtkit:x:118:
netdev:x:119:
avahi:x:120:
lpadmin:x:121:tom
nm-openvpn:x:122:
whoopsie:x:123:
sssd:x:124:
scanner:x:125:saned
saned:x:126:
colord:x:127:
geoclue:x:128:
pulse:x:129:
pulse-access:x:130:
gdm:x:131:
lxd:x:132:tom
tom:x:1000:
sambashare:x:133:tom
systemd-coredump:x:999:
anna:x:1001:
mca:x:1002:
tom@tom-VirtualBox:~/mca/3-08-2021$
```

34 groupmod

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



A screenshot of an Ubuntu desktop environment. On the left is a dock with icons for the Dash, Home, Applications, and Help. A terminal window is open in the center, showing the use of the 'groupmod' command. The output of the commands run in the terminal is as follows:

```
tom@tom-VirtualBox:~$ groups
tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~$ groups tom
tom : tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~$ id tom
uid=1000(tom) gid=1000(tom) groups=1000(tom),4(adm),24(cdrom),27(sudo),30(dip),
46(plugdev),121(lpadmin),132(lxd),133(sambashare)
tom@tom-VirtualBox:~$ sudo groupadd mygroup
tom@tom-VirtualBox:~$ groups
tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,tom
tty:x:5:
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:tom
```

```
?
pulse-access:x:130:
gdm:x:131:
lxd:x:132:tom
tom:x:1000:
sambashare:x:133:tom
systemd-coredump:x:999:
anna:x:1001:
new_group:x:1002:
```

```
?
tom:x:1000:
sambashare:x:133:tom
systemd-coredump:x:999:
anna:x:1001:
new_group:x:1002:
mygroup:x:1003:
tom@tom-VirtualBox:~$ sudo groupmod -n tree mygroup
tom@tom-VirtualBox:~$
```

```
?
pulse-access:x:130:
gdm:x:131:
lxd:x:132:tom
tom:x:1000:
sambashare:x:133:tom
systemd-coredump:x:999:
anna:x:1001:
new_group:x:1002:
tree:x:1003:
tom@tom-VirtualBox:~$
```

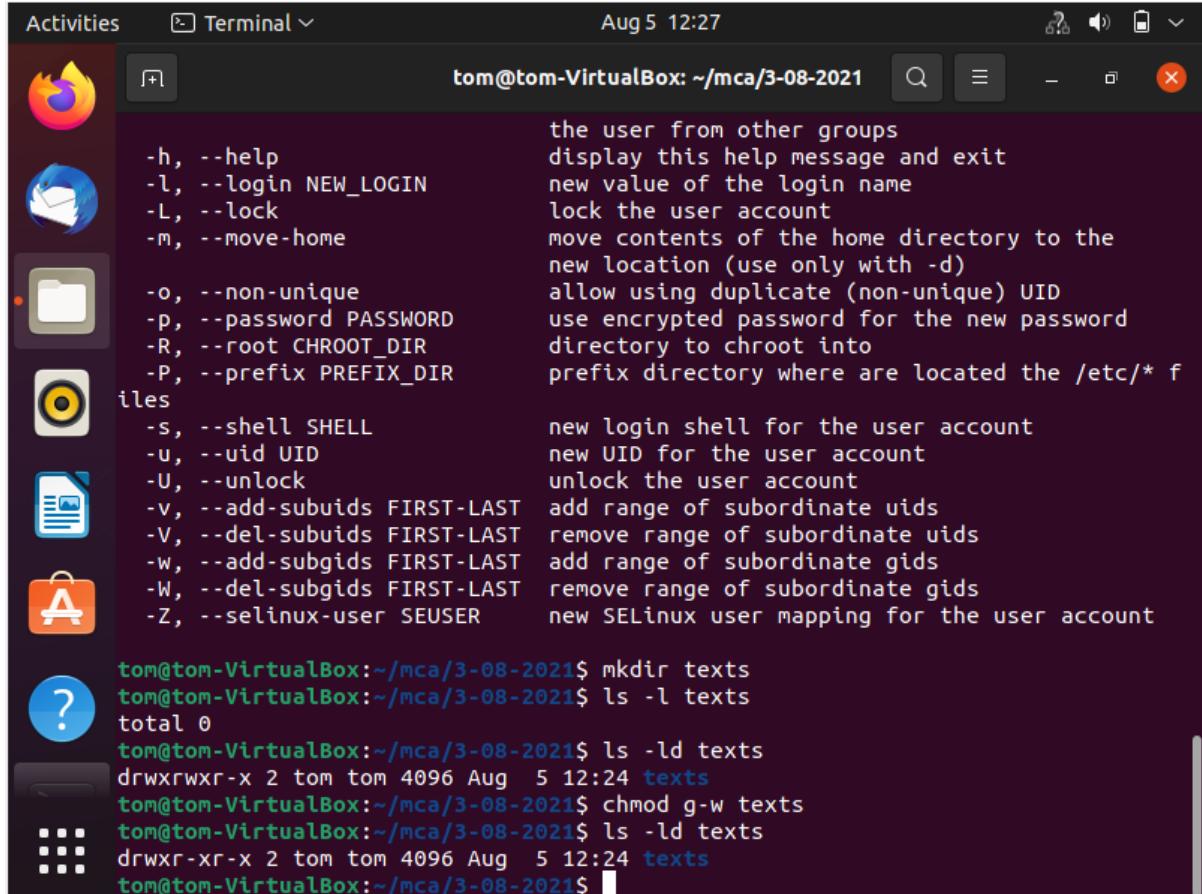
35 groupdel

The groupdel command modifies the system account files, deleting all entries that refer to group. The named group must exist.

```
Activities Terminal Aug 10 16:46
tom@tom-VirtualBox:~/mca/3-08-2021$ groupdel mac
groupdel: group 'mac' does not exist
tom@tom-VirtualBox:~/mca/3-08-2021$ groupdel mca
groupdel: Permission denied.
groupdel: cannot lock /etc/group; try again later.
tom@tom-VirtualBox:~/mca/3-08-2021$ sudo groupdel mca
[sudo] password for tom:
tom@tom-VirtualBox:~/mca/3-08-2021$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
admin:x:4:syslog,tom
tty:x:5:
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:tom
floppy:x:25:
tape:x:26:
sudo:x:27:tom
```

36 chmod

The chmod command is used to change the access mode of a file.



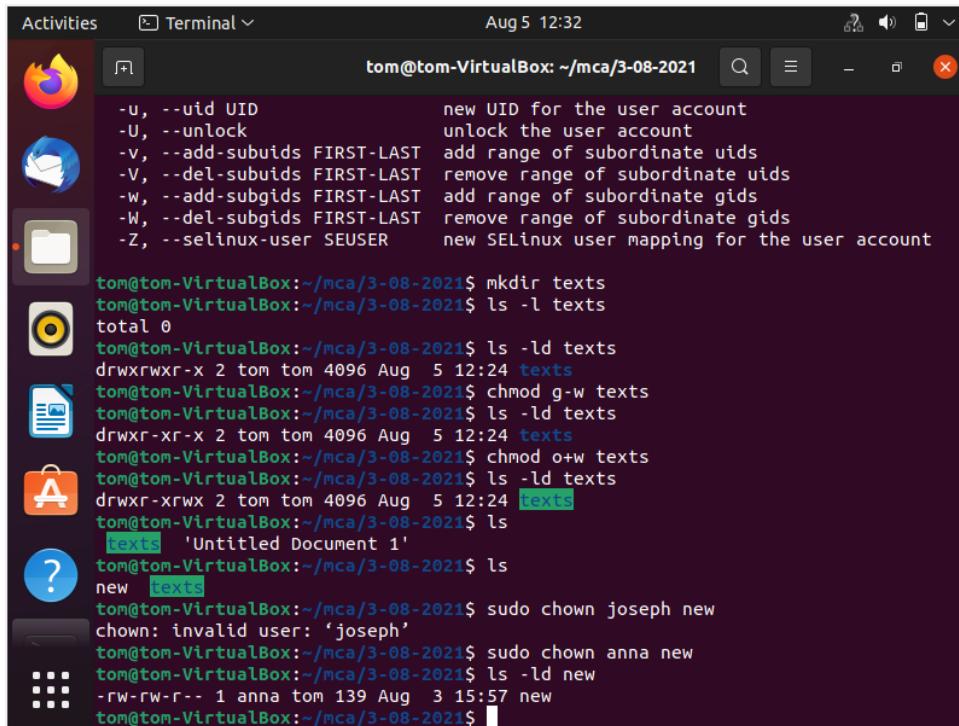
```
Activities Terminal Aug 5 12:27
tom@tom-VirtualBox: ~/mca/3-08-2021
the user from other groups
display this help message and exit
new value of the login name
lock the user account
move contents of the home directory to the
new location (use only with -d)
allow using duplicate (non-unique) UID
use encrypted password for the new password
directory to chroot into
prefix directory where are located the /etc/* f

-h, --help
-l, --login NEW_LOGIN
-L, --lock
-m, --move-home
-o, --non-unique
-p, --password PASSWORD
-R, --root CHROOT_DIR
-P, --prefix PREFIX_DIR
files
-s, --shell SHELL
-u, --uid UID
-U, --unlock
-v, --add-subuids FIRST-LAST
-V, --del-subuids FIRST-LAST
-w, --add-subgids FIRST-LAST
-W, --del-subgids FIRST-LAST
-Z, --selinux-user SEUSER

tom@tom-VirtualBox:~/mca/3-08-2021$ mkdir texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -l texts
total 0
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld texts
drwxrwxr-x 2 tom tom 4096 Aug 5 12:24 texts
tom@tom-VirtualBox:~/mca/3-08-2021$ chmod g-w texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld texts
drwxr-xr-x 2 tom tom 4096 Aug 5 12:24 texts
tom@tom-VirtualBox:~/mca/3-08-2021$
```

37 chown

The chown command allows you to change the user and/or group ownership of a given file, directory, or symbolic link. In Linux, all files are associated with an owner and a group and assigned with permission access rights for the file owner, the group members, and others.



```

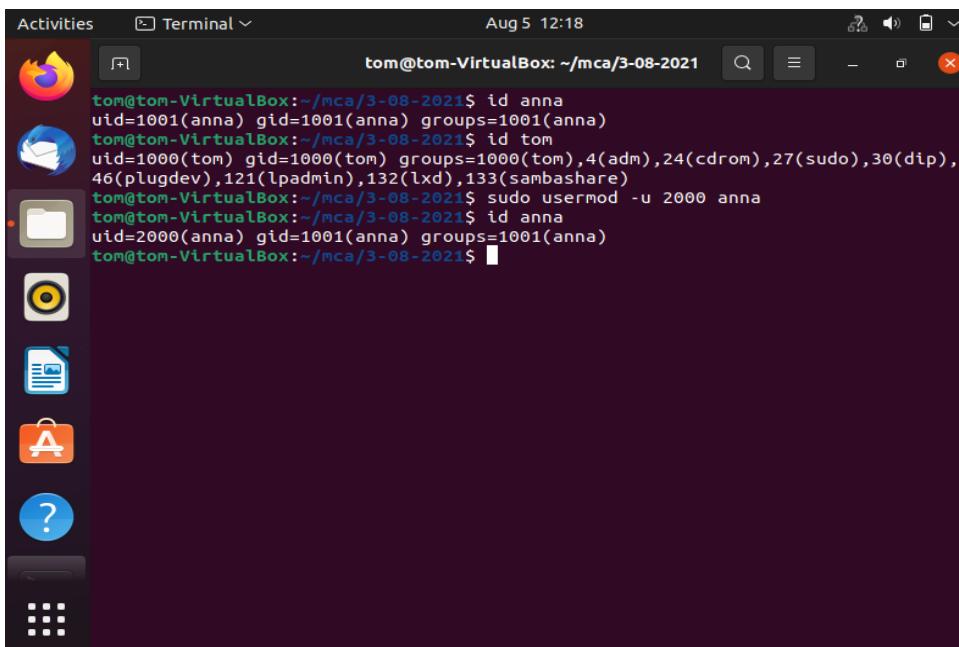
Activities Terminal Aug 5 12:32
tom@tom-VirtualBox: ~/mca/3-08-2021
-u, --uid UID           new UID for the user account
-U, --unlock            unlock the user account
-V, --add-subuids FIRST-LAST add range of subordinate uids
-V, --del-subuids FIRST-LAST remove range of subordinate uids
-W, --add-subgids FIRST-LAST add range of subordinate gids
-W, --del-subgids FIRST-LAST remove range of subordinate gids
-Z, --selinux-user SEUSER new SELinux user mapping for the user account

tom@tom-VirtualBox:~/mca/3-08-2021$ mkdir texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -l texts
total 0
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld texts
drwxrwxr-x 2 tom tom 4096 Aug  5 12:24 texts
tom@tom-VirtualBox:~/mca/3-08-2021$ chmod g+w texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld texts
drwxr-xr-x 2 tom tom 4096 Aug  5 12:24 texts
tom@tom-VirtualBox:~/mca/3-08-2021$ chmod o+w texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld texts
drwxr-xrwx 2 tom tom 4096 Aug  5 12:24 texts
tom@tom-VirtualBox:~/mca/3-08-2021$ ls
texts 'Untitled Document 1'
tom@tom-VirtualBox:~/mca/3-08-2021$ ls
new texts
tom@tom-VirtualBox:~/mca/3-08-2021$ sudo chown joseph new
chown: invalid user: 'joseph'
tom@tom-VirtualBox:~/mca/3-08-2021$ sudo chown anna new
tom@tom-VirtualBox:~/mca/3-08-2021$ ls -ld new
-rw-r--r-- 1 anna tom 139 Aug  3 15:57 new
tom@tom-VirtualBox:~/mca/3-08-2021$ 

```

38 id

The id command in Linux is used to find out user and group names and numeric ID's (UID or group ID) of the current user or any other user in the server. This command is useful to find out the following information as listed below: User name and real user id.



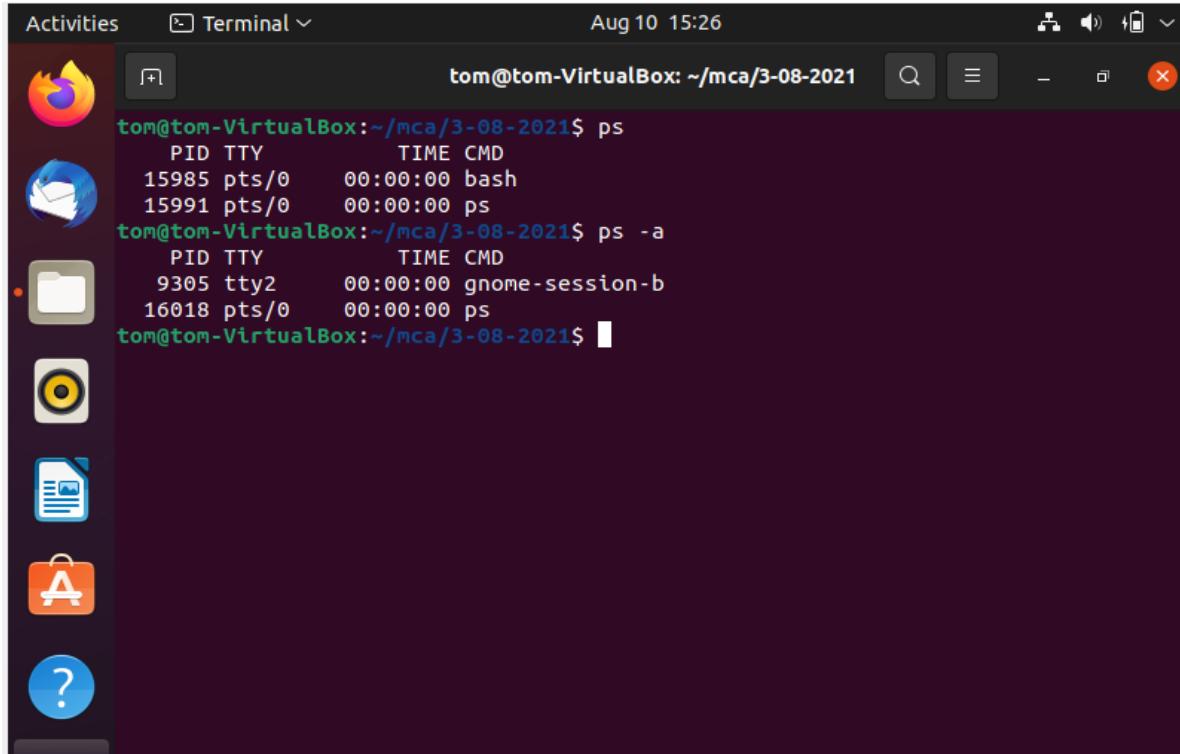
```

Activities Terminal Aug 5 12:18
tom@tom-VirtualBox: ~/mca/3-08-2021
tom@tom-VirtualBox:~/mca/3-08-2021$ id anna
uid=1001(anna) gid=1001(anna) groups=1001(anna)
tom@tom-VirtualBox:~/mca/3-08-2021$ id tom
uid=1000(tom) gid=1000(tom) groups=1000(tom),4(adm),24(cdrom),27(sudo),30(dip),
46(plugdev),121(lpadmin),132(lxd),133(sambashare)
tom@tom-VirtualBox:~/mca/3-08-2021$ sudo usermod -u 2000 anna
tom@tom-VirtualBox:~/mca/3-08-2021$ id anna
uid=2000(anna) gid=1001(anna) groups=1001(anna)
tom@tom-VirtualBox:~/mca/3-08-2021$ 

```

39 ps

The ps command in Linux is used to display about running processes on the system. You can get information like process ID (PID) for the processes you or any other user is running on the same Linux system.

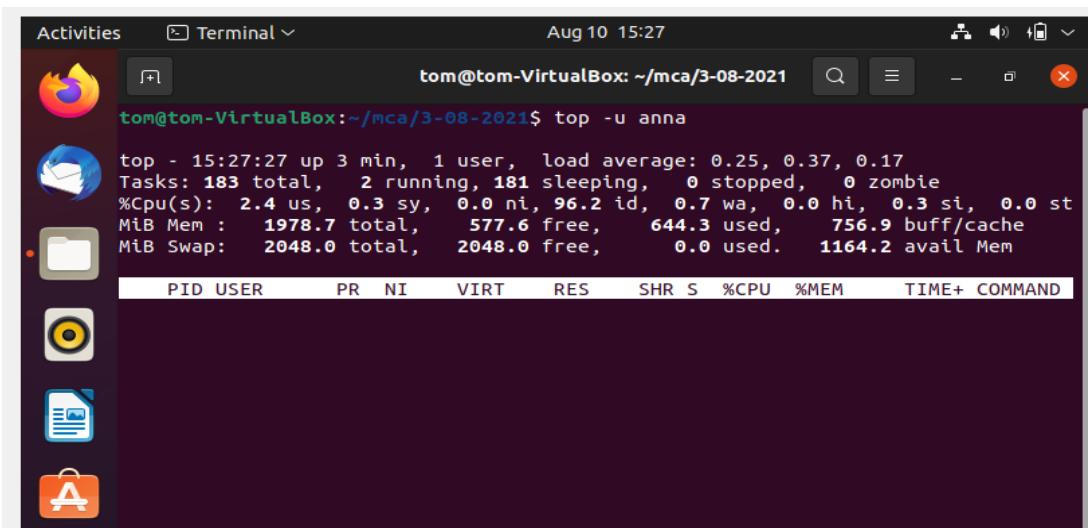


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/3-08-2021". The date and time at the top of the screen are Aug 10 15:26. The terminal shows two commands run:

```
tom@tom-VirtualBox:~/mca/3-08-2021$ ps
  PID TTY      TIME CMD
 15985 pts/0    00:00:00 bash
 15991 pts/0    00:00:00 ps
tom@tom-VirtualBox:~/mca/3-08-2021$ ps -a
  PID TTY      TIME CMD
  9305 tty2    00:00:00 gnome-session-b
 16018 pts/0    00:00:00 ps
```

40 top

The Linux top command shows the running processes within your Linux environment that consume the most system resources.



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/3-08-2021". The date and time at the top of the screen are Aug 10 15:27. The terminal shows the top command being run with the argument "-u anna":

```
tom@tom-VirtualBox:~/mca/3-08-2021$ top -u anna
```

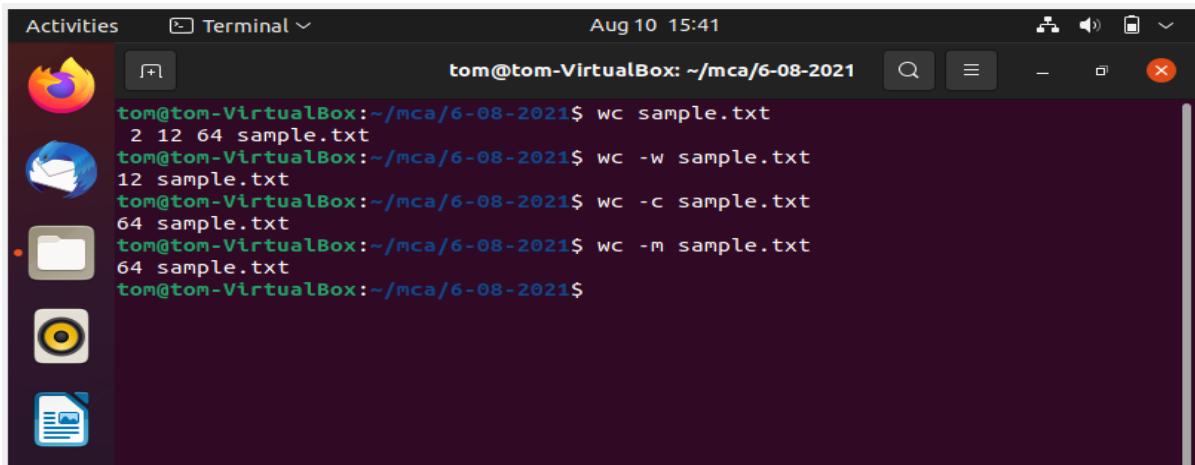
Output from the top command:

```
top - 15:27:27 up 3 min,  1 user,  load average: 0.25, 0.37, 0.17
Tasks: 183 total,   2 running, 181 sleeping,   0 stopped,   0 zombie
%CPU(s): 2.4 us, 0.3 sy, 0.0 ni, 96.2 id, 0.7 wa, 0.0 hi, 0.3 si, 0.0 st
MiB Mem : 1978.7 total, 577.6 free, 644.3 used, 756.9 buff/cache
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used. 1164.2 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
-----	------	----	----	------	-----	-----	---	------	------	-------	---------

41 wc

The wc command in Linux with examples It is used to find out number of lines, word count, byte and characters count in the files specified in the file.

A screenshot of a Linux desktop environment showing a terminal window. The terminal window is titled "Terminal" and has the command "tom@tom-VirtualBox: ~/mca/6-08-2021\$". The terminal shows four commands being run: "wc sample.txt", "wc -w sample.txt", "wc -c sample.txt", and "wc -m sample.txt", all resulting in the output "2 12 64 sample.txt".

```
Activities Terminal Aug 10 15:41
tom@tom-VirtualBox:~/mca/6-08-2021$ wc sample.txt
2 12 64 sample.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ wc -w sample.txt
12 sample.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ wc -c sample.txt
64 sample.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ wc -m sample.txt
64 sample.txt
tom@tom-VirtualBox:~/mca/6-08-2021$
```

42 tar

The Linux “tar” stands for tape archive, which is used by large number of Linux/Unix system administrators to deal with tape drives backup. The tar command used to rip a collection of files and directories into highly compressed archive file commonly called tarball or tar, gzip and bzip in Linux.

```

Activities Terminal Aug 10 15:54
tom@tom-VirtualBox:~/mca/6-08-2021/extract
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
capitals.txt sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ tar cf all.tar state.txt capitals.txt sample.txt
tar: capitals.txt: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
tom@tom-VirtualBox:~/mca/6-08-2021$ tar cf all.tar state.txt capitals.txt sample.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
all.tar capitals.txt sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ mkdir extract
tom@tom-VirtualBox:~/mca/6-08-2021$ cd extract
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ tar xf /home/mca/6-08-2021
tar: /home/mca/6-08-2021: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ tar xf /home/mca/6-08-2021/all.tar
tar: /home/mca/6-08-2021/all.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ tar xf /mca/6-08-2021/all.tar
tar: /mca/6-08-2021/all.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ tar xf /home/tom/mca/6-08-2021/all.tar
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ ls
capitals.txt sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021/extract$ 
```

Types for creating and extracting

- Gzip

A file that ends in .tar.gz or .tgz is a Tar archive compressed with Gzip. Gzip is most often used to compress text files, Tar archives, and web pages. Do not use Gzip to compress images, audio, PDF documents, and other binary files as they are already compressed.

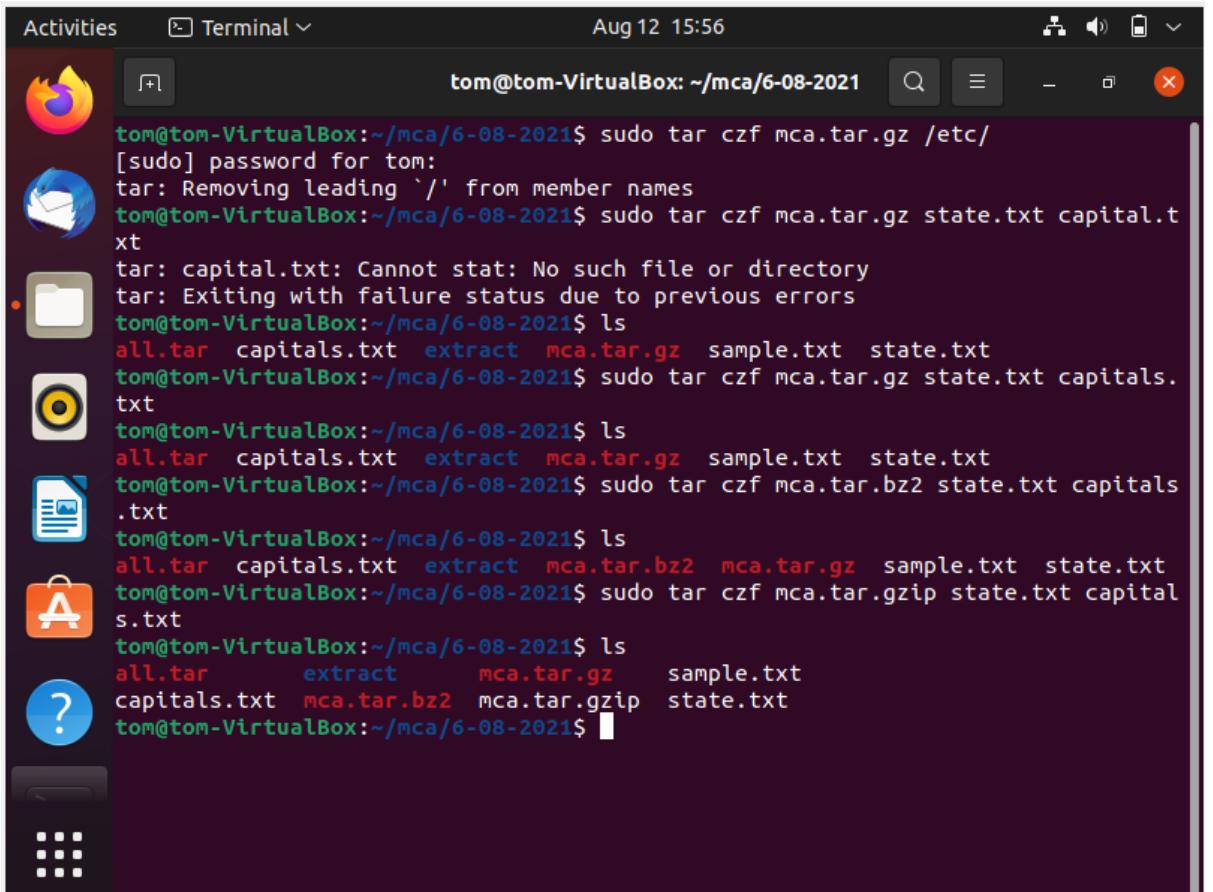
- Bz2

The .bz2 extension suffix tells us it has been compressed using the bzip2 command. bzip2 command in Linux is used to compress and decompress the files i.e. it helps in binding the files into a single file which takes less storage space as the original file use to take. It has a slower decompression time and higher memory use.

- Gz

You need to use the tar command which can create and manipulate archive files in .tar.gz under Unix like operating systems. It is very useful for archiving multiple files together into a single archive file. It allows us to restore files individually.

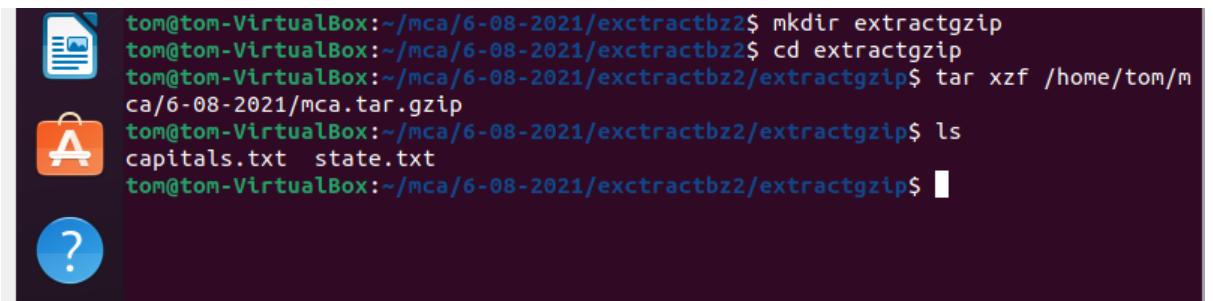
Creation using Gzip,bz2,gz



The screenshot shows a terminal window titled "Terminal" in the top bar. The window has a dark theme and displays a command-line session. The session starts with creating a tar archive named "mca.tar.gz" containing the "/etc" directory. It then attempts to add files "state.txt" and "capital.txt" to the archive, but "capital.txt" does not exist. The user then lists the contents of the archive, extracts it to a temporary directory, and creates a new archive named "mca.tar.bz2" containing "state.txt" and "capital.txt". Finally, the user creates a gzip archive named "mca.tar.gz" containing "state.txt" and "capital.txt". The terminal window also shows icons for various applications like the Dash, Home, and Help.

```
tom@tom-VirtualBox:~/mca/6-08-2021$ sudo tar czf mca.tar.gz /etc/
[sudo] password for tom:
tar: Removing leading '/' from member names
tom@tom-VirtualBox:~/mca/6-08-2021$ sudo tar czf mca.tar.gz state.txt capital.txt
tar: capital.txt: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
all.tar capitals.txt extract mca.tar.gz sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ sudo tar czf mca.tar.gz state.txt capitals.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
all.tar capitals.txt extract mca.tar.gz sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ sudo tar czf mca.tar.bz2 state.txt capitals.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
all.tar capitals.txt extract mca.tar.bz2 mca.tar.gz sample.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ sudo tar czf mca.tar.gzip state.txt capital.txt
tom@tom-VirtualBox:~/mca/6-08-2021$ ls
all.tar extract mca.tar.gz sample.txt
capitals.txt mca.tar.bz2 mca.tar.gzip state.txt
tom@tom-VirtualBox:~/mca/6-08-2021$
```

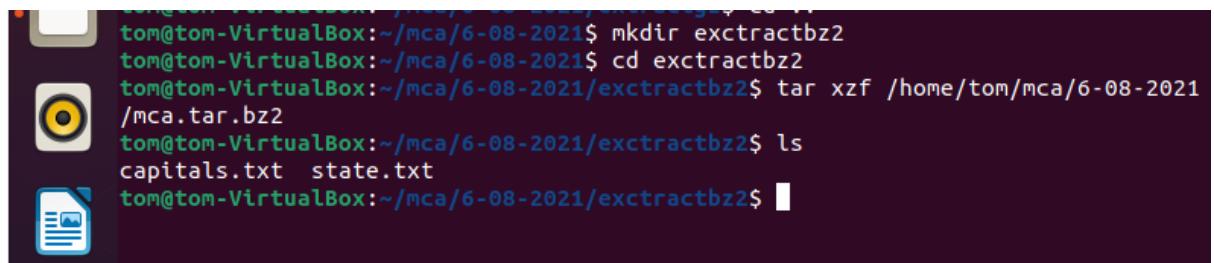
Extracting using Gzip



The screenshot shows a terminal window titled "Terminal" in the top bar. The window has a dark theme and displays a command-line session. The user first creates a directory named "extractgzip" and changes into it. They then extract the "mca.tar.gz" file from the previous session into this directory. Finally, they list the contents of the extracted directory, which contains "state.txt" and "capital.txt". The terminal window also shows icons for various applications like the Dash, Home, and Help.

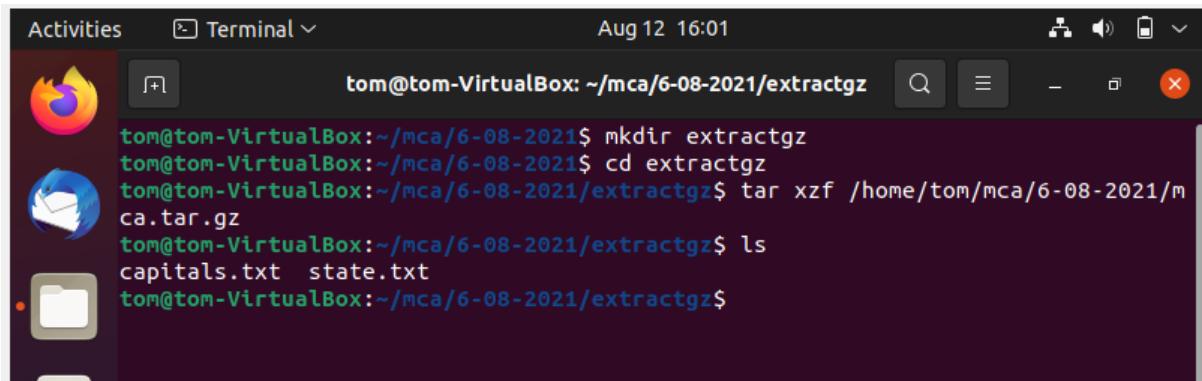
```
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2$ mkdir extractgzip
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2$ cd extractgzip
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2/extractgzip$ tar xzf /home/tom/mca/6-08-2021/mca.tar.gz
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2/extractgzip$ ls
capital.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2/extractgzip$
```

Extraction using Bz2



```
tom@tom-VirtualBox:~/mca/6-08-2021$ mkdir extractbz2
tom@tom-VirtualBox:~/mca/6-08-2021$ cd extractbz2
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2$ tar xzf /home/tom/mca/6-08-2021/mca.tar.bz2
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2$ ls
capitals.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2$
```

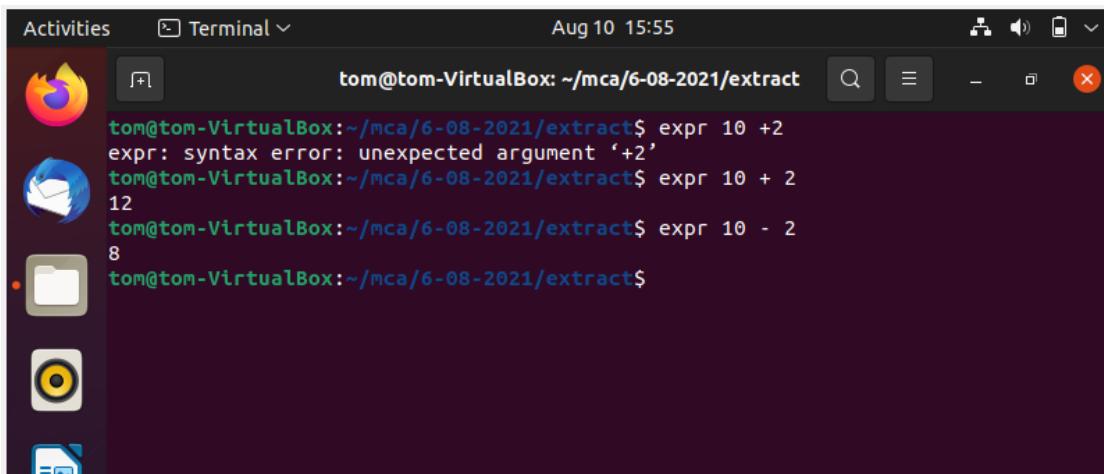
Extraction using Gz



```
Activities Terminal Aug 12 16:01
tom@tom-VirtualBox: ~/mca/6-08-2021/extractgz
tom@tom-VirtualBox:~/mca/6-08-2021$ mkdir extractgz
tom@tom-VirtualBox:~/mca/6-08-2021$ cd extractgz
tom@tom-VirtualBox:~/mca/6-08-2021/extractgz$ tar xzf /home/tom/mca/6-08-2021/mca.tar.gz
tom@tom-VirtualBox:~/mca/6-08-2021/extractgz$ ls
capitals.txt state.txt
tom@tom-VirtualBox:~/mca/6-08-2021/extractgz$
```

43 expr

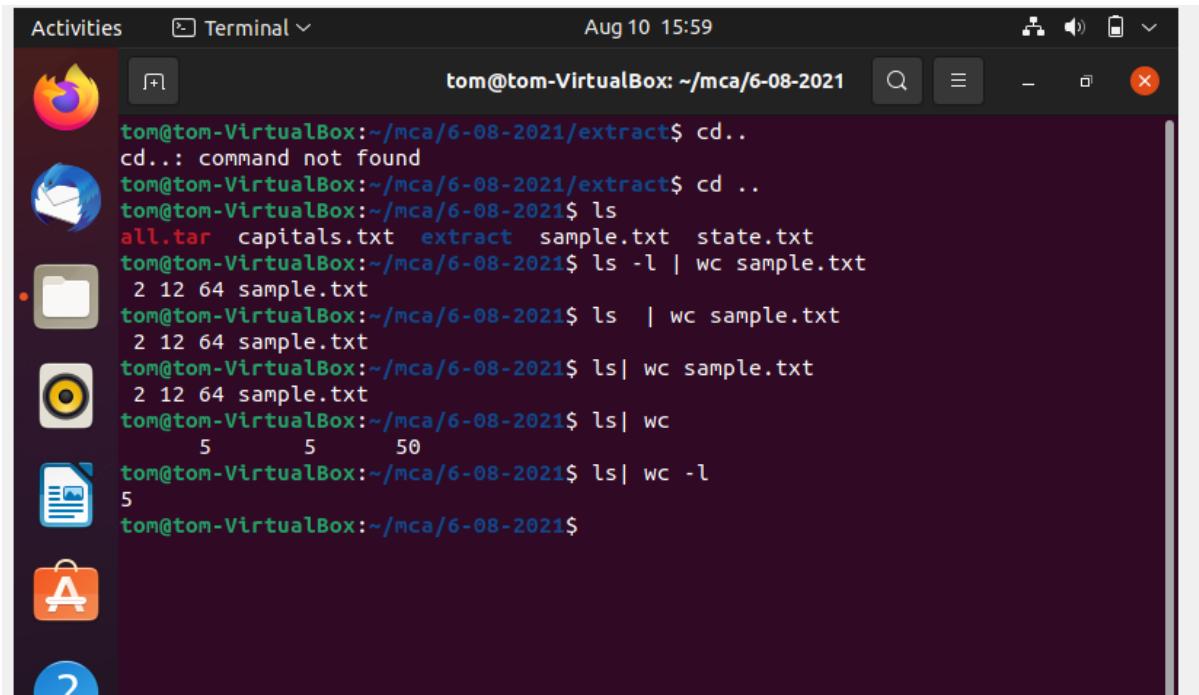
The expr command supports the following operators: for integer: addition, subtraction, multiplication, division, and modulus. For strings: regular expression, set of characters in a string.



```
Activities Terminal Aug 10 15:55
tom@tom-VirtualBox: ~/mca/6-08-2021/extract
tom@tom-VirtualBox:~/mca/6-08-2021$ expr 10 + 2
expr: syntax error: unexpected argument '+2'
tom@tom-VirtualBox:~/mca/6-08-2021$ expr 10 + 2
12
tom@tom-VirtualBox:~/mca/6-08-2021$ expr 10 - 2
8
tom@tom-VirtualBox:~/mca/6-08-2021$
```

44 Redirection and piping

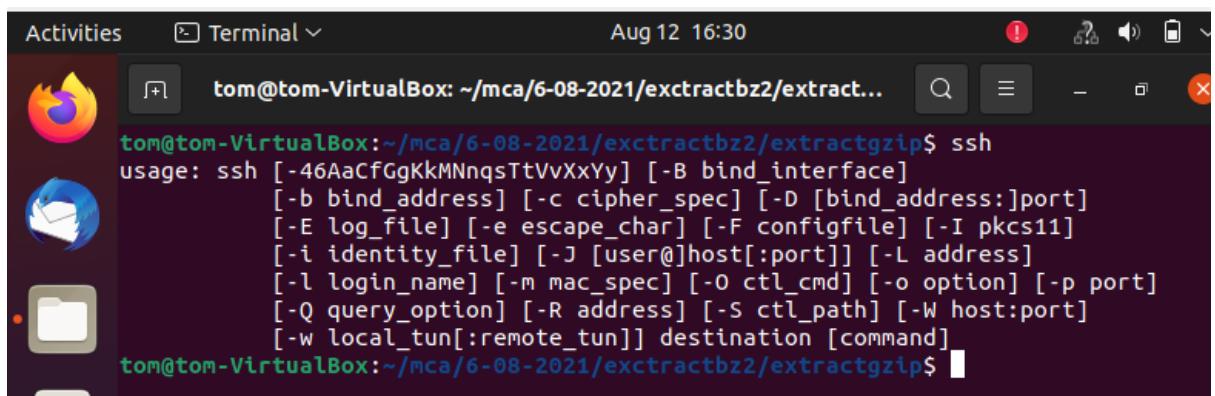
The pipe command denoted by the symbol | allows you to send output of one command to another for further processing. It can redirect the standard output, input, or error of one process to another.



```
Activities Terminal Aug 10 15:59
tom@tom-VirtualBox: ~/mca/6-08-2021/extract$ cd..
cd..: command not found
tom@tom-VirtualBox: ~/mca/6-08-2021/extract$ cd ..
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls
all.tar capitals.txt extract sample.txt state.txt
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls -l | wc sample.txt
2 12 64 sample.txt
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls | wc sample.txt
2 12 64 sample.txt
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls| wc sample.txt
2 12 64 sample.txt
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls| wc
      5      5     50
tom@tom-VirtualBox: ~/mca/6-08-2021$ ls| wc -l
5
tom@tom-VirtualBox: ~/mca/6-08-2021$
```

45 ssh

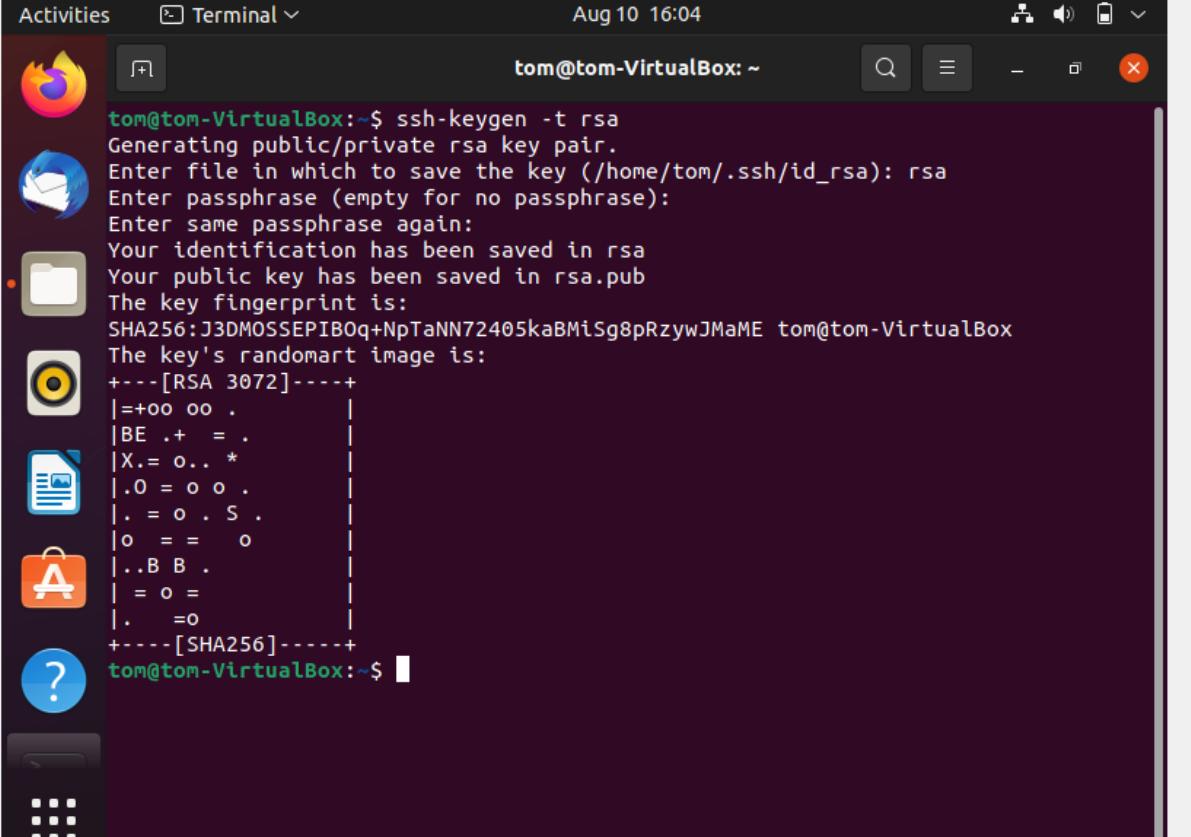
In Linux, ssh is a protocol, which stands for Secure Shell or Secure Socket Shell. The secure shell is useful for security while connecting to a remote server. The ssh command uses a ssh protocol, which is a secure protocol, as the data transfer between the client and the host takes place in encrypted form.



```
Activities Terminal Aug 12 16:30
tom@tom-VirtualBox: ~/mca/6-08-2021/extractbz2/extract...$ ssh
usage: ssh [-46AaCfGgKkMNqsTtVvXxYy] [-B bind_interface]
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
           [-i identity_file] [-J [user@]host[:port]] [-L address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
           [-w local_tun[:remote_tun]] destination [command]
tom@tom-VirtualBox: ~/mca/6-08-2021/extractbz2/extractgzip$
```

46 ssh-keygen

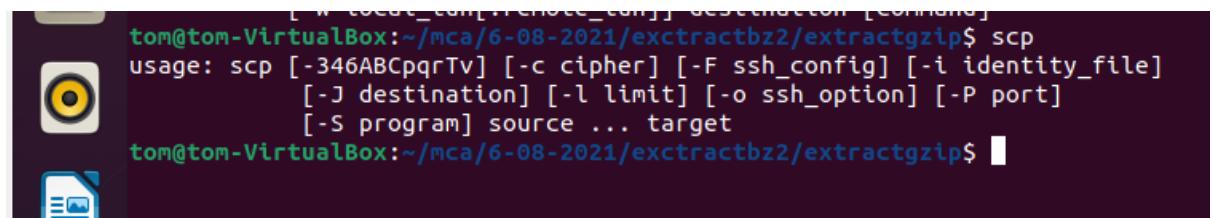
the ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system without supplying a password. Keys must be generated for each user separately. If you generate key pairs as the root user, only the root can use the keys.



```
Activities Terminal Aug 10 16:04
tom@tom-VirtualBox: ~
tom@tom-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/tom/.ssh/id_rsa): rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:J3DMOSSEPIB0q+NpTaNN72405kaBMiSg8pRzywJMaME tom@tom-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
|+oo oo .          |
|BE .+ = .         |
|X.= o... *        |
|.0 = o o .        |
|.= o . S .       |
|o  = =  o         |
|..B B .           |
|= o =             |
|.= o              |
+---[SHA256]-----+
tom@tom-VirtualBox:~$
```

47 scp

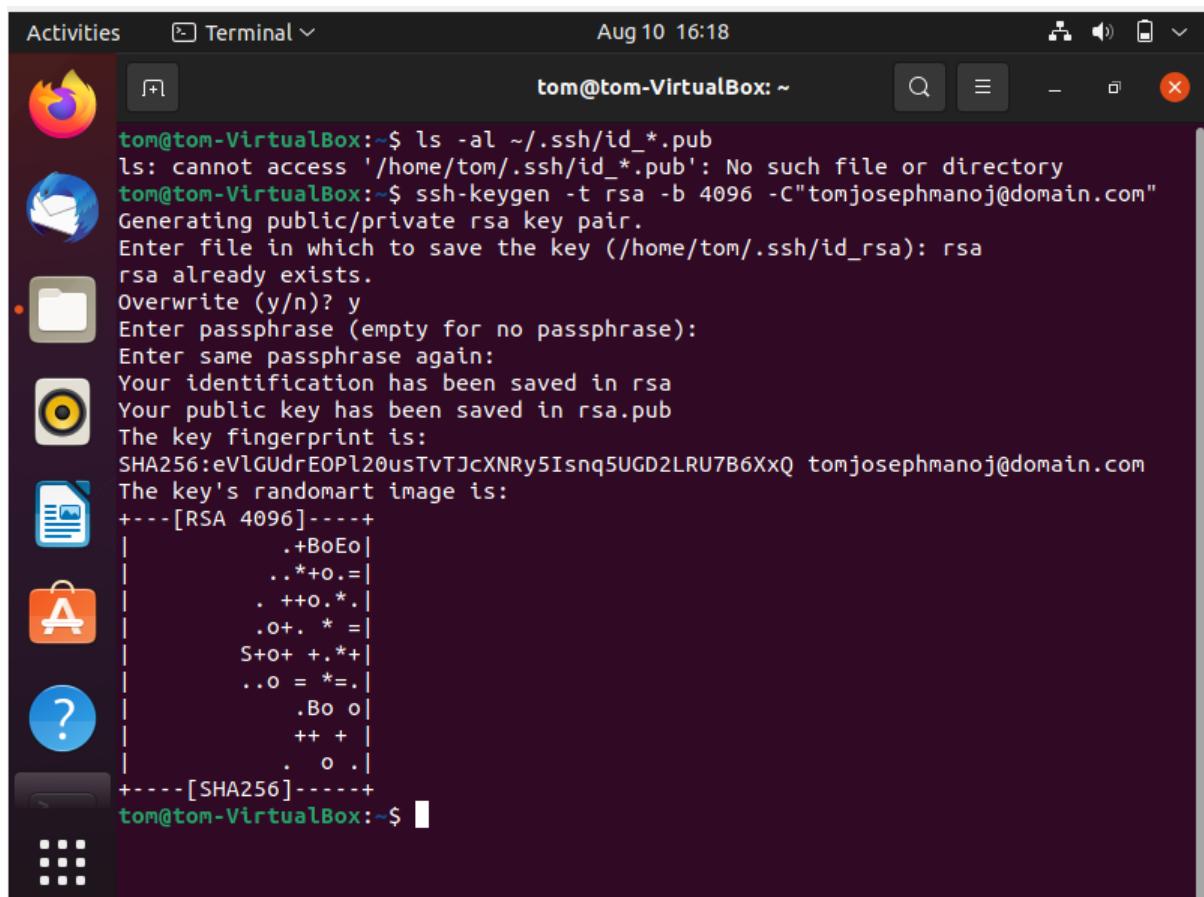
The scp (secure copy) command in Linux system is **used** to copy file (s) between servers in a secure way. The SCP command or secure copy allows secure transferring of files in between the local host and the remote host or between two remote hosts. It uses the same authentication and security as it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



```
[ -w to目的地[!从目的地] ] [destination] [命令]
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2/extractgzip$ scp
usage: scp [-346ABCpqrv] [-c cipher] [-F ssh_config] [-i identity_file]
           [-J destination] [-l limit] [-o ssh_option] [-P port]
           [-S program] source ... target
tom@tom-VirtualBox:~/mca/6-08-2021/extractbz2/extractgzip$
```

48 ssh-copy-id

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



```
Activities Terminal Aug 10 16:18
tom@tom-VirtualBox:~$ ls -al ~/.ssh/id_*.pub
ls: cannot access '/home/tom/.ssh/id_*.pub': No such file or directory
tom@tom-VirtualBox:~$ ssh-keygen -t rsa -b 4096 -C "tomjosephmanoj@domain.com"
Generating public/private rsa key pair.
Enter file in which to save the key (/home/tom/.ssh/id_rsa): rsa
rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:eVIGUdrEOPl20usTvTJcXNRy5Isnq5UGD2LRU7B6XxQ tomjosephmanoj@domain.com
The key's randomart image is:
+---[RSA 4096]---+
|          .+BoEo|
|          ..*+o.=|
|          . ++o.*.||
|          .o+.* |=
|          S+o+ +.*+|
|          ..o = *.=|
|          .Bo o|
|          ++ + |
|          . o .|
+---[SHA256]---+
tom@tom-VirtualBox:~$
```

```

Activities Terminal Aug 10 16:40
tom@tom-VirtualBox: ~
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/tom/.ssh/id_rsa
Your public key has been saved in /home/tom/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:RtojUmlQAfH6o7uqj/M5p1iMZkyiHKj1UrAI9Q8rHnA tomjosephmanoj@domain.com
The key's randomart image is:
+---[RSA 4096]----+
| . ++o. |
| . . o . |
| o E o = . |
| +o o B + |
| +o= = + S |
| B=. o o . |
| +== . o |
| ++.o... . |
| +=*=+o |
+---[SHA256]----+
tom@tom-VirtualBox:~$ ls ~/.ssh/id_*
/home/tom/.ssh/id_rsa /home/tom/.ssh/id_rsa.pub
tom@tom-VirtualBox:~$ ssh-copy-id mca@192.168.9.91
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter
out any that are already installed

/usr/bin/ssh-copy-id: ERROR: ssh: Could not resolve hostname 192/168.9.91: Name
or service not known

tom@tom-VirtualBox:~$ ssh-copy-id mca@192.168.9.91

```

Managing Files, Creating Users and Groups Using Command-line tools

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

(In each set, replace X with the numbers 1 through 6)

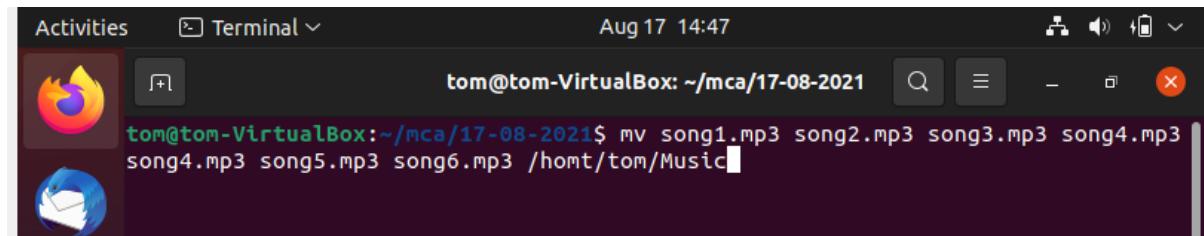
Activities Terminal Aug 17 14:11

```
tom@tom-VirtualBox:~/mca/17-08-2021$ cat song1.mp3
cat: song1.mp3: No such file or directory
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song1.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song2.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song3.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song4.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song5.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > song6.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$
```

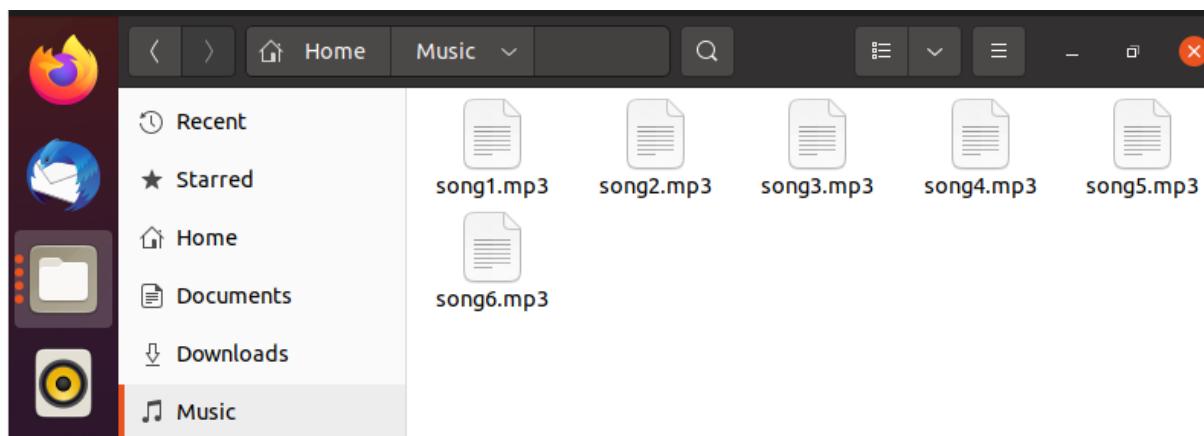
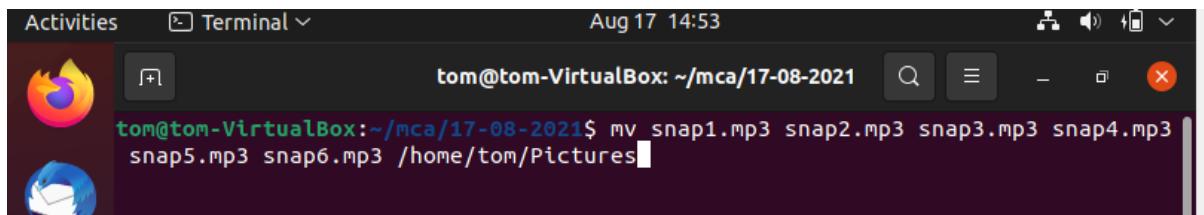
Activities Terminal Aug 17 16:22

```
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap1.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap2.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap3.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap4.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap5.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > snap6.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film1.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film2.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film3.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film4.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film5.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$ cat > film6.mp3
^C
tom@tom-VirtualBox:~/mca/17-08-2021$
```

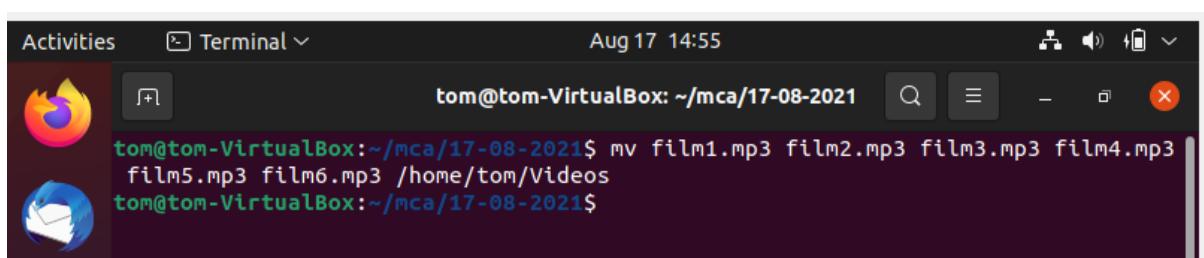
2). From your home directory, move the song files into your music subdirectory, the snapshot files into your pictures subdirectory, and the movie files into videos subdirectory.



Activities Terminal Aug 17 14:47
tom@tom-VirtualBox: ~/mca/17-08-2021\$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 /home/tom/Music

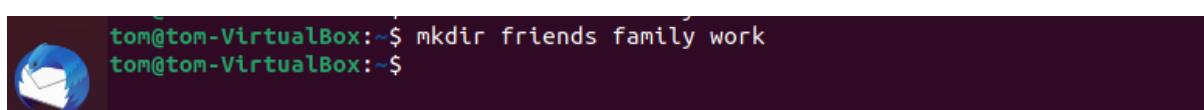



Activities Terminal Aug 17 14:53
tom@tom-VirtualBox: ~/mca/17-08-2021\$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 /home/tom/Pictures



Activities Terminal Aug 17 14:55
tom@tom-VirtualBox: ~/mca/17-08-2021\$ mv film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5.mp3 film6.mp3 /home/tom/Videos
tom@tom-VirtualBox: ~/mca/17-08-2021\$

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.



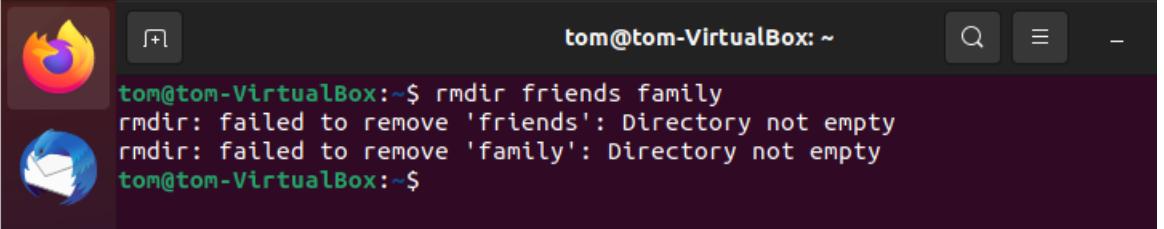
tom@tom-VirtualBox:~\$ mkdir friends family work
tom@tom-VirtualBox:~\$

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

The image consists of four vertically stacked screenshots of a Linux desktop environment, specifically a terminal window. Each screenshot shows a terminal session with a dark background and light-colored text. The terminal window has a title bar with the text "Activities Terminal" and the date/time "Aug 17 15:03". The title bar also includes icons for search, minimize, maximize, and close. The terminal content is as follows:

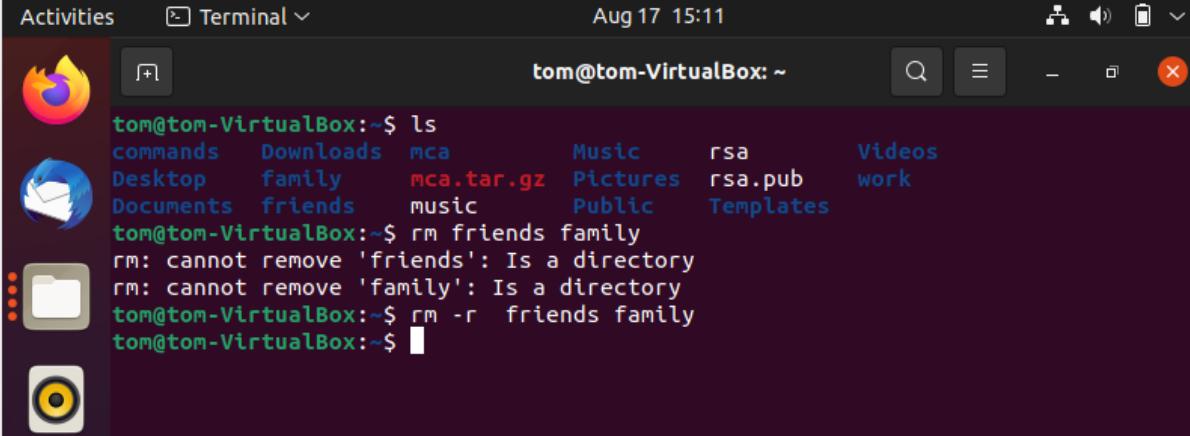
- Screenshot 1 (Aug 17 15:03):** The user is in the directory ~/Music. They run the command "cp song1.mp3 song2.mp3 song4.mp3 song5.mp3 song6.mp3 /home/tom/friends". The output shows the files being copied to the "/home/tom/friends" directory.
- Screenshot 2 (Aug 17 15:05):** The user is in the directory ~/Pictures. They run the command "cp snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 /home/tom/family". The output shows the files being copied to the "/home/tom/family" directory.
- Screenshot 3 (Aug 17 15:06):** The user is in the directory ~/friends. They run the command "ls" to list the contents of the directory, which are the six song files: song1.mp3, song2.mp3, song4.mp3, song5.mp3, song6.mp3.
- Screenshot 4 (Aug 17 15:07):** The user is in the directory ~/family. They run the command "ls" to list the contents of the directory, which are the six snap files: snap1.mp3, snap2.mp3, snap3.mp3, snap4.mp3, snap5.mp3, snap6.mp3.

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



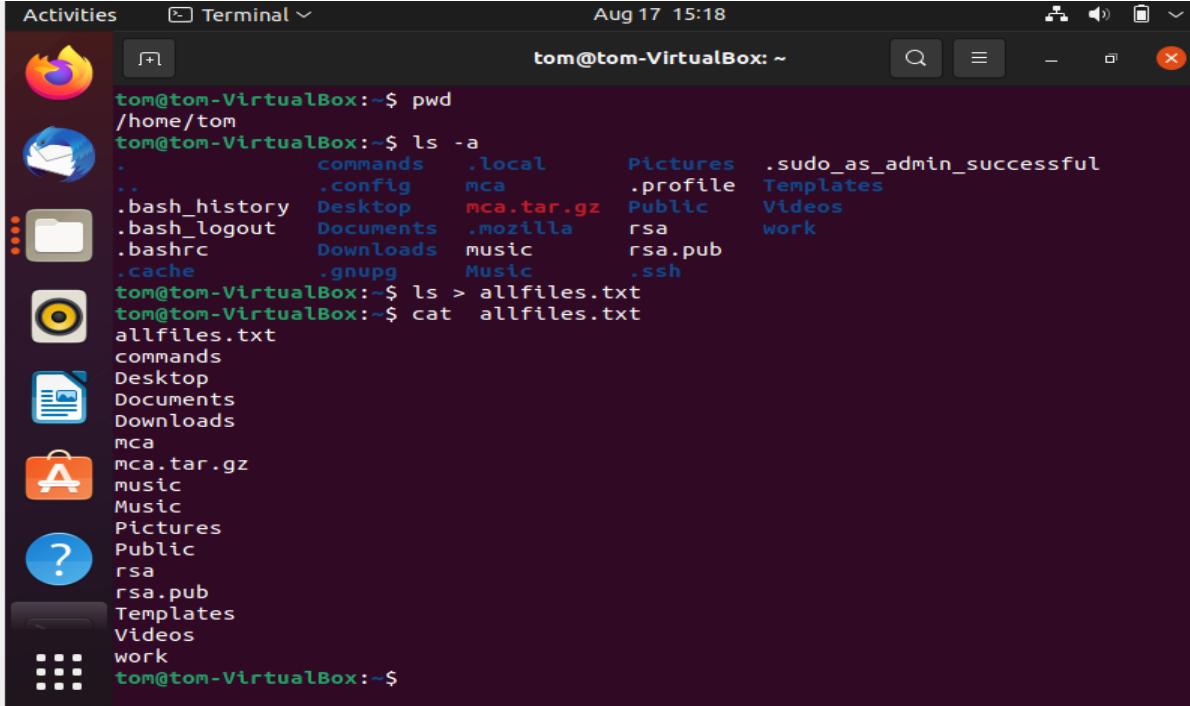
```
tom@tom-VirtualBox:~$ rmdir friends family
rmdir: failed to remove 'friends': Directory not empty
rmdir: failed to remove 'family': Directory not empty
tom@tom-VirtualBox:~$
```

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



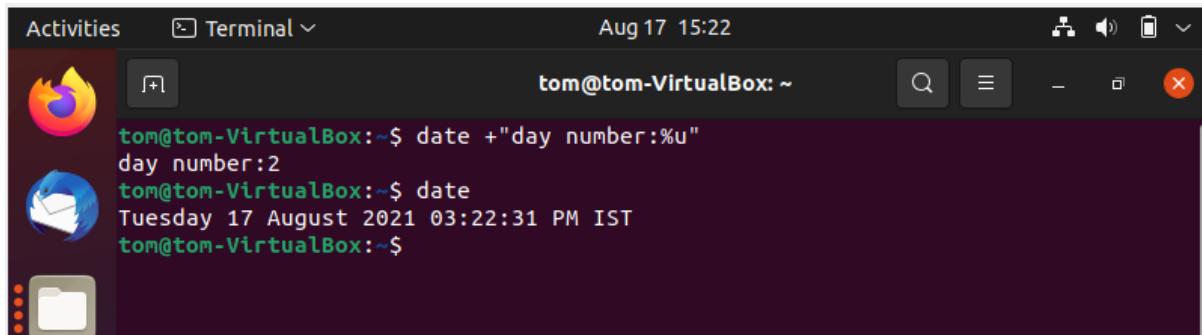
```
Activities Terminal Aug 17 15:11
tom@tom-VirtualBox:~$ ls
commands Downloads mca      Music    rsa       Videos
Desktop   family   mca.tar.gz Pictures  rsa.pub   work
Documents friends  music     Public   Templates
tom@tom-VirtualBox:~$ rm friends family
rm: cannot remove 'friends': Is a directory
rm: cannot remove 'family': Is a directory
tom@tom-VirtualBox:~$ rm -r friends family
tom@tom-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.



```
Activities Terminal Aug 17 15:18
tom@tom-VirtualBox:~$ pwd
/home/tom
tom@tom-VirtualBox:~$ ls -a
.
..
.bash_history Desktop mca.tar.gz Pictures .profile Templates
.bash_logout Documents .mozilla Public   rsa       Videos
.bashrc   Downloads music    rsa.pub   work
.cache    .gnupg  Music    .ssh
tom@tom-VirtualBox:~$ ls > allfiles.txt
tom@tom-VirtualBox:~$ cat allfiles.txt
allfiles.txt
commands
Desktop
Documents
Downloads
mca
mca.tar.gz
music
Music
Pictures
Public
rsa
rsa.pub
Templates
Videos
work
tom@tom-VirtualBox:~$
```

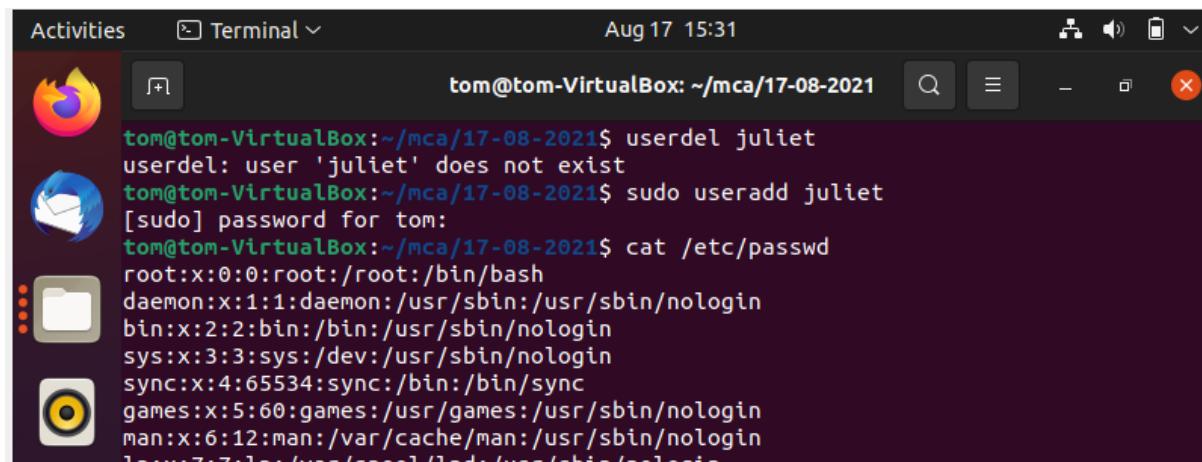
8). In the command window, display today's date with day of the week, month, date and year



A screenshot of a Linux desktop environment (Ubuntu) showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~". The terminal shows the following command and its output:

```
tom@tom-VirtualBox:~$ date +"day number:%u"
day number:2
tom@tom-VirtualBox:~$ date
Tuesday 17 August 2021 03:22:31 PM IST
tom@tom-VirtualBox:~$
```

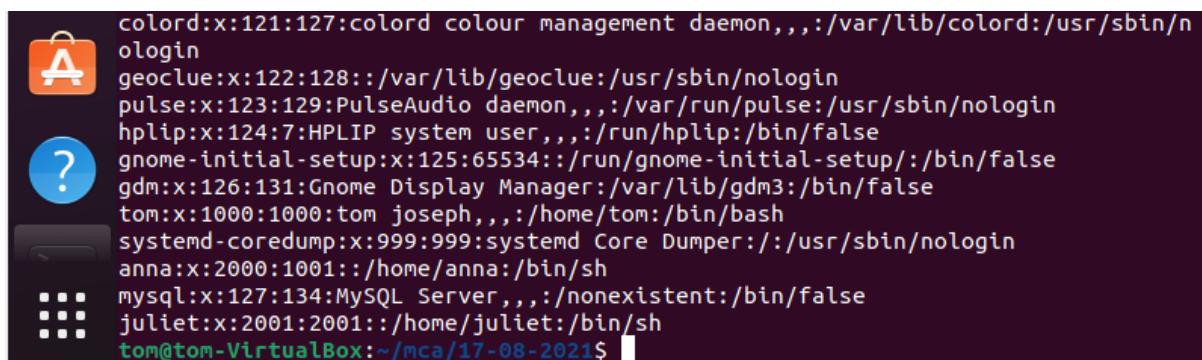
9). Add the user Juliet



A screenshot of a Linux desktop environment (Ubuntu) showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/17-08-2021". The terminal shows the following commands and their outputs:

```
tom@tom-VirtualBox:~/mca/17-08-2021$ userdel juliet
userdel: user 'juliet' does not exist
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd juliet
[sudo] password for tom:
tom@tom-VirtualBox:~/mca/17-08-2021$ 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
```

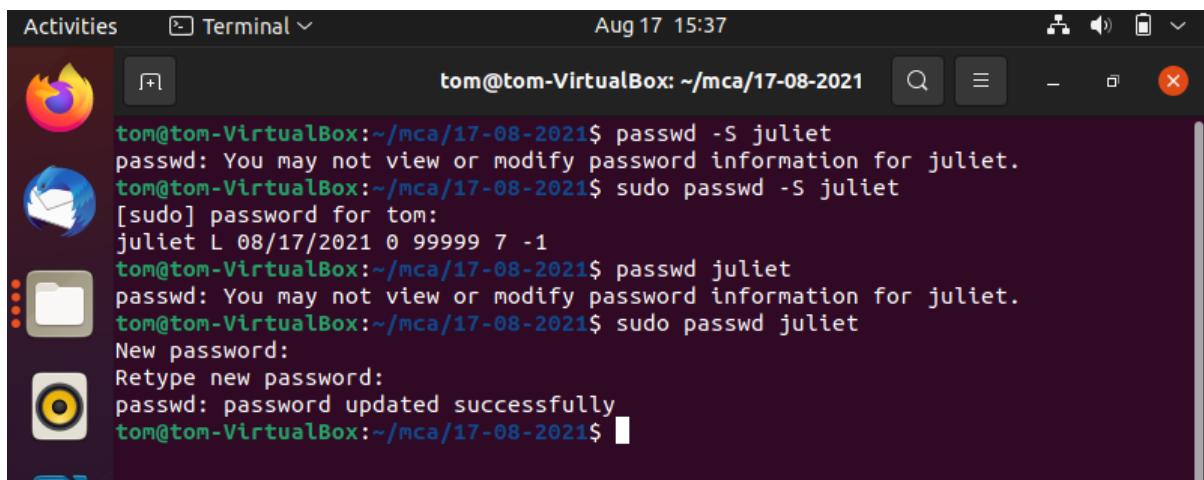
10). Confirm that Juliet has been added by examining the /etc/passwd file



A screenshot of a Linux desktop environment (Ubuntu) showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/17-08-2021\$". The terminal shows the full content of the /etc/passwd file:

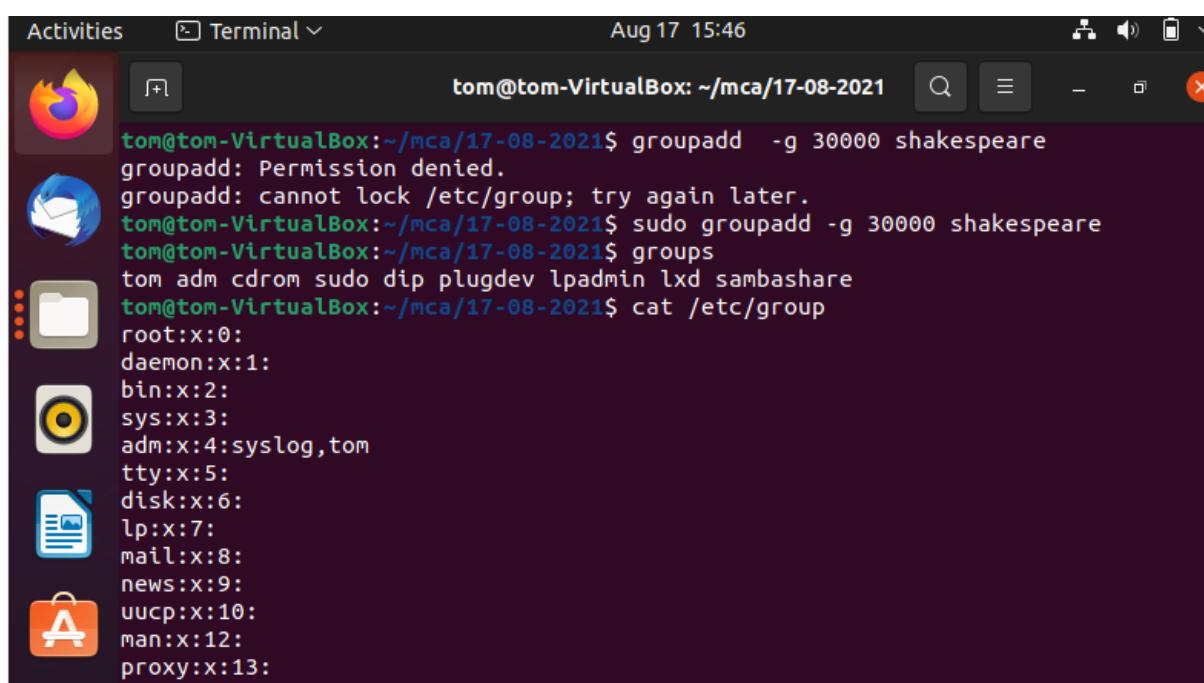
```
colord:x:121:127:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:128::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:129:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
hplip:x:124:7:HPLIP system user,,,:/run/hplip:/bin/false
gnome-initial-setup:x:125:65534::/run/gnome-initial-setup:/bin/false
gdm:x:126:131:Gnome Display Manager:/var/lib/gdm3:/bin/false
tom:x:1000:1000:tom joseph,,,:/home/tom:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
anna:x:2000:1001::/home/anna:/bin/sh
mysql:x:127:134:MySQL Server,,,:/nonexistent:/bin/false
juliet:x:2001:2001::/home/juliet:/bin/sh
tom@tom-VirtualBox:~/mca/17-08-2021$
```

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



```
Activities Terminal Aug 17 15:37
tom@tom-VirtualBox: ~/mca/17-08-2021
tom@tom-VirtualBox:~/mca/17-08-2021$ passwd -S juliet
passwd: You may not view or modify password information for juliet.
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo passwd -S juliet
[sudo] password for tom:
juliet L 08/17/2021 0 99999 7 -1
tom@tom-VirtualBox:~/mca/17-08-2021$ passwd juliet
passwd: You may not view or modify password information for juliet.
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo passwd juliet
New password:
Retype new password:
passwd: password updated successfully
tom@tom-VirtualBox:~/mca/17-08-2021$
```

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

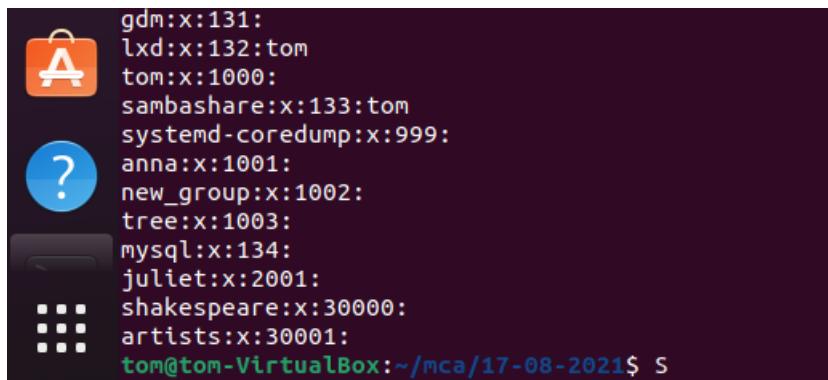


```
Activities Terminal Aug 17 15:46
tom@tom-VirtualBox: ~/mca/17-08-2021
tom@tom-VirtualBox:~/mca/17-08-2021$ groupadd -g 30000 shakespeare
groupadd: Permission denied.
groupadd: cannot lock /etc/group; try again later.
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo groupadd -g 30000 shakespeare
tom@tom-VirtualBox:~/mca/17-08-2021$ groups
tom adm cdrom sudo dip plugdev lpadmin lxd sambashare
tom@tom-VirtualBox:~/mca/17-08-2021$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,tom
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
tom:x:30000:
```

13). Create a supplementary group called artists.

```
shakespeare:x:30000:
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo groupadd artists
tom@tom-VirtualBox:~/mca/17-08-2021$ cat /etc/group
root:x:0:
```

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

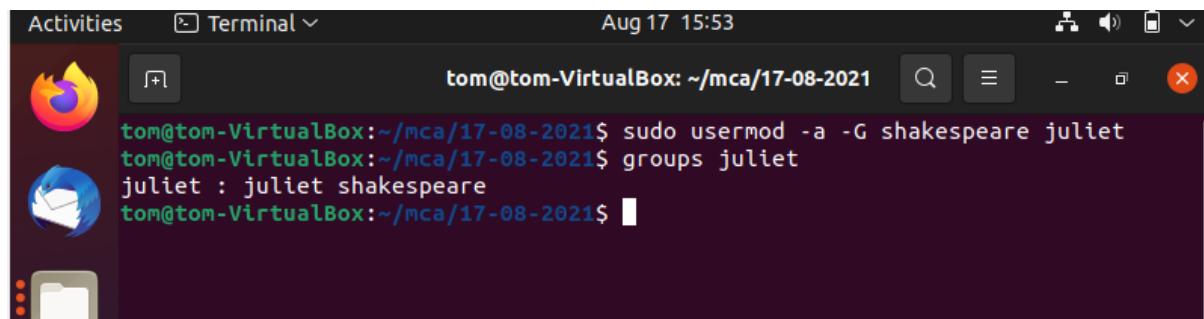


```

gdm:x:131:
lxd:x:132:tom
tom:x:1000:
sambashare:x:133:tom
systemd-coredump:x:999:
anna:x:1001:
new_group:x:1002:
tree:x:1003:
mysql:x:134:
juliet:x:2001:
shakespeare:x:30000:
artists:x:30001:
tom@tom-VirtualBox:~/mca/17-08-2021$ S

```

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

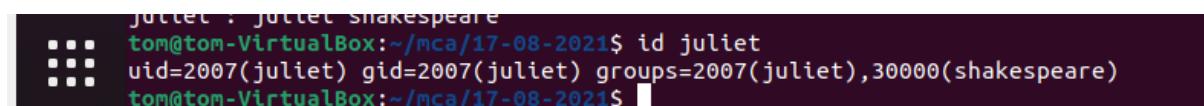


```

Activities Terminal Aug 17 15:53
tom@tom-VirtualBox: ~/mca/17-08-2021
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo usermod -a -G shakespeare juliet
tom@tom-VirtualBox:~/mca/17-08-2021$ groups juliet
juliet : juliet shakespeare
tom@tom-VirtualBox:~/mca/17-08-2021$ █

```

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



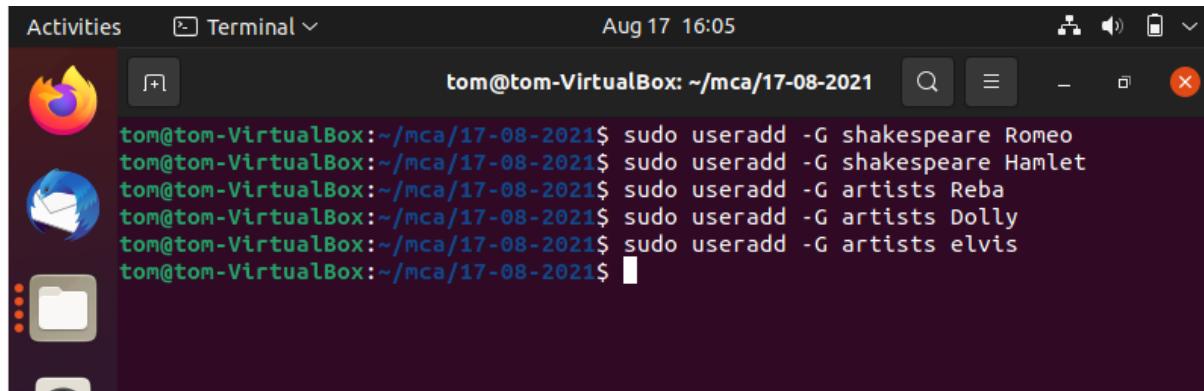
```

juliet : juliet shakespeare
tom@tom-VirtualBox:~/mca/17-08-2021$ id juliet
uid=2007(juliet) gid=2007(juliet) groups=2007(juliet),30000(shakespeare)
tom@tom-VirtualBox:~/mca/17-08-2021$ █

```

- 17). Add Romeo and Hamlet to the Shakespeare group.

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



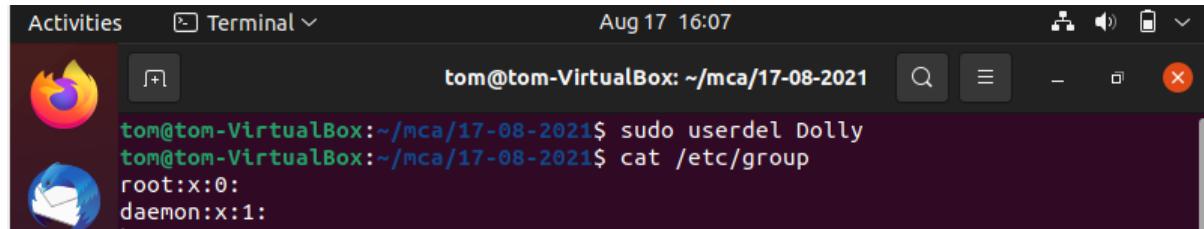
A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/17-08-2021". The terminal content shows several commands being run:

```
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd -G shakespeare Romeo
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd -G shakespeare Hamlet
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd -G artists Reba
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd -G artists Dolly
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo useradd -G artists elvis
tom@tom-VirtualBox:~/mca/17-08-2021$
```

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

```
systemd-coredump:x:999:
anna:x:1001:
new_group:x:1002:
tree:x:1003:
mysql:x:134:
juliet:x:2001:
shakespeare:x:30000:juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
Dolly:x:2005:
elvis:x:2006:
tom@tom-VirtualBox:~/mca/17-08-2021$
```

20). Attempt to remove user Dolly.



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window title is "tom@tom-VirtualBox: ~/mca/17-08-2021". The terminal content shows the user attempting to remove the user "Dolly":

```
tom@tom-VirtualBox:~/mca/17-08-2021$ sudo userdel Dolly
tom@tom-VirtualBox:~/mca/17-08-2021$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
www-data:x:4:

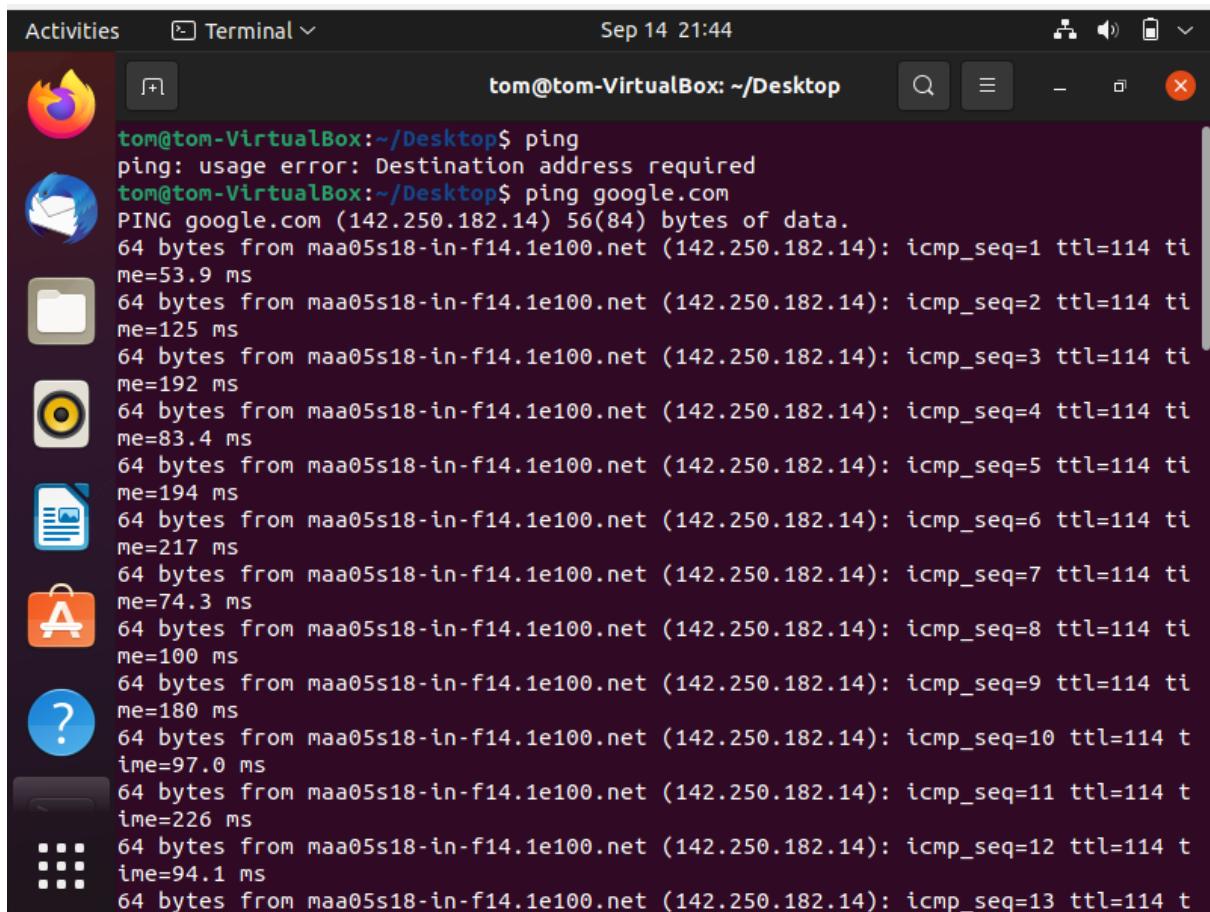
```

```
anna:x:1001:
new_group:x:1002:
tree:x:1003:
mysql:x:134:
juliet:x:2001:
shakespeare:x:30000:juliet,Romeo,Hamlet
artists:x:30001:Reba,elvis
Romeo:x:2002:
Hamlet:x:2003:
Reba:x:2004:
elvis:x:2006:
tom@tom-VirtualBox:~/mca/17-08-2021$
```

LINUX NETWORK COMMANDS

1 Ping Command

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection.



```
Activities Terminal Sep 14 21:44
tom@tom-VirtualBox: ~/Desktop
tom@tom-VirtualBox:~/Desktop$ ping
ping: usage error: Destination address required
tom@tom-VirtualBox:~/Desktop$ ping google.com
PING google.com (142.250.182.14) 56(84) bytes of data.
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=1 ttl=114 time=53.9 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=2 ttl=114 time=125 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=3 ttl=114 time=192 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=4 ttl=114 time=83.4 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=5 ttl=114 time=194 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=6 ttl=114 time=217 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=7 ttl=114 time=74.3 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=8 ttl=114 time=100 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=9 ttl=114 time=180 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=10 ttl=114 time=97.0 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=11 ttl=114 time=226 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=12 ttl=114 time=94.1 ms
64 bytes from maa05s18-in-f14.1e100.net (142.250.182.14): icmp_seq=13 ttl=114 time=114 ms
```

2 Route command

route command in Linux is used when you want to work with the IP/kernel routing table. It is mainly used to set up static routes to specific hosts or networks via an interface. It is used for showing or update the IP/kernel routing table.



```
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu2) ...
Processing triggers for man-db (2.9.4-2) ...
tom@tom-VirtualBox:~/Desktop$ 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
tom@tom-VirtualBox:~/Desktop$
```

```
ubuntu@ubuntu:~$ ip route show table local
broadcast 10.0.2.0 dev enp0s3 proto kernel scope link src 10.0.2.15
local 10.0.2.15 dev enp0s3 proto kernel scope host src 10.0.2.15
broadcast 10.0.2.255 dev enp0s3 proto kernel scope link src 10.0.2.15
broadcast 127.0.0.0 dev lo proto kernel scope link src 127.0.0.1
local 127.0.0.8 dev lo proto kernel scope host src 127.0.0.1
local 127.0.0.1 dev lo proto kernel scope host src 127.0.0.1
broadcast 127.255.255.255 dev lo proto kernel scope link src 127.0.0.1
ubuntu@ubuntu:~$
```



```
10.0.2.15.0.0.0 10.0.2.15.0.0.0 255.255.255.0.0.0 0 1000 0 0 enp0s3
tom@tom-VirtualBox:~/Desktop$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
tom@tom-VirtualBox:~/Desktop$
```



```
21
22 * * *
23 ^C
tom@tom-VirtualBox:~/Desktop$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2       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
169.254.0.0     0.0.0.0        255.255.0.0   U     1000   0        0 enp0s3
tom@tom-VirtualBox:~/Desktop$
```

3 Traceroute command

traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google(172.217.26.206) host from the local machine and it also prints detail about all the hops that it visits in between.

```
0 (traceroute) in auto mode
update-alternatives: using /usr/sbin/tcptraceroute.db to provide /usr/sbin/tcpt
traceroute (tcptraceroute) in auto mode
Processing triggers for man-db (2.9.4-2) ...
tom@tom-VirtualBox:~/Desktop$ traceroute google.com
traceroute to google.com (142.250.182.14), 30 hops max, 60 byte packets
 1 _gateway (10.0.2.2)  2.913 ms  2.869 ms  2.837 ms
 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 *

tom@tom-VirtualBox:~/Desktop$ traceroute -n google.com
traceroute to google.com (142.250.182.14), 30 hops max, 60 byte packets
 1 10.0.2.2  0.670 ms  0.645 ms  0.630 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 *■*
 8 *
 9 *
10 *
11 *
12 *
13 *
14 *
15 *
16 *
```



```
tom@tom-VirtualBox:~/Desktop$ traceroute google.com 100
traceroute to google.com (142.250.182.14), 30 hops max, 100 byte packets
 1 _gateway (10.0.2.2)  1.607 ms  1.564 ms  1.332 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
```

4 Nslookup command

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



```
29 * * *
30 * * *
tom@tom-VirtualBox:~/Desktop$ S^C
tom@tom-VirtualBox:~/Desktop$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

?
Non-authoritative answer:
Name:   google.com
Address: 142.250.182.14
Name:   google.com
Address: 2404:6800:4007:819::200e

tom@tom-VirtualBox:~/Desktop$
```

```
student@Comp9:~$ nslookup -type=any google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 172.217.167.174
google.com      nameserver = ns4.google.com.
google.com      nameserver = ns3.google.com.
google.com
    origin = ns1.google.com
    mail addr = dns-admin.google.com
    serial = 225939750
    refresh = 900
    retry = 900
    expire = 1800
    minimum = 60
google.com      mail exchanger = 20 alt1.aspmx.l.google.com.
google.com      text = "docusign=05958488-4752-4ef2-95eb-aa7ba8a3bd0e"
Name:   google.com
Address: 2404:6800:4009:810::200e
google.com      rdata_257 = 0 issue "pki.goog"
```

5 ifconfig(interface configuration) command

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.

```
Activities Terminal Sep 14 21:54
tom@tom-VirtualBox: ~/Desktop
tom@tom-VirtualBox:~/Desktop$ ifconfig -a
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::b70a:1952:37d9:8d95 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:9f:14:9c txqueuelen 1000 (Ethernet)
            RX packets 507 bytes 363999 (363.9 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 597 bytes 64433 (64.4 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 365 bytes 33935 (33.9 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 365 bytes 33935 (33.9 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
tom@tom-VirtualBox:~/Desktop$
```

Iface	MTU	RX-OK	RX-ERR	RX-DRP	RX-OVR	TX-OK	TX-ERR	TX-DRP	TX-OVR	Flg
enp0s3	1500	531	0	0	0	629	0	0	0	BMR
lo	65536	394	0	0	0	394	0	0	0	LRU

```
tom@tom-VirtualBox:~/Desktop$ ifconfig -v
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::b70a:1952:37d9:8d95 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:9f:14:9c txqueuelen 1000 (Ethernet)
            RX packets 531 bytes 366316 (366.3 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 629 bytes 66949 (66.9 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 394 bytes 36534 (36.5 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 394 bytes 36534 (36.5 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

6 Netstat command

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc.,

```

tom@tom-VirtualBox:~/Desktop$ netstat -at
Active Internet connections (servers and established)
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 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*
tcp6     0      0 ip6-localhost:ipp       [::]:*
tom@tom-VirtualBox:~/Desktop$


tom@tom-VirtualBox:~/Desktop$ netstat -a
Active Internet connections (servers and established)
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 localhost:ipp           0.0.0.0:*
tcp6     0      0 [::]:http              [::]:*
tcp6     0      0 ip6-localhost:ipp       [::]:*
udp      0      0 localhost:domain        0.0.0.0:*
udp      0      0 tom-VirtualBox:bootpc   _gateway:bootps      ESTABLISHED
udp      0      0 0.0.0.0:mdns           0.0.0.0:*
udp      0      0 0.0.0.0:631            0.0.0.0:*
udp      0      0 0.0.0.0:58207          0.0.0.0:*
udp6     0      0 [::]:mdns             [::]:*
udp6     0      0 [::]:40775            [::]:*
raw6    0      0 [::]:ipv6-icmp         [::]:*                7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type      State      I-Node  Path
unix    2      [ ACC ]     STREAM    LISTENING  23132   /tmp/.X11-unix/X0
unix    2      [ ACC ]     STREAM    LISTENING  23138   /tmp/.X11-unix/X1
unix    2      [ ACC ]     STREAM    LISTENING  18403   @/tmp/dbus-uVUTvLDD
tom@tom-VirtualBox:~/Desktop$ netstat -au
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
udp      0      0 localhost:domain        0.0.0.0:*

```

```

tcp6      0      0 [::]:http          [::]:*          LISTEN
tcp6      0      0 ip6-localhost:ipp  [::]:*          LISTEN
tom@tom-VirtualBox:~/Desktop$ 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 localhost:ipp         0.0.0.0:*
tcp6     0      0 [::]:http          [::]:*          LISTEN
tcp6     0      0 ip6-localhost:ipp  [::]:*          LISTEN
udp      0      0 localhost:domain       0.0.0.0:*
udp      0      0 0.0.0.0:mdns        0.0.0.0:*
udp      0      0 0.0.0.0:631        0.0.0.0:*
udp      0      0 0.0.0.0:58207      0.0.0.0:*
udp6     0      0 [::]:mdns        [::]:*          LISTEN
udp6     0      0 [::]:40775       [::]:*          LISTEN
raw6     0      0 [::]:ipv6-icmp    [::]:*          7
Active UNIX domain sockets (only servers)
Proto RefCnt Flags       Type      State      I-Node  Path
unix    2 [ACC]   STREAM    LISTENING  23132   /tmp/.X11-unix/X0
unix    2 [ACC]   STREAM    LISTENING  23138   /tmp/.X11-unix/X1
unix    2 [ACC]   STREAM    LISTENING  18403   @/tmp/dbus-uVUTvLDD
unix    2 [ACC]   STREAM    LISTENING  22617   @/tmp/.ICE-unix/1425
unix    2 [ACC]   STREAM    LISTENING  23131   @/tmp/.X11-unix/X0

```

WINDOWS COMMANDS

1. Ping & traceroute tests

Ping and Trace Route tests can help to identify any connection issues between your network and a specified server (or website) address.

PING test:

The PING command is used to test the connection and latency between two network connections. The PING command sends packets of information to a specified IP Address and then measures the time it takes to get a response from the specified computer or device.

```

C:\Users\tomma>ping www.google.com

Pinging www.google.com [142.250.196.36] with 32 bytes of data:
Reply from 142.250.196.36: bytes=32 time=226ms TTL=115
Reply from 142.250.196.36: bytes=32 time=136ms TTL=115
Reply from 142.250.196.36: bytes=32 time=151ms TTL=115
Reply from 142.250.196.36: bytes=32 time=266ms TTL=115

Ping statistics for 142.250.196.36:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 136ms, Maximum = 266ms, Average = 194ms

C:\Users\tomma>S_

```

Trace Route test:

The TRACERT command is used to conduct a similar test to PING, but instead of displaying the time it takes to connect, it looks at the exact server hops required to connect your computer to the server. You should already have the CMD prompt dialogue box open, after performing the PING test above.

1. Nslookup

Microsoft Windows includes a tool called NSLOOKUP that you can use via the command prompt. This tool can be used to check DNS records propagation and resolution using different servers, and perform other troubleshooting steps.

```
C:\Users\tomma>nslookup aesajce.in
Server: UnKnown
Address: 192.168.43.1

Non-authoritative answer:
Name:   aesajce.in
Address: 103.120.179.46

C:\Users\tomma>
```

- ⑤ Type nslookup -q=XX where XX is a type of a DNS record.
Some of the available types are MX, A, CNAME, and TXT. The records are then displayed, to exit the tool type exit

```
C:\Users\tomma>nslookup -type=ns aesajce.in
Server: UnKnown
Address: 192.168.43.1

Non-authoritative answer:
aesajce.in      nameserver = ns2.aessas.com
aesajce.in      nameserver = ns2.ajcemca.in
aesajce.in      nameserver = ns1.ajcemca.in
aesajce.in      nameserver = ns1.aessas.com

C:\Users\tomma>
```

- ⑤ To use **nslookup** as a troubleshooting tool, you can set the specific type of record to lookup for a domain by using the **-type=record_type** where **record_type** is A, CNAME, MX, PTR, NS, ANY.

Type **nslookup -type=ns**

domain_name where **domain_name** is the domain for your query and hit **Enter**. Now the tool will display the name servers for the domain you specified.

```
C:\Users\tomma>nslookup q=MX aesajce.in
Server: UnKnown
Address: 103.120.179.46

*** UnKnown can't find q=MX: Server failed

C:\Users\tomma>
```

2. Netstat

On Windows 10, netstat (network statistics) has been around for a long time, and it's a command-line tool that you can use in Command Prompt to display statistics for all network connections. It allows you to understand open and connected ports to monitor and troubleshoot networking problems for system or applications.

```
C:\Users\tomma>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:53395       LAPTOP-OF9SBL90:65001  ESTABLISHED
  TCP    127.0.0.1:53396       LAPTOP-OF9SBL90:53407  ESTABLISHED
  TCP    127.0.0.1:53407       LAPTOP-OF9SBL90:53396  ESTABLISHED
  TCP    127.0.0.1:65001       LAPTOP-OF9SBL90:53395  ESTABLISHED
```

netstat -n

command to display active connections showing numeric IP address and port number instead of trying to determine the names .

netstat -n INTERVAL

In the command, make sure to replace INTERVAL for the number (in seconds) you want to redisplay the information.

```
PS C:\Command Prompt - netstat -n 5
^C
C:\Users\tomma>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:53395       127.0.0.1:65001  ESTABLISHED
  TCP    127.0.0.1:53396       127.0.0.1:53407  ESTABLISHED
  TCP    127.0.0.1:53407       127.0.0.1:53396  ESTABLISHED
  TCP    127.0.0.1:65001       127.0.0.1:53395  ESTABLISHED
  TCP    192.168.43.170:49684   13.107.42.12:443  ESTABLISHED
  TCP    192.168.43.170:49685   20.44.229.112:443  ESTABLISHED
  TCP    192.168.43.170:49686   52.178.17.3:443  ESTABLISHED
  TCP    192.168.43.170:50126   204.79.197.200:443 TIME_WAIT
  TCP    192.168.43.170:50127   104.114.102.133:443 ESTABLISHED
  TCP    192.168.43.170:50128   52.173.134.115:443 ESTABLISHED
  TCP    192.168.43.170:50148   20.198.162.76:443  ESTABLISHED
  TCP    192.168.43.170:51304   204.79.197.219:443 TIME_WAIT
  TCP    192.168.43.170:53582   20.198.162.76:443 ESTABLISHED
  TCP    192.168.43.170:53590   13.88.181.35:443  ESTABLISHED
  TCP    192.168.43.170:54224   74.125.130.188:5228 ESTABLISHED
  TCP    192.168.43.170:55775   157.240.228.60:443 ESTABLISHED
  TCP    192.168.43.170:56326   142.250.183.227:443 TIME_WAIT
  TCP    192.168.43.170:56570   13.227.214.110:443 TIME_WAIT
  TCP    192.168.43.170:57037   204.79.197.200:443 ESTABLISHED
  TCP    192.168.43.170:62684   20.195.65.204:443  ESTABLISHED
  TCP    192.168.43.170:62928   35.201.64.102:443 TIME_WAIT
  TCP    192.168.43.170:64554   13.227.214.24:443 TIME_WAIT
  TCP    192.168.43.170:64555   13.107.42.12:443  ESTABLISHED
```

netstat -a

The netstat -a command displays all active and inactive connections, and the TCP and UDP ports the device is currently listening.

```
Command Prompt - netstat -a
C:\Users\tomma>netstat -a

Active Connections

Proto Local Address          Foreign Address        State
TCP   0.0.0.0:135           LAPTOP-OF9SBL90:0    LISTENING
TCP   0.0.0.0:445           LAPTOP-OF9SBL90:0    LISTENING
TCP   0.0.0.0:808           LAPTOP-OF9SBL90:0    LISTENING
TCP   0.0.0.0:5040          LAPTOP-OF9SBL90:0    LISTENING
TCP   0.0.0.0:5357          LAPTOP-OF9SBL90:0    LISTENING
TCP   0.0.0.0:49664          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:49665          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:49666          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:49667          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:49668          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:49670          LAPTOP-OF9SBL90:0   LISTENING
TCP   0.0.0.0:59171          LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:27017         LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:53395         LAPTOP-OF9SBL90:65001 ESTABLISHED
TCP   127.0.0.1:53396         LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:53396         LAPTOP-OF9SBL90:53407 ESTABLISHED
TCP   127.0.0.1:53407         LAPTOP-OF9SBL90:53396 ESTABLISHED
TCP   127.0.0.1:55989         LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:56989         LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:65001         LAPTOP-OF9SBL90:0   LISTENING
TCP   127.0.0.1:65001         LAPTOP-OF9SBL90:53395 ESTABLISHED
TCP   192.168.43.170:139       LAPTOP-OF9SBL90:0   LISTENING
TCP   192.168.43.170:49684     1drv:https          ESTABLISHED
TCP   192.168.43.170:49685     20.44.229.112:https ESTABLISHED
```

netstat -b

The netstat -b command lists all the executables (applications) associated with each connection. Sometimes, applications may open multiple connections.

netstat -e

The netstat -e command generates a statistic of the network interface, which shows information like the number of bytes, unicast and non-unicast sent and received packets. You can also see discarded packets and errors and unknown protocols, which can you troubleshoot networking problems.

Interface Statistics		
	Received	Sent
Bytes	696836938	233255883
Unicast packets	892556	733208
Non-unicast packets	777	4767
Discards	0	0
Errors	0	0
Unknown protocols	0	

3. ipconfig

Displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. Used without parameters, ipconfig displays Internet Protocol version 4 (IPv4) and IPv6 addresses, subnet mask, and default gateway for all adapters.

PARAMETERS:

/all: Displays the full TCP/IP configuration for all adapters. Adapters can represent physical interfaces, such as installed network adapters, or logical interfaces, such as dial-up connections.

/displaydns: Displays the contents of the DNS client resolver cache, which includes both entries preloaded from the local Hosts file and any recently obtained resource records for name queries resolved by the computer. The DNS Client service uses this information to

resolve frequently queried names quickly, before querying its configured DNS servers.

/flushdns: Flushes and resets the contents of the DNS client resolver cache. During DNS troubleshooting, you can use this procedure to discard negative cache entries from the cache, as well as any other entries that have been added dynamically.

/registerdns: Initiates manual dynamic registration for the DNS names and IP addresses that are configured at a computer. You can use this parameter to troubleshoot a failed DNS name registration or resolve a dynamic update problem between a client and the DNS server without rebooting the client computer. The DNS settings in the advanced properties of the TCP/IP protocol determine which names are registered in DNS.

```
C:\Users\tomma>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::5581:f92d:d588:6c84%7
  IPv4 Address. . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 1:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 2:
```

```

C:\Users\tomma>ipconfig /all

Windows IP Configuration

Host Name . . . . . : LAPTOP-OF9SBL90
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Realtek PCIe GbE Family Controller
Physical Address. . . . . : 08-97-98-B8-79-31
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Ethernet adapter VirtualBox Host-Only Network:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : VirtualBox Host-Only Ethernet Adapter
Physical Address. . . . . : 0A-00-27-00-00-07
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::5581:f92d:d588:6c84%7(Preferred)
IPv4 Address. . . . . : 192.168.56.1(Preferred)
  
```

Other Networking Commands

1. Hostname Command

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

2. getmac Command

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

3.arp Command

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.

4. Nbtstat

Diagnostic tool for troubleshooting netBIOS problems.

5. Net Command

Used for managing users,service,shares etc..

```
H:\>net
The syntax of this command is:

NET
[ ACCOUNTS | COMPUTER | CONFIG | CONTINUE | FILE | GROUP | HELP |
HELPMSG | LOCALGROUP | PAUSE | SESSION | SHARE | START |
STATISTICS | STOP | TIME | USE | USER | VIEW ]
```

```
H:\>hostname
DESKTOP-ILB31AE
```

```
H:\>
```

```
H:\>nbtstat
```

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

```
NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]
```

- a (adapter status) Lists the remote machine's name table given its name.
- A (Adapter status) Lists the remote machine's name table given its IP address.
- c (cache) Lists NBT's cache of remote [machine] names and their IP addresses.
- n (names) Lists local NetBIOS names.
- r (resolved) Lists names resolved by broadcast and via WINS.
- R (Reload) Purges and reloads the remote cache name table.
- S (Sessions) Lists sessions table with the destination IP addresses.
- s (sessions) Lists sessions table converting destination IP addresses to computer NETBIOS names.
- RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh.

RemoteName Remote host machine name.
IP address Dotted decimal representation of the IP address.
interval Redisplays selected statistics, pausing interval seconds
 between each display. Press Ctrl+C to stop redisplaying
 statistics.

```
H:\>
```

```
H:\>getmac  
  
Physical Address      Transport Name  
=====  =====  
48-F1-7F-04-07-81    \Device\Tcpip_{083275F0-5D75-483E-9CA1-5D2B536909B7}  
04-92-26-1D-65-3B    Media disconnected  
48-F1-7F-04-07-85    Media disconnected  
0A-00-27-00-00-11    \Device\Tcpip_{A74689BB-EA25-4EFA-8DC2-57AA7FC4E351}  
  
H:\>arp -a  
  
Interface: 192.168.1.33 --- 0x4  
  Internet Address        Physical Address      Type  
  192.168.1.1            14-a7-2b-83-03-34    dynamic  
  192.168.1.255          ff-ff-ff-ff-ff-ff    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  
  255.255.255.255        ff-ff-ff-ff-ff-ff    static  
  
Interface: 192.168.56.1 --- 0x11  
  Internet Address        Physical Address      Type  
  192.168.56.255         ff-ff-ff-ff-ff-ff    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
```

Networking & System Administration Lab

LAMP installation

Apache Installation

Steps

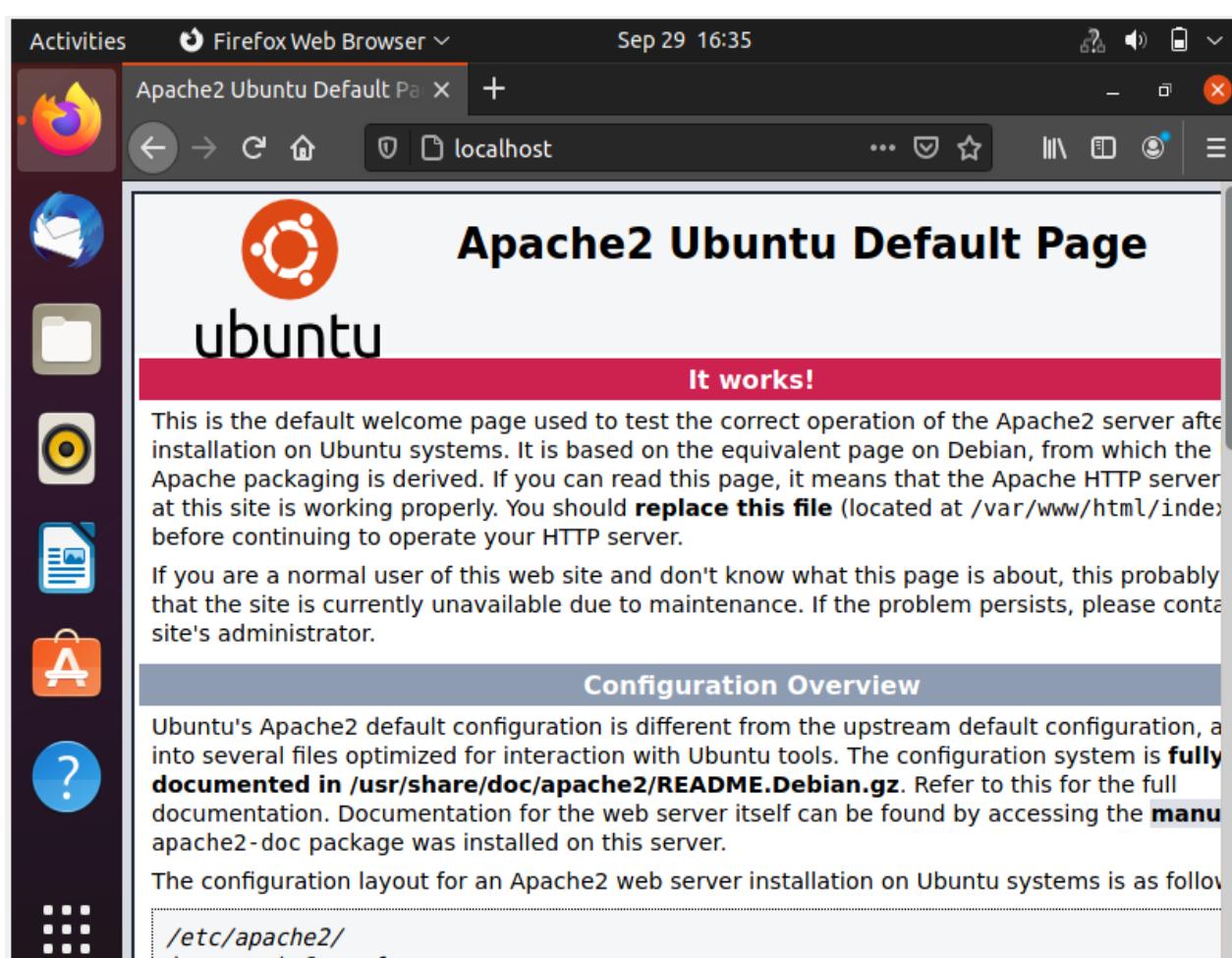
1. Update your system
Update the system using command **sudo apt update**
2. Install Apache using apt:
Install apache using the command **sudo apt install apache2**
3. Start apache
Using the command **sudo service apache2 start**
4. Confirm that Apache is now running with the following command:
Check the status of apache **sudo systemctl status apache2**

```

command 'states' from deb gocryptfs (1.8.0-1)
command 'states' from deb enscript (1.6.5.90-3)
See 'snap info <snapname>' for additional versions.
tom@tom-VirtualBox:~/Desktop$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
    Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
    Active: active (running) since Wed 2021-09-29 16:17:58 IST; 9min ago
      Docs: https://httpd.apache.org/docs/2.4/
   Process: 626 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SU>
 Main PID: 694 (apache2)
     Tasks: 6 (limit: 2296)
    Memory: 28.1M
   CGroup: /system.slice/apache2.service
           ├─694 /usr/sbin/apache2 -k start
           ├─751 /usr/sbin/apache2 -k start
           ├─752 /usr/sbin/apache2 -k start
           ├─754 /usr/sbin/apache2 -k start
           ├─755 /usr/sbin/apache2 -k start
           └─756 /usr/sbin/apache2 -k start

Sep 29 16:17:57 tom-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 29 16:17:58 tom-VirtualBox apachectl[658]: AH00558: apache2: Could not rel>
Sep 29 16:17:58 tom-VirtualBox systemd[1]: Started The Apache HTTP Server.
Lines 1-19/19 (FNDY)

```



Maria dB Installation

Steps

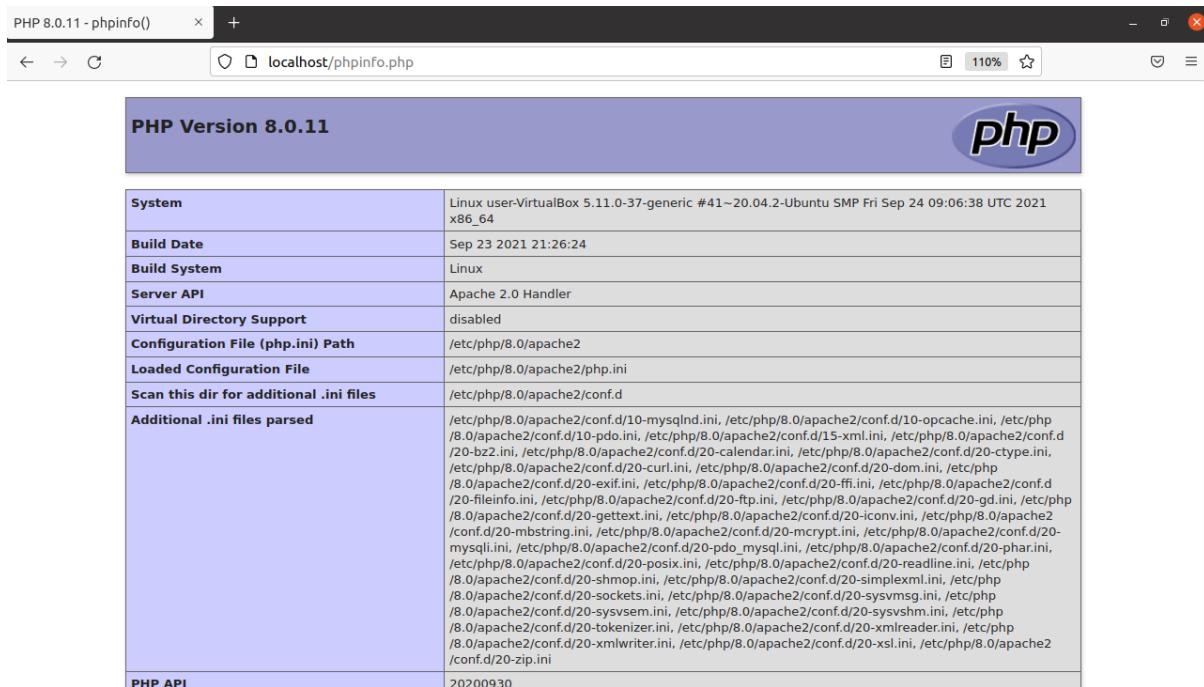
1. Install Maria dB using the command **sudo apt install mariadb-server mariadb-client**
2. Check the status of the Maria dB using **sudo systemctl status mysql**

```
tom@tom-VirtualBox:~/Desktop$ sudo systemctl start mysql
tom@tom-VirtualBox:~/Desktop$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
   Active: active (running) since Wed 2021-09-29 16:18:01 IST; 15min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Process: 630 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var>
   Process: 666 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_ST>
   Process: 673 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && >
   Process: 868 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_S>
   Process: 870 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/>
 Main PID: 735 (mariadb)
   Status: "Taking your SQL requests now..."
   Tasks: 8 (limit: 2296)
  Memory: 91.2M
    CGroup: /system.slice/mariadb.service
              └─735 /usr/sbin/mariadb

Sep 29 16:18:01 tom-VirtualBox mariadb[735]: 2021-09-29 16:18:01 0 [Note] /us>
Sep 29 16:18:01 tom-VirtualBox mariadb[735]: Version: '10.5.12-MariaDB-0ubuntu>
Sep 29 16:18:01 tom-VirtualBox systemd[1]: Started MariaDB 10.5.12 database se>
Sep 29 16:18:01 tom-VirtualBox /etc/mysql/debian-start[873]: Upgrading MySQL t>
Sep 29 16:18:02 tom-VirtualBox /etc/mysql/debian-start[876]: Looking for 'mysq>
Sep 29 16:18:02 tom-VirtualBox /etc/mysql/debian-start[876]: Looking for 'mysq>
Sep 29 16:18:02 tom-VirtualBox /etc/mysql/debian-start[876]: This installation>
Sep 29 16:18:02 tom-VirtualBox /etc/mysql/debian-start[951]: Checking for inse>
```

Installing PHP and commonly used modules

1. Install php using **sudo apt install php libapache2-mod-php php-opcache php-cli php-gd php-curl php-mysql**
2. Restart apache2 using the command **sudo systemctl restart apache2**
3. Check the php installation by using `localhost/phpinfo.php`

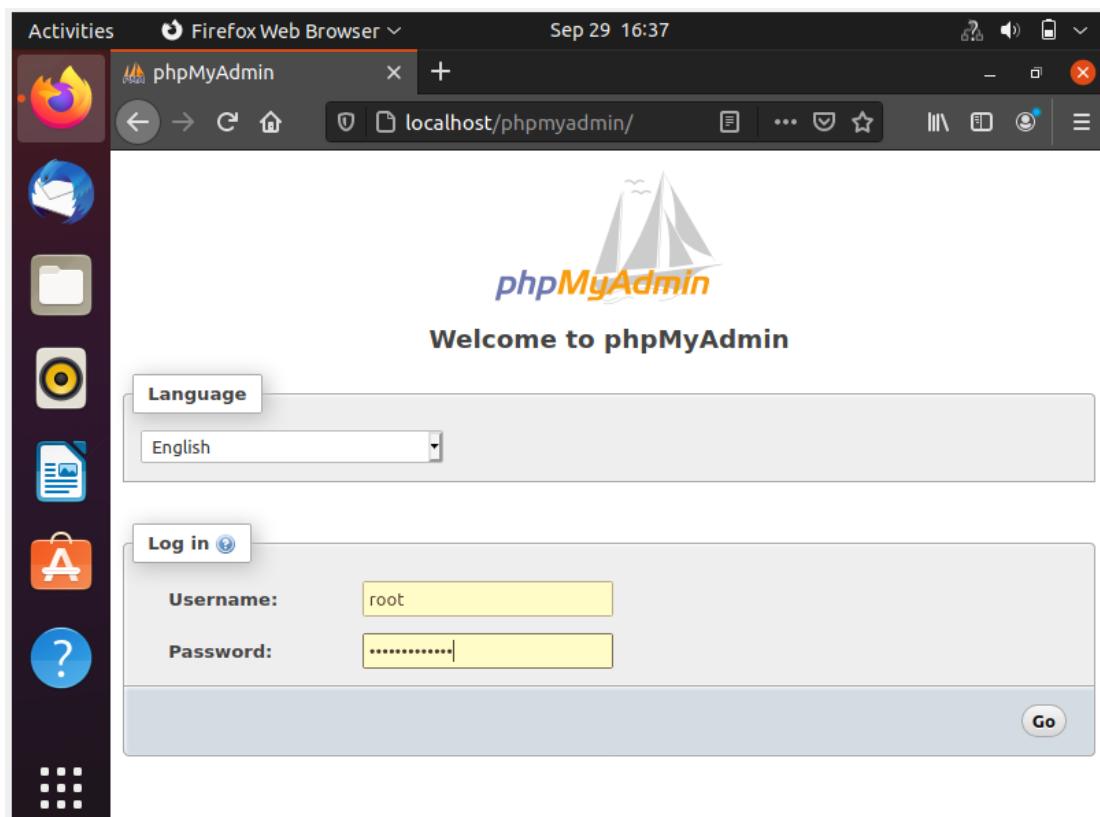


PHP Version 8.0.11	
php	
System	Linux user-VirtualBox 5.11.0-37-generic #41~20.04.2-Ubuntu SMP Fri Sep 24 09:06:38 UTC 2021 x86_64
Build Date	Sep 23 2021 21:26:24
Build System	Linux
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/8.0/apache2
Loaded Configuration File	/etc/php/8.0/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/8.0/apache2/conf.d
Additional .ini files parsed	/etc/php/8.0/apache2/conf.d/10-mysqlind.ini, /etc/php/8.0/apache2/conf.d/10-opcache.ini, /etc/php/8.0/apache2/conf.d/10-pdo.ini, /etc/php/8.0/apache2/conf.d/15-xml.ini, /etc/php/8.0/apache2/conf.d/20-bz2.ini, /etc/php/8.0/apache2/conf.d/20-calendar.ini, /etc/php/8.0/apache2/conf.d/20-ctype.ini, /etc/php/8.0/apache2/conf.d/20-curl.ini, /etc/php/8.0/apache2/conf.d/20-dom.ini, /etc/php/8.0/apache2/conf.d/20-exif.ini, /etc/php/8.0/apache2/conf.d/20-ffi.ini, /etc/php/8.0/apache2/conf.d/20-finfo.ini, /etc/php/8.0/apache2/conf.d/20-ftp.ini, /etc/php/8.0/apache2/conf.d/20-gd.ini, /etc/php/8.0/apache2/conf.d/20-gettext.ini, /etc/php/8.0/apache2/conf.d/20-iconv.ini, /etc/php/8.0/apache2/conf.d/20-mbstring.ini, /etc/php/8.0/apache2/conf.d/20-mcrypt.ini, /etc/php/8.0/apache2/conf.d/20-mysqli.ini, /etc/php/8.0/apache2/conf.d/20-pdo_mysql.ini, /etc/php/8.0/apache2/conf.d/20-phar.ini, /etc/php/8.0/apache2/conf.d/20-posix.ini, /etc/php/8.0/apache2/conf.d/20-readline.ini, /etc/php/8.0/apache2/conf.d/20-shmop.ini, /etc/php/8.0/apache2/conf.d/20-simplexml.ini, /etc/php/8.0/apache2/conf.d/20-sockets.ini, /etc/php/8.0/apache2/conf.d/20-sysvmsg.ini, /etc/php/8.0/apache2/conf.d/20-sysvsem.ini, /etc/php/8.0/apache2/conf.d/20-sysvshm.ini, /etc/php/8.0/apache2/conf.d/20-tokenizer.ini, /etc/php/8.0/apache2/conf.d/20-xmlreader.ini, /etc/php/8.0/apache2/conf.d/20-xmlwriter.ini, /etc/php/8.0/apache2/conf.d/20-xsl.ini, /etc/php/8.0/apache2/conf.d/20-zip.ini
PHP API	20200930

```
tom@tom-VirtualBox:~/Desktop$ php -version
PHP 7.4.16 (cli) (built: Jul 5 2021 13:04:38) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.16, Copyright (c), by Zend Technologies
tom@tom-VirtualBox:~/Desktop$ S
```

Installing phpmyadmin

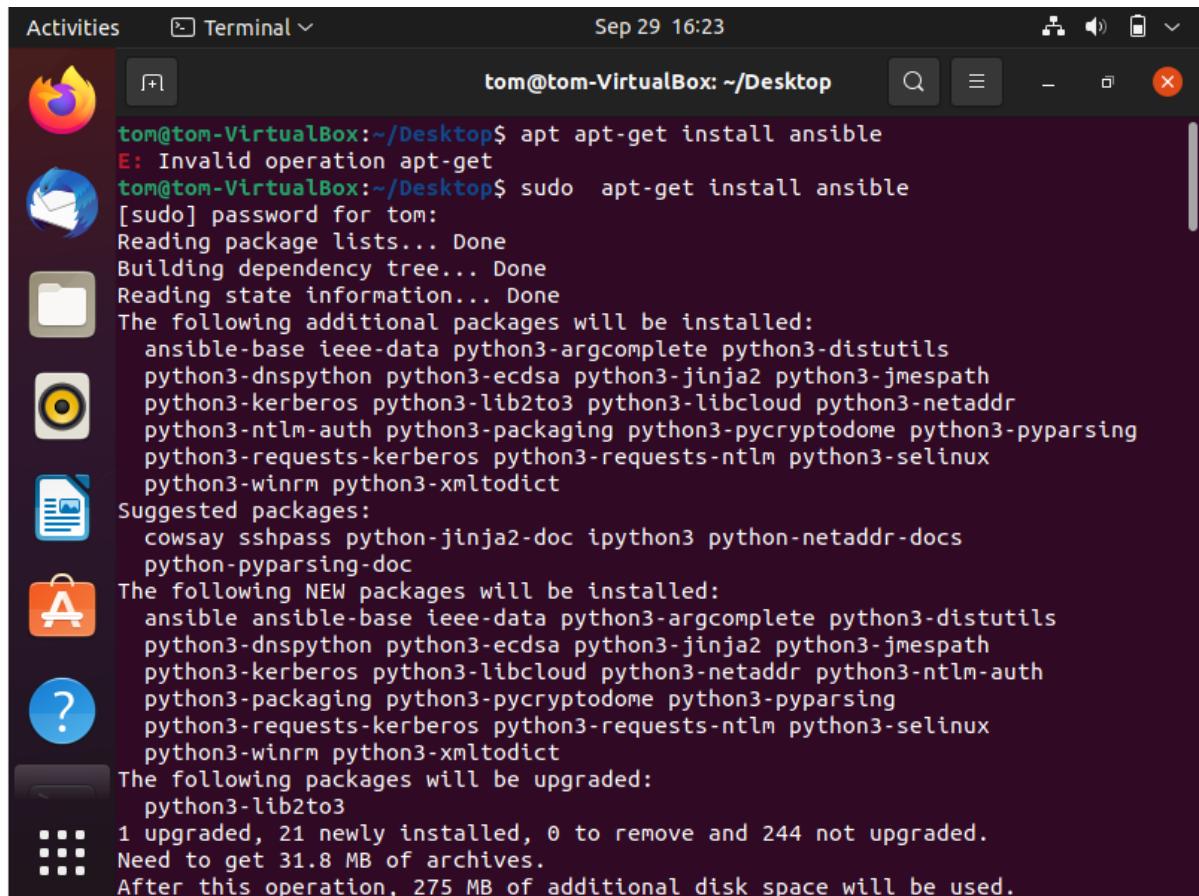
1. Install phpmyadmin using **sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl**
2. Restart apache2 **sudo systemctl restart apache2**
3. Check phpmyadmin by opening a browser and typing **http://localhost/phpmyadmin**



A screenshot of a Firefox browser window showing the phpMyAdmin general settings page. The title bar says "Activities Firefox Web Browser Sep 29 18:43". The main content area has several sections: "General settings" (with "Change password" and "Server connection collation" set to "utf8mb4_unicode_ci"), "Appearance settings" (with "Language" set to "English", "Theme" set to "pmahomme", "Font size" set to "82%", and a "More settings" link), and "Database server" (with a "Console" link).

Explain the steps for the installation of ansible with your own screenshots.

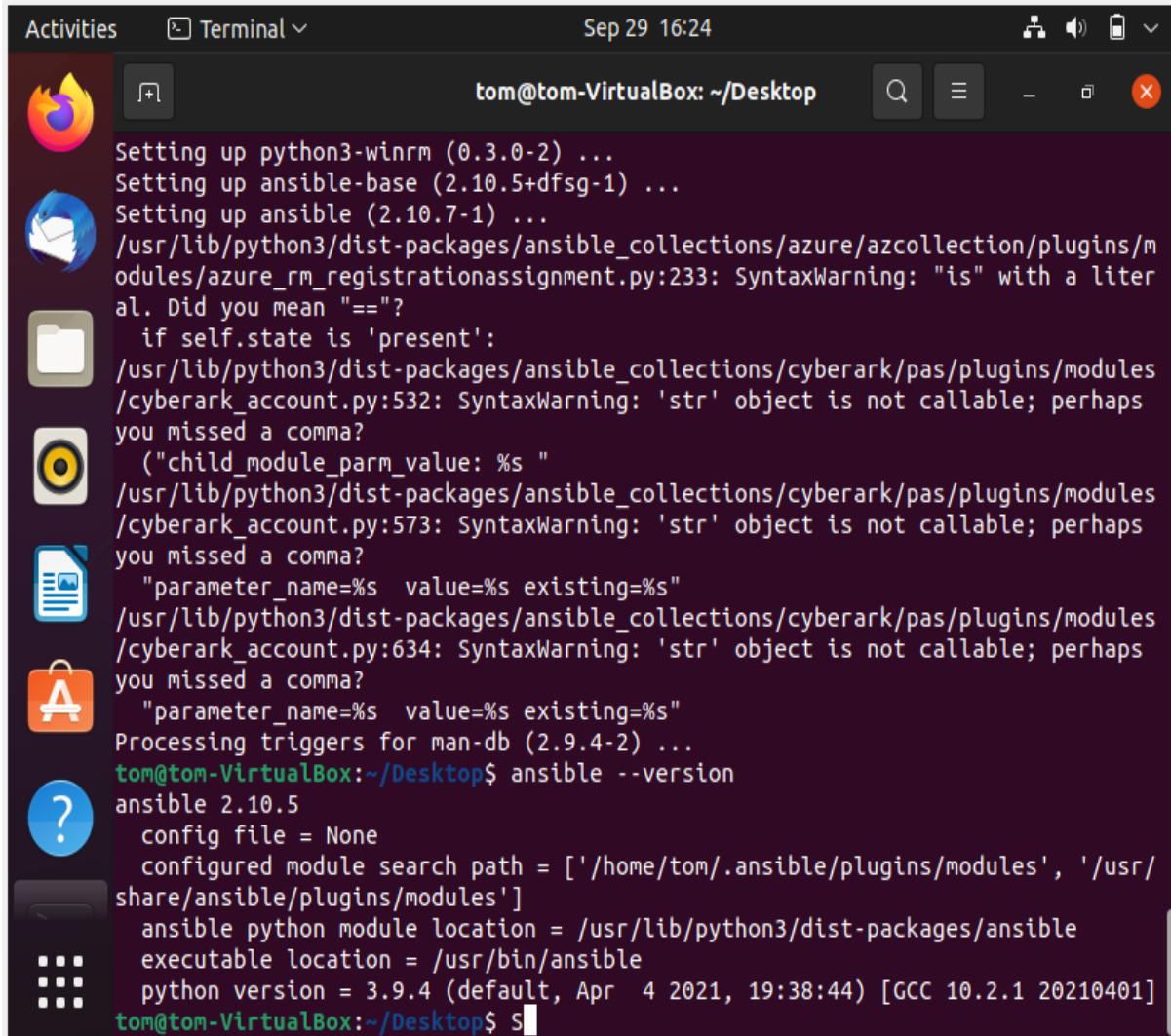
Command for install ansible: sudo apt-get install ansible



The screenshot shows a terminal window titled "Terminal" with the command "sudo apt-get install ansible" being run. The output indicates that the operation was invalid, so it was run with sudo. It then prompts for a password, which is provided. The process continues by reading package lists, building a dependency tree, and reading state information. It lists packages to be installed, including ansible-base, ieee-data, python3-argcomplete, python3-distutils, python3-dnspython, python3-ecdsa, python3-jinja2, python3-jmespath, python3-kerberos, python3-lib2to3, python3-libcloud, python3-netaddr, python3-ntlm-auth, python3-packaging, python3-pycryptodome, python3-pyparsing, python3-requests-kerberos, python3-requests-ntlm, python3-selinux, and python3-winrm. It also lists suggested packages like cowsay, sshpass, python-jinja2-doc, ipython3, python-netaddr-docs, and python-pyparsing-doc. It lists NEW packages to be installed, including ansible, ansible-base, ieee-data, python3-argcomplete, python3-distutils, python3-dnspython, python3-ecdsa, python3-jinja2, python3-jmespath, python3-kerberos, python3-libcloud, python3-netaddr, python3-ntlm-auth, python3-packaging, python3-pycryptodome, python3-pyparsing, python3-requests-kerberos, python3-requests-ntlm, python3-selinux, and python3-winrm. It also lists packages to be upgraded, specifically python3-lib2to3. It concludes with a summary: 1 upgraded, 21 newly installed, 0 to remove and 244 not upgraded. It requires 31.8 MB of additional disk space and will use 275 MB after the operation.

```
tom@tom-VirtualBox:~/Desktop$ apt apt-get install ansible
E: Invalid operation apt-get
tom@tom-VirtualBox:~/Desktop$ sudo apt-get install ansible
[sudo] password for tom:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-lib2to3 python3-libcloud python3-netaddr
  python3-ntlm-auth python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
  python-pyparsing-doc
The following NEW packages will be installed:
  ansible ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-libcloud python3-netaddr python3-ntlm-auth
  python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 21 newly installed, 0 to remove and 244 not upgraded.
Need to get 31.8 MB of additional disk space.
After this operation, 275 MB of additional disk space will be used.
```

Command for checking version of ansible:ansible --version



The screenshot shows a terminal window titled "Terminal" running on an Ubuntu desktop. The terminal output is as follows:

```
Setting up python3-winrm (0.3.0-2) ...
Setting up ansible-base (2.10.5+dfsg-1) ...
Setting up ansible (2.10.7-1) ...
/usr/lib/python3/dist-packages/ansible_collections/azure/azcollection/plugins/modules/azure_rm_registrationassignment.py:233: SyntaxWarning: "is" with a literal. Did you mean "=="?
    if self.state is 'present':
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:532: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    ("child_module_parm_value: %s "
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:573: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    "parameter_name=%s  value=%s existing=%s"
/usr/lib/python3/dist-packages/ansible_collections/cyberark/pas/plugins/modules/cyberark_account.py:634: SyntaxWarning: 'str' object is not callable; perhaps you missed a comma?
    "parameter_name=%s  value=%s existing=%s"
Processing triggers for man-db (2.9.4-2) ...
tom@tom-VirtualBox:~/Desktop$ ansible --version
ansible 2.10.5
  config file = None
  configured module search path = ['/home/tom/.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 = 3.9.4 (default, Apr  4 2021, 19:38:44) [GCC 10.2.1 20210401]
tom@tom-VirtualBox:~/Desktop$ S
```

Analyzing network packet stream using tcpdump

Tcpdump Installation

command : #sudo apt update && sudo apt install tcpdump

```
tom@tom-VirtualBox:~$ sudo apt-get update
[sudo] password for tom:
Sorry, try again.
[sudo] password for tom:
Sorry, try again.
[sudo] password for tom:
0% [Connecting to in.archive.ubuntu.com] [Connecting to security.ubuntu.com (200Get:1 http://security.ubuntu
Err:2 http://in.archive.ubuntu.com/ubuntu hirsute InRelease
Temporary failure resolving 'in.archive.ubuntu.com'
Err:3 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease
Temporary failure resolving 'in.archive.ubuntu.com'
Err:1 http://security.ubuntu.com/ubuntu hirsute-security InRelease
Connection timed out [IP: 91.189.91.39 80]
Err:4 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease
Temporary failure resolving 'in.archive.ubuntu.com'
Reading package lists... Done
W: Failed to fetch http://in.archive.ubuntu.com/ubuntu/dists/hirsute/InRelease Temporary failure resolving
W: Failed to fetch http://in.archive.ubuntu.com/ubuntu/dists/hirsute-updates/InRelease Temporary failure re
W: Failed to fetch http://in.archive.ubuntu.com/ubuntu/dists/hirsute-backports/InRelease Temporary failure
W: Failed to fetch http://security.ubuntu.com/ubuntu/dists/hirsute-security/InRelease Connection timed out
W: Some index files failed to download. They have been ignored, or old ones used instead.
tom@tom-VirtualBox:~$ sudo apt install tcpdump
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
tcpdump is already the newest version (4.9.3-7).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 244 not upgraded.
tom@tom-VirtualBox:~$ sudo tcpdump
```

Capturing Packets with tcpdump

command : sudo tcpdump

```

0 upgraded, 0 newly installed, 0 to remove and 244 not upgraded.
tom@tom-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
21:14:10.280129 IP tom-VirtualBox.53496 > golem.canonical.com.ntp: NTPv4, Client, length 48
21:14:10.286413 IP tom-VirtualBox.56096 > 192.168.137.1.domain: 61353+ [1au] PTR? 199.89.189.91.in-addr.arpa. (55)
21:14:10.762954 IP golem.canonical.com.ntp > tom-VirtualBox.53496: NTPv4, Server, length 48
21:14:10.763056 IP 192.168.137.1.domain > tom-VirtualBox.56096: 61353 1/0/1 PTR golem.canonical.com. (88)
21:14:10.768888 IP tom-VirtualBox.36852 > 192.168.137.1.domain: 5810+ [1au] PTR? 15.2.0.10.in-addr.arpa. (51)
21:14:10.887403 IP 192.168.137.1.domain > tom-VirtualBox.36852: 5810 NXDomain 0/0/1 (51)
21:14:10.887554 IP 192.168.137.1.domain > tom-VirtualBox.36852: 5810 NXDomain 0/0/1 (51)
21:14:10.887740 IP tom-VirtualBox.36852 > 192.168.137.1.domain: 5810+ PTR? 15.2.0.10.in-addr.arpa. (40)
21:14:10.889905 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 73- [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:10.906060 IP 192.168.137.1.domain > tom-VirtualBox.46656: 73- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:10.906360 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 2294+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:11.798024 IP 192.168.137.1.domain > tom-VirtualBox.46656: 2294- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:11.798151 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 54296+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:13.430006 IP 192.168.137.1.domain > tom-VirtualBox.46656: 54296- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:13.430208 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 10412+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:14.106994 IP 192.168.137.1.domain > tom-VirtualBox.46656: 10412- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:14.107260 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 49724+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:14.614462 IP 192.168.137.1.domain > tom-VirtualBox.46656: 49724- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:14.614698 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 64928+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:14.906285 IP 192.168.137.1.domain > tom-VirtualBox.46656: 64928- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:14.906517 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 41800+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:15.283673 ARP, Request who-has _gateway tell tom-VirtualBox, length 28
21:14:15.284048 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), length 46
21:14:15.556366 IP 192.168.137.1.domain > tom-VirtualBox.46656: 41800- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:15.556587 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 41277+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:16.190305 IP 192.168.137.1.domain > tom-VirtualBox.46656: 41277- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:16.190490 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 10851+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:16.649189 IP 192.168.137.1.domain > tom-VirtualBox.46656: 10851- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:16.649384 IP tom-VirtualBox.46656 > 192.168.137.1.domain: 11458+ [1au] PTR? 1.137.168.192.in-addr.arpa. (55)
21:14:17.024400 IP 192.168.137.1.domain > tom-VirtualBox.46656: 11458- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)
21:14:17.024417 IP 192.168.137.1.domain > tom-VirtualBox.36852: 5810 NXDomain 0/0/1 (51)
21:14:17.024439 IP tom-VirtualBox > 192.168.137.1: ICMP tom-VirtualBox.udp port 36852 unreachable, length 87
21:14:17.024454 IP 192.168.137.1.domain > tom-VirtualBox.36852: 5810 NXDomain 0/0/1 (51)
21:14:20.896357 IP tom-VirtualBox.50422 > 192.168.137.1.domain: 42324+ PTR? 2.2.0.10.in-addr.arpa. (39)
21:14:21.002948 IP 192.168.137.1.domain > tom-VirtualBox.46656: 17634- 1/0/0 PTR LAPTOP-5GEAB7TG.mshome.net. (110)

```

```

21:21:34.323609 IP tom-VirtualBox.38150 > 117.18.237.29.http: Flags [.], ack 1479, win 63554, length 0
21:21:34.324248 IP 117.18.237.29.http > tom-VirtualBox.38150: Flags [.], ack 759, win 65535, length 0
21:21:34.579682 IP tom-VirtualBox.44684 > maa05s13-in-f3.1e100.net.http: Flags [.], ack 703, win 63791, length 0
21:21:34.579750 IP tom-VirtualBox.44648 > maa05s13-in-f3.1e100.net.http: Flags [.], ack 3510, win 63882, length 0
21:21:34.580538 IP maa05s13-in-f3.1e100.net.http > tom-VirtualBox.44684: Flags [.], ack 383, win 65535, length 0
21:21:34.580569 IP maa05s13-in-f3.1e100.net.http > tom-VirtualBox.44648: Flags [.], ack 1909, win 65535, length 0
21:21:36.598243 IP tom-VirtualBox.34400 > 104.18.31.182.http: Flags [F.], seq 1, ack 939, win 63852, length 0
21:21:36.599261 IP 104.18.31.182.http > tom-VirtualBox.34400: Flags [.], ack 2, win 65535, length 0
^C
4777 packets captured
6664 packets received by filter
1887 packets dropped by kernel
tom@tom-VirtualBox: ~

```

tcpdump command option

command : # tcpdump -D

```

tom@tom-VirtualBox:~$ tcpdump -D
1.enp0s3 [Up, Running]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
7 dbus-system (D-Bus system bus) [none]
8 dbus-session (D-Bus session bus) [none]
tom@tom-VirtualBox:~$

```

command : # tcpdump -i enp2s0

```
tom@tom-VirtualBox:~$ sudo tcpdump -i enp2s0
tcpdump: enp2s0: No such device exists
(SIOCGIFHWADDR: No such device)
tom@tom-VirtualBox:~$ sudo tcpdump -i enp2s0
tcpdump: enp2s0: No such device exists
(SIOCGIFHWADDR: No such device)
```

command : #tcpdump -c 5

```
tom@tom-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
21:24:48.614542 IP 10.0.2.2.https > 10.0.2.15.48046: Flags [R.], seq 32903674, ack 2472992849, win 65535, length 0
21:24:48.616792 IP 10.0.2.15.53252 > 192.168.137.1.domain: 51720+ PTR? 15.2.0.10.in-addr.arpa. (40)
21:24:49.030575 IP 10.0.2.15.51407 > 192.168.137.1.domain: 35349+ AAAA? ntp.ubuntu.com.mshome.net. (43)
21:24:49.030686 IP 10.0.2.15.37103 > 192.168.137.1.domain: 59958+ A? ntp.ubuntu.com.mshome.net. (43)
21:24:49.030893 IP 10.0.2.15.40727 > 192.168.137.1.domain: 46438+ AAAA? ntp.ubuntu.com. (32)
5 packets captured
88 packets received by filter
55 packets dropped by kernel
```

tcpdump filter expressions

command : # tcpdump host 10.0.2.15

```
tom@tom-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
21:26:57.759643 IP 10.0.2.2.https > 10.0.2.15.43528: Flags [R.], seq 35533289, ack 471693438, win 65535, length 0
21:26:57.762111 IP 10.0.2.15.49764 > 192.168.137.1.domain: 11272+ PTR? 15.2.0.10.in-addr.arpa. (40)
21:27:00.600082 IP 10.0.2.15.53717 > 192.168.137.1.domain: 48710+ [1au] AAAA? services.addons.mozilla.org.mshome.net. (67)
```

```
21:28:31.031237 IP 10.0.2.15.58987 > 192.168.137.1.65535: ICMP echo request (echo reply requested) [1 bytes payload]
^C
265 packets captured
276 packets received by filter
11 packets dropped by kernel
tom@tom-VirtualBox:~$ sudo tcpdump -i eth1 not icmp
```

command : # tcpdump -i eth1 icmp

command : # tcpdump -i eth1 not icmp

Saving packet headers to a file

command : # tcpdump -i eth1 -c 10 -w icmp.pcap

command : tcpdump -r icmp.pcap

Viewing packet details

command : # tcpdump -c10 -i eth1 -n -A port 80

```
tom@tom-VirtualBox:~$ sudo tcpdump -i eth1 not icmp
tcpdump: eth: No such device exists
(SIOCGIFHWADDR: No such device)
tom@tom-VirtualBox:~$ tcpdump -i eth1 -c 10 -w icmp.pcap
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
tom@tom-VirtualBox:~$ sudo tcpdump -i eth1 -c 10 -w icmp.pcap
tcpdump: eth1: No such device exists
(SIOCGIFHWADDR: No such device)
tom@tom-VirtualBox:~$ tcpdump -c10 -i eth1 -n -A port 80
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
tom@tom-VirtualBox:~$ sudo tcpdump -c10 -i eth1 -n -A port 80
tcpdump: eth1: No such device exists
(SIOCGIFHWADDR: No such device)
tom@tom-VirtualBox:~$
```

Shell Programming

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

```
#!/bin/bash

echo " Enter Details and View"
echo "=====
echo Enter your Name
read name
echo Enter your College name
read college
echo Details you entered echo Name: $name
echo College: $college
```

```
tom@tom-VirtualBox:~/shell programming$ ./college.sh
Enter the Details and View
=====
Enter the name:
tom joseph
Enter the college name
AJCE
Details you Entered
Name:tom joseph
College:AJCE
```

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

```
#!/bin/bash

echo "Display value Variable"
echo "=====
a=10
echo "$a"
```

```
tom@tom-VirtualBox:~/shell programing$ ./variable.sh
display value of a variable
=====
20
tom@tom-VirtualBox:~/shell programing$
```

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

```
#!/bin/bash
echo"ARITHMETIC OPERATIONS"
echo"=====
echo "Enter a number"
read a
echo "Enter another number"
read b
echo "Enter operation needed"
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
```

```
tom@tom-VirtualBox:~/shell programing$ vi calculator.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x calculator.sh
tom@tom-VirtualBox:~/shell programing$ ./calculator.sh
ARITHMETIC OPERATIONS
=====
Enter a number
5
Enter another number
6
Enter operation needed
\n1.Addition\n2.Subtraction\n3.Multiplication\n4.Division
1
a+b=11
```

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

```
#!/bin/bash
echo "Finding a number"
echo"=====
echo "Enter a number"
read a
if [ $a == 10 ]; then
echo "Number found "
else
echo "Number NOT found !"
fi
```

```
tom@tom-VirtualBox:~/shell programing$ vi date.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x date.sh
tom@tom-VirtualBox:~/shell programing$ ./date.sh
Time and Calendar
=====
Today is Saturday 02 October 2021 06:16:00 PM IST
Calendar .
```

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

```
#!/bin/bash
echo "Time and
Calendar"
echo"=====
="
echo "Today is
$(date)"
echo ""
```

```
echo "Calendar :"
```

```
tom@tom-VirtualBox:~/shell programing$ vi date.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x date.sh
tom@tom-VirtualBox:~/shell programing$ ./date.sh
Time and Calendar
=====
Today is Saturday 02 October 2021 06:16:00 PM IST
Calendar .
```

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

```
#!/bin/bash

echo "EVEN OR ODD"

echo"====="

echo"Enter number"

read n x=$((n%2))

if [ $x -eq 0 ]; then

echo "Number is Even"

else

echo "Number is odd"

fi
```

```
tom@tom-VirtualBox:~/shell programing$ vi oddoreven.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x oddoreven.sh
tom@tom-VirtualBox:~/shell programing$ ./oddoreven.sh
EVEN OR ODD
=====
Enter a number
5
Number is odd
```

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

```
#!/bin/bash

echo "Comparing numbers"
```

```

echo "=====
echo "Enter first number"
read a
echo "Enter second number"
read b
if [ $a -gt $b ]; then
echo "$a is greater"
elif [ $b -gt $a ];then
echo "$b is greater"
else
echo "Both are Equal"
fi

```

```

tom@tom-VirtualBox:~/shell programing$ vi greater.sh
tom@tom-VirtualBox:~/shell programing$ ./greater.sh
Comparing numbers
=====
Enter first number
10
Enter second number
5
10 is greater

```

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

```

#!/bin/bash

echo "Sum of Numbers"
echo"====="

s=0

for (( i=1;i<=10;i++ ))
do
s=`expr $s + $i` done
echo "Sum of first 10 numbers = $s"

```

```
tom@tom-VirtualBox:~/shell programming$ vi sumof.sh
tom@tom-VirtualBox:~/shell programming$ chmod +x sumof.sh
tom@tom-VirtualBox:~/shell programming$ ./sumof.sh
Sum of Numbers
=====
"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.

```
#!/bin/bash

echo "AVG, SUM & Product
No."
echo"=====
==" echo "Please enter first
number:" read a

echo "Second number: "

read b

echo "Third number: "

read c

echo "Fourth number: "

read d

sum=$(($a + $b + $c + $d))
avg=$(echo $sum / 4 | bc -l )
prod=$(($a * $b * $c * $d))

echo "The sum of these numbers is:
" $sum

echo "The average of these
numbers is: " $avg
```

```
echo "The product of these
numbers is: " $prod
```

```
tom@tom-VirtualBox:~/shell programing$ vi avgpro.sh
tom@tom-VirtualBox:~/shell programing$ ./avgpro.sh
AVG, SUM & Product of 4 No.
=====
Please enter your first number:
10
Second number:
5
Third number:
3
Fourth number:
1
The sum of these numbers is: 19
The average of these numbers is: 4.750000000000000000000000000000
The product of these numbers is: 150
```

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

```
#!/bin/bash

echo "LARGEST OF THREE"
echo "====="
echo "Enter first number"
read a
echo "Enter second number"
read b
echo "Enter third number"
read c
if [$a -gt $b]; then
  if [$a -gt $c]; then
    echo "$a is big"
  else
```

```

echo "$c isbig"
fi
elif [$b -gt $c];then
echo "$b is big"
else
echo "$c is big"
fi

```

```

tom@tom-VirtualBox:~/shell programing$ vi smallest.sh
tom@tom-VirtualBox:~/shell programing$ ./smallest.sh
LARGEST OF THREE
=====
Enter first number
45
Enter second number
56
Enter third number
22
56 is big
tom@tom-VirtualBox:~/shell programing$ █

```

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

```

#!/bin/bash

echo "Factorial"
echo "====="
echo "Enter a number"
read num

fact=1

for((i=2;i<=num;i++))

{
    fact=$((fact * i)) #fact = fact * i
}

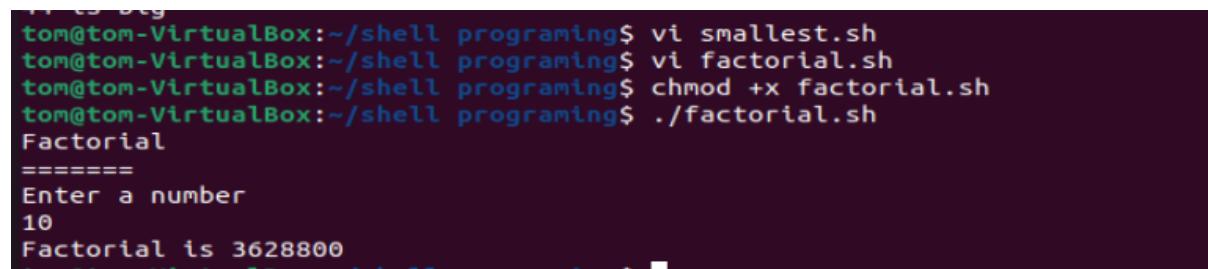
```

```

}

echo "Factorial is $fact"

```



A terminal window showing the execution of a shell script named factorial.sh. The user runs 'vi factorial.sh' to edit the script, then 'chmod +x factorial.sh' to make it executable, and finally './factorial.sh' to run it. The script prompts for a number (10) and outputs the factorial (3628800).

```

tom@tom-VirtualBox:~/shell programming$ vi factorial.sh
tom@tom-VirtualBox:~/shell programming$ chmod +x factorial.sh
tom@tom-VirtualBox:~/shell programming$ ./factorial.sh
Factorial
=====
Enter a number
10
Factorial is 3628800

```

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

```

#!/bin/bash

echo "Palindrome or Not"
echo "====="

echo "Enter number to
check"

read n

rev=$(echo $n | rev)

if [ $n -eq $rev ]; then

echo "Number is
Palindrome"

else

echo "Number is not
Palindrome"

```

```
fi
```

```
tom@tom-VirtualBox:~/shell programing$ vi palindrome.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x palindrome.sh
tom@tom-VirtualBox:~/shell programing$ ./palindrome.sh
Palindrome or Not
=====
Enter number to check
456
Number is not Palindrome
tom@tom-VirtualBox:~/shell programing$
```

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

```
#!/bin/bash

echo "Average of Nnumbers"
echo "====="
echo "Enter Size"
read n i=1
sum=0
echo "Enter Numbers"
while [ $i -le $n ] do
read num
sum=$((sum + num))
i=$((i + 1))
done
avg=$(echo $sum / $n | bc -l)
echo $avg
```

```

tom@tom-VirtualBox:~/shell programing$ vi average.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x average.sh
tom@tom-VirtualBox:~/shell programing$ ./average.sh
Average of N numbers
=====
Enter Size
5
Enter Numbers
12
45
66
33
55
42.200000000000000000000000000000

```

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

```

#!/bin/bash

echo "Sum of all digits"
echo "===== "
echo "Enter a number:"
read num
sum=0
while [ $num -gt 0 ]
do
mod=$((num % 10))
sum=$((sum + mod)) num=$((num / 10))
done
echo "Sum of digits is $sum"

```

```

tom@tom-VirtualBox:~/shell programing$ vi average.sh
tom@tom-VirtualBox:~/shell programing$ vi sumofdigit.sh
tom@tom-VirtualBox:~/shell programing$ chmod +x sumofdigit.sh
tom@tom-VirtualBox:~/shell programing$ ./sumofdigit.sh
Sum of all digits
=====
Enter a number:
10
Sum of digits is 1

```

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

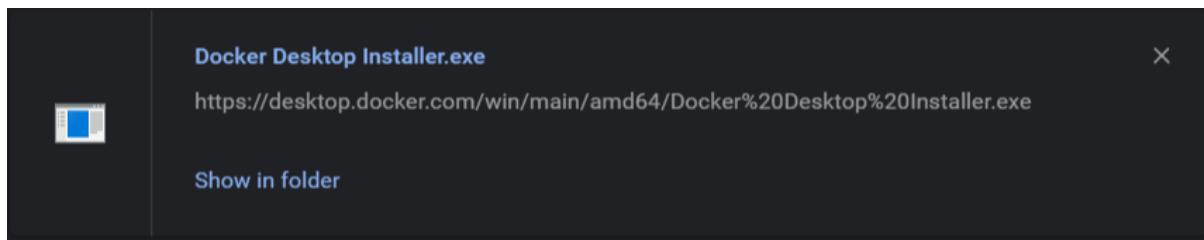
```
#!/bin/bash
echo "LEAP YEAR OR NOT"
echo "====="
echo "Enter the year" read y
a=`expr $y % 4`
b=`expr $y % 100`
c=`expr $y % 400`
if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];
then
echo "$y is leap year"
else
echo "$y is not leap year"
fi
```

Docker Installation

Step1:

Download Docker Desktop installer for Windows from

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



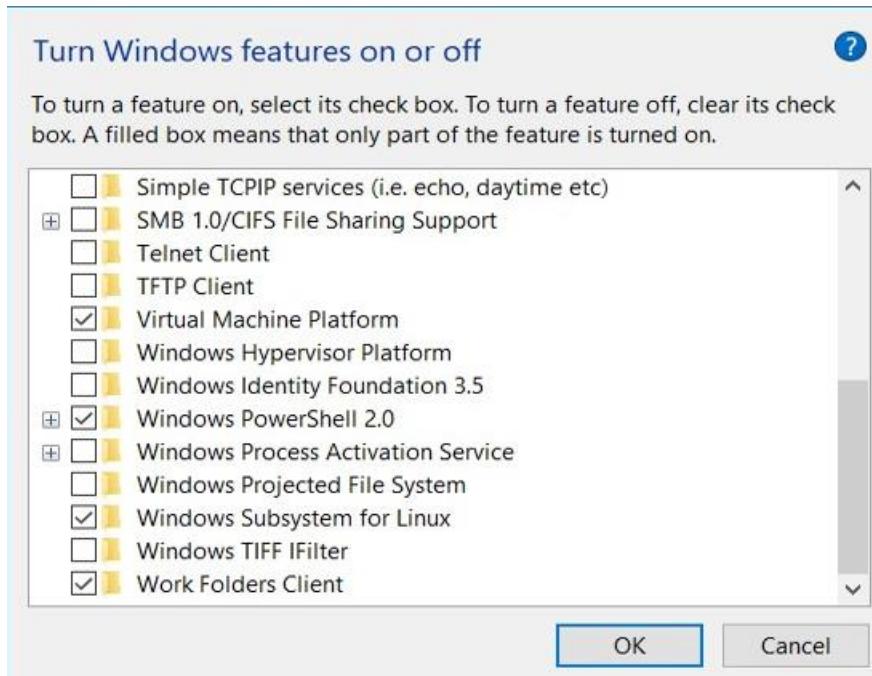
Step 2:

Open the exe file and follow the steps in the installation process.

Step 3:

After installing go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux

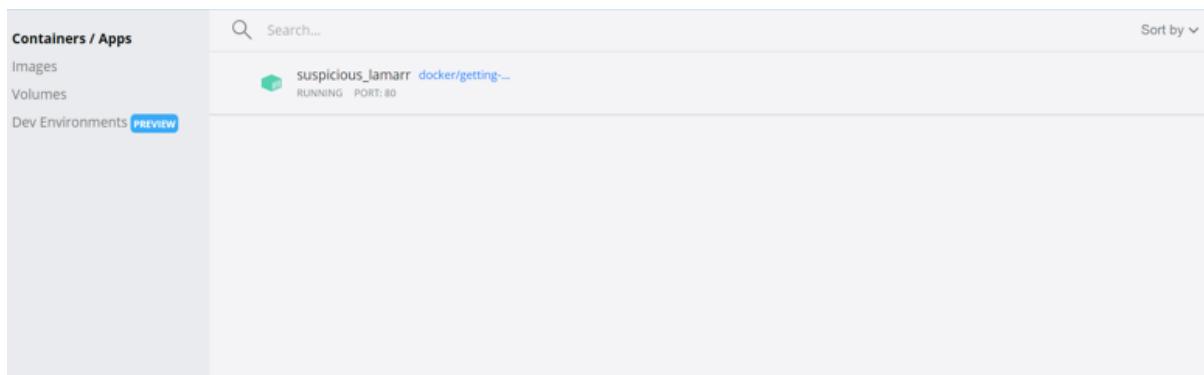


Step 4:

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:

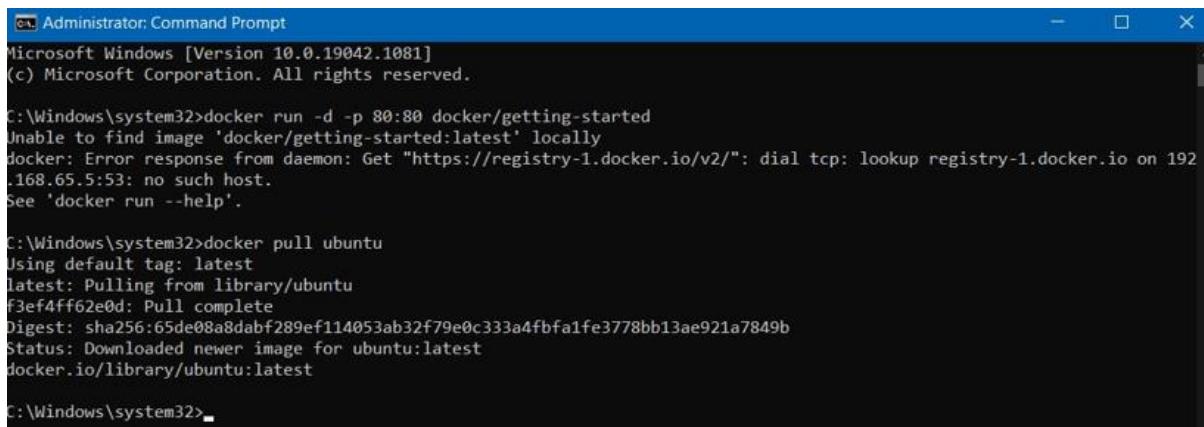
Once installed, open the Docker desktop app, and sign in using the Docker ID.



Step 6:

Pull any image from Docker hub using the docker pull

command in the command prompt (eg: docker pull ubuntu).



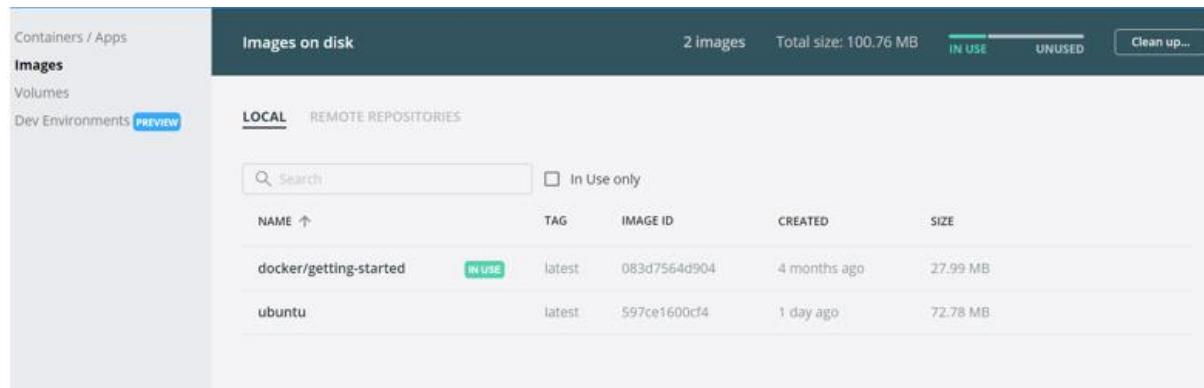
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

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.



The screenshot shows the Docker interface for managing images. On the left, there's a sidebar with options: Containers / Apps, Images (which is selected), Volumes, and Dev Environments (with a PREVIEW button). The main area is titled "Images on disk" and shows "2 images" with a total size of "100.76 MB". A progress bar indicates "IN USE" (green) and "UNUSED" (grey). There are tabs for "LOCAL" and "REMOTE REPOSITORIES", and a search bar with an "In Use only" checkbox. The table lists the images:

NAME	TAG	IMAGE ID	CREATED	SIZE
docker/getting-started	latest	083d7564d904	4 months ago	27.99 MB
ubuntu	latest	597ce1600cf4	1 day ago	72.78 MB

Analyze network packet stream using wireshark.
Perform basic network service tests using nc.

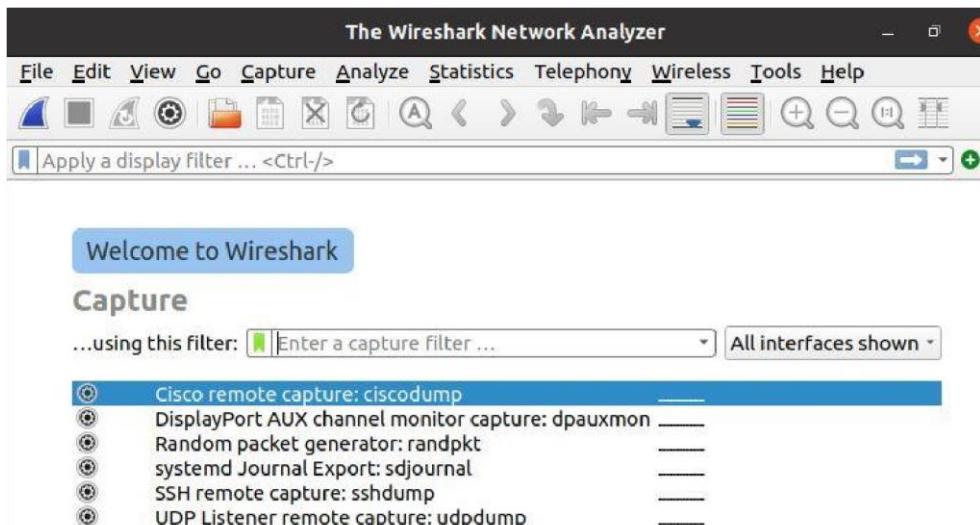
Commands: sudo apt-get update

```
sudo apt-get install wireshark
```

```
tom@tom-VirtualBox:~/Desktop$ sudo apt-get install wireshark
[sudo] password for tom:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
 libbcg729-0 libdouble-conversion3 liblua5.2-0 libmd4c0 libminizip1
 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5
 libqt5multimedia5-plugins libqt5multimediasupport5 libqt5multimediawidgets5
 libqt5network5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
 libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark14 libwiretap11
 libwsutil12 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:
 libbcg729-0 libdouble-conversion3 liblua5.2-0 libmd4c0 libminizip1
 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5
 libqt5multimedia5-plugins libqt5multimediasupport5 libqt5multimediawidgets5
 libqt5network5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
 libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark14 libwiretap11
 libwsutil12 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
 qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 31 newly installed, 0 to remove and 244 not upgraded.
Need to get 33.9 MB of archives.
After this operation, 170 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Fetched http://ie.archive.ubuntu.com/ubuntu/bionic/universe amd64 libdouble-conversion3_3.1.4-1
```

Command: Sudo dpkg-reconfigure wireshark-common

```
Processing triggers for gnome-menus (3.30.0-1ubuntu1) ...
tom@tom-VirtualBox:~/Desktop$ sudo dpkg-reconfigure wireshark-common
[sudo] password for tom:
```



Learn

[User's Guide](#) · [Wiki](#) · [Questions and Answers](#) · [Mailing Lists](#)

You are running Wireshark 3.4.4 (Git v3.4.4 packaged as 3.4.4-1ubuntu1).

Ready to load or capture No Packets Profile: Default

Capturing from enp0s3, any, and Loopback: lo

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length
700	3.904189589	13.33.146.49	10.0.2.15	TCP	1402
701	3.904221965	10.0.2.15	13.33.146.49	TCP	54
702	3.907674902	13.33.146.49	10.0.2.15	TCP	1325
703	3.907705214	10.0.2.15	13.33.146.49	TCP	54
704	3.941174357	10.0.2.15	13.33.146.49	TCP	54

Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits) on interface enp0s3
 Linux cooked capture v1
 Internet Protocol Version 4, Src: 13.33.179.27, Dst: 10.0.2.15
 Transmission Control Protocol, Src Port: 443, Dst Port: 54020, Seq: 0, Ack: 1,
 VSS Monitoring Ethernet trailer, Source Port: 0

Hex	Dec	
0000	00 00 00 01 00 06 52 54 00 12 35 02 00 00 08 00RT ..5.....
0010	45 00 00 2c 78 1d 00 00 40 06 36 64 0d 21 b3 1b	E..,x...@-6d..!..
0020	0a 00 02 0f 01 bb d3 04 02 80 a0 01 41 90 b7 b3A.....
0030	60 12 ff ff 5b 46 00 00 02 04 05 b4 00 00[F...

enp0s3, any, and Loopback capture in progress: Packets: 704 · Displayed: 704 (100.0%) Profile: Default

