

**20MCA136-NETWORKING & SYSTEM  
ADMINISTRATION LAB  
RECORD**

**KARTHIKA C BABU**

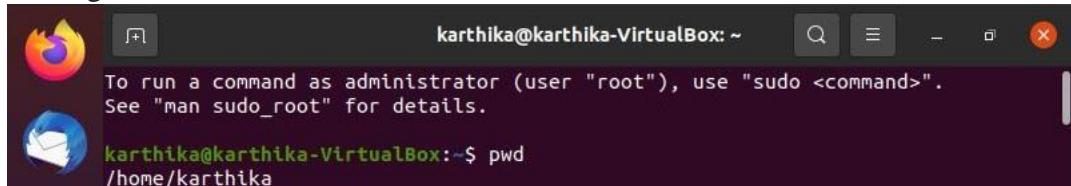
**RMCA-B S2**

**ROLL NO: 07**

# BASIC LINUX COMMANDS

## 1. pwd

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



A screenshot of a Linux terminal window titled "karthika@karthika-VirtualBox: ~". The window shows a desktop environment with icons for a browser and file manager. The terminal output is as follows:

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

karthika@karthika-VirtualBox:~$ pwd
/home/karthika
```

## 2. history

In Linux, there is a very useful **command** to show all of the last **commands** that have been recently used. The **command** is simply called **history**.

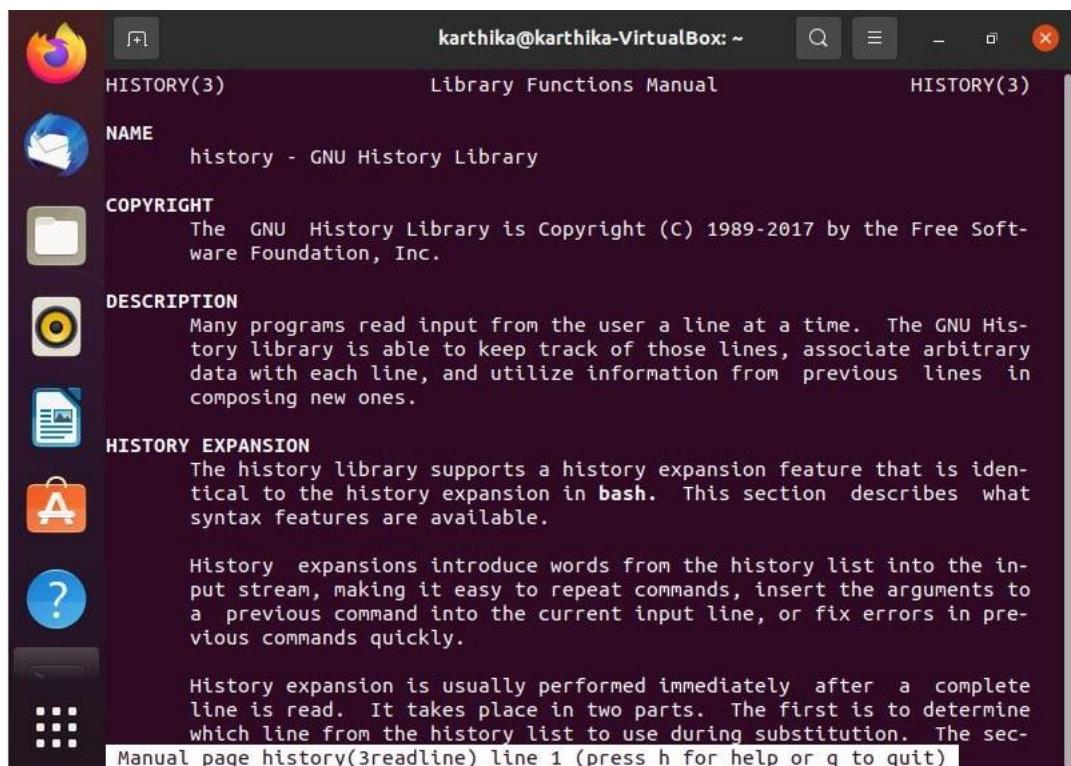


A screenshot of a Linux terminal window titled "karthika@karthika-VirtualBox: ~". The terminal output is as follows:

```
karthika@karthika-VirtualBox:~$ history
1  pwd
2  cd
3  cd..
4  pwd
5  history
```

## 3. man

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



A screenshot of a Linux terminal window titled "karthika@karthika-VirtualBox: ~". The terminal output is as follows:

```
HISTORY(3)          Library Functions Manual          HISTORY(3)

NAME               history - GNU History Library

COPYRIGHT          The GNU History Library is Copyright (C) 1989-2017 by the Free Software Foundation, Inc.

DESCRIPTION         Many programs read input from the user a line at a time. The GNU History library is able to keep track of those lines, associate arbitrary data with each line, and utilize information from previous lines in composing new ones.

HISTORY EXPANSION
The history library supports a history expansion feature that is identical to the history expansion in bash. This section describes what syntax features are available.

History expansions introduce words from the history list into the input stream, making it easy to repeat commands, insert the arguments to a previous command into the current input line, or fix errors in previous commands quickly.

History expansion is usually performed immediately after a complete line is read. It takes place in two parts. The first is to determine which line from the history list to use during substitution. The sec-
```

Manual page history(3 readline) line 1 (press h for help or q to quit)

#### 4. cd

The **cd** (“change directory”) command is used to change the current working directory in Linux and other Unix-like operating systems. It is one of the most basic and frequently used commands when working on the Linux terminal. The current working directory is the directory (folder) in which the user is currently working in. Each time you interact with your command prompt, you are working within a directory.

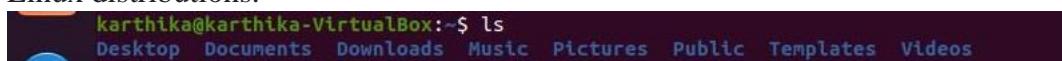


```
karthika@karthika-VirtualBox:~$ cd linux
karthika@karthika-VirtualBox:~/linux$ cd ..
karthika@karthika-VirtualBox:~$ cd linux
karthika@karthika-VirtualBox:~/linux$ cd .
karthika@karthika-VirtualBox:~/linux$ cd ..
karthika@karthika-VirtualBox:~/linux$ touch demo.txt
```

#### 5. ls

The **ls** command is one of the basic **commands** that any Linux user should know. It is used to list information about files and directories within the file system.

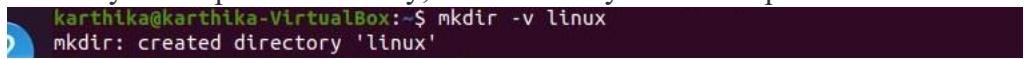
The **ls** utility is a part of the GNU core utilities package which is installed on all Linux distributions.



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

#### 6. mkdir

**mkdir** command in Linux allows the user to create directories (also referred to as folders in some operating systems). This command can create multiple directories at once as well as set the permissions for the directories. It is important to note that the user executing this command must have enough permissions to create a directory in the parent directory, or he/she may receive a ‘permission denied’ error.



```
karthika@karthika-VirtualBox:~$ mkdir -v linux
mkdir: created directory 'linux'
```

#### 7. rmdir

**rmdir** command is used remove empty directories from the file system 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.



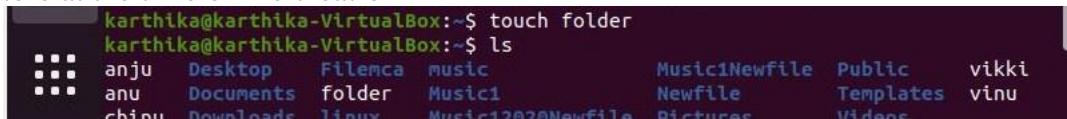
```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

karthika@karthika-VirtualBox:~$ mkdir commands
karthika@karthika-VirtualBox:~$ ls
anju commands Downloads linux Music12020Newfile Pictures Videos
anu Desktop Filemca music MusiciNewfile Public vikki
chinu Documents folder Musici Newfile Templates vinu
karthika@karthika-VirtualBox:~$ rmdir commands
karthika@karthika-VirtualBox:~$ ls
anju Desktop Filemca music Music1Newfile Public vikki
anu Documents folder Musici1 Newfile Templates vinu
chinu Downloads linux Music12020Newfile Pictures Videos
karthika@karthika-VirtualBox:~$
```

## 8. touch

The **touch** command is a standard command used in UNIX/Linux operating system which is used to create, change and modify timestamps of a file. Basically, there are two different commands to create a file in the Linux system which is as follows:

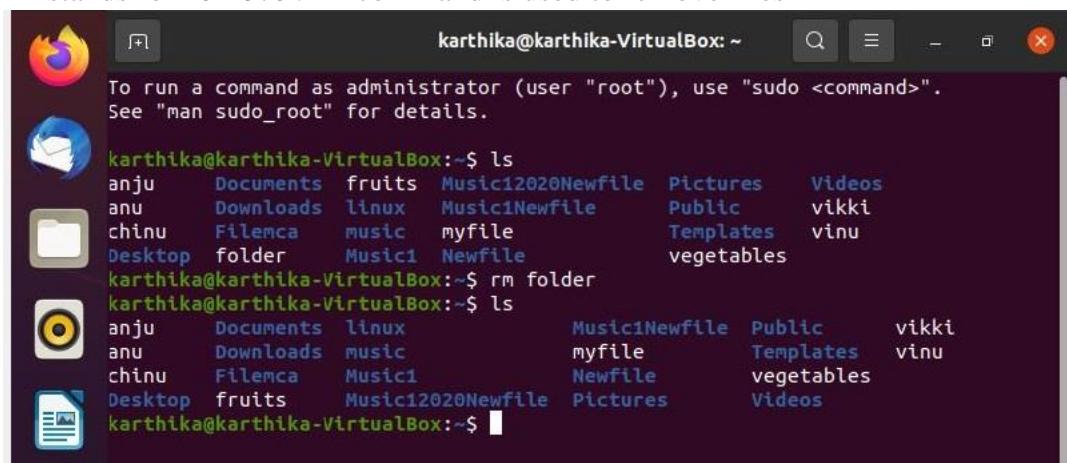
- **cat command:** It is used to create the file with content.
- **touch command:** It is used to create a file without any content. The file created using touch command is empty. This command can be used when the user doesn't have data to store at the time of file creation.



```
karthika@karthika-VirtualBox:~$ touch folder
karthika@karthika-VirtualBox:~$ ls
anju  Desktop  Filemca  music          Music1Newfile  Public    vikki
anu   Documents folder   Musici        Newfile       Templates  vinu
chinu Downloads  linux    Music12020Newfile Pictures    Videos
```

## 9. rm

rm stands for **remove**. rm command is used to remove files.

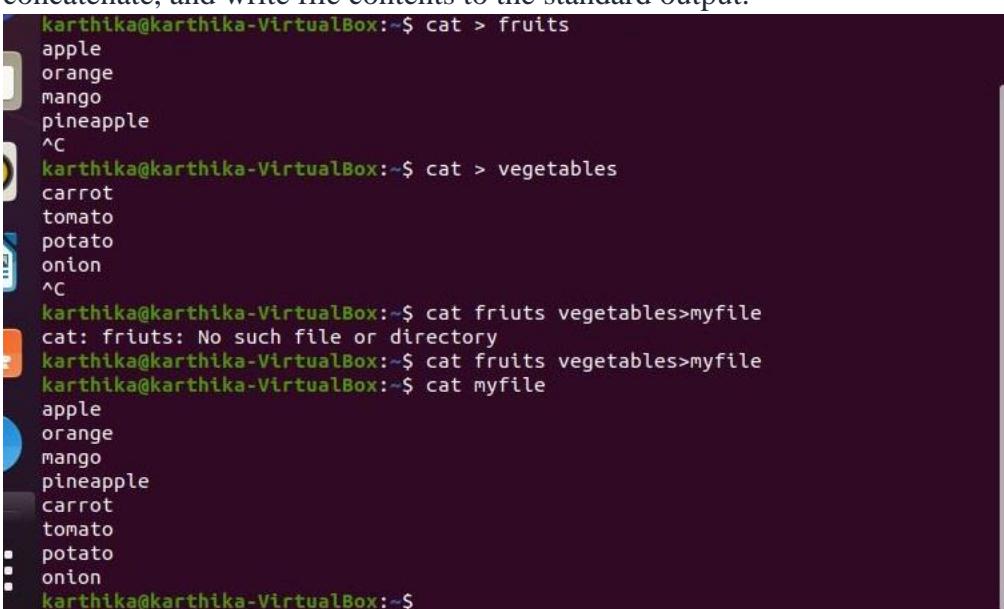


```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

karthika@karthika-VirtualBox:~$ ls
anju  Documents  fruits  Music12020Newfile  Pictures    Videos
anu   Downloads  linux   Music1Newfile     Public      vikki
chinu  Filemca  music   myfile         Templates  vinu
Desktop  folder   Musici  Newfile       vegetables
karthika@karthika-VirtualBox:~$ rm folder
karthika@karthika-VirtualBox:~$ ls
anju  Documents  linux      Music1Newfile  Public      vikki
anu   Downloads  music     myfile        Templates  vinu
chinu  Filemca  Musici    Newfile      vegetables
Desktop  fruits  Music12020Newfile Pictures    Videos
karthika@karthika-VirtualBox:~$
```

## 10. cat

The cat command is one of the most widely used commands in Linux. The name of the cat command comes from its functionality to **concatenate** files. It can read, concatenate, and write file contents to the standard output.

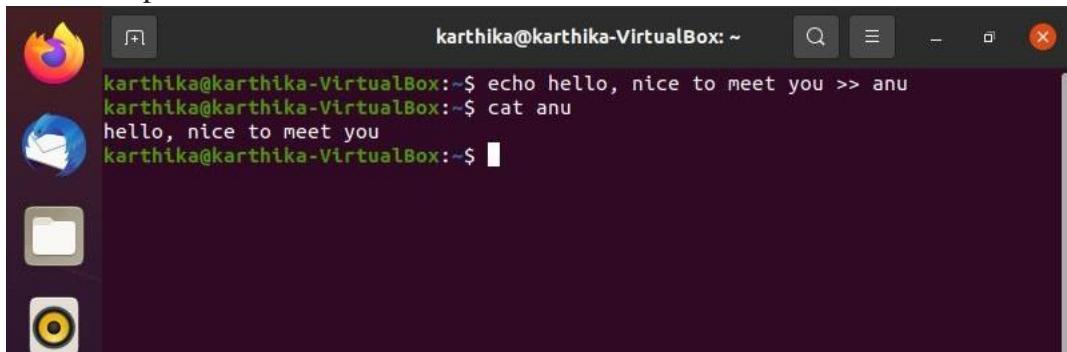


```
karthika@karthika-VirtualBox:~$ cat > fruits
apple
orange
mango
pineapple
^C
karthika@karthika-VirtualBox:~$ cat > vegetables
carrot
tomato
potato
onion
^C
karthika@karthika-VirtualBox:~$ cat fruits vegetables>myfile
cat: fruits: No such file or directory
karthika@karthika-VirtualBox:~$ cat fruits vegetables>myfile
karthika@karthika-VirtualBox:~$ cat myfile
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$
```

## BASIC LINUX COMMANDS

### 1. echo

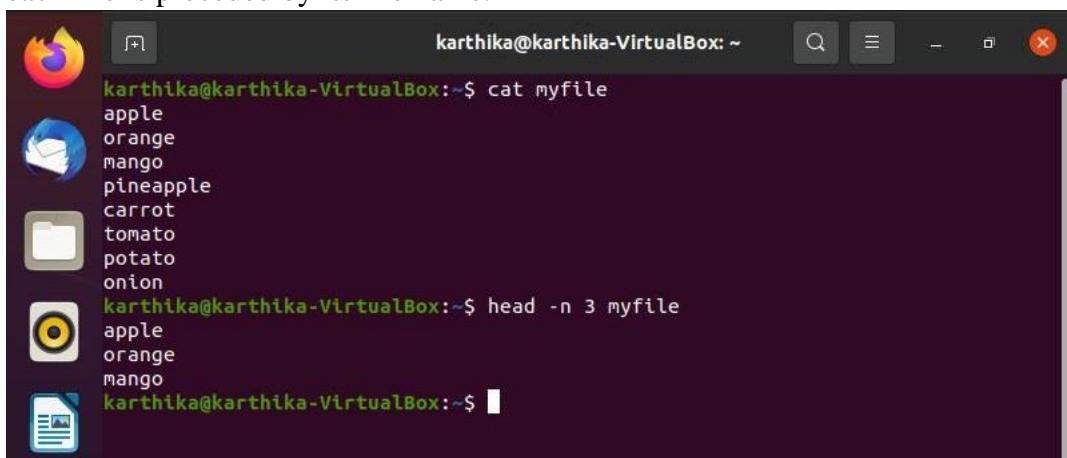
**echo command in linux** is used to display line of text/string that are passed as an argument . This is a built in **command** that is mostly used in shell scripts and batch files to output status text to the screen or a file.



```
karthika@karthika-VirtualBox:~$ echo hello, nice to meet you >> anu
karthika@karthika-VirtualBox:~$ cat anu
hello, nice to meet you
karthika@karthika-VirtualBox:~$
```

### 2. head

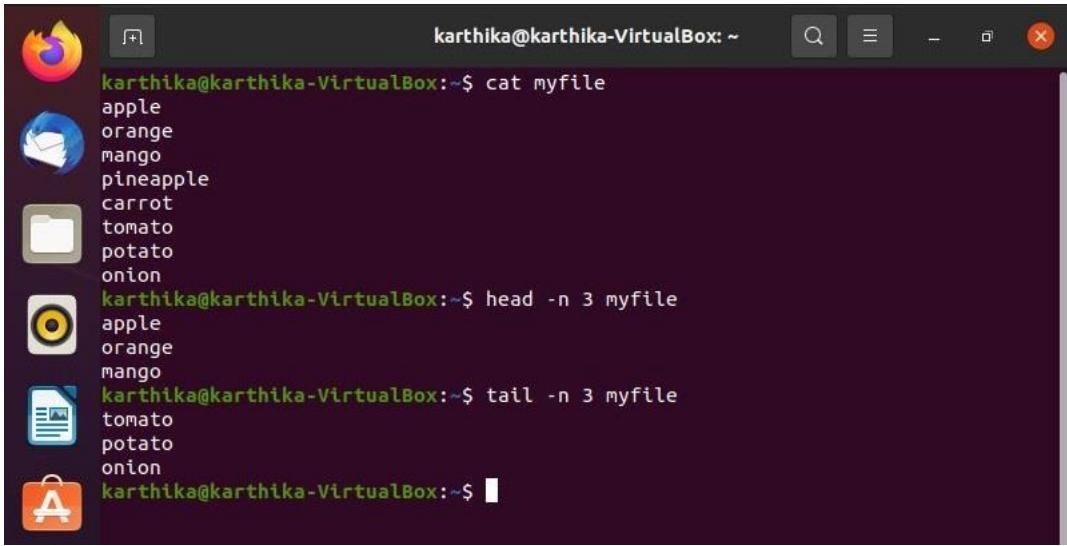
It is the complementary of Tail command. The head command, as the name implies, print the top N number of data of the given input. By default, it prints the first 10 lines of the specified files. If more than one file name is provided then data from each file is preceded by its file name.



```
karthika@karthika-VirtualBox:~$ cat myfile
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$ head -n 3 myfile
apple
orange
mango
karthika@karthika-VirtualBox:~$
```

### 3. tail

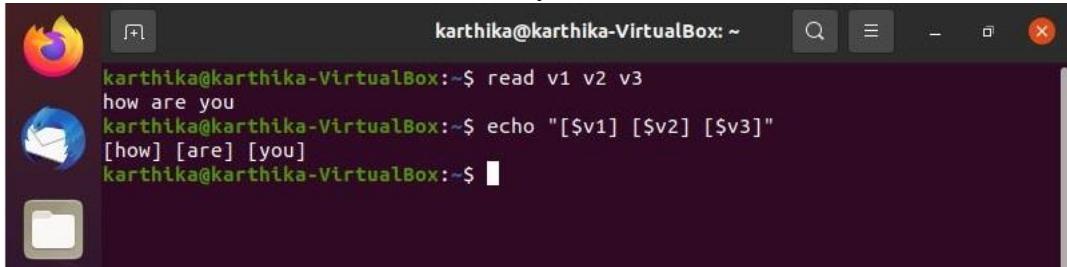
It is the complementary of head command. The tail command, as the name implies, print the last N number of data of the given input. By default it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name.



```
karthika@karthika-VirtualBox:~$ cat myfile
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$ head -n 3 myfile
apple
orange
mango
karthika@karthika-VirtualBox:~$ tail -n 3 myfile
tomato
potato
onion
karthika@karthika-VirtualBox:~$
```

#### 4. read

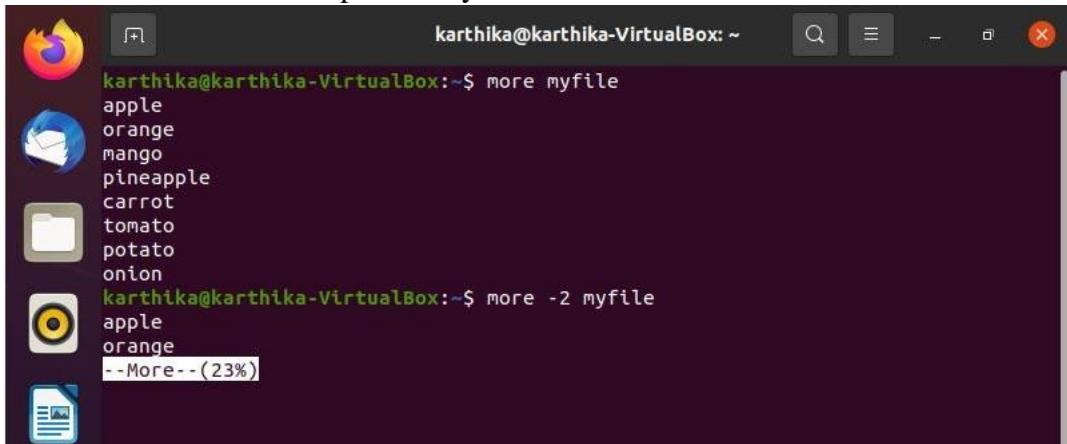
Read command in Linux system is used to read from a file descriptor. Basically, this command read up the total number of bytes from the specified file descriptor into the buffer. If the number or count is zero then this command may detect the errors. But on success, it returns the number of bytes read.



```
karthika@karthika-VirtualBox:~$ read v1 v2 v3
how are you
karthika@karthika-VirtualBox:~$ echo "[${v1} ${v2} ${v3}]"
[how] [are] [you]
karthika@karthika-VirtualBox:~$
```

#### 5. more

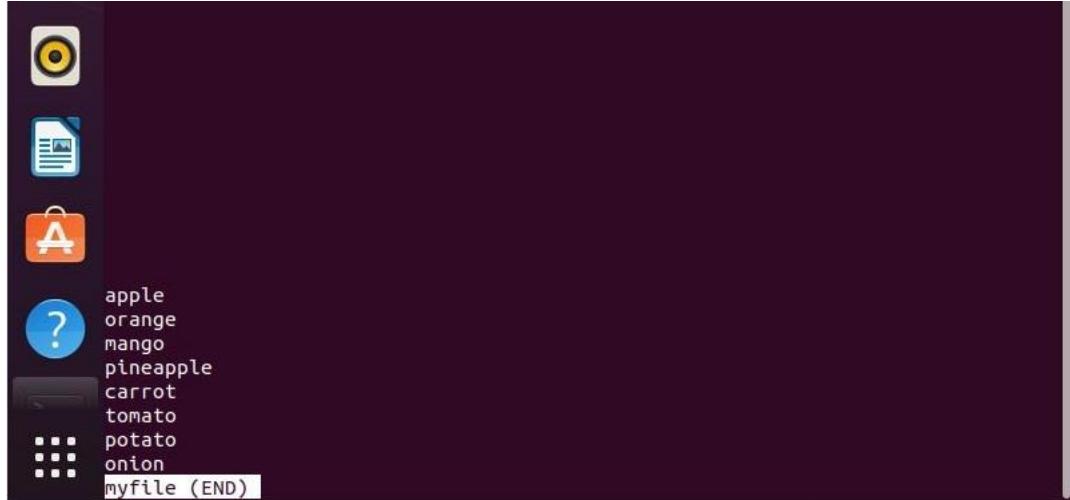
**more** command is used to view the text files in the command prompt, displaying one screen at a time in case the file is large (For example log files). The more command also allows the user do scroll up and down through the page. The syntax along with options and command is as follows. Another application of more is to use it with some other command after a pipe. When the output is large, we can use more command to see output one by one.



```
karthika@karthika-VirtualBox:~$ more myfile
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$ more -2 myfile
apple
orange
--More-- (23%)
```

## 6. less

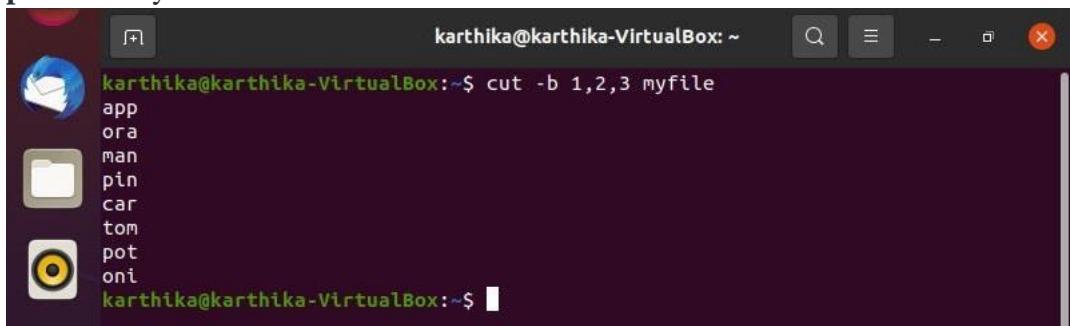
Less command is linux utility which can be used to read contents of text file one page (one screen) per time. It has faster access because if file is large, it don't access complete file, but access it page by page.



```
apple
orange
mango
pineapple
carrot
tomato
potato
onion
myfile (END)
```

## 7. cut

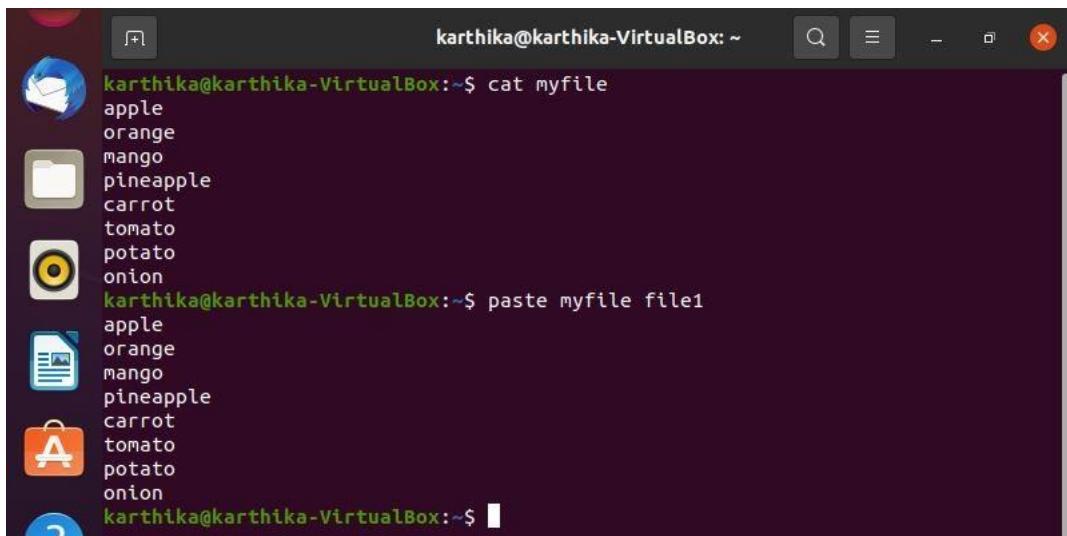
The cut command in UNIX is a command for cutting out the sections from each line of files and writing the result to standard output. It can be used to cut parts of a line by **byte position, character and field**. Basically the cut command slices a line and extracts the text. It is necessary to specify option with command otherwise it gives error. If more than one file name is provided then data from each file is **not precedes** by its file name.



```
karthika@karthika-VirtualBox:~$ cut -b 1,2,3 myfile
app
ora
man
pin
car
tom
pot
oni
karthika@karthika-VirtualBox:~$
```

## 8. paste

Paste command is one of the useful commands in Unix or Linux operating system. It is used to join files horizontally (parallel merging) by outputting lines consisting of lines from each file specified, separated by **tab** as delimiter, to the standard output. When no file is specified, or put dash ("--) instead of file name, paste reads from standard input and gives output as it is until a interrupt command [**Ctrl-c**] is given.

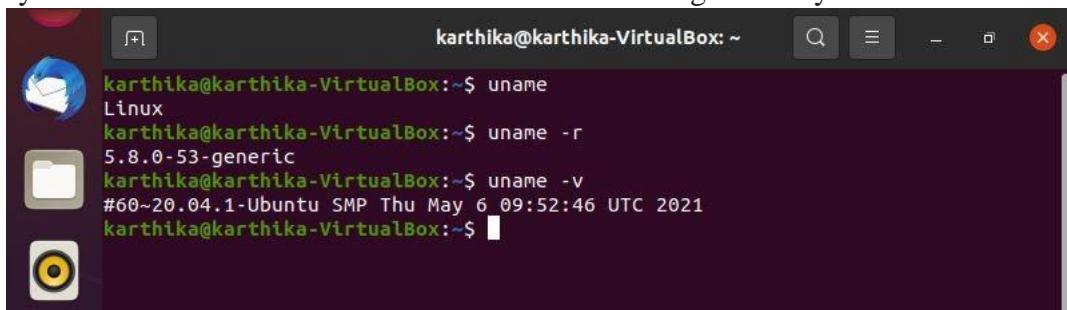


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark background and contains the following text:

```
karthika@karthika-VirtualBox:~$ cat myfile
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$ paste myfile file1
apple
orange
mango
pineapple
carrot
tomato
potato
onion
karthika@karthika-VirtualBox:~$
```

## 9. uname

The **uname** tool is most commonly used to determine the processor architecture, the system hostname and the version of the kernel running on the system.

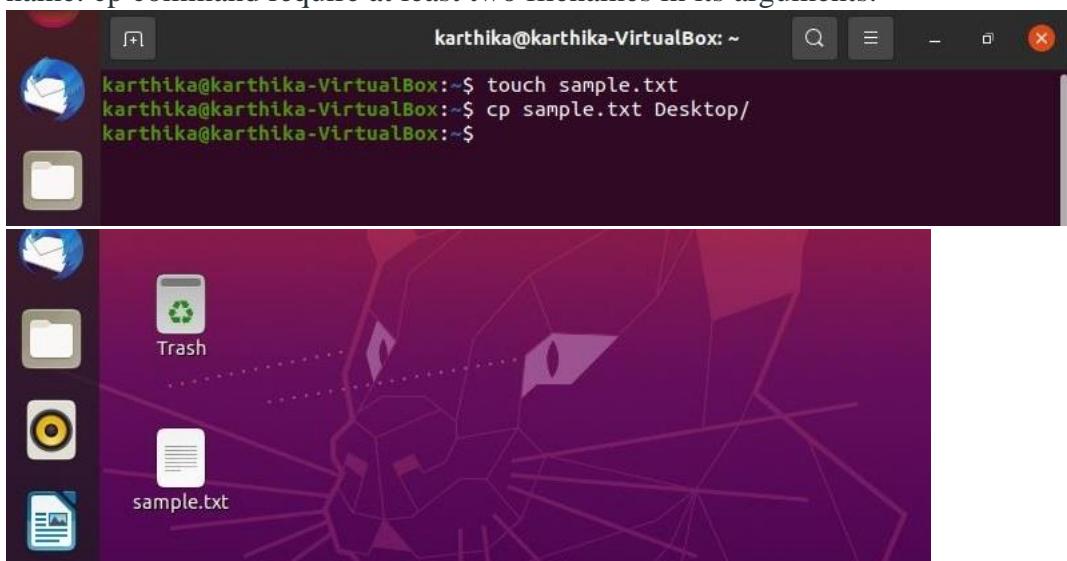


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark background and contains the following text:

```
karthika@karthika-VirtualBox:~$ uname
Linux
karthika@karthika-VirtualBox:~$ uname -r
5.8.0-53-generic
karthika@karthika-VirtualBox:~$ uname -v
#60~20.04.1-Ubuntu SMP Thu May 6 09:52:46 UTC 2021
karthika@karthika-VirtualBox:~$
```

## 10. cp

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



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window and a desktop screen. The terminal window has a dark background and contains the following text:

```
karthika@karthika-VirtualBox:~$ touch sample.txt
karthika@karthika-VirtualBox:~$ cp sample.txt Desktop/
karthika@karthika-VirtualBox:~$
```

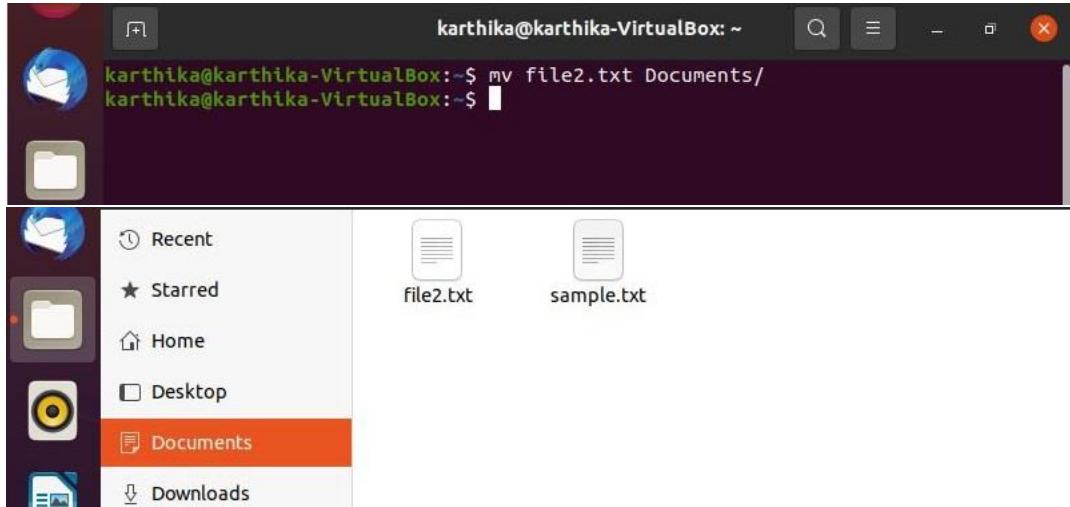
The desktop screen shows a purple wallpaper with a cracked glass effect. There are several icons on the desktop: a trash can icon labeled "Trash", a document icon labeled "sample.txt", and a folder icon.

## 11. mv

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

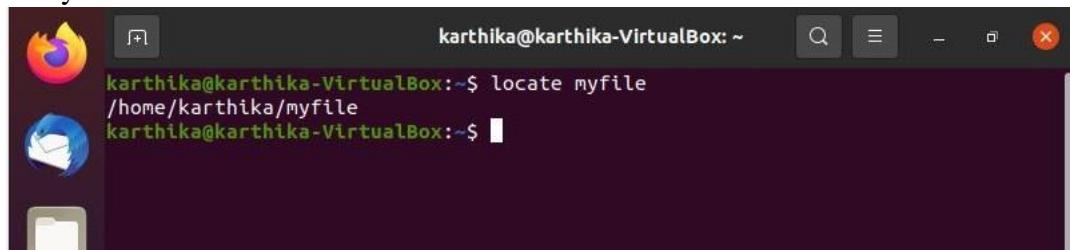
1. It renames a file or folder.
2. It moves a group of files to a different directory.

No additional space is consumed on a disk during renaming. This command normally **works silently** means no prompt for confirmation.



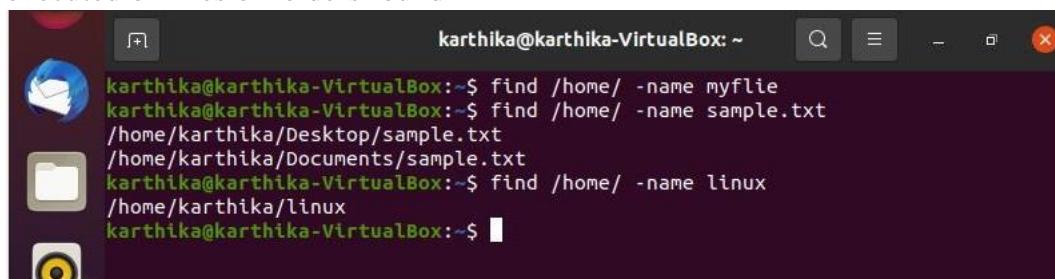
## 12. locate

The **locate** command and **find** command is used to search a file by name. But, the difference between both commands is that **locate** command is a background process and searches the file in the database whereas, **find** command searches in the filesystem. The **locate** command is much faster than **find** command.



## 13. find

The **find** command in UNIX is a command line utility for walking a file hierarchy. It can be used to find files and directories and perform subsequent operations on them. It supports searching by file, folder, name, creation date, modification date, owner and permissions. By using the '**-exec**' other UNIX commands can be executed on files or folders found.



#### 14. grep

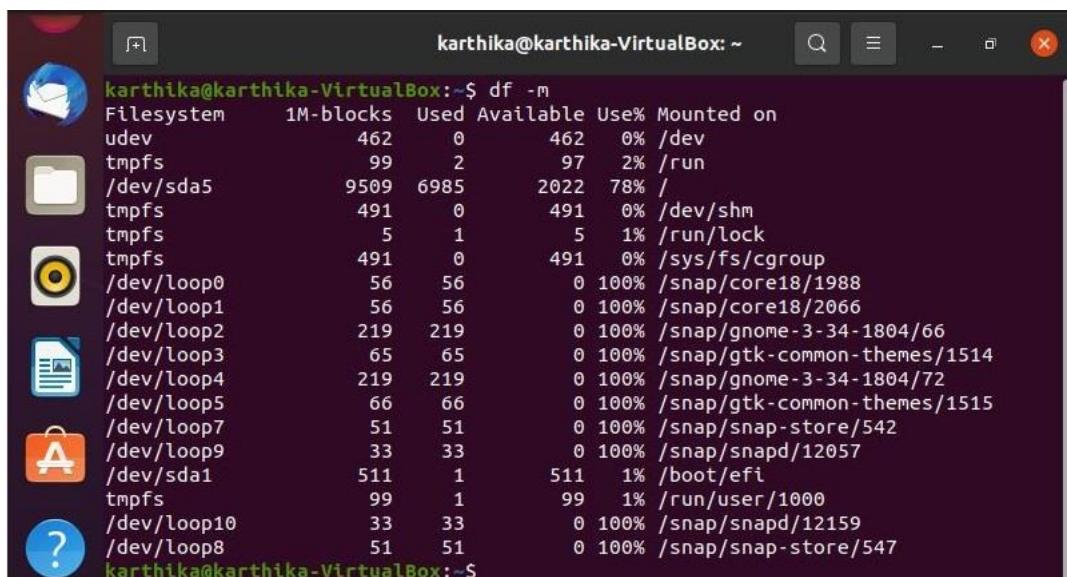
The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for globally search for regular expression and print out).



```
karthika@karthika-VirtualBox:~$ grep orange fruits
orange
karthika@karthika-VirtualBox:~$ grep karthika /etc/passwd
karthika:x:1000:1000:karthika,,,:/home/karthika:/bin/bash
karthika@karthika-VirtualBox:~$
```

#### 15. df

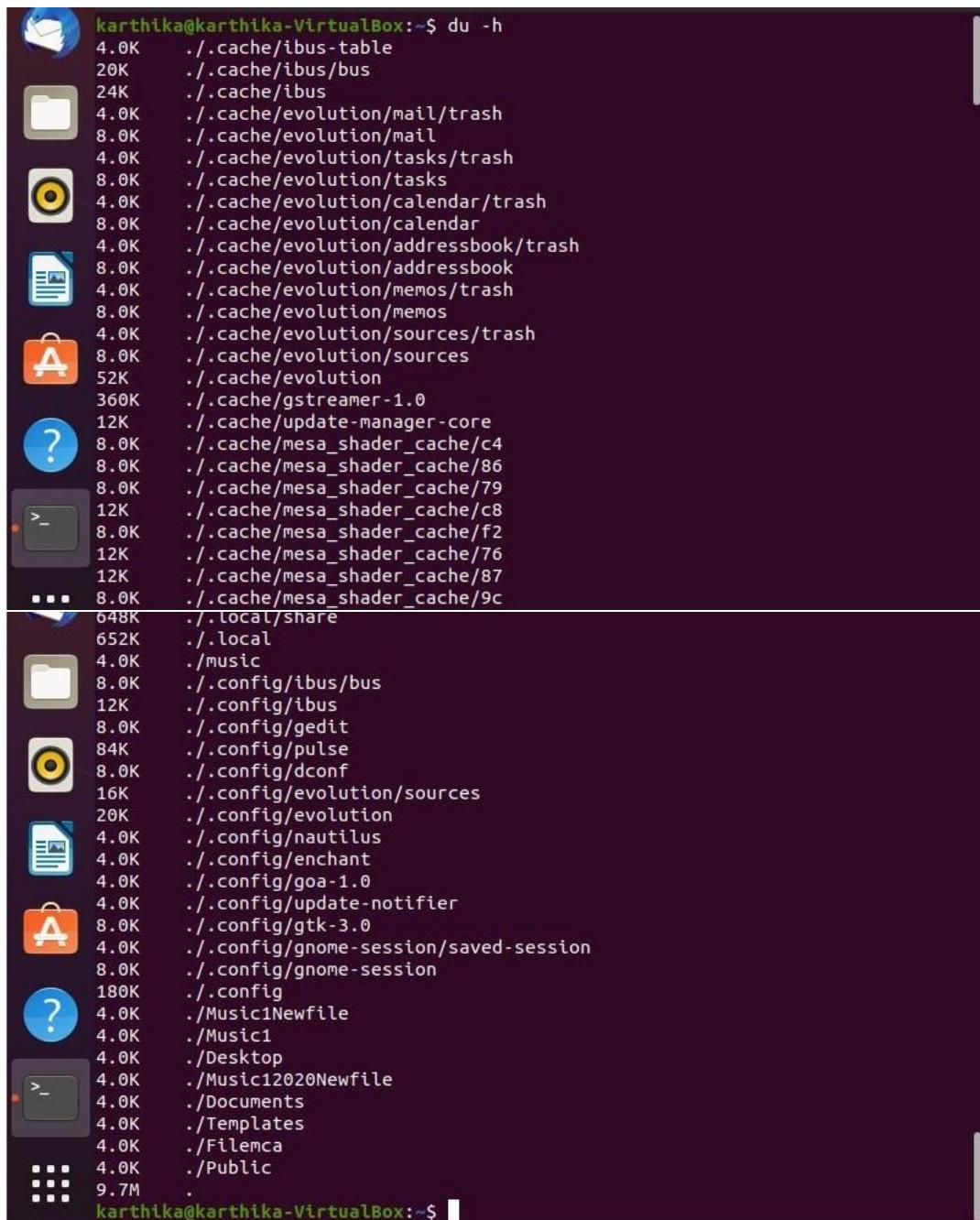
**Linux df command** is used to display the disk space used in the file system. The '**df**' stands for "disk filesystem." It defines the number of blocks used, the number of blocks available, and the directory where the file system is mounted.



```
karthika@karthika-VirtualBox:~$ df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
udev              462      0     462   0% /dev
tmpfs             99      2     97   2% /run
/dev/sda5        9509  6985    2022  78% /
tmpfs             491      0     491   0% /dev/shm
tmpfs              5      1      5   1% /run/lock
tmpfs             491      0     491   0% /sys/fs/cgroup
/dev/loop0          56      56      0 100% /snap/core18/1988
/dev/loop1          56      56      0 100% /snap/core18/2066
/dev/loop2          219    219      0 100% /snap/gnome-3-34-1804/66
/dev/loop3          65      65      0 100% /snap/gtk-common-themes/1514
/dev/loop4          219    219      0 100% /snap/gnome-3-34-1804/72
/dev/loop5          66      66      0 100% /snap/gtk-common-themes/1515
/dev/loop7          51      51      0 100% /snap/snap-store/542
/dev/loop9          33      33      0 100% /snap/snapd/12057
/dev/sda1           511      1     511   1% /boot/efi
tmpfs             99      1     99   1% /run/user/1000
/dev/loop10          33      33      0 100% /snap/snapd/12159
/dev/loop8           51      51      0 100% /snap/snap-store/547
karthika@karthika-VirtualBox:~$
```

#### 16. du

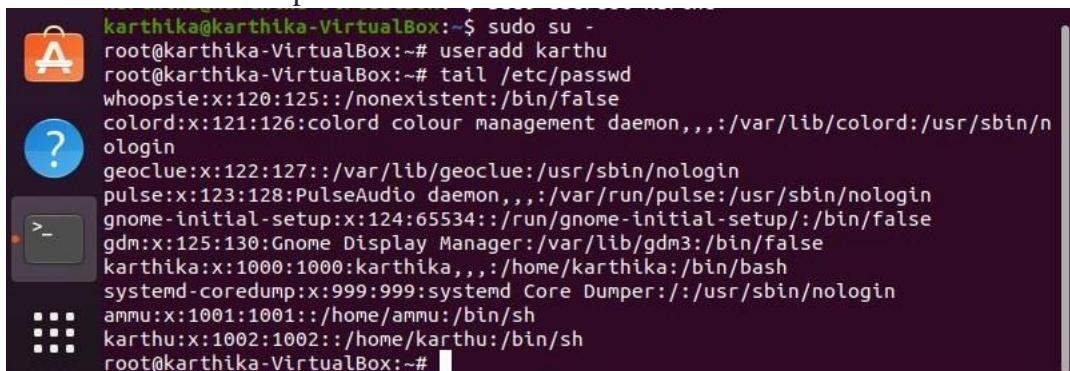
The **du command** is a standard **Linux/Unix command** that allows a user to gain disk usage information quickly. It is best applied to specific directories and allows many variations for customizing the output to meet your needs.



```
karthika@karthika-VirtualBox:~$ du -h
4.0K    ./cache/ibus-table
20K     ./cache/ibus/bus
24K     ./cache/ibus
4.0K     ./cache/evolution/mail/trash
8.0K     ./cache/evolution/mail
4.0K     ./cache/evolution/tasks/trash
8.0K     ./cache/evolution/tasks
4.0K     ./cache/evolution/calendar/trash
8.0K     ./cache/evolution/calendar
4.0K     ./cache/evolution/addressbook/trash
8.0K     ./cache/evolution/addressbook
4.0K     ./cache/evolution/memos/trash
8.0K     ./cache/evolution/memos
4.0K     ./cache/evolution/sources/trash
8.0K     ./cache/evolution/sources
52K      ./cache/evolution
360K    ./cache/gstreamer-1.0
12K     ./cache/update-manager-core
8.0K     ./cache/mesa_shader_cache/c4
8.0K     ./cache/mesa_shader_cache/86
8.0K     ./cache/mesa_shader_cache/79
12K     ./cache/mesa_shader_cache/c8
8.0K     ./cache/mesa_shader_cache/f2
12K     ./cache/mesa_shader_cache/76
12K     ./cache/mesa_shader_cache/87
8.0K     ./cache/mesa_shader_cache/9c
648K    ./local/share
652K    ./local
4.0K     ./music
8.0K     ./config/ibus/bus
12K     ./config/ibus
8.0K     ./config/gedit
84K      ./config/pulse
8.0K     ./config/dconf
16K      ./config/evolution/sources
20K     ./config/evolution
4.0K     ./config/nautilus
4.0K     ./config/enchant
4.0K     ./config/goa-1.0
4.0K     ./config/update-notifier
8.0K     ./config/gtk-3.0
4.0K     ./config/gnome-session/saved-session
8.0K     ./config/gnome-session
180K    ./config
4.0K     ./Music1Newfile
4.0K     ./Music1
4.0K     ./Desktop
4.0K     ./Music12020Newfile
4.0K     ./Documents
4.0K     ./Templates
4.0K     ./Filemca
4.0K     ./Public
9.7M    .
karthika@karthika-VirtualBox:~$
```

## 17. useradd

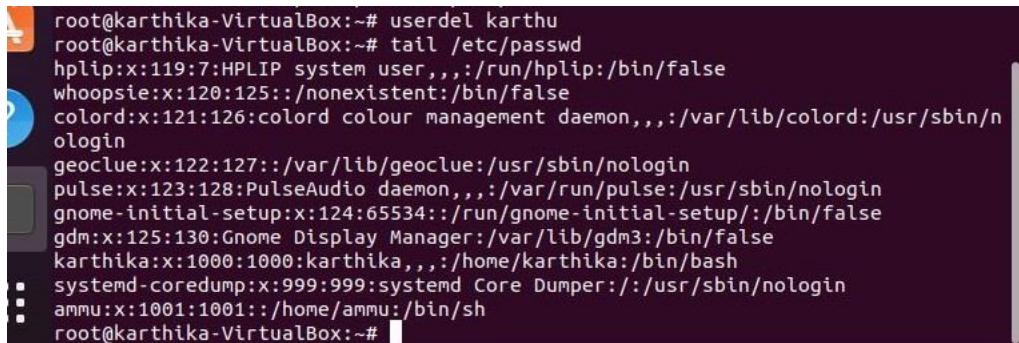
Create a new user or update default new user information.



```
karthika@karthika-VirtualBox:~$ sudo su -
root@karthika-VirtualBox:~# useradd karthu
root@karthika-VirtualBox:~# tail /etc/passwd
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
karthika:x:1000:1000:karthika,,,:/home/karthika:/bin/bash
systemd-coredump:x:999:999:system Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
karthu:x:1002:1002::/home/karthu:/bin/sh
root@karthika-VirtualBox:~#
```

## 18. userdel

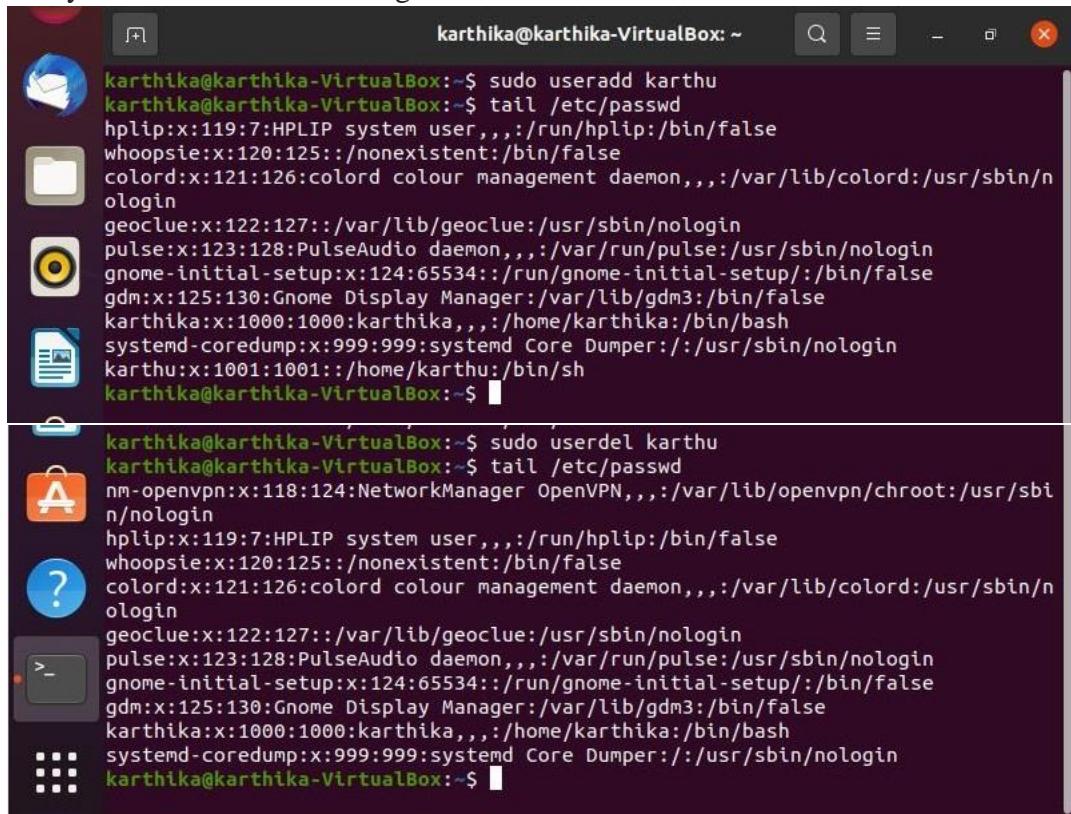
Delete a user account and related files.



```
root@karthika-VirtualBox:~# userdel karthu
root@karthika-VirtualBox:~# tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
karthika:x:1000:1000:karthika,,,:/home/karthika:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
ammu:x:1001:1001::/home/ammu:/bin/sh
root@karthika-VirtualBox:~#
```

## 19. sudo

The sudo command allows you to run programs with the security privileges of another user (by default, as the superuser). It prompts you for your personal password and confirms your request to execute a command by checking a file, called sudoers, which the system administrator configures.



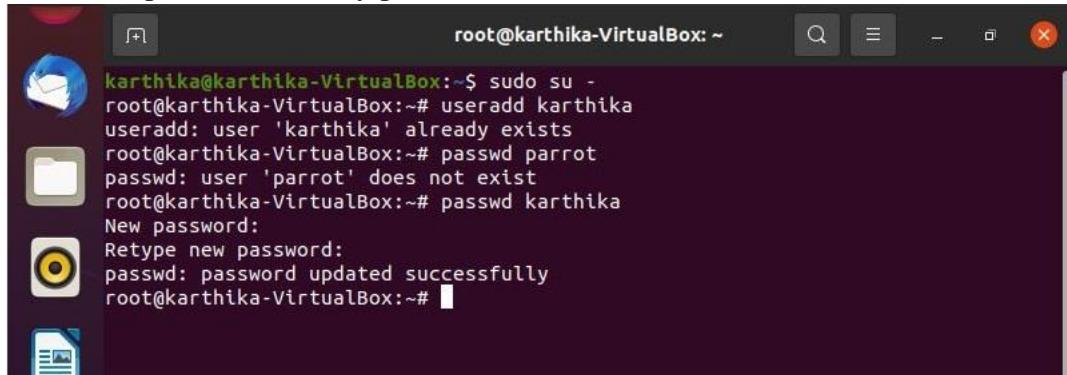
```
karthika@karthika-VirtualBox:~$ sudo useradd karthu
karthika@karthika-VirtualBox:~$ tail /etc/passwd
hplip:x:119:7:HPLIP system user,,,:/run/hplip:/bin/false
whoopsie:x:120:125::/nonexistent:/bin/false
colord:x:121:126:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:127::/var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:128:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
gnome-initial-setup:x:124:65534::/run/gnome-initial-setup/:/bin/false
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false
karthika:x:1000:1000:karthika,,,:/home/karthika:/bin/bash
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin
karthu:x:1001:1001::/home/karthu:/bin/sh
karthika@karthika-VirtualBox:~$
```

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

## 20. passwd

The passwd command changes passwords for user accounts. A normal user may only change the password for their own account, while the superuser may change the password for any account. passwd also changes the account or associated password validity period.



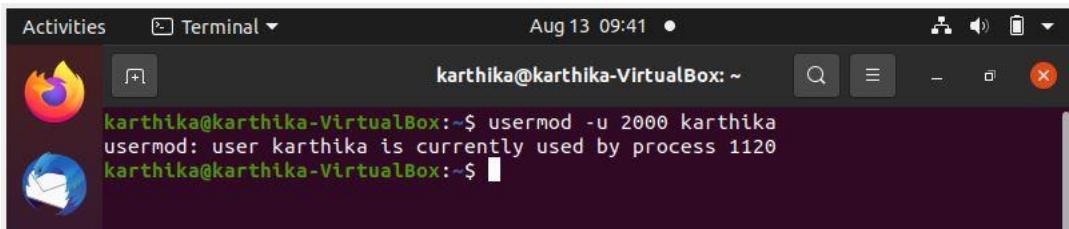
A screenshot of a terminal window titled "root@karthika-VirtualBox: ~". The terminal shows the following command sequence:

```
karthika@karthika-VirtualBox:~$ sudo su -  
root@karthika-VirtualBox:~# useradd karthika  
useradd: user 'karthika' already exists  
root@karthika-VirtualBox:~# passwd parrot  
passwd: user 'parrot' does not exist  
root@karthika-VirtualBox:~# passwd karthika  
New password:  
Retype new password:  
passwd: password updated successfully  
root@karthika-VirtualBox:~#
```

## BASIC LINUX COMMANDS

### 1. usermode

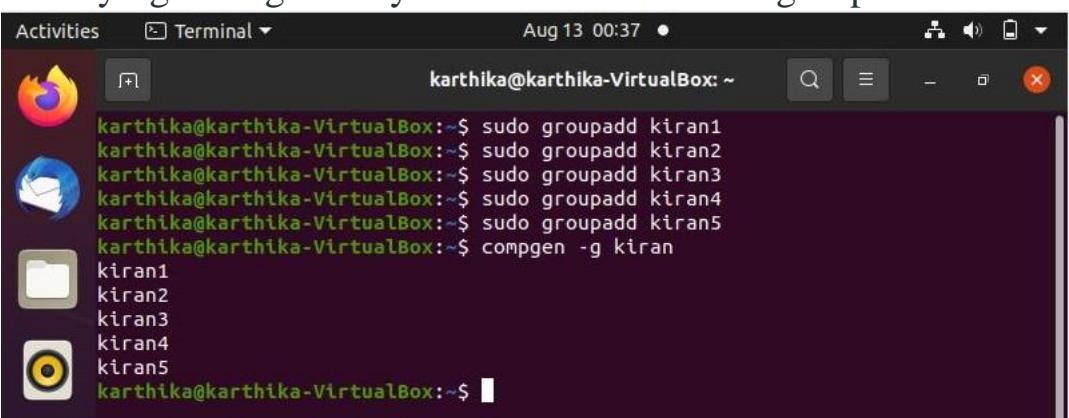
usermod command or modify user is a command in Linux that is used to change the properties of a user in Linux through the command line. After creating a user we have to sometimes change their attributes like password or login directory etc. so in order to do that we use the Usermod command.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Activities Terminal". The date and time are "Aug 13 09:41". The terminal window shows the command "usermod -u 2000 karthika" being run, followed by the message "usermod: user karthika is currently used by process 1120". The terminal prompt is "karthika@kartiha-VirtualBox:~\$".

### 2. groupadd

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.



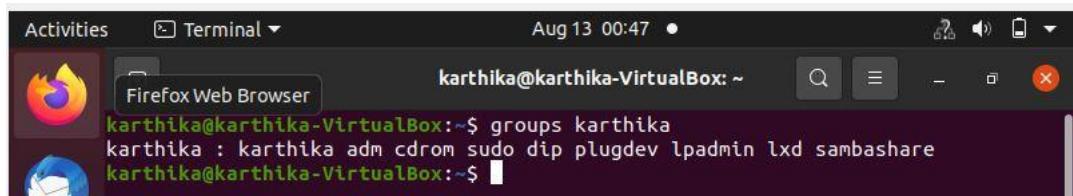
A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Activities Terminal". The date and time are "Aug 13 00:37". The terminal window shows five consecutive commands: "sudo groupadd kirani", "sudo groupadd kiran2", "sudo groupadd kiran3", "sudo groupadd kiran4", and "sudo groupadd kiran5". Below these commands, the terminal lists the new groups: "kirani", "kiran2", "kiran3", "kiran4", and "kiran5". The terminal prompt is "karthika@kartiha-VirtualBox:~\$".

### 3. groups

In linux, there can be multiple users(those who use/operate the system), and groups are nothing but the collection of users. Groups make it easy to manage users with the same security and access privileges. A user can be part of different groups.

## IMPORTANT POINTS:

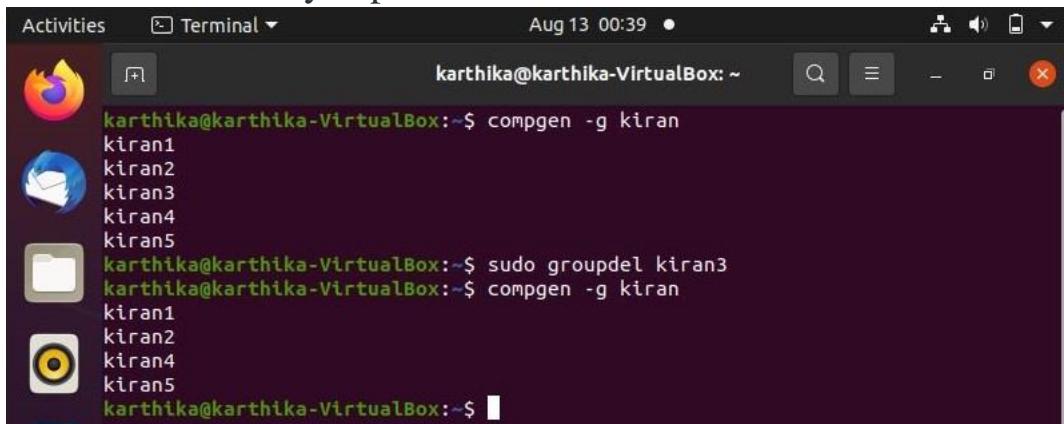
- Groups command prints the names of the primary and any supplementary groups for each given username, or the current process if no names are given.
- If more than one name is given, the name of each user is printed before the list of that user's groups and the username is separated from the group list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



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Aug 13 00:47". The terminal shows the command "groups karthika" being run, followed by the output: "karthika : karthika adm cdrom sudo dip plugdev lpadmin lxd sambashare". There are icons for Firefox and the terminal in the dock.

## 4. groupdel

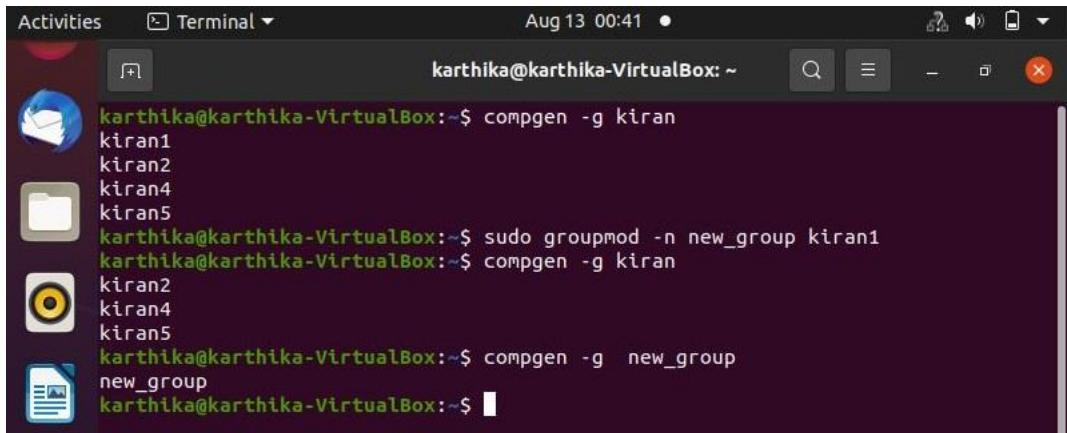
*groupdel* command is used to delete a existing group. It will delete all entry that refers to the group, modifies the system account files, and it is handled by superuser or root user.



A screenshot of a Linux desktop environment showing a terminal window. The terminal title is "Terminal". The date and time are "Aug 13 00:39". The terminal shows the command "sudo groupdel kiran3" being run, followed by the output: "kiran1", "kiran2", "kiran3", "kiran4", "kiran5". There are icons for Firefox, the terminal, and a file folder in the dock.

## 5. groupmod

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

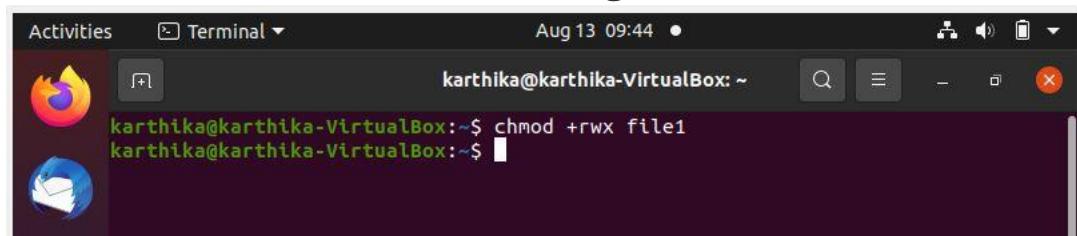


```
Activities Terminal Aug 13 00:41 karthika@karthika-VirtualBox:~$ compgen -g kiran
kiran1
kiran2
kiran4
kiran5
karthika@karthika-VirtualBox:~$ sudo groupmod -n new_group kiran1
karthika@karthika-VirtualBox:~$ compgen -g kiran
kiran2
kiran4
kiran5
karthika@karthika-VirtualBox:~$ compgen -g new_group
new_group
karthika@karthika-VirtualBox:~$
```

## 6. chmod

In Unix-like operating systems, the **chmod** command is used to change the access mode of a file.

The name is an abbreviation of **change mode**.



```
Activities Terminal Aug 13 09:44 karthika@karthika-VirtualBox:~$ chmod +rwx file1
karthika@karthika-VirtualBox:~$
```

## 7. chown

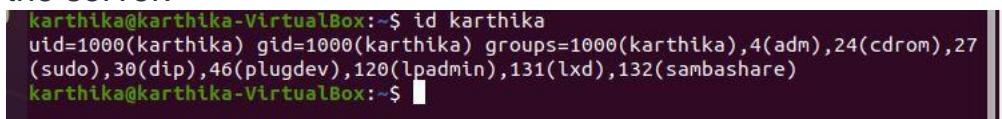
**chown** command is used to change the file Owner or group. Whenever you want to change ownership you can use **chown** command.



```
karthika@karthika-VirtualBox:~$ chown karthika fruits
karthika@karthika-VirtualBox:~$
```

## 8. id

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

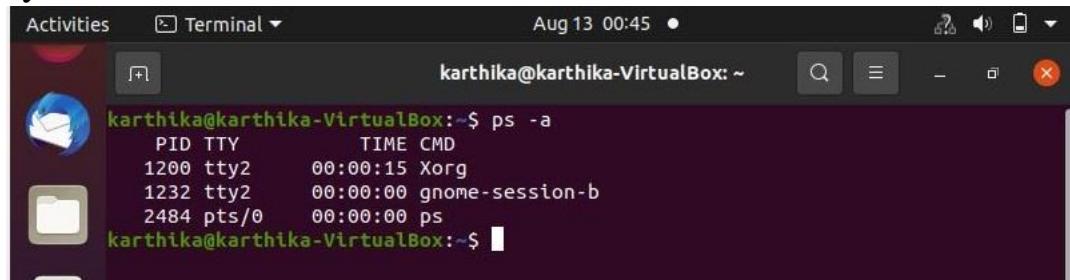


```
karthika@karthika-VirtualBox:~$ id karthika
uid=1000(karthika) gid=1000(karthika) groups=1000(karthika),4(adm),24(cdrom),27
(sudo),30(dip),46(plugdev),120(lpadmin),131(lxd),132(sambashare)
karthika@karthika-VirtualBox:~$
```

## 9. ps

Abbreviation for “**Process Status**”. **ps** command is used to list the currently running processes and their PIDs along with some other information depends on different options. It reads the process information from the virtual files in **/proc** file-system. **/proc**

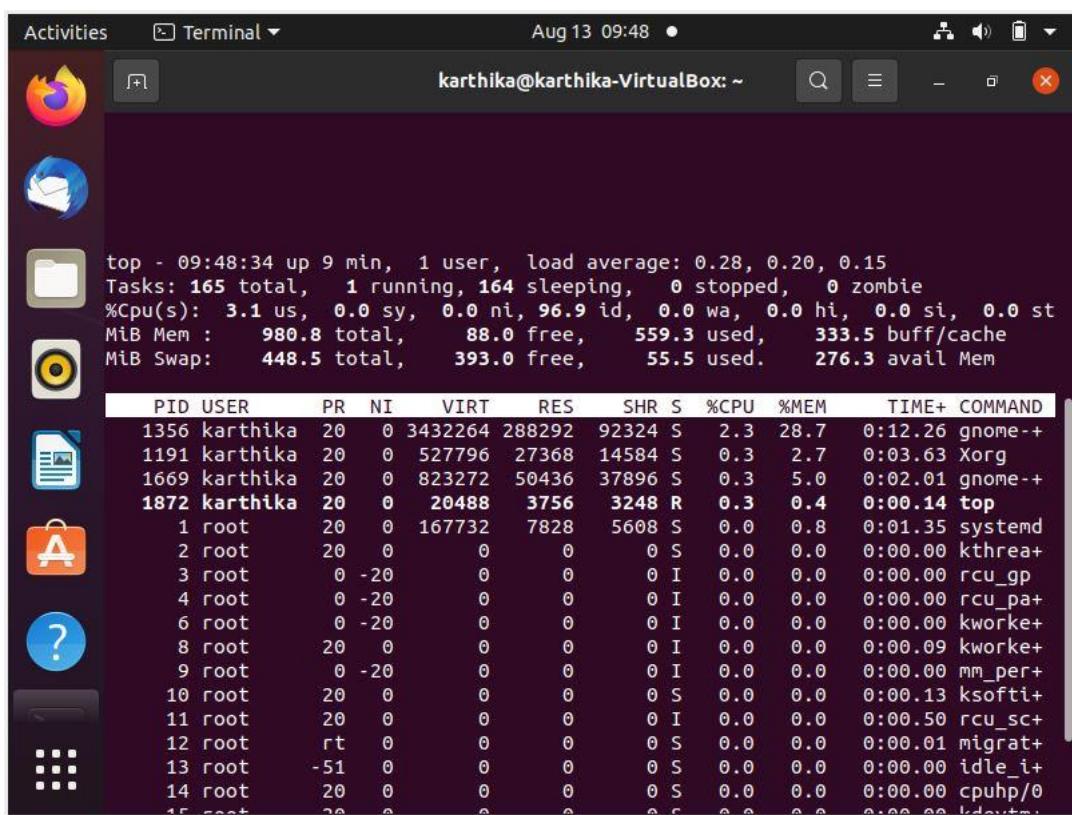
contains virtual files, this is the reason it's referred as a virtual file system.



```
Activities Terminal Aug 13 00:45 •
karthika@karthika-VirtualBox:~$ ps -a
 PID TTY      TIME CMD
 1200 tty2    00:00:15 Xorg
 1232 tty2    00:00:00 gnome-session-b
 2484 pts/0   00:00:00 ps
karthika@karthika-VirtualBox:~$
```

## 10. top

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



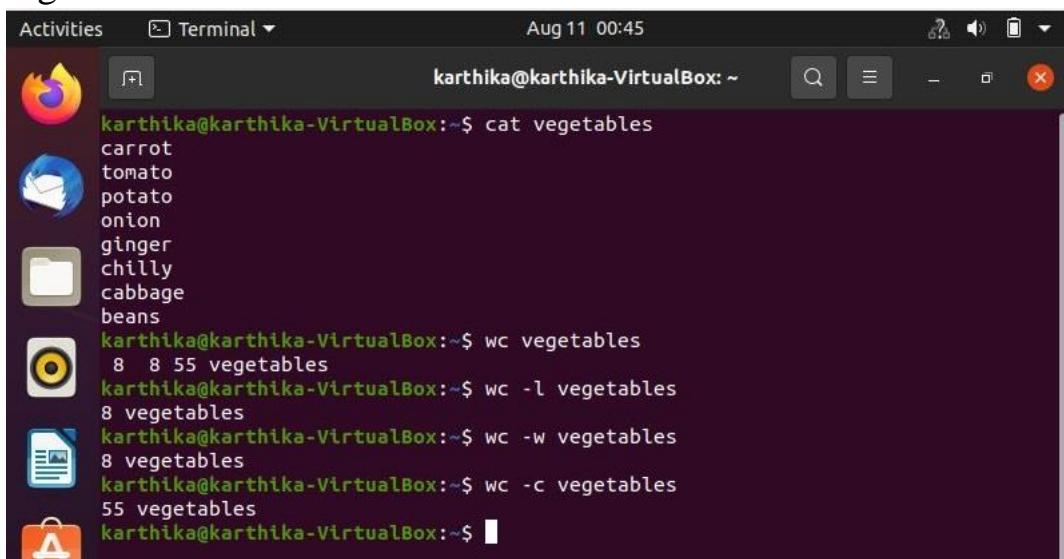
```
Activities Terminal Aug 13 09:48 •
karthika@karthika-VirtualBox:~$ top - 09:48:34 up 9 min,  1 user,  load average: 0.28, 0.20, 0.15
Tasks: 165 total,  1 running, 164 sleeping,  0 stopped,  0 zombie
%Cpu(s):  3.1 us,  0.0 sy,  0.0 ni, 96.9 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  980.8 total,     88.0 free,   559.3 used,   333.5 buff/cache
MiB Swap:  448.5 total,    393.0 free,     55.5 used.   276.3 avail Mem

          PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM TIME+ COMMAND
 1356 karthika  20   0 3432264 288292  92324 S  2.3 28.7  0:12.26 gnome-
 1191 karthika  20   0 527796  27368 14584 S  0.3  2.7  0:03.63 Xorg
 1669 karthika  20   0 823272  50436 37896 S  0.3  5.0  0:02.01 gnome-
 1872 karthika  20   0  20488  3756  3248 R  0.3  0.4  0:00.14 top
  1 root     20   0 167732   7828  5608 S  0.0  0.8  0:01.35 systemd
  2 root     20   0      0      0      0 S  0.0  0.0  0:00.00 kthrea+
  3 root     0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_gp
  4 root     0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_pa+
  6 root     0 -20      0      0      0 I  0.0  0.0  0:00.00 kworker+
  8 root     20   0      0      0      0 I  0.0  0.0  0:00.09 kworker+
  9 root     0 -20      0      0      0 I  0.0  0.0  0:00.00 mm_per+
 10 root    20   0      0      0      0 S  0.0  0.0  0:00.13 ksoftti+
 11 root    20   0      0      0      0 I  0.0  0.0  0:00.50 rcu_sc+
 12 root    rt   0      0      0      0 S  0.0  0.0  0:00.01 migrat+
 13 root   -51   0      0      0      0 S  0.0  0.0  0:00.00 idle_i+
 14 root    20   0      0      0      0 S  0.0  0.0  0:00.00 cpuhp/0
 15 root    20   0      0      0      0 S  0.0  0.0  0:00.00 kdevtmpf
```

## BASIC LINUX COMMANDS

### 1. wc

wc stands for **word count**. As the name implies, it is mainly used for counting purpose. It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "Terminal". The terminal content shows the following session:

```
Activities Terminal Aug 11 00:45
karthika@karthika-VirtualBox:~$ cat vegetables
carrot
tomato
potato
onion
ginger
chilly
cabbage
beans
karthika@karthika-VirtualBox:~$ wc vegetables
 8 8 55 vegetables
karthika@karthika-VirtualBox:~$ wc -l vegetables
8 vegetables
karthika@karthika-VirtualBox:~$ wc -w vegetables
8 vegetables
karthika@karthika-VirtualBox:~$ wc -c vegetables
55 vegetables
karthika@karthika-VirtualBox:~$
```

### 2. tar

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

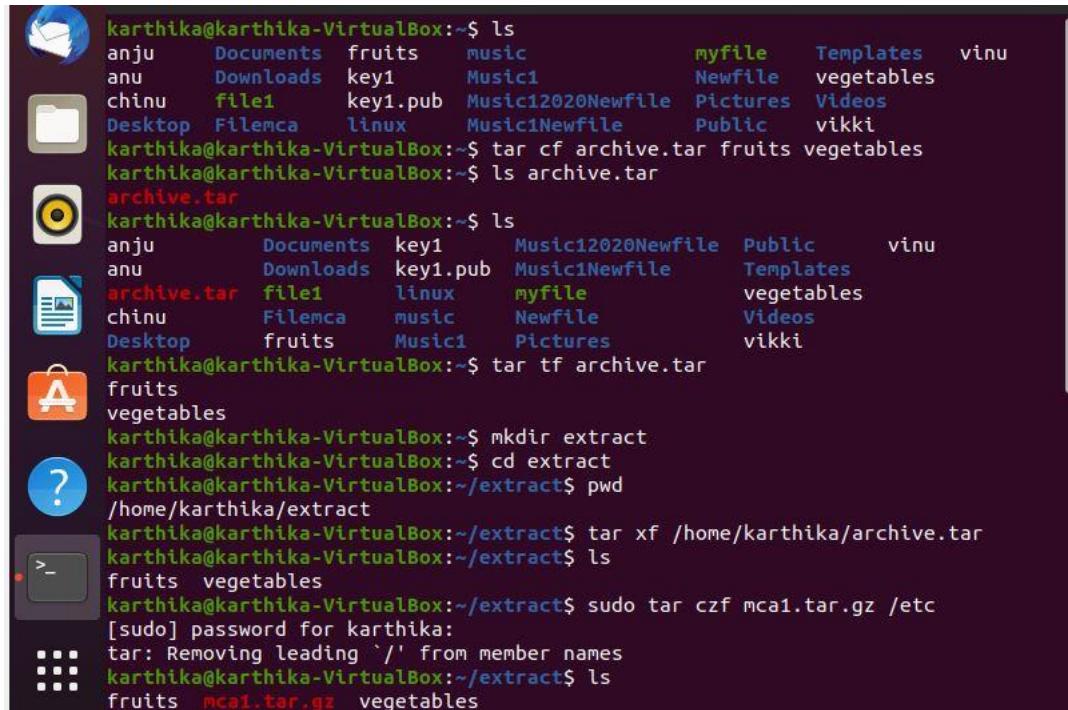
#### **OPTIONS:**

- c : Creates Archive
- x : Extract the archive
- f : creates archive with given filename
- t : displays or lists files in archived file
- u : archives and adds to an existing archive file
- v : Displays Verbose Information
- A : Concatenates the archive files
- z : zip, tells tar command that creates tar file using gzip
- j : filter archive tar file using tbzip

**-W** : Verify a archive file

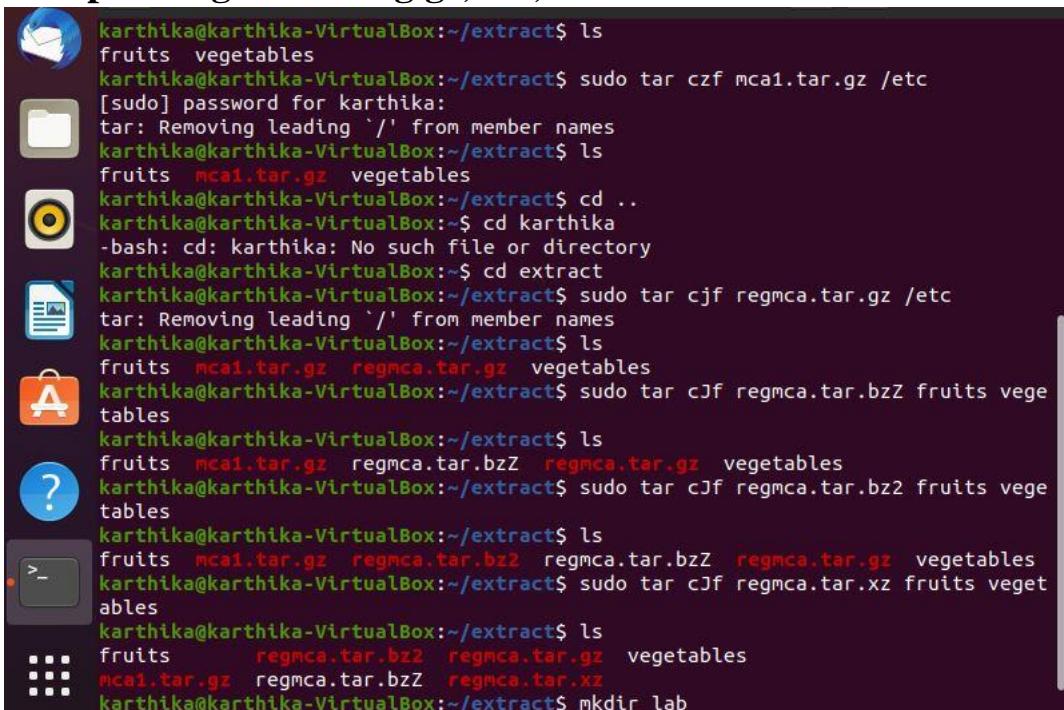
**-r** : update or add file or directory in already existed .tar file

## Tar command



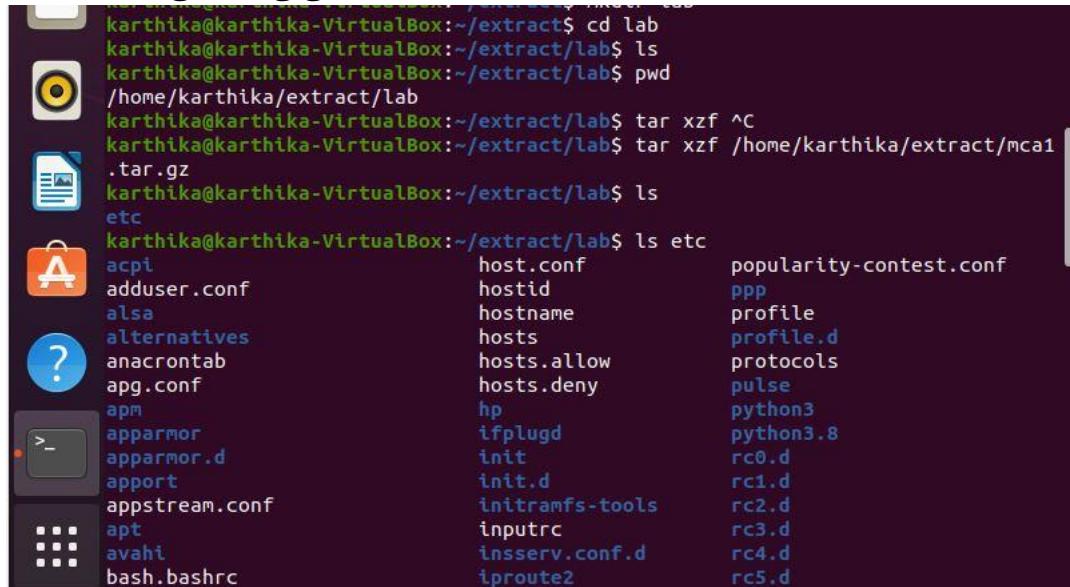
```
karthika@karthika-VirtualBox:~$ ls
anju    Documents  fruits   music      myfile  Templates  vinu
anu     Downloads  key1    Music1    Newfile  vegetables
chinu   file1     key1.pub  Music12020Newfile Pictures  Videos
Desktop  Filemca  linux   Music1Newfile  Public   vikki
karthika@karthika-VirtualBox:~$ tar cf archive.tar fruits vegetables
karthika@karthika-VirtualBox:~$ ls archive.tar
archive.tar
karthika@karthika-VirtualBox:~$ ls
anju    Documents  key1    Music12020Newfile  Public   vinu
anu     Downloads  key1.pub  Music1Newfile   Templates
archive.tar  file1     linux   myfile        vegetables
chinu   Filemca  music   Newfile       Videos
Desktop  fruits   Music1  Pictures      vikki
fruits
vegetables
karthika@karthika-VirtualBox:~$ mkdir extract
karthika@karthika-VirtualBox:~$ cd extract
karthika@karthika-VirtualBox:~/extract$ pwd
/home/karthika/extract
karthika@karthika-VirtualBox:~/extract$ tar xf /home/karthika/archive.tar
karthika@karthika-VirtualBox:~/extract$ ls
fruits  vegetables
karthika@karthika-VirtualBox:~/extract$ sudo tar czf mca1.tar.gz /etc
[sudo] password for karthika:
tar: Removing leading '/' from member names
karthika@karthika-VirtualBox:~/extract$ ls
fruits  mca1.tar.gz  vegetables
```

## Compressing files using gz,bz2, xz



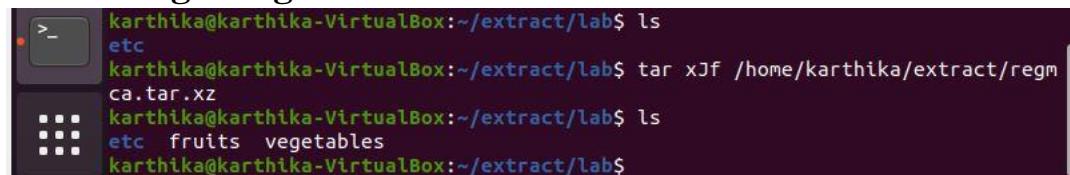
```
karthika@karthika-VirtualBox:~/extract$ ls
fruits  vegetables
karthika@karthika-VirtualBox:~/extract$ sudo tar czf mca1.tar.gz /etc
[sudo] password for karthika:
tar: Removing leading '/' from member names
karthika@karthika-VirtualBox:~/extract$ ls
fruits  mca1.tar.gz  vegetables
karthika@karthika-VirtualBox:~/extract$ cd ..
karthika@karthika-VirtualBox:~$ cd karthika
-bash: cd: karthika: No such file or directory
karthika@karthika-VirtualBox:~$ cd extract
karthika@karthika-VirtualBox:~/extract$ sudo tar cJf regmca.tar.gz /etc
tar: Removing leading '/' from member names
karthika@karthika-VirtualBox:~/extract$ ls
fruits  mca1.tar.gz  regmca.tar.gz  vegetables
karthika@karthika-VirtualBox:~/extract$ sudo tar cJf regmca.tar.bzz fruits vegetables
karthika@karthika-VirtualBox:~/extract$ ls
fruits  mca1.tar.gz  regmca.tar.bzz  regmca.tar.gz  vegetables
karthika@karthika-VirtualBox:~/extract$ sudo tar cJf regmca.tar.bzz fruits vegetables
karthika@karthika-VirtualBox:~/extract$ ls
fruits  regmca.tar.bzz  regmca.tar.gz  vegetables
mca1.tar.gz  regmca.tar.bzz  regmca.tar.xz
karthika@karthika-VirtualBox:~/extract$ mkdir lab
```

## Extracting using gz



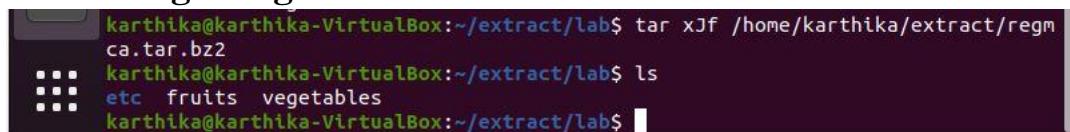
```
karthika@karthika-VirtualBox:~/extract$ cd lab
karthika@karthika-VirtualBox:~/extract/lab$ ls
karthika@karthika-VirtualBox:~/extract/lab$ pwd
/home/karthika/extract/lab
karthika@karthika-VirtualBox:~/extract/lab$ tar xzf ^C
karthika@karthika-VirtualBox:~/extract/lab$ tar xzf /home/karthika/extract/mca1
.tar.gz
karthika@karthika-VirtualBox:~/extract/lab$ ls
etc
karthika@karthika-VirtualBox:~/extract/lab$ ls etc
acpi host.conf popularity-contest.conf
adduser.conf hostid ppp
alsa hostname profile
alternatives hosts protocols
anacrontab hosts.allow pulse
apg.conf hosts.deny python3
apm hp python3.8
apparmor ifplugd rc0.d
apparmor.d init rc1.d
apport init.d rc2.d
appstream.conf initramfs-tools rc3.d
apt inputrc rc4.d
avahi inserv.conf.d rc5.d
bash.bashrc iproute2
```

## Extracting using xz



```
karthika@karthika-VirtualBox:~/extract/lab$ ls
etc
karthika@karthika-VirtualBox:~/extract/lab$ tar xJf /home/karthika/extract/regm
ca.tar.xz
karthika@karthika-VirtualBox:~/extract/lab$ ls
etc fruits vegetables
karthika@karthika-VirtualBox:~/extract/lab$
```

## Extracting using bz2

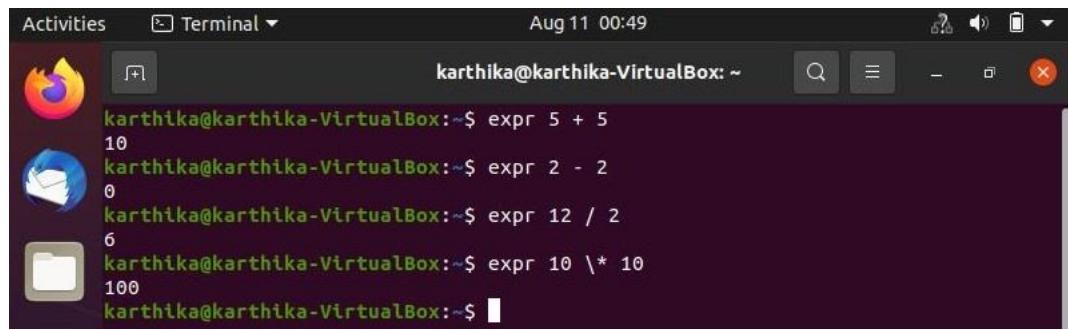


```
karthika@karthika-VirtualBox:~/extract/lab$ tar xJf /home/karthika/extract/regm
ca.tar.bz2
karthika@karthika-VirtualBox:~/extract/lab$ ls
etc fruits vegetables
karthika@karthika-VirtualBox:~/extract/lab$
```

## 3. expr

The **expr** command in Unix evaluates a given expression and displays its corresponding output.

- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.

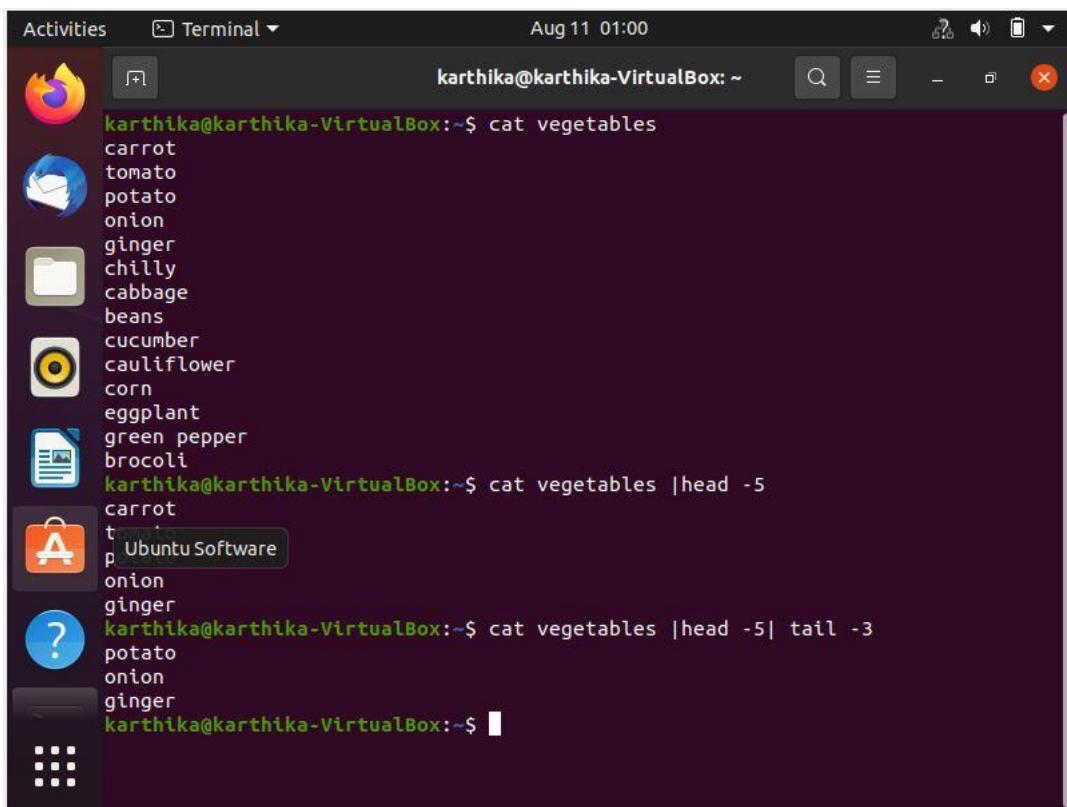


A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, and other applications. A terminal window is open in the center, titled 'Terminal'. The terminal shows the user 'karthika' at 'karthika@karthika-VirtualBox'. The user has run several commands: 'expr 5 + 5' (output: 10), 'expr 2 - 2' (output: 0), 'expr 12 / 2' (output: 6), and 'expr 10 \\* 10' (output: 100). The terminal window has a dark theme.

```
Activities Terminal Aug 11 00:49
karthika@karthika-VirtualBox:~$ expr 5 + 5
10
karthika@karthika-VirtualBox:~$ expr 2 - 2
0
karthika@karthika-VirtualBox:~$ expr 12 / 2
6
karthika@karthika-VirtualBox:~$ expr 10 \* 10
100
karthika@karthika-VirtualBox:~$
```

## 4. redirection and piping

Pipe is used to combine two or more commands, and in this, the output of one command acts as input to another command, and this command's output may act as input to the next command and so on.



A screenshot of an Ubuntu desktop environment. The terminal window shows the user 'karthika' at 'karthika@karthika-VirtualBox'. The user runs 'cat vegetables', which lists various vegetables: carrot, tomato, potato, onion, ginger, chilly, cabbage, beans, cucumber, cauliflower, corn, eggplant, green pepper, and broccoli. Then, the user runs 'cat vegetables | head -5', which outputs only the first five items: carrot, onion, ginger, potato, and onion. Finally, the user runs 'cat vegetables | head -5 | tail -3', which outputs the last three items from the first five: onion, ginger, and potato. The terminal window has a dark theme.

```
Activities Terminal Aug 11 01:00
karthika@karthika-VirtualBox:~$ cat vegetables
carrot
tomato
potato
onion
ginger
chilly
cabbage
beans
cucumber
cauliflower
corn
eggplant
green pepper
brocoli
karthika@karthika-VirtualBox:~$ cat vegetables |head -5
carrot
onion
ginger
potato
onion
karthika@karthika-VirtualBox:~$ cat vegetables |head -5| tail -3
potato
onion
ginger
karthika@karthika-VirtualBox:~$
```

## 5. ssh

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

```
sshd:  
karthika@karthika-VirtualBox:~$ sudo apt install openssh-client  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Suggested packages:  
  keychain libpam-ssh monkeysphere ssh-askpass  
The following packages will be upgraded:  
  openssh-client  
1 upgraded, 0 newly installed, 0 to remove and 207 not upgraded.  
Need to get 671 kB of archives.  
After this operation, 0 B of additional disk space will be used.  
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-clie  
nt amd64 1:8.2p1-4ubuntu0.2 [671 kB]  
Fetched 671 kB in 33s (20.6 kB/s)  
(Reading database ... 182841 files and directories currently installed.)  
Preparing to unpack .../openssh-client_1%3a8.2p1-4ubuntu0.2_amd64.deb ...  
Unpacking openssh-client (1:8.2p1-4ubuntu0.2) over (1:8.2p1-4ubuntu0.1) ...  
Setting up openssh-client (1:8.2p1-4ubuntu0.2) ...  
Processing triggers for man-db (2.9.1-1) ...  
karthika@karthika-VirtualBox:~$ ssh localhost  
ssh: connect to host localhost port 22: Connection refused  
karthika@karthika-VirtualBox:~$ sudo apt install openssh-server ii  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  ncurses-term openssh-sftp-server ssh-import-id
```

```
Processing triggers for man-db (2.9.1-1) ...  
Processing triggers for ufw (0.36-6) ...  
karthika@karthika-VirtualBox:~$ ssh localhost  
The authenticity of host 'localhost (127.0.0.1)' can't be established.  
ECDSA key fingerprint is SHA256:aJjVI5b5yndlMao45W/AVc77H0Wj6gLh+56vljPT4z8.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? y  
Please type 'yes', 'no' or the fingerprint: yes  
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.  
karthika@localhost's password:  
Welcome to Ubuntu 20.04.2 LTS (GNU/Linux 5.8.0-53-generic x86_64)  
  
 * Documentation:  https://help.ubuntu.com  
 * Management:    https://landscape.canonical.com  
 * Support:       https://ubuntu.com/advantage  
  
196 updates can be installed immediately.  
88 of these updates are security updates.  
To see these additional updates run: apt list --upgradable  
  
Your Hardware Enablement Stack (HWE) is supported until April 2025.  
  
The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/*copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
karthika@karthika-VirtualBox:~$
```

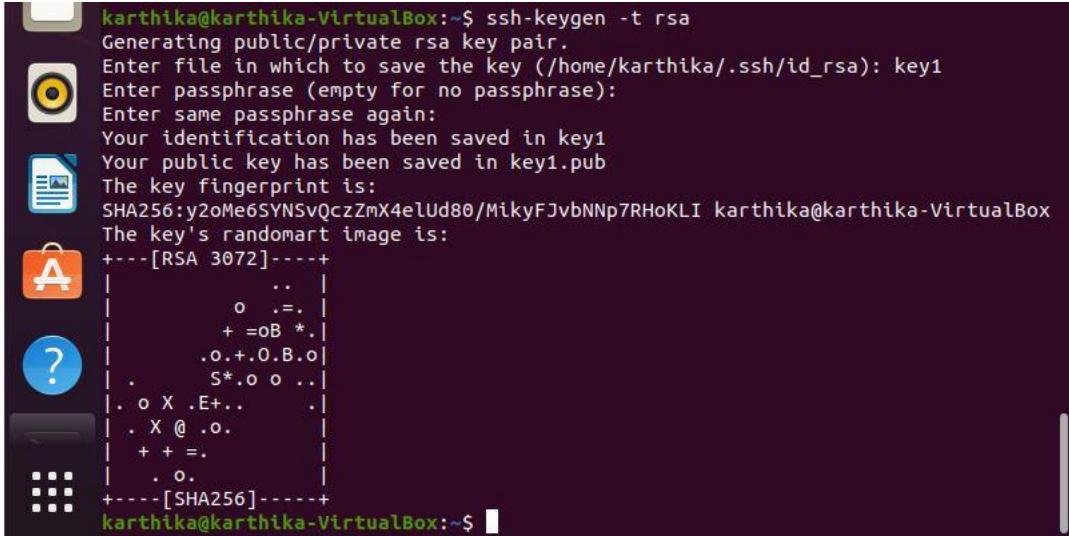
## 6. scp

**scp** (secure copy) command in Linux system is used to copy file(s) between servers in a secure way.

## 7. ssh-keygen

Use the **ssh-keygen** command to generate a public/private authentication key pair. Authentication keys allow a user to connect

to a remote system without supplying a password. Keys must be generated for each user separately. If you generate key pairs as the root user, only the root can use the keys.



```
karthika@karthika-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/karthika/.ssh/id_rsa): key1
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in key1
Your public key has been saved in key1.pub
The key fingerprint is:
SHA256:y2oMe6SYNSvQczZmX4elUd80/MikyFJvbNNp7RHoKLI karthika@karthika-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
|          .. |
|          o .=. |
|          + =oB * |
|          .o.+.0.B.o |
|          . S*.o o .. |
| . o X .E+.. . |
| . X @ .o. |
| + + =. |
| . o. |
+---[SHA256]-----+
karthika@karthika-VirtualBox:~$
```

## 8. 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 passwordless, automatic login process.
- The ssh-copy-id command is part of OpenSSH, a tool for performing remote system administrations using encrypted SSH connections.

## NETWORK COMMANDS

### Q1. Ping, route, traceroute, nslookup, IpConfig, NetStat LINUX

#### 1. Ping

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

```
karthika@karthika-VirtualBox:~$ ping www.facebook.com
PING star-mini.c10r.facebook.com (157.240.239.35) 56(84) bytes of data.
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=1 ttl=56 time=432 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=2 ttl=56 time=59.5 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=3 ttl=56 time=63.4 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=4 ttl=56 time=70.4 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=5 ttl=56 time=648 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=6 ttl=56 time=270 ms
64 bytes from edge-star-mini-shv-02-del1.facebook.com (157.240.239.35): icmp_se
q=7 ttl=56 time=61.3 ms
```

#### 2. Traceroute

Traceroute is a network diagnostic tool used to track in real-time the pathway taken by a packet on an IP network from source to destination, reporting the IP addresses of all the routers it pinged in between.

Traceroute also records the time taken for each hop the packet makes during its route to the destination.

The difference between **tracert(windows)** and **traceroute(linux)** is that: tracert(windows) will only use ICMP echo requests. traceroute(linux) [and somewhat dependent on linux distro] default to UDP echo requests.

```
karthika@karthika-VirtualBox:~$ traceroute www.facebook.com
traceroute to www.facebook.com (157.240.239.35), 30 hops max, 60 byte packets
1 _gateway (10.0.2.2) 0.611 ms 0.440 ms 0.374 ms
2 _gateway (10.0.2.2) 718.712 ms 720.560 ms 721.397 ms
karthika@karthika-VirtualBox:~$
```

### 3. Nslookup

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

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

Non-authoritative answer:
Name:   google.com
Address: 142.250.193.46
Name:   google.com
Address: 2404:6800:4002:820::200e
```

### 4. netstat -l

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

```
karthika@karthika-VirtualBox:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp     0      0 localhost:domain        0.0.0.0:*
tcp     0      0 0.0.0.0:ssh           0.0.0.0:*
tcp     0      0 localhost:ipp          0.0.0.0:*
tcp6    0      0 [::]:http            [::]:*
tcp6    0      0 [::]:ssh             [::]:*
tcp6    0      0 ip6-localhost:ipp    [::]:*
udp     0      0 0.0.0.0:41430       0.0.0.0:*
udp     0      0 localhost:domain       0.0.0.0:*
udp     0      0 0.0.0.0:631         0.0.0.0:*
udp     0      0 0.0.0.0:mdns        0.0.0.0:*
udp6    0      0 [::]:50723          [::]:*
udp6    0      0 [::]:mdns           [::]:*
raw6   0      0 [::]:ipv6-icmp      [::]:*
```

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### 5. route

The route command allows **you to make manual entries into the network routing tables**. The route command distinguishes between routes to hosts and routes to networks by interpreting the network address of the Destination variable, which can be specified either by symbolic name or numeric address.

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

## 6. ipconfig

- ipconfig (standing for "Internet Protocol configuration") is a console application program of some computer operating systems that displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings.
- Ifconfig (interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.
- The ifconfig command is supported by Unix-based operating systems. Functionality: The ipconfig command **displays all the currently connected network interfaces whether they are active or not**. On the other hand, the ifconfig command displays only the enabled network interfaces that are connected to the system.

```
karthika@karthika-VirtualBox:~$ sudo ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
        inet6 fe80::f97a:418c:23fe:52e9 prefixlen 64 scopeid 0x20<link>
          ether 08:00:27:cf:0b:55 txqueuelen 1000 (Ethernet)
            RX packets 1949 bytes 1315345 (1.3 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1410 bytes 148069 (148.0 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 473 bytes 38180 (38.1 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 473 bytes 38180 (38.1 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
karthika@karthika-VirtualBox:~$
```

## **WINDOWS**

### **1. ping**

```
Command Prompt
C:\Users\Vikrant Pillai>ping www.facebook.com

Pinging star-mini.c10r.facebook.com [157.240.239.35] with 32 bytes of data:
Reply from 157.240.239.35: bytes=32 time=62ms TTL=57
Reply from 157.240.239.35: bytes=32 time=86ms TTL=57
Reply from 157.240.239.35: bytes=32 time=116ms TTL=57
Reply from 157.240.239.35: bytes=32 time=59ms TTL=57

Ping statistics for 157.240.239.35:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 116ms, Average = 80ms

C:\Users\Vikrant Pillai>
```

### **2. route**

```
Command Prompt
C:\Users\Vikrant Pillai>route www.facebook.com

Manipulates network routing tables.

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

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

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

  -4           Force using IPv4.

  -6           Force using IPv6.
```

### 3. tracert

```
Command Prompt  
C:\Users\Vikrant Pillai>tracert www.facebook.com  
  
Tracing route to star-mini.c10r.facebook.com [157.240.239.35]  
over a maximum of 30 hops:  
  
 1      2 ms      1 ms      3 ms  192.168.0.1  
 2      59 ms     60 ms     60 ms  172.26.192.1  
 3      *         *         *      Request timed out.  
 4    131 ms    202 ms    59 ms  cache.google.com [112.196.151.1]  
 5    414 ms     64 ms   133 ms  ae12.pr04.del1.tfbnw.net [157.240.76.144]  
 6     65 ms     61 ms    61 ms  po104.psw03.del1.tfbnw.net [157.240.50.157]  
 7     59 ms     59 ms    62 ms  157.240.36.75  
 8     68 ms     61 ms    60 ms  edge-star-mini-shv-02-del1.facebook.com [157.240.239.35]  
  
Trace complete.
```

### 4. netstat

```
Command Prompt  
C:\Users\Vikrant Pillai>netstat -a  
  
Active Connections  
  
Proto  Local Address          Foreign Address        State  
TCP    0.0.0.0:135           LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:445           LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:808           LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:5040          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:5357          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:6646          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:9001          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:17500          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:49664          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:49665          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:49666          LAPTOP-22B199CS:0  LISTENING  
TCP    0.0.0.0:49667          LAPTOP-22B199CS:0  LISTENING
```

## 5. ipconfig

```
cmd Command Prompt
C:\Users\Vikrant Pillai>
C:\Users\Vikrant Pillai>ipconfig

Windows IP Configuration

Unknown adapter Local Area Connection:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

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

Ethernet adapter Ethernet 3:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
```

## 6. nslookup

```
cmd Command Prompt
Microsoft Windows [Version 10.0.19042.1165]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Vikrant Pillai>nslookup google.com
Server: UnKnown
Address: 192.168.0.1

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4002:81a::200e
           142.250.193.46

C:\Users\Vikrant Pillai>
```

## **Q2. Identify and perform 5 more network commands**

### **1. hostname**

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

```
C:\Users\Vikrant Pillai>hostname  
LAPTOP-22B199CS
```

### **2. getmac**

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

```
C:\Users\Vikrant Pillai>getmac  
  
Physical Address      Transport Name  
=====  =====  
E6-0D-C7-EB-5F-F4  \Device\Tcpip_{C29ED2C4-ADBC-427F-805D-A406B801D2EE}  
B4-A9-FC-D2-BD-35  Media disconnected  
34-2E-B7-60-A2-9C  Media disconnected  
00-FF-05-71-82-2E  Media disconnected  
00-FF-83-C2-52-CE  Media disconnected  
0A-00-27-00-00-11  \Device\Tcpip_{B0251EC1-2DFD-461A-87F6-F1F3E128F124}  
  
C:\Users\Vikrant Pillai>
```

### 3. arp

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

```
C:\Users\Vikrant Pillai>arp -a

Interface: 192.168.56.1 --- 0x11
  Internet Address      Physical Address      Type
  192.168.56.255        ff-ff-ff-ff-ff-ff    static
  224.0.0.2              01-00-5e-00-00-02    static
  224.0.0.22             01-00-5e-00-00-16    static
  224.0.0.251            01-00-5e-00-00-fb    static
  224.0.0.252            01-00-5e-00-00-fc    static
  239.255.255.250        01-00-5e-7f-ff-fa    static
  255.255.255.255        ff-ff-ff-ff-ff-ff    static

Interface: 192.168.138.248 --- 0x14
  Internet Address      Physical Address      Type
  192.168.138.244        76-5e-8f-c1-ec-34    dynamic
  192.168.138.255        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

C:\Users\Vikrant Pillai>hostname
```

### 4. nbtstat

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

```
C:\Users\Vikrant Pillai>nbtstat -r

  NetBIOS Names Resolution and Registration Statistics
  -----
  Resolved By Broadcast      = 0
  Resolved By Name Server   = 0

  Registered By Broadcast   = 1012
  Registered By Name Server = 0
```

## 5. path ping

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

```
C:\Users\Vikrant Pillai>pathping www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f168:81:face:b00c:0:25de]
over a maximum of 30 hops:
  0  LAPTOP-22B199CS [2402:3a80:1e69:1d00:28e0:307e:5c4:7528]
  1  2402:3a80:1e69:1d00::64
  2  2403:8100:20:5::3f
  3  *       *       *

Computing statistics for 50 seconds...
      Source to Here   This Node/Link
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address
  0          3/ 100 =  3%    |          LAPTOP-22B199CS [2402:3a80:1e69:1d00:28e0:307e:5c4:7528]
  1  11ms    5/ 100 =  5%    2/ 100 =  2%  2402:3a80:1e69:1d00::64
                                         0/ 100 =  0%    |
  2  71ms    3/ 100 =  3%    0/ 100 =  0%  2403:8100:20:5::3f

Trace complete.
```

# LAMP INSTALLATION STEPS

## 1. Install Apache

### Update your system

#### a. sudo apt update

```
karthika@karthika-VirtualBox:~$ sudo apt update
[sudo] password for karthika:
Hit:1 http://in.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,253 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [543 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [264 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [283 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu focal-updates/main DEP-11 48x48 Icons [60.3 kB]
Get:10 http://in.archive.ubuntu.com/ubuntu focal-updates/main DEP-11 64x64 Icons [94.8 kB]
Get:11 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [14.3 kB]
Get:12 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [482 kB]
Get:13 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted i386 Packages [19.3 kB]
Get:14 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [69.1 kB]
Get:15 http://in.archive.ubuntu.com/ubuntu focal-updates/restricted amd64 c-n-f Metadata [504 B]
Get:16 http://in.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Package
```

### Install Apache using apt:

#### b. sudo apt install apache2

```
karthika@karthika-VirtualBox:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following packages will be upgraded:
  apache2 apache2-bin apache2-data apache2-utils
4 upgraded, 0 newly installed, 0 to remove and 334 not upgraded.
Need to get 1,518 kB of archives.
After this operation, 4,096 B of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2 amd64 2.4.41-4ubuntu3.5 [95.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-bin amd64 2.4.41-4ubuntu3.5 [1,180 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-data all 2.4.41-4ubuntu3.5 [159 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 apache2-utils amd64 2.4.41-4ubuntu3.5 [84.2 kB]
Fetched 1,518 kB in 1s (1,358 kB/s)
(Reading database ... 186473 files and directories currently installed.)
Preparing to unpack .../apache2_2.4.41-4ubuntu3.5_amd64.deb ...
Unpacking apache2 (2.4.41-4ubuntu3.5) over (2.4.41-4ubuntu3.4) ...
Preparing to unpack .../apache2-bin_2.4.41-4ubuntu3.5_amd64.deb ...
```

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

c. sudo systemctl status apache2

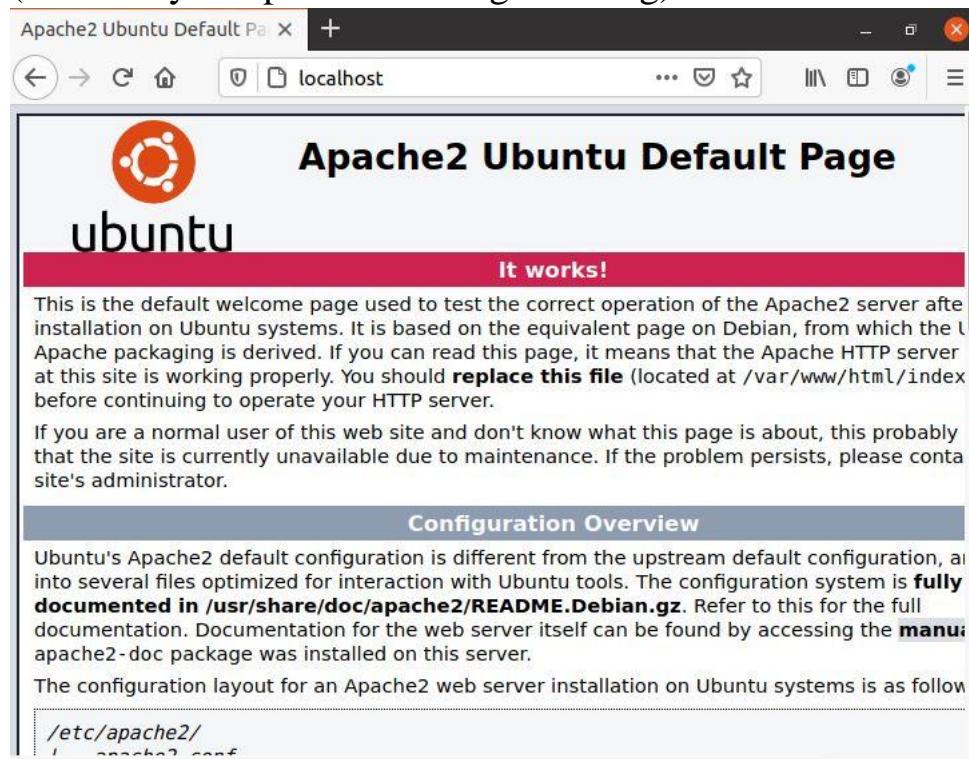
```
karthika@karthika-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
  Active: active (running) since Tue 2021-09-28 19:05:41 IST; 1min 20s ago
    Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 2766 (apache2)
      Tasks: 55 (limit: 1107)
     Memory: 5.1M
        CGroup: /system.slice/apache2.service
                  └─2766 /usr/sbin/apache2 -k start
                    ├─2768 /usr/sbin/apache2 -k start
                    ├─2769 /usr/sbin/apache2 -k start

Sep 28 19:05:41 karthika-VirtualBox systemd[1]: Starting The Apache HTTP Server>
Sep 28 19:05:41 karthika-VirtualBox apachectl[2765]: AH00558: apache2: Could n>
Sep 28 19:05:41 karthika-VirtualBox systemd[1]: Started The Apache HTTP Server.
karthika@karthika-VirtualBox:~$
```

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

<http://youripaddress>

d. ( find out your ip address using ifconfig)



## 2. Install MariaDB

### To install mariadb

#### a. sudo apt install mariadb-server mariadb-client

```
karthika@karthika-VirtualBox:~$ sudo apt install mariadb-server mariadb-client
[sudo] password for karthika:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  galera-3 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
  libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
  libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
  libterm-readkey-perl mariadb-client-10.3 mariadb-client-core-10.3
  mariadb-common mariadb-server-10.3 mariadb-server-core-10.3 socat
Suggested packages:
  gawk-doc libclone-perl libmlbm-perl libnet-daemon-perl
  libsql-statement-perl libipc-sharedcache-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
  galera-3 gawk libaio1 libcgi-fast-perl libcgi-pm-perl
  libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libfcgi-perl
  libhtml-template-perl libreadline5 libsigsegv2 libsnappy1v5
  libterm-readkey-perl mariadb-client mariadb-client-10.3
  mariadb-client-core-10.3 mariadb-common mariadb-server mariadb-server-10.3
  mariadb-server-core-10.3 socat
0 upgraded, 22 newly installed, 0 to remove and 334 not upgraded.
Need to get 20.2 MB of archives.
After this operation, 167 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 libsigsegv2 amd64 2.
12-2 [13.9 kB]
```

#### b. sudo systemctl status mysql

```
karthika@karthika-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
  Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
  Active: active (running) since Tue 2021-09-28 19:31:17 IST; 1min 28s ago
    Docs: man:mysqld(8)
          https://mariadb.com/kb/en/library/systemd/
   Main PID: 5742 (mysqld)
     Status: "Taking your SQL requests now..."
      Tasks: 31 (limit: 1107)
     Memory: 66.1M
    CGroup: /system.slice/mariadb.service
             └─5742 /usr/sbin/mysqld

Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: information>
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: mysql
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: performance>
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: Phase 6/7: >
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: Processing >
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: information>
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: performance>
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: Phase 7/7: >
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5780]: OK
Sep 28 19:31:17 karthika-VirtualBox /etc/mysql/debian-start[5839]: Checking fo>
karthika@karthika-VirtualBox:~$
```

## To secure mariadb

### c. sudo mysql\_secure\_installation

```
karthika@karthika-VirtualBox:~$ sudo mysql_secure_installation

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

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

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

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

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

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

By default, a MariaDB installation has an anonymous user, allowing anyone
to log into MariaDB without having to have a user account created for
it. This is not very secure and you should remove it before moving into
a production environment.

Normally, root should only be allowed to connect from 'localhost'. This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access. This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
- Dropping test database...
... Success!
- Removing privileges on test database...
... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

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

Cleaning up...

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

Thanks for using MariaDB!
karthika@karthika-VirtualBox:~$
```

3. Install PHP and commonly used modules
  - a. sudo apt install php libapache2-mod-php php-ocache php-cli  
php-gd php-curl php-mysql

```
karthika@kartiha-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocache php-cli php-gd php-curl php-mysql
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'php7.4-ocache' instead of 'php-ocache'
The following additional packages will be installed:
  libapache2-mod-php7.4 php-common php7.4 php7.4-cli php7.4-common
  php7.4-curl php7.4-gd php7.4-json php7.4-mysql php7.4-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-common php-curl
  php-gd php-mysql php7.4 php7.4-cli php7.4-common php7.4-curl php7.4-gd
  php7.4-json php7.4-mysql php7.4-ocache php7.4-readline
0 upgraded, 17 newly installed, 0 to remove and 334 not upgraded.
Need to get 4,209 kB of archives.
After this operation, 18.8 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 php-common all 2:75
[11.9 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-common
amd64 7.4.3-4ubuntu2.6 [980 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-json
amd64 7.4.3-4ubuntu2.6 [19.2 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 php7.4-ocache
amd64 7.4.3-4ubuntu2.6 [198 kB]
```

## Restart apache2

- b. sudo systemctl restart apache2

```
karthika@kartiha-VirtualBox:~$ sudo systemctl restart apache2
```

## Test PHP Processing on Web Server

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

```
karthika@kartiha-VirtualBox:~$ sudo nano /var/www/html/phpinfo.php
```

Inside the file, type in the valid PHP code:

```
<?php
    phpinfo ();
?>
```

Press CTRL + X to save and close the file. Press y and ENTER to confirm

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

<http://127.0.0.1/phpinfo.php>

PHP Version 7.4.3	
<b>System</b>	Linux karthika-VirtualBox 5.8.0-53-generic #60~20.04.1-Ubuntu x86_64
<b>Build Date</b>	Aug 13 2021 05:39:12
<b>Server API</b>	Apache 2.0 Handler
<b>Virtual Directory Support</b>	disabled
<b>Configuration File (php.ini) Path</b>	/etc/php/7.4/apache2
<b>Loaded Configuration File</b>	/etc/php/7.4/apache2/php.ini
<b>Scan this dir for additional .ini files</b>	/etc/php/7.4/apache2/conf.d
<b>Additional .ini files parsed</b>	/etc/php/7.4/apache2/conf.d/10-mysqlnd.ini, /etc/php/7.4/apache /7.4/apache2/conf.d/10-pdo.ini, /etc/php/7.4/apache2/conf.d/20-c /conf.d/20-ctype.ini, /etc/php/7.4/apache2/conf.d/20-curl.ini, /etc/ /etc/php/7.4/apache2/conf.d/20-ffi.ini, /etc/php/7.4/apache2/conf. /7.4/apache2/conf.d/20-ftp.ini, /etc/php/7.4/apache2/conf.d/20-gd gettext.ini, /etc/php/7.4/apache2/conf.d/20-iconv.ini, /etc/php/7.4 /7.4/apache2/conf.d/20-mysqli.ini, /etc/php/7.4/apache2/conf.d/21 /7.4/apache2/conf.d/20-phar.ini, /etc/php/7.4/apache2/conf.d/20- /conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-shmop.ini, sockets.ini, /etc/php/7.4/apache2/conf.d/20-sysvmsg.ini, /etc/php /etc/php/7.4/apache2/conf.d/20-sysvshm.ini, /etc/php/7.4/apache
<b>PHP API</b>	20190902

Configuration	
apache2handler	
<b>Apache Version</b>	Apache/2.4.41 (Ubuntu)
<b>Apache API Version</b>	20120211
<b>Server Administrator</b>	webmaster@localhost
<b>Hostname:Port</b>	127.0.1.1:80
<b>User/Group</b>	www-data(33)/33
<b>Max Requests</b>	Per Child: 0 - Keep Alive: on - Max Per Connection: 100
<b>Timeouts</b>	Connection: 300 - Keep-Alive: 5
<b>Virtual Server</b>	Yes
<b>Server Root</b>	/etc/apache2
<b>Loaded Modules</b>	core mod_so mod_watchdog http_core mod_log_config mod_logic mod_access_compat mod_alias mod_auth_basic mod_authn_core mod_authz_host mod_authz_user mod_autoindex mod_deflate mod_mime mod_prefork mod_negotiation mod_php7 mod_reqtimeout
Directive	
Local Value	
<b>engine</b>	1
<b>last modified</b>	0

#### 4. Install phpMyAdmin

##### To install phpMyAdmin

- a. sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json php-curl

```
karthika@karthika-VirtualBox:~$ sudo apt install phpmyadmin php-zip php-gd php-
json php-curl
Reading package lists... Done
Building dependency tree
Reading state information... Done
php-curl is already the newest version (2:7.4+75).
php-gd is already the newest version (2:7.4+75).
The following additional packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip5 php-bz2 php-google-recaptcha php-mbstring
  php-phpmyadmin-motranslator php-phpmyadmin-shapefile
  php-phpmyadmin-sql-parser php-phpseclib php-psr-cache php-psr-container
  php-psr-log php-symfony-cache php-symfony-cache-contracts
  php-symfony-expression-language php-symfony-service-contracts
  php-symfony-var-exporter php-tcpdf php-twig php-twig-extensions php-xml
  php7.4-bz2 php7.4-mbstring php7.4-xml php7.4-zip
Suggested packages:
  php-dbase php-libsodium php-mcrypt php-gmp
  php-symfony-service-implementation php-imagick php-twig-doc
  php-symfony-translation php-recode php-gd2 php-pragmarx-google2fa
  php-bacon-qr-code php-samyoul-u2f-php-server
Recommended packages:
  php-mcrypt
The following NEW packages will be installed:
  dbconfig-common dbconfig-mysql icc-profiles-free javascript-common
  libjs-jquery libjs-openlayers libjs-sphinxdoc libjs-underscore libonig5
  libzip5 php-bz2 php-google-recaptcha php-json php-mbstring
```

##### Restart apache2

- b. sudo systemctl restart apache2

```
populating database via sql... done.
dbconfig-common: flushing administrative password
Processing triggers for libapache2-mod-php7.4 (7.4.3-4ubuntu2.6) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for php7.4-cli (7.4.3-4ubuntu2.6) ...
karthika@karthika-VirtualBox:~$ sudo systemctl restart apache2
karthika@karthika-VirtualBox:~$
```

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

username: root

password: your password

If phpmyadmin page not found:

nano /etc/apache2/apache2.conf

```
karthika@karthika-VirtualBox:~$ sudo nano /etc/apache2/apache2.conf
[sudo] password for karthika:
karthika@karthika-VirtualBox:~$
```

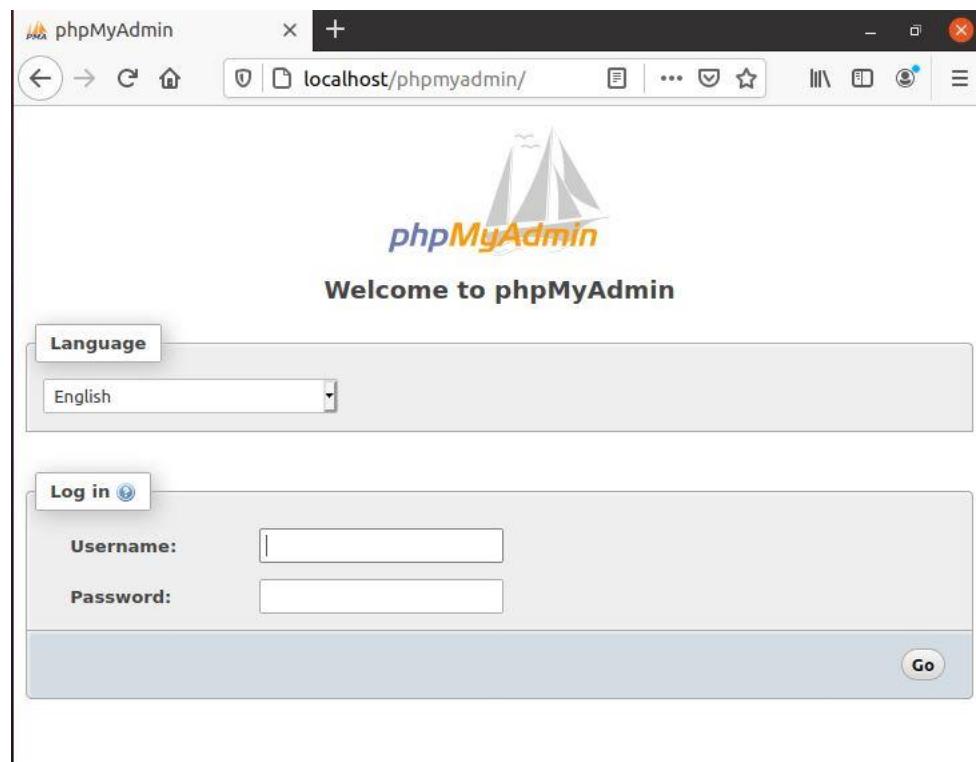
Add this line to last of the file.

“Include /etc/phpmyadmin/apache.conf”

Press CTRL + X to save and close the file. Press y and ENTER to confirm

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

sudo systemctl restart apache2



localhost / localhost | ph... X +

← → ⌂ ⌂ localhost/phpmyadmin/index.php ... ⌂ ⌂ ⌂

→ Server: localhost:3306

◀ Databases SQL Status User accounts Export Import ▶

General settings

Change password

Server connection collation: utf8mb4\_unicode\_ci

Appearance settings

Language: English

Theme: pmahomme

Font size: 82%

More settings

Database server

Console

A screenshot of the PHPMyAdmin interface, specifically the 'General settings' section. At the top, there's a header bar with navigation icons and a title 'localhost / localhost | ph...'. Below it is a toolbar with tabs for 'Databases', 'SQL', 'Status', 'User accounts', 'Export', and 'Import'. The main area has a grey header 'General settings' containing a 'Change password' link and a dropdown for 'Server connection collation' set to 'utf8mb4\_unicode\_ci'. Below this is another grey header 'Appearance settings' with options for 'Language' (set to 'English'), 'Theme' (set to 'pmahomme'), and 'Font size' (set to '82%'). There's also a 'More settings' link. At the bottom of the main area is a grey footer 'Database server' with a 'Console' link.

# ANSIBLE

## WHAT IS ANSIBLE?

- Ansible is an open source IT automation engine that automates provisioning, configuration management, application deployment, orchestration, and many other IT processes.
- Use Ansible automation to install software, automate daily tasks, provision infrastructure, improve security and compliance, patch systems, and share automation across your organization.
- Ansible works by connecting to your nodes and pushing out small programs, called modules to them. Modules are used to accomplish automation tasks in Ansible.
- These programs are written to be resource models of the desired state of the system. Ansible then executes these modules and removes them when finished.
- Without modules, you'd have to rely on ad-hoc commands and scripting to accomplish tasks.
- Ansible is agentless, which means the nodes it manages do not require any software to be installed on them.
- Ansible reads information about which machines you want to manage from your inventory. Ansible has a default inventory file, but you can create your own and define which servers you want Ansible to manage.
- Ansible uses SSH protocol to connect to servers and run tasks. By default, Ansible uses SSH keys with ssh-agent and connects to remote machines using your current username. Root logins are not required. You can log in as any user, and then su or sudo to any user.

## Ansible Playbooks:

- **Ansible Playbooks** are the files where Ansible code is written. These files are written in the language, **YAML**, which is a funny acronym for, “YAML Ain’t no Markup Language.”
- Playbooks contain one or more Plays. **Plays** map a group of computers to a few well-defined roles known as Tasks. **Tasks** can be defined as Ansible scripts.

## YAML

YAML is a simple language that consists of key-value pairs. While not mandatory, `--` marks the beginning of a YAML program, and `...` marks the end.

YAML also allows the creation of lists. Lists can be created with the `-` symbol inside variables to define elements.

## Orchestration with Ansible:

- In general, automation refers to automating a single task. This is different from orchestration, which is how you can automate a process or workflow that involves many steps across multiple disparate systems.
- Cloud orchestration can be used to provision or deploy servers, assign storage capacity, create virtual machines, and manage networking, among other tasks. There are many different orchestration tools that can help you with cloud orchestration. Ansible is one option.
- Server configuration and management and application deployments can also be orchestrated with a tool like Ansible.

## INSTALLATION:

### a. Sudo apt-get install ansible

```
karthika@karthika-VirtualBox:~/Desktop$ sudo apt-get install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-lib2to3 python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmldict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
```

### b. ansible --version

```
karthika@karthika-VirtualBox:~/Desktop$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/karthika/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.5 (default, Jul 28 2020, 12:59:40) [GCC 9.3.0]
karthika@karthika-VirtualBox:~/Desktop$
```

# TCPDUMP

## 1. Tcpdump installation

- Sudo apt install tcpdump
- Sudo tcpdump
- Tcpdump -D
- tcpdump-i enp0s3
- sudo tcpdump -c 5
- Sudo tcpdump -i enp0s3 -c 5 port 80

```
karthika@karthika-VirtualBox:~$ sudo apt install tcpdump
[sudo] password for karthika:
Reading package lists... Done
Building dependency tree
Reading state information... Done
tcpdump is already the newest version (4.9.3-4).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 333 not upgraded.
```

```
karthika@karthika-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
12:42:11.864449 IP karthika-VirtualBox.35549 > golem.canonical.com.ntp: NTPv4,
Client, length 48
12:42:11.876129 IP karthika-VirtualBox.59648 > 192.168.0.1.domain: 40298+ [1au]
    PTR? 199.89.189.91.in-addr.arpa. (55)
12:42:12.051930 IP 192.168.0.1.domain > karthika-VirtualBox.59648: 40298 1/0/1
    PTR golem.canonical.com. (88)
12:42:12.053316 IP karthika-VirtualBox.38514 > 192.168.0.1.domain: 59782+ [1au]
    PTR? 15.2.0.10.in-addr.arpa. (51)
12:42:12.064663 IP golem.canonical.com.ntp > karthika-VirtualBox.35549: NTPv4,
Server, length 48
12:42:12.113417 IP 192.168.0.1.domain > karthika-VirtualBox.38514: 59782 NXDoma
in 0/0/1 (51)
12:42:12.116423 IP karthika-VirtualBox.38514 > 192.168.0.1.domain: 59782+ PTR?
    15.2.0.10.in-addr.arpa. (40)
12:42:12.446390 IP 192.168.0.1.domain > karthika-VirtualBox.38514: 59782 NXDoma
in 0/0/0 (40)
12:42:12.458615 IP karthika-VirtualBox.48024 > 192.168.0.1.domain: 42074+ [1au]
    PTR? 1.0.168.192.in-addr.arpa. (53)
12:42:12.518371 IP 192.168.0.1.domain > karthika-VirtualBox.48024: 42074 NXDoma
in 0/0/1 (53)
12:42:12.519761 IP karthika-VirtualBox.48024 > 192.168.0.1.domain: 42074+ PTR?
    1.0.168.192.in-addr.arpa. (42)
12:42:12.663024 IP 192.168.0.1.domain > karthika-VirtualBox.48024: 42074 NXDoma
in 0/0/0 (42)
12:42:17.026955 ARP, Request who-has _gateway tell karthika-VirtualBox, length
```

```

2.2.0.10.in-addr.arpa. (39)
12:42:17.149342 IP 192.168.0.1.domain > karthika-VirtualBox.40381: 28623 NXDomain
in 0/0/0 (39)

^C
18 packets captured
18 packets received by filter
0 packets dropped by kernel
karthika@karthika-VirtualBox:~$ tcpdump -D
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
karthika@karthika-VirtualBox:~$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
karthika@karthika-VirtualBox:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
karthika@karthika-VirtualBox:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
karthika@karthika-VirtualBox:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:50:31.191912 IP karthika-VirtualBox.40732 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 810438797, win 64240, options [mss 1460,sackOK,TS val 85402834 ecr 0,nop,wscale 7], length 0
12:50:31.600770 IP 32.121.122.34.bc.googleusercontent.com.http > karthika-VirtualBox.40732: Flags [S.], seq 7616001, ack 810438798, win 65535, options [mss 1460], length 0
12:50:31.600857 IP karthika-VirtualBox.40732 > 32.121.122.34.bc.googleusercontent.com.http: Flags [.], ack 1, win 64240, length 0
12:50:31.602621 IP karthika-VirtualBox.40732 > 32.121.122.34.bc.googleusercontent.com.http: Flags [P.], seq 1:88, ack 1, win 64240, length 87: HTTP: GET / HTTP/1.1
12:50:31.603319 IP 32.121.122.34.bc.googleusercontent.com.http > karthika-VirtualBox.40732: Flags [.], ack 88, win 65535, length 0
5 packets captured
5 packets received by filter
0 packets dropped by kernel
karthika@karthika-VirtualBox:~$
```

- **tcpdump 10.0.2.15**
- **tcpdump -l eth1 icmp**

```

karthika@karthika-VirtualBox:~$ tcpdump host 10.0.2.15
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
karthika@karthika-VirtualBox:~$ tcpdump -i eth1 icmp
tcpdump: eth1: You don't have permission to capture on that device
(socket: Operation not permitted)
karthika@karthika-VirtualBox:~$
```

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

```
karthika@karthika-VirtualBox:~$ sudo tcpdump -n -i enp0s3 -c 10 -w
tcpdump: option requires an argument -- 'w'
tcpdump version 4.9.3
libpcap version 1.9.1 (with TPACKET_V3)
OpenSSL 1.1.1f  31 Mar 2020
Usage: tcpdump [-aAbdDefhHIJKLMNOPqStuUvxX#] [ -B size ] [ -c count ]
           [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
           [ -i interface ] [ -j tstamptype ] [ -M secret ] [ --number ]
           [ -Q in|out|inout ]
           [ -r file ] [ -s snaplen ] [ --time-stamp-precision precision ]
           [ --immediate-mode ] [ -T type ] [ --version ] [ -V file ]
           [ -w file ] [ -W filecount ] [ -y datalinktype ] [ -z postrotat
e-command ]
           [ -Z user ] [ expression ]
karthika@karthika-VirtualBox:~$
```

# SHELL SCRIPTING

**Q1.** Write a shell script to ask your name, and college name and print it on the screen.

The screenshot shows a terminal window with the following content:

```
details.sh
1 echo "Enter details and view"
2 echo Enter your name
3 read name
4 echo Enter your college name
5 read c
6 clear
7 echo Details you entered
8 echo Name:$name
9 echo college:$c
```

Terminal Output:

```
karthika@karthika-VirtualBox:~$ gedit details.sh
karthika@karthika-VirtualBox:~$ chmod +x details.sh
karthika@karthika-VirtualBox:~$ ./details.sh
Enter details and view
Enter your name
Karthika
Enter your college name
Amal Jyothi

Details you entered
Name:Karthika
college:Amal Jyothi
karthika@karthika-VirtualBox:~$
```

**Q2.** Write a shell script to set a value for a variable and display it on command line interface.

The screenshot shows a terminal window with the following session:

```
karthika@karthika-VirtualBox:~$ gedit variable.sh
karthika@karthika-VirtualBox:~$ chmod +x variable.sh
karthika@karthika-VirtualBox:~$ ./variable.sh
Display value of a variable
20
karthika@karthika-VirtualBox:~$
```

The terminal window has a dark background and light-colored text. The file path is shown at the top: "karthika@karthika-VirtualBox:~\$". The command "gedit variable.sh" is run to open the script in a text editor. "chmod +x variable.sh" is run to make the script executable. Finally, "./variable.sh" is run to execute the script, which outputs "Display value of a variable" followed by the value "20".

**Q3.** Write a shell script to perform addition, subtraction, multiplication, division with two numbers that is accepted from user.

The screenshot shows a terminal window with the following session:

```
Open   ▾   F+   maths.sh   Save   ⌂   ⌄   X
1 echo enter a number
2 read a
3 echo enter another number
4 read b
5 echo enter operation
6 echo " 1.Addition 2.Subtraction 3.Multiplication 4.Division"
7 read op
8 case "$op" in
9 "1") echo "a+b=$((a+b));;
10 "2") echo "a-b=$((a-b));;
11 "3") echo "a*b=$((a*b));;
12 "4") echo "a/b=$((a/b));;
13 esac
```

The terminal window has a dark background and light-colored text. The file path is shown at the top: "Open ▾ F+ maths.sh Save ⌂ ⌄ X". The script prompts the user to enter two numbers and an operation. It then performs the specified arithmetic operation and prints the result. The script uses a case statement to handle four operations: Addition, Subtraction, Multiplication, and Division.

```
karthika@karthika-VirtualBox:~$ gedit maths.sh
karthika@karthika-VirtualBox:~$ chmod +x maths.sh
karthika@karthika-VirtualBox:~$ ./maths.sh
enter a number
3
enter another number
4
enter operation
1.Addition 2.Subtraction 3.Multiplication 4.Division
3
a*b=12
```

**Q4.** Write a shell script to check the value of a given number and display whether the number is found or not.

The screenshot shows a terminal window with the following content:

```
Open ▾ F+ number.sh Save ⌂ X
1 echo enter a number
2 read a
3 if [ $a -eq 10];
4 then
5 echo "number found"
6 else
7 echo "not found"
8 fi

Not Found
karthika@karthika-VirtualBox:~$ gedit number.sh
karthika@karthika-VirtualBox:~$ chmod +x number.sh
karthika@karthika-VirtualBox:~$ ./number.sh
enter a number
6
not found
karthika@karthika-VirtualBox:~$
```

**Q5.** Write a shell script to display current date, calendar.

The screenshot shows a terminal window with the following content:

```
Open ▾ F+ cal.sh Save ⌂ X
1 echo "TODAY IS $(date)"
2 echo "calender";
3 cal

Not Found
karthika@karthika-VirtualBox:~$ gedit cal.sh
karthika@karthika-VirtualBox:~$ chmod +x cal.sh
karthika@karthika-VirtualBox:~$ ./cal.sh
TODAY IS Sunday 03 October 2021 12:07:55 AM IST
calender
    October 2021
Su Mo Tu We Th Fr Sa
        1  2
3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
karthika@karthika-VirtualBox:~$
```

**Q6.** Write a shell script to check a number is even or odd. #!/bin/bash

The screenshot shows a terminal window with the following content:

```
evenodd.sh
1 echo enter a number
2 read n
3 x=$(( $n % 2 ))
4 if [ $x -eq 0 ];
5 then
6 echo "number is even"
7 else
8 echo "number is odd"
9 fi

karthika@karthika-VirtualBox:~$ gedit evenodd.sh
karthika@karthika-VirtualBox:~$ chmod +x evenodd.sh
karthika@karthika-VirtualBox:~$ ./evenodd.sh
enter a number
5
number is odd
k Terminal karthika@karthika-VirtualBox:~$ chmod +x evenodd.sh
karthika@karthika-VirtualBox:~$ ./evenodd.sh
enter a number
2
number is even
karthika@karthika-VirtualBox:~$
```

**Q7.** Write a shell script to check a number is greater than, less than or equal to another number.

The screenshot shows a terminal window with the following content:

```
greaterorless.sh
1 echo enter first number
2 read a
3 echo enter second number
4 read b
5 if [ $a -gt $b ];
6 then
7 echo "$a is larger"
8 elif [ $b -gt $a ];
9 then
10 echo "$b is larger"
11 else
12 echo "both are equal"
13 fi

karthika@karthika-VirtualBox:~$ gedit greaterorless.sh
karthika@karthika-VirtualBox:~$ chmod +x greaterorless.sh
karthika@karthika-VirtualBox:~$ ./greaterorless.sh
enter first number
5
enter second number
6
6 is larger
karthika@karthika-VirtualBox:~$
```

**Q8.** Write a shell script to find the sum of first 10 numbers.

```
1 s=0
2 for ((i=0;i<=10;i++))
3 do
4 s=`expr $s + $i`
5 done
6 echo "sum of first 10 numbers=$s"
7
```

```
karthika@karthika-VirtualBox:~$ gedit sum.sh
karthika@karthika-VirtualBox:~$ chmod +x sum.sh
karthika@karthika-VirtualBox:~$ ./sum.sh
sum of first 10 numbers=55
karthika@karthika-VirtualBox:~$
```

**Q9.** Write a shell script to find the sum, the average and the product of the four integers entered.

```
Open ▾ 🔍 sumavgpro.sh Save ⌂ ⌄ ×
1 echo please enter your first number
2 read a
3 echo please enter your second number
4 read b
5 echo please enter your third number
6 read c
7 echo please enter your fourth number
8 read d
9 sum=$((a + $b + $c + $d))
10 pro=$((a * $b * $c * $d))
11 avg=$(echo $sum/4 | bc -l)
12 echo "the sum is:$sum"
13 echo "the average is:$avg"
14 echo "the product is:$pro"
```

```
karthika@karthika-VirtualBox:~$ gedit sumavgpro.sh
karthika@karthika-VirtualBox:~$ chmod +x sumavgpro.sh
karthika@karthika-VirtualBox:~$ ./sumavgpro.sh
please enter your first number
4
please enter your second number
3
please enter your third number
5
please enter your fourth number
1
the sum is:13
the average is:3.250000000000000000000000
the product is:60
karthika@karthika-VirtualBox:~$
```

**Q10.** Write a shell script to find the smallest of three numbers.

The screenshot shows a terminal window with the following content:

```
smallest.sh
Save
X

1 echo enter first number
2 read a
3 echo enter second number
4 read b
5 echo enter third number
6 read c
7 if [ $a -lt $b ];
8 then
9 if [ $a -lt $c ];
10 then
11 echo "$a is smallest"
12 fi
13 elif [ $b -lt $c ];
14 then
15 echo "$b is smallest"
16 else
17 echo "$c is smallest"
18 fi

[...]
karthika@karthika-VirtualBox:~$ gedit smallest.sh
karthika@karthika-VirtualBox:~$ chmod +x smallest.sh
karthika@karthika-VirtualBox:~$ ./smallest.sh
enter first number
3
enter second number
4
enter third number
5
3 is smallest
karthika@karthika-VirtualBox:~$
```

**Q11.** Write a shell program to find factorial of given number.

The screenshot shows a terminal window with the following content:

```
fact.sh
Save
X

1 echo enter a number
2 read n
3 f=1
4 for ((i=2;i<=n;i++))
5 do
6 f=$((f*i))
7 done
8 echo "factorial is $f"
9

[...]
karthika@karthika-VirtualBox:~$ gedit fact.sh
karthika@karthika-VirtualBox:~$ chmod +x fact.sh
karthika@karthika-VirtualBox:~$ ./fact.sh
enter a number
5
factorial is 120
karthika@karthika-VirtualBox:~$
```

**Q12.** Write a shell program to check a number is palindrome or not.

The screenshot shows a terminal window with the following session:

```
karthika@karthika-VirtualBox:~$ gedit palindrome.sh
karthika@karthika-VirtualBox:~$ chmod +x palindrome.sh
karthika@karthika-VirtualBox:~$ ./palindrome.sh
enter a number
5
number is palindrome
```

**Q13.** Write a shell script to find the average of the numbers entered in command line.

**Q14.** Write a shell program to find the sum of all the digits in a number.

The screenshot shows a terminal window with the following content:

```
sumofall.sh
1 echo enter a number
2 read n
3 s=0
4 while [ $n -gt 0 ]
5 do
6 mod=$((n%10))
7 s=$((s+mod))
8 n=$((n/10))
9 done
10 echo "sum of digit is $s"

karthika@karthika-VirtualBox:~$ gedit sumofall.sh
karthika@karthika-VirtualBox:~$ chmod +x sumofall.sh
karthika@karthika-VirtualBox:~$ ./sumofall.sh
enter a number
350
sum of digit is 8
karthika@karthika-VirtualBox:~$
```

**Q15.** Write a shell Script to check whether given year is leap year or not.

The screenshot shows a terminal window with the following content:

```
leapyear.sh
1 echo enter year
2 read y
3 a=$((y%4))
4 b=$((y%100))
5 c=$((y%400))
6 if [ $a -eq 0 -a $b -ne 0 -o $c -eq 0 ];
7 then
8 echo "$y is leap year"
9 else
10 echo "$y is not leap year"
11 fi

karthika@karthika-VirtualBox:~$ gedit leapyear.sh
karthika@karthika-VirtualBox:~$ chmod +x leapyear.sh
karthika@karthika-VirtualBox:~$ ./leapyear.sh
enter year
2008
2008 is leap year
karthika@karthika-VirtualBox:~$ chmod +x leapyear.sh
karthika@karthika-VirtualBox:~$ ./leapyear.sh
enter year
2009
2009 is not leap year
karthika@karthika-VirtualBox:~$
```

# Docker installation on Windows 10

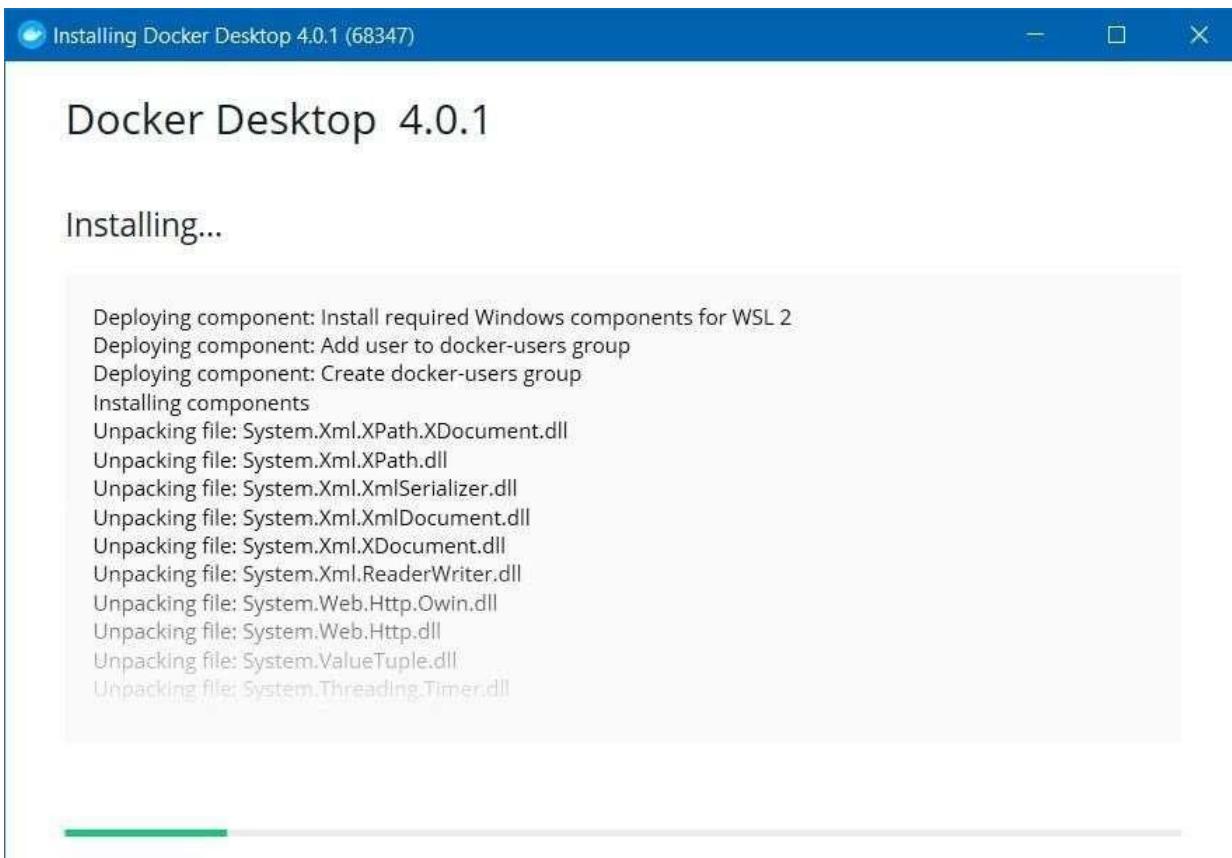
## STEP-I

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



## STEP-II

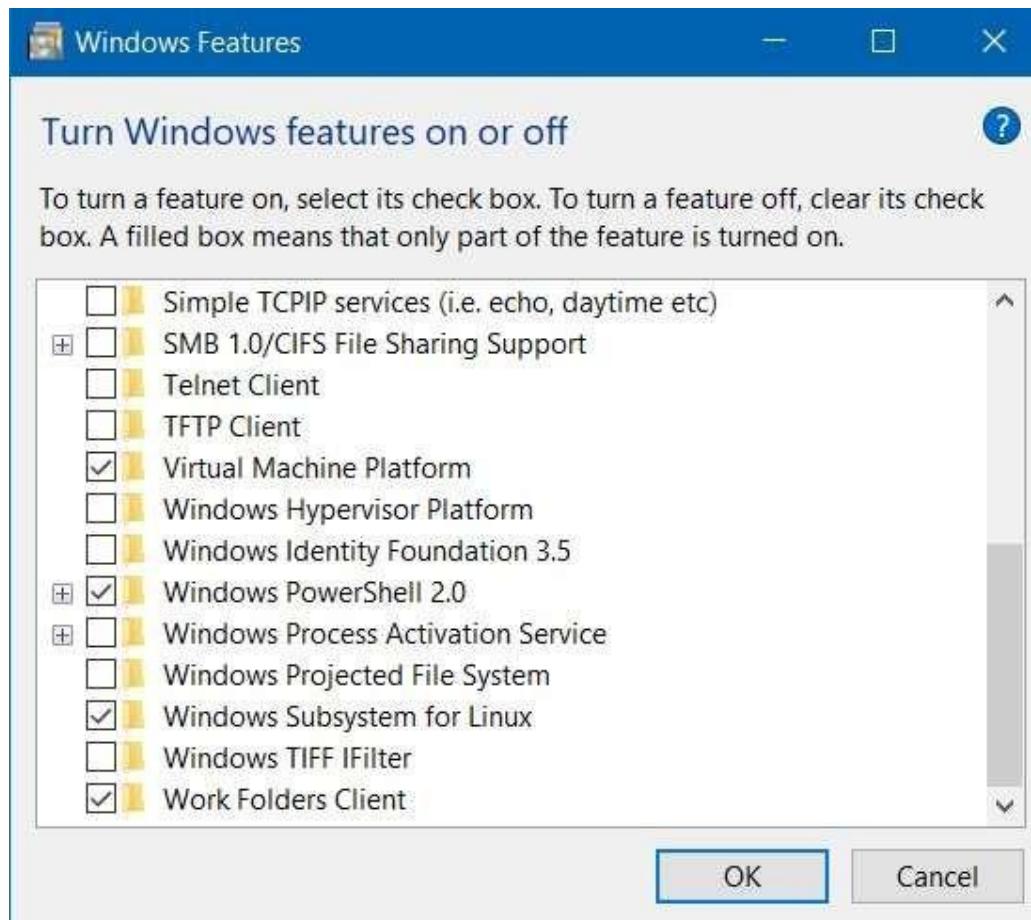
Open the .exe file and follow the steps after clicking install button.



## Step-III

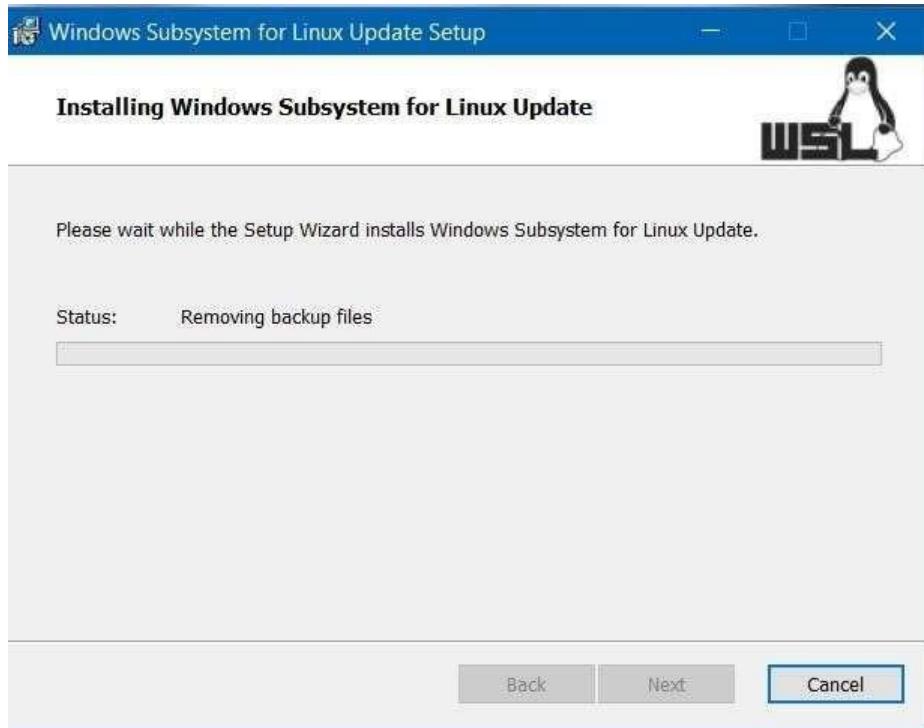
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



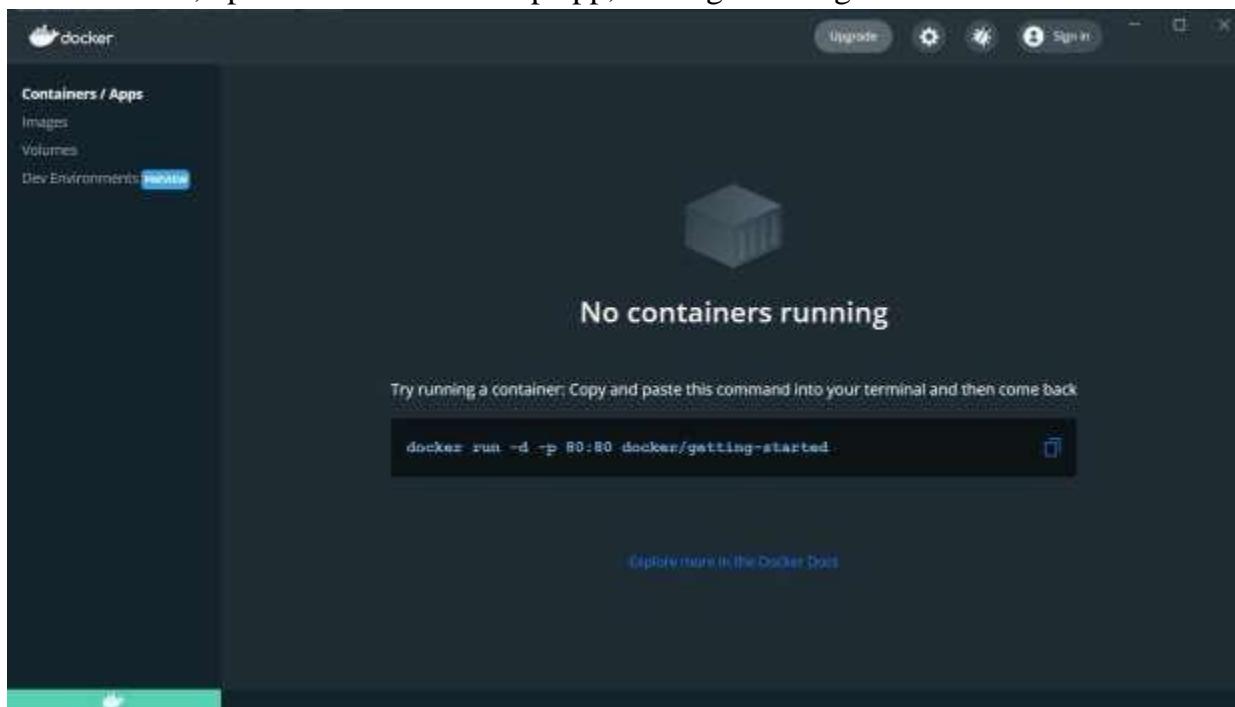
#### **STEP-IV**

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



## **STEP-V**

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



## **STEP-VI**

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

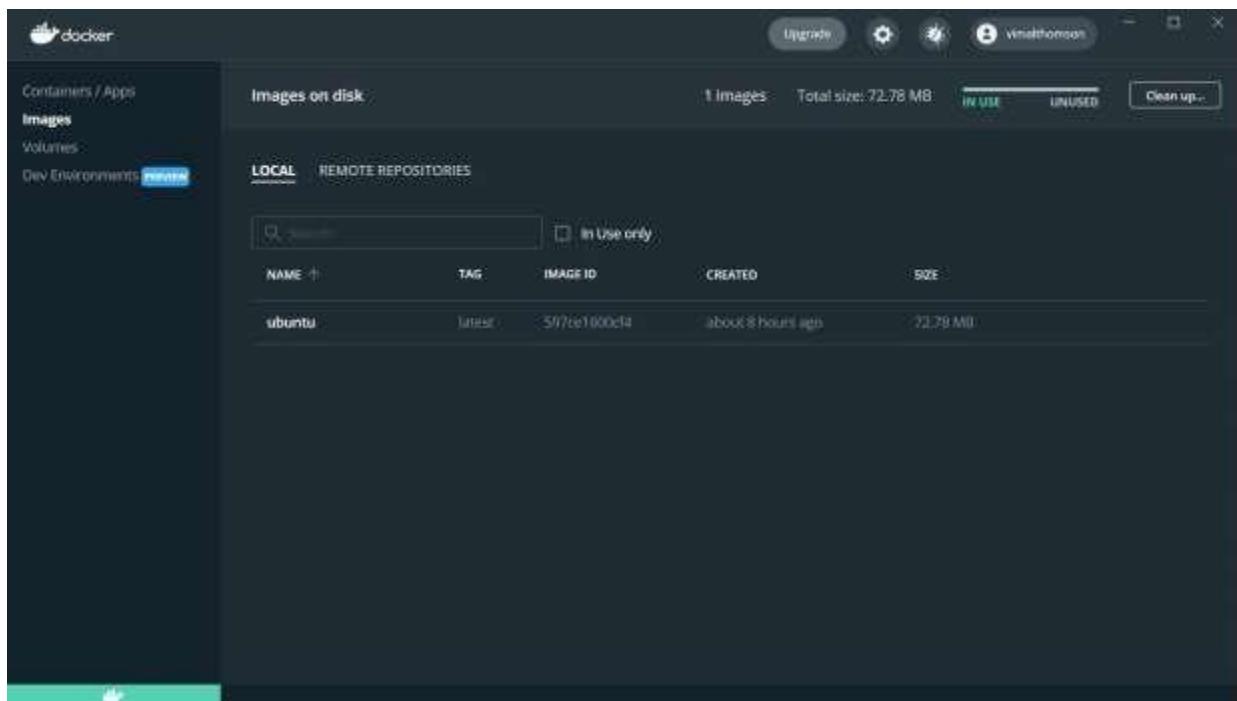
```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.1081]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.5:53: 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: sha256:65de08a0dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
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 `l`



# WIRESHARK INSTALLATION

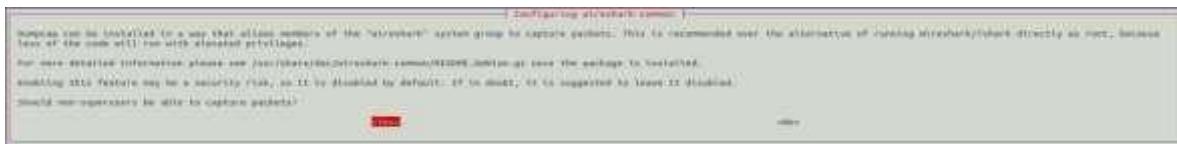
## 1. Command: sudo apt-get install wireshark

```
karthika@karthika-VirtualBox:~$ sudo apt-get install wireshark
[sudo] password for karthika:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasupports5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark-common wireshark-qt
Suggested packages:
  qt5-image-formats-plugins qtwayland5 snmp-mibs-downloader geoipupdate
  geoip-database geoip-database-extra libjs-leaflet
  libjs-leaflet.markercluster wireshark-doc
The following NEW packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimediasupports5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwiretap10
  libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme
  qttranslations5-l10n wireshark wireshark-common wireshark-qt
0 upgraded, 29 newly installed, 0 to remove and 333 not upgraded.
Need to get 32.8 MB of archives.
After this operation, 163 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
```

## 2. Command: sudo dpkg-reconfigure wireshark-common

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

## 3. Command: Select Yes and press enter



## 4. Open wireshark from the applist

