

Networking and System Administration Lab

Lab Record

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ROLL NO : 12

BASIC LINUX COMMANDS

1. pwd(PrintWorkingDirectory)

Use the pwd command to find out the path of the current working directory (folder) you're in.

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

2. history

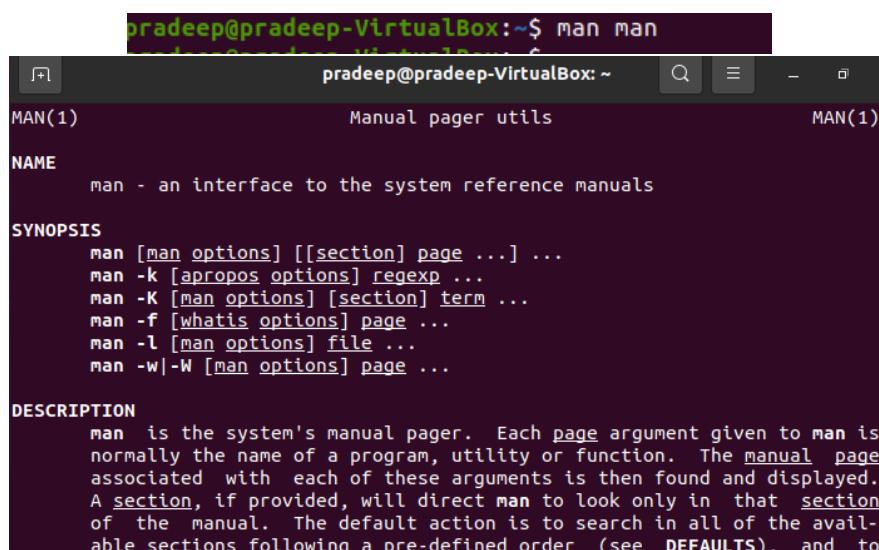
When you have been using Linux for a certain period of time, you will quickly notice that you can run hundreds of commands everyday. As such, running history command is particularly useful if you want to review the commands you have entered before.

```
/home/pradeep  
pradeep@pradeep-VirtualBox:~$ history  
 1  history  
 2  pwd  
 3  history  
pradeep@pradeep-VirtualBox:~$
```

3. man

If we are confused about the function of certain Linux commands we can easily learn how to use them right from Linux's shell by using the man command. For instance, entering man tail will show the manual instruction of the tail command.

man ls



The screenshot shows a terminal window with the following content:

```
pradeep@pradeep-VirtualBox:~$ man man  
pradeep@pradeep-VirtualBox:~$  
MAN(1) Manual pager utils MAN(1)  
  
NAME  
    man - an interface to the system reference manuals  
  
SYNOPSIS  
    man [man options] [[section] page ...]  
    man -k [apropos options] regexp ...  
    man -K [man options] [section] term ...  
    man -f [whatis options] page ...  
    man -l [man options] file ...  
    man -w|-W [man options] page ...  
  
DESCRIPTION  
    man is the system's manual pager. Each page argument given to man is  
    normally the name of a program, utility or function. The manual page  
    associated with each of these arguments is then found and displayed.  
    A section, if provided, will direct man to look only in that section  
    of the manual. The default action is to search in all of the available  
    sections following a pre-defined order (see DEFAULTS), and to
```

4. cd

To navigate through the Linux files and directories, use the cd.

It requires either the full path or the name of the directory, depending on the current working directory that you're in. Shortcuts to help you navigate quickly:

cd..(with two dots)to move one directory up

cd to go straight to the home folder

cd-(with a hyphen)to move to your previous directory

```
pradeep@pradeep-VirtualBox:~$ pwd
/home/pradeep
pradeep@pradeep-VirtualBox:~$ cd ..
pradeep@pradeep-VirtualBox:/home$ pwd
/home
pradeep@pradeep-VirtualBox:/home$ cd pradeep
pradeep@pradeep-VirtualBox:~/pradeep$ pwd
/home/pradeep
pradeep@pradeep-VirtualBox:~/pradeep$
```

5. ls

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

There are variations you can use with the ls command:

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

Usually used in combination with others This will reverse the time-wiseling.

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

6. mkdir

Use mkdir command to make a new directory.

To generate a new directory inside another directory, use this Linux basic command.

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

7. rmdir

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

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

8. touch

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

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ touch file
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

9. rm

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

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

To remove a file use rm filename

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ rm file
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

10. cat

cat (short for concatenate) is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output stdout .

To run this command, type cat followed by the file's name and its extension. For instance: cat file.txt.

Here are other ways to use the cat command:

- cat>filename creates a new file
- catfilename1filename2>filename3 joins two files(1 and2)and stores the output of them in a new file(3)
- to convert a file to upper or lower case use, cat filename
| tr a-z A-Z>output.txt
- cat>>myfile insert data to a file

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file1
psa
shinderu
dame dame

pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file2
naruto
bleach

pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file3
aot
juju
```

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file1 file2 file3 > File4
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3 File4
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file4
cat: file4: No such file or directory
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat File4
psa
shinderu
dame dame

naruto
bleach

aot
juju

pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

11.Echo :

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

```
pradeep@pradeep-VirtualBox:~$ echo psa rockz >>file.txt
pradeep@pradeep-VirtualBox:~$ cat file.txt
psa rockz
pradeep@pradeep-VirtualBox:~$ █
```

12.Head :

The head command is a command-line utility for outputting the first part of files given to it via standard input. It writes results to standard output. By default head returns the first ten lines of each file that it is given.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat file.txt
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
pradeep@pradeep-VirtualBox:~/Documents/aj$ head -n 4 file.txt
Goa
Gujarat
Haryana
Himachal Pradesh
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

13.Tail:

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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ tail -n 3 file.txt
Uttar Pradesh
Uttarakhand
West Bengal
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

14.Read:

read is a command found on Unix and Unix-like operating systems such as Linux. It reads a line of input from standard input or a file passed as an argument to its -u flag, and assigns it to a variable.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ echo "what is your name..?";read name;echo "hello $name"
what is your name..?
Pradeep Sojan
hello Pradeep Sojan
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

15.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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ more temp.txt
shinderu
dame dame

naruto
bleach

aot
juju
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

16.Less :

Less command 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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ less file.txt
[4]+  Stopped                  less file.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

```
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and Kashmir
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal
file.txt (END)
```

17.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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ cut -b 1,2 temp.txt
sh
da
na
bl
ao
ju
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

18.Paste :

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

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ paste file1 file2
psa      naruto
shinderu      bleach
dame   dame
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

19.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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ uname
Linux
pradeep@pradeep-VirtualBox:~/Documents/aj$ uname -r
5.8.0-55-generic
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

20.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

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3 file4 file.txt temp.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ cp temp.txt temp2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3 file4 file.txt temp2.txt temp.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat temp2.txt
shinderu
dame dame

naruto
bleach

aot
juju
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

21.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. Can also used to rename the file.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3 file4 file.txt temp2.txt temp.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ mv temp.txt temp1.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
file1 file2 file3 file4 file.txt temp1.txt temp2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ cat temp1.txt
shinderu
dame dame

naruto
bleach

aot
juju
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

22.Locate:

locate command in Linux is used to find the files by name.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ locate file4
/home/pradeep/Documents/aj/file4
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

23.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.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ find file2
file2
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

24.Grep :

The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ grep naruto temp1.txt
naruto
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

25.Df :

Linux df command is used to display the disk space used in the file system.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
udev              844     0     844   0% /dev
tmpfs             175     2     174   1% /run
/dev/sda5        9509  8341     666  93% /
tmpfs             873     0     873   0% /dev/shm
tmpfs               5     1      5   1% /run/lock
tmpfs             873     0     873   0% /sys/fs/cgroup
/dev/loop0          56     56      0 100% /snap/core18/2066
/dev/loop3          219    219      0 100% /snap/gnome-3-34-1804
/dev/loop2          56     56      0 100% /snap/core18/1988
/dev/loop1          163    163      0 100% /snap/gnome-3-28-1804
/dev/loop4          219    219      0 100% /snap/gnome-3-34-1804
/dev/loop6           66     66      0 100% /snap/gtk-common-them
tmpfs              65     65      0 100% /tmp
```

26.Du :

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

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ du
32 .
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

27.Useradd, 28.Userdel,29.Sudo :

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

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

sudo (Super User DO) command in Linux is generally used as a prefix of some command that only superuser are allowed to run.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo useradd psa
[sudo] password for pradeep:
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo userdel psa
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

30. Passwd :

Used to change the user account password.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo passwd
New password:
Retype new password:
passwd: password updated successfully
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

31. usermod

usermod command is used to change the properties of a user in Linux through the command line

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

```
usermod -u 2000 Tom
```

```
pradeep@pradeep-VirtualBox:~$ usermod --help
Usage: usermod [options] LOGIN

Options:
  -b, --badnames          allow bad names
  -c, --comment COMMENT    new value of the GECOS field
  -d, --home HOME_DIR      new home directory for the user account
  -e, --expiredate EXPIRE_DATE set account expiration date to EXPIRE_DATE
  -f, --inactive INACTIVE   set password inactive after expiration
                           ... INACTIVE
```

32. groupadd

groupadd command creates a new group account using the values specified on the command line and the default values from the system.
eg groupadd student

```
pradeep@pradeep-VirtualBox:~$ groupadd student
groupadd: Permission denied.
groupadd: cannot lock /etc/group; try again later.
pradeep@pradeep-VirtualBox:~$ sudo groupadd student
[sudo] password for pradeep:
```

33. groups - print the groups a user is in

eg groups pradeep

```
pradeep@pradeep-VirtualBox:~$ groups pradeep
pradeep : pradeep adm cdrom sudo dip plugdev lpadmin lxd sambashare
pradeep@pradeep-VirtualBox:~$
```

34. groupdel

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

```
pradeep@pradeep-VirtualBox:~$ groupdel student
groupdel: Permission denied.
groupdel: cannot lock /etc/group; try again later.
pradeep@pradeep-VirtualBox:~$ sudo groupdel student
pradeep@pradeep-VirtualBox:~$
```

35.groupmod

The groupmod command modifies the definition of the specified group by modifying the appropriate entry in the group database.
Eg groupmod -n group1 group2

```
pradeep@pradeep-VirtualBox:~$ sudo groupadd g2
pradeep@pradeep-VirtualBox:~$ sudo groupmod -n g1 g2
pradeep@pradeep-VirtualBox:~$
```

36. chmod

To change directory permissions of file/ Directory in Linux.
chmod whowhatwhich file/directory
chmod +rwx filename to add permissions.
chmod -rwx directoryname to remove permissions.
chmod +x filename to allow executable permissions.
chmod -wx filename to take out write and executable permissions.

```
pradeep@pradeep-VirtualBox:~$ chmod -wx psa
pradeep@pradeep-VirtualBox:~$
```

37. chown

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

```
pradeep@pradeep-VirtualBox:~$ chown pradeep psa
pradeep@pradeep-VirtualBox:~$
```

38. 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.

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

39. ps

The ps command, short for Process Status, is a command line utility that is used to display or view information related to the processes running in a Linux system.

PID – This is the unique process ID

TTY – This is the type of terminal that the user is logged in to

TIME – This is the time in minutes and seconds that the process has been running

CMD – The command that launched the process

ps -a

```
pradeep@pradeep-VirtualBox:~$ ps -a
  PID TTY      TIME CMD
  903 tty2    00:00:05 Xorg
 1006 tty2    00:00:00 gnome-session-b
 2894 pts/0    00:00:00 ps
pradeep@pradeep-VirtualBox:~$
```

40. top

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

top -u pradeep

```
pradeep@pradeep-VirtualBox:~$ top -u pradeep
top - 02:33:50 up  1:17,  1 user,  load average: 0.02, 0.05, 0.04
Tasks: 181 total,   1 running, 180 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.4 us,  0.0 sy,  0.0 ni, 99.6 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem : 1745.3 total,     86.4 free,   900.0 used,   758.9 buff/cache
MiB Swap:  448.5 total,    413.3 free,    35.2 used.   663.1 avail Mem

          PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
        903 pradeep    20   0  603048  60688  36960 S  2.0  3.4  0:07.42 Xorg
      2378 pradeep    20   0  823072  50376  37992 S  1.7  2.8  0:03.59 gnome-+
      1143 pradeep    20   0 3707256 326772 112488 S  1.3 18.3  0:27.48 gnome-+
      864 pradeep    20   0   19352   9548   8012 S  0.0  0.5  0:00.65 systemd
      865 pradeep    20   0  103696   2404     0 S  0.0  0.1  0:00.00 (sd-pa+
      890 pradeep     9  -11 1679052  14148  12364 S  0.0  0.8  0:00.58 pulsea+
      893 pradeep    39   19  519860  16352  13500 S  0.0  0.9  0:00.16 tracke+
      896 pradeep    20   0  248808   7304   6768 S  0.0  0.4  0:00.03 gnome-+
      901 pradeep    20   0  172652   6064   5784 S  0.0  0.3  0:00.00 gdm-x ++
      908 pradeep    20   0   8484   5220   3616 S  0.0  0.3  0:00.51 dbus-d+
      914 pradeep    20   0  248336   7188   6708 S  0.0  0.4  0:00.03 gvfsd
      929 pradeep    20   0  378344   5772   5672 S  0.0  0.3  0:00.00 gvfsd-
      933 pradeep    20   0  322560   8424   7652 S  0.0  0.5  0:00.26 gvfs-u+
```

41. wc

wc stands for word count.

Used for counting purpose.

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

- #wc state.txt
6 8 54 state.txt
- #wc state.txt capital.txt
- wc -l state.txt
- wc -w state.txt capital.txt
- wc -c state.txt
- wc -m state.txt

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ wc file1
4 4 24 file1
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

42. tar

The Linux “tar” stands for tape archive, which is used by large number of Linux/Unix system administrators to deal with tape drives backup.

The tar command used to rip a collection of files and directories into highly compressed archive file commonly called tarball or tar, gzip and bzip in Linux.

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ tar cf all.tar f1 f2 f3
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
all.tar f1 f2 f3 file1.txt file2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ mkdir extract
pradeep@pradeep-VirtualBox:~/Documents/aj$ cd extract
pradeep@pradeep-VirtualBox:~/Documents/aj/extract$ tar xf /home/Documents/aj/all.tar
tar: /home/Documents/aj/all.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
pradeep@pradeep-VirtualBox:~/Documents/aj/extract$ tar xf /home/pradeep/Documents/aj/all.tar
pradeep@pradeep-VirtualBox:~/Documents/aj/extract$ ls
f1 f2 f3
pradeep@pradeep-VirtualBox:~/Documents/aj/extract$
```

Creation using Gzip,bz2,gz

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo tar czf Documents.tar.gz /etc/
[sudo] password for pradeep:
tar: Removing leading '/' from member names
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
all.tar Documents.tar.gz extract f1 f2 f3 file1.txt file2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo tar czf Documents.tar.gz f1 f2 f3
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
all.tar Documents.tar.gz extract f1 f2 f3 file1.txt file2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo tar czf Documents.tar.bz2 f1 f2 f3
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
all.tar Documents.tar.gz f1 f3 file2.txt
Documents.tar.bz2 extract f2 file1.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$ sudo tar czf Documents.tar.gzip f1 f2 f3
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls
all.tar Documents.tar.gz extract f2 file1.txt
Documents.tar.bz2 Documents.tar.gzip f1 f3 file2.txt
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

Extracting using Gzip

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ mkdir extractgzip  
pradeep@pradeep-VirtualBox:~/Documents/aj$ cd extractgzip  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgzip$ tar xzf /home/pradeep/Documents/aj/Documents.tar.gzp  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgzip$ ls  
f1 f2 f3  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgzip$ █
```

Extraction using Bz2

```
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgzip$ cd ..  
pradeep@pradeep-VirtualBox:~/Documents/aj$ mkdir extractbz2  
pradeep@pradeep-VirtualBox:~/Documents/aj$ cd extractbz2  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractbz2$ tar xzf /home/pradeep/Documents/aj/Documents.tar.bz2  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractbz2$ ls  
f1 f2 f3  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractbz2$ █
```

Extraction using Gz

```
pradeep@pradeep-VirtualBox:~/Documents/aj/extractbz2$ cd ..  
pradeep@pradeep-VirtualBox:~/Documents/aj$ mkdir extractgz  
pradeep@pradeep-VirtualBox:~/Documents/aj$ cd extractgz  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ tar xzf /home/pradeep/Documents/aj/Documents.tar.gz  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ ls  
f1 f2 f3  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ █
```

43.expr

- The expr command evaluates a given expression and displays its corresponding output. It is used for:
- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.
- Performing operations on variables inside a shell script

```
#expr 10 + 2
```

```
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ expr 15 + 4  
19  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ expr 12 - 4  
8  
pradeep@pradeep-VirtualBox:~/Documents/aj/extractgz$ █
```

44. Redirections & Piping

- A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing.
- Pipe is used to combine two or more commands, the output of one command acts as input to another command, and this command's output may act as input to the next command and so on.

```
#ls -l | wc -l  
#cat /etc.passwd.txt | head -7 | tail -5
```

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls -l | wc file1.txt  
7 8 61 file1.txt  
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls | wc file1.txt  
7 8 61 file1.txt  
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls| wc  
13 13 132  
pradeep@pradeep-VirtualBox:~/Documents/aj$ ls| wc -l  
13  
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

45. 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.

```
#ssh user_name@host(IP/Domain_name)  
#ssh -X root@server1.example.com
```

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ssh  
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-B bind_interface]  
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]  
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]  
           [-i identity_file] [-J [user@]host[:port]] [-L address]  
           [-l login_name] [-m mac_spec] [-o ctl_cmd] [-o option] [-p port]  
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]  
           [-w local_tun[:remote_tun]] destination [command]  
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

46.ssh-keygen

- ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system without supplying a password. Keys must be generated for each user separately.

If you generate key pairs as the root user, only the root can use the keys.
\$ssh-keygen -t rsa

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/pradeep/.ssh/id_rsa): rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:E42juMYHIbBJqKDMtxVcPawB/lXCI5F4MJ1xzqxqptA pradeep@pradeep-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
|o. .+++oO . |
|++ .+.B=Oo |
|O . .o B=+ |
|oo o +.ooo |
| . = .oS |
| .o o. . |
| . E++. |
| ..+ |
| . |
+---[SHA256]----+
pradeep@pradeep-VirtualBox:~/Documents/aj$
```

47. ssh-copy-id

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

\$ssh-copy-id username@remote_host

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ ssh-keygen -t rsa -b 4096 -C"psa@domain.com"
Generating public/private rsa key pair.
Enter file in which to save the key (/home/pradeep/.ssh/id_rsa): rsa
rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:52VW6q/85tlG9FdHpPqfRJVHpxqLqALR7swfDbjYRRc psa@domain.com
The key's randomart image is:
+---[RSA 4096]----+
|       E      .+|
|   .     .    ++|
| . . . . . +oo|
| o o . . B   *|
| . o o S o O o+|
| B o + o = .. +|
| . B o . . . o.|
|   o .   . o+o|
|   .     o==oo|
+---[SHA256]----+
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

```
Your public key has been saved in /home/pradeep/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:47TkyBEXmxT9dJXiEsRuO5gA+077+WIvLGjZ93P/luE psa@domain.com
The key's randomart image is:
+---[RSA 4096]---+
|       .oo.   .o|
|     . . . +.o... |
|     . o + .oo.. |
|     . +     .. |
|     . . S + o |
|     o B = o   . |
|     = + +     .o|
|     + + *...   E |
|     . .*o*+o ...o. |
+---[SHA256]---+
pradeep@pradeep-VirtualBox:~$ ls ~/.ssh/id_*
/home/pradeep/.ssh/id_rsa  /home/pradeep/.ssh/id_rsa.pub
pradeep@pradeep-VirtualBox:~$ ssh-copy-id Documents@192.168.9.91
```

48. Scp

- SCP (secure copy) is a command-line utility that allows you to securely copy files and directories between two locations.
- With scp, you can copy a file or directory:
- From your local system to a remote system.
- From a remote system to your local system.
- Between two remote systems from your local system.
- Remote file system locations are specified in format [user@]host:/path

Syntax:

```
scp [OPTION] [user@]SRC_HOST:]file1 [user@]DEST_HOST:]file2
```

```
$scp /etc/yum.config /etc/hosts ServerX:/home/student
```

```
$scp ServerX:/etc/hostname /home/student
```

```
pradeep@pradeep-VirtualBox:~/Documents/aj$ scp
usage: scp [-346BCpqRTv] [-c cipher] [-F ssh_config] [-i identity_file]
           [-J destination] [-l limit] [-o ssh_option] [-P port]
           [-S program] source ... target
pradeep@pradeep-VirtualBox:~/Documents/aj$ █
```

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

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song1.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song2.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song3.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song4.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song5.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > song6.mp3
```

```
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap1.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap2.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap3.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap4.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap5.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > snap6.mp3
```

```
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film1.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film2.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film3.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film4.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film5.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ cat > film6.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ ls
film1.mp3  film4.mp3  snap1.mp3  snap4.mp3  song1.mp3  song4.mp3
film2.mp3  film5.mp3  snap2.mp3  snap5.mp3  song2.mp3  song5.mp3
film3.mp3  film6.mp3  snap3.mp3  snap6.mp3  song3.mp3  song6.mp3
pradeep@pradeep-VirtualBox:~/Documents/5$ mv song1.mp3 song2.mp3 song3.mp3 song
4.mp3 song5.mp3 song6.mp3 /home/pradeep/Music
pradeep@pradeep-VirtualBox:~/Documents/5$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap
4.mp3 snap5.mp3 snap6.mp3 /home/pradeep/Pictures
pradeep@pradeep-VirtualBox:~/Documents/5$ mv film1.mp3 film2.mp3 film3.mp3 film
4.mp3 film5.mp3 film6.mp3 /home/pradeep/Videos
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ mkdir friends family work  
pradeep@pradeep-VirtualBox:~/Documents/5$ ls  
family friends work  
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Music$ pwd  
/home/pradeep/Music  
pradeep@pradeep-VirtualBox:~/Music$ ls  
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3  
pradeep@pradeep-VirtualBox:~/Music$ cp song1.mp3 song2.mp3 song3.mp3 song4.mp3  
song5.mp3 song6.mp3 /home/pradeep/Documents/5/friends  
pradeep@pradeep-VirtualBox:~/Music$
```

```
pradeep@pradeep-VirtualBox:~/Documents/5/friends$ pwd  
/home/pradeep/Documents/5/friends  
pradeep@pradeep-VirtualBox:~/Documents/5/friends$ ls  
song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3  
pradeep@pradeep-VirtualBox:~/Documents/5/friends$
```

```
pradeep@pradeep-VirtualBox:~/Pictures$ pwd  
/home/pradeep/Pictures  
pradeep@pradeep-VirtualBox:~/Pictures$ ls  
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3  
pradeep@pradeep-VirtualBox:~/Pictures$ cp snap1.mp3 snap2.mp3 snap3.mp3 snap4.m  
p3 snap5.mp3 snap6.mp3 /home/pradeep/Documents/5/family  
pradeep@pradeep-VirtualBox:~/Pictures$
```

```
pradeep@pradeep-VirtualBox:~/Documents/5/family$ pwd  
/home/pradeep/Documents/5/family  
pradeep@pradeep-VirtualBox:~/Documents/5/family$ ls  
snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3  
pradeep@pradeep-VirtualBox:~/Documents/5/family$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ rmdir friends family
rmdir: failed to remove 'friends': Directory not empty
rmdir: failed to remove 'family': Directory not empty
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ ls
family friends work
pradeep@pradeep-VirtualBox:~/Documents/5$ rm -r friends family
pradeep@pradeep-VirtualBox:~/Documents/5$ ls
work
pradeep@pradeep-VirtualBox:~/Documents/5$ █
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ ls
work
pradeep@pradeep-VirtualBox:~/Documents/5$ ls -a
. .. work
pradeep@pradeep-VirtualBox:~/Documents/5$ ls > allfiles.txt
pradeep@pradeep-VirtualBox:~/Documents/5$ cat allfiles.txt
allfiles.txt
work
pradeep@pradeep-VirtualBox:~/Documents/5$ █
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ date +"day number:%u"
day number:2
pradeep@pradeep-VirtualBox:~/Documents/5$ date
Tuesday 17 August 2021 11:05:42 PM IST
pradeep@pradeep-VirtualBox:~/Documents/5$
```

9. Add the user Juliet.

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd juliet  
[sudo] password for pradeep:  
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ cat /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sys:x:3:3:sys:/dev:/usr/sbin/nologin
```

```
gdm:x:125:130:Gnome Display Manager:/var/lib/gdm3:/bin/false  
pradeep:x:1000:1000:Pradeep,,,:/home/pradeep:/bin/bash  
systemd-coredump:x:999:999:systemd Core Dumper:/:/usr/sbin/nologin  
juliet:x:1001:1001::/home/juliet:/bin/sh  
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo passwd -S juliet  
juliet L 08/17/2021 0 99999 7 -1  
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo passwd juliet  
New password:  
Retype new password:  
passwd: password updated successfully  
pradeep@pradeep-VirtualBox:~/Documents/5$
```

12. Create a supplementary group called Shakespeare with a group id of 3000.

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo groupadd -g 3000 shakespeare  
pradeep@pradeep-VirtualBox:~/Documents/5$  
pradeep@pradeep-VirtualBox:~/Documents/5$ cat /etc/group  
root:x:0:  
daemon:x:1:  
bin:x:2:  
sys:x:3:  
adm:x:4:pradeep  
  
exa:x:131:pradeep  
pradeep:x:1000:  
sambashare:x:132:pradeep  
systemd-coredump:x:999:  
juliet:x:1001:  
shakespeare:x:3000:  
pradeep@pradeep-VirtualBox:~/Documents/5$
```

13. Create a supplementary group called artists.

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo groupadd artists
pradeep@pradeep-VirtualBox:~/Documents/5$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
```

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

```
systemd-coredump:x:999:
juliet:x:1001:
shakespeare:x:3000:
artists:x:3001:
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo usermod -a -G shakespeare juliet
pradeep@pradeep-VirtualBox:~/Documents/5$ groups juliet
juliet : juliet shakespeare
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ id juliet
uid=1001(juliet) gid=1001(juliet) groups=1001(juliet),3000(shakespeare)
pradeep@pradeep-VirtualBox:~/Documents/5$
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd -G shakespeare Romeo
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd -G shakespeare Hamlet
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd -G artists Reba
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd -G artists Dolly
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo useradd -G artists Elvis
pradeep@pradeep-VirtualBox:~/Documents/5$
```

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

```
pradeep@pradeep-VirtualBox:~/Documents/5$  
pradeep@pradeep-VirtualBox:~/Documents/5$ cat /etc/group  
root:x:0:  
daemon:x:1:  
bin:x:2:
```

```
systemd-coredump:x:999:  
juliet:x:1001:  
shakespeare:x:3000:juliet,Romeo,Hamlet  
artists:x:3001:Reba,Dolly,Elvis  
Reba:x:1002:  
Dolly:x:1003:  
Elvis:x:1004:  
Romeo:x:1005:  
Hamlet:x:1006:  
pradeep@pradeep-VirtualBox:~/Documents/5$ █
```

20. Attempt to remove user Dolly.

```
pradeep@pradeep-VirtualBox:~/Documents/5$ sudo userdel Dolly  
pradeep@pradeep-VirtualBox:~/Documents/5$ cat /etc/group  
root:x:0:  
daemon:x:1:  
bin:x:2:  
sys:x:3:
```

```
systemd-coredump:x:999:  
juliet:x:1001:  
shakespeare:x:3000:juliet,Romeo,Hamlet  
artists:x:3001:Reba,Elvis  
Reba:x:1002:  
Elvis:x:1004:  
Romeo:x:1005:  
Hamlet:x:1006:  
pradeep@pradeep-VirtualBox:~/Documents/5$ █
```

1. Try out these network commands in Window as well as in Linux and perform at least 4 options with each command: ping route traceroute, nslookup, Ip Config, NetStat.

WINDOWS

Ping:

```
C:\Users\prade>ping google.com

Pinging google.com [142.250.182.14] with 32 bytes of data:
Reply from 142.250.182.14: bytes=32 time=21ms TTL=117
Reply from 142.250.182.14: bytes=32 time=20ms TTL=117
Reply from 142.250.182.14: bytes=32 time=20ms TTL=117
Reply from 142.250.182.14: bytes=32 time=20ms TTL=117

Ping statistics for 142.250.182.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 21ms, Average = 20ms
```

```
C:\Users\prade>ping -a google.com

Pinging google.com [142.250.182.14] with 32 bytes of data:
Reply from 142.250.182.14: bytes=32 time=20ms TTL=117

Ping statistics for 142.250.182.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 20ms, Average = 20ms
```

```
C:\Users\prade>ping -j google.com

Pinging google.com [142.250.182.14] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.182.14:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Route:

```
C:\Users\prade>route print
=====
Interface List
  9...98 28 a6 47 7e 3d ....Killer E2500 Gigabit Ethernet Controller
  22...0a 00 27 00 00 16 ....VirtualBox Host-Only Ethernet Adapter
  15...a0 51 0b ca 06 a3 ....Microsoft Wi-Fi Direct Virtual Adapter #3
  13...a2 51 0b ca 06 a2 ....Microsoft Wi-Fi Direct Virtual Adapter #4
    5...a0 51 0b ca 06 a2 ....Intel(R) Wireless-AC 9560 160MHz
    3...a0 51 0b ca 06 a6 ....Bluetooth Device (Personal Area Network)
    1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
          0.0.0.0        0.0.0.0    192.168.18.1  192.168.18.4    35
          127.0.0.0     255.0.0.0   On-link        127.0.0.1    331
          127.0.0.1     255.255.255.255  On-link        127.0.0.1    331
  127.255.255.255     255.255.255.255  On-link        127.0.0.1    331
          192.168.18.0   255.255.255.0   On-link        192.168.18.4   291
          192.168.18.4   255.255.255.255  On-link        192.168.18.4   291
  192.168.18.255     255.255.255.255  On-link        192.168.18.4   291
          192.168.56.0   255.255.255.0   On-link        192.168.56.1   281
          192.168.56.1   255.255.255.255  On-link        192.168.56.1   281
  192.168.56.255     255.255.255.255  On-link        192.168.56.1   281
          224.0.0.0      240.0.0.0   On-link        127.0.0.1    331
          224.0.0.0      240.0.0.0   On-link        192.168.56.1   281
          224.0.0.0      240.0.0.0   On-link        192.168.18.4   291
  255.255.255.255     255.255.255.255  On-link        127.0.0.1    331
  255.255.255.255     255.255.255.255  On-link        192.168.56.1   281
  255.255.255.255     255.255.255.255  On-link        192.168.18.4   291
=====

Persistent Routes:
  None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
  1    331 ::1/128            On-link
  22   281 fe80::/64          On-link
  5    291 fe80::/64          On-link
  22   281 fe80::85af:d7d9:9d47:318d/128
                                On-link
  5    291 fe80::acd4:38ce:8683:d5d0/128
                                On-link
  1    331 ff00::/8           On-link
  22   281 ff00::/8           On-link
```

```
C:\Users\prade>route print -6
=====
Interface List
  9...98 28 a6 47 7e 3d .....Killer E2500 Gigabit Ethernet Controller
  22...0a 00 27 00 00 16 .....VirtualBox Host-Only Ethernet Adapter
  15...a0 51 0b ca 06 a3 .....Microsoft Wi-Fi Direct Virtual Adapter #3
  13...a2 51 0b ca 06 a2 .....Microsoft Wi-Fi Direct Virtual Adapter #4
  5...a0 51 0b ca 06 a2 .....Intel(R) Wireless-AC 9560 160MHz
  3...a0 51 0b ca 06 a6 .....Bluetooth Device (Personal Area Network)
  1.....Software Loopback Interface 1
=====

IPv6 Route Table
=====
Active Routes:
  If Metric Network Destination      Gateway
    1     331 ::1/128                On-link
   22     281 fe80::/64              On-link
    5     291 fe80::/64              On-link
   22     281 fe80::85af:d7d9:9d47:318d/128
                                         On-link
    5     291 fe80::acd4:38ce:8683:d5d0/128
                                         On-link
    1     331 ff00::/8               On-link
   22     281 ff00::/8               On-link
    5     291 ff00::/8               On-link
=====

Persistent Routes:
  None

C:\Users\prade>
```

```
C:\Users\prade>route print *157
=====
Interface List
  9...98 28 a6 47 7e 3d .....Killer E2500 Gigabit Ethernet Controller
  22...0a 00 27 00 00 16 .....VirtualBox Host-Only Ethernet Adapter
  15...a0 51 0b ca 06 a3 .....Microsoft Wi-Fi Direct Virtual Adapter #3
  13...a2 51 0b ca 06 a2 .....Microsoft Wi-Fi Direct Virtual Adapter #4
  5...a0 51 0b ca 06 a2 .....Intel(R) Wireless-AC 9560 160MHz
  3...a0 51 0b ca 06 a6 .....Bluetooth Device (Personal Area Network)
  1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
  None
Persistent Routes:
  None

IPv6 Route Table
=====
Active Routes:
  None
Persistent Routes:
  None
```

Traceroute:

```
C:\Users\prade>tracert 192.168.18.1

Tracing route to 192.168.18.1 over a maximum of 30 hops

  1      1 ms      1 ms      1 ms  192.168.18.1

Trace complete.

C:\Users\prade>
```

```
C:\Users\prade>tracert www.google.com

Tracing route to www.google.com [142.250.196.36]
over a maximum of 30 hops:

  1      1 ms      1 ms      1 ms  192.168.18.1
  2      3 ms      3 ms      3 ms  59.89.208.1
  3     14 ms     13 ms     10 ms  218.248.168.86
  4      *         *         *      Request timed out.
  5      *         *         *      Request timed out.
  6     28 ms     27 ms     28 ms  72.14.205.109
  7     27 ms     27 ms     27 ms  108.170.253.113
  8     28 ms     27 ms     27 ms  142.251.55.29
  9     27 ms     27 ms     27 ms  maa03s45-in-f4.1e100.net [142.250.196.36]

Trace complete.
```

```
C:\Users\prade>tracert -d www.yahoo.com

Tracing route to new-fp-shed.wg1.b.yahoo.com [202.165.107.50]
over a maximum of 30 hops:

  1      1 ms      1 ms      1 ms  192.168.18.1
  2      3 ms      2 ms      2 ms  59.89.208.1
  3      3 ms     15 ms      3 ms  218.248.58.134
  4      *         *         *      Request timed out.
  5      *         *         *      Request timed out.
  6     23 ms     22 ms     22 ms  203.101.76.113
  7     59 ms     54 ms     54 ms  116.119.68.220
  8     55 ms     55 ms     55 ms  27.111.228.131
  9     76 ms     70 ms     65 ms  203.84.209.77
 10    64 ms     79 ms     63 ms  106.10.128.7
 11    65 ms     65 ms     65 ms  106.10.131.217
 12    59 ms     59 ms     59 ms  106.10.128.247
 13    91 ms     86 ms     84 ms  202.165.107.50

Trace complete.
```

Nslookup:

```
C:\Users\prade>nslookup  
Default Server: UnKnown  
Address: 192.168.18.1
```

```
C:\Users\prade>nslookup google.com  
Server: UnKnown  
Address: 192.168.18.1  
  
Non-authoritative answer:  
Name: google.com  
Addresses: 2404:6800:4007:819::200e  
          142.250.182.14
```

```
C:\Users\prade>
```

```
C:\Users\prade>nslookup -q=MX google.com  
Server: UnKnown  
Address: 192.168.18.1  
  
Non-authoritative answer:  
google.com      MX preference = 20, mail exchanger = alt1.aspmx.l.google.com  
google.com      MX preference = 30, mail exchanger = alt2.aspmx.l.google.com  
google.com      MX preference = 10, mail exchanger = aspmx.l.google.com  
google.com      MX preference = 50, mail exchanger = alt4.aspmx.l.google.com  
google.com      MX preference = 40, mail exchanger = alt3.aspmx.l.google.com  
  
alt1.aspmx.l.google.com internet address = 173.194.202.26  
alt1.aspmx.l.google.com AAAA IPv6 address = 2607:f8b0:400e:c00::1b  
alt2.aspmx.l.google.com internet address = 142.250.141.26  
alt2.aspmx.l.google.com AAAA IPv6 address = 2607:f8b0:4023:c0b::1b  
aspmx.l.google.com    internet address = 172.253.118.26  
aspmx.l.google.com    AAAA IPv6 address = 2404:6800:4003:c03::1b  
alt4.aspmx.l.google.com internet address = 64.233.171.26  
alt4.aspmx.l.google.com AAAA IPv6 address = 2607:f8b0:4003:c15::1a  
alt3.aspmx.l.google.com internet address = 142.250.115.26  
alt3.aspmx.l.google.com AAAA IPv6 address = 2607:f8b0:4023:1004::1a
```

```
C:\Users\prade>
```

Ip Config:

```
C:\Users\prade>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::85af:d7d9:9d47:318d%22
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 3:

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

Wireless LAN adapter Local Area Connection* 12:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::acd4:38ce:8683:d5d0%5
    IPv4 Address. . . . . : 192.168.18.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.18.1

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\prade>
```

NetStat:

```
C:\Users\prade>netstat  
  
Active Connections  
  
Proto  Local Address          Foreign Address        State  
TCP    127.0.0.1:49669        checkhost:49670      ESTABLISHED  
TCP    127.0.0.1:49670        checkhost:49669      ESTABLISHED  
TCP    127.0.0.1:49671        checkhost:49672      ESTABLISHED  
TCP    127.0.0.1:49672        checkhost:49671      ESTABLISHED  
TCP    127.0.0.1:55783        checkhost:55784      ESTABLISHED  
TCP    127.0.0.1:55784        checkhost:55783      ESTABLISHED  
TCP    127.0.0.1:55785        checkhost:55786      ESTABLISHED  
TCP    127.0.0.1:55786        checkhost:55785      ESTABLISHED  
TCP    127.0.0.1:55789        checkhost:55790      ESTABLISHED  
TCP    127.0.0.1:55790        checkhost:55789      ESTABLISHED  
TCP    127.0.0.1:60177        checkhost:60178      ESTABLISHED  
TCP    127.0.0.1:60178        checkhost:60177      ESTABLISHED  
TCP    127.0.0.1:61903        checkhost:65001      ESTABLISHED  
TCP    127.0.0.1:63042        checkhost:63043      ESTABLISHED  
TCP    127.0.0.1:63043        checkhost:63042      ESTABLISHED  
TCP    127.0.0.1:64928        checkhost:64929      ESTABLISHED  
TCP    127.0.0.1:64929        checkhost:64928      ESTABLISHED  
TCP    127.0.0.1:64944        checkhost:64945      ESTABLISHED  
TCP    127.0.0.1:64945        checkhost:64944      ESTABLISHED  
TCP    127.0.0.1:65001        checkhost:61903      ESTABLISHED  
TCP    192.168.18.4:49572     maa03s34-in-f10:https TIME_WAIT  
TCP    192.168.18.4:49866     ec2-35-170-0-145:https ESTABLISHED  
TCP    192.168.18.4:50586     20.44.229.112:https ESTABLISHED  
TCP    192.168.18.4:52860     bam-9:https       ESTABLISHED  
TCP    192.168.18.4:56006     104.16.248.249:https ESTABLISHED  
TCP    192.168.18.4:59791     a104-114-94-38:https ESTABLISHED  
TCP    192.168.18.4:59815     204.79.197.219:https ESTABLISHED  
TCP    192.168.18.4:59816     221:https         ESTABLISHED  
TCP    192.168.18.4:59817     239:https         ESTABLISHED  
TCP    192.168.18.4:60182     ec2-35-165-184-220:https ESTABLISHED  
TCP    192.168.18.4:60313     40.101.93.242:https ESTABLISHED  
TCP    192.168.18.4:62366     maa03s34-in-f10:https TIME_WAIT  
TCP    192.168.18.4:64649     ec2-34-230-213-36:https ESTABLISHED  
TCP    192.168.18.4:64937     whatsapp-cdn-shv-03-sin6:https ESTABLISHED  
  
C:\Users\prade>
```

```
C:\Users\prade>netstat -n
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:49669	127.0.0.1:49670	ESTABLISHED
TCP	127.0.0.1:49670	127.0.0.1:49669	ESTABLISHED
TCP	127.0.0.1:49671	127.0.0.1:49672	ESTABLISHED
TCP	127.0.0.1:49672	127.0.0.1:49671	ESTABLISHED
TCP	127.0.0.1:55783	127.0.0.1:55784	ESTABLISHED
TCP	127.0.0.1:55784	127.0.0.1:55783	ESTABLISHED
TCP	127.0.0.1:55785	127.0.0.1:55786	ESTABLISHED
TCP	127.0.0.1:55786	127.0.0.1:55785	ESTABLISHED
TCP	127.0.0.1:55789	127.0.0.1:55790	ESTABLISHED
TCP	127.0.0.1:55790	127.0.0.1:55789	ESTABLISHED
TCP	127.0.0.1:60177	127.0.0.1:60178	ESTABLISHED
TCP	127.0.0.1:60178	127.0.0.1:60177	ESTABLISHED
TCP	127.0.0.1:61903	127.0.0.1:65001	ESTABLISHED
TCP	127.0.0.1:63042	127.0.0.1:63043	ESTABLISHED
TCP	127.0.0.1:63043	127.0.0.1:63042	ESTABLISHED
TCP	127.0.0.1:64928	127.0.0.1:64929	ESTABLISHED
TCP	127.0.0.1:64929	127.0.0.1:64928	ESTABLISHED
TCP	127.0.0.1:64944	127.0.0.1:64945	ESTABLISHED
TCP	127.0.0.1:64945	127.0.0.1:64944	ESTABLISHED
TCP	127.0.0.1:65001	127.0.0.1:61903	ESTABLISHED
TCP	192.168.18.4:49866	35.170.0.145:443	ESTABLISHED
TCP	192.168.18.4:50586	20.44.229.112:443	TIME_WAIT
TCP	192.168.18.4:52860	162.247.242.21:443	ESTABLISHED

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

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:445	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:3306	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:5040	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:5357	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:33060	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:49664	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:49665	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:49666	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:49667	LAPTOP-ITV70PCJ:0	LISTENING
TCP	0.0.0.0:49668	LAPTOP-ITV70PCJ:0	LISTENING
TCP	127.0.0.1:27017	LAPTOP-ITV70PCJ:0	LISTENING
TCP	127.0.0.1:49669	checkhost:49670	ESTABLISHED
TCP	127.0.0.1:49670	checkhost:49669	ESTABLISHED
TCP	127.0.0.1:49671	checkhost:49672	ESTABLISHED
TCP	127.0.0.1:49672	checkhost:49671	ESTABLISHED
TCP	127.0.0.1:55783	checkhost:55784	ESTABLISHED
TCP	127.0.0.1:55784	checkhost:55783	ESTABLISHED
TCP	127.0.0.1:55785	checkhost:55786	ESTABLISHED
TCP	127.0.0.1:55786	checkhost:55785	ESTABLISHED

UBUNTU

Ping:

```
pradeep@pradeep-VirtualBox:~$ ping www.google.com
PING www.google.com (142.250.196.68) 56(84) bytes of data.
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=1 ttl=115 time=21.0 ms
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=2 ttl=115 time=21.8 ms
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=3 ttl=115 time=20.8 ms
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=4 ttl=115 time=25.3 ms
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=5 ttl=115 time=24.0 ms
64 bytes from maa03s46-in-f4.1e100.net (142.250.196.68): icmp_seq=6 ttl=115 time=
```

Route:

```
pradeep@pradeep-VirtualBox:~$ 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
pradeep@pradeep-VirtualBox:~$
```

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

Nslookup:

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

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

pradeep@pradeep-VirtualBox:~$
```

```
pradeep@pradeep-VirtualBox:~$ nslookup -q=MX google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
google.com    mail exchanger = 20 alt1.aspmx.l.google.com.
google.com    mail exchanger = 40 alt3.aspmx.l.google.com.
google.com    mail exchanger = 30 alt2.aspmx.l.google.com.
google.com    mail exchanger = 10 aspmx.l.google.com.
google.com    mail exchanger = 50 alt4.aspmx.l.google.com.

Authoritative answers can be found from:

pradeep@pradeep-VirtualBox:~$
```

```
pradeep@pradeep-VirtualBox:~$ nslookup -type=a google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.182.14

pradeep@pradeep-VirtualBox:~$
```

Ifconfig:

```
pradeep@pradeep-VirtualBox:~$ 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::e286:ce11:a483:5f07  prefixlen 64  scopeid 0x20<link>
          ether 08:00:27:48:95:01  txqueuelen 1000  (Ethernet)
            RX packets 2953  bytes 1994300 (1.9 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 2335  bytes 363910 (363.9 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
          loop  txqueuelen 1000  (Local Loopback)
            RX packets 832  bytes 84964 (84.9 KB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 832  bytes 84964 (84.9 KB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

pradeep@pradeep-VirtualBox:~$
```

Netstat:

```
pradeep@pradeep-VirtualBox:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 pradeep-VirtualBo:57994 stackoverflow.com:https ESTABLISHED
tcp      0      0 pradeep-VirtualBo:35896 ec2-35-155-6-125.:https TIME_WAIT
tcp      0      0 pradeep-VirtualBo:35390 ec2-44-239-205-25:https ESTABLISHED
tcp      0      1 pradeep-VirtualBo:55514 32.121.122.34.bc.g:http SYN_SENT
tcp      0      0 pradeep-VirtualBo:57946 stackoverflow.com:https ESTABLISHED
udp      0      0 pradeep-VirtualB:bootpc _gateway:bootps      ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node  Path
unix  2      [ ]      DGRAM                    25823   /run/user/1000/systemd/notify
unix  3      [ ]      DGRAM                    15456   /run/systemd/notify
unix  2      [ ]      DGRAM                    15470   /run/systemd/journal
/syslog
unix  15     [ ]      DGRAM                    15480   /run/systemd/journal
/dev-log
unix  8      [ ]      DGRAM                    15484   /run/systemd/journal
/socket
unix  3      [ ]      STREAM     CONNECTED    36589
unix  3      [ ]      STREAM     CONNECTED    28899
unix  3      [ ]      STREAM     CONNECTED    23043   /run/systemd/journal/stdout
unix  3      [ ]      STREAM     CONNECTED    22627
unix  3      [ ]      STREAM     CONNECTED    22922   /run/dbus/system_bus_socket
unix  3      [ ]      STREAM     CONNECTED    28618   /run/systemd/journal/stdout
```

```
pradeep@pradeep-VirtualBox:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 localhost:domain        0.0.0.0:*            LISTEN
tcp      0      0 localhost:ipp          0.0.0.0:*            LISTEN
tcp      0      0 pradeep-VirtualBo:57994 stackoverflow.com:https ESTABLISHED
tcp      0      0 pradeep-VirtualBo:35390 ec2-44-239-205-25:https ESTABLISHED
tcp      0      0 pradeep-VirtualBo:57946 stackoverflow.com:https ESTABLISHED
tcp6     0      0 [::]:http             [::]:*              LISTEN
tcp6     0      0 ip6-localhost:ipp       [::]:*              LISTEN
udp      0      0 0.0.0.0:33783        0.0.0.0:*
udp      0      0 localhost:domain       0.0.0.0:*
udp      0      0 pradeep-VirtualB:bootpc _gateway:bootps      ESTABLISHED
udp      0      0 0.0.0.0:mdns          0.0.0.0:*
udp      0      0 0.0.0.0:631           0.0.0.0:*
udp6     0      0 [::]:mdns            [::]:*
udp6     0      0 [::]:37421           [::]:*
raw6     0      0 [::]:ipv6-icmp        [::]:*              7
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags     Type      State         I-Node  Path
unix  2      [ ]      DGRAM                    25823   /run/user/1000/systemd/notify
unix  2      [ ACC ]    STREAM    LISTENING    25826   /run/user/1000/systemd/private
unix  2      [ ACC ]    STREAM    LISTENING    25842   /run/user/1000/bus
unix  2      [ ACC ]    STREAM    LISTENING    25843   /run/user/1000/gnupg
*s_dgram
```

2.Identify and perform 5 more network commands and it's working.

NbtStat:

computers that are running a Windows operating system are assigned a computer name. Oftentimes, there is a domain name or a workgroup name that is also assigned to the computer. The computer name is sometimes referred to as the NetBIOS name.

Windows uses several different methods to map NetBIOS names to IP addresses, such as broadcast, LMHost lookup, or even using the nearly extinct method of querying a WINS server.

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

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

    Registered By Broadcast   = 69
    Registered By Name Server = 0

C:\Users\prade>
```

ARP:

The ARP command corresponds to the Address Resolution Protocol. Although it is easy to think of network communications in terms of IP addressing, packet delivery is ultimately dependent on the Media Access Control (MAC) address of the device's network adapter. This is where the Address Resolution Protocol comes into play. Its job is to map IP addresses to MAC addresses.

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

Interface: 192.168.18.4 --- 0x5
  Internet Address      Physical Address      Type
  192.168.18.1          70-fd-45-e0-31-20    dynamic
  192.168.18.255        ff-ff-ff-ff-ff-ff    static
  224.0.0.22             01-00-5e-00-00-16    static
  224.0.0.251            01-00-5e-00-00-fb    static
  224.0.0.252            01-00-5e-00-00-fc    static
  239.255.255.250       01-00-5e-7f-ff-fa    static
  255.255.255.255       ff-ff-ff-ff-ff-ff    static

Interface: 192.168.56.1 --- 0x16
  Internet Address      Physical Address      Type
  192.168.56.255        ff-ff-ff-ff-ff-ff    static
  224.0.0.22             01-00-5e-00-00-16    static
  224.0.0.251            01-00-5e-00-00-fb    static
  224.0.0.252            01-00-5e-00-00-fc    static
  239.255.255.250       01-00-5e-7f-ff-fa    static
  255.255.255.255       ff-ff-ff-ff-ff-ff    static
```

PathPing:

Earlier, I talked about the Ping utility and the Tracert utility, and the similarities between them. As you might have guessed, the PathPing tool is a utility that combines the best aspects of Tracert and Ping.

Entering the PathPing command followed by a host name initiates what looks like a somewhat standard Tracert process. Once this process completes however, the tool takes 300 seconds (five minutes) to gather statistics, and then reports latency and packet loss statistics that are more detailed than those provided by Ping or Tracert.

```
C:\Users\prade>pathping google.com

Tracing route to google.com [142.250.182.14]
over a maximum of 30 hops:
  0  LAPTOP-ITV70PCJ [192.168.18.4]
  1  192.168.18.1
  2  59.89.208.1
  3  218.248.168.90
  4  *      *      *

Computing statistics for 75 seconds...
          Source to Here   This Node/Link
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                               LAPTOP-ITV70PCJ [192.168.18.4]
                                0/ 100 = 0%    |
  1  1ms      0/ 100 = 0%      0/ 100 = 0%  192.168.18.1
                                0/ 100 = 0%    |
  2  4ms      0/ 100 = 0%      0/ 100 = 0%  59.89.208.1
                                0/ 100 = 0%    |
  3  3ms      0/ 100 = 0%      0/ 100 = 0%  218.248.168.90

Trace complete.

C:\Users\prade>
```

Hostname:

The previously discussed NbtStat command can provide you with the host name that has been assigned to a Windows device, if you know which switch to use with the command. However, if you're just looking for a fast and easy way of verifying a computer's name, then try using the Hostname command. Typing Hostname at the command prompt returns the local computer name.

```
C:\Users\prade>hostname
LAPTOP-ITV70PCJ

C:\Users\prade>
```

Getmac:

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

```
C:\Users\prade>getmac

Physical Address      Transport Name
-----
A0-51-0B-CA-06-A2    \Device\Tcpip_{49896C69-D2F8-40EF-9F69-FD9F3E8CABA2}
98-28-A6-47-7E-3D    Media disconnected
A0-51-0B-CA-06-A6    Media disconnected
0A-00-27-00-00-16    \Device\Tcpip_{FAEDA05A-4A46-4249-B45E-F792EDB7F0AB}

C:\Users\prade>
```

LAMP INSTALLATION PROCEDURE

The name LAMP is an acronym of the following programs:

Linux Operating System

Apache HTTP Server

MySQL database management system

PHP programming language

Apache

sudo apt-get install apache2

Press y (yes) and hit ENTER to permit the installation

Check if Apache is installed correctly by running the Apache service status. Use the following command:

sudo service apache2 status

```
pradeep@pradeep-VirtualBox:~$ sudo service apache2 status
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pre
  Active: active (running) since Wed 2021-09-29 12:15:56 IST; 21min ago
    Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 4759 (apache2)
      Tasks: 55 (limit: 2316)
     Memory: 5.5M
        CPU: 0.000 CPU(s) since start
       CGroup: /system.slice/apache2.service
               ├─4759 /usr/sbin/apache2 -k start
               ├─4761 /usr/sbin/apache2 -k start
               └─4762 /usr/sbin/apache2 -k start

Sep 29 12:15:56 pradeep-VirtualBox systemd[1]: Starting The Apache HTTP Server
Sep 29 12:15:56 pradeep-VirtualBox apachectl[4758]: AH00558: apache2: Could n
Sep 29 12:15:56 pradeep-VirtualBox systemd[1]: Started The Apache HTTP Server
lines 1-15/15 (END)
```



This is the default welcome page used to test the correct operation of the Apache2 server a installation on Ubuntu systems. It is based on the equivalent page on Debian, from which th Apache packaging is derived. If you can read this page, it means that the Apache HTTP serv at this site is working properly. You should **replace this file** (located at /var/www/html/index.html) before continuing to operate your HTTP server.

If you are a normal user of this web site and don't know what this page is about, this probat that the site is currently unavailable due to maintenance. If the problem persists, please co site's administrator.

Configuration Overview

Ubuntu's Apache2 default configuration is different from the upstream default configuration into several files optimized for interaction with Ubuntu tools. The configuration system is **fully documented in /usr/share/doc/apache2/README.Debian.gz**. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the **man** page for apache2-doc package was installed on this server.

mariadb

MariaDB is an open source relational database management system (RDBMS)

Command: sudo apt install mariadb-server mariadb-client

Check mariadb Installation

sudo systemctl status mysql

(if it is not working sudo systemctl start mysql)

```
pradeep@pradeep-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
    Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pre
      Active: active (running) since Wed 2021-09-29 12:27:54 IST; 5min ago
        Docs: man:mysqld(8)
                  https://mariadb.com/kb/en/library/systemd/
    Main PID: 8075 (mysqld)
      Status: "Taking your SQL requests now..."
        Tasks: 30 (limit: 2316)
       Memory: 66.7M
      CGroup: /system.slice/mariadb.service
              └─8075 /usr/sbin/mysqld

Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: information
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: mysql
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: performance
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: Phase 6/7:
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: Processing
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: information
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: performance
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: Phase 7/7:
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8113]: OK
Sep 29 12:27:55 pradeep-VirtualBox /etc/mysql/debian-start[8177]: Triggering .
pradeep@pradeep-VirtualBox:~$
```

```
pradeep@pradeep-VirtualBox:~$ sudo mysql_secure_installation
[sudo] password for pradeep:

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'.
```

```
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!
pradeep@pradeep-VirtualBox:~$
```

Php

Command: sudo apt install php libapache2-mod-php php-ocache php-cli
php-gd php-curl php-mysql

Restart apache2

Sudo systemctl restart apache2

check installation

open http://127.0.0.1/phpinfo.php in any browser

```
pradeep@pradeep-VirtualBox:~$ sudo apt install php libapache2-mod-php php-ocac
he php-cli php-gd php-curl
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-readline
Suggested packages:
  php-pear
The following NEW packages will be installed:
  libapache2-mod-php libapache2-mod-php7.4 php php-cli php-common php-curl
    php-gd php7.4 php7.4-cli php7.4-common php7.4-curl php7.4-gd php7.4-json
      php7.4-ocache php7.4-readline
```

```
pradeep@pradeep-VirtualBox:~$ sudo systemctl restart apache2
pradeep@pradeep-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pre
   Active: active (running) since Wed 2021-09-29 15:37:06 IST; 9s ago
     Docs: https://httpd.apache.org/docs/2.4/
           
```

```
pradeep@pradeep-VirtualBox:~$ sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/html/phpinfo.php > /dev/null
pradeep@pradeep-VirtualBox:~$ 
```

PHP Version 7.4.3

System	Linux pradeep-VirtualBox 5.8.0-43-generic #49~20.04.1-Ubuntu x86_64
Build Date	Aug 13 2021 05:39:12
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.4/apache2
Loaded Configuration File	/etc/php/7.4/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.4/apache2/conf.d
Additional .ini files parsed	/etc/php/7.4/apache2/conf.d/10-opcache.ini, /etc/php/7.4/apache2/conf.d/20-calendar.ini, /etc/php/7.4/apache2/conf.d/20-mysqlnd.ini, /etc/php/7.4/apache2/conf.d/20-pdo.ini, /etc/php/7.4/apache2/conf.d/20-readline.ini, /etc/php/7.4/apache2/conf.d/20-zip.ini, /etc/php/7.4/apache2/conf.d/20-zts.ini

phpmyadmin

Command: Sudo apt install phpmyadmin php-mbstring php-zip php-gd php-json phpcurl (It asks for web server select apache2,select db-configuration and set password)

Restart apache2 Sudo systemctl restart apache2

Check phpmyadmin

Open a browser <http://localhost/phpmyadmin> username : root
password :yourpassword

```
pradeep@pradeep-VirtualBox:~$ sudo apt install phpmyadmin php-mbstring php-zip
php-gd php-json php-curl
[sudo] password for pradeep:
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

```
Processing triggers for php7.4-cli (7.4.3-4ubuntu2.6) ...
pradeep@pradeep-VirtualBox:~$ sudo systemctl restart apache2
pradeep@pradeep-VirtualBox:~$
```

phpMyAdmin

localhost/phpmyadmin/index.php

Welcome to phpMyAdmin

Language

English

Log in

Username:

Password:

Go

phpMyAdmin

Welcome to phpMyAdmin

Language

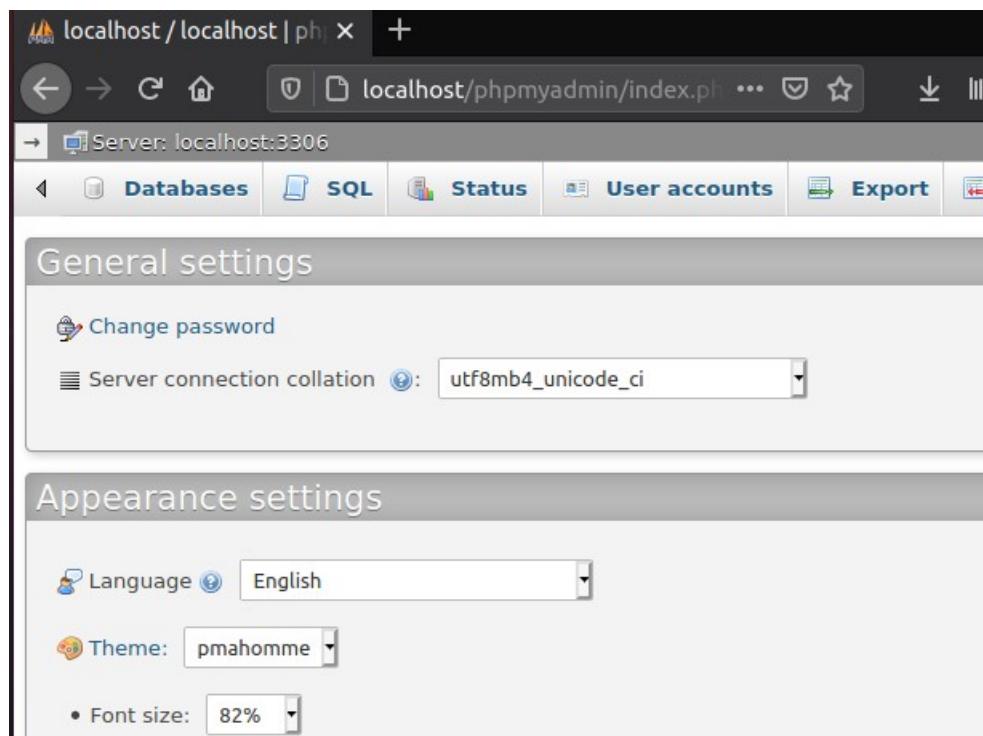
English

Log in

Username: root

Password:|

Go



Ansible Installation

Ansible installation:

Sudo apt-get install ansible

```
pradeep@pradeep-VirtualBox:~$ sudo apt-get install ansible
[sudo] password for pradeep:
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:
```

Version check:

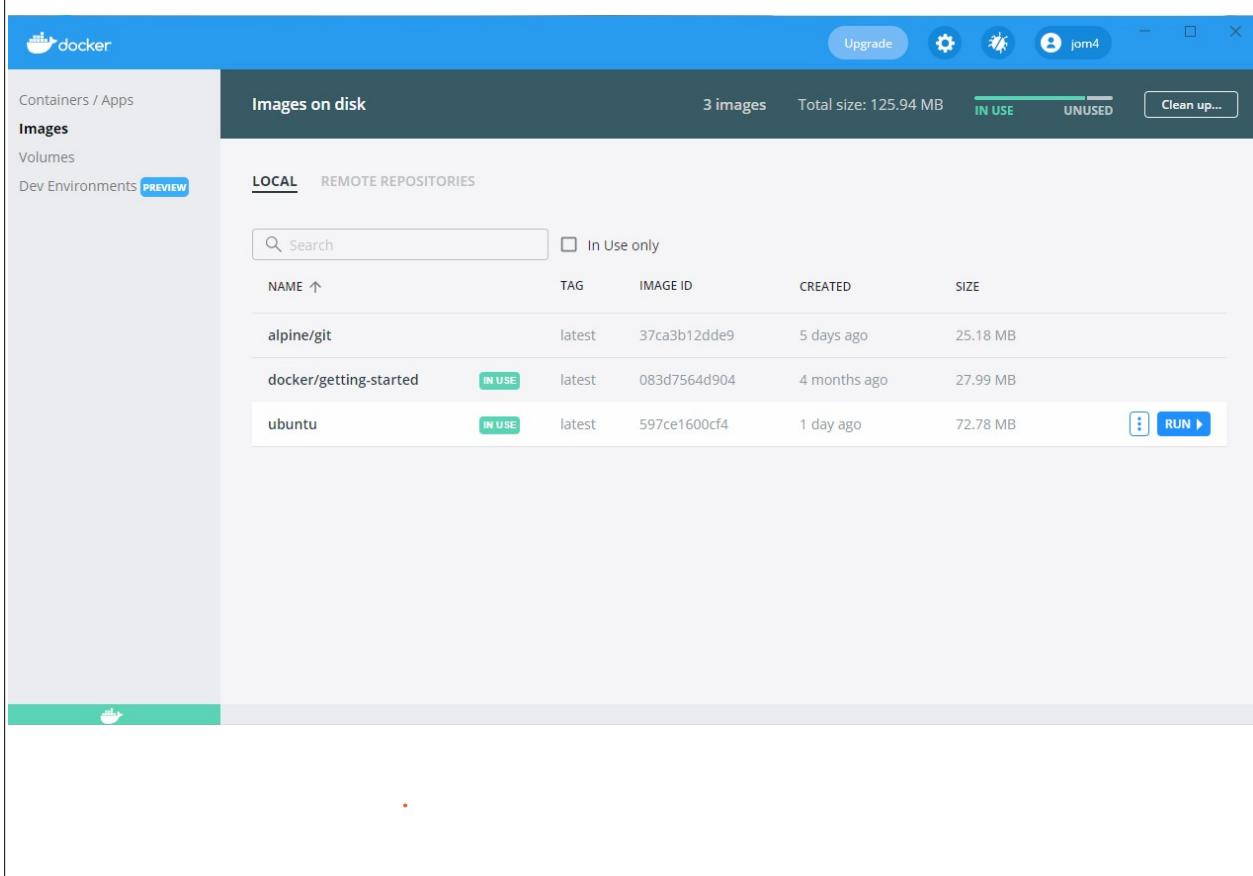
```
ansible --version
```

```
pradeep@pradeep-VirtualBox:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['~/home/pradeep/.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]
pradeep@pradeep-VirtualBox:~$
```

Docker installation

```
C:\WINDOWS\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
Digest: sha256:44ab2c3b26363823dc9b965498ab06abf74a1e6af20a732902250743df0d4172d
Status: Image is up to date for ubuntu:latest
docker.io/library/ubuntu:latest

C:\WINDOWS\system32>docker run -it ubuntu
root@41994f79cc71:/# echo pradeep
pradeep
root@41994f79cc71:/#
```



Tcpdump Installation

Tcpdump can be installed with the APT command:

Sudo apt install tcpdump

```
pradeep@pradeep-VirtualBox:~$ sudo apt install tcpdump
[sudo] password for pradeep:
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 215 not upgraded.
pradeep@pradeep-VirtualBox:~$
```

tcpdump command options

You need to be root to run tcpdump. It includes many options and filters. Running tcpdump without any options will capture all packets flowing through the default interface.

sudo tcpdump -D

```
pradeep@pradeep-VirtualBox:~$ sudo 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]
pradeep@pradeep-VirtualBox:~$ █
```

sudo tcpdump -v

```
pradeep@pradeep-VirtualBox:/home/SAMPLE/TRIAL$ sudo tcpdump -v
tcpdump: listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144
bytes
09:21:58.959490 IP (tos 0x10, ttl 64, id 14228, offset 0, flags [DF], proto UDP
(17), length 76)
    pradeep-VirtualBox.50066 > pugot.canonical.com.ntp: NTPv4, length 48
        Client, Leap indicator: (0), Stratum 0 (unspecified), poll 0 (1s), pre
cision 0
        Root Delay: 0.000000, Root dispersion: 0.000000, Reference-ID: (unspec)
        Reference Timestamp: 0.0000000000
        Originator Timestamp: 0.0000000000
        Receive Timestamp: 0.0000000000
        Transmit Timestamp: 3842135518.223394196 (2021/10/02 09:21:58)
        Originator - Receive Timestamp: 0.0000000000
        Originator - Transmit Timestamp: 3842135518.223394196 (2021/10/02 0
9:21:58)
09:21:58.960688 IP (tos 0x0, ttl 64, id 37208, offset 0, flags [DF], proto UDP
(17), length 70)
```

Sudo tcpdump host 10.0.2.15

```
pradeep@pradeep-VirtualBox:~$ sudo tcpdump host 10.0.2.15
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
13:33:16.701659 IP pradeep-VirtualBox.47186 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 2746337054, win 64240, options [mss 1460,sackOK,TS al 2206348256 ecr 0,nop,wscale 7], length 0
13:33:16.702274 IP pradeep-VirtualBox.55578 > 192.168.43.1.domain: 48393+ PTR? 32.121.122.34.in-addr.arpa. (44)
13:33:17.289971 IP 192.168.43.1.domain > pradeep-VirtualBox.55578: 48393 1/0/0 PTR 32.121.122.34.bc.googleusercontent.com. (96)
13:33:17.290333 IP pradeep-VirtualBox.46536 > 192.168.43.1.domain: 30645+ PTR?
```

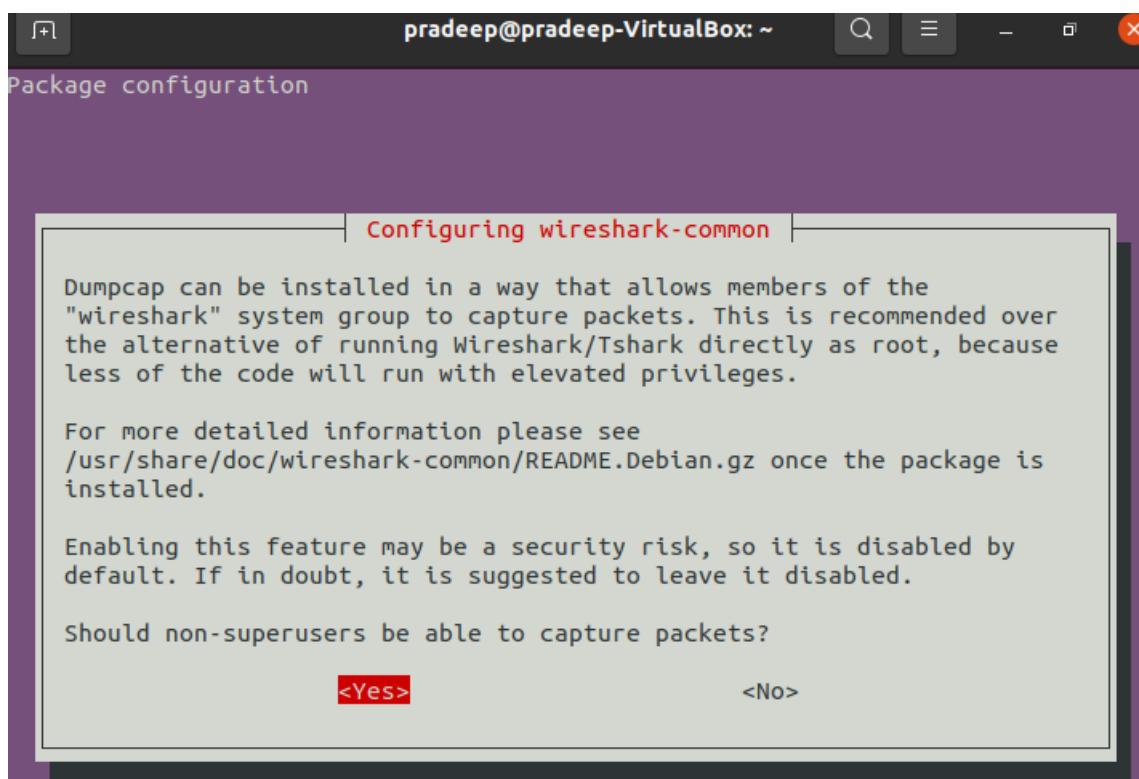
Sudo tcpdump -n net 10.0

```
pradeep@pradeep-VirtualBox:~$ sudo tcpdump -n net 10.0
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
13:37:08.156202 IP 10.0.2.15.51729 > 91.189.89.199.123: NTPv4, Client, length 48
13:37:08.664098 IP 91.189.89.199.123 > 10.0.2.15.51729: NTPv4, Server, length 48
13:37:13.245980 ARP, Request who-has 10.0.2.2 tell 10.0.2.15, length 28
13:37:13.246185 ARP, Reply 10.0.2.2 is at 52:54:00:12:35:02, length 46
```

Wireshark installation

1. Command: sudo apt-get install wireshark

```
pradeep@pradeep-VirtualBox:~$ sudo apt-get install wireshark
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libpcre2-16-0 libqt5core5a libqt5dbus5
  libqt5gui5 libqt5multimedia5 libqt5multimedia5-plugins
  libqt5multimeddiagstools5 libqt5multimediawidgets5 libqt5network5
  libqt5opengl5 libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2l dbl
  libspandsp2 libssh-gcrypt-4 libwireshark-data libwireshark13 libwireshap10
  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
```



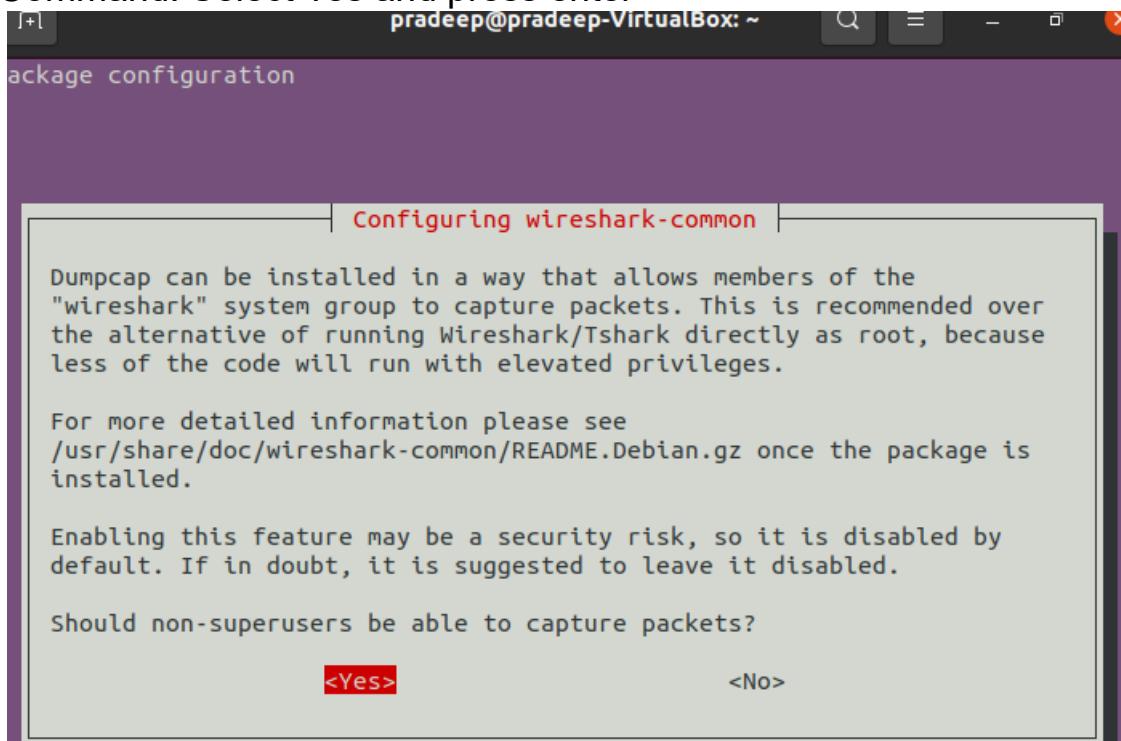
```
pradeep@pradeep-VirtualBox:~$ wireshark --version
Wireshark 3.2.3 (Git v3.2.3 packaged as 3.2.3-1)

Copyright 1998-2020 Gerald Combs <gerald@wireshark.org> and contributors.
License GPLv2+: GNU GPL version 2 or later <https://www.gnu.org/licenses/gpl-2.0.html>
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

2. Command: sudo dpkg-reconfigure wireshark-common

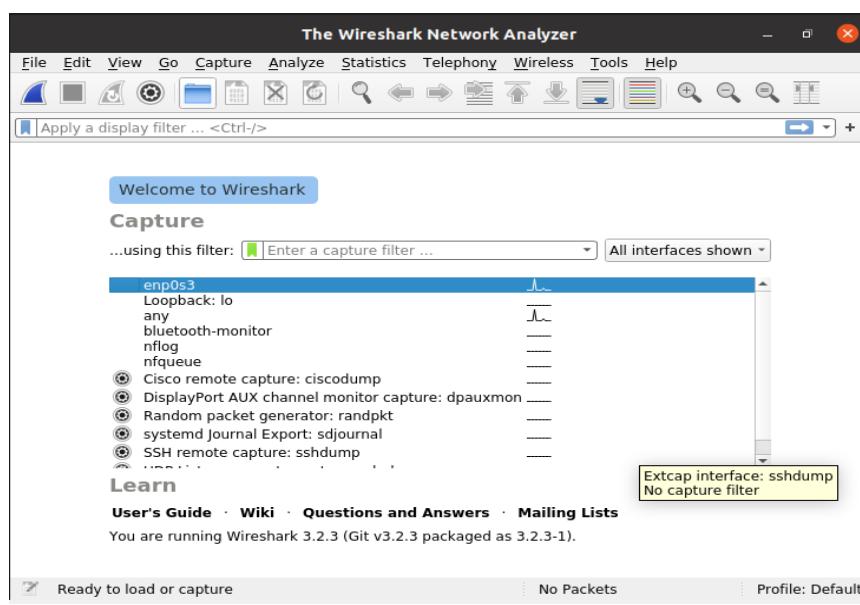
```
pradeep@pradeep-VirtualBox:~$ sudo dpkg-reconfigure wireshark-common
pradeep@pradeep-VirtualBox:~$
```

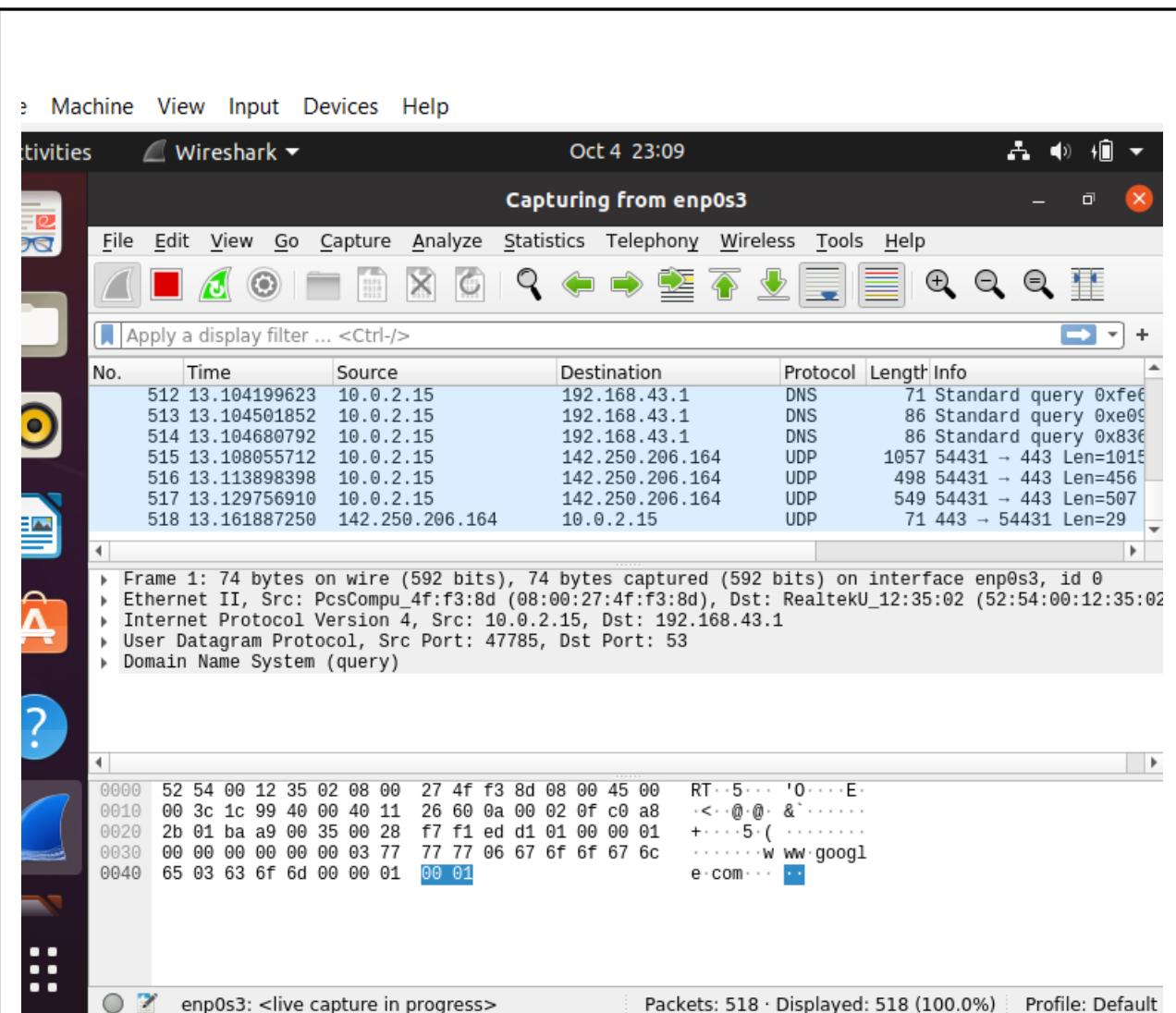
3. Command: Select Yes and press enter



```
pradeep@pradeep-VirtualBox:~$ sudo adduser $USER wireshark
Adding user `pradeep' to group `wireshark' ...
Adding user pradeep to group wireshark
Done.
pradeep@pradeep-VirtualBox:~$
```

4. Open wireshark from the applist





NETCAT

```
pradeep@pradeep-VirtualBox:~$ sudo apt-get install netcat
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  netcat
0 upgraded, 1 newly installed, 0 to remove and 220 not upgraded.
Need to get 2,172 B of archives.
After this operation, 15.4 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu focal/universe amd64 netcat all 1.206-1ubuntu1 [2,172 B]
Fetched 2,172 B in 4s (539 B/s)
Selecting previously unselected package netcat.
(Reading database ... 198804 files and directories currently installed.)
Preparing to unpack .../netcat_1.206-1ubuntu1_all.deb ...
Unpacking netcat (1.206-1ubuntu1) ...
Setting up netcat (1.206-1ubuntu1) ...
```

```
pradeep@pradeep-VirtualBox:~$ nc -h
OpenBSD netcat (Debian patchlevel 1.206-1ubuntu1)
usage: nc [-46CDDFhklNnrStUuvZz] [-I length] [-i interval] [-M ttl]
          [-m minttl] [-O length] [-P proxy_username] [-p source_port]
          [-q seconds] [-s source] [-T keyword] [-V rtable] [-W recvlimit] [-w
timeout]
          [-X proxy_protocol] [-x proxy_address[:port]]           [destination]
[port]
  Command Summary:
    -4          Use IPv4
    -6          Use IPv6
    -b          Allow broadcast
    -C          Send CRLF as line-ending
    -D          Enable the debug socket option
    -d          Detach from stdin
    -F          Pass socket fd
    -h          This help text
```

```
pradeep@pradeep-VirtualBox: ~
-I length      TCP receive buffer length
-i interval    Delay interval for lines sent, ports scanned
-k             Keep inbound sockets open for multiple connects
-l             Listen mode, for inbound connects
-M ttl         Outgoing TTL / Hop Limit
-m minttl      Minimum incoming TTL / Hop Limit
-N             Shutdown the network socket after EOF on stdin
-n             Suppress name/port resolutions
-O length      TCP send buffer length
-P proxyuser   Username for proxy authentication
-p port        Specify local port for remote connects
-q secs        quit after EOF on stdin and delay of secs
-r             Randomize remote ports
-S             Enable the TCP MD5 signature option
-s source      Local source address
-T keyword     TOS value
-t             Answer TELNET negotiation
-U             Use UNIX domain socket
-u             UDP mode
-V rtable      Specify alternate routing table
-v             Verbose
-W recvlimit   Terminate after receiving a number of packets
-w timeout     Timeout for connects and final net reads
-X proto       Proxy protocol: "4", "5" (SOCKS) or "connect"
-x addr[:port] Specify proxy address and port
-Z             DCCP mode
-z             Zero-I/O mode [used for scanning]

Port numbers can be individual or ranges: lo-hi [inclusive]
```

Shell Scripting

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

```
#!/bin/bash
echo "Enter Details "
echo ****
echo Enter your name
read name
echo Enter your college name
read college
clear
echo Details you entered
echo name:$name
echo college:$college
```

```
pradeep@pradeep-VirtualBox:~$ ./l1.sh
Enter Details
*****
Enter your name
Pradeep Sojan
Enter your college name
Amal Jyothi
```

```
Details you entered
name:Pradeep Sojan
college:Amal Jyothi
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Display value of variable"
a=12
echo "$a"
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l2.sh
pradeep@pradeep-VirtualBox:~$ ./l2.sh
Display value of variable
12
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Arithmetic Operation"
echo ****
echo "Enter a number"
read a
echo "Enter another number"
read b
echo "Enter the operation"
echo " 1.Addition  2.Subtraction  3.Multiplication  4.Division"
read op
case "$op" in
"1") echo "a+b=\"$((a+b))";;
"2") echo "a-b=\"$((a-b))";;
"3") echo "a*b=\"$((a*b))";;
"4") echo "a/b=\"$((a/b))";;
esac
```

```
pradeep@pradeep-VirtualBox:~$ vi l3.sh
pradeep@pradeep-VirtualBox:~$ chmod +x l3.sh
pradeep@pradeep-VirtualBox:~$ ./l3.sh
Arithmetic Operation
*****
Enter a number
30
Enter another number
10
Enter the operation
 1.Addition  2.Subtraction  3.Multiplication  4.Division
1
a+b=40
```

```
pradeep@pradeep-VirtualBox:~$ ./l3.sh
Arithmetic Operation
*****
Enter a number
30
Enter another number
10
Enter the operation
 1.Addition  2.Subtraction  3.Multiplication  4.Division
2
a-b=20
```

```
pradeep@pradeep-VirtualBox:~/l3.sh
Arithmetic Operation
*****
Enter a number
30
Enter another number
10
Enter the operation
    1.Addition  2.Subtraction  3.Multiplication  4.Division
3
a*b=300
```

```
pradeep@pradeep-VirtualBox:~/l3.sh
Arithmetic Operation
*****
Enter a number
30
Enter another number
10
Enter the operation
    1.Addition  2.Subtraction  3.Multiplication  4.Division
4
a/b=3
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Finding a number"
echo *****
echo "Enter a number"
read a
if [ $a == 15 ]
then
    echo "Number found;"
else
    echo "Number not found !"
fi
```

```
pradeep@pradeep-VirtualBox:~/l4.sh
pradeep@pradeep-VirtualBox:~/ bash l4.sh
Finding a number
*****
Enter a number
15
Number found;
pradeep@pradeep-VirtualBox:~/ bash l4.sh
Finding a number
*****
Enter a number
14
Number not found !
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo " Time and Calender"
echo " ****"
echo "Today is $(date)"
echo ""
echo "Calender :"
cal
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l5.sh
pradeep@pradeep-VirtualBox:~$ bash l5.sh
Time and Calender
*****
Today is Sunday 03 October 2021 10:52:45 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
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo " EVEN or ODD"
echo " ****"
echo "Enter the number"
read n
x=$((n%2))
if [ $x -eq 0 ]
then
echo "Number is even"
else
echo "Number is odd"
fi
```

```
pradeep@pradeep-VirtualBox:~$ bash l6.sh
EVEN or ODD
*****
Enter the number
6
Number is even
pradeep@pradeep-VirtualBox:~$ ./l6.sh
EVEN or ODD
*****
Enter the number
3
Number is odd
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo " Comparing Numbers"
echo *****
echo "Enter first number "
read a
echo " Enter second number "
read b
if [ $a -gt $b ]
then
echo "$a is greater "
elif [ $b -gt $a ]
then
echo "$b is greater"
else
echo "Both are equal"
fi
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l7.sh
pradeep@pradeep-VirtualBox:~$ ./l7.sh
Comparing Numbers
*****
Enter first number
15
Enter second number
7
15 is greater
pradeep@pradeep-VirtualBox:~$ bash l7.sh
Comparing Numbers
*****
Enter first number
3
Enter second number
3
Both are equal
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Sum of numbers"
echo ****
s=0
for (( i=0;i<=10;i++ ))
do
sum=$(( sum + i ))
done
echo "Sum of first 10 numbers= $sum "
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l8.sh
pradeep@pradeep-VirtualBox:~$ bash l8.sh
Sum of numbers
*****
Sum of first 10 numbers= 55
```

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

```
#!/bin/bash
echo "AVG , SUM & product of 4 no."
echo ****
echo " Enter your the first number "
read a
echo " Second number"
read b
echo "Third number"
read c
echo " Forth number"
read d
sum=$(($a + $b + $c + $d))
echo $sum
avg=$(echo $sum / 4 | bc -l )
prod=$((a * b * c * d))
echo "The sum of these numbers is : " $sum
echo "The average of these number is: " $avg
echo "The product of these number is:" $prod
```

```
pradeep@pradeep-VirtualBox:~$ bash l9.sh
AVG , SUM & product of 4 no.
*****
Enter your the first number
5
Second number
6
Third number
7
Forth number
8
26
The sum of these numbers is : 26
The average of these number is: 6.5
The product of these number is: 1680
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Largest of Three"
echo *****
echo "Enter first number"
read a
echo " second number"
read b
echo "third number"
read c
if [ $a -gt $b ]
then
if [ $a -gt $c ]
then
echo "$a is big"
else
echo "$c is big"
fi
elif [ $b -gt $c ]
then
echo "$b is big"
else
echo "$c is big"
fi
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l10.sh
pradeep@pradeep-VirtualBox:~$ bash l10.sh
Largest of Three
*****
Enter first number
16
second number
12
third number
15
16 is big
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo "Factorial"
echo *****
echo "Enter a number"
read num
fact=1
for((i=2;i<=num;i++))
{
fact=$((fact*i)) #fact = fact * i
}
echo " Factorial is $fact"
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l11.sh
pradeep@pradeep-VirtualBox:~$ ./l11.sh
Factorial
*****
Enter a number
5
Factorial is 120
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo" Palindrome"
echo *****
echo "Enter number to check"
read n
rev=$(echo $n | rev)
if [ $n -eq $rev ]
```

```
then
echo "Number is palindrome"
else
echo "Number is not palindrome"
fi
```

```
pradeep@pradeep-VirtualBox:~/Documents$ ./l12.sh
Palindrome
*****
Enter number to check
12
Number is not palindrome
pradeep@pradeep-VirtualBox:~/Documents$ bash l12.sh
Palindrome
*****
Enter number to check
121
Number is palindrome
pradeep@pradeep-VirtualBox:~/Documents$
```

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

```
#!/bin/bash
echo number one: $1
echo number two : $2
sum=$(( $1+$2 ))
avg=$(echo $sum / 2 | bc -l )
echo avg: $avg
```

```
pradeep@pradeep-VirtualBox:~/Documents$ chmod +x l13.sh
pradeep@pradeep-VirtualBox:~/Documents$ bash l13.sh 4 6
number one: 4
number two : 6
avg: 5.00000000000000000000000000000000
pradeep@pradeep-VirtualBox:~/Documents$
```

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

```
#!/bin/bash
echo "sum of all digits"
echo *****
echo "Enter a number"
read num
sum=0
```

```
while [ $num -gt 0 ]
do
mod=$((num % 10))
sum=$((sum + mod))
num=$((num / 10))
done
echo "Sum of digits is $sum"
```

```
pradeep@pradeep-VirtualBox:~$ bash l14.sh
sum of all digits
*****
Enter a number
5654
Sum of digits is 20
pradeep@pradeep-VirtualBox:~$
```

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

```
#!/bin/bash
echo " LEAP YEAR OR NOT"
echo *****
echo "Enter the year"
read y
if [ $((y % 4)) -eq 0 ]
then
if [ $((y % 100)) -eq 0 ]
then
if [ $((year % 400)) -eq 0 ]
then
echo "its a leap year"
else
echo "its not a leap year"
fi
else
echo " its a leap year"
fi
else
echo "its not a leap year"
fi
```

```
pradeep@pradeep-VirtualBox:~$ chmod +x l15.sh
pradeep@pradeep-VirtualBox:~$ ./l15.sh
LEAP YEAR OR NOT
*****
Enter the year
2020
its a leap year
pradeep@pradeep-VirtualBox:~$ bash l15.sh
LEAP YEAR OR NOT
*****
Enter the year
2021
its not a leap year
pradeep@pradeep-VirtualBox:~$
```