

NETWORK & SYSTEM ADMINISTRATION

LAB - (20MCA136)

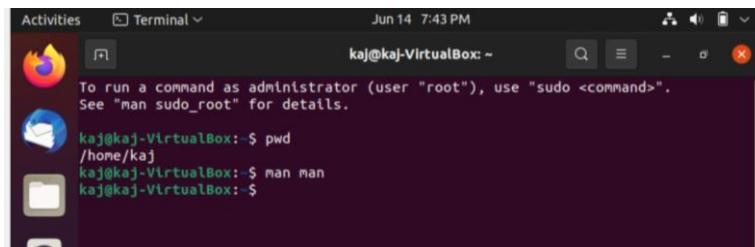
LAB RECORD

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BASIC LINUX COMMANDS

1. pwd (Print Working Directory)

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



```
Activities Terminal Jun 14 7:43 PM
kaj@kaj-VirtualBox: ~
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

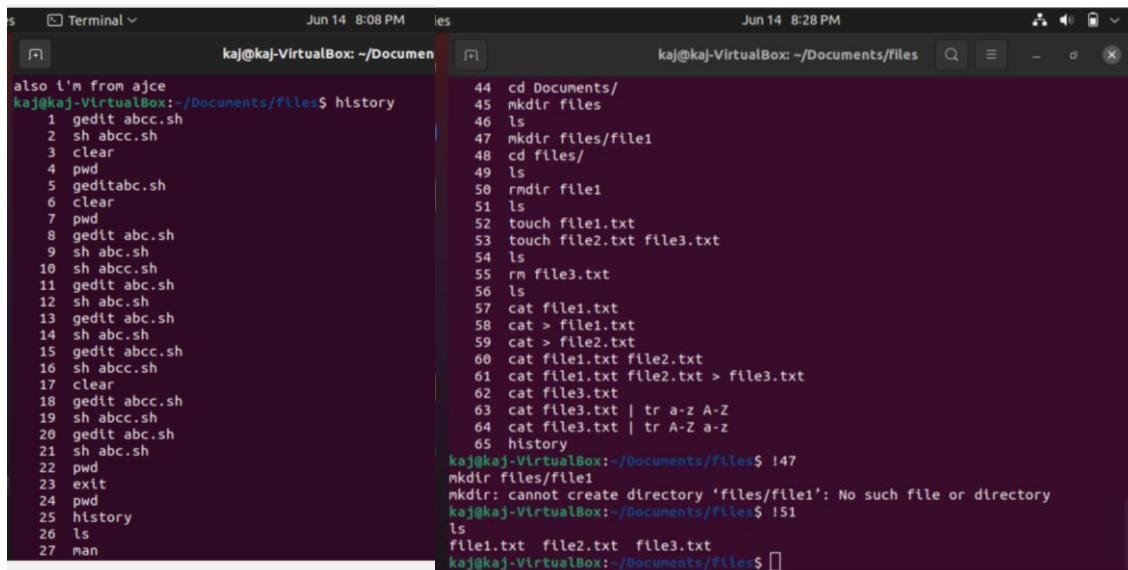
kaj@kaj-VirtualBox: $ pwd
/home/kaj
kaj@kaj-VirtualBox: $ man man
kaj@kaj-VirtualBox: $
```

2. history

Ø 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.

Ø `history`

Ø !command number to run a command from history



```
Jun 14 8:08 PM
kaj@kaj-VirtualBox: ~/Documents/files
also i'm from ajce
kaj@kaj-VirtualBox: ~/Documents/files$ history
 1  gedit abcc.sh
 2  sh abcc.sh
 3  clear
 4  pwd
 5  geditabc.sh
 6  clear
 7  pwd
 8  gedit abc.sh
 9  sh abc.sh
10  sh abcc.sh
11  gedit abc.sh
12  sh abc.sh
13  gedit abc.sh
14  sh abc.sh
15  gedit abcc.sh
16  sh abcc.sh
17  clear
18  gedit abcc.sh
19  sh abcc.sh
20  gedit abcc.sh
21  sh abc.sh
22  pwd
23  exit
24  pwd
25  history
26  ls
27  man

Jun 14 8:28 PM
kaj@kaj-VirtualBox: ~/Documents/files
44  cd Documents/
45  mkdir files
46  ls
47  mkdir files/file1
48  cd files/
49  ls
50  rmdir file1
51  ls
52  touch file1.txt
53  touch file2.txt file3.txt
54  ls
55  rm file3.txt
56  ls
57  cat file1.txt
58  cat > file1.txt
59  cat > file2.txt
60  cat file1.txt file2.txt > file3.txt
61  cat file1.txt file2.txt > file3.txt
62  cat file3.txt
63  cat file3.txt | tr a-z A-Z
64  cat file3.txt | tr A-Z a-z
65  history
kaj@kaj-VirtualBox: ~/Documents/files$ !47
mkdir files/file1
mkdir: cannot create directory 'files/file1': No such file or directory
kaj@kaj-VirtualBox: ~/Documents/files$ !51
ls
file1.txt file2.txt file3.txt
kaj@kaj-VirtualBox: ~/Documents/files$
```

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 man`

`man ls`

```

kaj@kaj-VirtualBox: ~
man - an interface to the system reference manuals

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

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

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

1 Executable programs or shell commands
2 System calls (functions provided by the kernel)
3 Library calls (functions within program libraries)
4 Special files (usually found in /dev)
5 File formats and conventions, e.g. /etc/passwd

```

Manual page man(1) line 4 (press h for help or q to quit)

```

kaj@kaj-VirtualBox: ~
TAIL(1)                               User Commands                               TAIL(1)

NAME
tail - output the last part of files

SYNOPSIS
tail [OPTION]... [FILE]...

DESCRIPTION
Print the last 10 lines of each FILE to standard output. With more than one FILE, precede each with a header giving the file name.

With no FILE, or when FILE is -, read standard input.

Mandatory arguments to long options are mandatory for short options too.

-c, --bytes=[+]NUM
       output the last NUM bytes; or use -c +NUM to output starting with byte NUM of each file

-f, --follow[={name|descriptor}]
       output appended data as the file grows;
              an absent option argument means 'descriptor'

-F      same as --follow=name --retry


```

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

4. cd

To navigate through the Linux files and directories, use the `cd`. It requires either the full path or the name of the directory, depending on the current working directory that you're in.

Shortcuts to help you navigate quickly:

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

Ø `cd` to go straight to the home folder

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

```

Templates Public Music Documents
kaj@kaj-VirtualBox: ~
kaj@kaj-VirtualBox: ~$ cd Documents/
kaj@kaj-VirtualBox: ~/Documents$ cd ~
kaj@kaj-VirtualBox: ~$ cd cd Videos/
bash: cd: too many arguments
kaj@kaj-VirtualBox: ~$ cd Videos/
kaj@kaj-VirtualBox: ~/Videos$ cd ..
kaj@kaj-VirtualBox: ~$ cd Documents/
kaj@kaj-VirtualBox: ~/Documents$ mkdir files
kaj@kaj-VirtualBox: ~/Documents$ ls
abcc.sh abc.sh files
kaj@kaj-VirtualBox: ~/Documents$ mkdir files/file1
kaj@kaj-VirtualBox: ~/Documents$ cd files/
kaj@kaj-VirtualBox: ~/Documents/files$ ls
file1

```

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 all the files in the sub-directories as well
- `ls -l` – long listing
- `ls -a` will show the hidden files
- `ls -al` will list the files and directories with detailed information like the permissions, size, owner, etc.

- **ls -t** lists files sorted in the order of “last modified”.
- **ls -r** option will reverse the natural sorting order. Usually used in combination with other switches such as ls -tr. This will reverse the time-wise listing.

The image shows two terminal windows side-by-side. The left terminal window shows the output of the 'ls' command with various flags (-t, -i, -a, -R) demonstrating different listing options. The right terminal window shows the output of the 'ls' command with the '-t' flag, which sorts files by their last modification time.

```

kaj@kaj-VirtualBox:~$ man tail
kaj@kaj-VirtualBox:~$ ls
Desktop Downloads Pictures snap Videos
Documents Music Public Templates
kaj@kaj-VirtualBox:~$ ls -i
21788 Desktop 21793 Music 22106 snap
21792 Documents 21794 Pictures 21790 Templates
21789 Downloads 21791 Public 21795 Videos
kaj@kaj-VirtualBox:~$ ls -a
. .bash_logout .config Downloads Music Public Templates
.. .bashrc Desktop .gnupg Pictures snap Videos
.bash_history .cache Documents .local .profile .ssh
kaj@kaj-VirtualBox:~$ ls -R
.
./Desktop Downloads Pictures snap Videos
./Documents Music Public Templates
./Music abcc.sh abc.sh
./Pictures
./Public

kaj@kaj-VirtualBox:~$ ls -t
total 36
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Desktop
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:38 Documents
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Downloads
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Music
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Pictures
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Public
drwxr-xr-x 3 kaj kaj 4096 Jun 2 00:23 snap
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Templates
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Videos
kaj@kaj-VirtualBox:~$ ls -r
Videos snap Pictures Downloads Desktop
Templates Public Music Documents
kaj@kaj-VirtualBox:~$ 

```

6. mkdir

Use **mkdir** command to make a new directory .

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

The image shows a terminal window demonstrating the creation of a new directory 'files' inside the 'Documents' directory, and then navigating into it to show its contents.

```

kaj@kaj-VirtualBox:~/Videos$ cd ..
kaj@kaj-VirtualBox:~$ cd Documents/
kaj@kaj-VirtualBox:~/Documents$ mkdir files
kaj@kaj-VirtualBox:~/Documents$ ls
abcc.sh abc.sh files
kaj@kaj-VirtualBox:~/Documents$ mkdir files/file1
kaj@kaj-VirtualBox:~/Documents$ cd files/
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1

```

7. rmdir

If you need to delete a directory, use the **rmdir** command.

However, **rmdir** only allows you to delete empty directories.

The image shows a terminal window demonstrating the deletion of an empty directory 'file1' using the 'rmdir' command.

```

kaj@kaj-VirtualBox:~/Documents/files$ ls
file1
kaj@kaj-VirtualBox:~/Documents/files$ rmdir file1
kaj@kaj-VirtualBox:~/Documents/files$ ls
kaj@kaj-VirtualBox:~/Documents/files$ 

```

8. touch

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

```
kaj@kaj-VirtualBox:~/Documents/files$ ls
kaj@kaj-VirtualBox:~/Documents/files$ touch file1.txt
kaj@kaj-VirtualBox:~/Documents/files$ touch file2.txt file3.txt
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1.txt  file2.txt  file3.txt
kaj@kaj-VirtualBox:~/Documents/files$ █
```

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**

```
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1.txt  file2.txt  file3.txt
kaj@kaj-VirtualBox:~/Documents/files$ rm file3.txt
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1.txt  file2.txt
kaj@kaj-VirtualBox:~/Documents/files$
```

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:

Ø **cat > filename** creates a new file

Ø **cat filename1 filename2>filename3** joins two files (1 and 2) and stores the output of them in a new file (3)

Ø to convert a file to upper or lower case use, **cat filename | tr a-z A-Z >output.txt**

Ø **cat >>myfile** insert data to a file

```
file1.txt  file2.txt
kaj@kaj-VirtualBox:~/Documents/files$ cat file1.txt
kaj@kaj-VirtualBox:~/Documents/files$ cat > file1.txt
Hello World
I'm Anilect Jose
kaj@kaj-VirtualBox:~/Documents/files$ cat > file2.txt
Also I'm from AJCE
kaj@kaj-VirtualBox:~/Documents/files$ cat file1.txt file2.txt
Hello World
I'm Anilect Jose
Also I'm from AJCE
kaj@kaj-VirtualBox:~/Documents/files$ cat file1.txt file2.txt > file3.txt
kaj@kaj-VirtualBox:~/Documents/files$ cat file3.txt
Hello World
I'm Anilect Jose
Also I'm from AJCE
kaj@kaj-VirtualBox:~/Documents/files$ cat file3.txt | tr a-z A-Z
HELLO WORLD
I'M ANILECT JOSE
ALSO I'M FROM AJCE
kaj@kaj-VirtualBox:~/Documents/files$ cat file3.txt | tr A-Z a-z
hello world
i'm anilect jose
also i'm from ajce
kaj@kaj-VirtualBox:~/Documents/files$ █
```

BASIC LINUX COMMANDS

1.echo

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

```
kaj@kaj-VirtualBox:~/Documents$ echo My name is Anilect>>name.txt
kaj@kaj-VirtualBox:~/Documents$ ls
abcc.sh abc.sh files name.txt
kaj@kaj-VirtualBox:~/Documents$ █
```

2. Head

The head command is used to view the first lines of any text file.

- By default, it will show the first ten lines, but you can change this number to your liking.
- If you only want to show the first five lines, type
 - **head -n 5 filename.txt**

```
kaj@kaj-VirtualBox:~/Documents$ head -n 5 name.txt
1. Pather Panchali (1955)          8.5
2. Nayakan (1987)                 8.5
3. Pariyerum Perumal (2018)       8.5
4. Anbe Sivam (2003)              8.5
5. Hanky Panky (1979)             8.5
kaj@kaj-VirtualBox:~/Documents$ head -n 10 name.txt
1. Pather Panchali (1955)          8.5
2. Nayakan (1987)                 8.5
3. Pariyerum Perumal (2018)       8.5
4. Anbe Sivam (2003)              8.5
5. Hanky Panky (1979)             8.5
6. C/o Kancharapalem (2018)        8.5
7. The World of Apu (1959)         8.5
8. Kireedam (1989)                8.4
9. Manichitrathazhu (1993)         8.4
10. Natsamrat (2016)               8.4
kaj@kaj-VirtualBox:~/Documents$ █
```

3. Tail

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

- **tail-n 5 filename.txt**

```
kaj@kaj-VirtualBox:~/Documents$ tail -n 5 name.txt
16. Visaaranai (2015)      8.4
17. 3 Idiots (2009)        8.3
18. Like Stars on Earth (2007) 8.3
19. Jersey (2019)           8.3
20. Soorarai Pottru (2020)   8.3
kaj@kaj-VirtualBox:~/Documents$ █
```

4. Read

Read the contents of a line into a variable.

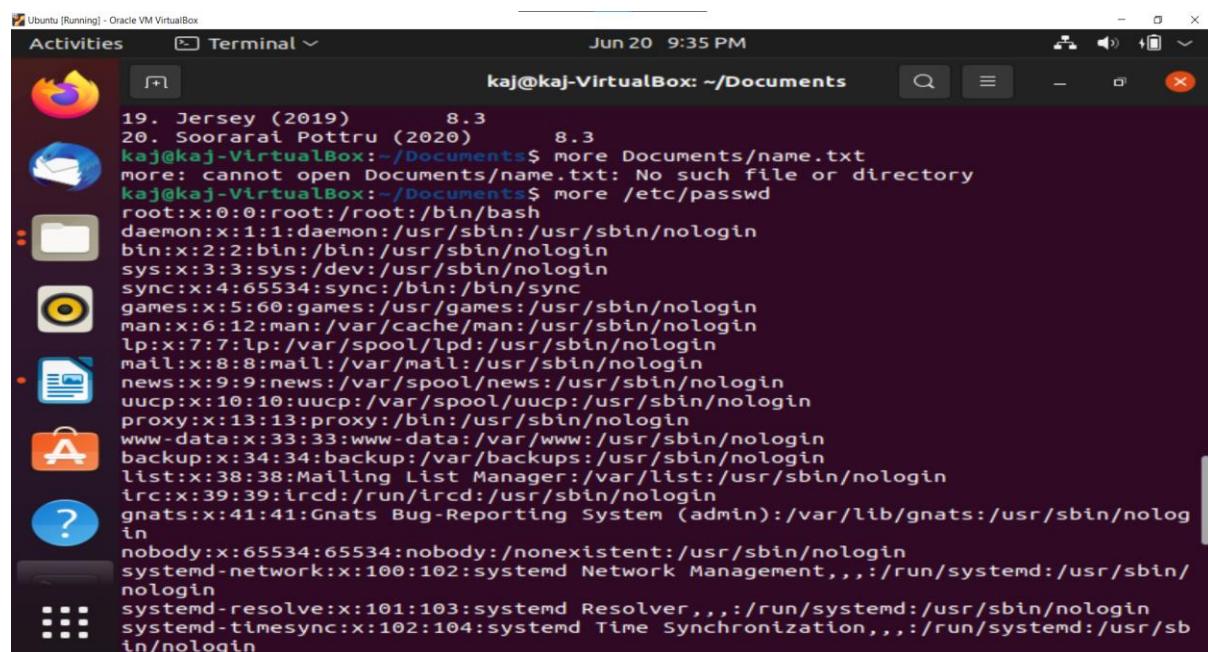
- The **read** command can be used with and without arguments.
- **Read** command is used to read [options] [name...]
 - \$read
 - \$read var1 var2 var3
 - \$echo"[\$var1] [\$var2] [\$var3]"

```
kaj@kaj-VirtualBox:~/Documents$ read name;
Anilect
kaj@kaj-VirtualBox:~/Documents$ read name2;
Jose
kaj@kaj-VirtualBox:~/Documents$ echo $name $name2;
Anilect Jose
kaj@kaj-VirtualBox:~/Documents$ █
```

5. more

Like cat command, more command displays the content of a file. Only difference is that, in case of larger files, 'cat' command output will scroll off your screen while 'more' command displays output one screenful at a time.

- Enter key: To scroll down page line by line.
- Space bar: To go to next page
- b key: To go to the backward page
- / key: Lets you search the string
- Syntax: more <file name>
- more /etc/passwd



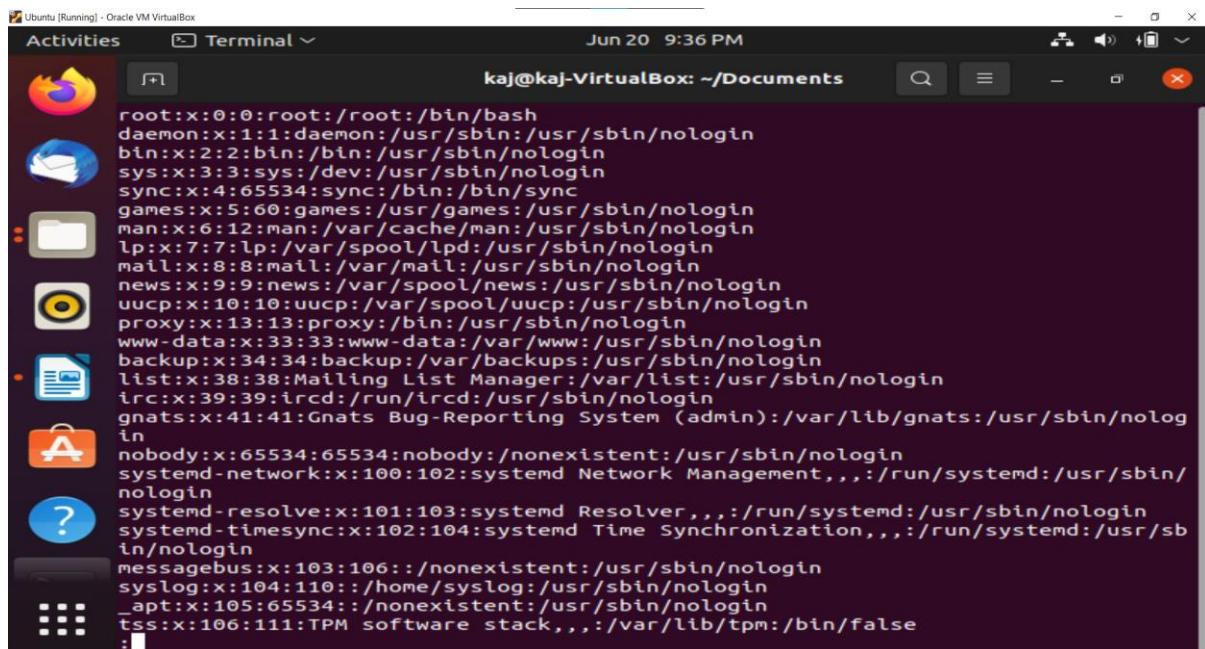
```
Ubuntu [Running] - Oracle VM VirtualBox
Activities Terminal Jun 20 9:35 PM
kaj@kaj-VirtualBox: ~/Documents
19. Jersey (2019)          8.3
20. Soorarai Pottru (2020)  8.3
kaj@kaj-VirtualBox:~/Documents$ more Documents/name.txt
more: cannot open Documents/name.txt: No such file or directory
kaj@kaj-VirtualBox:~/Documents$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin/sync
games:x:5:60:games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
```

6. less

The 'less' command is same as 'more' command but include some more features. It automatically adjusts with the width and height of the terminal window, while 'more' command cuts the content as the width of the terminal window get shorter

- **less <file name>**
- **less etc/passwd**

```
kaj@kaj-VirtualBox:~/Documents$ less /etc/passwd
kaj@kaj-VirtualBox:~/Documents$ █
```



A screenshot of a Linux desktop environment, specifically Ubuntu, showing a terminal window. The terminal window title is "kaj@kaj-VirtualBox: ~/Documents". The window displays the contents of the "/etc/passwd" file. The file contains a list of user entries, each consisting of a login name, a password (represented by an asterisk *), a user ID (UID), a group ID (GID), a full name, a home directory, and a shell. The terminal window has a dark background with light-colored text. The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal, and a system tray at the top.

```
root:x:0:0:root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin/nologin
bin:x:2:2:bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:102:104:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:103:106:/nonexistent:/usr/sbin/nologin
syslog:x:104:110:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:/nonexistent:/usr/sbin/nologin
tss:x:106:111:TPM software stack,,,:/var/lib/tpm:/bin/false
:█
```

7. cut

The cut command is used for cutting out the sections from each line of files and writing the result to standard output. It can be used to cut parts of a line by **byte position, character and field**

- **cut OPTION ... [FILE]...**
- **\$cut -b 1,2,3 state.txt**

```
kaj@kaj-VirtualBox:~/Documents$ cut -b 1,2,3 name.txt
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20. █
```

8. paste

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

- **paste [OPTION] ... [FILES] ...**
- **\$paste state.txt capital.txt**

```
kaj@kaj-VirtualBox:~/Documents/files$ cat >newfile.txt
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1.txt  file2.txt  file3.txt  newfile.txt
kaj@kaj-VirtualBox:~/Documents/files$ paste file2.txt newfile.txt
Also I'm from AJCE
```

9. uname

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

- **\$uname**
- **\$uname -r**

```
kaj@kaj-VirtualBox:~/Documents/files$ uname
Linux
kaj@kaj-VirtualBox:~/Documents/files$ uname -r
5.11.0-18-generic
kaj@kaj-VirtualBox:~/Documents/files$
```

10. cp

cp command is used to copy files from the current directory to a different directory. For instance, the command **cp scenery.jpg**

/home/username/Pictures would create a copy of scenery jpg (from your current directory) into the Pictures directory.

- **cp -i** will ask for user's consent in case of a potential file overwrite
- **cp -p** will preserve source files' mode, ownership and timestamp
- **cp -r** will copy directories recursively
- **cp -u** copies files only if the destination file is not existing or the source file is newer than the destination file

```
cp: cannot create regular file 'files': Permission denied
kaj@kaj-VirtualBox:~/Documents$ cp name.txt files
kaj@kaj-VirtualBox:~/Documents$ ls
abcc.sh  abc.sh  files  name.txt
kaj@kaj-VirtualBox:~/Documents$ cd files
kaj@kaj-VirtualBox:~/Documents/files$ ls
file1.txt  file2.txt  file3.txt  name.txt  newfile.txt
kaj@kaj-VirtualBox:~/Documents/files$
```

11. mv

The primary use of the mv command is to move files, it can also be used to rename files. The arguments in mv are similar to the cp command You need to type mv, the file's name, and the destination's directory.

- **mv file txt /home/username/Documents**
- To rename files, the Linux is mv oldname.ext newname.ext

```
kaj@kaj-VirtualBox:~/Documents$ ls
abcc.sh abc.sh files name.txt
kaj@kaj-VirtualBox:~/Documents$ mv abc.sh files
kaj@kaj-VirtualBox:~/Documents$ cd files/
kaj@kaj-VirtualBox:~/Documents/files$ ls
abc.sh file1.txt file2.txt file3.txt name.txt newfile.txt
kaj@kaj-VirtualBox:~/Documents/files$
```

12. locate

To locate a file, just like the search command in Windows.

What's more, using the -i argument along with this command will make it case-insensitive, so you can search for a file even if you don't remember its exact name.

To search for a file that contains two or more words, use an asterisk (*).

For example, **locate -i school*note** command will search for any file that contains the word "school" and "note" whether it is uppercase or lowercase.

```
kaj@kaj-VirtualBox:~$ locate name.txt
/home/kaj/Documents/name.txt
/home/kaj/Documents/files/name.txt
kaj@kaj-VirtualBox:~$
```

13. find

Similar to the locate command, using find also searches for files and directories.

The difference is, you use the find command to locate files within a given directory.

As an example, **find / name notes.txt** command will search for a file called notes.txt within the home directory and its subdirectories. Other variations when using the find are:

- To find files in the current directory use, find name notes.txt
- To look for directories use, type d name notes.txt

```
kaj@kaj-VirtualBox:~/Documents$ ls
abcc.sh files name.txt
kaj@kaj-VirtualBox:~/Documents$ find name.txt
name.txt
kaj@kaj-VirtualBox:~/Documents$
```

14. grep

Another basic Linux command that is undoubtedly helpful for everyday use is grep. It lets you search through all the text in a given file.

To illustrate, **grep blue notepad.txt** will search for the word blue in the notepad file. Lines that contain the searched word will be displayed fully. Usually output of a previous command is piped into the grep command. For example **ls -l | grep "kernel"**.

```
kaj@kaj-VirtualBox:~/Documents$ cd files
kaj@kaj-VirtualBox:~/Documents/files$ grep Anilect file3.txt
I'm Anilect Jose
kaj@kaj-VirtualBox:~/Documents/files$ █
```

15. df

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

```
I'm Anilect Jose
kaj@kaj-VirtualBox:~/Documents/files$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
tmpfs            99556     1412    98144   2% /run
/dev/sda3       9735476  7798920  1422304  85% /
tmpfs            497772      0    497772   0% /dev/shm
tmpfs             5120      4     5116   1% /run/lock
tmpfs             4096      0     4096   0% /sys/fs/cgroup
/dev/sda2        524252     5340    518912   2% /boot/efi
tmpfs            99552     136    99416   1% /run/user/1000
kaj@kaj-VirtualBox:~/Documents/files$
```

16. du

If you want to check how much space a file or a directory takes, the du (Disk Usage) command is the answer. However, the disk usage summary will show disk block numbers instead of the usual size format.

- If you want to see it in bytes, kilobytes, and megabytes, add the **-h** argument to the command line

\$du -h

```
kaj@kaj-VirtualBox:~$ du
4      ./ssh
4      ./Desktop
4      ./Videos
4      ./Downloads
24     ./Documents/files
36     ./Documents
12     ./gnupg
4      ./Public
8      ./config/goa-1.0
32     ./config/evolution/sources
36     ./config/evolution
4      ./config/gnome-session/saved-session
8      ./config/gnome-session
16     ./config/ibus/bus
20     ./config/ibus
8      ./config/gedit
12     ./config/dconf
4      ./config/enchant
84     ./config/pulse
8      ./config/gtk-3.0
4      ./config/nautilus
4      ./config/libreoffice/4/user/autocorr
4      ./config/libreoffice/4/user/extensions/tmp/extensions
4      ./config/libreoffice/4/user/extensions/tmp/registry/com.sun.star.comp.
deployment.executable.PackageRegistryBackend
```

17. useradd

This is available only to system admins.

Since Linux is a multi-user system, this means more than one person can interact with the same system at the same time.

useradd is used to create a new user, while passwd is adding a password to that user's account To add a new person named John type, **useradd John** and then to add his password type, **passwd 123456789**

```
kaj@kaj-VirtualBox:~$ useradd kaj
useradd: user 'kaj' already exists
kaj@kaj-VirtualBox:~$ useradd chinnu
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
kaj@kaj-VirtualBox:~$ sudo useradd chinnu
kaj@kaj-VirtualBox:~$ sudo useradd chinnu
useradd: user 'chinnu' already exists
kaj@kaj-VirtualBox:~$ █
```

18. userdel

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

```
kaj@kaj-VirtualBox:~$ sudo userdel chinnu
kaj@kaj-VirtualBox:~$ sudo userdel chinnu
userdel: user 'chinnu' does not exist
kaj@kaj-VirtualBox:~$
```

19. sudo

Short for "SuperUser Do", this command enables you to perform tasks that require administrative or root permissions You must have sufficient permissions to use this command.

sudo useradd maria

```
kaj@kaj-VirtualBox:~$ sudo useradd chinnu
kaj@kaj-VirtualBox:~$ sudo useradd chinnu
useradd: user 'chinnu' already exists
kaj@kaj-VirtualBox:~$ █
```

20. passwd

Changes passwords for user accounts

A normal user may only change the password for their own account, while the superuser may change the password for any account.

passwd[option] [username]

passwd

passwd user 1

```
kaj@kaj-VirtualBox:~$ passwd kaj
Changing password for kaj.
Current password:
New password:
BAD PASSWORD: The password is the same as the old one
New password: █
```

BASIC LINUX COMMANDS

1. 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
- #usermod --help
- #usermod -u 2000 Tom

```
kaj@kaj-VirtualBox:~$ sudo useradd ani
```

```
kaj@kaj-VirtualBox:~$ sudo usermod -u 2000 ani
```

```
kaj@kaj-VirtualBox:~$ sudo usermod --help
[sudo] password for kaj:
Usage: usermod [options] LOGIN

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

2. groupadd

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

- #groupadd student

```
kaj@kaj-VirtualBox:~$ sudo groupadd MCA
```

3. groups

print the groups a user is in

- #groups alice

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

```
kaj@kaj-VirtualBox:~$ sudo usermod -G MCA ani  
kaj@kaj-VirtualBox:~$ groups ani  
ani : ani MCA
```

4. groupdel

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

The named group must exist

- #groupdel marketing

```
kaj@kaj-VirtualBox:~$ sudo groupadd tree  
kaj@kaj-VirtualBox:~$ sudo groupadd plant  
kaj@kaj-VirtualBox:~$ sudo groupadd flower  
kaj@kaj-VirtualBox:~$ sudo usermod -G tree,plant,flower ani  
kaj@kaj-VirtualBox:~$ groups ani  
ani : ani tree plant flower  
kaj@kaj-VirtualBox:~$ sudo groupdel tree  
kaj@kaj-VirtualBox:~$ groups ani  
ani : ani plant flower  
kaj@kaj-VirtualBox:~$
```

5. groupmod

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

- # groupmod -n group1 group2

```
kaj@kaj-VirtualBox:~$ sudo groupmod -n tree flower  
kaj@kaj-VirtualBox:~$ groups ani  
ani : ani plant tree  
kaj@kaj-VirtualBox:~$ sudo groupmod -n AJCE tree  
kaj@kaj-VirtualBox:~$ groups ani  
ani : ani plant AJCE
```

6. 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.
#chmod u+x test
#chmod g-rwx test
#chmod o-r test

```
kaj@kaj-VirtualBox:~$ mkdir Anilect
kaj@kaj-VirtualBox:~$ ls
abc.txt Desktop Downloads Pictures snap Videos
Anilect Documents Music Public Templates
kaj@kaj-VirtualBox:~$ ls -ld Anilect/
drwxrwxr-x 2 kaj kaj 4096 Aug 11 20:15 Anilect/
kaj@kaj-VirtualBox:~$ chmod -rwx Anilect/
kaj@kaj-VirtualBox:~$ ls -ld Anilect/
d----- 2 kaj kaj 4096 Aug 11 20:15 Anilect/
kaj@kaj-VirtualBox:~$ ls Anilect/
ls: cannot open directory 'Anilect/': Permission denied
kaj@kaj-VirtualBox:~$ chmod +rwx Anilect/
kaj@kaj-VirtualBox:~$ ls -ld Anilect/
drwxrwxr-x 2 kaj kaj 4096 Aug 11 20:15 Anilect/
kaj@kaj-VirtualBox:~$ ls Anilect/
```

7. chown

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

- #chown Tom Test

```
kaj@kaj-VirtualBox:~$ ls -ld Anilect/
drwxrwxr-x 2 kaj kaj 4096 Aug 11 20:15 Anilect/
kaj@kaj-VirtualBox:~$ sudo chown ani Anilect
kaj@kaj-VirtualBox:~$ ls -ld Anilect/
drwxrwxr-x 2 ani kaj 4096 Aug 11 20:15 Anilect/
```

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.

- #id

```
kaj@kaj-VirtualBox:~$ id ani
uid=2000(ani) gid=1002(ani) groups=1002(ani)
```

9. 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
```

```
kaj@kaj-VirtualBox:~$ ps
    PID TTY          TIME CMD
  3504 pts/0        00:00:00 bash
  3811 pts/0        00:00:00 ps
kaj@kaj-VirtualBox:~$ ps -a
    PID TTY          TIME CMD
  767 tty2        00:00:00 gnome-session-b
  3812 pts/0        00:00:00 ps
kaj@kaj-VirtualBox:~$ █
```

10.top

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

- #top -u rose

```
3812 pts/0        00:00:00 ps
kaj@kaj-VirtualBox:~$ top

top - 20:27:08 up  1:02,  1 user,  load average: 0.00, 0.00, 0.00
Tasks: 181 total,   1 running, 180 sleeping,   0 stopped,   0 zombie
%Cpu(s):  1.7 us,  0.3 sy,  0.0 ni, 97.9 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :  972.2 total,   123.1 free,   536.2 used,   312.9 buff/cache
MiB Swap:  448.4 total,   135.4 free,   313.0 used.   286.5 avail Mem

      PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
  912 kaj      20   0 4012928 195844 66660 S  2.3 19.7  0:57.89 gnome-
 3411 kaj      20   0 411380  48376 36600 S  0.7  4.9  0:06.45 gnome-
 3516 root     20   0     0     0     0 I  0.3  0.0  0:01.92 kworker+
 3815 kaj      20   0 21440  3708  3176 R  0.3  0.4  0:00.09 top
  1 root     20   0 165880  9280  5360 S  0.0  0.9  0:02.05 systemd
  2 root     20   0     0     0     0 S  0.0  0.0  0:00.00 kthread+
  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+
  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  0:00.00 rCU_ta+
 11 root    20   0     0     0     0 S  0.0  0.0  0:00.00 rCU_ta+
 12 root    20   0     0     0     0 S  0.0  0.0  0:00.42 ksofti+
 13 root    20   0     0     0     0 I  0.0  0.0  0:01.00 rCU_sc+
 14 root    rt   0     0     0     0 S  0.0  0.0  0:00.05 migrat+
 15 root   -51   0     0     0     0 S  0.0  0.0  0:00.00 idle_i+
 16 root    20   0     0     0     0 S  0.0  0.0  0:00.00 cpuhp/0
 17 root    20   0     0     0     0 S  0.0  0.0  0:00.00 kdevtm+
 18 root     0 -20     0     0     0 I  0.0  0.0  0:00.00 netns
```

BASIC LINUX COMMANDS

1. 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
 - #wc state.txt capital.txt
 - wc -l state.txt
 - wc -w state.txt capital.txt
 - wc -c state.txt
 - wc -m state.txt

```
kaj@kaj-VirtualBox:~$ ls
abc.txt  Desktop  Downloads  Pictures  snap      Videos
Anilect  Documents  Music    Public    Templates
kaj@kaj-VirtualBox:~$ wc abc.txt
2 2 35 abc.txt
kaj@kaj-VirtualBox:~$ wc -l abc.txt
2 abc.txt
kaj@kaj-VirtualBox:~$ wc -w abc.txt
2 abc.txt
kaj@kaj-VirtualBox:~$ wc -c abc.txt
35 abc.txt
kaj@kaj-VirtualBox:~$ cat >> file2.txt
Hello hai
kaj@kaj-VirtualBox:~$ wc abc.txt file2.txt
2 2 35 abc.txt
1 2 10 file2.txt
3 4 45 total
kaj@kaj-VirtualBox:~$ wc -m file2.txt
10 file2.txt
kaj@kaj-VirtualBox:~$ █
```

2. tar

The Linux ‘tar’stands for tape archive, is used to create Archive and extract the Archive files

- Linux tar command to create compressed or uncompressed Archive files

- 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 cf archive.tar state.txt capital.txt //create archive file
```

```
#ls archive.tar
```

```
#tar tf /archive.tar // list contents of tar archive file
```

- Extract an archive created with tar

```
#mkdir backup
```

```
#cd backup
```

```
#tar xf /home/kaj/Documents/Kaj_Linux/archive.tar
```

- Compression Types

```
gzip(z),bzip2(j), xz(J)
```

```
#tar czf /abc.tar.gz /etc
```

```
#tar cjf /abcd.tar.bz2 /etc
```

```
#tar cJf /abcde.tar.xz /etc
```

- Extract an archive

```
#mkdir backup1
```

```

#cd backup1
#tar xzf /abc.tar.gz
#mkdir backup2
#cd backup2
#tar xjf /abcd.tar.bz2
#mkdir backup3
#cd backup3
#tar xJf /abcde.tar.xz

```

● tar commands

```

kaj@kaj-VirtualBox:~$ tar cf archive.tar abc.txt file2.txt
kaj@kaj-VirtualBox:~$ ls archive.tar
archive.tar
kaj@kaj-VirtualBox:~$ ls
abc.txt archive.tar Documents file2.txt Pictures snap Videos
Anilect Desktop Downloads Music Public Templates
kaj@kaj-VirtualBox:~$ tar tf archive.tar
tar: Old option 'f' requires an argument.
Try 'tar --help' or 'tar --usage' for more information.
kaj@kaj-VirtualBox:~$ tar tf /archive.tar
tar: /archive.tar: Cannot open: No such file or directory
tar: Error is not recoverable: exiting now
kaj@kaj-VirtualBox:~$ tar tf archive.tar
abc.txt
file2.txt
kaj@kaj-VirtualBox:~$ mkdir Extracted
kaj@kaj-VirtualBox:~$ cd Extracted/
kaj@kaj-VirtualBox:~/Extracted$ pwd
/home/kaj/Extracted
kaj@kaj-VirtualBox:~/Extracted$ tar xf /home/kaj/archive.tar
kaj@kaj-VirtualBox:~/Extracted$ ls
abc.txt file2.txt

```

● Compressing using gz, bz2 and xz

```

kaj@kaj-VirtualBox:~/Anilect$ ls
abc.txt ani.txt file2.txt file.txt
kaj@kaj-VirtualBox:~/Anilect$ sudo tar czf mca.tar.gz /etc
[sudo] password for kaj:
tar: Removing leading `/' from member names
kaj@kaj-VirtualBox:~/Anilect$ ls
abc.txt ani.txt file2.txt file.txt mca.tar.gz
kaj@kaj-VirtualBox:~/Anilect$ sudo tar cJf mcareg.tar.gz /etc
tar: Removing leading `/' from member names
kaj@kaj-VirtualBox:~/Anilect$ ls
abc.txt ani.txt file2.txt file.txt mcareg.tar.gz mca.tar.gz
kaj@kaj-VirtualBox:~/Anilect$ sudo tar cJf mcareg.tar.bz2 abc.txt ani.txt
kaj@kaj-VirtualBox:~/Anilect$ ls
abc.txt file2.txt mcareg.tar.bz2 mca.tar.gz
ani.txt file.txt mcareg.tar.gz
kaj@kaj-VirtualBox:~/Anilect$ sudo tar cJf mcareg.tar.xz file.txt file2.txt
kaj@kaj-VirtualBox:~/Anilect$ ls
abc.txt file2.txt mcareg.tar.bz2 mcareg.tar.xz
ani.txt file.txt mcareg.tar.gz mca.tar.gz
kaj@kaj-VirtualBox:~/Anilect$ mkdir Lab
kaj@kaj-VirtualBox:~/Anilect$ cd Lab/

```

- Extract using gzip

```
kaj@kaj-VirtualBox:~/Anilect/Lab$ tar xzf /home/kaj/Anilect/mca.tar.gz
kaj@kaj-VirtualBox:~/Anilect/Lab$ ls
etc
kaj@kaj-VirtualBox:~/Anilect/Lab$ ls etc
acpi           hosts           profile.d
adduser.conf   hosts.allow    protocols
alsa           hosts.deny    pulse
alternatives   hp             python3
anacrontab     ifplugd       Python3.9
apg.conf       init           rc0.d
apm            init.d        rc1.d
apparmor       initramfs-tools rc2.d
apparmor.d     inputrc       rc3.d
apport         inserv.conf.d rc4.d
appstream.conf ipp-usb       rc5.d
apt            iproute2      rc6.d
avahi          issue         rcs.d
bash.bashrc    issue.net    resolv.conf
bash_completion kernel         rmt
bash_completion.d kernel-img.conf rpc
bindresvport.blacklist kerneloops.conf rsyslog.conf
binfmt.d       ldap          rsyslog.d
bluetooth      ld.so.cache  rygel.conf
brlapi.key     ld.so.conf   sane.d
brltty         ld.so.conf.d security
brltty.conf    legal         selinux
ca-certificates libao.conf   sensors3.conf
```

- Extract using xz

```
kaj@kaj-VirtualBox:~/Anilect/Lab$ ls
etc
kaj@kaj-VirtualBox:~/Anilect/Lab$ tar xJf /home/kaj/Anilect/mcareg.tar.xz
kaj@kaj-VirtualBox:~/Anilect/Lab$ ls
etc  file2.txt  file.txt
```

- Extract using bz2

```
kaj@kaj-VirtualBox:~/Anilect/Lab$ tar xJf /home/kaj/Anilect/mcareg.tar.bz2
kaj@kaj-VirtualBox:~/Anilect/Lab$ ls
abc.txt  ani.txt  etc  file2.txt  file.txt
```

3. expr

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

- Basic operations like addition, subtraction, multiplication, division, and modulus on integers.
- Evaluating regular expressions, string operations like substring, length of strings etc.
- Performing operations on variables inside a shell script

```
#expr 10 + 2
```

```
kaj@kaj-VirtualBox:~$ expr --version
expr (GNU coreutils) 8.32
Copyright (C) 2020 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.

Written by Mike Parker, James Youngman, and Paul Eggert.
kaj@kaj-VirtualBox:~$ expr 10 + 5
15
kaj@kaj-VirtualBox:~$ expr 10 \* 5
50
kaj@kaj-VirtualBox:~$ expr 10 / 5
2
kaj@kaj-VirtualBox:~$ expr 10 - 5
5
kaj@kaj-VirtualBox:~$ expr 11 % 5
1
kaj@kaj-VirtualBox:~$
```

```
kaj@kaj-VirtualBox:~$ expr length "Anilect" "<" 5 " | " 19 - 6 ">" 10
1
kaj@kaj-VirtualBox:~$ expr length "Anilect" "<" 5 " | " 19 - 6 ">" 20
0
```

4. Redirections & Piping

A pipe is a form of redirection to send the output of one command/program/process to another command/program/process for further processing.

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

```
#ls -l | wc -l
```

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

```
kaj@kaj-VirtualBox:~$ ls -l
total 64
-rw-rw-r-- 1 kaj kaj 731 Aug 12 12:55 abc.txt
drwxrwxr-x 2 ant kaj 4096 Aug 11 20:15 Anilect
-rw-rw-r-- 1 kaj kaj 10240 Aug 11 22:09 archive.tar
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Desktop
drwxr-xr-x 3 kaj kaj 4096 Jun 20 21:51 Documents
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Downloads
drwxrwxr-x 2 kaj kaj 4096 Aug 11 22:15 Extracted
-rw-rw-r-- 1 kaj kaj 10 Aug 11 22:02 file2.txt
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Music
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Pictures
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Public
drwxr-xr-x 3 kaj kaj 4096 Jun 2 00:23 snap
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Templates
drwxr-xr-x 2 kaj kaj 4096 Jun 2 00:20 Videos
kaj@kaj-VirtualBox:~$ ls -l | wc -l
15
```

```
kaj@kaj-VirtualBox:~$ ls | wc -m -w
14      120
```

```
kaj@kaj-VirtualBox:~$ cat abc.txt | head -5 | tail -5
Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
```

```
kaj@kaj-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.

```
#ssh user_name@host(IP/Domain_name)
```

```
#ssh -X root@server1.example.com
```

```
kaj@kaj-VirtualBox:~$ sudo apt install openssh-client
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  liburing1
Use 'sudo apt autoremove' to remove it.
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 226 not upgraded.
Need to get 702 kB of archives.
After this operation, 0 B of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 openssh-client amd64 1:8.4p1-5ubuntu1.1 [702 kB]
Fetched 702 kB in 1s (484 kB/s)
(Reading database ... 186834 files and directories currently installed.)
Preparing to unpack .../openssh-client_1%3a8.4p1-5ubuntu1.1_amd64.deb ...
Unpacking openssh-client (1:8.4p1-5ubuntu1.1) over (1:8.4p1-5ubuntu1) ...
Setting up openssh-client (1:8.4p1-5ubuntu1.1) ...
Processing triggers for man-db (2.9.4-2) ...
kaj@kaj-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
kaj@kaj-VirtualBox:~$ sudo apt-get install openssh-server i
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

```
kaj@kaj-VirtualBox:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:TAWY3kIseZ06S6gaE8mr0n6NJ5em3cCKmPMz01hklzI.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
kaj@localhost's password:
Welcome to Ubuntu 21.04 (GNU/Linux 5.11.0-18-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

231 updates can be installed immediately.
97 of these updates are security updates.
To see these additional updates run: apt list --upgradable

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.
```

6. 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
```

7. ssh-keygen

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

```
$ssh-keygen -t rsa
```

```
kaj@kaj-VirtualBox:~/Anilect/Keygen$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/kaj/.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:T5p9D717xvpqgSp5BkFa7KG8tROIfR38bW2Rxak8BPc kaj@kaj-VirtualBox
The key's randomart image is:
+---[RSA 3072]---+
|          . |
|       . . o |
|      = o .o |
|     . * Eo |
|    oS*.o = .o|
|   . =*B +.o =|
|   .oB++o .= |
|   =.*o o...+|
|   .=.. .*B. |
+---[SHA256]---+
kaj@kaj-VirtualBox:~/Anilect/Keygen$ ls
key1  key1.pub
```

8. ssh-copy-id

The ssh-copy-id command allows you to install an SSH key on a remote server's authorized keys.

- This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process.

```
$ssh-copy-id username@remote_host
```

ASSIGNMENT 5: LAB EXERCISES

Lab Assignment 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) .

```
kaj@kaj-VirtualBox:~$ mkdir Assignment
kaj@kaj-VirtualBox:~$ cd Assignment/
kaj@kaj-VirtualBox:~/Assignment$ touch song{1..6}.mp3
kaj@kaj-VirtualBox:~/Assignment$ ls
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
kaj@kaj-VirtualBox:~/Assignment$ touch snap{1..6}.mp3
kaj@kaj-VirtualBox:~/Assignment$ ls
snap1.mp3  snap3.mp3  snap5.mp3  song1.mp3  song3.mp3  song5.mp3
snap2.mp3  snap4.mp3  snap6.mp3  song2.mp3  song4.mp3  song6.mp3
kaj@kaj-VirtualBox:~/Assignment$ touch film{1..6}.mp3
kaj@kaj-VirtualBox:~/Assignment$ 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
kaj@kaj-VirtualBox:~/Assignment$ █
```

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.

```
kaj@kaj-VirtualBox:~/Assignment$ mv song{1..6}.mp3 /home/kaj/Music/
kaj@kaj-VirtualBox:~/Assignment$ mv snap{1..6}.mp3 /home/kaj/Pictures/
kaj@kaj-VirtualBox:~/Assignment$ mv film{1..6}.mp3 /home/kaj/Videos/
kaj@kaj-VirtualBox:~/Assignment$ cd ..
kaj@kaj-VirtualBox:~$ cd Music/
kaj@kaj-VirtualBox:~/Music$ ls
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
kaj@kaj-VirtualBox:~/Music$ cd ..
kaj@kaj-VirtualBox:~$ cd Pictures/
kaj@kaj-VirtualBox:~/Pictures$ ls
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3
kaj@kaj-VirtualBox:~/Pictures$ cd ..
kaj@kaj-VirtualBox:~$ cd Videos/
kaj@kaj-VirtualBox:~/Videos$ ls
film1.mp3  film2.mp3  film3.mp3  film4.mp3  film5.mp3  film6.mp3
kaj@kaj-VirtualBox:~/Videos$ cd ..
kaj@kaj-VirtualBox:~$ █
```

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

```
kaj@kaj-VirtualBox:~$ mkdir -p Assignment/{friends,family,work}
kaj@kaj-VirtualBox:~$ cd Assignment/
kaj@kaj-VirtualBox:~/Assignment$ ls
family  friends  work
kaj@kaj-VirtualBox:~/Assignment$ █
```

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

```
kaj@kaj-VirtualBox:~$ cp -i /home/kaj/Music/* /home/kaj/Assignment/friends/
kaj@kaj-VirtualBox:~$ ls /home/kaj/Assignment/friends/
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
kaj@kaj-VirtualBox:~$ cp -i /home/kaj/Pictures/* /home/kaj/Assignment/family/
kaj@kaj-VirtualBox:~$ ls /home/kaj/Assignment/family/
snap1.mp3  snap2.mp3  snap3.mp3  snap4.mp3  snap5.mp3  snap6.mp3
kaj@kaj-VirtualBox:~$
```

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

```
kaj@kaj-VirtualBox:~$ rmdir /home/kaj/Assignment/family/ /home/kaj/Assignment/f
riends/
rmdir: failed to remove '/home/kaj/Assignment/family/': Directory not empty
rmdir: failed to remove '/home/kaj/Assignment/friends/': Directory not empty
kaj@kaj-VirtualBox:~$ █
```

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

```
kaj@kaj-VirtualBox:~$ rm -r /home/kaj/Assignment/family/ /home/kaj/Assignment/f
riends/
kaj@kaj-VirtualBox:~$ ls /home/kaj/Assignment/
work
kaj@kaj-VirtualBox:~$ █
```

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

```
kaj@kaj-VirtualBox:~$ ls -a
.          .bashrc    Downloads  Pictures  .sudo_as_admin_successful
..         .cache     .gnupg    .profile  Templates
Assignment .config    .local    Public   Videos
.bash_history Desktop   .mozilla  snap
.bash_logout Documents Music    .ssh
kaj@kaj-VirtualBox:~$ ls -a > allfiles.txt
kaj@kaj-VirtualBox:~$ cat allfiles.txt
.
..
allfiles.txt
Assignment
.bash_history
.bash_logout
.bashrc
.cache
.config
Desktop
Documents
Downloads
.gnupg
.local
.mozilla
Music
Pictures
.profile
Public
snap
.ssh
```

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

```
kaj@kaj-VirtualBox:~$ date -u
Tuesday 17 August 2021 10:45:40 AM UTC
kaj@kaj-VirtualBox:~$ date "+%A %B %d %G"
Tuesday August 17 2021
kaj@kaj-VirtualBox:~$
```

9. Add the user Juliet.

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

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

```
kaj@kaj-VirtualBox:~$ tail -5 /etc/passwd
chinnu:x:1001:1001::/home/chinnu:/bin/sh
ani:x:2000:1002::/home/ani:/bin/sh
sshd:x:127:65534::/run/sshd:/usr/sbin/nologin
mysql:x:128:136:MySQL Server,,,:/nonexistent:/bin/false
Juliet:x:2001:2001::/home/Juliet:/bin/sh
kaj@kaj-VirtualBox:~$
```

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

```
kaj@kaj-VirtualBox:~$ sudo passwd Juliet
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
kaj@kaj-VirtualBox:~$
```

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

```
kaj@kaj-VirtualBox:~$ sudo groupadd -g 30000 Shakespeare
kaj@kaj-VirtualBox:~$ tail -5 /etc/group
plant:x:1005:ani
AJCE:x:1006:ani
mysql:x:136:
Juliet:x:2001:
Shakespeare:x:30000:
kaj@kaj-VirtualBox:~$
```

13. Create a supplementary group called artists.

```
kaj@kaj-VirtualBox:~$ sudo groupadd artists
kaj@kaj-VirtualBox:~$ tail -5 /etc/group
AJCE:x:1006:ani
mysql:x:136:
Juliet:x:2001:
Shakespeare:x:30000:
artists:x:30001:
kaj@kaj-VirtualBox:~$ █
```

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

```
kaj@kaj-VirtualBox:~$ tail -20 /etc/group
colord:x:127:
geoclue:x:128:
pulse:x:129:
pulse-access:x:130:
gdm:x:131:
lxde:x:132:kaj
kaj:x:1000:
sambashare:x:133:kaj
systemd-coredump:x:999:
plocate:x:134:
mlocate:x:135:
chinnu:x:1001:
ani:x:1002:
MCA:x:1003:
plant:x:1005:ani
AJCE:x:1006:ani
mysql:x:136:
Juliet:x:2001:
Shakespeare:x:30000:
artists:x:30001:
kaj@kaj-VirtualBox:~$
```

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

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

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

```
kaj@kaj-VirtualBox:~$ id Juliet
uid=2001(Juliet) gid=2001(Juliet) groups=2001(Juliet),30000(Shakespeare)
kaj@kaj-VirtualBox:~$ █
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
kaj@kaj-VirtualBox:~$ sudo useradd Romeo
kaj@kaj-VirtualBox:~$ sudo useradd Hamlet
kaj@kaj-VirtualBox:~$ sudo usermod -G Shakespeare Romeo
kaj@kaj-VirtualBox:~$ sudo usermod -G Shakespeare Hamlet
kaj@kaj-VirtualBox:~$ members Shakespeare
Juliet Romeo Hamlet
kaj@kaj-VirtualBox:~$
```

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

```
kaj@kaj-VirtualBox:~$ sudo useradd Reba
kaj@kaj-VirtualBox:~$ sudo useradd Dolly
kaj@kaj-VirtualBox:~$ sudo useradd Elvis
kaj@kaj-VirtualBox:~$ sudo usermod -G artists Reba
kaj@kaj-VirtualBox:~$ sudo usermod -G artists Dolly
kaj@kaj-VirtualBox:~$ sudo usermod -G artists Elvis
kaj@kaj-VirtualBox:~$ members artists
Reba Dolly Elvis
kaj@kaj-VirtualBox:~$ █
```

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

```
kaj@kaj-VirtualBox:~$ tail -20 /etc/group
sambashare:x:133:kaj
systemd-coredump:x:999:
plocate:x:134:
mlocate:x:135:
chinnu:x:1001:
ani:x:1002:
MCA:x:1003:
Plant:x:1005:ani
AJCE:x:1006:ani
mysql:x:136:
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:Reba,Dolly,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Arun:x:2007:
arjun:x:2008:
Reba:x:2009:
Dolly:x:2010:
Elvis:x:2011:
kaj@kaj-VirtualBox:~$
```

20. Attempt to remove user Dolly

```
kaj@kaj-VirtualBox:~$ sudo userdel Dolly
kaj@kaj-VirtualBox:~$ tail -20 /etc/group
kaj:x:1000:
sambashare:x:133:kaj
systemd-coredump:x:999:
plocate:x:134:
mlocate:x:135:
chinnu:x:1001:
ani:x:1002:
MCA:x:1003:
plant:x:1005:ani
AJCE:x:1006:ani
mysql:x:136:
Juliet:x:2001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artists:x:30001:Reba,Elvis
Romeo:x:2002:
Hamlet:x:2003:
Arun:x:2007:
arjun:x:2008:
Reba:x:2009:
Elvis:x:2011:
kaj@kaj-VirtualBox:~$
```

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:\Administrator: Command Prompt
Microsoft Windows [Version 10.0.19043.1202]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\system32>ping google.com

Pinging google.com [142.250.196.78] with 32 bytes of data:
Reply from 142.250.196.78: bytes=32 time=45ms TTL=119
Reply from 142.250.196.78: bytes=32 time=45ms TTL=119
Reply from 142.250.196.78: bytes=32 time=47ms TTL=119
Reply from 142.250.196.78: bytes=32 time=20ms TTL=119

Ping statistics for 142.250.196.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 47ms, Average = 39ms

C:\Windows\system32>ping -a google.com

Pinging google.com [142.250.196.78] with 32 bytes of data:
Reply from 142.250.196.78: bytes=32 time=37ms TTL=119
Reply from 142.250.196.78: bytes=32 time=21ms TTL=119
Reply from 142.250.196.78: bytes=32 time=20ms TTL=119
Reply from 142.250.196.78: bytes=32 time=31ms TTL=119

Ping statistics for 142.250.196.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 37ms, Average = 27ms
```

```
C:\Windows\system32>ping -t google.com

Pinging google.com [142.250.196.78] with 32 bytes of data:
Reply from 142.250.196.78: bytes=32 time=34ms TTL=119
Reply from 142.250.196.78: bytes=32 time=21ms TTL=119
Reply from 142.250.196.78: bytes=32 time=23ms TTL=119
Reply from 142.250.196.78: bytes=32 time=24ms TTL=119
Reply from 142.250.196.78: bytes=32 time=29ms TTL=119
Reply from 142.250.196.78: bytes=32 time=33ms TTL=119
Reply from 142.250.196.78: bytes=32 time=41ms TTL=119

Ping statistics for 142.250.196.78:
    Packets: Sent = 7, Received = 7, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 21ms, Maximum = 41ms, Average = 29ms
```

```
C:\Windows\system32>ping -j google.com

Pinging google.com [142.250.196.78] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.196.78:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Windows\system32>ping -4 google.com

Pinging google.com [142.250.196.78] with 32 bytes of data:
Reply from 142.250.196.78: bytes=32 time=25ms TTL=119
Reply from 142.250.196.78: bytes=32 time=20ms TTL=119
Reply from 142.250.196.78: bytes=32 time=20ms TTL=119
Reply from 142.250.196.78: bytes=32 time=21ms TTL=119

Ping statistics for 142.250.196.78:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 20ms, Maximum = 25ms, Average = 21ms
```

● Route

```
Administrator: Command Prompt
Minimum = 20ms, Maximum = 25ms, Average = 21ms

C:\Windows\system32>route print
=====
Interface List
 2...0a 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
 25...1a 47 3d e9 62 5d ....Microsoft Wi-Fi Direct Virtual Adapter #5
 19...2a 47 3d e9 62 5d ....Microsoft Wi-Fi Direct Virtual Adapter #6
 23...18 47 3d e9 62 5d ....Qualcomm QCA61x4A 802.11ac Wireless Adapter
 10...18 47 3d e9 62 5e ....Bluetooth Device (Personal Area Network) #2
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway        Interface Metric
          0.0.0.0          0.0.0.0    192.168.1.1  192.168.1.2      40
         127.0.0.0        255.0.0.0     On-link       127.0.0.1      331
         127.0.0.1        255.255.255     On-link       127.0.0.1      331
 127.255.255.255        255.255.255     On-link       127.0.0.1      331
         192.168.1.0      255.255.255     On-link      192.168.1.2      296
         192.168.1.2      255.255.255     On-link      192.168.1.2      296
 192.168.1.255        255.255.255     On-link      192.168.1.2      296
         192.168.56.0      255.255.255     On-link     192.168.56.1      281
         192.168.56.1      255.255.255     On-link     192.168.56.1      281
 192.168.56.255        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      192.168.1.2      296
 255.255.255.255        255.255.255     On-link       127.0.0.1      331
 255.255.255.255        255.255.255     On-link     192.168.56.1      281
 255.255.255.255        255.255.255     On-link      192.168.1.2      296
=====

Persistent Routes:
  None
```

```
IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
 1    331 ::1/128          On-link
 2    281 fe80::/64         On-link
23   296 fe80::/64         On-link
23   296 fe80::3967:1de3:1924:1daf/128
                                On-link
 2    281 fe80::e866:65b:18f5:53de/128
                                On-link
 1    331 ff00::/8          On-link
 2    281 ff00::/8          On-link
23   296 ff00::/8          On-link
=====
Persistent Routes:
  None
```

```
C:\Windows\system32>route print -4
=====
Interface List
 2...0a 00 27 00 00 02 ....VirtualBox Host-Only Ethernet Adapter
 25...1a 47 3d e9 62 5d ....Microsoft Wi-Fi Direct Virtual Adapter #5
 19...2a 47 3d e9 62 5d ....Microsoft Wi-Fi Direct Virtual Adapter #6
 23...18 47 3d e9 62 5d ....Qualcomm QCA61x4A 802.11ac Wireless Adapter
 10...18 47 3d e9 62 5e ....Bluetooth Device (Personal Area Network) #2
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway       Interface Metric
  0.0.0.0          0.0.0.0    192.168.1.1  192.168.1.2    40
 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
 192.168.1.0      255.255.255.0  On-link        192.168.1.2    296
 192.168.1.2      255.255.255.255  On-link        192.168.1.2    296
 192.168.1.255    255.255.255.255  On-link        192.168.1.2    296
 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        192.168.1.2    296
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        192.168.1.2    296
=====
Persistent Routes:
  None
```

```
C:\Windows\system32>route print -6
=====
Interface List
 2...0a 00 27 00 00 02 .....VirtualBox Host-Only Ethernet Adapter
 25...1a 47 3d e9 62 5d .....Microsoft Wi-Fi Direct Virtual Adapter #5
 19...2a 47 3d e9 62 5d .....Microsoft Wi-Fi Direct Virtual Adapter #6
 23...18 47 3d e9 62 5d .....Qualcomm QCA61x4A 802.11ac Wireless Adapter
 10...18 47 3d e9 62 5e .....Bluetooth Device (Personal Area Network) #2
 1.....Software Loopback Interface 1
=====

IPv6 Route Table
=====
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
  2    281 fe80::/64                On-link
 23    296 fe80::/64                On-link
 23    296 fe80::3967:1de3:1924:1daf/128
                                On-link
  2    281 fe80::e866:65b:18f5:53de/128
                                On-link
  1    331 ff00::/8                 On-link
  2    281 ff00::/8                 On-link
 23    296 ff00::/8                 On-link
=====

Persistent Routes:
 None
```

```
C:\Windows\system32>route print *153
=====
Interface List
 2...0a 00 27 00 00 02 .....VirtualBox Host-Only Ethernet Adapter
 25...1a 47 3d e9 62 5d .....Microsoft Wi-Fi Direct Virtual Adapter #5
 19...2a 47 3d e9 62 5d .....Microsoft Wi-Fi Direct Virtual Adapter #6
 23...18 47 3d e9 62 5d .....Qualcomm QCA61x4A 802.11ac Wireless Adapter
 10...18 47 3d e9 62 5e .....Bluetooth Device (Personal Area Network) #2
 1.....Software Loopback Interface 1
=====

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

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

- Tracert

```
C:\Windows\system32>tracert 192.168.1.2

Tracing route to KAJ [192.168.1.2]
over a maximum of 30 hops:

 1    <1 ms     <1 ms     <1 ms  KAJ [192.168.1.2]

Trace complete.

C:\Windows\system32>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

 1      8 ms      2 ms      2 ms  192.168.1.1

Trace complete.
```

```
C:\Windows\system32>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

 1      18 ms      2 ms      2 ms  192.168.1.1
 2      22 ms      6 ms      5 ms  100.76.0.1
 3      66 ms      79 ms     80 ms  125.23.238.89
 4     249 ms     258 ms     250 ms  116.119.52.163
 5     242 ms     232 ms     257 ms  10gigabitethernet1-2.core1.nyc6.he.net [198.32.160.61]
 6     234 ms     240 ms     254 ms  100ge13-1.core1.nyc4.he.net [184.105.64.177]
 7     265 ms     255 ms     252 ms  100ge16-1.core1.ash1.he.net [184.105.223.165]
 8     223 ms     227 ms     238 ms  100ge5-1.core2.ash1.he.net [72.52.92.226]
 9      *          *          * Request timed out.
10      *          *          * Request timed out.
11      *          *          * Request timed out.
12      *          *          * Request timed out.
13      *          *          * Request timed out.
14      *          *          * Request timed out.
15      *          *          * Request timed out.
16      *          *          * Request timed out.
17      *          *          * Request timed out.
18      *          *          * Request timed out.
19      *          *          * Request timed out.
20      *          *          * Request timed out.
21      *          *          * Request timed out.
22      *          *          * Request timed out.
23      *          *          * Request timed out.
24      *          *          * Request timed out.
25      *          *          * Request timed out.
26      *          *          * Request timed out.
27      *          *          * Request timed out.
28      *          *          * Request timed out.
29      *          *          * Request timed out.
30      *          *          * Request timed out.

Trace complete.
```

```
C:\Windows\system32>tracert google.com

Tracing route to google.com [142.250.193.142]
over a maximum of 30 hops:

 1   6 ms    2 ms    2 ms  192.168.1.1
 2   5 ms    6 ms    5 ms  100.76.0.1
 3   39 ms   21 ms   20 ms  10.1.3.10
 4   22 ms   31 ms   20 ms  72.14.205.178
 5   33 ms   25 ms   54 ms  216.239.54.75
 6   21 ms   37 ms   23 ms  142.251.55.227
 7   21 ms   21 ms   36 ms  maa05s25-in-f14.1e100.net [142.250.193.142]

Trace complete.
```

```
C:\Windows\system32>tracert -d www.linkedin.com

Tracing route to l-0005.l-msedge.net [13.107.42.14]
over a maximum of 30 hops:

 1   4 ms    3 ms    3 ms  192.168.1.1
 2   5 ms    6 ms    6 ms  100.76.0.1
 3   21 ms   45 ms   21 ms  10.1.3.14
 4   20 ms   22 ms   43 ms  104.44.6.123
 5   28 ms   34 ms   21 ms  104.44.41.233
 6   21 ms   30 ms   29 ms  104.44.22.123
 7   45 ms   24 ms   56 ms  104.44.18.159
 8   62 ms   29 ms   49 ms  104.44.23.248
 9   21 ms   38 ms   22 ms  104.44.234.36
10   23 ms   20 ms   37 ms  13.104.182.49
11   *       *       *       Request timed out.
12   *       *       *       Request timed out.
13   *       *       *       Request timed out.
14   63 ms   30 ms   *       13.107.42.14
15   21 ms   51 ms   21 ms  13.107.42.14

Trace complete.
```

● Nslookup

```
C:\Windows\system32>nslookup
Default Server: UnKnown
Address: 103.140.17.242

> exit

C:\Windows\system32>nslookup google.com
Server: UnKnown
Address: 103.140.17.242

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4007:82b::200e
           142.250.196.78

C:\Windows\system32>nslookup -q=MX google.com
Server: UnKnown
Address: 103.140.17.242

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

C:\Windows\system32>nslookup -type=ns google.com
Server: UnKnown
Address: 103.140.17.242

Non-authoritative answer:
google.com      nameserver = ns4.google.com
google.com      nameserver = ns3.google.com
google.com      nameserver = ns1.google.com
google.com      nameserver = ns2.google.com
```

● Ipconfig

```
C:\Windows\system32>ipconfig

Windows IP Configuration

Ethernet adapter VirtualBox Host-Only Network:

  Connection-specific DNS Suffix  . :
  Link-local IPv6 Address . . . . . : fe80::e866:65b:18f5:53de%2
  IPv4 Address. . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 13:

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

Wireless LAN adapter Local Area Connection* 14:

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

Wireless LAN adapter Wi-Fi:

  Connection-specific DNS Suffix  . :
  Link-local IPv6 Address . . . . . : fe80::3967:1de3:1924:1daf%23
  IPv4 Address. . . . . : 192.168.1.2
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection 2:

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

```
C:\Windows\system32>ipconfig /allcompartments

Windows IP Configuration

=====
Network Information for Compartment 1 (ACTIVE)
=====

Ethernet adapter VirtualBox Host-Only Network:

  Connection-specific DNS Suffix  . :
  Link-local IPv6 Address . . . . . : fe80::e866:65b:18f5:53de%2
  IPv4 Address. . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 13:

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

Wireless LAN adapter Local Area Connection* 14:

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

Wireless LAN adapter Wi-Fi:

  Connection-specific DNS Suffix  . :
  Link-local IPv6 Address . . . . . : fe80::3967:1de3:1924:1daf%23
  IPv4 Address. . . . . : 192.168.1.2
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection 2:

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

```
C:\Windows\system32>ipconfig/displaydns
```

```
Windows IP Configuration
```

```
www.wondershare.com
```

```
-----  
No records of type AAAA
```

```
www.wondershare.com
```

```
-----  
Record Name . . . . . : www.wondershare.com  
Record Type . . . . . : 1  
Time To Live . . . . . : 483101  
Data Length . . . . . : 4  
Section . . . . . : Answer  
A (Host) Record . . . . : 127.0.0.1
```

```
cbs.wondershare.com
```

```
-----  
No records of type AAAA
```

```
cbs.wondershare.com
```

```
-----  
Record Name . . . . . : cbs.wondershare.com  
Record Type . . . . . : 1  
Time To Live . . . . . : 483101  
Data Length . . . . . : 4  
Section . . . . . : Answer  
A (Host) Record . . . . : 127.0.0.1
```

```
tracker.openbittorrent.com
```

```
-----  
Record Name . . . . . : tracker.openbittorrent.com  
Record Type . . . . . : 1  
Time To Live . . . . . : 389  
Data Length . . . . . : 4  
Section . . . . . : Answer  
A (Host) Record . . . . : 45.154.253.5
```

```
-----  
Record Name . . . . . : tracker.openbittorrent.com  
Record Type . . . . . : 1  
Time To Live . . . . . : 389  
Data Length . . . . . : 4
```

```
C:\Windows\system32>ipconfig/release

Windows IP Configuration

No operation can be performed on Local Area Connection* 13 while it has its media disconnected.
No operation can be performed on Local Area Connection* 14 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection 2 while it has its media disconnected.

Ethernet adapter VirtualBox Host-Only Network:

  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::e866:65b:18f5:53de%2
  IPv4 Address. . . . . : 192.168.56.1
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 13:

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

Wireless LAN adapter Local Area Connection* 14:

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

Wireless LAN adapter Wi-Fi:

  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::3967:1de3:1924:1daf%23
  Default Gateway . . . . . :

Ethernet adapter Bluetooth Network Connection 2:

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

C:\Windows\system32>
```

● Netstat

```
C:\Windows\system32>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:19575       platform:50181      TIME_WAIT
  TCP    127.0.0.1:19575       platform:51946      TIME_WAIT
  TCP    127.0.0.1:19575       platform:53545      TIME_WAIT
  TCP    127.0.0.1:19575       platform:54604      TIME_WAIT
  TCP    127.0.0.1:19575       platform:55679      TIME_WAIT
  TCP    127.0.0.1:19575       platform:55970      TIME_WAIT
  TCP    127.0.0.1:19575       platform:57517      TIME_WAIT
  TCP    127.0.0.1:19575       platform:61464      TIME_WAIT
  TCP    127.0.0.1:19575       platform:61848      TIME_WAIT
  TCP    127.0.0.1:49376       platform:49377      ESTABLISHED
  TCP    127.0.0.1:49377       platform:49376      ESTABLISHED
  TCP    127.0.0.1:49670       platform:49671      ESTABLISHED
  TCP    127.0.0.1:49671       platform:49670      ESTABLISHED
  TCP    127.0.0.1:49672       platform:49673      ESTABLISHED
  TCP    127.0.0.1:49673       platform:49672      ESTABLISHED
  TCP    127.0.0.1:57118       platform:63736      ESTABLISHED
  TCP    127.0.0.1:58630       platform:58631      ESTABLISHED
  TCP    127.0.0.1:58631       platform:58630      ESTABLISHED
  TCP    127.0.0.1:62788       platform:62789      ESTABLISHED
  TCP    127.0.0.1:62789       platform:62788      ESTABLISHED
  TCP    127.0.0.1:63736       platform:57118      ESTABLISHED
```

```
C:\Windows\system32>netstat -n
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:19575	127.0.0.1:49321	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:54740	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:55939	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:60557	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:60870	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:63199	TIME_WAIT
TCP	127.0.0.1:49376	127.0.0.1:49377	ESTABLISHED
TCP	127.0.0.1:49377	127.0.0.1:49376	ESTABLISHED
TCP	127.0.0.1:49665	127.0.0.1:55846	ESTABLISHED
TCP	127.0.0.1:49670	127.0.0.1:49671	ESTABLISHED
TCP	127.0.0.1:49671	127.0.0.1:49670	ESTABLISHED
TCP	127.0.0.1:49672	127.0.0.1:49673	ESTABLISHED
TCP	127.0.0.1:49673	127.0.0.1:49672	ESTABLISHED
TCP	127.0.0.1:55846	127.0.0.1:49665	ESTABLISHED
TCP	127.0.0.1:57118	127.0.0.1:63736	ESTABLISHED
TCP	127.0.0.1:58630	127.0.0.1:58631	ESTABLISHED
TCP	127.0.0.1:58631	127.0.0.1:58630	ESTABLISHED
TCP	127.0.0.1:62788	127.0.0.1:62789	ESTABLISHED
TCP	127.0.0.1:62789	127.0.0.1:62788	ESTABLISHED
TCP	127.0.0.1:63736	127.0.0.1:57118	ESTABLISHED
TCP	127.0.0.1:63738	127.0.0.1:63739	ESTABLISHED
TCP	127.0.0.1:63739	127.0.0.1:63738	ESTABLISHED
TCP	127.0.0.1:63743	127.0.0.1:63755	ESTABLISHED
TCP	127.0.0.1:63743	127.0.0.1:63743	ESTABLISHED
TCP	127.0.0.1:63755	127.0.0.1:63743	ESTABLISHED
TCP	127.0.0.1:64322	127.0.0.1:64323	ESTABLISHED
TCP	127.0.0.1:64323	127.0.0.1:64322	ESTABLISHED
TCP	127.0.0.1:64324	127.0.0.1:64325	ESTABLISHED
TCP	127.0.0.1:64325	127.0.0.1:64324	ESTABLISHED
TCP	127.0.0.1:64326	127.0.0.1:64327	ESTABLISHED
TCP	127.0.0.1:64327	127.0.0.1:64326	ESTABLISHED
TCP	127.0.0.1:64335	127.0.0.1:64337	ESTABLISHED
TCP	127.0.0.1:64336	127.0.0.1:64338	ESTABLISHED
TCP	127.0.0.1:64337	127.0.0.1:64335	ESTABLISHED
TCP	127.0.0.1:64338	127.0.0.1:64336	ESTABLISHED
TCP	127.0.0.1:64339	127.0.0.1:64340	ESTABLISHED

```
C:\Windows\system32>netstat -n 5
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:19575	127.0.0.1:50233	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:52594	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:54740	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:55939	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:58174	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:60557	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:60576	TIME_WAIT
TCP	127.0.0.1:19575	127.0.0.1:64364	TIME_WAIT
TCP	127.0.0.1:49376	127.0.0.1:49377	ESTABLISHED
TCP	127.0.0.1:49377	127.0.0.1:49376	ESTABLISHED
TCP	127.0.0.1:49665	127.0.0.1:55846	ESTABLISHED
TCP	127.0.0.1:49670	127.0.0.1:49671	ESTABLISHED
TCP	127.0.0.1:49671	127.0.0.1:49670	ESTABLISHED
TCP	127.0.0.1:49672	127.0.0.1:49673	ESTABLISHED
TCP	127.0.0.1:49673	127.0.0.1:49672	ESTABLISHED
TCP	127.0.0.1:55846	127.0.0.1:49665	ESTABLISHED
TCP	127.0.0.1:57118	127.0.0.1:63736	ESTABLISHED
TCP	127.0.0.1:58630	127.0.0.1:58631	ESTABLISHED
TCP	127.0.0.1:58631	127.0.0.1:58630	ESTABLISHED
TCP	127.0.0.1:62788	127.0.0.1:62789	ESTABLISHED
TCP	127.0.0.1:62789	127.0.0.1:62788	ESTABLISHED
TCP	127.0.0.1:63736	127.0.0.1:57118	ESTABLISHED
TCP	127.0.0.1:63738	127.0.0.1:63739	ESTABLISHED
TCP	127.0.0.1:63739	127.0.0.1:63738	ESTABLISHED
TCP	127.0.0.1:63743	127.0.0.1:63755	ESTABLISHED
TCP	127.0.0.1:63743	127.0.0.1:63743	ESTABLISHED
TCP	127.0.0.1:63755	127.0.0.1:63743	ESTABLISHED
TCP	127.0.0.1:64322	127.0.0.1:64323	ESTABLISHED
TCP	127.0.0.1:64323	127.0.0.1:64322	ESTABLISHED
TCP	127.0.0.1:64324	127.0.0.1:64325	ESTABLISHED
TCP	127.0.0.1:64325	127.0.0.1:64324	ESTABLISHED
TCP	127.0.0.1:64326	127.0.0.1:64327	ESTABLISHED
TCP	127.0.0.1:64327	127.0.0.1:64326	ESTABLISHED
TCP	127.0.0.1:64335	127.0.0.1:64337	ESTABLISHED
TCP	127.0.0.1:64336	127.0.0.1:64338	ESTABLISHED
TCP	127.0.0.1:64337	127.0.0.1:64335	ESTABLISHED
TCP	127.0.0.1:64338	127.0.0.1:64336	ESTABLISHED
TCP	127.0.0.1:64339	127.0.0.1:64340	ESTABLISHED

```
C:\Windows\system32>netstat -a
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	KAJ:0	LISTENING
TCP	0.0.0.0:445	KAJ:0	LISTENING
TCP	0.0.0.0:3306	KAJ:0	LISTENING
TCP	0.0.0.0:5040	KAJ:0	LISTENING
TCP	0.0.0.0:5357	KAJ:0	LISTENING
TCP	0.0.0.0:5700	KAJ:0	LISTENING
TCP	0.0.0.0:6646	KAJ:0	LISTENING
TCP	0.0.0.0:6881	KAJ:0	LISTENING
TCP	0.0.0.0:7070	KAJ:0	LISTENING
TCP	0.0.0.0:19575	KAJ:0	LISTENING
TCP	0.0.0.0:19576	KAJ:0	LISTENING
TCP	0.0.0.0:19577	KAJ:0	LISTENING
TCP	0.0.0.0:33060	KAJ:0	LISTENING
TCP	0.0.0.0:49664	KAJ:0	LISTENING
TCP	0.0.0.0:49665	KAJ:0	LISTENING
TCP	0.0.0.0:49666	KAJ:0	LISTENING
TCP	0.0.0.0:49667	KAJ:0	LISTENING
TCP	0.0.0.0:49668	KAJ:0	LISTENING
TCP	0.0.0.0:49674	KAJ:0	LISTENING
TCP	127.0.0.1:1001	KAJ:0	LISTENING
TCP	127.0.0.1:8884	KAJ:0	LISTENING
TCP	127.0.0.1:9012	KAJ:0	LISTENING
TCP	127.0.0.1:19575	platform:50968	TIME_WAIT
TCP	127.0.0.1:19575	platform:51233	TIME_WAIT
TCP	127.0.0.1:19575	platform:51555	TIME_WAIT
TCP	127.0.0.1:19575	platform:54936	TIME_WAIT
TCP	127.0.0.1:19575	platform:57818	TIME_WAIT
TCP	127.0.0.1:19575	platform:64050	TIME_WAIT
TCP	127.0.0.1:27017	KAJ:0	LISTENING
TCP	127.0.0.1:49376	platform:49377	ESTABLISHED
TCP	127.0.0.1:49377	platform:49376	ESTABLISHED
TCP	127.0.0.1:49665	platform:64119	ESTABLISHED
TCP	127.0.0.1:49670	platform:49671	ESTABLISHED
TCP	127.0.0.1:49671	platform:49670	ESTABLISHED
TCP	127.0.0.1:49672	platform:49673	ESTABLISHED
TCP	127.0.0.1:49673	platform:49672	ESTABLISHED
TCP	127.0.0.1:49710	KAJ:0	LISTENING
TCP	127.0.0.1:53659	KAJ:0	LISTENING
TCP	127.0.0.1:57118	platform:63736	ESTABLISHED
TCP	127.0.0.1:58630	platform:58631	ESTABLISHED
TCP	127.0.0.1:58631	platform:58630	ESTABLISHED
TCP	127.0.0.1:62788	platform:62789	ESTABLISHED

Linux

● Ping

```
ani@KAJ:~$ ping google.com
PING google.com (142.250.196.78) 56(84) bytes of data.
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=1 ttl=119 time=91.1 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=2 ttl=119 time=35.6 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=3 ttl=119 time=49.3 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=4 ttl=119 time=48.7 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=5 ttl=119 time=21.1 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4003ms
rtt min/avg/max/mdev = 21.138/49.154/91.064/23.351 ms
ani@KAJ:~$ ping -a google.com
PING google.com (142.250.196.78) 56(84) bytes of data.
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=1 ttl=119 time=186 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=2 ttl=119 time=45.5 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=3 ttl=119 time=49.2 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=4 ttl=119 time=20.5 ms
64 bytes from maa03s46-in-f14.1e100.net (142.250.196.78): icmp_seq=5 ttl=119 time=36.0 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4004ms
rtt min/avg/max/mdev = 20.522/67.409/185.728/59.985 ms
ani@KAJ:~$ ping -V
ping from iputils s20190709
ani@KAJ:~$ ping -b google.com
PING google.com (142.250.193.110) 56(84) bytes of data.
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=1 ttl=119 time=177 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=2 ttl=119 time=65.0 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=3 ttl=119 time=47.9 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=4 ttl=119 time=22.8 ms
64 bytes from maa05s24-in-f14.1e100.net (142.250.193.110): icmp_seq=5 ttl=119 time=34.4 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4002ms
rtt min/avg/max/mdev = 22.802/69.497/177.345/55.728 ms
ani@KAJ:~$
```

● Route

```
ani@KAJ:~$ route
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
192.168.56.0    0.0.0.0        255.255.255.0   U      256    0      0 eth1
192.168.56.1    0.0.0.0        255.255.255.255 U      256    0      0 eth1
192.168.56.255  0.0.0.0        255.255.255.255 U      256    0      0 eth1
224.0.0.0        0.0.0.0        240.0.0.0      U      256    0      0 eth1
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 eth1
127.0.0.0        0.0.0.0        255.0.0.0      U      256    0      0 lo
127.0.0.1        0.0.0.0        255.255.255.255 U      256    0      0 lo
127.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 lo
224.0.0.0        0.0.0.0        240.0.0.0      U      256    0      0 lo
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 lo
0.0.0.0          192.168.1.1   255.255.255.255 U      0      0      0 wifi0
192.168.1.0      0.0.0.0        255.255.255.0      U      256    0      0 wifi0
192.168.1.2      0.0.0.0        255.255.255.255 U      256    0      0 wifi0
192.168.1.255    0.0.0.0        255.255.255.255 U      256    0      0 wifi0
224.0.0.0        0.0.0.0        240.0.0.0      U      256    0      0 wifi0
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 wifi0
ani@KAJ:~$ route -n
```

```

ani@KAJ:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
192.168.56.0    0.0.0.0        255.255.255.0   U      256    0      0 eth1
192.168.56.1    0.0.0.0        255.255.255.255 U      256    0      0 eth1
192.168.56.255  0.0.0.0        255.255.255.255 U      256    0      0 eth1
224.0.0.0       0.0.0.0        240.0.0.0      U      256    0      0 eth1
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 eth1
127.0.0.0       0.0.0.0        255.0.0.0      U      256    0      0 lo
127.0.0.1       0.0.0.0        255.255.255.255 U      256    0      0 lo
127.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 lo
224.0.0.0       0.0.0.0        240.0.0.0      U      256    0      0 lo
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 lo
0.0.0.0          192.168.1.1    255.255.255.255 U      0      0      0 wifi0
192.168.1.0     0.0.0.0        255.255.255.0      U    256    0      0 wifi0
192.168.1.2     0.0.0.0        255.255.255.255 U      256    0      0 wifi0
192.168.1.255   0.0.0.0        255.255.255.255 U      256    0      0 wifi0
224.0.0.0       0.0.0.0        240.0.0.0      U      256    0      0 wifi0
255.255.255.255 0.0.0.0       255.255.255.255 U      256    0      0 wifi0
ani@KAJ:~$ route -Cn
/proc/net/rt_cache: No such file or directory
INET (IPv4) not configured in this system.
ani@KAJ:~$ ip route
none 224.0.0.0/4 dev eth0 proto unspec metric 256
none 255.255.255.255 dev eth0 proto unspec metric 256
none 192.168.56.0/24 dev eth1 proto unspec metric 256
none 192.168.56.1 dev eth1 proto unspec metric 256
none 192.168.56.255 dev eth1 proto unspec metric 256
none 224.0.0.0/4 dev eth1 proto unspec metric 256
none 255.255.255.255 dev eth1 proto unspec metric 256
none 127.0.0.0/8 dev lo proto unspec metric 256
none 127.0.0.1 dev lo proto unspec metric 256
none 127.255.255.255 dev lo proto unspec metric 256
none 224.0.0.0/4 dev lo proto unspec metric 256
none 255.255.255.255 dev lo proto unspec metric 256
none default via 192.168.1.1 dev wifi0 proto unspec metric 0
none 192.168.1.0/24 dev wifi0 proto unspec metric 256
none 192.168.1.2 dev wifi0 proto unspec metric 256
none 192.168.1.255 dev wifi0 proto unspec metric 256
none 224.0.0.0/4 dev wifi0 proto unspec metric 256
none 255.255.255.255 dev wifi0 proto unspec metric 256
none 224.0.0.0/4 dev wifi1 proto unspec metric 256
none 255.255.255.255 dev wifi1 proto unspec metric 256
none 224.0.0.0/4 dev wifi2 proto unspec metric 256
none 255.255.255.255 dev wifi2 proto unspec metric 256
ani@KAJ:~$
```

● Traceroute

```

ani@KAJ:~$ traceroute google.com
traceroute to google.com (142.250.196.78), 30 hops max, 60 byte packets
 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 * * *
ani@KAJ:~$
```

```
ani@KAJ:~$ traceroute -4 google.com
traceroute to google.com (172.217.160.142), 30 hops max, 60 byte packets
 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 * * *

ani@KAJ:~$ traceroute -6 google.com
traceroute to google.com (2404:6800:4007:82b::200e), 30 hops max, 80 byte packets
connect: Invalid argument
ani@KAJ:~$ traceroute -6 google.com
traceroute to google.com (2404:6800:4007:82b::200e), 30 hops max, 80 byte packets
connect: Invalid argument
ani@KAJ:~$
```

- NSlookup

```
ani@KAJ:~$ nslookup google.com
Server:      103.140.17.242
Address:     103.140.17.242#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.193.142
Name:   google.com
Address: 2404:6800:4007:82b::200e

ani@KAJ:~$ nslookup -q=MX google.com
*** Invalid option: q-MX
Server:      103.140.17.242
Address:     103.140.17.242#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.193.142
Name:   google.com
Address: 2404:6800:4007:82b::200e
```

```
ani@KAJ:~$ nslookup -type=soa google.com
Server:      103.140.17.242
Address:     103.140.17.242#53
```

Non-authoritative answer:

```
google.com
    origin = ns1.google.com
    mail addr = dns-admin.google.com
    serial = 396090275
    refresh = 900
    retry = 900
    expire = 1800
    minimum = 60
```

Authoritative answers can be found from:

```
ani@KAJ:~$ nslookup -type=a google.com
Server:      103.140.17.242
Address:     103.140.17.242#53
```

Non-authoritative answer:

```
Name:   google.com
Address: 142.250.193.142
```

```
ani@KAJ:~$
```

● Ifconfig

```
ani@KAJ:~$ ifconfig
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.56.1  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::e866:65b:18f5:53de  prefixlen 64  scopeid 0xfd<compat,link,site,host>
          ether 0a:00:27:00:00:02  (Ethernet)
            RX packets 0  bytes 0 (0.0 B)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 0  bytes 0 (0.0 B)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 1500
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0xfe<compat,link,site,host>
          loop  (Local Loopback)
            RX packets 0  bytes 0 (0.0 B)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 0  bytes 0 (0.0 B)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

wific0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.2  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::3967:1de3:1924:1daf  prefixlen 64  scopeid 0xfd<compat,link,site,host>
          ether 18:47:3d:e9:62:5d  (Ethernet)
            RX packets 0  bytes 0 (0.0 B)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 0  bytes 0 (0.0 B)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

ani@KAJ:~$ ifconfig -a
```

```
ani@KAJ:~$ ifconfig -a
eth0: flags=64<RUNNING> mtu 1500
    inet 169.254.213.84 netmask 255.255.0.0
        inet6 fe80::39eb:2543:9d3c:d554 prefixlen 64 scopeid 0xfd<compat,link,site,host>
            ether 18:47:3d:e9:62:5e (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 0 bytes 0 (0.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.1 netmask 255.255.255.0 broadcast 192.168.56.255
        inet6 fe80::e866:65b:18f5:53de prefixlen 64 scopeid 0xfd<compat,link,site,host>
            ether 0a:00:27:00:00:02 (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 0 bytes 0 (0.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 1500
```

```
ani@KAJ:~$ ifconfig -s
Iface      MTU     RX-OK RX-ERR RX-DRP RX-OVR      TX-OK TX-ERR TX-DRP TX-OVR Flg
eth1       1500      0     0     0 0          0     0     0     0 BMRU
lo        1500      0     0     0 0          0     0     0     0 LRU
wifi0     1500      0     0     0 0          0     0     0     0 BMRU
ani@KAJ:~$ ifconfig -v
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.1 netmask 255.255.255.0 broadcast 192.168.56.255
        inet6 fe80::e866:65b:18f5:53de prefixlen 64 scopeid 0xfd<compat,link,site,host>
            ether 0a:00:27:00:00:02 (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 0 bytes 0 (0.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 1500
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0xfe<compat,link,site,host>
            loop (Local Loopback)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 0 bytes 0 (0.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wifi0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.2 netmask 255.255.255.0 broadcast 192.168.1.255
        inet6 fe80::3967:1de3:1924:1daf prefixlen 64 scopeid 0xfd<compat,link,site,host>
            ether 18:47:3d:e9:62:5d (Ethernet)
            RX packets 0 bytes 0 (0.0 B)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 0 bytes 0 (0.0 B)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ani@KAJ:~$
```

● Netstat

```
ani@KAJ:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node  Path
ani@KAJ:~$ netstat -n
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node  Path
ani@KAJ:~$ netstat -n 5
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags     Type      State         I-Node  Path
ani@KAJ:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags     Type      State         I-Node  Path
ani@KAJ:~$
```

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

a). 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. Windows devices maintain an ARP cache, which contains the results of recent ARP queries.

You can see the contents of this cache by using the ARP -A command. If you are having problems communicating with one specific host, you can append the remote host's IP address to the ARP -A command.

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

Interface: 192.168.56.1 --- 0x2
  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
  239.192.152.143          01-00-5e-40-98-8f    static
  239.255.255.250          01-00-5e-7f-ff-fa    static

Interface: 192.168.1.2 --- 0x17
  Internet Address        Physical Address      Type
  192.168.1.1              14-a7-2b-4a-69-c2  dynamic
  192.168.1.5              30-84-54-38-bf-1f  dynamic
  192.168.1.255            ff-ff-ff-ff-ff-ff    static
  224.0.0.22               01-00-5e-00-00-16    static
  239.255.255.250          01-00-5e-7f-ff-fa    static
```

b)NbtStat

As I am sure you probably know, 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. Of course, NetBIOS over TCP/IP can occasionally break down. The NbtStat command can help you to diagnose and correct such problems. The NbtStat -n command for example, shows the NetBIOS names that are in use by a device. The NbtStat -r command shows how many NetBIOS names the device has been able to resolve recently.

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

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

Registered By Broadcast   = 99
Registered By Name Server = 0
```

c) 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\Admin>hostname  
KAJ
```

d) 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\Admin>pathping www.google.com  
  
Tracing route to www.google.com [2404:6800:4007:828::2004]  
over a maximum of 30 hops:  
  0  KAJ [2409:4073:118:cc8b:7de7:2bbb:dc74:3211]  
  1  *      fe80::1075:8dff:febe:d0f1  
  2  *      *      *  
  
Computing statistics for 25 seconds...  
          Source to Here  This Node/Link  
Hop  RTT     Lost/Sent = Pct  Lost/Sent = Pct  Address  
  0           0/ 100 = 0%          KAJ [2409:4073:118:cc8b:7de7:2bbb:dc74:3211]  
               |  
  1   4ms     0/ 100 = 0%     0/ 100 = 0%  fe80::1075:8dff:febe:d0f1  
  
Trace complete.
```

e) getmac

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

```
C:\Users\Admin>getmac  
  
Physical Address      Transport Name  
===== =====  
18-47-3D-E9-62-5D    \Device\Tcpip_{E246FA29-6751-4D42-9394-7835D0BE7087}  
0A-00-27-00-00-02    \Device\Tcpip_{03466B3A-4067-427F-AB65-C5159998A27D}
```

F) Dig

Linux dig command stands for Domain Information Groper. This command is used in DNS lookup to query the DNS name server. It is also used to troubleshoot DNS related issues. It is mainly used to verify DNS mappings, MX Records, host addresses, and all other DNS records for a better understanding of the DNS topography.

This command is an improvised version of nslookup command.

```
ani@KAJ:~$ dig google.com

; <>> DiG 9.16.1-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6399
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 1280
;; QUESTION SECTION:
;google.com.           IN      A

;; ANSWER SECTION:
google.com.        107     IN      A      142.250.67.46

;; Query time: 39 msec
;; SERVER: 192.168.43.1#53(192.168.43.1)
;; WHEN: Mon Sep 13 11:05:49 IST 2021
;; MSG SIZE  rcvd: 55
```

g)iwconfig

Linux iwconfig is used to configure the wireless network interface. It is used to set and view the basic WI-FI details like SSID and encryption. To know more about this command, refer to the man page.

```
ani@KAJ:~$ iwconfig
eth0      no wireless extensions.

lo       no wireless extensions.

wifi0    no wireless extensions.

wifi1    no wireless extensions.

wifi2    no wireless extensions.
```

h)whois

Linux whois command is used to fetch all the information related to a website. You can get all the information about a website including the registration and the owner information.

```
ani@KAJ: ~
ani@KAJ:~$ whois google.com
Domain Name: GOOGLE.COM
Registry Domain ID: 2138514_DOMAIN_COM-VRSN
Registrar WHOIS Server: whois.markmonitor.com
Registrar URL: http://www.markmonitor.com
Updated Date: 2019-09-09T15:39:04Z
Creation Date: 1997-09-15T04:00:00Z
Registry Expiry Date: 2028-09-14T04:00:00Z
Registrar: MarkMonitor Inc.
Registrar IANA ID: 292
Registrar Abuse Contact Email: abusecomplaints@markmonitor.com
Registrar Abuse Contact Phone: +1.2083895740
Domain Status: clientDeleteProhibited https://icann.org/epp#clientDeleteProhibited
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Domain Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
Domain Status: serverDeleteProhibited https://icann.org/epp#serverDeleteProhibited
Domain Status: serverTransferProhibited https://icann.org/epp#serverTransferProhibited
Domain Status: serverUpdateProhibited https://icann.org/epp#serverUpdateProhibited
Name Server: NS1.GOOGLE.COM
Name Server: NS2.GOOGLE.COM
Name Server: NS3.GOOGLE.COM
Name Server: NS4.GOOGLE.COM
DNSSEC: unsigned
URL of the ICANN Whois Inaccuracy Complaint Form: https://www.icann.org/wicf/
>>> Last update of whois database: 2021-09-13T05:46:50Z <<<

For more information on Whois status codes, please visit https://icann.org/epp

NOTICE: The expiration date displayed in this record is the date the
registrar's sponsorship of the domain name registration in the registry is
currently set to expire. This date does not necessarily reflect the expiration
date of the domain name registrant's agreement with the sponsoring
registrar. Users may consult the sponsoring registrar's Whois database to
view the registrar's reported date of expiration for this registration.

TERMS OF USE: You are not authorized to access or query our Whois
database through the use of electronic processes that are high-volume and
automated except as reasonably necessary to register domain names or
modify existing registrations; the Data in VeriSign Global Registry
Services' ("VeriSign") Whois database is provided by VeriSign for
information purposes only, and to assist persons in obtaining information
about or related to a domain name registration record. VeriSign does not
guarantee its accuracy. By submitting a Whois query, you agree to abide
by the following terms of use: You agree that you may use this Data only
for lawful purposes and that under no circumstances will you use this Data
to: (1) allow, enable, or otherwise support the transmission of mass
unsolicited, commercial advertising or solicitations via e-mail, telephone,
or facsimile; or (2) enable high volume, automated, electronic processes
that apply to VeriSign (or its computer systems). The compilation,
repackaging, dissemination or other use of this Data is expressly
```

LAMP Installation

Install Apache2

.Update your system

```
sudo apt update
```

. Install Apache using apt:

```
sudo apt install apache2
```

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

```
sudo systemctl status apache2
```

if it is not working

```
sudo systemctl start apache2
```

```
user@user-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
   Active: active (running) since Wed 2021-09-29 12:41:39 IST; 4min 43s ago
     Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 3464 (apache2)
      Tasks: 6 (limit: 1124)
    Memory: 15.2M
      CGroup: /system.slice/apache2.service
              └─3464 /usr/sbin/apache2 -k start
                  ├─3496 /usr/sbin/apache2 -k start
                  ├─3497 /usr/sbin/apache2 -k start
                  ├─3498 /usr/sbin/apache2 -k start
                  ├─3499 /usr/sbin/apache2 -k start
                  ├─3500 /usr/sbin/apache2 -k start

Sep 29 12:41:38 user-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Sep 29 12:41:39 user-VirtualBox apachectl[3463]: AH00558: apache2: Could not r>
Sep 29 12:41:39 user-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-18/18 (END)
```

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

<http://youripaddress>

(find out your ipaddress using ifconfig)



2. Install mariDB

sudo apt install mariadb-server mariadb-client

Check mariadb Installation

sudo systemctl status mysql

(if it is not working sudo systemctl start mysql)

```

user@user-VirtualBox:~$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.3.31 database server
  Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres>
  Active: active (running) since Wed 2021-09-29 13:28:34 IST; 27min ago
    Docs: man:mysqld(8)
          https://mariadb.com/kb/en/library/systemd/
   Process: 644 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var>
   Process: 657 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_ST>
   Process: 659 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && >
   Process: 903 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_S>
   Process: 905 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/>
 Main PID: 731 (mysqld)
   Status: "Taking your SQL requests now..."
     Tasks: 30 (limit: 1124)
    Memory: 7.6M
      CGroup: /system.slice/mariadb.service
              └─731 /usr/sbin/mysqld

Sep 29 13:28:24 user-VirtualBox systemd[1]: Starting MariaDB 10.3.31 database >
Sep 29 13:28:29 user-VirtualBox mysqld[731]: 2021-09-29 13:28:29 0 [Note] /usr>
Sep 29 13:28:34 user-VirtualBox systemd[1]: Started MariaDB 10.3.31 database s>
Sep 29 13:28:34 user-VirtualBox /etc/mysql/debian-start[907]: Upgrading MySQL >
Sep 29 13:28:35 user-VirtualBox /etc/mysql/debian-start[910]: Looking for 'mys>
Sep 29 13:28:35 user-VirtualBox /etc/mysql/debian-start[910]: Looking for 'mys>
Sep 29 13:28:35 user-VirtualBox /etc/mysql/debian-start[910]: This installatio>
Sep 29 13:28:35 user-VirtualBox /etc/mysql/debian-start[929]: Checking for ins>
Sep 29 13:28:35 user-VirtualBox /etc/mysql/debian-start[933]: Triggering myisa>

```

3. Install PHP and commonly used modules

sudo apt install php libapache2-mod-php php-ocpache

php-cli php-gd php-curl php-mysql

Restart apache2

sudo systemctl restart apache2

Now you can check php installation

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

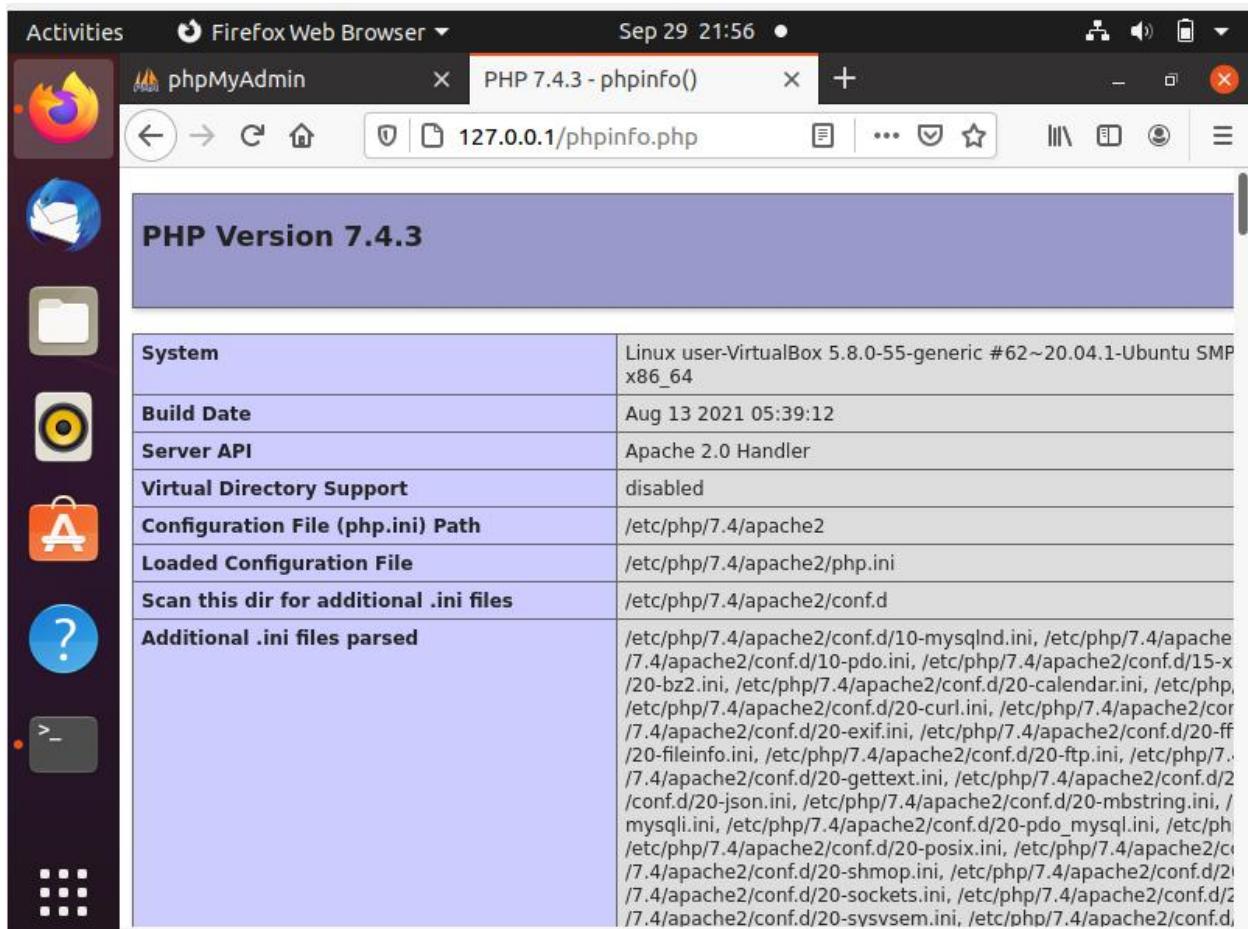
```

user@user-VirtualBox:~$ sudo echo "<?php phpinfo(); ?>" | sudo tee -a /var/www/ht
ml/phpinfo.php > /dev/null
user@user-VirtualBox:~$ █

```

Open a browser

<http://127.0.0.1/phpinfo.php>



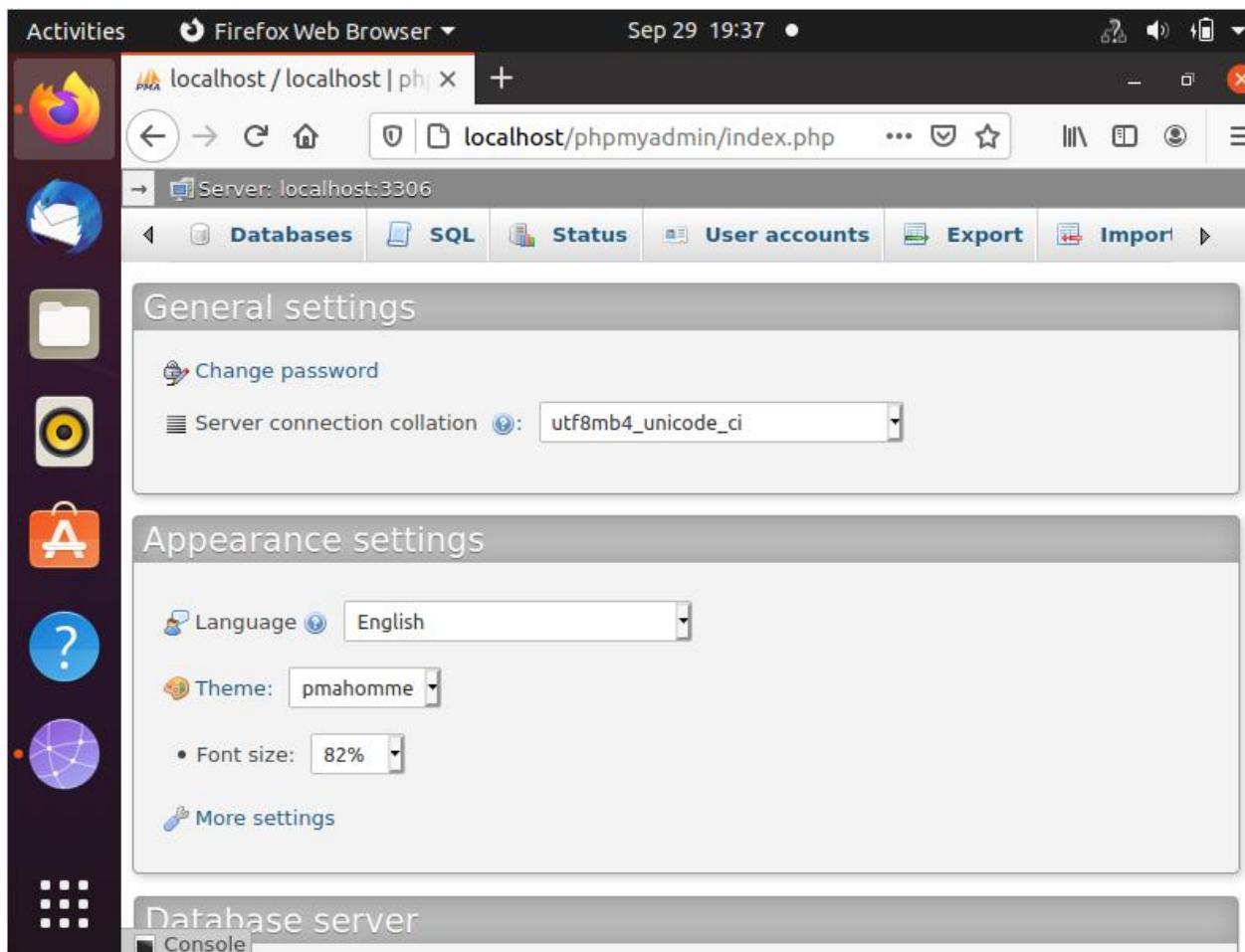
Check phpmyadmin

Open a browser

<http://localhost/phpmyadmin>

username : root

password : yourpassword



```
MariaDB [(none)]> create database example;
Query OK, 1 row affected (0.000 sec)
```

```
MariaDB [(none)]> show databases;
```

Database
example
information_schema
mysql
performance_schema
phpmyadmin
sample

```
6 rows in set (0.001 sec)
```

```
MariaDB [(none)]> █
```

Ansible installation

- sudo apt install ansible

```
user@user-VirtualBox:~$ sudo apt install ansible
[sudo] password for user:
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
  python3-winrm python3-xmldict
```

Check the version

- ansible --version

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

Docker Installation

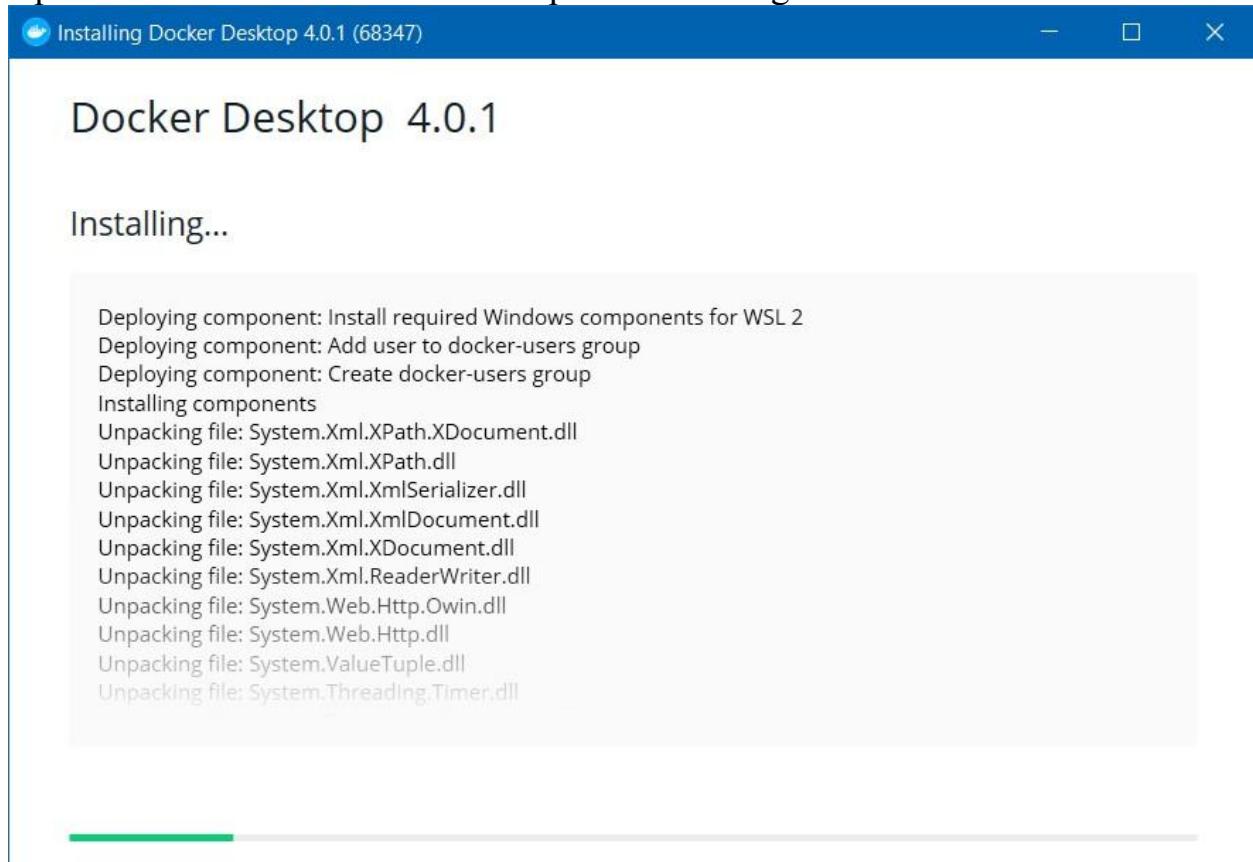
Step-I

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



Step-II

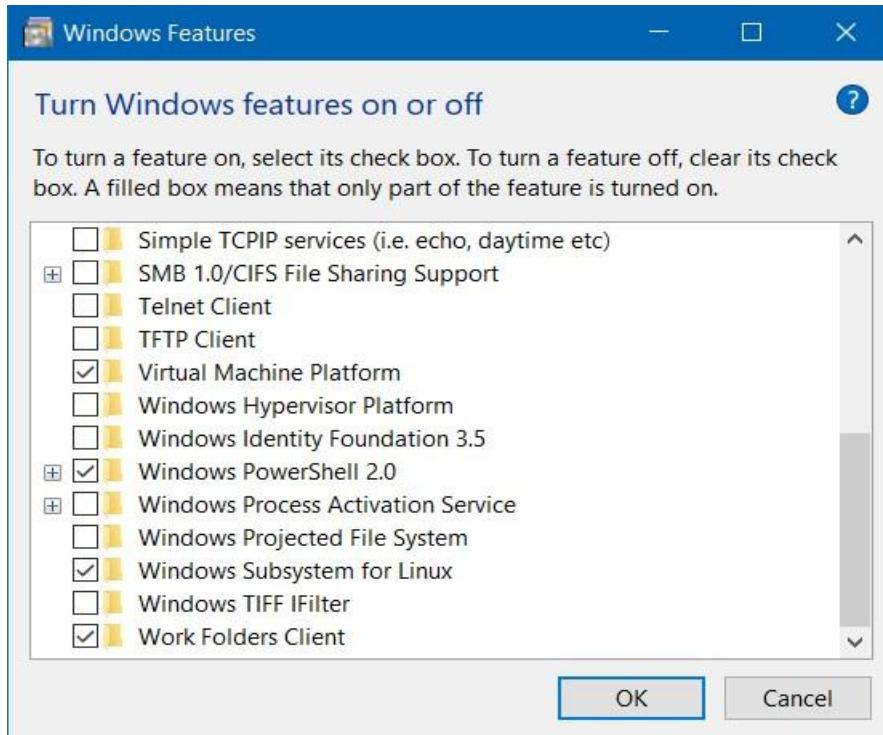
Open the .exe file and follow the steps after clicking install button.



Step-III

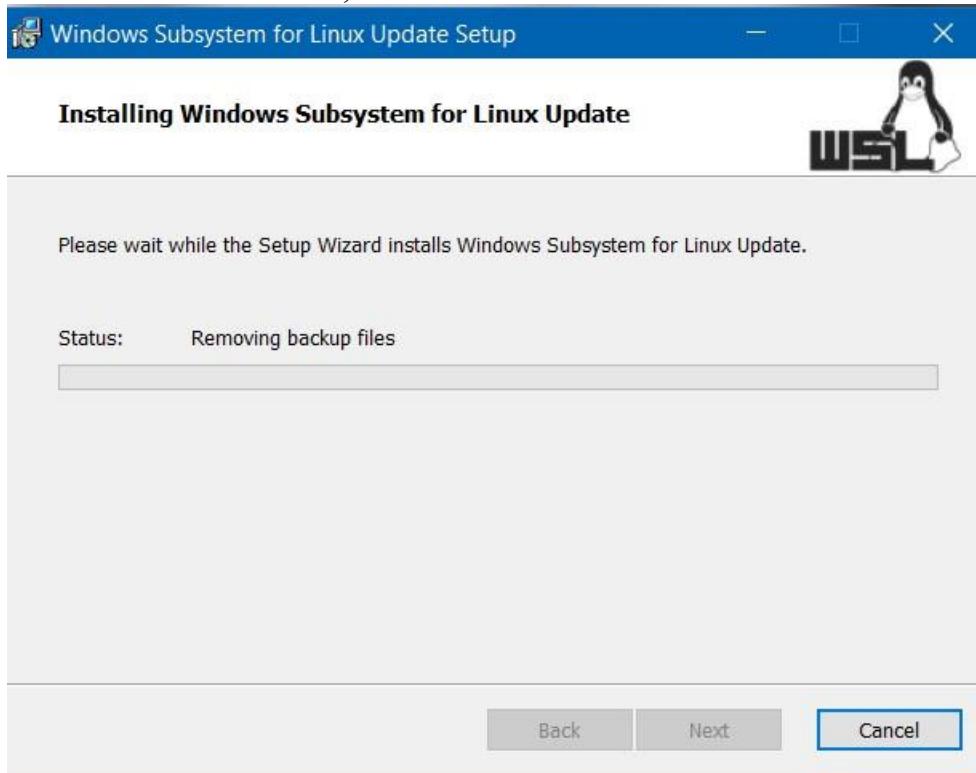
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



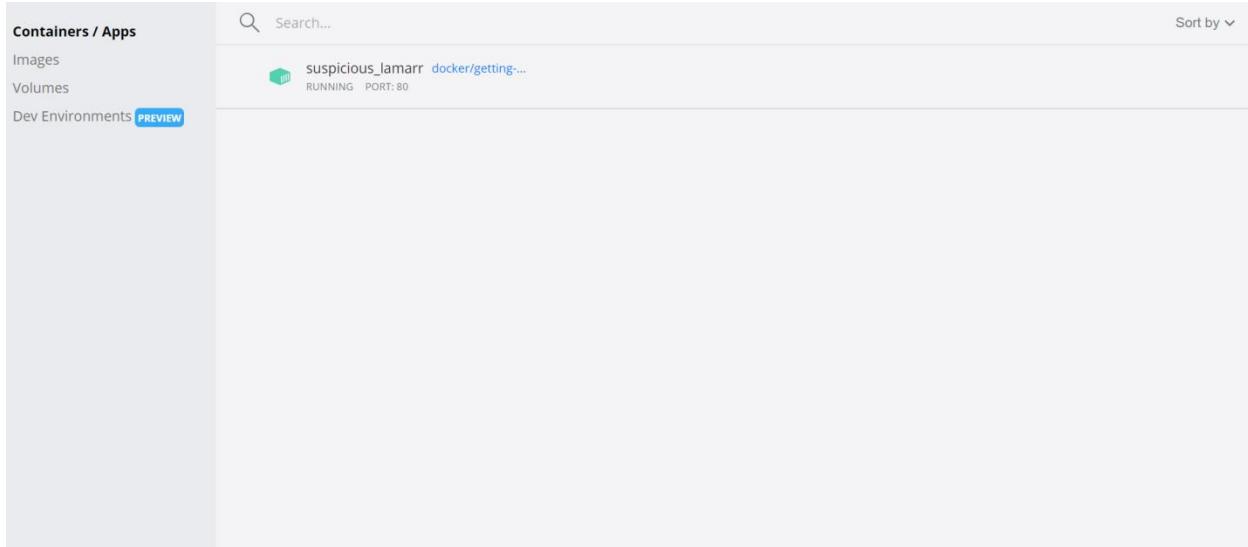
Step-IV

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

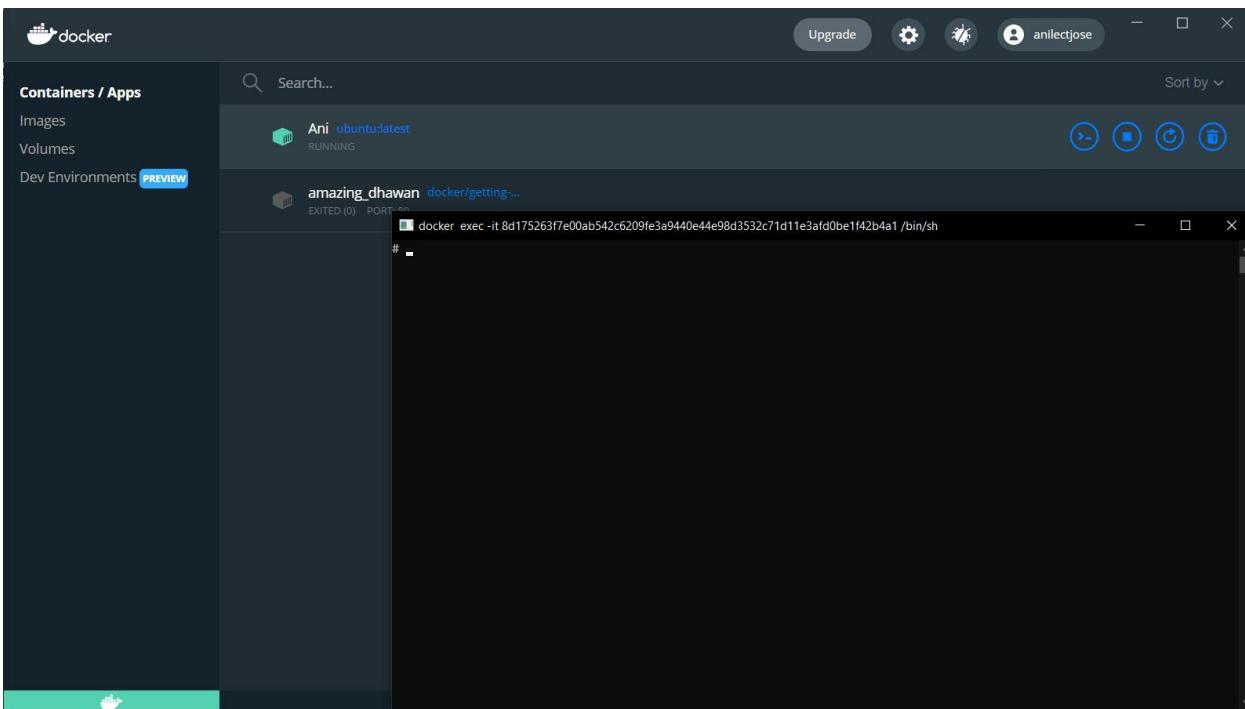
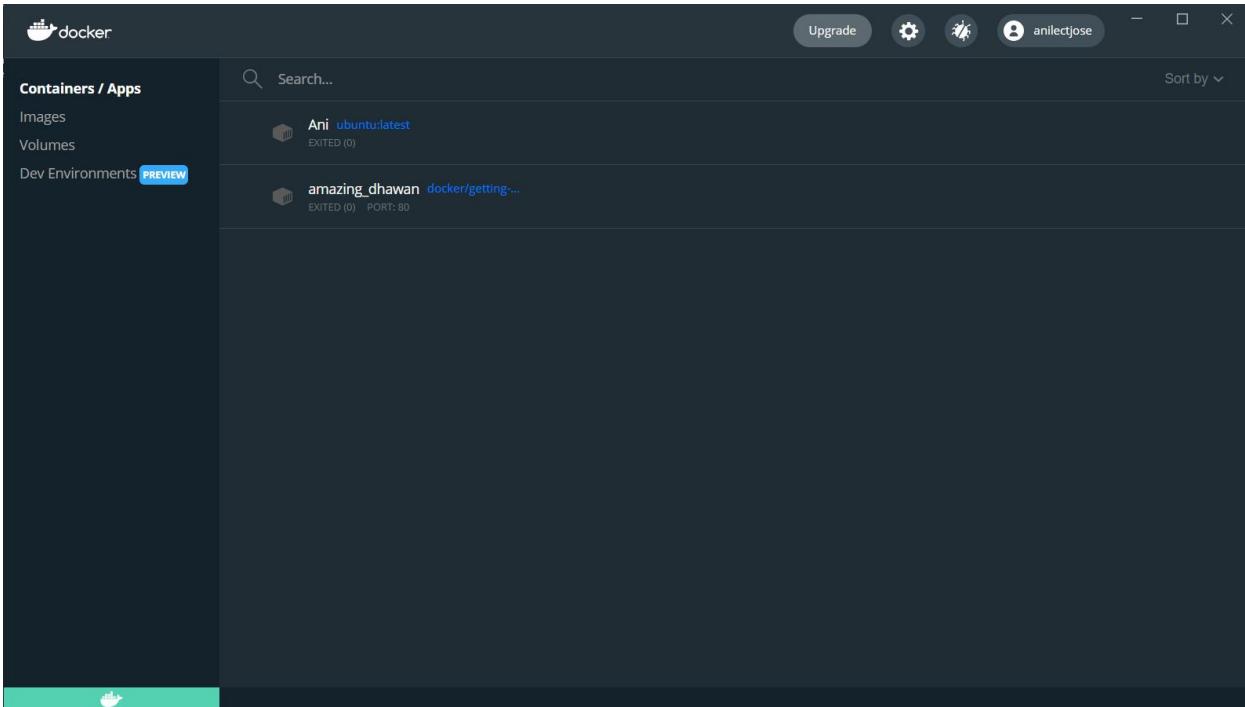
Now pull any image from docker hub using the docker pull command in the command prompt (eg: docker pull ubuntu)

```
C:\Windows\system32>docker run -d -p 80:80 docker/getting-started
Unable to find image 'docker/getting-started:latest' locally
docker: Error response from daemon: Get "https://registry-1.docker.io/v2/": dial tcp: lookup registry-1.docker.io on 192.168.65.5:53: no such host.
See 'docker run --help'.

C:\Windows\system32>docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
f3ef4ff62e0d: Pull complete
Digest: sha256:65de08a8dabf289ef114053ab32f79e0c333a4fbfa1fe3778bb13ae921a7849b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

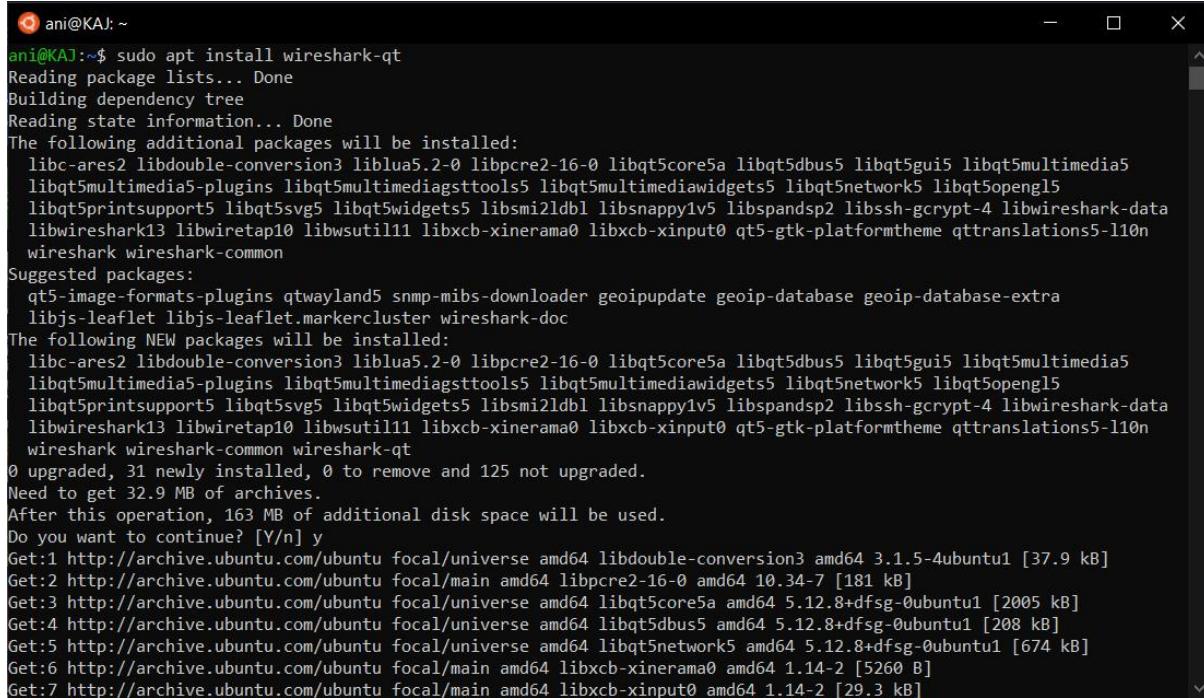
C:\Windows\system32>
```

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

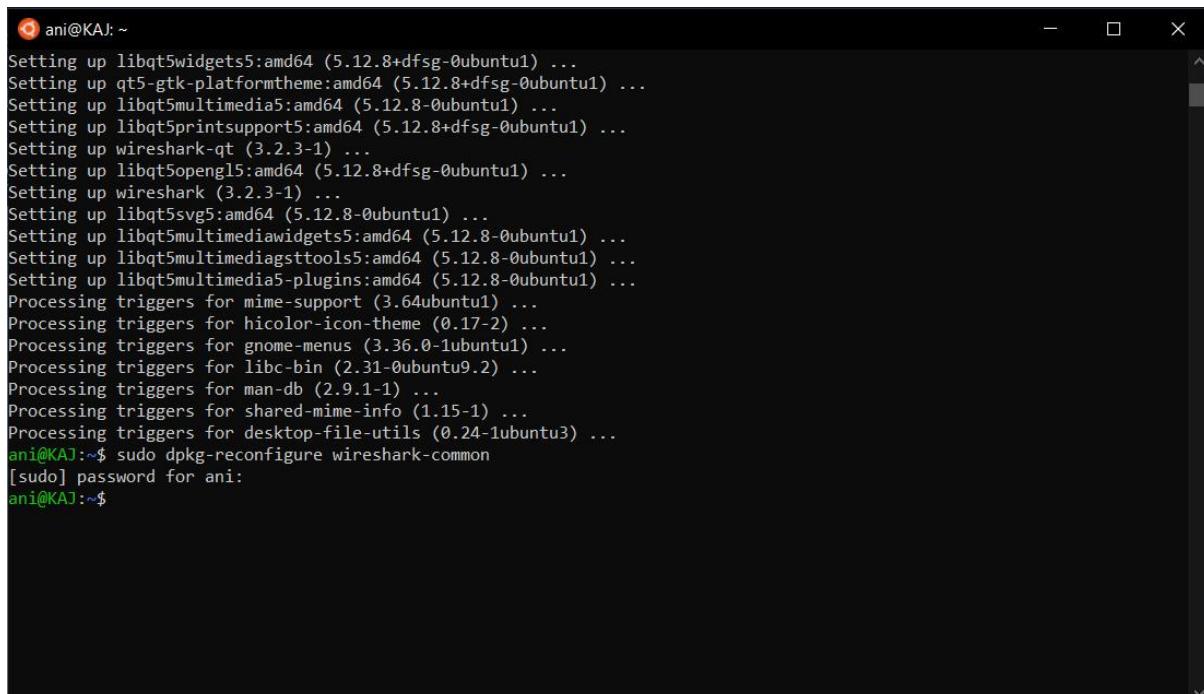


WireShark Installation

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

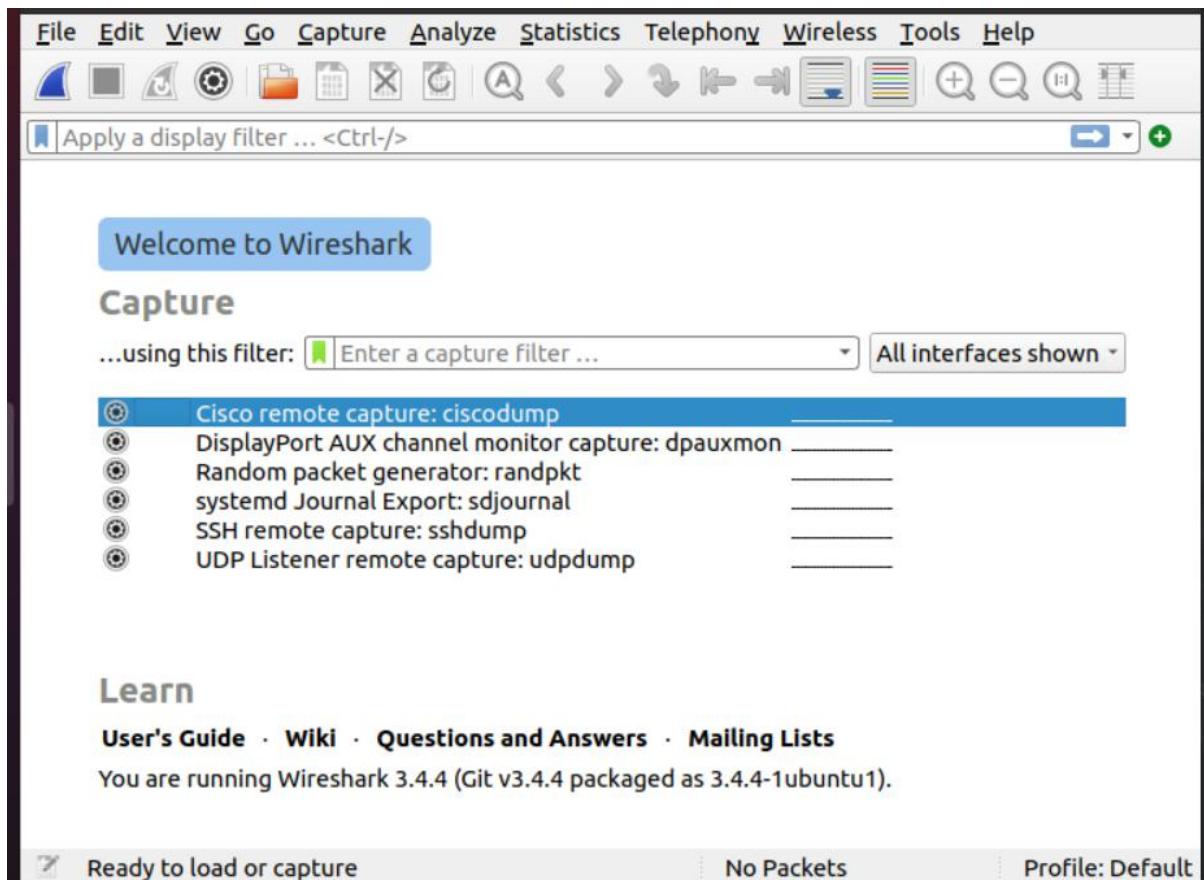


```
ani@KAJ: ~
ani@KAJ:~$ sudo apt install wireshark-qt
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libc-ares2 libdouble-conversion3 libluas5.2-0 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5
  libqt5multimedia5-plugins libqt5multimediasupport5 libqt5multimediamultimedia5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2lbd1 libsnappy1v5 libspansp2 libssh-gcrypt-4 libwireshark-data
  libwireshark13 libwiretap10 libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n
  wireshark wireshark-common
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 libluas5.2-0 libpcre2-16-0 libqt5core5a libqt5dbus5 libqt5gui5 libqt5multimedia5
  libqt5multimedia5-plugins libqt5multimediasupport5 libqt5multimediamultimedia5 libqt5network5 libqt5opengl5
  libqt5printsupport5 libqt5svg5 libqt5widgets5 libsmi2lbd1 libsnappy1v5 libspansp2 libssh-gcrypt-4 libwireshark-data
  libwireshark13 libwiretap10 libwsutil11 libxcb-xinerama0 libxcb-xinput0 qt5-gtk-platformtheme qttranslations5-l10n
  wireshark wireshark-common wireshark-qt
0 upgraded, 31 newly installed, 0 to remove and 125 not upgraded.
Need to get 32.9 MB of archives.
After this operation, 163 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu focal/universe amd64 libdouble-conversion3 amd64 3.1.5-4ubuntu1 [37.9 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal/main amd64 libpcre2-16-0 amd64 10.34-7 [181 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal/universe amd64 libqt5core5a amd64 5.12.8+dfsg-0ubuntu1 [2005 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal/universe amd64 libqt5dbus5 amd64 5.12.8+dfsg-0ubuntu1 [208 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal/universe amd64 libqt5network5 amd64 5.12.8+dfsg-0ubuntu1 [674 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal/main amd64 libxcb-xinerama0 amd64 1.14-2 [5260 B]
Get:7 http://archive.ubuntu.com/ubuntu focal/main amd64 libxcb-xinput0 amd64 1.14-2 [29.3 kB]
```



```
ani@KAJ: ~
Setting up libqt5widgets5:amd64 (5.12.8+dfsg-0ubuntu1) ...
Setting up qt5-gtk-platformtheme:amd64 (5.12.8+dfsg-0ubuntu1) ...
Setting up libqt5multimedia5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5printsupport5:amd64 (5.12.8+dfsg-0ubuntu1) ...
Setting up wireshark-qt (3.2.3-1) ...
Setting up libqt5opengl5:amd64 (5.12.8+dfsg-0ubuntu1) ...
Setting up wireshark (3.2.3-1) ...
Setting up libqt5svg5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5multimediamultimedia5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5multimediasupport5:amd64 (5.12.8-0ubuntu1) ...
Setting up libqt5multimedia5-plugins:amd64 (5.12.8-0ubuntu1) ...
Processing triggers for mime-support (3.64ubuntu1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.2) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for shared-mime-info (1.15-1) ...
Processing triggers for desktop-file-utils (0.24-1ubuntu3) ...
ani@KAJ:~$ sudo dpkg-reconfigure wireshark-common
[sudo] password for ani:
ani@KAJ:~$
```

Opening Wireshark



Netcat

```
nc -z -v 10.0.2.255 20-80
```

```
ani@KAJ:~$ nc -z -v 10.0.2.255 20-80
nc: connect to 10.0.2.255 port 20 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 21 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 22 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 23 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 24 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 25 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 26 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 27 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 28 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 29 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 30 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 31 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 32 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 33 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 34 (tcp) failed: Connection refused
nc: connect to 10.0.2.255 port 35 (tcp) failed: Connection refused
```

Shell Scripting Lab Assignments

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

```
#!/bin/bash
echo " Enter Details and View"
echo "=====
echo Enter your Name
read name
echo Enter your College name
read college
clear
echo Details you entered
echo Name: $name
echo College: $college
```

```
ani@KAJ:~/Anilect$ bash 1.sh
Enter Details and View
=====
Enter your Name:
Anilect Jose
Enter your College name:
Amal Jyothi College of Engineering
Details you entered
Name: Anilect Jose
College: Amal Jyothi College of Engineering
ani@KAJ:~/Anilect$
```

- 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 a Variable "
echo "=====
a=10
echo "$a"
```

```
ani@KAJ:~/Anilect$ bash 2.sh
Display value of a Variable
=====
10
```

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

```
#!/bin/bash

echo "ARITHMETIC OPERATIONS"
echo "====="

echo "Enter a number"
read a

echo "Enter another number"
read b

echo "Enter operation needed"
echo "\n1.Addition\n2.Subtraction\n3.Multiplication\n4.Division"
read op

case "$op" in
"1") echo "a+b=\"$((a+b));"
"2") echo "a-b=\"$((a-b));"
"3") echo "a*b=\"$((a*b));"
"4") echo "a/b=\"$((a/b));"
esac
```

```
ARITHMETIC OPERATIONS
=====
Enter a number
20
Enter another number
10
Enter operation needed

1.Addition
2.Subtraction
3.Multiplication
4.Division1
a+b=30
ani@KAJ:~/Anilect$ vi 3.sh
ani@KAJ:~/Anilect$ bash 3.sh
ARITHMETIC OPERATIONS
=====
Enter a number
20
Enter another number
10
Enter operation needed
1.Addition
2.Subtraction
3.Multiplication
4.Division
1
a+b=30
ani@KAJ:~/Anilect$ bash 3.sh
ARITHMETIC OPERATIONS
=====
Enter a number
20
Enter another number
10
Enter operation needed
1.Addition
2.Subtraction
3.Multiplication
4.Division
2
a-b=10
```

```
ARITHMETIC OPERATIONS
=====
Enter a number
20
Enter another number
10
Enter operation needed
1.Addition
2.Subtraction
3.Multiplication
4.Division
4
a/b=2
```

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

```

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

```

```

ani@KAJ:~/Anilect$ bash 4.sh
Finding a number
=====
Enter a number
10
Number found ;)
ani@KAJ:~/Anilect$ bash 4.sh
Finding a number
=====
Enter a number
30
Number NOT found !

```

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

```

#!/bin/bash
echo "Time and Calendar"
echo "===="
echo "Today is $(date)"
echo ""
echo "Calendar :"
cal
ani@KAJ:~/Anilect$ bash 5.sh
Time and Calendar
=====
Today is Sat Oct 2 15:29:52 IST 2021

Calendar :
    October 2021
Su Mo Tu We Th Fr Sa
        1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31

```

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

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

```
ani@KAJ:~/Anilect$ bash 6.sh
EVEN OR ODD
=====
Enter a number
100
Number is Even
ani@KAJ:~/Anilect$ bash 6.sh
EVEN OR ODD
=====
Enter a number
51
Number is odd
```

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

```
#!/bin/bash
echo "Comparing numbers"
echo =====
echo "Enter first number"
```

```

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

```

```

Number is odd
ani@KAJ:~/Anilect$ bash 7.sh
Comparing numbers
=====
Enter first number
100
Enter second number
50
100 is greater
ani@KAJ:~/Anilect$ bash 7.sh
Comparing numbers
=====
Enter first number
79
Enter second number
101
101 is greater

```

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

```

#!/bin/bash
echo "Sum of Numbers "
echo "====="
s=0
for (( i=1;i<=10;i++ ))
do
s=`expr $s + $i`
done
echo "Sum of first 10 numbers = $s"

```

```
ani@KAJ:~/Anilect$ bash 8.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 "Please enter your first number: "
read a
echo "Second number: "
read b
echo "Third number: "
read c
echo "Fourth number: "
read d

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

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

```
ani@KAJ:~/Anilect$ bash 9.sh
AVG, SUM & Product of 4 No.
=====
Please enter your first number:
25
Second number:
45
Third number:
15
Fourth number:
35
The sum of these numbers is: 120
The average of these numbers is: 30.000000000000000000000000000000
The product of these numbers is: 590625
```

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

```
#!/bin/bash

echo "LARGEST OF THREE"
=====

echo "Enter first number"
read a

echo "Enter second number"
read b

echo "Enter third number"
read c

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

```
[ani@KAJ:~/Anilect$ bash 10.sh
LARGEST OF THREE
=====
Enter first number
20
Enter second number
78
Enter third number
60
78 is big
```

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"
```

```
ani@KAJ:~/Anilect$ bash 11.sh
Factorial
=====
Enter a number
3
Factorial is 6
ani@KAJ:~/Anilect$ bash 11.sh
Factorial
=====
Enter a number
6
Factorial is 720
```

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

```
#!/bin/bash
echo "Palindrome or Not"
echo "====="
echo "Enter number to check"
read n
rev=$(echo $n | rev)
if [ $n -eq $rev ]; then
    echo "Number is Palindrome"
else
    echo "Number is not Palindrome"
fi
```

```
ani@KAJ:~/Anilect$ bash 12.sh
Palindrome or Not
=====
Enter number to check
1234321
Number is Palindrome
ani@KAJ:~/Anilect$ bash 12.sh
Palindrome or Not
=====
Enter number to check
123323
Number is not Palindrome
```

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

```
#!/bin/bash
echo "Average of N numbers"
echo "====="
echo "Enter Size"
read n
i=1
sum=0

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

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"
```

```
[ani@KAJ:~/Anilect$ bash 14.sh
Sum of all digits
=====
Enter a number:
457734
Sum of digits is 30
```

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

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

```
echo "$y is leap year"  
else  
echo "$y is not leap year"  
fi
```

```
ani@KAJ:~/Anilect$ bash 15.sh  
LEAP YEAR OR NOT  
=====  
Enter the year  
2001  
2001 is not leap year  
[ani@KAJ:~/Anilect$ bash 15.sh  
LEAP YEAR OR NOT  
=====  
Enter the year  
2020  
2020 is leap year
```