20MCA136 - Networking & System Administration Lab

LAB RECORD

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Roll no: 25

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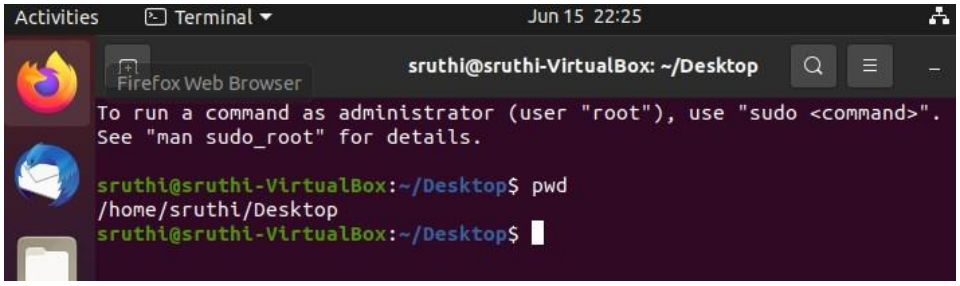
BASIC LINUX COMMANDS(PT-1)

1. pwd (Print WorkingDirectory)

- Use the **pwd** command to find out the path of the current working directory (folder) you're in.
- The command will return an absolute (full) path, which is basically a path of all the directories that starts with a forward slash (/).
- An example of an absolute path is /home/username.
- **Note:** An absolute path is defined as the specifying the location of a file or directory from the root directory(/).
- Relative path is defined as the path related to the present working directly(pwd). It starts at your current directory and **never starts with a / .**
- */home/sruthi/documents* **- absolute path**
- *documents* - **relativepath**



2. history

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

- **#history**
- **!command number to run a command from history**

```
sruthi@sruthi-VirtualBox:~/Desktop$ history
    1  pwd
    2  history
    3  touch
    4  history
    5  clear
    6  !
    7  pwd
    8  history
    9  pwd
   10  history
   11  touch
   12  clear
   13  pwd
   14  history
   15  clear
   16  pwd
   17  history
   18  man history
   19  cd DocumeNTS
   20  cd Documents
   21  cd ..
   22  clear
   23  ls
   24  clear
   25  mkdir sruthi
   26  ls
   27  rmdir sruthi
   28  ls
   29  touch sruthi
   30  ls
   31  rm sruthi
   32  ls
   33  clear
   34  cat > file1
   35  cat > file2
   36  cat file1 file2>file3
   37  cat file3
   38  pwd
   39  history
sruthi@sruthi-VirtualBox:~/Desktop$
```

3.man

- Confused about the function of certain Linux commands? Don't worry, you can easily learn how to use them right from Linux's shell by using the man command. For instance, entering man tail will show the manual instruction of the **tail** command.

- Use the command: **man man** to start learning about man utility.

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

NAME
       history - GNU History Library

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

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

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

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

       History expansion is usually performed immediately  after  a  complete
       line is read.  It takes place in two parts.  The first is to determine
       which line from the history list to use during substitution.  The sec-
Manual page history(3readline) line 1 (press h for help or q to quit)
```

4.cd

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

Note: Linux's shell is case sensitive. So, you have to type the name's directory exactly as it is.

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

5.ls

- The **ls** command is used to view the contents of a directory. By default, this command will display the contents of your current working directory.
- If you want to see the content of other directories, type ls and then the directory's path. For example, enter **ls /home/username/Documents** to view the content of **Documents.**
- 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.

```
sruthi@sruthi-VirtualBox:~$ ls
Desktop     Downloads  file2  Music     Public     Videos
Documents   file1      file3  Pictures  Templates
sruthi@sruthi-VirtualBox:~$
```

6. mkdir

• Use **mkdir** command to make a new directory — if you type **mkdir Music**

it will create a directory called Music.

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

mkdir Music/Newfile

• use the p (parents) option to create a directory in between two existing directories. For example, **mkdir -p Music/2020/Newfile** will create the new "2020" file.

```
sruthi@sruthi-VirtualBox:~$ mkdir sruthi
sruthi@sruthi-VirtualBox:~$ ls
Desktop     Downloads  file2  Music     Public  Templates
Documents   file1      file3  Pictures  sruthi  Videos
sruthi@sruthi-VirtualBox:~$
```

7.rmdir

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

• Example: **rmdir /ajce/mca/regmca**

```
sruthi@sruthi-VirtualBox:~$ rmdir sruthi
sruthi@sruthi-VirtualBox:~$ ls
Desktop     Downloads  file2  Music     Public     Videos
Documents   file1      file3  Pictures  Templates
sruthi@sruthi-VirtualBox:~$
```

8.touch

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

• As an example, enter **touch /home/username/Documents/Web.html** to create an HTML file entitled Web under the Documents directory

```
sruthi@sruthi-VirtualBox:~$ touch sruthi
sruthi@sruthi-VirtualBox:~$ ls
Desktop     Downloads  file2  Music     Public  Templates
Documents   file1      file3  Pictures  sruthi  Videos
sruthi@sruthi-VirtualBox:~$
```

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.
- Note: Be very careful with this command and double-check which directory you are in. This will delete everything and there is no undo.
- To remove a file use **rm filename**

```
sruthi@sruthi-VirtualBox:~$ rm sruthi
sruthi@sruthi-VirtualBox:~$ ls
Desktop    Downloads  file2  Music     Public     Videos
Documents  file1      file3  Pictures  Templates
sruthi@sruthi-VirtualBox:~$
```

10.cat

- cat (short for concatenate) is one of the most frequently used commands in Linux. It is used to list the contents of a file on the standard output stdout.
- To run this command, type cat followed by the file's name and its extension. For instance: **cat file.txt.**
- Here are other ways to use the cat command:

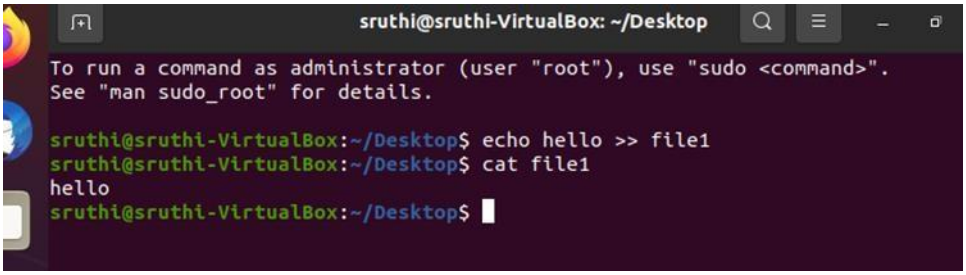
- **cat > filename** creates a new file
- **cat filename1 filename2>filename3** joins two files (1 and 2) and stores the output of them in a new file (3)
- to convert a file to upper or lower case use, **cat filename | tr a-z A-Z >output.txt**
- **cat >>myfile** insert data to a file

```
sruthi@sruthi-VirtualBox:~$ cat > file4
Cat
Dog
Cow
^C
sruthi@sruthi-VirtualBox:~$ cat > file5
Donkey
Monkey
Elephant
^C
sruthi@sruthi-VirtualBox:~$ cat file4 file5>file6
sruthi@sruthi-VirtualBox:~$ cat file6
Cat
Dog
Cow
Donkey
Monkey
Elephant
sruthi@sruthi-VirtualBox:~$
```

BASIC LINUX COMMANDS(PT-2)

1. echo

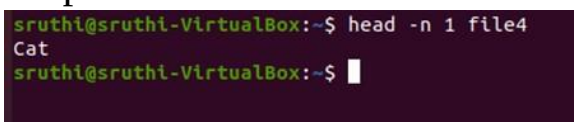
echo command in linux is used to display line of text/string that are passed as an argument . This is a built in command that is mostly used in shell scripts and batch files to output status text to the screen or a file. echo is one of the most commonly and widely used built-in command for Linux bash and C shells, that typically used in scripting language and batch files to display a line of text/string on standard output or a file. The echo command writes text to standard output (stdout). The syntax of using the echo command is pretty straightforward: … Some common usages of the echo command are piping shell variable to other commands, writing text to stdout in a shell script, and redirecting text to a file.



2. head

The head command is a command-line utility for outputting the first part of files given to it via standard input. It writes results to standard output. By default head returns the first ten lines of each file that it is given. head is used to print the first ten lines (by default) or any other amount specified of a file or files. cat , on the other hand, is used to read a file sequentially and print it to the standard output (that is, it prints out the entire contents of the file).Enter the head command, followed by the file of which you'd like to view: head /etc/passwd.

To change the number of lines displayed, use the -n option: head -n 5 /etc/passwd



3. tail

The tail command, as the name implies, print the last N number of data of the given input. By default it prints the last 10 lines of the specified files. If more than one file name is provided then data from each file is precedes by its file name. tail has two special command line option -f and -F (follow) that allows a file to be monitored.
Instead of just displaying the last few lines and exiting, tail displays the lines and then monitors the file. As new lines are added to the file by another process, tail updates the display. Enter the tail command, followed by the file you'd like to view: tail /etc/passwd To change the number of lines displayed, use the -n option: tail -n 5 /etc/passwd

```
sruthi@sruthi-VirtualBox:~$ tail -n 2 file4
Dog
Cow
sruthi@sruthi-VirtualBox:~$
```

4. read

read command in Linux system is used to read from a file descriptor. Basically, this command read up the total number of bytes from the specified file descriptor into the buffer. If the number or count is zero then this command may detect the errors. But on success, it returns the number of bytes read.
Read is a bash built in command that reads the contents of a line into a variable. It allows for word splitting that is tied to the special shell variable IFS. It is primarily used for catching user input but can be used to implement functions taking input from standard input.

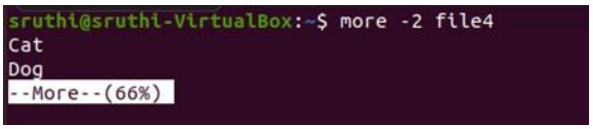
```
sruthi@sruthi-VirtualBox:~$ read v1 v2 v3
What is your name?
sruthi@sruthi-VirtualBox:~$ echo "[$v1] [$v2] [$v3]"
[What] [is] [your name?]
sruthi@sruthi-VirtualBox:~$ read v1 v2 v3 v4
How are you doing?
sruthi@sruthi-VirtualBox:~$ echo "[$v1] [$v2] [$v3] [$v4]"
[How] [are] [you] [doing?]
sruthi@sruthi-VirtualBox:~$
```

5. more

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

more [-options] [-num] [+/pattern] [+linenum] [file_name]

- [-options]: any option that you want to use in order to change the way the file is displayed. Choose any one from the followings: (-d, -l, -f, -p, -c, -s, -u)
- [-num]: type the number of lines that you want to display per screen.
- [+/pattern]: replace the pattern with any string that you want to find in the text file.
- [+linenum]: use the line number from where you want to start displaying the text content.
- [file_name]: name of the file containing the text that you want to display on the screen.



6. less

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

For example, if it's a large file and you are reading it using any text editor, then the complete file will be loaded to main memory, but less command don't load entire file, but load it part by part, which makes it faster.

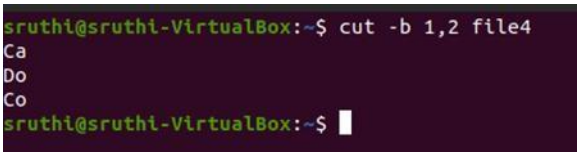
mostly used Options:

-E: causes less to automatically exit the first time it reaches end of file.

- -f : forces non-regular file to open.
- -F: causes less to exit if entire file can be displayed on first screen
- -g: highlight the string which was found by last search command
- -G: suppresses all highlighting of strings found by search commands
- -i : cause searches to ignore case
- -n : suppresses line numbers
- -p pattern : it tells less to start at the first occurrence of pattern in the file
- -s : causes consecutive blank lines to be squeezed into a single blank line

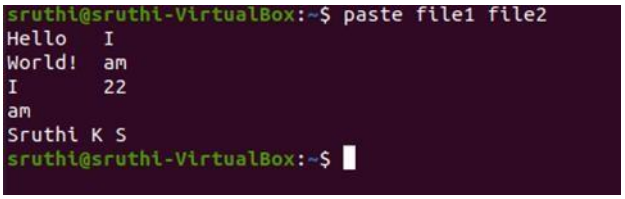
7. cut

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



8. paste

Paste is a command that allows you to insert data from the clipboard into an application. The Paste command is most commonly used to copy text from one area to another. For example, you can copy a paragraph from a text document and paste it into an email message.



9. uname

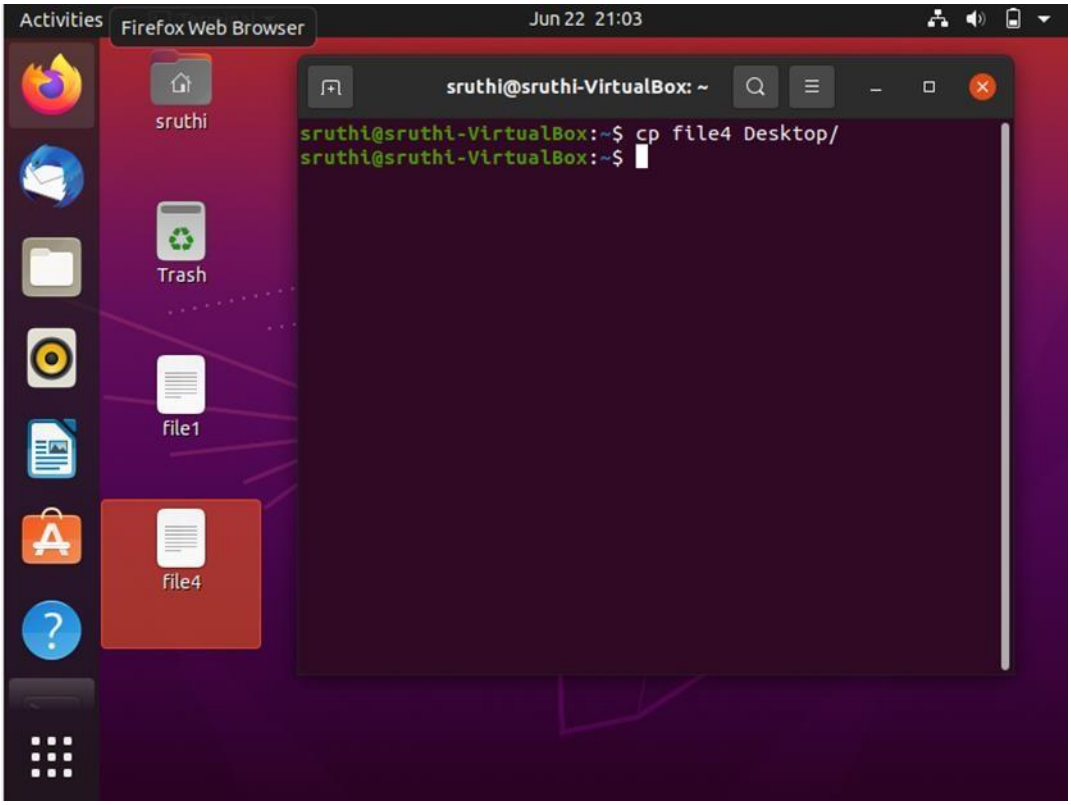
Uname command is used to display basic information about the operating system and hardware. With options, Uname prints kernel details, and system architecture. Uname is the short name for 'UNIX name'. Uname command works on all Linux and Unix like operating systems. uname is a command-line utility that prints basic information about the operating system name and system hardware. The uname() function returns a string naming the current system in the character array sysname. The arrays release and version further identify the operating system. The array machine contains a name that identifies the hardware that the system is running on.

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

10. cp

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

'cp' means copy. 'cp' command is used to copy a file or a directory. To copy a file into the same directory syntax will be, cp <existing file name> <new file name>

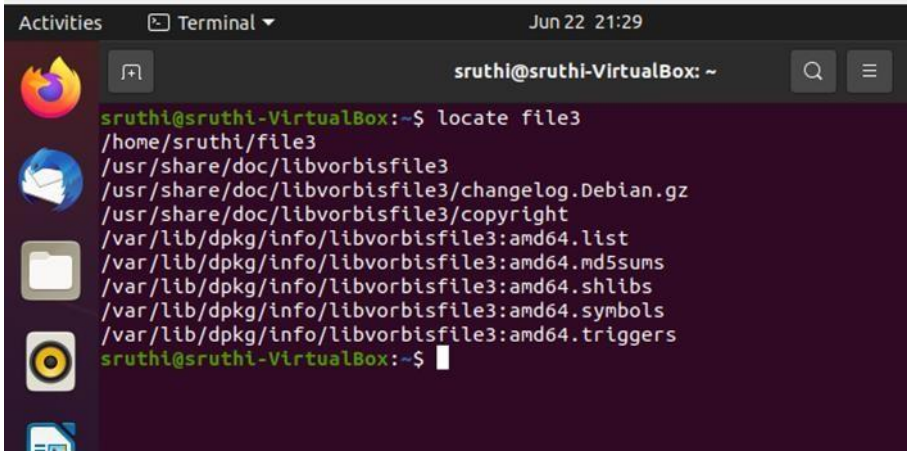


11. locate

To use locate, open a terminal and type locate followed by the file name you are looking for. In this example, I'm searching for files that contain the word 'sunny' in their name. Locate can also tell you how many times a search keyword is matched in the database.

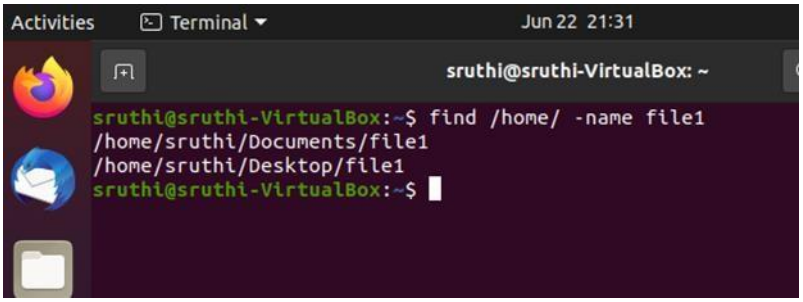
Command. locate is a Unix utility which serves to find files on filesystems. It searches through a prebuilt database of files generated by the updatedb command or by a daemon and compressed using incremental encoding. It operates significantly faster than find, but requires regular updating of the database. Try using this command: sudo apt-get install locate . – ...

For the future: if you're looking for a program and don't know the package, install apt-file: sudo apt-get install apt-file and search for the program using apt-file: apt-file search /usr/bin/locate .



12. find

The find command is one of the most powerful tools in the Linux system administrators arsenal. It searches for files and directories in a directory hierarchy based on a user given expression and can perform user-specified action on each matched file.

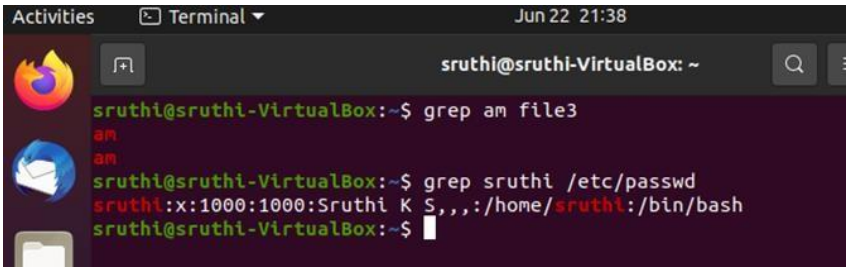


13. grep

To search multiple files with the grep command, insert the filenames you want to search, separated with a space character. The terminal prints the name of every file that contains the matching lines, and the actual lines that include the required string of characters. You can append as many filenames as needed.

To use the grep command in Linux

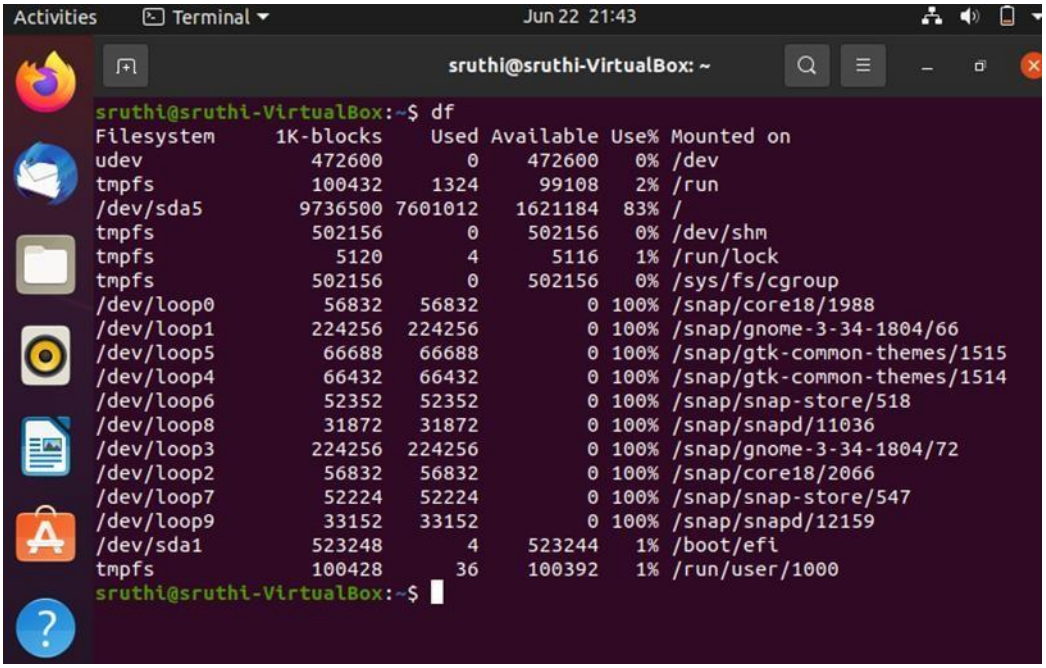
- Grep Command Syntax: grep [options] PATTERN [FILE…] ... • Examples of using'grep'
- grep foo /file/name. ...
- grep -i “foo” /file/name. ...
- grep 'error 123' /file/name. ...
- grep -r “192.168.1.5” /etc/ ...
- grep -w “foo” /file/name. ...
- egrep -w 'word1|word2' /file/name.



14. df

The df command (short for disk free), is used to display information related to file systems about total space and available space. If no file name is given, it displays the space available on all currently mounted file systems. df (abbreviation for disk free) is a standard Unix command used to display the amount of available disk space for file systems on which the invoking user has appropriate read access. df is typically implemented using the statfs or statvfs system calls.

To view disk space usage run the df command. This will print a table of information to standard output. This can be useful to discover the amount of free space available on a system or filesystems. Use% - the percentage that the filesystem is in use.



15. du

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

With no arguments, 'du' reports the disk space for the current directory. Normally the disk space is printed in units of 1024 bytes,

but this can be overridden. Options -a --all Show counts for all files, not just directories.

As you may have seen that the du command in Linux outputs all the sizes of all the files. But if all you want to see is the summarized output, then you can use the -s option which stands for a summary. I'm also combining it with the -h option to view human-readable info.

```
sruthi@sruthi-VirtualBox:~$ du
4       ./Videos
4       ./Templates
4       ./.config/enchant
4       ./.config/update-notifier
8       ./.config/gedit
4       ./.config/nautilus
84      ./.config/pulse
8       ./.config/evolution/sources
12      ./.config/evolution
8       ./.config/dconf
8       ./.config/gtk-3.0
4       ./.config/gnome-session/saved-session
8       ./.config/gnome-session
8       ./.config/ibus/bus
12      ./.config/ibus
4       ./.config/goa-1.0
172     ./.config
4       ./.gnupg/private-keys-v1.d
8       ./.gnupg
12      ./.cache/update-manager-core
4       ./.cache/evolution/tasks/trash
8       ./.cache/evolution/tasks
4       ./.cache/evolution/sources/trash
8       ./.cache/evolution/sources
4       ./.cache/evolution/memos/trash
8       ./.cache/evolution/memos
4       ./.cache/evolution/mail/trash
8       ./.cache/evolution/mail
4       ./.local/share/evolution/mail/trash
8       ./.local/share/evolution/mail
4       ./.local/share/evolution/addressbook/system/photos
92      ./.local/share/evolution/addressbook/system
4       ./.local/share/evolution/addressbook/trash
100     ./.local/share/evolution/addressbook
8       ./.local/share/evolution/calendar/system
4       ./.local/share/evolution/calendar/trash
16      ./.local/share/evolution/calendar
152     ./.local/share/evolution
8       ./.local/share/gnome-shell
316     ./.local/share/tracker/data
320     ./.local/share/tracker
4       ./.local/share/applications
4       ./.local/share/ibus-table
60      ./.local/share/xorg
112     ./.local/share/gvfs-metadata
4       ./.local/share/sounds
4       ./.local/share/flatpak/db
8       ./.local/share/flatpak
712     ./.local/share
716     ./.local
8       ./Documents
4       ./Music
12      ./Desktop
4       ./Downloads
4       ./Public
10144   .
sruthi@sruthi-VirtualBox:~$
```

16. useradd

Only root or users with sudo privileges can use the useradd command to create new user accounts. When invoked, useradd creates a new user account according to the options specified on the command line and the default values set in the /etc/default/useradd file.

In Linux, a 'useradd' command is a low-level utility that is used for adding/creating user accounts in Linux and other Unix-like operating systems. The 'adduser' is much similar to useradd command, because it is just a symbolic link to it.

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

17. userdel

userdel command in Linux system is used to delete a user account and related files. This command basically modifies the system account files, deleting all the entries which refer to the username LOGIN. It is a low-level utility for removing the users.

Another option is to use the -f (--force) option that tells userdel to forcefully remove the user account, even if the user is still logged in or if there are running processes that belong to the user.

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

18. sudo

The sudo command allows you to run programs with the security privileges of another user (by default, as the superuser). It prompts you for your personal password and confirms your request to execute a command by checking a file, called sudoers , which the system administrator configures Use the visudo command to edit the configuration file: sudo visudo. This will open /etc/sudoers for editing. To add a user and grant full sudo privileges, add the following line: [username] ALL=(ALL:ALL) ALL. Save and exit the file.

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

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

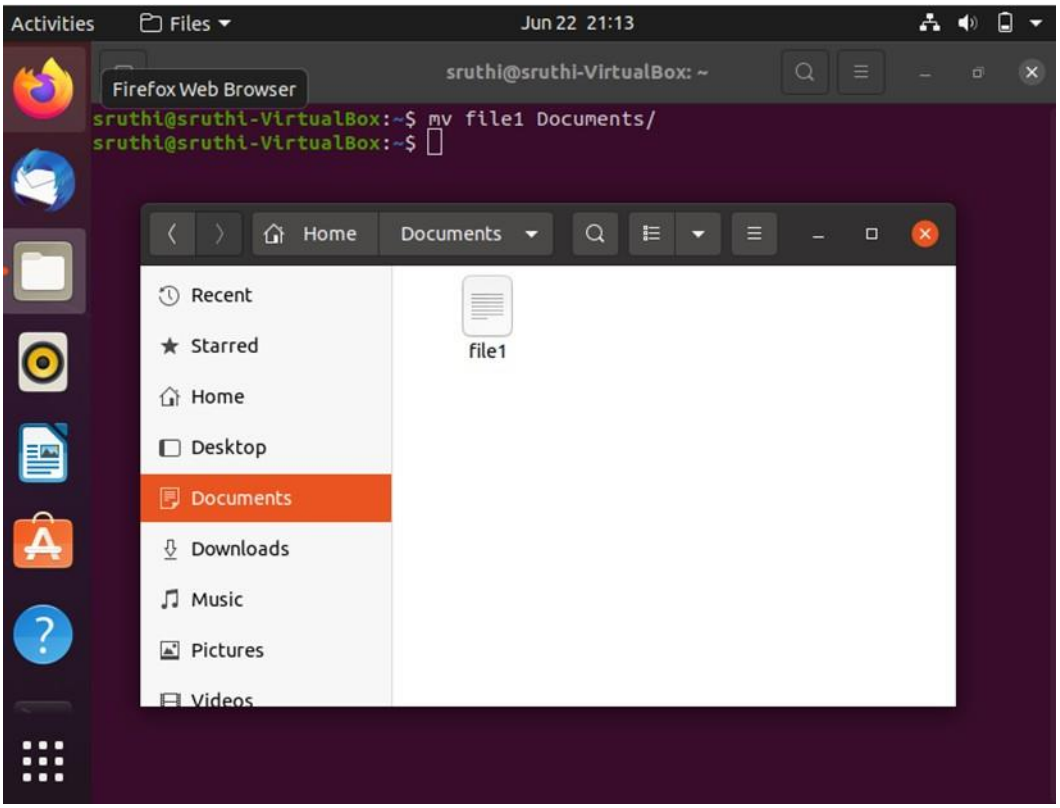
19. mv

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

(i) It renames a file or folder.

(ii) It moves a group of files to a different directory.

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

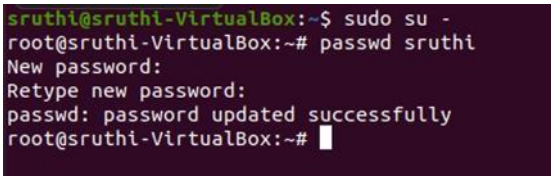


20. passwd

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

Creates a password definition, without a password value, that prompts users for a password while a script is running. To display password status information of a user, use -S option in passwd command.

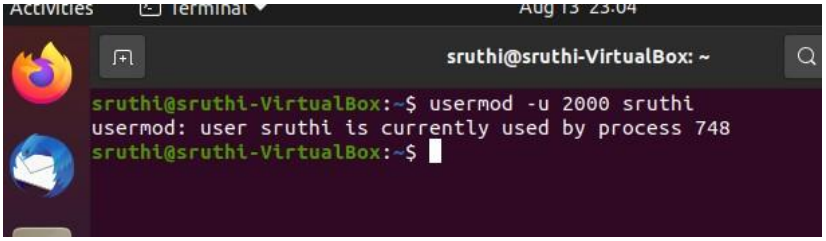
-d,–delete: This option deletes the user password and makes the account password-less. -e,–expire: This option immediately expires the account password and forces the user to change password on their next login. -h, –help: Display help related to the passwd command. The passwd command sets and changes passwords for users. Use this command to change your own password or another user's password. You can also use the passwd command to change the full name (gecos) associated with your login name and the shell you use as an interface to the operating system.



BASIC LINUX COMMANDS(PART-3)

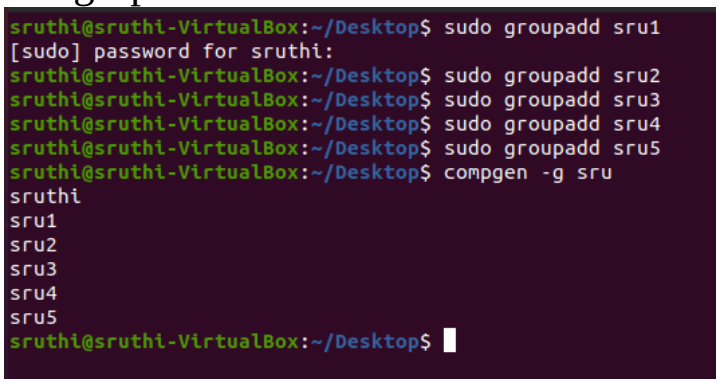
1. usermod

- 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



2. groupadd

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



3. groups

- print the groups a user is in
- #groups alice

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

4. groupdel

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ compgen -g sru
sruthi
sru1
sru2
sru3
sru4
sru5
sruthi@sruthi-VirtualBox:~/Desktop$ sudo groupdel sru5
sruthi@sruthi-VirtualBox:~/Desktop$ compgen -g sru
sruthi
sru1
sru2
sru3
sru4
```

5. groupmod

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

- # groupmod-n group1 group2

```
sruthi@sruthi-VirtualBox:~/Desktop$ compgen -g sru
sruthi
sru1
sru2
sru3
sru4
sruthi@sruthi-VirtualBox:~/Desktop$ sudo groupmod -n new_group sru1
sruthi@sruthi-VirtualBox:~/Desktop$ compgen -g sru
sruthi
sru2
sru3
sru4
sruthi@sruthi-VirtualBox:~/Desktop$ compgen -g new_group
new_group
sruthi@sruthi-VirtualBox:~/Desktop$
```

6. chmod

- To change directory permissions of file/ Directory in Linux. #chmodwhowhatwhichfile/directory
- **chmod+rwxfilename**to add permissions.
- **chmod-rwxdirectoryname**to remove permissions.

- **chmod+x filename**to allow executable permissions.
- **chmod-wxfilename**to take out write and executable permissions.

#chmodu+xtest
#chmodg-rwxtest
#chmodo-r test

```
sruthi@sruthi-VirtualBox:~/Desktop$ chmod +rwx file1
sruthi@sruthi-VirtualBox:~/Desktop$
```

7.chown

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ chown sruthi file1
sruthi@sruthi-VirtualBox:~/Desktop$
```

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

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

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 into

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

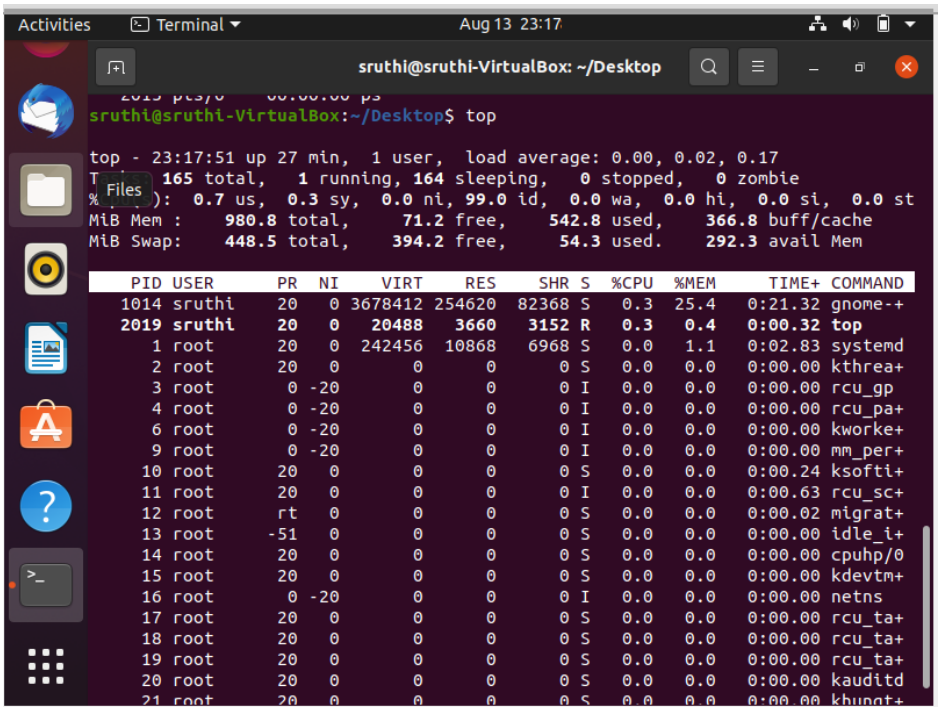
  •CMD–The command that launched the process

- #ps-a

```
sruthi@sruthi-VirtualBox:~/Desktop$ ps -a
    PID TTY          TIME CMD
    784 tty2     00:00:04 Xorg
    884 tty2     00:00:00 gnome-session-b
   2015 pts/0    00:00:00 ps
sruthi@sruthi-VirtualBox:~/Desktop$
```

10.top

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



BASIC LINUX COMMANDS(PART-4)

1. wc

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ cat file4
Cat
Dog
Cow
sruthi@sruthi-VirtualBox:~/Desktop$ wc file4
 3  3 12 file4
sruthi@sruthi-VirtualBox:~/Desktop$ wc -l file4
3 file4
sruthi@sruthi-VirtualBox:~/Desktop$ wc -w file4
3 file4
sruthi@sruthi-VirtualBox:~/Desktop$ wc -c file4
12 file4
sruthi@sruthi-VirtualBox:~/Desktop$
```

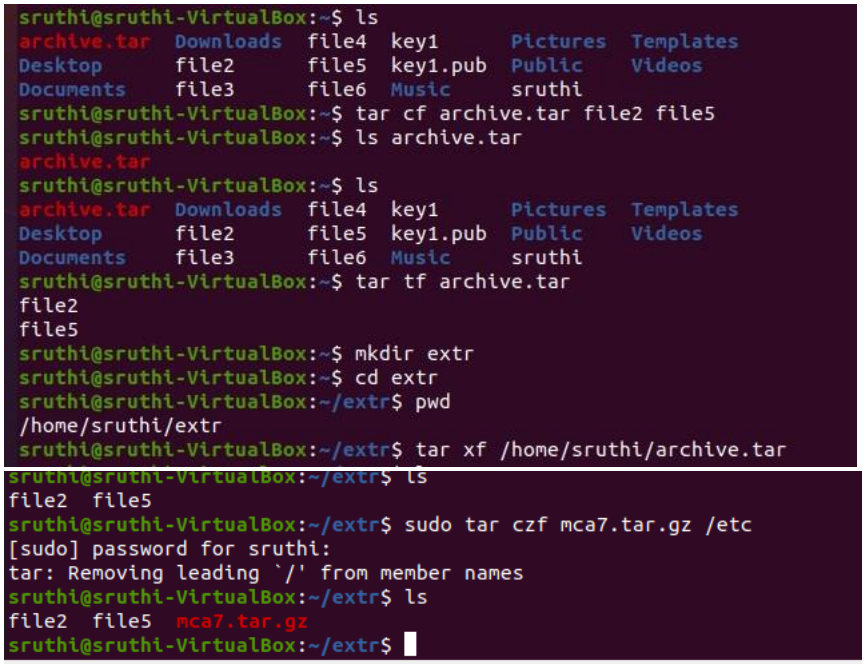
2. tar

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

OPTIONS:

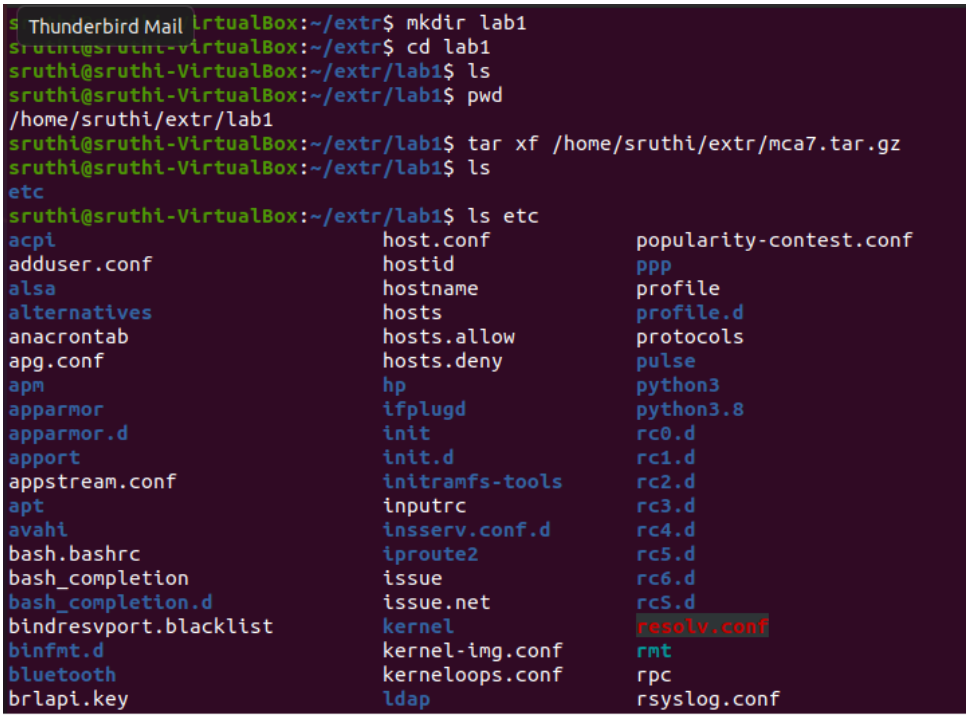
-c : Creates Archive
-x : Extract the archive
-f : creates archive with given filename
-t : displays or lists files in archived file
-u : archives and adds to an existing archive file
-v : Displays Verbose Information
-A : Concatenates the archive files
-z : zip, tells tar command that creates tar file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

Tar command

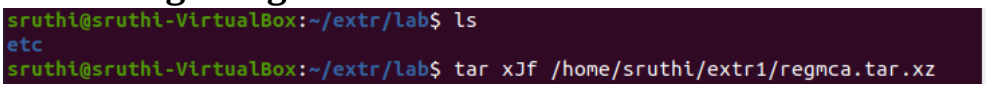


Compressing files using gz,bz2, xz

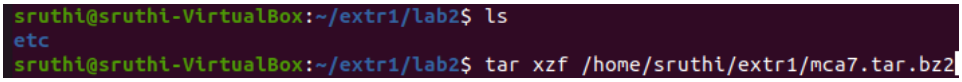
Extracting using gz



Extracting using xz



Extracting using bz2



3. expr

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

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

```
sruthi@sruthi-VirtualBox:~$ expr 5 + 5
10
sruthi@sruthi-VirtualBox:~$ expr 2 + 2
4
sruthi@sruthi-VirtualBox:~$ expr 5 - 6
-1
sruthi@sruthi-VirtualBox:~$ expr 9 / 3
3
sruthi@sruthi-VirtualBox:~$ expr 10 \* 10
100
sruthi@sruthi-VirtualBox:~$
```

4. redirection and piping

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

```
sruthi@sruthi-VirtualBox:~$ cat file4
Cat
Dog
Cow
sruthi@sruthi-VirtualBox:~$ cat file4 |head -1
Cat
sruthi@sruthi-VirtualBox:~$ cat file4 |head -1| tail -1
Cat
sruthi@sruthi-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.

```
sruthi@sruthi-VirtualBox:~$ sudo apt install openssh-client
[sudo] password for sruthi:
Reading package lists... Done
Building dependency tree
Reading state information... Done
openssh-client is already the newest version (1:8.2p1-4ubuntu0.2).
openssh-client set to manually installed.
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
sruthi@sruthi-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
sruthi@sruthi-VirtualBox:~$ ssh localhost
ssh: connect to host localhost port 22: Connection refused
sruthi@sruthi-VirtualBox:~$ sudo apt install openssh-server ii
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ii ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 5 newly installed, 0 to remove and 6 not upgraded.
```

```
The following package was automatically installed and is no longer required:
  distro-info
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 6 not upgraded.
Files @sruthi-VirtualBox:~$ ssh localhost
The authenticity of host 'localhost (127.0.0.1)' can't be established.
ECDSA key fingerprint is SHA256:aGp4Rpuu90dIcDMruSL+8pRAJt163D8+Dh2n7z69RlQ.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'localhost' (ECDSA) to the list of known hosts.
sruthi@localhost's password:
Welcome to Ubuntu 20.04.2 LTS (GNU/Linux 5.8.0-55-generic x86_64)

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

0 updates can be installed immediately.
0 of these updates are security updates.

Your Hardware Enablement Stack (HWE) is supported until April 2025.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

sruthi@sruthi-VirtualBox:~$
```

6. scp

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

7. ssh-keygen

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

```
sruthi@sruthi-VirtualBox:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/sruthi/.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:yRkgGulQHGE2L9M2LhlTJXRaUky7h7E13/jTq3M9k78 sruthi@sruthi-VirtualBox
The key's randomart image is:
+---[RSA 3072]----+
| oO=*=B          |
|.ooB B.o         |
| o* * o +        |
|  .O . B * o     |
|  o . + S o .    |
|   .   .   . .   |
|            o ...|
|            ...=.|
|           .+.E*|
+----[SHA256]-----+
sruthi@sruthi-VirtualBox:~$
```

8. ssh-copy-id

- The ssh-copy-id command is a simple tool that allows you to install an SSH key on a remote server’s authorized keys.
- This command facilitates SSH key login, which removes the need for a password for each login, thus ensuring a password-less, automatic login process.
- The ssh-copy-id command is part of OpenSSH, a tool for performing remote system administrations using encrypted SSH connections.

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

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

```
sruthi@sruthi-VirtualBox:~$ touch song1.mp3 song2.mp3 song4.mp3 song5.mp3 song6
.mp3
```

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

```
sruthi@sruthi-VirtualBox:~$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5
.jpg snap6.jpg
```

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

```
sruthi@sruthi-VirtualBox:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5
.mp4 film6.mp4
```

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.

```
sruthi@sruthi-VirtualBox:~$ mv *.mp3 ./Music/
sruthi@sruthi-VirtualBox:~$ mv *.jpg ./Pictures/
sruthi@sruthi-VirtualBox:~$ mv *.mp4 ./Videos/
```

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.

```
sruthi@sruthi-VirtualBox:~$ mkdir -p {friends,family,work}
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ cp /home/sruthi/Pictures snap1.jpg snap2.jp
g snap3.jpg snap4.jpg snap5.jpg snap6.jpg /home/sruthi/family/
sruthi@sruthi-VirtualBox:~/Desktop$ cp /home/sruthi/Music song1.mp3 song2.mp3 s
ong4.mp3 song5.mp3 song6.mp3 /home/sruthi/friends/
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ rmdir {friends,family}
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ rm -r friends family
```

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.

```
sruthi@sruthi-VirtualBox:~/Desktop$ ls -a > allfiles.txt
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ date
Tuesday 17 August 2021 08:46:35 PM IST
```

9. Add the user Juliet

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Juliet
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ cat /etc/passwd | grep Juliet
Juliet:x:1003:1011::/home/Juliet:/bin/sh
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo passwd Juliet
New password:
Retype new password:
passwd: password updated successfully
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo groupadd -g 30000 Shakespeare
```

13. Create a supplementary group called artists.

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo groupadd artist
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ less /etc/group
Shakespeare:x:30000:
artist:x:30001:
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G Shakespeare Juliet
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ id Juliet
uid=1003(Juliet) gid=1011(Juliet) groups=1011(Juliet),30000(Shakespeare)
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Romeo
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Hamlet
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G Shakespeare Romeo
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G Shakespeare Hamlet
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Reba
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Dolly
sruthi@sruthi-VirtualBox:~/Desktop$ sudo useradd Elvis
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G artist Reba
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G artist Dolly
sruthi@sruthi-VirtualBox:~/Desktop$ sudo usermod -G artist Elvis
```

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

```
sruthi@sruthi-VirtualBox:~/Desktop$ less /etc/group
Romeo:x:1009:
Ram:x:1010:
Juliet:x:1011:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artist:x:30001:Reba,Dolly,Elvis
Hamlet:x:30002:
Reba:x:30003:
Dolly:x:30004:
Elvis:x:30005:
```

20. Attempt to remove user Dolly.

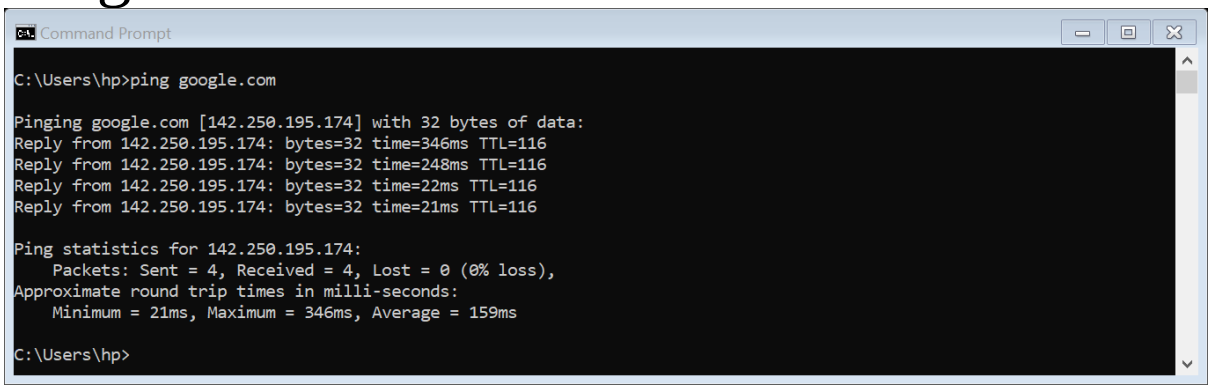
```
sruthi@sruthi-VirtualBox:~/Desktop$ sudo userdel Dolly
[sudo] password for sruthi:
```

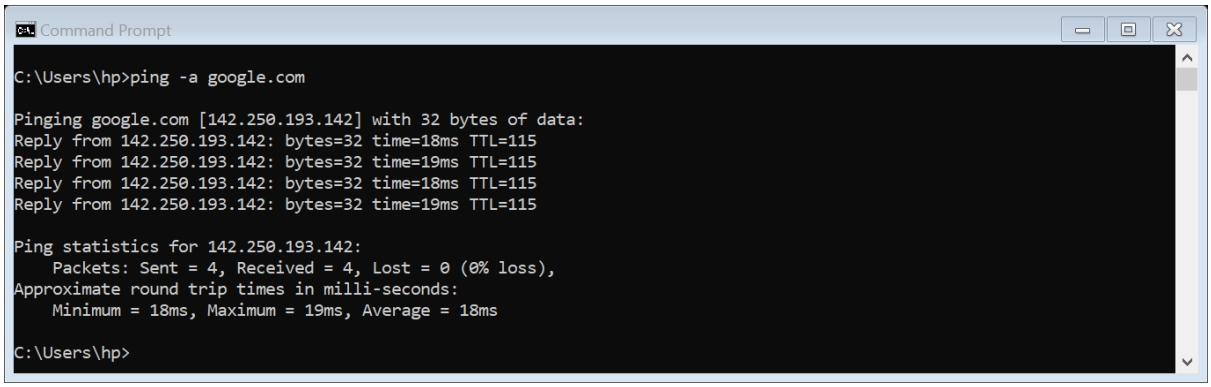
LAB EXCERCISES

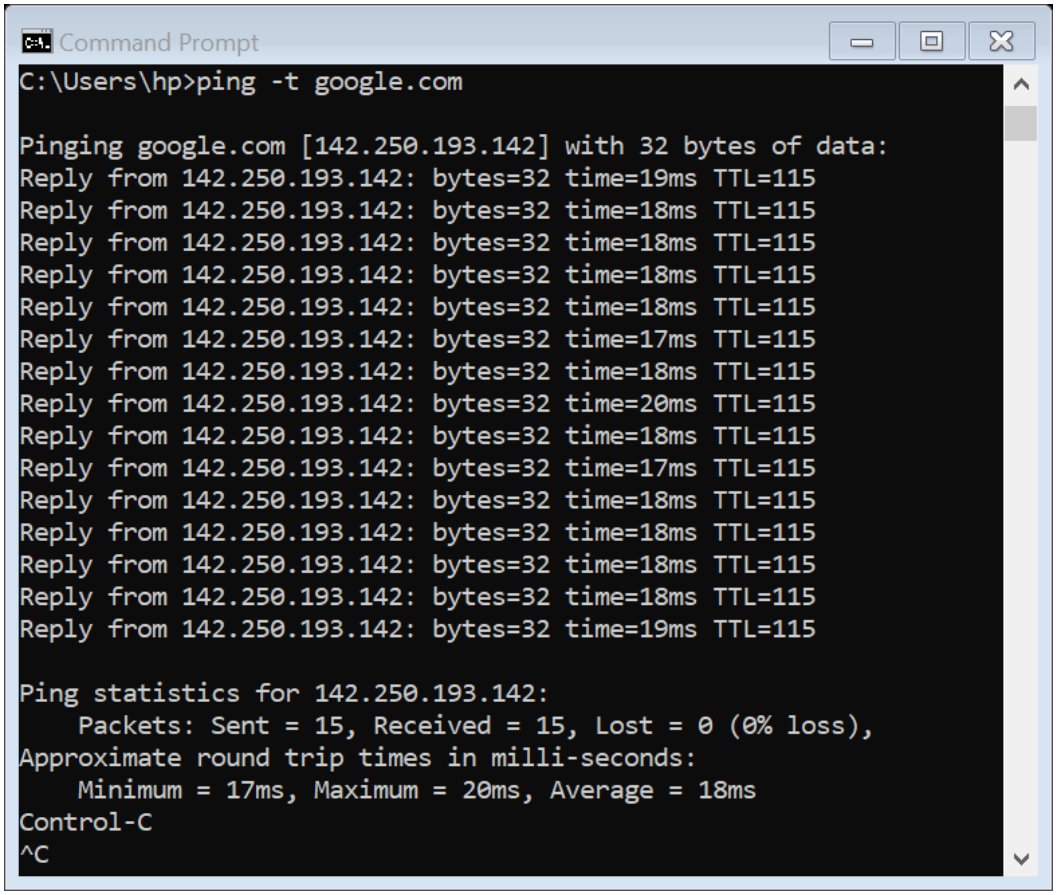
1. Try out these network commands in Window as well as in Linux and perform at least 4 options with each command: ping, route, traceroute, nslookup, Ip Config, NetStat .

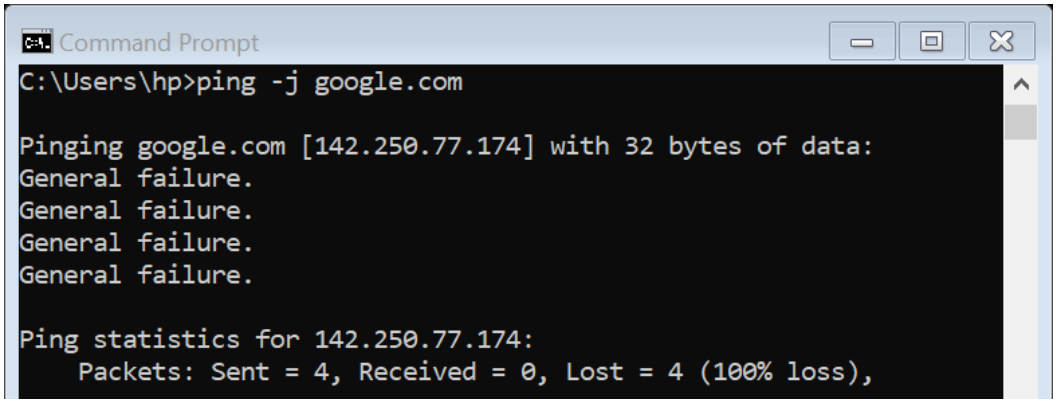
WINDOWS

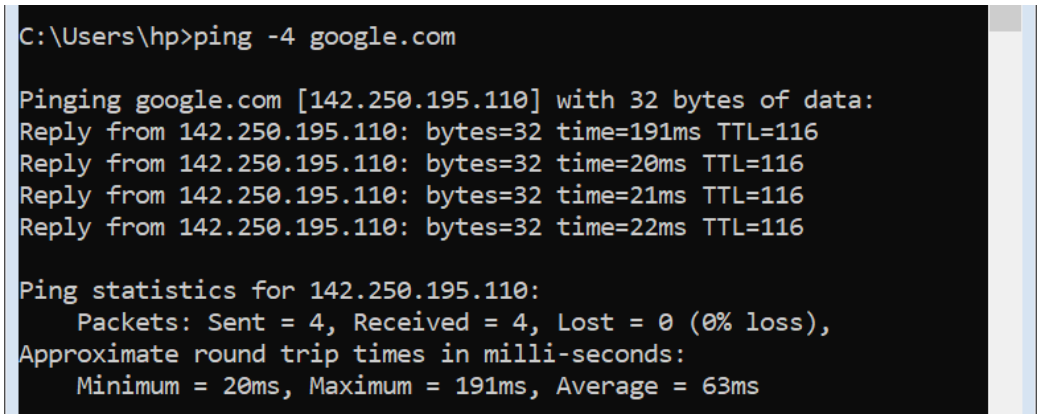
Ping:



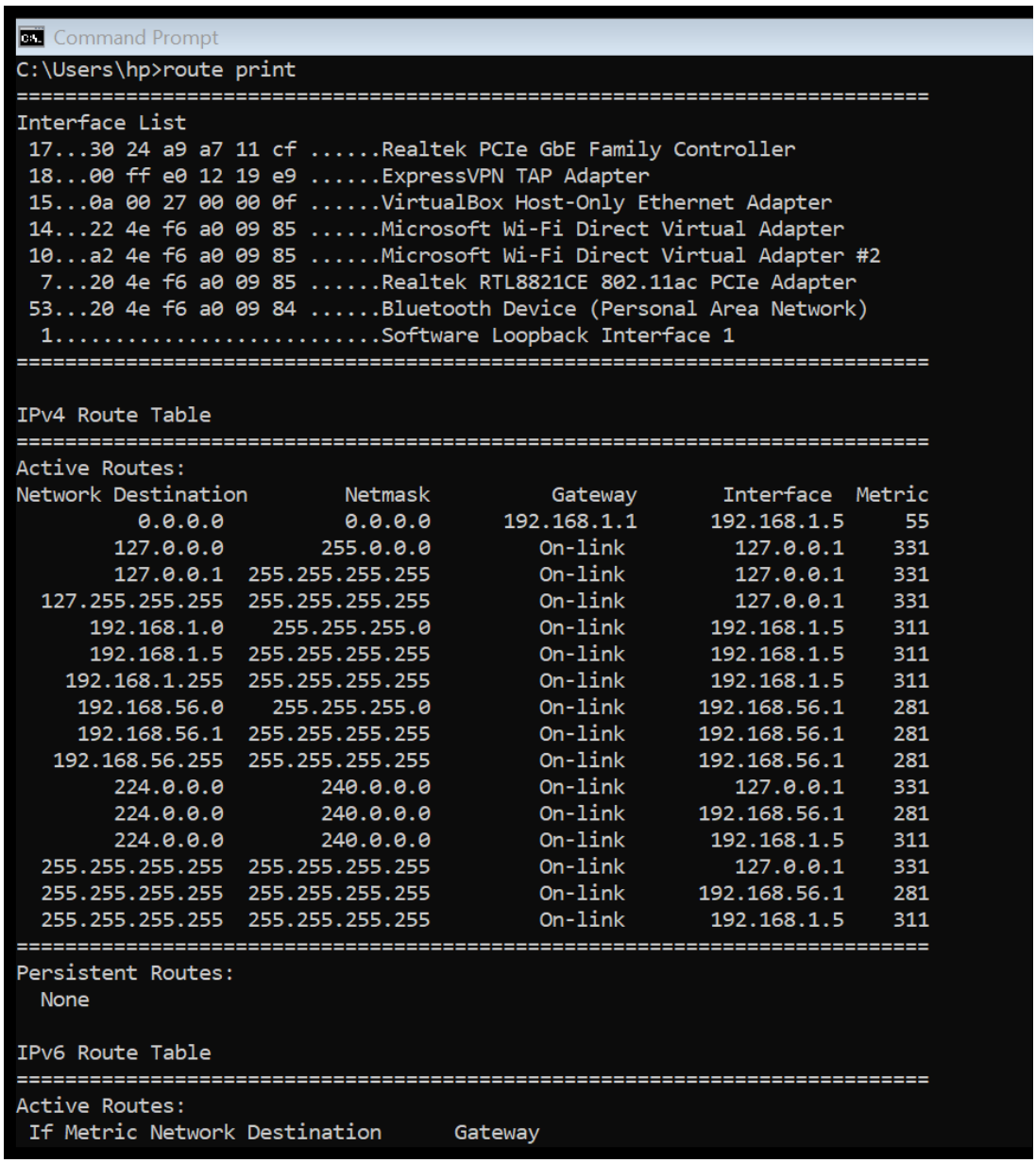



Command Prompt
C:\Users\hp>ping -t google.com
Pinging google.com [142.250.193.142] with 32 bytes of data:
Reply from 142.250.193.142: bytes=32 time=19ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=17ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=20ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=17ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=18ms TTL=115
Reply from 142.250.193.142: bytes=32 time=19ms TTL=115
Ping statistics for 142.250.193.142:
Packets: Sent = 15, Received = 15, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 17ms, Maximum = 20ms, Average = 18ms
Control-C
^C


Command Prompt
C:\Users\hp>ping -j google.com
Pinging google.com [142.250.77.174] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.
Ping statistics for 142.250.77.174:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),


C:\Users\hp>ping -4 google.com
Pinging google.com [142.250.195.110] with 32 bytes of data:
Reply from 142.250.195.110: bytes=32 time=191ms TTL=116
Reply from 142.250.195.110: bytes=32 time=20ms TTL=116
Reply from 142.250.195.110: bytes=32 time=21ms TTL=116
Reply from 142.250.195.110: bytes=32 time=22ms TTL=116
Ping statistics for 142.250.195.110:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 20ms, Maximum = 191ms, Average = 63ms

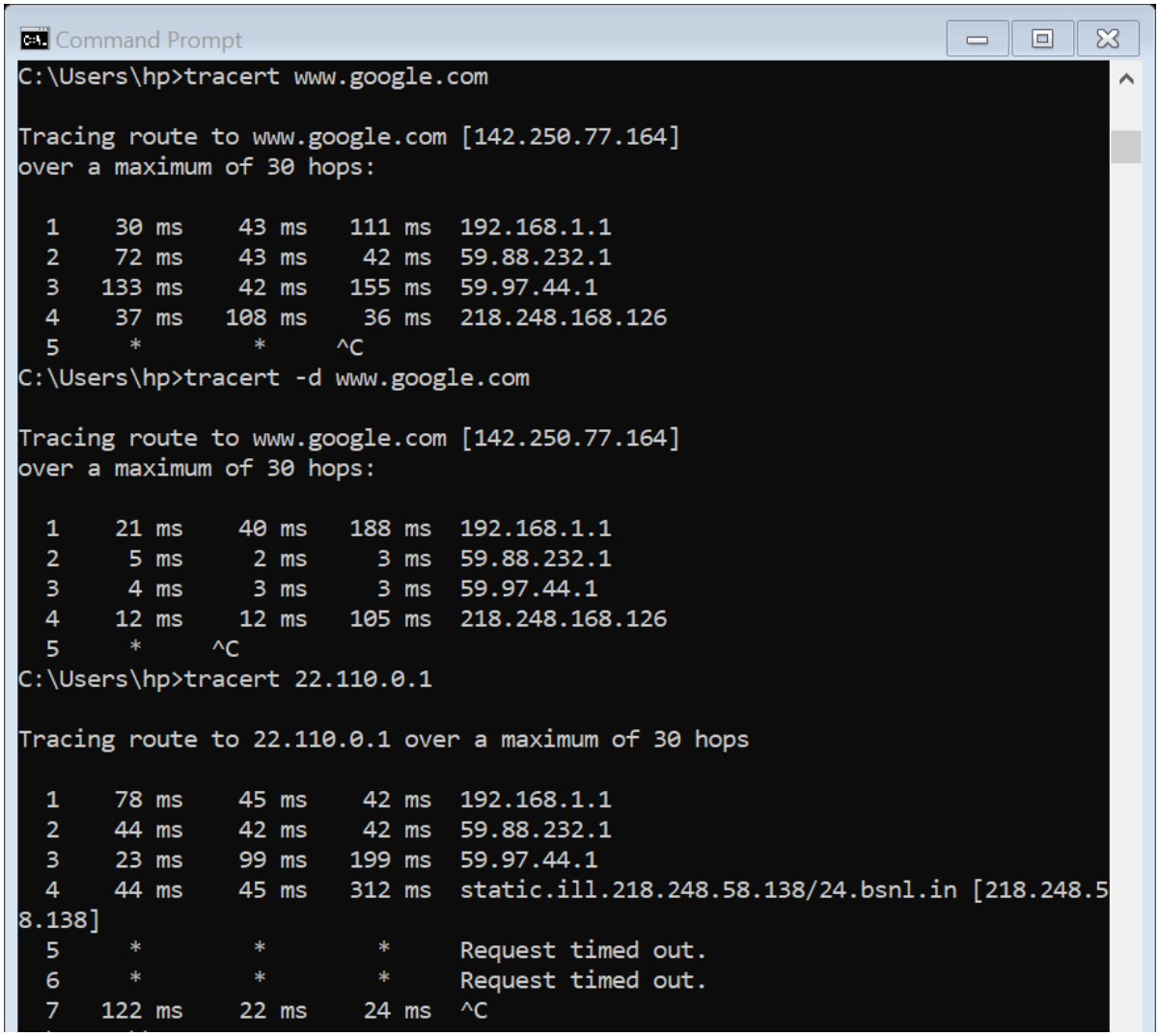
Route


Command Prompt
C:\Users\hp>route print
===
Interface List
 17...30 24 a9 a7 11 cf ......Realtek PCIe GbE Family Controller
 18...00 ff e0 12 19 e9 ......ExpressVPN TAP Adapter
 15...0a 00 27 00 00 0f ......VirtualBox Host-Only Ethernet Adapter
 14...22 4e f6 a0 09 85 ......Microsoft Wi-Fi Direct Virtual Adapter
 10...a2 4e f6 a0 09 85 ......Microsoft Wi-Fi Direct Virtual Adapter #2
  7...20 4e f6 a0 09 85 ......Realtek RTL8821CE 802.11ac PCIe Adapter
 53...20 4e f6 a0 09 84 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===
IPv4 Route Table
===
Active Routes:
Network Destination Netmask Gateway Interface Metric
0.0.0.0 0.0.0.0 192.168.1.1 192.168.1.5 55
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 192.168.1.5 311
192.168.1.5 255.255.255.255 On-link 192.168.1.5 311
192.168.1.255 255.255.255.255 On-link 192.168.1.5 311
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 192.168.1.5 311
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 192.168.1.5 311
===
Persistent Routes:
None
IPv6 Route Table
===
Active Routes:
If Metric Network Destination Gateway

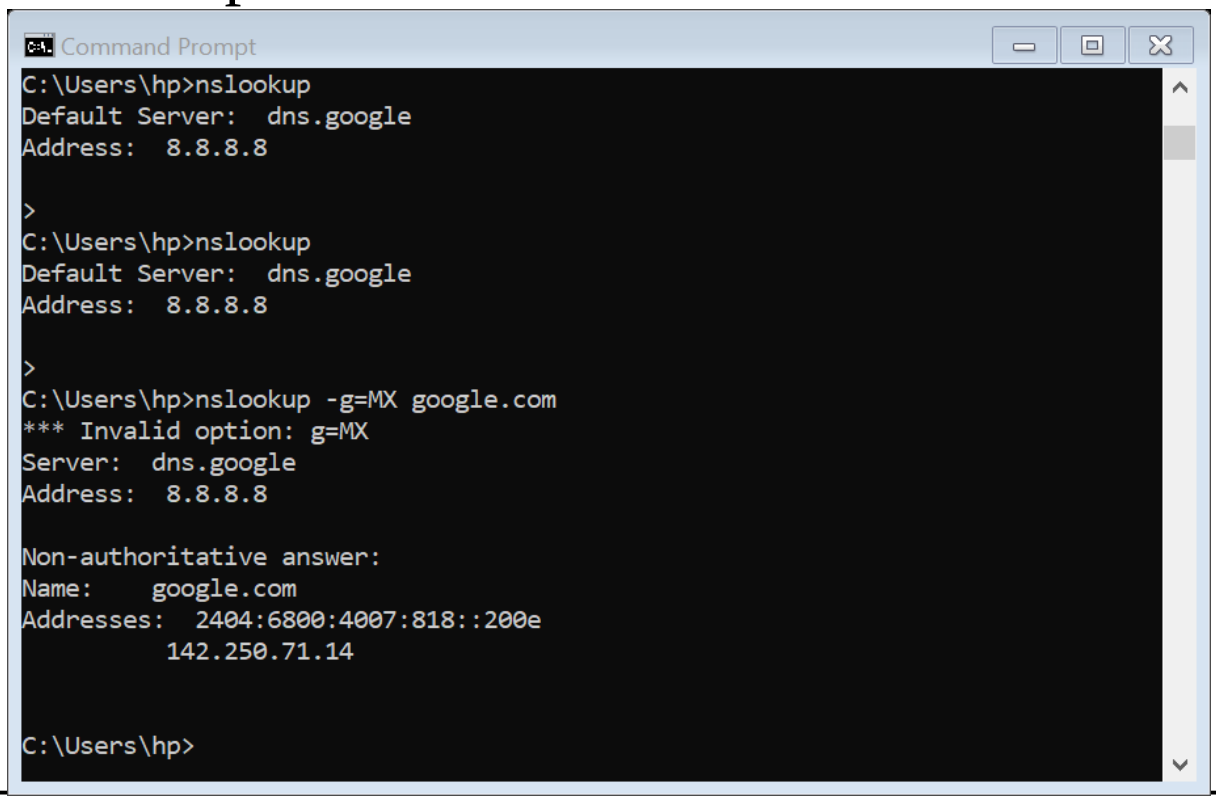
```
C:\Users\hp>route -6

Manipulates network routing tables.

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

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

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

  -4           Force using IPv4.

  -6           Force using IPv6.

  command      One of these:
                 PRINT     Prints  a route
                 ADD       Adds    a route
                 DELETE    Deletes a route
                 CHANGE    Modifies an existing route
  destination  Specifies the host.
  MASK         Specifies that the next parameter is the 'netmask' value.
  netmask      Specifies a subnet mask value for this route entry.
               If not specified, it defaults to 255.255.255.255.
  gateway      Specifies gateway.
  interface    the interface number for the specified route.
  METRIC       specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard,
(wildcard is specified as a star '*'), or the gateway argument may be omitted.

If Dest contains a * or ?, it is treated as a shell pattern, and only
```

```
C:\Users\hp>route print *157
===========================================================================
Interface List
 17...30 24 a9 a7 11 cf ......Realtek PCIe GbE Family Controller
 18...00 ff e0 12 19 e9 ......ExpressVPN TAP Adapter
 15...0a 00 27 00 00 0f ......VirtualBox Host-Only Ethernet Adapter
 14...22 4e f6 a0 09 85 ......Microsoft Wi-Fi Direct Virtual Adapter
 10...a2 4e f6 a0 09 85 ......Microsoft Wi-Fi Direct Virtual Adapter #2
  7...20 4e f6 a0 09 85 ......Realtek RTL8821CE 802.11ac PCIe Adapter
 53...20 4e f6 a0 09 84 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

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

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

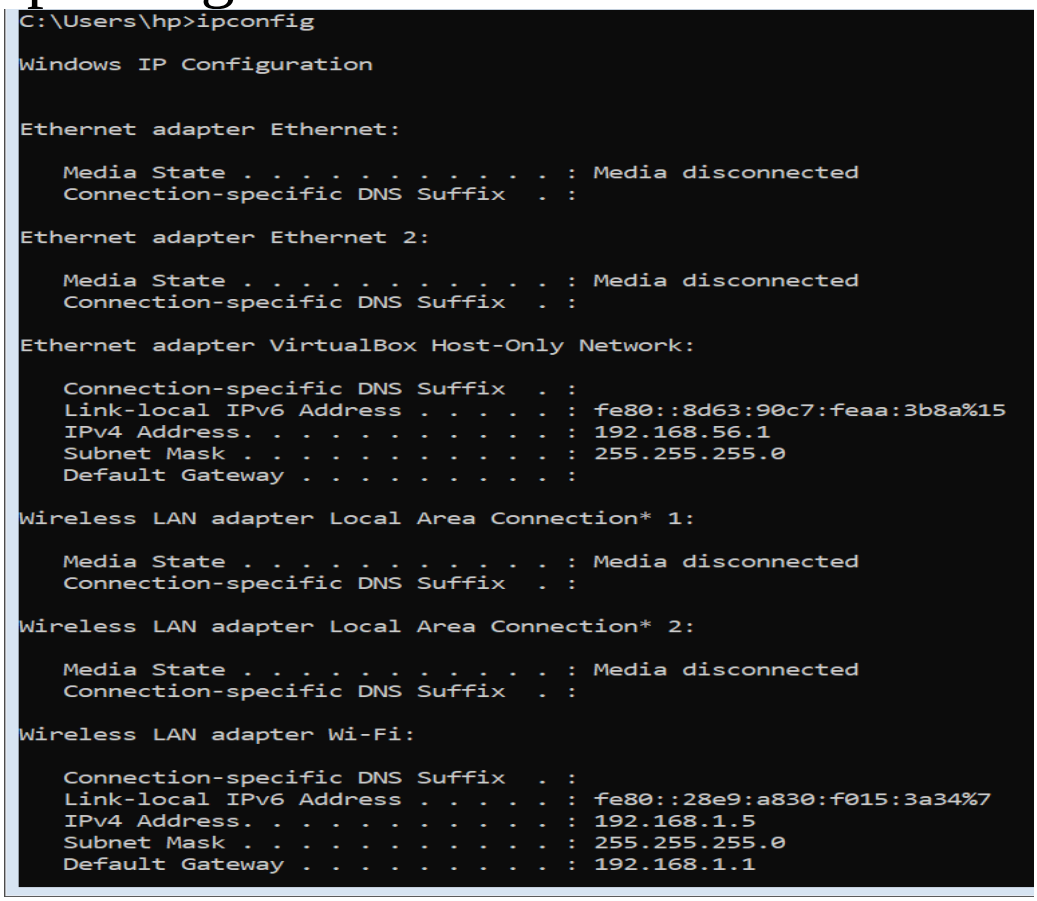
```
C:\Users\hp>tracert 192.168.1.1

Tracing route to 192.168.1.1 over a maximum of 30 hops

  1     3 ms     2 ms     2 ms  192.168.1.1

Trace complete.
```



Nslookup



Ipconfig



```
C:\Users\hp>ipconfig /displaying

Error: unrecognized or incomplete command line.

USAGE:
    ipconfig [/allcompartments] [/? | /all |
                                 /renew [adapter] | /release [adapter] |
                                 /renew6 [adapter] | /release6 [adapter] |
                                 /flushdns | /displaydns | /registerdns |
                                 /showclassid adapter |
                                 /setclassid adapter [classid] |
                                 /showclassid6 adapter |
                                 /setclassid6 adapter [classid] ]

where
    adapter             Connection name
                       (wildcard characters * and ? allowed, see examples)

    Options:
       /?               Display this help message
       /all             Display full configuration information.
       /release         Release the IPv4 address for the specified adapter.
       /release6        Release the IPv6 address for the specified adapter.
       /renew           Renew the IPv4 address for the specified adapter.
       /renew6          Renew the IPv6 address for the specified adapter.
       /flushdns        Purges the DNS Resolver cache.
       /registerdns     Refreshes all DHCP leases and re-registers DNS names
       /displaydns      Display the contents of the DNS Resolver Cache.
       /showclassid     Displays all the dhcp class IDs allowed for adapter.
       /setclassid      Modifies the dhcp class id.
       /showclassid6    Displays all the IPv6 DHCP class IDs allowed for adapter.
       /setclassid6     Modifies the IPv6 DHCP class id.


The default is to display only the IP address, subnet mask and
default gateway for each adapter bound to TCP/IP.

For Release and Renew, if no adapter name is specified, then the IP address
leases for all adapters bound to TCP/IP will be released or renewed.
```

Netstat

```
Command Prompt

C:\Users\hp>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:60256        LAPTOP-NDIS9IAF:60258  ESTABLISHED
  TCP    127.0.0.1:60258        LAPTOP-NDIS9IAF:60256  ESTABLISHED
  TCP    192.168.1.5:50490      20.198.162.78:https    ESTABLISHED
  TCP    192.168.1.5:54567      dns:https              ESTABLISHED
  TCP    192.168.1.5:54568      20.189.173.6:https     TIME_WAIT
  TCP    192.168.1.5:59617      maa03s26-in-f3:https   ESTABLISHED
^C
C:\Users\hp>
```

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

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:60256        127.0.0.1:60258        ESTABLISHED
  TCP    127.0.0.1:60258        127.0.0.1:60256        ESTABLISHED
  TCP    192.168.1.5:50490      20.198.162.78:443      ESTABLISHED
  TCP    192.168.1.5:54567      8.8.4.4:443            ESTABLISHED
  TCP    192.168.1.5:54568      20.189.173.6:443       TIME_WAIT
  TCP    192.168.1.5:59617      172.217.167.131:443    ESTABLISHED
  TCP    192.168.1.5:63627      74.125.130.188:5228    ESTABLISHED

C:\Users\hp>netstat -n 5

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:60256        127.0.0.1:60258        ESTABLISHED
  TCP    127.0.0.1:60258        127.0.0.1:60256        ESTABLISHED
  TCP    192.168.1.5:50490      20.198.162.78:443      ESTABLISHED
  TCP    192.168.1.5:54567      8.8.4.4:443            ESTABLISHED
  TCP    192.168.1.5:59617      172.217.167.131:443    ESTABLISHED
  TCP    192.168.1.5:63627      74.125.130.188:5228    ESTABLISHED

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:60256        127.0.0.1:60258        ESTABLISHED
  TCP    127.0.0.1:60258        127.0.0.1:60256        ESTABLISHED
  TCP    192.168.1.5:50490      20.198.162.78:443      ESTABLISHED
  TCP    192.168.1.5:54567      8.8.4.4:443            ESTABLISHED
  TCP    192.168.1.5:59617      172.217.167.131:443    FIN_WAIT_1
  TCP    192.168.1.5:63627      74.125.130.188:5228    ESTABLISHED
```

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

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:445            LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:5040           LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:5357           LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:6646           LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49664          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49665          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49666          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49667          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49668          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    0.0.0.0:49670          LAPTOP-NDIS9IAF:0      LISTENING
  TCP    127.0.0.1:2015         LAPTOP-NDIS9IAF:0      LISTENING
  TCP    127.0.0.1:27017        LAPTOP-NDIS9IAF:0      LISTENING
  TCP    127.0.0.1:60256        LAPTOP-NDIS9IAF:0      LISTENING
  TCP    127.0.0.1:60256        LAPTOP-NDIS9IAF:60258  ESTABLISHED
  TCP    127.0.0.1:60258        LAPTOP-NDIS9IAF:60256  ESTABLISHED
  TCP    192.168.1.5:139        LAPTOP-NDIS9IAF:0      LISTENING
  TCP    192.168.1.5:50490      20.198.162.78:https    ESTABLISHED
  TCP    192.168.1.5:54567      dns:https              CLOSE_WAIT
  TCP    192.168.1.5:59617      maa03s26-in-f3:https   TIME_WAIT
  TCP    192.168.1.5:63627      sb-in-f188:5228        ESTABLISHED
  TCP    192.168.56.1:139       LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:135               LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:445               LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:5357              LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49664             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49665             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49666             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49667             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49668             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::]:49670             LAPTOP-NDIS9IAF:0      LISTENING
  TCP    [::1]:50382            LAPTOP-NDIS9IAF:0      LISTENING
  UDP    0.0.0.0:123            *:*
  UDP    0.0.0.0:500            *:*
  UDP    0.0.0.0:3702           *:*
  UDP    0.0.0.0:3702           *:*
```

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

i. 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\hp>arp -a

Interface: 192.168.1.5 --- 0x7
  Internet Address      Physical Address      Type
  192.168.1.1           00-6d-61-98-9c-11     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

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

ii. NbtStat

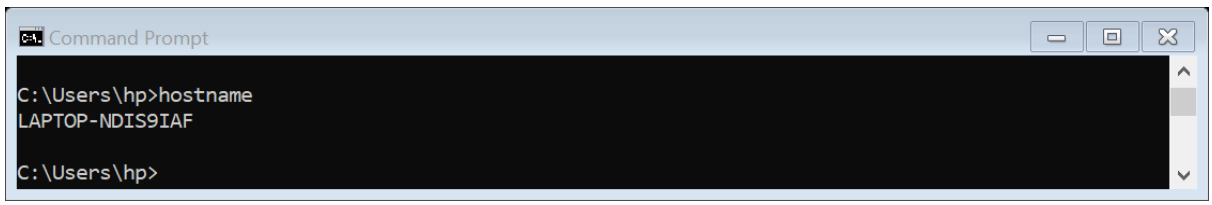
Computers that are running a Windows operating system are assigned a computer name. Oftentimes, there is a domain name or a workgroup name that is also assigned to the computer. The

computer name is sometimes referred to as the NetBIOS name. Windows uses several different methods to map NetBIOS names to IP addresses, such as broadcast, LMHost lookup, or even using the nearly extinct method of querying a WINS server. 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\hp>nbtstat -r

    NetBIOS Names Resolution and Registration Statistics
    ----------------------------------------------------

    Resolved By Broadcast     = 0
    Resolved By Name Server   = 0

    Registered By Broadcast   = 516
    Registered By Name Server = 0
```

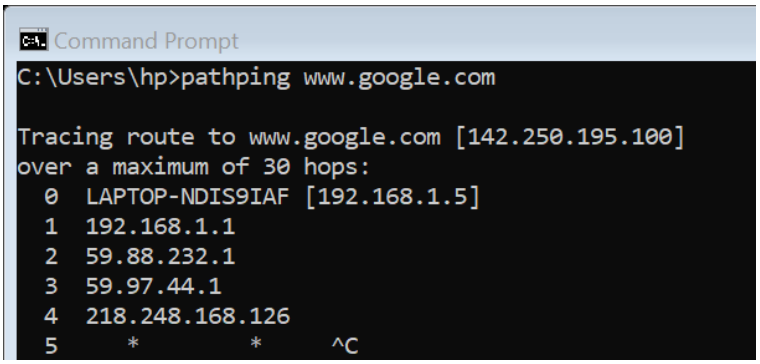
iii. Hostname

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.



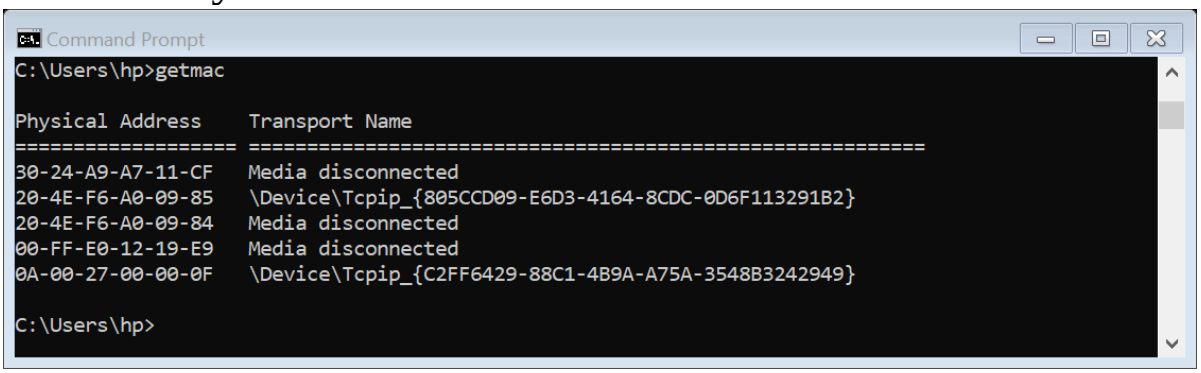
iv. PathPing Earlier,

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.



v. getmac

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



LAMP INSTALLATION

Install apache

- **Update your system**

  sudo apt update

- **Install Apache using apt:**

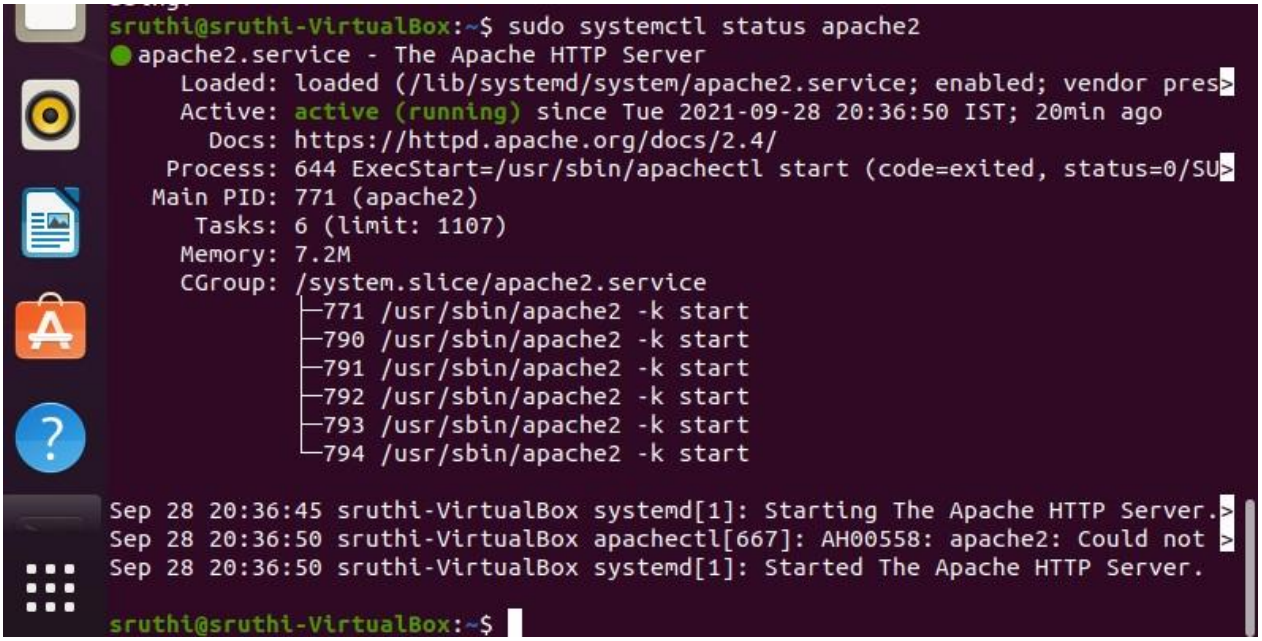
  sudo apt install apache2

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

  sudo systemctl status apache2

- **if it is not working**

  sudo systemctl start apache2



Install mariadb

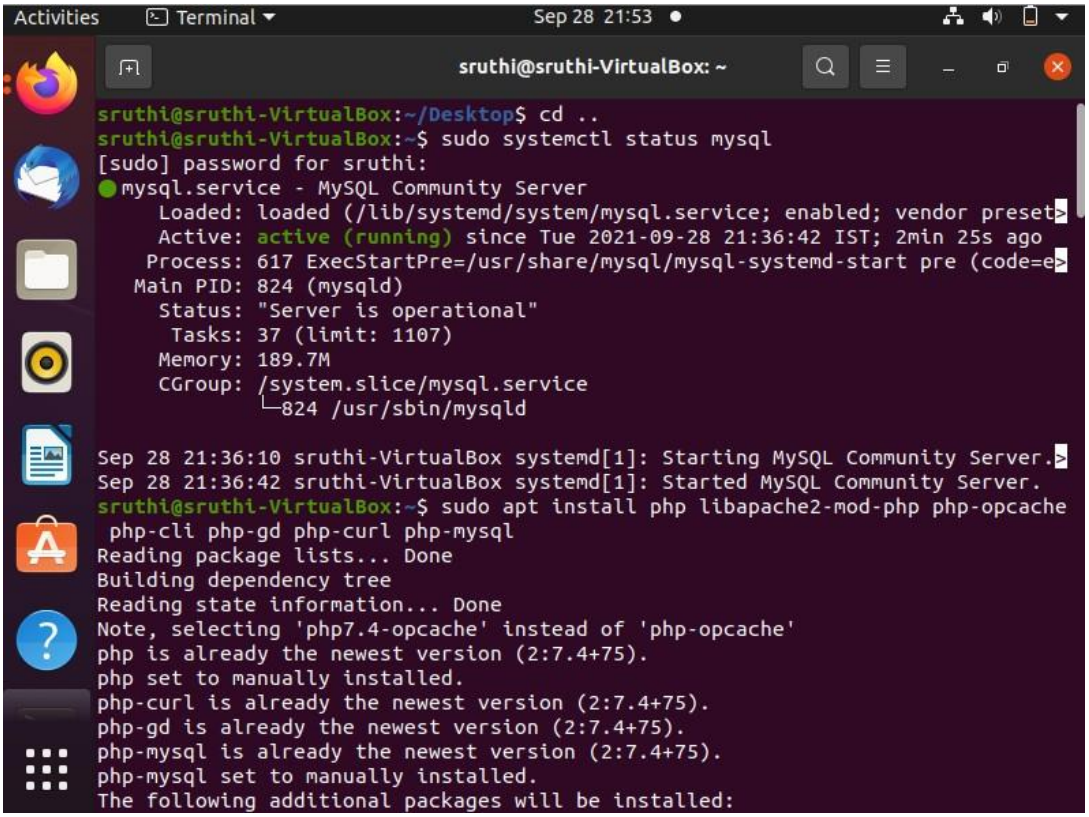
- **Install mariaDB**

sudo apt install mariadb-server mariadb-client

- **Check mariadb Installation**

sudo systemctl status mysql

(if it is not working sudo systemctl start mysql)



Install PHP

- **Install PHP**

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

- **Restart apache2**

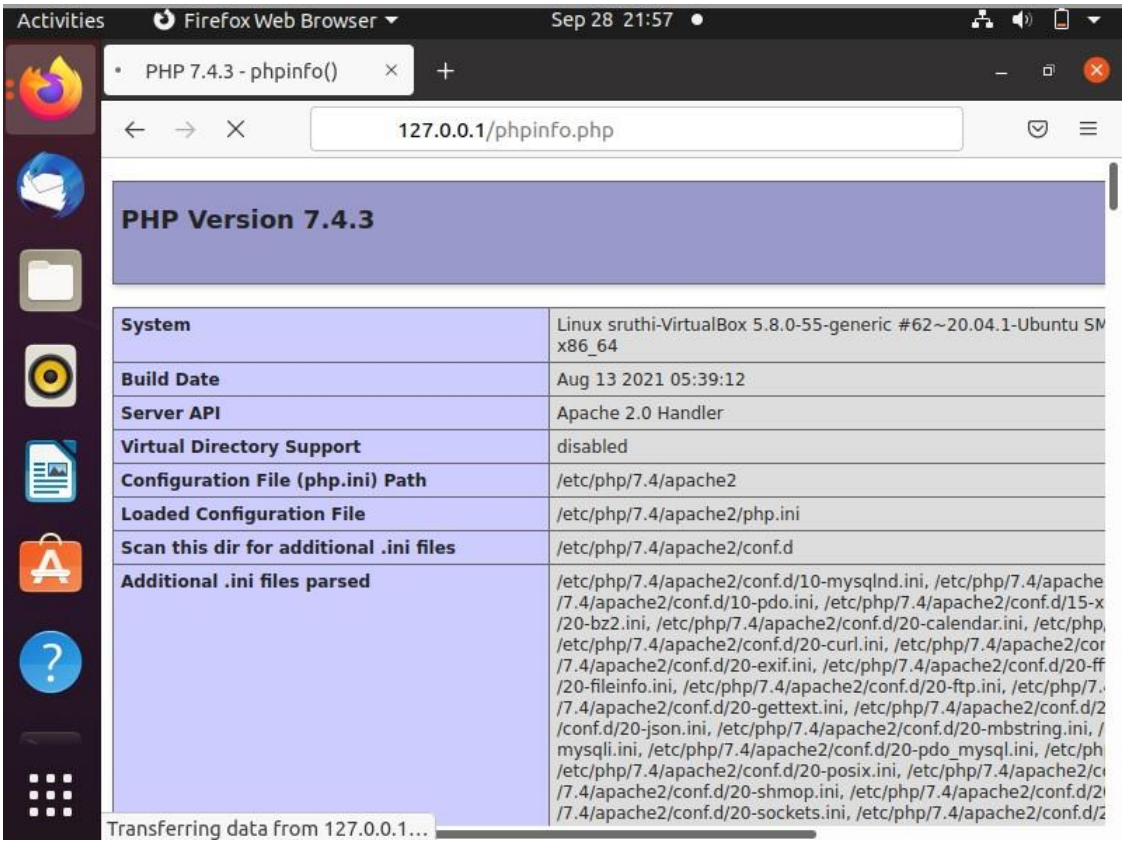
  sudo systemctl restart apache2

- **Now you can check php installation**

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

- **Open a browser**

  http://127.0.0.1/phpinfo.php



Install phpmyadmin

- **Install phpmyadmin**

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

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

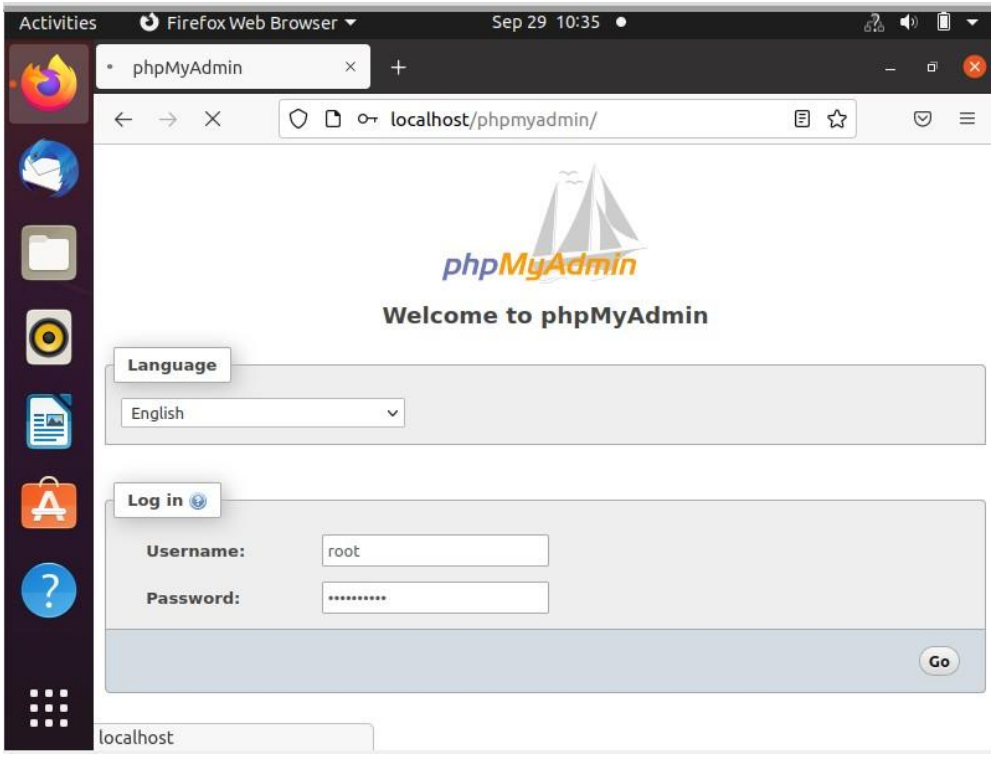
- **Restart apache2**

  sudo systemctl restart apache2

- **Check phpmyadmin**

- **Open a browser**

  http://localhost/phpmyadmin



ldc localhost/ localhost | ph

\+ —+ C 0 0 localhost/phpmyadminindex.php

¥ Databases D SQL @ Status o User accounts Export Import }•

@ Change password

Server connection collation '@: deg 4 n c

@ Language '@ En i h

@ Theme: apa

• Font size:

@ More settings

@w Console

ANSIBLE INSTALLATION

- **INSTALLATION**
  STEP 1: sudo apt install ansible

```
sruthi@sruthi-VirtualBox:~$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmltodict
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xmltodict
0 upgraded, 17 newly installed, 0 to remove and 202 not upgraded.
Need to get 9,865 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
.10.1-2 [95.5 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
 2.6.1-13ubuntu2 [237 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-dist
utils all 3.8.10-0ubuntu1~20.04 [141 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu focal/main amd64 python3-dnspython al
```

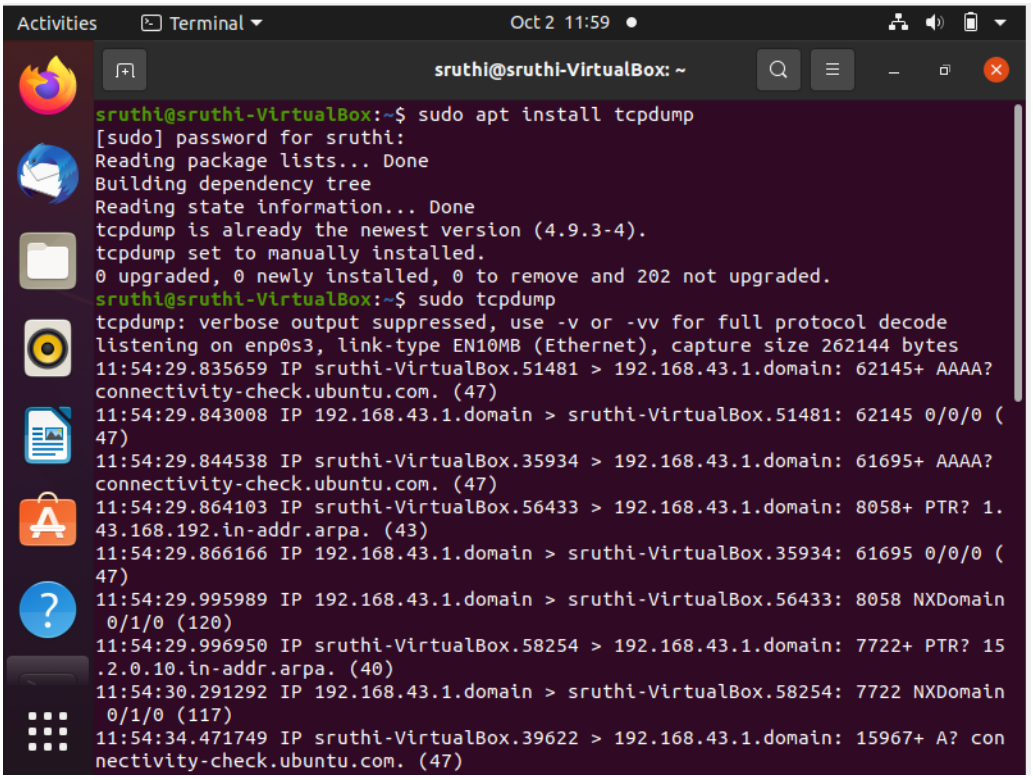
- **INSTALLATION CHECK**
  Step 2: sudo ansible –version

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

TCPDUMP INSTALLATION

1. INSTALLATION

- **sudo apt install tcpdump**
- **sudo tcpdump**




```
.com.http: Flags [.], ack 149, win 64092, length 0
11:54:35.469754 IP 17.111.232.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.49578: Flags [F.], seq 149, ack 88, win 65535, length 0
11:54:35.470283 IP sruthi-VirtualBox.49578 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [F.], seq 88, ack 150, win 64091, length 0
11:54:35.470794 IP 17.111.232.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.49578: Flags [.], ack 89, win 65535, length 0
^C
22 packets captured
22 packets received by filter
0 packets dropped by kernel
```

- **tcpdump -D**
- **tcpdump -i enp0s3**
- **sudo tcpdump -c 5**

```
sruthi@sruthi-VirtualBox:~$ tcpdump -D
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
sruthi@sruthi-VirtualBox:~$ tcpdump -i enp0s3
tcpdump: enp0s3: You don't have permission to capture on that device
(socket: Operation not permitted)
sruthi@sruthi-VirtualBox:~$ sudo tcpdump -c 5
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
sruthi@sruthi-VirtualBox:~$
```

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

```
sruthi@sruthi-VirtualBox:~$ sudo tcpdump -i enp0s3 -c 5 port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:14:34.482167 IP sruthi-VirtualBox.53296 > 84.170.224.35.bc.googleusercontent
.com.http: Flags [S], seq 2801704923, win 64240, options [mss 1460,sackOK,TS va
l 16054154 ecr 0,nop,wscale 7], length 0
12:14:34.927054 IP 84.170.224.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.53296: Flags [S.], seq 33152001, ack 2801704924, win 65535, options [mss 14
60], length 0
12:14:34.927099 IP sruthi-VirtualBox.53296 > 84.170.224.35.bc.googleusercontent
.com.http: Flags [.], ack 1, win 64240, length 0
12:14:34.927336 IP sruthi-VirtualBox.53296 > 84.170.224.35.bc.googleusercontent
.com.http: Flags [P.], seq 1:88, ack 1, win 64240, length 87: HTTP: GET / HTTP/
1.1
12:14:34.927832 IP 84.170.224.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.53296: Flags [.], ack 88, win 65535, length 0
5 packets captured
10 packets received by filter
0 packets dropped by kernel
sruthi@sruthi-VirtualBox:~$
```

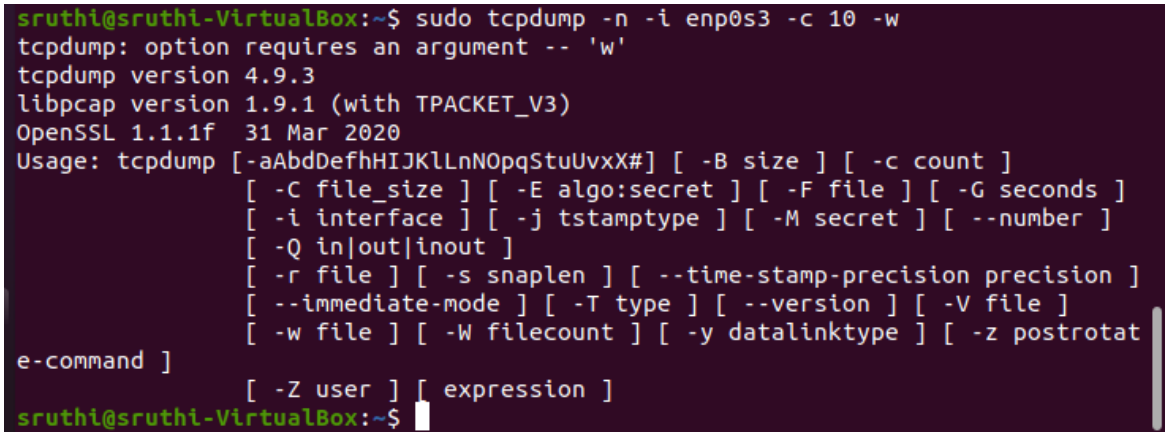
- **sudo tcpdump host 10.0.2.15**

```
sruthi@sruthi-VirtualBox:~$ sudo tcpdump host 10.0.2.15
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:19:29.802921 IP sruthi-VirtualBox.45927 > 192.168.43.1.domain: 31418+ AAAA?
connectivity-check.ubuntu.com. (47)
12:19:29.805938 IP sruthi-VirtualBox.53113 > 192.168.43.1.domain: 17721+ PTR? 1
.43.168.192.in-addr.arpa. (43)
12:19:30.028439 IP 192.168.43.1.domain > sruthi-VirtualBox.53113: 17721 NXDomai
n 0/0/0 (43)
12:19:30.028473 IP 192.168.43.1.domain > sruthi-VirtualBox.45927: 31418 0/0/0 (
47)
12:19:30.030426 IP sruthi-VirtualBox.37759 > 192.168.43.1.domain: 60134+ AAAA?
connectivity-check.ubuntu.com. (47)
12:19:30.031734 IP sruthi-VirtualBox.56393 > 192.168.43.1.domain: 52362+ PTR? 1
5.2.0.10.in-addr.arpa. (40)
12:19:30.036276 IP 192.168.43.1.domain > sruthi-VirtualBox.56393: 52362 NXDomai
n 0/0/0 (40)
12:19:30.036313 IP 192.168.43.1.domain > sruthi-VirtualBox.37759: 60134 0/0/0 (
47)
12:19:34.471839 IP sruthi-VirtualBox.49588 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [S], seq 3746838713, win 64240, options [mss 1460,sackOK,TS va
l 1432515971 ecr 0,nop,wscale 7], length 0
12:19:34.472886 IP sruthi-VirtualBox.35104 > 192.168.43.1.domain: 22031+ PTR? 1
7.111.232.35.in-addr.arpa. (44)
12:19:34.897182 ARP, Request who-has _gateway tell sruthi-VirtualBox, length 28
12:19:34.897480 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng
th 46
12:19:35.141544 IP 192.168.43.1.domain > sruthi-VirtualBox.35104: 22031 1/0/0 P
TR 17.111.232.35.bc.googleusercontent.com. (96)
 204 No Content
12:19:35.754896 IP sruthi-VirtualBox.49588 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [.], ack 149, win 64092, length 0
12:19:35.755154 IP 17.111.232.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.49588: Flags [F.], seq 149, ack 88, win 65535, length 0
12:19:35.755558 IP sruthi-VirtualBox.49588 > 17.111.232.35.bc.googleusercontent
.com.http: Flags [F.], seq 88, ack 150, win 64091, length 0
12:19:35.756046 IP 17.111.232.35.bc.googleusercontent.com.http > sruthi-Virtual
Box.49588: Flags [.], ack 89, win 65535, length 0
^C
24 packets captured
24 packets received by filter
0 packets dropped by kernel
sruthi@sruthi-VirtualBox:~$
```

- **tcpdump -i eth1icmp**

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

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

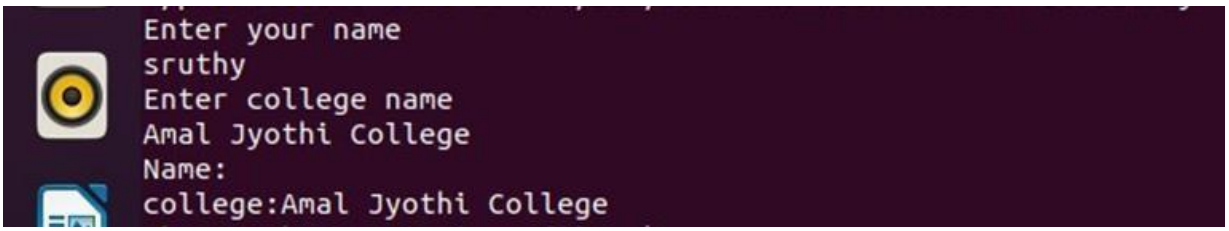


SHELL SCRIPTING INSTALLATION

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

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

OUTPUT:



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

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

OUTPUT:

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

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

OUTPUT:

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

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

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

OUTPUT:

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

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

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

OUTPUT:

```
user@user-VirtualBox:~$ bash 5.sh
Today is Saturday 02 October 2021 05:53:45 PM IST
calender:
    October 2021
Su Mo Tu We Th Fr Sa
                1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
```

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

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

OUTPUT:

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

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

```
echo enter first number
read a
echo enter second number
read b
if [ $a -gt $b ];
then
```

```
echo "$a is larger"
elif [ $b -gt $a ];
then
echo "$b is larger"
else
echo "both are equal"
fi
```

OUTPUT:

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

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

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

OUTPUT:

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

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

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

```
echo "the sum is:"$sum
echo "the average is:"$avg
echo "the product is:"$prod
```

OUTPUT:

```
user@user-VirtualBox:~$ bash 9.sh
please enter your first number
1
please enter your second number
2
please enter your third number
3
please enter your fourth number
4
the sum is:10
the average is:2.5000000000000000000
the product is:24
```

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

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

OUTPUT:

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

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

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

OUTPUT:

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

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

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

OUTPUT:

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

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

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

OUTPUT:

```
user@user-VirtualBox:~$ bash 13.sh
enter size
5
enter numbers
6
7
8
9
4
average is 6.80000000000000000000
```

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

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

OUTPUT:

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

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

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

OUTPUT:

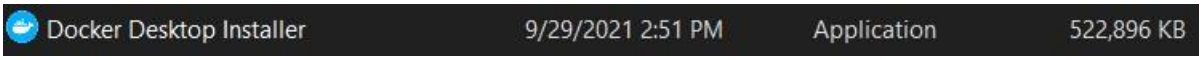
```
user@user-VirtualBox:~$ bash 15.sh
enter year
1994
1994 is leap year
```

INSTALLATION AND DEPLOYMENT OF DOCKER

Step-I

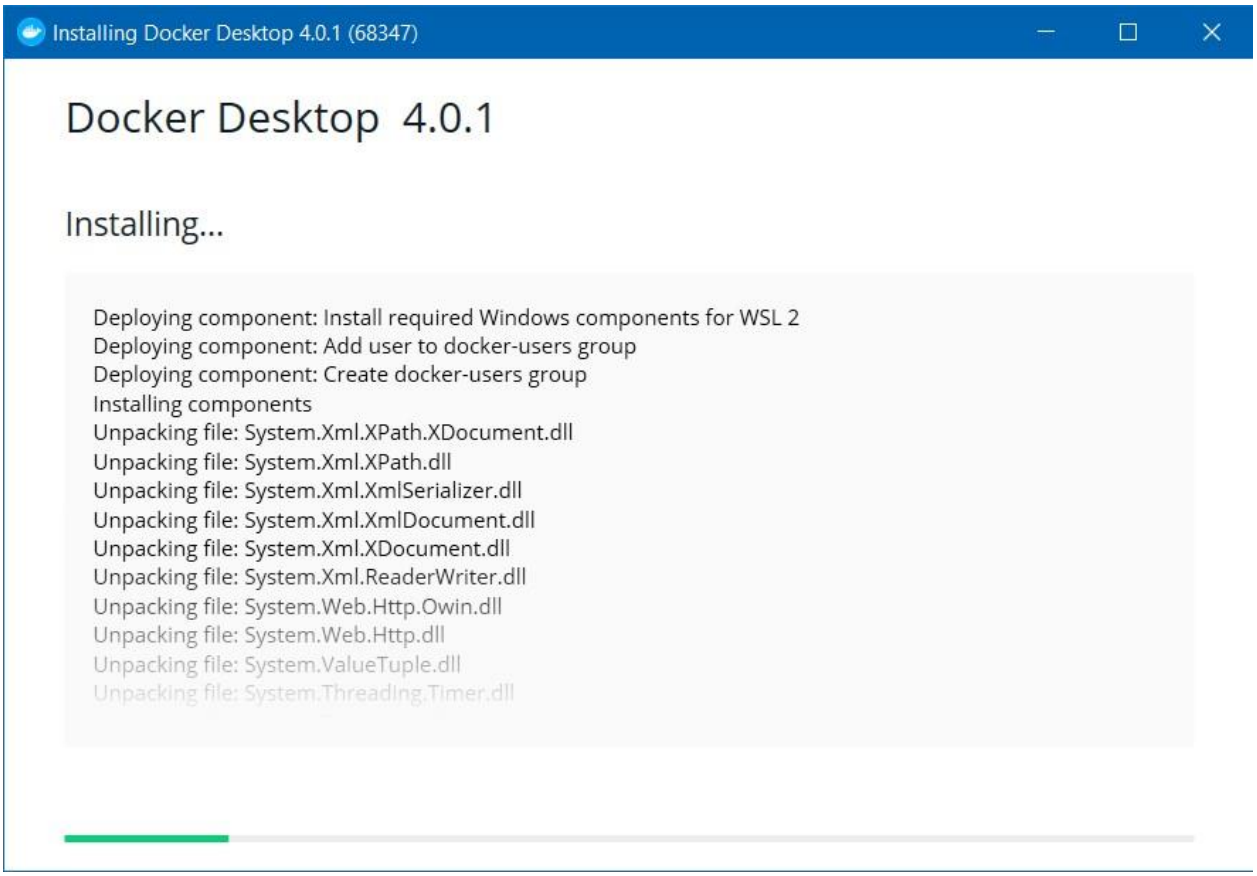
Download Docker Desktop installer for Windows from https://desktop.docker.com/win/main/amd64/Docker%20Desktop%20Installer.exe

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



Step-II

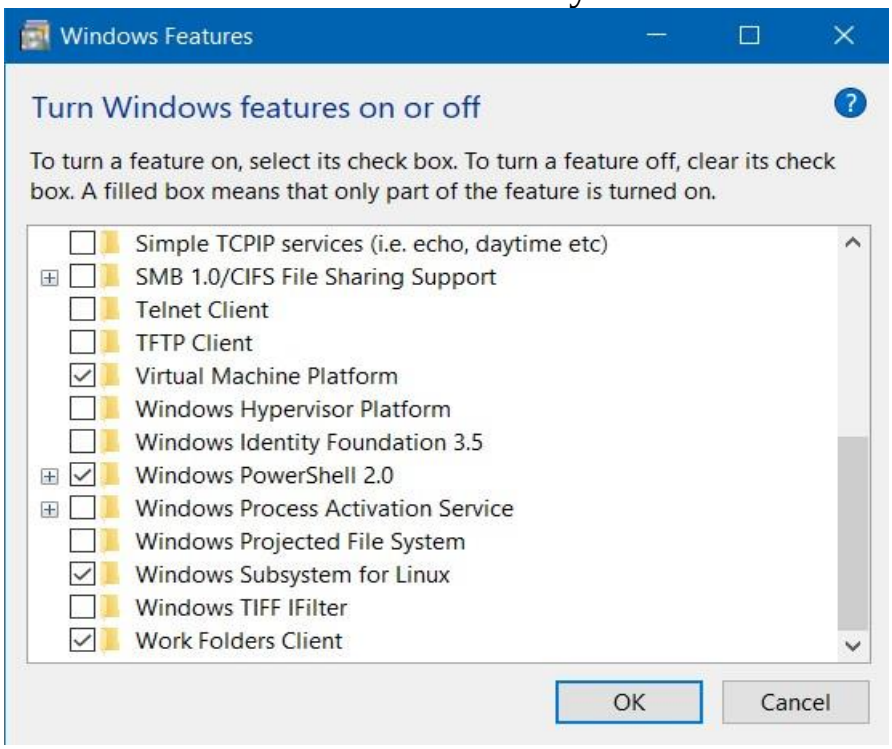
Open the .exe file and follow the steps after clicking install button.



Step-III

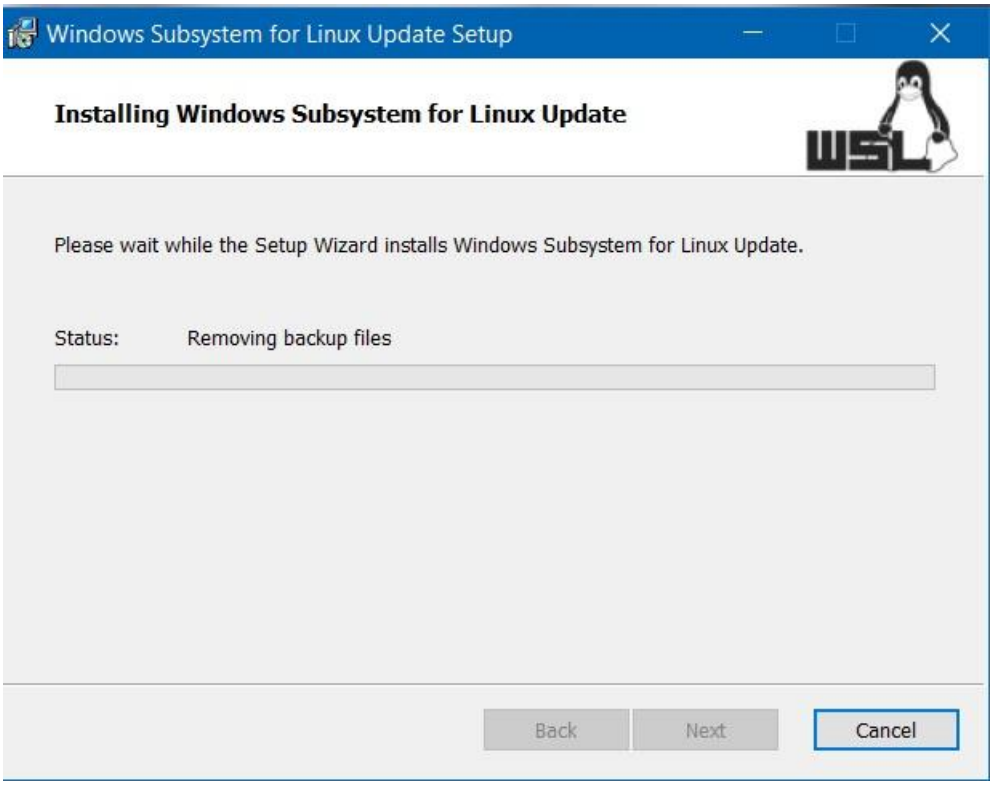
Once installed go to programs and features and click turn on windows features on or off

Scroll to the bottom and select windows subsystem for Linux



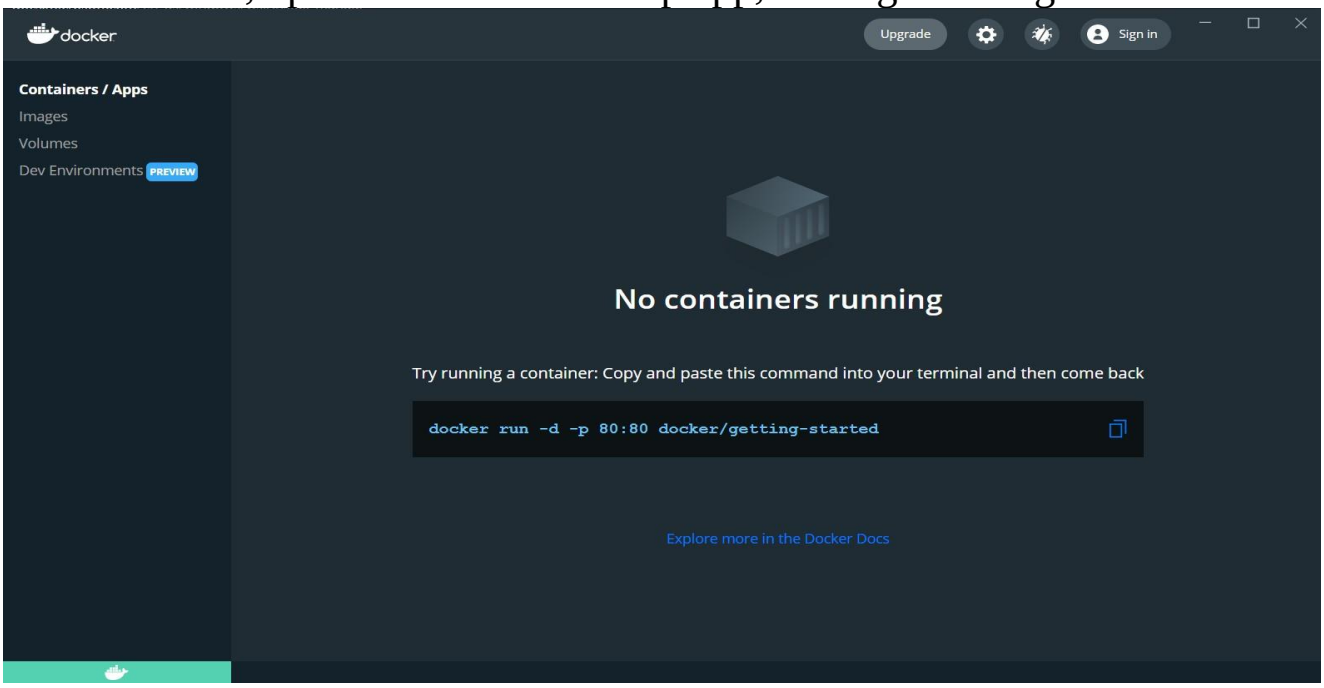
Step-IV

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.



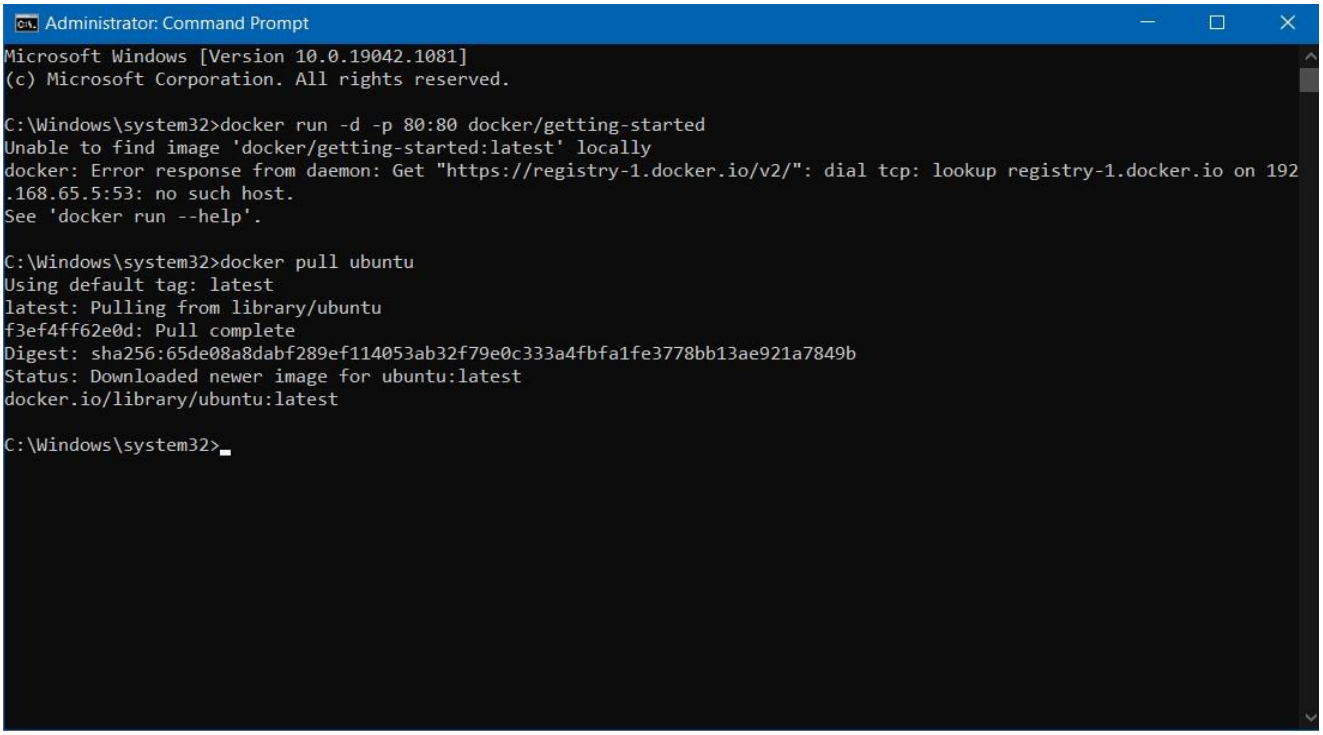
Step-V

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

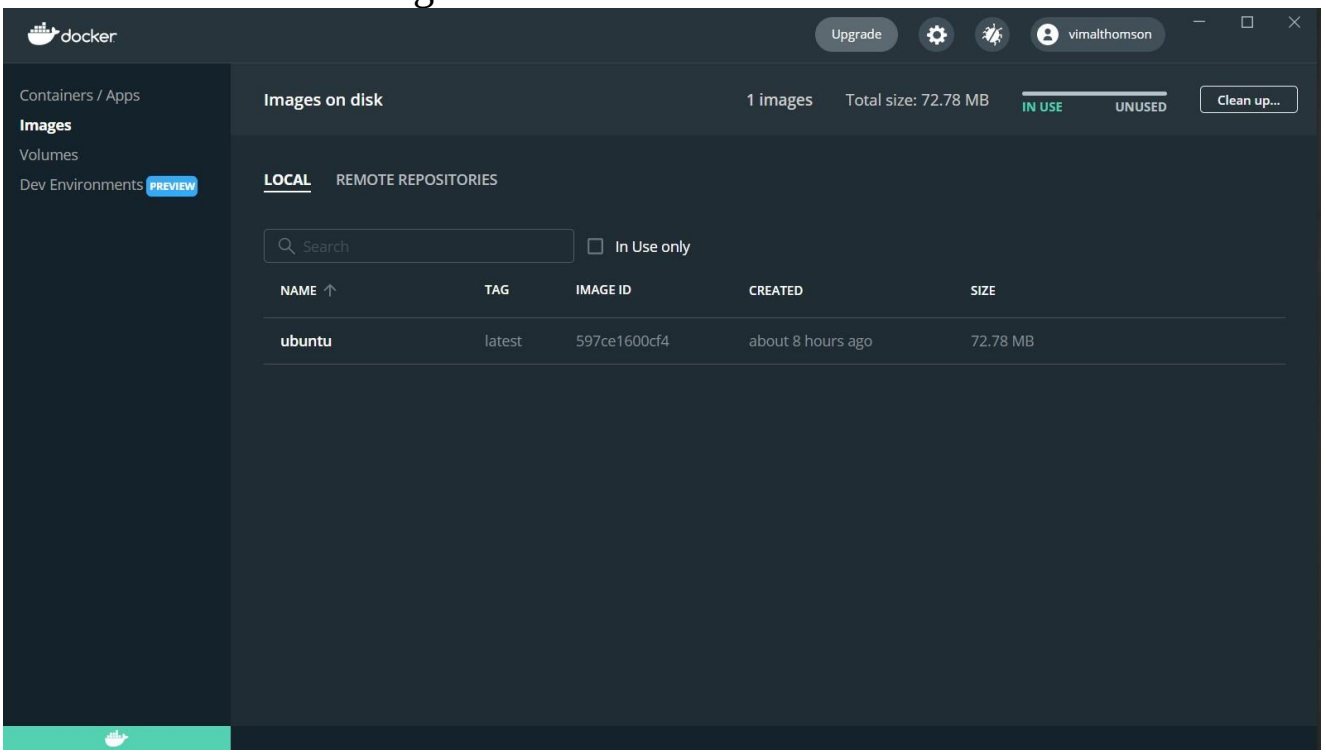


Step-VI

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

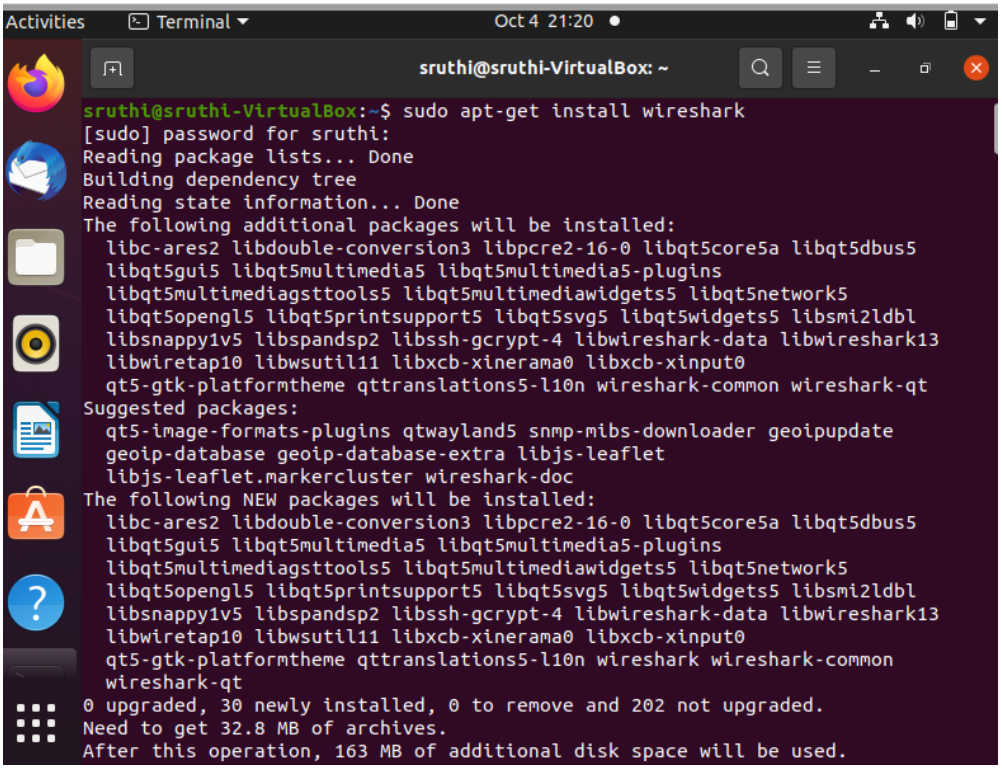


Now in the images tab an image of ubuntu will be displayed, we can run the ubuntu instance using the cli.

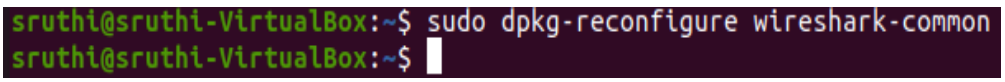


Analyzing network packet stream using NC AND WIRESHARK

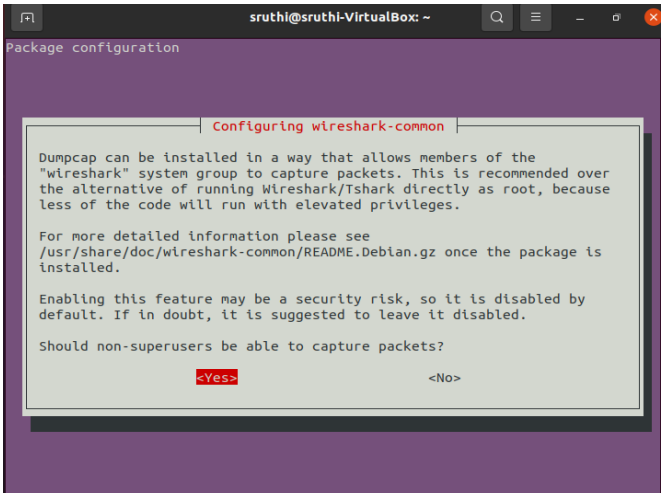
1. Command: sudo apt- get install wireshark



2. Command: sudo dkpg- reconfigure wireshark- common



3. Command: Select Yes and press enter



4. Open wireshark from the applist