



NETWORKING AND SYSTEM ADMINISTRATION LAB

Lab Record

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BASIC LINUX COMMANDS

1. pwd (Print Working Directory)

The pwd command is used to find out the path of the current working directory. The command will return an absolute (full) path, which is basically a path of all the directories that starts with a forward slash (/).

2. history

The history command is used to view the previously executed command.

3. man

The man command is used to display the user manual of any command that we can run on the terminal.

4. cd

The cd command, also known as chdir (change directory), is a command-line shell command used to change the current working directory in various operating systems.

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.

6. mkdir

The mkdir command is used to make a new directory.

7. rmdir

The rmdir command is used to delete a directory. However, rmdir only allows you to delete empty directories.

8. touch

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

9. rm

The rm command is used to delete directories and the contents within them. To remove a file use rm filename

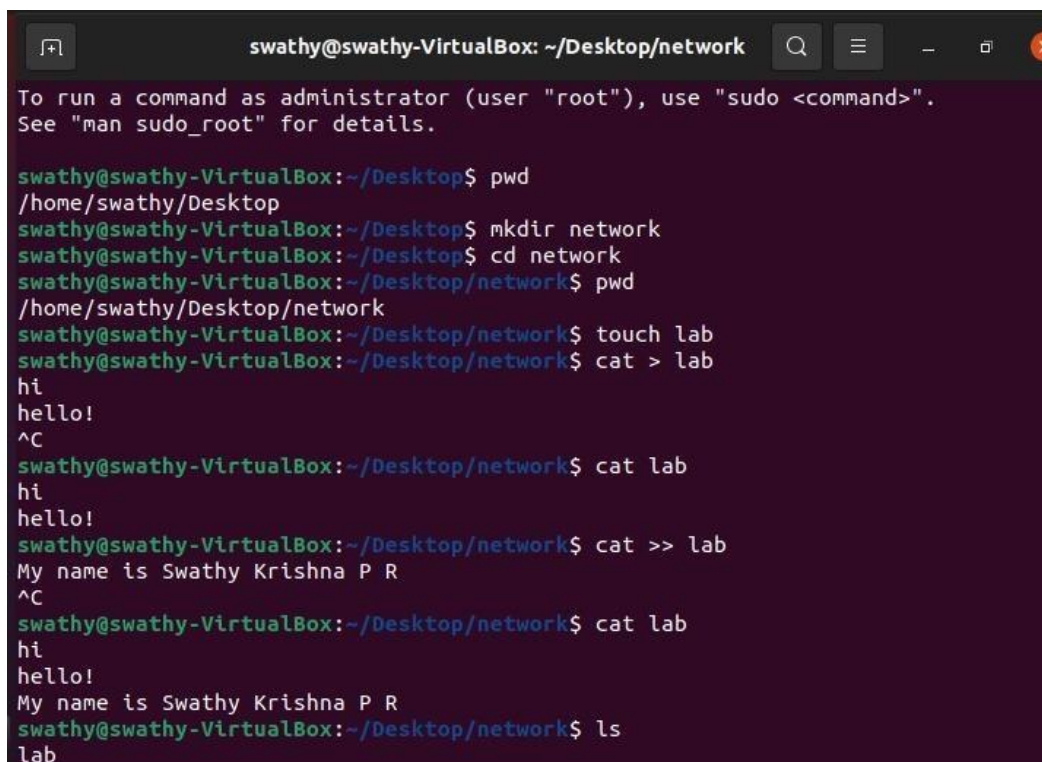
10. cat

The 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.

cat > filename creates a new file

cat >> myfile insert data to a file

OUTPUT



```
swathy@swathy-VirtualBox: ~/Desktop/network
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

swathy@swathy-VirtualBox:~/Desktop$ pwd
/home/swathy/Desktop
swathy@swathy-VirtualBox:~/Desktop$ mkdir network
swathy@swathy-VirtualBox:~/Desktop$ cd network
swathy@swathy-VirtualBox:~/Desktop/network$ pwd
/home/swathy/Desktop/network
swathy@swathy-VirtualBox:~/Desktop/network$ touch lab
swathy@swathy-VirtualBox:~/Desktop/network$ cat > lab
hi
hello!
^C
swathy@swathy-VirtualBox:~/Desktop/network$ cat lab
hi
hello!
swathy@swathy-VirtualBox:~/Desktop/network$ cat >> lab
My name is Swathy Krishna P R
^C
swathy@swathy-VirtualBox:~/Desktop/network$ cat lab
hi
hello!
My name is Swathy Krishna P R
swathy@swathy-VirtualBox:~/Desktop/network$ ls
lab
```

```
swathy@swathy-VirtualBox: ~/Desktop/network
swathy@swathy-VirtualBox:~/Desktop/network$ history
1  pwd
2  history
3  ls
4  man pwd
5  mkdir swathy
6  mkdir ajce
7  ls
8  ls- r
9  ls -r
10 rmdir ajce
11 ls
12 mkdir ajce
13 ls
14 pwd
15 mkdir network
16 cd network
17 pwd
18 touch newfile
19 cat > newfile
20 pwd
21 mkdir network
22 pwd
23 mkdir network
24 cd network
25 pwd
26 touch lab
27 pwd
28 mkdir network
```

```
swathy@swathy-VirtualBox: ~/Desktop/network
28 mkdir network
29 cd network
30 pwd
31 touch lab
32 cat > lab
33 cat new file
34 cat lab
35 cat >> lab
36 cat lab
37 ls
38 history
39 man pwd
40 rm lab
41 ls
42 pwd
43 mkdir network
44 cd network
45 pwd
46 touch lab
47 cat > lab
48 cat lab
49 cat >> lab
50 cat lab
51 ls
52 history
swathy@swathy-VirtualBox:~/Desktop/network$ man pwd
swathy@swathy-VirtualBox:~/Desktop/network$ rm lab
swathy@swathy-VirtualBox:~/Desktop/network$ rmdir lab
rmdir: failed to remove 'lab': No such file or directory
```

11. echo

The echo command is used to move some data into a file.

```
network
swathy@swathy-VirtualBox:~/Desktop$ touch song1.txt
swathy@swathy-VirtualBox:~/Desktop$ ls
network  song1.txt
swathy@swathy-VirtualBox:~/Desktop$ echo swathy >> song1.txt
swathy@swathy-VirtualBox:~/Desktop$ cat song1.txt
swathy
```

12. 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.

```
swathy
swathy@swathy-VirtualBox:~/Desktop$ head -n 3 /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
```

13. tail

The tail command will display the last ten lines of a text file.

```
swathy@swathy-VirtualBox:~/Desktop$ tail /etc/passwd
sssd:x:119:124:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin
saned:x:120:126:./var/lib/saned:/usr/sbin/nologin
colord:x:121:127:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
geoclue:x:122:128:./var/lib/geoclue:/usr/sbin/nologin
pulse:x:123:129:PulseAudio daemon,,,:/var/run/pulse:/usr/sbin/nologin
hplip:x:124:7:HPLIP system user,,,:/run/hplip:/bin/false
gnome-initial-setup:x:125:65534:./run/gnome-initial-setup:/bin/false
gdm:x:126:131:Gnome Display Manager:/var/lib/gdm3:/bin/false
swathy:x:1000:1000:Swathy Krishna P R,,,:/home/swathy:/bin/bash
```

14. read

The read the contents of a line into a variable. The read command can be used with and without arguments.

```
systemd-coredump@x:1000:1000:systemd-core-dump:/usr/sbin/nologin
swathy@swathy-VirtualBox:~/Desktop$ read v1 v2 v3
Amal Jyothi College
swathy@swathy-VirtualBox:~/Desktop$ echo ["$v1"] ["$v2"] ["$v3"]
[Amal] [Jyothi] [College]
```

15. more

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

```
swathy@swathy-VirtualBox:~/Desktop$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
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
```

16. less

Less command is linux utility which can be used to read contents of text file one page(one screen) per time.

```
swathy@swathy-VirtualBox:~/Desktop$ less /etc/passwd
swathy@swathy-VirtualBox:~/Desktop$ ls
network  song1.txt
```

17. 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


```

swathy@swathy-VirtualBox:~/Desktop$ cat song1.txt
swathy
swathy@swathy-VirtualBox:~/Desktop$ echo cat >> song1.txt
swathy@swathy-VirtualBox:~/Desktop$ echo flower >> song1.txt
swathy@swathy-VirtualBox:~/Desktop$ cat song1.txt
swathy
cat
flower
swathy@swathy-VirtualBox:~/Desktop$ cut -b 1,2,3 song1.txt
swa
cat
flo

```

18. paste

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

```

swathy@swathy-VirtualBox:~/Desktop$ paste number.txt song1.txt
1      swathy
2      cat
3      flower

```

19. 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.

```

swathy@swathy-VirtualBox:~/Desktop$ uname
Linux
swathy@swathy-VirtualBox:~/Desktop$ uname -r
5.11.0-16-generic
swathy@swathy-VirtualBox:~/Desktop$ uname -v
#17-Ubuntu SMP Wed Apr 14 20:12:43 UTC 2021
swathy@swathy-VirtualBox:~/Desktop$ man uname
swathy@swathy-VirtualBox:~/Desktop$ uname -p
x86_64

```

20. cp

The cp command is used to copy files from the current directory to a different directory.

```

swathy@swathy-VirtualBox:~/Desktop$ touch v1.txt v2.txt
swathy@swathy-VirtualBox:~/Desktop$ ls
network number.txt song1.txt v1.txt v2.txt
swathy@swathy-VirtualBox:~/Desktop$ mkdir ajce
swathy@swathy-VirtualBox:~/Desktop$ ls
ajce network number.txt song1.txt v1.txt v2.txt
swathy@swathy-VirtualBox:~/Desktop$ cp v1.txt ajce/
swathy@swathy-VirtualBox:~/Desktop$ ls ajce
v1.txt
swathy@swathy-VirtualBox:~/Desktop$ cp v2.txt ajce/
swathy@swathy-VirtualBox:~/Desktop$ ls ajce
v1.txt v2.txt

```

21. 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.

```

v1.txt v2.txt
swathy@swathy-VirtualBox:~/Desktop$ mv v1.txt ajce/
swathy@swathy-VirtualBox:~/Desktop$ ls ajce
v1.txt v2.txt

```

22. locate

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

```

swathy@swathy-VirtualBox:~/Desktop$ locate number*song
Command 'locate' not found, but can be installed with:
sudo apt install mlocate
swathy@swathy-VirtualBox:~/Desktop$ find /home/ -name song1.txt

```

23. 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.

```

swathy@swathy-VirtualBox:~/Desktop$ find /home/ -name song1.txt
/home/swathy/.local/share/Trash/files/song1.txt
/home/swathy/Desktop/song1.txt
swathy@swathy-VirtualBox:~/Desktop$ ls
ajce network number.txt song1.txt v2.txt
swathy@swathy-VirtualBox:~/Desktop$ find /home/ -name v2.txt
/home/swathy/Desktop/ajce/v2.txt
/home/swathy/Desktop/v2.txt

```


24. grep

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

```
swathy@swathy-VirtualBox:~/Desktop$ cat song1.txt
swathy
cat
flower
swathy@swathy-VirtualBox:~/Desktop$ grep cat song1.txt
cat
```

25. 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.

26. du

The du (Disk Usage) command is used to check how much space a file or a directory takes. 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

```
swathy@swathy-VirtualBox:~/Desktop$ du -h
4.0K  ./ajce
4.0K  ./network
20K   .
```

27. useradd

The 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.

```
swathy@swathy-VirtualBox:~/Desktop$ sudo useradd soja
[sudo] password for swathy:
Sorry, try again.
[sudo] password for swathy:
Sorry, try again.
[sudo] password for swathy:
```

28. userdel

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

```
swathy@swathy-VirtualBox:~/Desktop$ sudo passwd soja
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:
passwd: password updated successfully
swathy@swathy-VirtualBox:~/Desktop$ sudo userdel soja
swathy@swathy-VirtualBox:~/Desktop$
```

29. sudo

SuperUser Do(sudo) command enables you to perform tasks that require administrative or root permissions.

30. 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.

```
swathy@swathy-VirtualBox:~/Desktop$ sudo passwd soja
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:
passwd: password updated successfully
```

Q.Explain linux commands usermod, groupadd, groups, groupmod, groupdel, chmod, chown, id, ps, top with examples

COMMANDS

31. usermod

- usermod command is used to change the properties of a user in Linux through the command line
- command-line utility that allows you to modify a user's login information
- #usermod --help
- #usermod -u 2000 swathy

```
swathy@LAPTOP-1TOUJQNG:~$ usermod -u 2000 swathy
usermod: user swathy is currently used by process 10
swathy@LAPTOP-1TOUJQNG:~$ usermod --help
Usage: usermod [options] LOGIN
```

32. groupadd

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

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd student
[sudo] password for swathy:
```

33. groups

Groups command print the groups a user is in

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groups swathy
swathy : swathy adm dialout cdrom floppy sudo audio dip video plugdev netdev
```

34. groupdel

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

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd -g 1010 mygroup1
[sudo] password for swathy:
swathy@LAPTOP-1TOUJQNG:~$ getent group mygroup1
mygroup1:x:1010:
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd swathy12
swathy@LAPTOP-1TOUJQNG:~$ getent group swathy12
swathy12:x:1011:
swathy@LAPTOP-1TOUJQNG:~$ groupdel swathy12
groupdel: Permission denied.
groupdel: cannot lock /etc/group; try again later.
swathy@LAPTOP-1TOUJQNG:~$ getent group swathy12
swathy12:x:1011:
swathy@LAPTOP-1TOUJQNG:~$ sudo groupdel swathy12
```

35. groupmod

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

groupmod -n group1 group2

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd student2
swathy@LAPTOP-1TOUJQNG:~$ groupmod -n swathy12 student2
groupmod: Permission denied.
groupmod: cannot lock /etc/group; try again later.
swathy@LAPTOP-1TOUJQNG:~$ sudo groupmod-n swathy12 student2
sudo: groupmod-n: command not found
swathy@LAPTOP-1TOUJQNG:~$ sudo groupmod -n swathy12 student2
```

36. chmod

- To change directory permissions of file/ Directory in Linux.

#chmod whowhatwhich file/directory.

```
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ chmod +rwx text.txt.txt
```

37. chown

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

```
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ chown HP text.txt.txt
chown: invalid user: 'HP'
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ chown swathy text.txt.txt
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ id
```

38. id

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

```
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ chown swathy text.txt.txt
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ id
uid=1000(swathy) gid=1000(swathy) groups=1000(swathy),4(adm),20(dialout),24(cdrom),25(floppy),27(sudo),29(audio),30(dip),44(video),46(plugdev),117(netdev)
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ ps -a
```

39. ps

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

```
swathy@LAPTOP-1T0UJQNG:/mnt/c/Users/HP/Downloads$ ps -a
PID TTY          TIME CMD
  10 tty1        00:00:00 bash
  11 tty2        00:00:00 bash
 202 tty1        00:00:00 ps
```

40. top

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

```
top - 22:44:54 up 1:33, 0 users, load average: 0.52, 0.58, 0.59
Tasks: 6 total, 1 running, 5 sleeping, 0 stopped, 0 zombie
%Cpu(s): 12.9 us, 4.1 sy, 0.0 ni, 82.9 id, 0.0 wa, 0.1 hi, 0.0 si, 0.0 st
MiB Mem : 6086.8 total, 2360.2 free, 3502.7 used, 224.0 buff/cache
MiB Swap: 18432.0 total, 18294.6 free, 137.4 used. 2453.5 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   10 swathy    20   0  18088   3612  3496 S   0.0   0.1   0:00.67 bash
   11 swathy    20   0  18088   3588  2108 S   0.0   0.1   0:00.34 bash
  203 swathy    20   0  18924   2184  1524 R   0.0   0.0   0:00.07 top
```


Q. Explain linux commands wc, tar(create, extract using gzip, xz, bzip2), expr, redirections and piping, ssh, ssh-keygen, scp, ssh-copy-id with examples

COMMANDS

41. wc

- wc stands for word count.
- Used for counting purpose.
- It is used to find out number of lines, word count, byte and characters count in the files specified in the file arguments.
- #wc state.txt

```
This message is shown once a day. To disable it please create the
/home/swathy/.hushlogin file.
swathy@LAPTOP-1TOUJQNG:~$ cd /mnt
swathy@LAPTOP-1TOUJQNG:/mnt$ cd c
swathy@LAPTOP-1TOUJQNG:/mnt/c$ cd Users
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users$ cd HP
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP$ cd Downloads
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ wc qwert.txt
 0  2 23 qwert.txt
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ wc qwert.txt
 6  7 92 qwert.txt
```

42. 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

```

swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ tar cf archieve.tar qwert.txt capital.txt
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ ls
!qhlogs.doc'                               RESUME.pdf
Appointment_slip.pdf                       SmartWorkbench_32.exe
CT20213724165_Application (1).pdf'         'Swathy\'\'s Resume-converted-converted (1).pdf'
CT20213724165_Application (10).pdf'        'Unconfirmed 91588.crdownload'
CT20213724165_Application (11).pdf'        VC_redist.x64.exe
CT20213724165_Application (12).pdf'        VC_redist.x86.exe
CT20213724165_Application (2).pdf'         VirtualBox-6.1.26-145957-Win.exe
CT20213724165_Application (3).pdf'         ZoomInstaller.exe
CT20213724165_Application (4).pdf'         archieve.tar
CT20213724165_Application (5).pdf'         capital.txt
CT20213724165_Application (6).pdf'         'certificate (1).pdf'
CT20213724165_Application (7).pdf'         certificate.pdf
CT20213724165_Application (8).pdf'         com.alightcreative.motion-v3.7.1.apk
CT20213724165_Application (9).pdf'         desktop.ini
CT20213724165_Application.pdf              dia-setup-0.97.2-2-unsigned.exe
CT20213724165_Resume.pdf                   filmora-idco_setup_full1901.exe
Desktop - Shortcut.lnk'                    mysql-workbench-community-8.0.26-winx64.msi
LAB.rar                                    qwert.txt
LabExam3728.pdf                           text.txt.txt
New Text Document.txt'                     ubuntu-21.04-desktop-amd64.iso
New folder'                               xampp-windows-x64-8.0.9-0-VS16-installer.exe

```

43. **expr**

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

#expr 10 + 2

```

swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ expr 5 + 10
15

```

44. Redirections & Piping 7

- 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
```

```
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ ls -l|wc -l
43
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$
```

45. ssh

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

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

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

```
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ ssh swathy@LAPTOP-1TOUJQNG
ssh: connect to host laptop-1toujqng port 22: Connection refused
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ S_
```

46. 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

47. 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

```
swathy@LAPTOP-1TOUJQNG:/mnt/c/Users/HP/Downloads$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/swathy/.ssh/id_rsa): rsa
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in rsa
Your public key has been saved in rsa.pub
The key fingerprint is:
SHA256:XmBrLu+Y1MkwjySIW0IWlcFjkNtZdX5G/nTkZQS00xY swathy@LAPTOP-1TOUJQNG
The key's randomart image is:
+---[RSA 3072]-----+
|  o=oo .. . .oo=|
|  ..= . o o  =.|
|  o+ + o . + E o|
|  o..o. . o o o +|
|  o o . S .  =|
|  + 0 *  . .|
|  . o 0 .|
|  . *|
|  o.o|
+----[SHA256]-----+
```

48. 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`

Execute the following commands in the ubuntu terminal

- i) Create six files with name of the form songX.mp3

```
swathy@LAPTOP-1TOUJQNG:~$ touch song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3
swathy@LAPTOP-1TOUJQNG:~$
```

- ii) Create six files with name of the form snapX.jpg

```
swathy@LAPTOP-1TOUJQNG:~$ touch snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg
swathy@LAPTOP-1TOUJQNG:~$
```

- iii) Create six files with name of the form filmX.mp4

```
swathy@LAPTOP-1TOUJQNG:~$ touch film1.mp4 film2.mp4 film3.mp4 film4.mp4 film5.mp4 film6.mp4
swathy@LAPTOP-1TOUJQNG:~$
```

- iv) From your home directory, move the song files into your music subdirectory, the snapshotfiles into your pictures subdirectory, and the movie files into videos subdirectory.

```
swathy@LAPTOP-1TOUJQNG:~$ mv *.mp3 ./Music/
swathy@LAPTOP-1TOUJQNG:~$ mv *.jpg ./Pictures/
swathy@LAPTOP-1TOUJQNG:~$ mv *.mp4 ./Videos/
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ mkdir -p {friends,family,work}
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ cp /home/swathy/Music song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 /home/swathy/friends/
swathy@LAPTOP-1TOUJQNG:~$ cp /home/swathy/Pictures snap1.jpg snap2.jpg snap3.jpg snap4.jpg snap5.jpg snap6.jpg /home/swathy/family/
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ rmdir {friends,family}
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ rm - friends family
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ ls -a > allfiles.txt
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ date
Tue Aug 17 19:29:24 IST 2021
swathy@LAPTOP-1TOUJQNG:~$
```

- xi) Add the user Juliet

```
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Juliet
[sudo] password for swathy:
swathy@LAPTOP-1TOUJQNG:~$
```

- xii) Confirm that Juliet has been added by examining the /etc/passwd file

```
swathy@LAPTOP-1TOUJQNG:~$ cat /etc/passwd | grep Juliet
Juliet:x:1001:1012::/home/Juliet:/bin/sh
swathy@LAPTOP-1TOUJQNG:~$
```

- xiii) Use the passwd command to initialize Juliet's password

```
swathy@LAPTOP-1TOUJQNG:~$ sudo passwd Juliet
New password:
Retype new password:
passwd: password updated successfully
swathy@LAPTOP-1TOUJQNG:~$
```

- xiv) Create a supplementary group called Shakespeare with a group id of 30000

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd -g 30000 Shakespeare
swathy@LAPTOP-1TOUJQNG:~$
```

- xv) Create a supplementary group called artists

```
swathy@LAPTOP-1TOUJQNG:~$ sudo groupadd artist
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ less /etc/group
Shakespeare:x:30000:
artist:x:30001:
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G Shakespeare Juliet
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ id Juliet
uid=1001(Juliet) gid=1012(Juliet) groups=1012(Juliet),30000(Shakespeare)
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Romeo
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Hamlet
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G Shakespeare Romeo
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G Shakespeare Hamlet
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Reba
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Dolly
swathy@LAPTOP-1TOUJQNG:~$ sudo useradd Elvis
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G artist Reba
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G artist Dolly
swathy@LAPTOP-1TOUJQNG:~$ sudo usermod -G artist Elvis
swathy@LAPTOP-1TOUJQNG:~$
```

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

```
swathy@LAPTOP-1TOUJQNG:~$ less /etc/group
swathy@LAPTOP-1TOUJQNG:~$
Juliet:x:1001:
Shakespeare:x:30000:Juliet,Romeo,Hamlet
artist:x:30001:Reba,Dolly,Elvis
Romeo:x:1002:
Hamlet:x:1003:
Reba:x:1004:
Dolly:x:1005:
Elvis:x:1006:
```

- xxii) Attempt to remove user Dolly.

```
swathy@LAPTOP-1TOUJQNG:~$ sudo userdel Dolly
swathy@LAPTOP-1TOUJQNG:~$
```

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

WINDOWS

Ping:

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

Pinging google.com [2404:6800:4007:816::200e] with 32 bytes of data:
Reply from 2404:6800:4007:816::200e: time=91ms
Reply from 2404:6800:4007:816::200e: time=108ms
Reply from 2404:6800:4007:816::200e: time=133ms
Request timed out.

Ping statistics for 2404:6800:4007:816::200e:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 91ms, Maximum = 133ms, Average = 110ms
```

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

Pinging google.com [2404:6800:4007:816::200e] with 32 bytes of data:
Reply from 2404:6800:4007:816::200e: time=139ms
Reply from 2404:6800:4007:816::200e: time=87ms
Reply from 2404:6800:4007:816::200e: time=94ms
Reply from 2404:6800:4007:816::200e: time=66ms

Ping statistics for 2404:6800:4007:816::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 66ms, Maximum = 139ms, Average = 96ms
```

```
C:\Users\acer>ping -t google.com

Pinging google.com [2404:6800:4007:816::200e] with 32 bytes of data:
Reply from 2404:6800:4007:816::200e: time=95ms
Reply from 2404:6800:4007:816::200e: time=80ms
Reply from 2404:6800:4007:816::200e: time=59ms
Reply from 2404:6800:4007:816::200e: time=82ms
Reply from 2404:6800:4007:816::200e: time=90ms
Reply from 2404:6800:4007:816::200e: time=54ms
Reply from 2404:6800:4007:816::200e: time=88ms
Reply from 2404:6800:4007:816::200e: time=161ms
Reply from 2404:6800:4007:816::200e: time=99ms
Reply from 2404:6800:4007:816::200e: time=73ms
Reply from 2404:6800:4007:816::200e: time=81ms
Reply from 2404:6800:4007:816::200e: time=61ms
Reply from 2404:6800:4007:816::200e: time=52ms
Reply from 2404:6800:4007:816::200e: time=75ms
Reply from 2404:6800:4007:816::200e: time=68ms
Reply from 2404:6800:4007:816::200e: time=57ms
Reply from 2404:6800:4007:816::200e: time=77ms
Reply from 2404:6800:4007:816::200e: time=73ms
Reply from 2404:6800:4007:816::200e: time=73ms
Reply from 2404:6800:4007:816::200e: time=53ms
Reply from 2404:6800:4007:816::200e: time=72ms
Reply from 2404:6800:4007:816::200e: time=64ms
Reply from 2404:6800:4007:816::200e: time=91ms
Reply from 2404:6800:4007:816::200e: time=72ms
Reply from 2404:6800:4007:816::200e: time=65ms
Reply from 2404:6800:4007:816::200e: time=58ms

Ping statistics for 2404:6800:4007:816::200e:
    Packets: Sent = 26, Received = 26, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 52ms, Maximum = 161ms, Average = 75ms
Control-C
^C
```

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

Pinging google.com [142.250.195.14] with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 142.250.195.14:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Users\acer>ping -4 google.com

Pinging google.com [142.250.195.14] with 32 bytes of data:
Reply from 142.250.195.14: bytes=32 time=901ms TTL=111
Reply from 142.250.195.14: bytes=32 time=144ms TTL=111
Reply from 142.250.195.14: bytes=32 time=157ms TTL=111
Reply from 142.250.195.14: bytes=32 time=711ms TTL=111

Ping statistics for 142.250.195.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 144ms, Maximum = 901ms, Average = 478ms
```


Route

```
C:\Users\acer>route print

Interface List
=====
24...98 29 a6 42 e0 55 .....Realtek PCIe GBE Family Controller
12...0a 00 27 00 00 0c .....VirtualBox Host-Only Ethernet Adapter
22...ea 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter
17...fa 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter #2
 7...e8 2a 44 d5 87 e5 .....Qualcomm Atheros QCA9377 Wireless Network Adapter
15...e8 2a 44 d5 87 e6 .....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          192.168.108.237     192.168.108.151     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
192.168.56.0               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
192.168.108.0              255.255.255.0    On-link             192.168.108.151     311
192.168.108.151            255.255.255.255  On-link             192.168.108.151     311
192.168.108.255            255.255.255.255  On-link             192.168.108.151     311
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             192.168.108.151     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             192.168.108.151     311
=====

Persistent Routes:
None
```

```
C:\Users\acer>route print -4

Interface List
=====
24...98 29 a6 42 e0 55 .....Realtek PCIe GBE Family Controller
12...0a 00 27 00 00 0c .....VirtualBox Host-Only Ethernet Adapter
22...ea 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter
17...fa 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter #2
 7...e8 2a 44 d5 87 e5 .....Qualcomm Atheros QCA9377 Wireless Network Adapter
15...e8 2a 44 d5 87 e6 .....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          192.168.108.237     192.168.108.151     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
192.168.56.0               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
192.168.108.0              255.255.255.0    On-link             192.168.108.151     311
192.168.108.151            255.255.255.255  On-link             192.168.108.151     311
192.168.108.255            255.255.255.255  On-link             192.168.108.151     311
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             192.168.108.151     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             192.168.108.151     311
=====

Persistent Routes:
None
```

```
C:\Users\acer>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.

```
C:\Users\acer>route print *157
```

```
=====
```

Interface List

```
24...98 29 a6 42 e0 55 .....Realtek PCIe GBE Family Controller
12...0a 00 27 00 00 0c .....VirtualBox Host-Only Ethernet Adapter
22...ea 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter
17...fa 2a 44 d5 87 e5 .....Microsoft Wi-Fi Direct Virtual Adapter #2
7...e8 2a 44 d5 87 e5 .....Qualcomm Atheros QCA9377 Wireless Network Adapter
15...e8 2a 44 d5 87 e6 .....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\acer>tracert 192.168.1.1
```

Tracing route to 192.168.1.1 over a maximum of 30 hops

```
  1      6 ms      4 ms      3 ms    192.168.108.237
  2      *          *          *      Request timed out.
  3     104 ms     97 ms     95 ms    56.8.63.77
  4     127 ms     97 ms     69 ms    192.168.35.238
  5      60 ms     51 ms     61 ms    192.168.35.237
  6      63 ms     58 ms     56 ms    172.26.76.4
  7      55 ms     53 ms     58 ms    AC
```

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

Tracing route to www.google.com [2404:6800:4007:827::2004]
over a maximum of 30 hops:

  1      5 ms      4 ms      3 ms  2409:4073:2e9d:d01a::d
  2      *          *          *    Request timed out.
  3     96 ms     100 ms     95 ms  2405:200:366:eeee:20::20
  4    200 ms      53 ms      75 ms  2405:200:801:3500::1e2
  5    107 ms      76 ms      77 ms  2405:200:801:3500::1e3
  6    110 ms      78 ms      74 ms  2405:200:801:3500::1e9
  7      *          *          *    ^C
```

```
C:\Users\acer>tracert -d www.google.com

Tracing route to www.google.com [2404:6800:4007:827::2004]
over a maximum of 30 hops:

  1      3 ms      3 ms      3 ms  2409:4073:2e9d:d01a::d
  2      *          *          *    Request timed out.
  3     58 ms      76 ms      73 ms  2405:200:366:eeee:20::20
  4     98 ms      75 ms      74 ms  2405:200:801:3500::1e2
  5    102 ms     118 ms      72 ms  2405:200:801:3500::1e3
  6     67 ms      62 ms      64 ms  2405:200:801:3500::1e9
  7      *          *          *    ^C
```

```
C:\Users\acer>tracert 22.110.0.1

Tracing route to 22.110.0.1 over a maximum of 30 hops

  1      6 ms      4 ms      3 ms  192.168.108.237
  2      *          *          *    Request timed out.
  3     59 ms      82 ms      85 ms  56.8.63.73
  4     66 ms      54 ms      40 ms  192.168.35.240
  5    273 ms      55 ms     140 ms  ^C
```

Nslookup

```
C:\Users\acer>nslookup
Default Server: UnKnown
Address: 192.168.108.237
```

```
C:\Users\acer>nslookup
Default Server: UnKnown
Address: 192.168.108.237
```

```
C:\Users\acer>nslookup -g=MX google.com
*** Invalid option: g=MX
Server: UnKnown
Address: 192.168.108.237

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4002:820::200e
          142.250.183.238
```


Ipconfig

```
C:\Users\acer>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

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

Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::6d69:a328:564:62f9%12
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2409:4073:2e9d:d01a:d477:e710:5db1:9a52
    Temporary IPv6 Address. . . . . : 2409:4073:2e9d:d01a:cee:ad8c:6152:3a71
    Link-local IPv6 Address . . . . . : fe80::d477:e710:5db1:9a52%7
    IPv4 Address. . . . . : 192.168.108.151
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::e42e:13ff:fec7:367c%7
                                192.168.108.237

Ethernet adapter Bluetooth Network Connection:

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

```
C:\Users\acer>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.

```

Connection specific DNS suffix : .
C:\Users\acer>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

```

C:\Users\acer>netstat

Active Connections

Proto Local Address           Foreign Address         State
TCP   127.0.0.1:50869          DESKTOP-SHTJPRU:50870  ESTABLISHED
TCP   127.0.0.1:50870          DESKTOP-SHTJPRU:50869  ESTABLISHED
TCP   127.0.0.1:55518          DESKTOP-SHTJPRU:55519  ESTABLISHED
TCP   127.0.0.1:55519          DESKTOP-SHTJPRU:55518  ESTABLISHED
TCP   127.0.0.1:57195          DESKTOP-SHTJPRU:57196  ESTABLISHED
TCP   127.0.0.1:57196          DESKTOP-SHTJPRU:57195  ESTABLISHED
TCP   127.0.0.1:59716          DESKTOP-SHTJPRU:59717  ESTABLISHED
TCP   127.0.0.1:59717          DESKTOP-SHTJPRU:59716  ESTABLISHED
TCP   192.168.108.151:49526    20.44.229.112:https    TIME_WAIT
TCP   192.168.108.151:51026    17: http                TIME_WAIT

```



```

PC
C:\Users\acer>netstat -n

Active Connections

Proto Local Address          Foreign Address         State
TCP    127.0.0.1:50869         127.0.0.1:50870        ESTABLISHED
TCP    127.0.0.1:50870         127.0.0.1:50869        ESTABLISHED
TCP    127.0.0.1:55518         127.0.0.1:55519        ESTABLISHED
TCP    127.0.0.1:55519         127.0.0.1:55518        ESTABLISHED
TCP    127.0.0.1:57195         127.0.0.1:57196        ESTABLISHED
TCP    127.0.0.1:57196         127.0.0.1:57195        ESTABLISHED
TCP    127.0.0.1:59716         127.0.0.1:59717        ESTABLISHED
TCP    127.0.0.1:59717         127.0.0.1:59716        ESTABLISHED
TCP    192.168.108.151:49526    20.44.229.112:443      TIME_WAIT
TCP    192.168.108.151:51026    35.232.111.17:80       TIME_WAIT
TCP    192.168.108.151:51027    20.44.229.112:443      TIME_WAIT
TCP    192.168.108.151:51028    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:51029    20.44.229.112:443      ESTABLISHED
TCP    192.168.108.151:52519    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:52525    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:56802    117.18.232.200:443     CLOSE_WAIT
TCP    192.168.108.151:56805    184.84.176.64:443      CLOSE_WAIT
TCP    192.168.108.151:58322    20.197.71.89:443       ESTABLISHED
TCP    [2409:4073:2e9d:d01a:cee:ad8c:6152:3a71]:51025 [2404:6800:4003:c00::bc]:5228 ESTABLISHED

```

```

PC
C:\Users\acer>netstat -n 5

Active Connections

Proto Local Address          Foreign Address         State
TCP    127.0.0.1:50869         127.0.0.1:50870        ESTABLISHED
TCP    127.0.0.1:50870         127.0.0.1:50869        ESTABLISHED
TCP    127.0.0.1:55518         127.0.0.1:55519        ESTABLISHED
TCP    127.0.0.1:55519         127.0.0.1:55518        ESTABLISHED
TCP    127.0.0.1:57195         127.0.0.1:57196        ESTABLISHED
TCP    127.0.0.1:57196         127.0.0.1:57195        ESTABLISHED
TCP    127.0.0.1:59716         127.0.0.1:59717        ESTABLISHED
TCP    127.0.0.1:59717         127.0.0.1:59716        ESTABLISHED
TCP    192.168.108.151:51027    20.44.229.112:443      TIME_WAIT
TCP    192.168.108.151:51028    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:51029    20.44.229.112:443      ESTABLISHED
TCP    192.168.108.151:52519    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:52525    34.98.122.109:443      ESTABLISHED
TCP    192.168.108.151:56802    117.18.232.200:443     CLOSE_WAIT
TCP    192.168.108.151:56805    184.84.176.64:443      CLOSE_WAIT
TCP    192.168.108.151:58322    20.197.71.89:443       ESTABLISHED
TCP    [2409:4073:2e9d:d01a:cee:ad8c:6152:3a71]:51025 [2404:6800:4003:c00::bc]:5228 ESTABLISHED

```

```

PC
C:\Users\acer>netstat -a

Active Connections

Proto Local Address          Foreign Address         State
TCP    0.0.0.0:135            DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:445            DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:808            DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:2869           DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:5040           DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:28252          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49664          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49665          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49666          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49667          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49676          DESKTOP-SHTJPRU:0      LISTENING
TCP    0.0.0.0:49704          DESKTOP-SHTJPRU:0      LISTENING
TCP    127.0.0.1:50869         DESKTOP-SHTJPRU:50870  ESTABLISHED
TCP    127.0.0.1:50870         DESKTOP-SHTJPRU:50869  ESTABLISHED
TCP    127.0.0.1:55518         DESKTOP-SHTJPRU:55519  ESTABLISHED
TCP    127.0.0.1:55519         DESKTOP-SHTJPRU:55518  ESTABLISHED
TCP    127.0.0.1:57195         DESKTOP-SHTJPRU:57196  ESTABLISHED
TCP    127.0.0.1:57196         DESKTOP-SHTJPRU:57195  ESTABLISHED
TCP    127.0.0.1:59716         DESKTOP-SHTJPRU:59717  ESTABLISHED
TCP    127.0.0.1:59717         DESKTOP-SHTJPRU:59716  ESTABLISHED
TCP    192.168.56.1:139        DESKTOP-SHTJPRU:0      LISTENING
TCP    192.168.108.151:139    DESKTOP-SHTJPRU:0      LISTENING

```

UBUNTU

Ping

```
swathy@swathy-VirtualBox:~/Desktop$ ping www.google.com
PING www.google.com (142.250.193.4) 56(84) bytes of data.
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=1 ttl=110 time
=105 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=2 ttl=110 time
=131 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=3 ttl=110 time
=131 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=4 ttl=110 time
=129 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=5 ttl=110 time
=136 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=6 ttl=110 time
=124 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=7 ttl=110 time
=124 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=8 ttl=110 time
=105 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=9 ttl=110 time
=103 ms
^C
--- www.google.com ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8017ms
rtt min/avg/max/mdev = 103.194/120.834/135.635/12.017 ms
```

```
swathy@swathy-VirtualBox:~/Desktop$ ping -a google.com
PING google.com (142.250.77.110) 56(84) bytes of data.
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=1 ttl=110 ti
me=68.2 ms
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=2 ttl=110 ti
me=67.3 ms
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=3 ttl=110 ti
me=95.1 ms
^C
--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 67.261/76.859/95.095/12.900 ms
```

```
swathy@swathy-VirtualBox:~/Desktop$ ping -V google.com
ping from iputils 20210202
```

```
swathy@swathy-VirtualBox:~/Desktop$ ping -b google.com
PING google.com (142.250.77.110) 56(84) bytes of data.
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=1 ttl=110 ti
me=84.5 ms
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=2 ttl=110 ti
me=112 ms
64 bytes from maa05s15-in-f14.1e100.net (142.250.77.110): icmp_seq=3 ttl=110 ti
me=81.6 ms
^C
--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 81.558/92.624/111.842/13.640 ms
```


Route

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

```
swathy@swathy-VirtualBox:~/Desktop$ route -n
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
0.0.0.0         10.0.2.2        0.0.0.0          UG    100    0      0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0    U     100    0      0 enp0s3
169.254.0.0     0.0.0.0         255.255.0.0      U     1000   0      0 enp0s3
```

```
swathy@swathy-VirtualBox:~/Desktop$ route -Cn
Kernel IP routing cache
Source           Destination      Gateway          Flags Metric Ref    Use Iface
10.0.2.15        10.0.2.2        0.0.0.0          UG    100    0      0 enp0s3
```

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

Traceroute

```
swathy@swathy-VirtualBox:~/Desktop$ traceroute google.com
traceroute to google.com (142.250.194.78), 64 hops max
 1  10.0.2.2  0.374ms  0.347ms  0.424ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
```

```
swathy@swathy-VirtualBox:~/Desktop$ traceroute -V
traceroute (GNU inetutils) 2.0
Copyright (C) 2021 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 Elian Cidoni
```

Nslookup

```
swathy@swathy-VirtualBox:~/Desktop$ nslookup google.com
```

```
Server:      127.0.0.53
Address:     127.0.0.53#53
```

Non-authoritative answer:

```
Name:   google.com
Address: 142.250.183.238
Name:   google.com
Address: 2404:6800:4007:817::200e
```

```
swathy@swathy-VirtualBox:~/Desktop$ nslookup -q=MX google.com
```

```
Server:      127.0.0.53
Address:     127.0.0.53#53
```

Non-authoritative answer:

```
google.com      mail exchanger = 20 alt1.aspmx.l.google.com.
google.com      mail exchanger = 50 alt4.aspmx.l.google.com.
google.com      mail exchanger = 30 alt2.aspmx.l.google.com.
google.com      mail exchanger = 40 alt3.aspmx.l.google.com.
google.com      mail exchanger = 10 aspmx.l.google.com.
```

authoritative answers can be found from:

```
swathy@swathy-VirtualBox:~/Desktop$ nslookup -type=soa redhat.com
```

```
Server:      127.0.0.53
Address:     127.0.0.53#53
```

Non-authoritative answer:

```
redhat.com
    origin = a1-68.akam.net
    mail addr = noc.redhat.com
    serial = 2021091002
    refresh = 300
    retry = 180
    expire = 604800
    minimum = 14400
```

```
swathy@swathy-VirtualBox:~/Desktop$ nslookup -type=a google.com
```

```
Server:      127.0.0.53
Address:     127.0.0.53#53
```

Non-authoritative answer:

```
Name:   google.com
Address: 142.250.77.142
```

Ifconfig

```
swathy@swathy-VirtualBox:~/Desktop$ ifconfig -v
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::11b7:5552:7848:59d6 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:9d:53:44 txqueuelen 1000 (Ethernet)
    RX packets 855 bytes 657641 (657.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 875 bytes 87098 (87.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 443 bytes 40775 (40.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 443 bytes 40775 (40.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
swathy@swathy-VirtualBox:~/Desktop$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::11b7:5552:7848:59d6 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:9d:53:44 txqueuelen 1000 (Ethernet)
    RX packets 855 bytes 657641 (657.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 875 bytes 87098 (87.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 443 bytes 40775 (40.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 443 bytes 40775 (40.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
swathy@swathy-VirtualBox:~/Desktop$ ifconfig -s
Iface      MTU      RX-OK RX-ERR RX-DRP RX-OVR      TX-OK TX-ERR TX-DRP TX-OVR Flg
enp0s3     1500      855     0     0 0         875     0     0 0 BMRU
lo         65536     443     0     0 0         443     0     0 0 LRU
```



```

swathy@swathy-VirtualBox:~/Desktop$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::11b7:5552:7848:59d6 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:9d:53:44 txqueuelen 1000 (Ethernet)
    RX packets 855 bytes 657641 (657.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 875 bytes 87098 (87.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 443 bytes 40775 (40.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 443 bytes 40775 (40.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

Netstat

```

swathy@swathy-VirtualBox:~/Desktop$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 swathy-VirtualBo:bootpc _gateway:bootps        ESTABLISHED

Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags               Type                   State         I-Node  Path
unix    2      [ ]                   DGRAM                 19419         /run/user/1000/systemd/notify
unix    3      [ ]                   DGRAM                 15463         /run/systemd/notify
unix    2      [ ]                   DGRAM                 15477         /run/systemd/journal/syslog
unix   17      [ ]                   DGRAM                 15486         /run/systemd/journal/dev-log
unix    8      [ ]                   DGRAM                 15488         /run/systemd/journal/socket
unix    3      [ ]                   STREAM                CONNECTED      20518         /run/dbus/system_bus_socket
unix    3      [ ]                   STREAM                CONNECTED      18661         /run/dbus/system_bus_socket
unix    2      [ ]                   DGRAM                 15593
unix    3      [ ]                   STREAM                CONNECTED      20457         /run/systemd/journal/stdout
unix    3      [ ]                   STREAM                CONNECTED      17582
unix    3      [ ]                   STREAM                CONNECTED      17465
unix    3      [ ]                   STREAM                CONNECTED      21961         /run/user/1000/bus
unix    3      [ ]                   STREAM                CONNECTED      20465         /run/systemd/journal

```



```

swathy@swathy-VirtualBox:~/Desktop$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:mysql         0.0.0.0:*               LISTEN
tcp        0      0 localhost:domain       0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp6       0      0 [::]:http              [::]:*                  LISTEN
tcp6       0      0 ip6-localhost:ipp      [::]:*                  LISTEN
udp        0      0 0.0.0.0:mdns            0.0.0.0:*               LISTEN
udp        0      0 0.0.0.0:631            0.0.0.0:*               LISTEN
udp        0      0 0.0.0.0:39623          0.0.0.0:*               LISTEN
udp        0      0 localhost:domain       0.0.0.0:*               LISTEN
udp        0      0 swathy-VirtualBo:bootpc_gateway:bootps ESTABLISHED
udp6       0      0 [::]:mdns              [::]:*                  LISTEN
udp6       0      0 [::]:60782             [::]:*                  LISTEN
raw6       0      0 [::]:ipv6-icmp         [::]:*                  LISTEN
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State      I-Node     Path
unix   2      [ ACC ]     STREAM    LISTENING   19570     @/tmp/dbus-S8RgEAx0
unix   2      [ ACC ]     STREAM    LISTENING   20479     @/tmp/.ICE-unix/1071
unix   2      [ ACC ]     STREAM    LISTENING   19411     /run/mysqld/mysqld.sock
unix   2      [ ACC ]     STREAM    LISTENING   20856     @/tmp/.X11-unix/X0
unix   2      [ ACC ]     STREAM    LISTENING   22260     @/home/swathy/.cache/ibus/dbus-4JLAFVsN

```

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\acer>arp -a

Interface: 192.168.108.151 --- 0x7
Internet Address      Physical Address      Type
192.168.108.237       e6-2e-13-c7-36-7c    dynamic
192.168.108.255       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 --- 0xc
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
```

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\acer>nbtstat -r

NetBIOS Names Resolution and Registration Statistics
-----

Resolved By Broadcast      = 0
Resolved By Name Server    = 0

Registered By Broadcast    = 256
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.

```
C:\Users\acer>hostname
DESKTOP-SHTJPRU
```

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.

```
C:\Users\acer>pathping www.google.com

Tracing route to www.google.com [2404:6800:4002:819::2004]
over a maximum of 30 hops:
  0  DESKTOP-SHTJPRU [2409:4073:2e9d:d01a:cee:ad8c:6152:3a71]
  1  2409:4073:2e9d:d01a::8e
  2  * * *
Computing statistics for 25 seconds...
```

v. getmac

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

```
C:\Users\acer>getmac

Physical Address      Transport Name
=====
98-29-A6-42-E0-55    Media disconnected
E8-2A-44-D5-87-E5    \Device\Tcpip_{3CE17871-BF64-4016-9B09-B2C5823B464F}
E8-2A-44-D5-87-E6    Media disconnected
0A-00-27-00-00-0C    \Device\Tcpip_{7DF5DAC1-05EE-4574-AA97-C1A61200DA71}
```

The name LAMP is an acronym of the following programs:

Linux Operating System

Apache HTTP Server

MySQL database management system

PHP programming language

1. Installation of Apache Server.

Command:

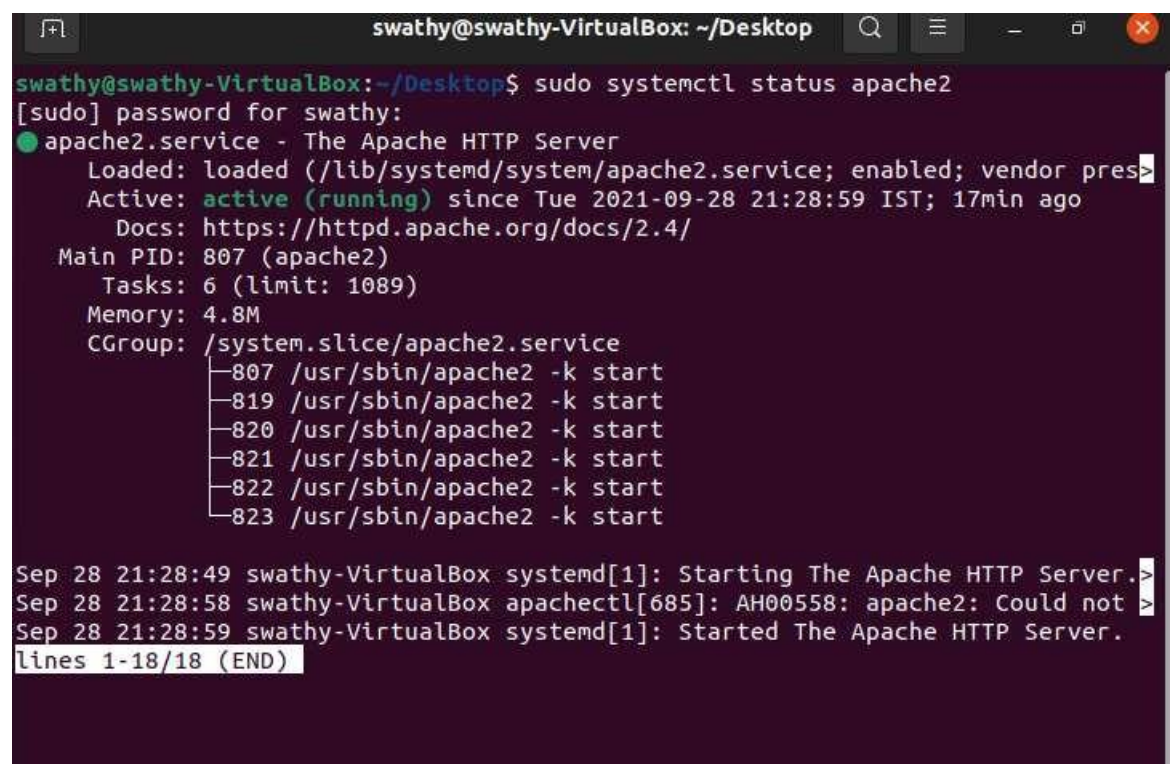
```
sudo apt-get install apache2
```

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

Check if Apache is installed correctly by running the Apache service status.

Use the following the command:

```
sudo service apache2 status
```



```
swathy@swathy-VirtualBox: ~/Desktop
swathy@swathy-VirtualBox:~/Desktop$ sudo systemctl status apache2
[sudo] password for swathy:
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor pres>
   Active: active (running) since Tue 2021-09-28 21:28:59 IST; 17min ago
     Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 807 (apache2)
    Tasks: 6 (limit: 1089)
   Memory: 4.8M
   CGroup: /system.slice/apache2.service
           └─807 /usr/sbin/apache2 -k start
             └─819 /usr/sbin/apache2 -k start
               └─820 /usr/sbin/apache2 -k start
                 └─821 /usr/sbin/apache2 -k start
                   └─822 /usr/sbin/apache2 -k start
                     └─823 /usr/sbin/apache2 -k start

Sep 28 21:28:49 swathy-VirtualBox systemd[1]: Starting The Apache HTTP Server.>
Sep 28 21:28:58 swathy-VirtualBox apachectl[685]: AH00558: apache2: Could not >
Sep 28 21:28:59 swathy-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-18/18 (END)
```

2. Installation of MariaDB

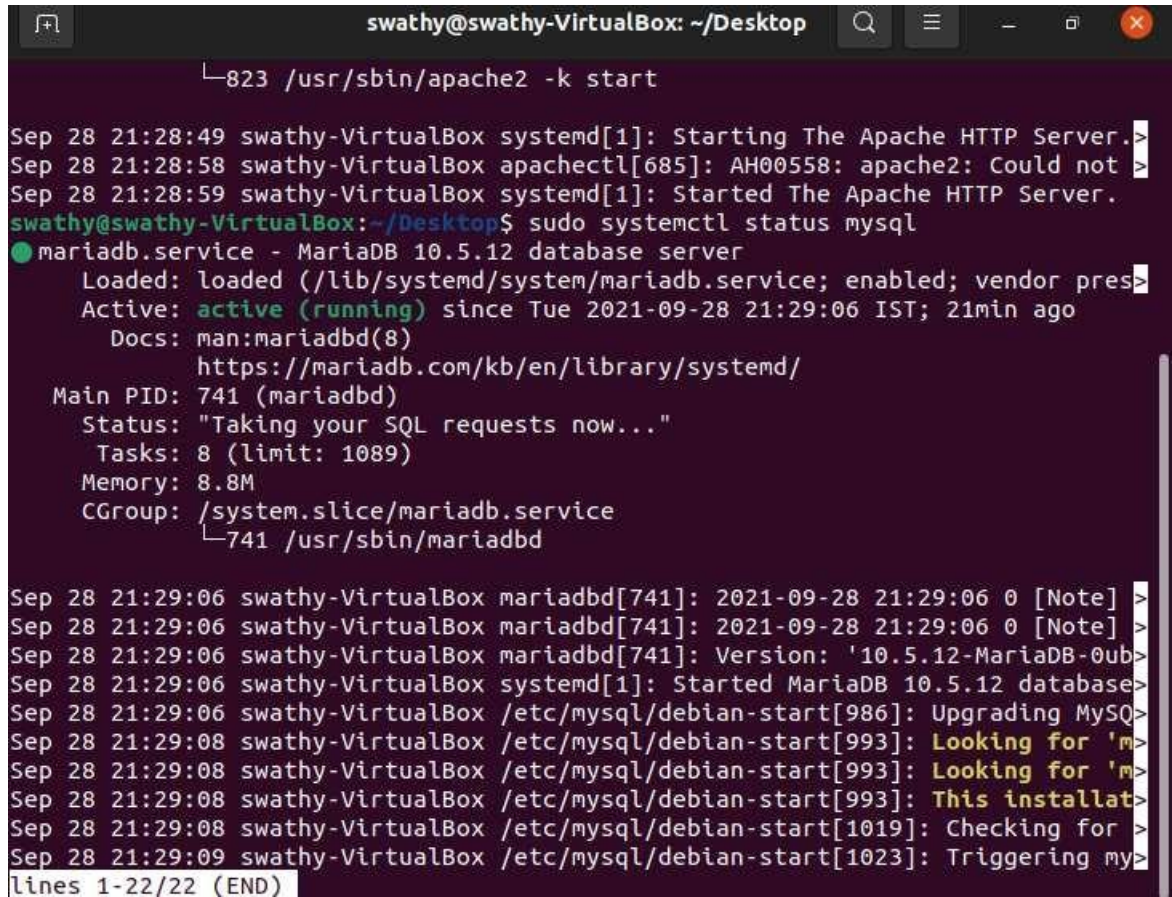
MariaDB is an open source relational database management system (RDBMS)

Command: `sudo apt install mariadb-server mariadb-client`

Check mariadb Installation

`sudo systemctl status mysql`

(if it is not working `sudo systemctl start mysql`)



```
swathy@swathy-VirtualBox: ~/Desktop
└─823 /usr/sbin/apache2 -k start
Sep 28 21:28:49 swathy-VirtualBox systemd[1]: Starting The Apache HTTP Server.
Sep 28 21:28:58 swathy-VirtualBox apachectl[685]: AH00558: apache2: Could not
Sep 28 21:28:59 swathy-VirtualBox systemd[1]: Started The Apache HTTP Server.
swathy@swathy-VirtualBox:~/Desktop$ sudo systemctl status mysql
● mariadb.service - MariaDB 10.5.12 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor pres
   Active: active (running) since Tue 2021-09-28 21:29:06 IST; 21min ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 741 (mariabdd)
    Status: "Taking your SQL requests now..."
     Tasks: 8 (limit: 1089)
    Memory: 8.8M
    CGroup: /system.slice/mariadb.service
           └─741 /usr/sbin/mariabdd
Sep 28 21:29:06 swathy-VirtualBox mariabdd[741]: 2021-09-28 21:29:06 0 [Note]
Sep 28 21:29:06 swathy-VirtualBox mariabdd[741]: 2021-09-28 21:29:06 0 [Note]
Sep 28 21:29:06 swathy-VirtualBox mariabdd[741]: Version: '10.5.12-MariaDB-0ub
Sep 28 21:29:06 swathy-VirtualBox systemd[1]: Started MariaDB 10.5.12 database
Sep 28 21:29:06 swathy-VirtualBox /etc/mysql/debian-start[986]: Upgrading MySQ
Sep 28 21:29:06 swathy-VirtualBox /etc/mysql/debian-start[993]: Looking for 'm
Sep 28 21:29:08 swathy-VirtualBox /etc/mysql/debian-start[993]: Looking for 'm
Sep 28 21:29:08 swathy-VirtualBox /etc/mysql/debian-start[993]: This installat
Sep 28 21:29:08 swathy-VirtualBox /etc/mysql/debian-start[1019]: Checking for
Sep 28 21:29:09 swathy-VirtualBox /etc/mysql/debian-start[1023]: Triggering my
lines 1-22/22 (END)
```

3.

2. Install PHP

Command:

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

Restart apache2

`sudo systemctl restart apache2`

check installation

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

3. Install phpmyadmin

Command:

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

(It asks for webserver select apache2, select db-configuration and set

password)

Restart apache2

sudo systemctl restart apache2

Check phpmyadmin

Open a browser

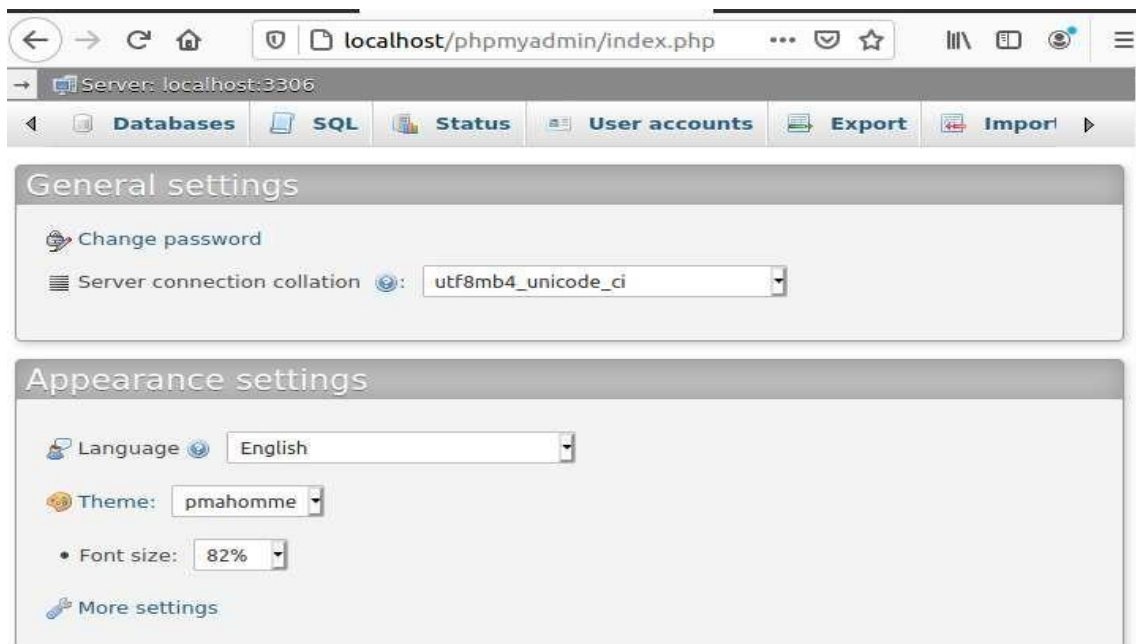
http://localhost/phpmyadmin

username : root

password : yourpassword



The screenshot shows the phpMyAdmin login page in a web browser. The address bar displays 'localhost/phpmyadmin/'. The page features the phpMyAdmin logo and the text 'Welcome to phpMyAdmin'. Below this, there is a 'Language' dropdown menu set to 'English'. A 'Log in' button is followed by input fields for 'Username' (containing 'admin') and 'Password' (masked with dots). A 'Go' button is located at the bottom right of the login section.



The screenshot shows the phpMyAdmin settings page. The browser address bar shows 'localhost/phpmyadmin/index.php'. The page has a navigation bar with links: 'Databases', 'SQL', 'Status', 'User accounts', 'Export', and 'Import'. The 'General settings' section includes a 'Change password' link and a 'Server connection collation' dropdown set to 'utf8mb4_unicode_ci'. The 'Appearance settings' section includes a 'Language' dropdown set to 'English', a 'Theme' dropdown set to 'pmahomme', a 'Font size' dropdown set to '82%', and a 'More settings' link.

Ansible Installation

Step 1: sudo apt install ansible

```
swathy@swathy-VirtualBox: ~/Desktop x swathy@swathy-VirtualBox: ~/Desktop x v
swathy@swathy-VirtualBox:~/Desktop$ sudo apt install ansible
[sudo] password for swathy:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-lib2to3 python3-libcloud python3-netaddr
  python3-ntlm-auth python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xlrd python3-xlsxwriter
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
  python-pyparsing-doc
The following NEW packages will be installed:
  ansible ansible-base ieee-data python3-argcomplete python3-distutils
  python3-dnspython python3-ecdsa python3-jinja2 python3-jmespath
  python3-kerberos python3-libcloud python3-netaddr python3-ntlm-auth
  python3-packaging python3-pycryptodome python3-pyparsing
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xlrd python3-xlsxwriter
The following packages will be upgraded:
  python3-lib2to3
1 upgraded, 21 newly installed, 0 to remove and 234 not upgraded.
Need to get 31.8 MB of archives.
After this operation, 275 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-jinja2 all 2.11.2-
1 [99.8 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu hirsute/main amd64 python3-pyparsing all 2.4.
```

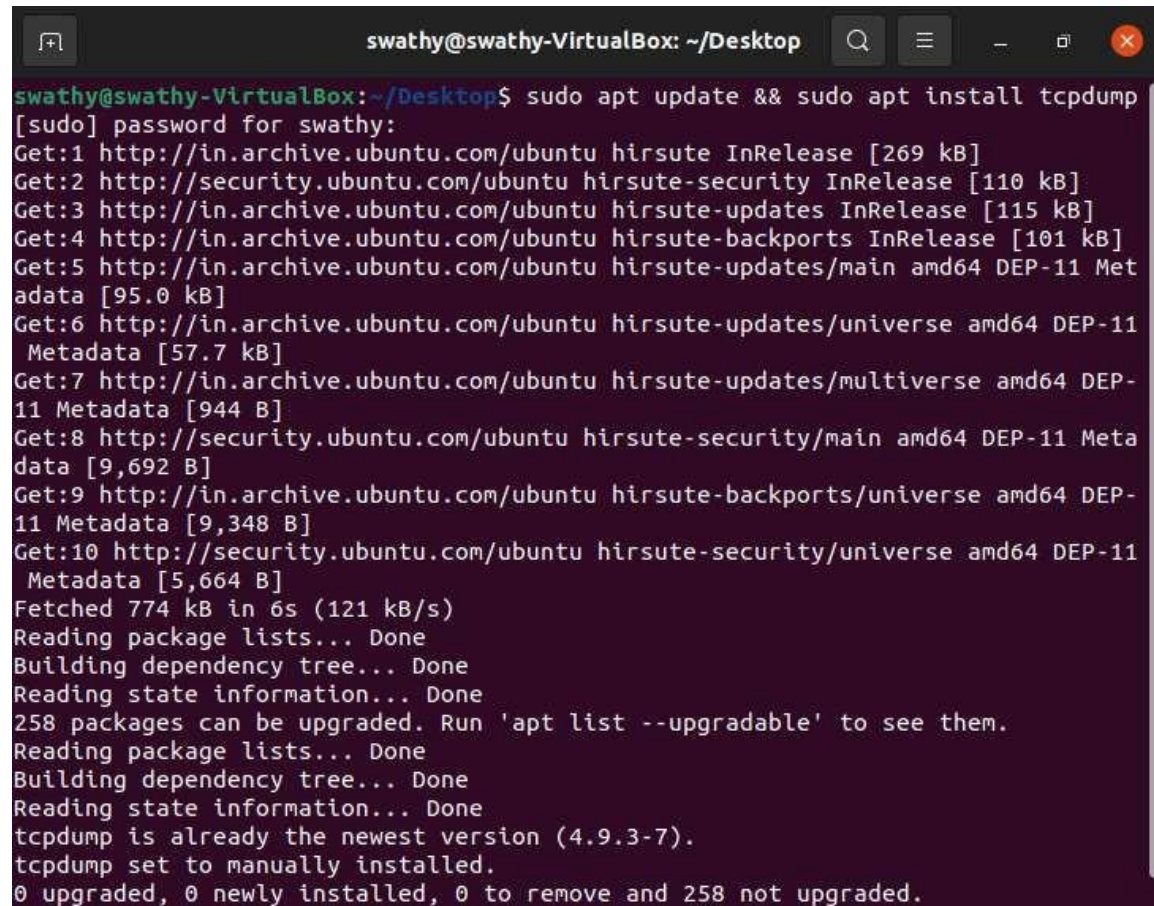
Installation Check

Step 2: ansible --version

```
swathy@swathy-VirtualBox:~/Desktop$ ansible --version
ansible 2.10.5
  config file = None
  configured module search path = ['/home/swathy/.ansible/plugins/modules', '/usr/share
/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.9.4 (default, Apr 4 2021, 19:38:44) [GCC 10.2.1 20210401]
swathy@swathy-VirtualBox:~/Desktop$
```

1. Execute tcpdump and its options on your own system, and submit the output screenshot as a document.

Sudo apt install tcpdump



```
swathy@swathy-VirtualBox: ~/Desktop
swathy@swathy-VirtualBox:~/Desktop$ sudo apt update && sudo apt install tcpdump
[sudo] password for swathy:
Get:1 http://in.archive.ubuntu.com/ubuntu hirsute InRelease [269 kB]
Get:2 http://security.ubuntu.com/ubuntu hirsute-security InRelease [110 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu hirsute-updates InRelease [115 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu hirsute-backports InRelease [101 kB]
Get:5 http://in.archive.ubuntu.com/ubuntu hirsute-updates/main amd64 DEP-11 Met
adata [95.0 kB]
Get:6 http://in.archive.ubuntu.com/ubuntu hirsute-updates/universe amd64 DEP-11
Metadata [57.7 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu hirsute-updates/multiverse amd64 DEP-
11 Metadata [944 B]
Get:8 http://security.ubuntu.com/ubuntu hirsute-security/main amd64 DEP-11 Meta
data [9,692 B]
Get:9 http://in.archive.ubuntu.com/ubuntu hirsute-backports/universe amd64 DEP-
11 Metadata [9,348 B]
Get:10 http://security.ubuntu.com/ubuntu hirsute-security/universe amd64 DEP-11
Metadata [5,664 B]
Fetched 774 kB in 6s (121 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
258 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
tcpdump is already the newest version (4.9.3-7).
tcpdump set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 258 not upgraded.
```


Sudo tcpdump

```
swathy@swathy-VirtualBox: ~/Desktop
0 packets received by filter
0 packets dropped by kernel
swathy@swathy-VirtualBox:~/Desktop$ sudo tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:37:10.535396 IP swathy-VirtualBox.38197 > alphyn.canonical.com.ntp: NTPv4, C
lient, length 48
12:37:10.537606 IP swathy-VirtualBox.43039 > 192.168.29.78.domain: 37325+ PTR?
15.2.0.10.in-addr.arpa. (40)
12:37:10.543365 IP 192.168.29.78.domain > swathy-VirtualBox.43039: 37325 NXDoma
in 0/0/0 (40)
12:37:10.544767 IP swathy-VirtualBox.39376 > 192.168.29.78.domain: 4503+ PTR? 7
8.29.168.192.in-addr.arpa. (44)
12:37:10.549317 IP 192.168.29.78.domain > swathy-VirtualBox.39376: 4503 NXDoma
in 0/0/0 (44)
12:37:10.831149 IP alphyn.canonical.com.ntp > swathy-VirtualBox.38197: NTPv4, S
erver, length 48
12:37:15.626799 ARP, Request who-has _gateway tell swathy-VirtualBox, length 28
12:37:15.627697 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng
th 46
12:37:15.627771 IP swathy-VirtualBox.54727 > 192.168.29.78.domain: 25591+ PTR?
2.2.0.10.in-addr.arpa. (39)
12:37:15.633439 IP 192.168.29.78.domain > swathy-VirtualBox.54727: 25591 NXDoma
in 0/0/0 (39)
^C
10 packets captured
10 packets received by filter
0 packets dropped by kernel
swathy@swathy-VirtualBox:~/Desktop$
```

Sudo tcpdump -d

```
swathy@swathy-VirtualBox:~/Desktop$ sudo tcpdump -d
(000) ret #262144
swathy@swathy-VirtualBox:~/Desktop$
```

Sudo tcpdump -c 5

```
swathy@swathy-VirtualBox:~/Desktop$ 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
12:40:15.727044 IP6 swathy-VirtualBox > ip6-allrouters: ICMP6, router solicitat
ion, length 8
12:40:57.534950 IP swathy-VirtualBox.49574 > alphyn.canonical.com.ntp: NTPv4, C
lient, length 48
12:40:57.538188 IP swathy-VirtualBox.39330 > 192.168.29.78.domain: 54046+ PTR?
15.2.0.10.in-addr.arpa. (40)
12:40:57.542950 IP 192.168.29.78.domain > swathy-VirtualBox.39330: 54046 NXDoma
in 0/0/0 (40)
12:40:57.544313 IP swathy-VirtualBox.56811 > 192.168.29.78.domain: 59130+ PTR?
78.29.168.192.in-addr.arpa. (44)
5 packets captured
6 packets received by filter
0 packets dropped by kernel
swathy@swathy-VirtualBox:~/Desktop$
```

Sudo tcpdum -i enp2s0

```
swathy@swathy-VirtualBox: ~/Desktop
0 packets dropped by kernel
swathy@swathy-VirtualBox:~/Desktop$ sudo tcpdump -i enp0s3
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp0s3, link-type EN10MB (Ethernet), capture size 262144 bytes
12:46:55.534685 IP swathy-VirtualBox.57380 > alphyn.canonical.com.ntp: NTPv4, C
lient, length 48
12:46:55.537105 IP swathy-VirtualBox.37780 > 192.168.29.78.domain: 14587+ PTR?
15.2.0.10.in-addr.arpa. (40)
12:46:55.543531 IP 192.168.29.78.domain > swathy-VirtualBox.37780: 14587 NXDoma
in 0/0/0 (40)
12:46:55.544913 IP swathy-VirtualBox.42013 > 192.168.29.78.domain: 42789+ PTR?
78.29.168.192.in-addr.arpa. (44)
12:46:56.325863 IP 192.168.29.78.domain > swathy-VirtualBox.42013: 42789 NXDoma
in 0/0/0 (44)
12:46:56.325864 IP alphyn.canonical.com.ntp > swathy-VirtualBox.57380: NTPv4, S
erver, length 48
12:47:00.587126 ARP, Request who-has _gateway tell swathy-VirtualBox, length 28
12:47:00.587961 ARP, Reply _gateway is-at 52:54:00:12:35:02 (oui Unknown), leng
th 46
12:47:00.588183 IP swathy-VirtualBox.58256 > 192.168.29.78.domain: 38945+ PTR?
2.2.0.10.in-addr.arpa. (39)
12:47:00.593212 IP 192.168.29.78.domain > swathy-VirtualBox.58256: 38945 NXDoma
in 0/0/0 (39)
12:47:28.534769 IP swathy-VirtualBox.36699 > alphyn.canonical.com.ntp: NTPv4, C
lient, length 48
12:47:29.165017 IP alphyn.canonical.com.ntp > swathy-VirtualBox.36699: NTPv4, S
erver, length 48
12:47:49.673501 IP swathy-VirtualBox.39068 > 32.121.122.34.bc.googleusercontent
.com.http: Flags [S], seq 4005747145, win 64240, options [mss 1460,sackOK,TS va
```

Shell Scripting

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:

```
user@user-VirtualBox:~$ bash 1.sh
enter details and view
enter your name
swathi
enter your college name
amal jyothi college of engineering
Details you entered
Name:swathi
College:amal jyothi college of engineering
user@user-VirtualBox:~$
```

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:

```
user@user-VirtualBox:~$ bash 2.sh
Display value of a variable
50
```


3. Write a shell script to perform addition, subtraction, 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:2.50000000000000000000
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
```