

NETWORKING & SYSTEM ADMINISTRATION

LAB RECORD

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NETWORKING & SYSTEM ADMINISTRATION LAB ASSIGNMENT (LINUX COMMANDS)

1.Basic Linux Commands Explain Linux commands

pwd,history,man,ls,cd,mkdir,rmdir,touch,rm,cat with Examples

pwd

Linux pwd (print working directory) command displays your location currently you are working on. It will give the whole path starting from the root ending to the directory.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ pwd
/home/dak
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

history

history command is used to view the previously executed command.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ history
 1  pwd
 2  history
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

man

The "man" is a short term for manual page. A user can request to display a man page by simply typing man followed by a space and then argument. Here its argument can be a command, utility or function. A manual page associated with each of these arguments is displayed.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ man  
What manual page do you want?  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls  
Desktop  donis  examples.desktop  Pictures  Templates  
Documents  Downloads  Music  Public  Videos  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ man ls  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

ls

The ls is the list command in Linux. It will show the full list or content of your directory. Just type ls and press the enter key.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls  
Desktop  donis  examples.desktop  Pictures  Templates  
Documents  Downloads  Music  Public  Videos
```

cd

The cd command stands for (change directory). It is used to change to the directory you want to work from the present directory.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd /  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:/$ pwd  
/  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:/$ █
```

mkdir

With mkdir command you can create your own directory.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mkdir donis  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls  
Desktop  donis  examples.desktop  Pictures  Templates  
Documents  Downloads  Music  Public  Videos  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

rmdir

The rmdir command is used to remove a directory from your system.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  Downloads  Music  Public  Videos
Documents examples.desktop  Pictures  Templates
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

touch

touch command is a way to create empty files. You can update the modification and access time of each file with the help of touch command.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ touch donis
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  donis  examples.desktop  Pictures  Templates
Documents  Downloads  Music  Public  Videos
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

rm

The 'rm' means remove. This command is used to remove a file. The command line doesn't have a recycle bin or trash unlike other GUI's to recover the files. Hence, be very much careful while using this command. Once you have deleted a file, it is removed permanently.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ rm donis
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
Desktop  Downloads  Music  Public  Videos
Documents  examples.desktop  Pictures  Templates
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

cat

Cat(concatenate) command is very frequently used in Linux. It reads data from the file and gives their content as output. It helps us to create, view, concatenate files. So let us see some frequently used cat commands.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat >donis1  
hi i am donis  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat >donis2  
how are you?  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat donis1 donis2  
hi i am donis  
how are you?  
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

Basic Linux Commands Explain Linux Commands with Examples

Echo,Head,tail,read,more,less,cut,paste,uname,cp,mv,locate,find,grep,df,du,useradd,userdel,sudo,passwd

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..

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ echo Donis
Donis
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ name="Donis"
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ echo $name
Donis
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

head

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
aosp      Downloads                  Pictures
Desktop   examples.desktop          Public
Documents  gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf Templates
donis.txt  Music                   Videos
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ head donis.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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 preceded by its file name.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
aosp      Downloads                               Pictures
Desktop   examples.desktop                         Public
Documents gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf Templates
tx'       donis.txt    Music                           Videos
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ tail donis.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ tail -f donis.txt
hi
hallo donis
welcome
D 1
ut
```

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. Zero indicates the end of the file. If some errors found then it returns -1.

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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ more -3 copy.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ less -f copy.txt
[2]+  Stopped                  less -f copy.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

```
hi  
hallo donis  
welcome  
copy.txt (END)
```

cut

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cut -b 1,2 donis.txt  
hi  
ha  
we  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

paste

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat copy.txt
who is this
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ paste donis.txt copy.txt
hi      who is this
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ uname -a
Linux aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA 5.4.0-42-generic #46~18.04.1-Ubu
ntu SMP Fri Jul 10 07:21:24 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

uname

The command ‘*uname*’ displays the information about the system.

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat donis.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat copy.txt
who is this
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cp donis.txt copy.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat donis.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat copy.txt
hi
hallo donis
welcome
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mv donis.txt Desktop
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd Desktop
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ls
donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

Locate

locate command in Linux is used to find the files by name. There are two most widely used file searching utilities accessible to users called *find* and *locate*. The *locate* utility works better and faster than *find* command counterpart because instead of searching the file system when a file search is initiated, it would look through a database. This database contains bits and parts of files and their corresponding paths on your system. By default, *locate* command does not check whether the files found in the database still exist and it never reports files created after the most recent update of the relevant database.

Find

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ find donis.txt
donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

Grep

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

df

The **df** command (short for disk free), is used to display information related to file systems about total space and available space.

Syntax :

df [OPTION]... [FILE]...

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            1.9G   0    1.9G  0% /dev
tmpfs           376M  2.0M  374M  1% /run
/dev/sda7        134G  85G  43G  67% /
tmpfs           1.9G   0    1.9G  0% /dev/shm
tmpfs           5.0M  4.0K  5.0M  1% /run/lock
tmpfs           1.9G   0    1.9G  0% /sys/fs/cgroup
/dev/loop5       30M   30M   0  100% /snap/snapd/8542
/dev/loop1       66M   66M   0  100% /snap/gtk-common-themes/1515
/dev/loop7       63M   63M   0  100% /snap/gtk-common-themes/1506
/dev/loop9       56M   56M   0  100% /snap/core18/1885
/dev/loop2       33M   33M   0  100% /snap/snapd/12704
/dev/loop11      244M  244M   0  100% /snap/gnome-3-38-2004/39
/dev/loop0       1.0M  1.0M   0  100% /snap/gnome-logs/100
/dev/loop4       2.3M  2.3M   0  100% /snap/gnome-system-monitor/148
/dev/loop3       640K  640K   0  100% /snap/gnome-logs/106
/dev/loop12      2.5M  2.5M   0  100% /snap/gnome-calculator/748
/dev/loop14      384K  384K   0  100% /snap/gnome-characters/550
/dev/loop6       2.5M  2.5M   0  100% /snap/gnome-calculator/884
/dev/loop17      768K  768K   0  100% /snap/gnome-characters/726
/dev/loop16      2.5M  2.5M   0  100% /snap/gnome-system-monitor/163
/dev/loop8        56M   56M   0  100% /snap/core18/2074
/dev/loop10      256M  256M   0  100% /snap/gnome-3-34-1804/36
/dev/loop13      219M  219M   0  100% /snap/gnome-3-34-1804/72
/dev/loop15      62M   62M   0  100% /snap/core20/1081
/dev/sda2        96M   31M   66M  33% /boot/efi
tmpfs           376M  16K   376M  1% /run/user/121
tmpfs           376M  48K   376M  1% /run/user/1000
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

Du

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

The du command can be used to track the files and directories which are consuming excessive amount of space on hard disk drive.

Syntax :

du [OPTION]... [FILE]...

du [OPTION]... --files0-from=F

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ du
100    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/gcc-7.4.1/python/libstd
x/v6
108    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/gcc-7.4.1/python/libstd
x
112    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/gcc-7.4.1/python
116    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/gcc-7.4.1
12440   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/info
12     ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/man/man5
38     ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/man/man7
2976    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/man/man1
3080    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/man
34     ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/libquadmath.html
296    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/gprof.html
1712   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/bfd.html
128    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/libitm.html
4200   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/gfortran
124    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/cppinternals
296    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/gccinstall
5104   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/as.html
6332   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/gccint
448    ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/binutils.html
6356   ./zip/gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf/share/doc/gcc
```

Useradd

useradd is a command in Linux that is used to add user accounts to your system. It is just a symbolic link to adduser command in Linux and the difference between both of them is that useradd is a native binary compiled with system whereas adduser is a Perl script which uses useradd binary in the background. It make changes to the following files:

- /etc/passwd
- /etc/shadow
- /etc/group
- /etc/gshadow
- creates a directory for new user in /home

Syntax:

```
useradd [options] name_of_the_user
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ sudo useradd -u 12345 donis
[sudo] password for aim:
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ █
```

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.

Syntax:

userdel [options] LOGIN

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ userdel -h
```

```
Usage: userdel [options] LOGIN
```

Options:

-f, --force	force removal of files, even if not owned by user
-h, --help	display this help message and exit
-r, --remove	remove home directory and mail spool
-R, --root CHROOT_DIR	directory to chroot into
--extrausers	use the extra users database
-Z, --selinux-user	remove any SELinux user mapping for the user

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ █
```

Sudo

sudo (**Super User DO**) command in Linux is generally used as a prefix of some command that only superuser are allowed to run. If you prefix “**sudo**” with any command, it will run that command with elevated privileges or in other words allow a user with proper permissions to execute a command as another user, such as the superuser. This is the equivalent of “run as administrator” option in Windows. The option of sudo lets us have multiple administrators.

These users who can use the **sudo** command need to have an entry in the **sudoers** file located at “**/etc/sudoers**”. Remember that to edit or view the sudoers file you have to use sudo command. To edit the sudoers file it is recommended to use “visudo” command.

By default, sudo requires that users authenticate themselves with a password which is the user’s password, not the root password itself.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ sudo -V
Sudo version 1.8.21p2
Sudoers policy plugin version 1.8.21p2
Sudoers file grammar version 46
Sudoers I/O plugin version 1.8.21p2
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$
```

Passwd

passwd command in Linux is used to change the user account passwords. The root user reserves the privilege to change the password for any user on the system, while a normal user can only change the account password for his or her own account.

Syntax:

```
passwd [options] [username]
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Downloads$ passwd
Changing password for aim.
(current) UNIX password:
```

1.usermod

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

```
File Edit View Search Terminal Help
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd dak
[sudo] password for aim:
useradd: user 'dak' already exists
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -u 2002 dak
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
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:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
```

2.groupadd

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupadd CNN
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ groups
aim adm cdrom sudo dip plugdev lpadmin sambashare
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,aim
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:aim
floppy:x:25:
```

3.groups –

print the groups a user is in

4..groupdel

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupdel CNN
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,aim
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:aim
```

5.groupmod

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupadd donis3
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupmod -n CNNN donis3
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,aim
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
```

6.chmod

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd Desktop
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ chmod u+x donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ █
```

7.chown

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ chown aim donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ id
uid=1000(aim) gid=1000(aim) groups=1000(aim),4(adm),24(cdrom),27(sudo),30(dip),4
6(plugdev),116(lpadmin),126(sambashare)
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ps -u
USER        PID %CPU %MEM    VSZ   RSS TTY      STAT START  TIME COMMAND
aim       1649  0.0  0.1 212136  6096 tty2      Ssl+ 22:07  0:00 /usr/lib/gdm3/g
aim       1651  7.1  2.7 1122060 106600 tty2      Sl+  22:07  2:12 /usr/lib/xorg/X
aim       1666  0.0  0.4 569476 15952 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1808 11.0  7.3 3820996 282400 tty2      Sl+  22:07  3:23 /usr/bin/gnome-
aim      1837  0.3  0.2 451708 10540 tty2      Sl   22:07  0:06 ibus-daemon --x
aim      1845  0.0  0.2 296792  8616 tty2      Sl   22:07  0:00 /usr/lib/ibus/i
aim      1847  0.0  0.5 356232 22368 tty2      Sl   22:07  0:00 /usr/lib/ibus/i
aim      1911  0.0  0.6 808544 26132 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1913  0.0  0.2 349324 10308 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1914  0.0  0.1 423348  5820 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1915  0.0  0.1 275736  4856 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1920  0.0  0.3 471328 12016 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1924  0.0  0.6 504640 23536 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1931  0.0  0.2 343100  9836 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
aim      1935  0.0  0.2 392716 10184 tty2      Sl+  22:07  0:00 /usr/lib/gnome-
```

10.top

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

```

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ top

top - 22:41:14 up 35 min, 1 user, load average: 0.78, 0.66, 0.79
Tasks: 272 total, 2 running, 210 sleeping, 0 stopped, 0 zombie
%Cpu(s): 5.4 us, 2.6 sy, 0.0 ni, 91.3 id, 0.0 wa, 0.0 hi, 0.7 si, 0.0 st
KiB Mem : 3849156 total, 157052 free, 1926472 used, 1765632 buff/cache
KiB Swap: 2097148 total, 2096624 free, 524 used. 1144728 avail Mem

      PID USER      PR  NI      VIRT      RES      SHR   S %CPU %MEM     TIME+ COMMAND
 1808 aim      20   0  3820796  281792  131824 R  15.8  7.3  3:38.77 gnome-shell
 1821 aim      9 -11 2914668  19040  14704 S  7.3  0.5  1:56.80 pulseaudio
 1651 aim      20   0 1123668 108512  83172 S  4.6  2.8  2:27.78 Xorg
 424 root     -51   0      0      0      0 S  2.3  0.0  0:11.63 irq/60-ELA+
  1 root      20   0  225796   9632  6788 S  0.7  0.3  0:08.56 systemd
 2840 aim      20   0 2681716 156384  99584 S  0.7  4.1  0:13.89 Web Content
 4147 aim      20   0  51324   4108  3452 R  0.7  0.1  0:00.72 top
  8 root      20   0      0      0      0 D  0.3  0.0  0:03.63 kworker/u8+
 860 root      20   0 110488   3452  3124 S  0.3  0.1  0:00.26 irqbalance
 3387 root      20   0      0      0      0 I  0.3  0.0  0:03.23 kworker/1:+
  2 root      20   0      0      0      0 S  0.0  0.0  0:00.00 kthreadd
  3 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_gp
  4 root      0 -20      0      0      0 I  0.0  0.0  0:00.00 rcu_par_gp

```

1. wc

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

- #wc state.txt

6 8 54 state.txt

- #wc state.txt capital.txt

- wc -l state.txt

- wc -w state.txt capital.txt

- wc -c state.txt

- wc -m state.txt

```
File Edit View Search Terminal Help
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ wc donis.txt
 3  4 23 donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ █
```

2. tar

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

- Linux tar command to create compressed or uncompressed Archive files

- Options:

- c : Creates Archive

- x : Extract the archive

- f : creates archive with given filename-t : displays or lists files in archived file

- u : archives and adds to an existing archive file

-v : Displays Verbose Information

-A : Concatenates the archive files

-z : zip, tells tar command that creates tar file using gzip

-j : filter archive tar file using tbzip

-W : Verify a archive file

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

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

```
#ls archive.tar
```

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

- Extract an archive created with tar

```
#mkdir backup
```

```
#cd backup
```

```
#tar xf/home/meera/Documents/Meera_Linux/archive.tar
```

- Compression Types

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

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

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

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

Extract an archive

```
#mkdir backup1
```

```
#cd backup1
```

```
#tar xzf /abc.tar.gz
```

```
#mkdir backup2
```

```
#cd backup2
```

```
#tar xjf /abcd.tar.bz2
```

```
#mkdir backup3
```

```
#cd backup3
```

```
#tar xJf /abcde.tar.xz
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ tar cf zip.tar donis.txt
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ls
donis.txt  zip.tar
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ █
```

3.expr

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

```
#expr 10 + 2
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ expr 7 + 7  
14  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ █
```

4. Redirections & Piping

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

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

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ls -l|wc -l  
3  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ █
```

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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ssh --help
unknown option -- -
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-b bind_address] [-c cipher_spec]
           [-D [bind_address:]port] [-E log_file] [-e escape_char]
           [-F configfile] [-I pkcs11] [-i identity_file]
           [-J [user@]host[:port]] [-L address] [-l login_name] [-m mac_spec]
           [-o ctl_cmd] [-o option] [-p port] [-Q query_option] [-R address]
           [-S ctl_path] [-W host:port] [-w local_tun[:remote_tun]]
           [user@]hostname [command]
```

#ssh user_name@host(IP/Domain_name)

#ssh -X root@server1.example.com

6. scp

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

Syntax:

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

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

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ssh aim@aim-vivoBook-15
-ASUS-Laptop-X540MA-X540MA
ssh: connect to host aim-vivobook-15-asus-laptop-x540ma-x540ma port 22: Connection refused
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

7.ssh-keygen

- ssh-keygen command to generate a public/private authentication key pair. Authentication keys allow a user to connect to a remote system

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

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

```
SHA256:xsFa2lW341uVp1l7/SzBF99YlnIGUZygi9P65HuIxVw aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA
The key's randomart image is:
+---[RSA 2048]---+
|          .+*..|
|       . ....+o|
|      + .. .o**|
|     * oo .E+00|
|    o Sooo. B.B|
|     . o+   *o|
|     .o.. o o|
|     .+. . .|
|        +o |
+---[SHA256]---+
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

8. ssh-copy-id

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

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$ ssh-copy-id
Usage: /usr/bin/ssh-copy-id [-h|-?]-f|-n] [-i [identity_file]] [-p port] [[-o <ssh -o options>] ...] [user@]hostname
      -f: force mode -- copy keys without trying to check if they are already
installed
      -n: dry run    -- no keys are actually copied
      -h|-?: print this help
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Desktop$
```

- Create six files with name of the form songX.mp3
- Create six files with name of the form snapX.mp3
- Create six files with name of the form filmX.mp3

(In each set, replace X with the numbers 1 through 6)

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ touch song1.mp3 song2.mp3 song3
.mp3 song4.mp3 song5.mp3 song6.mp3 snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5
.mp3 snap6.mp3 film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5.mp3 film6.mp3
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
aosp                               Pictures
'Assignment 2 Donis Abraham.ps'   Public
copy.txt                            qs
Desktop                            snap1.mp3
Documents                           snap2.mp3
Downloads                           snap3.mp3
examples.desktop                    snap4.mp3
film1.mp3                           snap5.mp3
film2.mp3                           snap6.mp3
film3.mp3                           song1.mp3
film4.mp3                           song2.mp3
film5.mp3                           song3.mp3
film6.mp3                           song4.mp3
gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf  song5.mp3
keygen                            song6.mp3
keygen.pub                         Templates
lampstack-8.0.9-0                  Videos
Music
```

- 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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mv song1.mp3 song2.mp3 song3.mp3 song4.mp3 song5.mp3 song6.mp3 Music
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd Music
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Music$ ls
song1.mp3  song2.mp3  song3.mp3  song4.mp3  song5.mp3  song6.mp3
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mv film1.mp3 film2.mp3 film3.mp3 film4.mp3 film5.mp3 film6.mp3 Videos
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd Videos
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Videos$ ls
film1.mp3  film2.mp3  film3.mp3  film4.mp3  film5.mp3  film6.mp3
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Videos$ █
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Music$ cd ..
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mv snap1.mp3 snap2.mp3 snap3.mp3 snap4.mp3 snap5.mp3 snap6.mp3 Pictures
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cd Pictures
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Pictures$ ls
10.png  16.png  '1 c.png'  7.png  d.png  jdsalkjoe.png  snap1.mp3  tuvi.png
11.png  17.png  1.png    8.png  fhgjhfhgdfhhjvfjg.png  ljjji.png  snap2.mp3  yh1sg.png
12.png  18.png  2.png    9.png  gdehekjw.png  nuesguyewue.png  snap3.mp3  yhk.png
13.png  '1 ABC.png'  4.png  dasfhstd.png  ghhhhh.png  sbadhasajdotwqhd.png  snap4.mp3
14.png  '1 a.png'   5.png  dbshf.png  hhhhhh.png  'Screenshot from 2021-08-09 21-12-21.png'  snap5.mp3
15.png  1b.png   6.png  djjjjjjj.png  hjkls.png  sdnfblkjasdhfjknsn.png  snap6.mp3
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~/Pictures$ █
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ mkdir family friends work
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls
aosp                               keygen.pub
'Assignment 2 Donis Abraham.ps'   lampstack-8.0.9-0
copy.txt                            music
Desktop                            Pictures
Documents                           Public
Downloads                           qs
examples.desktop                   Templates
family                             Videos
friends                            work
gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf
keygen
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ █
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cp Music/song1.mp3 Music/song2.mp3 Music/song3.mp3 Music/song4.mp3 Music/song5.mp3 Music/song6.mp3 friends  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cp Pictures/snap1.mp3 Pictures/snap2.mp3 Pictures/snap3.mp3 Pictures/snap4.mp3 Pictures/snap5.mp3 Pictures/snap6.mp3 family  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ rmdir friends family  
rmdir: failed to remove 'friends': Directory not empty  
rmdir: failed to remove 'family': Directory not empty  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ rm -r family friends  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls  
aosp  
'Assignment 2 Donis Abraham.ps'  
copy.txt  
Desktop  
Documents  
Downloads  
examples.desktop  
gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabihf  
keygen  
keygen.pub  
lampstack-8.0.9-0  
music  
Music  
Pictures  
Public  
qs  
Templates  
Videos  
work  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ls -al >allfiles.txt  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ date  
Tue Aug 17 22:13:14 IST 2021  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

9. Add the user Juliet

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd juliet  
[sudo] password for aim:  
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
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:/var/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin):/var/lib/gnats:/usr/sbin/nologin
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo passwd juliet
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupadd -g 30000 shakespeare
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

13. Create a supplementary group called artists.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo groupadd -g 50000 artists
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/group
root:x:0:
daemon:x:1:
bin:x:2:
sys:x:3:
adm:x:4:syslog,aim
tty:x:5:
disk:x:6:
lp:x:7:
mail:x:8:
news:x:9:
uucp:x:10:
man:x:12:
proxy:x:13:
kmem:x:15:
dialout:x:20:
fax:x:21:
voice:x:22:
cdrom:x:24:aim
floppy:x:25:
tape:x:26:
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ groups juliet
juliet : juliet
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -a -G shakespeare
juliet
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ groups juliet
juliet : juliet shakespeare
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ id juliet
uid=12346(juliet) gid=12348(juliet) groups=12348(juliet),30000(shakespeare)
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

17. Add Romeo and Hamlet to the Shakespeare group.

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd romeo
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd hamlet
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -a -G shakespeare
romeo hamlet
Usage: usermod [options] LOGIN

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

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd reba
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd dolly
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd elvis
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo useradd -a -G artists
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -a -G artists reba
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -a -G artists dolly
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo usermod -a -G artists elvis
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ cat /etc/group
root:x:0:
juliet:x:12348:
shakespeare:x:30000:juliet
artists:x:50000:reba,dolly,elvis
romeo:x:50001:
hamlet:x:50002:
reba:x:12349:
dolly:x:12350:
elvis:x:12351:
cat: file: No such file or directory
```

20. Attempt to remove user Dolly.

```
cat: file: No such file or directory
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo userdel dolly
```

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 .

ping

```
C:\Users\DAK>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
           [-r count] [-s count] [[-j host-list] | [-k host-list]]
           [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
           [-4] [-6] target_name

Options:
  -t      Ping the specified host until stopped.
          To see statistics and continue - type Control-Break;
          To stop - type Control-C.
  -a      Resolve addresses to hostnames.
  -n count Number of echo requests to send.
  -l size Send buffer size.
  -f      Set Don't Fragment flag in packet (IPv4-only).
  -i TTL  Time To Live.
  -v TOS  Type Of Service (IPv4-only. This setting has been deprecated
          and has no effect on the type of service field in the IP
          Header).
  -r count Record route for count hops (IPv4-only).
  -s count Timestamp for count hops (IPv4-only).
  -j host-list Loose source route along host-list (IPv4-only).
  -k host-list Strict source route along host-list (IPv4-only).
  -w timeout Timeout in milliseconds to wait for each reply.
  -R      Use routing header to test reverse route also (IPv6-only).
          Per RFC 5095 the use of this routing header has been
          deprecated. Some systems may drop echo requests if
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=119 time=24.0 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=119 time=24.5 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=119 time=25.1 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=119 time=24.4 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=119 time=23.7 ms
^[[c64 bytes from 8.8.8.8: icmp_seq=6 ttl=119 time=23.9 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=119 time=24.1 ms
^[[c64 bytes from 8.8.8.8: icmp_seq=8 ttl=119 time=23.9 ms

64 bytes from 8.8.8.8: icmp_seq=9 ttl=119 time=23.0 ms

64 bytes from 8.8.8.8: icmp_seq=10 ttl=119 time=142 ms

64 bytes from 8.8.8.8: icmp_seq=11 ttl=119 time=151 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=119 time=78.1 ms
^Z
```

route

```
C:\Users\DAK>route

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.
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         csp1.zte.com.cn 0.0.0.0       UG    600    0        0 wlo1
192.168.1.0    0.0.0.0       255.255.255.0   U     600    0        0 wlo1
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         192.168.1.1   0.0.0.0       UG    600    0        0 wlo1
192.168.1.0    0.0.0.0       255.255.255.0   U     600    0        0 wlo1
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ route -cn
route: invalid option -- 'c'
Usage: route [-nVee] [-FC] [<AF>]          List kernel routing tables
        route [-v] [-FC] {add|del|flush} ...  Modify routing table for AF.

        route {-h|--help} [<AF>]          Detailed usage syntax for specified AF.
        route {-V|--version}             Display version/author and exit.

        -v, --verbose                 be verbose
        -n, --numeric                don't resolve names
        -e, --extend                 display other/more information
        -F, --fib                   display Forwarding Information Base (default)
        -C, --cache                 display routing cache instead of FIB
```

traceroute

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ traceroute www.google.com
traceroute to www.google.com (142.250.195.132), 64 hops max
 1 * * *
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ traceroute --help
Usage: traceroute [OPTION...] HOST
Print the route packets trace to network host.

-f, --first-hop=NUM      set initial hop distance, i.e., time-to-live
-g, --gateways=GATES    list of gateways for loose source routing
-I, --icmp               use ICMP ECHO as probe
-m, --max-hop=NUM        set maximal hop count (default: 64)
-M, --type=METHOD        use METHOD ('icmp' or 'udp') for traceroute
                         operations, defaulting to 'udp'
-p, --port=PORT          use destination PORT port (default: 33434)
-q, --tries=NUM           send NUM probe packets per hop (default: 3)
--resolve-hostnames      resolve hostnames
-t, --tos=NUM             set type of service (TOS) to NUM
-w, --wait=NUM            wait NUM seconds for response (default: 3)
-?, --help                give this help list
--usage                 give a short usage message
-V, --version              print program version

Mandatory or optional arguments to long options are also mandatory or optional
for any corresponding short options.

Report bugs to <bug-netutils@gnu.org>
```

```
C:\Users\DAK>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d                  Do not resolve addresses to hostnames.
  -h maximum hops    Maximum number of hops to search for target.
  -j host-list        Loose source route along host-list (IPv4-only).
  -w timeout          Wait timeout milliseconds for each reply.
  -R                  Trace round-trip path (IPv6-only).
  -S srcaddr          Source address to use (IPv6-only).
  -4                  Force using IPv4.
  -6                  Force using IPv6.

C:\Users\DAK>
```

```
C:\Users\DAK>tracert -S
A value must be supplied for option -S.

C:\Users\DAK>
C:\Users\DAK>tracert -R
A target name or address must be specified.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d                  Do not resolve addresses to hostnames.
  -h maximum_hops    Maximum number of hops to search for target.
  -j host-list        Loose source route along host-list (IPv4-only).
  -w timeout          Wait timeout milliseconds for each reply.
  -R                  Trace round-trip path (IPv6-only).
  -S srcaddr          Source address to use (IPv6-only).
  -4                  Force using IPv4.
  -6                  Force using IPv6.
```

```
C:\Users\DAK>tracert -S
A value must be supplied for option -S.

C:\Users\DAK>tracert -j
A target name or address must be specified.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d           Do not resolve addresses to hostnames.
  -h maximum_hops   Maximum number of hops to search for target.
  -j host-list     Loose source route along host-list (IPv4-only).
  -w timeout       Wait timeout milliseconds for each reply.
  -R             Trace round-trip path (IPv6-only).
  -S srcaddr       Source address to use (IPv6-only).
  -4             Force using IPv4.
  -6             Force using IPv6.
```

```
C:\Users\DAK>tracert -W
-W is not a valid command option.

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
                [-R] [-S srcaddr] [-4] [-6] target_name

Options:
  -d           Do not resolve addresses to hostnames.
  -h maximum_hops   Maximum number of hops to search for target.
  -j host-list     Loose source route along host-list (IPv4-only).
  -w timeout       Wait timeout milliseconds for each reply.
  -R             Trace round-trip path (IPv6-only).
  -S srcaddr       Source address to use (IPv6-only).
  -4             Force using IPv4.
  -6             Force using IPv6.
```

Nslookup

```
C:\Users\DAK>nslookup
Default Server: csp1.zte.com.cn
Address: fe80::1

> google.com
Server: csp1.zte.com.cn
Address: fe80::1

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4007:811::200e
          172.217.166.110

> gmail.com
Server: csp1.zte.com.cn
Address: fe80::1

Non-authoritative answer:
Name: gmail.com
Addresses: 2404:6800:4007:820::2005
          142.250.193.133

> reldec.co.in
Server: csp1.zte.com.cn
Address: fe80::1

*** csp1.zte.com.cn can't find reldec.co.in: Non-existent domain
> donisabk-aim.web.app
Server: csp1.zte.com.cn
Address: fe80::1

Non-authoritative answer:
Name: donisabk-aim.web.app
Addresses: 2620:0:890::100
          199.36.158.100

>
```

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ nslookup www.google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name: www.google.com
Address: 142.250.195.100
Name: www.google.com
Address: 2404:6800:4007:825::2004

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

ipconfig

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ifconfig
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 6579 bytes 640107 (640.1 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 6579 bytes 640107 (640.1 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.5 netmask 255.255.255.0 broadcast 192.168.1.255
        inet6 fe80::e12b:1de6:9043:cb76 prefixlen 64 scopeid 0x20<link>
            ether f8:a2:d6:18:ce:48 txqueuelen 1000 (Ethernet)
            RX packets 60198 bytes 66436298 (66.4 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 35467 bytes 7980033 (7.9 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

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

C:\Users\DAK>ipconfig

Windows IP Configuration

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 Local Area Connection* 11:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . .

Wireless LAN adapter Wi-Fi:
    Connection-specific DNS Suffix . .
    Link-local IPv6 Address . . . . . : fe80::dc7d:fdbe:c612:d57%11
    IPv4 Address . . . . . : 192.168.1.5
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::1%11
```

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

C:\Users\DAK>ipconfig/all

Windows IP Configuration

Host Name . . . . . : DESKTOP-038E77Q
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Wireless LAN adapter Local Area Connection* 1:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
Physical Address. . . . . : 1A-A2-D6-18-CE-48
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
Physical Address. . . . . : 2A-A2-D6-18-CE-48
DHCP Enabled. . . . . : Yes
```

netstat

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ 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:*
tcp      0      0 localhost:domain         0.0.0.0:*
tcp      0      0 localhost:ipp            0.0.0.0:*
tcp      0      0 aim-vivobook-15-a:42892 maa05s19-in-f10.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:50530 maa05s14-in-f14.1:https TIME_WAIT
tcp      0      0 aim-vivobook-15-a:34600 ec2-34-209-131-4:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:35334 maa03s26-in-f5.1e:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:50534 maa05s14-in-f14.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:36458 whatsapp-cdn-shv:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:42254 si-in-f189.1e100.:https ESTABLISHED
tcp6     0      0 [::]:http               [::]:*
```

```

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ netstat -s
Ip:
    Forwarding: 2
    67583 total packets received
    0 forwarded
    0 incoming packets discarded
    67533 incoming packets delivered
    42316 requests sent out
Icmp:
    13 ICMP messages received
    0 input ICMP message failed
    ICMP input histogram:
        destination unreachable: 13
    17 ICMP messages sent
    0 ICMP messages failed
    ICMP output histogram:
        destination unreachable: 17
IcmpMsg:
    InType3: 13
    OutType3: 17
Tcp:
    424 active connection openings
    0 passive connection openings
    8 failed connection attempts
    20 connection resets received

```

```

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ 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:*
tcp      0      0 localhost:domain        0.0.0.0:*
tcp      0      0 localhost:ipp           0.0.0.0:*
tcp      0      0 aim-vivobook-15-a:42892 maa05s19-in-f10.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:50530 maa05s14-in-f14.1:https TIME_WAIT
tcp      0      0 aim-vivobook-15-a:34600 ec2-34-209-131-4.:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:35334 maa03s26-in-f5.1e:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:50534 maa05s14-in-f14.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:36458 whatsapp-cdn-shv-:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:42254 si-in-f189.1e100.:https ESTABLISHED
tcp6     0      0 [::]:http              [::]:*                  LISTEN

```

```

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ netstat -v
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp      0      0 aim-vivobook-15-a:42892 maa05s19-in-f10.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:34600 ec2-34-209-131-4.:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:35334 maa03s26-in-f5.1e:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:50534 maa05s14-in-f14.1:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:36458 whatsapp-cdn-shv-:https ESTABLISHED
tcp      0      0 aim-vivobook-15-a:42254 si-in-f189.1e100.:https ESTABLISHED
netstat: no support for 'AF INET (sctp)' on this system.
netstat: no support for 'AF INET (sctp)' on this system.
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State         I-Node Path
unix  2      [ ]        DGRAM                    35774  /run/user/1000/systemd/notify
unix  2      [ ]        DGRAM                    30138  /run/user/121/systemd/notify
unix  2      [ ]        DGRAM                   1114   /run/lsnsnd/notify

```

```
C:\Users\DAK>NetStat -n
```

```
Active Connections
```

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:52576	127.0.0.1:52577	ESTABLISHED
TCP	127.0.0.1:52577	127.0.0.1:52576	ESTABLISHED
TCP	127.0.0.1:52578	127.0.0.1:52579	ESTABLISHED
TCP	127.0.0.1:52579	127.0.0.1:52578	ESTABLISHED
TCP	127.0.0.1:52580	127.0.0.1:52581	ESTABLISHED
TCP	127.0.0.1:52581	127.0.0.1:52580	ESTABLISHED
TCP	127.0.0.1:52582	127.0.0.1:52583	ESTABLISHED
TCP	127.0.0.1:52583	127.0.0.1:52582	ESTABLISHED
TCP	127.0.0.1:60610	127.0.0.1:60609	TIME_WAIT
TCP	127.0.0.1:62381	127.0.0.1:62380	TIME_WAIT
TCP	192.168.1.5:49798	172.217.31.197:443	TIME_WAIT
TCP	192.168.1.5:49799	13.107.42.12:443	ESTABLISHED
TCP	192.168.1.5:49800	20.38.101.132:443	ESTABLISHED
TCP	192.168.1.5:49803	51.38.152.26:4005	ESTABLISHED
TCP	192.168.1.5:50402	20.198.162.76:443	ESTABLISHED
TCP	192.168.1.5:50708	202.88.226.32:443	CLOSE_WAIT
TCP	192.168.1.5:52439	51.38.152.26:4005	TIME_WAIT
TCP	192.168.1.5:58006	20.44.229.112:443	TIME_WAIT

```
C:\Users\DAK>NetStat -a
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:445	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:808	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:5040	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49664	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49665	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49666	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49667	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49668	DESKTOP-038E77Q:0	LISTENING
TCP	0.0.0.0:49672	DESKTOP-038E77Q:0	LISTENING
TCP	127.0.0.1:1001	DESKTOP-038E77Q:0	LISTENING
TCP	127.0.0.1:5939	DESKTOP-038E77Q:0	LISTENING
TCP	127.0.0.1:27015	DESKTOP-038E77Q:0	LISTENING
TCP	127.0.0.1:49681	DESKTOP-038E77Q:0	LISTENING
TCP	127.0.0.1:52576	DESKTOP-038E77Q:52577	ESTABLISHED
TCP	127.0.0.1:52577	DESKTOP-038E77Q:52576	ESTABLISHED
TCP	127.0.0.1:52578	DESKTOP-038E77Q:52579	ESTABLISHED
TCP	127.0.0.1:52579	DESKTOP-038E77Q:52578	ESTABLISHED
TCP	127.0.0.1:52580	DESKTOP-038E77Q:52581	ESTABLISHED
TCP	127.0.0.1:52581	DESKTOP-038E77Q:52580	ESTABLISHED
TCP	127.0.0.1:52582	DESKTOP-038E77Q:52583	ESTABLISHED
TCP	127.0.0.1:52583	DESKTOP-038E77Q:52582	ESTABLISHED
TCP	127.0.0.1:60255	DESKTOP-038E77Q:60254	TIME_WAIT
TCP	127.0.0.1:62381	DESKTOP-038E77Q:62380	TIME_WAIT
TCP	192.168.1.5:139	DESKTOP-038E77Q:0	LISTENING
TCP	192.168.1.5:49670	maa03s43-in-f3:https	TIME_WAIT
TCP	192.168.1.5:49798	maa03s28-in-f5:https	TIME_WAIT
TCP	192.168.1.5:49799	1drv:https	ESTABLISHED
TCP	192.168.1.5:49800	20.38.101.132:https	ESTABLISHED
TCP	192.168.1.5:49803	ip26:4005	ESTABLISHED
TCP	192.168.1.5:50402	20.198.162.76:https	ESTABLISHED
TCP	192.168.1.5:50708	32:https	CLOSE_WAIT

```
C:\Users\DAK>NetStat
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:52576	DESKTOP-038E77Q:52577	ESTABLISHED
TCP	127.0.0.1:52577	DESKTOP-038E77Q:52576	ESTABLISHED
TCP	127.0.0.1:52578	DESKTOP-038E77Q:52579	ESTABLISHED
TCP	127.0.0.1:52579	DESKTOP-038E77Q:52578	ESTABLISHED
TCP	127.0.0.1:52580	DESKTOP-038E77Q:52581	ESTABLISHED
TCP	127.0.0.1:52581	DESKTOP-038E77Q:52580	ESTABLISHED
TCP	127.0.0.1:52582	DESKTOP-038E77Q:52583	ESTABLISHED
TCP	127.0.0.1:52583	DESKTOP-038E77Q:52582	ESTABLISHED
TCP	127.0.0.1:60610	DESKTOP-038E77Q:60609	TIME_WAIT
TCP	127.0.0.1:62248	DESKTOP-038E77Q:62247	TIME_WAIT
TCP	192.168.1.5:50402	20.198.162.76:https	ESTABLISHED
TCP	192.168.1.5:50708	32:https	CLOSE_WAIT
TCP	192.168.1.5:52439	ip26:4005	ESTABLISHED
TCP	192.168.1.5:58005	maa03s28-in-f5:https	TIME_WAIT

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

Getmac

```
C:\Users\DAK>getmac

Physical Address      Transport Name
=====
F8-A2-D6-18-CE-48    \Device\Tcpip_{620269E8-37DA-4F04-8433-E0E8A57F90AC}
F8-A2-D6-19-05-D4    Media disconnected

C:\Users\DAK>
```

hostname

```
C:\Users\DAK>hostname
DESKTOP-038E77Q

C:\Users\DAK>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

-a           Displays current ARP entries by interrogating the current
            protocol data. If inet_addr is specified, the IP and Physical
            addresses for only the specified computer are displayed. If
            more than one network interface uses ARP, entries for each ARP
            table are displayed.
-g           Same as -a.
-v           Displays current ARP entries in verbose mode. All invalid
            entries and entries on the loop-back interface will be shown.
inet_addr   Specifies an internet address.
-N if_addr   Displays the ARP entries for the network interface specified
            by if_addr.
```

ARP

```
C:\Users\DAK>hostname  
DESKTOP-038E77Q  
  
C:\Users\DAK>arp  
  
Displays and modifies the IP-to-Physical address translation tables used by  
address resolution protocol (ARP).  
  
ARP -s inet_addr eth_addr [if_addr]  
ARP -d inet_addr [if_addr]  
ARP -a [inet_addr] [-N if_addr] [-v]  
  
-a           Displays current ARP entries by interrogating the current  
             protocol data. If inet_addr is specified, the IP and Physical  
             addresses for only the specified computer are displayed. If  
             more than one network interface uses ARP, entries for each ARP  
             table are displayed.  
-g           Same as -a.  
-v           Displays current ARP entries in verbose mode. All invalid  
             entries and entries on the loop-back interface will be shown.  
inet_addr    Specifies an internet address.  
-N if_addr   Displays the ARP entries for the network interface specified  
             by if_addr.
```

System Info

```
C:\Users\DAK>systeminfo  
  
Host Name:          DESKTOP-038E77Q  
OS Name:           Microsoft Windows 10 Pro  
OS Version:        10.0.19042 N/A Build 19042  
OS Manufacturer:  Microsoft Corporation  
OS Configuration: Standalone Workstation  
OS Build Type:   Multiprocessor Free  
Registered Owner: DAK  
Registered Organization:  
Product ID:        00331-10000-00001-AA698  
Original Install Date: 7/25/2021, 7:00:22 PM  
System Boot Time: 9/12/2021, 10:28:24 PM  
System Manufacturer: ASUSTeK COMPUTER INC.  
System Model:      VivoBook 15_ASUS Laptop X540MA_X540MA  
System Type:       x64-based PC  
Processor(s):     1 Processor(s) Installed.  
                  [01]: Intel64 Family 6 Model 122 Stepping 1 GenuineIntel ~1101 Mhz  
BIOS Version:      American Megatrends Inc. X540MA.314, 10/1/2019  
Windows Directory: C:\WINDOWS  
System Directory:  C:\WINDOWS\system32  
Boot Device:       \Device\HarddiskVolume2  
System Locale:    en-us;English (United States)
```

Pathping

```
C:\Users\DAK>pathping

Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]
                 [-p period] [-q num_queries] [-w timeout]
                 [-4] [-6] target_name

Options:
  -g host-list      Loose source route along host-list.
  -h maximum_hops  Maximum number of hops to search for target.
  -i address        Use the specified source address.
  -n                Do not resolve addresses to hostnames.
  -p period         Wait period milliseconds between pings.
  -q num_queries   Number of queries per hop.
  -w timeout        Wait timeout milliseconds for each reply.
  -4                Force using IPv4.
  -6                Force using IPv6.
```

Net

```
C:\Users\DAK>net
The syntax of this command is:

NET
  [ ACCOUNTS | COMPUTER | CONFIG | CONTINUE | FILE | GROUP | HELP |
    HELPMMSG | LOCALGROUP | PAUSE | SESSION | SHARE | START |
    STATISTICS | STOP | TIME | USE | USER | VIEW ]
```

Nbstat

```
C:\Users\DAK>nbtstat

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
           [-r] [-R] [-s] [-S] [interval] ]

  -a  (adapter status) Lists the remote machine's name table given its name.
  -A  (Adapter status) Lists the remote machine's name table given its
      IP address.
  -c  (cache)          Lists NBT's cache of remote [machine] names and their IP addresses.
  -n  (names)          Lists local NetBIOS names.
  -r  (resolved)       Lists names resolved by broadcast and via WINS.
  -R  (Reload)         Purges and reloads the remote cache name table.
  -S  (Sessions)       Lists sessions table with the destination IP addresses.
  -s  (sessions)       Lists sessions table converting destination IP
                      addresses to computer NETBIOS names.
  -RR  (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

  RemoteName  Remote host machine name.
  IP address  Dotted decimal representation of the IP address.
  interval    Redisplays selected statistics, pausing interval seconds
              between each display. Press Ctrl+C to stop redisplaying
              statistics.
```

Linux Command

Dig

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ dig google.com
; <>> DiG 9.11.3-1ubuntu1.12-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51884
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.           IN      A

;; ANSWER SECTION:
google.com.        29      IN      A       172.217.166.110

;; Query time: 131 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Mon Sep 13 11:40:28 IST 2021
;; MSG SIZE  rcvd: 55

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ arp
Address          HWtype  HWaddress          Flags Mask     Iface
csp3.zte.com.cn   ether   5c:3a:3d:5d:80:7b  C          wlo1
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

Arp

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ dig google.com
; <>> DiG 9.11.3-1ubuntu1.12-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51884
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.           IN      A

;; ANSWER SECTION:
google.com.        29      IN      A       172.217.166.110

;; Query time: 131 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Mon Sep 13 11:40:28 IST 2021
;; MSG SIZE  rcvd: 55

aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ arp
Address          HWtype  HWaddress          Flags Mask     Iface
csp3.zte.com.cn   ether   5c:3a:3d:5d:80:7b  C          wlo1
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

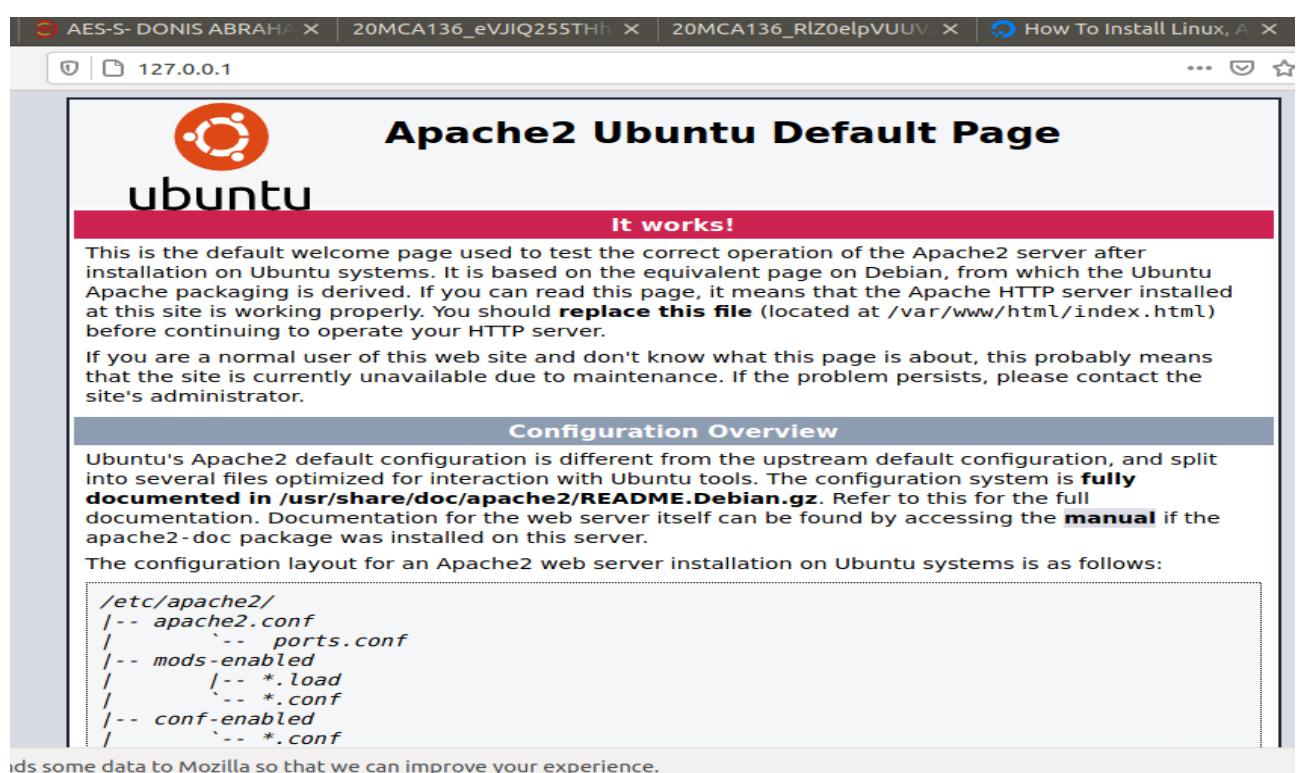
Host

```
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ host google.com
google.com has address 172.217.166.110
google.com has IPv6 address 2404:6800:4007:811::200e
google.com mail is handled by 40 alt3.aspmx.l.google.com.
google.com mail is handled by 30 alt2.aspmx.l.google.com.
google.com mail is handled by 50 alt4.aspmx.l.google.com.
google.com mail is handled by 10 aspmx.l.google.com.
google.com mail is handled by 20 alt1.aspmx.l.google.com.
aim@aim-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

- Take the screenshots of LAMP installation and outputs, Submit them as a document

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA: ~
File Edit View Search Terminal Help
lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.
service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
Processing triggers for systemd (237-3ubuntu10.42) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ufw (0.36-0ubuntu0.18.04.1) ...
Processing triggers for ureadahead (0.100.0-21) ...
ureadahead will be reprofiled on next reboot
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo ufw app list
Available applications:
 Apache
 Apache Full
 Apache Secure
 CUPS
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo ufw app info "Apache Full"
Profile: Apache Full
Title: Web Server (HTTP,HTTPS)
Description: Apache v2 is the next generation of the omnipresent Apache web
server.

Ports:
 80,443/tcp
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```



```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA: ~
File Edit View Search Terminal Help
- Removing privileges on test database...
Success.

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

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.

All done!
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

PHP Version 7.2.24-0ubuntu0.18.04.9



System	Linux dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA 5.4.0-42-generic #46~18.04.1-Ubuntu SMP Fri Jul 10 07:21:24 UTC 2020 x86_64
Build Date	Aug 16 2021 05:46:32
Server API	Apache 2.0 Handler
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc/php/7.2/apache2
Loaded Configuration File	/etc/php/7.2/apache2/php.ini
Scan this dir for additional .ini files	/etc/php/7.2/apache2/conf.d
Additional .ini files parsed	/etc/php/7.2/apache2/conf.d/10-mysqlind.ini, /etc/php/7.2/apache2/conf.d/10-opcache.ini, /etc/php/7.2/apache2/conf.d/10-pdo.ini, /etc/php/7.2/apache2/conf.d/20-calendar.ini, /etc/php/7.2/apache2/conf.d/20-ctype.ini, /etc/php/7.2/apache2/conf.d/20-exif.ini, /etc/php/7.2/apache2/conf.d/20-finfo.info, /etc/php/7.2/apache2/conf.d/20-ftp.ini, /etc/php/7.2/apache2/conf.d/20-gettext.ini, /etc/php/7.2/apache2/conf.d/20-iconv.ini, /etc/php/7.2/apache2/conf.d/20-json.ini, /etc/php/7.2/apache2/conf.d/20-phar.ini, /etc/php/7.2/apache2/conf.d/20-posix.ini, /etc/php/7.2/apache2/conf.d/20-readline.ini, /etc/php/7.2/apache2/conf.d/20-shmop.ini, /etc/php/7.2/apache2/conf.d/20-sockets.ini, /etc/php/7.2/apache2/conf.d/20-sysvmsg.ini, /etc/php/7.2/apache2/conf.d/20-sysvsem.ini, /etc/php/7.2/apache2/conf.d/20-sysvshm.ini, /etc/php/7.2/apache2/conf.d/20-tokenizer.ini
PHP API	20170718
PHP Extension	20170718
Zend Extension	320170718
Zend Extension Build	API320170718,NTS
PHP Extension Build	API20170718,NTS
Debug Build	no
Thread Safety	disabled

Explain the steps for the installation of Ansible with your own screenshots.

Step 1 —Installing Ansible

To begin using Ansible as a means of managing your server infrastructure, you need to install the Ansible software on the machine that will serve as the Ansible control node.

From your control node, run the following command to include the official project's PPA (personal package archive) in your system's list of sources:

```
sudo apt-add-repository ppa:ansible/ansible
```

Press ENTER when prompted to accept the PPA addition.

Next, refresh your system's package index so that it is aware of the packages available in the newly included PPA:

```
sudo apt update
```

Following this update, you can install the Ansible software with:

```
sudo apt install ansible
```

Your Ansible control node now has all of the software required to administer your hosts. Next, we will go over how to add your hosts to the control node's inventory file so that it can control them.

```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo apt install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data libpython-stdlib libpython2.7 libpython2.7-minimal
  libpython2.7-stdlib python python-asn1crypto python-certifi
  python-cffi-backend python-chardet python-crypto python-cryptography
  python-enum34 python-httplib2 python-idna python-ipaddress python-jinja2
  python-jmespath python-kerberos python-libcloud python-lockfile
  python-markupsafe python-minimal python-netaddr python-openssl
  python-paramiko python-pkg-resources python-pyasn1 python-requests
  python-selinux python-simplejson python-six python-urllib3 python-xmldict
  python-yaml python2.7 python2.7-minimal
Suggested packages:
  asciimath python-doc python-tk python-crypto-doc
```

Step 2: Verify version of ansible

Following this command, you can find version of ansible installed.

Ansible -version

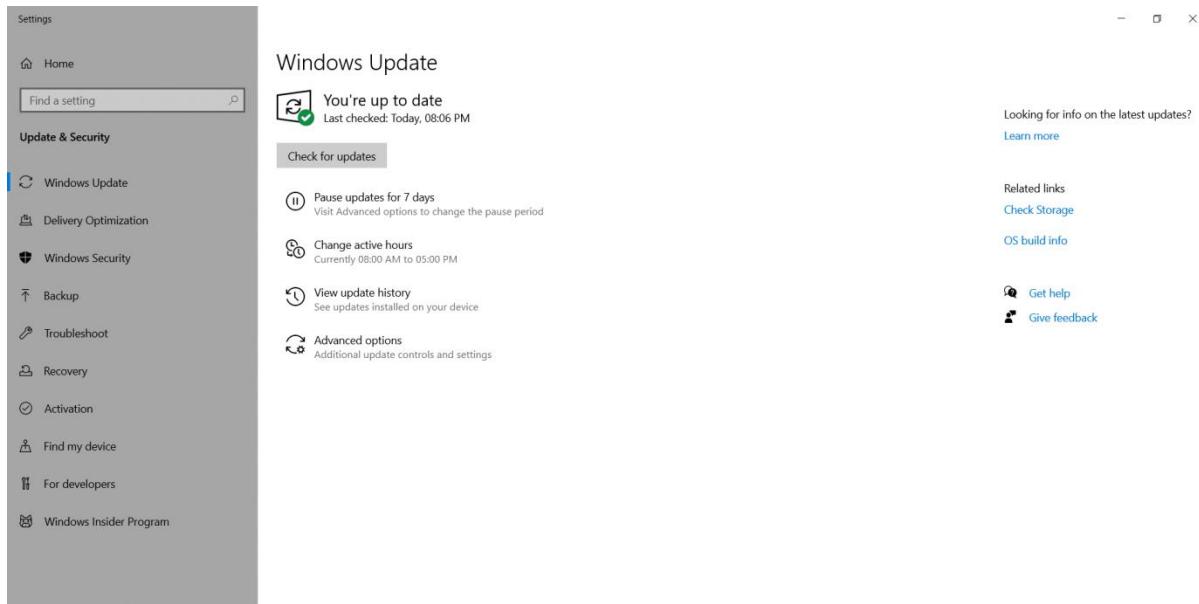
```
dak@dak-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ ansible --version
ansible 2.5.1
  config file = /etc/ansible/ansible.cfg
  configured module search path = [u'/home/dak/.ansible/plugins/modules', u'/usr/share/ansible/plugins/modules']
    ansible python module location = /usr/lib/python2.7/dist-packages/ansible
    executable location = /usr/bin/ansible
      python version = 2.7.17 (default, Feb 27 2021, 15:10:58) [GCC 7.5.0]
```

Installing Docker on Windows 10

First make sure Windows is up to date.

In the Windows search type "Windows Update" and select Windows Update setting.

You should see a green check and "You're up to date". If not click "Check for updates". You will need to repeat this process until you no longer have any updates to install.



Next install WSL2

- From the Windows Search Type "powershell" then right-click on Windows PowerShell and then Run as administrator.
- Click 'Yes' to allow PowerShell to make changes to your device.
- In the Administrator: Windows PowerShell window run (copy and past) "wsl --install" to install Windows Services for Linux (wsl).

```
PS C:\Windows\system32> wsl --install
Installing: Virtual Machine Platform
Virtual Machine Platform has been installed.
Installing: Windows Subsystem for Linux
Windows Subsystem for Linux has been installed.
Downloading: WSL Kernel
Installing: WSL Kernel
WSL Kernel has been installed.
Downloading: Ubuntu
The requested operation is successful. Changes will not be effective until the system is rebooted.
PS C:\Windows\system32>
```

- Next enable the Virtual Machine Platform. In the Administrator: Windows PowerShell run (copy and past) "dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart".

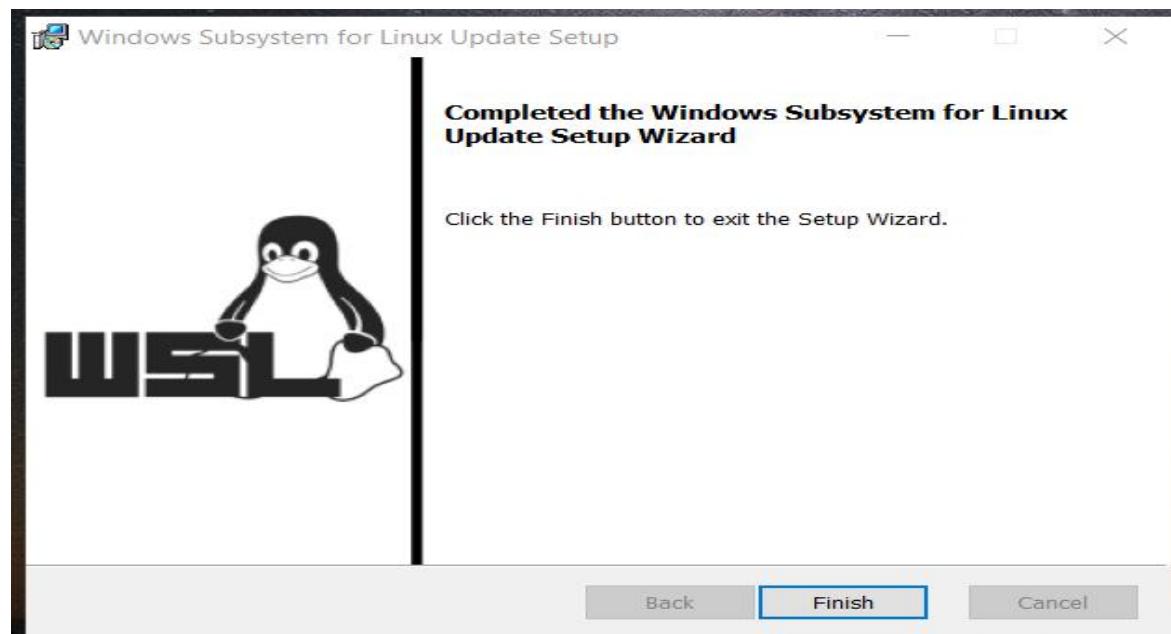
```
PS C:\Windows\system32> dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart

Deployment Image Servicing and Management tool
Version: 10.0.19041.844

Image Version: 10.0.19043.1266

Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
PS C:\Windows\system32>
```

- Download and install the WSL2 Linux kernel update package for x64 machines



- set up a Linux user

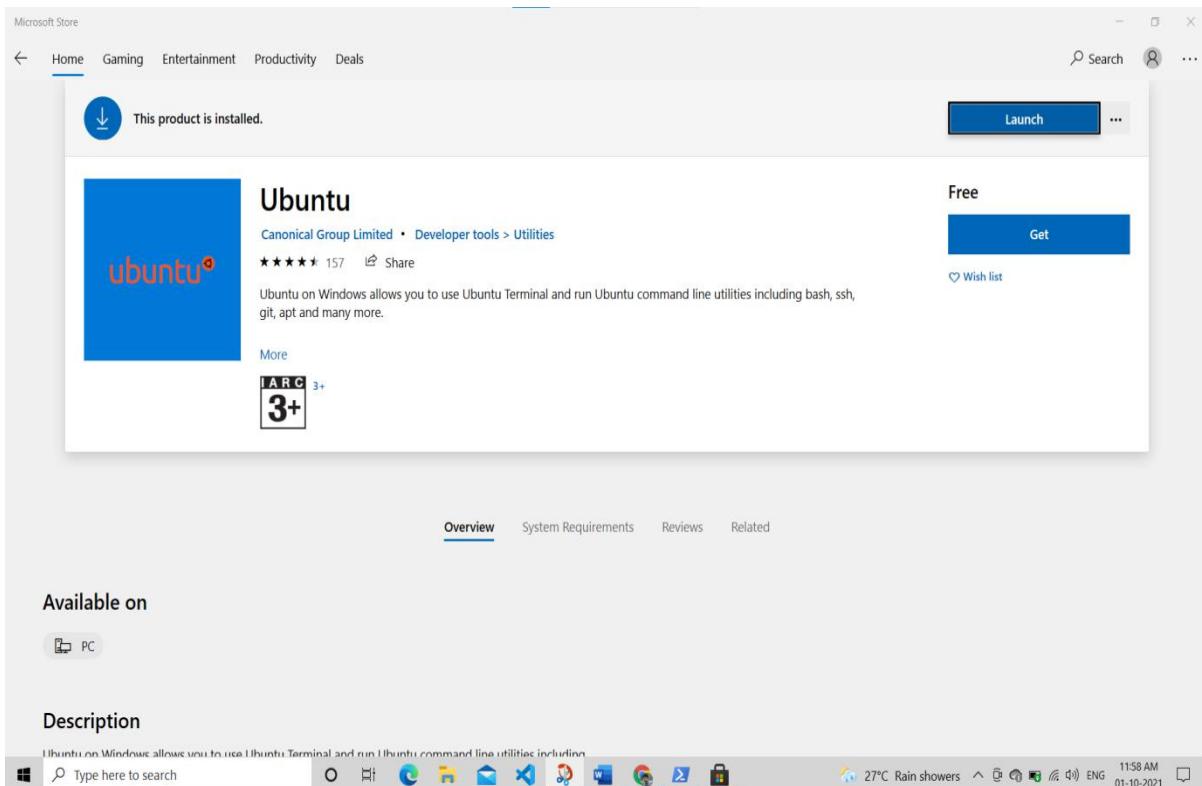


```
Retype new password:  
passwd: password updated successfully  
Installation successful!  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.10.16.3-microsoft-standard-WSL2 x86_64)  
  
 * Documentation: https://help.ubuntu.com  
 * Management: https://landscape.canonical.com  
 * Support: https://ubuntu.com/advantage  
  
 System information as of Fri Oct 1 11:50:30 IST 2021  
  
 System load: 0.16 Processes: 8  
 Usage of /: 0.4% of 250.98GB Users logged in: 0  
 Memory usage: 2% IPv4 address for eth0: 172.24.46.235  
 Swap usage: 0%  
  
 0 updates can be installed immediately.  
 0 of these updates are security updates.  
  
The list of available updates is more than a week old.  
To check for new updates run: sudo apt update  
  
This message is shown once once a day. To disable it please create the  
/home/sam/.hushlogin file.
```

- Reboot Windows.
- Again, from the Windows Search Type "powershell" then right-click on Windows PowerShell and then Run as administrator.
- In the PowerShell window run "**wsl --set-default-version 2**".

```
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Try the new cross-platform PowerShell https://aka.ms/pscore6  
  
PS C:\Windows\system32> wsl --set-default-version 2  
For information on key differences with WSL 2 please visit https://aka.ms/wsl2  
The operation completed successfully.  
PS C:\Windows\system32>
```

- Next install a Linux distribution from the Microsoft Store



- You will now be able to run Linux commands in the Ubuntu terminal window.

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

```
LAPTOP-2S6KTBFB:~$ ls  
LAPTOP-2S6KTBFB:~$ exit
```

Now you can install Docker Desktop for Windows

- Download the Docker Desktop for Windows installer from <https://www.docker.com/products/docker-desktop>

- Run the installer.

Installing Docker Desktop 4.1.0 (69386) — X

Configuration

- Install required Windows components for WSL 2
- Add shortcut to desktop

Installing Docker Desktop 4.1.0 (69386) — X

Docker Desktop 4.1.0

Unpacking files...

```
Unpacking file: resources/docker-desktop.iso
Unpacking file: resources/ddvp.ico
Unpacking file: resources/config-options.json
Unpacking file: resources/componentsVersion.json
Unpacking file: resources/bin/docker-compose
Unpacking file: resources/bin/docker
Unpacking file: resources/.gitignore
Unpacking file: InstallerCli.pdb
Unpacking file: InstallerCli.exe.config
Unpacking file: frontend/vk_swiftshader_icd.json
Unpacking file: frontend/v8_context_snapshot.bin
Unpacking file: frontend/snapshot_blob.bin
Unpacking file: frontend/resources/regedit/vbs/util.vbs
Unpacking file: frontend/resources/regedit/vbs/regUtil.vbs
```

Installing Docker Desktop 4.1.0 (69386) — X

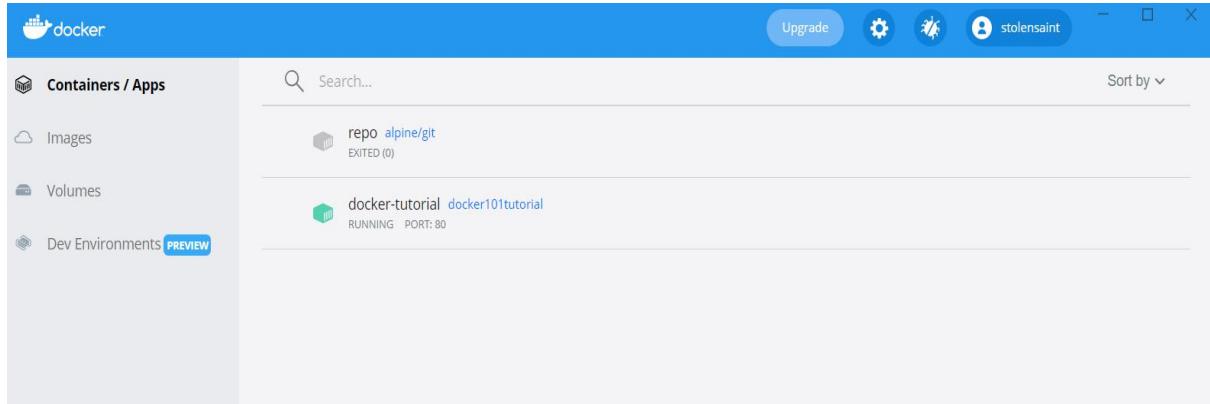
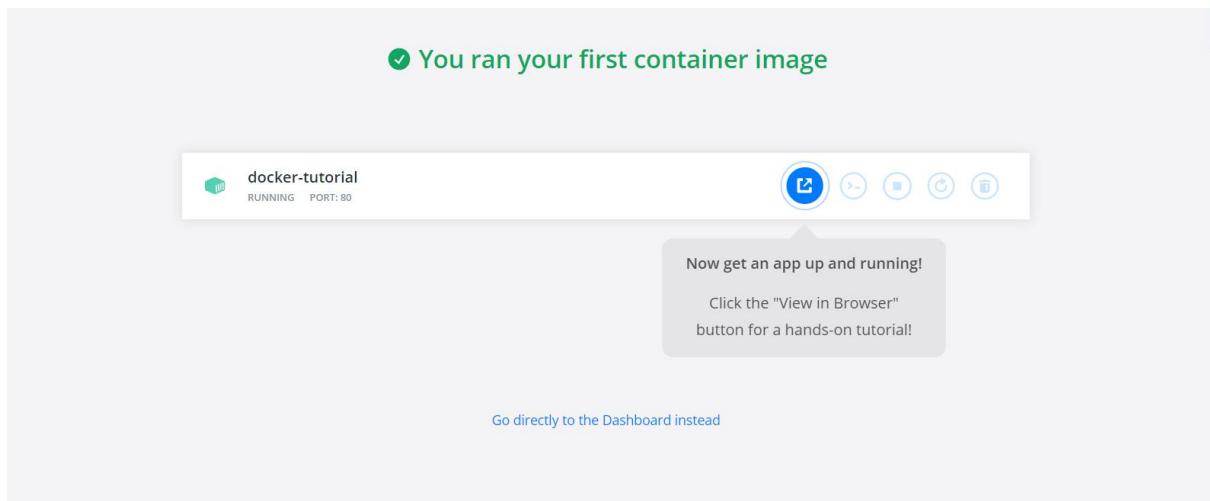
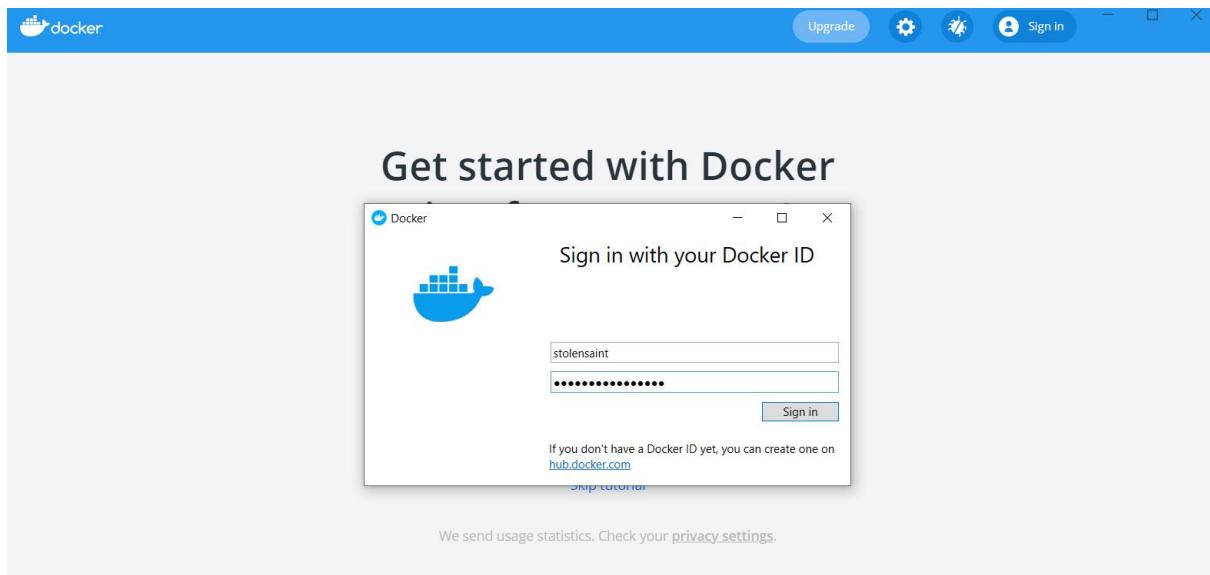
Docker Desktop 4.1.0

Installation succeeded

You must log out of Windows to complete installation.

[Close and log out](#)

- Reboot Windows.
- Login to Windows and let Docker finish setting up. This can take a few minutes depending on your machine.



- Run the docker “Hello World” from an Ubuntu Terminal run “**docker run hello-world**”.

```
Inable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
2db29710123e: Pull complete
Digest: sha256:9ade9cc2e26189a19c2e8854b9c8f1e14829b51c55a630ee675a5a9540ef6ccf
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

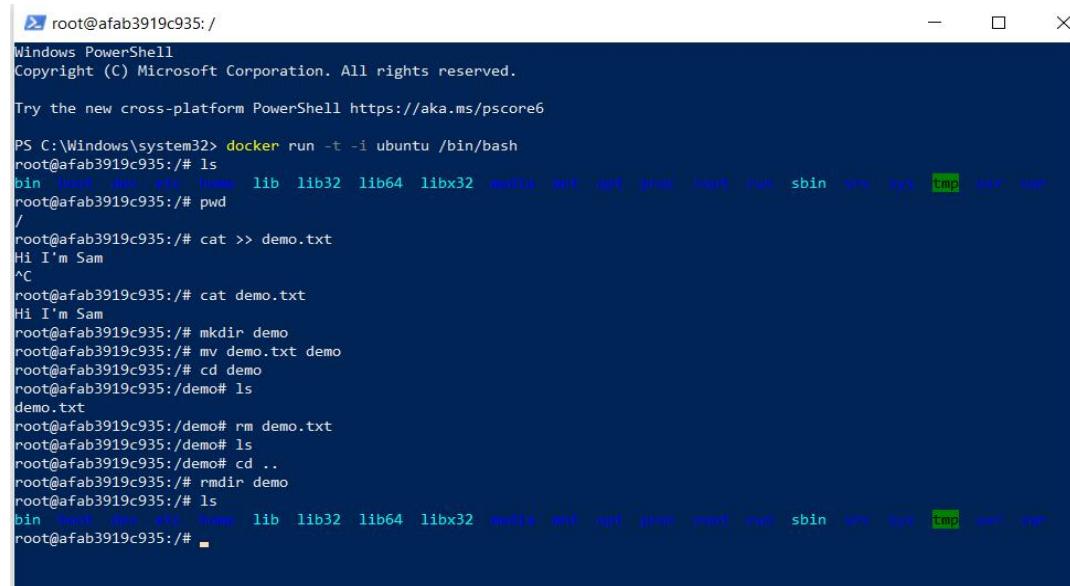
To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
```

Running Ubuntu Machine

- Run the command “**docker run -t -i ubuntu /bin/bash**” in powershell
- This is a Linux root bash, try some commands



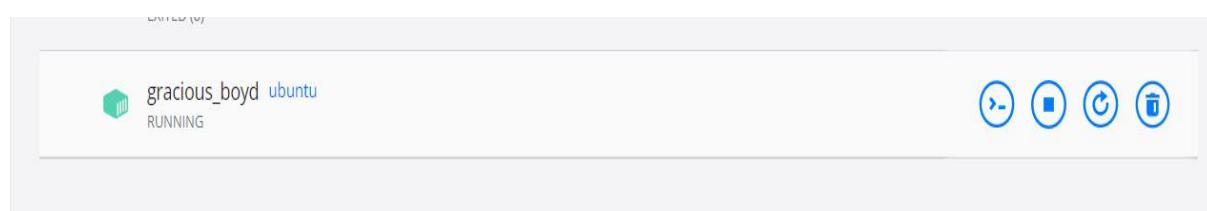
A screenshot of a Windows PowerShell window titled "Windows PowerShell". The title bar includes standard window controls (minimize, maximize, close). The command prompt shows the path "PS C:\Windows\system32>" followed by the command "docker run -t -i ubuntu /bin/bash". The resulting root shell session is displayed, showing basic Linux file system navigation and command execution. The user creates a file named "demo.txt", writes "Hi I'm Sam" to it, and then removes it. The session ends with a Ctrl+C interrupt.

```
root@afab3919c935:/ 
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Windows\system32> docker run -t -i ubuntu /bin/bash
root@afab3919c935:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin sys tmp var var
root@afab3919c935:/# pwd
/
root@afab3919c935:/# cat >> demo.txt
Hi I'm Sam
^C
root@afab3919c935:/# cat demo.txt
Hi I'm Sam
root@afab3919c935:/# mkdir demo
root@afab3919c935:/# mv demo.txt demo
root@afab3919c935:/# cd demo
root@afab3919c935:/demo# ls
demo.txt
root@afab3919c935:/demo# rm demo.txt
root@afab3919c935:/demo# ls
root@afab3919c935:/demo# cd ..
root@afab3919c935:/# rmdir demo
root@afab3919c935:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin sys tmp var var
root@afab3919c935:/#
```

Docker GUI-Containers

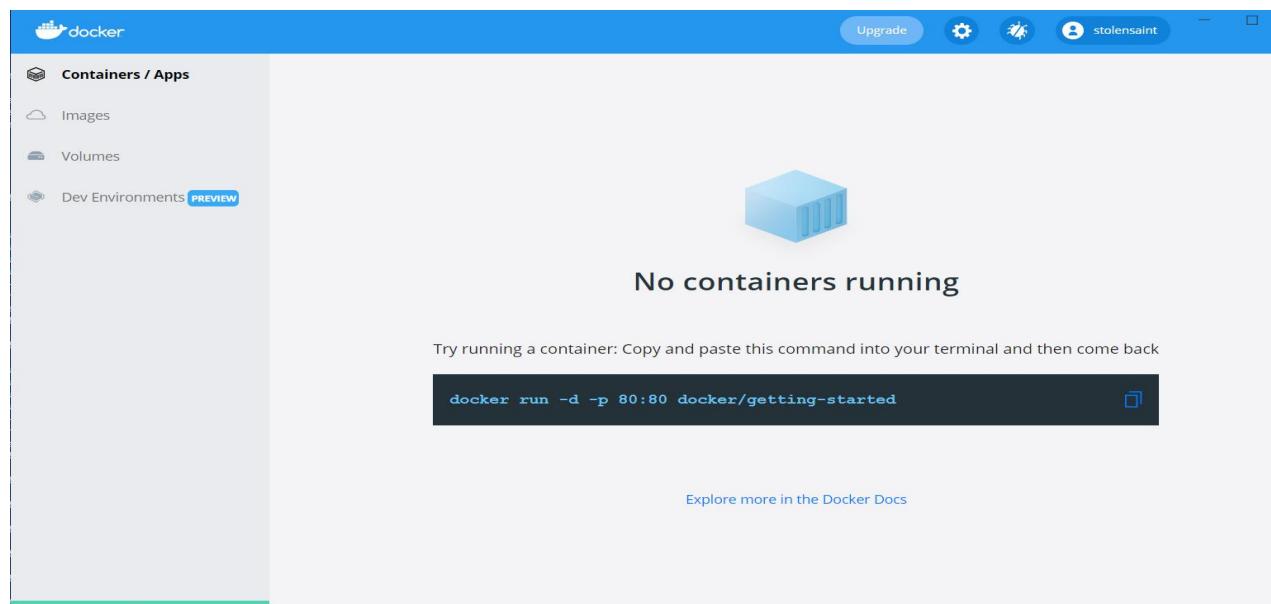


Removing All Containers

```
root@afab3919c935:/# exit
exit
PS C:\Windows\system32> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
acious_boyd
8d21c1d81c22 ubuntu:latest "bash" 6 hours ago Exited (255) 8 minutes ago
1b0186a069a3 ubuntu "bash" 6 hours ago Exited (0) 6 hours ago
48ab9a4423d5 ubuntu "bash" 7 hours ago Exited (0) 7 hours ago
fd9061619454 ubuntu "bash" 7 hours ago Exited (0) 7 hours ago
398156a697cc hello-world "/hello"
a7e83e3eeda docker101tutorial "/docker-entrypoint..." 8 hours ago Exited (0) 8 hours ago
e750d0f55bb4 alpine/git "git clone https://g..." 8 hours ago Exited (0) 8 hours ago
repo

PS C:\Windows\system32> docker rm -f busy_maxwell
busy_maxwell
PS C:\Windows\system32> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
afab3919c935 ubuntu "/bin/bash" 7 minutes ago Exited (0) 2 minutes ago
1b0186a069a3 ubuntu "bash" 6 hours ago Exited (0) 6 hours ago
48ab9a4423d5 ubuntu "bash" 8 hours ago Exited (0) 7 hours ago
fd9061619454 ubuntu "bash" 8 hours ago Exited (0) 7 hours ago
398156a697cc hello-world "/hello"
a7e83e3eeda docker101tutorial "/docker-entrypoint..." 8 hours ago Exited (0) 8 hours ago
e750d0f55bb4 alpine/git "git clone https://g..." 8 hours ago Exited (0) 8 hours ago
repo

PS C:\Windows\system32> docker rm -f gracious_boyd
gracious_boyd
PS C:\Windows\system32> docker rm -f serene_dubinsky
serene_dubinsky
PS C:\Windows\system32> docker rm -f serene_bhaskara
serene_bhaskara
PS C:\Windows\system32> docker rm -f beautiful_tereshkova
beautiful_tereshkova
PS C:\Windows\system32> docker rm -f jolly_torvalds
jolly_torvalds
PS C:\Windows\system32> docker rm -f docker-tutorial
docker-tutorial
PS C:\Windows\system32> docker rm -f repo
repo
PS C:\Windows\system32> docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
PS C:\Windows\system32>
```



1:Analyzing network packet stream using wireshark.

```
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ wireshark --version
Wireshark 2.6.10 (Git v2.6.10 packaged as 2.6.10-1~ubuntu18.04.0)

Copyright 1998-2019 Gerald Combs <gerald@wireshark.org> and contributors.
License GPLv2+: GNU GPL version 2 or later <http://www.gnu.org/licenses/old-licenses/gpl-2.0.html>
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

Compiled (64-bit) with Qt 5.9.5, with libpcap, with POSIX capabilities (Linux),
with libnl 3, with GLib 2.56.4, with zlib 1.2.11, with SMI 0.4.8, with c-ares
1.14.0, with Lua 5.2.4, with GnuTLS 3.5.18, with Gcrypt 1.8.1, with MIT
Kerberos, with MaxMind DB resolver, with nghttp2 1.30.0, with LZ4, with Snappy,
with libxml2 2.9.4, with QtMultimedia, with SBC, with SpanDSP, without bcg729.

Running on Linux 5.4.0-42-generic, with Intel(R) Pentium(R) Silver N5000 CPU @
1.10GHz (with SSE4.2), with 3758 MB of physical memory, with locale en_IN, with
libpcap version 1.8.1, with GnuTLS 3.5.18, with Gcrypt 1.8.1, with zlib 1.2.11,
binary plugins supported (0 loaded).

Built using gcc 7.4.0.
```

```
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo adduser donis wireshark
Adding user `donis' to group `wireshark' ...
Adding user donis to group wireshark
Done.
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```



Capturing From ens33						
No.	Time	Source	Destination	Protocol	Length	Info
2	1.173906162	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
3	1.999137810	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
4	2.999964395	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
5	4.176986535	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
6	4.999890910	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
7	5.999917800	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
8	7.178865467	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
9	8.001679738	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel
10	8.999938685	VMware_c0:00:08	Broadcast	ARP	60	Who has 192.168.17.2? Tel

* Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface ens33, id 0
* Ethernet II, Src: VMware_c0:00:08 (00:50:56:c0:00:08), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
* Address Resolution Protocol (request)

Hex dump:

0000	ff ff ff ff ff ff 00 50 56 c0 00 08 08 06 00 01P V.....
0010	08 00 06 04 00 01 00 50 56 c0 00 08 c0 a8 11 01P V.....
0020	00 00 00 00 00 00 c0 a8 11 02 00 00 00 00 00 00
0030	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

ens33: <live capture in progress> Packets: 10 - Displayed: 10 (100.0%) Profile: Default

2: Perform basic network service tests using nc.

```
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ sudo apt install netcat
Reading package lists... Done
Building dependency tree
Reading state information... Done
netcat is already the newest version (1.10-41.1).
The following package was automatically installed and is no longer required:
  shim
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ nc -h
OpenBSD netcat (Debian patchlevel 1.187-1ubuntu0.1)
usage: nc [-46CDdFhklNnrStUuvZz] [-I length] [-i interval] [-M ttl]
          [-m minttl] [-O length] [-P proxy_username] [-p source_port]
          [-q seconds] [-s source] [-T keyword] [-V rtable] [-W recvlimit] [-w timeout]
          [-X proxy_protocol] [-x proxy_address[:port]]           [destination]
[port]
Command Summary:
  -4          Use IPv4
  -6          Use IPv6
  -b          Allow broadcast
  -C          Send CRLF as line-ending
  -D          Enable the debug socket option
  -d          Detach from stdin
  -F          Pass socket fd
  -h          This help text
  -I length   TCP receive buffer length
  -i interval Delay interval for lines sent, ports scanned
```

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

```
i#!/bin/bash
echo Enter your name
read Donis
echo enter college name
read Amal Jyothi College
echo Name:$name
echo college:$Amal Jyothi College
```

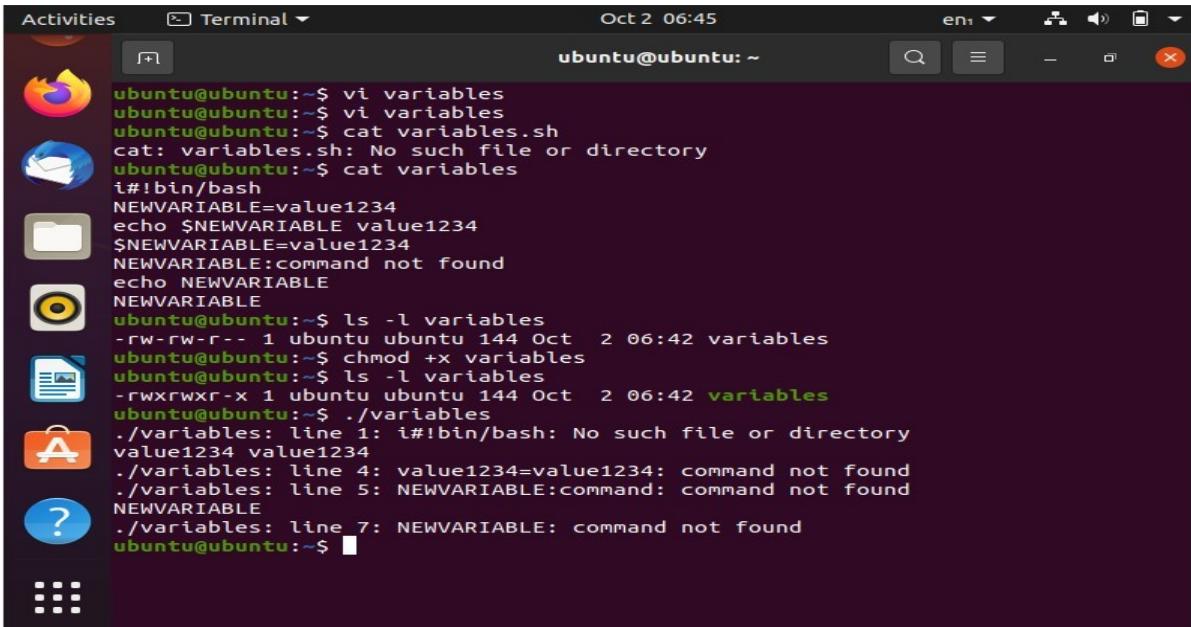
"profile2.sh" [New] 8L, 145C written

8,0-1

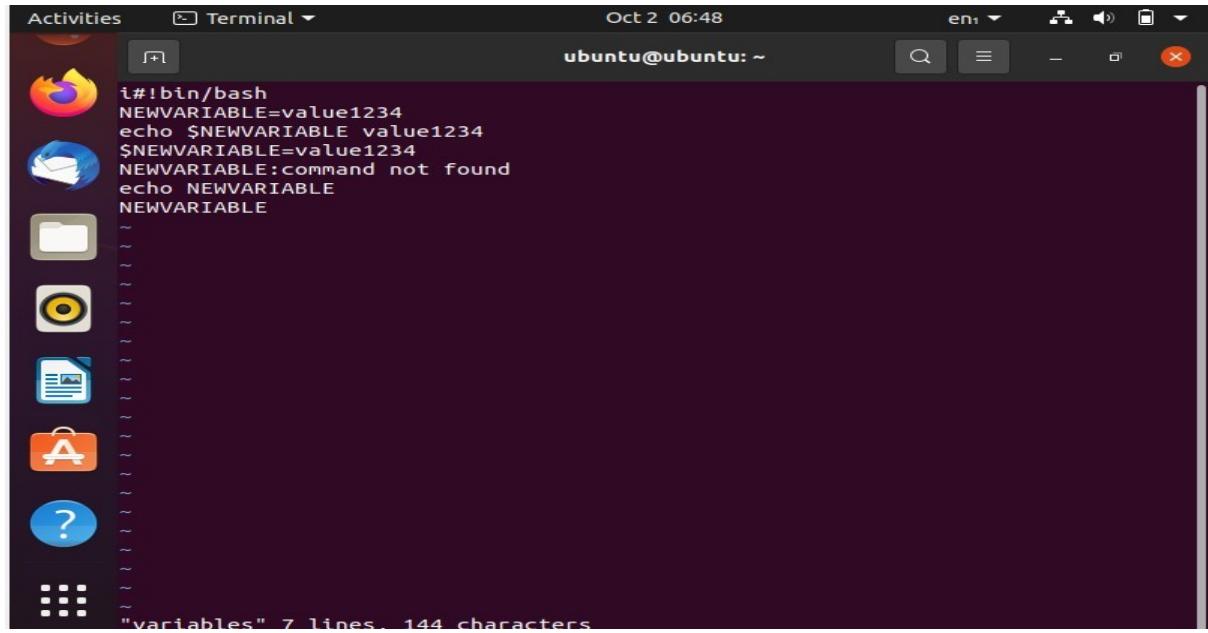
All

```
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$ bash profile2.sh
profile2.sh: line 1: i#!/bin/bash: No such file or directory
Enter your name
Donis Abraham
enter college name
Amal Jyothi College
Name:
college:Amal Jyothi College
donis@donis-VivoBook-15-ASUS-Laptop-X540MA-X540MA:~$
```

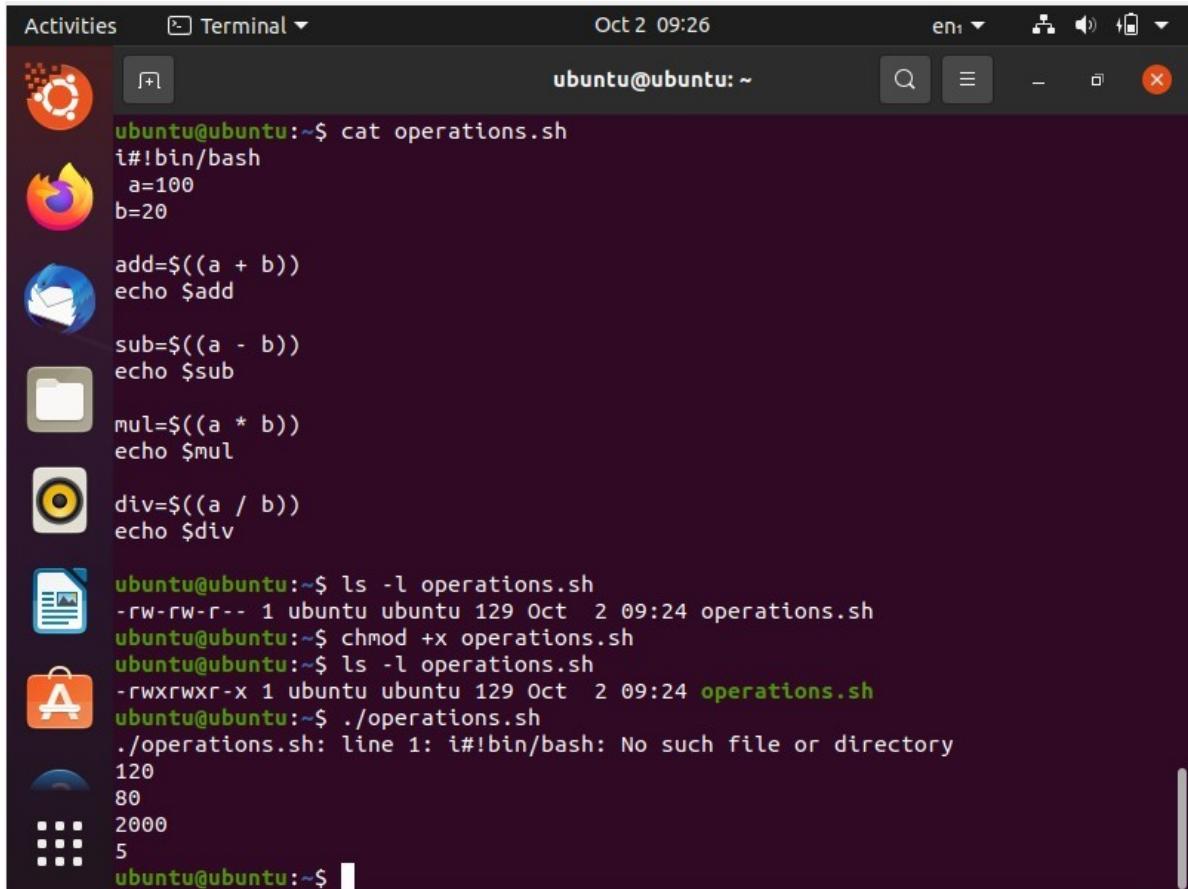
2. Write a shell script to set a value for a variable and display it on command line interface.

A screenshot of an Ubuntu desktop environment. On the left, there's a dock with icons for the Dash, Home, Applications, and Help. The main area shows a terminal window titled "Terminal" with the command line "Activities Terminal". The terminal window has a dark background and contains the following text:

```
Activities Terminal Oct 2 06:45 ubuntu@ubuntu: ~
ubantu@ubuntu:~$ vi variables
ubantu@ubuntu:~$ vi variables
ubantu@ubuntu:~$ cat variables.sh
cat: variables.sh: No such file or directory
ubantu@ubuntu:~$ cat variables
#!/bin/bash
NEWVARIABLE=value1234
echo $NEWWVARIABLE value1234
$NEWWVARIABLE=value1234
NEWWVARIABLE:command not found
echo NEWVARIABLE
NEWWVARIABLE
ubantu@ubuntu:~$ ls -l variables
-rw-rw-r-- 1 ubantu ubantu 144 Oct  2 06:42 variables
ubantu@ubuntu:~$ chmod +x variables
ubantu@ubuntu:~$ ls -l variables
-rwxrwxr-x 1 ubantu ubantu 144 Oct  2 06:42 variables
ubantu@ubuntu:~$ ./variables
./variables: line 1: i#!bin/bash: No such file or directory
value1234 value1234
./variables: line 4: value1234=value1234: command not found
./variables: line 5: NEWVARIABLE:command: command not found
NEWWVARIABLE
./variables: line 7: NEWVARIABLE: command not found
ubantu@ubuntu:~$
```



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



The image shows a screenshot of an Ubuntu desktop environment. In the top left corner, there's a dock with icons for the Dash, Home, and several application windows. The central part of the screen is occupied by a terminal window titled "Terminal". The terminal has a dark purple background and white text. It displays the following commands and their outputs:

```
Activities Terminal Oct 2 09:26 en1
ubuntu@ubuntu:~$ cat operations.sh
#!/bin/bash
a=100
b=20

add=$((a + b))
echo $add

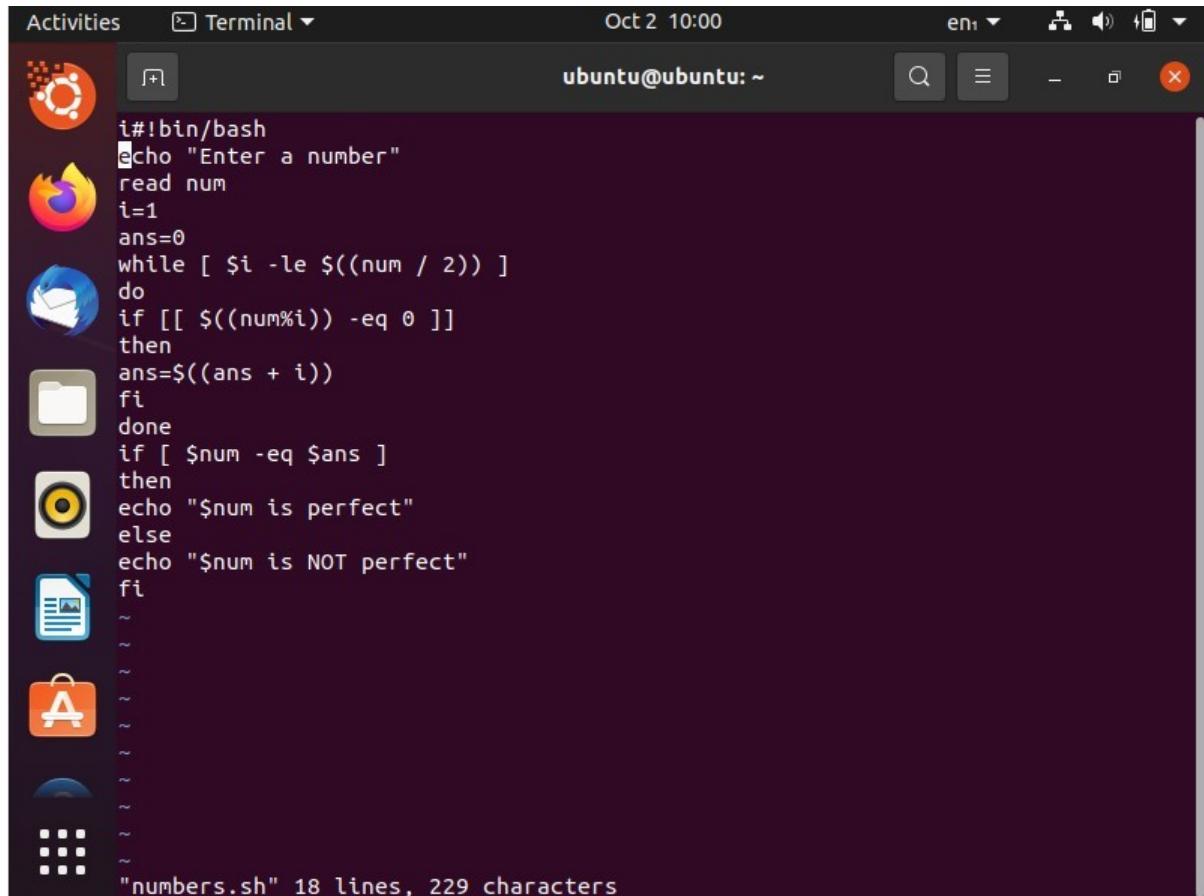
sub=$((a - b))
echo $sub

mul=$((a * b))
echo $mul

div=$((a / b))
echo $div

ubuntu@ubuntu:~$ ls -l operations.sh
-rw-rw-r-- 1 ubuntu ubuntu 129 Oct  2 09:24 operations.sh
ubuntu@ubuntu:~$ chmod +x operations.sh
ubuntu@ubuntu:~$ ls -l operations.sh
-rwxrwxr-x 1 ubuntu ubuntu 129 Oct  2 09:24 operations.sh
ubuntu@ubuntu:~$ ./operations.sh
./operations.sh: line 1: i#!bin/bash: No such file or directory
120
80
2000
5
ubuntu@ubuntu:~$
```

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



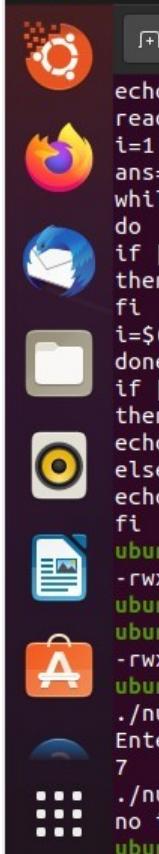
A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, and several application icons (Nautilus, Firefox, Evolution, etc.). The main area shows a terminal window titled "Terminal". The terminal window has a dark background and contains the following shell script:

```
i#!/bin/bash
echo "Enter a number"
read num
i=1
ans=0
while [ $i -le $((num / 2)) ]
do
if [[ $((num%i)) -eq 0 ]]
then
ans=$((ans + i))
fi
done
if [ $num -eq $ans ]
then
echo "$num is perfect"
else
echo "$num is NOT perfect"
fi
~
~
~
~
~
~
~
~
numbers.sh 18 lines, 229 characters
```

The terminal window also displays the current date and time ("Oct 2 10:00") and the user information ("ubuntu@ubuntu: ~").

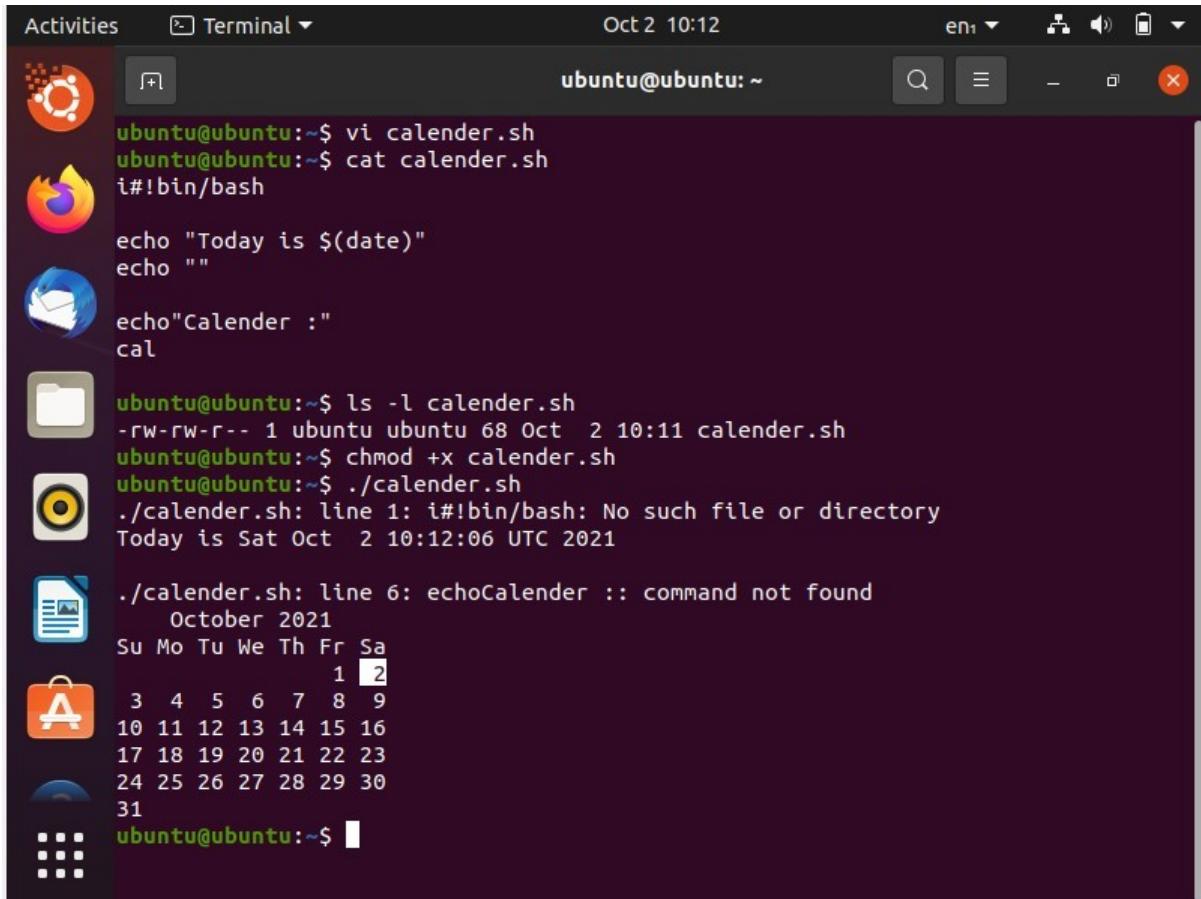
Activities Terminal ▾ Oct 2 10:05 en1 ▾

```
ubuntu@ubuntu:~
```



```
echo "Enter a number"
read no
i=1
ans=0
while [ $i -le $((no / 2))]
do
if [[ $(no%i) -eq 0 ]]
then ans=$((ans + i))
fi
i=$((i +1))
done
if [ $no -eq $ans ]
then
echo "$no is perfect"
else
echo "no is not perfect"
fi
ubuntu@ubuntu:~$ ls -l number.sh
-rwxrwxr-x 1 ubuntu ubuntu 233 Oct  2 09:42 number.sh
ubuntu@ubuntu:~$ chmod +x number.sh
ubuntu@ubuntu:~$ ls -l number.sh
-rwxrwxr-x 1 ubuntu ubuntu 233 Oct  2 09:42 number.sh
ubuntu@ubuntu:~$ ./number.sh
./number.sh: line 1: i#!/bin/bash: No such file or directory
Enter a number
7
./number.sh: line 6: [: missing ']'
no is not perfect
ubuntu@ubuntu:~$
```

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



A screenshot of an Ubuntu desktop environment. In the top bar, there are icons for Activities, Terminal, date (Oct 2 10:12), network (en1), volume, brightness, and a window control button. The main window is a terminal window titled "Terminal". The terminal shows the following session:

```
Activities Terminal Oct 2 10:12 en1
ubuntu@ubuntu:~$ vi calender.sh
ubuntu@ubuntu:~$ cat calender.sh
#!/bin/bash

echo "Today is $(date)"
echo ""

echo"Calender :"
cal

ubuntu@ubuntu:~$ ls -l calender.sh
-rw-rw-r-- 1 ubuntu ubuntu 68 Oct  2 10:11 calender.sh
ubuntu@ubuntu:~$ chmod +x calender.sh
ubuntu@ubuntu:~$ ./calender.sh
./calender.sh: line 1: i#!bin/bash: No such file or directory
Today is Sat Oct  2 10:12:06 UTC 2021

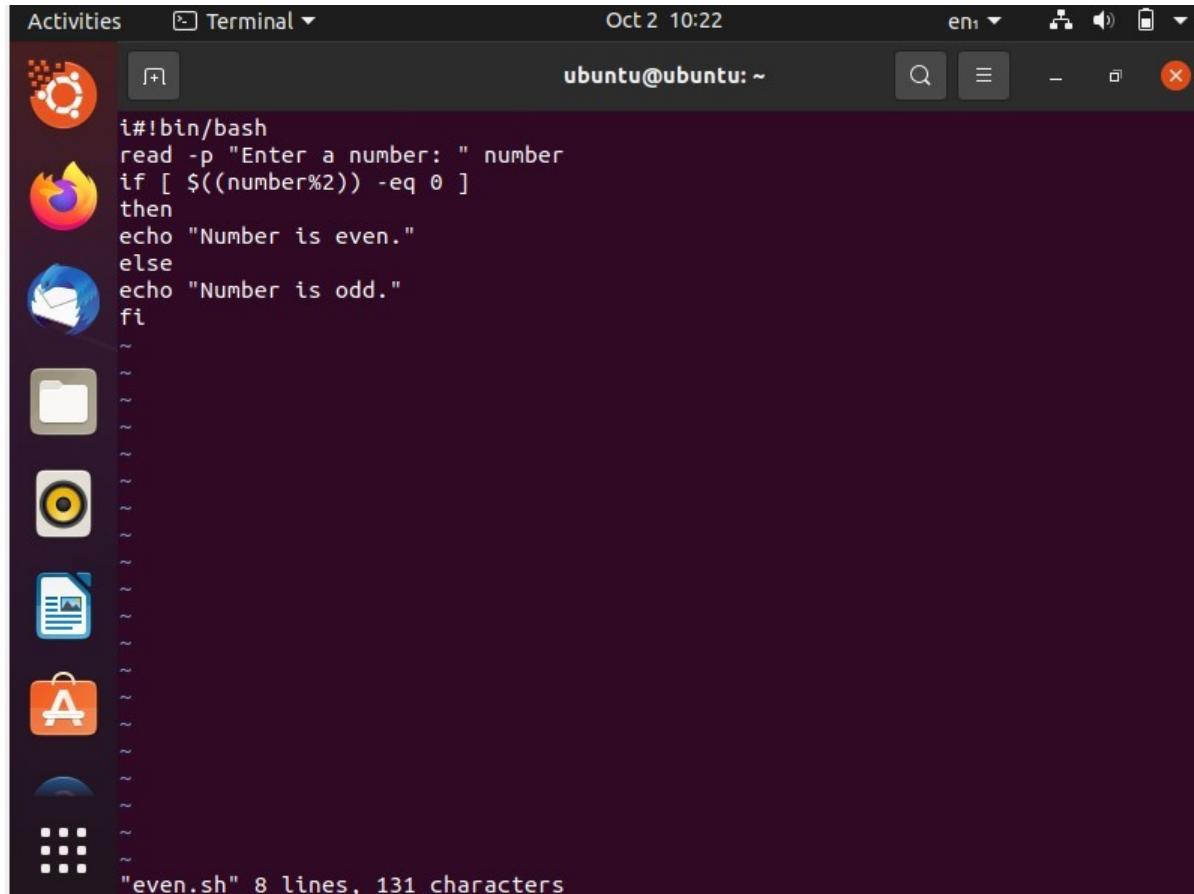
./calender.sh: line 6: echoCalender :: command not found
          October 2021
Su Mo Tu We Th Fr Sa
      1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
ubuntu@ubuntu:~$
```

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

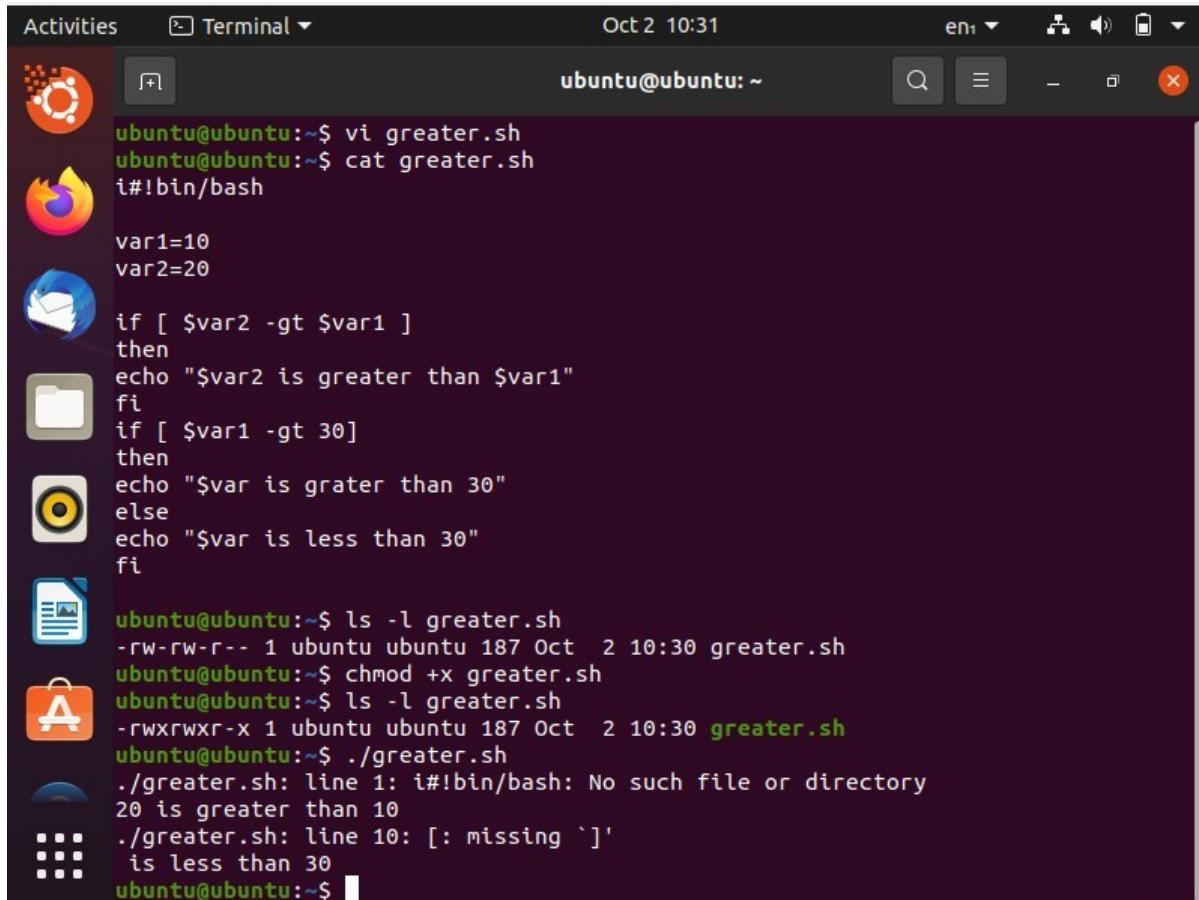
Activities Terminal Oct 2 10:21 en1

ubuntu@ubuntu:~

```
ubuntu@ubuntu:~$ vi even.sh
ubuntu@ubuntu:~$ cat even.sh
#!/bin/bash
read -p "Enter a number: " number
if [ $((number%2)) -eq 0 ]
then
echo "Number is even."
else
echo "Number is odd."
fi
ubuntu@ubuntu:~$ ls -l even.sh
-rw-rw-r-- 1 ubuntu ubuntu 131 Oct  2 10:18 even.sh
ubuntu@ubuntu:~$ chmod +x even.sh
ubuntu@ubuntu:~$ ls -l even.sh
-rwxrwxr-x 1 ubuntu ubuntu 131 Oct  2 10:18 even.sh
ubuntu@ubuntu:~$ ./even.sh
./even.sh: line 1: i#!/bin/bash: No such file or directory
Enter a number: 88
Number is even.
ubuntu@ubuntu:~$ 67
67: command not found
```



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

A screenshot of an Ubuntu desktop environment. On the left, there's a dock with icons for Dash, Home, Activities, Terminal, Dash Home, Dash Help, and Dash Search. The main area shows a terminal window titled "Terminal". The terminal output is as follows:

```
Activities Terminal Oct 2 10:31 en1
ubuntu@ubuntu:~$ vi greater.sh
ubuntu@ubuntu:~$ cat greater.sh
#!/bin/bash

var1=10
var2=20

if [ $var2 -gt $var1 ]
then
echo "$var2 is greater than $var1"
fi
if [ $var1 -gt 30]
then
echo "$var is grater than 30"
else
echo "$var is less than 30"
fi

ubuntu@ubuntu:~$ ls -l greater.sh
-rw-rw-r-- 1 ubuntu ubuntu 187 Oct  2 10:30 greater.sh
ubuntu@ubuntu:~$ chmod +x greater.sh
ubuntu@ubuntu:~$ ls -l greater.sh
-rwxrwxr-x 1 ubuntu ubuntu 187 Oct  2 10:30 greater.sh
ubuntu@ubuntu:~$ ./greater.sh
./greater.sh: line 1: i#!bin/bash: No such file or directory
20 is greater than 10
./greater.sh: line 10: [: missing `]'
is less than 30
ubuntu@ubuntu:~$
```

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

Activities Terminal ▾ Oct 2 10:42 en1 ▾

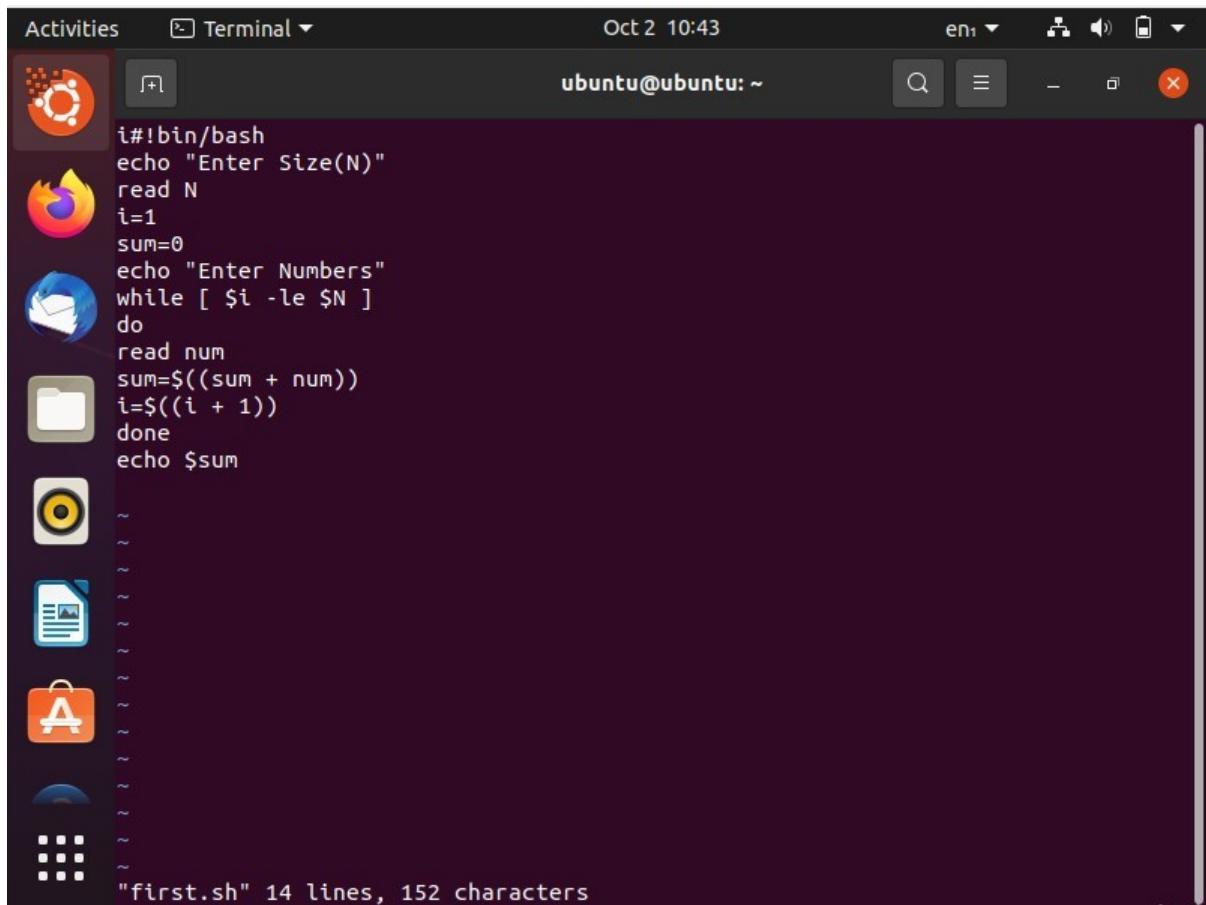
```
ubuntu@ubuntu:~$ vi first.sh
ubuntu@ubuntu:~$ cat first.sh
#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo $sum

ubuntu@ubuntu:~$ ls -l first.sh
-rw-rw-r-- 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ chmod +x first.sh
ubuntu@ubuntu:~$ ls -l first.sh
-rwxrwxr-x 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ ./first.sh
./first.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
10
Enter Numbers
1
2
3
```

Activities Terminal ▾ Oct 2 10:42 en1 ▾

```
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo $sum

ubuntu@ubuntu:~$ ls -l first.sh
-rw-rw-r-- 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ chmod +x first.sh
ubuntu@ubuntu:~$ ls -l first.sh
-rwxrwxr-x 1 ubuntu ubuntu 152 Oct  2 10:40 first.sh
ubuntu@ubuntu:~$ ./first.sh
./first.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
10
Enter Numbers
1
2
3
4
5
6
7
8
9
10
55
```



A screenshot of a Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Terminal, Home, Applications, and Help. The main window is a terminal titled "Terminal" with the command "Activities". The terminal window shows a shell script named "first.sh" with the following content:

```
i#!bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
echo $sum
```

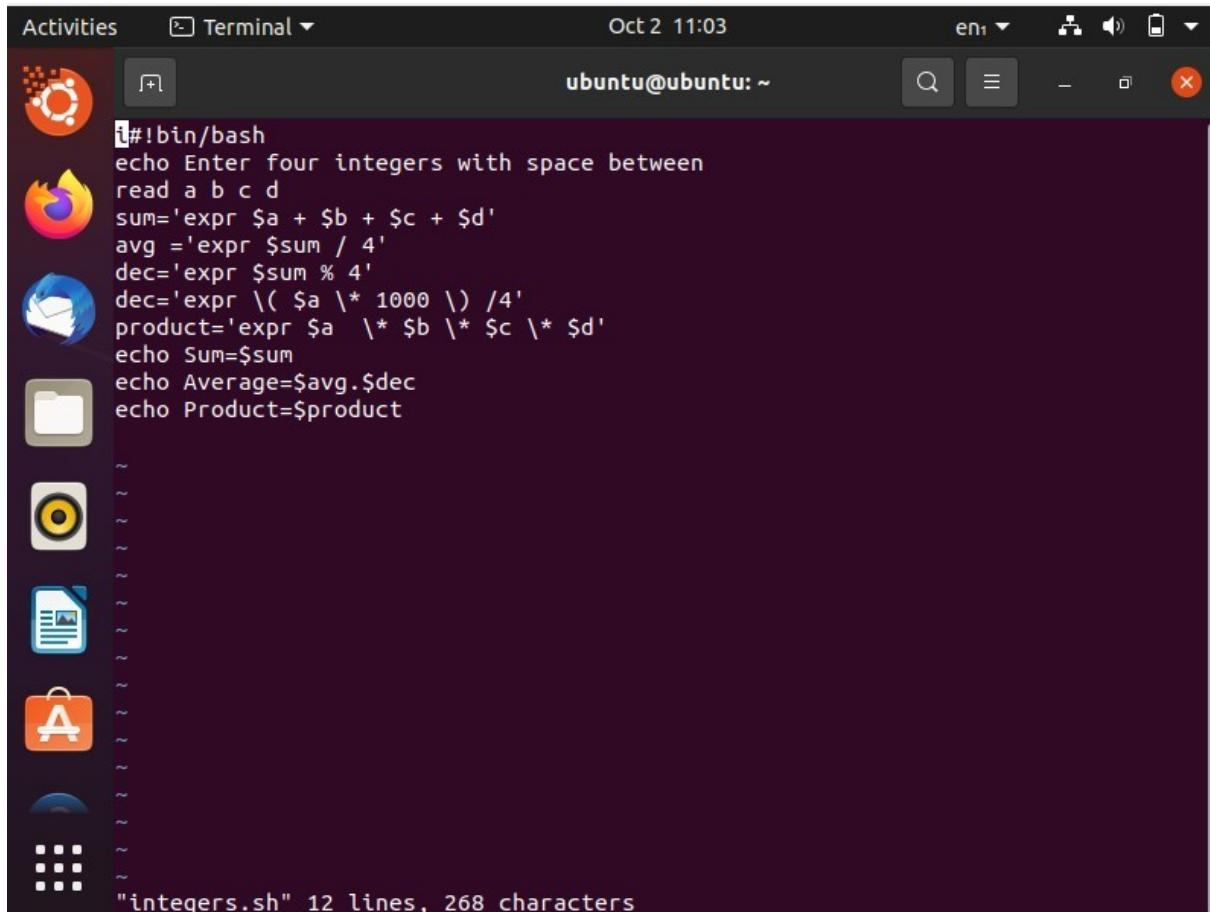
The terminal also displays several blank lines starting with a tilde (~) and ends with the message: "first.sh" 14 lines, 152 characters.

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

Activities Terminal ▾ Oct 2 11:02 en1 ▾

```
ubuntu@ubuntu:~$ vi integers.sh
ubuntu@ubuntu:~$ cat integers.sh
#!/bin/bash
echo Enter four integers with space between
read a b c d
sum='expr $a + $b + $c + $d'
avg ='expr $sum / 4'
dec='expr $sum % 4'
dec='expr \( $a \* 1000 \) /4'
product='expr $a \* $b \* $c \* $d'
echo Sum=$sum
echo Average=$avg.$dec
echo Product=$product

ubuntu@ubuntu:~$ ls -l integers.sh
-rw-rw-r-- 1 ubuntu ubuntu 268 Oct  2 10:59 integers.sh
ubuntu@ubuntu:~$ chmod +x integers.sh
ubuntu@ubuntu:~$ ls -l integers.sh
-rwxrwxr-x 1 ubuntu ubuntu 268 Oct  2 10:59 integers.sh
ubuntu@ubuntu:~$ ./integers.sh
./integers.sh: line 1: i#!bin/bash: No such file or directory
Enter four integers with space between
3
./integers.sh: line 5: avg: command not found
Sum=expr $a + $b + $c + $d
Average=.expr \( $a \* 1000 \) /4
Product=expr $a \* $b \* $c \* $d
ubuntu@ubuntu:~$
```



The image shows a screenshot of an Ubuntu desktop environment. In the top left corner, there's a dock with icons for the Dash, Home, Activities, and Terminal. The Terminal window is open and titled "Terminal". The status bar at the top indicates the date and time as "Oct 2 11:03" and the user as "ubuntu@ubuntu: ~". The terminal window contains a shell script named "integers.sh" which reads four integers from the user, calculates their sum, average, and product, and then prints them out. The script uses `expr` for arithmetic operations. The terminal also shows the file statistics at the bottom: "integers.sh" has 12 lines and 268 characters.

```
#!/bin/bash
echo Enter four integers with space between
read a b c d
sum='expr $a + $b + $c + $d'
avg ='expr $sum / 4'
dec='expr $sum % 4'
dec='expr \($a \* 1000 \) /4'
product='expr $a \* $b \* $c \* $d'
echo Sum=$sum
echo Average=$avg.$dec
echo Product=$product
```

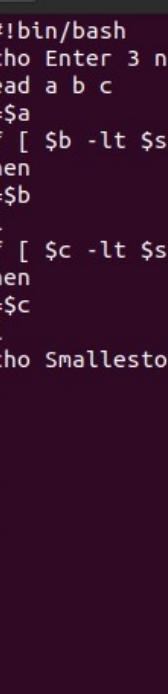
~
~
~
~
~
~
~
~
~
~
~
~
"integers.sh" 12 lines, 268 characters

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

Activities Terminal Oct 2 11:12 en1

```
ubuntu@ubuntu:~$ vi small.sh
ubuntu@ubuntu:~$ cat small.sh
#!/bin/bash
echo Enter 3 numbers with spaces in between
read a b c
s=$a
if [ $b -lt $s ]
then
s=$b
fi
if [ $c -lt $s ]
then
s=$c
fi
echo Smallestof $a $b $c is $s
ubuntu@ubuntu:~$ ls -l small.sh
-rw-rw-r-- 1 ubuntu ubuntu 164 Oct  2 11:10 small.sh
ubuntu@ubuntu:~$ chmod +x small.sh
ubuntu@ubuntu:~$ ls -l small.sh
-rwxrwxr-x 1 ubuntu ubuntu 164 Oct  2 11:10 small.sh
ubuntu@ubuntu:~$ ./small.sh
./small.sh: line 1: i#!bin/bash: No such file or directory
Enter 3 numbers with spaces in between
3
./small.sh: line 5: [: -lt: unary operator expected
./small.sh: line 9: [: -lt: unary operator expected
Smallestof 3 is 3
ubuntu@ubuntu:~$ ./small.sh
./small.sh: line 1: i#!bin/bash: No such file or directory
```

Activities Terminal Oct 2 11:13 en1



```
i#!/bin/bash
echo Enter 3 numbers with spaces in between
read a b c
s=$a
if [ $b -lt $s ]
then
s=$b
fi
if [ $c -lt $s ]
then
s=$c
fi
echo Smallest of $a $b $c is $s
~
```

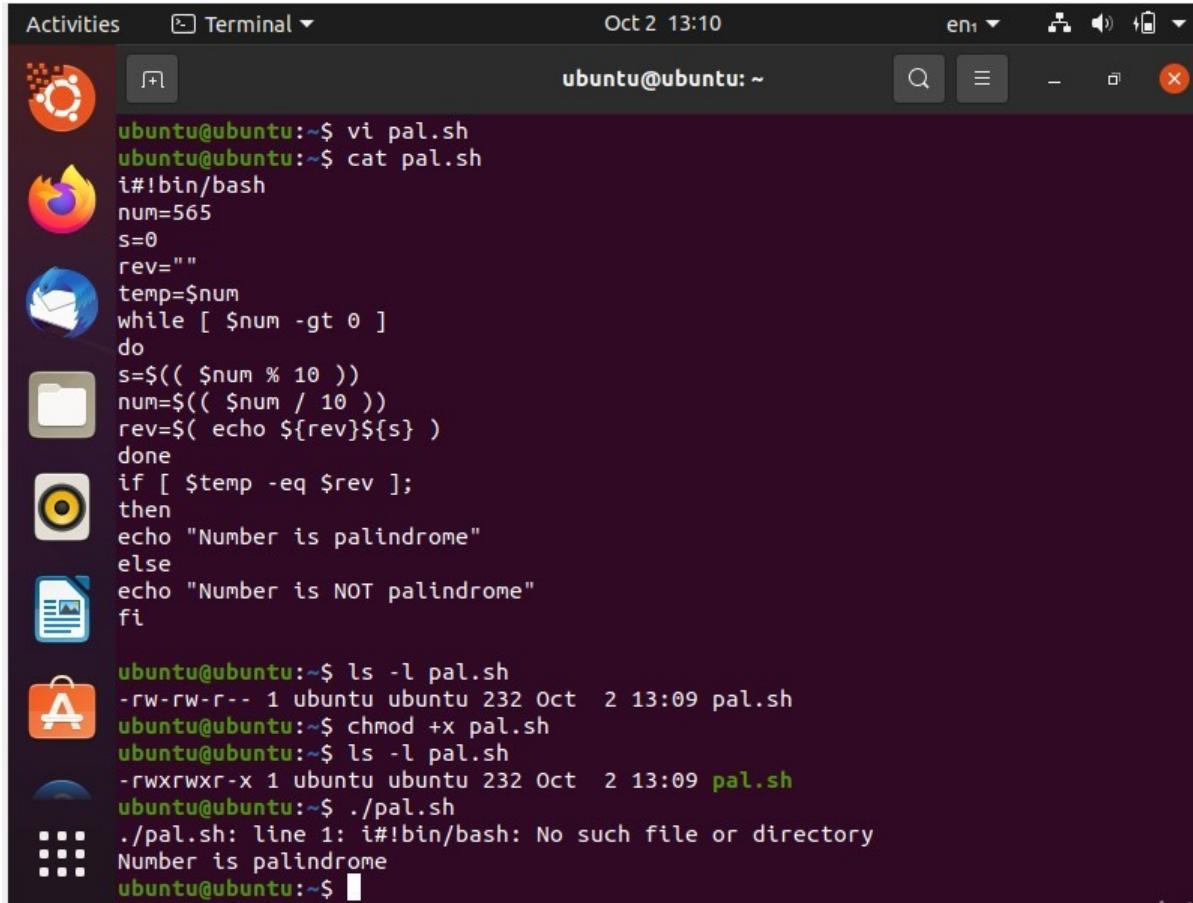
"small.sh" 13 lines, 164 characters

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

```
ubuntu@ubuntu:~$ vi fact.sh
ubuntu@ubuntu:~$ cat fact.sh
#!/bin/bash
echo "Enter a number"
read num
fact=1
while [ $num -gt 1 ]
do
fact=$((fact * num))
num=$((num -1))
done
echo $fact

ubuntu@ubuntu:~$ ls -l fact.sh
-rw-rw-r-- 1 ubuntu ubuntu 128 Oct  2 11:17 fact.sh
ubuntu@ubuntu:~$ chmod +x fact.sh
ubuntu@ubuntu:~$ ls -l fact.sh
-rwxrwxr-x 1 ubuntu ubuntu 128 Oct  2 11:17 fact.sh
ubuntu@ubuntu:~$ ./fact.sh
./fact.sh: line 1: i#!bin/bash: No such file or directory
Enter a number
6
720
ubuntu@ubuntu:~$
```

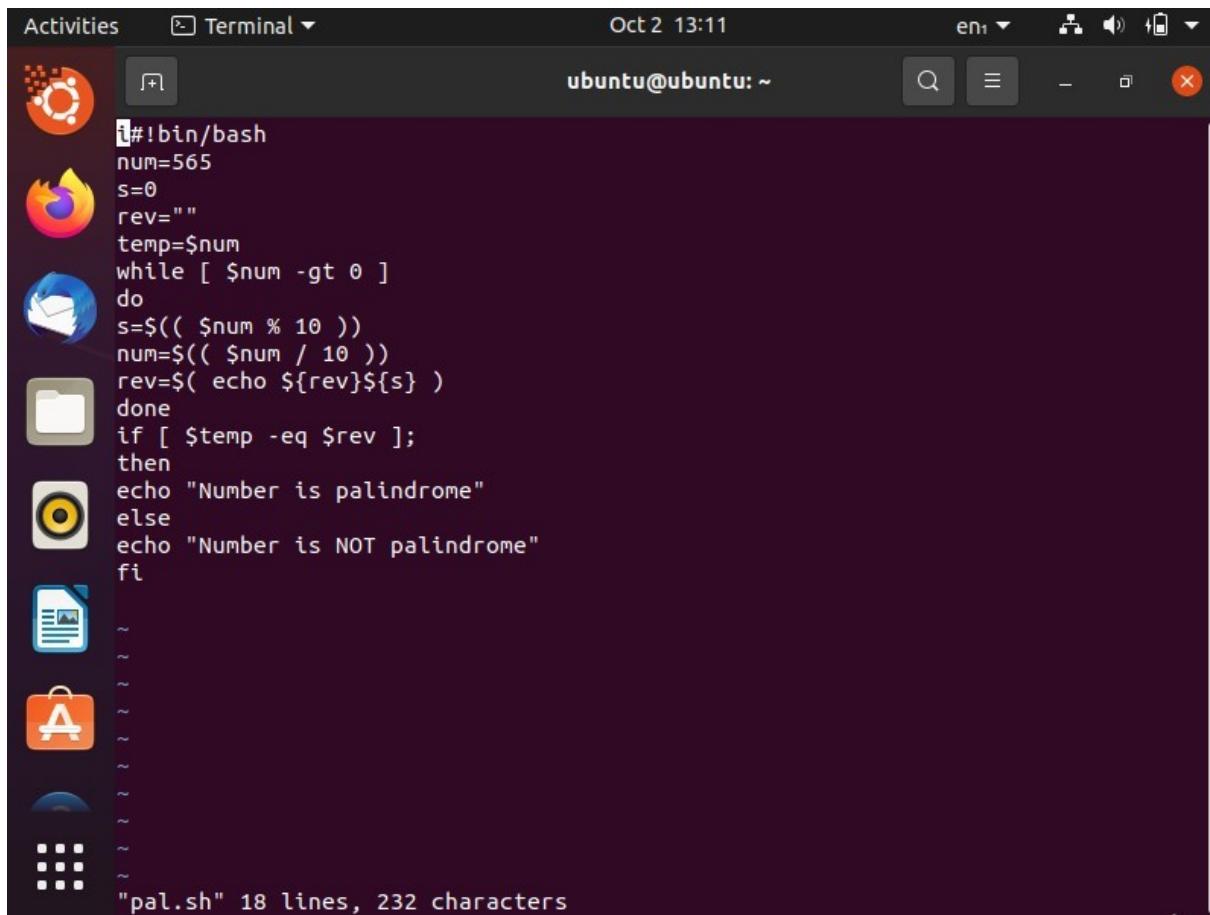
12. Write a shell program to check a number is palindrome or not.



The image shows a screenshot of an Ubuntu desktop environment. In the top left, there's an 'Activities' button and a 'Terminal' icon. The terminal window is open and titled 'Terminal'. The window shows the following session:

```
Activities Terminal Oct 2 13:10 en1
ubuntu@ubuntu:~$ vi pal.sh
ubuntu@ubuntu:~$ cat pal.sh
#!/bin/bash
num=565
s=0
rev=""
temp=$num
while [ $num -gt 0 ]
do
s=$(( $num % 10 ))
num=$(( $num / 10 ))
rev=$( echo ${rev}${s} )
done
if [ $temp -eq $rev ];
then
echo "Number is palindrome"
else
echo "Number is NOT palindrome"
fi

ubuntu@ubuntu:~$ ls -l pal.sh
-rw-rw-r-- 1 ubuntu ubuntu 232 Oct  2 13:09 pal.sh
ubuntu@ubuntu:~$ chmod +x pal.sh
ubuntu@ubuntu:~$ ls -l pal.sh
-rwxrwxr-x 1 ubuntu ubuntu 232 Oct  2 13:09 pal.sh
ubuntu@ubuntu:~$ ./pal.sh
./pal.sh: line 1: i#!bin/bash: No such file or directory
Number is palindrome
ubuntu@ubuntu:~$
```



A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, Activities, and Terminal. The terminal window is open and shows the following script:

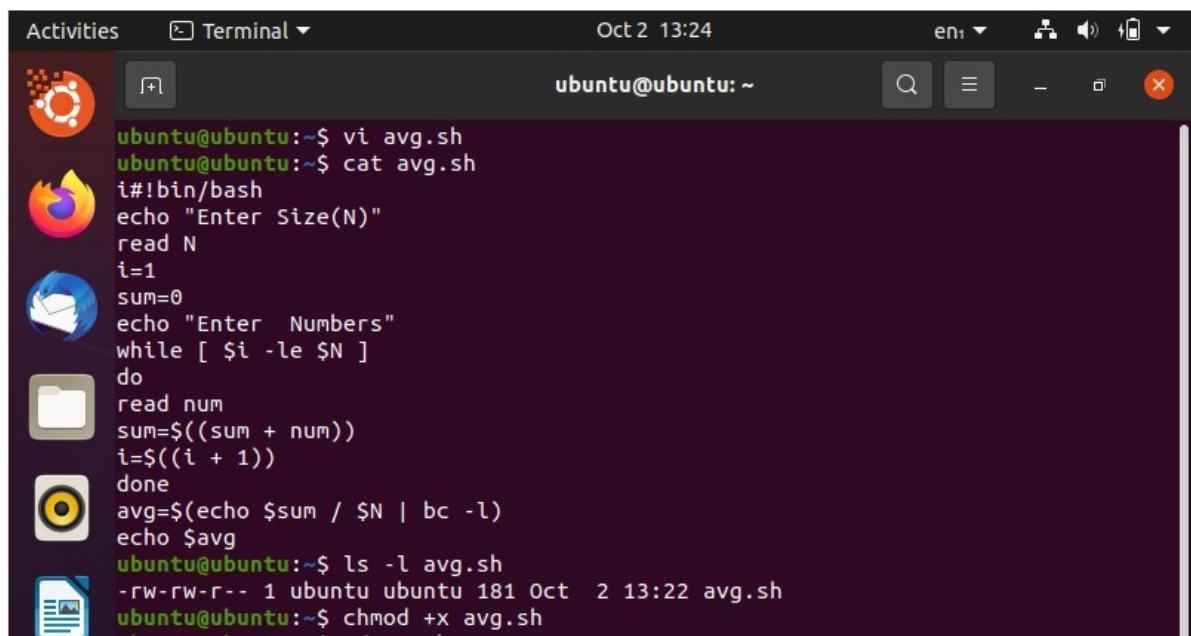
```
#!/bin/bash
num=565
s=0
rev=""
temp=$num
while [ $num -gt 0 ]
do
s=$(( $num % 10 ))
num=$(( $num / 10 ))
rev=$( echo ${rev}${s} )
done
if [ $temp -eq $rev ];
then
echo "Number is palindrome"
else
echo "Number is NOT palindrome"
fi
```

The terminal also displays the command "ls" and its output:

```
~
~
```

At the bottom of the terminal, it says "pal.sh" 18 lines, 232 characters.

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



A screenshot of an Ubuntu desktop environment. In the top left, there's a dock with icons for the Dash, Home, Activities, and Terminal. The terminal window is open and shows the following script:

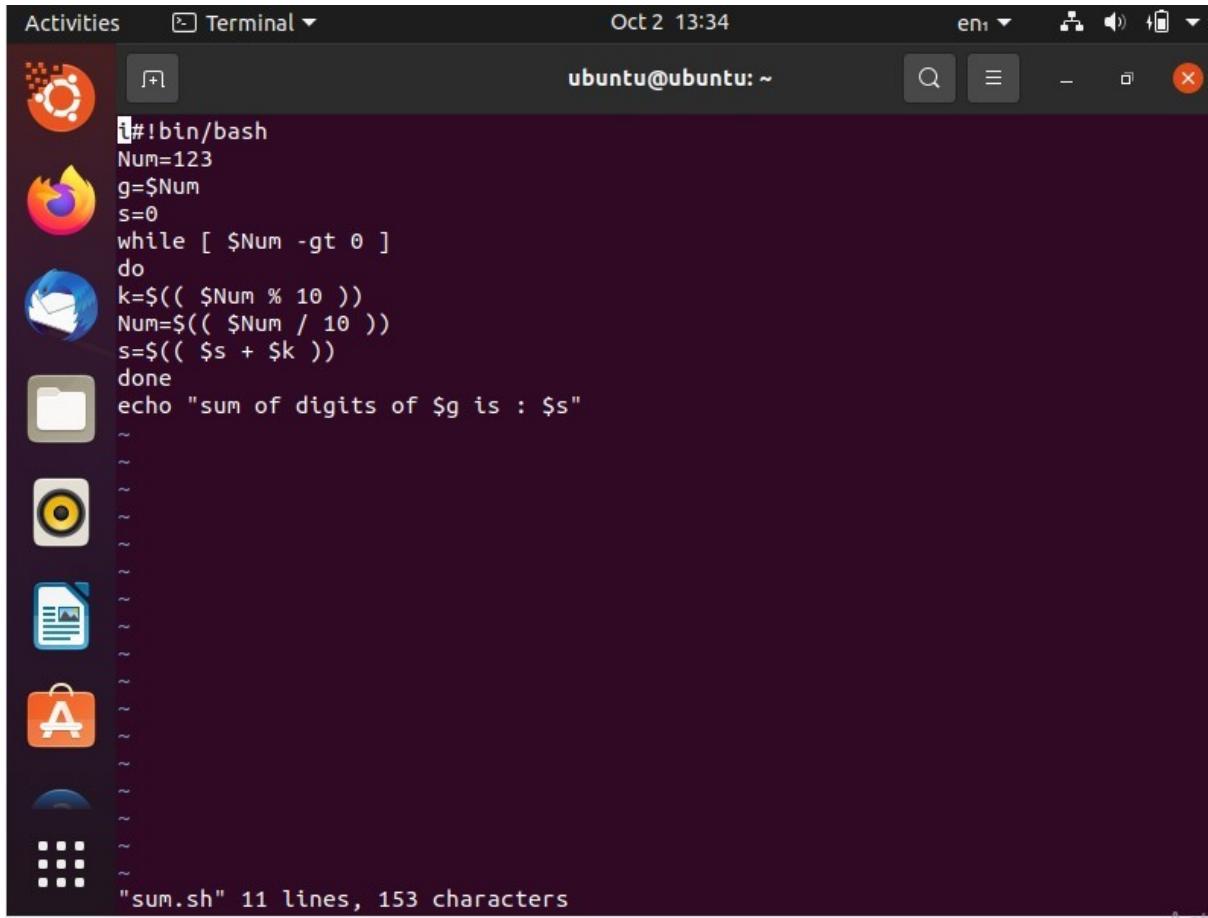
```
ubuntu@ubuntu:~$ vi avg.sh
ubuntu@ubuntu:~$ cat avg.sh
#!/bin/bash
echo "Enter Size(N)"
read N
i=1
sum=0
echo "Enter Numbers"
while [ $i -le $N ]
do
read num
sum=$((sum + num))
i=$((i + 1))
done
avg=$(echo $sum / $N | bc -l)
echo $avg
ubuntu@ubuntu:~$ ls -l avg.sh
-rw-rw-r-- 1 ubuntu ubuntu 181 Oct  2 13:22 avg.sh
ubuntu@ubuntu:~$ chmod +x avg.sh
```

```
ubuntu@ubuntu:~$ ./avg.sh
./avg.sh: line 1: i#!bin/bash: No such file or directory
Enter Size(N)
3
Enter Numbers
2
4
5
3.666666666666666666666666666666
ubuntu@ubuntu:~$
```

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

Activities Terminal ▾ Oct 2 13:33 en1 ▾ 🔍 ⌂ ✎

```
ubuntu@ubuntu:~$ vi sum.sh
ubuntu@ubuntu:~$ cat sum.sh
#!/bin/bash
Num=123
g=$Num
s=0
while [ $Num -gt 0 ]
do
k=$(( $Num % 10 ))
Num=$(( $Num / 10 ))
s=$(( $s + $k ))
done
echo "sum of digits of $g is : $s"
ubuntu@ubuntu:~$ ls -l sum.sh
-rw-rw-r-- 1 ubuntu ubuntu 153 Oct  2 13:32 sum.sh
ubuntu@ubuntu:~$ chmod +x sum.sh
ubuntu@ubuntu:~$ ls -l sum.sh
-rwxrwxr-x 1 ubuntu ubuntu 153 Oct  2 13:32 sum.sh
ubuntu@ubuntu:~$ ./sum.sh
./sum.sh: line 1: i#!bin/bash: No such file or directory
sum of digits of 123 is : 6
ubuntu@ubuntu:~$
```



A screenshot of a Ubuntu desktop environment. In the top bar, there are icons for Activities, Terminal, date and time (Oct 2 13:34), network (en1), and system status. The terminal window is open at the root prompt (ubuntu@ubuntu: ~). The script content is as follows:

```
#!/bin/bash
Num=123
g=$Num
s=0
while [ $Num -gt 0 ]
do
k=$(( $Num % 10 ))
Num=$(( $Num / 10 ))
s=$(( $s + $k ))
done
echo "sum of digits of $g is : $s"
```

The terminal shows several blank lines (~) and ends with the message: "sum.sh" 11 lines, 153 characters.

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

Activities Terminal Oct 2 13:46 en1

```
ubuntu@ubuntu:~$ vi year.sh
ubuntu@ubuntu:~$ cat year.sh
#!/bin/bash
echo -n "Enter year (YYYY) : "
read y
a = 'expr $y%4'
b = 'expr $y%100'
c = 'expr $y%400'
if [${a} -eq 0 -a ${b} -ne 0 -o ${c} -eq 0 ]
then
echo "$y is leap year"
else
echo "$y is not leap year"
fi

ubuntu@ubuntu:~$ ls -l year.sh
-rw-rw-r-- 1 ubuntu ubuntu 206 Oct  2 13:45 year.sh
ubuntu@ubuntu:~$ chmod +x year.sh
ubuntu@ubuntu:~$ ls -l year.sh
-rwxrwxr-x 1 ubuntu ubuntu 206 Oct  2 13:45 year.sh
ubuntu@ubuntu:~$ ./year.sh
./year.sh: line 1: #!/bin/bash: No such file or directory
Enter year (YYYY) : 2024
./year.sh: line 4: a: command not found
./year.sh: line 5: b: command not found
./year.sh: line 6: c: command not found
./year.sh: line 7: [: too many arguments
2024 is not leap year
```