Name: Jogalekar Ishan Sagar

Reg no: 19BCE2250

Course: Operating System CSE2005

Slot: L35+L36

LAB Digital Assignment 1

1. Study of basic Linux commands.

a) date : -

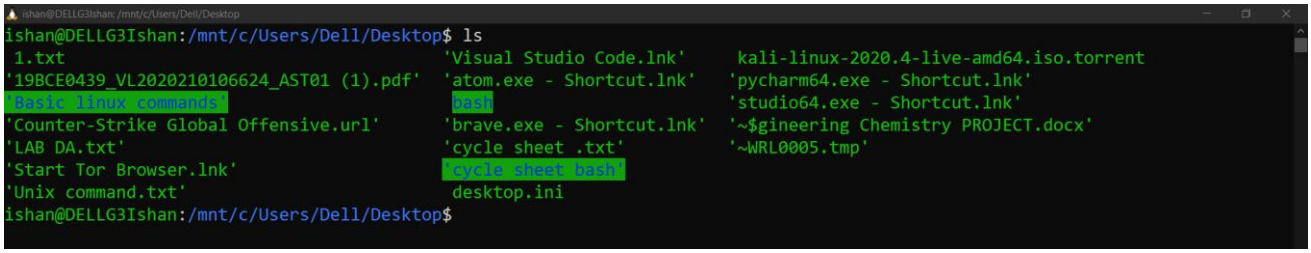
To see current date

Output –

b) ls : -

Listing all files inside directory

Output-



c) whoami : -

Current login user

Output-

d) cal : -

Calendar of given month

Output-

e) mkdir :-

Make directory

Output-

f) rmdir :-

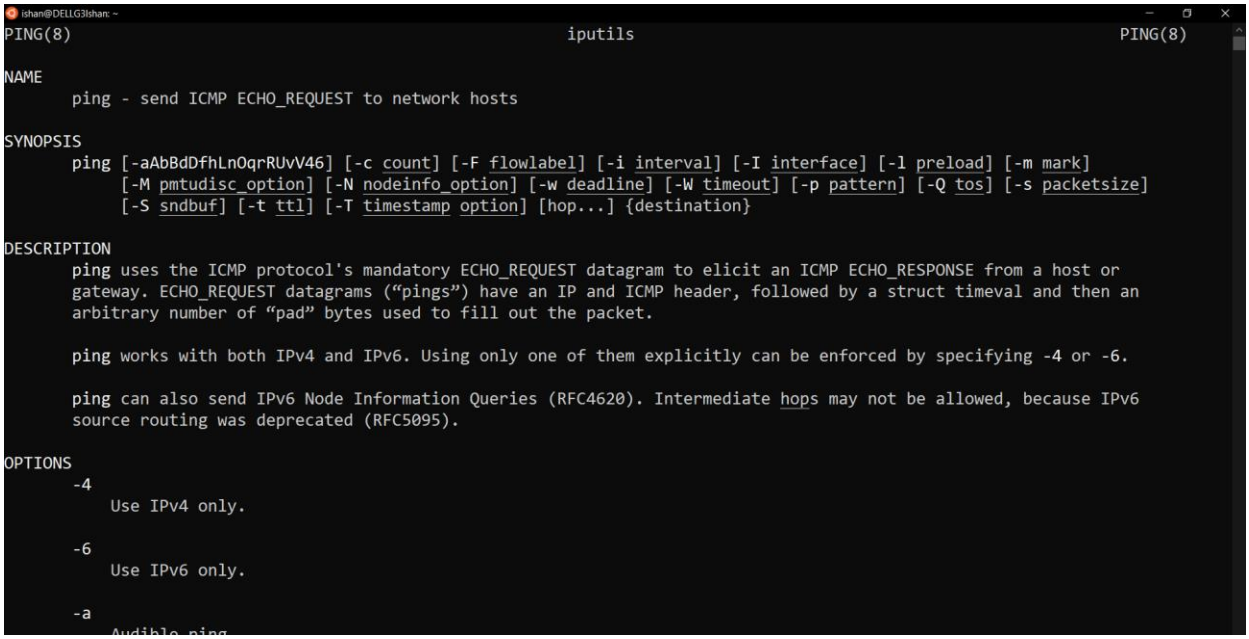
Remove directory

Output-

g) man :-

Manual of commands

Output-



h) cd :-

Change directory

Output-

```
ishan@DELLG3Ishan: ~/new
ishan@DELLG3Ishan:~$ mkdir new
ishan@DELLG3Ishan:~$ ls
new
ishan@DELLG3Ishan:~$ cd new
ishan@DELLG3Ishan:~/new$
```

```
ishan@DELLG3Ishan: ~
ishan@DELLG3Ishan:~$ mkdir new
ishan@DELLG3Ishan:~$ ls
new
ishan@DELLG3Ishan:~$ cd new
ishan@DELLG3Ishan:~/new$ cd ~
ishan@DELLG3Ishan:~$
```

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ cd new
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop/new$ cd -
/mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

i) vi :-

VI editor in linux shell

Output-

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ vi 1.txt
```

j) rm:-

Remove file

Output–

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ rm new.txt
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ cat new.txt
cat: new.txt: No such file or directory
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

k) pwd :-

Print working directory

Output-

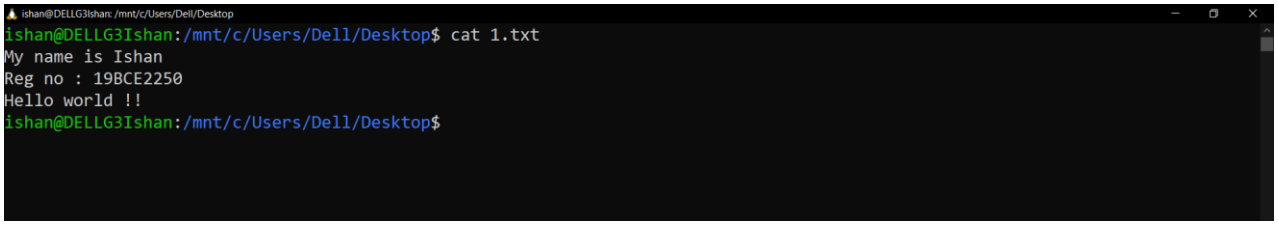
L) cat :-

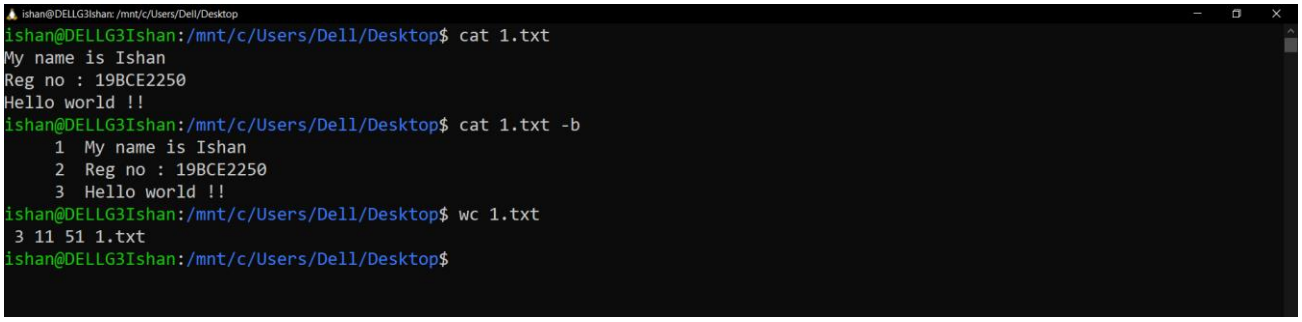
Print data inside file

-b to print line no.

wc word count

Output-





M) cp :-

Copy file

Output-

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ cp 1.txt 2.txt
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ cat 2.txt
My name is Ishan
Reg no : 19BCE2250
Hello world !!
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

N) df :-

To summarise free space on disk drive

Output-

```
ishan@DELLG3Ishan: ~
ishan@DELLG3Ishan:~$ df
Filesystem     1K-blocks      Used Available Use% Mounted on
/dev/sdb       263174212   1520164 248215892   1% /
tmpfs            3192504         0   3192504   0% /mnt/wsl
tools          108578812  91396420  17182392  85% /init
none             3190104         0   3190104   0% /dev
none             3192504         4   3192500   1% /run
none             3192504         0   3192504   0% /run/lock
none             3192504         0   3192504   0% /run/shm
none             3192504         0   3192504   0% /run/user
tmpfs            3192504         0   3192504   0% /sys/fs/cgroup
C:\            108578812  91396420  17182392  85% /mnt/c
D:\            976628732 263990248 712638484  28% /mnt/d
ishan@DELLG3Ishan:~$
```

O) du :-

To show disk space used by files or directories

Output-

```
ishan@DELLG3Ishan: ~
ishan@DELLG3Ishan:~$ du
4       ./.landscape
36      .
ishan@DELLG3Ishan:~$
```

P) mv :-

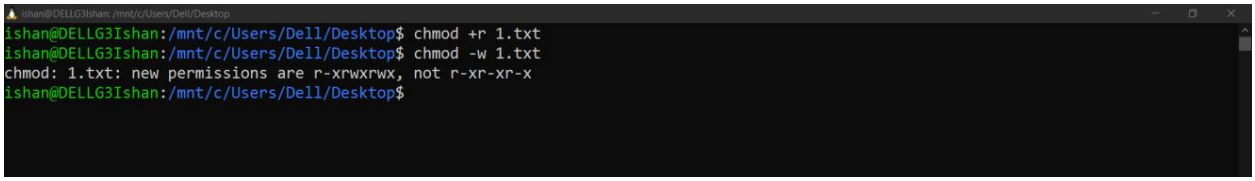
Rename file

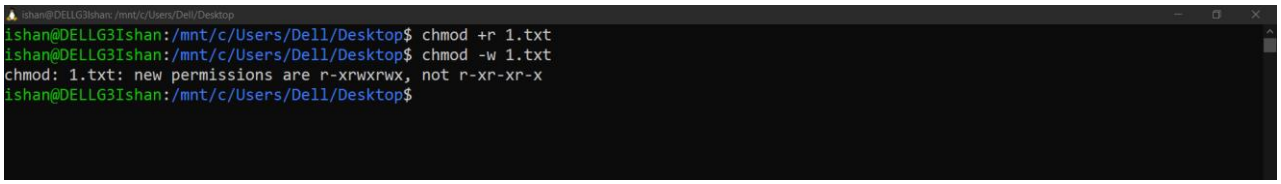
Output-

Q) chmod :-

Change permissions of file

Output-





R) Ping :-

Network command to ping specific host

Output-

```
ishan@DELLG3Ishan:~$ ping www.google.com
PING www.google.com (142.250.67.132) 56(84) bytes of data.
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=1 ttl=117 time=50.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=2 ttl=117 time=45.4 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=3 ttl=117 time=46.0 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=4 ttl=117 time=45.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=5 ttl=117 time=56.0 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=6 ttl=117 time=40.3 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=7 ttl=117 time=39.3 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=8 ttl=117 time=57.4 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=9 ttl=117 time=25.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=10 ttl=117 time=21.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=11 ttl=117 time=37.1 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=12 ttl=117 time=40.9 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=13 ttl=117 time=43.4 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=14 ttl=117 time=18.0 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=15 ttl=117 time=43.4 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=16 ttl=117 time=42.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=17 ttl=117 time=27.2 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=18 ttl=117 time=39.3 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=19 ttl=117 time=40.1 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=20 ttl=117 time=39.5 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=21 ttl=117 time=49.4 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=22 ttl=117 time=40.6 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=23 ttl=117 time=41.0 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=24 ttl=117 time=47.9 ms
64 bytes from bom12s06-in-f4.1e100.net (142.250.67.132): icmp_seq=25 ttl=117 time=41.6 ms
```

S) host :-

Details of hostname

Output-

```
ishan@DELLG3Ishan:~$ host www.google.com
www.google.com has address 142.250.67.132
ns1.google.com has address 216.239.32.10
ns1.google.com has IPv6 address 2001:4860:4802:32::a
ns2.google.com has address 216.239.34.10
ns2.google.com has IPv6 address 2001:4860:4802:34::a
ns3.google.com has address 216.239.36.10
ns3.google.com has IPv6 address 2001:4860:4802:36::a
ns4.google.com has address 216.239.38.10
ns4.google.com has IPv6 address 2001:4860:4802:38::a
www.google.com has IPv6 address 2404:6800:4009:811::2004
ns1.google.com has address 216.239.32.10
ns1.google.com has IPv6 address 2001:4860:4802:32::a
ns2.google.com has address 216.239.34.10
ns2.google.com has IPv6 address 2001:4860:4802:34::a
ns3.google.com has address 216.239.36.10
ns3.google.com has IPv6 address 2001:4860:4802:36::a
ns4.google.com has address 216.239.38.10
ns4.google.com has IPv6 address 2001:4860:4802:38::a
ishan@DELLG3Ishan:~$
```

(b) Shell Programming :-

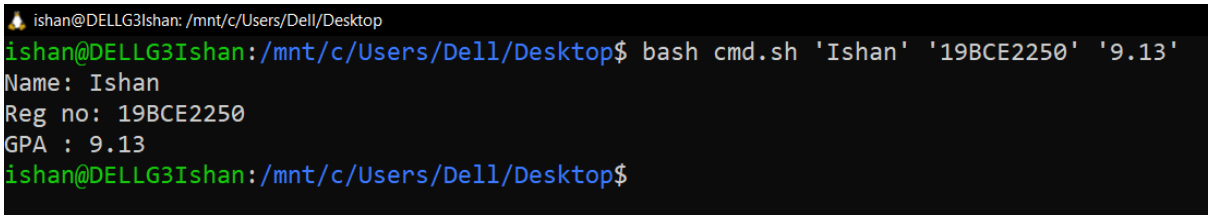
1. Handling the command line arguments :

Ans:-

Code :

```
#! /bin/sh
echo "Name: $1";
echo "Reg no: $2";
echo "GPA : $3 ";
```

Output-



2. String reversal :

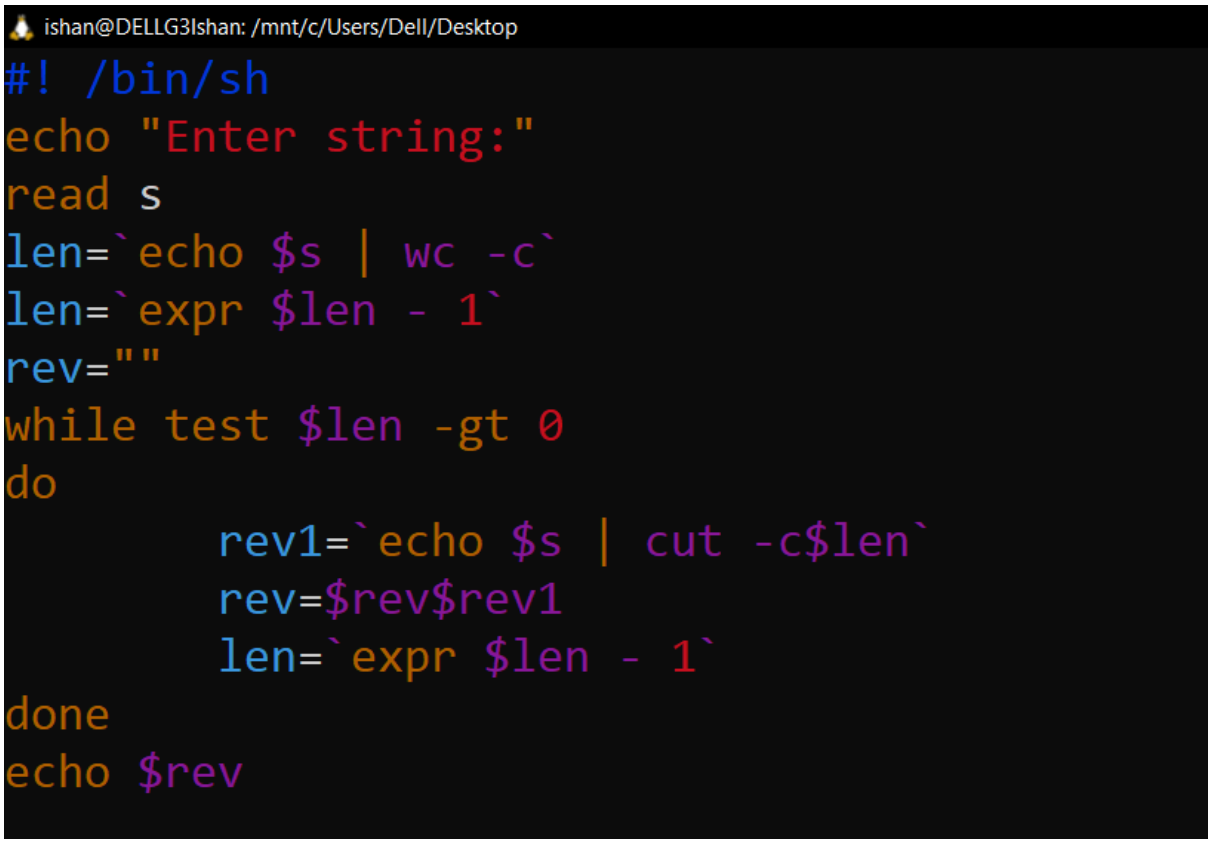
Ans:

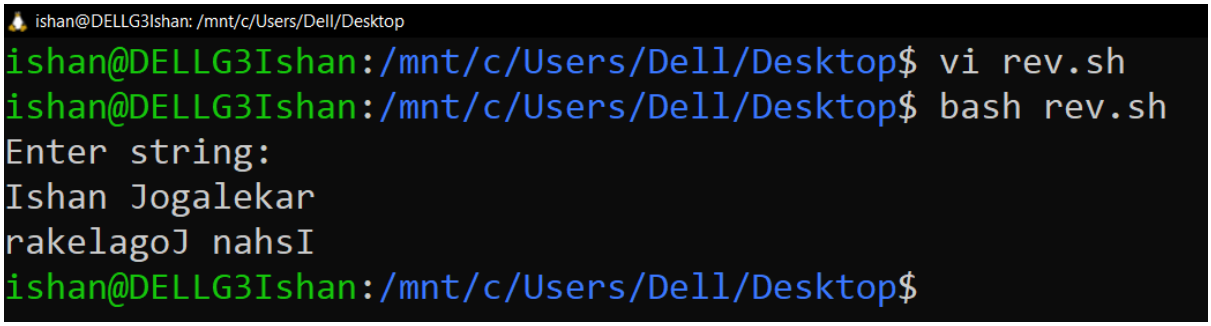
Code-

```
#! /bin/sh
echo "Enter string:"
read s
len=`echo $s | wc -c`
```

```
len=`expr $len - 1`
rev=""
while test $len -gt 0
do
        rev1=`echo $s | cut -c$len`
        rev=$rev$rev1
        len=`expr $len - 1`
done
echo $rev
```

Output-





3. If-Else, Nested If Else,Switch cases in shell :

I) If-else :-

Ans :

Code-

```
#! /bin/sh
echo "Ishan Jogalekar - 19BCE2250"
echo "Enter no 1 :"
read a
echo "Enter no 2 :"
read b
if [ $a == $b ]
then
        echo "No 1 is equal to No 2"
else
        echo "No 1 is not equal to No 2"
fi
```

Output-

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
#! /bin/sh
echo "Ishan Jogalekar - 19BCE2250"
echo "Enter no 1 :"
read a
echo "Enter no 2 :"
read b
if [ $a == $b ]
then
        echo "No 1 is equal to No 2"
else
        echo "No 1 is not equal to No 2"
fi


~
```

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ vi ifelse.sh
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ bash ifelse.sh
Ishan Jogalekar - 19BCE2250
Enter no 1 :
12
Enter no 2 :
12
No 1 is equal to No 2
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ bash ifelse.sh
Ishan Jogalekar - 19BCE2250
Enter no 1 :
45
Enter no 2 :
89
No 1 is not equal to No 2
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

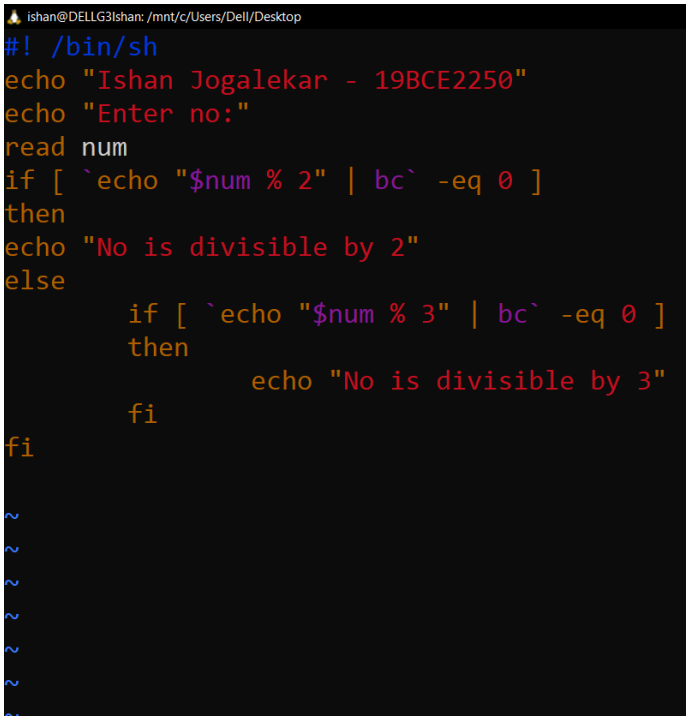
II) Nested If -else :-

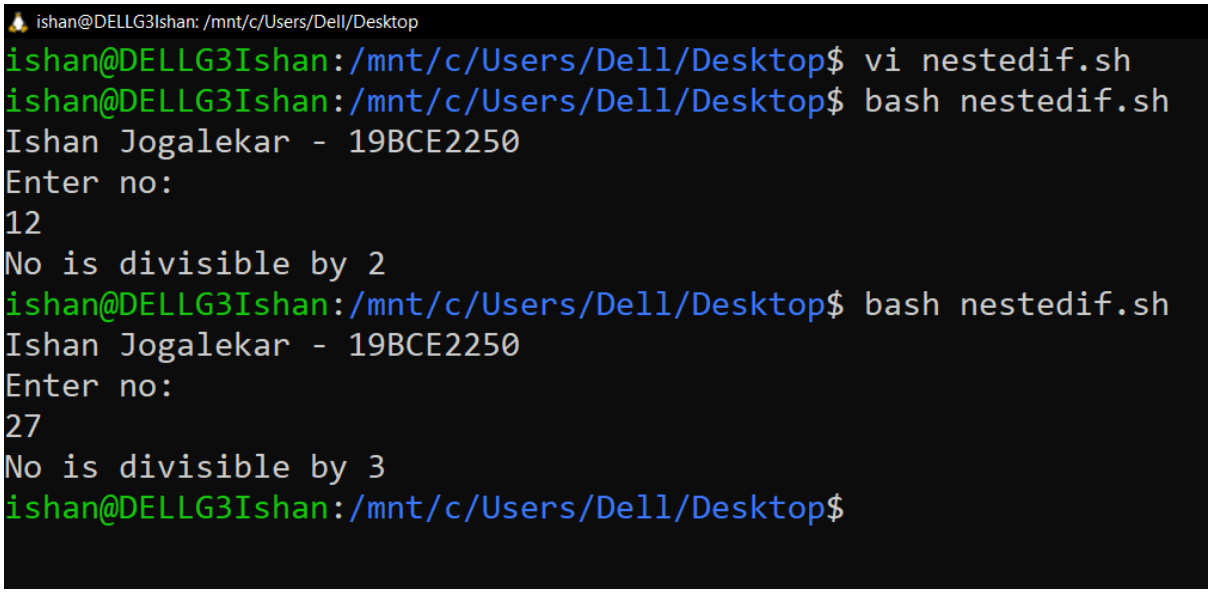
Ans :

Code-

```
#! /bin/sh
echo "Ishan Jogalekar - 19BCE2250"
echo "Enter no:"
read num
if [ `echo "$num % 2" | bc` -eq 0 ]
then
echo "No is divisible by 2"
else
        if [ `echo "$num % 3" | bc` -eq 0 ]
        then
                echo "No is divisible by 3"
        fi
fi
```

Output-





III) Switch case :-

Ans:

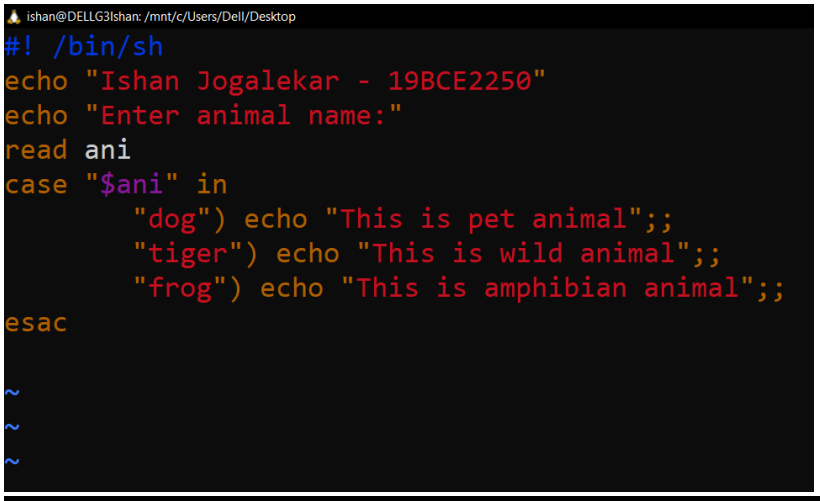
Code-

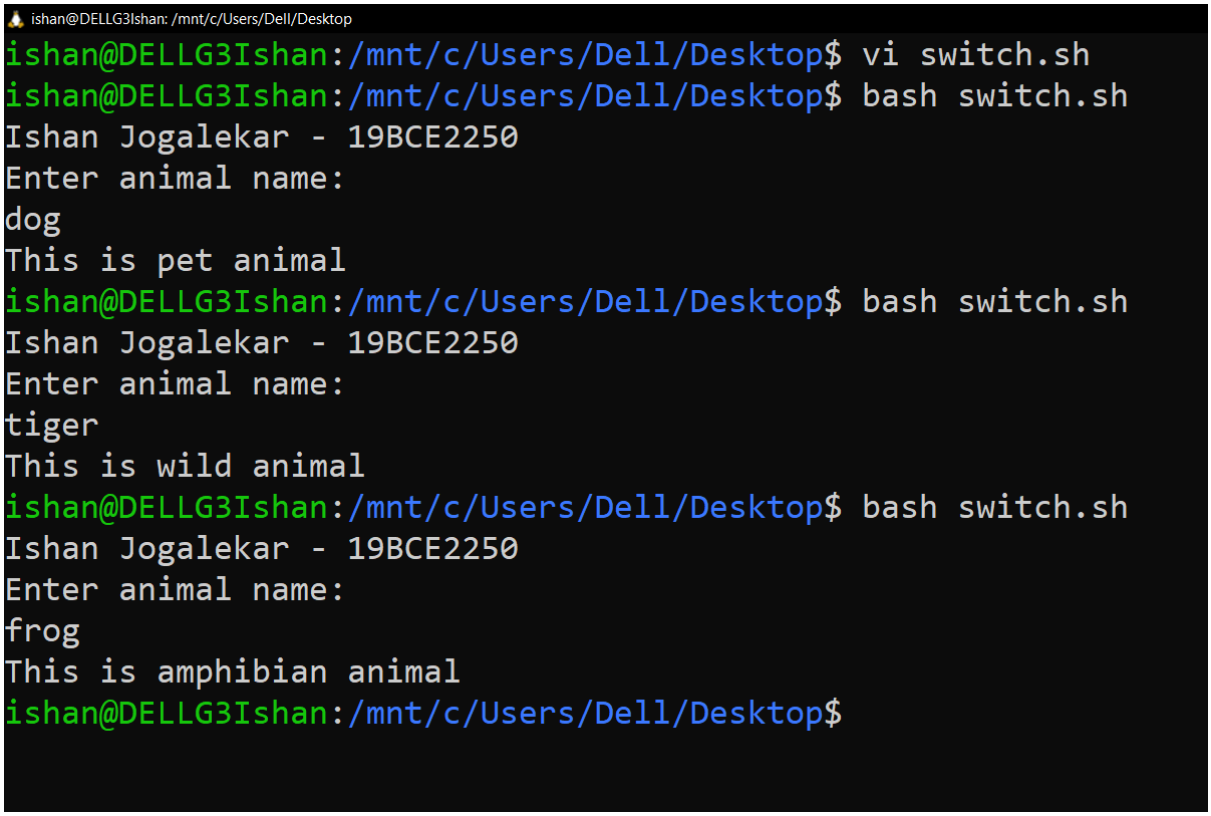
#! /bin/sh

echo "Ishan Jogalekar - 19BCE2250"

```
echo "Enter animal name:"
read ani
case "$ani" in
        "dog") echo "This is pet animal";;
        "tiger") echo "This is wild animal";;
        "frog") echo "This is amphibian animal";;
esac
```

Output-





(c) Parent child process creation using fork( ) and exec() system call

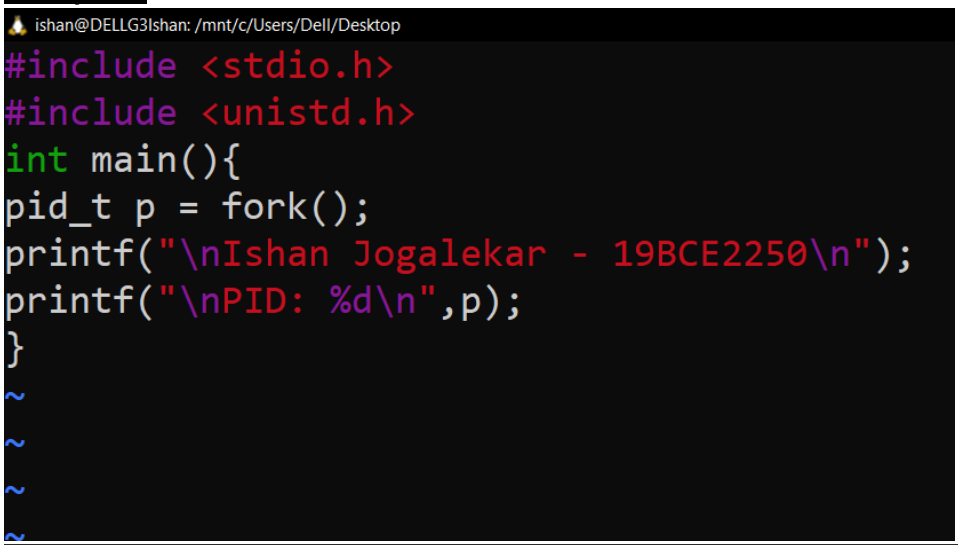
a. Checking the Process Identifier:-

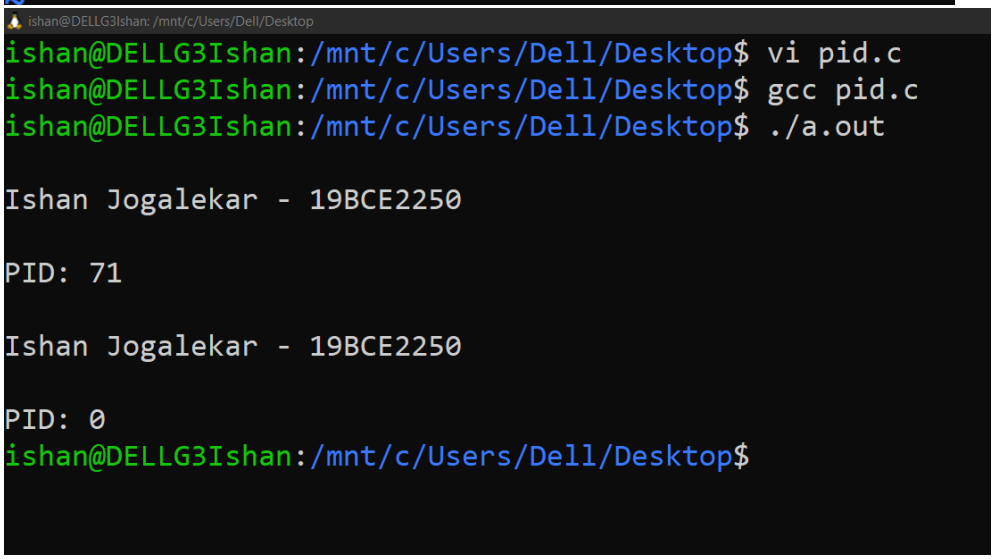
Ans:

Code-

```
#include <stdio.h>
#include <unistd.h>
int main(){
pid_t p = fork();
printf("\nIshan Jogalekar - 19BCE2250\n");
printf("\nPID: %d\n",p);
}
```

Output-





b. Assigning new task to child :-

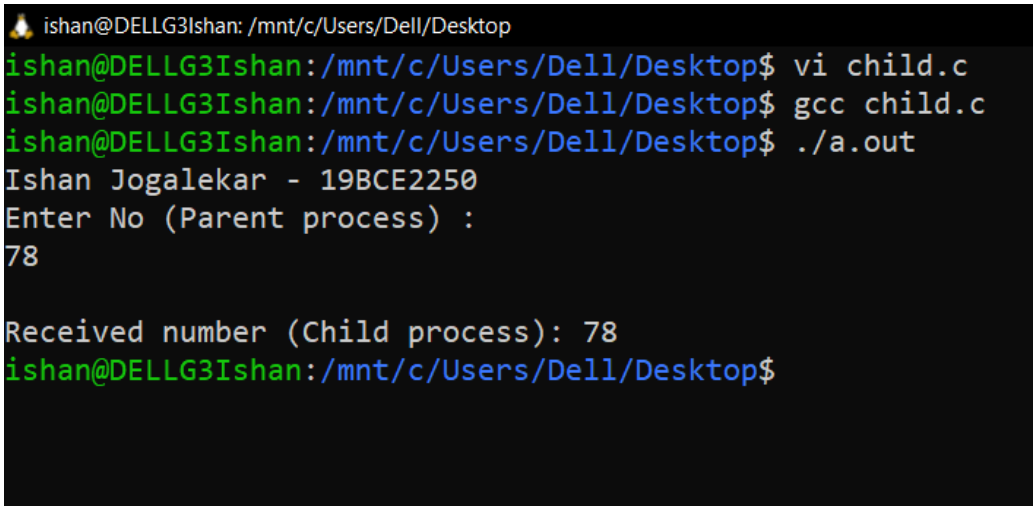
Ans:

Code:-

```
#include <stdio.h>
#include <unistd.h>

int main(){
        int a=fork();
        if (a==0)
        {
                printf("I am a child\n");
        }
        else
        {
                printf("I am a parent\n");
        }
        return 0;
}
```

Output-



c. Providing the path name and program name to exec() :
Ans:-

Code-
EXCE :

```
#include <stdio.h>
#include <unistd.h>

int main()
{
    int i;
    printf("\nIshan Jogalekar - 19BCE2250\n");
    printf("\nexec.c File called by execv() file\n");
    return 0;

}
```

EXCEV :

```
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main()
{

        char *args[]={"./exec",NULL};
```

```
        execvp(args[0],args);
}
```

Output-

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
#include <stdio.h>
#include <unistd.h>

int main()
{
    int i;
    printf("\nIshan Jogalekar - 19BCE2250\n");
    printf("\nexec.c File called by execv() file\n");
    return 0;

}
~
~
~
~
~
~
```

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
#include<stdio.h>
#include<stdlib.h>
#include<unistd.h>
int main()
{

        char *args[]={"./exec",NULL};
        execvp(args[0],args);
}


~
~
~
```

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ gcc exec.c -o exec
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ gcc execv.c -o execv
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ gcc exec.c -o exec
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ gcc execv.c -o execv
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ ./execv

Ishan Jogalekar - 19BCE2250

exec.c File called by execv() file
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```

d. Synchronizing Parent and child process using wait() :-

Ans:-

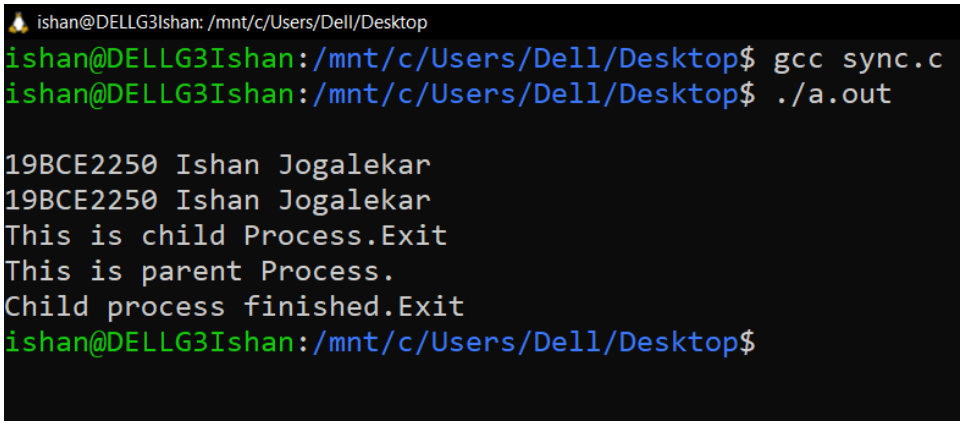
Code :

```
#include<stdio.h>
#include<sys/wait.h>
#include<unistd.h>

int main()
{
   printf("\n19BCE2250 Ishan Jogalekar");
        if (fork()== 0)
                printf("\nThis is child Process.");
        else
        {
                printf("\nThis is parent Process.");
                wait(NULL);
                printf("\nChild process finished.");
        }

        printf("Exit\n");
        return 0;
}
```

Output-



(d) The Collatz conjecture concerns what happens when we take
any positive integer n and apply the following algorithm:
n = n/2, if n is even n = 3 × n + 1, if n is odd
The conjecture states that when this algorithm is continually
applied, all positive integers will eventually reach 1. For example,
if n = 35, the sequence is 35, 106, 53, 160, 80, 40, 20, 10, 5, 16,
8, 4, 2, 1.Write a C program using the fork () system call that
generates this sequence in the child process. The starting number
will be provided from the command line. For example, if 8 is
passed as a parameter on the Command line, the child process
will output 8, 4, 2, 1. Because the parent and child processes have
their own copies of the data, it will be necessary for the child to

output the sequence. Have the parent invoke the wait () call to
wait for the child process to complete before exiting the program :

Ans :-

Code-

```
#include<stdio.h>
#include<stdlib.h>
#include<sys/wait.h>
#include<unistd.h>

int main(int arg1, char **arg2){
   int n;
   printf("\nIshan Jogalekar - 19BCE2250\n");
   if(arg1==1){
        printf("\nArguments missing..\n");
        exit(0);
    }
    n = atoi(arg2[1]);
    if(n <= 0){
       printf("\nPositive interger required..\n");
        exit(0);
    }
    if(fork() == 0){
        while(n > 1){
           printf("%d ", n);
           if(n %2 == 0)
               n = n / 2;
           else
               n = 3 * n + 1;
       }
       printf("1\n\n");
    }
    else{

      wait(NULL);
    }
    return 0;
}
```

Output-

ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop

```
#include<stdio.h>
#include<stdlib.h>
#include<sys/wait.h>
#include<unistd.h>

int main(int arg1, char **arg2){
   int n;
   printf("\nIshan Jogalekar - 19BCE2250\n");
   if(arg1==1){
        printf("\nArguments missing..\n");
        exit(0);
    }
    n = atoi(arg2[1]);
    if(n <= 0){
       printf("\nPositive interger required..\n");
        exit(0);
    }
    if(fork() == 0){
        while(n > 1){
           printf("%d ", n);
           if(n %2 == 0)
               n = n / 2;
           else
               n = 3 * n + 1;
       }
       printf("1\n\n");
    }
    else{

       wait(NULL);
    }
    return 0;
-- INSERT --
```

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ vi colltaz.c
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ gcc colltaz.c
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ ./a.out

Ishan Jogalekar - 19BCE2250

Arguments missing..
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ ./a.out -74

Ishan Jogalekar - 19BCE2250

Positive interger required..
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ ./a.out 74

Ishan Jogalekar - 19BCE2250
74 37 112 56 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
```

```
ishan@DELLG3Ishan: /mnt/c/Users/Dell/Desktop
ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$ ./a.out 23

Ishan Jogalekar - 19BCE2250
23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1

ishan@DELLG3Ishan:/mnt/c/Users/Dell/Desktop$
```