VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.

LAB REPORT
on

UNIX SHELL AND PROGRAMMING

Submitted by

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in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "LAB COURSE **UNIX SHELL AND PROGRAMMING**" carried out by **AKSHATA MANJUNATH NAIK (1BM20CS008)** who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a **Unix Shell and Programming - (20CS5PCUSP)** work prescribed for the said degree.

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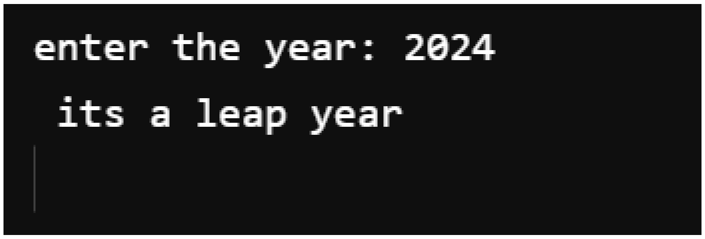
Experiment No 1

Shell script to find if the given year is leap or not

```
#!/bin/bash
echo "Enter an Year: "
read year
if [ $((year % 4)) -eq 0 ]
then
  if [ $((year % 100)) -eq 0 ]
    then
    if [ $((year % 400)) -eq 0 ]
          then
        echo "$year is a leap year"
    else
           echo "$year is not a leap year"
    fi
  else
  echo "$year is a leap year"
  fi
else
 echo "$year is not a leap year"
fi
```

Output



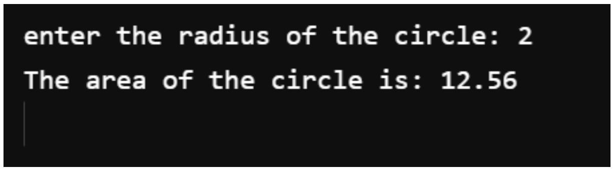
```
enter the year: 2024
 its a leap year
```

Experiment No 2

Shell script to find the area of a circle

```
#!/bin/bash

echo -n "\nEnter the radius of a circle : "

read r

echo -n "\nArea of circle is "

echo “3.14*$r*$r" | bc
```

Output



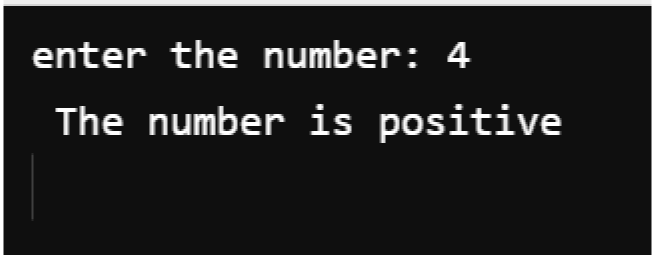
```
enter the radius of the circle: 2
The area of the circle is: 12.56
```

Experiment No 3

Shell script to check whether the number is zero/ positive/ negative

```
#!/bin/bash

echo "Enter the number : "

read num

if [ $num -gt 0 ]

then

   echo "$num is positive"

elif [ $num -lt 0 ]

then

   echo "$num is negative"

else

   echo "$num is zero"

fi
```

Output



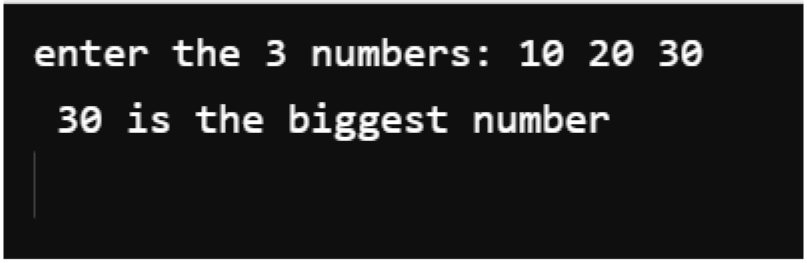
```
enter the number: 4
 The number is positive
```

Experiment No 4

Shell script to find the biggest of three numbers

```
#!/bin/bash

echo "Enter first number : "

read num1

echo "Enter second number : "

read num2

echo "Enter third number : "

read num3

if [ $num1 -gt $num2 ] && [ $num1 -gt $num3 ]

then

   echo "\n$num1 is the greatest"

elif [ $num2 -gt $num1 ] && [ $num2 -gt $num3 ]

then

   echo "\n$num2 is the greatest"

else

   echo "\n$num3 is the greatest"

fi
```

Output



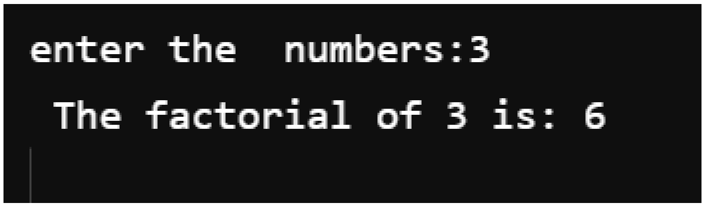
```
enter the 3 numbers: 10 20 30
 30 is the biggest number
```

Experiment No 5

Shell script to find the factorial of a number

```
#!/bin/bash

echo "ENTER THE NUMBER: "

read n

fact=1

while [ $n -gt 1 ]

do

  fact=$(( fact * n))

  n=$((n-1 ))

done

echo "FACTORIAL IS: "

echo $fact
```

Output



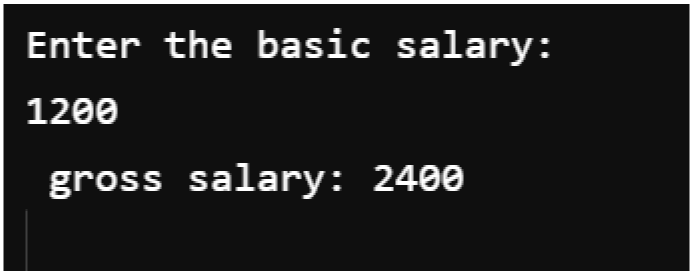
```
enter the  numbers:3
 The factorial of 3 is: 6
```

Experiment No 6

Shell script to compute the gross salary of an employee

```
#!/bin/bash

echo "\nEnter name of Employee :"

read name

echo "\nEnter DA :"

read da

echo "\nEnter HRA:"

read hra

echo "\nEnter basic"

read basic

sal=$(( $da + $hra + $basic ))

echo "\nGross Salary of $name is $sal"
```

Output



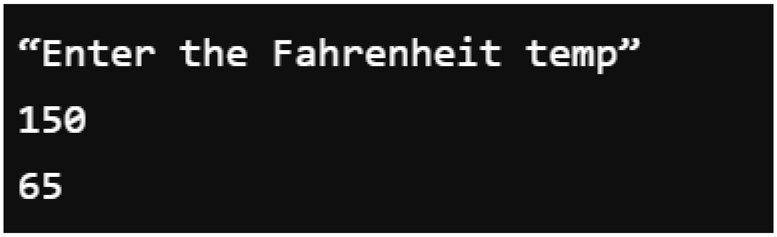
```
Enter the basic salary:
1200
 gross salary: 2400
```

Experiment No 7

Shell script to convert the temperature Fahrenheit to Celsius

```
#!/bin/bash

echo "Enter temperature in F : "

read f

c=$(echo "scale=2;(5/9)*($f-32)"|bc)

echo "$f °F = $c °C"
```

Output:



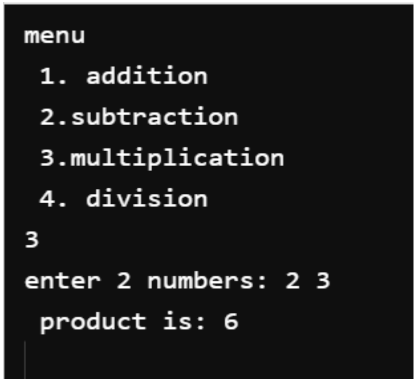
```
“Enter the Fahrenheit temp”

150

65
```

Experiment No 8

Shell script to perform arithmetic operations on given two numbers

```
#!/bin/bash

echo "Enter 2 Numbers : "

read a

read b

echo "Enter Operation : \n"

echo "1) Addition"

echo "2) Subtraction"

echo "3) Multiplication"

echo "4) Division(Quotient)"

echo "5) Modulus(Remainder)\n"

read op

case $op in

   1)echo "scale=3; $a + $b" | bc -l  ;;

   2)echo "scale=3; $a - $b" | bc -l ;;

   3)echo "scale=3; $a \* $b" | bc -l ;;

   4)echo "scale=3; $a / $b" | bc -l ;;

   5)echo "scale=3; $a % $b" | bc -l ;;

   *)echo "Choose a valid option"

esac
```

Output



```
menu
 1. addition
 2.subtraction
 3.multiplication
 4. division
3
enter 2 numbers: 2 3
 product is: 6
```

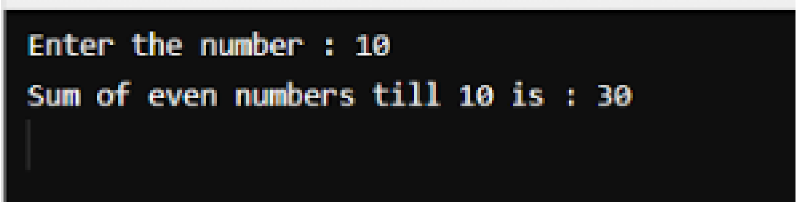
Experiment No 9

Shell script to find the sum of even numbers upto n

Program:

```
#!/bin/bash
sum=0
read -p "Enter maximum limit of Even Numbers : " m
for ((i = 0; i < m; i++)); do
   if [[ $i%2 -eq 0 ]]; then
       sum=$(expr $sum + $i)
   fi
done
echo $sum
```

Output



```
Enter the number : 10
Sum of even numbers till 10 is : 30
```

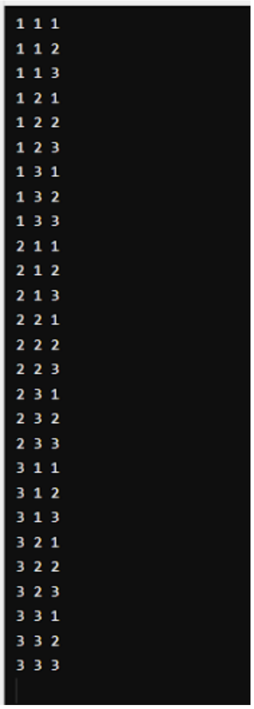
Experiment No 10

Shell script to print the combinations of numbers 123

Program:

```
#!/bin/bash
echo "Combinations for 123 :"
for ((i = 1; i <= 3; i++)); do
   for ((j = 1; j <= 3; j++)); do
      for ((k = 1; k <= 3; k++)); do
         echo $i $j $k
      done
   done
done
```

Output



```
1 1 1
1 1 2
1 1 3
1 2 1
1 2 2
1 2 3
1 3 1
1 3 2
1 3 3
2 1 1
2 1 2
2 1 3
2 2 1
2 2 2
2 2 3
2 3 1
2 3 2
2 3 3
3 1 1
3 1 2
3 1 3
3 2 1
3 2 2
3 2 3
3 3 1
3 3 2
3 3 3
```

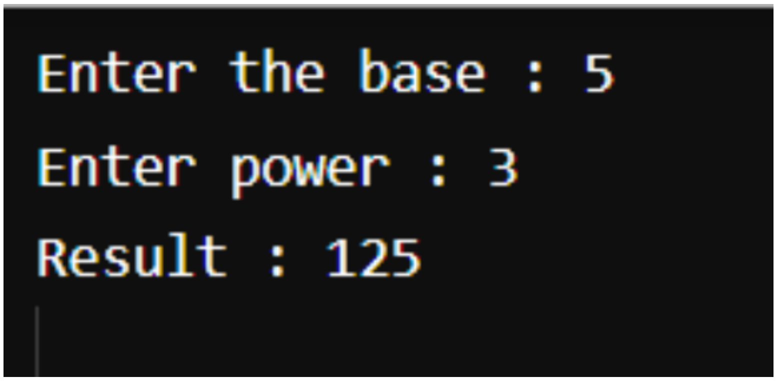
Experiment No 11

Shell script to find the power of a number

Program:

```
#!/bin/bash

echo "Enter base"

read a

echo "Enter power"

read b

res=1

for ((i = 1; i <= b; i++)); do

    res=`expr $res \* $a`

done

echo $res
```

Output



```
Enter the base : 5
Enter power : 3
Result : 125
```

Experiment No 12

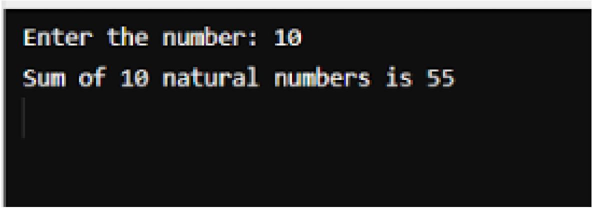
Shell script to find the sum of n natural numbers

Program:

```
#!/bin/bash
echo "Enter a number"
read n
i=1
sum=0
while [ $i -le $n ]
  do
   echo "$i"
   sum=$(( $sum + $i ))
        i=$(( $i + 1 ))
  done
```

echo "Sum=$sum"

Output



```
Enter the number: 10
Sum of 10 natural numbers is 55
```

Experiment No 13

Shell script to display the pass class of a student

#!/bin/bash

echo "Enter m1:\c and Enter m2:\c "

read m1

echo "Enter m3:\c"

read m3

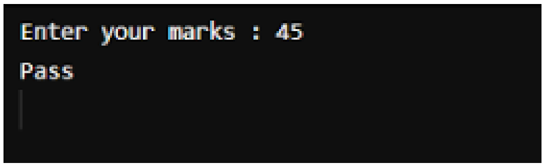
echo "Enter m4:\c"

read m4

echo "Enter m5:\c"

read m5

```
tot=`expr $m1 + $m2 + $m3 + $m4 + $m5`;
avg=`expr $tot / 5`;
echo "total : $tot \n avg : $avg"
if [ $avg -gt 85 ];then
echo " Grade: Distinction "
elif [ $avg -gt 65 ];then
echo " Grade: First Class "
elif [ $avg -gt 50 ];then
echo " Grade: Second Class  "
elif [ $avg -gt 35 ];then
echo " Grade: Pass "
else echo " Grade: Fail"
fi
```



```
Enter your marks : 45
Pass
```

Experiment No 14

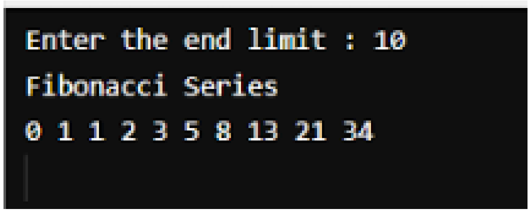
Shell script to find the Fibonacci series up to n

Program:

```
#!/bin/bash
read N
a=0
b=1
echo "The Fibonacci series is : "
for (( i=0; i<N; i++ ))
do
    echo "$a"
    fib=$((a + b))
```

```
   a=$b
   b=$fib
done
```

Output



```
Enter the end limit : 10
Fibonacci Series
0 1 1 2 3 5 8 13 21 34
```

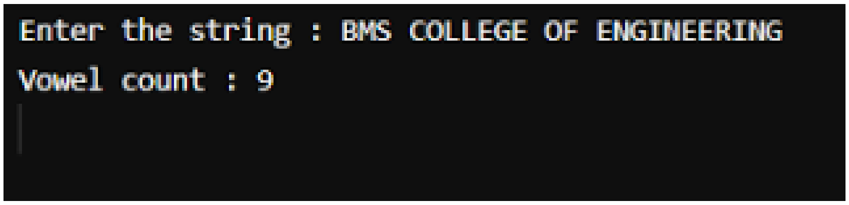
Experiment No 15

Shell script to count the number of vowels of a string

Program:

```
#!/bin/bash
echo "enter filename"
read filename
vowels=`cat $filename | tr -cd 'aeiouAEIOU' | wc -c`
echo "Number of vowels in $filename: $vowels"
```

Output



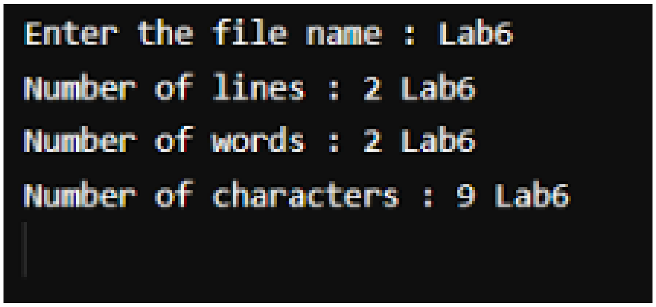
```
Enter the string : BMS COLLEGE OF ENGINEERING
Vowel count : 9
```

Experiment No 16

Shell script to check number of lines, words, characters in a file

```
#!/bin/bash
echo "Enter the filename or path to proceed"
read filename
words=`wc -w $filename`
lines=`wc -l $filename`
chars=`wc -c $filename`
echo "Words is $words"
echo "Lines is $lines"
echo "Characters is $chars"
```

Output

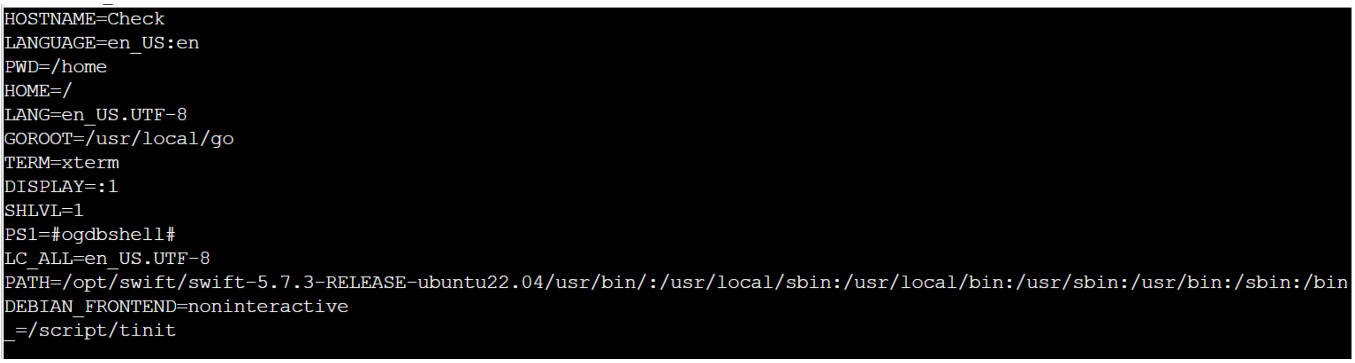


```
Enter the file name : Lab6
Number of lines : 2 Lab6
Number of words : 2 Lab6
Number of characters : 9 Lab6
```

Experiment No 17

Write a C/C++ program to that outputs the contents of its environment list

```
#include&lt;stdio.h&gt;

#include&lt;unistd.h&gt;

int main(int argc,char *argv[])

{

char **ptr;

extern char **environ;

for(ptr=environ; *ptr; ptr++)
printf(&quot;%s\n&quot;,*ptr);

return 0;

}
```



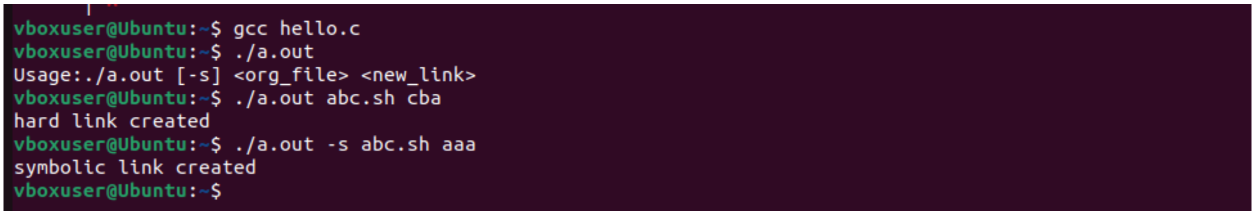
```
HOSTNAME=Check
LANGUAGE=en_US:en
PWD=/home
HOME=/
LANG=en_US.UTF-8
GOROOT=/usr/local/go
TERM=xterm
DISPLAY=:1
SHLVL=1
PS1=#ogdbshell#
LC_ALL=en_US.UTF-8
PATH=/opt/swift/swift-5.7.3-RELEASE-ubuntu22.04/usr/bin/:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
DEBIAN_FRONTEND=noninteractive
_=/script/tinit
```

Experiment No 18

Write a C/C++ program to emulate the Unix ln command

```
#include<unistd.h>
#include<stdio.h>
#include<string.h>
int main(int argc , char * argv[])
{
	if(argc<3 || argc>4){
		printf("Error in usage\n");
		return -1;
	}
	if(argc==4 && strcmp(argv[1],"-s")!=0){
		printf("for symbolic link use -s option");
```

```
                return -1;
        }
        if(argc==4 && access(argv[2] , F_OK)==-1){
                printf("Source file does not exist");
                return -1;
        }
        if(argc==3 && access(argv[1] , F_OK)==-1){
                printf("Source file does not exist");
                return -1;
        }
        if(argc==4){
                symlink(argv[2] , argv[3]);
                printf("Symbolic link is created");
                return 0;
        }
        if(argc==3){
                link(argv[1] , argv[2]);
                printf("Hard link is created");
                return 0;
        }
}
```



```
vboxuser@Ubuntu:~$ gcc hello.c
vboxuser@Ubuntu:~$ ./a.out
Usage:./a.out [-s] <org_file> <new_link>
vboxuser@Ubuntu:~$ ./a.out abc.sh cba
hard link created
vboxuser@Ubuntu:~$ ./a.out -s abc.sh aaa
symbolic link created
vboxuser@Ubuntu:~$
```

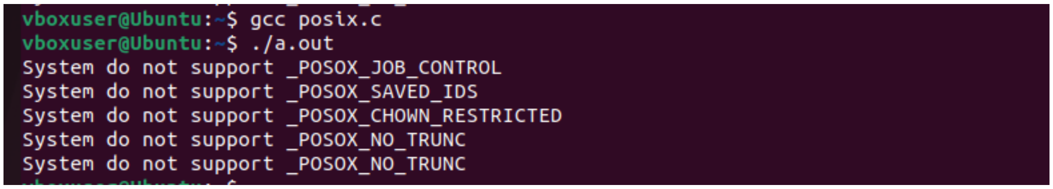
Experiment No 19

Write a C/C++ POSIX compliant program that prints the POSIX defined Configuration options supported on any given system using feature test macros.

```
#define _POSIX_SOURCE

#define _POSIX_C_SOURCE 199309L

#include<stdio.h>

#include<unistd.h>

int main()

{
```

```
#ifdef _POSIX_JOB_CONTROL
printf(“System supports job control\n”);
#else
printf(“System does not support job control \n”);
#endif

#ifdef _POSIX_SAVED_IDS
printf(“System supports saved set-UID and saved set-GID\n”);
#else
printf(“System does not support saved set-UID and saved set-GID \n”);
#endif

#ifdef _POSIX_CHOWN_RESTRICTED
printf(“chown_restricted option is %d\n”,_POSIX_CHOWN_RESTRICTED);
#else
printf(“System does not support chown_restricted option \n”);
#endif

#ifdef _POSIX_NO_TRUNC
printf(“Pathname trunc option is %d\n”,_POSIX_NO_TRUNC);
#else
printf(“System does not support system-wide pathname trunc option \n”);
#endif

#ifdef _POSIX_VDISABLE
printf(“Disable
character for terminal files is %d\n”,_POSIX_VDISABLE);
#else
printf(“System does not support _POSIX_VDISABLE \n”);
```

```
#endif
return 0;
}
```



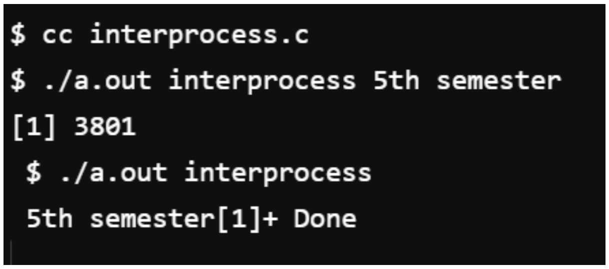
```
vboxuser@Ubuntu:~$ gcc posix.c
vboxuser@Ubuntu:~$ ./a.out
System do not support _POSOX_JOB_CONTROL
System do not support _POSOX_SAVED_IDS
System do not support _POSOX_CHOWN_RESTRICTED
System do not support _POSOX_NO_TRUNC
System do not support _POSOX_NO_TRUNC
```

Experiment No 20

Write a C/C++ program which demonstrates Interprocess Communication between a reader process and a writer process. Use mkfifo, open, read, write and close apis in your program.

```
#include <sys/stat.h>
        #include <string.h>
        #include <fcntl.h>
        #include <stdio.h>
```

```
#include <unistd.h>
int main(int argc, char *argv[])
{
char buf[100];
int fd,n;
mkfifo (argv[1], S_IFIFO |0777);
if (argc == 3){
fd =  open (argv[1], O_WRONLY);
write (fd, argv[2], strlen(argv[2]));
close(fd);}
if (argc ==2){
fd = open (argv[1], O_RDONLY);
n= read (fd, buf, sizeof(buf));
buf[n]='\0';
printf ("%s", buf);
close(fd);
}
```



```
$ cc interprocess.c
$ ./a.out interprocess 5th semester
[1] 3801
 $ ./a.out interprocess
 5th semester[1]+ Done
```