

# 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**

(Autonomous Institution under VTU)

**BENGALURU-560019**

**October-2022 to Feb-2023**

**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 **DARSHAN HUBBLY (1BM20CS037)**, 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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## Index

<b>Sl · No ·</b>	<b>Date</b>	<b>Experiment Title</b>	<b>Pa ge No.</b>
<b>1.</b>	14/11/22	Shell script to find if the given year is leap or not	4
<b>2</b>	14/11/22	Shell script to find the area of a circle	5
<b>3</b>	14/11/22	Shell script to check whether the number is zero/ positive/ negative	6
<b>4</b>	19/11/22	Shell script to find the biggest of three numbers	7
<b>5</b>	19/11/22	Shell script to find the factorial of a number	8
<b>6</b>	19/11/22	Shell script to compute the gross salary of an employee	9
<b>7</b>	28/11/22	Shell script to convert the temperature Fahrenheit to Celsius	10
<b>8</b>	28/11/22	Shell script to perform arithmetic operations on given two numbers	11
<b>9</b>	28/11/22	Shell script to find the sum of even numbers up to n	12
<b>10</b>	5/12/22	Shell script to print the combinations of numbers 123	13
<b>11</b>	5/12/22	Shell script to find the power of a number	14
<b>12</b>	12/12/22	Shell script to find the sum of n natural numbers	15
<b>13</b>	12/12/22	Shell script to display the pass class of a student	16
<b>14</b>	12/12/22	Shell script to find the Fibonacci series up to n	17
<b>15</b>	19/12/22	Shell script to count the number of vowels of a string	18
<b>16</b>	19/12/22	Shell script to check number of lines, words, characters in a file	19
<b>17</b>	9/1/23	Write a C/C++ program to that outputs the contents of its environment list	20
<b>18</b>	16/1/23	Write a C/C++ program to emulate the Unix ln command	21

<b>19</b>	16/1/23	Write a C/C++ POSIX compliant program that prints the POSIX defined Configuration options supported on any given system using feature test macros.	23
<b>20</b>	16/1/23	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.	25

3

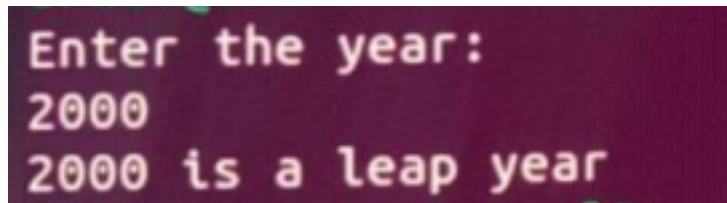
## Experiment No 1

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

CODE:

```
#!/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:
2000
2000 is a leap year
```

4

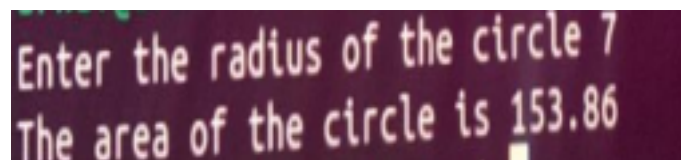
## Experiment No 2

### Shell script to find the area of a circle

CODE:

```
#!/bin/bash
echo "\nEnter the radius of a circle : "
read r
d=$(echo "scale=2;2 * $r" | bc) #Diameter
area=$(echo "scale=2; 22/7 * ($r * $r)" | bc)
circumference=$(echo "scale=2; 22/7 * $d" | bc)
echo "\nArea of circle is : $area"
echo "\nCircumference of circle is : $circumference \n"
```

OUTPUT:



```
Enter the radius of the circle 7
The area of the circle is 153.86
```

## Experiment No 3

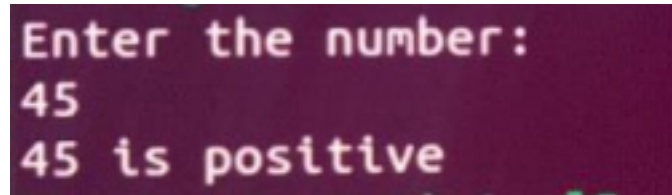
**Shell script to check whether the number is zero/ positive/ negative**

CODE:

```
#!/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:
45
45 is positive
```

6

## Experiment No 4

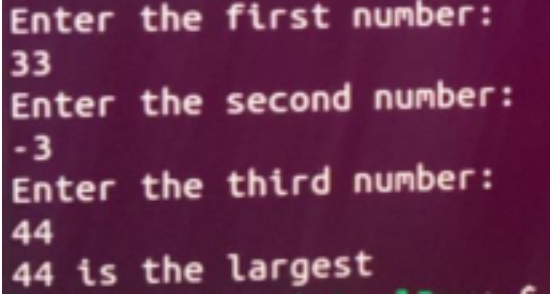
### **Shell script to find the biggest of three numbers**

CODE:

```
#!/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 "\$num2 is the greatest"
else
echo "\$num3 is the greatest"
fi
```

OUTPUT:



```
Enter the first number:
33
Enter the second number:
-3
Enter the third number:
44
44 is the largest
```

7

## Experiment No 5

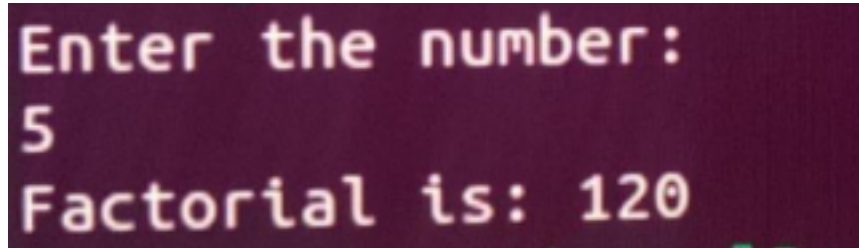
### Shell script to find the factorial of a number

CODE:

```
#!/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:



A terminal window with a dark background and light-colored text. It displays the prompt "Enter the number:", the input "5", and the output "Factorial is: 120".

```
Enter the number:
5
Factorial is: 120
```

8

## Experiment No 6

### **Shell script to compute the gross salary of an employee**

CODE:

```
#!/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
30
Gross salary: 39.0
```

9

## Experiment No 7

### Shell script to convert the temperature Fahrenheit to Celsius

CODE:

```
#!/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 temperature in fahrenheit
100
The temperature in celsius is:
37
```

## Experiment No 8

### **Shell script to perform arithmetic operations on given two numbers**

CODE:

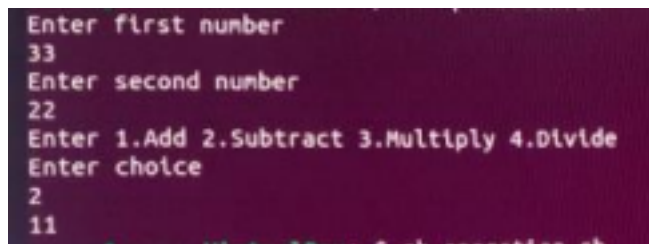
```
#!/bin/bash
echo "Enter 2 Numbers : "
read a
read b
echo "Enter Operation : \n"
echo "1) Addition"
echo "2) Subtraction"
echo "3) Multiplication"
echo "4) Division(Quotient)"
```

```

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:



```

Enter first number
33
Enter second number
22
Enter 1.Add 2.Subtract 3.Multiply 4.Divide
Enter choice
2
11

```

11

## Experiment No 9

### Shell script to find the sum of even numbers upto n

CODE:

```

#!/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
```

12

## Experiment No 10

### Shell script to print the combinations of numbers 123

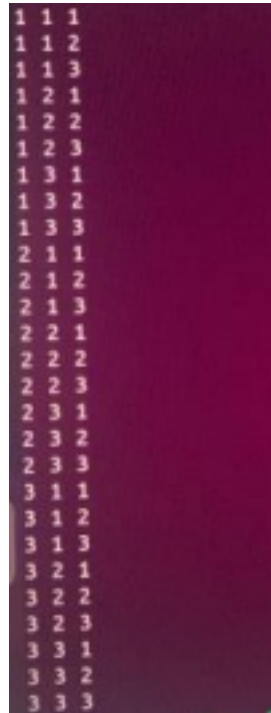
CODE:

```
#!/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
```

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
```

13

## Experiment No 11

### Shell script to find the power of a number

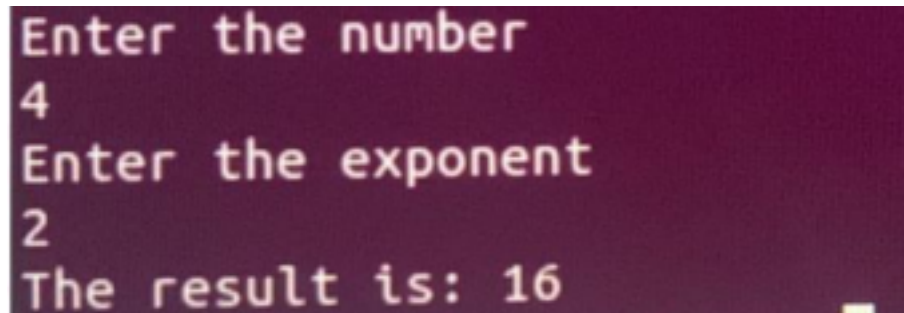
CODE:

```
#!/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 number
4
Enter the exponent
2
The result is: 16
```

14

## Experiment No 12

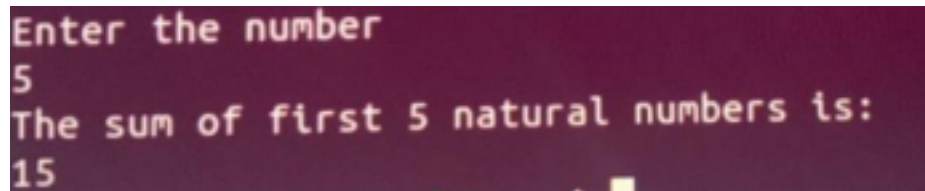
### Shell script to find the sum of n natural numbers

CODE:

```
#!/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  
5  
The sum of first 5 natural numbers is:  
15
```

15

## Experiment No 13

**Shell script to display the pass class of a student**

CODE:

```
#!/bin/bash  
echo "Enter m1:\c and Enter m2:\c "  
read m1  
echo "Enter m3:\c"  
read m3  
echo "Enter m4:\c"  
read m4
```

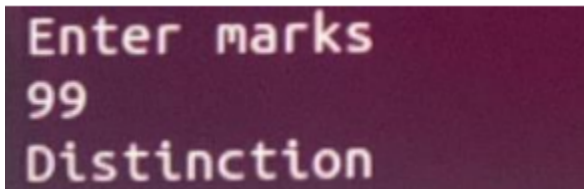


```

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

```

OUTPUT:



```

Enter marks
99
Distinction

```

16

## Experiment No 14

### Shell script to find the Fibonacci series up to n

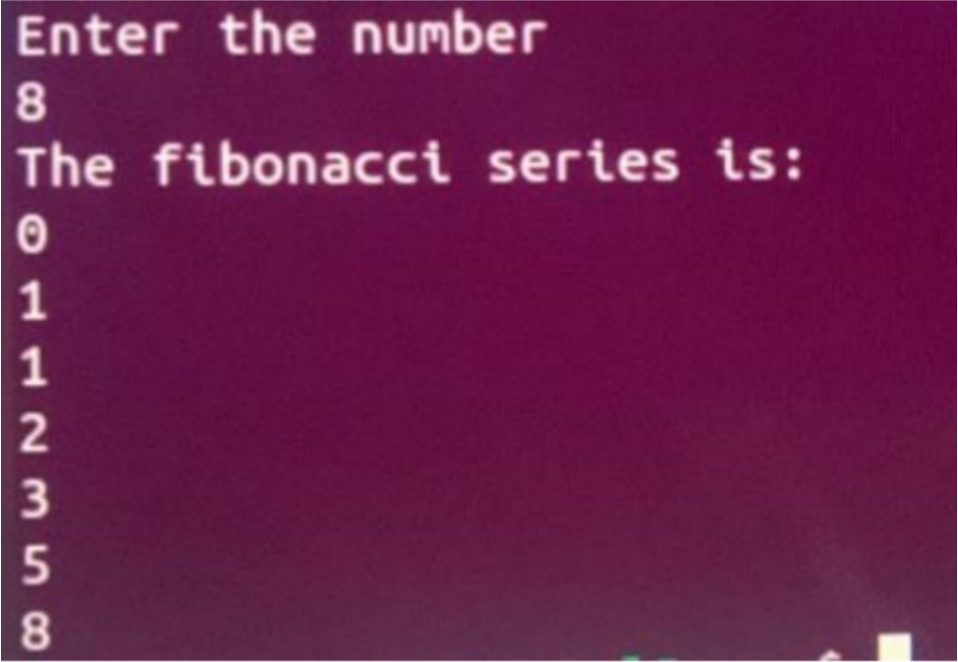
CODE:

```

#!/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 number
8
The fibonacci series is:
0
1
1
2
3
5
8
```

17

## Experiment No 15

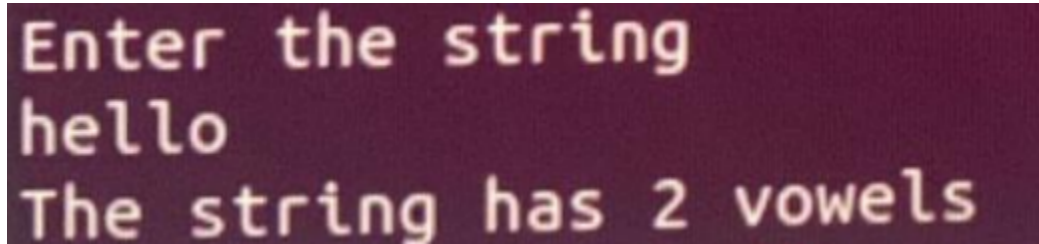
### **Shell script to count the number of vowels of a string**

CODE:

```
#!/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  
hello  
The string has 2 vowels
```

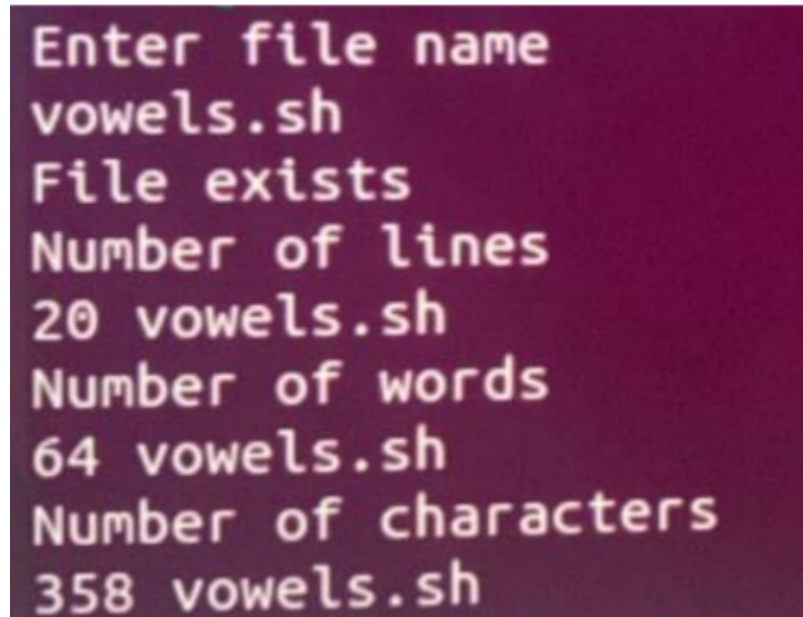
## Experiment No 16

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

CODE:

```
#!/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:
```



The screenshot shows the execution of a shell script named 'vowels.sh'. The user is prompted to enter a file name, and 'vowels.sh' is entered. The script then checks if the file exists and reports the number of lines (20), words (64), and characters (358) in the file.

```
Enter file name  
vowels.sh  
File exists  
Number of lines  
20 vowels.sh  
Number of words  
64 vowels.sh  
Number of characters  
358 vowels.sh
```

## Experiment No 17

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

CODE:

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

```

int main(int argc,char *argv[])
{
char **ptr;
extern char **environ;
for(ptr=environ; *ptr; ptr++)
printf("&quot;%s\n&quot;,*ptr);
return 0;
}

```

OUTPUT:

```

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

```

20

## Experiment No 18

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

CODE:

```

#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;
    }
}

```

OUTPUT:

```
Hard link is created
```

```
Symbolic link is created
```

## 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.**

CODE:

```
#define _POSIX_SOURCE
#define _POSIX_C_SOURCE 199309L
#include<iostream>
#include<unistd.h>
int main()
{
    using namespace std;
    #ifdef _POSIX_JOB_CONTROL
        cout<<<"System Supports Job Control
        feature"<<<endl; #else
        cout<<<"System doesnot support job control\n"<<<endl;
    #endif
    #ifdef _POSIX_SAVED_IDS
        cout<<<"System Supports saved set-UID and saved set-GID"<<<endl;
    #else
        cout<<<"System doesnot support saved set-UID\n"<<<endl;
    #endif
    #ifdef _POSIX_CHOWN_RESTRICTED
        cout<<<"System Supports Change Ownership
        feature:"<<<endl; #else
        cout<<<"System doesnot support change Ownership feature\n"<<<endl;
    #endif
    #ifdef _POSIX_NO_TRUNC
        cout<<<"System Supports Path truncation option:"<<<endl;
```





## 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.**

CODE:

```
#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];

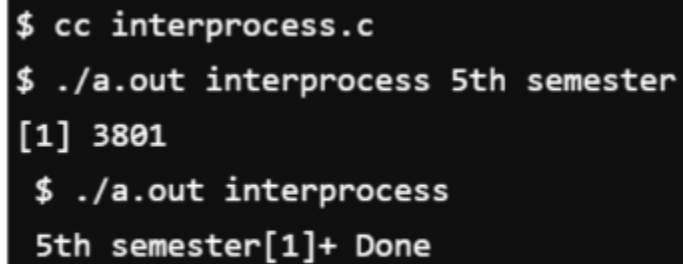
int fd,n;

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);  
}
```

OUTPUT:



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

