VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

UNIX SHELL AND SYSTEM 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)
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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 "**UNIX SHELL AND SYSTEM PROGRAMMING**" carried out by **BHARGAVA G Y (1BM20CS030),** 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 System Programming - (20CS5PCUSP)** work prescribed for the said degree.

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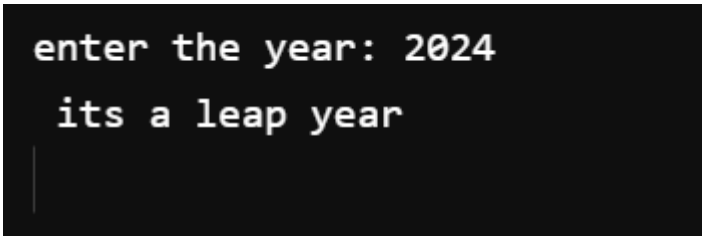
Experiment No 1

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



Experiment No 2

Shell script to find the area of a circle

```
#!/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"
```

Output

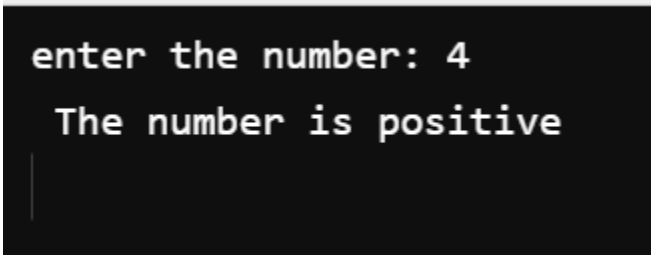
```
enter the radius of the circle: 2
The area of the circle is: 12.56
```

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

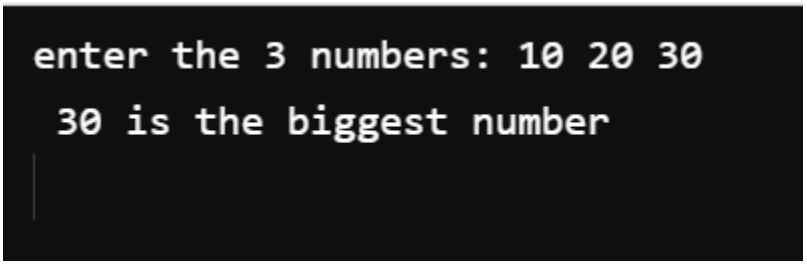


Experiment No 4

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

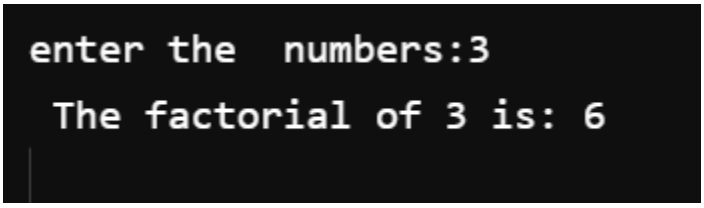


Experiment No 5

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

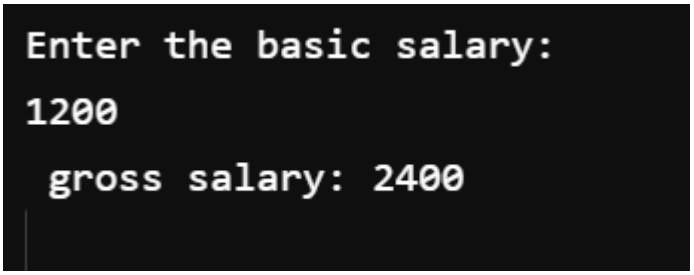


Experiment No 6

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



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
```

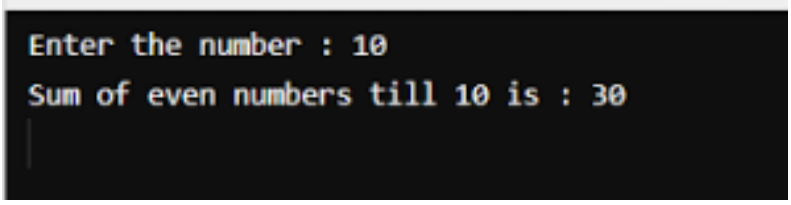
Experiment No 9

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



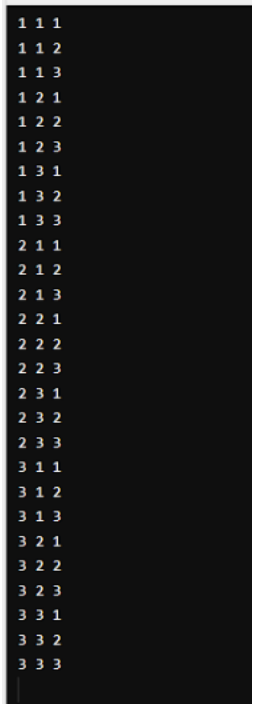
Experiment No 10

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



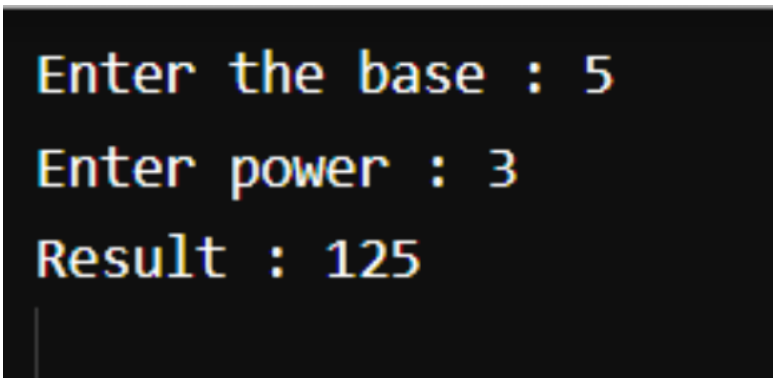
Experiment No 11

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



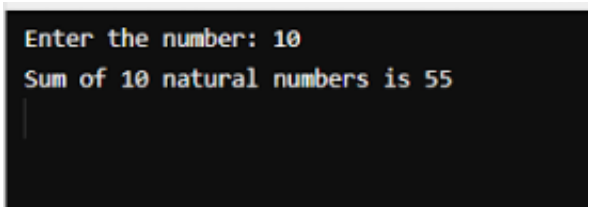
Experiment No 12

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"
```

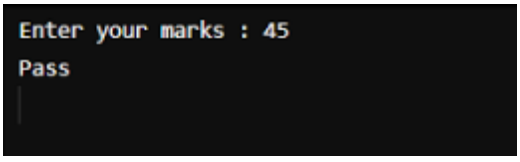
Output



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
```



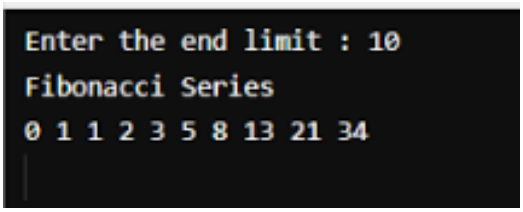
Experiment No 14

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



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

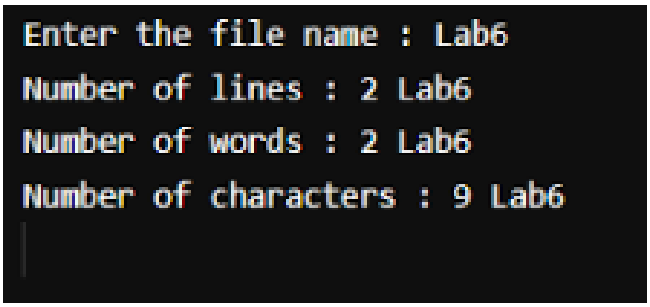
```
Enter the string : BMS COLLEGE OF ENGINEERING
Vowel count : 9
```

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"
```

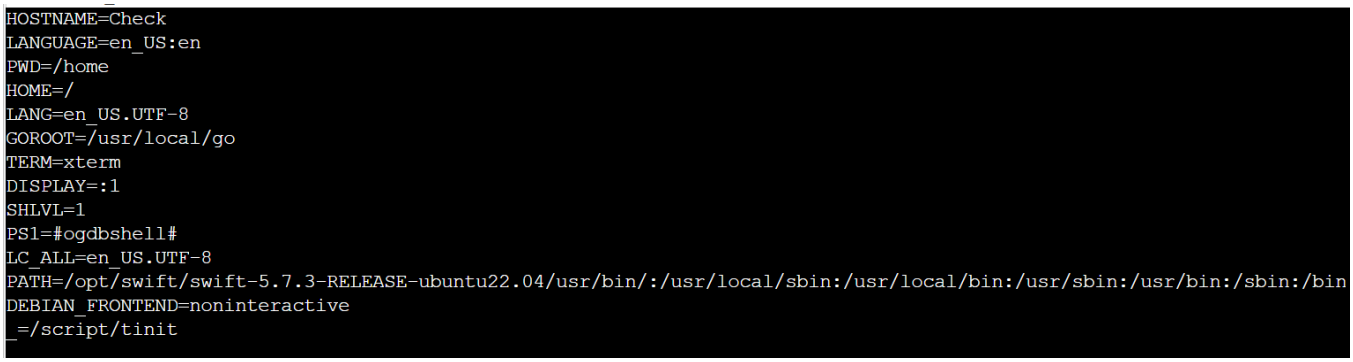
Output



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;
}
```



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;
	}
}
```

```
Hard 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.

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

cout<<"System doesnot support Path truncation \n";

#endif

#ifdef _POSIX_VDISABLE

cout<<"System Supports Disable Character for files:"<<endl;

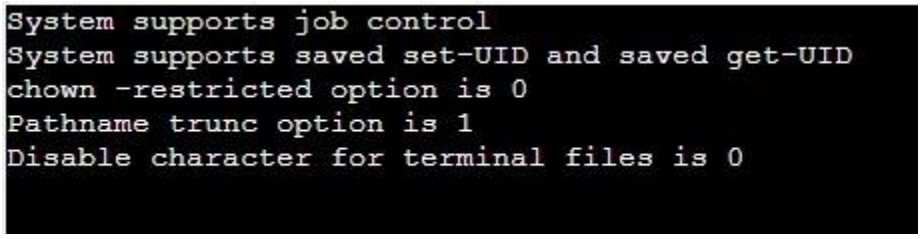
#else

cout<<"System doesnot support Disable Characters \n";

#endif

return 0;

OUTPUT



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
```