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**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)  
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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 **GIRIDHAR K R (1BM20CS051)**, 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 "\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: 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
```

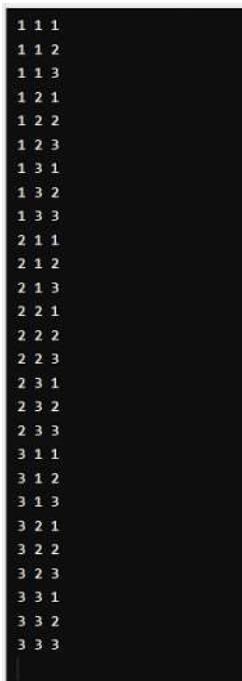
# Experiment No 10

## 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

A black terminal window with a white border. Inside, there is a single column of text representing the combinations of numbers 1, 2, and 3. The text is in a monospaced font and is as follows:  

```
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
```

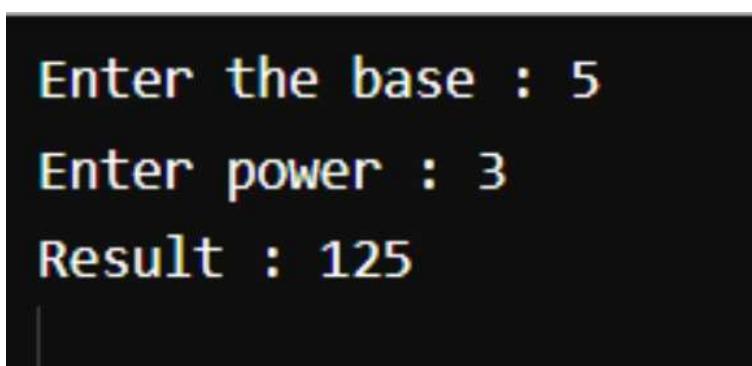
## Experiment No 11

### 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<stdio.h>
#include<unistd.h>
int main(int argc,char *argv[])
{
char **ptr;
extern char **environ;
for(ptr=environ; *ptr; ptr++)
printf("%s\n",*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;
    }
}
```

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<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";
#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";
#endif
#ifdef _POSIX_CHOWN_RESTRICTED
cout<<"System Supports Change Ownership feature:"<<endl;
#else
cout<<"System doesnot support change Ownership feature\n";
#endif
#ifdef _POSIX_NO_TRUNC
cout<<"System Supports Path truncation option:"<<endl;
#else
```

```
cout<<"System doesnot support Path truncation \";  
#endif  
#ifdef _POSIX_VDISABLE  
cout<<"System Supports Disable Character for files:\"<<endl;  
#else  
cout<<"System doesnot support Disable Characters \";  
#endif  
return 0;
```

## 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
```