Laboratory Manual

On

OPERATING SYSTEM LAB

(For 4th Semester CSE/IT)

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OPERATING SYSTEM LAB 4th SEMESTER

Total Periods	**60**	**Maximum Marks**	**50 Marks**
Lab. Periods:	**4 Periods /week**	**Term Works**	**25 Marks**
Examination	**3hours**	**End Semester Examination**	**25Marks**

Steps to Install Git Bash

Follow the steps given below to install **Git Bash on Windows**:

Step 1: Download and Runt he installer

The .exe file installer for Git Bash can be downloaded from "**https://gitforwindows.org/"**

Once downloaded execute that installer, following window will occur.

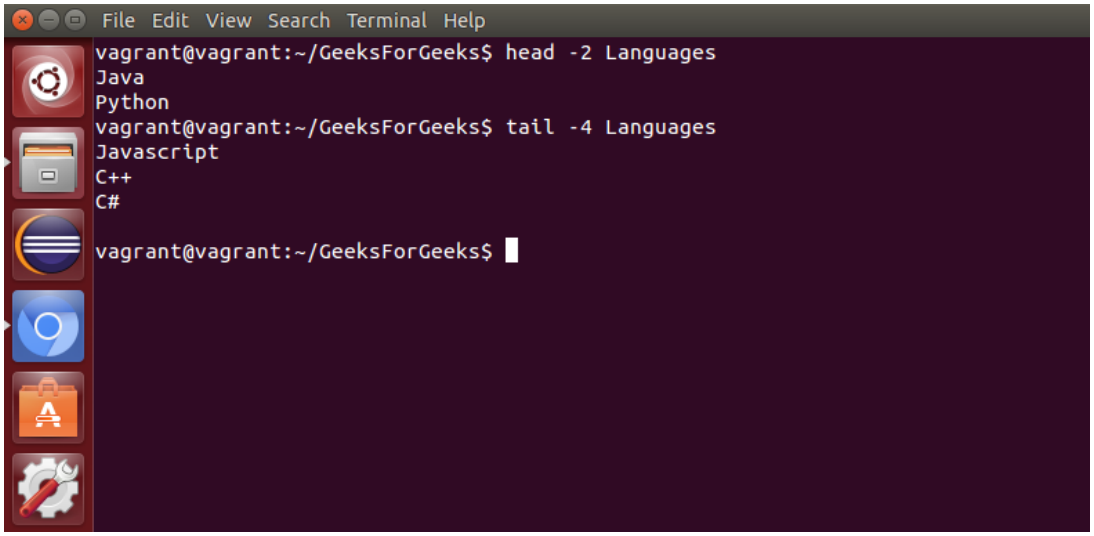
Basic Git Bash Commands

Here are some fundamental Git Bash commands to get you started:

1). Displaying the file contents on the terminal:

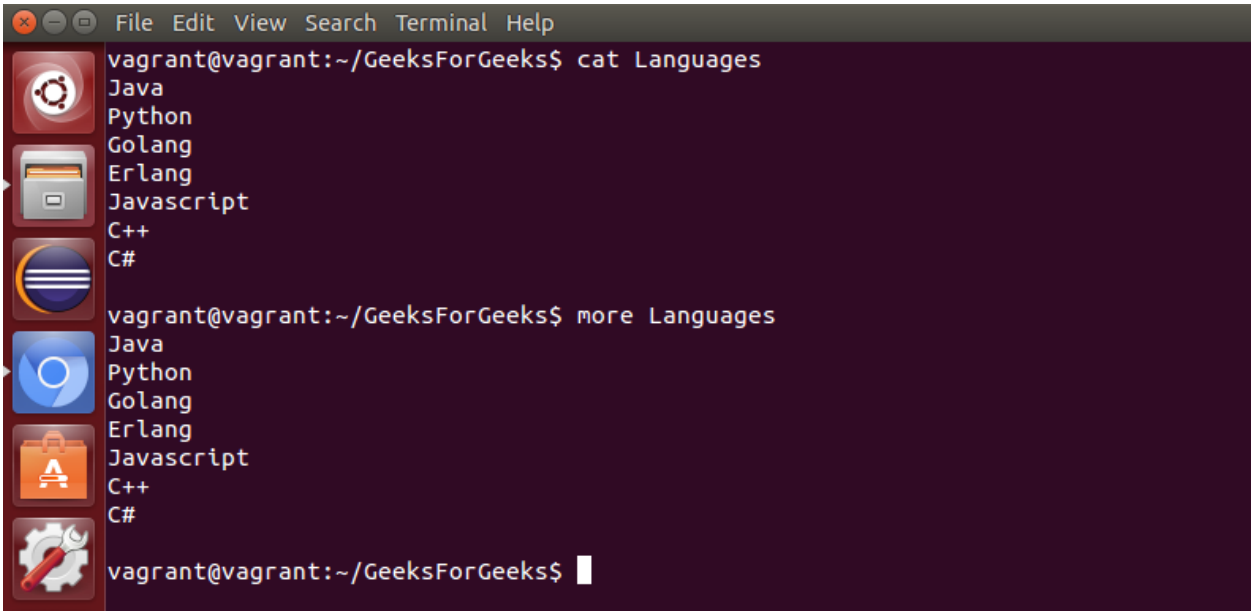
- **cat**: It is generally used to concatenate the files. It gives the output on the standard output.

- **more**: It is a filter for paging through text one screenful at a time.
  - **less**: It is used to viewing the files instead of opening the file.Similar to *more* command but it allows backward as well as forward movement.
  - **head** : Used to print the first N lines of a file. It accepts N as input



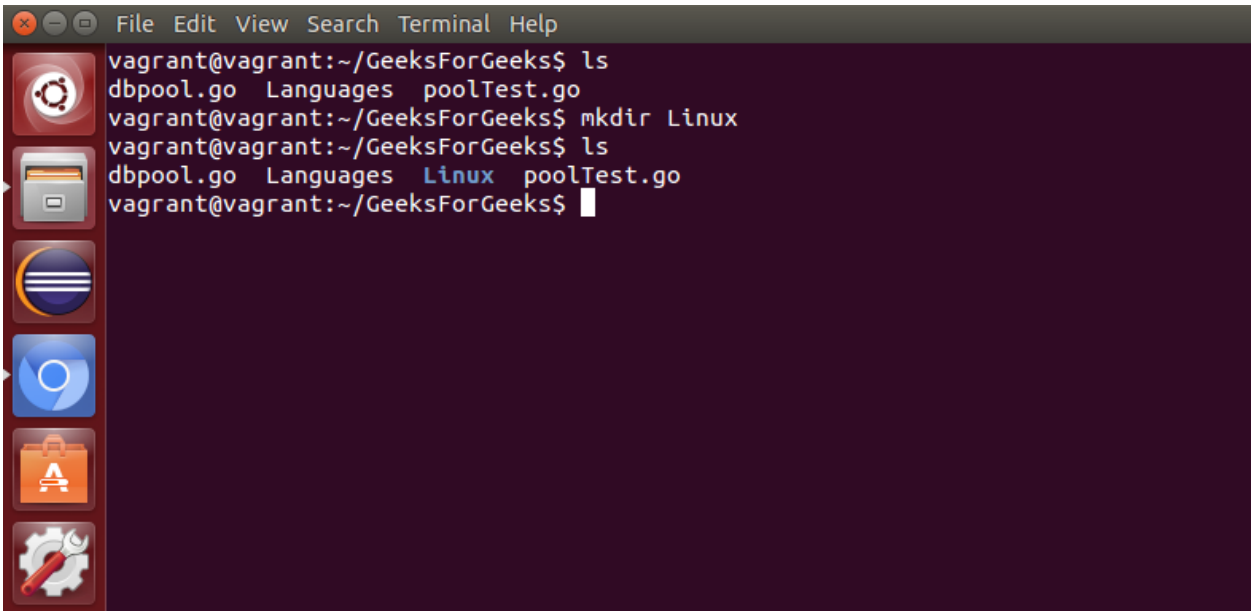
and the default value of N is 10.

  - **tail** : Used to print the last N-1 lines of a file. It accepts N as input and the default value of N is 10.

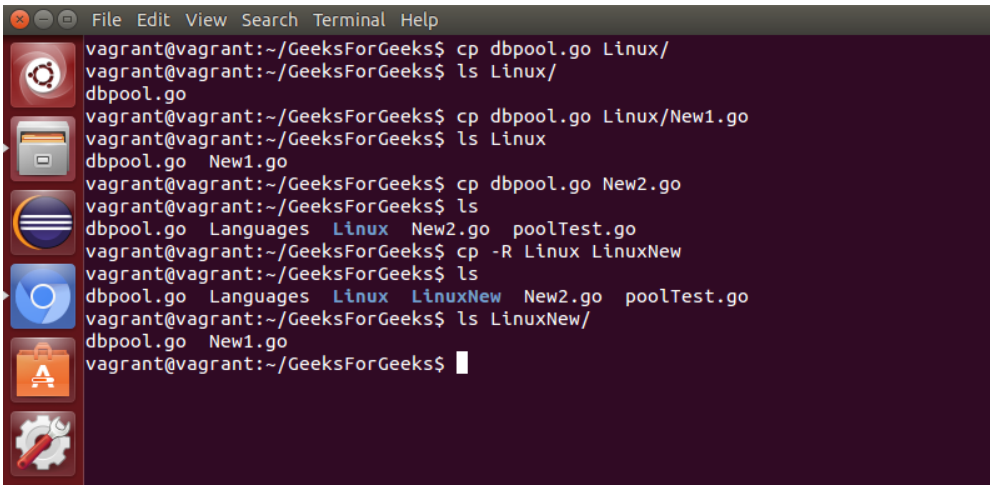


2). File and Directory Manipulation Commands:

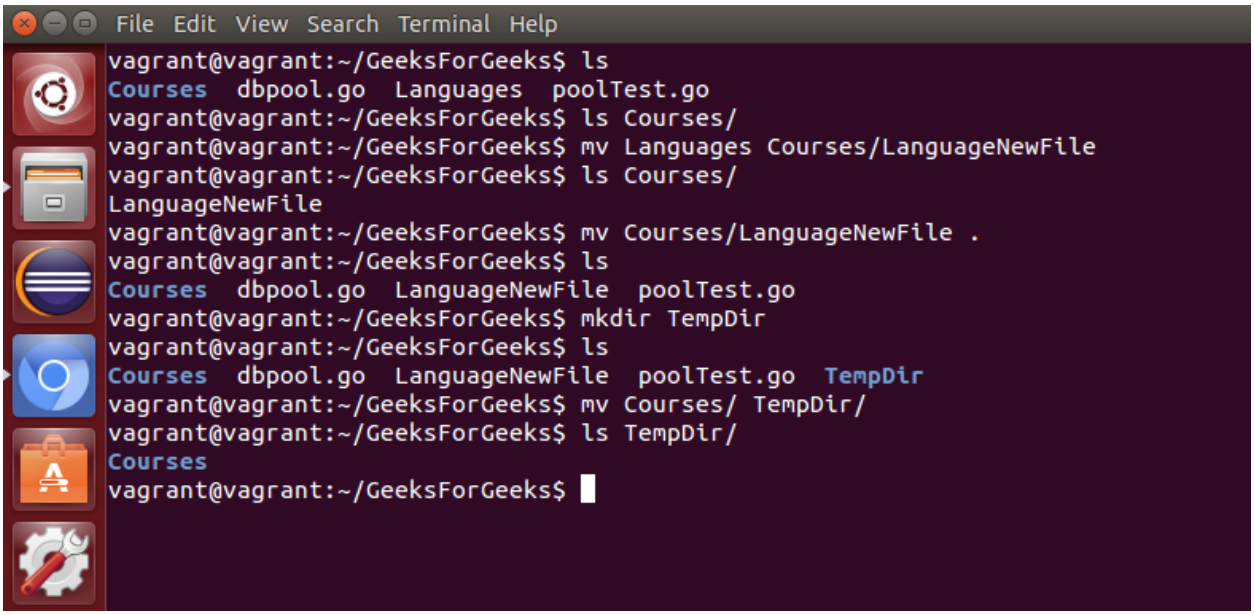
- **mkdir** : Used to create a directory if not already exist. It accepts the directory
- name as an input parameter.



- **cp** : This command will copy the files and directories from the source path to the destination path. It can copy a file/directory with the new name to the destination path. It accepts the source file/directory and destination file/directory.



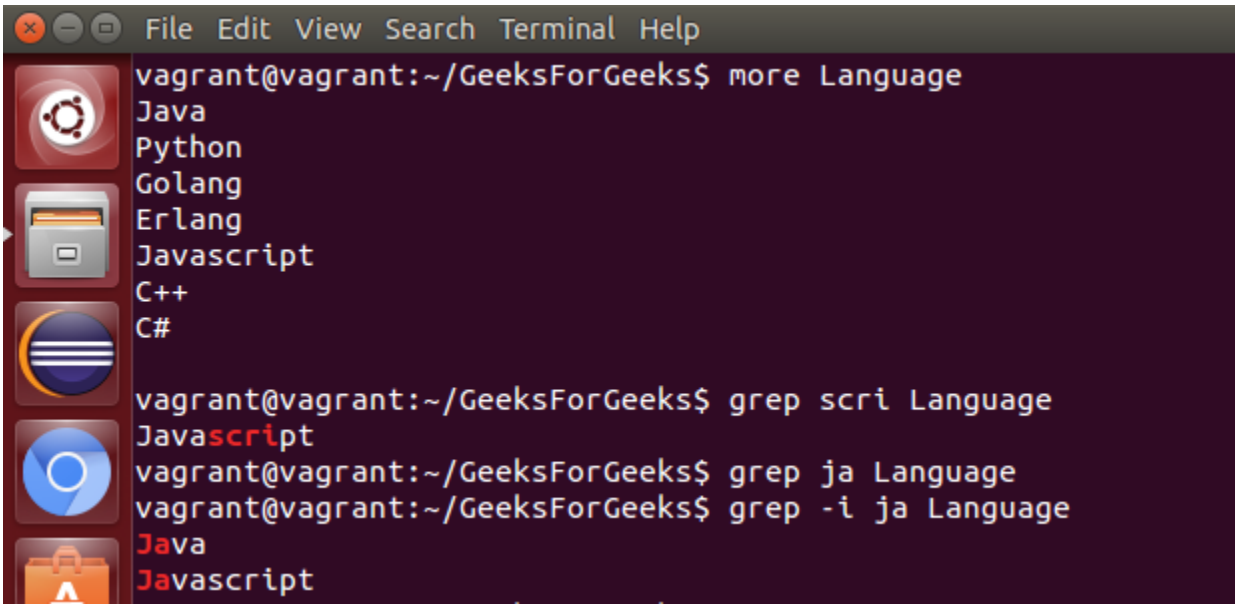
- **mv** : Used to move the files or directories. This command's working is almost similar to *cp* command but it deletes a copy of the file or directory from the source path.

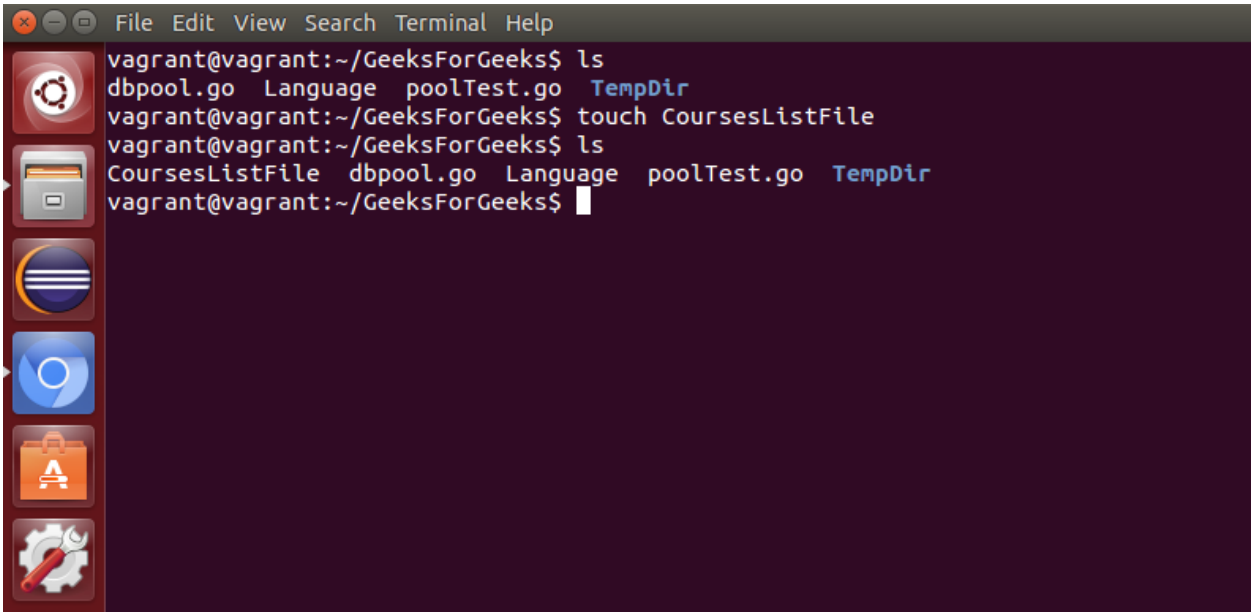


- **rm** : Used to remove files or directories.
- **touch** : Used to create or update a file.

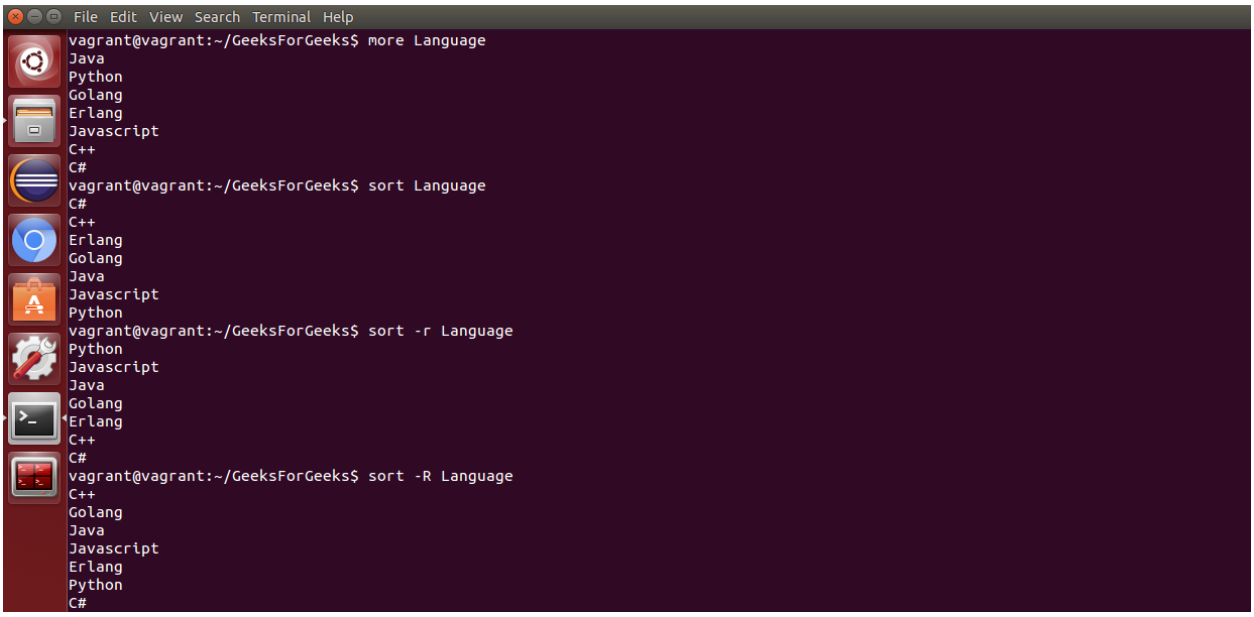
3). Extract, sort, and filter data Commands:

- **grep** : This command is used to search for the specified text in a file.

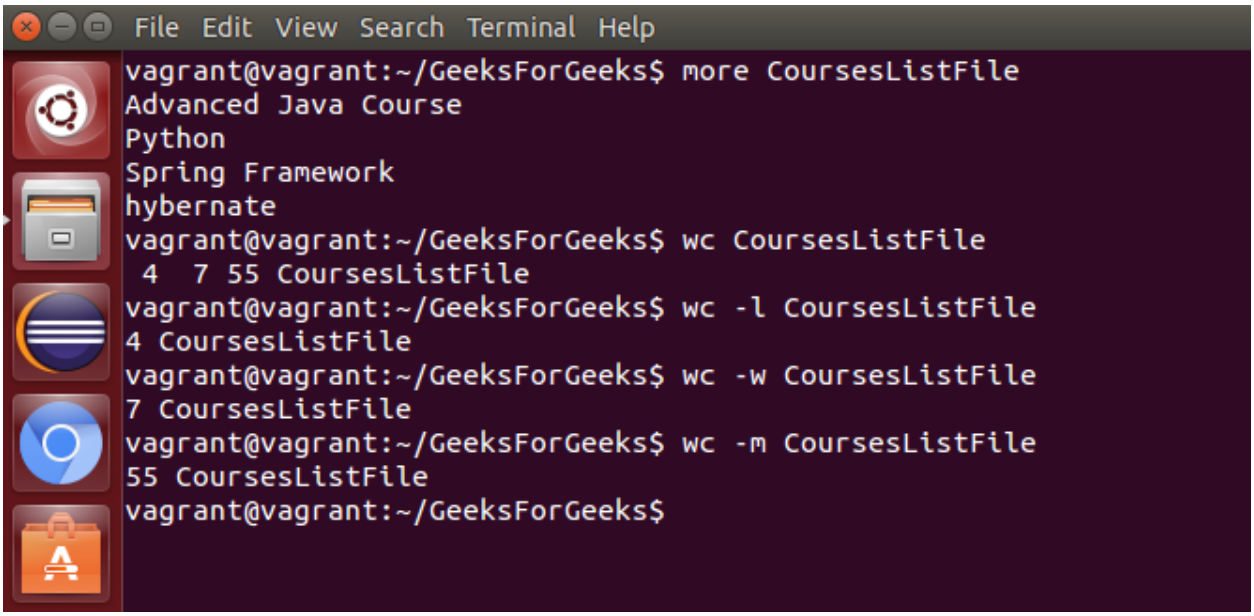


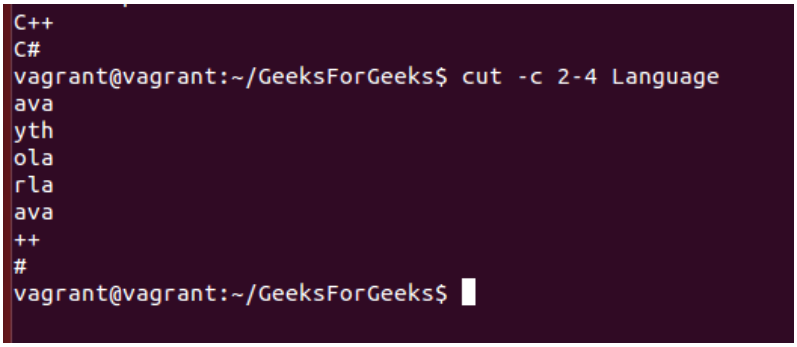

File Edit View Search Terminal Help
vagrant@vagrant:~/GeeksForGeeks$ ls
dbpool.go Language poolTest.go TempDir
vagrant@vagrant:~/GeeksForGeeks$ touch CoursesListFile
vagrant@vagrant:~/GeeksForGeeks$ ls
CoursesListFile dbpool.go Language poolTest.go TempDir
vagrant@vagrant:~/GeeksForGeeks$

- **sort** : This command is used to sort the contents of files.



- **wc** : Used to count the number of characters, words in a file.





- **cut** : Used to cut a specified part of a file.

4). Basic Terminal Navigation Commands:

- **ls** : To get the list of all the files or folders.
- **ls -l:** Optional flags are added to **ls** to modify default behavior, listing contents in extended form **-l** is used for **"long" output**
- **ls -a:** Lists of all files including the hidden files, add **-a flag**
- **cd**: Used to change the directory.
- **du**: Show disk usage.
- **pwd**: Show the present working directory.
- **man**: Used to show the manual of any command present in Linux.
- **rmdir**: It is used to delete a directory if it is empty.
- **ln file1 file2**: Creates a physical link.
- **ln -s file1 file2**: Creates a symbolic link.
- **locate:** It is used to locate a file in Linux System
- **echo:** This command helps us move some data, usually text into a file.
- **df:** It is used to see the available disk space in each of the partitions in your system.
- **tar:** Used to work with tarballs (or files compressed in a tarball archive)

5). File Permissions Commands: The *chmod* and *chown* commands are used to control access to files in UNIX and Linux systems.

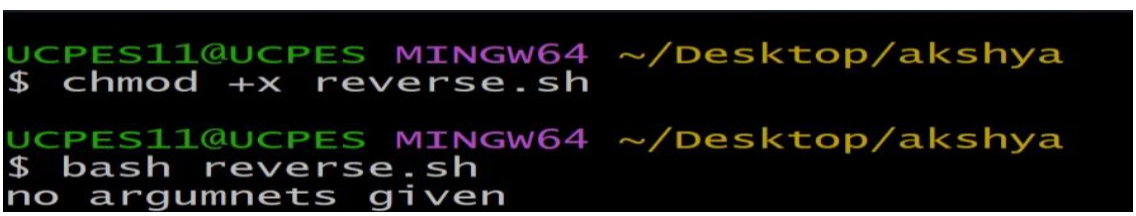
- **chown** : Used to change the owner of the file.
- **chgrp** : Used to change the group owner of the file.
- **chmod** : Used to modify the access/permission of a user.

OPERATING SYSTEM LAB 4th SEMESTER

Exp1. Write a Shell script to print the command line arguments in reverse order.

Ans.

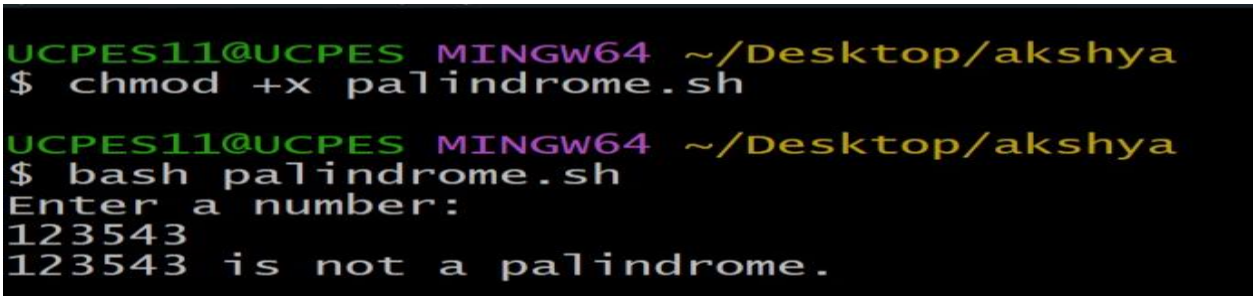
```
#!/bin/bash

if [ $# -eq 00 ]

then

        echo "no argumnets given"

        exit

fi

echo "arguments no. $#"

echo "arguments value $*"

echo "in reverse"

rev=" "

for i in $*

do

        rev=$i" "$rev

done

echo $rev
```



Exp2. Write a Shell script to check whether the given number is palindrome or not.

Ans.

```
echo "Enter a number: "
read number

reverse=0
original=$number

while [ $number -ne 0 ]
do
   remainder=$(( $number % 10 ))
   reverse=$(( $reverse * 10 + $remainder ))
   number=$(( $number / 10 ))
done

if [ $original -eq $reverse ]
then
   echo "$original is a palindrome."
else
   echo "$original is not a palindrome."
fi
```



Exp3. Write a Shell script to sort the given array elements in ascending order using bubble sort.

Ans.

```
arr=(11 44 55 22 33)
echo "Array in original order"
echo ${arr[*]}
for((i=0; i<5; i++))
do
for((j=0; j<5-i-1;j++))
do
if [ ${arr[j]} -gt ${arr[$((j+1))]} ]
then
temp=${arr[j]}
arr[$j]=${arr[$((j+1))]}
arr[$((j+1))]=$temp
fi
done
done
echo "Array in sorted order :"
echo ${arr[*]}
```

```
UCPES11@UCPES MINGW64 ~/Desktop/akshya
$ bash bubblesort.sh
Array in original order
11 44 55 22 33
Array in sorted order :
11 22 33 44 55
```

Exp4 . Write a Shell script to perform sequential search on a given array elements.

Ans

```
echo Enter the number of elements:
read n
echo Enter the array elements:
for (( i=1; i<=n; i++ ))
do
   read a[$i]
done
echo Enter the element to be searched:
read item
j=1
while [ $j -lt $n -a $item -ne ${a[$j]} ]
do
   j=`expr $j + 1`
done
if [ $item -eq ${a[$j]} ]
then
   echo $item is present at location $j
else
   echo "$item is not present in the array."
```

Fi

```
UCPES11@UCPES MINGW64 ~/Desktop/akshya
$ bash sequential.sh
Enter the number of elements:
6
Enter the array elements:
34
54
3
35
22
98
Enter the element to be searched:
22
22 is present at location 5
```

Exp5. Write a Shell script to perform binary search on a given array elements.

Ans

```
echo “Enter the limit:”
read n
echo “Enter the numbers”
for(( i=0 ;i<n; i++ ))
do
read m
a[i]=$m
done
for(( i=1; i<n; i++ ))
do
for(( j=0; j<n-i; j++))
do
if [ ${a[$j]} -gt ${a[$j+1]} ]
then
t=${a[$j]}
a[$j]=${a[$j+1]}
a[$j+1]=$t
fi
done
done
echo “Sorted array is”
for(( i=0; i<n; i++ ))
do
```

```
echo “${a[$i]}”
done
echo “Enter the element to be searched :”
read s
l=0
c=0
u=$(($n-1))
while [ $l -le $u ]
do
mid=$(((( $l+$u ))/2 ))
if [ $s -eq ${a[$mid]} ]
then
c=1
break
elif [ $s -lt ${a[$mid]} ]
then
u=$(($mid-1))
else
l=$(($mid+1))
fi
done
if [ $c -eq 1 ]
then
echo “Element found at position $(($mid+1))”
else
```

echo “Element not found”

fi

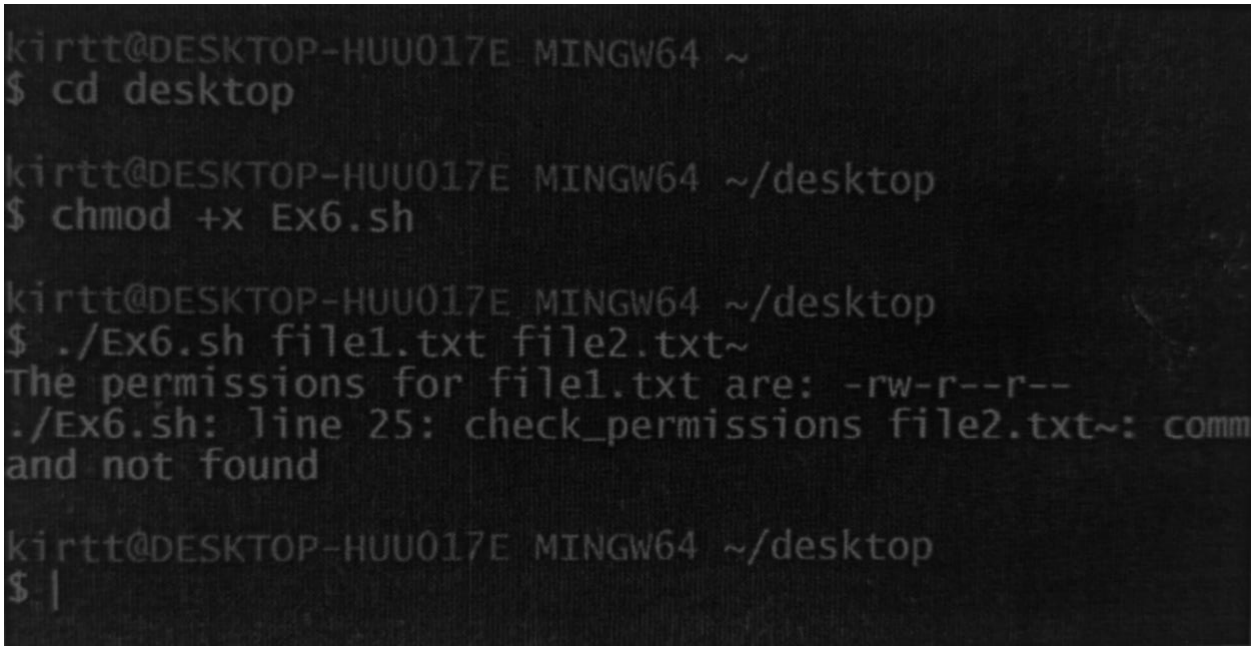
```
UCPES11@UCPES MINGW64 ~/Desktop/akshya
$ bash binarysearch.sh
“Enter the limit:”
4
“Enter the numbers”
3
6554
33
56
“Sorted array is”
“3”
“33”
“56”
“6554”
“Enter the element to be searched :”
6554
“Element found at position 4”
```

Exp 6.Write a Shell script to accept any two file names and check their file permissions.

Ans.

```
echo "Enter 1st file names"

read file1

echo "Enter 2nd file names"

read file2


if [ -f $file1 -a -f $file2 ]

then

   echo "$file1 and $file2 exists "

else

   echo "Files doesn't existZ"

   exit

fi
```

```
if [ -x $file1 ]
   then
      echo "$file1 has execute permission."
fi
if [ -r $file1 ]
   then
      echo "$file1 has read permission."
fi
if [ -w $file1 ]
   then
      echo "$file1 has write permission."
fi
echo "------------------------------------------------------------"
if [ -x $file2 ]
   then
      echo "$file2 has execute permission."
fi
if [ -r $file2 ]
   then
      echo "$file2 has read permission."
fi
if [ -w $file2 ]
   then
      echo "$file2 has write permission."
Fi
```



Exp7. Write a Shell script to read a path name, create each element in that path e.g: a/b/c i.e., ‘a’ is directory in the current working directory, under ‘a’ create ‘b’, under ‘b’ create ‘c’.

Ans

#!/bin/bash

Read-p “Enter the path name :”path

IFS = ‘I’ read – ra dirs. <<< “$path”

For dirin “${dirc [@]}”

Do

If [d”$dir]

Then

Echo “directory $dir already exists”

Else

#create the directory

Mkdir “$dir”

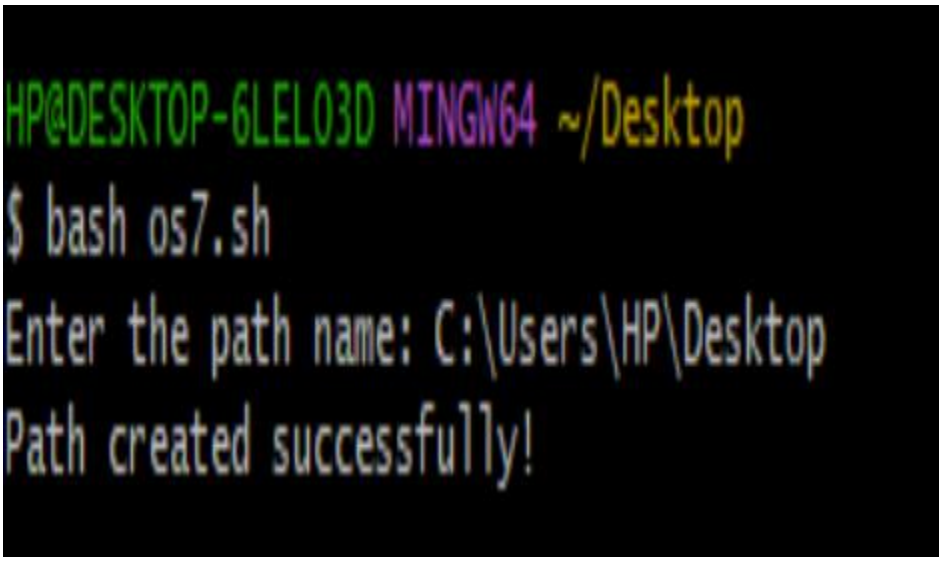
echo “Directory ‘$dir’ created”

Fi

#change to the new directory

Cd “$dir”

done



Exp8. Write a Shell script to illustrate the case-statement.

Ans

#!/bin/bash

#prompt the user for input

echo "Enter a Fruit"

read fruit

use the case statement to perform different actions based on the

input case $ Fruit in

"apple")

echo" you selected apple"

echo "Apples are red"

;;

"banana")

echo "you setected banana"

```
echo "oranges are orange"

;;

*)

echo "unknown fruit"

;;

esac
```

```
HP@DESKTOP-6LEL03D MINGW64 ~/Desktop
$ bash os8.sh
Select an option:
1. Say Hello
2. Say Goodbye
3. Exit
1
Hello!
```

Exp9. Write a Shell script to accept the file name as arguments and create another shell script, which recreates these files with its original contents.

Ans

#!/bin/bash

if [$ # -eq 0]; then

echo "Please provide a file name as an argument"

read file name

fi

#create a new shell script with the provided file touch $ losh

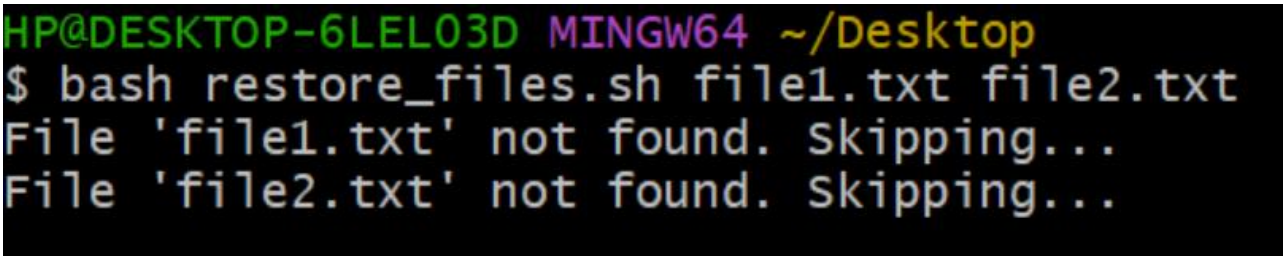
Add she bang to the new script

echo "#!/bin/bash">> $ l.sh

#mark the new script executable

Chmode +x $ l.sh

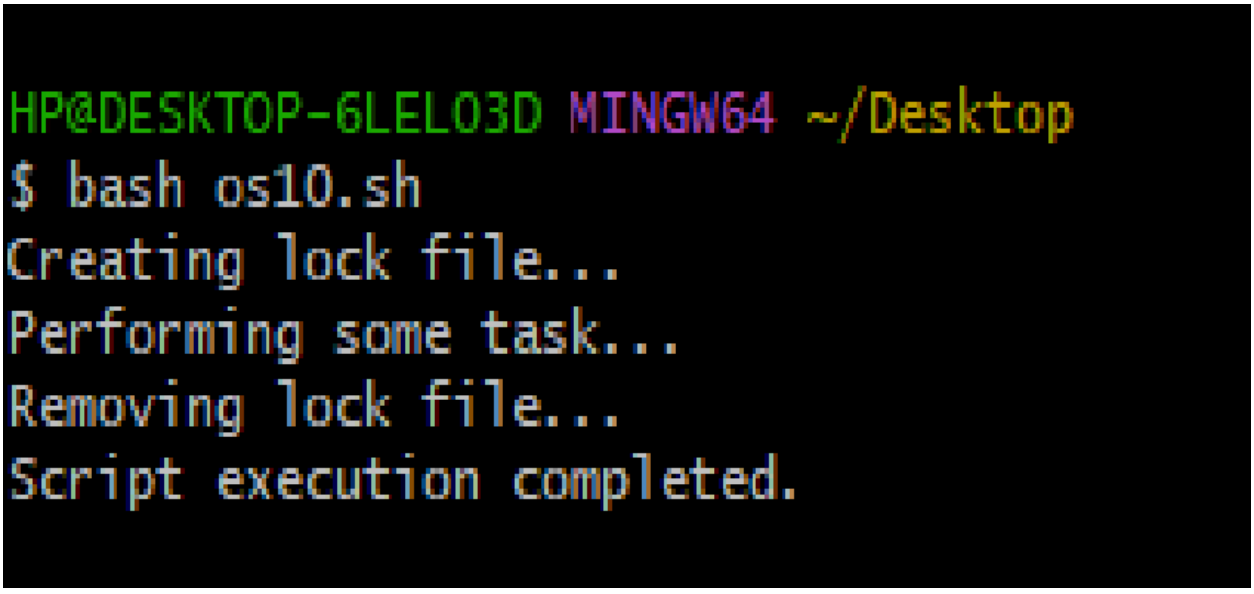
echo" New shell script created with name & File.sh"



Exp10. Write a Shell script to demonstrate Terminal locking.

Ans

```
#!/bin/bash

# Define the lock file

lock-file = " 1 + mp/my_Script lock"

if [-e "$ lock-file "]; +1

then

echo "Another instances of the script is already running. Existing"

exit 1

Fi

touch "$ lock-file"

echo "performing Same work...."

Sleep 5

rom ''$ lock-filed”

echo "Script Completed lock released"
```



Exp 11. Write a Shell script to accept the valid login name, if the login name is valid then print its home directory else an appropriate message.

Ans

#!/bin/bash

prompt the user two enter a login name read-p" Enter a valid login.

name:" login-name

Check if the user exists

if id-U" $ login-name "> /dev/null 2> $1; then

if the user exists print the name directory

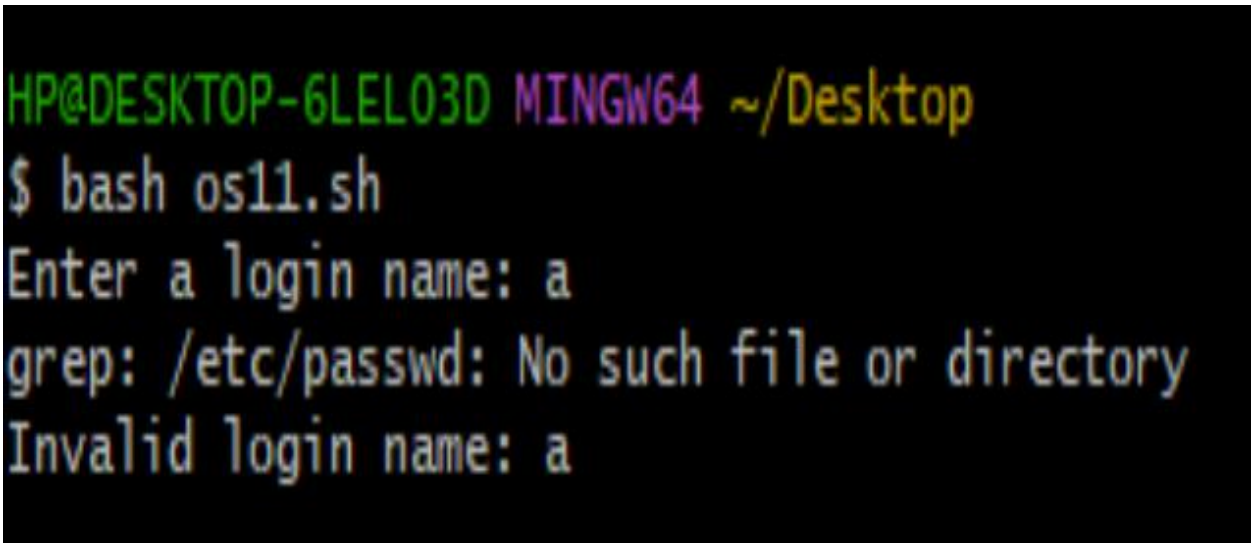
echo "Home directory Form user & login name is :" $ (getent password $ Login name login d"-fb")”

else

if the user does not exit display an error

echo" user $ login-name does not exist."

Fi



Exp12. Write a Shell script to read a file name and change the existing file permissions.

Ans

#!/bin/bash

Read.p "Enter file name: " file name

#Check if file exists

if [$ -I "$ file name"]; then

echo "file not round".

exit 1

fi

#prompt user to enter now file permissions

read-p"(Enter newfile permissions lin octalformat): "permission

 # change file permission

Chmod "$ permission" " $ file "name"

echo "file permission changed to $ permission for & file & file name"

```
HP@DESKTOP-6LEL03D MINGW64 ~/Desktop
$ bash os12.sh
Enter file name: os12.sh
Enter new file permissions (in octal format, e.g., 644)
chmod: invalid mode: ‘445.sh’
Try 'chmod --help' for more information.
Permissions for file 'os12.sh' changed to '445.sh'.
```

Exp13 Write a Shell script to print current month calendar and to replace the current day number by ‘*’ or ‘**’ respectively.

Ans

#!/bin/bash

read-p" Enter file name:" file name

#Check if file exists

if [-f "$ rile name"]; then

echo "File not found"

exit 1

fi

#prompt user to enter now file permissions

read-p" Enter newfile permissions (in octalformal): "permission

#Change File permission

Chmod "$ permission" " & File name"

echo "file permission changed to $ permissions fore $ file $ file name"

Exp14. Write a Shell Script to display a menu consisting of options to display disk space, the current users logged in, total memory usage, etc. (using functions.)

Ans

#!/bin/bash

display-disk-space(){

df.h

}

display-users(){

```
who

}

display-memory-usuagel){

Free-M

}

# display menu and prompt fore user input while input

While true; do

echo "Menu:"

echo "1. Display the disk space"

echo "2. Display current users logged in"

echo " 3. Display total memory usuage"

echo "4.Exit"

Read-p"Enter your choice; "Choice

Case $ Choice in

(1)

display-disk-space

;;

(2)

display-users

;;

(3)

display-memory-usuage ::

(4)

exit

;;
```

```
*)
echo "invalid choice"
;;
esac
echo "press Enter to continue"
read
done
```

```
HP@DESKTOP-6LEL03D MINGW64 ~/Desktop
$ bash os14.sh
Select the Option From below:


[ 1 ] For Only the Disk-Name and Used-Space

[ 2 ] For Only the Disk-Name and its Size

[ 3 ] To print Disk-Name and File-System

[ 4 ] To see all fields in DiskUsage

2
Filesystem              Size
C:/Program Files/Git    472G
F:                      4.9G
```

Exp15. Write a C-program to fork a child process and execute the given Linux commands.

Ans.

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
int main(){
pid-t pid;
```

Fork a child process

pid: fork():

if (pid <6){ // Error

F print f (stderr "Fork Failed \h");

exit(1); }

else if (pid = = 0) { // Child process

System ("/s-1");

System (" echo System Hello World");}

Else { // parent process

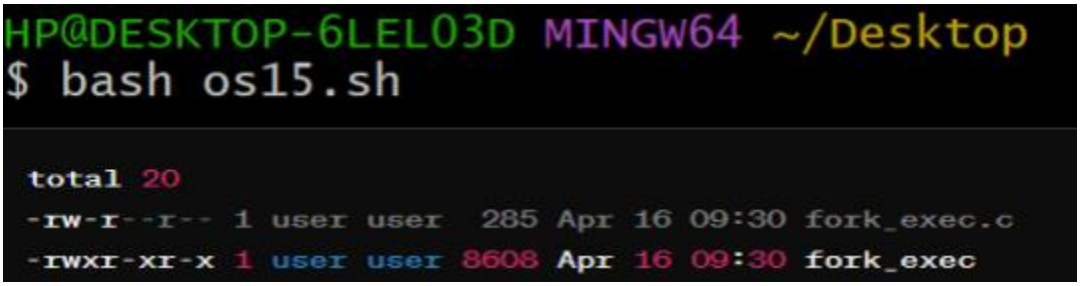
Wait (NULL);

print f ("child process complete \h");

}

return 0;

}



Exp16. Write a C-program to fork a child process, print owner process ID and its parent process ID

Ans

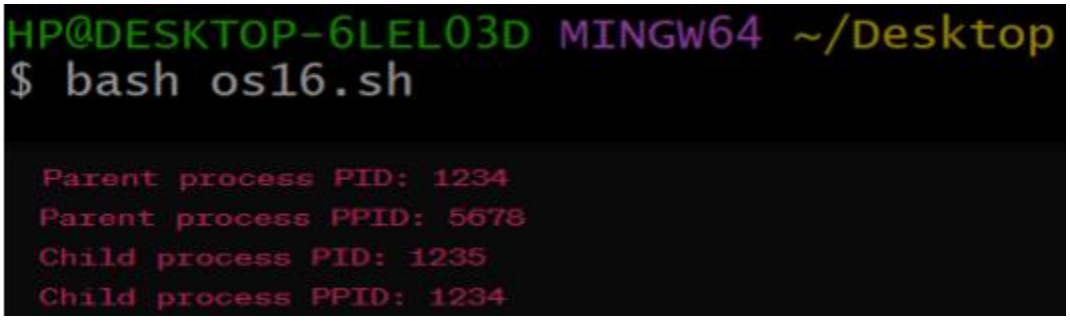
#include <stdio.h>

#include <unistd.h>

int main()

pid = T Pid;

```
Pid = fork ();

if (pid <0){

I print f (Sidr "fork Failed");

return 1;

}

else if (pid==0){

printf("Child process: owner pin=%d,Parrent pin = %d\h". get pin().

get ppid());{

else{

printf ("parent process: owner p/n = % a, parent pin = %d\h",pide, get pid();

gey ppid());

}

Return 0;

}
```



Exp17. Write a C-program to prompt the user for the name of the environment variable, check its validity and print an appropriate message.

Ans

```
#include<stdio.h>

#include <stdlib.h>

#include <string.h>

int main(){
```

```
Chae env_var [100];

Char* value

printf ("Please enter the name of environment variable);

Scanf ("%s", evn-var);

value = get ernv(env-var);

if (value == NULL){

printf("The value of the environment Variable "%s" 's'%s\n");

env_var,value;

}

return o;

}
```

Exp18. Write a C-program to READ details of N students such as student name, reg number, semester and age. Find the eldest of them and display his details.

Ans

```
#include <studio.h>

#include <string.h>

#define. MAX_STUDENT 100

Struct student{

Chare name [50];

int reg_no:

int semester:
```

```
int age;
};
int main(){
int n.i;
Struct Student students [MAX-STUDENTS);
Struct student eldest_Student;
printf("Enter the number of Students: ");
Scanf ("%d".$h);
for(i=0,i<h; i++){
printf ("In Enter details of student %d: \h", i+1);
print("Name");
Scanf ("%s", Students [i]name);
printf("Registration Number: ");
Scanf("% a", $ student [ ]. Reg_no);
printf ("semester: ");
scanf("%d", $ students [i], Semester);
printf ("Age:");
Scanf("%d", & student [1]age);
}
eldest _Student=students [0];
for (i=1;i<h; i++) {
is (Student [i]age> eldest_Student age){
eldest-student = students [i];
}
printf ("In Details of the eldest Student: /n");
```

```
printf ("Name: %s\n", eldest-student Name);

printf ("Registration Number: %d \n" eldest student.reg.no);

printf("semester: %d\n", eldest-Student-semester);

printf ("Age: %d\n", eldest student.ages;

 return 0;

}
```