MANAV RACHNA
vidyanatariksha
SINCE 1997

MANAV RACHNA
INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under Section 3 of the UGC Act, 1956)
(NAAC Accredited 'A' Grade)

FACULTY OF ENGINEERING AND TECHNOLOGY

Practical File

IV Semester (Academic Year 2024-25.)

COURSE NAME: Operating Systems LAB

COURSE CODE: BCS-OS-451

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Section: 4CSE (F2).	

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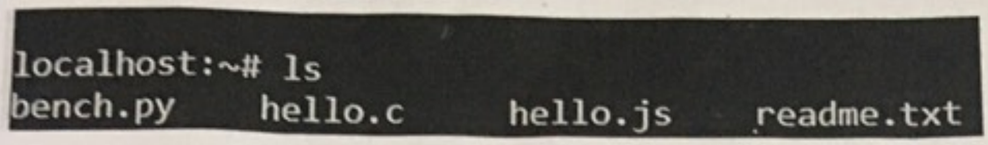
Operating Systems Lab

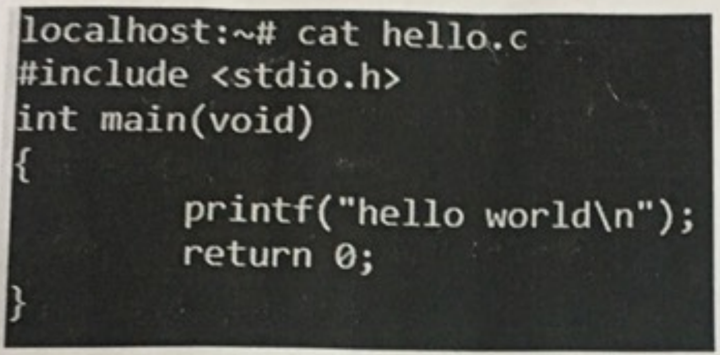
Experiment 01: Basic Linux Commands

1. ls – It lists the contents of the directory.



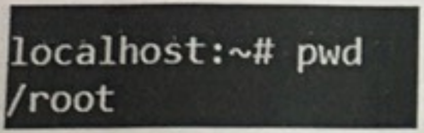
```
localhost:~# ls
bench.py     hello.c      hello.js     readme.txt
```

2. cat – It displays the contents of the files



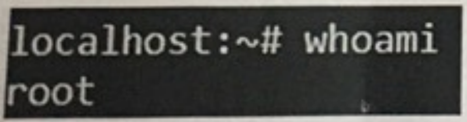
```
localhost:~# cat hello.c
#include <stdio.h>
int main(void)
{
        printf("hello world\n");
        return 0;
}
```

3. pwd – It prints the current working directory



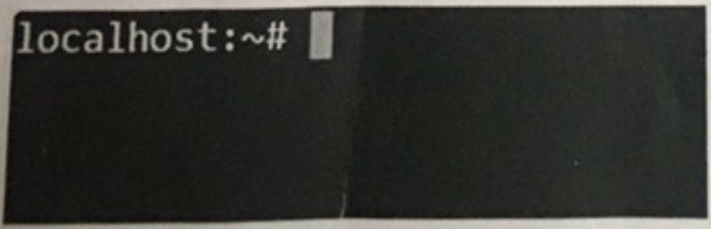
```
localhost:~# pwd
/root
```

4. whoami – It displays the current user name



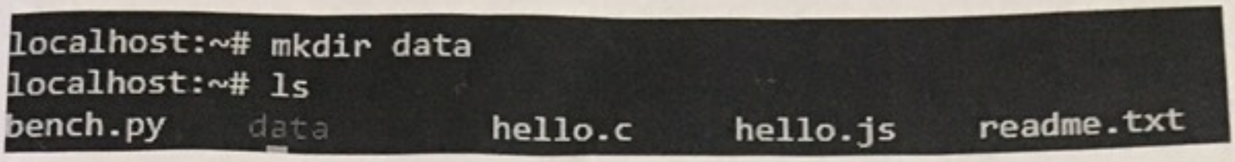
```
localhost:~# whoami
root
```

5. clear – It clears the terminal screen.



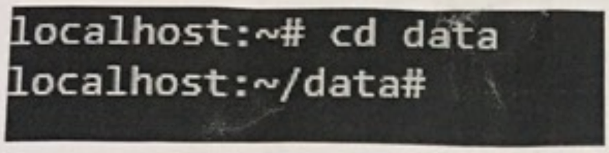
```
localhost:~# █
```

6. **mkdir – It creates a new directory**



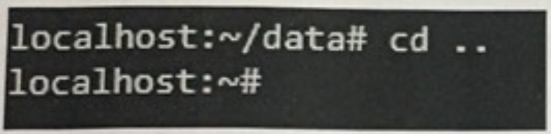
```
localhost:~# mkdir data
localhost:~# ls
bench.py     data           hello.c      hello.js     readme.txt
```

7. **cd – It changes the current working directory**



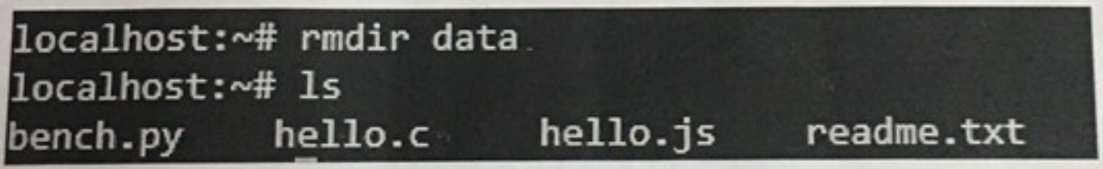
```
localhost:~# cd data
localhost:~/data#
```

8. **cd .. – It moves back to the parent directory.**



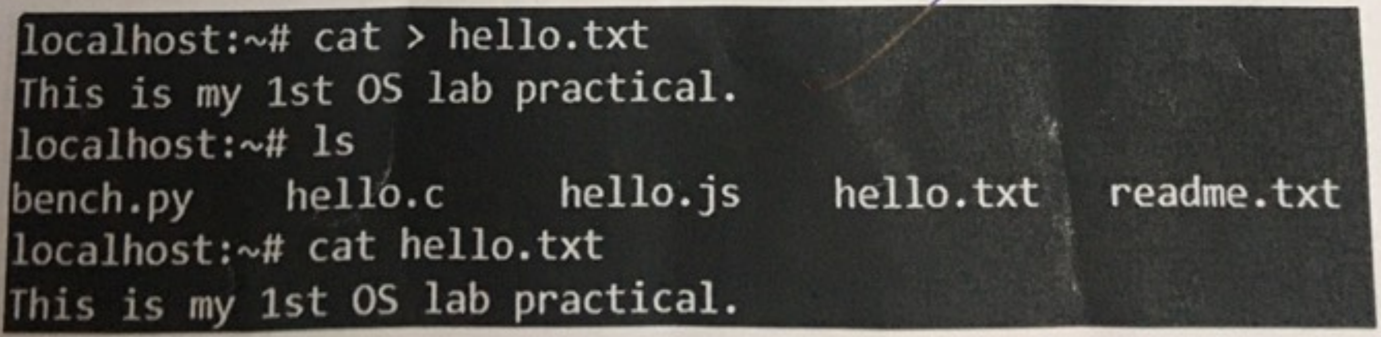
```
localhost:~/data# cd ..
localhost:~#
```

9. **rmdir – It deletes the directory.**



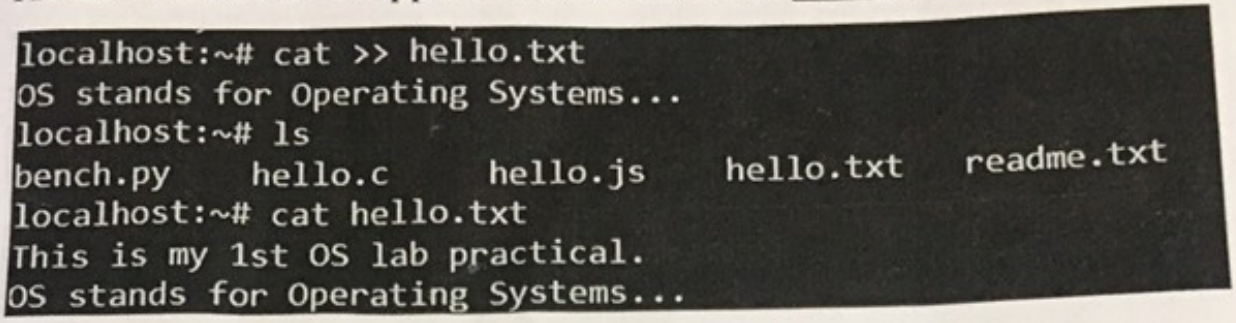
```
localhost:~# rmdir data
localhost:~# ls
bench.py    hello.c     hello.js    readme.txt
```

10. **cat > helllo.txt – It allows us to create a file named hello.txt and allows to write content in it. Press Ctrl + D to save and exit.**



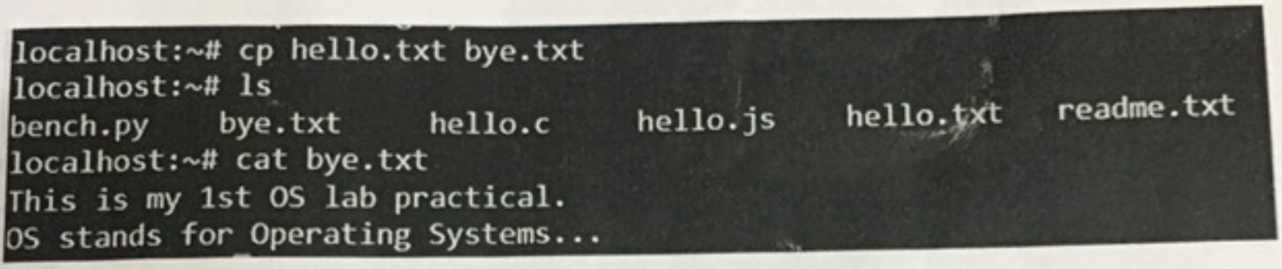
```
localhost:~# cat > hello.txt
This is my 1st OS lab practical.
localhost:~# ls
bench.py    hello.c    hello.js    hello.txt    readme.txt
localhost:~# cat hello.txt
This is my 1st OS lab practical.
```

11. **cat >> hello.txt – It appends the content to the hello.txt file.**



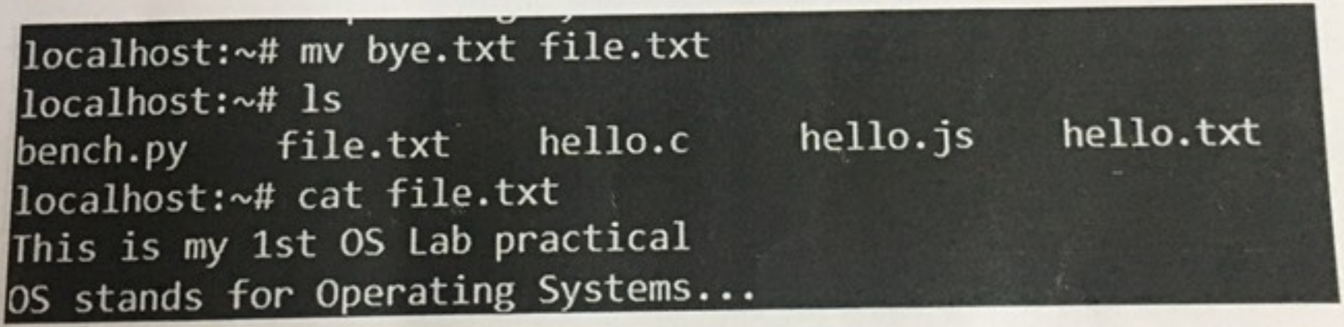
```
localhost:~# cat >> hello.txt
OS stands for Operating Systems...
localhost:~# ls
bench.py    hello.c    hello.js    hello.txt    readme.txt
localhost:~# cat hello.txt
This is my 1st OS lab practical.
OS stands for Operating Systems...
```

12. **cp hello.txt bye.txt – It copies hello.txt file to a new file named bye.txt. Here, hello.txt acts as source file and bye.txt as a destination file.**



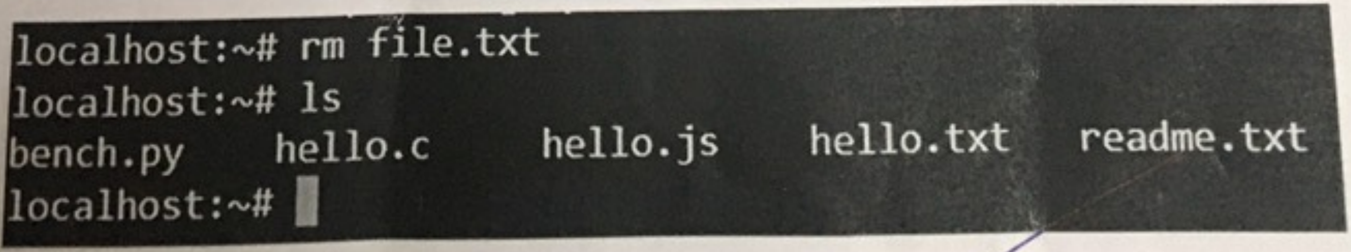
```
localhost:~# cp hello.txt bye.txt
localhost:~# ls
bench.py    bye.txt    hello.c    hello.js    hello.txt    readme.txt
localhost:~# cat bye.txt
This is my 1st OS lab practical.
OS stands for Operating Systems...
```

13. **mv bye.txt file.txt – It renames or moves bye.txt file to file.txt file. Here, bye.txt is source file and file.txt is destination file.**



```
localhost:~# mv bye.txt file.txt
localhost:~# ls
bench.py    file.txt    hello.c    hello.js    hello.txt
localhost:~# cat file.txt
This is my 1st OS Lab practical
OS stands for Operating Systems...
```

14. **rm file.txt – It deletes the file 'file.txt'.**



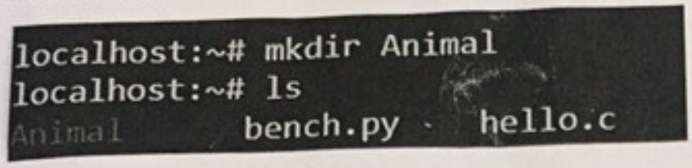
```
localhost:~# rm file.txt
localhost:~# ls
bench.py    hello.c    hello.js    hello.txt    readme.txt
localhost:~# 
```

Experiment 02

Create an Animal directory, now create 2 more directories in Animal namely Mammal and Reptile. In Mammal directory create 2 files cow.txt and lizard.txt with 2 lines about cow and lizard respectively. Now, move lizard.txt from mammal to reptile directory.

Step 1: Create a directory Animal

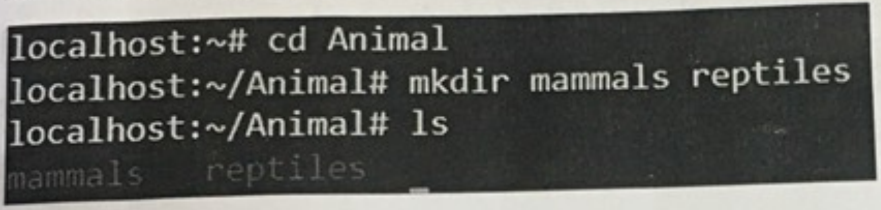
mkdir Animal



```
localhost:~# mkdir Animal
localhost:~# ls
Animal        bench.py    hello.c
```

Step 2: In Animal, create two directories mammals and reptiles

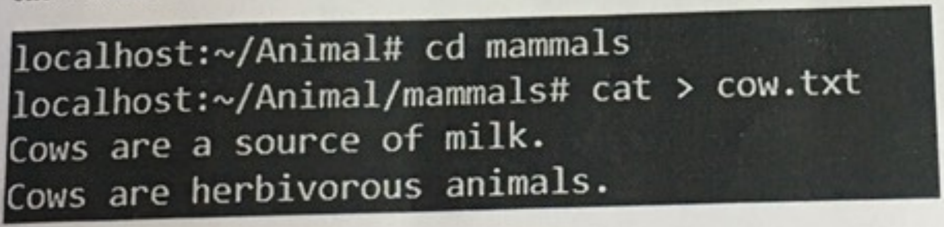
cd Animal
mkdir mammals reptiles



```
localhost:~# cd Animal
localhost:~/Animal# mkdir mammals reptiles
localhost:~/Animal# ls
mammals   reptiles
```

Step 3: In mammals add a file cow.txt with 2 lines on cow written in the file.

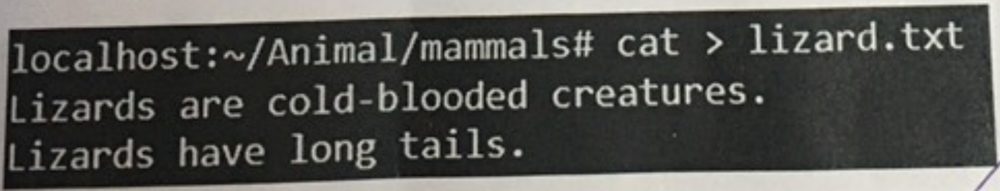
cd mammals
cat > cow.txt



```
localhost:~/Animal# cd mammals
localhost:~/Animal/mammals# cat > cow.txt
Cows are a source of milk.
Cows are herbivorous animals.
```

Step 4: Again, in mammals add a file lizard.txt with 2 lines on lizard written in the file.

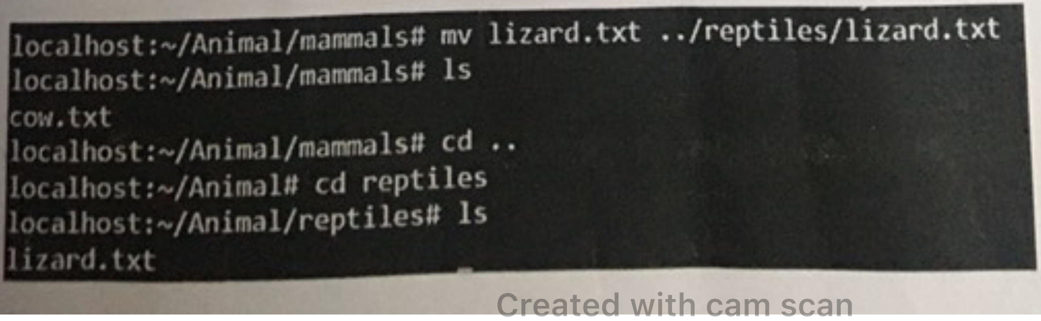
cat > lizard.txt



```
localhost:~/Animal/mammals# cat > lizard.txt
Lizards are cold-blooded creatures.
Lizards have long tails.
```

Step 5: Now, move lizard.txt file to reptiles from mammals.

mv lizard.txt ../reptiles/lizard.txt



```
localhost:~/Animal/mammals# mv lizard.txt ../reptiles/lizard.txt
localhost:~/Animal/mammals# ls
cow.txt
localhost:~/Animal/mammals# cd ..
localhost:~/Animal# cd reptiles
localhost:~/Animal/reptiles# ls
lizard.txt
```

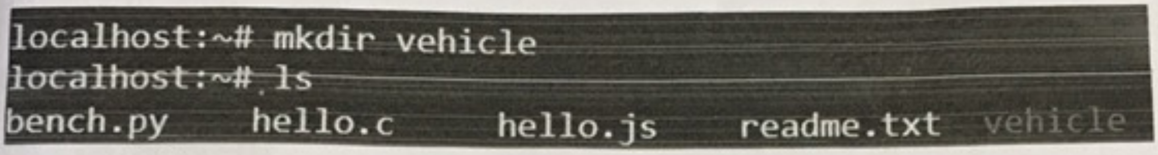
Experiment 03

Aim: Create a directory Vehicle. In Vehicle create three directories with names Fourwheelers, Threewheelers, Twowheelers.

- In Fourwheelers create directories Bus, Car, Truck.
- In Threewheelers create directories Auto.
- In Twowheelers create directories Cycle and Scooty.

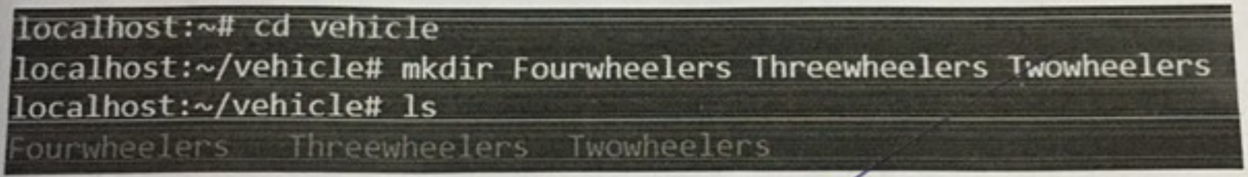
In the Car directory, create files: Carbrand.txt, Busbrand.txt, Truckbrand.txt, Autocolor.txt, Cyclebrand.txt. Write 2 lines in each file. Move each file to their respective directories. Also, delete the Cycle directory finally.

Step 1: Create a directory named Vehicle.
mkdir Vehicle
ls



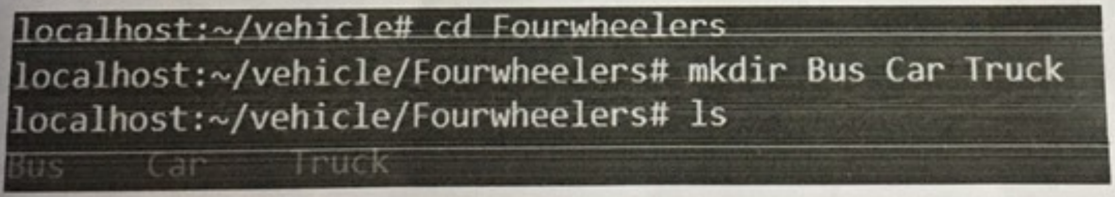
```
localhost:~# mkdir vehicle
localhost:~# ls
bench.py    hello.c     hello.js    readme.txt  vehicle
```

Step 2: In vehicle directory create subdirectories - Fourwheelers, Threewheelers, Twowheelers.
cd vehicle
mkdir Fourwheelers Threewheelers Twowheelers
ls



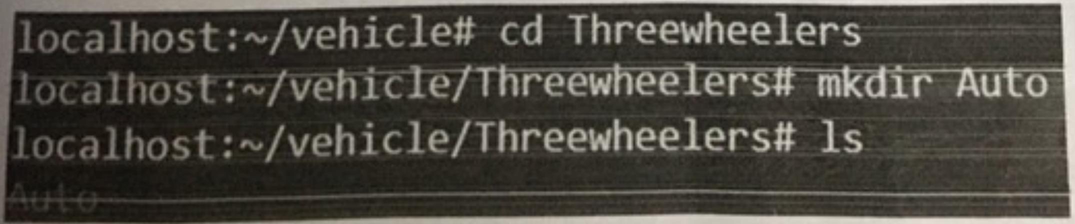
```
localhost:~# cd vehicle
localhost:~/vehicle# mkdir Fourwheelers Threewheelers Twowheelers
localhost:~/vehicle# ls
Fourwheelers   Threewheelers  Twowheelers
```

Step 3: Inside the Fourwheelers directory, create the following subdirectories – Bus, Car, Truck.
cd Fourwheelers
mkdir Bus Car Truck
ls



```
localhost:~/vehicle# cd Fourwheelers
localhost:~/vehicle/Fourwheelers# mkdir Bus Car Truck
localhost:~/vehicle/Fourwheelers# ls
Bus    Car    Truck
```

Step 4: Inside the Threewheelers directory, create a subdirectory named Auto
cd Threewheelers
mkdir Auto
ls



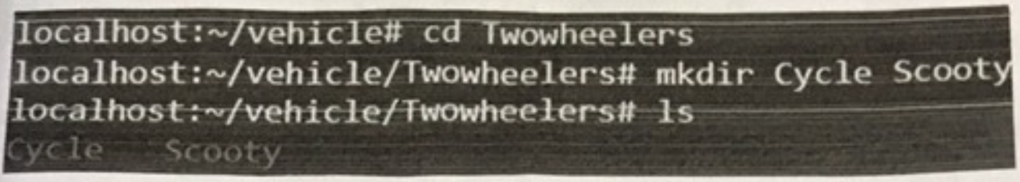
```
localhost:~/vehicle# cd Threewheelers
localhost:~/vehicle/Threewheelers# mkdir Auto
localhost:~/vehicle/Threewheelers# ls
Auto
```

Step 5: Inside the Twowheelers directory, create the following subdirectories – Cycle, Scooty.

cd Twowheelers

mkdir Cycle Scooty

ls



```
localhost:~/vehicle# cd Twowheelers
localhost:~/vehicle/Twowheelers# mkdir Cycle Scooty
localhost:~/vehicle/Twowheelers# ls
Cycle   Scooty
```

Step 6: In the Car directory, create the following files - Carbrand.txt, Busbrand.txt, Truckbrand.txt, Autocolor.txt, Cyclebrand.txt.

cd Fourwheelers

cd car

cat > carbrand.txt

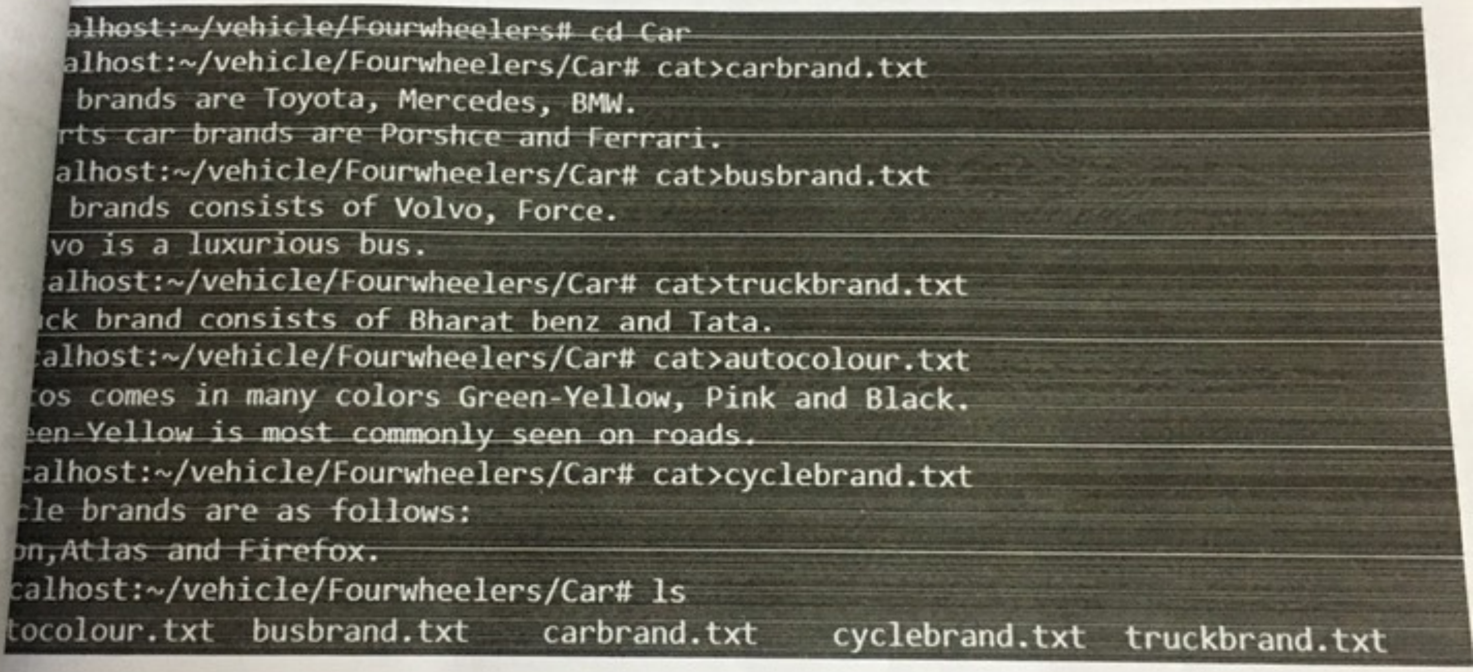
cat > busbrand.txt

cat > truckbrand.txt

cat > autoclour.txt

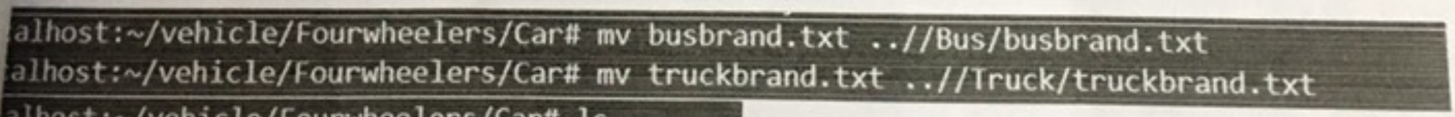
cat > cyclebrand.txt

ls

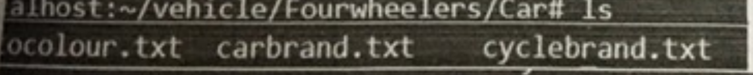


```
alhost:~/vehicle/Fourwheelers# cd Car
alhost:~/vehicle/Fourwheelers/Car# cat>carbrand.txt
 brands are Toyota, Mercedes, BMW.
rts car brands are Porshce and Ferrari.
alhost:~/vehicle/Fourwheelers/Car# cat>busbrand.txt
 brands consists of Volvo, Force.
vo is a luxurious bus.
alhost:~/vehicle/Fourwheelers/Car# cat>truckbrand.txt
ck brand consists of Bharat benz and Tata.
alhost:~/vehicle/Fourwheelers/Car# cat>autocolour.txt
os comes in many colors Green-Yellow, Pink and Black.
en-Yellow is most commonly seen on roads.
alhost:~/vehicle/Fourwheelers/Car# cat>cyclebrand.txt
le brands are as follows:
on,Atlas and Firefox.
alhost:~/vehicle/Fourwheelers/Car# ls
tocolour.txt  busbrand.txt    carbrand.txt    cyclebrand.txt  truckbrand.txt
```

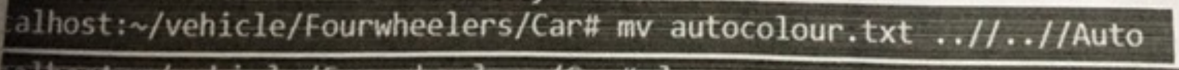
Step 7: Now move the files to their respective directories.



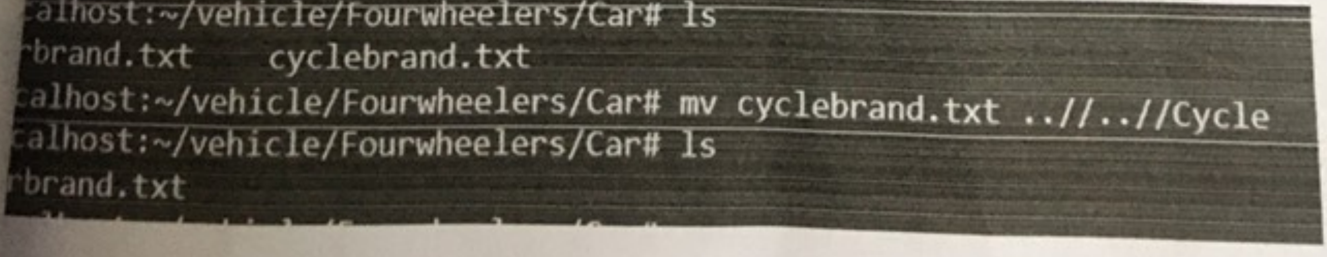
```
alhost:~/vehicle/Fourwheelers/Car# mv busbrand.txt ..//Bus/busbrand.txt
alhost:~/vehicle/Fourwheelers/Car# mv truckbrand.txt ..//Truck/truckbrand.txt
```



```
alhost:~/vehicle/Fourwheelers/Car# ls
ocolour.txt  carbrand.txt    cyclebrand.txt
```

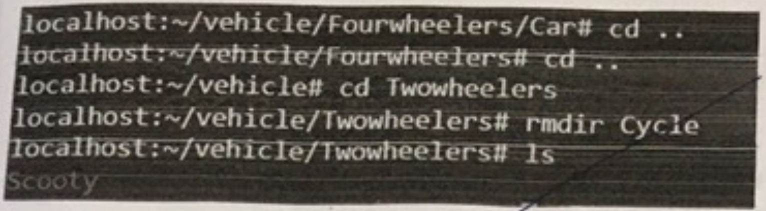


```
alhost:~/vehicle/Fourwheelers/Car# mv autocolour.txt ..//..//Auto
```



```
alhost:~/vehicle/Fourwheelers/Car# ls
brand.txt    cyclebrand.txt
alhost:~/vehicle/Fourwheelers/Car# mv cyclebrand.txt ..//..//Cycle
alhost:~/vehicle/Fourwheelers/Car# ls
brand.txt
```

Step 8: Delete the Cycle Directory



```
localhost:~/vehicle/Fourwheelers/Car# cd ..
localhost:~/vehicle/Fourwheelers# cd ..
localhost:~/vehicle# cd Twowheelers
localhost:~/vehicle/Twowheelers# rmdir Cycle
localhost:~/vehicle/Twowheelers# ls
Scooty
```

10/2/25

Experiment 04

Aim: Learn use of chmod command and vi text editor.

The "chmod" command modifies the read, write, and execute permissions of specified files. The octal digits used for assigning permissions are as follows:

Octal Digit	Permissions	Symbolic Display
7	read, write, execute	rwx
6	read, write	rw-
5	read, execute	r-x
4	read	r--
3	write, execute	-WX
2	write	-W-
1	execute	--X
0	no permissions	---

- **Owner is denoted by 'u'.**
- **Group is denoted by 'g'.**
- **Others is denoted by 'o'.**

Examples

1. **Using octal notation:**
   - **chmod 711 test.sh**
2. **Using symbolic notation:**
   - **chmod u+rwx test.sh**
   - **chmod go+--x test.sh**

The "vi text editor" is a powerful text editor available in Unix and Linux systems. It is widely used for editing configuration files and scripts.

Basic Modes in vi

1. Insert Mode (For writing text)

- Press i to enter insert mode.
- Start typing the content.

2. Command Mode (Default mode)

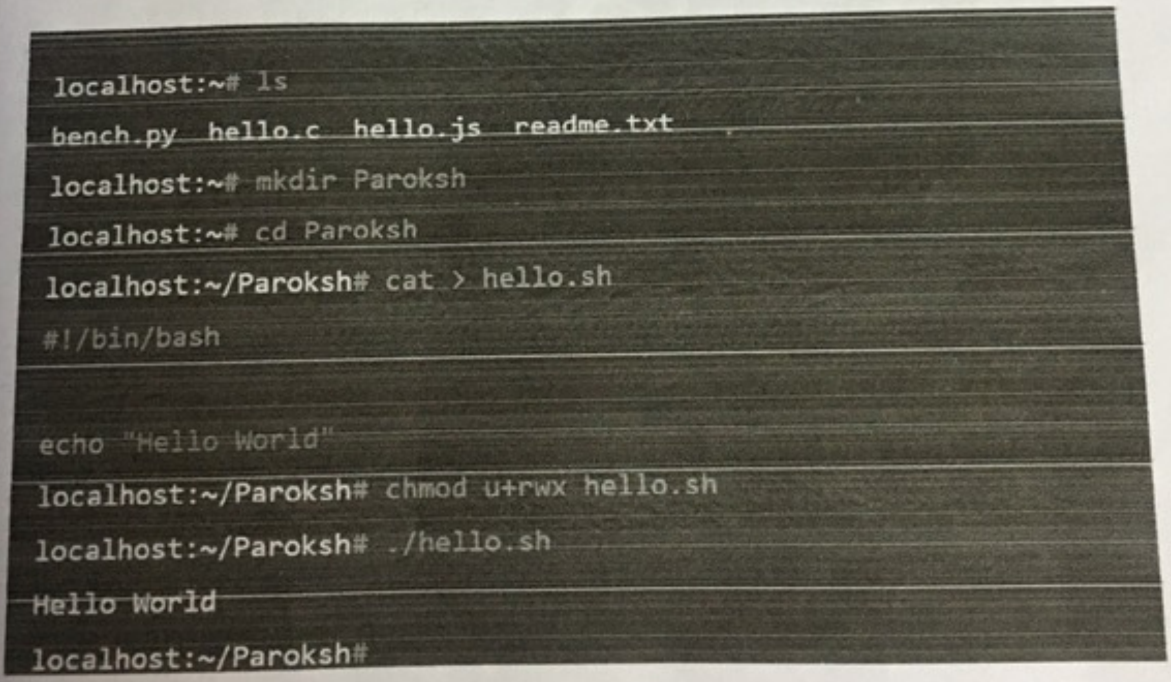
- Used for navigation and executing commands.
- Press Esc to return to this mode.

3. Last Line Mode (For saving and exiting)

- Press Esc, then type: to enter last line mode.
- :wq→ Save and exit.

Program Case 1: Creating hello.sh file in a directory with your name and giving permission to user only using chmod command.

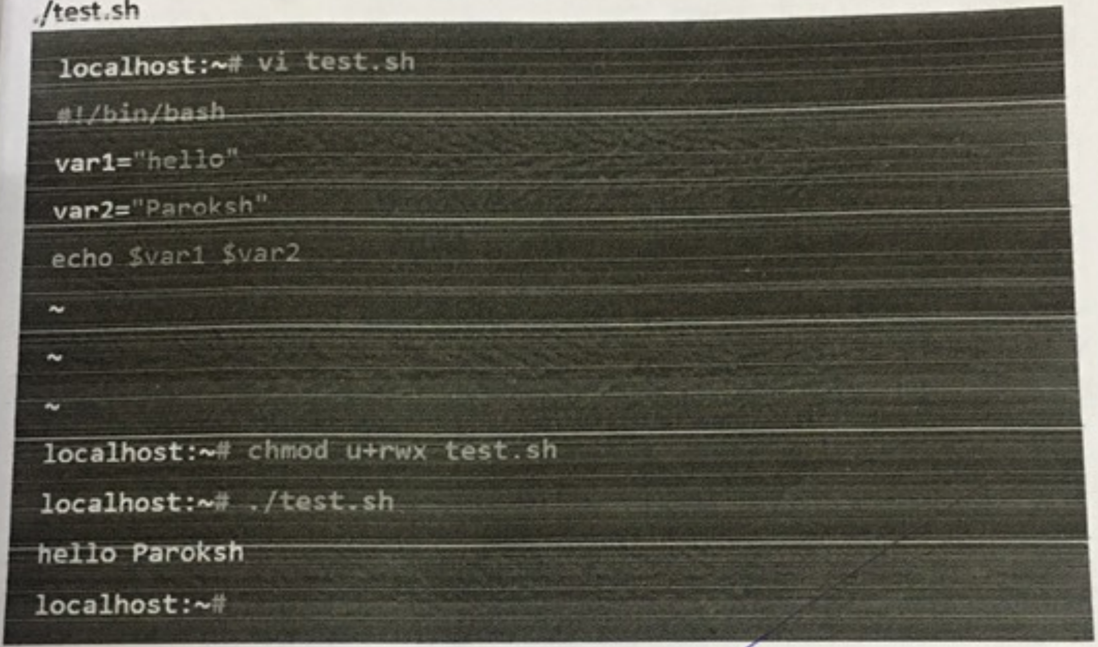
```
ls
mkdir Paroksh
cd Paroksh
cat > hello.sh
#!/bin/bash
echo "Hello World"
chmod u+rwx hello.sh
./hello.sh
```



```
localhost:~# ls
bench.py  hello.c  hello.js  readme.txt
localhost:~# mkdir Paroksh
localhost:~# cd Paroksh
localhost:~/Paroksh# cat > hello.sh
#!/bin/bash

echo "Hello World"
localhost:~/Paroksh# chmod u+rwx hello.sh
localhost:~/Paroksh# ./hello.sh
Hello World
localhost:~/Paroksh#
```

Program Case 2: Creating vi text editor file namely test.sh

```
vi test.sh
i (for start inserting text)
#!/bin/bash
var1="hello"
var2="paroksh"
echo $varl $var2
esc (for escaping insert mode and come back to command mode)
:wq(for save and exit)
chmod u+rwx test.sh
./test.sh
```



```
localhost:~# vi test.sh
#!/bin/bash
var1="hello"
var2="Paroksh"
echo $var1 $var2
~
~
~
localhost:~# chmod u+rwx test.sh
localhost:~# ./test.sh
hello Paroksh
localhost:~#
```

10/2/25

Experiment 05

im: If – Else statements in bash

ash scripting allows conditional execution using if-else statements. These statements enable ecision-making within a script, executing different commands based on whether a condition valuates to true or false.

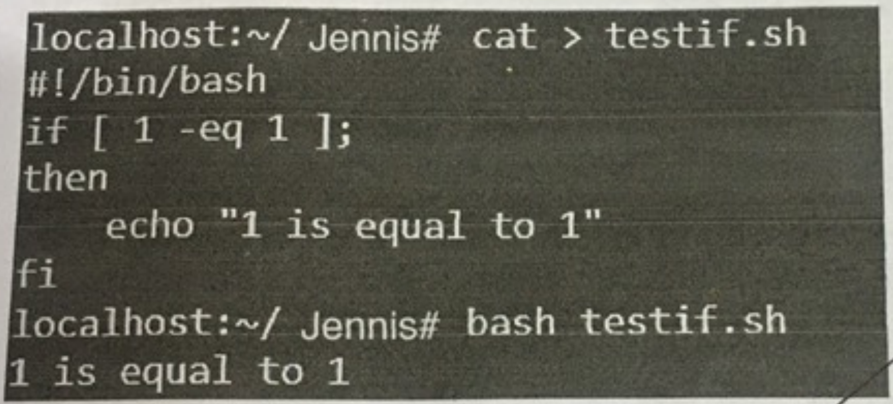
asic Syntax of If-Else Statement

```
[ condition ]; then
 # Code to execute if condition is true
se
 # Code to execute if condition is false
```

xamples of If-Else Statements

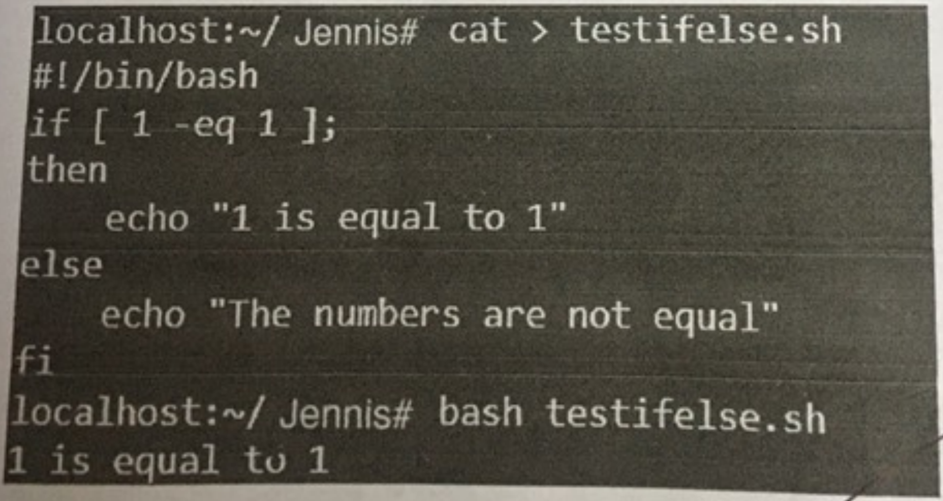
●

1. **Simple If Statement:**
   This script checks if 1 is equal to 1 and prints a message.



```
localhost:~/ Jennis#  cat > testif.sh
#!/bin/bash
if [ 1 -eq 1 ];
then
    echo "1 is equal to 1"
fi
localhost:~/ Jennis# bash testif.sh
1 is equal to 1
```

2. **If-Else Statement:**
   This script compares two numbers.



```
localhost:~/ Jennis#  cat > testifelse.sh
#!/bin/bash
if [ 1 -eq 1 ];
then
    echo "1 is equal to 1"
else
    echo "The numbers are not equal"
fi
localhost:~/ Jennis# bash testifelse.sh
1 is equal to 1
```

Experiment 06

Aim: To study the usage of For loop in shell.

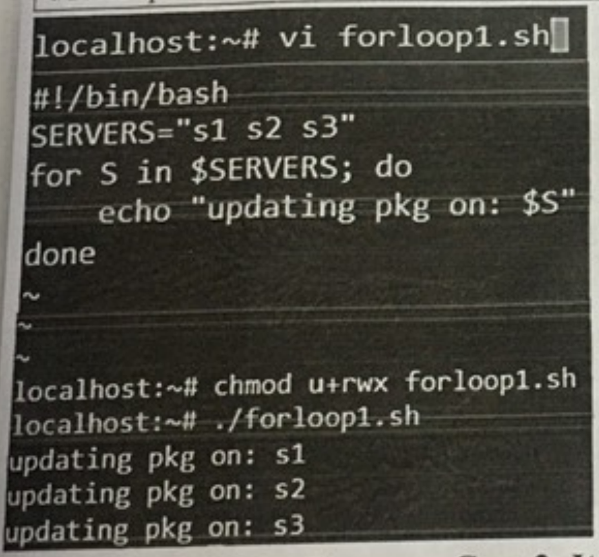
- Using a for loop in shell scripting can be handy for iterating through lists of items or performing operations on files.

- In shell scripting, for loops typically follow this syntax:

```
for item in list
   do
      #commands to be executed for each item
   done
```

Program Case 1: Echo Basic Manage

```
vi forloop1.sh
#!/bin/bash
SERVERS="s1 s2 s3"
for S in $SERVERS; do
   echo "updating pkg on: $S"
done
~
~
chmod u+rwx forloop1.sh
./forloop1.sh
```

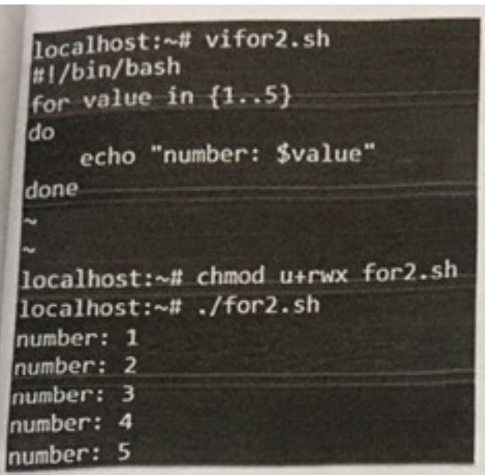


```
localhost:~# vi forloop1.sh
#!/bin/bash
SERVERS="s1 s2 s3"
for S in $SERVERS; do
    echo "updating pkg on: $S"
done
~
~
~
localhost:~# chmod u+rwx forloop1.sh
localhost:~# ./forloop1.sh
updating pkg on: s1
updating pkg on: s2
updating pkg on: s3
```

Program Case 2: Iterating through range of Numbers

```
vi for2.sh
#!/bin/bash
for value in {1..5}
do
   echo "number: $value"
done
~
~
chmod u+rwx for2.sh
./for2.sh
```

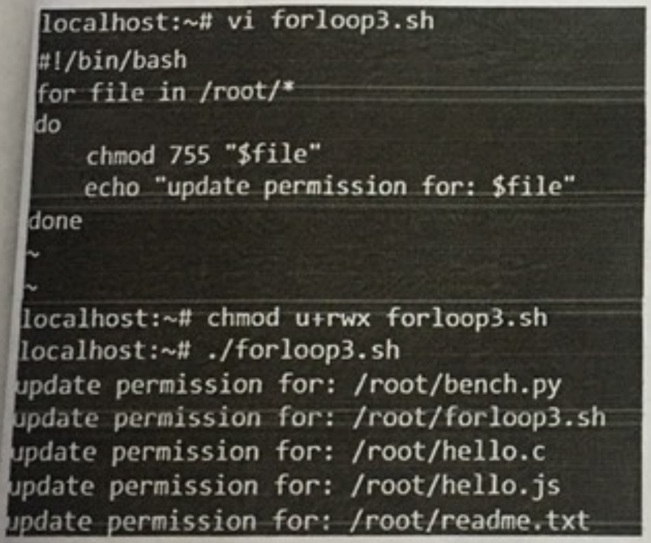
Created with cam scan



```
localhost:~# vifor2.sh
#!/bin/bash
for value in {1..5}
do
    echo "number: $value"
done
~
~
localhost:~# chmod u+rwx for2.sh
localhost:~# ./for2.sh
number: 1
number: 2
number: 3
number: 4
number: 5
```

Program Case 3: Iterating through multiple files

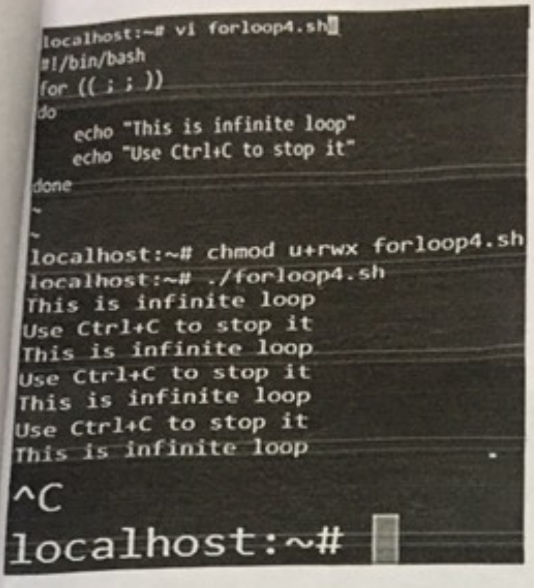
```
vi forloop3.sh
#!/bin/bash
for file in /root/*
do
   chmod 755 "$file"
   echo "update permission for: $file"
done
~
chmod u+rwx forloop3.sh
./forloop3.sh
```



```
localhost:~# vi forloop3.sh
#!/bin/bash
for file in /root/*
do
    chmod 755 "$file"
    echo "update permission for: $file"
done
~
~
localhost:~# chmod u+rwx forloop3.sh
localhost:~# ./forloop3.sh
update permission for: /root/bench.py
update permission for: /root/forloop3.sh
update permission for: /root/hello.c
update permission for: /root/hello.js
update permission for: /root/readme.txt
```

Program Case 4: Creating an Infinite Loop

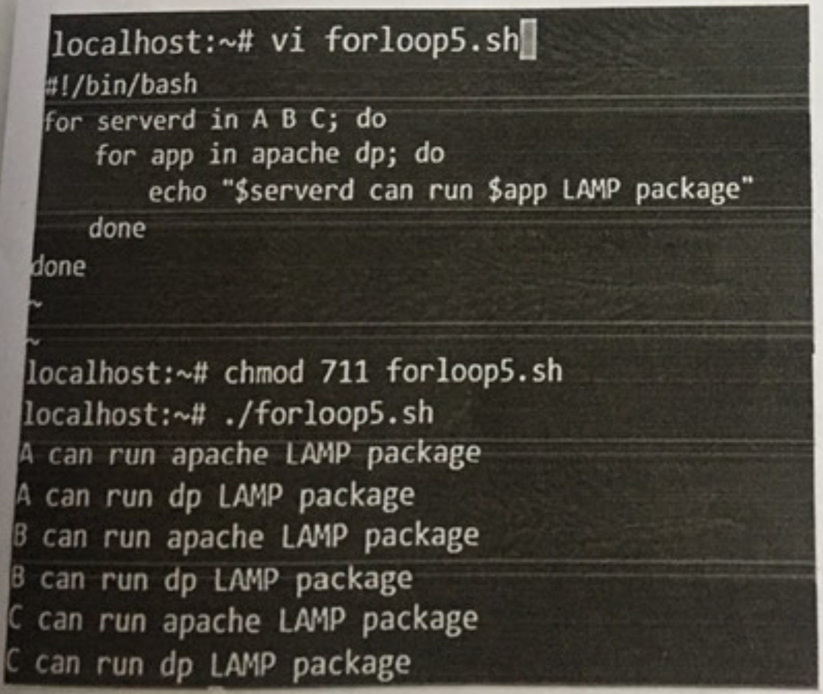
```
vi forloop4.sh
#!/bin/bash
for (( ; ; ))
do
   echo "This is infinite loop"
   echo "Use Ctrl+C to stop it"
done
~
~
Chmod u+rwx forloop4.sh
./forloop4.sh
```



```
localhost:~# vi forloop4.sh
#!/bin/bash
for (( ; ; ))
do
    echo "This is infinite loop"
    echo "Use Ctrl+C to stop it"
done
~
~
localhost:~# chmod u+rwx forloop4.sh
localhost:~# ./forloop4.sh
This is infinite loop
Use Ctrl+C to stop it
This is infinite loop
Use Ctrl+C to stop it
This is infinite loop
Use Ctrl+C to stop it
This is infinite loop
^C
localhost:~#
```

Program Case 5: Implementing a Nested for loop

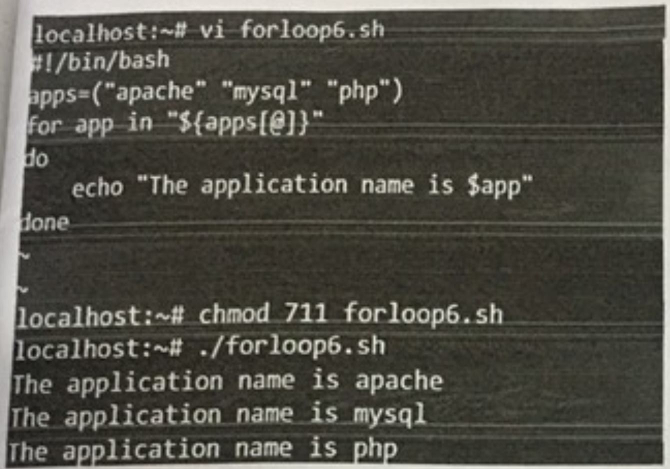
```
vi forloop5.sh
#!/bin/bash
for serverd in A B C; do
   for app in apache dp; do
      echo "$serverd can run $app LAMP package"
   done
done
~
~
Chmod 711 forloop5.sh
./forloop5.sh
```



```
localhost:~# vi forloop5.sh
#!/bin/bash
for serverd in A B C; do
    for app in apache dp; do
        echo "$serverd can run $app LAMP package"
    done
done
~
~
localhost:~# chmod 711 forloop5.sh
localhost:~# ./forloop5.sh
A can run apache LAMP package
A can run dp LAMP package
B can run apache LAMP package
B can run dp LAMP package
C can run apache LAMP package
C can run dp LAMP package
```

Program Case 6: Array utilization in for loop

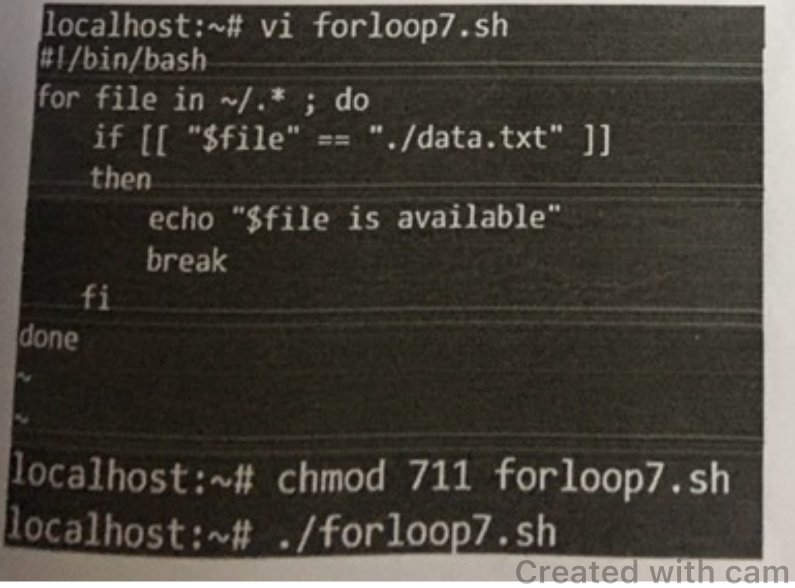
```
vi forloop6.sh
#!/bin/bash
apps=("apache" "mysql" "php")
for app in "${apps[@]}"
do
  echo "The application name is $app"
done
~
~
chmod 711 forloop6.sh
./forloop6.sh
```



```
localhost:~# vi forloop6.sh
#!/bin/bash
apps=("apache" "mysql" "php")
for app in "${apps[@]}"
do
    echo "The application name is $app"
done
~
~
localhost:~# chmod 711 forloop6.sh
localhost:~# ./forloop6.sh
The application name is apache
The application name is mysql
The application name is php
```

Program Case 7: Using break statement in for loop

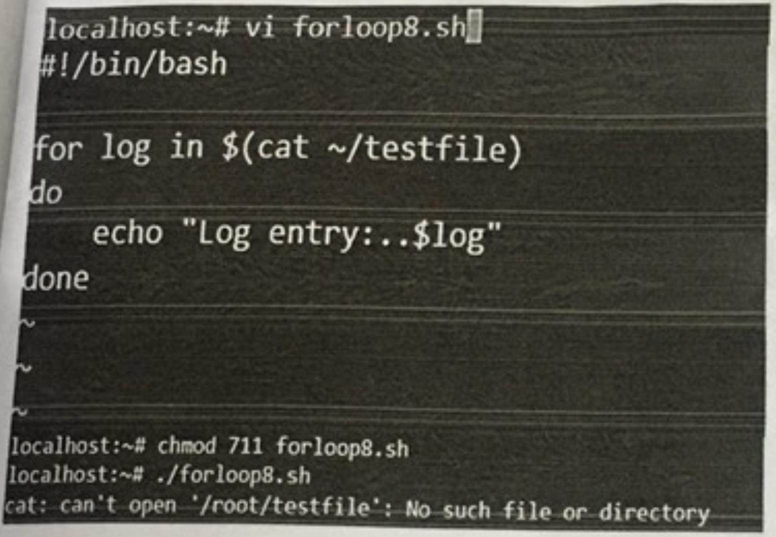
```
vi forloop7.sh
#!/bin/bash
for file in ~/.* ; do
   if [[ "$file" == "./data.txt" ]]
   then
      echo "$file is available"
      break
   fi
done
~
chmod 711 forloop7.sh
./forloop7.sh
```



```
localhost:~# vi forloop7.sh
#!/bin/bash
for file in ~/.* ; do
   if [[ "$file" == "./data.txt" ]]
   then
      echo "$file is available"
      break
   fi
done
~
~
localhost:~# chmod 711 forloop7.sh
localhost:~# ./forloop7.sh
```

Program Case 8: Use of command substitution

```
vi forloop8.sh
#!/bin/bash
for log in $(cat ~/testfile)
do
   echo "Log entry: $log"
done
~
~
chmod 711 forloop8.sh
./forloop8.sh
```



```
localhost:~# vi forloop8.sh
#!/bin/bash

for log in $(cat ~/testfile)
do
    echo "Log entry:..$log"
done
~
~
~
localhost:~# chmod 711 forloop8.sh
localhost:~# ./forloop8.sh
cat: can't open '/root/testfile': No such file or directory
```

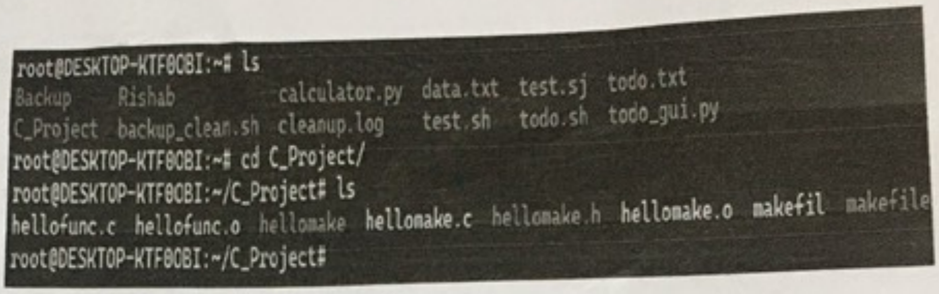
Experiment 07

Aim: Building C Project using makefile.

A Makefile is a script used by the make command to automate the process of compiling and linking programs. It defines a set of rules that specify how to build a project efficiently.

1. Main Project Directory

```
mkdir C_Project
ls
cd C_Project
```



```
root@DESKTOP-KTF0OBI:~# ls
Backup    Rishab           calculator.py  data.txt  test.sj  todo.txt
C_Project backup_clean.sh  cleanup.log    test.sh   todo.sh  todo_gui.py
root@DESKTOP-KTF0OBI:~# cd C_Project/
root@DESKTOP-KTF0OBI:~/C_Project# ls
hellofunc.c  hellofunc.o  hellomake  hellomake.c  hellomake.h  hellomake.o  makefil  makefile
root@DESKTOP-KTF0OBI:~/C_Project#
```

2. Create hellomake.c

```
nano hellomake.c
#include <hellomake.h>
int main() {
  myPrintHelloMake();
  return(0);
}
```

esc (for escaping insert mode and come back to command mode)
:ctrl+X and Y (for save and exit)

3. Create hellofunc.c

```
nano hellofunc.c
#include <stdio.h> #include <hellomake.h>
void myPrintHelloMake() {
  printf("Hello makefile! \\n");
  return;
}
```

esc (for escaping insert mode and come back to command mode)
: ctrl+X and Y (for save and exit)

.Create Makefile

```
  nano makefile
 CC=clang CFLAG=-I.
 DEPS = hellomake.h

%.o: %.c $(DEPS)
  $(CC) -c -o $@ $< $(CFLAG)

hellomake: hellomake.o hellofunc.o     $(CC) -o hellomake hellomake.o
hellofunc.o
```

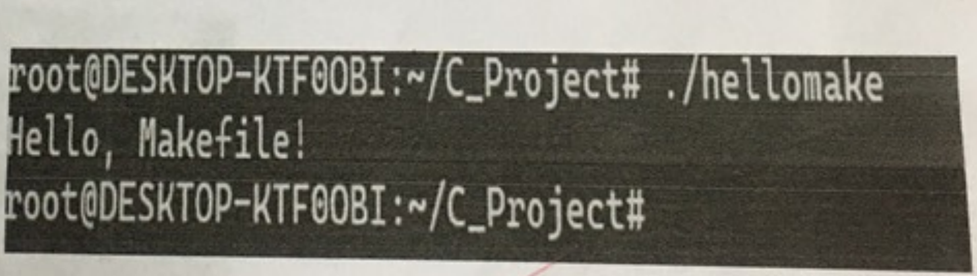
esc (for escaping insert mode and come back to command mode)
: ctrl+X and Y (for save and exit)

5. Create hellomake.h

```
nano hellomake.h
/* example include file */
void myPrintHelloMake();
```

esc (for escaping insert mode and come back to command mode)
: ctrl+X and Y (for save and exit)

6. Compile & Run To compile the program:
make
To run the program:
./ hellomake



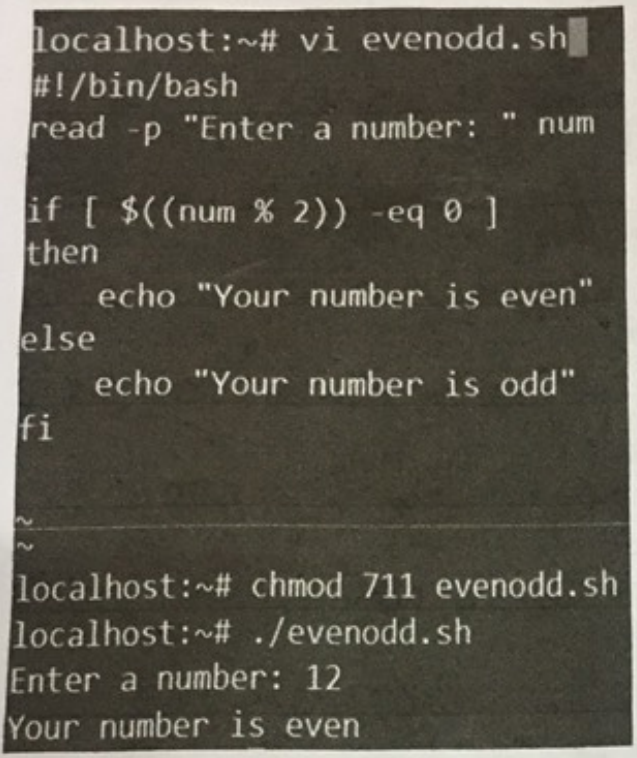
```
root@DESKTOP-KTF0OBI:~/C_Project# ./hellomake
Hello, Makefile!
root@DESKTOP-KTF0OBI:~/C_Project#
```

10/3/25

Experiment 08

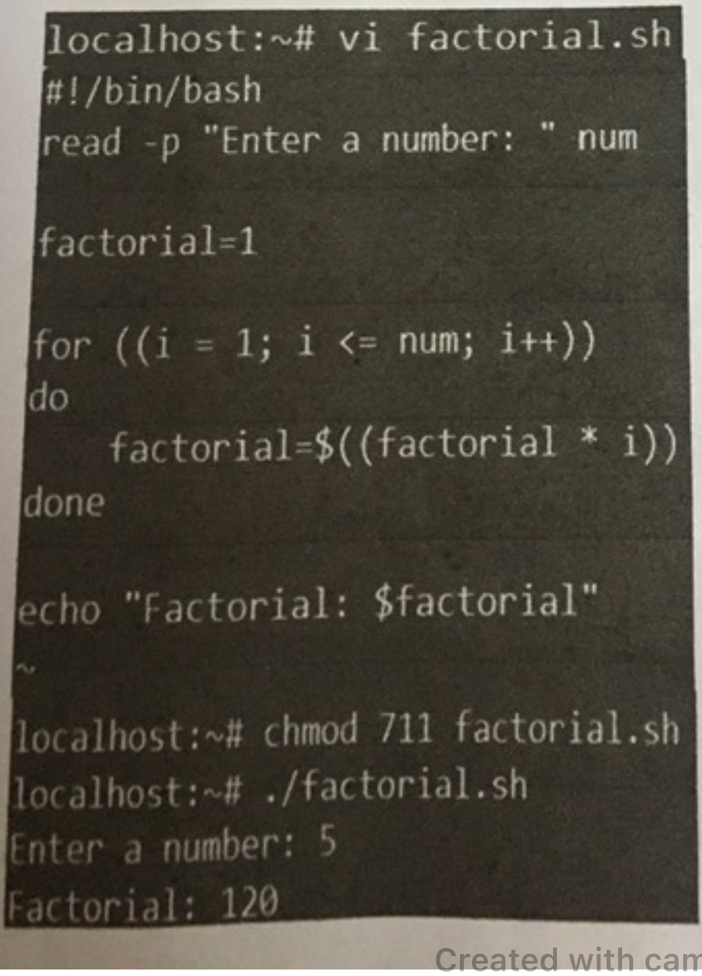
Aim: Basic programs in shell scripting

1. **WAP to check whether no. entered is even or odd**



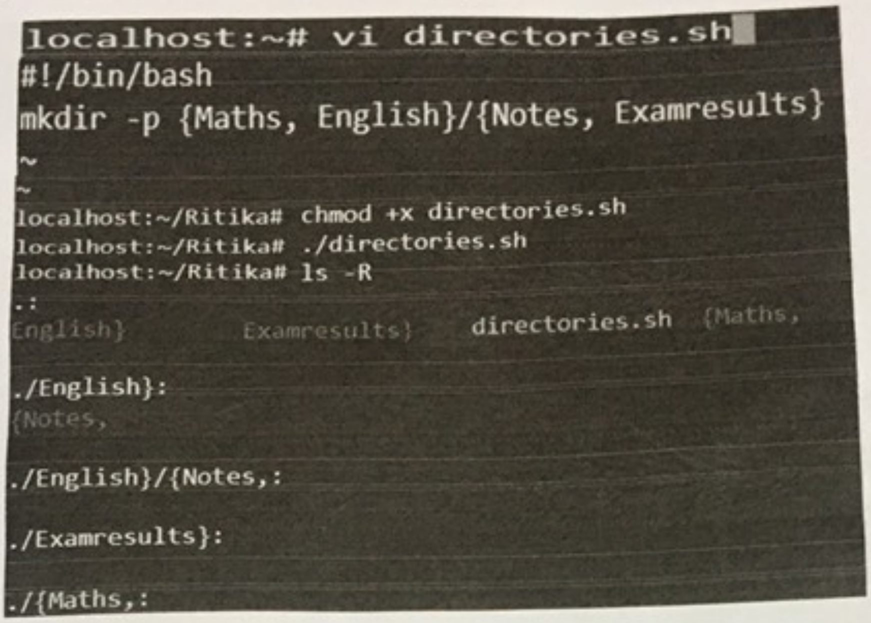
```
localhost:~# vi evenodd.sh
#!/bin/bash
read -p "Enter a number: " num

if [ $((num % 2)) -eq 0 ]
then
    echo "Your number is even"
else
    echo "Your number is odd"
fi

~
~
localhost:~# chmod 711 evenodd.sh
localhost:~# ./evenodd.sh
Enter a number: 12
Your number is even
```

2. **WAP to print the factorial of a number**



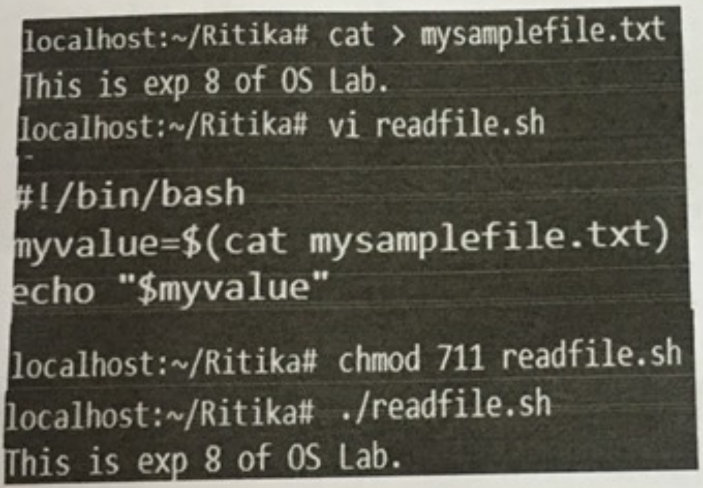
```
localhost:~# vi factorial.sh
#!/bin/bash
read -p "Enter a number: " num

factorial=1

for ((i = 1; i <= num; i++))
do
    factorial=$((factorial * i))
done

echo "Factorial: $factorial"
~
localhost:~# chmod 711 factorial.sh
localhost:~# ./factorial.sh
Enter a number: 5
Factorial: 120
```

3. **WAP to create directories through vi text editor**



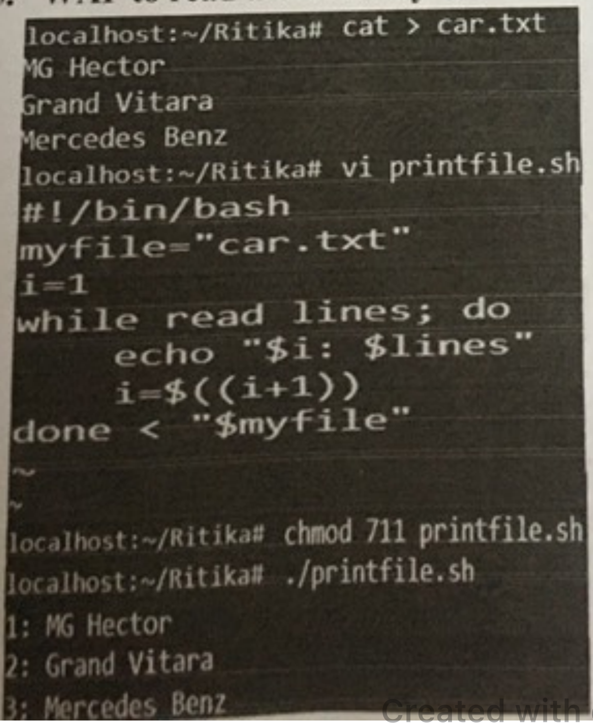
```
localhost:~# vi directories.sh
#!/bin/bash
mkdir -p {Maths, English}/{Notes, Examresults}
~
~
localhost:~/Ritika# chmod +x directories.sh
localhost:~/Ritika# ./directories.sh
localhost:~/Ritika# ls -R
.:
English}          Examresults}     directories.sh  {Maths,

./English}:
{Notes,

./English}/{Notes,:

./Examresults}:

./{Maths,:
```

4. **WAP to read a file into a variable**



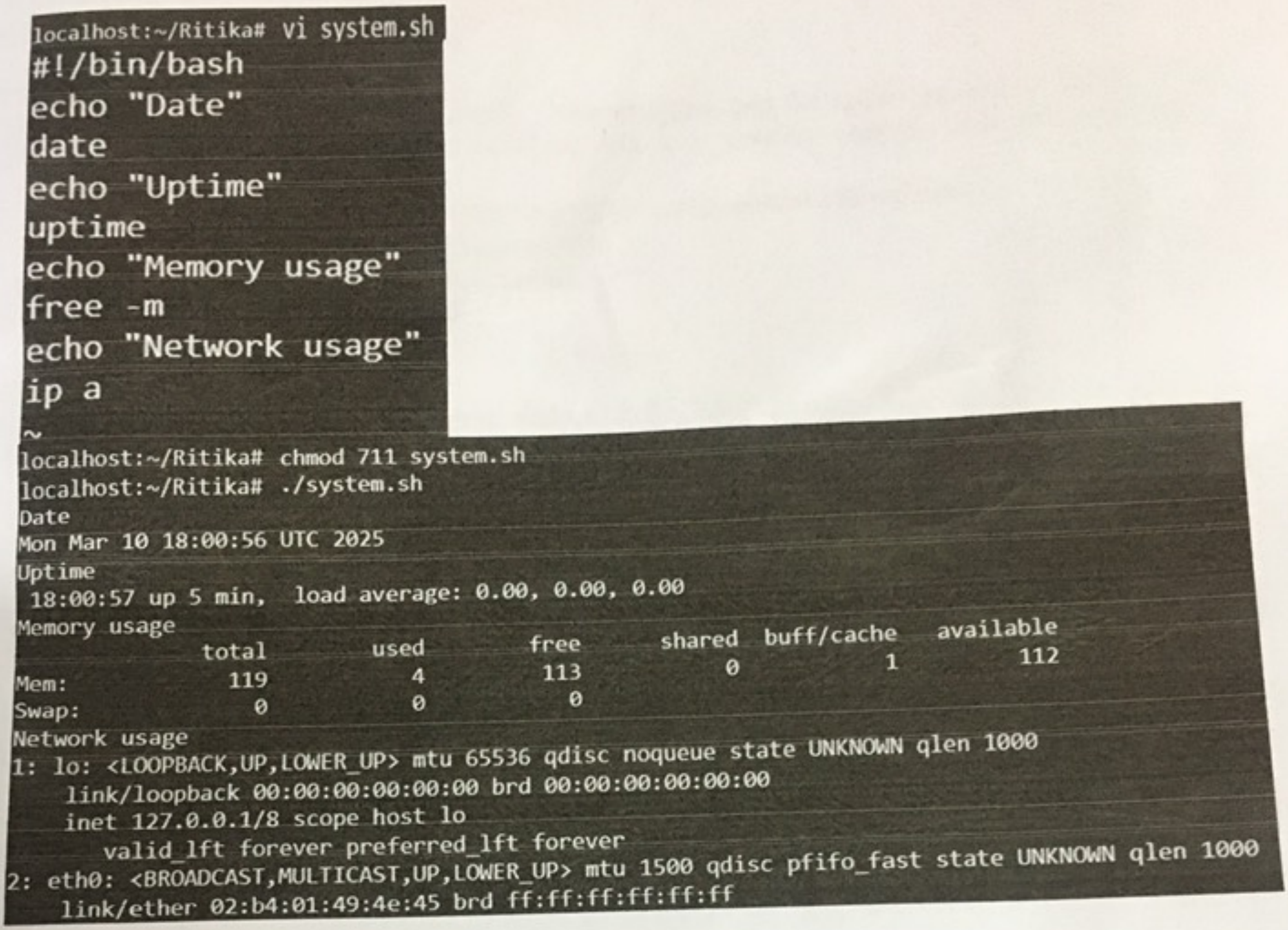
```
localhost:~/Ritika# cat > mysamplefile.txt
This is exp 8 of OS Lab.
localhost:~/Ritika# vi readfile.sh

#!/bin/bash
myvalue=$(cat mysamplefile.txt)
echo "$myvalue"

localhost:~/Ritika# chmod 711 readfile.sh
localhost:~/Ritika# ./readfile.sh
This is exp 8 of OS Lab.
```

5. **WAP to read a file line by line**



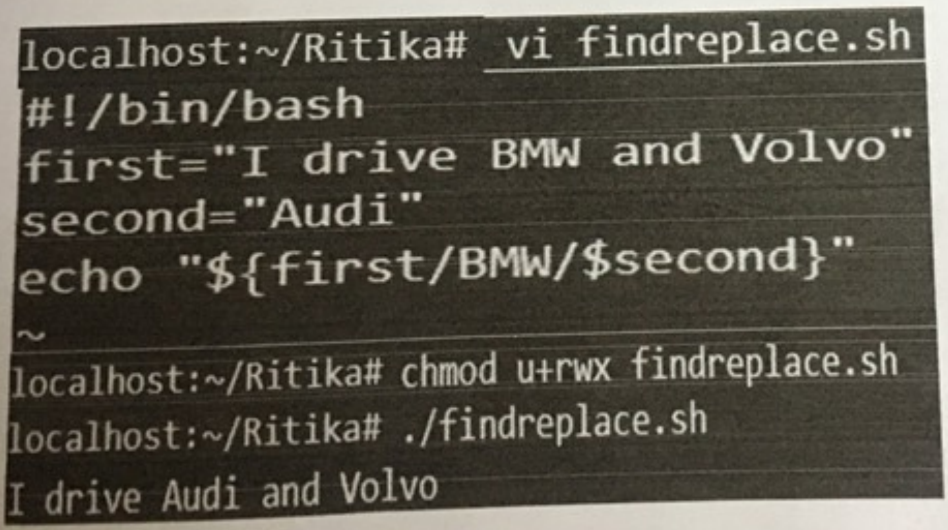
```
localhost:~/Ritika# cat > car.txt
MG Hector
Grand Vitara
Mercedes Benz
localhost:~/Ritika# vi printfile.sh
#!/bin/bash
myfile="car.txt"
i=1
while read lines; do
    echo "$i: $lines"
    i=$((i+1))
done < "$myfile"
~
~
localhost:~/Ritika# chmod 711 printfile.sh
localhost:~/Ritika# ./printfile.sh
1: MG Hector
2: Grand Vitara
3: Mercedes Benz
```

6. **WAP to display system information**



```
localhost:~/Ritika# vi system.sh
#!/bin/bash
echo "Date"
date
echo "Uptime"
uptime
echo "Memory usage"
free -m
echo "Network usage"
ip a
~
localhost:~/Ritika# chmod 711 system.sh
localhost:~/Ritika# ./system.sh
Date
Mon Mar 10 18:00:56 UTC 2025
Uptime
 18:00:57 up 5 min,  load average: 0.00, 0.00, 0.00
Memory usage
              total        used        free      shared  buff/cache   available
Mem:            119           4         113           0           1         112
Swap:             0           0           0
Network usage
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UNKNOWN qlen 1000
    link/ether 02:b4:01:49:4e:45 brd ff:ff:ff:ff:ff:ff
```

7. **WAP to find and replace text in a string**



```
localhost:~/Ritika#  vi findreplace.sh
#!/bin/bash
first="I drive BMW and Volvo"
second="Audi"
echo "${first/BMW/$second}"
~
localhost:~/Ritika# chmod u+rwx findreplace.sh
localhost:~/Ritika# ./findreplace.sh
I drive Audi and Volvo
```

Srishty
24/3/25

Experiment 09

Aim: To study and implement the read(), write(), and fork() system calls in Unix/Linux operating systems.

System Calls in Unix/Linux

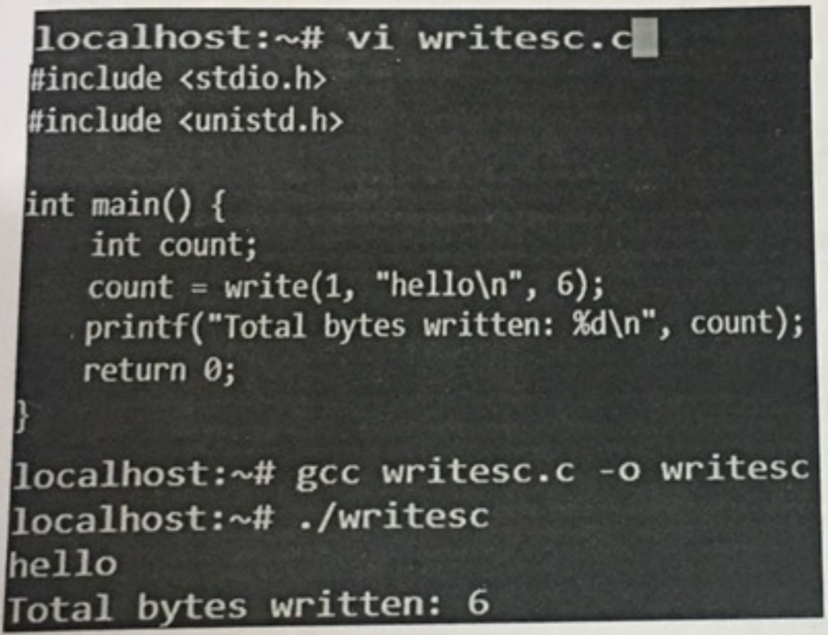
A system call is a direct interface between a user program and the operating system kernel. It allows programs to request services such as file I/O, process control, and inter-process communication.

In this experiment, we focus on the following three fundamental system calls:

1. **write() – For low-level output operations.**
2. **read() – For low-level input operations.**
3. **fork() – For process creation.**

write() System Call

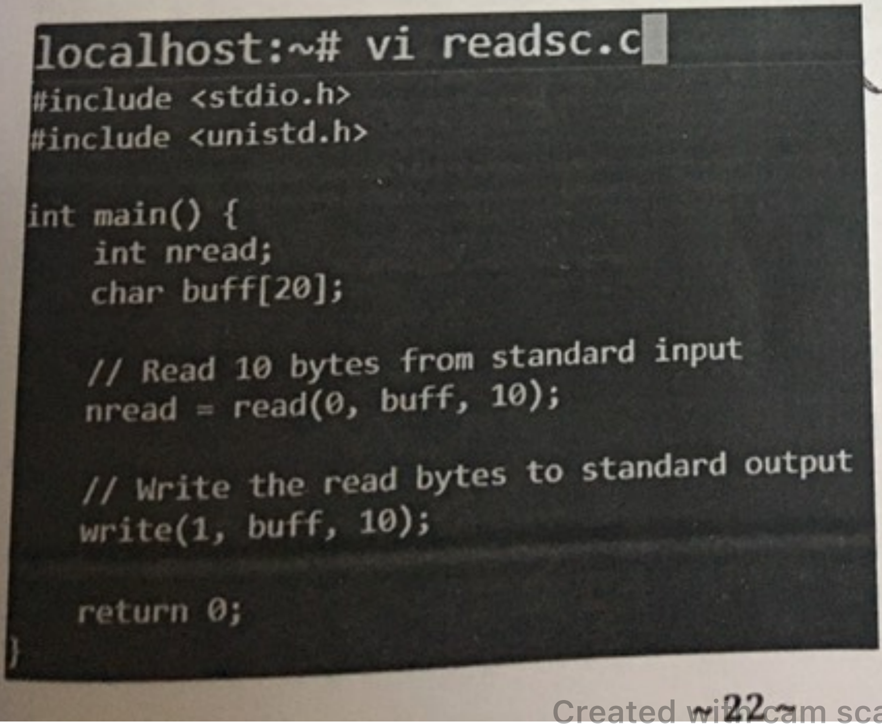
The write() system call is used to **output data** to a file descriptor, such as the standard output (screen).



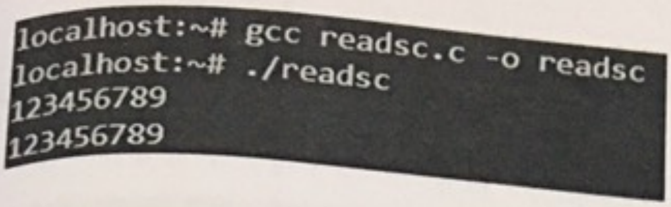
```
localhost:~# vi writesc.c
#include <stdio.h>
#include <unistd.h>

int main() {
    int count;
    count = write(1, "hello\n", 6);
    printf("Total bytes written: %d\n", count);
    return 0;
}
localhost:~# gcc writesc.c -o writesc
localhost:~# ./writesc
hello
Total bytes written: 6
```

read() System Call

The read() system call is used to **read data** from an input file descriptor, such as the keyboard (standard input).



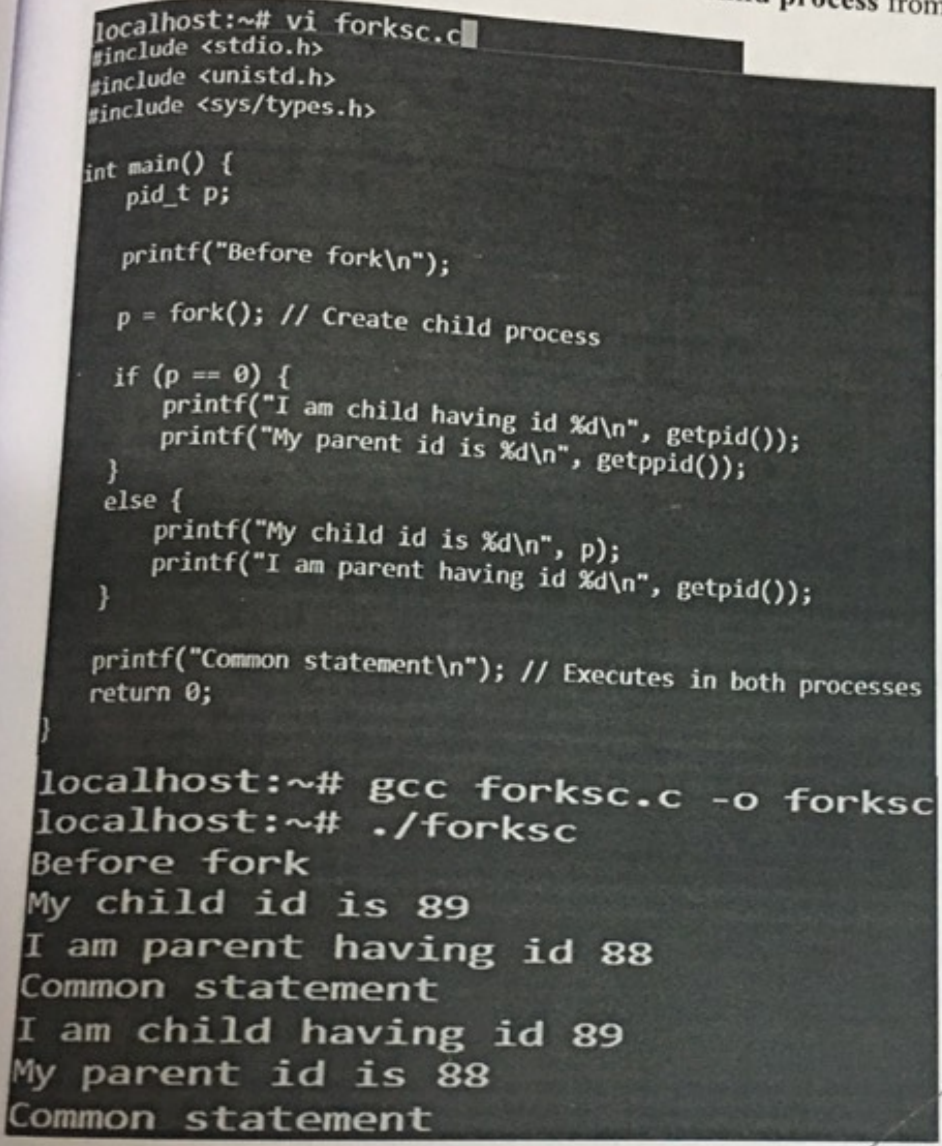
```
localhost:~# vi readsc.c
#include <stdio.h>
#include <unistd.h>

int main() {
    int nread;
    char buff[20];

    // Read 10 bytes from standard input
    nread = read(0, buff, 10);

    // Write the read bytes to standard output
    write(1, buff, 10);

    return 0;
}
```



```
localhost:~# gcc readsc.c -o readsc
localhost:~# ./readsc
123456789
123456789
```

fork() System Call

The fork() system call is used to **create a new child process** from the parent process.



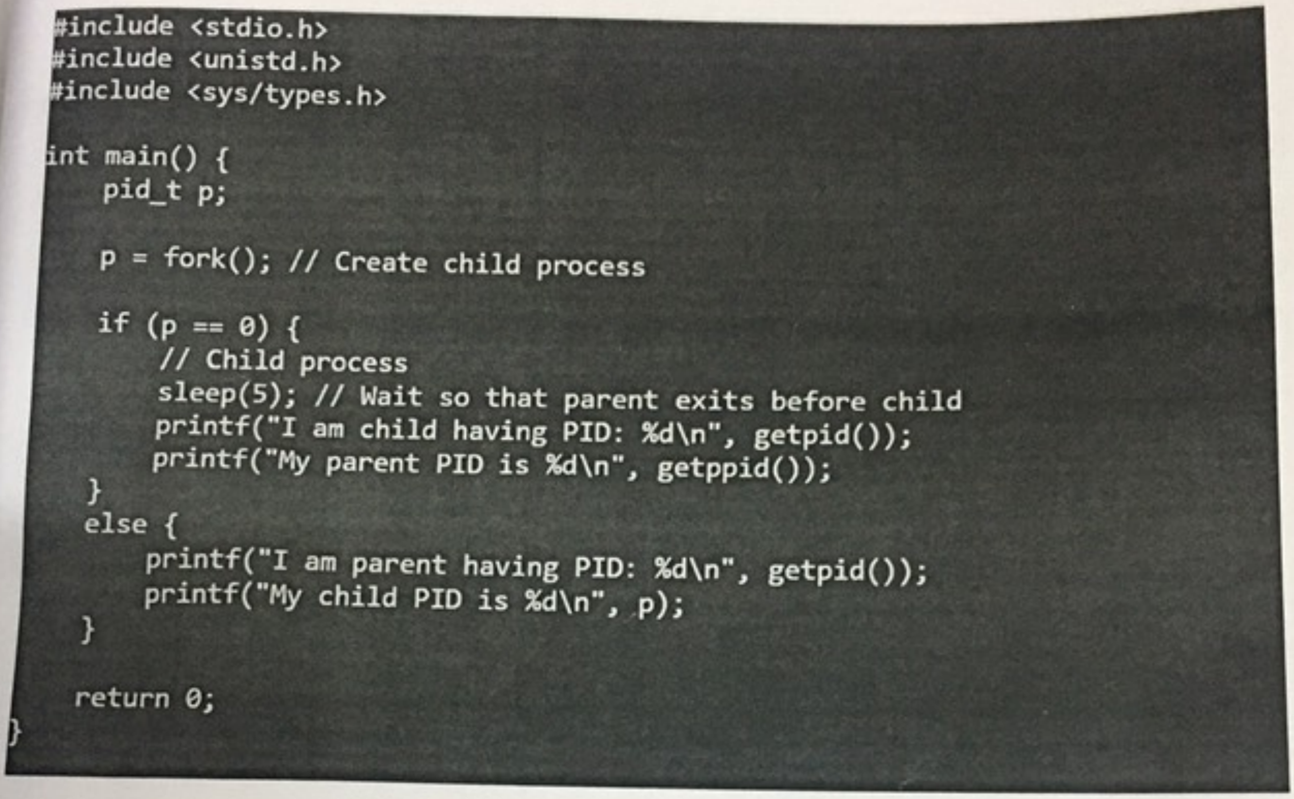
```
localhost:~# vi forksc.c
#include <stdio.h>
#include <unistd.h>
#include <sys/types.h>

int main() {
    pid_t p;

    printf("Before fork\n");

    p = fork(); // Create child process

    if (p == 0) {
        printf("I am child having id %d\n", getpid());
        printf("My parent id is %d\n", getppid());
    }
    else {
        printf("My child id is %d\n", p);
        printf("I am parent having id %d\n", getpid());
    }

    printf("Common statement\n"); // Executes in both processes
    return 0;
}
```

```
localhost:~# gcc forksc.c -o forksc
localhost:~# ./forksc
Before fork
My child id is 89
I am parent having id 88
Common statement
I am child having id 89
My parent id is 88
Common statement
```

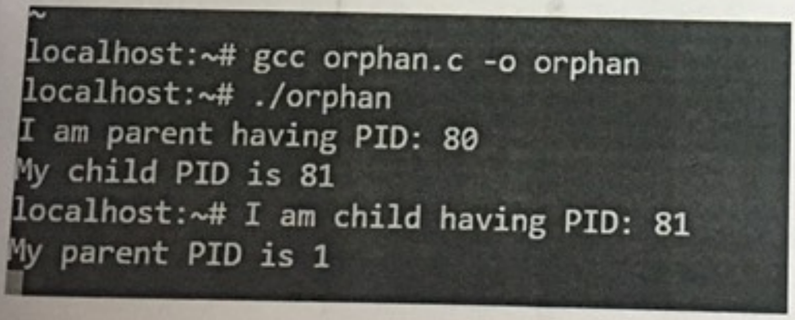
Srishty
7/4/23

EXPIREMENT 10

1) Program to create orphan process

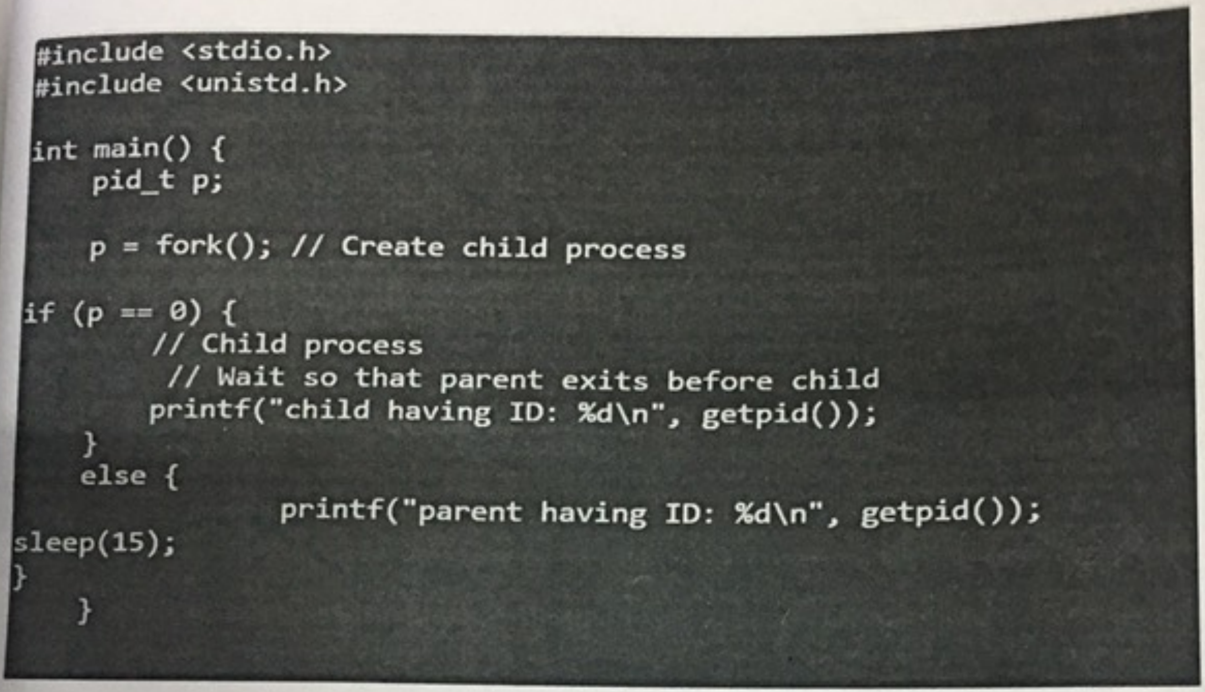


```c
#include <stdio.h>
#include <unistd.h>
#include <sys/types.h>

int main() {
    pid_t p;

    p = fork(); // Create child process

    if (p == 0) {
        // Child process
        sleep(5); // Wait so that parent exits before child
        printf("I am child having PID: %d\n", getpid());
        printf("My parent PID is %d\n", getppid());
    }
    else {
        printf("I am parent having PID: %d\n", getpid());
        printf("My child PID is %d\n", p);
    }

    return 0;
}
```

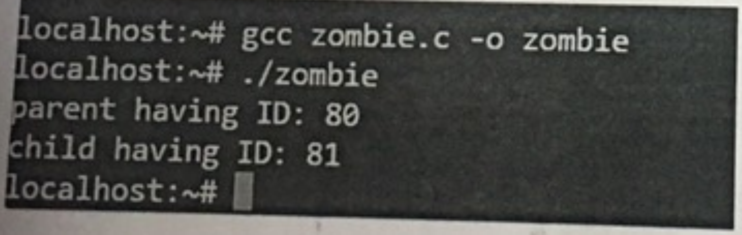


```
~
localhost:~# gcc orphan.c -o orphan
localhost:~# ./orphan
I am parent having PID: 80
My child PID is 81
localhost:~# I am child having PID: 81
My parent PID is 1
```

2)Program to create a zombic process



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

int main() {
    pid_t p;

    p = fork(); // Create child process

if (p == 0) {
        // Child process
         // Wait so that parent exits before child
        printf("child having ID: %d\n", getpid());
    }
    else {
                printf("parent having ID: %d\n", getpid());
sleep(15);
}
    }
```



```
localhost:~# gcc zombie.c -o zombie
localhost:~# ./zombie
parent having ID: 80
child having ID: 81
localhost:~# 
```

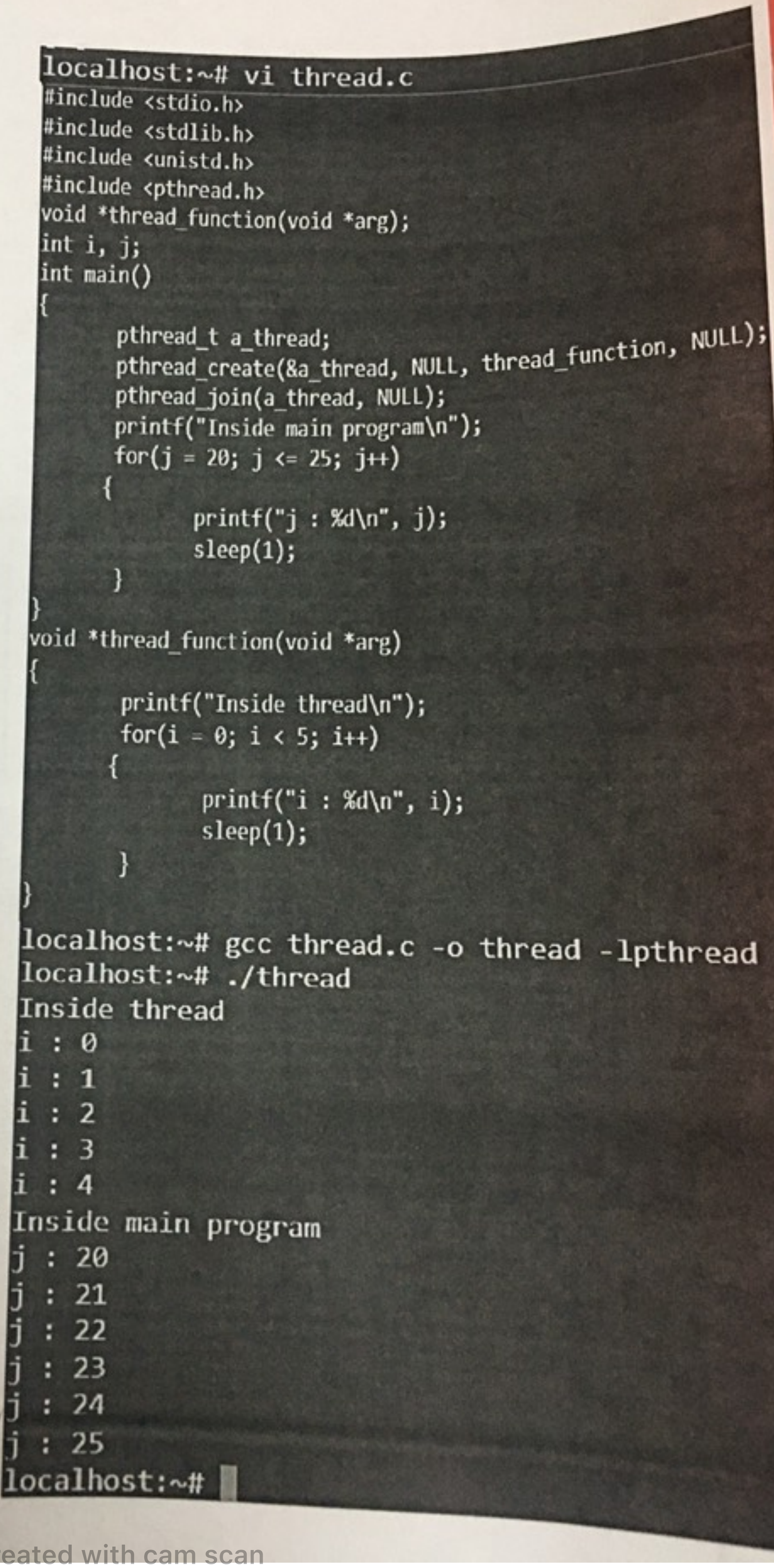
21/4/25

Experiment – 11

Aim: Write a program to create threads in Linux.

```
vi thread.c

#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <pthread.h>
void *thread_function(void *arg);
int i, j;
int main()
{
      pthread_t a_thread;
      pthread_create(&a_thread,
NULL, thread_function, NULL);
      pthread_join(a_thread, NULL);
      printf("Inside main program\n");
      for(j = 20; j <= 25; j++)
      {
            printf("j : %d\n", j);
            sleep(1);
      }
}
void *thread_function(void *arg)
{
      printf("Inside thread\n");
      for(i = 0; i < 5; i++)
      {
            printf("i : %d\n", i);
            sleep(1);
      }
}
```

```
gcc thread.c -o thread -lpthread

./thread
```



```
localhost:~# vi thread.c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <pthread.h>
void *thread_function(void *arg);
int i, j;
int main()
{
        pthread_t a_thread;
        pthread_create(&a_thread, NULL, thread_function, NULL);
        pthread_join(a_thread, NULL);
        printf("Inside main program\n");
        for(j = 20; j <= 25; j++)
      {
                printf("j : %d\n", j);
                sleep(1);
        }
}
void *thread_function(void *arg)
{
        printf("Inside thread\n");
        for(i = 0; i < 5; i++)
        {
                printf("i : %d\n", i);
                sleep(1);
        }
}
localhost:~# gcc thread.c -o thread -lpthread
localhost:~# ./thread
Inside thread
i : 0
i : 1
i : 2
i : 3
i : 4
Inside main program
j : 20
j : 21
j : 22
j : 23
j : 24
j : 25
localhost:~#
```

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