Experiment No. 10
Implement program on Multithreading
Date of Performance:
Date of Submission:

Aim: Implement program on Multithreading

Objective:

Theory:

Multithreading in Java is a process of executing multiple threads simultaneously.

A thread is a lightweight sub-process, the smallest unit of processing. Multiprocessing and multithreading, both are used to achieve multitasking.

However, we use multithreading than multiprocessing because threads use a shared memory area. They don't allocate separate memory area so saves memory, and context-switching between the threads takes less time than process.

Java Multithreading is mostly used in games, animation, etc.

Java provides **Thread class** to achieve thread programming. Thread class provides constructors and methods to create and perform operations on a thread. Thread class extends Object class and implements Runnable interface.

There are two ways to create a thread:

1. By extending Thread class
2. By implementing Runnable interface.

Thread class:
Thread class provide constructors and methods to create and perform operations on a thread.Thread class extends Object class and implements Runnable interface.

1) Java Thread Example by extending Thread class
FileName: Multi.java

```
class Multi extends Thread{
public void run(){
System.out.println("thread is running...");
}
public static void main(String args[]){
Multi t1=new Multi();
t1.start();
 }
}
```

Output:

```
thread is running...
```

2) Java Thread Example by implementing Runnable interface

FileName: Multi3.java

```
class Multi3 implements Runnable{
public void run(){
System.out.println("thread is running...");
}

public static void main(String args[]){
Multi3 m1=new Multi3();
Thread t1 =new Thread(m1);   // Using the constructor Thread(Runnable r)
t1.start();
 }
}
```

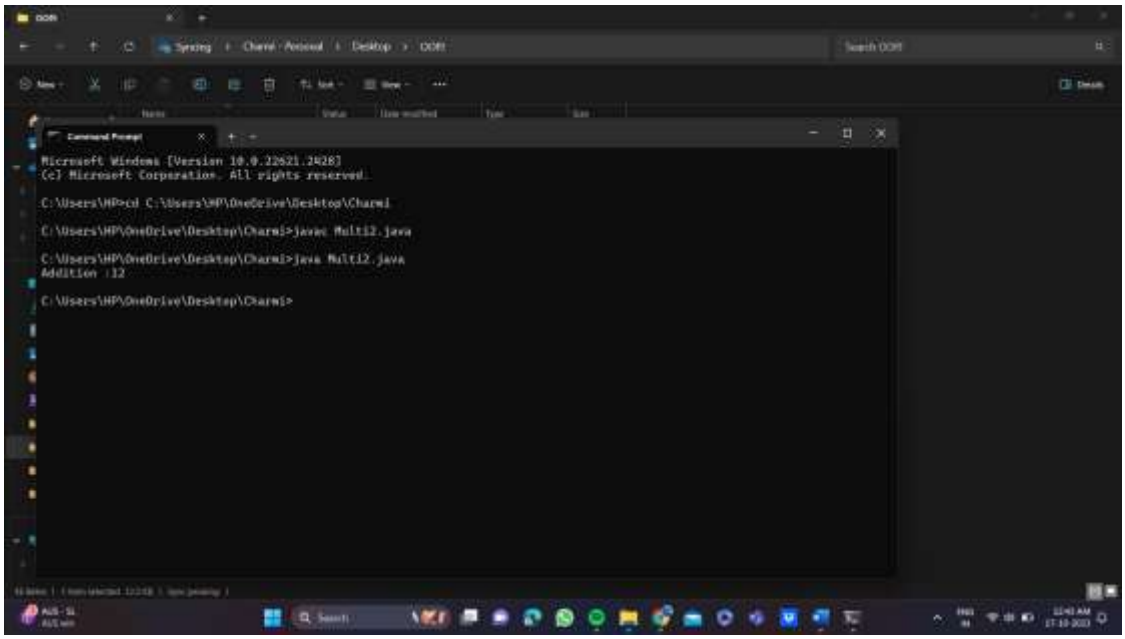
Output:

```
thread is running...
```

Code:

```
class Multi2 implements Runnable{
public void run()
{
    int a=5;
    int b=7;
    int c=a+b;
    System.out.println("Addition :"+c);
}

public static void main(String args[]){
Multi2 m1=new Multi2();
Thread t1=new Thread(m1);
t1.start();
}
}
```



Conclusion:

Multithreading in Java is supported through the `Thread` class and the `Runnable` interface. You can create and manage threads by extending the `Thread` class or implementing the `Runnable` interface. Java provides thread synchronization, management, and various thread states to enable concurrent execution of tasks. It's a fundamental feature for efficient resource utilization, improved application responsiveness, and better performance in multi-tasking environments.

In Java, you can create a new thread by extending the `Thread` class and overriding its `run()` method. Alternatively, you can implement the `Runnable` interface and pass an instance of the implementing class to a new `Thread` object. The `Thread` class provides several methods for managing threads, such as starting, stopping, pausing, and resuming threads.

Java also provides thread synchronization mechanisms such as locks and semaphores to ensure that multiple threads can access shared resources safely. This is important to avoid race conditions and other concurrency issues.

In summary, multithreading is a fundamental feature of Java that enables concurrent execution of tasks. It's supported through the `Thread` class and the `Runnable` interface, and Java provides several mechanisms for managing threads and ensuring thread safety.