OBJECT ORIENTED PROGRAMMING LAB

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Course – BTech CSE AIML

BATCH-03

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Experiment – 09

TITLE: Multithreading

1. “Write a program to implement the concept of multithreading by extending the Thread class.”

Code:

```
class Thread1 extends Thread {
    public void run() {
        for (int i = 0; i < 5; i++) {
            System.out.println("Thread 1 is running: " + (i + 1));
        }
    }
}
class Thread2 extends Thread {
    public void run() {
        for (int i = 6; i <= 10; i++) {
            System.out.println("Thread 2 is running: " + i);
        }
    }
}
class ques1 {
    public static void main(String[] args) {
        Thread1 t1 = new Thread1();
        t1.start();
        Thread2 t2 = new Thread2();
        t2.start();
        System.out.println("Bhavya Talwar");
        System.out.println("500121992");
    }
}
```

Output:

```
Bhavya Talwar
500121992
Thread 2 is running: 6
Thread 1 is running: 1
Thread 1 is running: 2
Thread 1 is running: 3
Thread 2 is running: 7
Thread 1 is running: 4
Thread 1 is running: 5
Thread 2 is running: 8
Thread 2 is running: 9
Thread 2 is running: 10
```

2. “Write a program to implement the concept of multithreading by implementing a Runnable interface.”

Code:

```
class Thread3 implements Runnable {
    public void run() {
        for (int i = 0; i < 5; i++) {
            System.out.println("Thread 1 is running: " + (i + 1));
        }
    }
}
class Thread4 implements Runnable {
    public void run() {
        for (int i = 6; i <= 10; i++) {
            System.out.println("Thread 2 is running: " + i);
        }
    }
}
class ques2 {
    public static void main(String[] args) {
        Thread3 t1 = new Thread3();
        Thread t3 = new Thread(t1);
        t3.start();
        Thread4 t2 = new Thread4();
        Thread t4 = new Thread(t2);
        t4.start();
        System.out.println("Bhavya Talwar");
        System.out.println("500121992");
    }
}
```

Output:

```
Bhavya Talwar
500121992
Thread 2 is running: 6
Thread 2 is running: 7
Thread 2 is running: 8
Thread 2 is running: 9
Thread 1 is running: 1
Thread 1 is running: 2
Thread 1 is running: 3
Thread 2 is running: 10
Thread 1 is running: 4
Thread 1 is running: 5
```

3. “Write a program for generating 2 threads, one for printing even numbers and the other for printing odd numbers.”

Code:

```
import java.util.Scanner;
class Thread1 extends Thread {
    int n;
    Thread1(int n) {
        this.n = n;
    }
    public void run() {
        for (int i = 0; i <= n; i++) {
            if (i % 2 == 0) {
                System.out.println("Thread 1 is even: " + i);
            }
        }
    }
}
class Thread2 extends Thread {
    int n;
    Thread2(int n) {
        this.n = n;
    }
    public void run() {
        for (int i = 0; i <= n; i++) {
            if (i % 2 != 0) {
                System.out.println("Thread 2 is odd: " + i);
            }
        }
    }
}
class ques3 {
    public static void main(String[] args) {
        System.err.print("Enter the limit: ");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        Thread1 t1 = new Thread1(n);
        t1.start();
        Thread2 t2 = new Thread2(n);
        t2.start();
        System.out.println("Bhavya Talwar");
        System.out.println("500121992");
    }
}
```

Output:

```
Enter the limit: 10
Bhavya Talwar
500121992
Thread 2 is odd: 1
Thread 2 is odd: 3
Thread 2 is odd: 5
Thread 2 is odd: 7
Thread 2 is odd: 9
Thread 1 is even: 0
Thread 1 is even: 2
Thread 1 is even: 4
Thread 1 is even: 6
Thread 1 is even: 8
Thread 1 is even: 10
```

4. “Write a Java program that implements multithreading among 3 threads. Use sleep() and join() methods and show appropriate output.”

Code:

```
class Thread1 extends Thread {
    public void run() {
        for (int i = 0; i < 3; i++) {
            System.out.println("Thread 1 is running: " + (i + 1));
        }
        try {
            Thread.sleep(1000);
        } catch (Exception e) {
            System.out.println(e);
        }
    }
}
class Thread2 extends Thread {
    public void run() {
        for (int i = 0; i < 3; i++) {
            System.out.println("Thread 2 is running: " + (i + 1));
        }
        try {
            Thread.sleep(1000);
        } catch (Exception e) {
            System.out.println(e);
        }
    }
}
class Thread3 extends Thread {
    public void run() {
        for (int i = 0; i < 3; i++) {
            System.out.println("Thread 3 is running: " + (i + 1));
        }
        try {
            Thread.sleep(1000);
        } catch (Exception e) {
```

```
            System.out.println(e);
        }
    }
}
class ques4 {
    public static void main(String[] args) {
        Thread1 t1 = new Thread1();
        Thread2 t2 = new Thread2();
        Thread3 t3 = new Thread3();
        System.out.println("Thread-1 Started");
        t1.start();
        try {
            t1.join();
        } catch (Exception e) {
            System.out.println(e);
        }
        System.out.println("Thread-1 Finished");
        System.out.println("Thread-2 Started");
        t2.start();
        try {
            t2.join();
        } catch (Exception e) {
            System.out.println(e);
        }
        System.out.println("Thread-2 Finished");
        System.out.println("Thread-3 Started");
        t3.start();
        try {
            t3.join();
        } catch (Exception e) {
            System.out.println(e);
        }
        System.out.println("Thread-3 Finished");
        System.out.println("Bhavya Talwar");
        System.out.println("500121992");
    }
}
```

Output:

```
Thread-1 Started
Thread 1 is running: 1
Thread 1 is running: 2
Thread 1 is running: 3
Thread-1 Finished
Thread-2 Started
Thread 2 is running: 1
Thread 2 is running: 2
Thread 2 is running: 3
Thread-2 Finished
Thread-3 Started
Thread 3 is running: 1
Thread 3 is running: 2
Thread 3 is running: 3
Thread-3 Finished
Bhavya Talwar
500121992
```

5. “Write a Java program that shows multithreading between three threads. Set different priorities for each thread and show output.”

Code:

```
class Thread1 extends Thread {
    public void run() {
        for (int i = 0; i < 5; i++) {
            System.out.println("Thread 1 is running: " + (i + 1));
        }
    }
}
class Thread2 extends Thread {
    public void run() {
        for (int i = 6; i <= 10; i++) {
            System.out.println("Thread 2 is running: " + i);
        }
    }
}
class Thread3 extends Thread {
    public void run() {
        for (int i = 11; i <= 15; i++) {
            System.out.println("Thread 3 is running: " + i);
        }
    }
}
class ques5 {
    public static void main(String[] args) {
        Thread1 t1 = new Thread1();
        Thread2 t2 = new Thread2();
        Thread3 t3 = new Thread3();
        t1.setPriority(Thread.MIN_PRIORITY);
        t2.setPriority(Thread.MAX_PRIORITY);
        t3.setPriority(Thread.NORM_PRIORITY);
        System.out.println("Priority Value of t1 thread=" + t1.getPriority());
        System.out.println("Priority Value of t2 thread=" + t2.getPriority());
        System.out.println("Priority Value of t3 thread=" + t3.getPriority());
        t1.start();
        t2.start();
        t3.start();
        System.out.println("Bhavya Talwar");
        System.out.println("500121992");
    }
}
```

Output:

```
Priority Value of t1 thread=1
Priority Value of t2 thread=10
Priority Value of t3 thread=5
Bhavya Talwar
500121992
Thread 2 is running: 6
Thread 1 is running: 1
Thread 2 is running: 7
Thread 1 is running: 2
Thread 1 is running: 3
Thread 1 is running: 4
Thread 3 is running: 11
Thread 3 is running: 12
Thread 2 is running: 8
Thread 2 is running: 9
Thread 1 is running: 5
Thread 3 is running: 13
Thread 2 is running: 10
Thread 3 is running: 14
Thread 3 is running: 15
```