Java Assignment No.7

```java
/*
    Ques : 1.Can we call the run() method instead of start() ans : Yes you can
    Name : Sandesh Shivaji Shinde
    PRN : 23620006

 */

public class Ques_1 implements Runnable {
    public void run() {
        System.out.println("Thread is running...");
    }

    public static void main(String[] args) {
        Ques_1 myThread = new Ques_1();
        // Call run() directly instead of start()
        myThread.run();
    }
}
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> javac Ques_1.java
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> java Ques_1
Thread is running...
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07>
```

2. Explain the use of word Synchronized

Ans -

When a method or a block of code is marked as synchronized, only one thread can execute that code at any given time. Other threads must wait until the executing thread releases the lock on the object that the synchronized block is synchronized on.

```java
/*
    Ques : Write a program to display thread information.
    Name : Sandesh Shivaji Shinde
    PRN : 23620006
 */

public class ThreadInfo {

    public static void main(String[] args) {
        // Get a reference to the current thread
        Thread mainThread = Thread.currentThread();

        // Display information about the main thread
        System.out.println("Main Thread:");
        System.out.println("Thread name: " + mainThread.getName());
        System.out.println("Thread ID: " + mainThread.getId());
        System.out.println("Thread priority: " + mainThread.getPriority());
        System.out.println("Thread state: " + mainThread.getState());
        System.out.println("Thread is daemon: " + mainThread.isDaemon());
        System.out.println();

        // Display information about all active threads
        System.out.println("Currently active threads:");
        ThreadGroup currentThreadGroup = Thread.currentThread().getThreadGroup();
        Thread[] activeThreads = new Thread[currentThreadGroup.activeCount()];
        currentThreadGroup.enumerate(activeThreads);

        for (Thread thread : activeThreads) {
            System.out.println("Thread name: " + thread.getName());
            System.out.println("Thread ID: " + thread.getId());
            System.out.println("Thread priority: " + thread.getPriority());
            System.out.println("Thread state: " + thread.getState());
            System.out.println("Thread is daemon: " + thread.isDaemon());
            System.out.println();
        }
    }
}
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> javac Ques_3.java
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> java Ques_3
Main Thread:
Thread name: main
Thread ID: 1
Thread priority: 5
Thread state: RUNNABLE
Thread is daemon: false

Currently active threads:
Thread name: main
Thread ID: 1
Thread priority: 5
Thread state: RUNNABLE
Thread is daemon: false

PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07>
```

```java
/*
    Ques : Create a thread using Thread class.
    Name : Sandesh Shivaji Shinde
    PRN : 23620006
 */

public class Ques_4_1 extends Thread {
    public void run() {
        System.out.println("Thread using Thread class is running.");
    }

    public static void main(String[] args) {
        Ques_4_1 thread = new Ques_4_1();
        thread.start(); // Start the thread
    }
}
```

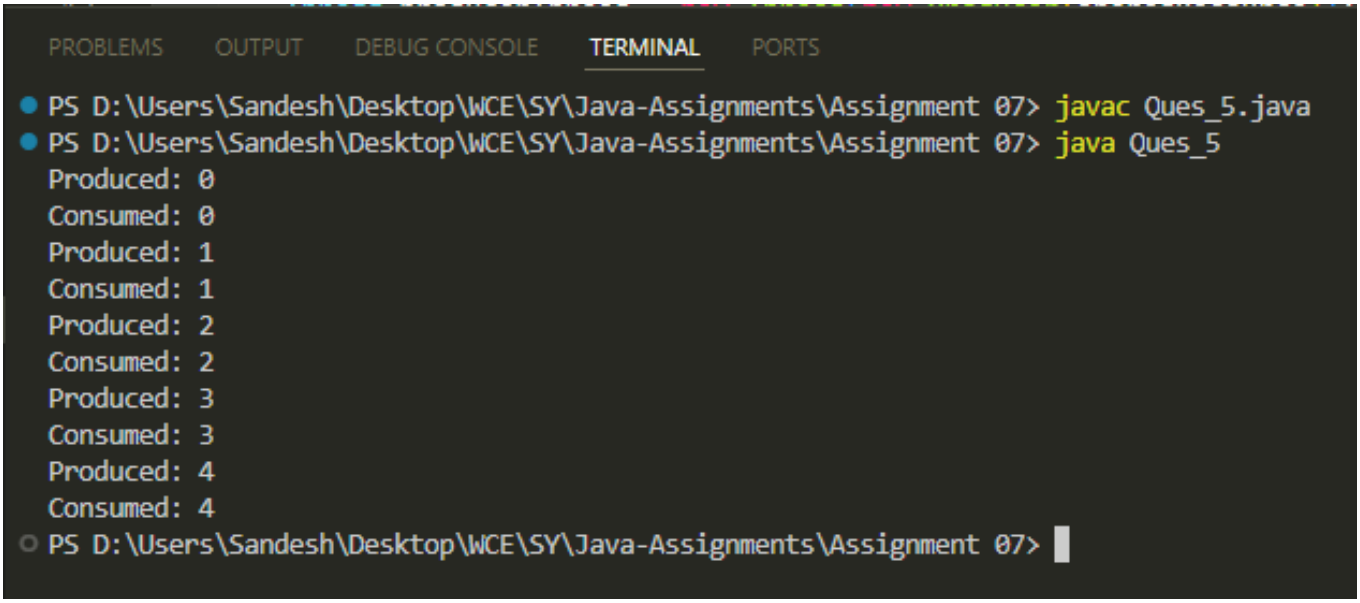
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> javac Ques_4_1.java
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> java Ques_4_1
Thread using Thread class is running.
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07>
```

```java
/*
    Ques : Create a thread using  Runnable class.
    Name : Sandesh Shivaji Shinde
    PRN : 23620006
 */

public class Ques_4_2 implements Runnable {
    public void run() {
        System.out.println("Thread using Runnable interface is running.");
    }

    public static void main(String[] args) {
        Ques_4_2 runnable = new Ques_4_2();
        Thread thread = new Thread(runnable); // Create a new thread with the Runnable
object
        thread.start(); // Start the thread
    }
}
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> javac Ques_4_2.java
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> java Ques_4_2
Thread using Runnable interface is running.
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07>
```

```java
/*
    Ques : Write a program for thread communication and synchronization.
    Name : Sandesh Shivaji Shinde
    PRN : 23620006
 */

public class Ques_5 {
    public static void main(String[] args) {
        final SharedResource sharedResource = new SharedResource();

        // Creating two threads
        Thread producerThread = new Thread(new Producer(sharedResource));
        Thread consumerThread = new Thread(new Consumer(sharedResource));

        // Start both threads
        producerThread.start();
        consumerThread.start();
    }
}

class SharedResource {
    private int data;
    private boolean produced;

    // Method for producing data
    public synchronized void produce(int newData) {
        // If data is already produced, wait for it to be consumed
        while (produced) {
            try {
                wait(); // Wait for the consumer to consume the data
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }

        // Produce new data
        data = newData;
        System.out.println("Produced: " + data);
        produced = true;

        // Notify the consumer that data is available
        notify();
    }

    // Method for consuming data
    public synchronized void consume() {
        // If data is not produced yet, wait for it to be produced
        while (!produced) {
            try {
                wait(); // Wait for the producer to produce data
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
```

```
        // Consume the data
        System.out.println("Consumed: " + data);
        produced = false;

        // Notify the producer that data has been consumed
        notify();
    }
}

// Producer class
class Producer implements Runnable {
    private final SharedResource sharedResource;

    public Producer(SharedResource sharedResource) {
        this.sharedResource = sharedResource;
    }

    public void run() {
        for (int i = 0; i < 5; i++) {
            sharedResource.produce(i);
            try {
                Thread.sleep(1000); // Sleep for 1 second
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}

// Consumer class
class Consumer implements Runnable {
    private final SharedResource sharedResource;

    public Consumer(SharedResource sharedResource) {
        this.sharedResource = sharedResource;
    }

    public void run() {
        for (int i = 0; i < 5; i++) {
            sharedResource.consume();
            try {
                Thread.sleep(1000); // Sleep for 1 second
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> javac Ques_5.java
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07> java Ques_5
Produced: 0
Consumed: 0
Produced: 1
Consumed: 1
Produced: 2
Consumed: 2
Produced: 3
Consumed: 3
Produced: 4
Consumed: 4
PS D:\Users\Sandesh\Desktop\WCE\SY\Java-Assignments\Assignment 07>