

Assignment4 mutex and semaphore

```
import java.util.LinkedList;
```

```
import java.util.Queue;
```

```
import java.util.concurrent.Semaphore;
```

```
class ProducerConsumer {
```

```
    private static final int BUFFER_SIZE = 5;
```

```
    private static Queue<Integer> buffer = new LinkedList<>();
```

```
    private static Semaphore mutex = new Semaphore(1);
```

```
    private static Semaphore empty = new Semaphore(BUFFER_SIZE);
```

```
    private static Semaphore full = new Semaphore(0);
```

```
    public static void main(String[] args) {
```

```
        Thread producer = new Thread(new Producer());
```

```
        Thread consumer = new Thread(new Consumer());
```

```
        producer.start();
```

```
        consumer.start();
```

```
    }
```

```
    static class Producer implements Runnable {
```

```
        public void run() {
```

```
            try {
```

```
                for (int i = 0; i < 10; i++) {
```

```
                    empty.acquire(); // wait for empty slot
```

```
                    mutex.acquire(); // enter critical section
```

```
                    buffer.add(i);
```

```
                    System.out.println("Produced: " + i);
```

```
                    mutex.release(); // exit critical section
```

```
                    full.release(); // signal that buffer is not empty
```

```
                }
```

```
            } catch (InterruptedException e) {
```

```
                Thread.currentThread().interrupt();
```

```
            }
```

```

    }
}

static class Consumer implements Runnable {

    public void run() {

        try {

            for (int i = 0; i < 10; i++) {

                full.acquire(); // wait for full slot

                mutex.acquire(); // enter critical section

                int item = buffer.remove();

                System.out.println("Consumed: " + item);

                mutex.release(); // exit critical section

                empty.release(); // signal that buffer has empty slots

            }

        } catch (InterruptedException e) {

            Thread.currentThread().interrupt();

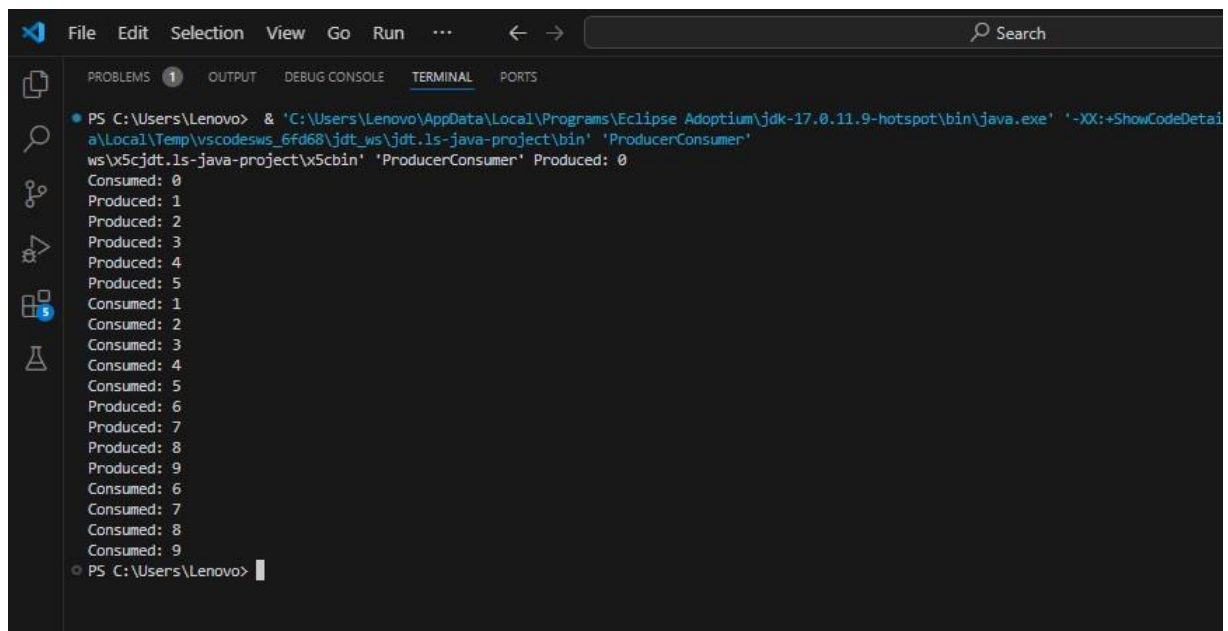
        }

    }

}
}

```

OUTPUT:



```

PS C:\Users\Lenovo> & 'C:\Users\Lenovo\AppData\Local\Programs\Eclipse Adoptium\jdk-17.0.11.9-hotspot\bin\java.exe' '-XX:+ShowCodeDetails' '-Djava.class.path=.' 'ProducerConsumer'
ws\X5cjdtdt.ls-java-project\X5cbin' 'ProducerConsumer' Produced: 0
Consumed: 0
Produced: 1
Produced: 2
Produced: 3
Produced: 4
Produced: 5
Consumed: 1
Consumed: 2
Consumed: 3
Consumed: 4
Consumed: 5
Produced: 6
Produced: 7
Produced: 8
Produced: 9
Consumed: 6
Consumed: 7
Consumed: 8
Consumed: 9
PS C:\Users\Lenovo>

```