

## Task 7: Writing Thread-Safe Code, Immutable Objects

Design a thread-safe Counter class with increment and decrement methods. Then demonstrate its usage from multiple threads. Also, implement and use an immutable class to share data between threads

```
package Day_18;

class Counter {
    private int count = 0;

    public synchronized void increment() {
        count++;
    }

    public synchronized void decrement() {
        count--;
    }

    public synchronized int getCount() {
        return count;
    }
}

final class ImmutableData {
    private final String data;

    public ImmutableData(String data) {
        this.data = data;
    }

    public String getData() {
        return data;
    }
}

public class Task7 {
    public static void main(String[] args) {
        // Create a Counter instance
        Counter counter = new Counter();

        // Create and start multiple threads to increment and decrement the counter
        Thread[] threads = new Thread[10];
        for (int i = 0; i < threads.length; i++) {
            threads[i] = new Thread(() -> {
                for (int j = 0; j < 1000; j++) {
                    counter.increment();
                    counter.decrement();
                }
            });
            threads[i].start();
        }

        // Wait for all threads to finish
        for (Thread thread : threads) {
            try {
                thread.join();
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
        }
    }
}
```

```

    }
}

// Print the final count
System.out.println("Final count: " + counter.getCount());

// Immutable data shared between threads
ImmutableData immutableData = new ImmutableData("Shared Immutable Data");

// Create and start threads to access immutable data
Thread[] immutableThreads = new Thread[5];
for (int i = 0; i < immutableThreads.length; i++) {
    immutableThreads[i] = new Thread(() -> {
        System.out.println("Immutable Data: " + immutableData.getData());
    });
    immutableThreads[i].start();
}
}
}

```

The screenshot shows an IDE with a toolbar at the top containing icons for Run, Debug, Stop, Share, Save, Beautify, and Download. The editor displays the following Java code:

```

Main.java
30 public synchronized int getCount() {
31     return count;
32 }
33 }
34
35 final class ImmutableData {
36     private final String data;
37
38     public ImmutableData(String data) {
39         this.data = data;
40     }
41
42     public String getData() {
43         return data;
44     }
45 }
46 public class Main{
47
48     public static void main(String[] args) {
49         // Create a Counter instance
50         Counter counter = new Counter();
51
52         // Create and start multiple threads to increment and decrement the counter
53         Thread[] threads = new Thread[10];
54         for (int i = 0; i < threads.length; i++) {
55             threads[i] = new Thread(() -> {
56                 for (int j = 0; j < 1000; j++) {
57                     counter.increment();

```

Below the code editor, the output is displayed in a terminal window:

```

Final count: 0
Immutable Data: Shared Immutable Data
Immutable Data: Shared Immutable Data
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Immutable Data: Shared Immutable Data

```