WEEK-1

SKILL:DESIGN PRINCIPLES & PATTERNS

EXERCISE 1: IMPLEMENTING THE SINGLETON PATTERN

Scenario:

You need to ensure that a logging utility class in your application has only one instance throughout the application lifecycle to ensure consistent logging.

Steps:

1.Create a New Java Project:

- Create a new Java project named **SingletonPatternExample**.

2.Define a Singleton Class:

- Create a class named Logger that has a private static instance of itself.
- Ensure the constructor of Logger is private.
- Provide a public static method to get the instance of the Logger class.

3.Implement the Singleton Pattern:

- Write code to ensure that the Logger class follows the Singleton design pattern.

4.Test the Singleton Implementation:

- Create a test class to verify that only one instance of Logger is created and used across the application.

SINGLETONPATTERNEXAMPLE

Logger.java

```
import java.time.LocalDateTime;
import java.time.format.DateTimeFormatter;

public class Logger {
    private static Logger singleInstance;
    private int logCount = 0;

    private Logger() {
        System.out.println("[Logger] Initialized at: " + currentTime());
    }

    public static Logger getInstance() {
        if (singleInstance == null) {
            singleInstance = new Logger();
        }
        return singleInstance;
    }

    public void log(String message) {
        logCount++;
        String output = String.format("[Log-%02d @ %s] %s", logCount, currentTime(), message);
        System.out.println(output);
    }

    private String currentTime() {
        DateTimeFormatter dtf = DateTimeFormatter.ofPattern("HH:mm:ss");
        return LocalDateTime.now().format(dtf);
    }
}
```

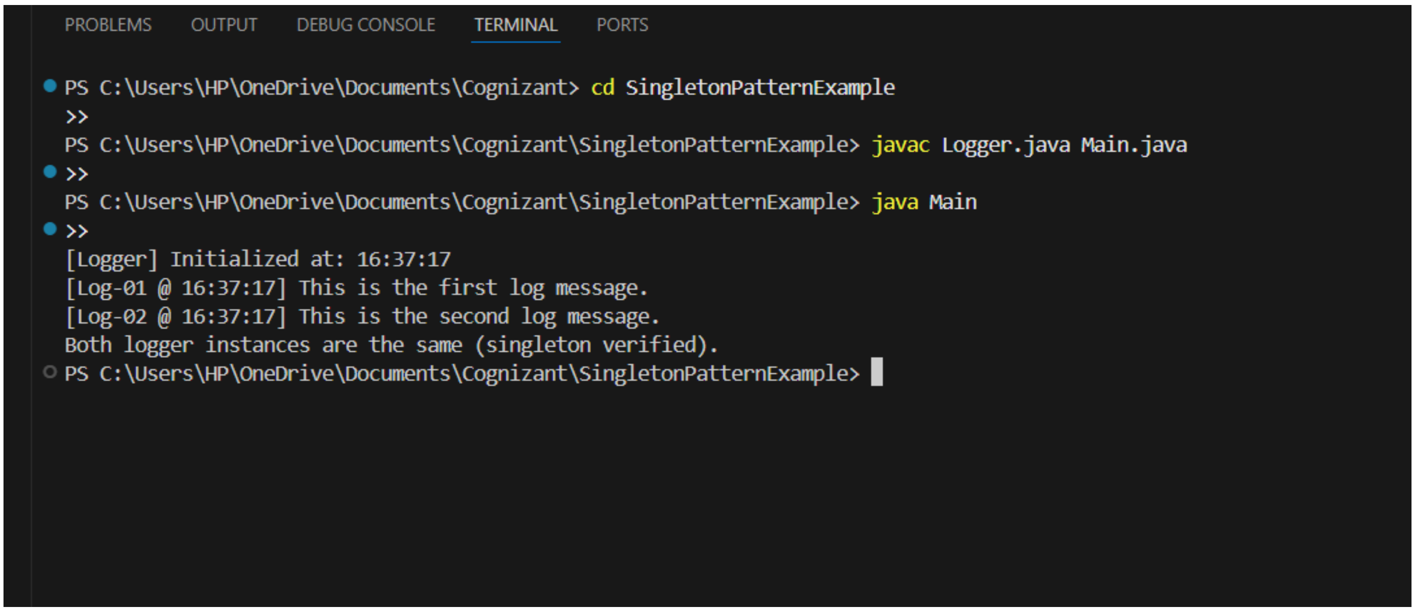
Main.java

```
public class Main {
        public static void main(String[] args) {
       Logger logger1 = Logger.getInstance();
       logger1.log("System booting up.");

       Logger logger2 = Logger.getInstance();
       logger2.log("Configuration loaded.");
       logger2.log("User login successful.");

       if (logger1 == logger2) {
           System.out.println("[Info] Singleton confirmed: Only one logger instance used.");
       } else {
           System.out.println("[Warning] Singleton failed: Different instances created.");
       }
   }
}
```

OUTPUT:



```
PS C:\Users\HP\OneDrive\Documents\Cognizant> cd SingletonPatternExample
>>
PS C:\Users\HP\OneDrive\Documents\Cognizant\SingletonPatternExample> javac Logger.java Main.java
>>
PS C:\Users\HP\OneDrive\Documents\Cognizant\SingletonPatternExample> java Main
>>
[Logger] Initialized at: 16:37:17
[Log-01 @ 16:37:17] This is the first log message.
[Log-02 @ 16:37:17] This is the second log message.
Both logger instances are the same (singleton verified).
PS C:\Users\HP\OneDrive\Documents\Cognizant\SingletonPatternExample>
```