**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.

**Program**

**Logger.java**

public class Logger {

private static Logger instance;

private Logger() {

System.out.println("Logger instance created.");

}

public static Logger getInstance() {

if (instance == null) {

instance = new Logger();

}

return instance;

}

public void log(String message) {

System.out.println("[LOG] " + message);

}

}

**TestSingleton.java**

public class TestSingleton {

public static void main(String[] args) {

Logger logger1 = Logger.getInstance();

logger1.log("First log message.");

Logger logger2 = Logger.getInstance();

logger2.log("Second log message.");

if (logger1 == logger2) {

System.out.println("Both logger1 and logger2 refer to the same instance.");

} else {

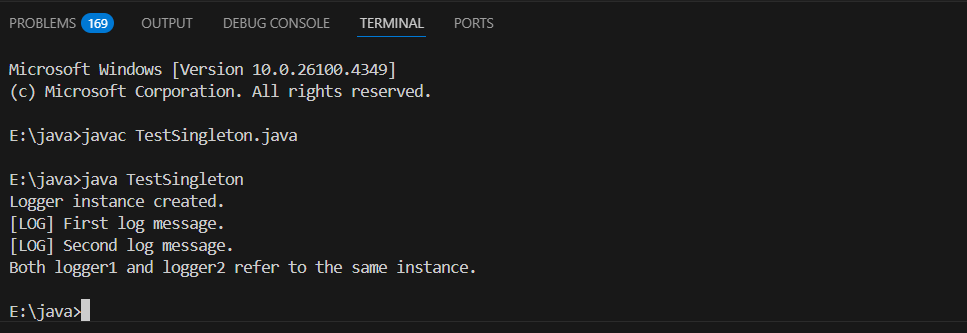
System.out.println("Different instances exist! Singleton failed.");

}

}

}

**Output**

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