**Exercise 1: Implementing the Singleton Pattern**

Program:

class Logger {

    private static Logger instance;

    private Logger() {

        System.out.println("Logger initialized.");

    }

    public static Logger getInstance() {

        if (instance == null) {

            instance = new Logger();

        }

        return instance;

    }

    public void log(String message) {

        System.out.println("Log: " + message);

    }

}

public class Exercise1 {

    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("Only one Logger instance exists.");

        } else {

            System.out.println("Multiple Logger instances found!");

        }

    }

}

Output:

Logger initialized.

Log: First log message

Log: Second log message

Only one Logger instance exists.

Screenshot:

