**Exercise 1: Implementing the Singleton Pattern**

**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);

}

**public** **class** Main {

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

Logger logger1 = Logger.*getInstance*();

Logger logger2 = Logger.*getInstance*();

logger1.log("This is the first log message.");

logger2.log("This is the second log message.");

**if** (logger1 == logger2) {

System.***out***.println("Both logger1 and logger2 are the same instance.");

} **else** {

System.***out***.println("Different instances were created.");

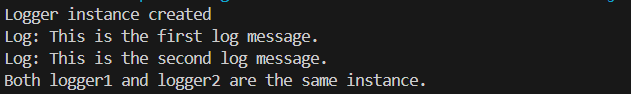
}

}

}

}

**OUTPUT**:



**Exercise 2: Implementing the Factory Method Pattern**

import java.util.Scanner;

interface Document {

    void open();

}

// WordDocument.java

class WordDocument implements Document {

    public void open() {

        System.out.println("Opening Word Document");

    }

}

// PdfDocument.java

class PdfDocument implements Document {

    public void open() {

        System.out.println("Opening PDF Document");

    }

}

// ExcelDocument.java

class ExcelDocument implements Document {

    public void open() {

        System.out.println("Opening Excel Document");

    }

}

// DocumentFactory.java

abstract class DocumentFactory {

    abstract Document createDocument();

}

// WordFactory.java

class WordFactory extends DocumentFactory {

    Document createDocument() {

        return new WordDocument();

    }

}

// PdfFactory.java

class PdfFactory extends DocumentFactory {

    Document createDocument() {

        return new PdfDocument();

    }

}

// ExcelFactory.java

class ExcelFactory extends DocumentFactory {

    Document createDocument() {

        return new ExcelDocument();

    }

}

// Main.java

public class Main {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter document type (word/pdf/excel):");

        String type = scanner.nextLine().toLowerCase();

        DocumentFactory factory;

        switch (type) {

            case "word":

                factory = new WordFactory();

                break;

            case "pdf":

                factory = new PdfFactory();

                break;

            case "excel":

                factory = new ExcelFactory();

                break;

            default:

                System.out.println("Invalid document type!");

                scanner.close();

                return;

        }

        Document doc = factory.createDocument();

        doc.open();

        scanner.close();

    }

}

**OUTPUT:**

