**Exercise 6: Implementing the Proxy Pattern**

**Step 1: Create a New Java Project**

Create a new Java project named ProxyPatternExample using your preferred IDE.

**Step 2: Define Subject Interface**

Create an interface Image with a method display().

// Image.java

public interface Image {

void display();

}

**Step 3: Implement Real Subject Class**

Create a class RealImage that implements Image and simulates loading an image from a remote server.

// RealImage.java

public class RealImage implements Image {

private String fileName;

public RealImage(String fileName) {

this.fileName = fileName;

loadFromRemoteServer();}

private void loadFromRemoteServer() {

System.out.println("Loading " + fileName + " from remote server...");

// Simulate time delay for loading image

try {

Thread.sleep(2000); // 2 seconds delay

} catch (InterruptedException e) {

e.printStackTrace(); }

System.out.println(fileName + " loaded.");}

@Override

public void display() {

System.out.println("Displaying " + fileName);

}

}

**Step 4: Implement Proxy Class**

Create a class ProxyImage that implements Image and holds a reference to RealImage. Implement lazy initialization and caching in ProxyImage.

// ProxyImage.java

public class ProxyImage implements Image {

private String fileName;

private RealImage realImage;

public ProxyImage(String fileName) {

this.fileName = filename; }

@Override

public void display() {

if (realImage == null) {

realImage = new RealImage(fileName);}

realImage.display();}}

**Step 5: Test the Proxy Implementation**

Create a test class to demonstrate the use of ProxyImage to load and display images.

// ProxyPatternExample.java

public class ProxyPatternExample {

public static void main(String[] args) {

Image image1 = new ProxyImage("image1.jpg");

Image image2 = new ProxyImage("image2.jpg");

// Image will be loaded from remote server

image1.display();

// Image will not be loaded from remote server, as it is cached

image1.display();

// Image will be loaded from remote server

image2.display();

// Image will not be loaded from remote server, as it is cached

image2.display();

}

}