**Exercise 6: Implementing the Proxy Pattern**

**Scenario:**

You are developing an image viewer application that loads images from a remote server. Use the Proxy Pattern to add lazy initialization and caching.

**Steps:**

1. **Create a New Java Project:**
   * Create a new Java project named **ProxyPatternExample**.
2. **Define Subject Interface:**
   * Create an interface Image with a method **display()**.
3. **Implement Real Subject Class:**
   * Create a class **RealImage** that implements Image and loads an image from a remote server.
4. **Implement Proxy Class:**
   * Create a class **ProxyImage** that implements Image and holds a reference to RealImage.
   * Implement lazy initialization and caching in **ProxyImage**.
5. **Test the Proxy Implementation:**
   * Create a test class to demonstrate the use of **ProxyImage** to load and display images.
6. **Create a New Java Project:**

// Image.java

public interface Image {

void display();

}

1. **Define Subject Interface:**

// RealImage.java

public class RealImage implements Image {

private String fileName;

public RealImage(String fileName) {

this.fileName = fileName;

loadFromDisk(fileName);

}

private void loadFromDisk(String fileName) {

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

// Simulate a delay in loading the image from a remote server

try {

Thread.sleep(2000);

} catch (InterruptedException e) {

e.printStackTrace();

}

}

@Override

public void display() {

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

}

}

1. **Implement Real Subject Class:**

// ProxyImage.java

public class ProxyImage implements Image {

private RealImage realImage;

private String fileName;

public ProxyImage(String fileName) {

this.fileName = fileName;

}

@Override

public void display() {

if (realImage == null) {

realImage = new RealImage(fileName);

}

realImage.display();

}

}

1. **Test Class**

// ProxyPatternDemo.java

public class ProxyPatternDemo {

public static void main(String[] args) {

Image image1 = new ProxyImage("test\_1.jpg");

Image image2 = new ProxyImage("test\_2.jpg");

// Image will be loaded from disk

image1.display();

System.out.println("");

// Image will not be loaded from disk

image1.display();

System.out.println("");

// Image will be loaded from disk

image2.display();

System.out.println("");

// Image will not be loaded from disk

image2.display();

}

}