Object Oriented Analysis and Design with Java

UE19CS353

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UE19CS353: Object Oriented Analysis and Design with Java

OO Design Patterns & Anti-Patterns with Sample implementation in Java

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Unit-5

Structural Patterns – Proxy

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Proxy

- In proxy design pattern, a proxy object provide a surrogate or placeholder for another object to control access to it.

- Proxy is heavily used to implement lazy loading related usecases where we do not want to create full object until it is actually needed.

Proxy design pattern - Intent

- Provide a surrogate or placeholder for another object to control access to it.

- A proxy object hides the original object and control access to it.

- Using the proxy pattern, a class represents the functionality of another class.

Proxy design pattern - Intent

- In the Proxy Design Pattern, a client does not directly talk to the original object, it delegates calls to the proxy object which calls the methods of the original object. Moreover, the important point is that the client does not know about the proxy. The proxy acts as an original object for the client. But there are many variations to this approach which we will see shortly.

- There are three main variations of the Proxy Pattern:

  A remote proxy provides a local representative for an object in a different address space.

  A virtual proxy creates expensive objects on demand.

  A protection proxy controls access to the original object. Protection proxies are useful when objects should have different access rights.

Design participants

- **Subject –** is an interface which expose the functionality available to be used by the clients.

- **Real Subject –** is a class implementing Subject and it is concrete implementation which needs to be hidden behind a proxy.

- **Proxy –** hides the real object by extending it and clients communicate to real object via this proxy object. Usually frameworks create this proxy object when client request for real object.

Example

The Proxy provides a surrogate or place holder to provide access to an object. A check or bank draft is a proxy for funds in an account. A check can be used in place of cash for making purchases and ultimately controls access to cash in the issuer's account.
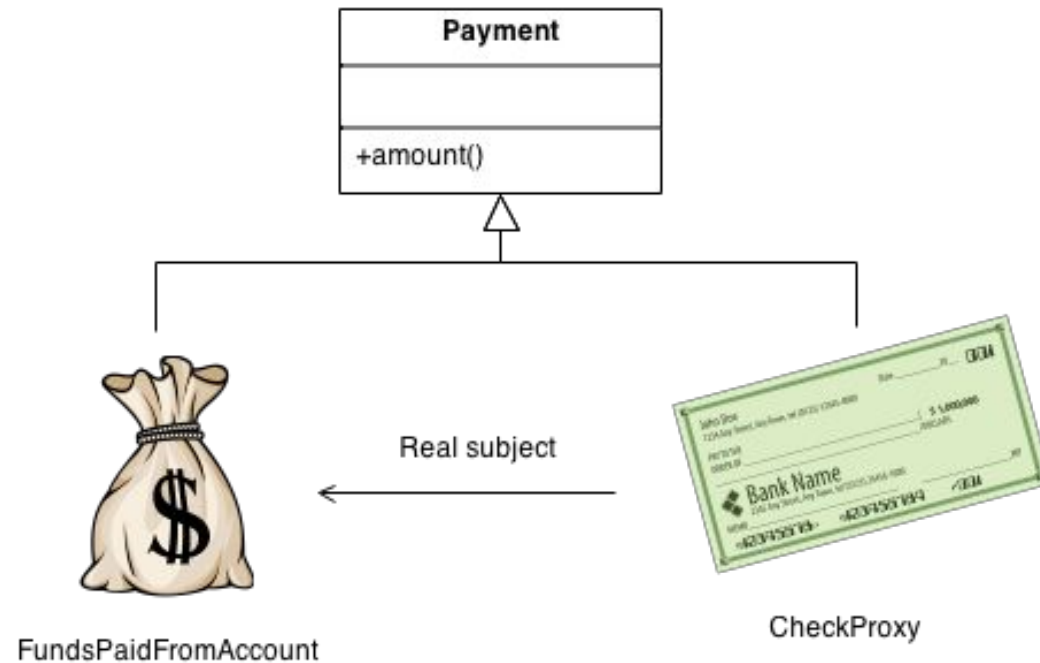
Real-world example

- In corporate networks, internet access is guarded behind a network proxy. All network requests goes through proxy which first check the requests for allowed websites and posted data to network. If request looks suspicious, proxy block the request – else request pass through.

When to use proxy design pattern

- A remote proxy provides a local representative for an object in a different address space.

- A virtual proxy creates expensive objects on demand.

- A protection proxy controls access to the original object. Protection proxies are useful when objects should have different access rights.

- We can use proxy when we may want to use a class that can perform as an interface to something else.

- A proxy can be used to add an additional security layer around the original object as well

Disadvantages of Proxy Design Pattern

- A few of the disadvantages of the Proxy Design Pattern are as follows:

    The Proxy Design Pattern introduces an additional layer   between the client and the Real Subject, this contributes to the   code complexity.

    Additional request forwarding is introduced between the client and the Real Subject.

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Usage examples:

1. Image viewer program that lists and displays high resolution photos. The program has to show a list of all photos however it does not need to display the actual photo until the user selects an image item from a list.

2. The same for document editor that can embed graphical objects in a document. It isn't necessary to load all pictures when the document is opened, because not all of these objects will be visible at the same time.

3. The protective proxy acts as an authorization layer to verify if the actual user has access to appropriate content. An example can be thought about the proxy server which provides restrictive internet access in office. Only the websites and contents which are valid will be allowed and the remaining ones will be blocked.

4. Maybe used also for adding a thread-safe feature to an existing class without changing the existing class's code.

Example

Create an Image interface and concrete classes implementing the Image interface. ProxyImage is a a proxy class to reduce memory footprint of RealImage object loading.
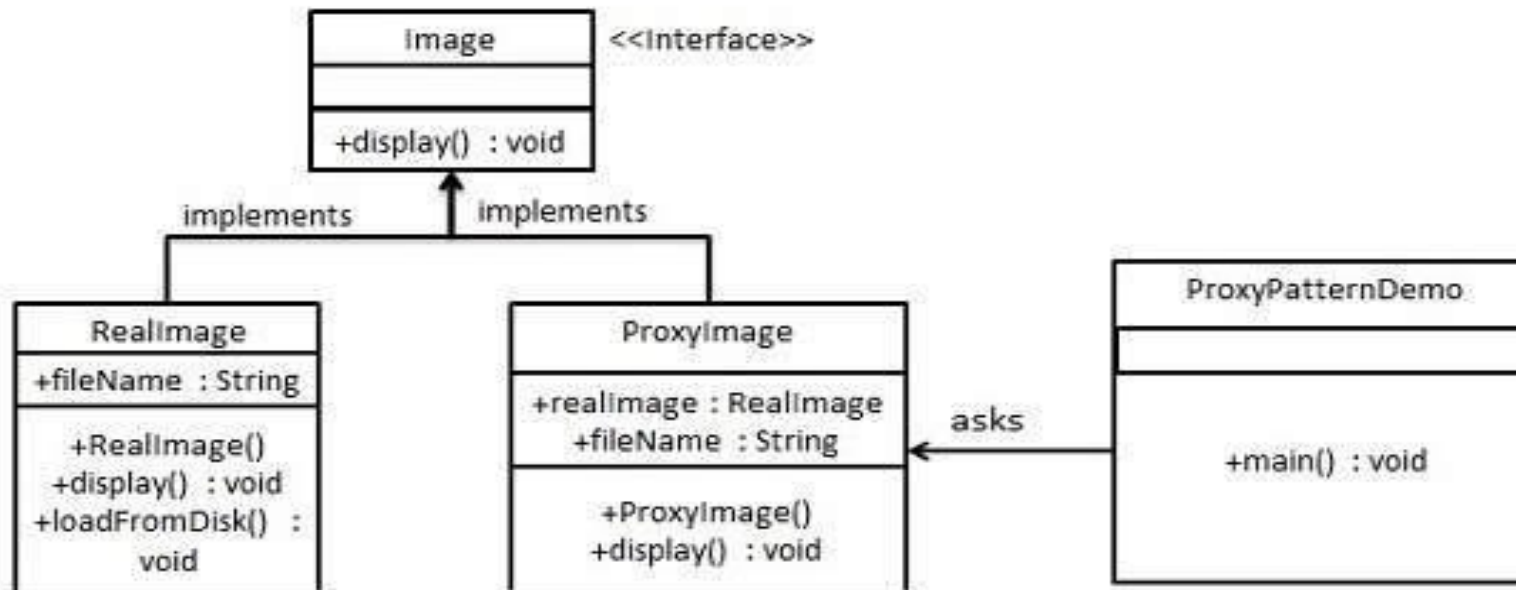
THANK YOU

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