Object Oriented Analysis and Design with Java

UE19CS353

Sindhu R Pai

Department of Computer Science and Engineering

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UE19CS353: Object Oriented Analysis and Design with Java

Theory and Implementation: Facade pattern

Prof. Sindhu R Pai
Department of Computer Science and Engineering

Agenda

- What is façade?
- Why Façade?
- Pictorial Representation
- Applicability
- Advantages
- Known Uses
- Implementation
- References

What is facade?

Meaning:

- The principal front of a building, that faces on to a street or open space.

  "the house has a half-timbered façade"

- A deceptive outward appearance.

  "her flawless public façade masked private despair"

Facade in Software

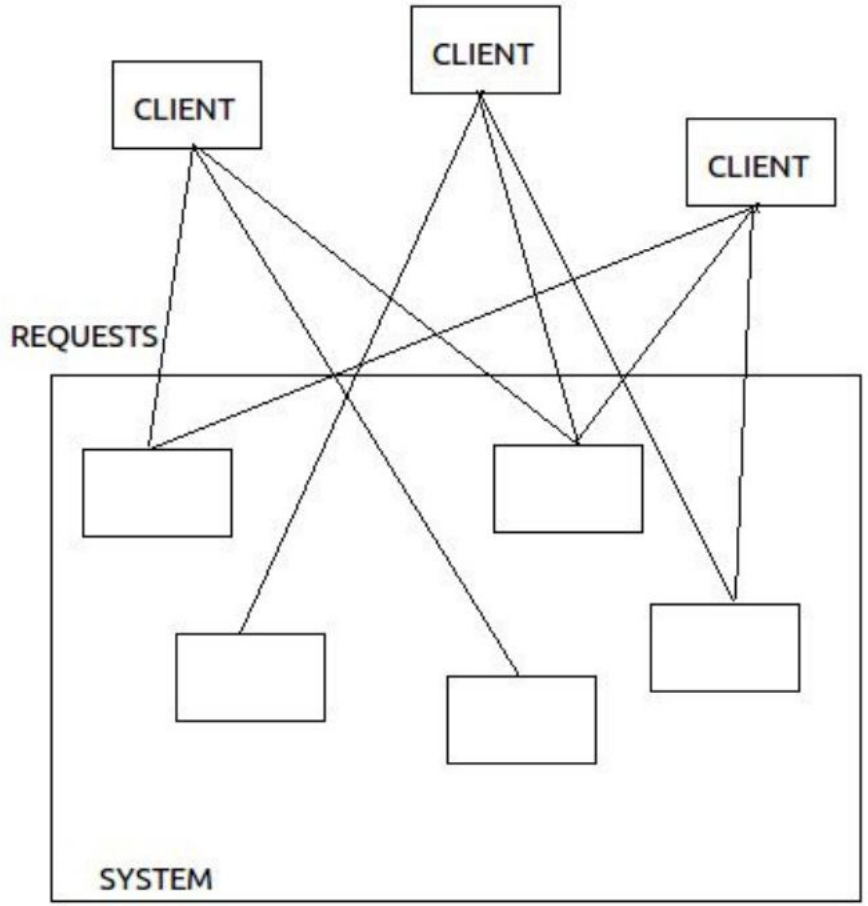
- An object that provides a **simplified interface to a larger body** of code, a library, a framework, or any other complex set of classes.
- The main intent of Façade is to provide a **unified interface to a set of interfaces in a subsystem**. Façade defines a **higher-level interface** that makes the subsystem easier to use.
- Example: fopen is an interface to open and read system commands.
- A structural design pattern, which **wraps a complicated subsystem with a simpler interface.**
- If the Facade is the only access point for the subsystem, it will limit the features and flexibility that **"power users**" may need

Why Facade?

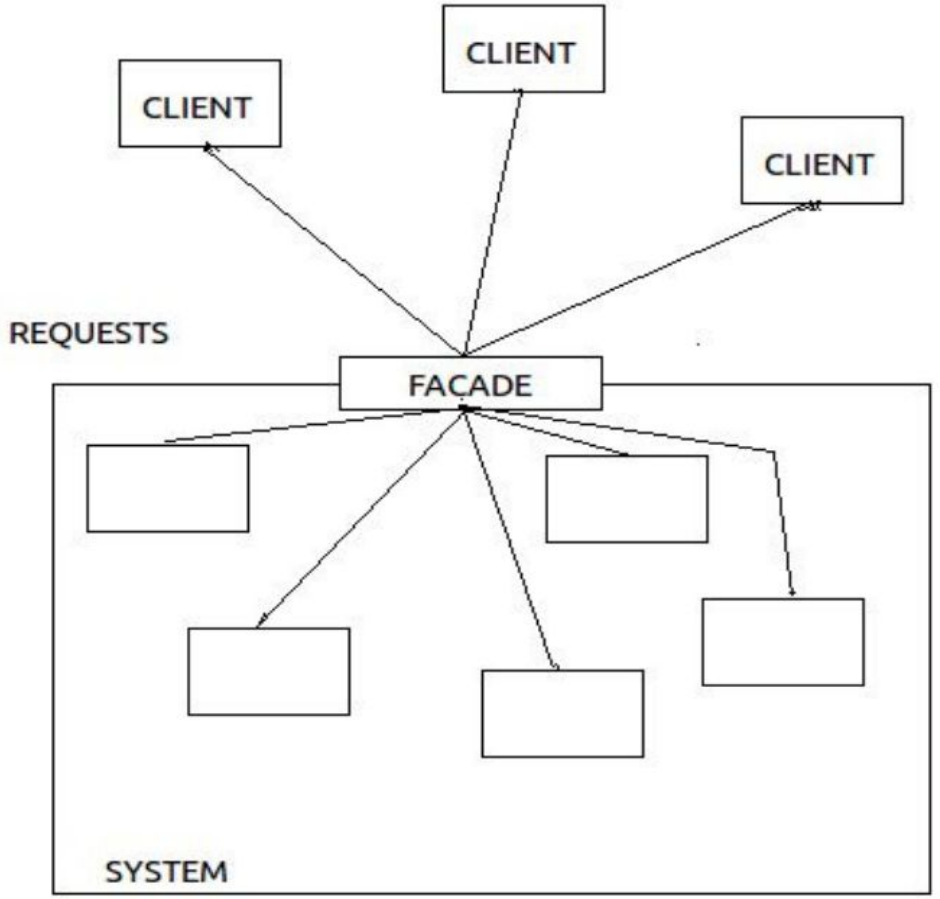
- Structuring a system into subsystems **helps reduce complexity**.

- A common design goal is to **minimize the communication and dependencies between subsystems**. One way to achieve this goal is to introduce a façade object that provides a single, simplified interface to the more general facilities of a subsystem.

Pictorial representation



Without facade



With facade

Applicability

- To provide a **simple interface to a complex subsystem**. A façade can provide **a simple default view of the subsystem** that is good enough for most clients.
- Introduce a façade to **decouple the subsystem from clients and other subsystems**, thereby promoting **subsystem independence and portability**.
- Use a façade to **define an entry point to each subsystem** level.
- To **simplify the dependencies between subsystems** by making them communicate with each other solely through their façades.

Advantages

- It **shields clients from subsystem components**, thereby reducing the number of objects that clients deal with and making the subsystem easier to use.
- It **promotes weak coupling between the subsystem and its clients**. Often the components in a subsystem are strongly coupled.
- This can **eliminate complex or circular dependencies**. This can be an important consequence when the client and the subsystem are implemented independently.
- Reducing compilation dependencies with façades **can limit the recompilation needed for a small change** in an important subsystem.

Known uses

- In the **ET++ application framework**, an application that can have built-in browsing tools for inspecting its objects at run-time. These browsing tools are implemented in a separate subsystem that includes a façade class called "ProgrammingEnvironment." This façade defines operations such as InspectObject and InspectClass for accessing the browsers.

- The **Choices operating system** uses façade to compose many frameworks into one. The key abstractions in Choices are processes, storage, and address spaces. For each of these abstractions there is a corresponding subsystem, implemented as a framework, that supports porting Choices to a variety of different hardware platforms.

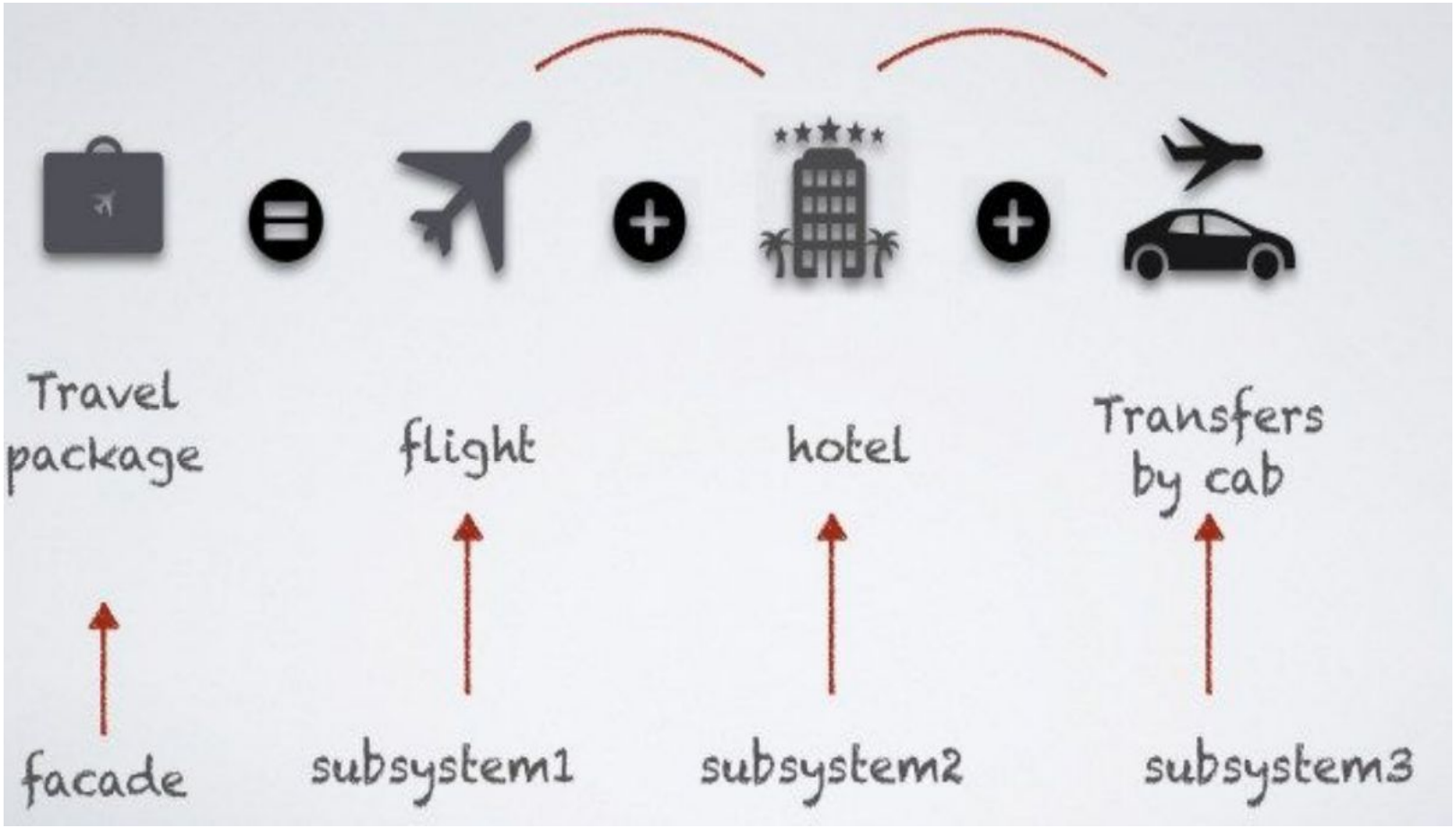
Implementation

- **Reduce client-subsystem coupling**. This can be done by simply **creating a "Façade Abstract Class" and concrete subclasses for the implementation of the subsystem**. Now the client class can communicate with the subsystem through the "**Abstract Façade Class**“.

  An alternative approach is to configure a façade object with different subsystem objects

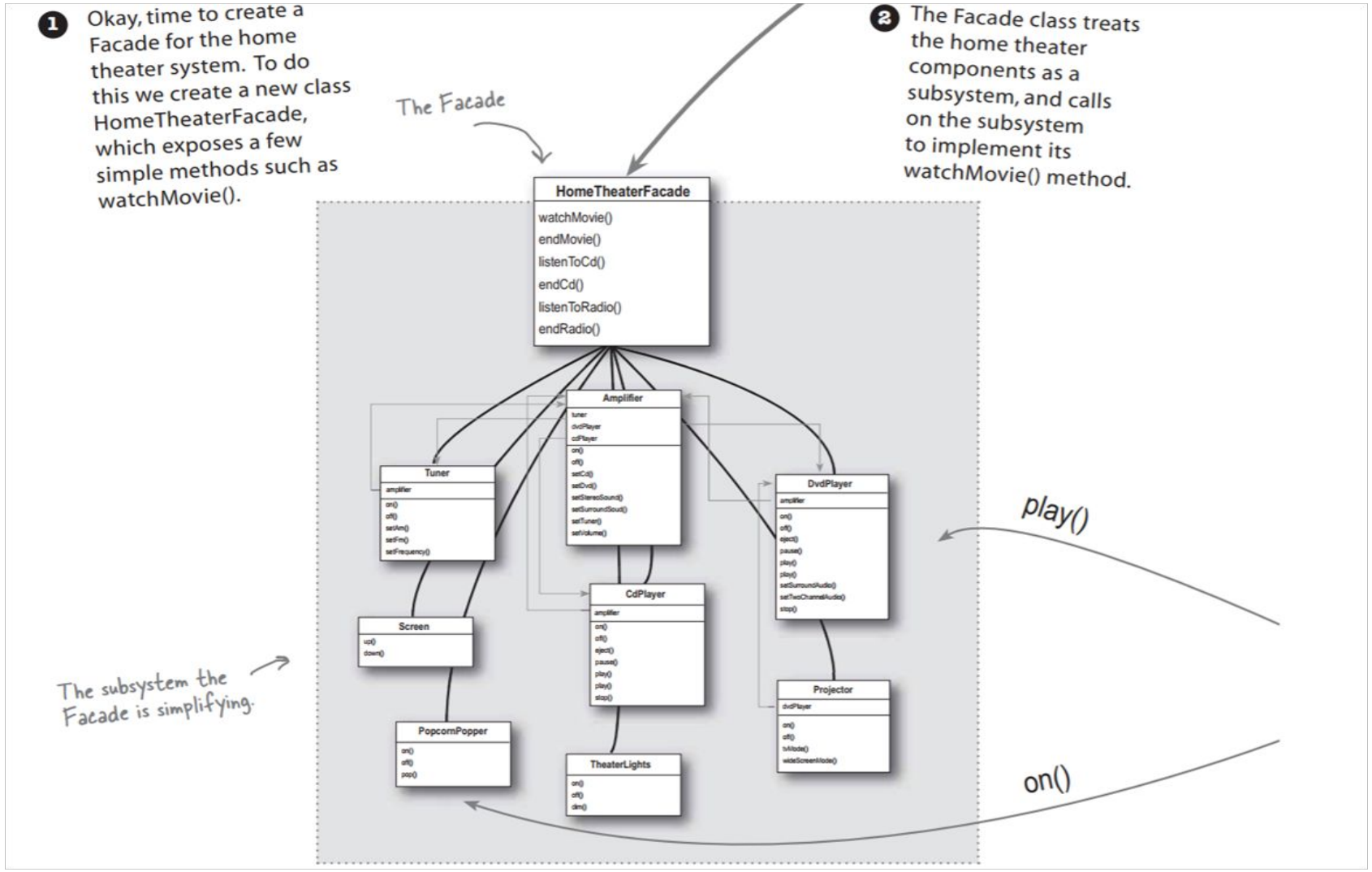
- Public versus Private Interfaces. Classes and Subsystems are similar. Both encapsulate something. Both have private and public interfaces. The **public interface consists of classes accessible by all Clients** whereas the private interface is only for subsystem extenders. **Façade is part of the public interface**

Example -1: Booking a package



Booking a package

Example -2: Designing Hometheater



References

- Facade Pattern from Head First Design Patterns (javaguides.net)
- Facade Design Pattern (sourcemaking.com)
- https://refactoring.guru/design-patterns/java

THANK YOU

Prof. Sindhu R Pai

Department of Computer Science and Engineering

sindhurpai@pes.edu