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Aamir Shabbir Pare

Problem Solving Programming

Design Patterns

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Previous Lecture

- Decorator Pattern
- Go to teams and watch video lecture

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Bridge Design Pattern

Bridge

Lets you split a large class or a set of closely related classes into two separate hierarchies—abstraction and implementation—which can be developed independently of each other.

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Bridge Concept

- Decouple an abstraction from its implementation so that the two can vary independently.
- This patten is used to separate an abstraction from its implementation so that both can be modified independently.
- It involves an interface which acts as a bridge between the abstraction class and implementer classes.

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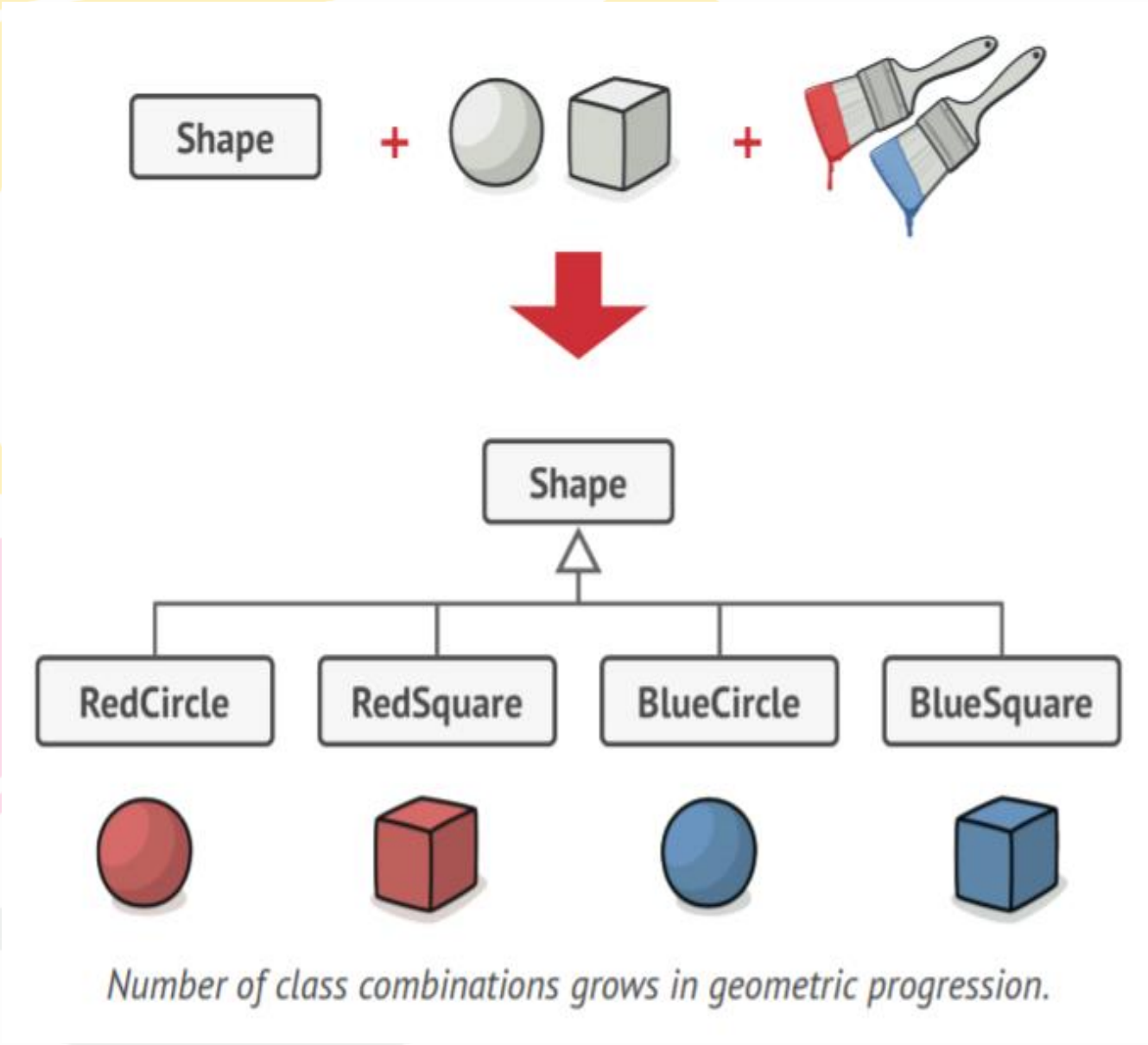
Real World Analogy of the Problem

- In a software product development company, the development team and the marketing team both play crucial roles.
- The marketing team does a market survey and gathers the customer requirements.
- The development team implements those requirements in the product to fulfill the customer needs.
- Any change (say, in the operational strategy) in one team should not have a direct impact on the other team.
- In this case, you can think of the marketing team as playing the role of the bridge between the clients of the product and the development team of the software organization.

Understanding the Problem

- Geometric shape with two subclasses Circle and Square.
- Extend to incorporate colors Red and Blue.
- Adding up further subclasses two for each shape.
- Adding new shape types and colors to the hierarchy will grow it exponentially



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Analysis

- Growing two different dimensions.
- This problem occurs because we're trying to extend the shape classes in two independent dimensions: by form and by color.
- That's a very common issue with class inheritance
- Here comes the bridge pattern to solve this problem.

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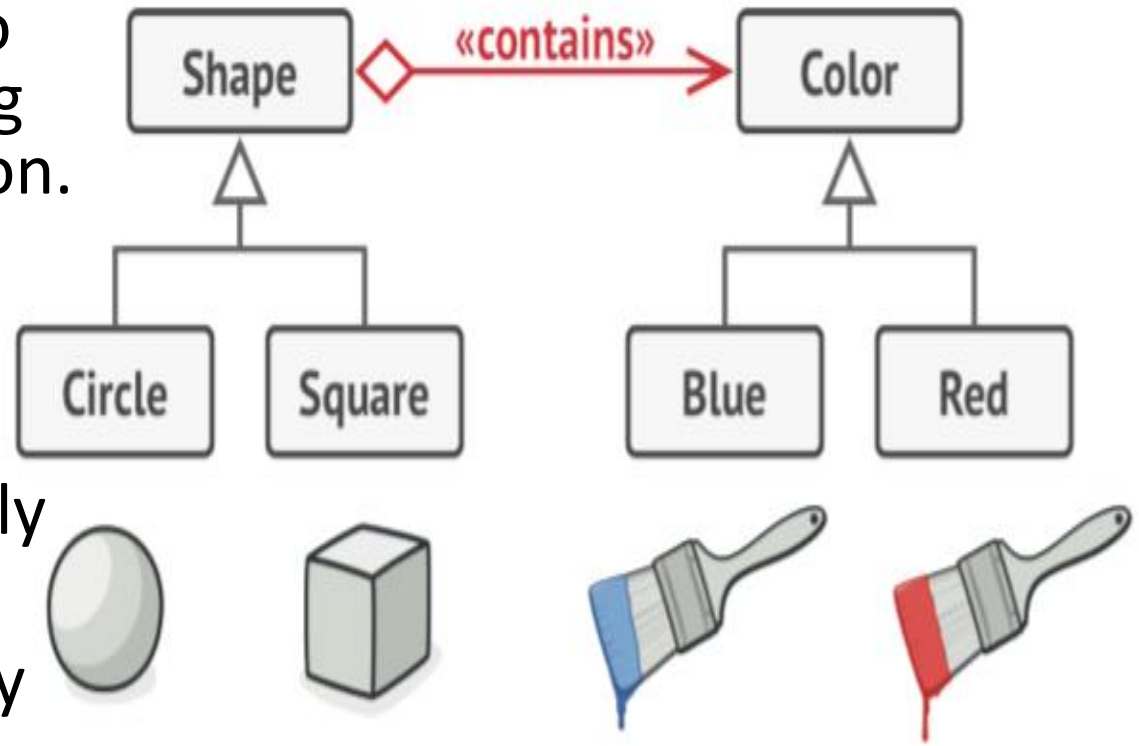
Solution

- The Bridge pattern attempts to solve this problem by switching from inheritance to composition.
- Extract one of the dimensions into a separate class hierarchy.
- The original classes will reference to the object of newly created hierarchy.
- This way the big class or closely related classes are going to separate into two or more hierarchies.



You can prevent the explosion of a class hierarchy by transforming it into several related hierarchies.

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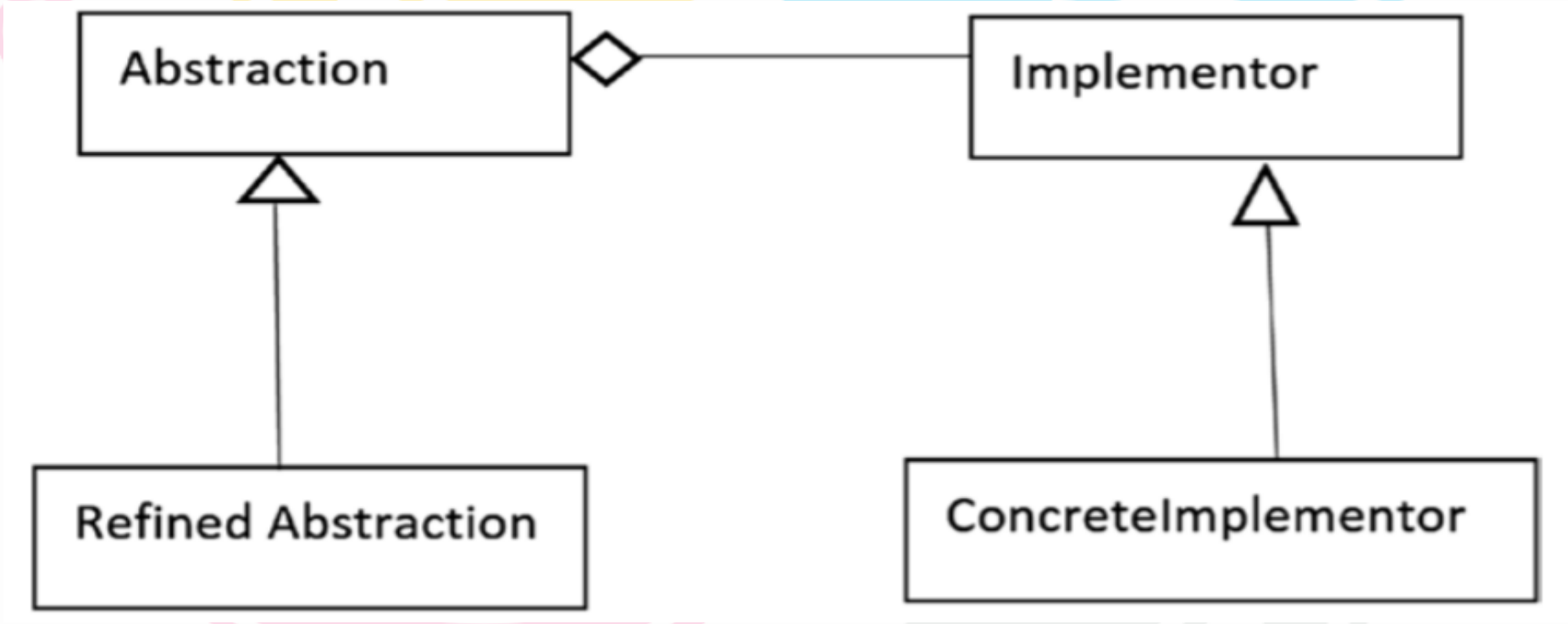
Classical Structure



A Classical Structure of Bridge Pattern

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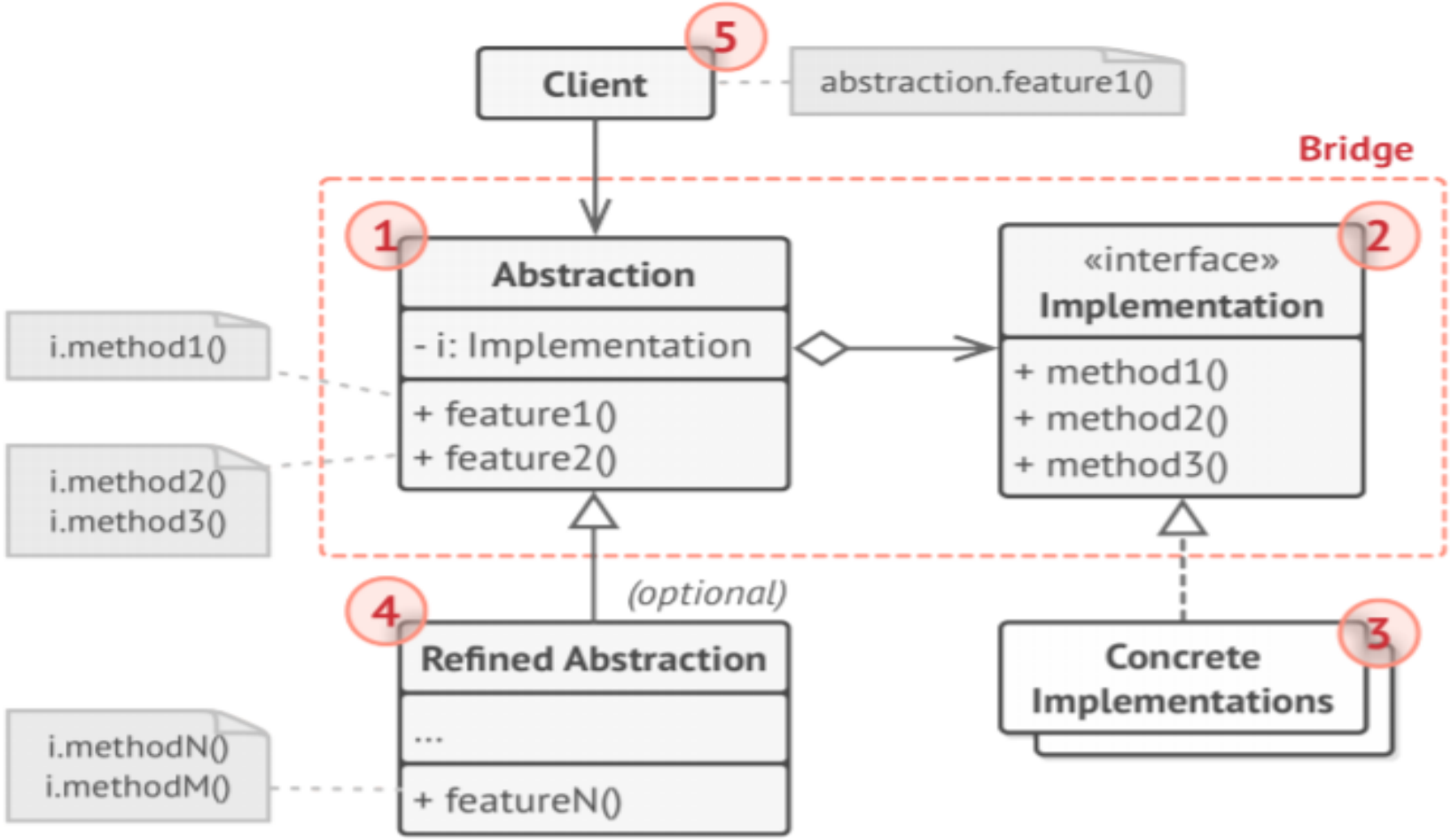
Structure of Bridge Pattern



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Structure Details

- The **Abstraction** provides high-level control logic. It relies on the implementation object to do the actual low-level work.
- The **Implementation** declares the interface that's common for all concrete implementations. An abstraction can only communicate with an implementation object via methods that are declared here.
- **Concrete Implementations** contain platform-specific code.
- **Refined Abstractions** provide variants of control logic. Like their parent, they work with different implementations via the general implementation interface.
- **Client** is only interested in working with the abstraction. However, it's the client's job to link the abstraction object with one of the implementation objects.

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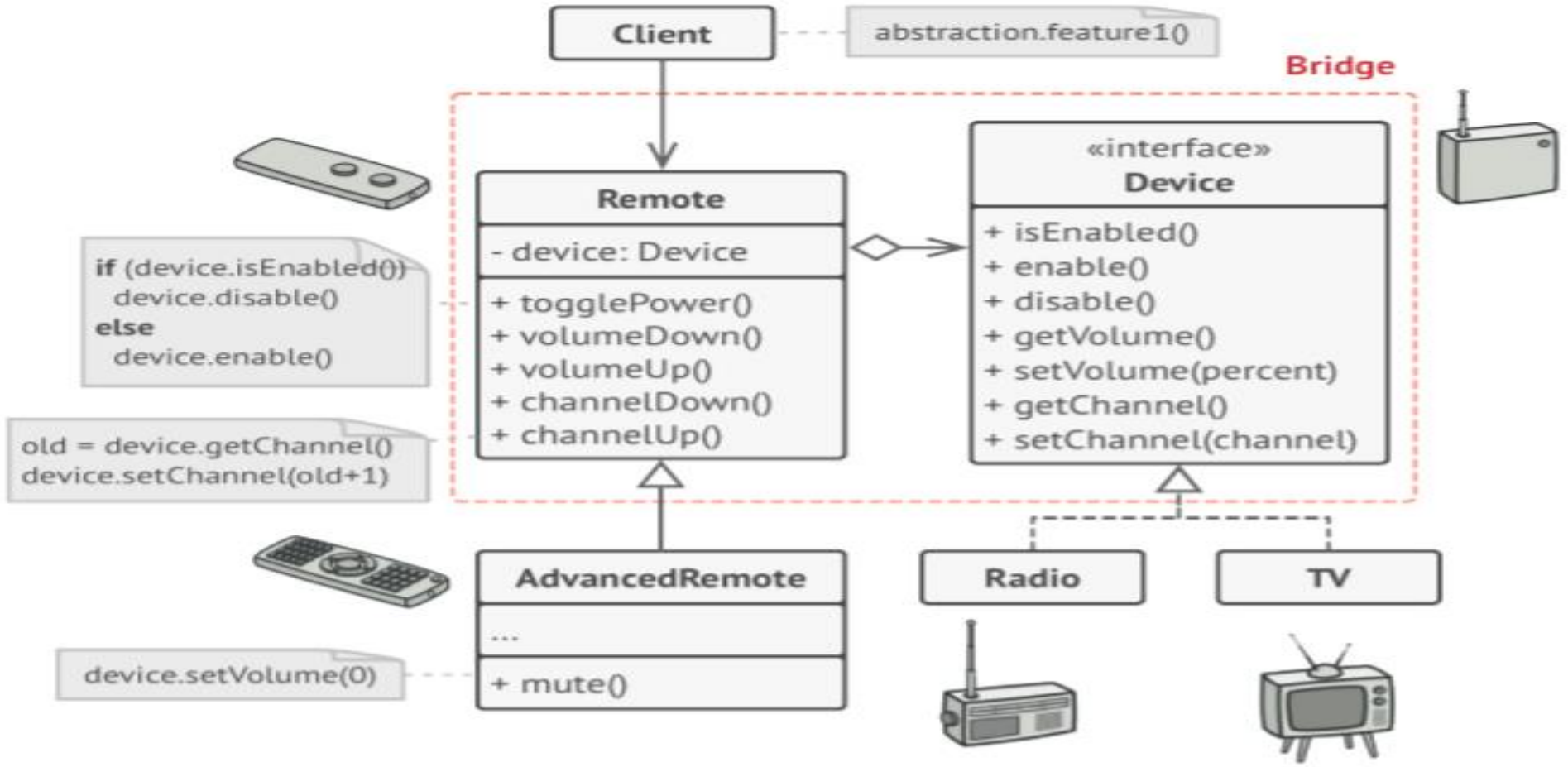
A Bridge Pattern Real World Example



The original class hierarchy is divided into two parts: devices and remote controls.

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A Computer World Example

- As maker of a remote controller for different devices.
- Assume currently you have orders for two devices TV and VCD.
- The remote control has two major functionalities : On and Off.

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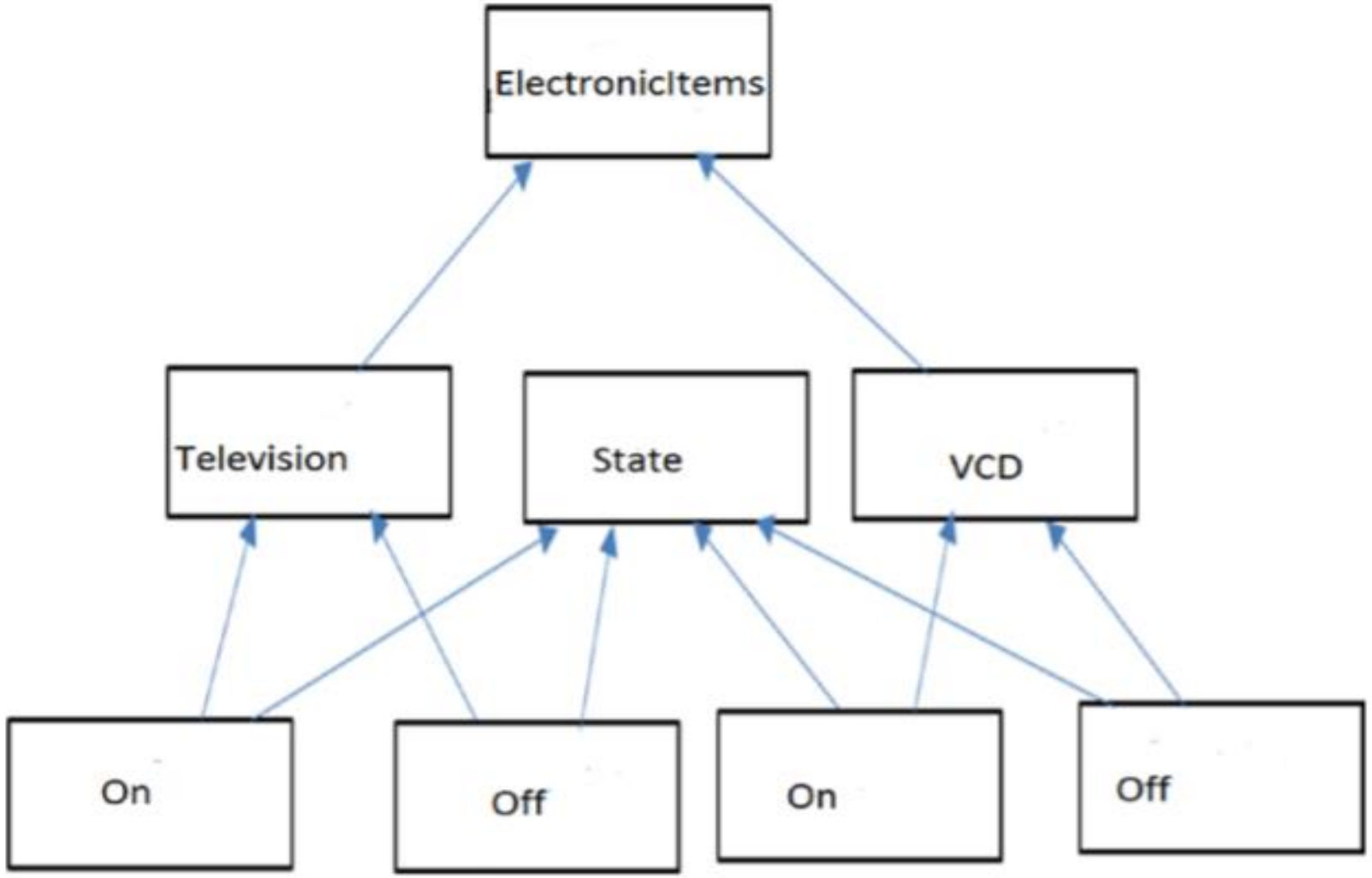
Approach One



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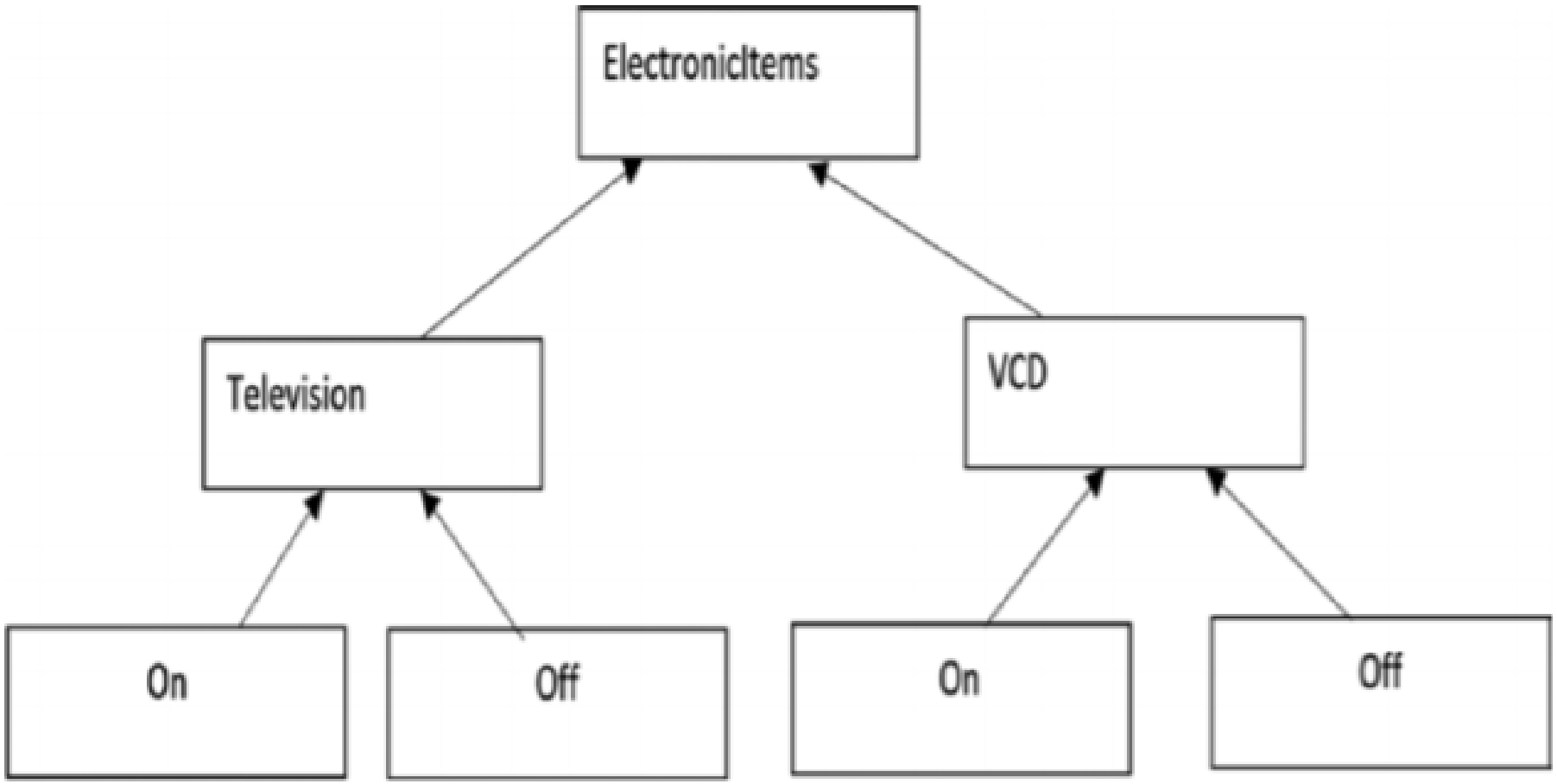
Approach Two



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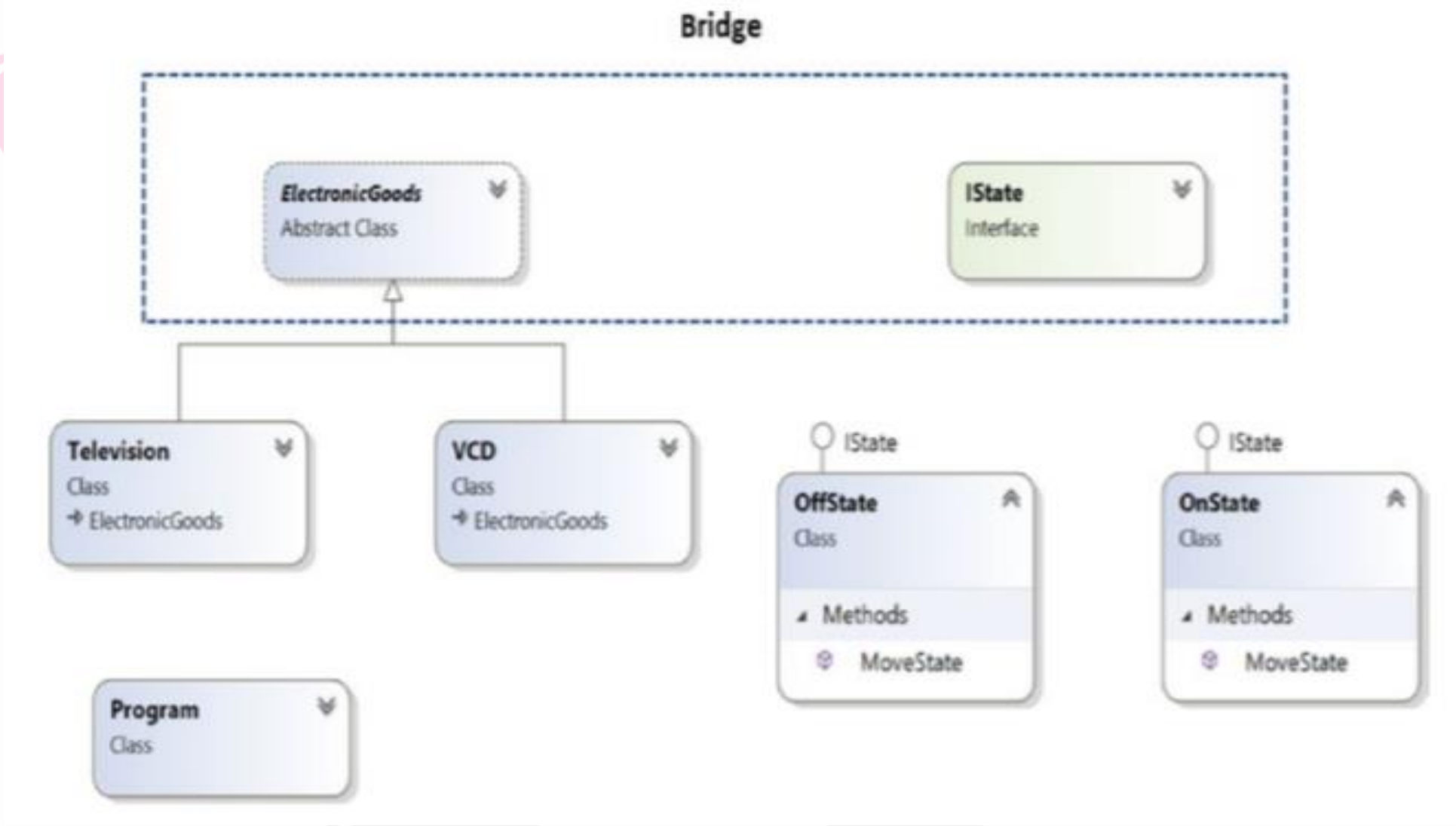
Implementation : Class Diagram



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