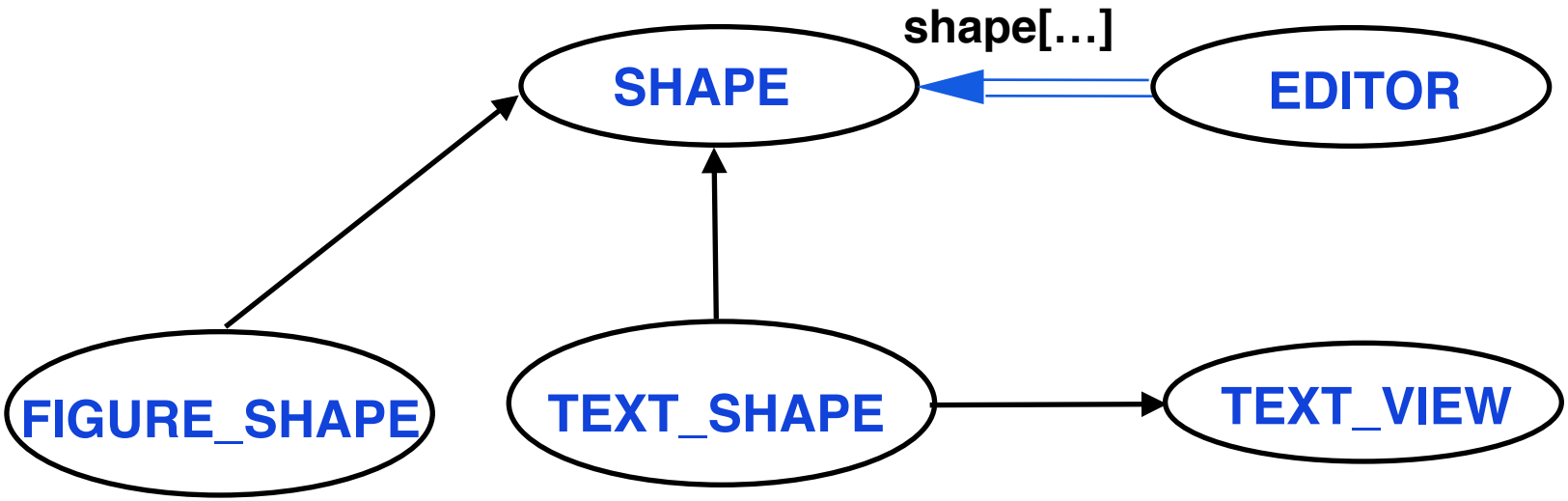
Adapter Pattern – Structural

- Intent
  - » **Convert the interface of a class into a different interface that a client expects.**
  - » **Lets classes work together that otherwise could not**

Class Adapter – Motivation

- EDITOR expects a SHAPE
- TEXT_VIEW is not a SHAPE
- TEXT_SHAPE is a SHAPE

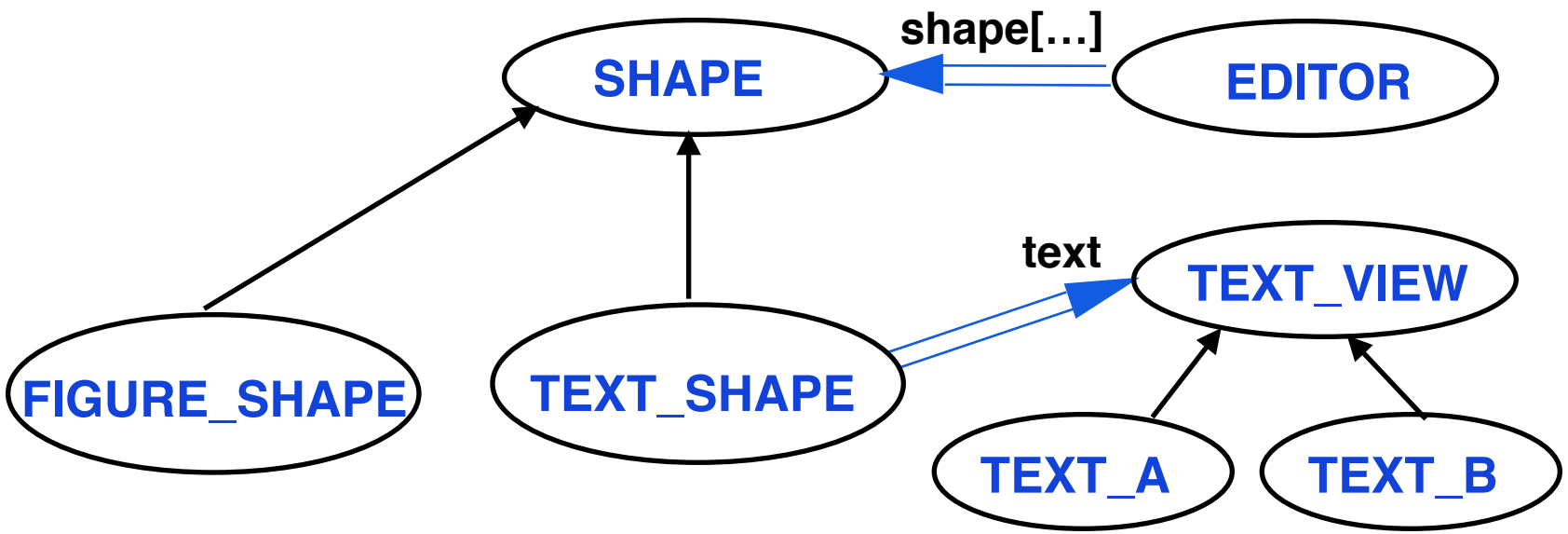
Reuse TEXT_VIEW in the context of a SHAPE



Object Adapter – Motivation

- EDITOR expects a SHAPE
- TEXT_VIEW is not a SHAPE
- TEXT_SHAPE is a SHAPE

Reuse subclasses of TEXT_VIEW in the context of a SHAPE



Applicability

- Use an existing class when its interface does not match the one you need

- Create a class that cooperates with unrelated or unforeseen classes with incompatible interfaces

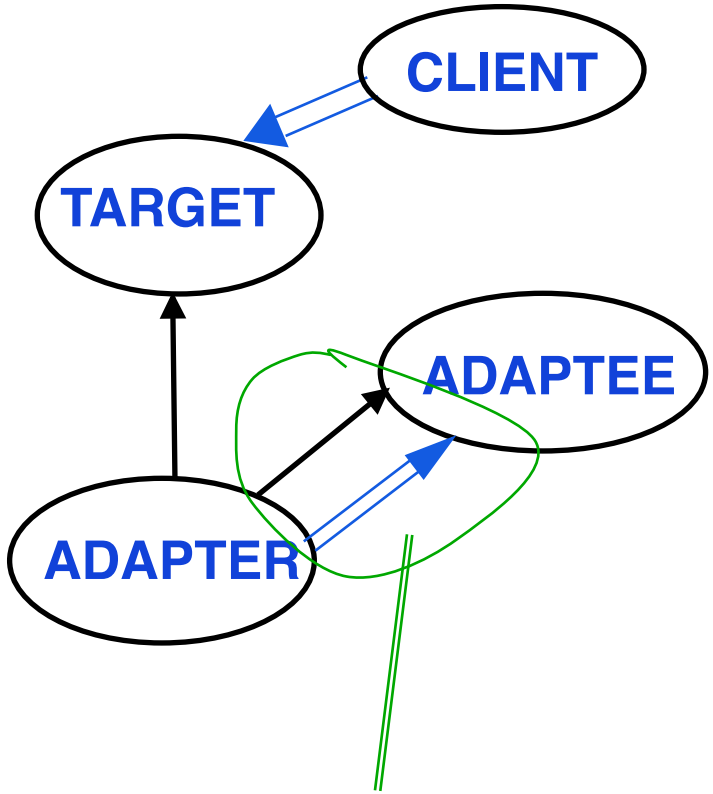
- Object Adapter Only

  Need to use several existing subclasses, but it is impractical to adapt by sub-classing each one of them

  Object adapter adapts the interface of the parent class

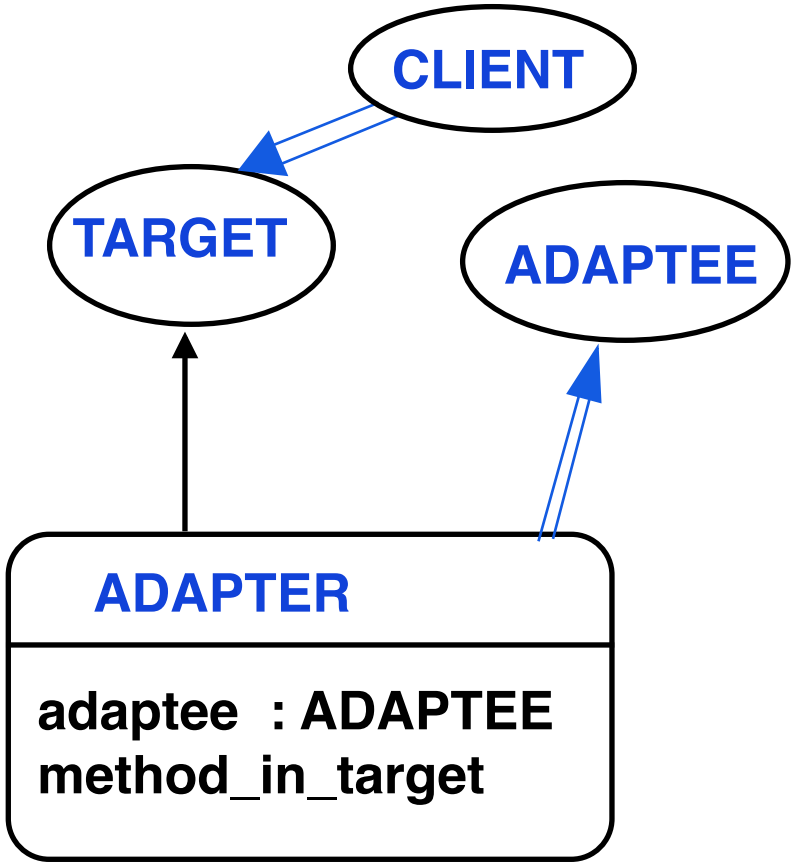
Participants

- TARGET
  Application interface
- Client
  Target user
- Adaptee
  Interface that needs adapting
- Adapter
  – alternative name **wrapper**
  Provides functionality not provided by the adaptee



Either relationship (only 1 of them for an ADAPTER)
is_a – class adapter
has_a – object adapter

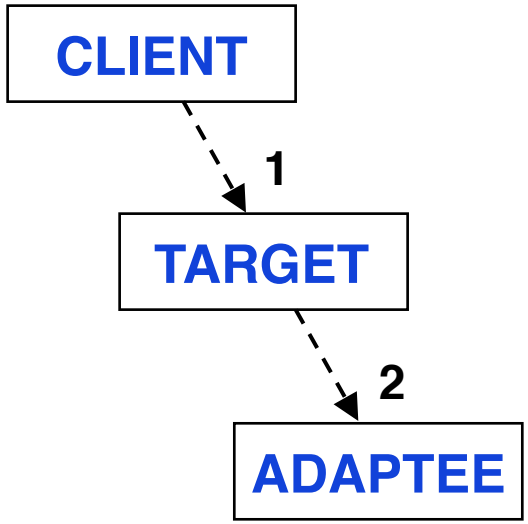
Object Adapter – Scenario



Scenario – collaboration

1 Client does
target.method_in_target

2 Adapter does
adaptee.method_in_adaptee
(note polymorphism)



Object Adapter– Pseudocode

```
class ADAPTER
   feature
      adaptee : ADAPTEE
      ...
      method_in_target do
            pre_actions
           adaptee . method_in_adaptee
            post_actions
      end
   end
end
```

```
class ADAPTEE
  feature
     method_in_adaptee do ... end
  end
end
```

Object Adapter– Stack Implementation

- The Adapter pattern used where stack operations are calls to "equivalent" sequence operations

```
Sequence container;
```

- Push – **Uses the Sequence putHead**

```
public void push(final Object obj) {
   container.putHead(obj);   }
```

- Pop – **Uses the Sequence takeHead**

```
public Object pop() {
      return container.takeHead();  }
```

Consequences

- There are tradeoffs – a class adapter – inheritance
  - » **adapts Adaptee to Target by committing to concrete Adapter class**

    Class adapter is not useful when we want to adapt a class and all its subclasses
  - » **Lets Adapter override some of Adaptee's behaviour**

    Adapter is a subclass of Adaptee
  - » **Introduces only one object**

    No additional pointer indirection is needed to get to adaptee

Consequences – 2

- There are tradeoffs – an object adapter – uses
  - » **One Adapter can work with many Adaptees**
    - > **Adaptee and all its subclasses**
    - > **Can add functionality to all Adaptees at once**
  - » **Makes it harder to override Adaptee behaviour**

    Requires making ADAPTER refer to the subclass rather than the ADAPTEE itself

    Or

    Subclassing ADAPTER for each ADAPTEE subclass

Related Patterns

- Bridge is similar to object Adapter but Bridge is meant to separate interface from implementation so they can vary independently, while Adapter extends the interface of an existing object

- Decorator is more transparent than Adapter, so Decorator supports recursive composition, while Adapter doesn't

- Proxy defines a representative for another object and does not change its interface

Adapter in Java API

- Java Listeners are adapters.
  - » **myMethod in myClass is to execute whenever myButton is pressed**
  - » **Introduce MyListener that implements the ActionListener class**
    - > **MyListener is an adapter as the program text in myButton references ActionListener**