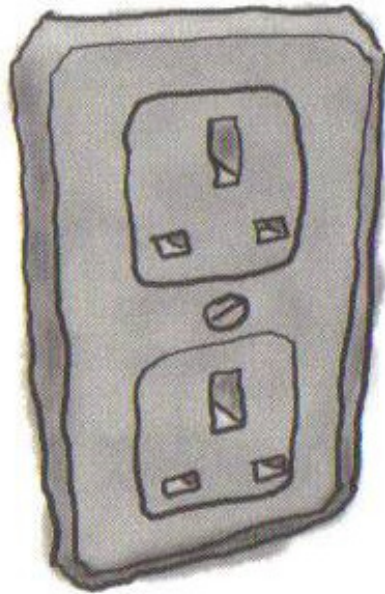


Tecniche di Progettazione: Design Patterns

GoF: Adapter

Adapters in real life (anglo-centric...)

European Wall Outlet

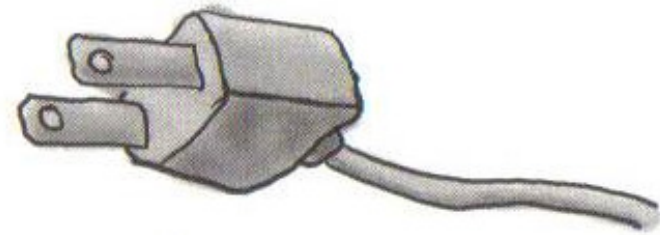


The European wall outlet exposes one interface for getting power.

AC Power Adapter



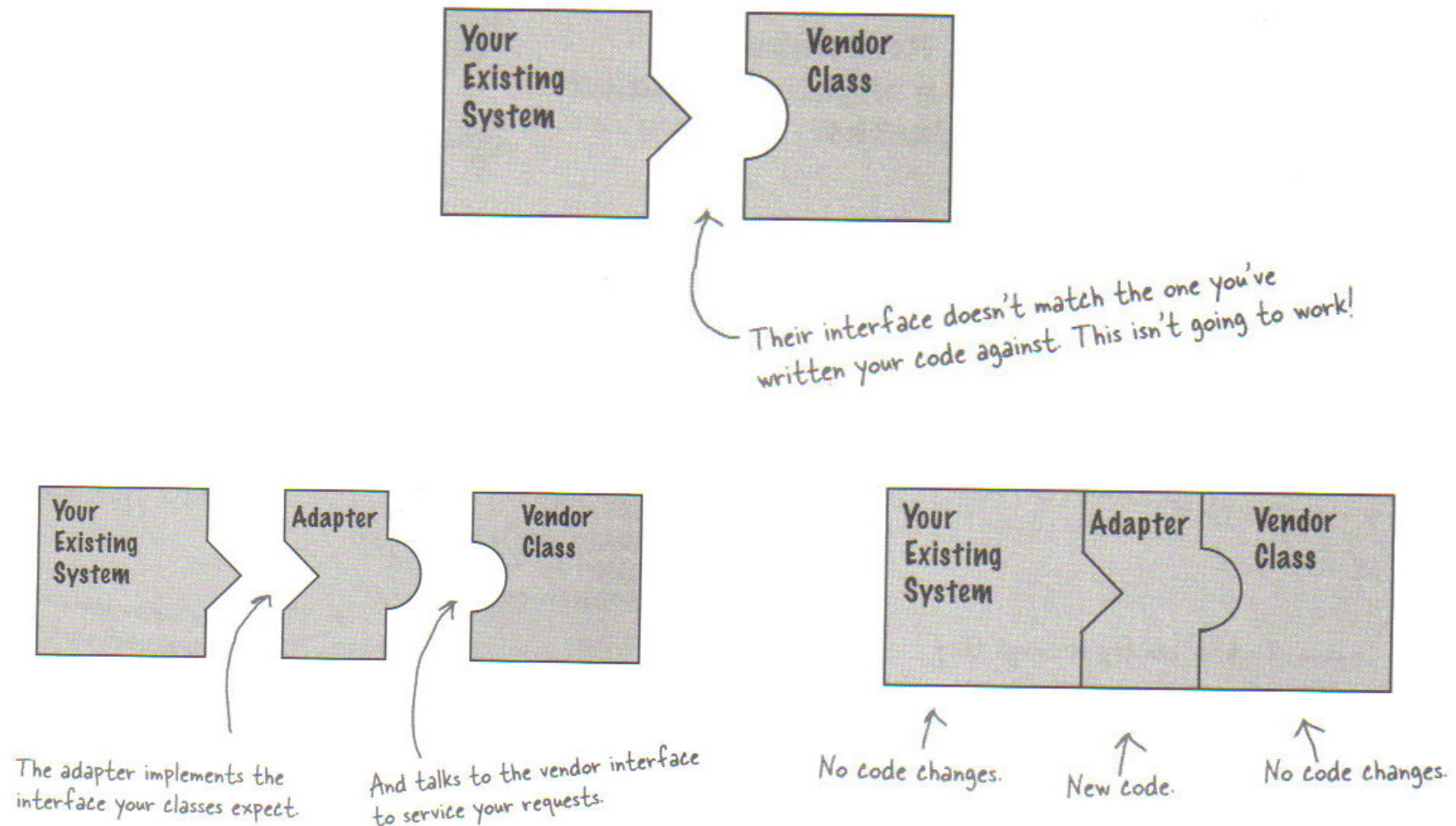
Standard AC Plug

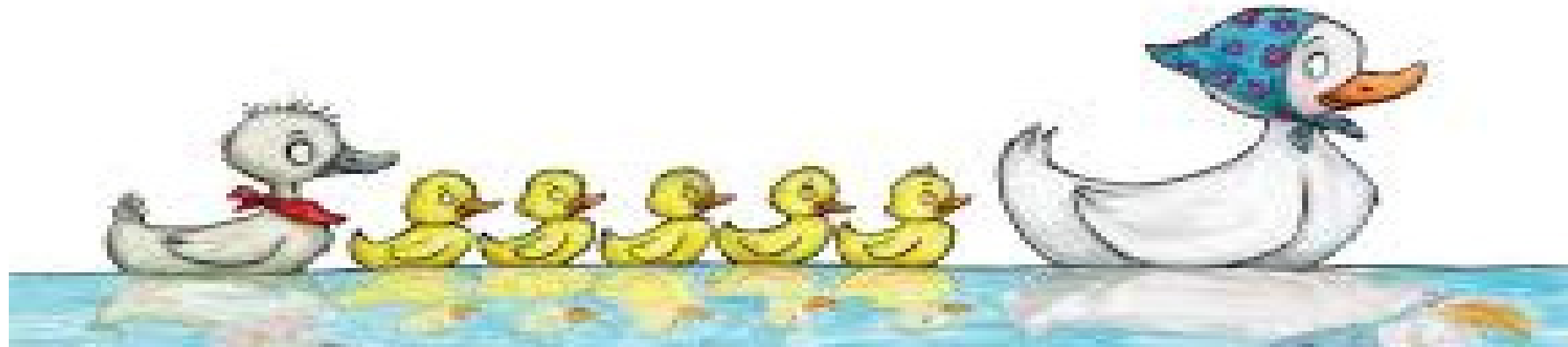


The US laptop expects another interface.

The adapter converts one interface into another.

Object-Oriented Adapters





```
public interface Duck {  
    public void display();  
    public void swim();  
}
```

```
public interface Swan{  
    public void show();  
    public void swim();  
}
```

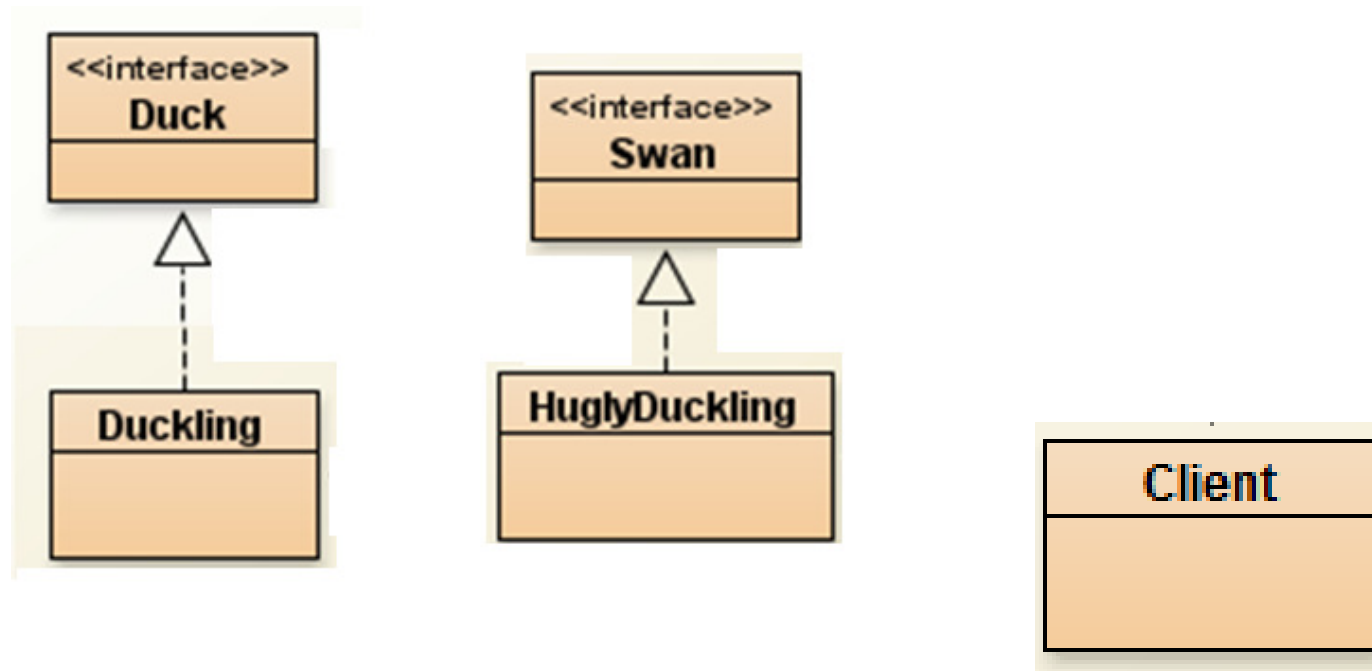
```
public class Duckling implements Duck {  
    public void display() {  
        System.out.println("I'm a pretty duckling");  
    }  
    public void swim() {  
        System.out.println("I'm learning...");  
    }  
}
```

```
public class HuglyDuckling implements Swan{  
    public void show() {  
        System.out.println("I'm large and hugly");  
    }  
    public void swim() {  
        System.out.println("I'm swimming!");  
    }  
}
```

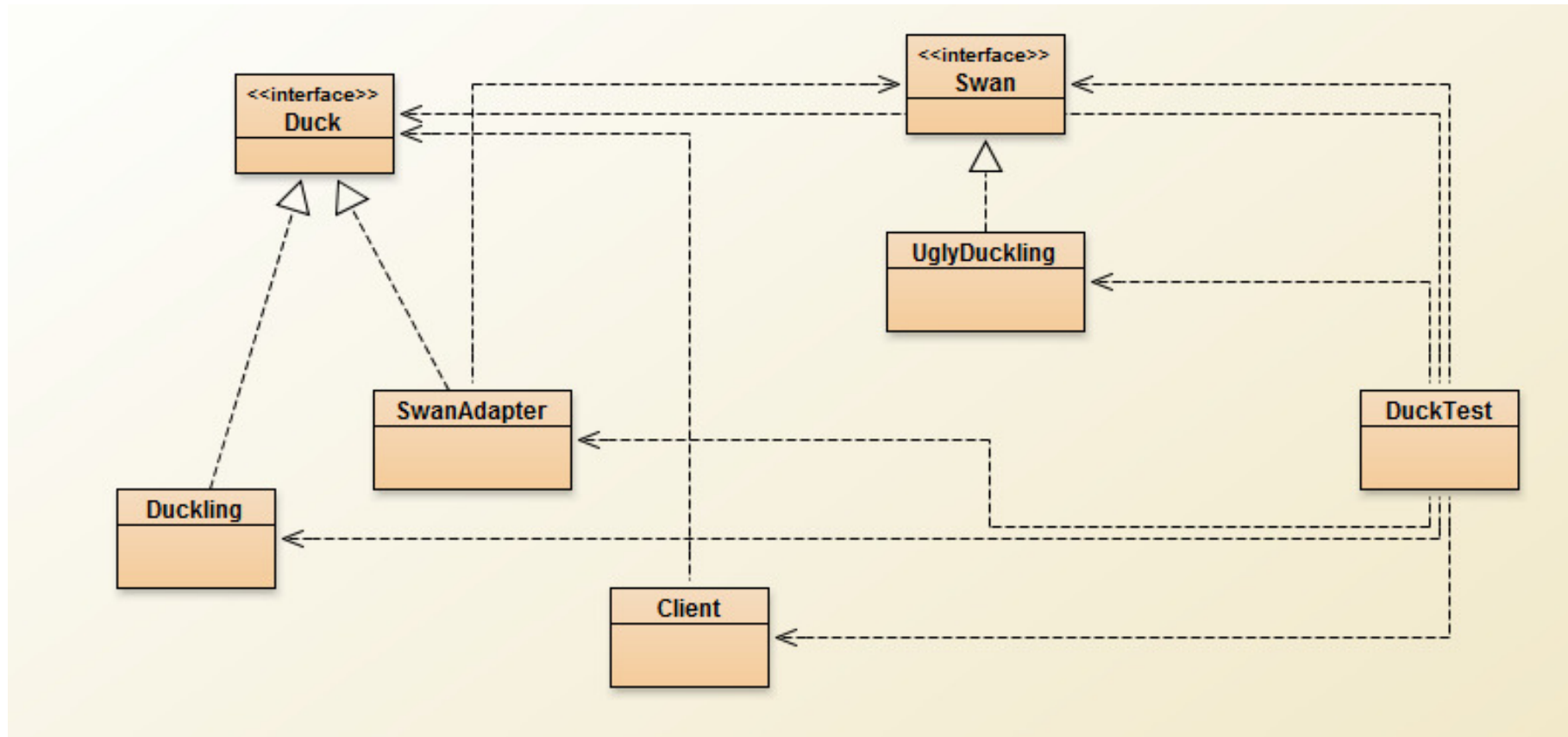
Two hierarchies and the need to deal with objects in a uniform way

```
public interface Duck {  
    public void display();  
    public void swim();  
}
```

```
public interface Swan {  
    public void show();  
    public void swim();  
}
```



Using an adapter



SwanAdapter

makes a swan look like a duck

```
public class SwanAdapter implements Duck {
    Swan swan;
    public SwanAdapter(Swan swan) {
        this.swan = swan;
    }

    public void display() {
        swan.show ();
    }

    public void swim() {
        swan.swim();
    }
}
```

Duck test drive

```
public class DuckTest {  
    public static void main(String[] args) {  
  
        Swan hg= new HuglyDuckling();  
        Duck swanAdapter = new SwanAdapter(hg);  
  
        System.out.println("The HuglyDuckling says...");  
  
        duck.display();  
        duck.swim();  
    }  
}
```

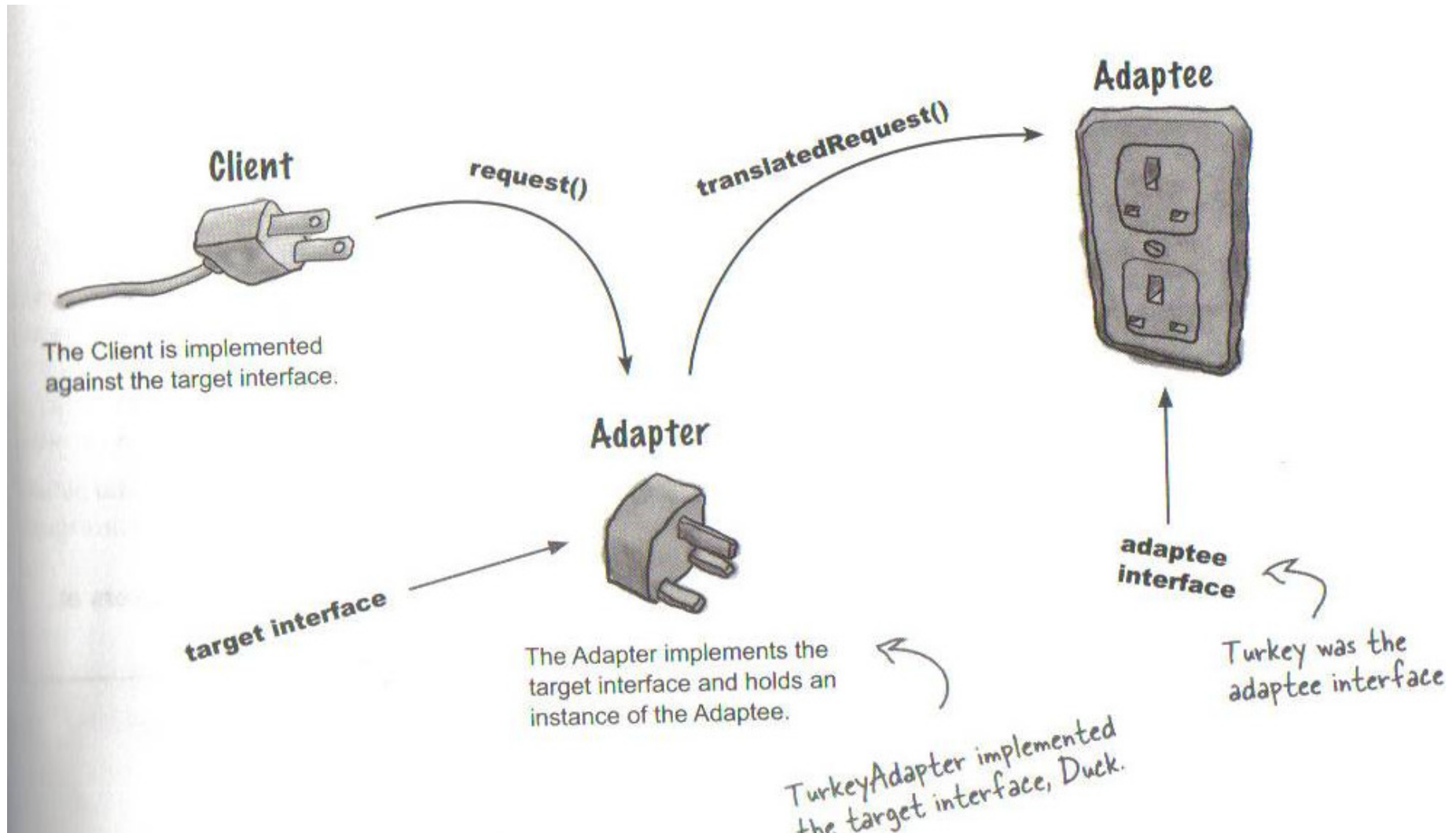

Test run

HuglyDuckling provides his answer

The HuglyDuckling says...
I'm large and hugly
I'm swimming!"



Adapter Pattern explained

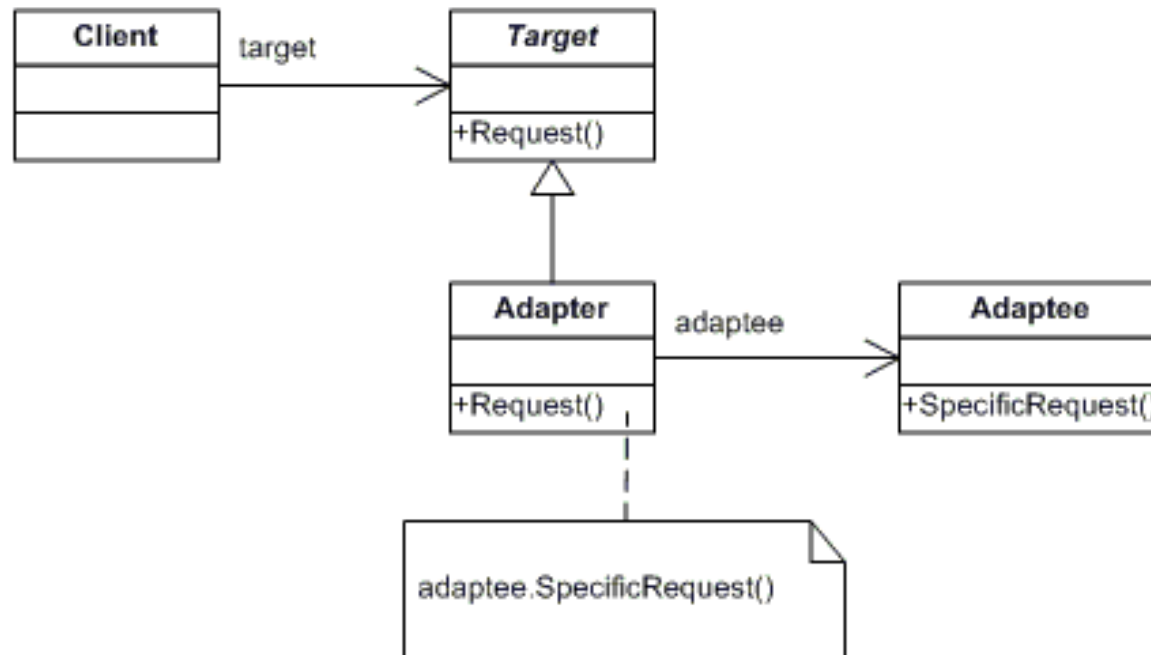


Adapter Pattern defined

The Adapter Pattern converts the interface of a class into another interface the clients expect. Adapter lets classes work together that couldn't otherwise because of incompatible interfaces.



Adapter pattern



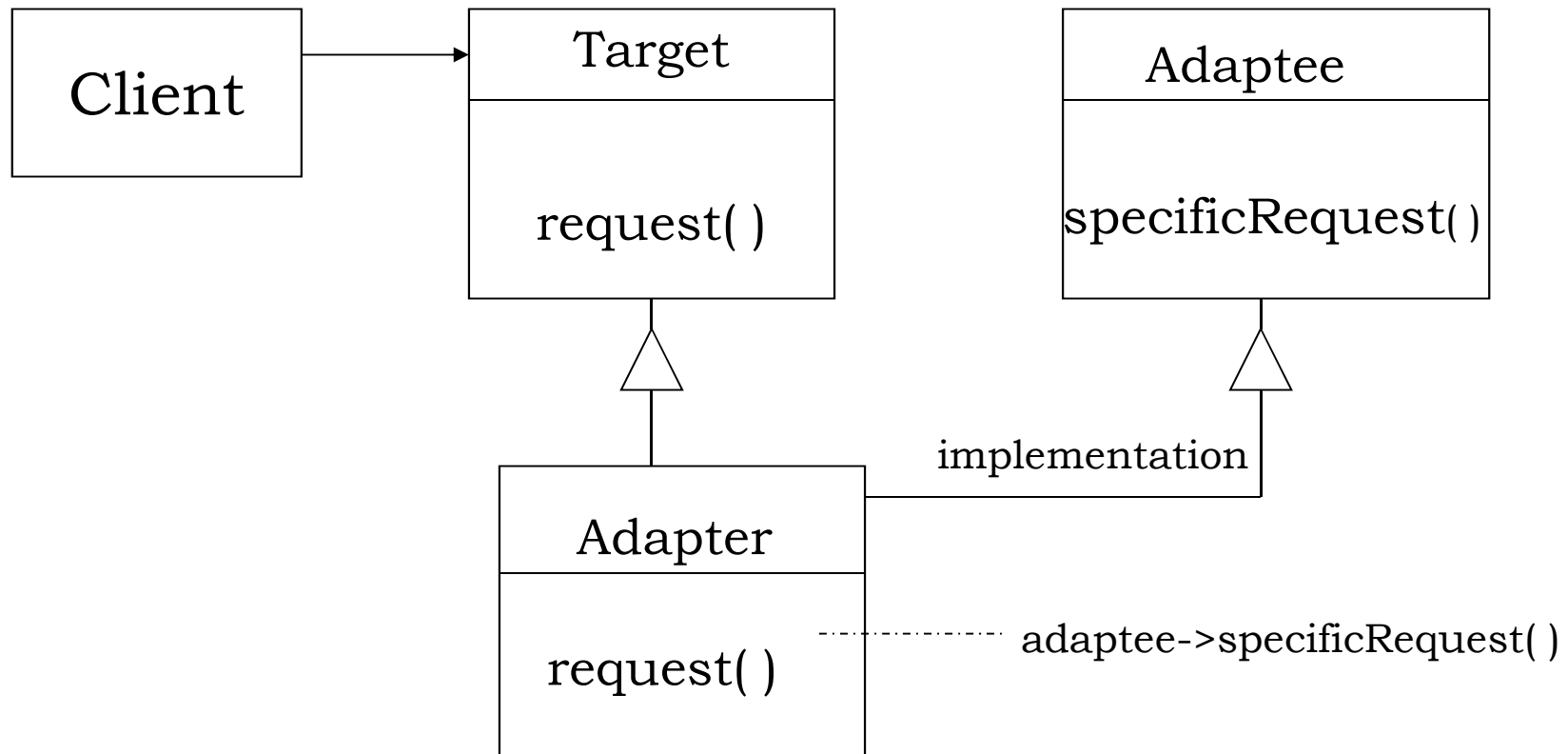
- ▶ Delegation is used to bind an Adapter to an Adaptee
- ▶ Interface inheritance is used to specify the interface of the Adapter class.
- ▶ Target and Adaptee (usually called legacy system) pre-exist the Adapter.
- ▶ Target may be realized as an interface in Java.

Participants

- ▶ **Target:** Defines the application-specific interface that clients use.
- ▶ **Client:** Collaborates with objects conforming to the target interface.
- ▶ **Adaptee:** Defines an existing interface that needs adapting.
- ▶ **Adapter:** Adapts the interface of the adaptee to the target interface.

Class Adapters

Use multiple inheritance to compose classes



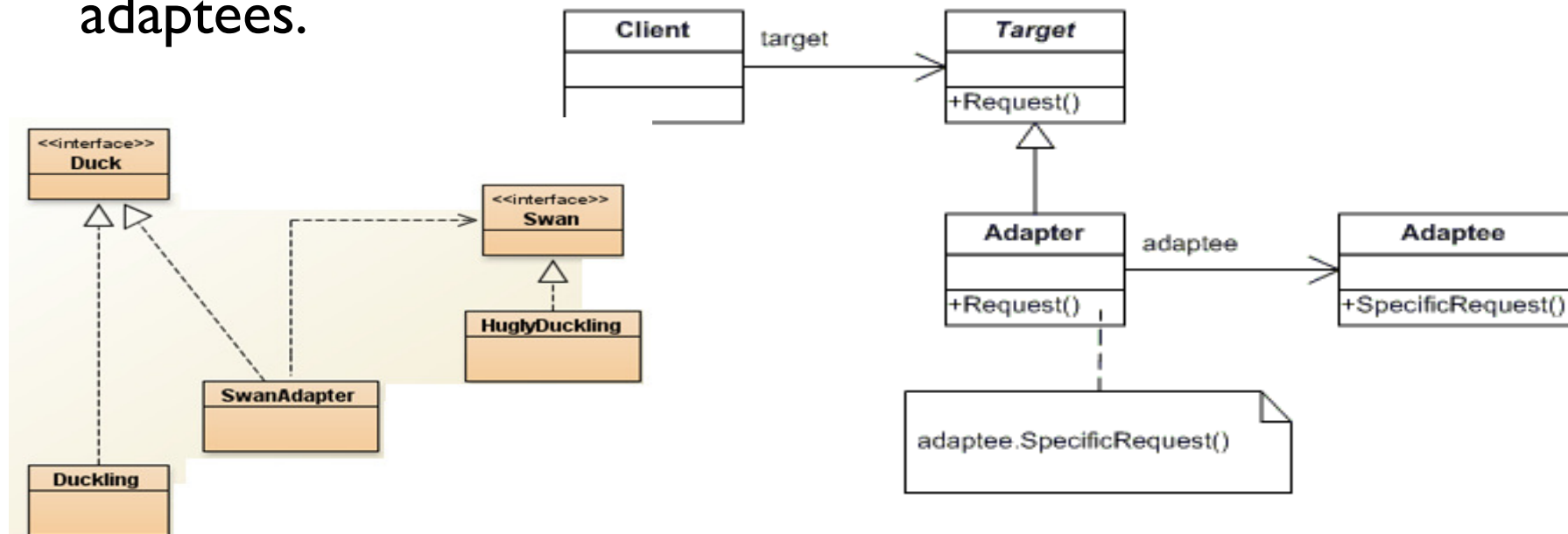
When multiple inheritance is not permitted by the language, we can have our adapter class implement two different interfaces

Two-way adapter

- ▶ What if we want to have an adapter that acts as a Target or an Adaptee?
- ▶ Such an adapter is called a two-way adapter.
 - ▶ One way to implement two-way adapters is to use multiple inheritance
 - ▶ Twin pattern offers a solution with delegation
- ▶ Btw...do we really need it ?

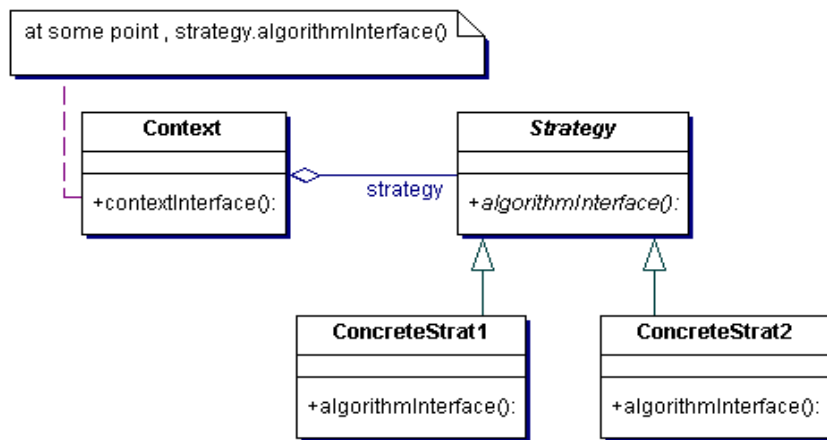
Multiple Adapters for different Adaptees

- ▶ Multiple implementations of adapters for different adaptees.



- ▶ Assume we need a turkey adapter.
 - ▶ Façade if the two adapters (and adaptees) coexist
 - ▶ Strategy if Client refers to only one Adapter per time

Adapter Pattern and Strategy Pattern



- ▶ There are many cases when the adapter can play the role of the Strategy Pattern. If we have several modules implementing the same functionality and we wrote adapters for them, the adapters are implementing the same interface. We can simply replace the adapters objects at run time because they implements the same interface.

Standard AC Plug



Façade



- ▶ (For assume it is possible to plug this)
- ▶ Forwards requests to many adaptees at a time
- ▶ Next lecture

Homework: DPHomework4

- ▶ Extend the ugly duckling example to adapt turkeys too.
 - ▶ Using strategy
 - ▶ Using Façade (see in a while)