Adapter Pattern

Contents

Adapter Pattern

- Also known as
  - Wrapper
- Purpose
  - Permits classes with disparate interfaces to work together by creating a common object by which they may communicate and interact.
- Use When
  - A class to be used doesn't meet interface requirements.

Adapters

- Real world is full of them!

- Object oriented adapters
  - Scenario: you have an existing software system that you need to work a new vendor library into, but the new vendor designed their interfaces differently than the last vendor
  - What to do? Write a class that adapts the new vendor interface into the one you’re expecting

How a Client Uses the Adapter

- The client makes a request to the adapter by calling a method on it using the target interface
- The adapter translates the request into one or more calls on the adaptee using the adaptee interface
- The client receives the results of the call and never knows there is an adapter doing the translation

Simplified Duck and Turkey

```
public interface Duck {
    public void quack ();
    public void fly ();
}

public class MallardDuck implements Duck {
    public void quack () {
        System.out.println(“Quack”);
    }
    public void fly ( ) {
        System.out.println (“I am flying”);
    }
}

public interface Turkey {
    public void gobble ();
    public void fly ( );
}

public class WildTurkey implements Turkey {
    public void gobble ( ) {
        System.out.println(“Gobble Gobble”);
    }
    public void fly ( ){
        System.out.println(“I’m flying a short distance”);
    }
}
```

Turkey Adapter

```
public class TurkeyAdapter implements Duck {
    Turkey turkey;

    public TurkeyAdapter (Turkey turkey) {
        this.turkey = turkey;
   }

    public void quack () {
        turkey.gobble ();
    }

    public void fly () {
        for (int i= 0; i < 5; i++)
             turkey.fly ();
    }
}
```

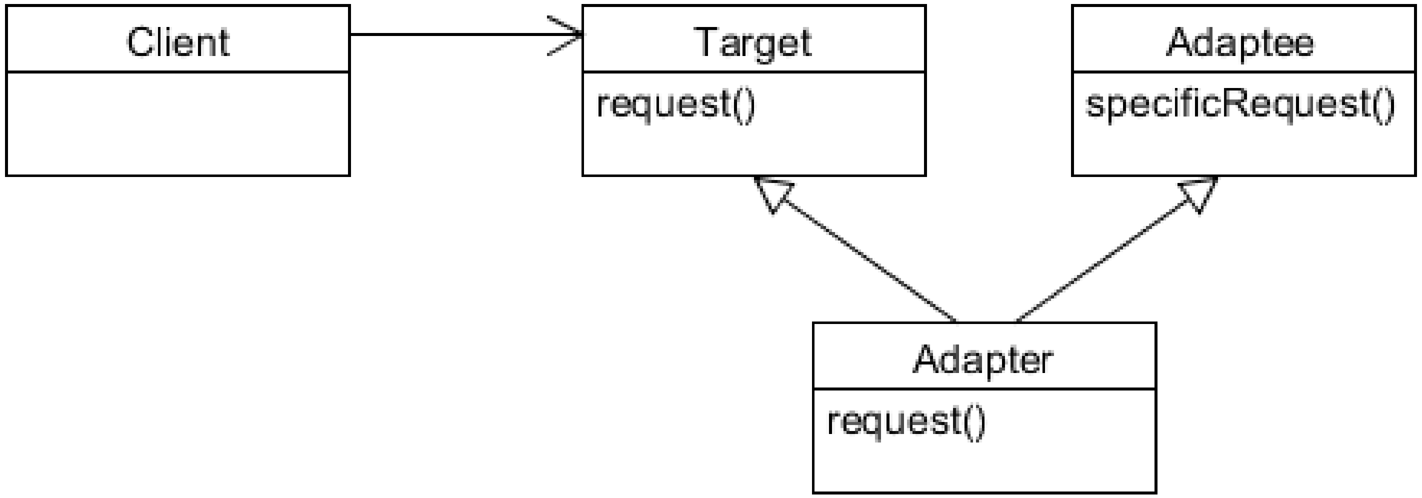
TestDrive

```java
public class DuckTestDrive {

    public static void main(String[] args) {
        MallardDuck duck = new MallardDuck();

        WildTurkey turkey = new WildTurkey();
        Duck turkeyAdapter = new TurkeyAdapter(turkey);

        System.out.println("The Turkey says...");
        turkey.gobble();
        turkey.fly();

        System.out.println("\nThe Duck says...");
        testDuck(duck);

        System.out.println("\nThe TurkeyAdapter says...");
        testDuck(turkeyAdapter);
    }

    static void testDuck(Duck duck) {
        duck.quack();
        duck.fly();
    }
}
```

The Adapter Pattern

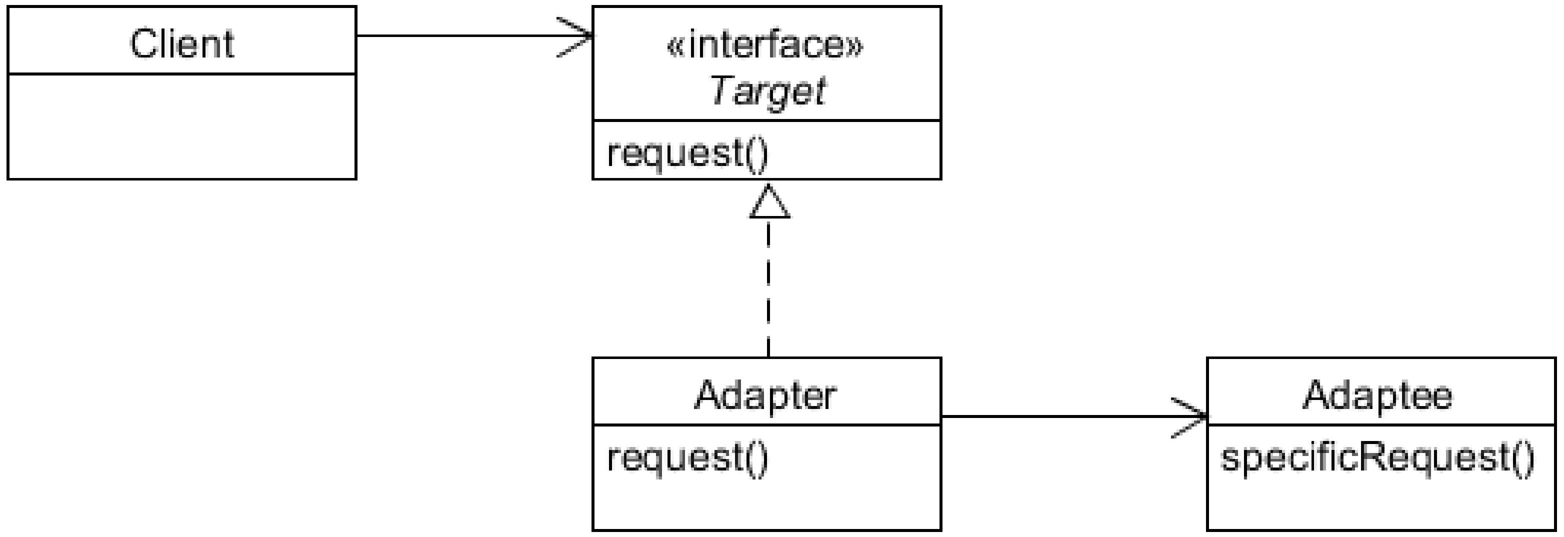
- Motivation
  - A toolkit or class library may have an interface which is incompatible with an application’s interface we want to integrate.
  - It is possible that we do not have access to the source code of the toolkit or library.
  - Even if the source code is available, we may want to minimize the change

Class Adapter



Object Adapter

- Use composition
- Program to interface



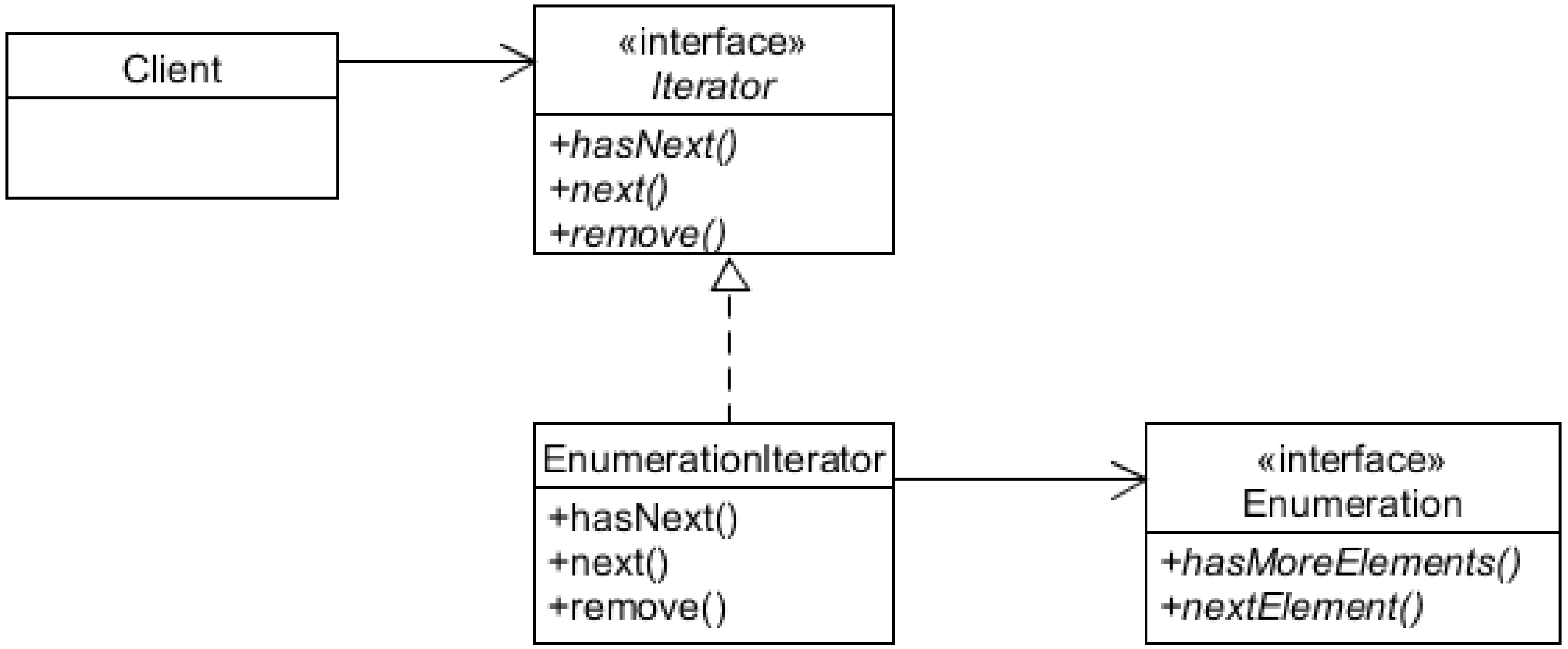
Implementation Issues

- How much adaptation?
  - Simple and straightforward interface conversion such as
    - Changing method names
    - Changing the order of arguments
  - Totally different set of operations
- Two-way transparency?
  - A *two-way adapter* supports both the Target and the Adaptee interface. It allows an adapted object (Adapter) to appear as an Adaptee object or a Target object

Enumerators v.s. Iterators

- Enumeration
  - Java's old collection types
    - Vector, Stack, HashTable, etc
    - Method:
      - hasMoreElements()
      - nextElement()
- Iterators
  - hasNext()
  - next()
  - remove()

Adapting Enumeration to Iterator



EnumerationIterator Adapter

```
public class EnumerationIterator implements Iterator {
  Enumeration enum;
  public EnumerationIterator(Enumeration enum) {
        this.enum = enum;
  }
  public boolean hasNext() {
        return enum.hasMoreElements();
  }
  public Object next() {
        return enum.nextElement();
  }
  public void remove() {
        throw new UnsupportedOperationException();
  }
}
```

IteratorEnumeration Adapter

```
public class IteratorEnumeration implements Enumeration {
  Iterator iterator;
  public IteratorEnumeration(Iterator iterator) {
        this.iterator = iterator;
  }
  public boolean hasMoreElements () {
        return iterator.hasNext();
  }
  public Object nextElement () {
        return iterator.next ();
  }
}
```

Summary

- Adapter
  - Converts the interface of a class into another interface clients expect.
  - Lets classes work together that couldn’t otherwise because of incompatible interfaces
  - Class adapter and object adapter