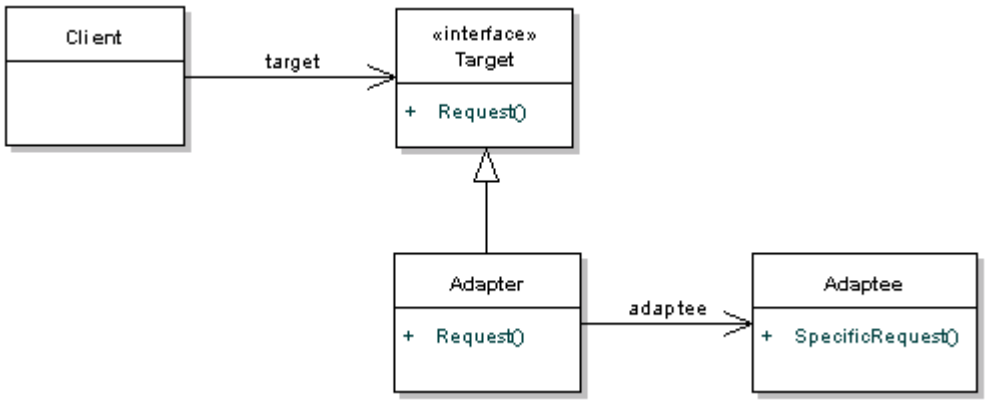
ADAPTER PATTERN

The adapter pattern is a structural design pattern. In the adapter pattern, a wrapper class (ie, the adapter) is used translate requests from it to another class (ie, the adaptee). In effect, an adapter provides particular interactions with an adaptee that are not offered directly by the adaptee.



The adapter pattern takes two forms. In the first form, a "class adapter" utilizes inheritance. The class adapter extends the adaptee class and adds the desired methods to the adapter. These methods can be declared in an interface (ie, the "target" interface).

In the second form, an "object adapter" utilizes composition. The object adapter contains an adaptee and implements the target interface to interact with the adaptee.

Now let's look at simple examples of a class adapter and an object adapter. First, we have an adaptee class named CelciusReporter. It stores a temperature value in Celcius.

CelciusReporter.java

```
public class CelciusReporter {

	double temperatureInC;

	public CelciusReporter() {
	}

	public double getTemperature() {
		return temperatureInC;
	}

	public void setTemperature(double temperatureInC) {
		this.temperatureInC = temperatureInC;
	}
]
```

Here is our target interface that will be implemented by our adapter. It defines actions that our adapter will perform.

TemperatureInfo.java

```
public interface TemperatureInfo {

	public double getTemperatureInF();

	public void setTemperatureInF(double temperatureInF);

	public double getTemperatureInC();

	public void setTemperatureInC(double temperatureInC);

}
```

TemperatureClassReporter is a class adapter. It extends CelciusReporter (the adaptee) and implements TemperatureInfo (the target interface). If a temperature is in Celcius, TemperatureClassReporter utilizes the temperatureInC value from CelciusReporter. Fahrenheit requests are internally handled in Celcius.

TemperatureClassReporter.java

```
;

// example of a class adapter
public class TemperatureClassReporter extends CelciusReporter implements TemperatureInfo {

	@Override
	public double getTemperatureInC() {
		return temperatureInC;
	}

	@Override
	public double getTemperatureInF() {
		return cToF(temperatureInC);
	}

	@Override
	public void setTemperatureInC(double temperatureInC) {
		this.temperatureInC = temperatureInC;
	}

	@Override
	public void setTemperatureInF(double temperatureInF) {
		this.temperatureInC = fToC(temperatureInF);
	}
```

```
	private double fToC(double f) {
		return ((f - 32) * 5 / 9);
	}

	private double cToF(double c) {
		return ((c * 9 / 5) + 32);
	}

}
```

TemperatureObjectReporter is an object adapter. It is similar in functionality to TemperatureClassReporter, except that it utilizes composition for the CelciusReporter rather than inheritance.

TemperatureObjectReporter.java

```
// example of an object adapter
public class TemperatureObjectReporter implements TemperatureInfo {

	CelciusReporter celciusReporter;

	public TemperatureObjectReporter() {
		celciusReporter = new CelciusReporter();
	}

	@Override
	public double getTemperatureInC() {
		return celciusReporter.getTemperature();
	}

	@Override
	public double getTemperatureInF() {
		return cToF(celciusReporter.getTemperature());
	}

	@Override
	public void setTemperatureInC(double temperatureInC) {
		celciusReporter.setTemperature(temperatureInC);
	}

	@Override
	public void setTemperatureInF(double temperatureInF) {
		celciusReporter.setTemperature(fToC(temperatureInF));
	}

	private double fToC(double f) {
		return ((f - 32) * 5 / 9);
	}
```

```
	private double cToF(double c) {
		return ((c * 9 / 5) + 32);
	}

}
```

The AdapterDemo class is a client class that demonstrates the adapter pattern. First, it creates a TemperatureClassReporter object and references it via a TemperatureInfo reference. It demonstrates calls to the class adapter via the TemperatureInfo interface. After this, it creates a TemperatureObjectReporter object and references it via the same TemperatureInfo reference. It then demonstrates calls to the object adapter.

AdapterDemo.java

```
public class AdapterDemo {

	public static void main(String[] args) {

		// class adapter
		System.out.println("class adapter test");
		TemperatureInfo tempInfo = new TemperatureClassReporter();
		testTempInfo(tempInfo);

		// object adapter
		System.out.println("\nobject adapter test");
		tempInfo = new TemperatureObjectReporter();
		testTempInfo(tempInfo);

	}

	public static void testTempInfo(TemperatureInfo tempInfo) {
		tempInfo.setTemperatureInC(0);
		System.out.println("temp in C:" + tempInfo.getTemperatureInC());
		System.out.println("temp in F:" + tempInfo.getTemperatureInF());

		tempInfo.setTemperatureInF(85);
		System.out.println("temp in C:" + tempInfo.getTemperatureInC());
		System.out.println("temp in F:" + tempInfo.getTemperatureInF());
	}

}
```

The console output of the execution of AdapterDemo is shown here.

Console Output

```
class adapter test
temp in C:0.0
temp in F:32.0
temp in C:29.444444444444443
temp in F:85.0
object adapter test
temp in C:0.0
temp in F:32.0
temp in C:29.444444444444443
temp in F:85.0
```