



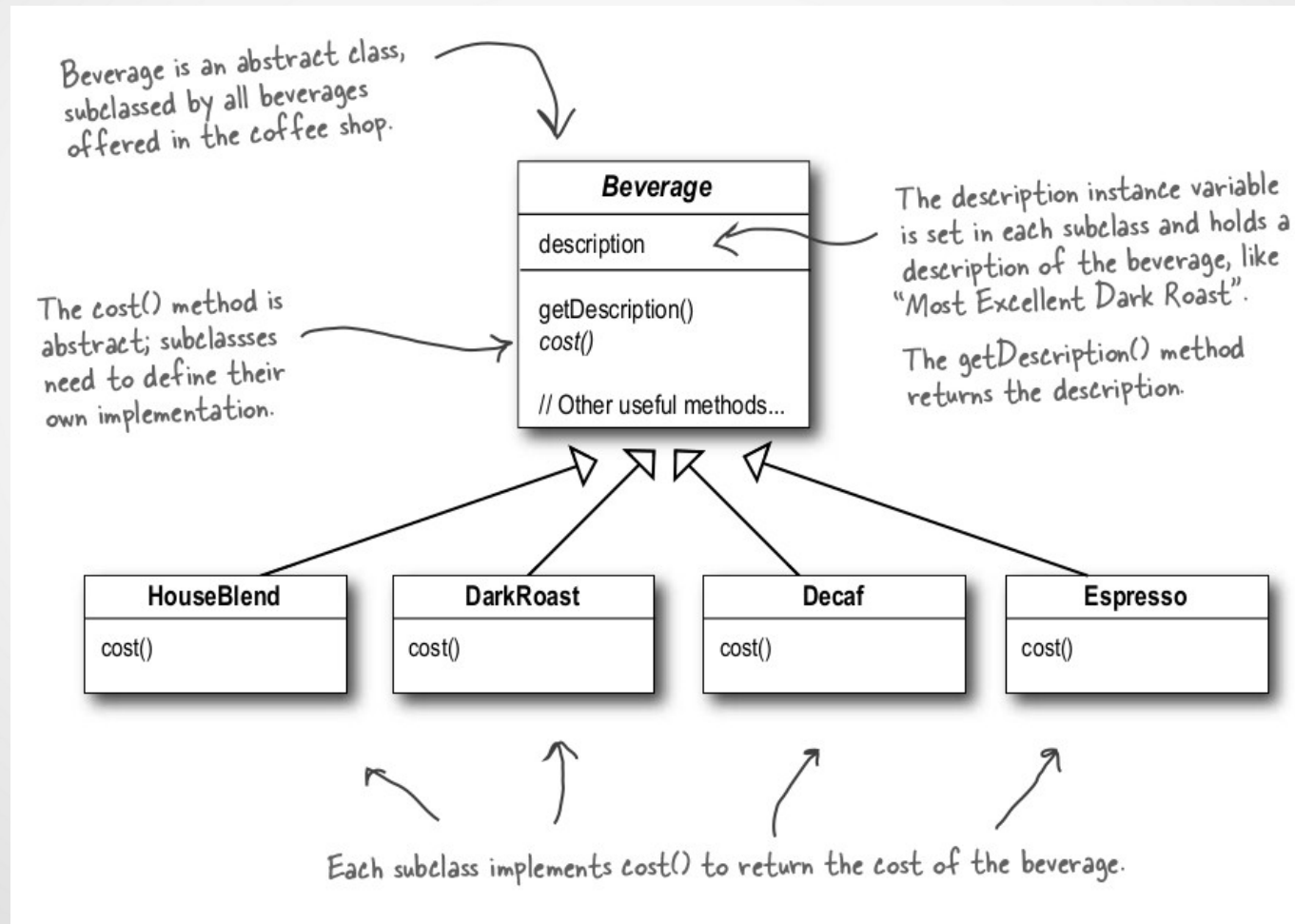
# Patrón de Diseño “Decorator”

# Cáfe Starbuzz



- ” Ha tenido un gran crecimiento dentro de las tiendas de café, ya que ha aumentado el número de locales Starbuzz.
- ” Esto ha provocado que necesiten hacer coincidir su sistema de pedidos con las bebidas que ofrecen.

# El primer diseño fue:



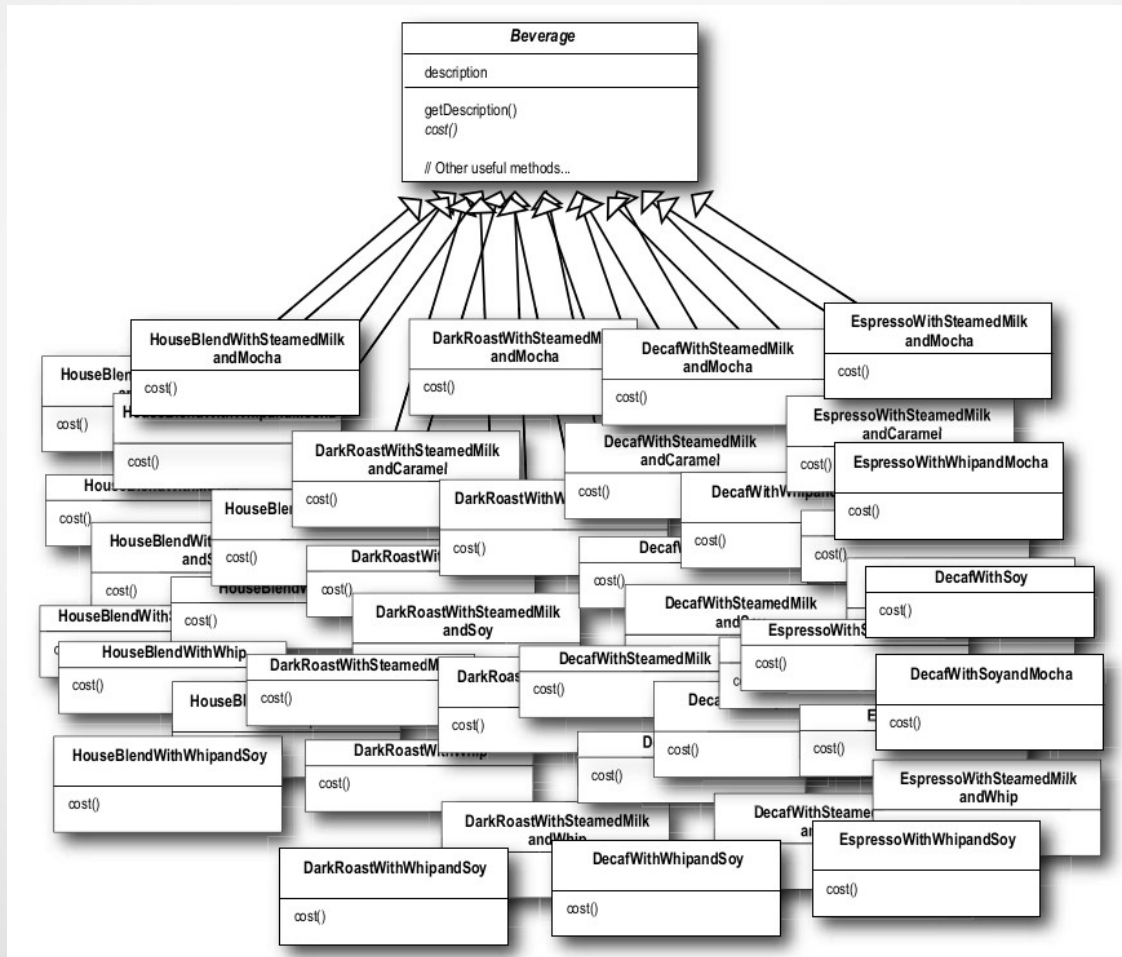
- ” Además de su bebida, los clientes pueden pedir varios ingredientes, como vapor de leche o mocha, pero siempre debe incluir al final batido de leche.
- ” Cobra un montó más por cada uno de los ingredientes extra que pidan los clientes, por lo cual debe tener cada uno de estos casos en su sistema de pedidos.

*Entonces, ¿Qué tendríamos con el diseño anterior?*

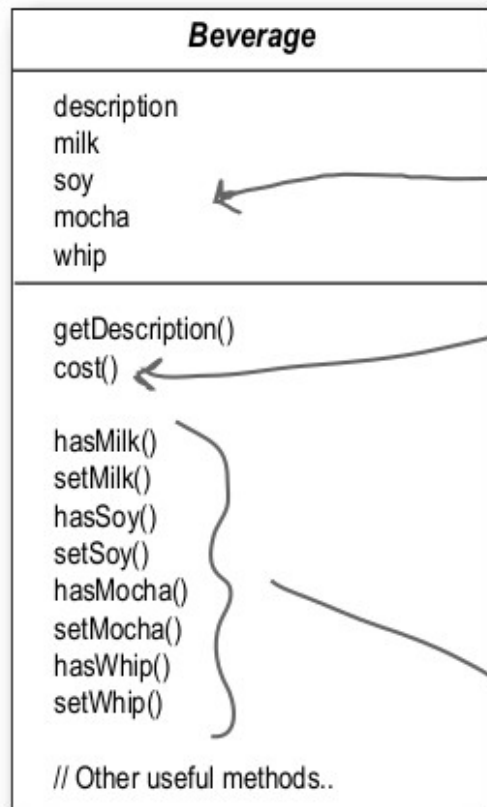
*¡Advertencia! La siguiente diapositiva puede ser perturbadora.*



# Obtenemos algo como esto:



# ¿Qué pasa si lo arreglamos así?



New boolean values for each condiment.

Now we'll implement `cost()` in `Beverage` (instead of keeping it abstract), so that it can calculate the costs associated with the condiments for a particular beverage instance. Subclasses will still override `cost()`, but they will also invoke the super version so that they can calculate the total cost of the basic beverage plus the costs of the added condiments.

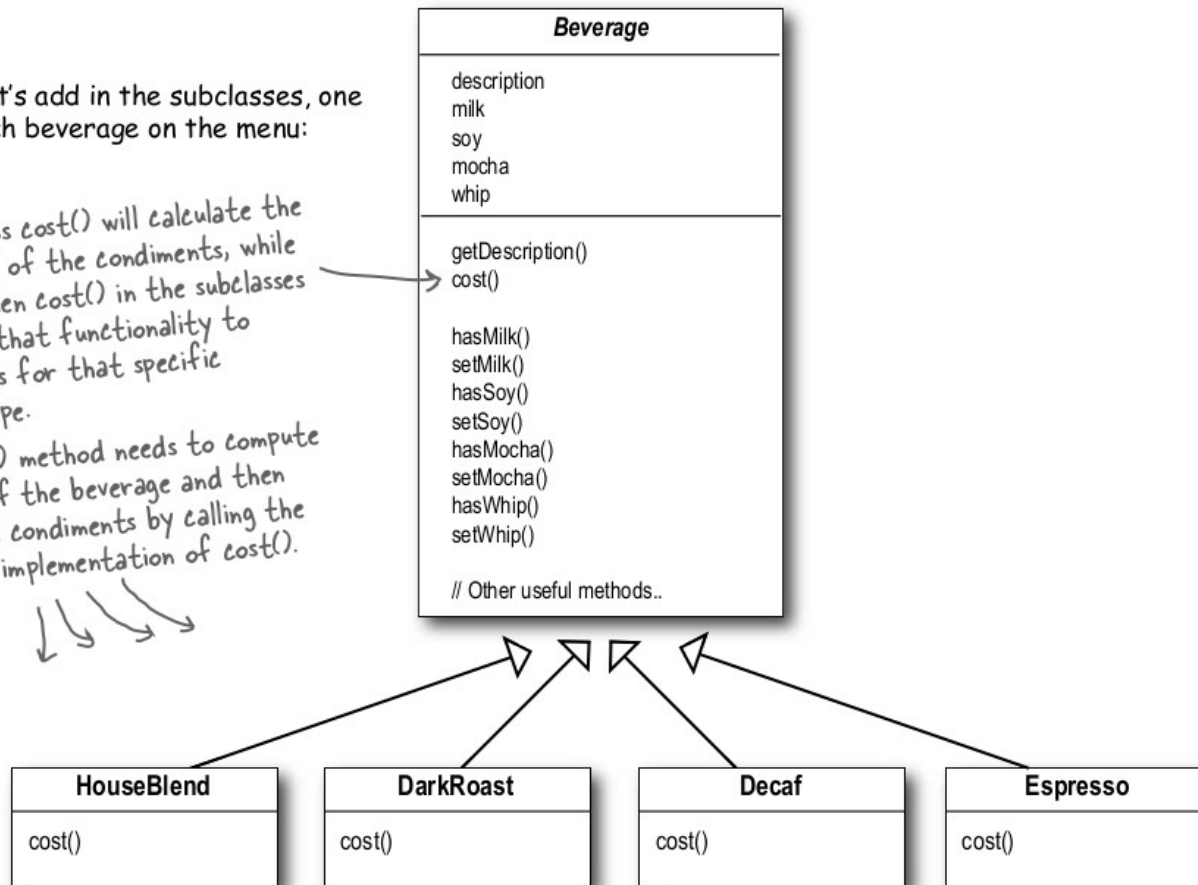
These get and set the boolean values for the condiments.

Ahora agregamos las subclases para cada tipo de bebida:

Now let's add in the subclasses, one for each beverage on the menu:

The superclass `cost()` will calculate the costs for all of the condiments, while the overridden `cost()` in the subclasses will extend that functionality to include costs for that specific beverage type.

Each `cost()` method needs to compute the cost of the beverage and then add in the condiments by calling the superclass implementation of `cost()`.



```
public class Beverage {
```

```
    // declare instance variables for milkCost,  
    // soyCost, mochaCost, and whipCost, and  
    // getters and setters for milk, soy, mocha  
    // and whip.
```

```
    public double cost() {
```

```
        double condimentCost = 0.0;
```

```
        if (hasMilk()) {
```

```
            condimentCost += milkCost;
```

```
        }
```

```
        if (hasSoy()) {
```

```
            condimentCost += soyCost;
```

```
        }
```

```
        if (hasMocha()) {
```

```
            condimentCost += mochaCost;
```

```
        }
```

```
        if (hasWhip()) {
```

```
            condimentCost += whipCost;
```

```
        }
```

```
        return condimentCost;
```

```
    }
```

```
}
```

```
public class DarkRoast extends Beverage {
```

```
    public DarkRoast() {
```

```
        description = "Most Excellent Dark Roast";
```

```
    }
```

```
    public double cost() {
```

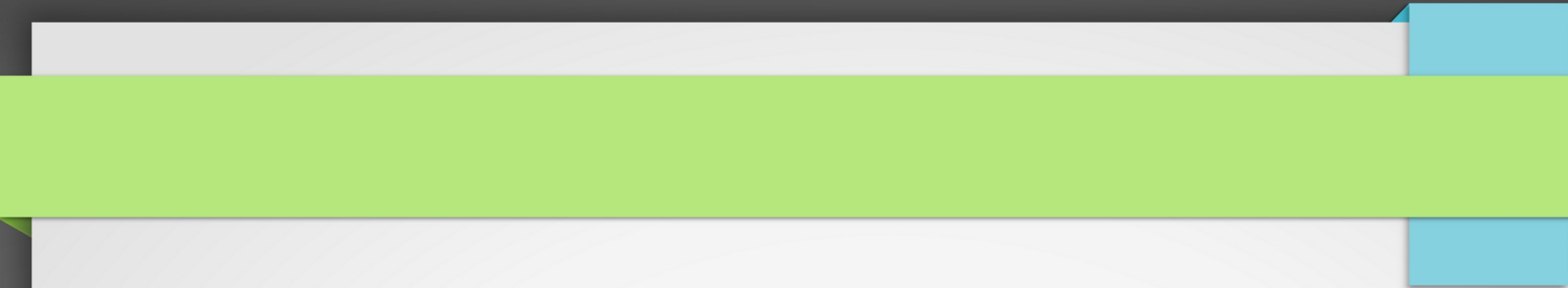
```
        return 1.99 + super.cost();
```

```
    }
```

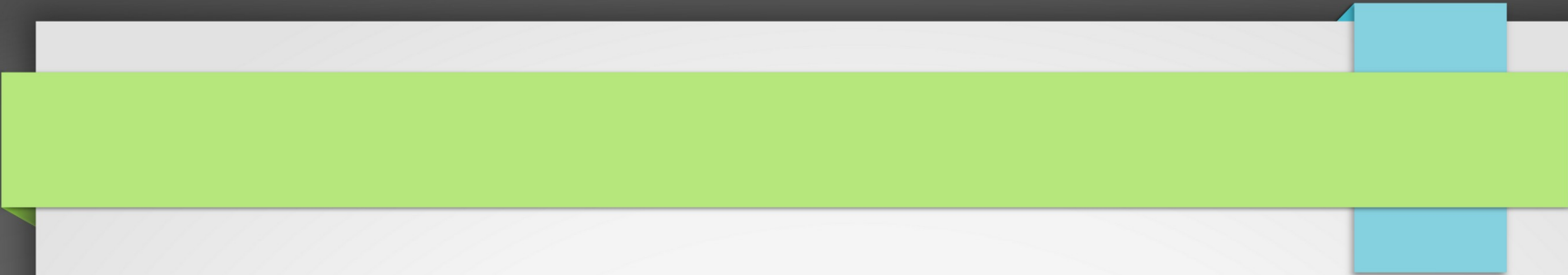
```
}
```



- 77 En la superclase, se calculara el costo de cada ingrediente con el método `cost()`.
- 77 En método `cost()` lo *sobreescribimos* en las subclases, se da el precio de la bebida y le agregamos el costo de los ingredientes llamando al método `cost()` de la superclase



¿Qué factores podrían causar  
un cambio o impacto en este  
diseño?

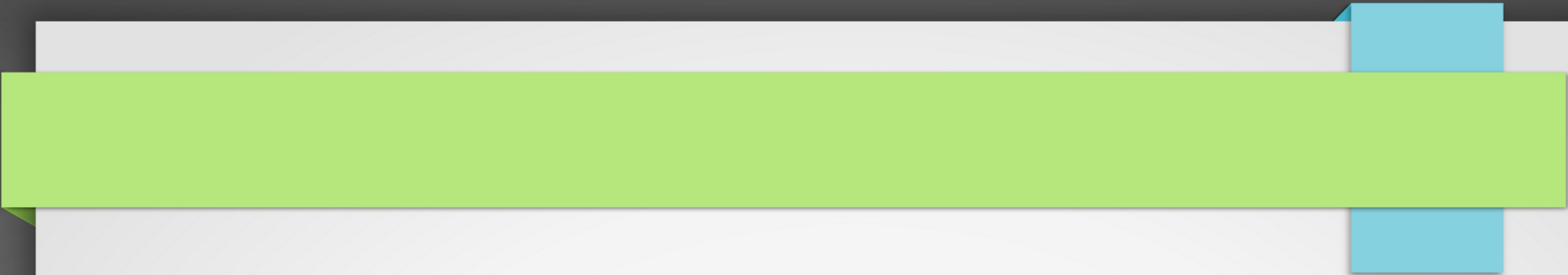
- 
- Si cambia el precio de los ingredientes, sería forzoso alterar el código.
  - Si es necesario agregar diferentes complementos, sería necesario agregar nuevos métodos y alterar el método costo en la superclase.
  - Si agregamos nuevos tipos de bebidas, podría ser que algunos ingredientes o métodos no sean adecuados.

# Principio de Diseño:

- Las clases debe estar abiertas a la extensión, pero cerradas a la modificación.

# Nuestro objetivo es:

- ” Permitir que las clases sean fácilmente extendidas incorporando el nuevo comportamiento sin necesidad de modificar el código existente.



## Para obtener lo anterior:

- 77 Si tenemos una Bebida, la “decoramos” con los ingredientes en tiempo de ejecución.



# Por ejemplo:

El cliente pide un café oscuro con mocha y batido, entonces:

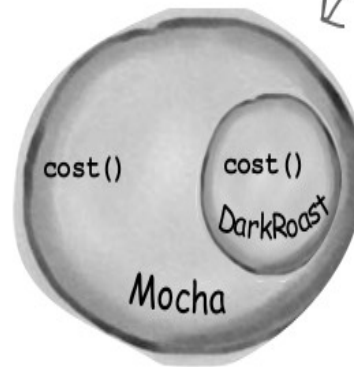
## DarkRoast object.



Remember that DarkRoast inherits from Beverage and has a `cost()` method that computes the cost of the drink.

## 1) Comenzamos con nuestro objeto Café Oscuro

2) El cliente quiere Mocha, entonces creamos un objeto Mocha y envuélvelo alrededor al objeto Café Oscuro.

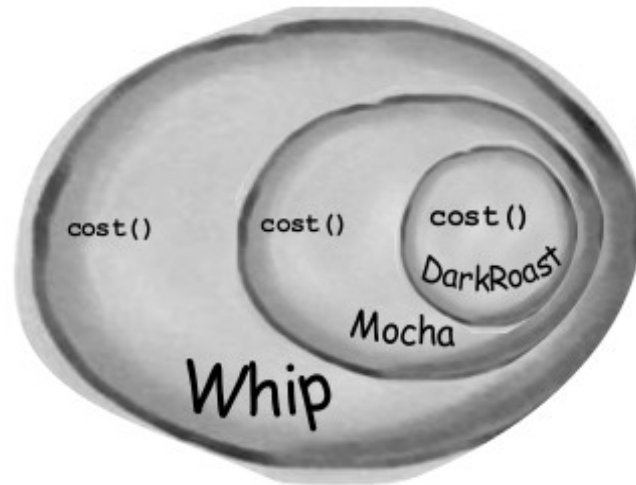


The Mocha object is a decorator. Its type mirrors the object it is decorating, in this case, a Beverage. (By "mirror", we mean it is the same type..)

So, Mocha has a `cost()` method too, and through polymorphism we can treat any Beverage wrapped in Mocha as a Beverage, too (because Mocha is a subtype of Beverage).



- 3) El cliente también quiere batido, así que creamos un decorador Batido y envolvemos Mocha con él.

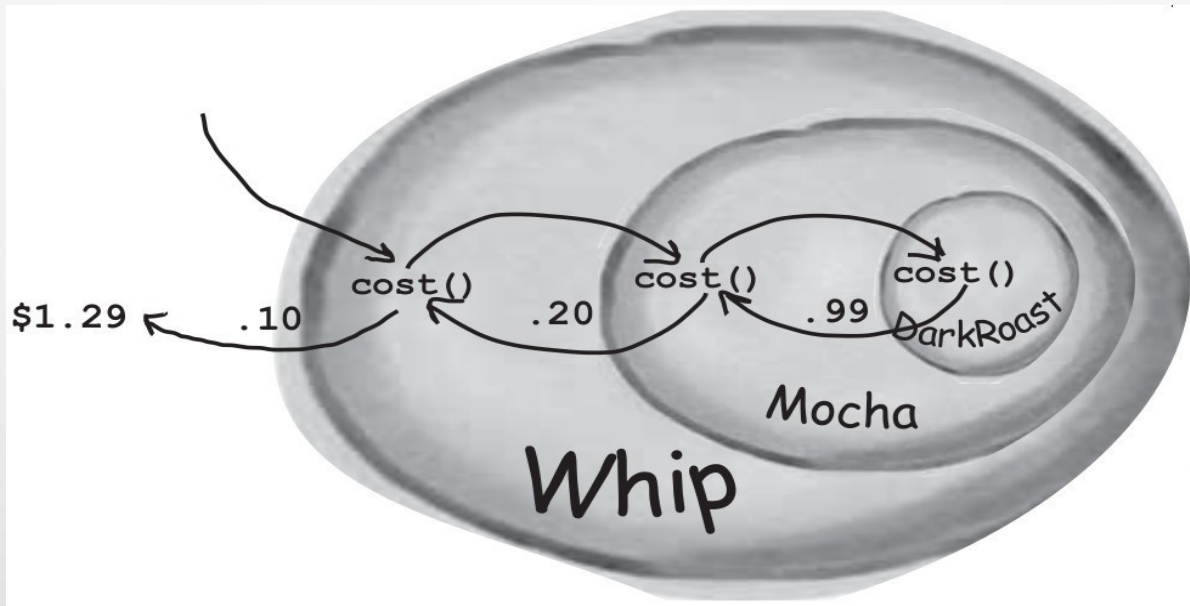


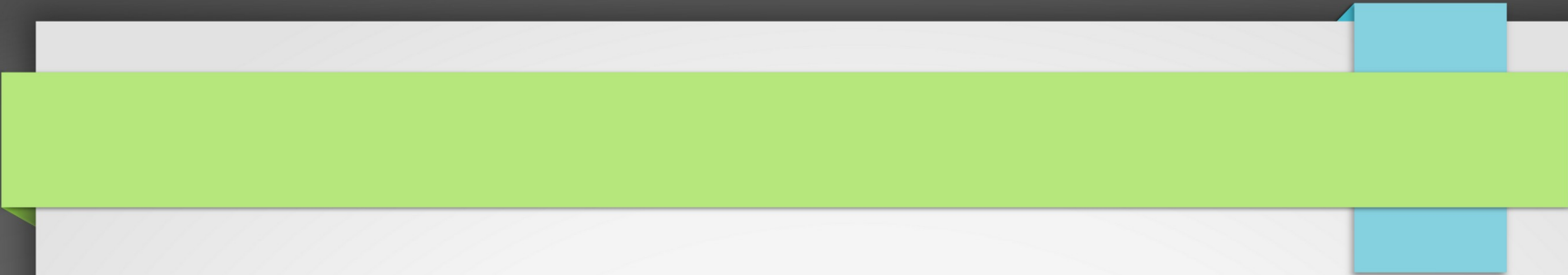
Whip is a decorator, so it also mirrors DarkRoast's type and includes a `cost()` method.

So, a DarkRoast wrapped in Mocha and Whip is still a Beverage and we can do anything with it we can do with a DarkRoast, including call its `cost()` method.

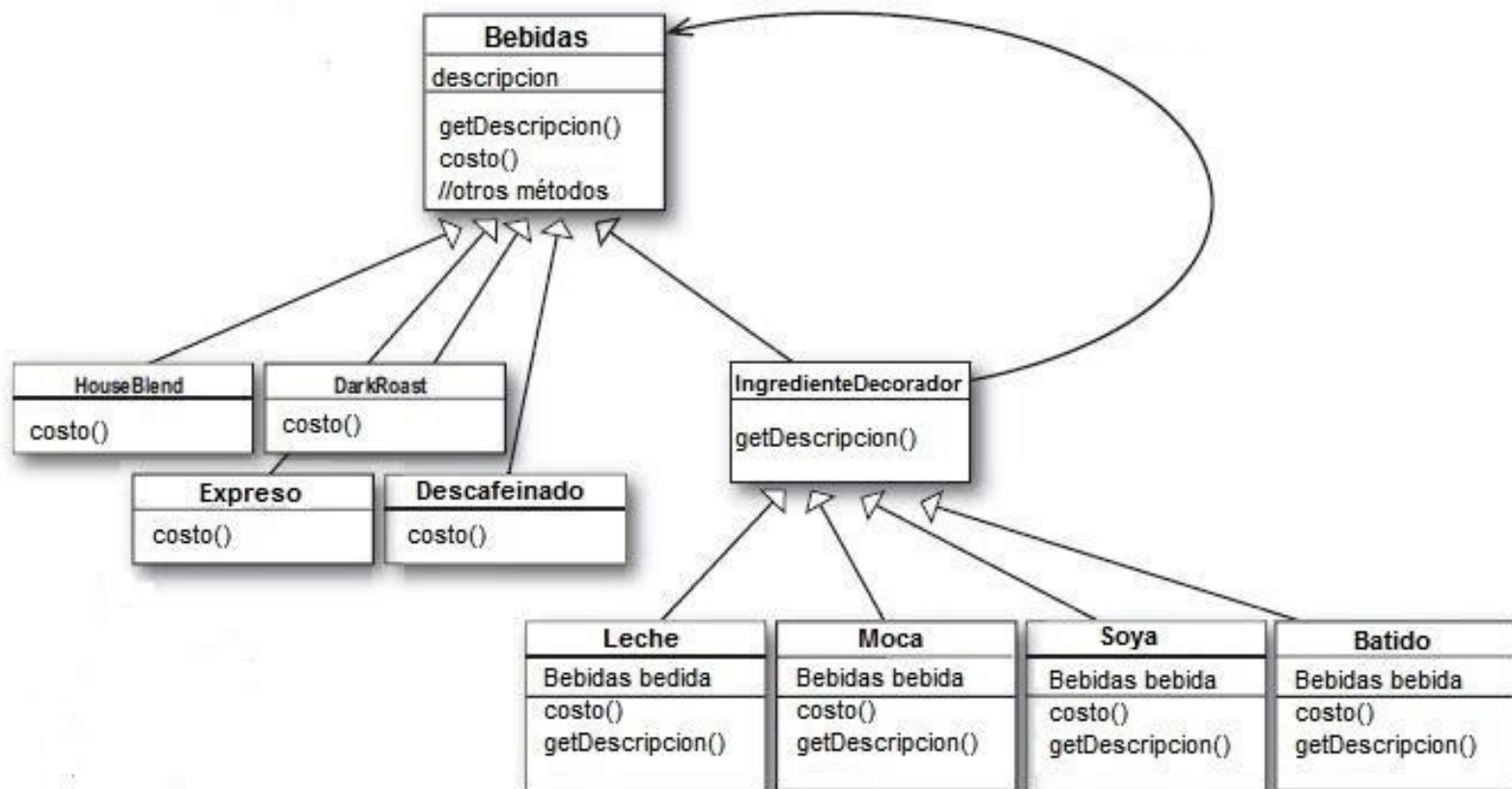
# Algo así

- 4) Ahora es el momento de calcular el costo para el cliente. Nosotros hacemos esto llamando al método `cost()` en el decorador externo, Batido, y Batido va a delegar el calcular el costo de los objetos que decora.
- Una vez que tenga un costo, agregará el costo del Batido.



- 
- El patrón decorador atribuye responsabilidades adicionales a un objeto dinámicamente.
  - Los decoradores proporcionan una alternativa flexible a las subclases para ampliar la funcionalidad.

# El diseño final:



# Clase Bebida

```
public abstract class Beverage {  
    String description = "Unknown Beverage";  
  
    public String getDescription() {  
        return description;  
    }  
  
    public abstract double cost();  
}
```

Beverage is an abstract class with the two methods `getDescription()` and `cost()`.

`getDescription` is already implemented for us, but we need to implement `cost()` in the subclasses.

# Class Cafe Espresso

```
public class Espresso extends Beverage {
```

```
    public Espresso() {  
        description = "Espresso";  
    }
```

```
    public double cost() {  
        return 1.99;  
    }
```

```
}
```

First we extend the Beverage class, since this is a beverage.

To take care of the description, we set this in the constructor for the class. Remember the description instance variable is inherited from Beverage.

Finally, we need to compute the cost of an Espresso. We don't need to worry about adding in condiments in this class, we just need to return the price of an Espresso: \$1.99.

# Clase Decoradora

First, we need to be interchangeable with a Beverage, so we extend the Beverage class.

```
public abstract class CondimentDecorator extends Beverage {  
    public abstract String getDescription();  
}
```

We're also going to require that the condiment decorators all reimplement the `getDescription()` method. Again, we'll see why in a sec...



# Clase Moca

Mocha is a decorator, so we extend `CondimentDecorator`.

Remember, `CondimentDecorator` extends `Beverage`.

We're going to instantiate Mocha with a reference to a `Beverage` using:

(1) An instance variable to hold the beverage we are wrapping.

(2) A way to set this instance variable to the object we are wrapping. Here, we're going to pass the beverage we're wrapping to the decorator's constructor.

```
public class Mocha extends CondimentDecorator {
    Beverage beverage;

    public Mocha(Beverage beverage) {
        this.beverage = beverage;
    }

    public String getDescription() {
        return beverage.getDescription() + ", Mocha";
    }

    public double cost() {
        return .20 + beverage.cost();
    }
}
```

Now we need to compute the cost of our beverage with Mocha. First, we delegate the call to the object we're decorating, so that it can compute the cost; then, we add the cost of Mocha to the result.

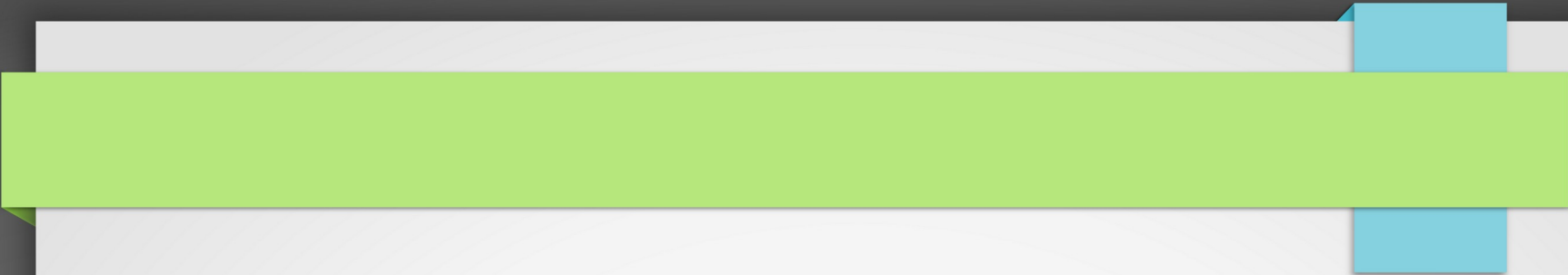
We want our description to not only include the beverage – say “Dark Roast” – but also to include each item decorating the beverage, for instance, “Dark Roast, Mocha”. So we first delegate to the object we are decorating to get its description, then append “, Mocha” to that description.





## Ahora tenemos:

Un diseño resistente al  
cambio y lo  
suficientemente flexible  
para soportar cambios  
en los requerimientos.



Cada componente se puede usar solo o envuelto por un decorador.

Cada decorador HAS-A (envuelve) un componente, lo que significa que el decorador tiene una variable de instancia que contiene una referencia a un componente

# Clase Main

```
public class StarbuzzCoffee {
```

```
    public static void main(String args[]) {  
        Beverage beverage = new Espresso();  
        System.out.println(beverage.getDescription()  
            + " $" + beverage.cost());
```

Order up an espresso, no condiments  
and print its description and cost.

```
        Beverage beverage2 = new DarkRoast();
```

Make a DarkRoast object.  
Wrap it with a Mocha.

```
        beverage2 = new Mocha(beverage2);
```

```
        beverage2 = new Mocha(beverage2);
```

Wrap it in a second Mocha.

```
        beverage2 = new Whip(beverage2);
```

Wrap it in a Whip.

```
        System.out.println(beverage2.getDescription()  
            + " $" + beverage2.cost());
```

```
        Beverage beverage3 = new HouseBlend();
```

```
        beverage3 = new Soy(beverage3);
```

```
        beverage3 = new Mocha(beverage3);
```

```
        beverage3 = new Whip(beverage3);
```

```
        System.out.println(beverage3.getDescription()  
            + " $" + beverage3.cost());
```

Finally, give us a HouseBlend  
with Soy, Mocha, and Whip.

```
    }
```

```
}
```

## Starbuzz Coffee

### Coffees

House Blend	.89
Dark Roast	.99
Decaf	1.05
Espresso	1.99

### Condiments

Steamed Milk	.10
Mocha	.20
Soy	.15
Whip	.10

File Edit Window Help CloudsInMyCoffee

```
% java StarbuzzCoffee
```

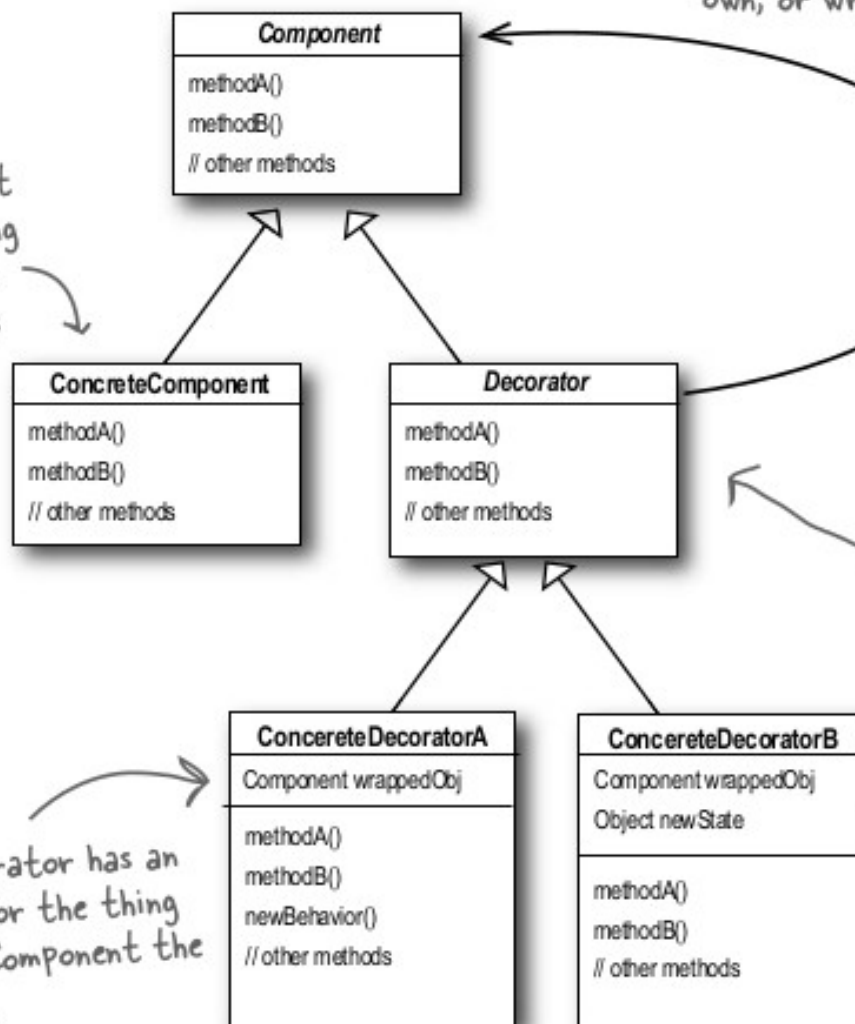
```
Espresso $1.99
```

```
Dark Roast Coffee, Mocha, Mocha, Whip $1.49
```

```
House Blend Coffee, Soy, Mocha, Whip $1.34
```

```
%
```

The ConcreteComponent is the object we're going to dynamically add new behavior to. It extends Component.



Each component can be used on its own, or wrapped by a decorator.

component

Each decorator HAS-A (wraps) a component, which means the decorator has an instance variable that holds a reference to a component.

Decorators implement the same interface or abstract class as the component they are going to decorate.

The ConcreteDecorator has an instance variable for the thing it decorates (the Component the Decorator wraps).

Decorators can extend the state of the component.

# Recuerda

- Adjuntar responsabilidades adicionales a un objeto de forma dinámica.
- Decorator proporciona una alternativa flexible a la subclasificación para ampliar la funcionalidad.