

Design Patterns - Builder Pattern

Builder pattern builds a complex object using simple objects and using a step by step approach. This type of design pattern comes under creational pattern as this pattern provides one of the best ways to create an object.

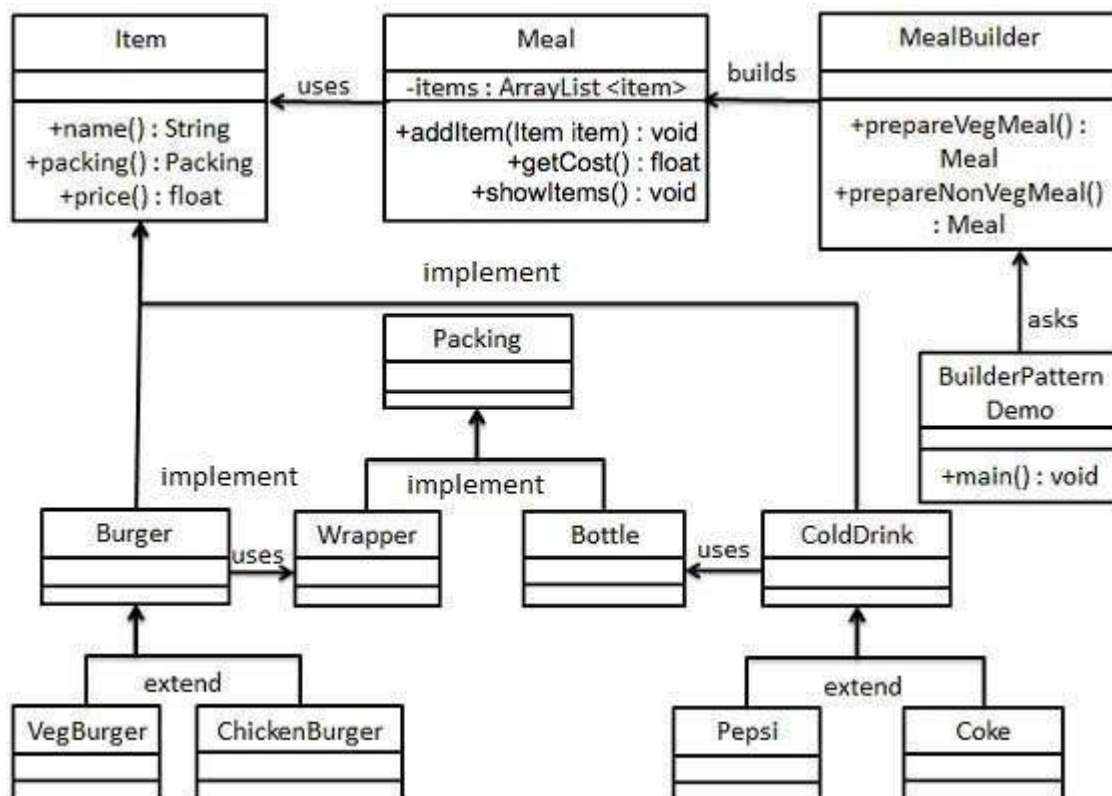
A Builder class builds the final object step by step. This builder is independent of other objects.

Implementation

We have considered a business case of fast-food restaurant where a typical meal could be a burger and a cold drink. Burger could be either a Veg Burger or Chicken Burger and will be packed by a wrapper. Cold drink could be either a coke or pepsi and will be packed in a bottle.

We are going to create an *Item* interface representing food items such as burgers and cold drinks and concrete classes implementing the *Item* interface and a *Packing* interface representing packaging of food items and concrete classes implementing the *Packing* interface as burger would be packed in wrapper and cold drink would be packed as bottle.

We then create a *Meal* class having *ArrayList* of *Item* and a *MealBuilder* to build different types of *Meal* objects by combining *Item*. *BuilderPatternDemo*, our demo class will use *MealBuilder* to build a *Meal*.



Step 1

Create an interface Item representing food item and packing.

Item.java

```
public interface Item {  
    public String name();  
    public Packing packing();  
    public float price();  
}
```

Packing.java

```
public interface Packing {  
    public String pack();  
}
```

Step 2

Create concrete classes implementing the Packing interface.

Wrapper.java

```
public class Wrapper implements Packing {  
  
    @Override  
    public String pack() {  
        return "Wrapper";  
    }  
}
```

Bottle.java

```
public class Bottle implements Packing {  
  
    @Override  
    public String pack() {  
        return "Bottle";  
    }  
}
```

Step 3

Create abstract classes implementing the item interface providing default functionalities.

Burger.java

```
public abstract class Burger implements Item {  
  
    @Override  
    public Packing packing() {  
        return new Wrapper();  
    }  
  
    @Override  
    public abstract float price();  
}
```

ColdDrink.java

```
public abstract class ColdDrink implements Item {  
  
    @Override  
    public Packing packing() {  
        return new Bottle();  
    }  
  
    @Override  
    public abstract float price();  
}
```

Step 4

Create concrete classes extending Burger and ColdDrink classes

VegBurger.java

```
public class VegBurger extends Burger {  
  
    @Override  
    public float price() {  
        return 25.0f;  
    }  
  
    @Override  
    public String name() {  
        return "Veg Burger";  
    }  
}
```

ChickenBurger.java

```
public class ChickenBurger extends Burger {

    @Override
    public float price() {
        return 50.5f;
    }

    @Override
    public String name() {
        return "Chicken Burger";
    }
}
```

Coke.java

```
public class Coke extends ColdDrink {

    @Override
    public float price() {
        return 30.0f;
    }

    @Override
    public String name() {
        return "Coke";
    }
}
```

Pepsi.java

```
public class Pepsi extends ColdDrink {

    @Override
    public float price() {
        return 35.0f;
    }

    @Override
    public String name() {
        return "Pepsi";
    }
}
```

Step 5

Create a Meal class having Item objects defined above.

Meal.java

```
import java.util.ArrayList;
import java.util.List;

public class Meal {
    private List<Item> items = new ArrayList<Item>();

    public void addItem(Item item){
        items.add(item);
    }

    public float getCost(){
        float cost = 0.0f;

        for (Item item : items) {
            cost += item.price();
        }
        return cost;
    }

    public void showItems(){

        for (Item item : items) {
            System.out.print("Item : " + item.name());
            System.out.print(", Packing : " + item.packing().pack());
            System.out.println(", Price : " + item.price());
        }
    }
}
```

Step 6

Create a MealBuilder class, the actual builder class responsible to create Meal objects.

MealBuilder.java

```
public class MealBuilder {

    public Meal prepareVegMeal (){
        Meal meal = new Meal();
        meal.addItem(new VegBurger());
        meal.addItem(new Coke());
        return meal;
    }
}
```

```
public Meal prepareNonVegMeal (){
    Meal meal = new Meal();
    meal.addItem(new ChickenBurger());
    meal.addItem(new Pepsi());
    return meal;
}
}
```

Step 7

BuilderPatternDemo uses MealBuilder to demonstrate builder pattern.

BuilderPatternDemo.java

```
public class BuilderPatternDemo {
    public static void main(String[] args) {

        MealBuilder mealBuilder = new MealBuilder();

        Meal vegMeal = mealBuilder.prepareVegMeal();
        System.out.println("Veg Meal");
        vegMeal.showItems();
        System.out.println("Total Cost: " + vegMeal.getCost());

        Meal nonVegMeal = mealBuilder.prepareNonVegMeal();
        System.out.println("\n\nNon-Veg Meal");
        nonVegMeal.showItems();
        System.out.println("Total Cost: " + nonVegMeal.getCost());
    }
}
```

Step 8

Verify the output.

```
Veg Meal
Item : Veg Burger, Packing : Wrapper, Price : 25.0
Item : Coke, Packing : Bottle, Price : 30.0
Total Cost: 55.0

Non-Veg Meal
Item : Chicken Burger, Packing : Wrapper, Price : 50.5
Item : Pepsi, Packing : Bottle, Price : 35.0
Total Cost: 85.5
```

