SWE-4501: Design Pattern

Decorator Design Pattern

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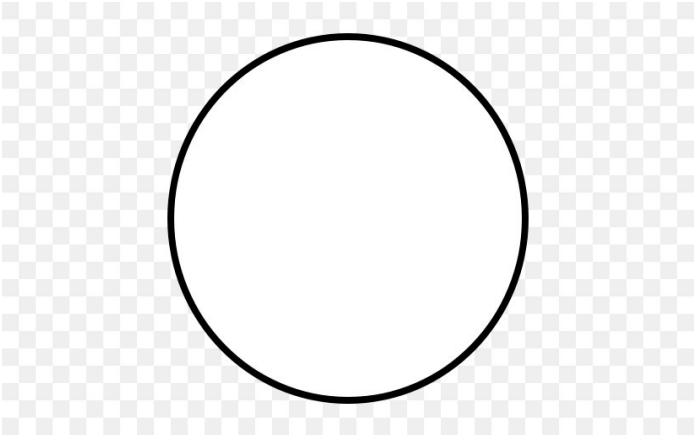
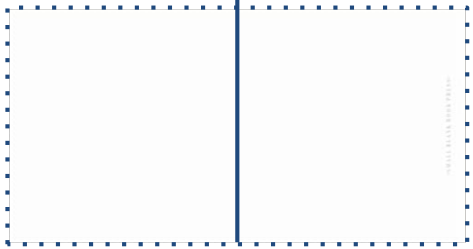
Contents

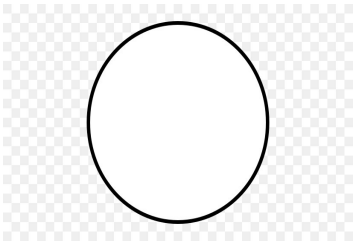
Circle decoration

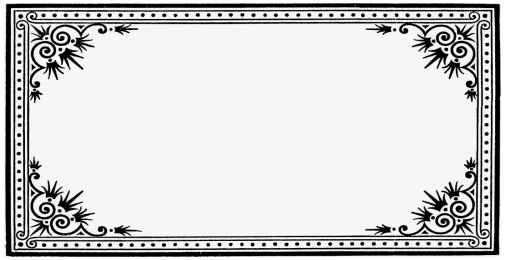
decorate

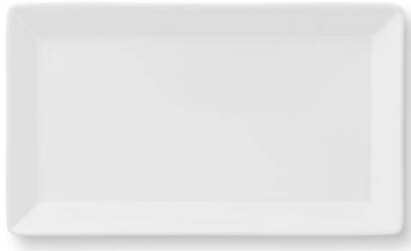


Shape decoration





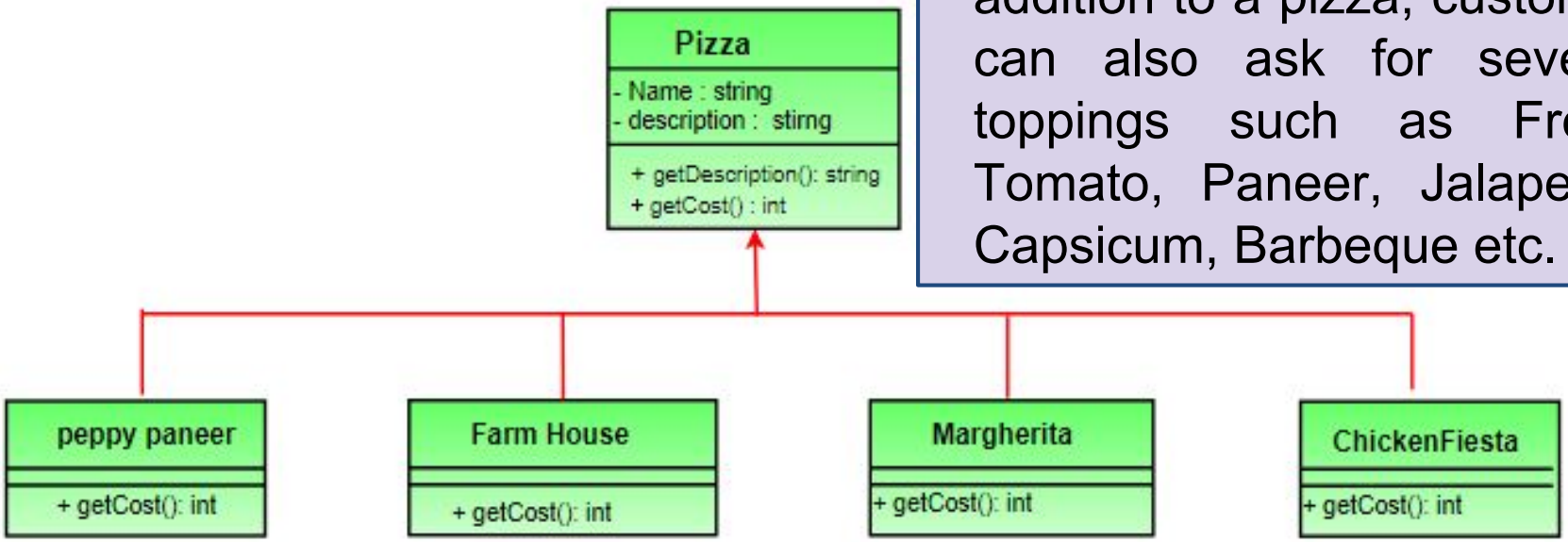




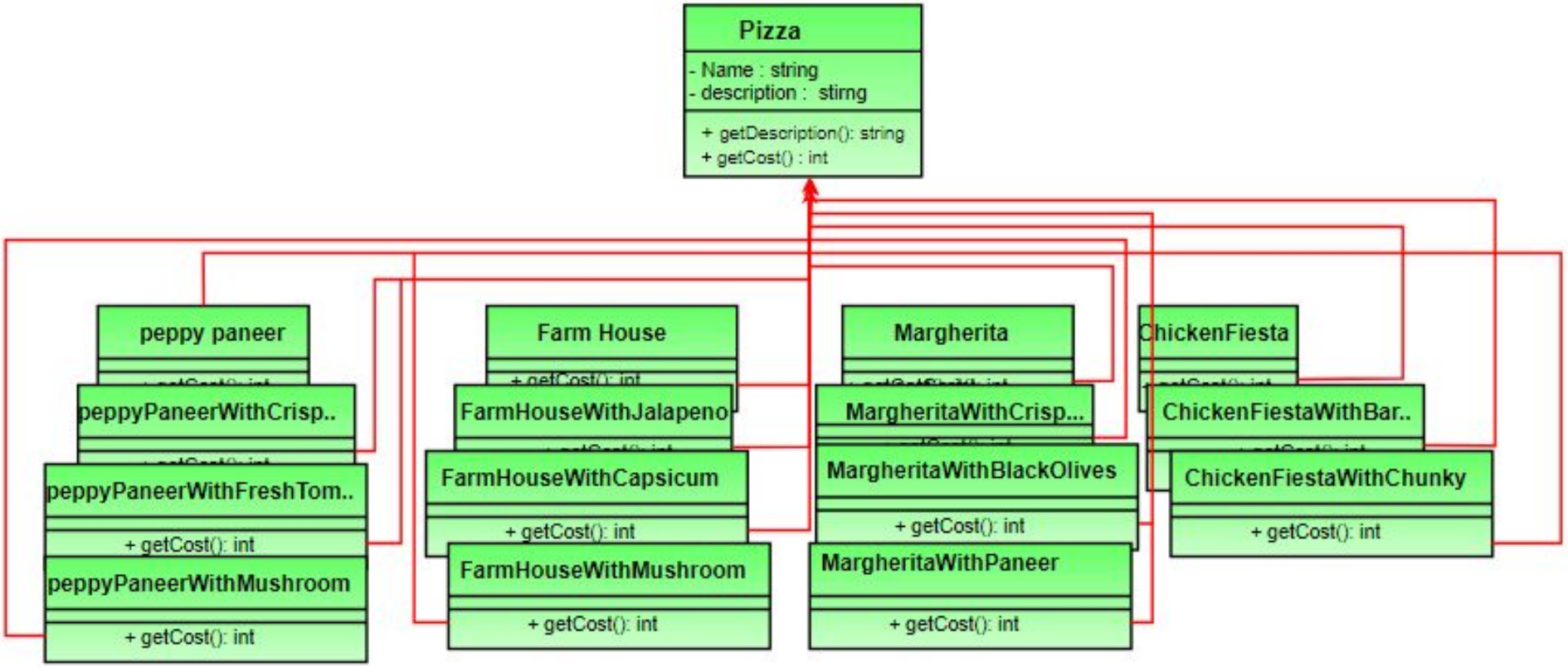
Problem scenario

- Suppose we are building an application for a pizza store that offers four types of pizzas such as Peppy Paneer, Farmhouse, Margherita and Chicken Fiesta. Each pizza has different cost.

New requirement: In addition to a pizza, customer can also ask for several toppings such as Fresh Tomato, Paneer, Jalapeno, Capsicum, Barbeque etc.

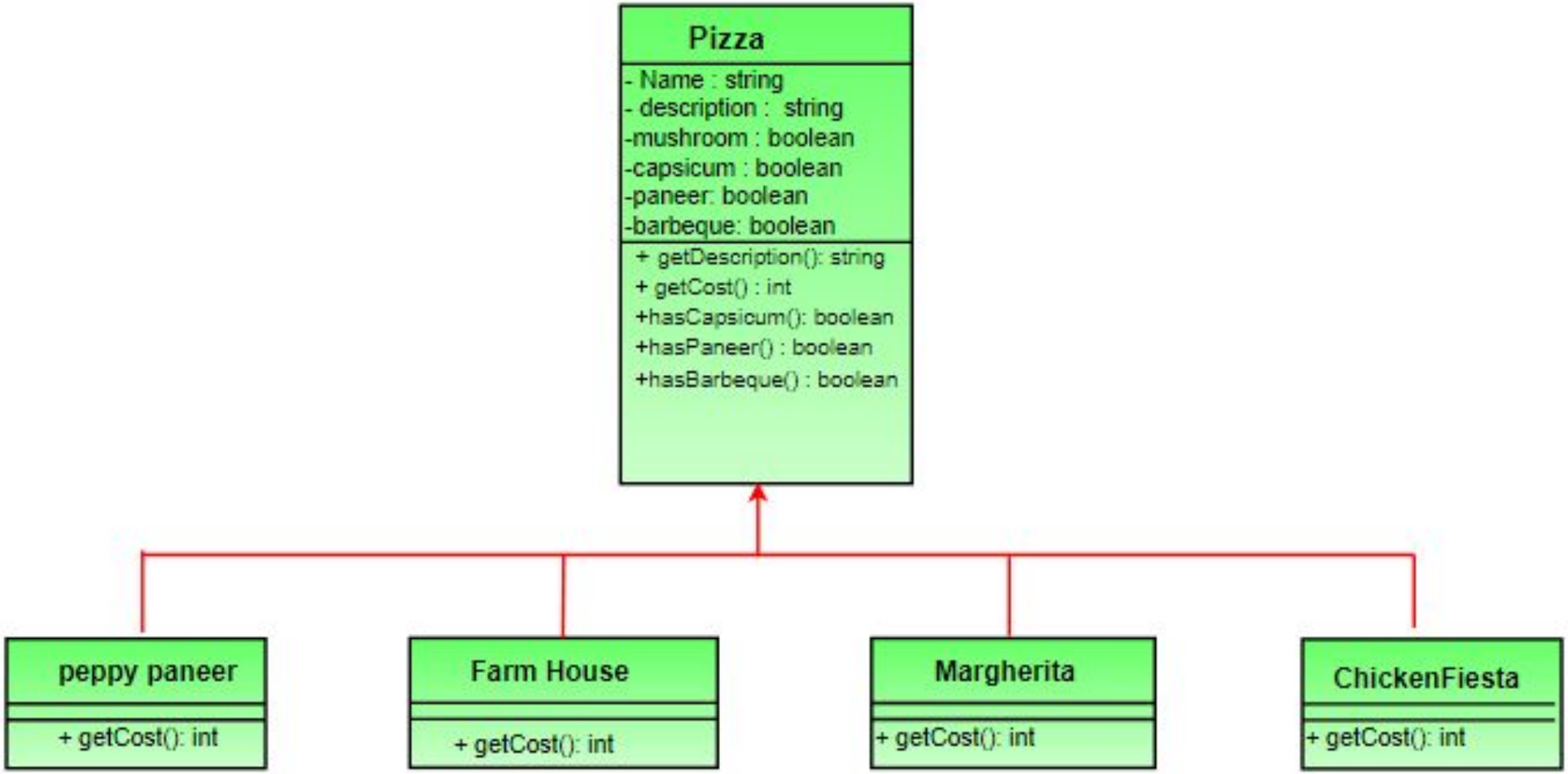


Problem scenario



Class EXPLOSION !!!

Solution option-2



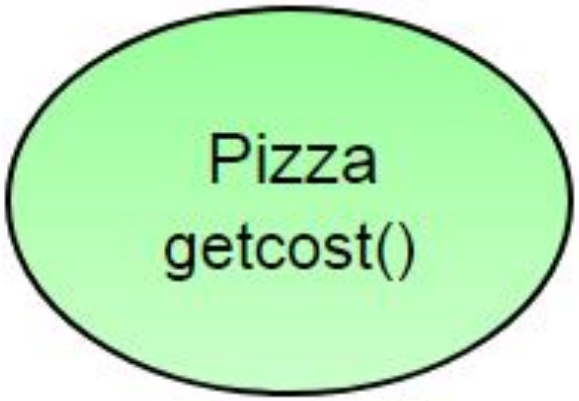
Problems of the solution option-2

- Price changes in toppings will lead to alteration in the existing code.
- New toppings will force us to add new methods and alter getCost() method in superclass.
- For some pizzas, some toppings may not be appropriate yet the subclass inherits them.
- What if customer wants double capsicum or double cheeseburst?

VIOLATE

OPEN CLOSED DESIGN PRINCIPLE

Solution



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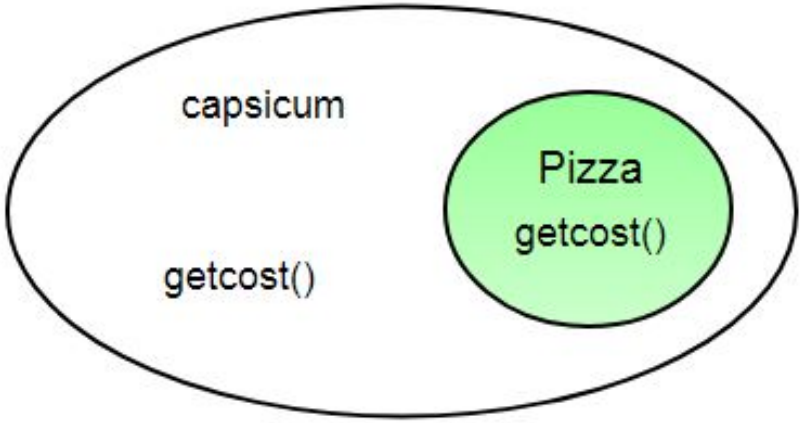
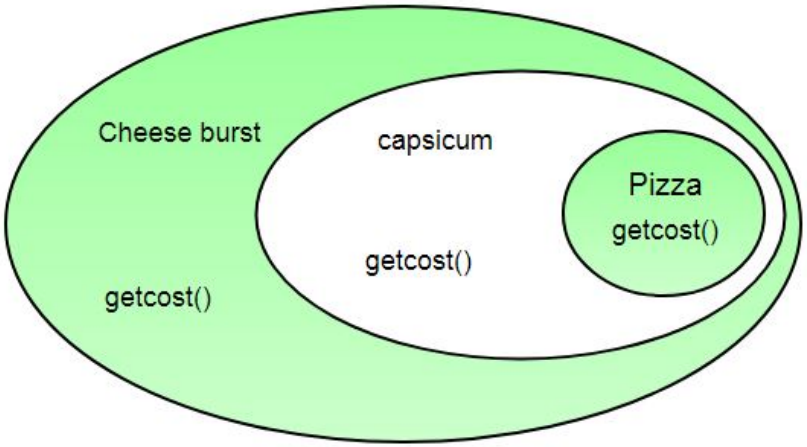


2



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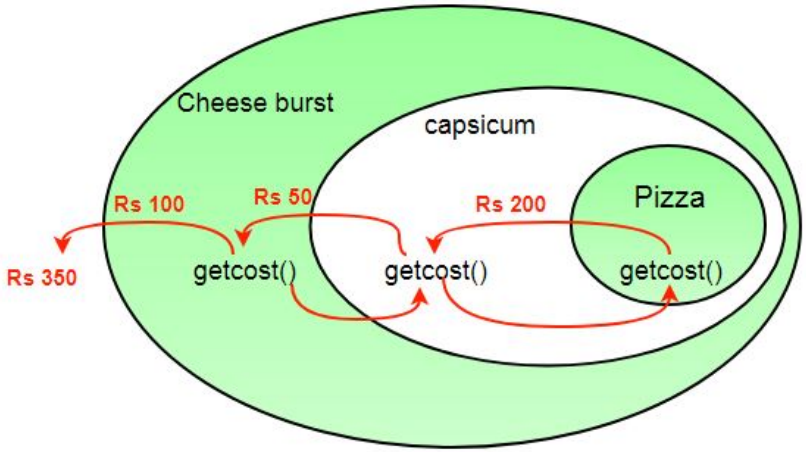
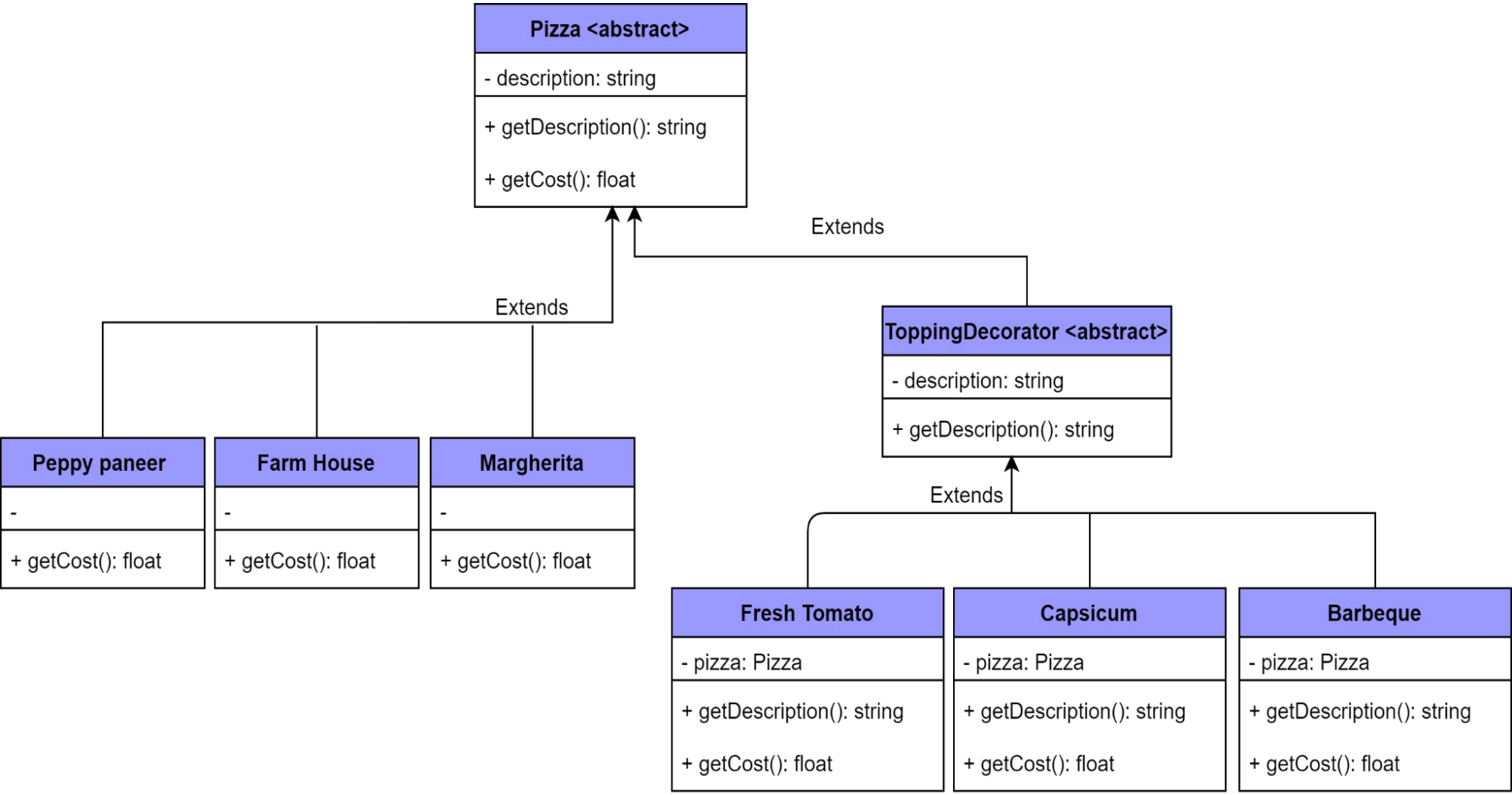


4

Solution


Pizza <abstract>
- description: string
+ getDescription(): string
+ getCost(): float
Extends
Extends
Peppy paneer
-
+ getCost(): float
Farm House
-
+ getCost(): float
Margherita
-
+ getCost(): float
ToppingDecorator <abstract>
- description: string
+ getDescription(): string
Extends
Fresh Tomato
- pizza: Pizza
+ getDescription(): string
+ getCost(): float
Capsicum
- pizza: Pizza
+ getDescription(): string
+ getCost(): float
Barbeque
- pizza: Pizza
+ getDescription(): string
+ getCost(): float

Implementation

```
public abstract class Pizza {
    String description = "Unknown Pizza";

    public String getDescription() {
        return description;
    }

    public abstract float getCost();
}
```

```
public class PeppyPaneer extends Pizza {

    public PeppyPaneer() {
        description = "PeppyPaneer";
    }

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

```
public class FarmHouse extends Pizza {

    public FarmHouse() {
        description = "FarmHouse";
    }

    public double cost() {
        return 0.79;
    }
}
```

```
public abstract class ToppingDecorator extends Pizza {

    public abstract String getDescription();
}
```

```
public class FreshTomato extends ToppingDecorator {
    Pizza pizza;

    public FreshTomato(Pizza pizza) {
        this.pizza = pizza;
    }

    public String getDescription() {
        return pizza.getDescription() + ", FreshTomato";
    }

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

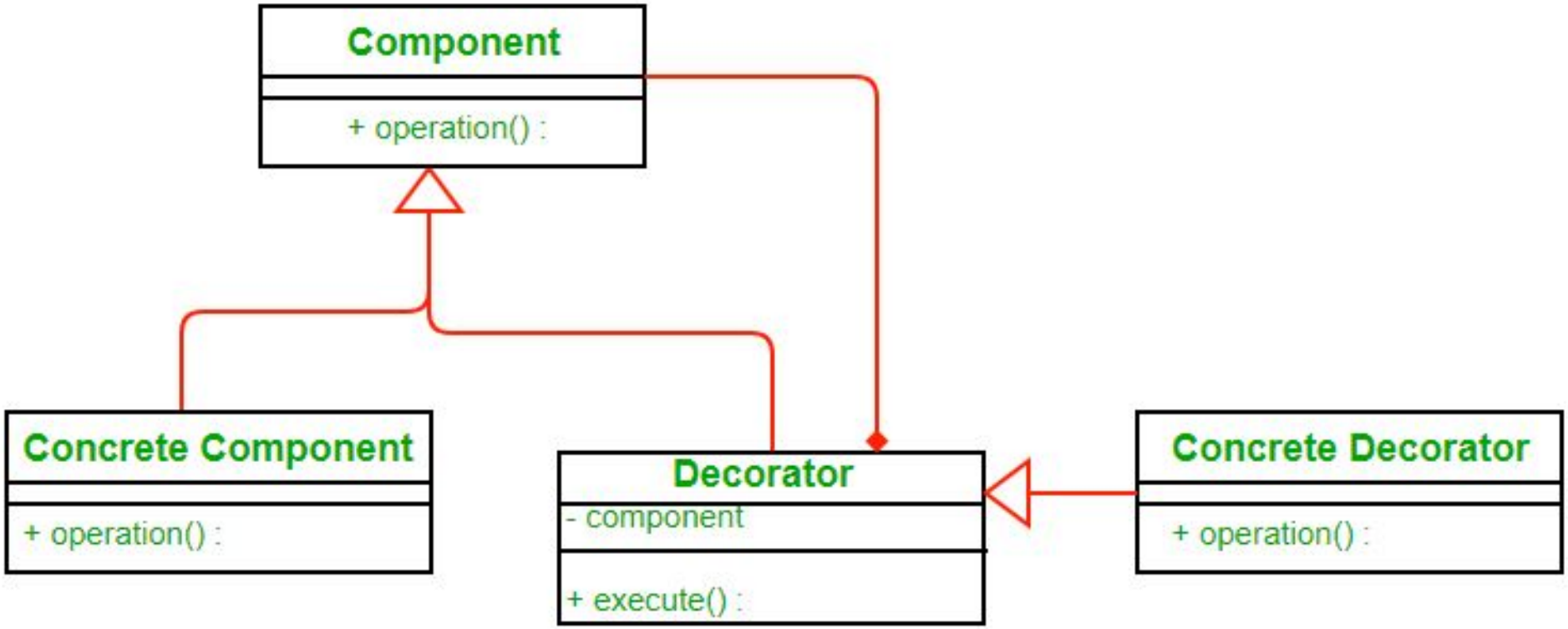
```
public class Capsicum extends ToppingDecorator {
    Pizza pizza;

    public Capsicum(Pizza pizza) {
        this.pizza = pizza;
    }

    public String getDescription() {
        return pizza.getDescription() + ", Capsicum";
    }

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

Decorator Design Pattern



ANY QUESTION ?
THANK YOU !

Acknowledgements

[1] Gamma, Erich. Design patterns: elements of reusable object-oriented software. Addison-Wesley Professional, 1 edition, 1994.

[2] Freeman, Eric, et al. Head first design patterns. " O'Reilly Media, Inc.", 2008.

[3] TutorialsPoint

[4] GeeksforGeeks