소프트웨어 디자인 패턴
프로그램 숙제 1

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목차

1. DependentPizzaStore 버전

DependentPizzaStore 코드는 피자 스타일과 종류에 따라 여러 조건문을 사용하여 구상 클래스의 인스턴스를 생성한다. NY, Chicago, Seoul 스타일을 구분하고, 그에 맞는 피자를 생성하는 방식으로 구현되어 있다. 이와 같이 각 스타일에 맞춘 클래스를 직접 생성하는 방식은 단일 책임 원칙(SRP)을 지키지 못하고, 코드의 변경이 필요할 때마다 전체적인 영향을 줄 수 있다.

기존 코드

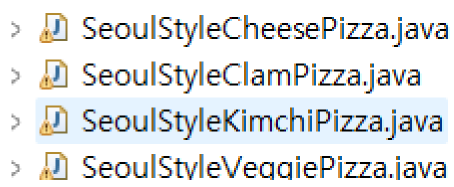
```java
package headfirst.factory.pizzafm;
public class DependentPizzaStore {

	public Pizza createPizza(String style, String type) {
		Pizza pizza = null;
		if (style.equals("NY")) {
			if (type.equals("cheese")) {
				pizza = new NYStyleCheesePizza();
			} else if (type.equals("veggie")) {
				pizza = new NYStyleVeggiePizza();
			} else if (type.equals("clam")) {
				pizza = new NYStyleClamPizza();
			} else if (type.equals("pepperoni")) {
				pizza = new NYStylePepperoniPizza();
			}
		} else if (style.equals("Chicago")) {
			if (type.equals("cheese")) {
				pizza = new ChicagoStyleCheesePizza();
			} else if (type.equals("veggie")) {
				pizza = new ChicagoStyleVeggiePizza();
			} else if (type.equals("clam")) {
				pizza = new ChicagoStyleClamPizza();
			} else if (type.equals("pepperoni")) {
				pizza = new ChicagoStylePepperoniPizza();
			}
		} else {
			System.out.println("Error: invalid type of pizza");
			return null;
		}
		pizza.prepare();
		pizza.bake();
		pizza.cut();
		pizza.box();
```

```
                return pizza;
        }
}
```

위 원래 코드에 아래 부분을 추가했다.

```
                } else if(style.equals("Seoul")) {
                        if (type.equals("Kimchi")) {
                                pizza = new SeoulStyleKimchiPizza();
                        } else if (type.equals("veggie")) {
                                pizza = new SeoulStyleVeggiePizza();
                        } else if (type.equals("clam")) {
                                pizza = new SeoulStyleClamPizza();
                        } else if (type.equals("cheese")) {
                                pizza = new SeoulStyleCheesePizza();
                        }
```

기존 코드에 Seoul 스타일을 추가하면서 조건문에 새로운 스타일과 그에 따른 피자 종류를 추가했다. 아래는 SeoulStyleKimchiPizza 클래스이다:


SeoulStyleCheesePizza.java
SeoulStyleClamPizza.java
SeoulStyleKimchiPizza.java
SeoulStyleVeggiePizza.java

각각의 클래스는 Pizza 인터페이스를 통해 구현하였다.

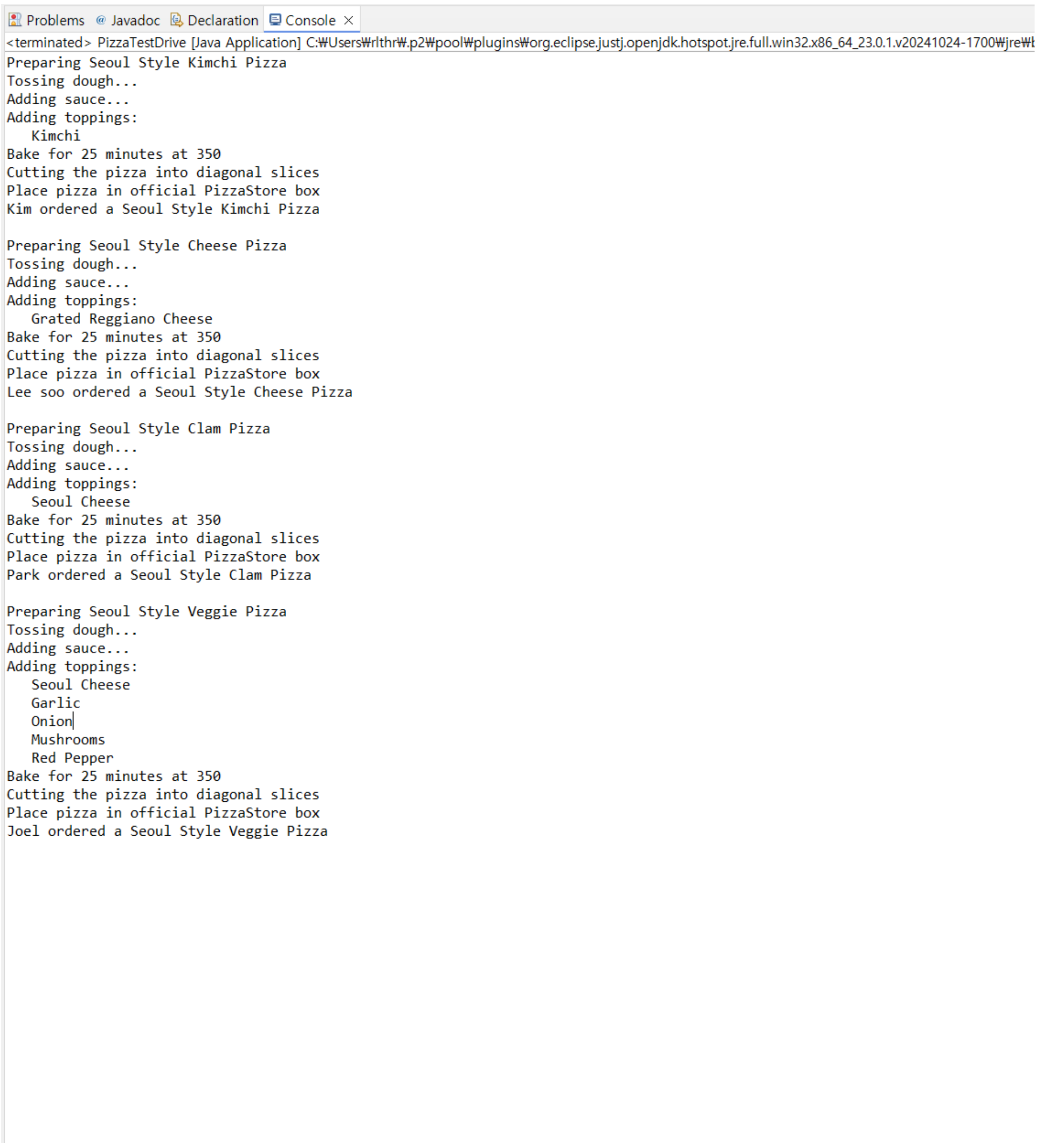
```
package headfirst.factory.pizzafm;
public class SeoulStyleKimchiPizza extends Pizza {

        public SeoulStyleKimchiPizza() {
                name = "Seoul Style Kimchi Pizza";
                dough = "Rice Dough";
                sauce = "Kimchi Sauce";

                toppings.add("Kimchi");
        }
}
```

Dough가 쌀로 만들어졌으며, 김치가 토핑으로 올라간다.

Seoul 지점의 코드를 테스트 하기 위한 테스트 코드이다.

```
package headfirst.factory.pizzafm;
public class PizzaTestDrive {

        public static void main(String[] args) {

                Pizza pizza;
                DependentPizzaStore dependentPizzaStore = new DependentPizzaStore();

                pizza = dependentPizzaStore.createPizza("Seoul", "Kimchi");
                System.out.println("Kim ordered a " + pizza.getName() + "\n");
                pizza = dependentPizzaStore.createPizza("Seoul", "cheese");
                System.out.println("Lee soo ordered a " + pizza.getName() + "\n");

                pizza = dependentPizzaStore.createPizza("Seoul", "clam");
                System.out.println("Park ordered a " + pizza.getName() + "\n");

                pizza = dependentPizzaStore.createPizza("Seoul", "veggie");
                System.out.println("Joel ordered a " + pizza.getName() + "\n");

        }
}
```

실행결과



```
<terminated> PizzaTestDrive [Java Application] C:₩Users₩rlthr₩.p2₩pool₩plugins₩org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_23.0.1.v20241024-1700₩jre₩
Preparing Seoul Style Kimchi Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Kimchi
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Kim ordered a Seoul Style Kimchi Pizza

Preparing Seoul Style Cheese Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Grated Reggiano Cheese
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Lee soo ordered a Seoul Style Cheese Pizza

Preparing Seoul Style Clam Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Seoul Cheese
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Park ordered a Seoul Style Clam Pizza

Preparing Seoul Style Veggie Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Seoul Cheese
   Garlic
   Onion
   Mushrooms
   Red Pepper
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Joel ordered a Seoul Style Veggie Pizza
```

2. Factory Method 가 적용된 버전

Factory Method 를 적용하여 DependentPizzaStore 의 문제점을 해결하려 했다. 핵심은 피자 생성 책임을 각 지역의 피자 가게(PizzaStore 서브클래스)로 분리하는 것이다. 이렇게 하면 새로운 피자 스타일을 추가할 때 각 지역에 맞는 서브클래스만 추가하면 된다

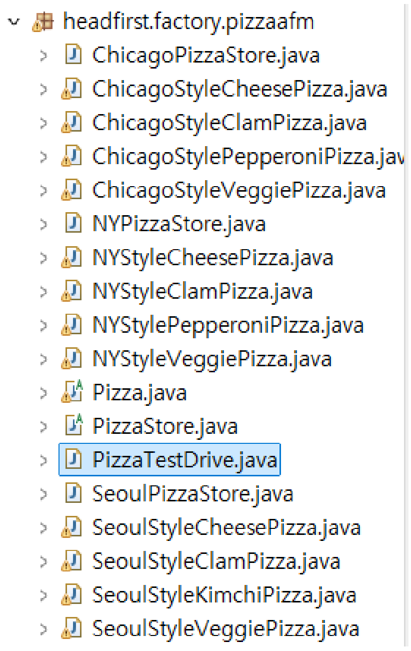
PizzaStore 인터페이스를 통해 SeoulPizzaStore 클래스 추가

```java
package headfirst.factory.pizzaafm;
public abstract class PizzaStore {

         abstract Pizza createPizza(String item);

         public Pizza orderPizza(String type) {
                  Pizza pizza = createPizza(type);
                  System.out.println("--- Making a " + pizza.getName() + " ---");
                  pizza.prepare();
                  pizza.bake();
                  pizza.cut();
                  pizza.box();
                  return pizza;
         }
}
```

SeoulPizzaStore

```java
package headfirst.factory.pizzaafm;
public class SeoulPizzaStore extends PizzaStore {
    @Override
    Pizza createPizza(String type) {
        if (type.equals("Kimchi")) {
           return new SeoulStyleKimchiPizza();
        } else if (type.equals("cheese")) {
           return new SeoulStyleCheesePizza();
        } else if (type.equals("clam")) {
           return new SeoulStyleClamPizza();
        } else if (type.equals("veggie")) {
           return new SeoulStyleVeggiePizza();
        } else {
           return null;
        }
    }
}
```

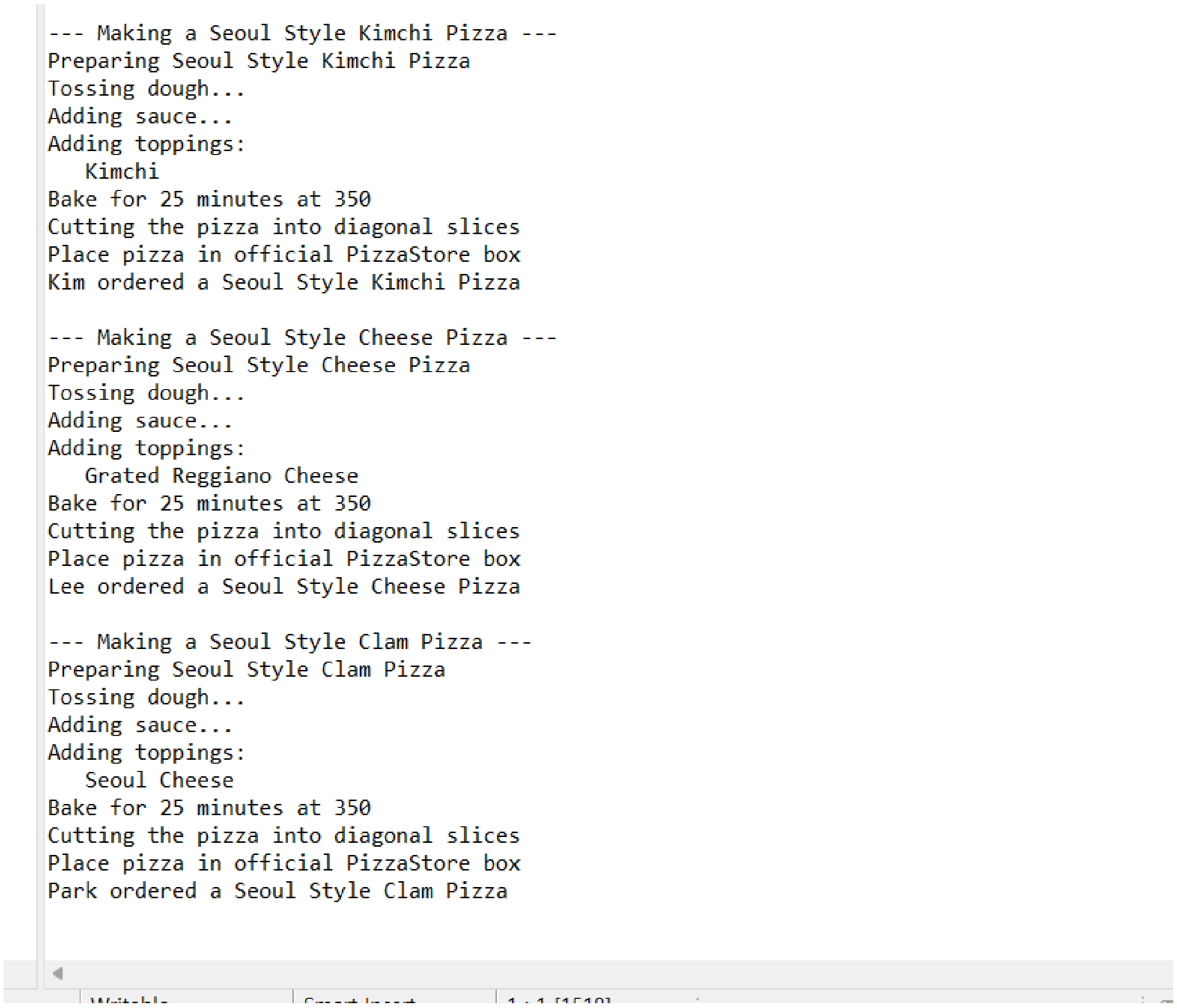
피자를 만드는 과정에서 생성 부분을 추상화하여, 피자 종류가 바뀌더라도 PizzaStore 클래스의 로직은 그대로 유지될 수 있다. 이렇게 함으로써 각 지역의 특색을 반영하는 새로운 피자를 쉽게 추가할 수 있게 된다.


headfirst.factory.pizzaafm
ChicagoPizzaStore.java
ChicagoStyleCheesePizza.java
ChicagoStyleClamPizza.java
ChicagoStylePepperoniPizza.jav
ChicagoStyleVeggiePizza.java
NYPizzaStore.java
NYStyleCheesePizza.java
NYStyleClamPizza.java
NYStylePepperoniPizza.java
NYStyleVeggiePizza.java
Pizza.java
PizzaStore.java
PizzaTestDrive.java
SeoulPizzaStore.java
SeoulStyleCheesePizza.java
SeoulStyleClamPizza.java
SeoulStyleKimchiPizza.java
SeoulStyleVeggiePizza.java

Test Code 추가

```java
package headfirst.factory.pizzaafm;
public class PizzaTestDrive {

	public static void main(String[] args) {
		PizzaStore nyStore = new NYPizzaStore();
		PizzaStore chicagoStore = new ChicagoPizzaStore();
		PizzaStore seoulStore = new SeoulPizzaStore();

		Pizza pizza = nyStore.orderPizza("cheese");
		System.out.println("Ethan ordered a " + pizza.getName() + "\n");

		pizza = chicagoStore.orderPizza("cheese");
		System.out.println("Joel ordered a " + pizza.getName() + "\n");
		pizza = nyStore.orderPizza("clam");
		System.out.println("Ethan ordered a " + pizza.getName() + "\n");

		pizza = chicagoStore.orderPizza("clam");
		System.out.println("Joel ordered a " + pizza.getName() + "\n");
		pizza = nyStore.orderPizza("pepperoni");
		System.out.println("Ethan ordered a " + pizza.getName() + "\n");

		pizza = chicagoStore.orderPizza("pepperoni");
		System.out.println("Joel ordered a " + pizza.getName() + "\n");
		pizza = nyStore.orderPizza("veggie");
		System.out.println("Ethan ordered a " + pizza.getName() + "\n");

		pizza = chicagoStore.orderPizza("veggie");
		System.out.println("Joel ordered a " + pizza.getName() + "\n");

	pizza = seoulStore.orderPizza("Kimchi");
	System.out.println("Kim ordered a " + pizza.getName() + "\n");
	pizza = seoulStore.orderPizza("cheese");
	System.out.println("Lee ordered a " + pizza.getName() + "\n");
	pizza = seoulStore.orderPizza("clam");
	System.out.println("Park ordered a " + pizza.getName() + "\n");
	  }
}
```

실행결과



```
--- Making a Seoul Style Kimchi Pizza ---
Preparing Seoul Style Kimchi Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Kimchi
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Kim ordered a Seoul Style Kimchi Pizza

--- Making a Seoul Style Cheese Pizza ---
Preparing Seoul Style Cheese Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Grated Reggiano Cheese
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Lee ordered a Seoul Style Cheese Pizza

--- Making a Seoul Style Clam Pizza ---
Preparing Seoul Style Clam Pizza
Tossing dough...
Adding sauce...
Adding toppings:
   Seoul Cheese
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Park ordered a Seoul Style Clam Pizza
```

3. Abstract Factory 가 적용된 버전

구상 클래스에 의존하지 않고도 서로 연관되거나 의존적인 객체로 이루어진 제품군을 생산하는 인터페이스 제공한다. 구상 클래스는 서브클래스에서 만들고, 클라이언트와 팩토리에서 생산되는 제품을 분리할 수 있다.

SeoulPizzaIngredientFactory 구현

```java
package headfirst.factory.pizzaaf;
public class SeoulPizzaIngredientFactory implements PizzaIngredientFactory {

    public Dough createDough() {
        return new RiceDough();
    }
    public Sauce createSauce() {
        return new KimchiSauce();
    }

    public Cheese createCheese() {
        return new ParmesanCheese();
    }

    public Veggies[] createVeggies() {
        Veggies[] veggies = {new Garlic(), new Onion(), new Kimchi()};
        return veggies;
    }

    public Pepperoni createPepperoni() {
        return new SlicedPepperoni();
    }

    public Clams createClam() {
        return new FreshClams();
    }

}
```

RiceDough 클래스, KimchiSauce 클래스와 Kimchi 클래스를 추가하였다.

```java
package headfirst.factory.pizzaaf;
public class RiceDough implements Dough {
    public String toString() {
        return "Rice Dough";
    }
}


package headfirst.factory.pizzaaf;
public class KimchiSauce implements Sauce {
    public String toString() {
        return "Kimchi Sauce";
    }
}

package headfirst.factory.pizzaaf;
public class Kimchi implements Veggies {
    public String toString() {
          return "Kimchi";
    }
}
```

SeoulPizzaStore 클래스

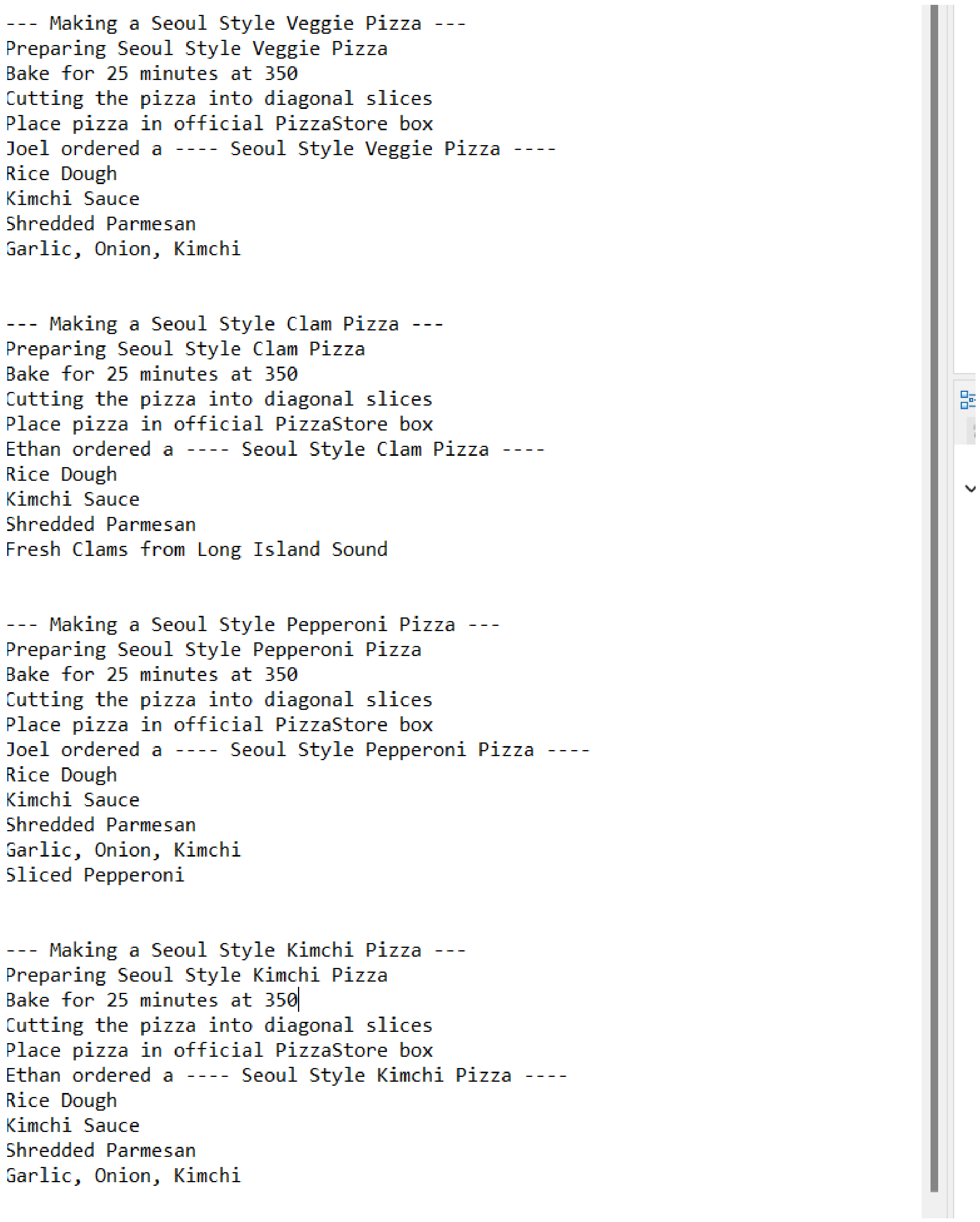
서울 지점의 PizzaStore 에서는 SeoulPizzaIngredientFactory 를 사용하여 피자를 생성한다. 각 피자는 지역 재료 팩토리를 통해 생성된다.

```java
package headfirst.factory.pizzaaf;
public class SeoulPizzaStore extends PizzaStore {
    @Override
    protected Pizza createPizza(String item) {
        Pizza pizza = null;
        PizzaIngredientFactory ingredientFactory =
            new SeoulPizzaIngredientFactory();
        if (item.equals("cheese")) {
            pizza = new CheesePizza(ingredientFactory);
            pizza.setName("Seoul Style Cheese Pizza");
        } else if (item.equals("veggie")) {
            pizza = new VeggiePizza(ingredientFactory);
            pizza.setName("Seoul Style Veggie Pizza");
        } else if (item.equals("clam")) {
            pizza = new ClamPizza(ingredientFactory);
            pizza.setName("Seoul Style Clam Pizza");
        } else if (item.equals("pepperoni")) {
            pizza = new PepperoniPizza(ingredientFactory);
            pizza.setName("Seoul Style Pepperoni Pizza");
        } else if (item.equals("kimchi")) {
            pizza = new KimchiPizza(ingredientFactory);
            pizza.setName("Seoul Style Kimchi Pizza");
        }

        return pizza;
    }
}
```

아래는 테스트 코드이다

```
package headfirst.factory.pizzaaf;
public class PizzaTestDrive {

         public static void main(String[] args) {
                  PizzaStore nyStore = new NYPizzaStore();
                  PizzaStore chicagoStore = new ChicagoPizzaStore();
                  PizzaStore seoulStore = new SeoulPizzaStore();
                Pizza pizza = seoulStore.orderPizza("cheese");
                System.out.println("Ethan ordered a " + pizza + "\n");
                pizza = seoulStore.orderPizza("veggie");
                System.out.println("Joel ordered a " + pizza + "\n");
                pizza = seoulStore.orderPizza("clam");
                System.out.println("Ethan ordered a " + pizza + "\n");
                pizza = seoulStore.orderPizza("pepperoni");
                System.out.println("Joel ordered a " + pizza + "\n");
                pizza = seoulStore.orderPizza("kimchi");
                System.out.println("Ethan ordered a " + pizza + "\n");
         }
}
```

출력결과



```
--- Making a Seoul Style Veggie Pizza ---
Preparing Seoul Style Veggie Pizza
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Joel ordered a ---- Seoul Style Veggie Pizza ----
Rice Dough
Kimchi Sauce
Shredded Parmesan
Garlic, Onion, Kimchi


--- Making a Seoul Style Clam Pizza ---
Preparing Seoul Style Clam Pizza
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Ethan ordered a ---- Seoul Style Clam Pizza ----
Rice Dough
Kimchi Sauce
Shredded Parmesan
Fresh Clams from Long Island Sound


--- Making a Seoul Style Pepperoni Pizza ---
Preparing Seoul Style Pepperoni Pizza
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Joel ordered a ---- Seoul Style Pepperoni Pizza ----
Rice Dough
Kimchi Sauce
Shredded Parmesan
Garlic, Onion, Kimchi
Sliced Pepperoni


--- Making a Seoul Style Kimchi Pizza ---
Preparing Seoul Style Kimchi Pizza
Bake for 25 minutes at 350
Cutting the pizza into diagonal slices
Place pizza in official PizzaStore box
Ethan ordered a ---- Seoul Style Kimchi Pizza ----
Rice Dough
Kimchi Sauce
Shredded Parmesan
Garlic, Onion, Kimchi
```

감사합니다.