Factory Method

A variation on a theme

Recap - The problem with simple factory

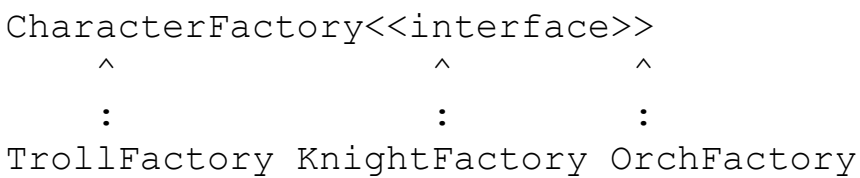
Simple Factory used only one factory class for creating any kind of character (and likewise with the weapon factory).

We had to add cases to the swith-case of the createCharacter method whenever a new concrete character was introduced. That’s a violation of “open-closed”.

We should be open for extension (adding more characters) but closed for modification (we shouldn’t have to modify the factory each time).

Factory Method - an improvement

The factory method pattern (as we interpret it) is an improvement over simple factory, because we add new factories rather than maintaining one single factory.



Client code now chooses the correct factory instead. We can keep adding character classes and corresponding factories.

The CharacterFactory interface becomes simpler

```
public interface CharacterFactory{
  public Character createCharacter(WeaponType    weapon,
                                   String        name);
  public Character createUnarmedCharacter(String name);
}
// No need to specify character type!
```

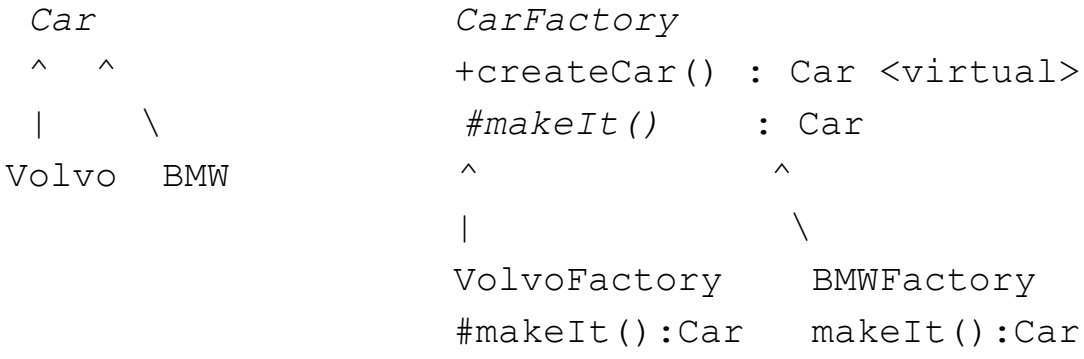
The client code becomes simpler

```
CharacterFactory cFactory =  new TrollFactory();
Character troll = cFactory.createCharacter(WeaponType.CLUB, "Lillfjant");

cFactory = new KnightFactory();
Character sirJames =  cFactory.createCharacter(WeaponType.SWORD, "Sir
James");
Character blackKnight = cFactory
  .createUnarmedCharacter("Fistfighting Black Knight");

cFactory = new OrchFactory();
Character evilOrch = cFactory.createCharacter(WeaponType.SHOTGUN,
                                              "Ugly scary Orch");
Character unarmedOrch = cFactory
  .createUnarmedCharacter("Ugly scary unarmed Orch");
```

Virtual method version




```
Client code:
CarFactory cf = new VolvoFactory();
System.out.println(cf.createCar());
cf = new BMWFactory();
System.out.println(cf.createCar());
```

Virtual method version

```
public abstract class CarFactory{
  // Virtual method - A concrete method which calls an abstract method
  public Car createCar(){
    return makeIt();
  }
  protected abstract Car makeIt(); // Overriding classes decide type
}
```

```
class VolvoFactory extends CarFactory{
  @Override
  protected Car makeIt(){
    return new Volvo();
  }
}
```

```
class BMWFactory extends CarFactory{
  @Override
  protected Car makeIt(){
    return new BMW();
  }
}
```

Virtual method version

```
CarFactory cf = new VolvoFactory();
System.out.println(cf.createCar());
cf = new BMWFactory();
System.out.println(cf.createCar());

// createCar() is inherited “as is”
// it calls the overridden version
// of makeIt()
```

```
class VolvoFactory extends CarFactory{
  @Override
  protected Car makeIt(){
    return new Volvo();
  }
}
```

```
class BMWFactory extends CarFactory{
  @Override
  protected Car makeIt(){
    return new BMW();
  }
}
```