Theory: Covariant return types

16 minutes 0 / 5 problems solved

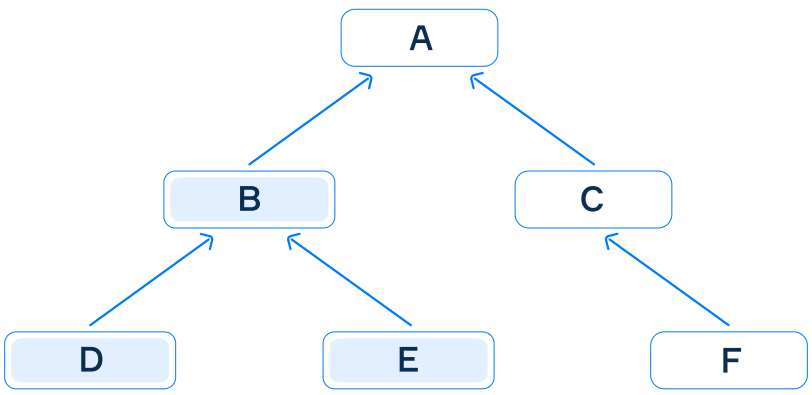
As you already know, **method overriding** is a mechanism for providing new behavior for the superclass method in a subclass method.

Method overriding follows a set of specific rules. When you override a superclass method, the name and parameters of a subclass method have to be exactly the same as that of the superclass method. The situation with the return type, however, is slightly different. The subclass method can return the same type as the superclass method or a subtype of this return type. This feature is known as the **covariant return type**.

§1. How it works

Covariant return type allows you to narrow (but not widen) the return type of the overridden method, that is to make it more specific.

The following picture demonstrates the covariance with respect to the type B. If the superclass method returns B then an overriding subclass method can return B, D or E, but not A, C or F.



Covariance with respect to the type B

Let's consider the following code:

```
class SuperType { }

class SubType extends SuperType { }

class A {

    public SuperType getType() {
        return new SuperType();
    }

}


class B extends A {


    @Override

    public SubType getType() {

        return new SubType();

    }

}
```

In this example, the class `SubType` inherits from `SuperType`. The method `getType` of `A` returns an instance of `SuperType`, but the overridden method `getType` of the class `B` (that extends A) returns an instance of `SubType`. There

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are no compile-time errors, this overriding works perfect.

The next example, though, doesn't compile:

```
class A {

    public SubType getType() {
        return new SubType();
    }
}

class B extends A {


    @Override

    public SuperType getType() {

        return new SuperType();

    }

}
```

Here, the method `getType` of the class `A` returns an instance of `SubType`, while the overridden method `getType` of the class `B` returns an instance of `SuperType`. It's not a covariant return type so this code does not compile.

§2. Summary

Remember, when overriding the return type of a subclass method can be the same type or a subclass of the return type of a superclass method. Covariance is always changing down the hierarchy.

> It is also important to note that the covariant return types are possible only for non-primitive return types.

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