When to bind?

```
void func (Account obj) {
    obj.deposit();
}
```

- What should the compiler do here?
  - The compiler doesn't know which concrete object type is referenced by `obj`
  - the method to call can only be known at run time (*because of polymorphism*)
  - Run-time binding

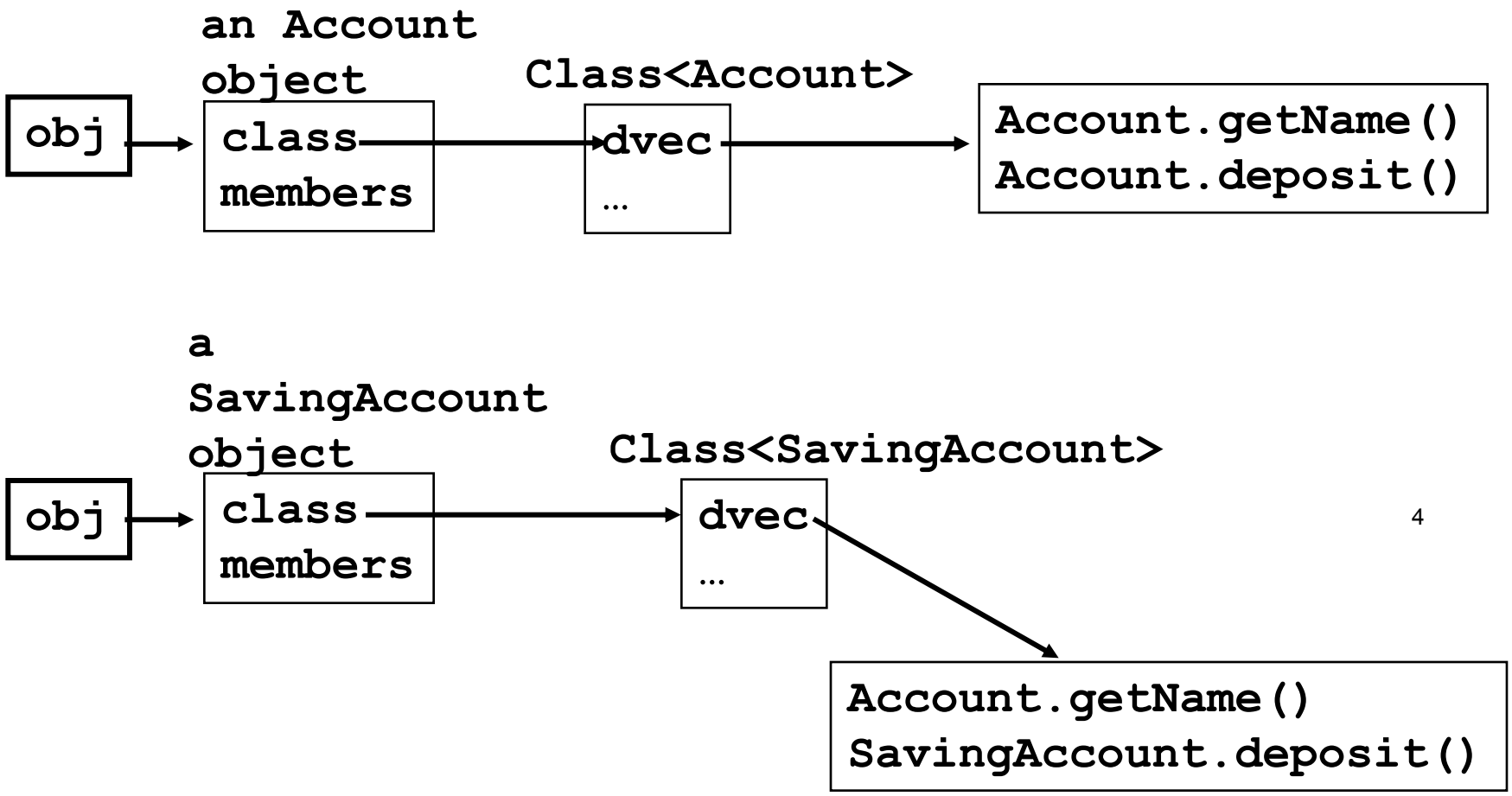
Run-time binding (or late binding)

- Binding
  - The translation of name into memory address
- Run-time binding
  - The translation is done at run-time
  - also known as
    - late binding
    - dynamic binding
    - virtual invocation
- Polymorphism depends on run-time binding

Possible implementation of run-time binding (polymorphism)

- Not necessarily the exact Java implementation
- Each class has a `dvec` (***dispatch vector***)
  - `dvec` contains addresses of the class methods (that can be overriden)
- Every object has a pointer to it's class

Possible implementation of run-time binding (polymorphism)



Dynamic binding – under the hood (simplified)

- Compile `obj.deposit()` to

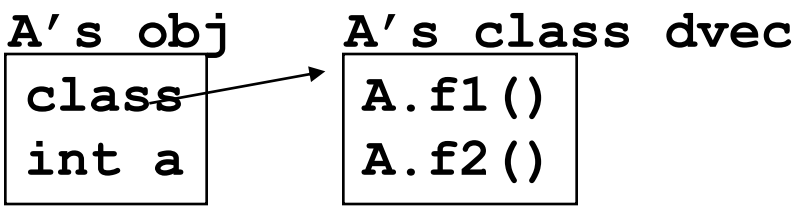
  `obj.class.dvec[1](obj);`

- `obj` is a pointer to the object
- `obj.class` is a pointer to `obj's` runtime class (getClass())
- `obj.class.dvec` is a pointer to `dispatch vector`
- `obj.class.dvec[1]` is the 2nd slot in the `dvec`
- `deposit()` is the second method
- `obj.class.dvec[1](obj)` passes `obj` as '`this`' pointer

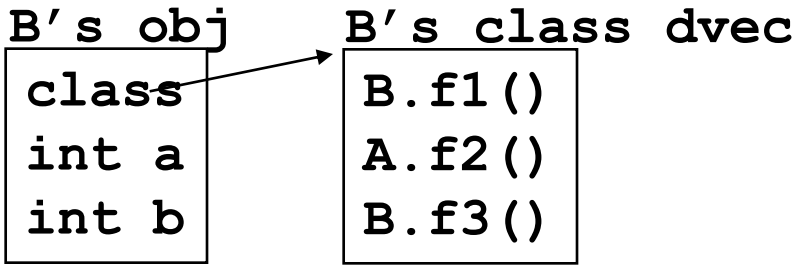
- If `obj` is an `Account`, then `Account.deposit()` is called
- If `obj` is a `SavingAccount`, then `SavingAccount.deposit()` is called

Another example

```
class A {
   public final void f0(){…};
   public void f1(){…};
   public void f2(){…};
   private int a;
}
```




```
class B extends A {
   public void f1();
   public void f3();
   protected int b;
}
```



f0 is a method that can not be inherited
f1() is overridden by B
f2() has not been overridden
f3() is a new method in B