

CSSE 220 Day 16

Inheritance

Check out *Inheritance* from SVN

Questions?

Inheritance

- ▶ Sometimes a new class is a **special case** of the concept represented by another
- ▶ Can “borrow” from an existing class, changing just what we need
- ▶ The new class **inherits** from the existing one:
 - all methods
 - all instance fields



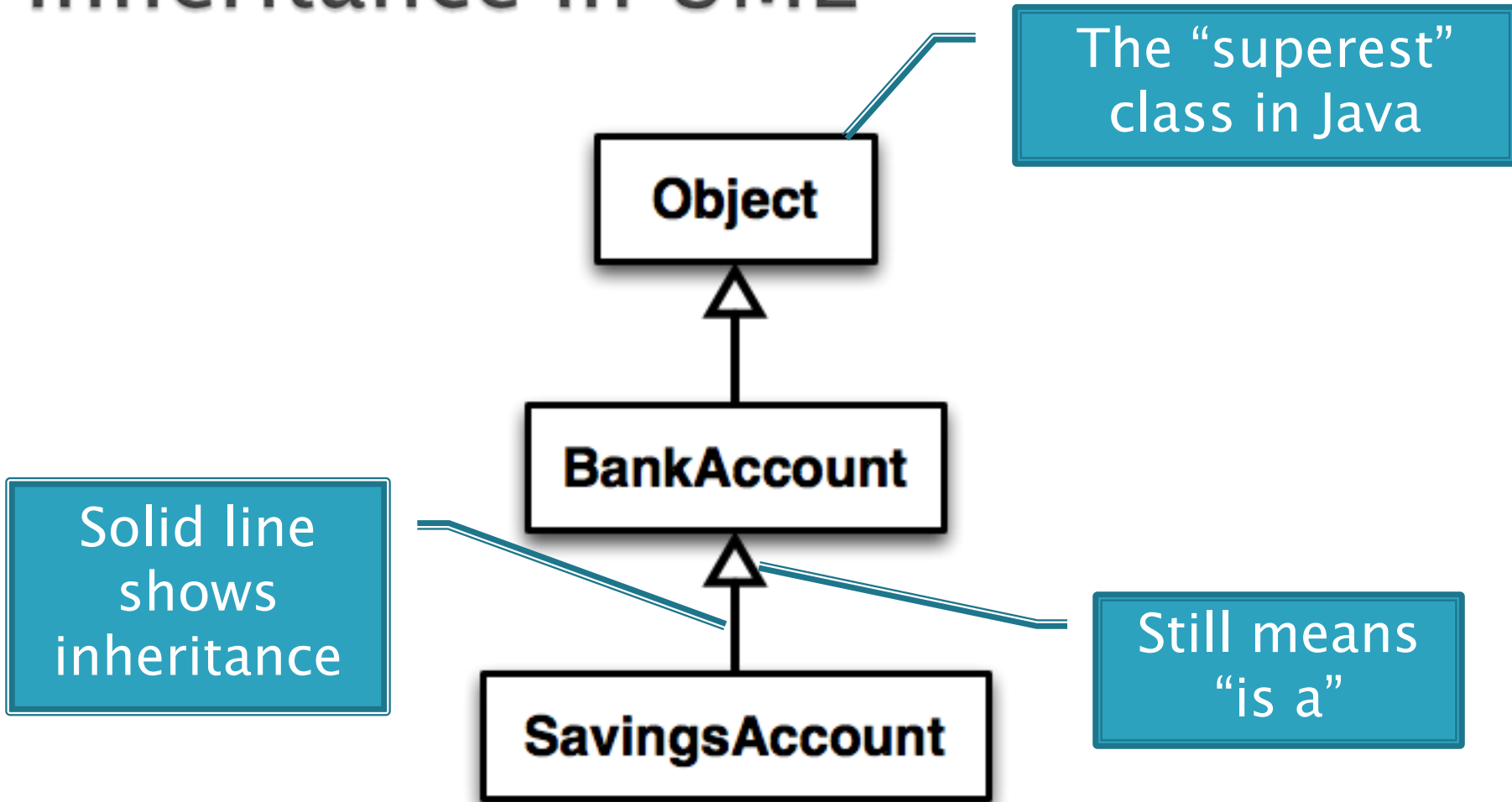
Examples

- ▶ **class SavingsAccount extends BankAccount**
 - adds interest earning, keeps other traits
- ▶ **class Employee extends Person**
 - adds pay info. and methods, keeps other traits
- ▶ **class Manager extends Employee**
 - adds info. about employees managed, changes pay mechanism, keeps other traits

Notation and Terminology

- ▶ `class SavingsAccount extends BankAccount {
 // added fields
 // added methods
}`
- ▶ Say “SavingsAccount **is a** BankAccount”
- ▶ **Superclass**: BankAccount
- ▶ **Subclass**: SavingsAccount

Inheritance in UML



Interfaces vs. Inheritance

▶ `class ClickHandler implements MouseListener`

- ClickHandler **promises** to implement all the methods of MouseListener

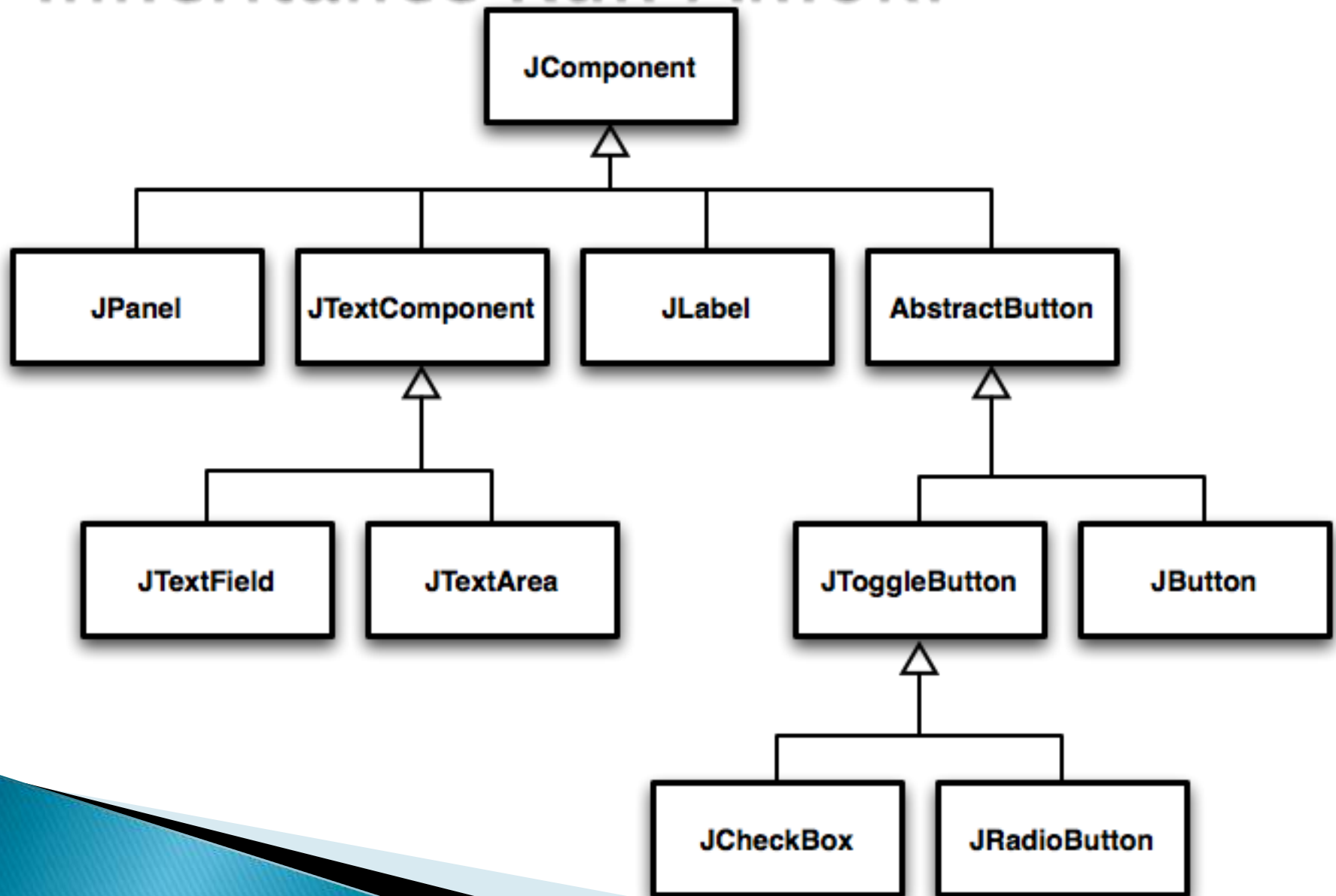
For client code reuse

▶ `class CheckingAccount extends BankAccount`

- CheckingAccount **inherits** (or overrides) all the methods of BankAccount

For implementation code reuse

Inheritance Run Amok?

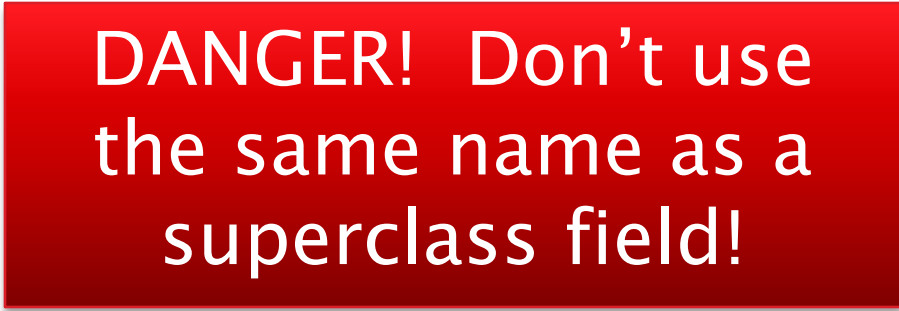


With Methods, Subclasses can:

- ▶ **Inherit** methods **unchanged**
- ▶ **Override** methods
 - Declare a new method **with same signature** to use **instead of superclass method**
- ▶ **Add** entirely new methods not in superclass

With Fields, Subclasses:

- ▶ **ALWAYS inherit** all fields **unchanged**
- ▶ **Can add** entirely new fields not in superclass

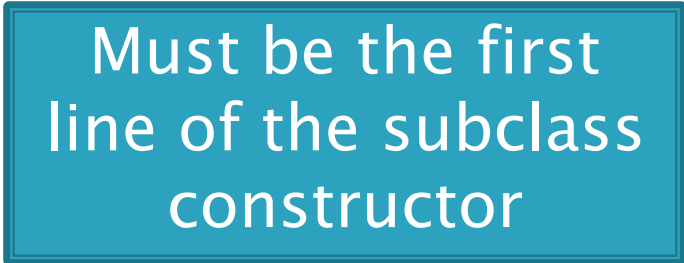


DANGER! Don't use
the same name as a
superclass field!

Super Calls

- ▶ Calling superclass **method**:
 - **`super.methodName(args);`**

- ▶ Calling superclass **constructor**:
 - **`super(args);`**



Must be the first
line of the subclass
constructor

Polymorphism and Subclasses

- ▶ A subclass instance is a superclass instance
 - Polymorphism still works!

- **BankAccount ba = new SavingsAccount();**
ba.deposit(100);

For client code reuse

- ▶ But not the other way around!

- **SavingsAccount sa = new BankAccount();**
sa.addInterest();

- ▶ Why not?

BOOM!

Another Example

- ▶ Can use:

- `public void transfer(double amt, BankAccount o){
 withdraw(amount);
 o.deposit(amount);
}`

in BankAccount

- ▶ To transfer between different accounts:

- `SavingsAccount sa = ...;`
- `CheckingAccount ca = ...;`
- `sa.transfer(100, ca);`

Abstract Classes

- ▶ Hybrid of superclasses and interfaces
 - Like regular superclass:
 - Provide implementation of some methods
 - Like interfaces
 - Just provide signatures and docs of other methods
 - Can't be instantiated

- ▶ Example:

- ```
public abstract class BankAccount {
 /** documentation here */
 public abstract void deductFees();
```

```
}
```

```
...
```



Elided methods as before

# Access Modifiers

## ▶ Review

- **public**—any code can see it
- **private**—only the class itself can see it

## ▶ Others

- **default** (i.e., no modifier)—only code in the same **package** can see it
  - good choice for classes
- **protected**—like default, but subclasses also have access
  - sometimes useful for helper methods



Bad  
for  
fields!

# Work Time

»» Linear Lights Out