CSSE 220 Day 16

Inheritance recap
Object: the superest class of all
Inheritance and text in GUIs

Questions?

Object

▸ **Every** class in Java inherits from **Object**

- ◦ Directly and **explicitly**:
    - `public class String extends Object {…}`

- ◦ Directly and **implicitly**:
    - `class BankAccount {…}`

- ◦ **Indirectly**:
    - `class SavingsAccount extends BankAccount {…}`

Q1

Object Provides Several Methods

- **String toString()**
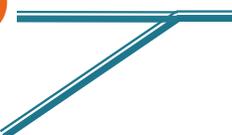
  Often overridden

- **boolean equals(Object otherObject)**

- **Class getClass()**

  Sometimes useful

- **Object clone()**

  Often dangerous!

- …

Q2

Overriding `toString()`

▸ Return a concise, human-readable summary of the object state

▸ Very useful because it's called automatically:
  ◦ During string concatenation
  ◦ For printing
  ◦ In the debugger

▸ **`getClass().getName()`** comes in handy here…

Q3

Overriding `equals(Object o)`

▸ Should return true when comparing two objects of same type with same "meaning"

▸ How?
  ◦ Must check types—use **instanceof**
  ◦ Must compare state—use **cast**

▸ Example…

Q4

Polymorphism

» Review and Practice

Polymorphism and Subclasses

- A subclass instance **is a** superclass instance
  - Polymorphism still works!
  - ```
    BankAccount ba = new SavingsAccount();
    ba.deposit(100);
    ```

- 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){
        this.withdraw(amount);
        o.deposit(amount);
    }
    ```
    in BankAccount
- To transfer between different accounts:
  - ◦ `SavingsAccount sa = …;`
  - ◦ `CheckingAccount ca = …;`
  - ◦ `sa.transfer(100, ca);`

# Summary

- If B extends or implements A, we can write

A x = new B();

Declared type tells which methods x can access. Compile-time error if try to use method not in A.

The actual type tells which class' version of the method to use.

- Can cast to recover methods from B:

((B)x).foo()

Now we can access all of B's methods too.

If x isn't an instance of B, it gives a run-time error (class cast exception)

Q5–7, hand in when done

# BallWorlds

- Single Person Project (since you can work on it over break)
- Ask questions (instructor and TAs).
- Work on Ball Worlds or Linear Lights Out

# BallWorlds Worktime

» Pulsar, Mover, etc.