Inheritance

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Very *Very* Basic Inheritance

- Making a Game

```
public class Dude {
    public String name;
    public  int hp = 100;
    public  int mp = 0;

    public void sayName() {
          System.out.println(name);
    }
    public void punchFace(Dude target) {
          target.hp -= 10;
    }
}
```

Inheritance..

- Now create a Wizard…

```
public class Wizard {
    // ugh, gotta copy and paste
    // Dude's stuff
}
```

Inheritance?

- Now create a Wizard…

But Wait!

A Wizard does and has everything a Dude does and has!

Inheritance?

- Now create a Wizard…

Don’t Act Now!

You don’t have to Copy & Paste!

Buy Inheritance!

- Wizard is a **subclass** of Dude

```
public class Wizard extends Dude {
}
```

Buy Inheritance!

- Wizard can use everything* the Dude has!

```
wizard1.hp += 1;
```

*except for private fields and methods

Buy Inheritance!

- Wizard can do everything* Dude can do!

```
wizard1.punchFace(dude1);
```

*except for private fields and methods

Buy Inheritance!

- You can use a Wizard like a Dude too!

```
dude1.punchface(wizard1);
```

*except for private fields and methods

Buy Inheritance!

- Now augment a Wizard

```
public class Wizard extends Dude {
    ArrayList<Spell> spells;
    public class cast(String spell) {
        // cool stuff here
        ...
        mp -= 10;
    }
}
```

Inheriting from inherited classes

- What about a Grand Wizard?

```
public class GrandWizard extends Wizard {
    public void sayName() {
      System.out.println("Grand wizard" + name)
    }
}

grandWizard1.name = "Flash"
grandWizard1.sayName();
((Dude)grandWizard1).sayName();
```

How does Java do that?

- What Java does when it sees

```
grandWizard1.punchFace(dude1)
```

1. Look for `punchFace()` in the GrandWizard class
2. It's not there! Does GrandWizard have a parent?
3. Look for `punchFace()` in Wizard class
4. It's not there! Does Wizard have a parent?
5. Look for `punchFace()` in Dude class
6. Found it! Call `punchFace()`
7. Deduct hp from dude1

How does Java do that? pt2

- What Java does when it sees

```
((Dude)grandWizard1).sayName()
```

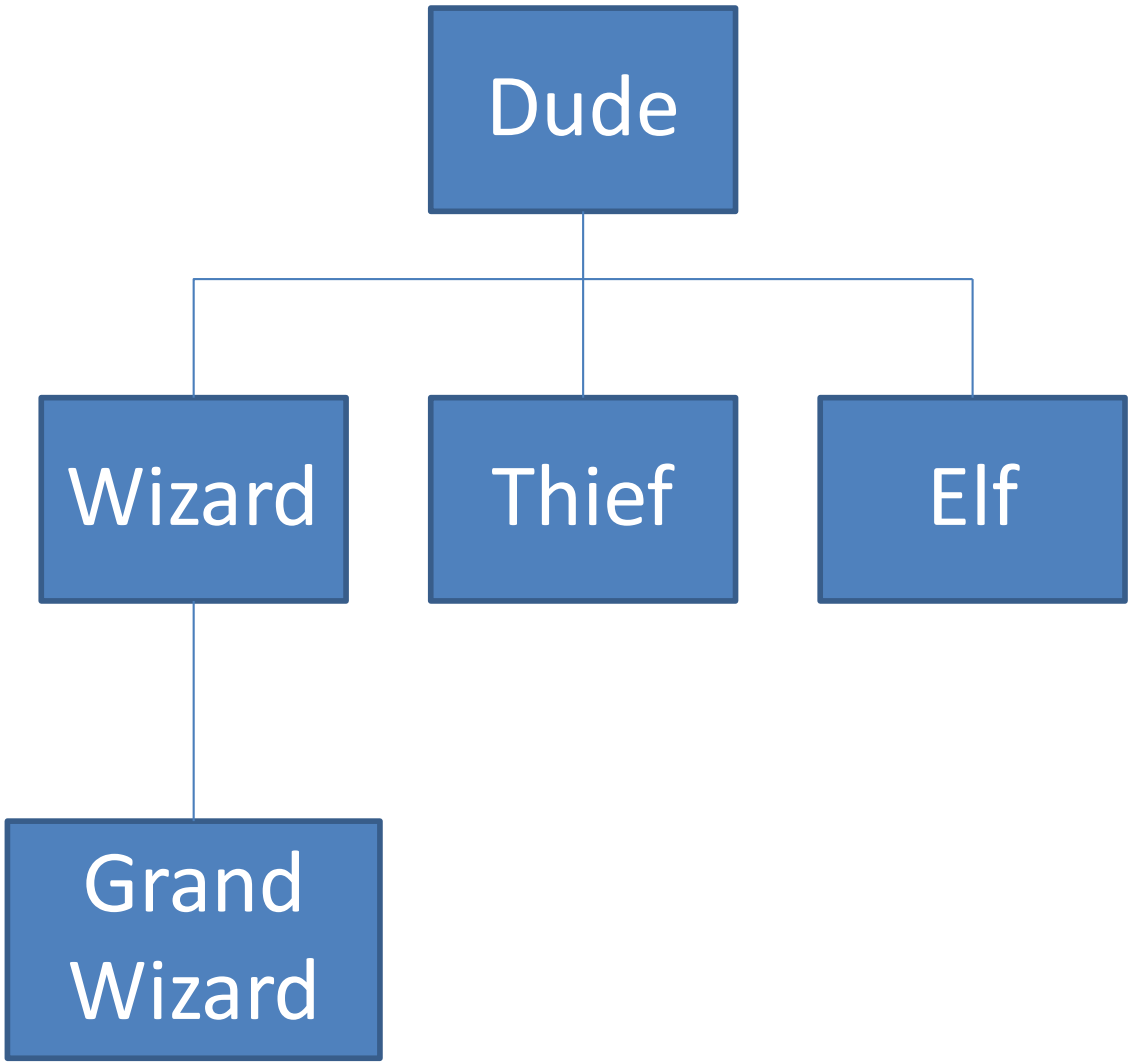
1. Cast to `Dude` tells Java to start looking in `Dude`
2. Look for `sayName()` in Dude class
3. Found it! Call `sayName()`

What's going on?

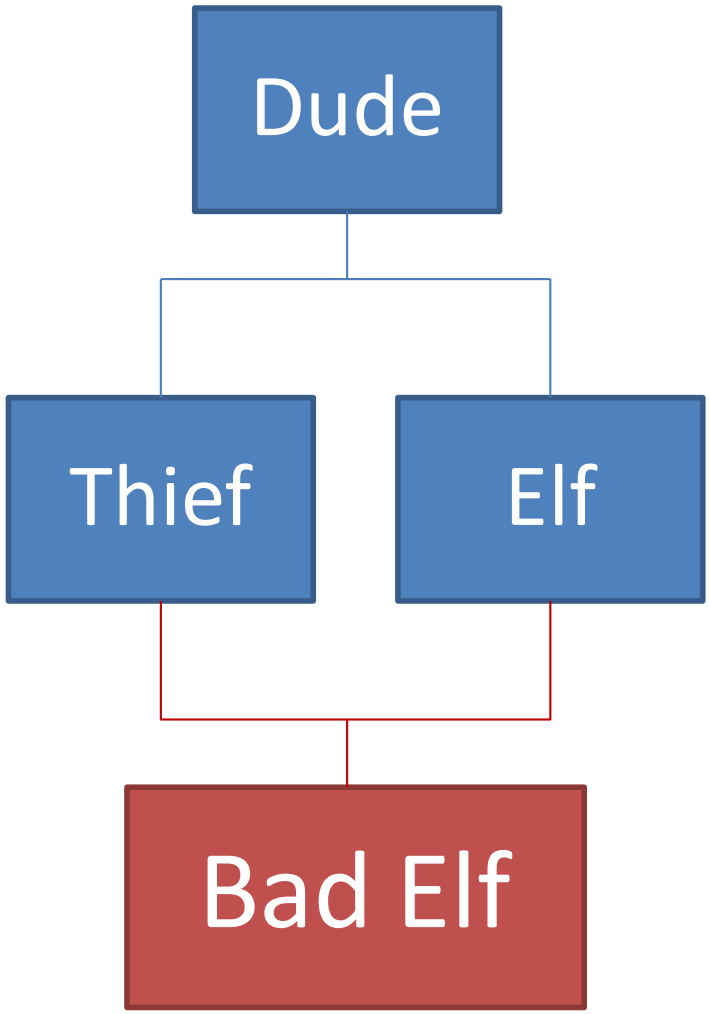
Parent of Wizard, Elf..

Subclass of Dude

Subclass of Wizard



You can only inherit from one class



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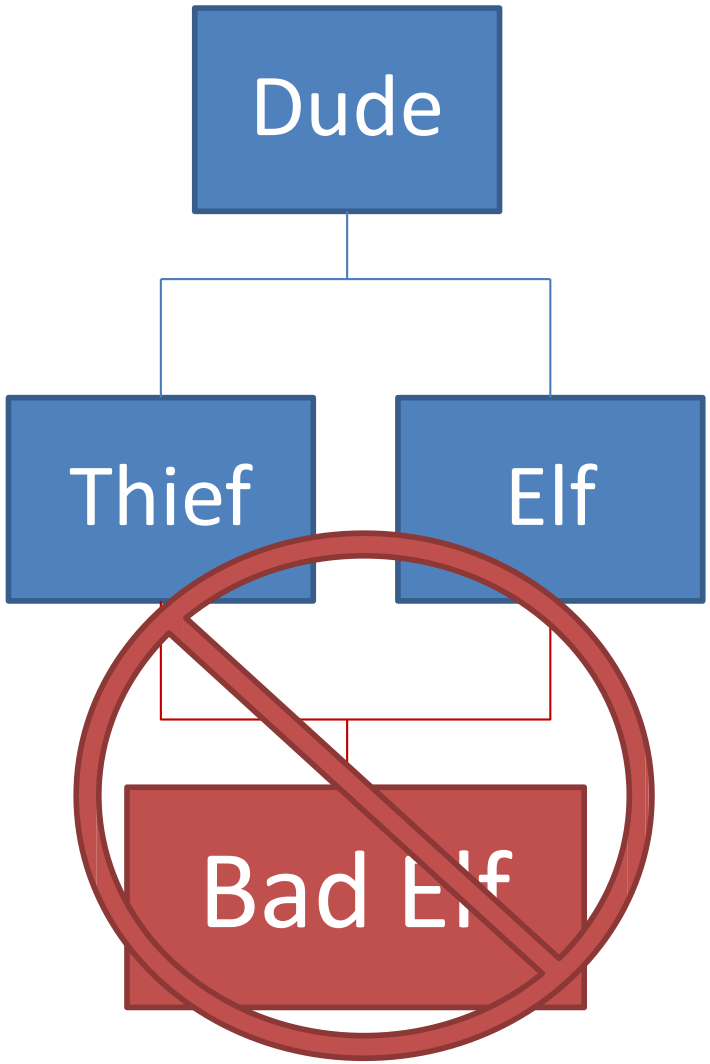


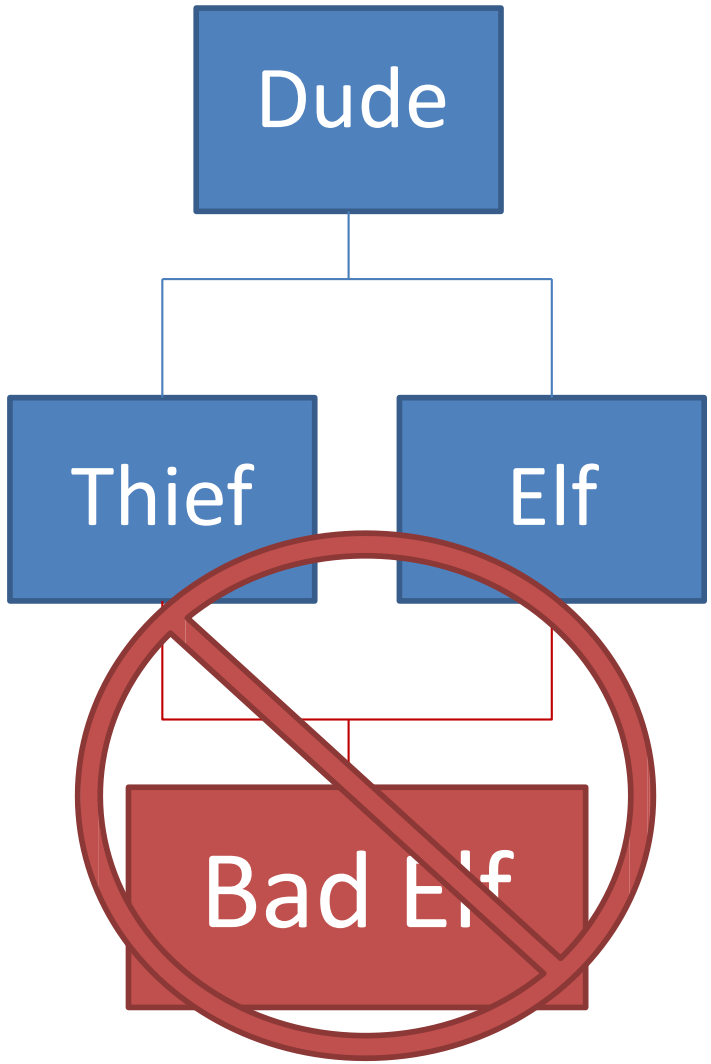
You can only inherit from one class

What if Thief and Elf both implement

```
public void sneakUp()
```

If they implemented differently, which `sneakUp()` does BadElf call?

Java Doesn't Know!!



Inheritance Summary

- class A extends B {} == A is a subclass of B
- A has all the fields and methods that B has
- A can add it's own fields and methods
- A can only have 1 parent
- A can replace a parent's method by re-implementing it
- If A doesn't implement something Java searches ancestors

LAB#5-1 Family Simulation

- Simulate your family's earning and spending for this month.
  - Discuss your family earning and spending structure
    - Who earn money?
    - How many do family members spending it?
    - Is there any regulations or characteristics?
  - Select one's family
  - Create more classes and their inheritance
  - Simulate the earning and spending of your family, using the main method.

LAB#5-2 Animal Sound

- Exercise method overriding using animals' hierarchy:
  - Parent class: Animal
  - Child classes: Dog, Cat, Cow, Lion
  - Their methods: bark()

- Create each class for each animal
- Create the bark() method in the Animal class
- Make each class inherit the method from Animal
- Implement the bark() method in each class

These slides are from:

- 6.092 Introduction to Programming in Java, January (IAP) 2010, MIT OpenCourseWare http://ocw.mit.edu

So much more to learn!

- http://java.sun.com/docs/books/tutorial/java/IandI/subclasses.html
- http://home.cogeco.ca/~ve3ll/jatutor5.htm
- http://en.wikipedia.org/wiki/Inheritance_(computer_science)
- http://www.google.com