Why Bother With Inheritance?
Declared Type and Actual Type

```java
DeclaredType varName = new ActualType(...);
```

Employee headChef = new Chef("Julia Child");  
Declared Type: Employee  
Actual Type: Chef

Chef headChef = new Chef("Julia Child");  
Declared Type: Chef  
Actual Type: Chef

Can call methods that makes sense for EVERY Employee  
If Chef overrides a method, uses the Chef version

Can call methods that makes sense for EVERY Chef  
If Chef overrides a method, uses the Chef version
Inheritance and Method Calls

Employee headChef = new Chef("Julia Child");
headChef.cookFood("potatoes");

When compiling:

Can we guarantee that the method exists for the declared type?

Does the declared type or one of its super classes contain a method of that name?

If not... Compile Error!
Overrides and Method Calls

When running:

Use the *most specific* version of the method call starting from the *actual type*.

Start from the *actual type*, then go “up” to super classes until you find the method. Run that first-discovered version.

```
Employee headChef = new Chef("Julia Child");
headChef.getHourlyRate();
```
Casting and Method Calls

Employee headChef = new Chef("Julia Child");
((Chef) headChef).cookFood("potatoes");

When compiling:

Can we guarantee that the method exists for the Cast-to type?

Does the Cast-to type or one of its super classes contain a method of that name?

If not... Compile Error!

When Running:

Check that the Cast-to Type is either the Actual Type, or one of its super classes
public class Employee
    public int getHours()
    public int getVacationDays()
    public String toString()

public class HealthcareWorker extends Employee
    public String getHospital()
    public String toString()
    public int getHours()

public class Doctor extends HealthcareWorker
    public void takePulse()
    public void takePulse(String patient)
    public String toString()

public class Surgeon extends Doctor
    public void performSurgery()
    public String toString()

public class Lawyer extends Employee
    public void argue()
    public String toString()
    public int getHours()

public class Astronaut extends Employee
    public void takeoff()
    public String toString()
    public int getHours()
public class Employee
   public int getHours()
   public int getVacationDays()
   public String toString()

public class HealthcareWorker extends Employee
   public String getHospital()
   public String toString()
   public int getHours()

public class Astronaut extends Employee
   public void takeoff()
   public String toString()
   public int getHours()

public class PhysicalTherapist extends HealthcareWorker
   public String toString()

public class Doctor extends HealthcareWorker
   public void takePulse()
   public void takePulse(String patient)
   public String toString()

public class Surgeon extends Doctor
   public void performSurgery()
   public String toString()

public class Lawyer extends Employee
   public void argue()
   public String toString()
   public int getHours()

public class Astronaut extends Employee
   public void takeoff()
   public String toString()
   public int getHours()