COMP 110/L Lecture 19

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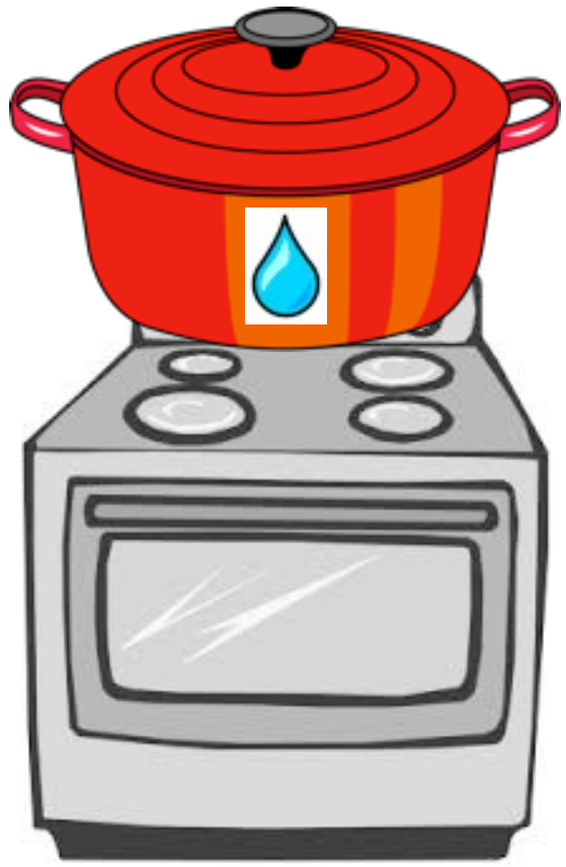
Slides adapted from Dr. Kyle Dewey

Outline

- Inheritance
  - `extends`
  - `super`
- Method overriding
- Automatically-generated constructors

Inheritance

Recap



Mammal

Mammal

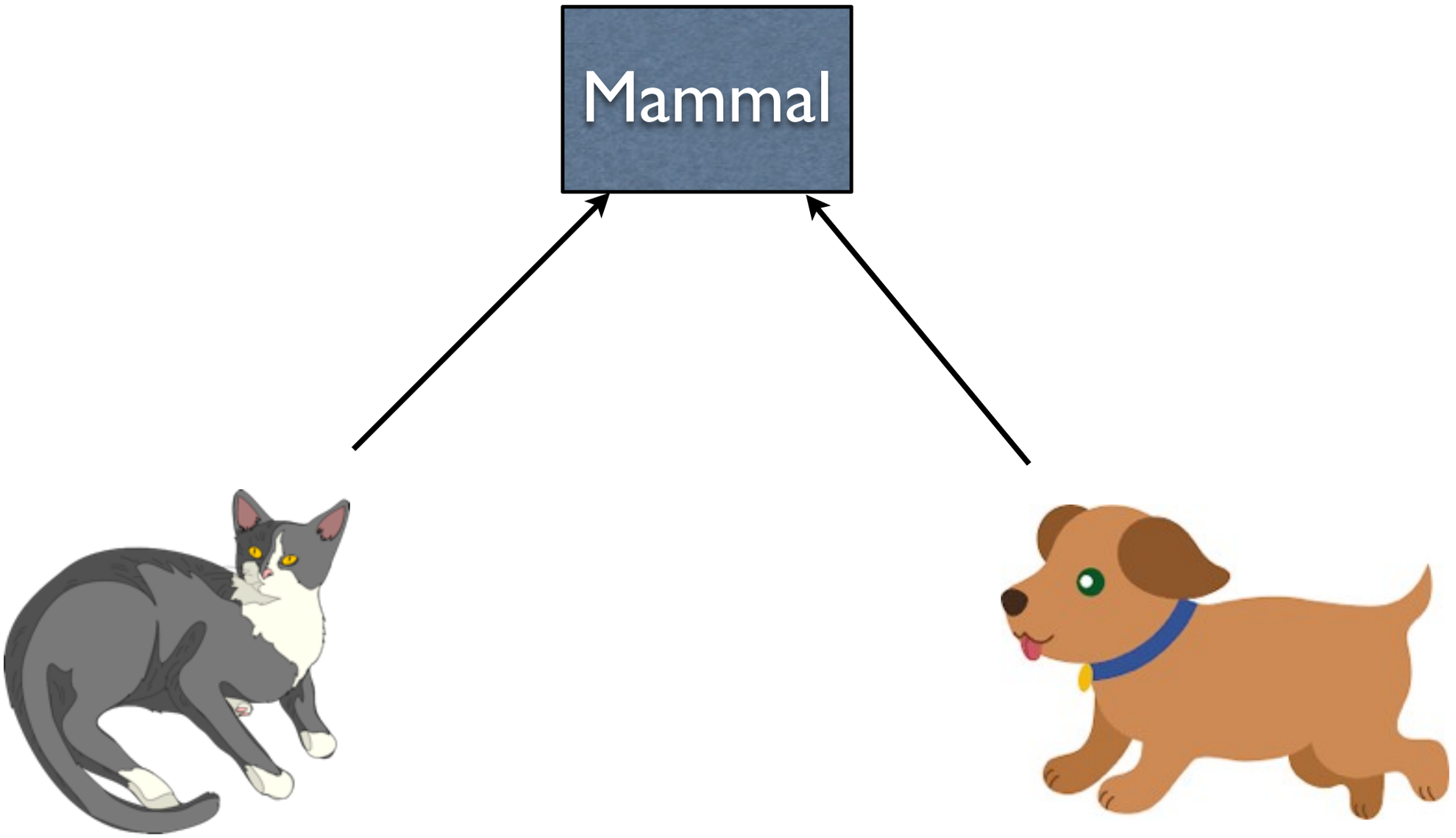
Mammal

Mammal

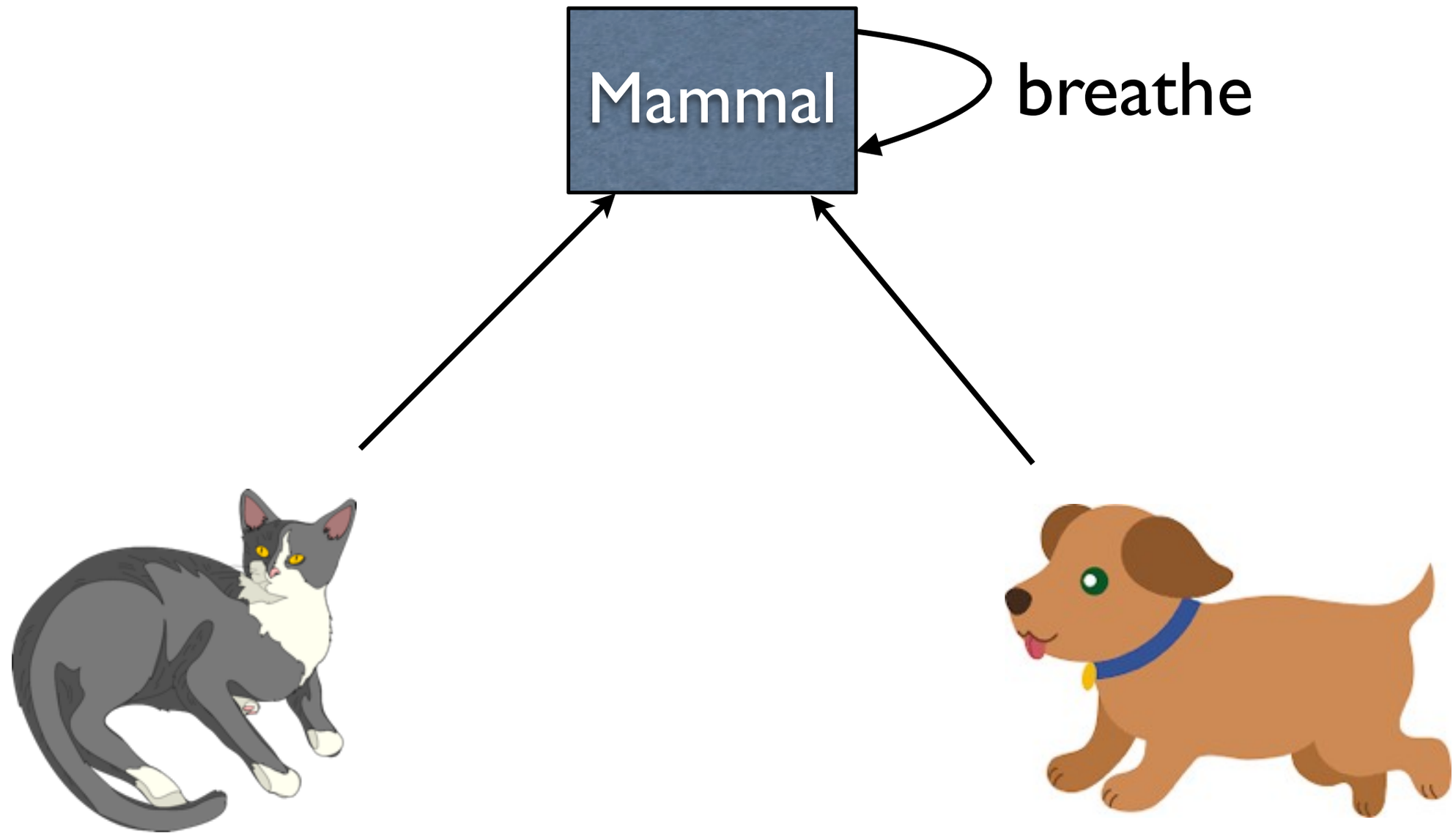
breathe

breathe

Inheritance



Inheritance



extends

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States that a *subclass* inherits from a *parent* class

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```
public class Mammal {
   ...
}
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```
public class Mammal {
   ...
}
```

```
public class Cat extends Mammal {
   ...
}
```

extends

States that a *subclass* inherits from a *parent* class

```
public class Mammal {
   ...
}
```

```
public class Cat extends Mammal {
   ...
}
```

```
public class Dog extends Mammal {
   ...
}
```

super

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Used to invoke the constructor of the parent class.
Another name for the parent class is the *superclass*.

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```
public class BaseClass {
   public BaseClass(String s) {...}
}
```

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Another name for the parent class is the *superclass*.

```
public class BaseClass {
   public BaseClass(String s) {...}
}
```

```
public class Child extends BaseClass {
   public Child(String s) {
      super(s);
   }
}
```

Example

- `Mammal.java`
- `Cat.java`
- `Dog.java`
- `MammalMain.java`

Method Overriding

`toString()` Revisit

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```
public String toString() {
   ...
}
```

`toString()` Revisit

```
public String toString() {
   ...
}
```

```
Rectangle(3, 4)
```

`toString()` **Revisit**

```
public String toString() {
   ...
}
```

```
Rectangle(3, 4)
```

```
Rectangle@302b09c9
```

`toString()` **Revisit**

```
public String toString() {
   ...
}
```

```
Rectangle(3, 4)
```

```
Rectangle@302b09c9
```

Key point: even without `toString()` defined, a `String` was still produced.

Base `toString()` Origin

- All classes inherit from `Object`, **even if** you don't explicitly say so
- `Object` defines its own `toString()` that produces `Rectangle@302b09c9`

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```
public class Object {
  public String toString() { ... }
}
```

Base `toString()` Origin

- All classes inherit from `Object`, **even if** you don't explicitly say so
- `Object` **defines its own** `toString()` **that produces** `Rectangle@302b09c9`

```
public class Object {
  public String toString() { ... }
}
```

```
public class Rectangle { ... }
```

Base `toString()` Origin

- All classes inherit from `Object`, **even if** you don't explicitly say so
- `Object` **defines its own** `toString()` **that produces** `Rectangle@302b09c9`

```
public class Object {
  public String toString() { ... }
}
```

```
public class Rectangle { ... }
```

```
public class Rectangle extends Object {
  ...
}
```

Overriding Methods

- You can *override* a method definition in a base class by defining a method with the same signature in a subclass
- The method in the subclass will execute *instead of* the method in the parent class

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public class Rectangle {
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{
        ...
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Overriding Methods

- You can *override* a method definition in a base class by defining a method with the same signature in a subclass
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```
public class Rectangle extends Object {
   public String toString() {
      ...
   }
}
```

Example

- `OverrideBase.java`
- `OverrideSub.java`
- `OverrideMain.java`

Automatically-Generated Constructors

Automatic Constructors

If you don't define any constructors,
Java will define one for you which takes no arguments.

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public class MyClass {
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Example:

`AutomaticConstructor.java`

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as long as the base class has a no-argument constructor

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public class MyBase {}
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```
public class MyBase {
   public MyBase() {}
}

public class MySub extends MyBase {
   public MySub() { super(); }
}
```

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public class MyBase {
  // explicit non-no-arg constructor
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  public MyBase(int x) {}
}
public class MySub extends MyBase {}
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Does not exist - code will not compile