

COMP 110/L Lecture 19

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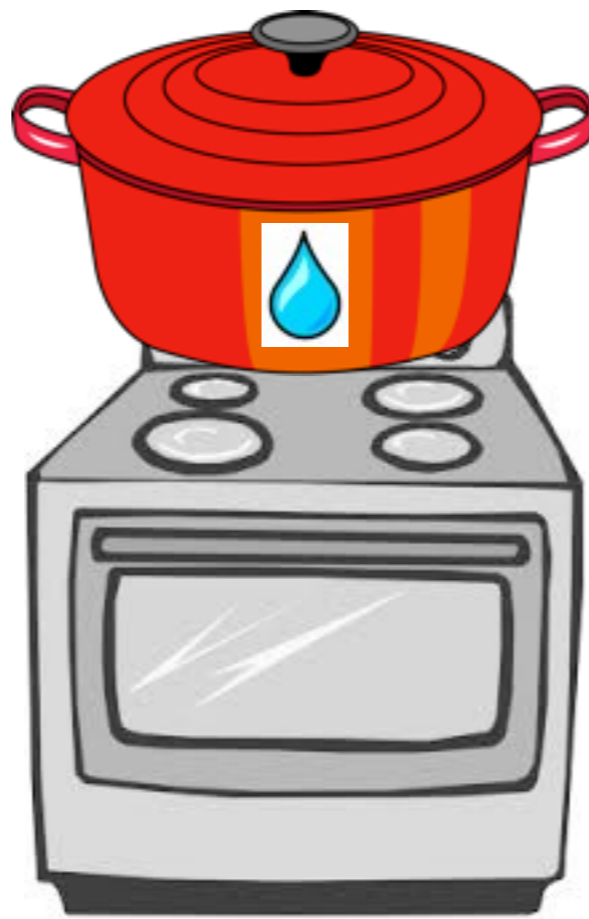
Slides adapted from Dr. Kyle Dewey

Outline

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

Inheritance

Recap



Mammal

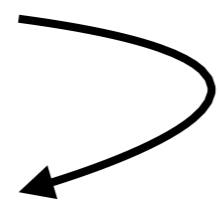
Mammal



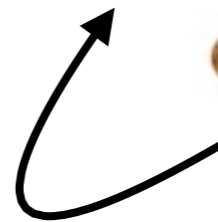
Mammal



Mammal

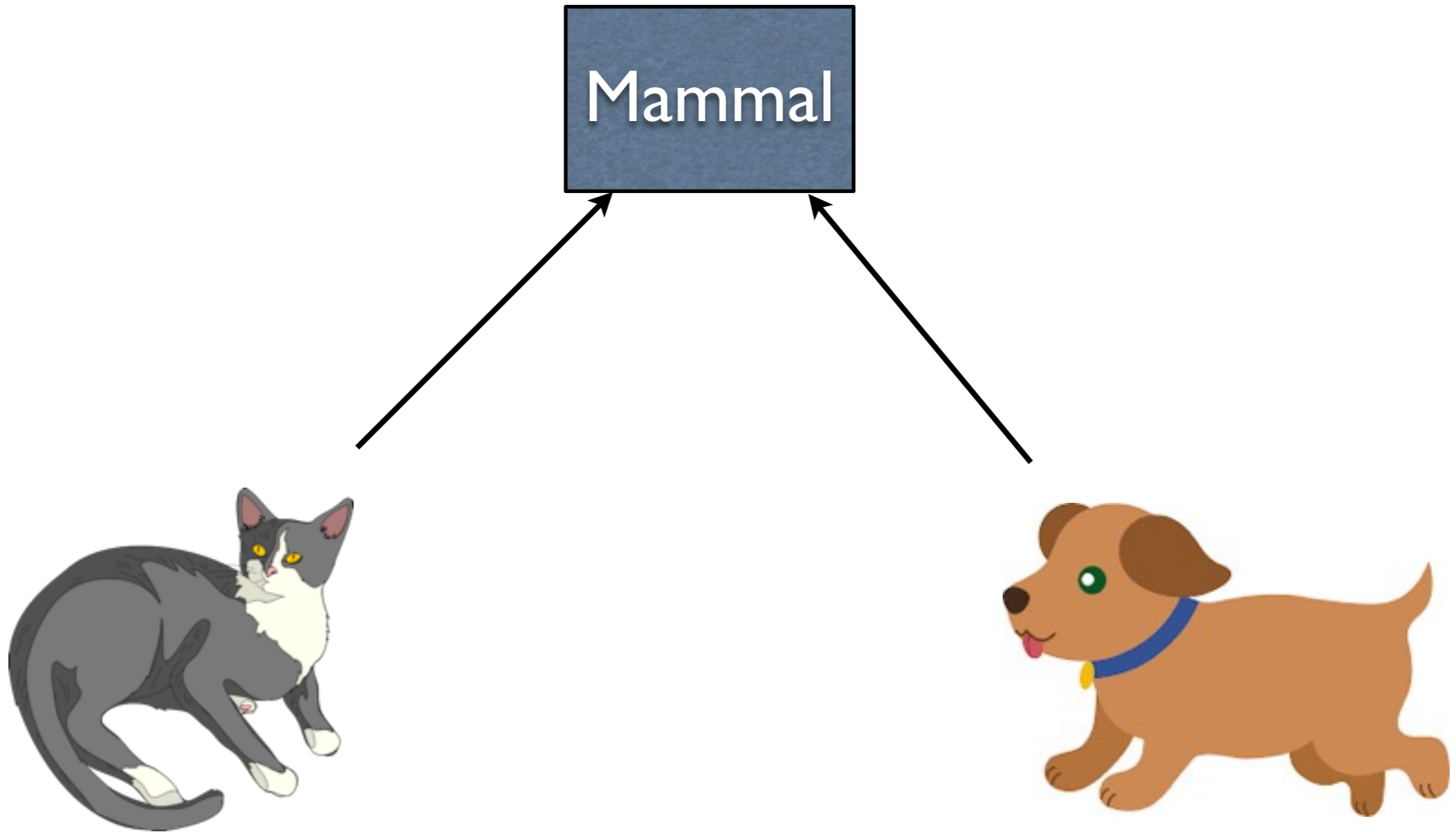


breathe

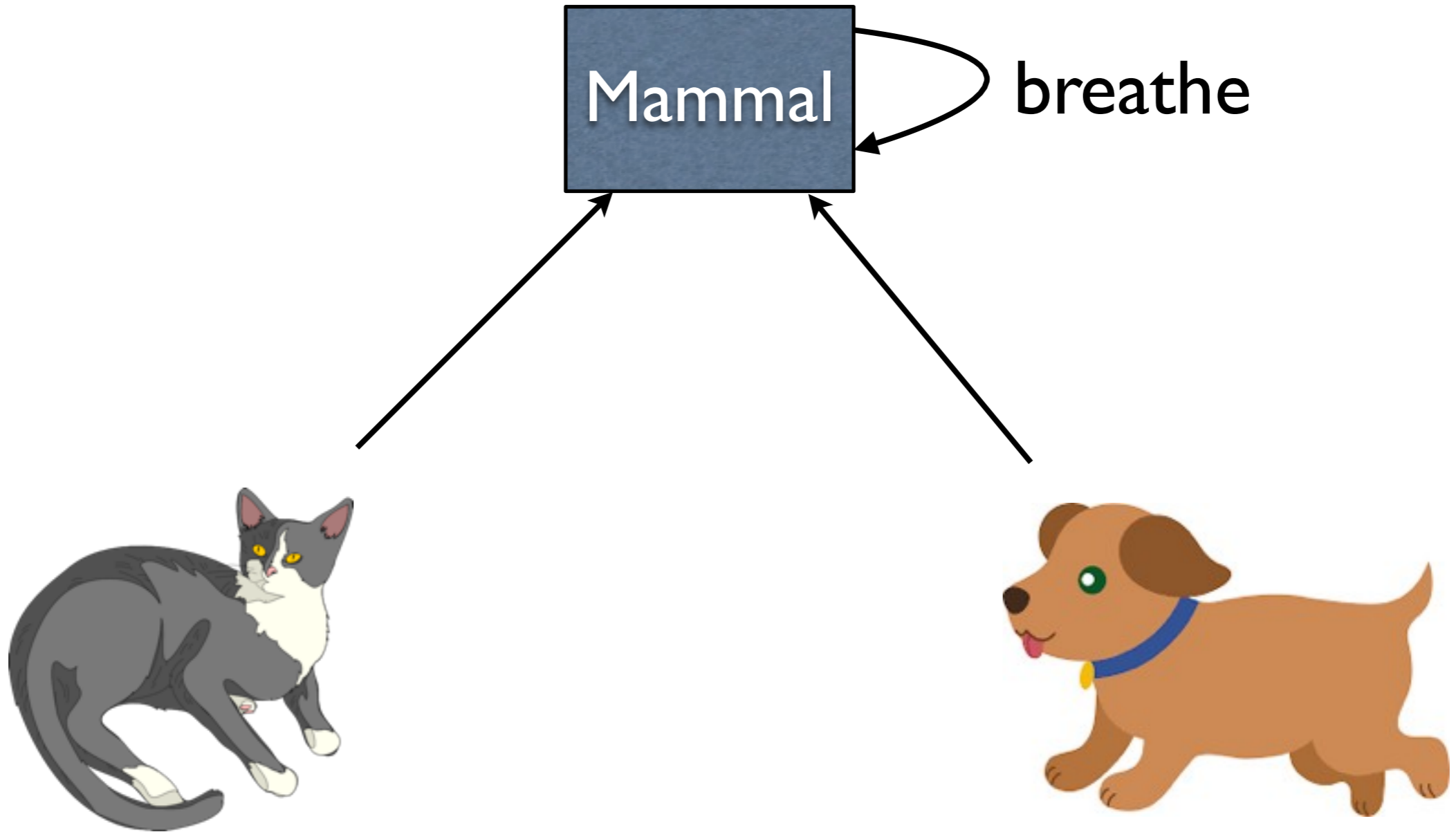


breathe

Inheritance



Inheritance



extends

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

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

extends

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

```
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) {...}  
}
```

super

Used to invoke the constructor of the parent class.
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**

toString() Revisit

```
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

Base toString() Origin

- All classes inherit from Object, **even if you don't explicitly say so**
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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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- 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 {  
    public String toString()  
{  
    ...  
}  
}
```


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

```
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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```
public class MyClass {  
}
```

```
public class MyClass {  
    public MyClass() {}  
}
```

Example:

`AutomaticConstructor.java`

Automatic Constructors

This also applies to subclasses,
as long as the base class has a no-argument constructor

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public class MyBase {}  
public class MySub extends MyBase {}
```

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This also applies to subclasses,
as long as the base class has a no-argument constructor

```
public class MyBase {}  
public class MySub extends MyBase {}
```

```
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  
    // defined - no automatically  
    // generated constructors  
    public MyBase(int x) {}  
}  
public class MySub extends MyBase {}
```

Automatic Constructors

This also applies to subclasses,
**as long as the base class has a no-argument
constructor**

```
public class MyBase {
    // explicit non-no-arg constructor
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    public MyBase(int x) {}
}
public class MySub extends MyBase {
    public MySub() { super(); }
}
```

Automatic Constructors

This also applies to subclasses,
**as long as the base class has a no-argument
constructor**

```
public class MyBase {  
    // explicit non-no-arg constructor  
    // defined - no automatically  
    // generated constructors  
    public MyBase(int x) {}  
}  
    Does not exist - code will not compile  
public class MySub extends MyBase {  
    public MySub() { super(); }  
}
```