COMP 110/L Lecture 20

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Slides are adapted from Dr. Kyle Dewey

Outline

- `super` in methods
- `abstract` Classes and Methods
- Polymorphism

`super` in Methods

Recap

You've seen `super` in constructors...

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public class Base {
  public Base(int x) { ... }
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public class Base {
  public Base(int x) { ... }
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```
public class Sub extends Base {
  public Sub(int x) {
    super(x);
  }
}
```

`super` in Methods

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Used to execute a superclass' implementation of a method.

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public class Base {
  public int returnNum() {
    return 17;
  }
}
```

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```
public class Base {
  public int returnNum() {
    return 17;
  }
}
```

```
public class Sub extends Base {
  public int returnNum() {
    return super.returnNum() + 3;
  }
}
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Used to execute a superclass' implementation of a method.

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public class Base {
  public int returnNum() {
    return 17;
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}
```

```
public class Sub extends Base {
  public int returnNum() {
    return super.returnNum() + 3;
  }
}
```

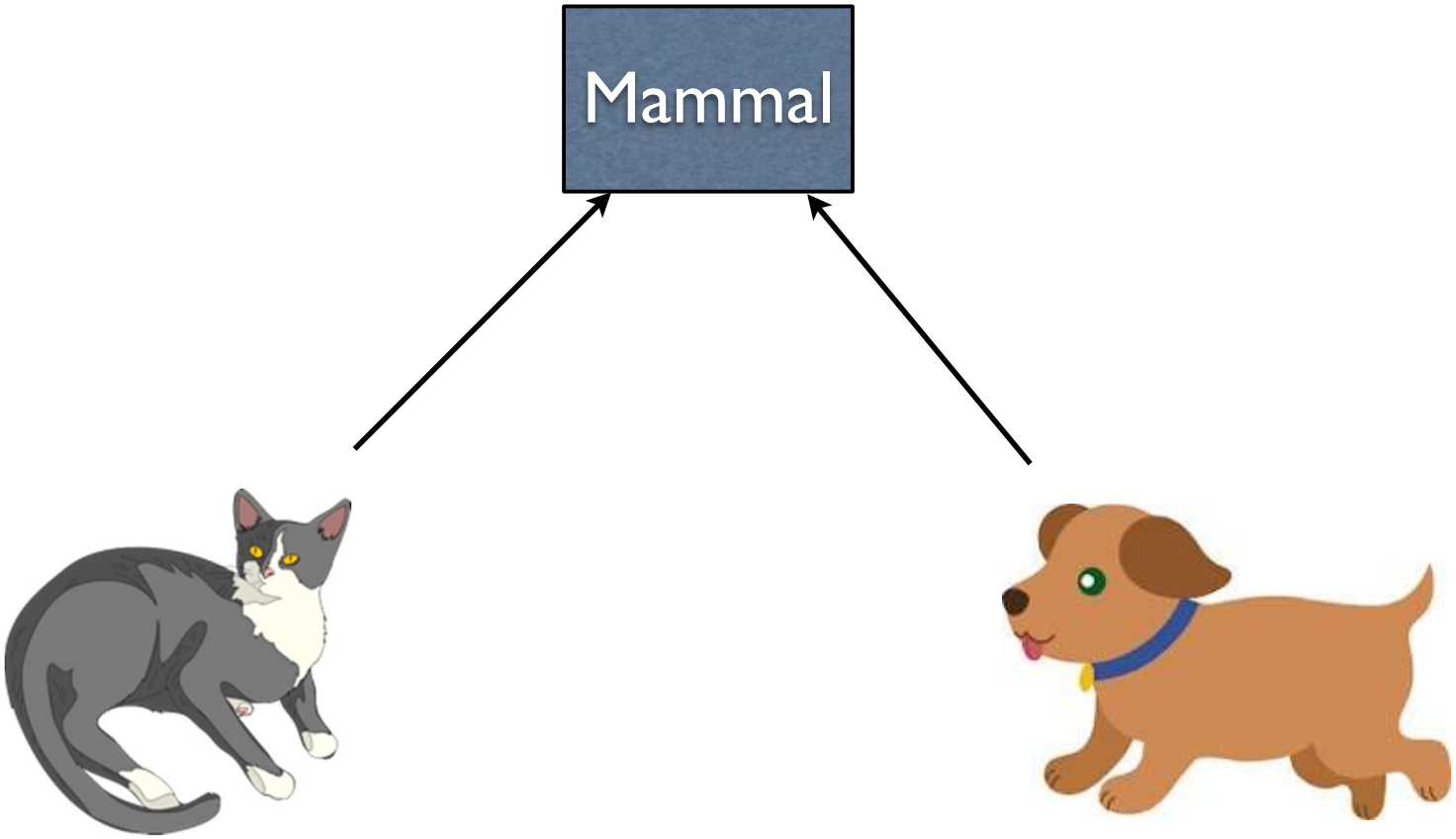
Returns 17

Example

- `Base.java`
- `Sub.java`
- `SuperMethodMain.java`

`abstract` Classes and Methods

Recap - A Problem



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public abstract class Mammal {
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Does not compile

Example

- `AbstractBase.java`
- `AbstractSub.java`
- `AbstractMain.java`

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  public abstract int getValue();
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- Methods of `abstract` classes can also be defined `abstract`
  - To be overridden later
- `abstract` methods have no bodies

```
public abstract class Abstract {
  public abstract int getValue();
}
```

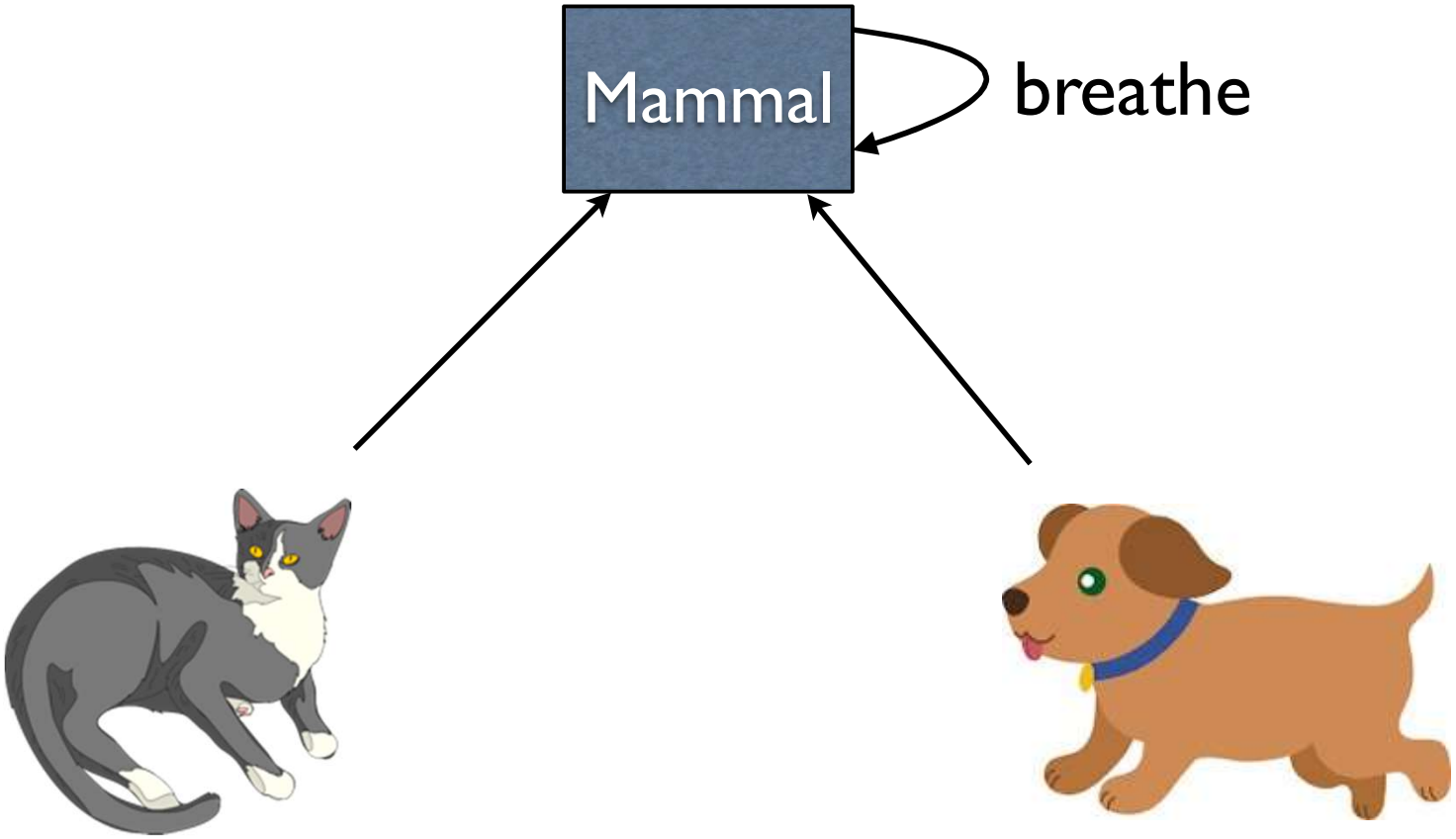
```
public class Sub extends Abstract {
  public int getValue() { return 5; }
}
```

Example

- `ArithmeticOperation.java`
- `Add.java`
- `Subtract.java`

Polymorphism

Revisit



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Dog dog = new Dog("Rover");
cat.breathe();
dog.breathe();
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Polymorphism

- "many-forms"
- A `Mammal` could be a `Cat` or a `Dog`
- Specific use in Java: a variable with a superclass type can hold an instance of any subclass, too

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Polymorphism Significance

Can write code without knowing exactly which implementation is used.

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```
public static void method(Mammal m) {
  m.breathe();
}
```

Example

- `Car.java`
- `SportsCar.java`
- `SemiTruck.java`
- `CarMain.java`

Example

- `MammalRevisited.java`
- `CatRevisited.java`
- `DogRevisited.java`
- `MammalMainRevisited.java`