LESSON 6

Main.java

```java
class Dog extends Animal {
  @Override
  String sound() {
    return "Woof"; }
}
```

# Java

## Inheritance

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# JAVA PROGRAMMING

LESSON 6

## Inheritance and Polymorphism

extends, super, @Override, abstract classes and polymorphism

# extends



Animals.java

```java
class Animal {
    protected String name;
    Animal(String name) { this.name = name; }
    String sound() { return "..."; }
}
class Dog extends Animal {
    Dog(String name) { super(name); }
    @Override String sound() { return "Woof"; }
}
```

- A subclass extends a superclass and inherits its fields and methods. It can add more and …
- Java allows only one superclass. Every class ultimately extends Object.

01

# super and @Override



Cat.java

```
class Cat extends Animal {
    Cat(String name) { super(name); }

    @Override
    String sound() {
        return super.sound() + " Meow";
    }
}
```

- super calls the parent's constructor, and must come first. super dot method calls the …
- Always add the at-Override annotation. The compiler then checks that you really are …

02

# Polymorphism



Zoo.java

```
List<Animal> zoo = List.of(new Dog("Rex"), new Cat("Pishak"));
for (Animal a : zoo) {
    System.out.println(a.name + ": " + a.sound());
}
// Rex: Woof
// Pishak: ... Meow
```

- A variable of the parent type can hold any subclass object. When you call a method, Java …
- One loop can treat dogs, cats and birds the same way, and each still behaves in its own way.

03

# Abstract Classes



Shape.java

```java
abstract class Shape {
    abstract double area();
    String describe() {
        return getClass().getSimpleName() + " area " + area();
    }
}
class Square extends Shape {
    double side;
    Square(double s) { side = s; }
    double area() { return side * side; }
}
```

- An abstract class cannot be created with new. It can declare abstract methods with no body, …
- Use it when subclasses share code but each must fill in certain details.

04

# Composition over Inheritance

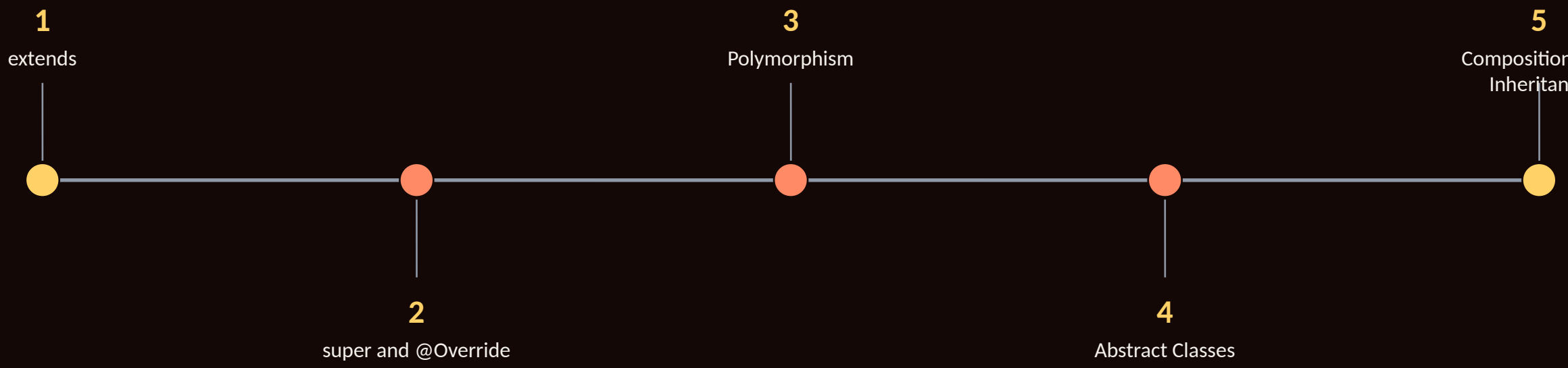





- Inheritance means is-a: a Dog is an Animal. If the relationship is has-a, like a Car has an ...
- Deep inheritance trees become fragile. Prefer shallow hierarchies, interfaces and ...

05

# Lesson Map


1
extends
2
super and @Override
3
Polymorphism
4
Abstract Classes
5
Composition over Inheritance

# Sources and Further Reading



Animals.java

```java
class Animal {
    protected String name;
    Animal(String name) { this.name = name; }
    String sound() { return "..."; }
}
class Dog extends Animal {
    Dog(String name) { super(name); }
    @Override String sound() { return "Woof"; }
}
```

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Zoo.java

```java
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for (Animal a : zoo) {
    System.out.println(a.name + ": " + a.sound());
}
// Rex: Woof
// Pishak: ... Meow
```

Thank you for watching

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