Abstract Classes and Methods

In this lesson, you'll get to know about the abstract classes and methods.

WE'LL COVER THE FOLLOWING

Abstract Methods

> A method with the keyword `abstract` in its declaration is known as an **abstract method**.

Rules to be Followed

- In contrast to a concrete/normal Java method an **abstract method** does not have a body/definition i.e. it only has a declaration or method signature inside an *abstract class or an interface* (more on these later).
- An **abstract method** can be declared inside an *abstract class* or an *interface* only.
- In other words, it can be said that to contain any **abstract method** in its implementation a class has to be declared as an *abstract class* because *non-abstract classes* **cannot** have abstract methods.
- An *abstract method* **cannot** be declared *private* as it has to be

implemented in some other class.

Declaration

Now moving on to the *syntax* part, syntactically, the generalized declaration of an abstract method is as follows:

```
public abstract void methodName(parameter(s));
```

An abstract method's declaration has:

1. An *access identifier*
2. The keyword `abstract`
3. A `return` type
4. A name of the method
5. The parameter(s) to be passed
6. A semicolon(;) to end the declaration

At this point, one may raise a question about the definition or the body of an abstract method i.e. *"Where do we implement the body of an abstract method?"*

Well, the upcoming topics will address the above question.

Abstract Class

> An **abstract class** is a class which is declared using the keyword `abstract`.

Rules to be Followed

- An abstract class ***cannot*** be instantiated i.e. one cannot create an object of an *abstract class*.

- An *abstract class* can have the declaration of *abstract method(s)* (as an abstract method's body cannot be implemented in an abstract class) but it is not compulsory to have any.

- Non-abstract/normal methods can be implemented in an **abstract class**.

- To use an *abstract class* it needs to be **inherited from**.

- The class which *inherits* from the *abstract class* **must** implement all the *abstract methods* declared in the *parent abstract class*.
- An abstract class can have everything else as same as a normal Java class has i.e. constructor, `static` variables and methods.

Declaration

Talking about the syntax, the *declaration* of an `abstract` class in Java is as follows:

```
abstract class ClassName {

  // Implementation here

}
```

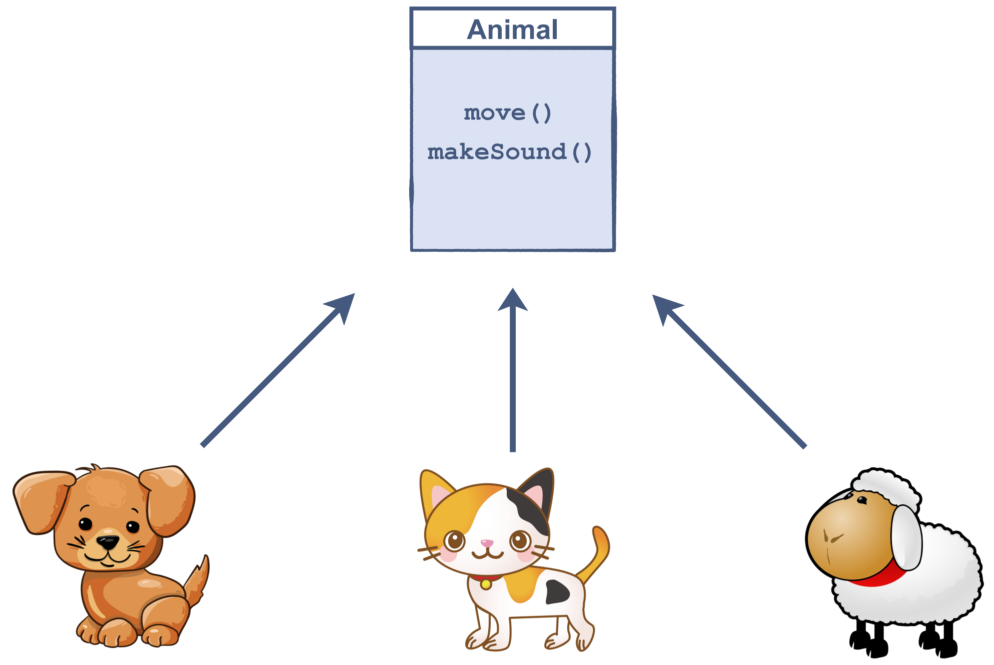
Implementation

Abstraction has already been discussed in the previous lesson. Abstract classes are used to achieve abstraction in Java.

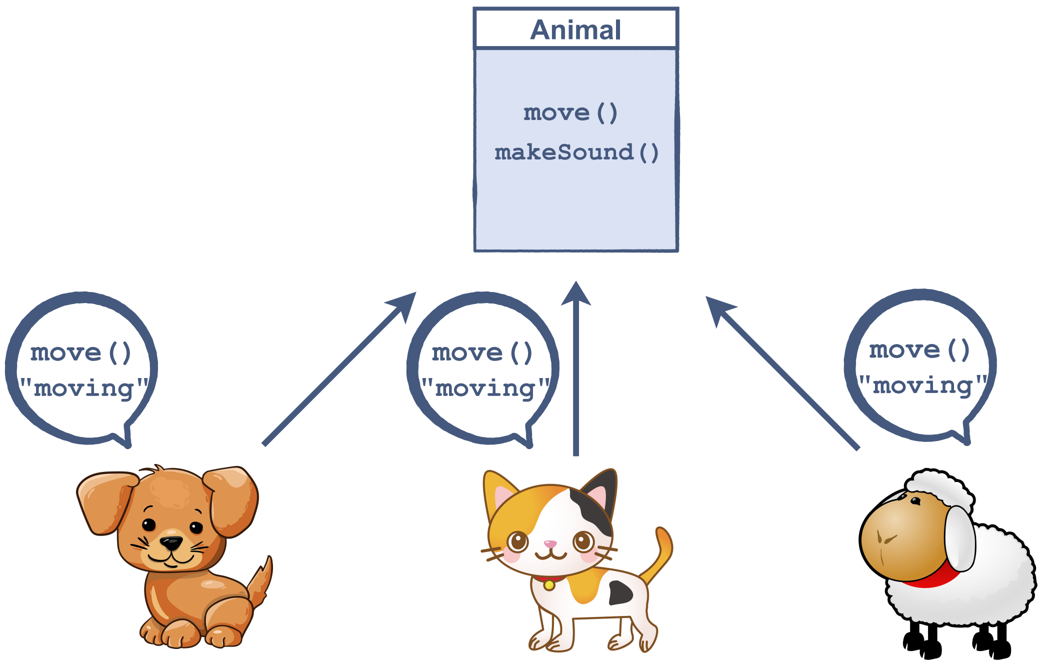
Consider modeling an Animal kingdom using Java having:

- A base `abstract` class named `Animal`
- A child class named `Dog`
- A child class named `Cat`
- A child class named `Sheep`

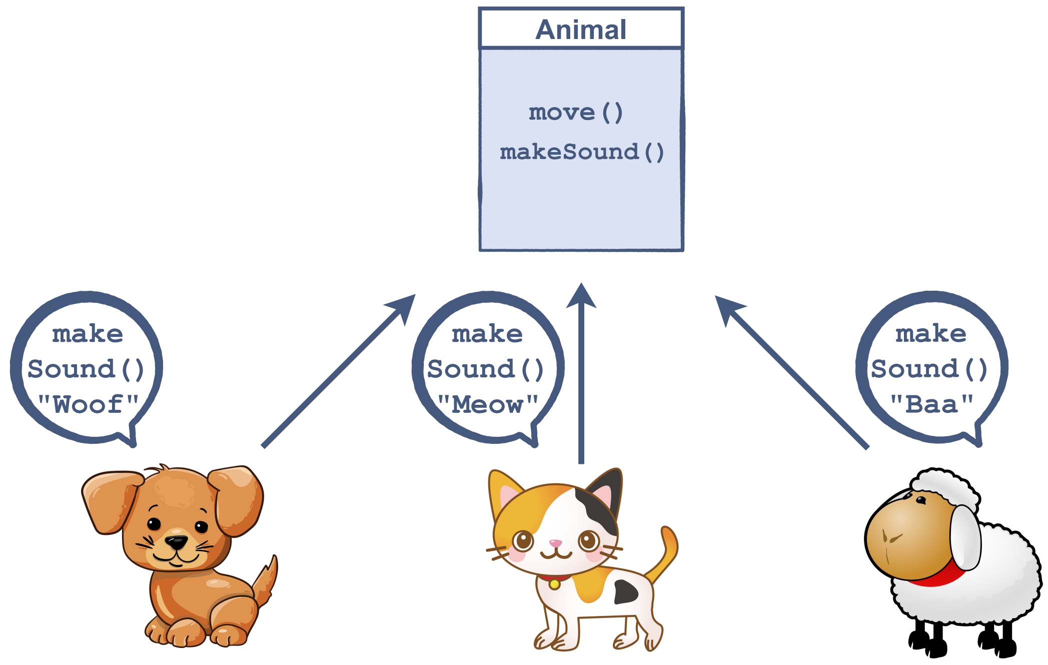
All of these animals make different sounds:


Animal
move()
makeSound()

1 of 3


Animal
move()
makeSound()
move()
"moving"
move()
"moving"
move()
"moving"

2 of 3



3 of 3

In the above example, one can observe that in the `Animal` class all the common traits of the animals should be implemented. All the other type-specific traits should be implemented inside the respective *child* classes. The `abstract` classes provide exactly the same functionality to the programmer. Let's implement this example below:

```
abstract class Animal {

  public abstract void makeSound();

  public void move() {
    System.out.println(getClass().getSimpleName()+" is moving");
    //getClass().getSimpleName() is an inbuilt functionality of Java
    //to get the class name from which the method is being called
  }

}

class Dog extends Animal {

    @Override
    public void makeSound() {
    System.out.println("Woof Woof...");
  }
}

class Cat extends Animal {

    @Override
    public void makeSound() {
    System.out.println("Meow Meow...");
  }

}

class Sheep extends Animal {

    @Override
    public void makeSound() {
    System.out.println("Baa Baa..");
  }

}

class Main {

  public static void main(String args[]) {
    // Creating the objects
    Animal dog = new Dog();
    Animal cat = new Cat();
    Animal sheep = new Sheep();

    dog.makeSound();    // Calling methods from Dog
    dog.move();

    cat.makeSound();    // Calling methods from Cat
    cat.move();

    sheep.makeSound();  // Calling methods from Sheep
    sheep.move();
  }

}
```

From the example above, we can observe just how beneficial an abstract class can be:

- All the animals can move and this is a common trait so the `move()` method is implemented in the `Animal` class and all the child classes can use this without any implementation inside themselves.
- All the animals make different sounds and because of that an `abstract` method is declared in the `Animal` class so that all the child classes **must** `@Override` this method in their own respective ways.

This was pretty much about the abstract classes and abstract methods. In the

This was pretty much about the abstract classes and abstract methods. In the next lesson, you'll get to know about the interfaces.