Computer Science Virtual Learning

HS Computer Science A

May 19th, 2020

Lesson: What is Inheritance?

Objective/Learning Target:

Understanding what Inheritance is and how to apply it using Java

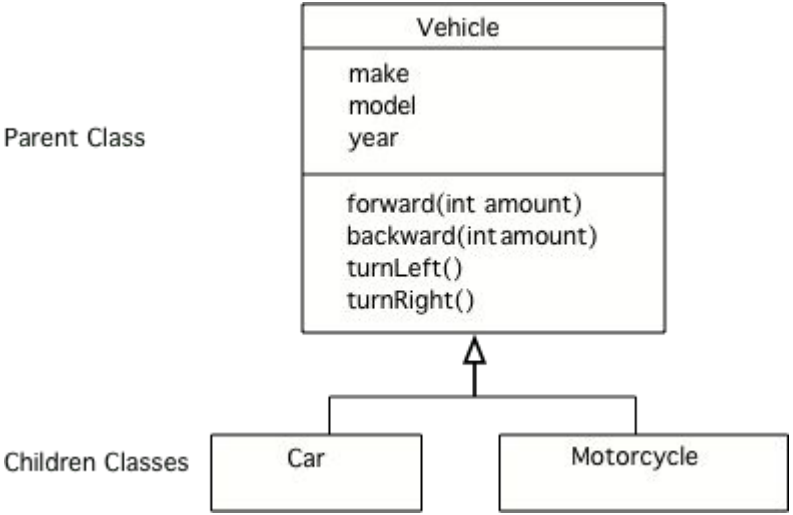
What is Inheritance?

One of the really useful features of Object-Oriented programming is inheritance. You may have heard of someone coming into an inheritance, which often means they were left something from a relative that died. Or, you might hear someone say that they have inherited musical ability from a parent. In Java all classes can inherit object fields and methods from another class. The class being inherited from is called the parent class or superclass. The class that is inheriting is called the child class or subclass.

When one class inherits from another, we can say that it is the same kind of thing as the parent class (the class it inherits from). For example, a car is a kind of vehicle. This is sometimes called the is-a relationship, but I prefer is-a kind of. A motorcycle is another kind of vehicle. All vehicles have a make, model, and year that they were created. All vehicles can go forward, backward, turn left and turn right.

Unified Modeling Language

A UML (Unified Modeling Language) class diagram shows classes and the relationships between the classes as seen in Figure 1. An open triangle points to the parent class. The parent class for `Car` and `Motorcycle` is `Vehicle`. The `Vehicle` class has two child classes or subclasses: `Car` and `Motorcycle`.



Parent Class

Vehicle

make
model
year

forward(int amount)
backward(intamount)
turnLeft()
turnRight()

Children Classes

Car

Motorcycle

Specifying the Parent Class

How is a parent class specified? Use the Java keyword extends after the class name and then followed by the parent class name to specify the parent class as shown below.

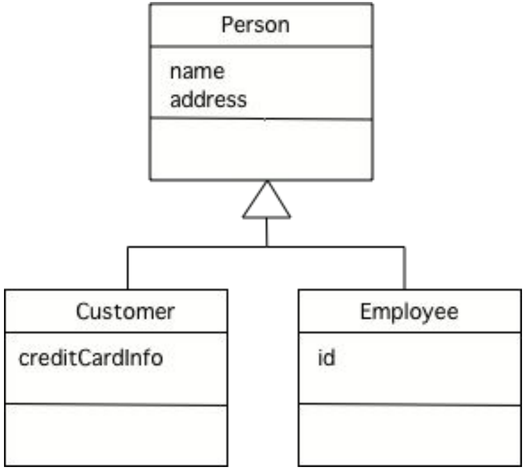
```
public class Car extends Vehicle
public class Motorcycle extends Vehicle
```

While a person has two parents, a Java class can only inherit from one parent class. If you leave off the extends keyword when you declare a class then the class will inherit from the Object class. The Person class declared below will inherit from the Object class.

```
public class Person
```

Why use Inheritance

Inheritance allows you to reuse data and behavior from the parent class. It is useful for generalization in which case you may notice that several classes share the same data and/or behavior and you pull that out into a parent class. Customers and Employees are both people so it makes sense use the general Person class. It is also useful for specialization which is when you want most of the behavior of a parent class, but want to do at least one thing differently and/or add more data. An example of specialization is the Employee class below. An employee is a person but also has a unique id. A customer is a person, but also has a credit card.



Check Your Understanding

1. If you don’t specify the parent class in a class declaration which of the following is true?

   A. It doesn't have a parent class.
   B. It inherits from the Object class.
   C. It inherits from the Default class.
   D. It inherits from the Parent class.

2. If the class Vehicle has object fields of make and model and the class Car inherits from the class vehicle will a car object have a make and model?

   A. Yes
   B. No

3. If I had a class ParkingGarage should it inherit from the class Vehicle?

   A. Yes
   B. No

4. In Java how many parents can a class have?

   A. 0
   B. 1
   C. 2
   D. infinite

For More Resources and to Check Answers

Go to: https://runestone.academy/runestone/books/published/apcsareview/OOBasics/ooInheritance.html