

JCCC Interview

Spring 2018

Polymorphism: Vehicles

Objective: Demonstrate proficiency with C++ polymorphism

You have been asked to create a program that represents various types of vehicles for the county tax assessor. Each type of vehicle is taxed in a different way, as described below.

Classes

Your project should have the following classes and members:

Vehicle

- A variable only accessible to itself and its subclasses for the **tax rate**, set to **36.7** in the **default constructor** for the class.
- A public function to **calculate the tax value** that has no implementation, but should be defined in subclasses.
- A public function to report the **vehicle type**, which should print "Vehicle" to standard output, but which can be overridden in subclasses.

Car

- A subclass of Vehicle
- A variable only accessible to itself and its subclasses for the **number of wheels**
- A variable only accessible to itself and its subclasses for the **number of doors**
- Public functions to get and set the number of wheels and doors
- An implementation of the function to **calculate the tax value** as:
(wheels + doors) * tax rate
- A public function to report the **vehicle type**, which should print "Car" to standard output, but which can be overridden in subclasses.
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Truck

- A subclass of Car
- A private variable for **cargo size** (in cubic feet, to the nearest 0.1 cu. ft.)
- Public functions to get and set the cargo size
- An implementation of the function to **calculate the tax value** as:
((wheels + doors) * tax rate) + cargo size
- A public function to report the **vehicle type**, which should print "Truck" to standard output

Motorcycle

- A subclass of Vehicle
- A private variable for the **top speed**
- A variable only accessible to itself and its subclasses for the **number of wheels**
- Public functions to get and set the number of wheels and top speed
- An implementation of the function to **calculate the tax value** as:
(wheels * tax rate) + top speed
- A public function to report the **vehicle type**, which should print "Motorcycle" to standard output, but which can be overridden in subclasses.

Scooter

- A subclass of Motorcycle
- A private variable for the **number of baskets**
- Public functions to get and set the number of baskets
- An implementation of the function to **calculate the tax value** as:
(wheels * tax rate) - (10 * number of baskets)
- A public function to report the **vehicle type**, which should print "Scooter" to standard output.

Main Method

The main method of this program should accomplish the following tasks:

1. Declare a single Vehicle pointer
2. Ask the user which type of vehicle to create
 - a. Use a **switch** statement to perform this task!
3. Ask the user for the appropriate variables from user input and create the desired vehicle
4. Store the created object in the single Vehicle pointer
5. Demonstrate that calling functions from the Vehicle pointer reports the correct vehicle type and tax value.

```
youboon2@CoolerWindowsBox:~/examples$ ./a.out
Choose a vehicle type - [c]ar, [t]ruck, [m]otorcycle, or [s]cooter: c
Enter a number of wheels: 4
Enter a number of doors: 2
Car
Tax Value: 220.2
youboon2@CoolerWindowsBox:~/examples$ ./a.out
Choose a vehicle type - [c]ar, [t]ruck, [m]otorcycle, or [s]cooter: s
Enter a number of wheels: 2
Enter a number of baskets: 10
Scooter
Tax Value: -26.6
youboon2@CoolerWindowsBox:~/examples$ ./a.out
Choose a vehicle type - [c]ar, [t]ruck, [m]otorcycle, or [s]cooter: t
Enter a number of wheels: 4
Enter a number of doors: 4
Enter a cargo size: 25.0
Truck
Tax Value: 318.6
youboon2@CoolerWindowsBox:~/examples$ ./a.out
Choose a vehicle type - [c]ar, [t]ruck, [m]otorcycle, or [s]cooter: d
Error!
youboon2@CoolerWindowsBox:~/examples$
```