

Practice for PQ2

Intro

In this programming quiz you will apply principles of subtype polymorphism to the redesign of a family of classes and extend this family using your new polymorphic design.

Problem Description

We've been simulating different cars to determine their range and horsepower, that is, how far they can go on a full tank of gas. We've explored some different vehicles, including traditional gasoline-powered cars and hybrids. Now we'd like to look at a new car, but there's just one problem: It's electric. (Boogie woogie woogie!) That means no gas, and no gas tank! Electric cars still have a range, based on a full battery charge, so we can do the same operation (calculating range), but it will require an entirely different implementation.

Solution Description

1. Create an interface class called `Car` which will be the interface for all of the classes that represent cars.
2. Modify each of the existing car classes so that they implement `Car`.
3. Each of the existing car classes has a `double getRange()` method that returns a double describing how many miles that car can travel on a full tank of gas. Each also has a `int getHorsepower()` method that returns the car's horsepower. Make both of these methods polymorphic so that you could have a reference variable of type `Car` that references an object of type `Prius`, `Hummer`, or `TeslaRoadster` and you could invoke the `double getRange()` and `int getHorsepower()` methods on that object. There is a commented-out section of `Ranges` that shows how this might work.
4. Add a new class, `TeslaRoadster` which implements `Car`.
 - `TeslaRoadster` should have a constructor that takes in an `int horsepower` and a `double range`. It should use these to set the value of corresponding instance fields.
 - `TeslaRoadster`'s `double getRange()` method should return a double with the value that was passed into the constructor.
 - `TeslaRoadster`'s `int getHorsepower()` method should return an `int` with the value that was passed into the constructor.