CT2106 Assignment 1

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Overview

The project creates a **TestCar** – a **Car** with a certain specification of **Engine** and **Wheel**.

The project runs tests that calculate how far the **TestCar** will travel on a certain amount of fuel.

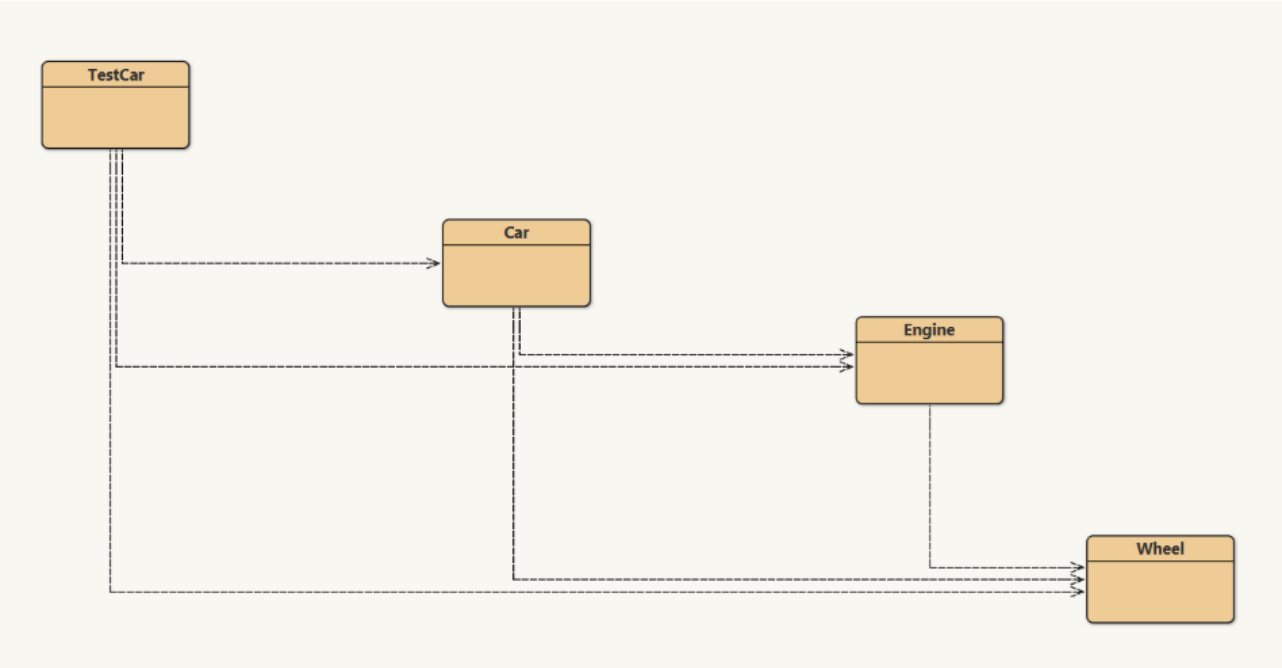
A record is kept of the total distance travelled and total amount of work the engine has performed.

Sample Output

```
Fuel level: 100
Car name: Donda Civic
Engine name: XXXCOMBUSTION
Engine turns per litre: 43.00
Engine's total turn count: 4300.00
Wheel name: Wheel Lotta Red
Wheel radius: 0.15 m
Wheel circumference (distance per turn): 0.94 m
Fuel level: 0
Distance travelled this trip: 4052.65 Km
Total distance travelled: 4052.65 Km

Fuel level: 50
Car name: Donda Civic
Engine name: XXXCOMBUSTION
Engine turns per litre: 43.00
Engine's total turn count: 6450.00
Wheel name: Wheel Lotta Red
Wheel radius: 0.15 m
Wheel circumference (distance per turn): 0.94 m
Fuel level: 0
Distance travelled this trip: 2026.33 Km
Total distance travelled: 6078.98 Km
```

Class Structure



TestCar class

```
/**
 *
 * @author Michael McC
 * @version 1
 */
public class TestCar
{

   /**
    * main method
    * creates the test configuration
    * runs tests
    */
 public static void main(String[] args) {

    // create test configuration

    Car car = new Car("Donda Civic");

    // add engine with specified name and turns per litre
    Engine engine = new Engine("XXXCOMBUSTION", 43);
    car.addEngine(engine);

   // add wheel with specified name and radius
    Wheel wheel = new Wheel ("Wheel Lotta Red", 0.15);
    car.addWheel(wheel);
```

```
    // Test 1
    car.setFuel(100);
    car.drive();

    // Test 2
    car.setFuel(50);
    car.drive();


 }
}
```

Car class

```
/**
 *
 * @author Michael McC
 * @version 1
 */
public class Car
{
    // instance variables
    private String name;
    private double totalDistance;
    private double totalKm;
    private double fuelLevel;

    private Engine engine;


    /**
     * Constructor for objects of class Car
     */
    public Car(String name)
    {
        this.name = name;
    }
```

```
/**
 * addEngine method adds an engine to the car
 */
public void addEngine(Engine engine) {
   this.engine = engine;
}

/**
 * addWheel method
 * calls on the engine to add a wheel
 */

public void addWheel(Wheel wheel) {
   this.engine.addWheel(wheel);
}

/**
 * setFuel method
 * sets the fuel level then prints it
 */
public void setFuel(int fuelLevel) {
   this.fuelLevel = fuelLevel;
   System.out.printf("Fuel level: %d\n",fuelLevel);

}
```

```
    /**
     * drive method
     * prints the car name, runs the car then reports the distance travelled
     */

    public void drive() {

        System.out.printf("Car name: %s\n", name);

        // get distance by running the engine
        double tripDistance = engine.runEngine(fuelLevel);

        // empty the tank as all fuel has been used by engine
        setFuel(0);

        // report distance travelled
        System.out.printf("Distance travelled this trip: %.2f Km\n",tripDistance);

        totalDistance += tripDistance;

        System.out.printf("Total distance travelled: %.2f Km\n\n",totalDistance);

    }

}
```

Engine class

```
/**
 *
 * @author Michael McC
 * @version 1
 */
public class Engine
{
   // instance variables
   private String name;
   private double tpl;
   private double totalNumTurns;

   private Wheel wheel;

   /**
    * Constructor for objects of class Engine
    */
   public Engine(String name, double tpl)
   {
      this.name = name;

      this.tpl = tpl;
   }

   /**
    * addWheel method adds a wheel to the engine
    */

   public void addWheel(Wheel wheel) {
```

```
    this.wheel = wheel;
}

/**
 * runEngine method
 * prints engine information
 * calculates amount of turns from given amount of fuel
 * adds to running total of turns performed
 * returns max distance travelled from given amount of fuel
 */
```

```
  public double runEngine(double fuelLevel) {

    // print engine information
    System.out.printf("Engine name: %s\n",name);
    System.out.printf("Engine turns per litre: %.2f\n",tpl);

    // calculate amount of turns per tank of fuel
    double numTurns = (fuelLevel * tpl);

    // add to running total then print
    totalNumTurns += numTurns;
    System.out.printf("Engine's total turn count: %.2f\n",totalNumTurns);

    // return the distance travelled

    double distance = (numTurns * wheel.turn());

    return distance;
 }
}
```

Wheel class

```
/**
 *
 * @author Michael McC
 * @version 1
 */
public class Wheel
{
    // instance variables
    private double radius;
    private String name;
    private double circumference;


    /**
     * Constructor for objects of class Wheel
     */

    public Wheel(String name, double radius)
    {
        this.name = name;
        this.radius = radius;
    }
```

```
    /** turn method
     * essentially wheel's main method
     * prints wheel information
     * calculates wheel circumference, prints and returns it
     */

    public double turn() {

        // print wheel information
        System.out.printf("Wheel name: %s\n",name);
        System.out.printf("Wheel radius: %.2f m\n",radius);

        // calculate wheel circumference, print and return
        double circumference = 2 * Math.PI * radius;
        System.out.printf("Wheel circumference (distance per turn): %.2f m \n",circumference);
        return circumference;

    }

}
```