Console-based Coding Challenge

(Assessment Task 2)

Working Document

***Problem Specifications:***

***What exactly is the problem?***

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Description automatically generatedStudents have been given a task based around a traffic intersection, which has multiple roads and different types of cars that will be entering the intersection. The task is to create a simulation of this within Java, this simulation should include the multiple roads and cars, but also the traffic lights that let the cars know when they are able to go or when they need to stop. Furthermore, this solution will be displayed in a GUI style for java called java swing where it will be displayed physically. Moreover, each on of the different parts of the simulation such as Road, Vehicles and Traffic lights will be made into their own classes with in the java style programming all being embodied in a World class that holds all these classes and gives the main controller that runs the program all the information from one source.

See drawing bellow of intended solution to the problem that’s been set:

***How will the program behave?***

The program will run in a way where all the different classes, such as Road and Vehicle, will work in conjunction with each other, meaning that both the road and the vehicle within the code will be communicating in a way that ultimately move the vehicle. This then will lead into the traffic light, the road will be getting a response from the traffic light weather it can go or not go, and with the bond that the vehicle and road classes share, the road class will then pass this information onto the vehicle.

Moreover, a Node classes has also been implemented in order to allow the Road, Vehicle and TrafficLight classes to know exactly on which part of the x and y axis they are working on, with each point being known as a node. An intersection of 4 nodes create the major work, as these nodes will be telling the vehicles when they can turn and not according to the traffic light.

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As seen above, these nodes also work in a directional way, therefore, with the use of two Enum’s, RoadType and Orientation, with RoadType having an array list of the different type of intersection that there are, such as a straight road, a three-way intersection and a four way intersection, and with Orientation keeping an array of which way the vehicle can move in regards to which node it is on, such as North, East, South and west.

Furthermore, while all these different overlaps are happening all this information is being given to the World class which includes the entire intersection, including the GUI and the physical features of this program, the World class is also where the roads, cars and traffic lights are drawn using imported java wing methods. All this information is then read by Main acting as the controller of the intersection put all these processes into place.

Below is an image of my end GUI creation:

A screenshot of a cell phone

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***How Will the program be used?***

The created program will be used to simulate a real-life traffic intersection, where vehicles and traffic lights have to work together to get all the required vehicles moving as efficiently as possible. This program will also be the start of creating a more complex simulation for this problem, that potentially could be implemented in the timing of a traffic intersections, with complex timers and sensors, as the timer would at stages of the day be obsolete as there might not be any cars during that period of the day from one road more busy than one of the others. It is there where this program could be implemented within these areas. Moreover, this program could be used for showing future programmers how what they are learning could be implemented in the real-world and provide a great example of industry programs.

***UML Diagram:***

The following UML diagram has been updated as the design process developed of time, with there being a few new classes being added, such as the Node class, RoadType Enum, and Orientation Enum.

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