Cp2406-Console based coding-Java

Student ID: 12891761

CP2406 Assessment Task 1

The working document

Problem specification

The problem specified in the CP2406 assignment task sheet is to develop a Java based car traffic simulator. The simulator needs to contain the following requirements and specifications:

- The simulator needs to contain the vehicle classes/traffic light class/road class and a main class to run the simulation.
- 3 vehicle classes: car/bus/motorbike.
- All vehicle dimensions are dependent on the car class dimensions.
- The simulator needs to track vehicle position, traffic light state and road type (straight/t-section/crossroads/end).
- Collision detection for side/front of vehicle. Back of one vehicle is the front position of another vehicle, reuse front condition for back condition.
- Roads need to have directional traffic (later feature).
- Dialogue box & drag and drop functionality (later feature).
- Paint/draw cars as they move (update position) across the screen (later feature).
- Buttons (later feature).
- Vehicle counter (later feature).
- Grid to drop roads onto (later feature).

The purpose of this simulator is to create a Java Object Oriented Programming (OOP) script that allows a user (player) to drop road sections onto an area and to populate the roads with varying vehicles. The actions of these vehicles after being generated are governed by Australian road rules (left lane/stop at traffic lights/left lane turns into left lane etc.). The simulator needs to track car positions as they travel, what speed they are travelling at, where the vehicle is in relation to another cars position or traffic light distance and how many cars are in the simulator. Tests will be generated to confirm that simulator conditions are being met during the development stage.
The interaction of these specifications are laid out in the structure.

Structure

To code the simulator mentioned in the previous section, the following structure will be attempted and variations will be adjusted as the process continues.

Main Class

Main class will run the script to run the simulator.

Road Class

Road class will contain the following:

- Length/width (width = lane_width*lanes)
- Car position, amount of cars
- Road type, traffic light at end of road? yes/no.

Vehicle Class (Car/Bus/Motorbike children classes)

Vehicle class will be the parent of car/bus/motorbike, getters/setters and variables only have to be written once. Vehicle will contain the following parameters:

- x/y positions
- newX/newY update position (move car).
- width/height (dimensions of car).
- Speed (how many road segments in 1 step)

Traffic Light Class

The traffic light class will simply update its state (red/green, later yellow) by a given input parameter and return the updated state allowing road to update car functions.

Approach

Main() will create a new road()--road() will generate road types/traffic lights and cars. Road() will loop with a while loop and counter function to update car position. If a car position is in range of the end of the road, the traffic light is red and car slows down. Traffic light is green after a period of time, car accelerates and moves forward. Car only moves forward if collision is false. If at end of road section jump to new road section. If end of road section is reached and new road isn't present return to start.

UML Class Diagram