COS 333 – Advanced Programming Techniques

Programming Assignment IV

Assigned: Monday, April 8, 1996

Due: 11:59pm, Thursday, April 18, 1996

Program: In `~cs333/src/highway-1/` you will find a Java program that implements a simple simulation of cars traveling along a short straight road. Read, build, run and understand this program.

As an exercise in Java programming, you are to make the following modifications:

(i) When the user clicks the left mouse button on a segment of road, place a *roadblock* at that position, being careful not to place roadblocks on cars, *etc.* A click of the left button on an existing roadblock should remove that roadblock. Hints: use the `Block` class and read the Java API entry for `java.awt.Canvas`.

(ii) Extend the `Car.move` method so that your cars *navigate* to avoid roadblocks. Your cars must not, however, cheat by jumping over roadblocks, for example. A car that tries to change lanes when the next segment is occupied suffices for this part of the assignment. However you may, for example, wish to experiment with cars that change lanes based on roadblocks further ahead or with different colored cars exhibiting different navigation behavior.

(iii) Allow placement of *timed roadblocks*. A timed roadblock is placed with the right mouse button subject to the same constraints as in part (i). However, your program will automatically remove this roadblock approximately 10 seconds after its placement. Hints: do part (i) first and then build a timer class using threads.

We supply the following in `~cs333/src/highway-1/`:

`README` – describes the program's components

`makefile` – builds the program; make sure that the Java tools are in the path

`Driver.html` – HTML to load the applet into `appletviewer` or into a Java-powered web browser (Netscape 2.0).

`Driver.java` – extends the `Applet` class and "drives" the program; manges layout and handles events

`Road.java` – maintains a "road"; the `Road.advance` method is used to drive all cars on the road forward (if possible) during a time step

`Segment.java` – an empty piece of highway

`Block.java` – extends `Segment` and is suitable as a roadblock

`Car.java` – defines car objects and extends `Segment`; a `Road` object invokes `Car.move` to compute a new position for a car

`Position.java` – a position on the road (lane, segment number)

Submission Procedure: Along with your program, submit a `makefile` and a `README` file; see the course's web page for details.