University of Toronto
Department of Computer Science
CSC 228 - Winter 1995

Assignment 1: Bike Lane Patrol

Due: at beginning of tutorial, October 10

This assignment will give you some practice with separate compilation, file I/O, master file update, and file-based linked lists.

You are to write a program, make up test data for all the necessary files, and write a report. The report is intended to convince your tutor that your program is correct and that you have tested its performance. Read the relevant sections of the course guide for more information.

The problem

The advent of bike lanes on St. George was supposed to encourage cycling and improve safety. Unfortunately, many car and delivery truck drivers view these bike lanes as a convenient parking spot for a few minutes. To avoid these obstacles, cyclists have to veer into another lane, often placing themselves directly in the path of rapidly approaching traffic. While the Metro Toronto police officially maintain a policy of tagging vehicles parked in these lanes, such ticketing is rare.

One step that cyclists can take to discourage the use of bike lanes as parking spots is to note the license plates of offending vehicles, the location and date and time of the infraction. If the same vehicle has repeatedly abused the bike lanes of Toronto, the license plate number can be brought to the attention of police, who may, at the very least, issue a warning to the vehicle's driver.

Your Task

To help pool together the data collected by many cyclists and pedestrians on these poorly behaved drivers, your task is to write a program that maintains relevant information for presentation to the police.

Your program will require a database consisting of two files, organized as follows:

A master vehicles file, sorted by license plate:

license plate #	car manufacturer	colour	# of observations	pointer to first activity record

An activity file, arranged as a series of chronologically ordered linked lists, one per vehicle, maintaining the history of all noted abuses of bike lanes:

date	time	location	pointer to next activity record for this vehicle

As mentioned in class, the choice as to ASCII or binary storage for the activity file is up to you. Both formats are explained in the lecture #1 notes.

Each day, your program will take a transactions file, sorted by license plate number, and apply it to the database. Transactions file records will consist solely of observations made by cyclists and pedestrians, and contain the fields as shown below:

license plate #	car manufacturer	colour	date	time	location

Note that the fields of “car manufacturer” and “colour” are optional. Transactions without this information may be valid, although the police will be reluctant to pursue action against a driver unless this information is supplied. Transactions do not distinguish between new vehicles and those already in the database. Therefore, your program should treat every transaction as an insert operation, unless the vehicle identified by the license plate number already exists.

As new observations about a particular vehicle are supplied, they are added to the linked list in chronological order, and the “number of observations” field in the master file should be updated. When the number of observations recorded for any particular vehicle exceeds five, your program should generate a notice to the police, containing the relevant information from your files.

What to submit

You must submit the report, program code, and some test files, demonstrating the input and output of your program. Read the course guide for more details. For full marks, your program must be modular and follow a consistent code design. Note that the report and error logs generated by your program should be clearly formatted and easily readable.

Things to think about

What will your program do when two observations for the same license plate report the car as being of a different manufacturer or different colour?