Research Topic (Version D)
Title: Traffic Control System

1. Research Requirements

Traffic control system is used to improve the flow of vehicle traffic and improve safety. Real-time traffic data flows into a transportation management center where it is integrated and processed for incident detection and may result in actions taken such as traffic routing.

- System keeps track of drivers' information such as driver license number, person name, birthdate and list of owned cars. Driver can own a maximum of 3 cars.
- For each registered car, the system stores the car plate number, model, list of recorded fines and production year.
- For each fine, system stores its value, street name, date and status (paid/not).
- Traffic man detects the plate number and measures the speed of the passing car. If the car speed exceeds the road maximum speed, a violation is recorded with a specific fine. The fine equals double the difference between the car speed and the road maximum speed.
- System can show the total amount of unpaid fines for a specific driver.
- User can pay the fine for one of his cars and his record is updated accordingly.
- Search is available for a specific car via its plate number or the owner name.

2. Research Objective

Structured programming is a programming paradigm aimed at improving the clarity, quality, and development time of a computer program by dividing the code into functions and making extensive use of the structured control flow constructs. Elaborate on the development life cycle of the mentioned management system. Show the details of all steps required following the structured programming paradigm. The required research thesis sections will be as follows:

1. Data Model

1.1. Identify the appropriate datatypes and sizes of all the data items you need to keep in the above system. Explain your choice of the compound/aggregate data types required (You can only use the ones taught as part of the SP course).
1.2. Describe your choice of variable vs. constant and local vs. global with respect of the data items in the system.
1.3. Indicate how to validate the user inputs.

2. Logical Model (Algorithm)

Draw a flowchart or write a pseudocode for the violation recording function.

3. Process Model (Functions)

Specify the declarations of all the required functions for this system. Clearly identify the inputs and outputs datatypes.

4. Coding Style

When coding, the coding style you follow is important. Most of these guidelines are standard and can be applied to most of the programming languages.

Illustrate the different clean code/language conventions guidelines applied to your program by specifying the line number(s) from your code and explain how you applied the guideline.

5. Implementation

Write a C++ program that fully implements the above system features. It is recommended to start the program with a menu of options, each provides one of the system features.
Copy the code from IDE, make sure to choose 'keep the source formatting' when you paste it in the word file.

6. Testing

Include screenshots that demonstrate sample run of all the system features.
For screenshots, kindly set the background colour to white and text colour to black.

General Instructions:

The research is individual, and each part/component of the research has a weight.

The form of the research should follow the following rules:

a. Writing using Microsoft Word.
b. Using Time New Roman font.
c. 14 Font size for text and 16 Bold for the title.
d. 1.5 line spacing between the lines.
e. Page margins are set to the moderate settings in word (write in the answer template directly)
f. The whole thesis must be written in English. You should write the question number and the answer directly, do not repeat the question itself. English language formulation should be correct and sound.
g. Clarity of texts, pictures or drawings.
h. You should use external sources other than the course textbook. At least 5 recent references are required. You should properly cite them in section 4 in the objectives.
i. You should deliver two files. The first file is the research thesis document with the above sections. Submit it as PDF file named SP_DOC_VerD. The second file is the CPP file of the project named SP_CPP_VerD.
j. You should submit your files via FCIS LMS before the deadline announced by the faculty (not at the last minute).
k. Make sure the files you submit are the correct files because once you submit, you cannot undo or resubmit again.
l. Plagiarism checking will be applied. Research is subject to rejection in such case.

Best Wishes
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Dr. Yasmine Afify
Dr. Salsabil Amin