High Performance, Robust Embedded Automotive Information System

Due Date: Tuesday December 5, 2017, 23:59.

1. Description of the Assignment

You are required to apply the concepts of data structures and algorithms that you have learned in this course to design, analyze, implement, test, document, ***and compare in detail two (2)*** High Performance, Robust Embedded Automotive Information Systems ***with significantly different designs*** described below.

1.1. System Characteristics, Requirements, and Constraints for both of the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs

(a) Each entry in the system consists of a key-value pair (k, v), where k is the key and v is the value.

(b) The key for each entry is unique, that is, two different entries will not have a same key. The key for each entry is a character string. No advance knowledge can be assumed about other characteristics of the keys.

(c) The number of entries in the system can be very large, but the system can still fit into main memory.

(d) Search, insertion and deletion operations on the entries in the system are equally likely.

(e) *The primary system performance criteria is speed, that is, under normal circumstances the search, insertion, and deletion operations should be as fast as possible. However, since this is an embedded automotive information system, the system is also expected to be robust in the sense that one should still be able to guarantee good, predictable, and verifiable performance of the system even under worst-case scenarios, possibly even including when under malicious attacks.*

1.2. Requirements regarding the design, analysis, implementation, testing, documentation, and comparison in detail of the software in the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs

(a) When designing the software to implement the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs, you

must apply best practice software engineering principles and carefully choose appropriate data structures and methods. Furthermore, in your report/documentation you must justify and explain why you chose each particular data structure and method.

(b) You must analyze the run times and space usage of your methods in the report.

(c) You must describe in detail any problems or difficulties that you had encountered, and how you solved or were able to overcome those problems or difficulties in the report.

(d) Additional Requirements:

(d1) You must make sure that your code has very detailed comments.

(d2) You must make sure that your code compiles correctly.

(d3) You must make sure that your code does not generate non-recoverable exceptions.

(d4) You must make sure that your code is able to handle incorrect input.

Failure to satisfy all the requirements above will result in a low mark for the assignment.

2. Platform on Which The System for the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs are to be Implemented

The programs should to be implemented using the Java programming language and you should make sure that the TAs/markers will be able to run them using the system at York.

3. What to Hand In

Each group is required to hand in both a hard copy and an electronic copy of the following:

1. A written report that identifies and addresses all the important aspects and issues in the design, analysis, implementation, testing, documentation, and comparison in detail of the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs described above.

2. The Java source programs.

3. A "Test_output" file containing the output of any testing your group has done.

4. A "README" file explaining how to compile and run your group's program.

5. In addition to submitting a hard copy, each group is required to use the utility "submit" to submit the electronic version of the above 4 files to the course directory /cs/course/2011E/submit/a3

Important Warning:

Only submitting an electronic copy of your assignment is not enough! If you fail to submit a hard copy of your assignment on or before the due date, your assignment will receive a grade of 'F'.

4. Evaluation of the Assignment

4.1. The report part of your assignment (70%) will be evaluated according to:

(a) How well you have satisfied the requirements specified in Section 1.1 and 1.2 above.

(b) How well you have explained the design and implementation of your systems and how well you have justified your design decisions.

(c) The quality of your design.

(d) How well you have designed and explained the testing.

(e) The clarity, and readability of the report.

4.2. The program and testing part of your assignment (30%) will be evaluated according to:

(a) The quality of the design and implementation of your programs.

(b) The quality of the testing of your programs.

(c) Whether your programs satisfy the Additional Requirements in section 1.2 (d), (d1)-(d4) above.

5. Notes

Please note that the requirements specified in Section 1. Description of the Assignment above, are the *minimum requirements* that must be satisfied by your assignment. Obviously, there are many other possible details of the two High Speed, Robust Embedded Automotive Information Systems with significantly different designs that have been left unspecified.
It is your responsibility to make appropriate design, analysis, implementation, testing, and documentation choices concerning the unspecified

details of the two High Performance, Robust Embedded Automotive Information Systems with significantly different designs, and justify those decisions in your report.

 Please also note that *the due date of this assignment, **Tuesday December 5, 2017, falls on the Last Day to Hand In Term Work*** according to the University Regulations. Thus it will not be possible to postpone the due date of this assignment. So please plan carefully in advance in order to make sure that you will be able to complete this assignment before the posted due date.