Name/Surname: Date:

Number:

EHB208E   **Data Structures**   **Spring 2020**

Project

1) Write a "C" program, which inputs and then saves school numbers into the student automation system. School number are stored by using the linked list data structure. Each school number will be saved in a separate linked list. Accessing to student numbers sequentially and accessing to student numbers by the year are two frequently performed operations in the student automation system. In this question, queue and/or stack data structures are used to perform the desired operations with minimum time cost. When each school number is entered, a new record is added into a **proper data structure (stack or queue)** to be able to access the relevant linked list record and perform the desired operations explained below with minimum time cost.

You can define any number of stack or queue data structures to answer the options of the question below. In this question, two important access information is stored in the defined data structures (stack or queue). The first one is the sequential access information according to the last four digits of the student numbers (option A). The second is the grouping information of the student numbers according to the years they belong to (option B). Thus, these two operations, which are used frequently by the student automation system users can be carried out quickly.

(A) Write a function to display all the entered school numbers in ascending order by the last four digits of school numbers, using the defined data structures (stack or queue). (30 points)
(B) Group school numbers according to years and display them on the screen in ascending order. For example, the function first displays the school numbers which belong to 2010 year, then the numbers which belong to 2011 and so on... (20 points)

Sample school number *(A student number belonging to the Institute of Informatics is given as an example. Your student numbers are 9-digit student numbers starting with "0")*:
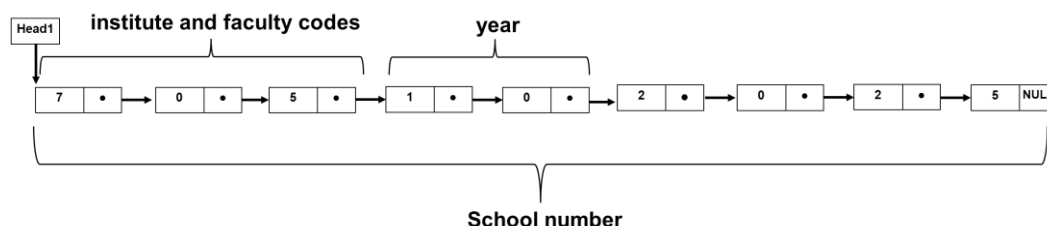
2) When each school number is entered into the system, the school number are stored by using linked list data structure as in the first question. Each school number will be saved in a separate linked list. In this question, binary search tree will be used to manage the records of school numbers. Create a new node in a binary search tree at each new school number entry. This new node should contain the necessary information to be able to access the relevant linked list record and perform the desired operations explained below with minimum time cost.

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Project

All school numbers entered in this question is assumed to be for the same faculty and entrance year.

(A) Write a function to display all the entered school numbers in ascending order by the last four digits, using the defined binary search tree. (30 points)

(B) Visit all the nodes of this binary tree by using pre-order traversal method. (10 points)

(C) Delete a school number from binary search tree according to its last four digits. (10 points)

Note: You may need to research for this project from internet or course resources. You can also find helpful codes related with data structures in the course resources section of this course in Ninova (under Tutorial folder).

Sample screeen output of the 1st question

Sample screeen output of the 2nd question