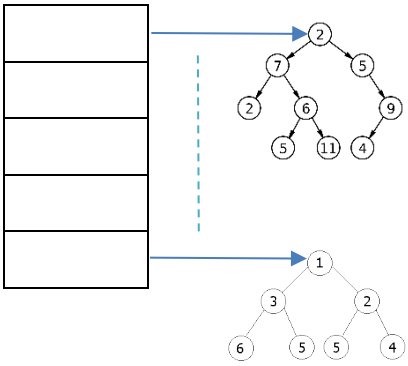
Course Project

Student ID at Qatar University is composed of year of admission and students' number. In this project, we aim to implement a structure that improves operations of inserting and searching for a student. To enhance these operations when using tree data structure, we will use hash table that contains trees (***treeTable***) where each tree holds only data of students admitted in a specific year. Figure 1 illustrates this concept:



We will keep data for 25 years so the table length is 25, and your hash function will be h(year)= year% 25.

Using linear probing implement the following functionalities in treeTable:

Implementation:

1- Each node in the tree will hold an object of type ***Student***.

2- Student class has: id (int), name (String), address (String), GPA (double).

3- Implement a class ***treeTable*** that apply the structure above, which has the following methods:

   a) ***void insert(Student)***, this method inserts students in the appropriate tree based on his id.

   b) ***Student find(int)***, it receives an id, and returns student record with that id, or it returns null if it was not found.

   c) ***Student update(int)***, it receives an id, and it will allow the user to update the selected record, or it returns null if it was not found.

   d) ***boolean remove(int)***, it receives student' id, removes his record if found and returns true, or returns false if it was not found.

   e) ***void printStudent(int)***, it receives an integer number represents the year, then prints students' data who were admitted in that year using inoder approach.

   f) ***void printAll()***, this method prints all students in the treeTable using preorder approach.

   g) ***Student studentWithGPA(double)***, it returns array list of all students whose GPA is below the received parameter.

h) ***Student highestGPA()***, it returns the student has the highest GPA over the 25 years.

i) ***Student highestGPA(int)***, it returns the student has the highest GPA over the parameter year.

j) ***int numberStudents()***, it returns the overall students enrolled over 25 years.

k) ***int numberStudents (int)***, it returns the overall students enrolled over the parameter year.

4- Your main application should have a menu at the beginning, that will allow you to call any of the above-listed methods – 11 methods. Moreover, to save the ***treeTable*** to a txt/dat file, and load it from the file once the program gets executed.

Notes:

1- This is a team-work project –***3 students' as minimum – 4 students' as maximum***.

2- Submission will be on midnight – ***Saturday, May 27th, 2023***.

3- Only one submission per team.

Good Luck!