CSE4014 – Data Structures and Algorithms I

Lab Assignment II

Due: 26/04/2019

< 2018 - 2019, Spring >

April 12, 2019

1. **[50 pts]** Write a program that can handle duplicate nodes in a binary search tree as follows: include a field in the structure of each node that will contain a count of the number of occurrences of a particular value. Increment the count by one when inserting a value that is already in the tree. Decrement the count by one when deleting a value in the tree for which the count is greater than one. Be sure to handle the case where the count is decremented to zero. Print out the inorder sequence after each insertion and deletion. When a node has a count greater than one, print the node "count" number of times. For example, an inorder sequence for the tree in Fig. 1, may look like: A B B C D D D E.

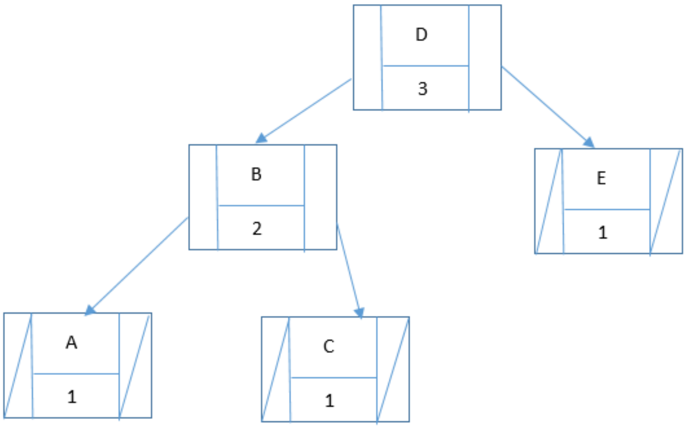

Fig. 1. Binary search tree with additional member named "count" in node struct.

2. **[50 pts]** Write a program to read in the nodes from a file, and create a graph using an adjacency matrix representation. Using the breadth first and depth first traversal algorithms respectively print out the nodes.
   - Create a text file that is in the same form with "graph_template.txt"(i.e., the line in i.th order represents the adjacent nodes reachable from i.th node) to represent a random directed graph then load the adjacency matrix using its' information.
   - Do not forget that without the graph text file that you will create, your project cannot be run and partly evaluated!
   - In main, first read the contents of your text file, convert it to adjacency matrix and display this matrix on the screen. Then the test functionality of BFS and DFS methods and display the order of nodes.

Submission format: Compressed file including
1st question: Project with name **nameSurname_stdID_HW2_1.rar** (same format for C++ source code required), sample output screenshot
2nd question: Project with name **nameSurname_stdID_HW2_2.rar** (same format for C++ source code required), graph text file **nameSurname.txt**, sample screenshot

Do not forget that the following criteria is important for grading; existence of comment lines and output screenshots, indentation, submission name template..!