COP 3502 Computer Science I Spring 2016

Assignment 6

Due Sunday 10th April at 11:30 pm.

This assignment is worth a maximum of 100 points

Objective

By completing this assignment, students will demonstrate a working knowledge of the following Binary Search Tree (BST) concepts:

1. Code implementation of BST
2. Traversing BST
3. Algorithm for inserting nodes into a binary search tree
4. Deleting nodes from a BST
5. Searching for values in BST

Problem: Manipulating Real Estate Database

You are required to create software to manage a real estate database. Because the system must be frequently searched and updated, your team-lead has suggested that you use a BST, ordered on the listingID, to store all of the property listings.

Each property listing is comprised of the following information:

Listing ID (an integer)
Agent (a string no greater than 12 characters long with no spaces)
Price (an integer)
Size in square footage (an integer)
Number of beds (an integer)
Number of baths (a double)
Year built (an integer)
Address (a string, no longer than 30 characters long)

Your code should be able to handle the following database operations:

1) Adding a property listing
2) Deleting a listed property
3) Searching for a listed property by ID
4) Searching for properties listed up to a specified price
5) Searching for listed properties by Agent
6) Listing all of the available properties

When run, your program should read real estate information from an input file called ***listings.txt***. It should store this information in a database implemented as a BST, built as each listing is read. Your program should then execute a given set of operations on the created database.

Input Specification (for listings.txt)

The first line of the file will contain a single positive integer ***n*** representing the number of properties listed. This will then be followed by ***n*** lines of data; each representing a single property. Each line of data will begin with an integer representing the listingID, a string representing the agent, an integer representing the cost of the property. This is followed by: the property size (an integer)
Number of beds (an integer)
Number of baths (a double)
Year built (an integer)
Address (a string, no longer than 30 characters long)

The rest of the file is a series of lines each with a database operation to be executed. Each line begins with an integer from 1 – 6 inclusive, indicating the database operation to be executed. The numbers correspond to the list on the previous page.

If the operation is (1), to add a property to the listings, then the line will contain the all of the listing information, in the order given above.

If the operation is (2), to delete a listing, then the line will contain one other integer representing the listingID of the property to be deleted.

If the operation is (3), to search for a listing by ID, then the line will contain one other integer representing the listingID of the property to be searched for.

If the operation is (4), to search for a listing by price, then the line will contain an integer representing the maximum price of the properties to be searched for.

If the operation is (5), to list all of properties under a given agent, then the line will contain the agent's name after the operation number.

If the operation is (6), to print all of the available properties, then that will be the only number on the line

The input file ends with a 0.

Output Specification

Your output should match that in the sample output. You are to use the exact text for the functions as shown.

Implementation Restrictions

a. #define ADD_LENGTH 30 (for address length)
b. Each Listing must be implemented as a struct
c. Each BST node should have a listing as its data
d. Your program should be written using appropriate functions.
e. Do not use global variables. Instead pass parameters to your functions. Remember that for functions that will be changing your BST, it (the BST), should be passed as a parameter by reference.
f. Deletions of listings should be implemented using the successor algorithm

Deliverables

Your assignment should be submitted via Webcourses by the deadline. No assignments will be accepted via email. Your submission should include a single .c file called **realEstateDB.c.** Remember that your program will be graded using Eustis, so be sure that your submitted code runs correctly on the server.

Remember that it is each student's responsibility to ensure that the correct file has been uploaded. Thus, as advised at the beginning of the semester, immediately after submitting your code, download it and verify that you have submitted the intended file and that the submission has gone through. An excuse that there was an upload error is not grounds for late submission. No assignments will be accepted after the 24 hour window for late submissions via Webcourses.

Sample Input File (library.txt)

```
6
121 Matt   205000 3000 3  2.0  2000 35 Blueberry Lane
163 Amy  450000 5000 5  5.5   2016  8885 Winter Garden Drive
116 Grant 375000 3000 3 2.0  2015  191 Oviedo Lakes
100 Linda  355000  4000 4 2.5  2014  79 Bradmore Lane
155 Amy  495000  3500  3 3.0   2012  52 Lenox Drive
280  Grant 950000 5000  5   6.5  2016  223 Willow Pines

6
1  119 Linda  985000 2950  2  2.0   2013   1200  Park Avenue
2  116
3 132
5 Amy
4 400000
6
0
```

<u>Sample Output (corresponding to input file)</u>

```
LID   Agent   Price $K     size     Bd    Bth    Yr      Address
-------------------------------------------------------------------------------------
100    Linda     355         4000     4      2.5    2014     79 Bradmore Lane
116    Grant     375         3000     3      2.0    2015     191 Oviedo Lakes
121    Matt       205         3000    3      2.0    2000    35 Blueberry Lane
155    Amy       495          3500     3      3.0    2012     52 Lenox Drive
163    Amy       450          5000     5      5.5    2016     8885 Winter Garden Drive
280    Grant     950          5000     5      6.5    2016     223 Willow Pines


Listing 119 has been added to the database

Listing 116 has been deleted from the database

Listing 132  does not exist in the database


LID   Agent   Price $K     size     Bd    Bth    Yr      Address
-------------------------------------------------------------------------------------
155    Amy       495          3500     3      3.0    2012     52 Lenox Drive
163    Amy       450          5000     5      5.5    2016     8885 Winter Garden Drive



LID   Agent   Price $K     size     Bd    Bth    Yr      Address
-------------------------------------------------------------------------------------
100    Linda     355         4000     4      2.5    2014     79 Bradmore Lane
121    Matt       205         3000     3      2.0    2000     35 Blueberry Lane



LID   Agent   Price $K     size     Bd    Bth    Yr      Address
-------------------------------------------------------------------------------------
100    Linda     355         4000     4      2.5    2014     79 Bradmore Lane
119    Linda     985         2950     2      2.0    2013     1200  Park Avenue
121    Matt       205         3000     3      2.0    2000     35 Blueberry Lane
155    Amy       495          3500     3      3.0    2012     52 Lenox Drive
163    Amy       450          5000     5      5.5    2016     8885 Winter Garden Drive
280    Grant     950          5000     5      6.5    2016     223 Willow Pines
```