

ITCS 6114 & 8114 Algorithm and Data Structures

Spring 2015

Programming project #3 – Binary Search Tree

Due Date: February 19th , 2015 at 11PM

Important: Please read the structure of test.txt content and the answer.txt sample. You must follow the project requirement!

Requirement

Build a data structure of binary search tree and implement the operations of inorder tree walk / printing, successor, predecessor, insertion, and deletion.

There are online sources for this project. It's OK to reuse some of the online sources, but you need to reference them and make necessary changes according to our project requirement.

Your program should run from the command line:

bst test.txt (or *java bst test.txt* if you are using java)

where “bst” is the name of your program, “test.txt” is a file that contains multiple lines with sequence of letters and numbers separated by space.

Sample test.txt file content:

B 40 25 78 10 32

S 25

P 25

I 50

D 10

D 87

Here is the meaning of the abbreviations in the test.txt with sample input values:

- B 40 25 78 10 32 means Build binary tree from the sequence 40 25 78 10 32 and output its in-order walk/printing
- S 25 means find Successor of 25
- P 25 means find Predecessor of 25
- I 50 means Insert 50 into the tree
- D 10 means Delete 10 from the tree

The outputs of your program should be written to a plain text file called “answer.txt” recording your outputs’ info for all operations. Your outputs MUST be labeled as clear as possible with clean display.

Sample answer.txt file content for the sample test.txt:

B 40 25 78 10 32: Binary tree built successfully and its in-order traversal is 10 25 32 40 78

S 25: Successor of 25 is 32

P 25: Predecessor of 25 is 10

I 50: Before insertion of 50, in-order traversal of the tree is 10 25 32 40 78

After insertion of 50, in-order traversal of the tree is 10 25 32 40 50 78

D 10: Before deletion of 10, in-order traversal of the tree is 10 25 32 40 50 78

After deletion of 10, in-order traversal of the tree is 25 32 40 50 78
D 87: 87 is not in the tree to be deleted!

When first run, your program will use the sequence of numbers in test.txt (the line starting with "B"), build the binary search tree, output the in-order walk/printing and run the operations specified with the input values.

Grading Criteria

The total of 100 points for this project is broken up into:

- 20 points for proper construction of data structures required in the program.
- 20 points for correctly handling the input and output files (clean labeling and display of the output info. Your readme file should layout what is working and what need improving).
- 40 points for efficiently implementing all functions.
- 20 points for compilation, structure, and documentation.

Within these criteria, your grade will depend on program structure, efficiency, and correct execution.

The structure of your code will be judged for quality of the comments, quality of the data structure design, and especially the logic of the implementation. The comments need not be extremely long: just explain clearly the purpose of each class and each function within each class.

Submission Guidelines

Your submission must include all your source code and a brief report as a README file. Your submission should NOT include any IDE-specific project files, any compiled files, or any executable. Every file should have your name in a comment line at the top. Your README file should have a brief description of your program design, the breakdown of the files, the compiler you used, the platform you used, a summary of what you think works and fails in your program, and a short description of your data structure design.

You will submit your project on Moodle. You should submit a single zip or tar file containing your source code files and README file. You can submit your project multiple times; only the most recent project submission will be graded.

NO LATE SUBMISSION IS ALLOWED. THE SUBMISSION LINK WILL BE DISABLE AT THE EXACT DUE TIME SO DO NOT WAIT FOR A LAST MINUTE

Final Warning

A project that does not follow the submission guidelines will receive a 10 point deduction. Proper submission is entirely your responsibility. Contact the TA if you have any doubts whatsoever about your submission. Do NOT submit your project via email.

Please observe the academic integrity guidelines in the syllabus, and submit your own work.