

CS241 -- Project 1: BST Implementation

Purpose:

1. Warm up your Java programming skills.
2. Understand the structure and application of a binary search tree.

Task Description:

Your program should read from the standard input a sequence of integer values, with each value separated by a space. Your task is to :

- Build a binary search tree using these values in the order they are entered.
- Print 3 traversals: pre-, in-, and post-order.
- Allow the user to insert/delete a value. Once a new tree is generated, print it in-order.
- Find predecessor of a given value. The predecessor is the node that appears right before the given value in an in-order traversal.
- Find successor of a given value. The successor is the node that appears right after the given value in an in-order traversal.

In your BST implementation, the add and delete methods must be implemented using recursion. You will lose major points for using a non-recursive implementation.

Note that no duplicates are allowed in this BST. Your program should use an interactive interface with the format shown below (the user inputs are underlined):

```
% java Project1
Please enter the initial sequence of values:
51 29 68 90 36 40 22 59 44 99 77 60 27 83 15 75 3
Pre-order: X X X ... X
In-order:  X X X ... X
Post-order: X X X ... X
Command? H
  I  Insert a value
  D  Delete a value
  P  Find predecessor
  S  Find successor
  E  Exit the program
  H  Display this message
Command? I 88
In-order:  X X X ... X
Command? I 42
In-order:  X X X ... X
Command? I 22
22 already exists, ignore.
Command? D 44
In-order:  X X X ... X
```

```

Command? D 90
In-order: X X X ... X
Command? D 70
70 doesn't exist!
Command? D 68
In-order: X X X ... X
Command? S 75
77
Command? P 99
88
Command? E
Thank you for using my program!
%
```

You should test your program with the above data set as well as your own data sets, since it will be tested against other data sets. For the output submission, please use exactly the same data as shown above.

What to Submit?

1. Project report (please follow the standard guideline listed on the project webpage).
2. Java source code (Project1.java, which contains the main method and other supported java files).
3. Printed output showing the run results with the data in the demo example above.
4. Please zip all documents as yourname_p1.zip and send it as an attachment to ftang@cpp.edu.

You will be graded based on the quality of your program, your project report and how well you follow the project description and our general project guideline.

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