University of Regina, Department of Computer Science, CS210, Assignment 3

Part A [50]

A toy that many children play with is a base with three pegs and five disks of different diameters. The disks begin on one peg, with the largest disk on the bottom and the other four disks added on in order of size. The idea is to move the disks from the peg they are on to another peg by moving only one disk at a time and without ever putting a larger disk on top of a smaller one. This child's toy is actually an example of a classic mathematical puzzle called the Towers of Hanoi problem.

Write a recursive solution to this problem. It may take you a while to see the solution, but the program itself is quite short.

Consider the source peg is A, the temporary peg is B, and the destination peg is C.

Sample Input/output

Enter number of disks: 1

Solution: A→C

Enter number of disks: 2

Solution: A→B A→C B→C

Enter number of disks: 3

Solution: A→C A→B C→B A→C B→A B→C A→C

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The source code (Assignment3PartA.CPP)

Part B [50]

Create a Binary Search Tree of integer values, then implement the operations:

Traverse Inorder

Traverse Preorder

Traverse Postorder

Insert a new item (if the same item already exists, give a message “already exists”)

Delete an item (if the item does not exists, give a message “item not found”)

Assumption

Each item in the BST is unique.

Sample input/output

How many integers you want: 5

Enter the integers: 7 9 1 2 10

Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 4

Enter the item for insert: 2

This item already exists. Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 4

Enter the item for insert: 8

This item is inserted. Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 5

Enter the item for delete: 12

This item not found. Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 5

Enter the item for delete: 7

This item is deleted. Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 1

Inorder Traverse: 1 2 8 9 10

Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 2

Preorder Traverse: 2 1 9 8 10

Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 3

Postorder Traverse: 18 10 9 2

Press 1 for inorder traverse, 2 for preorder traverse, 3 for postorder traverse, 4 for inserting new item, 5 for deleting an item, or 6 for exit the program: 6

Program terminated

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The source code (Assignment3PartB.CPP)