Introduction to Algorithms Assignment2

Due Date: 2018/05/25 23:59:59 **Language:** C \ C++ \ Python

Score:

If you pass the given data(d1), you get 30% each problem

Another 20% will be gotten if you pass the hidden data(d2, d3)

Report 5%

if you pass d1, you'll get 60(30 + 30)

if you pass d1 and (d2 or d3) you'll get 80

if you all pass, you'll get 100

Red-black tree(p.308)

Rule:

- 1. Every node is either red or black.
- 2. The root is black.
- 3. Every leaf (NIL) is black.
- 4. If a node is red, then both its children are black.
- 5. For each node, all simple paths from the node to descendant leaves contain the same number of black nodes.

Display:

Display the tree use Inorder traversal(p.288)

Output the (1)node value (2)parent of node (3) node color

P.S.

- (1) Do not output the root node and NIL,
- (2) May not specify consider the space of output, but the order should be right.
- (3) Linux user can modify \r\n to \n for testing by yourself.

1. Insert node:

Input:

2 (number of works)

1(insert)

5 11 9 7 6 12 5 4 1

1

2 3

Output:

Insert: 5, 11, 9, 7, 6, 12, 5, 4, 1

key: 1 parent: 4 color: red key: 4 parent: 5 color: black key: 5 parent: 6 color: red key: 5 parent: 5 color: black key: 6 parent: 0 color: black key: 7 parent: 9 color: black key: 9 parent: 6 color: red key: 11 parent: 9 color: black key: 12 parent: 11 color: red

Insert: 2, 3

key: 1 parent: 2 color: black key: 2 parent: 5 color: red key: 3 parent: 4 color: red key: 4 parent: 2 color: black key: 5 parent: 6 color: black key: 5 parent: 5 color: black key: 6 parent: 0 color: black key: 7 parent: 9 color: black key: 9 parent: 6 color: black key: 11 parent: 9 color: black key: 12 parent: 11 color: red

2. Delete node:

Input:

2 (number of works)

1

5 11 9 7 6 12 5 4 1

2 (delete)

115

Output:

Insert: 5, 11, 9, 7, 6, 12, 5, 4, 1 key: 1 parent: 4 color: red key: 4 parent: 5 color: black key: 5 parent: 6 color: red key: 5 parent: 5 color: black key: 6 parent: 0 color: black key: 7 parent: 9 color: black key: 9 parent: 6 color: red key: 11 parent: 9 color: black key: 12 parent: 11 color: red

Delete: 11, 5

key: 1 parent: 4 color: black key: 4 parent: 6 color: red key: 5 parent: 4 color: black key: 6 parent: 0 color: black key: 7 parent: 9 color: black key: 9 parent: 6 color: red key: 12 parent: 9 color: black

Rule of programing and the dataset:

- (1) Dataset will always insert first.
- (2) Dataset will not delete not exist number.
- (3) All element type is Integer.
- (4) Output do not break the rule will be right.
- (5) Cannot use not standard header file or you should attach on your zip
- (6) Auto input and output, the relative path is beside the main program