Assignment 7: Advanced Data Stucture

Due: 1st week after the winter vacation (submission through moodle before sessional class)

Section B1:

Implement the following methods of a Red-Black tree:

1) Insert (insert a key value)
2) Lookup (search for a key value in the tree)
3) Delete (delete a key value from the tree)
4) Print (print all of the key values in ascending order)

N:B: 1) The worst case running time of all the methods should be O(log N), where N is the number of nodes in the tree.

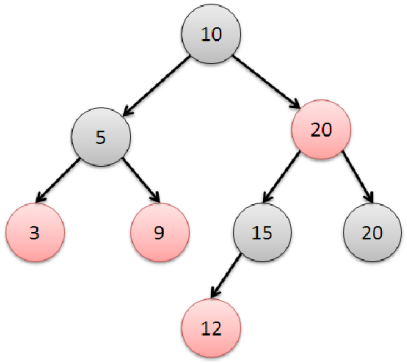
2) Implementation must be done in C/C++

Example:

Suppose you have inserted the following key values consecutively:

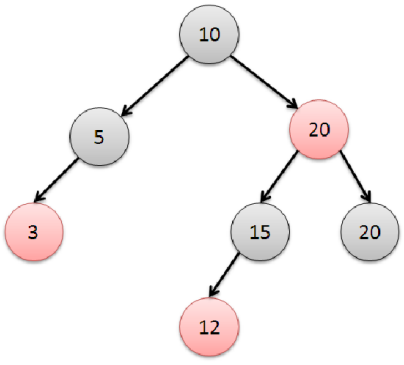
10, 20, 5, 3, 9, 15, 20, 12

Now, the **Red-black tree** would be as follows:



After the insertions of these key values, if you search for 20, then the **Lookup** function will return **true**. If you search for 16, it will return **false**.

Now, if you delete the key value 9, then after the deletion the tree would be as follows:



For the **Print** function, the values will be printed in the sorted order.

Section A1/ A2/ B2:

Implement the following methods of a Red-Black tree:

1) Insert (insert a key value)
2) Lookup (search for a key value in the tree)
3) Delete (delete a key value from the tree)
4) Print (print all of the key values in ascending order)
5) Min (return the minimum key value of the tree)
6) Max (return the maximum key value of the tree)

N:B: 1) The worst case running time of all the methods should be O(log N), where N is the number of nodes in the tree.

2) Implementation must be done in C/C++

Example:

Suppose you have inserted the following key values consecutively:

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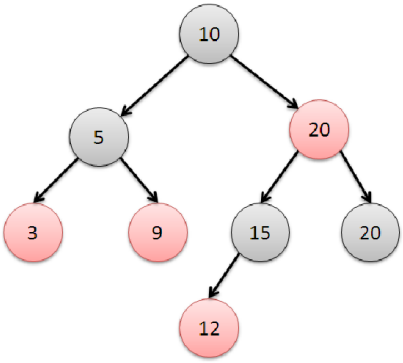

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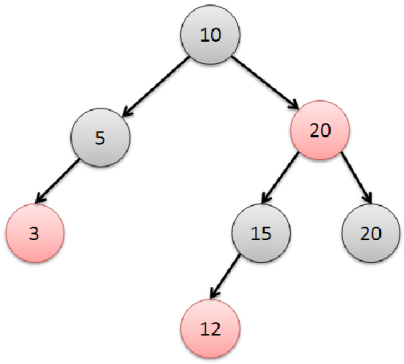

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