Indian Institute of Technology Mandi
February-June 2015 Semester

CS202: Advanced Data Structure and Algorithms

Programming Assignment 6

Last date of submission: 24th April, 2016 – 10:00 PM

Implement the Dictionary data structure using Red-Black Tree (RB Tree) using C++ programming language.

1. Create and Use a "Node" class to implement a node of a tree. (Do not use structure (struct))
2. Use the same interfaces for the Dictionary ADT and BST given for Assignment 5.
   Dictionary.hpp: abstract Dictionary interface.
   BSTree.hpp: Interface for BST
3. Interface for the RB Tree is given in moodle.
   RBTree.hpp: Interface for RB Tree
4. Inherit as much functionality as possible from the BSTree class. Then provide custom RB Tree functionality on top of that. The RB Tree should make use of as many BST functions as possible. Override only those methods which are extremely necessary.
5. Your main program should ask the use to input the key each time new key is inserted. Your main program should have following menu of operations and this menu should be displayed each time after the completion of an operation:
   a. Insert a key
   b. Search for a key
   c. Delete a key along withh color.
   d. Display all the keys along with color and black height as obserbed in inorder traversal
   e. Display all the keys along with color and black height as obserbed in preorder traversal
   f. Display all the keys along with color and black height as obserbed in postorder traversal
   g. Display all the keys along with color and black height as obserbed in levelorder traversal
   h. Display the minimum key along with color and black height in a tree
   i. Display the maximum key along with color and black height in a tree
   j. Display the succesor of a key along with color and black height
   k. Display the predecessor of a key along with color and black height
   l. Display the height of a tree
   m. Display the black height of a tree
   n. Exit