

⑧ Insertion in Red-black Tree

1.) Perform a normal ^{bst} insertion into the tree and consider the newly inserted node's colour as red.

2.) if newnode == root
then newnode.colour = black
black_height++

3.) if newnode.parent.colour != black && newnode != root:
if newnode.uncle.colour == red:
while (newnode.uncle.colour != red) {
newnode.uncle.colour = black;
newnode.parent.colour = black;
newnode.grandparent.colour = red;
~~newnode = newnode.grandparent;~~
newnode = newnode.grandparent;
}

if (newnode.uncle.colour == black):

(i) //LL rotation
right_rotate(newnode.grandparent)
swap(newnode.grandparent.colour,
newnode.parent.colour)

(ii) //LR rotation
left_rotate(newnode.parent)
LL-rotation.

(iii) //RR rotation
left_rotate(newnode.grandparent)
swap(newnode.grandparent.colour,
newnode.parent.colour)

(iv) //RL rotation
right_rotate(newnode.parent)
RR-rotation