

Red Black tree deletion

1-delete like BST if node has 2 children find Successor replace it with Successor
delete Successor

2- if node has 1-0 child

- If red node just delete it .
- If black node with one red child so replace node with its child make child black

3-if node is double black node

what is double black node :

black node that has two black children null children or not null when deleted it will have double weight.

Six cases

1. Case1 :the black node is the root and only node

Solution :

- just delete it and you will have empty tree .

2. Case2:Black node with black father and red sibling and sibling has both black children

Solution

- Delete it
- rotate sibling around parent
- exchange color between parent and sibling
- it became case 4 solve as case 4

3. Case3: Black node with black father and black sibling both sibling's children are black

Solution

- Delete it
- change sibling color to red.
- THIS CONVERT IT TO OTHER CASE MAY BE CASE 1 OR OTHER MAY PUSH PROBLEM UP

4. Case4: Black node with red father and black sibling and sibling has both black children

solution

- o delete it
- o exchange color between parent and sibling

5. Case5: Black node with black father and black sibling left child of sibling is red right child of sibling is black

SOLUTION :

- Rotation and recoloring to convert it into case 6
1. Rotate sibling's left child around sibling (right rotation)

2. Recolor : Sibling and its rotated child exchange colors.

- Solve it as case 6

6. Case6 : Black node with any father and black sibling right child of sibling is red
(color of parent + color of left sibling's child not important)

solution

- delete
- rotate sibling with parent
- recoloring
 - 2) sibling right child black
 - 3) sibling left child and parent nochange