# Red Black Tree

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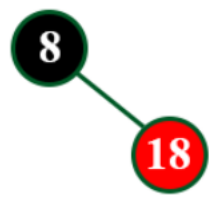
Create a RED BLACK Tree by inserting following sequence of number
8, 18, 5, 15, 17, 25, 40 & 80.

**insert ( 8 )**

Tree is Empty. So insert newNode as Root node  with black color.

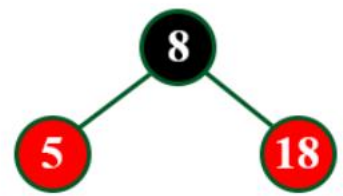

**insert ( 18 )**

Tree is not Empty. So insert newNode with red color.



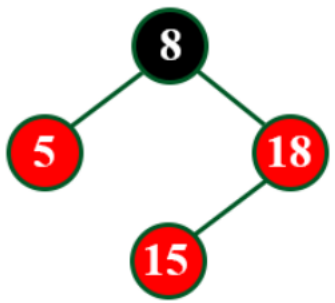
**insert ( 5 )**

Tree is not Empty. So insert newNode with red color.



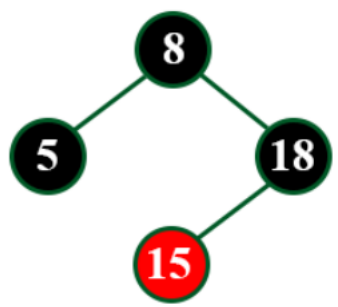
**insert ( 15 )**

Tree is not Empty. So insert newNode with red color.




Here there are two consecutive Red nodes (18 & 15).
The newnode's parent sibling color is Red
and parent's parent is root node.
So we use RECOLOR to make it Red Black Tree.

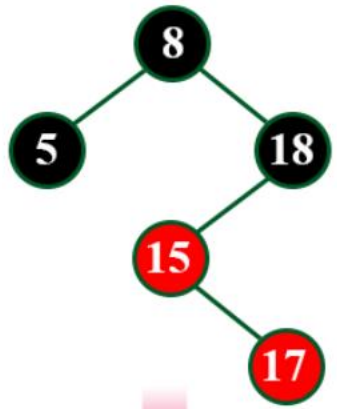
After RECOLOR




After Recolor operation, the tree is satisfying all Red Black Tree properties.

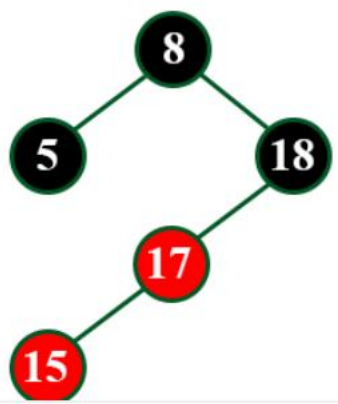
**insert ( 17 )**

Tree is not Empty. So insert newNode with red color.

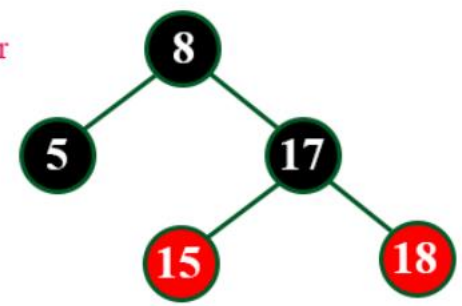



Here there are two consecutive Red nodes (15 & 17).
The newnode's parent sibling is NULL. So we need rotation.
Here, we need LR Rotation & Recolor.

After Left Rotation

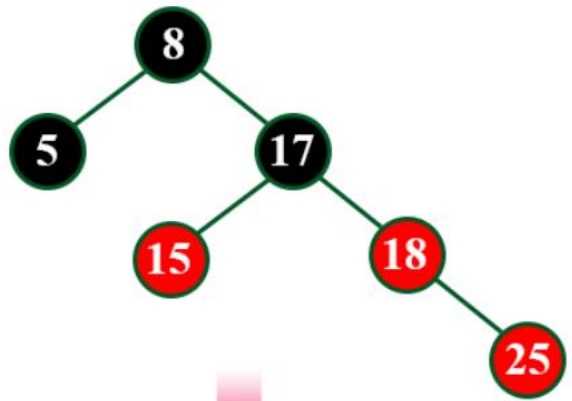



After Right Rotation & Recolor



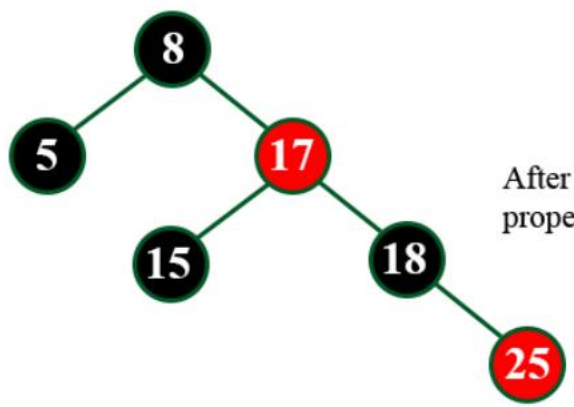
**insert ( 25 )**

Tree is not Empty. So insert newNode with red color.




Here there are two consecutive Red nodes (18 & 25).
The newnode's parent sibling color is Red
and parent's parent is not root node.
So we use RECOLOR and Recheck.

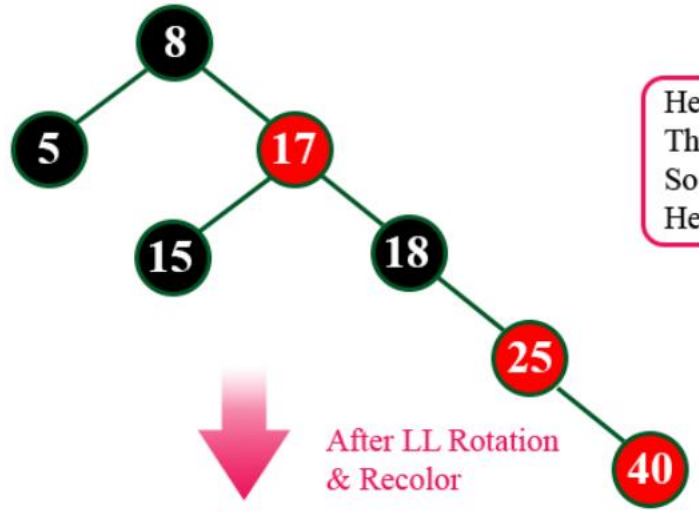
After Recolor




After Recolor operation, the tree is satisfying all Red Black Tree properties.

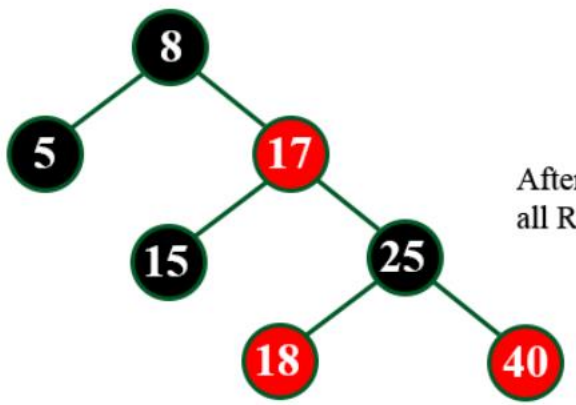
**insert ( 40 )**

Tree is not Empty. So insert newNode with red color.




Here there are two consecutive Red nodes (25 & 40).
The newnode's parent sibling is NULL
So we need a Rotation & Recolor.
Here, we use LL Rotation and Recheck.

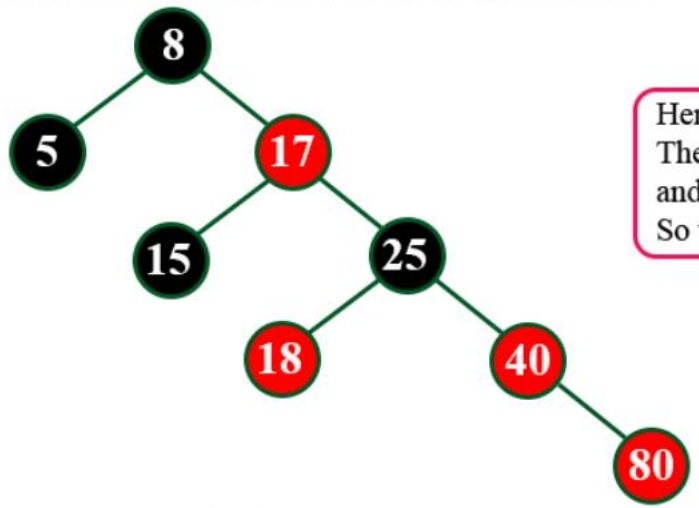
After LL Rotation
& Recolor




After LL Rotation & Recolor operation, the tree is satisfying all Red Black Tree properties.

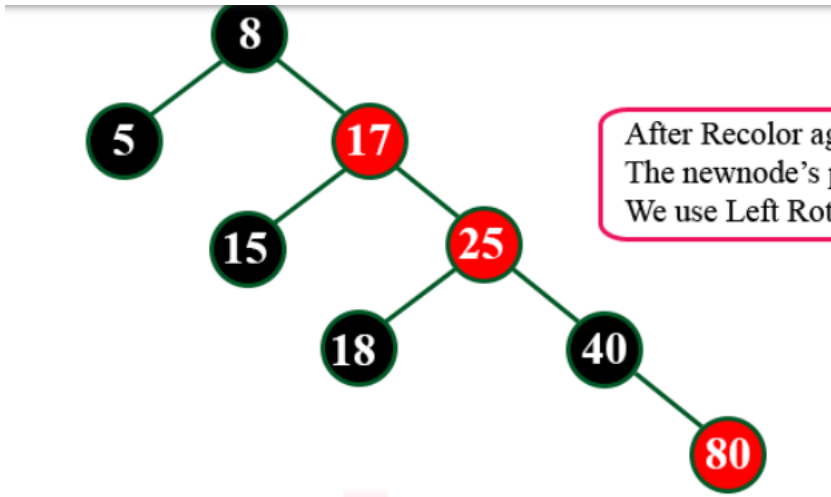
**insert ( 80 )**

Tree is not Empty. So insert newNode with red color.



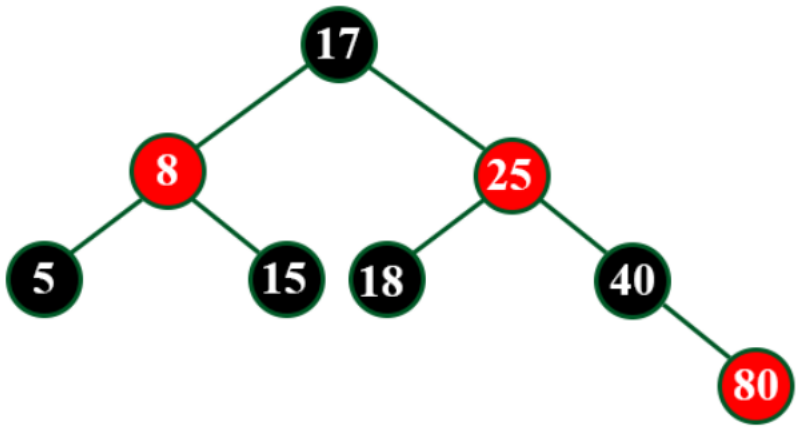

Here there are two consecutive Red nodes (40 & 80).
The newnode's parent sibling color is Red
and parent's parent is not root node.
So we use RECOLOR and Recheck.

After Recolor




After Recolor again there are two consecutive Red nodes (17 & 25).
The newnode's parent sibling color is Black. So we need Rotation.
We use Left Rotation & Recolor.

After Left Rotation
& Recolor



Finally above tree is satisfying all the properties of Red Black Tree and it is a perfect Red Black tree.