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مهم جداً

هذا الملف للمراجعة السريعة واخذ الملاحظات عليه فقط ،لانه يحتوي
على اقل من 20٪ مما يتم شرحه في الفيديوهات
الاستعجال والاعتماد عليه فقط سوف يجعلك تخسر كميه معلومات
وخبرات كثيره

يجب عليك مشاهدة فيديو الدرس كاملا

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Algorithms & Problem Solving
Level 6
Fix Violations
Case 1 – Sibling
is Red
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Case 1: Sibling is Red

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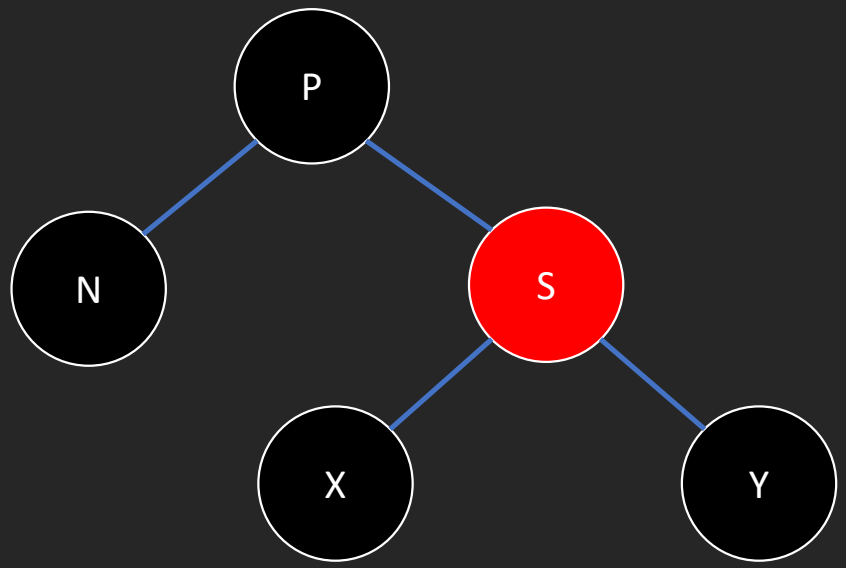
Case 1: The Sibling is Red.

- P is the parent node (black).
- N is the node being deleted or its replacement.
- S is the sibling of N (which is red).
- X and Y are children of S.



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Case 1: The Sibling is Red:

Scenario: The sibling of the double black node is red.

Action:

1. When you delete the node, it becomes double black.
2. Perform a rotation to move the red sibling to the parent's position.
3. Swap the colors of the sibling and the parent (color the sibling black and the parent red).
4. The double black situation still exists, but now the sibling of the double black node is black, allowing you to continue with the appropriate steps for Case 2.

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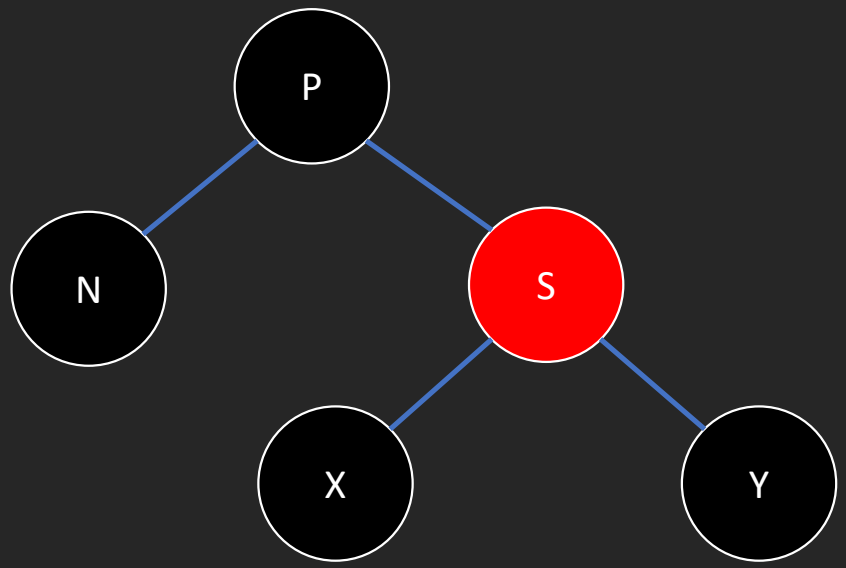

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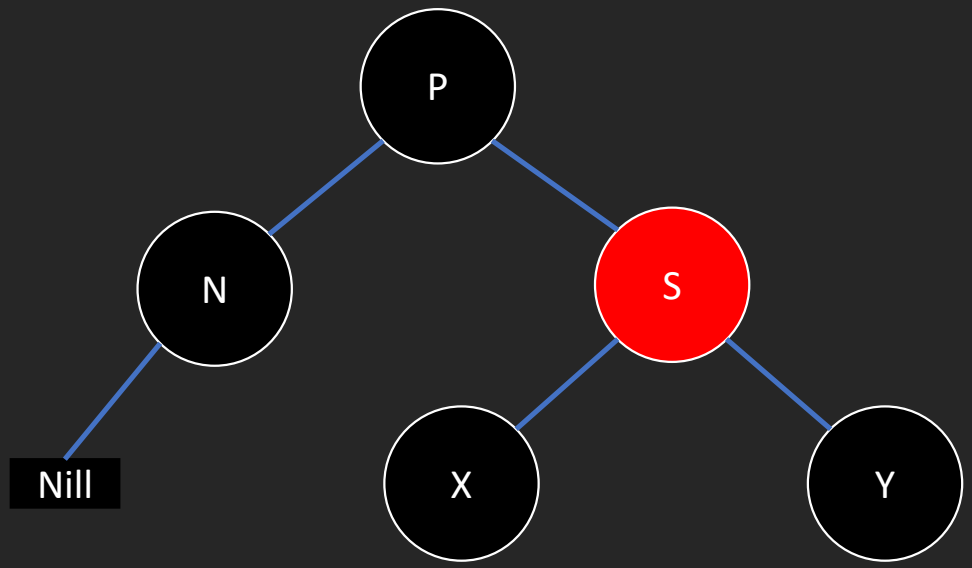
Case 1: The Sibling is Red.

- 1- Delete Node: it will become double black.



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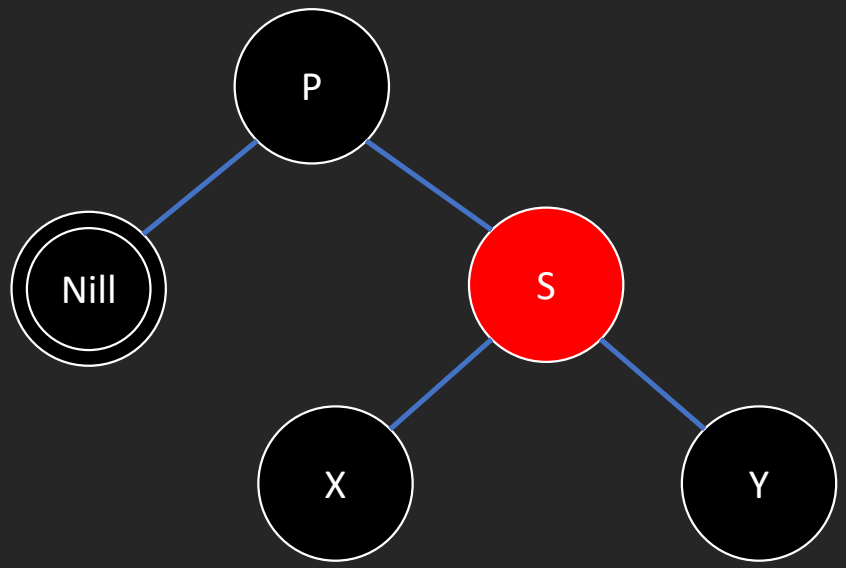

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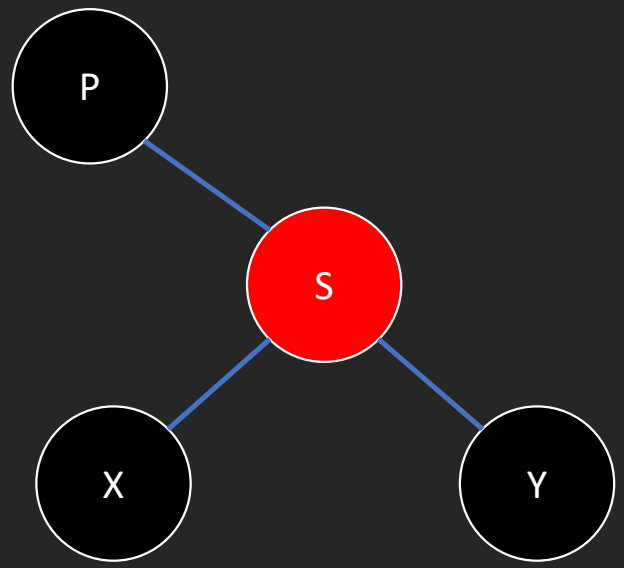
Case 1: The Sibling is Red.

2- Perform a rotation to move the red sibling to the parent's position. (left or Right rotation depends on the balance)



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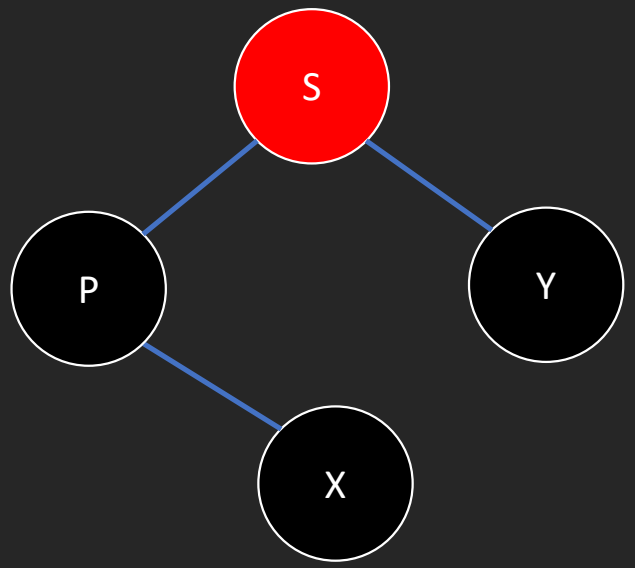
Case 1: The Sibling is Red.

- The red sibling has now moved to the parent position.
- The original parent (now a child) becomes the left child of the red sibling.

After Rotation



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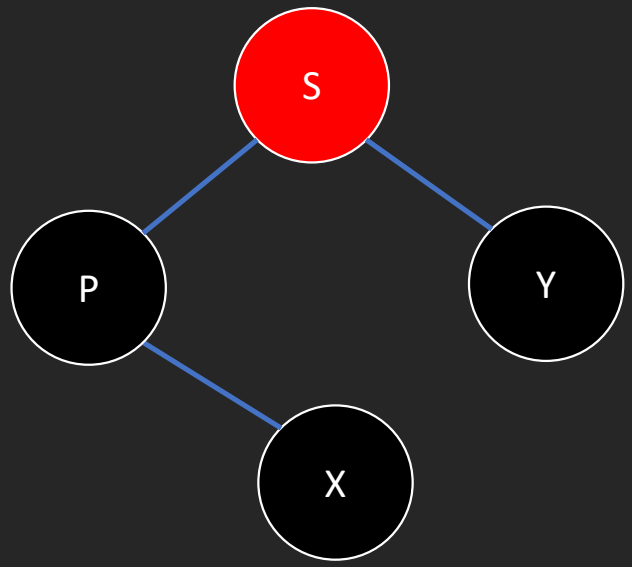
Case 1: The Sibling is Red.

3- Swap the colors of the sibling and the parent (color the sibling black and the parent red).

After Rotation



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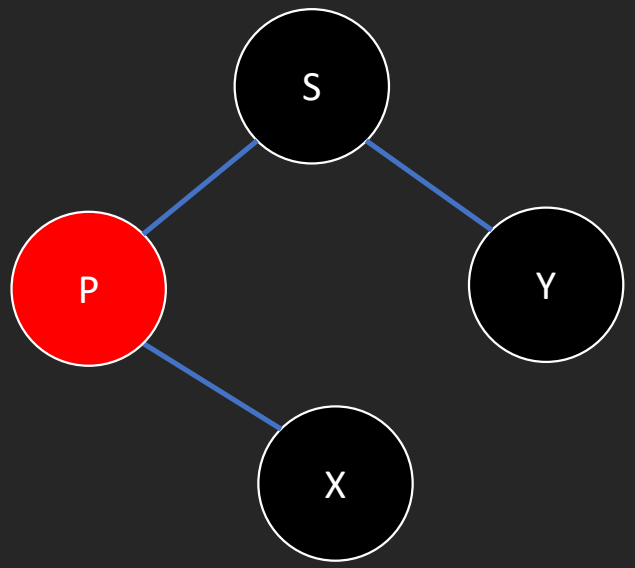
Case 1: The Sibling is Red.

- Recolor the Nodes (Swap Colors):
  - Color the sibling (now the parent) black.
  - Color the original parent red.
  - The double black situation still exists, but now the sibling of the double black node is black, allowing you to continue with the appropriate steps for Case2.

After Recoloring



- Why The double black situation still exists

Simply count the blacks in the tree you will find that path S➔P has only one black, while S➔P➔X , S➔Y have 2 blacks ☺

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