
PROGRAMMING ADVICES
LEARN THE RIGHT WAY
26+ Years of Experience
Mohammed Abu-Hadhoud
MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CSE, ITILF, MCPD, MCSD
لا تنسى الاشتراك في قناتنا على اليوتيوب ومشاركة القناة مع اصدقائك
لتعم الفائدة للجميع وانقاذ الاف الناس من التشتت وجزاكم الله خيرا
لا تنسونا من دعائكم وادعو لوالدي بالرحمة
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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
لاتنسى عمل لايك ومشاركة القناة لتعم الفائدة للجميع
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STOP
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Algorithms & Problem Solving
Level 6
Fix Violations
Sub Case 2.1 –
Sibling's children
are both black.
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Case 2: Sibling is Black

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Case 2: Sibling is Black

- 2.1: Sibling's children are both black.
- 2.2: At least one of the sibling's children is red
  - **2.2.1: Sibling's far child is red**
  - 2.2.2: Sibling's near child is red

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Case 2.1 - Sibling's children are both black.

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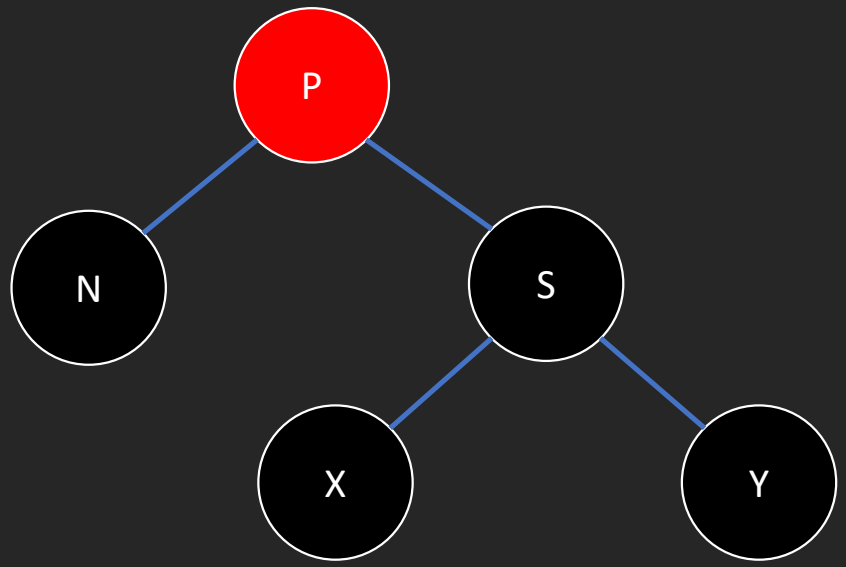
Case 2.1: Sibling's children are both black.

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



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Sub Case 2.1: Sibling's children are both black.

Scenario: Sibling's children are both black.

Action:

1. When you delete the node, it becomes double black.
2. Color the sibling red.
3. Move the double black up to the parent (effectively reducing the problem to the parent).
   A. If the parent is red, color it black to resolve the double black.
   B. If the parent is black, the double black situation may continue, requiring further handling up the tree.

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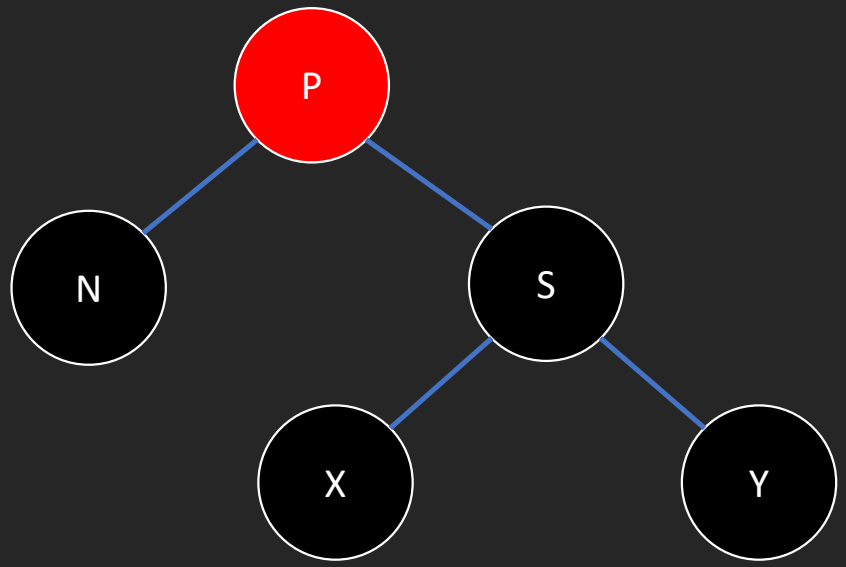

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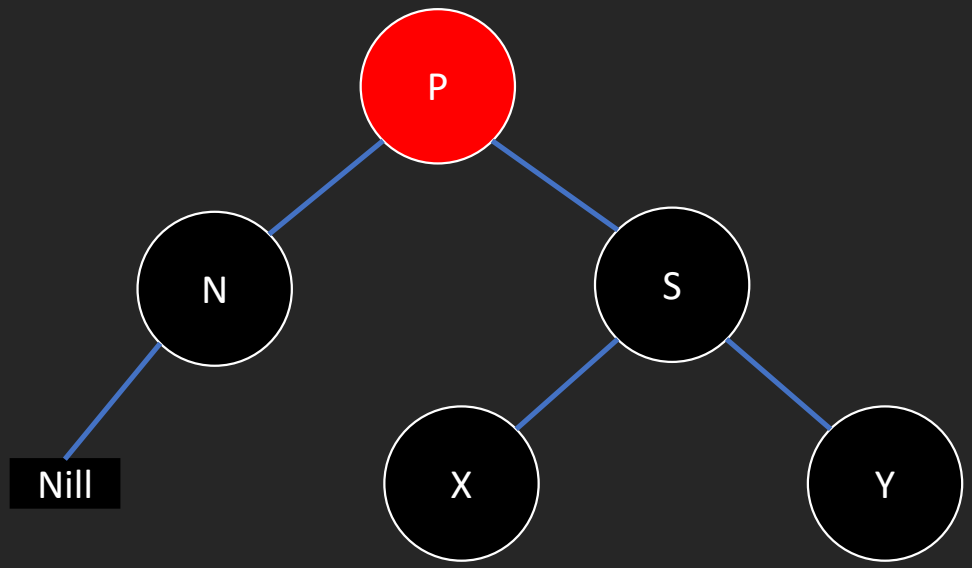
Case 2.1: Sibling's children are both black.

- Delete Node: It will become double black



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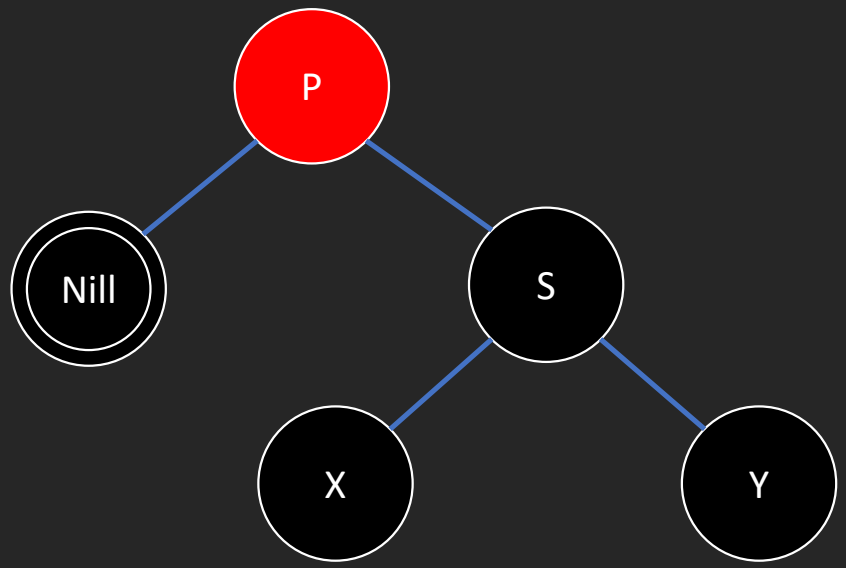
Case 2.1: Sibling's children are both black.

- Delete Node: It will become double black



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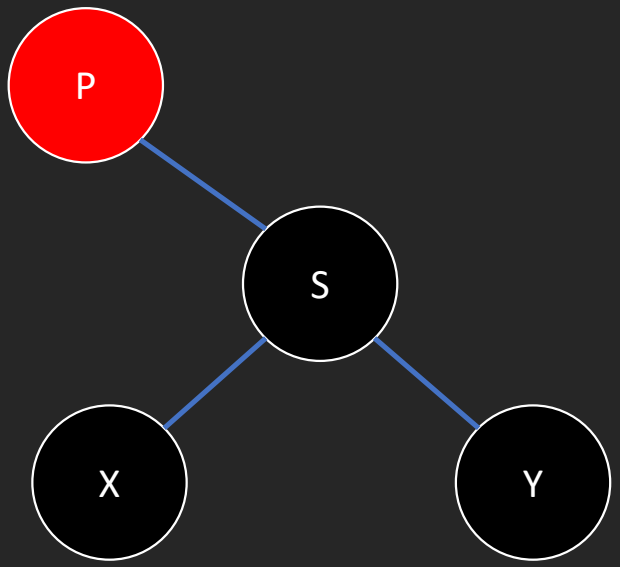
Case 2.1: Sibling's children are both black.

2- Color the sibling red.



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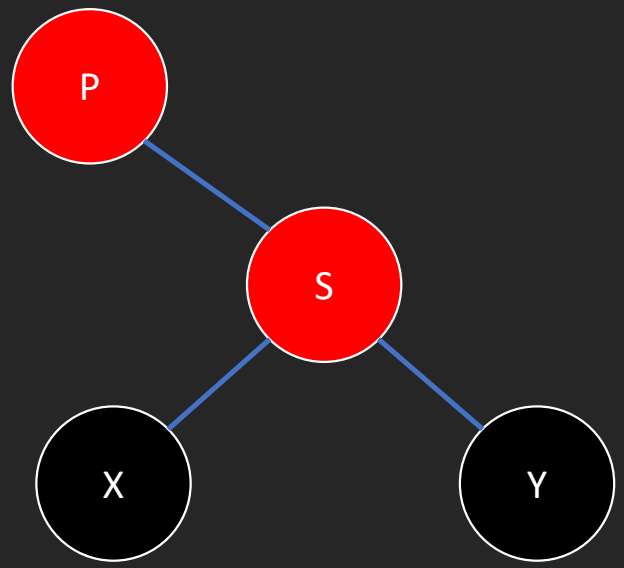
Case 2.1: Sibling's children are both black.

2- Move the double black up to the parent (effectively reducing the problem to the parent).

A. If the parent is red, color it black to resolve the double black.
B. If the parent is black, the double black situation may continue, requiring further handling up the tree.

After Recoloring



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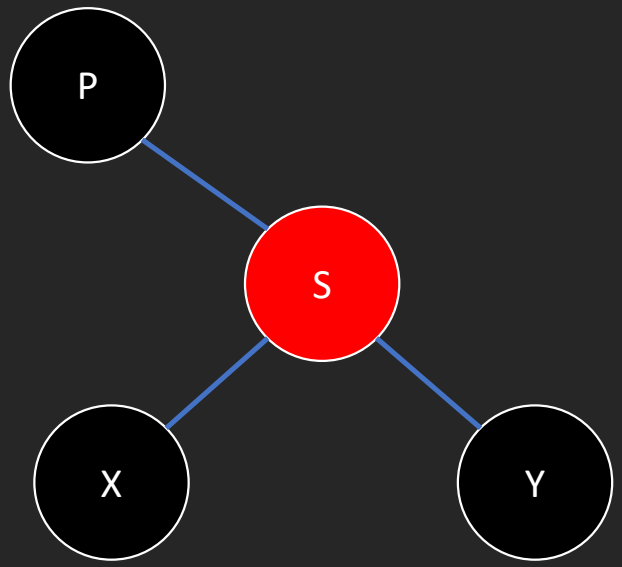
Case 2.1: Sibling's children are both black.

After Recoloring Parent to black

Problem Resolved.



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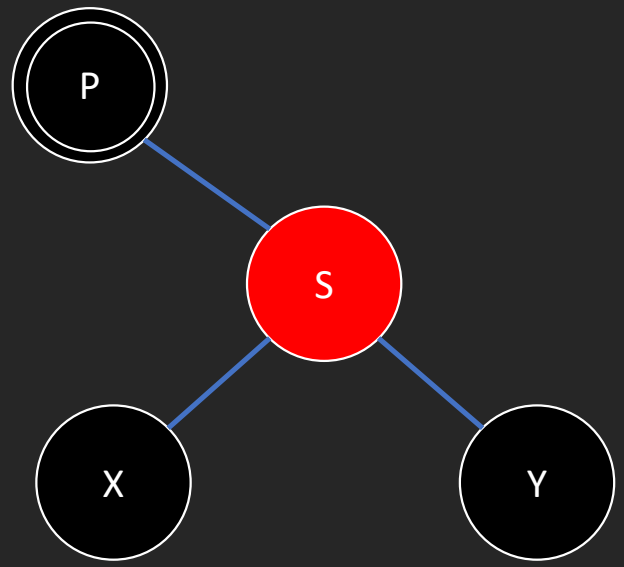
Case 2.1: Sibling's children are both black.

What if Parent is Black?

2- Move the double black up to the parent (effectively reducing the problem to the parent).

A. If the parent is red, color it black to resolve the double black.
B. If the parent is black, the double black situation may continue, requiring further handling up the tree.



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