Data Structures and Object Oriented Programming

Lecture 15

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Object-Oriented Programming in C++

Binary Search Trees

Deletion

BST – Deletion

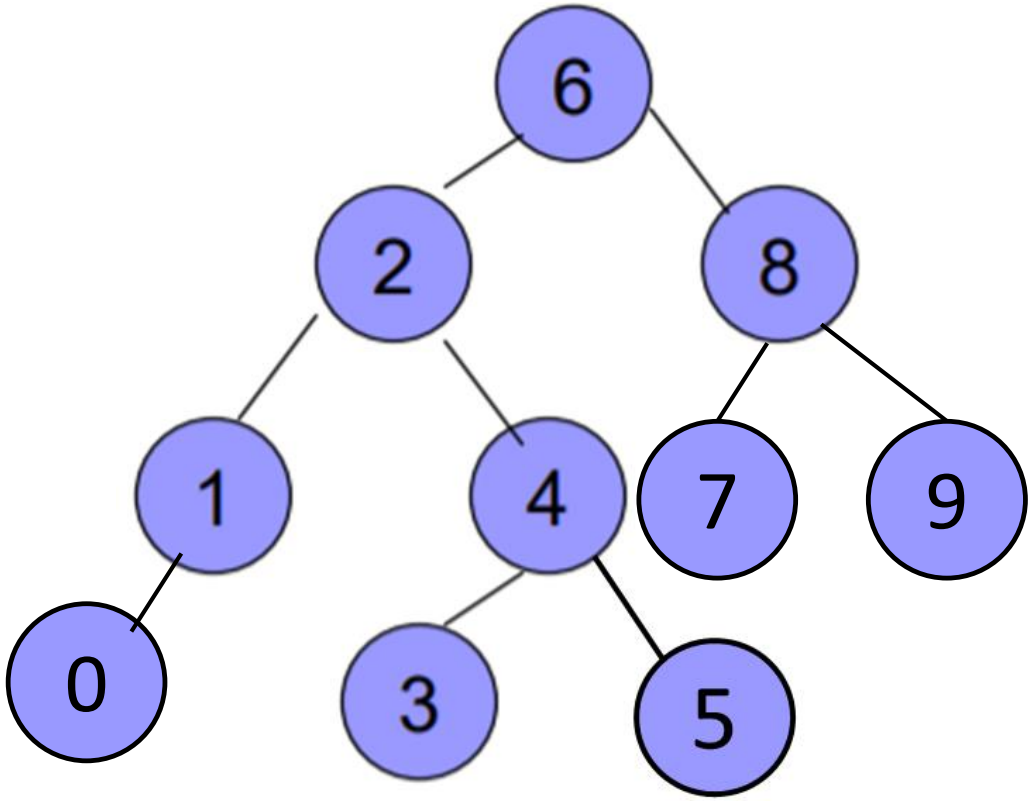
Deletion of a node **N** from the tree depends primarily on the number of children of node **N**.

There are three cases:

- Case 1: No Children
- Case 2: One Child
- Case 3: Two Children

BST – Deletion

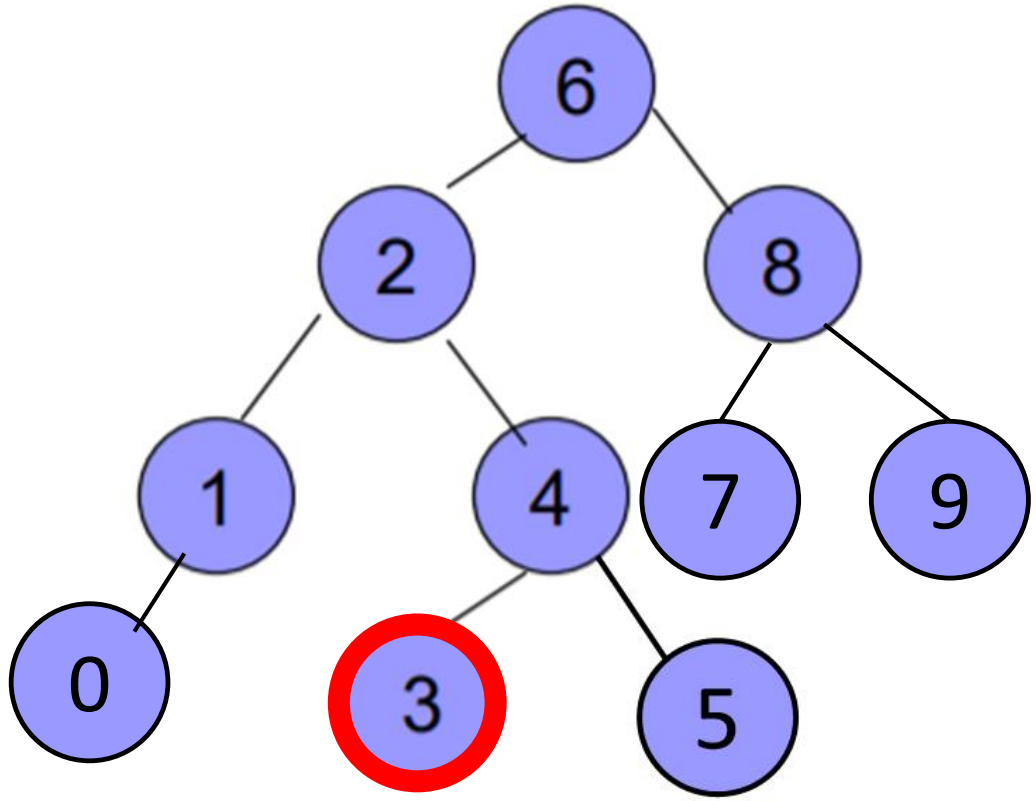
Case 1: No Children



BST – Deletion

Case 1: No Children

Delete ‘3’



BST – Deletion

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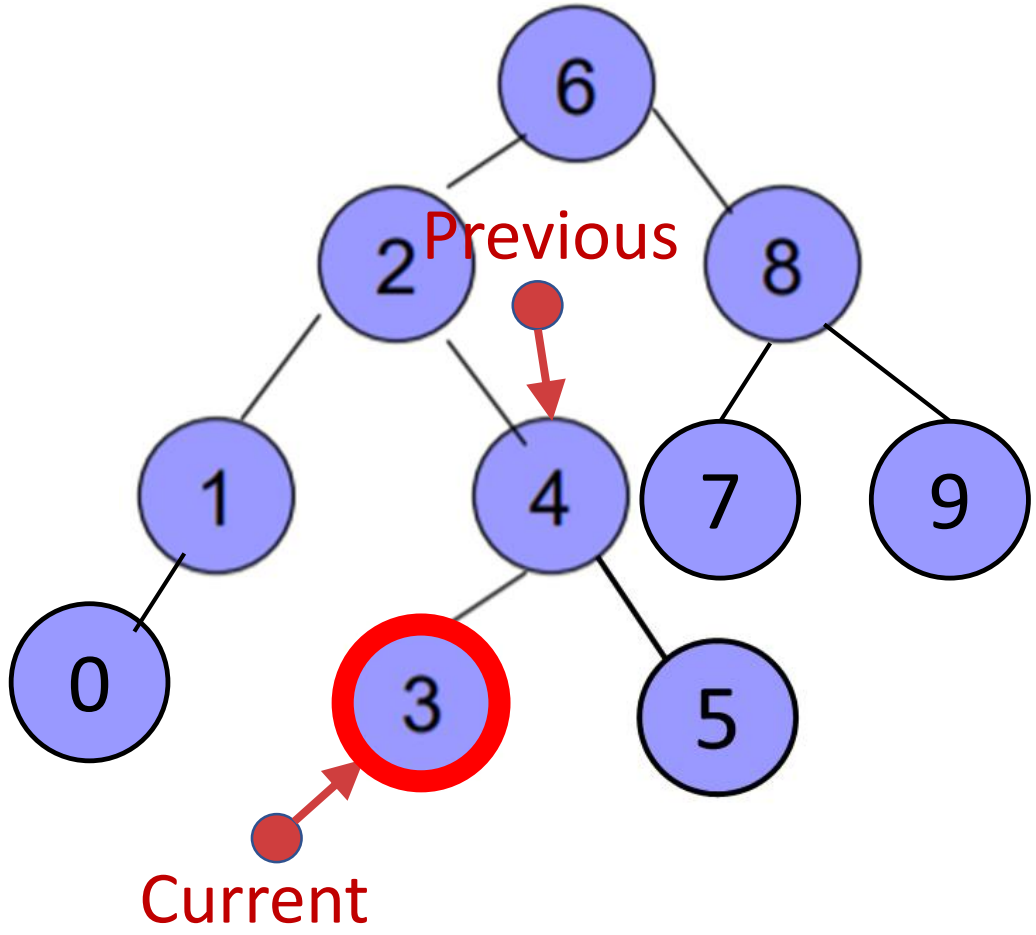
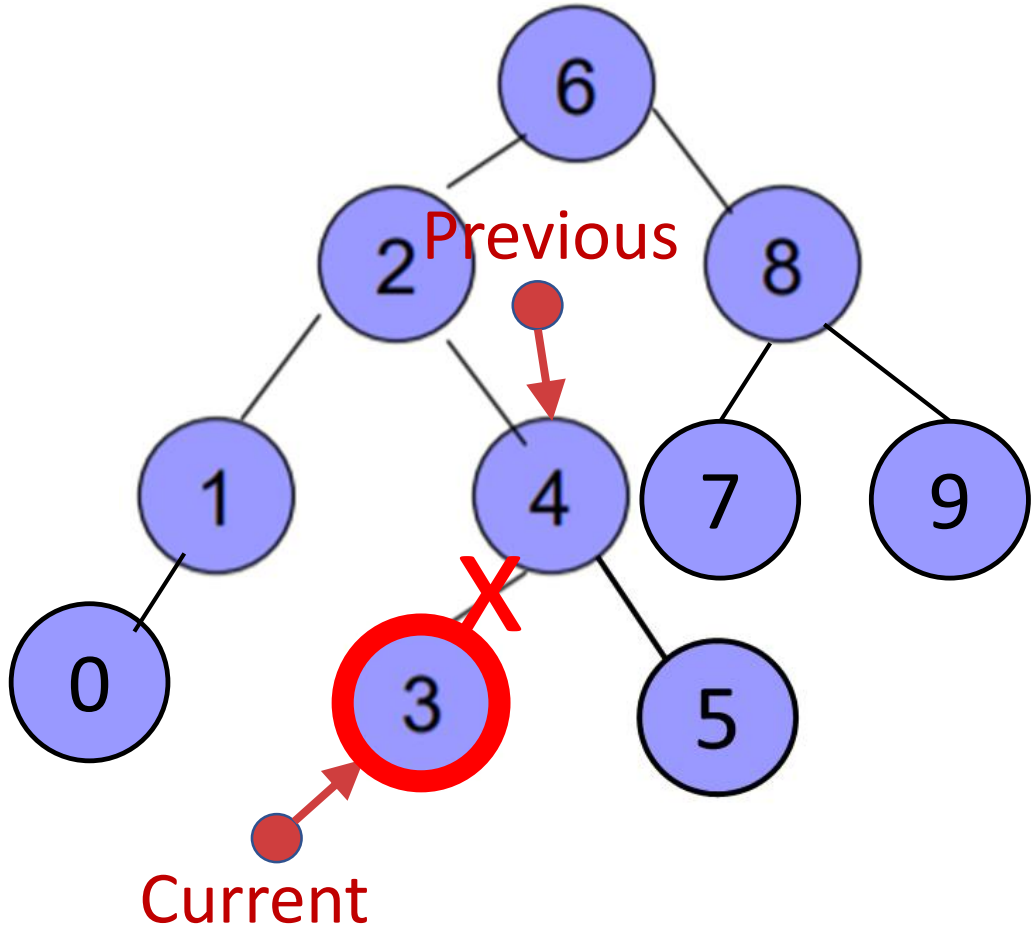


BST – Deletion

Case 1: No Children

Delete ‘3’

```
if (Previous->right == Current)
        Previous->right = NULL
else
        Previous->left = NULL
```



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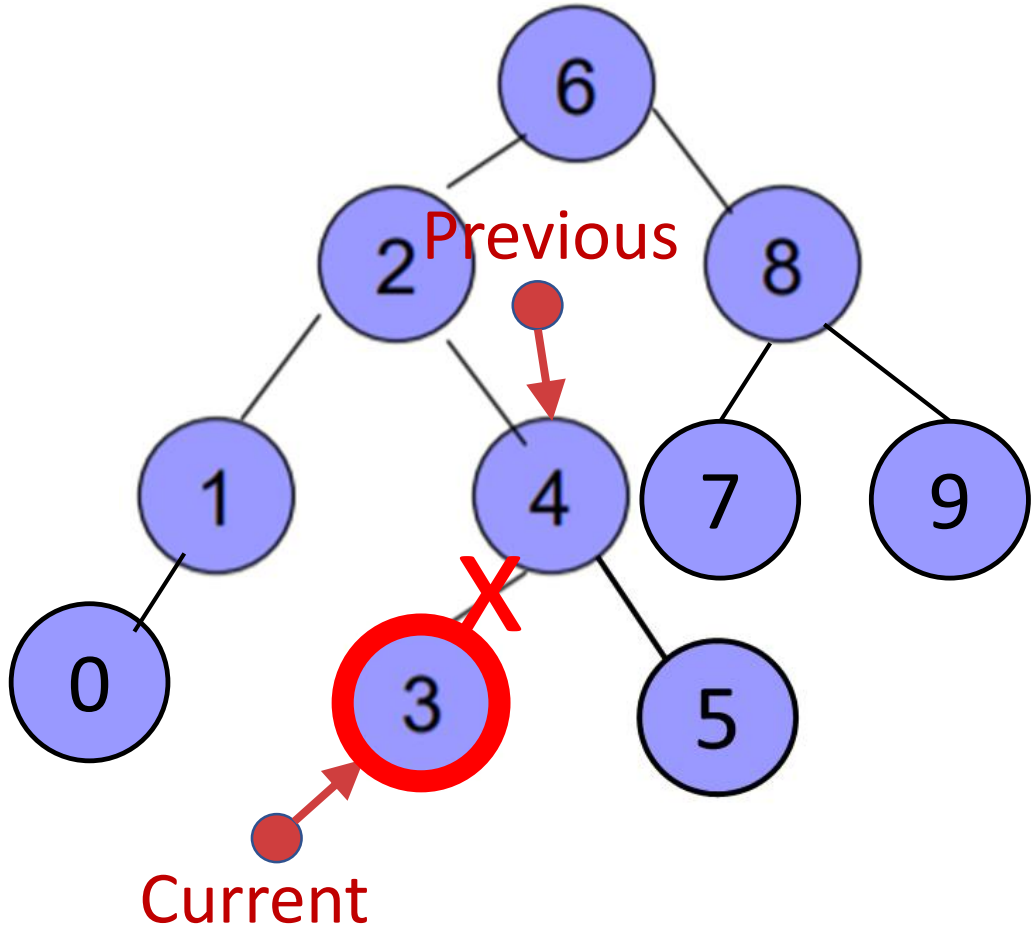

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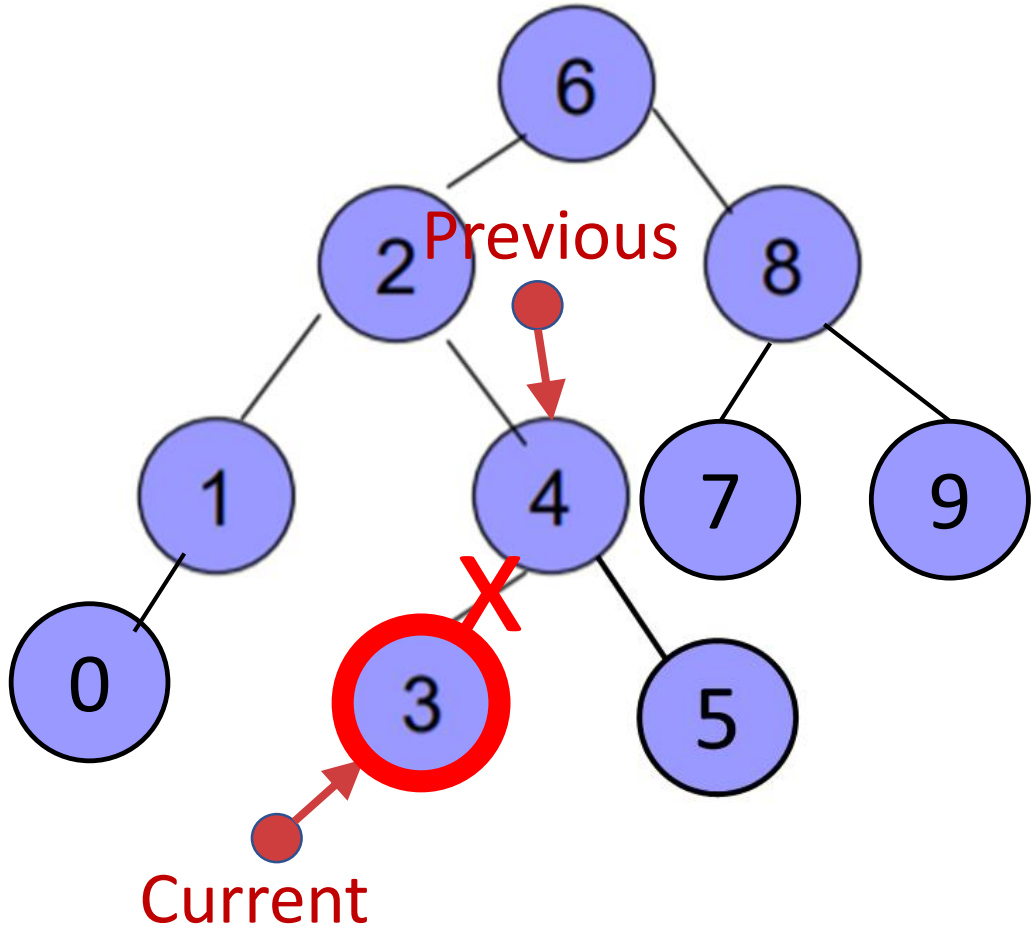
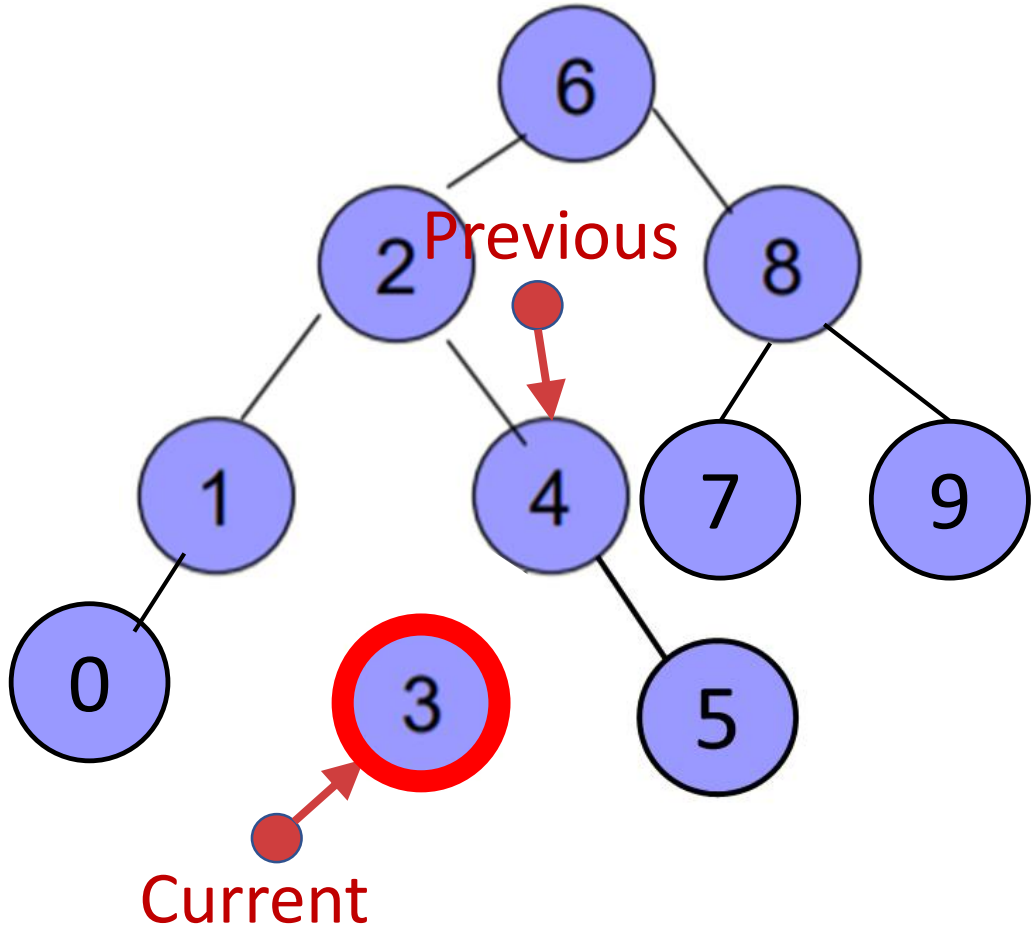


BST – Deletion

Case 1: No Children

Delete ‘0’

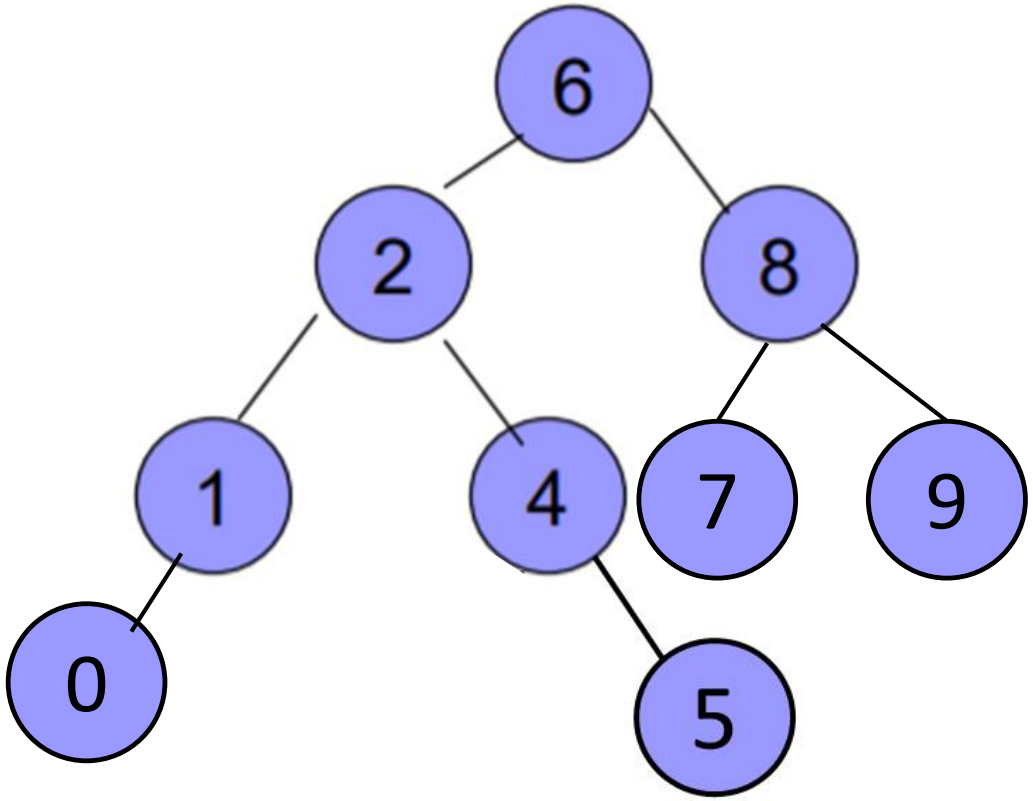
Delete Current



BST – Deletion

Case 1: No Children

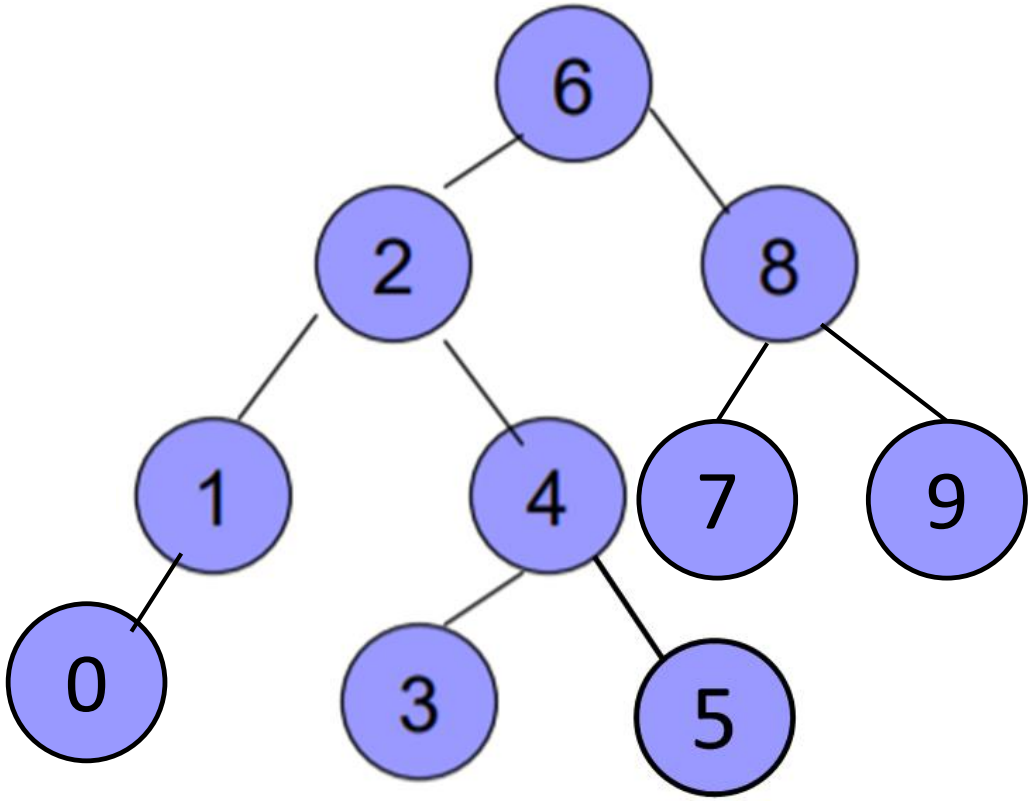
Delete ‘0’



BST – Deletion

Case 2: One child

Delete ‘1’



BST – Deletion

Case 2: One child

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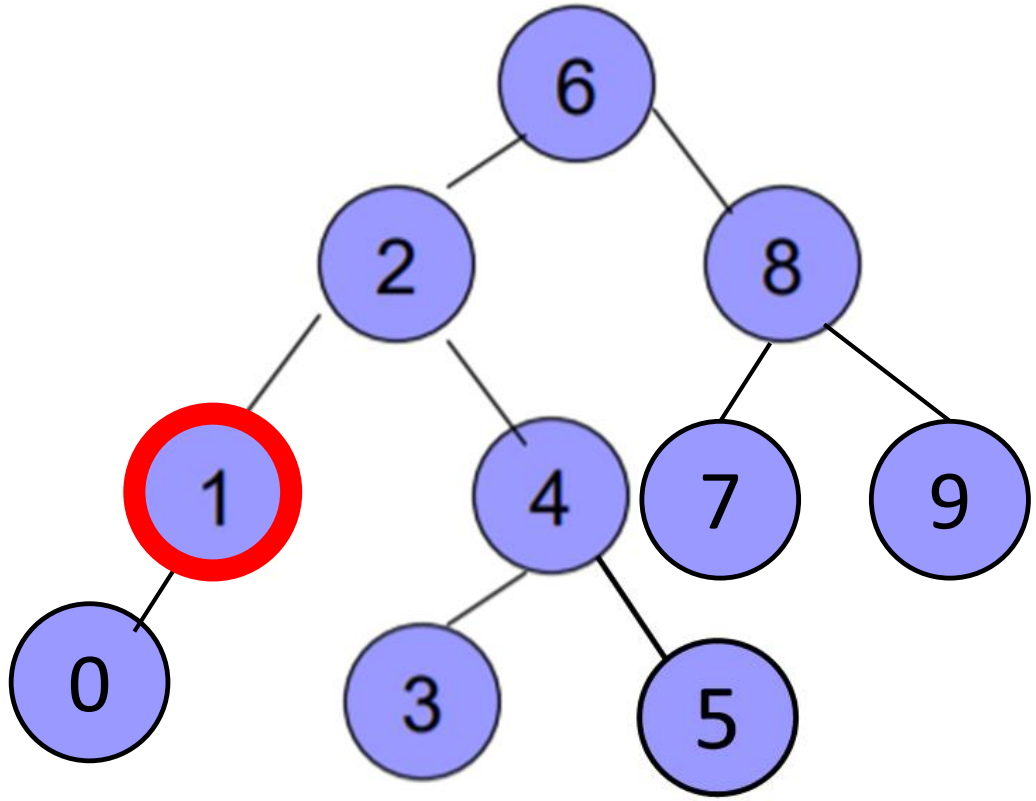

BST – Deletion

Case 2: One child

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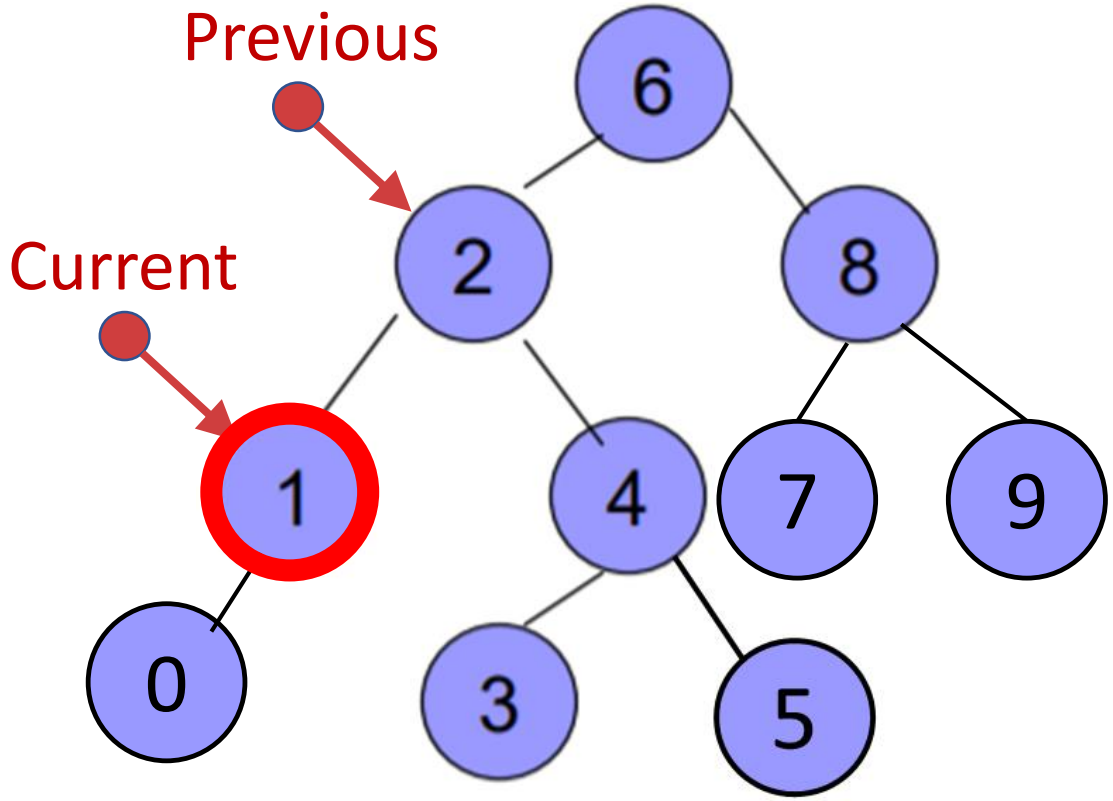

BST – Deletion

Case 2: One child

Delete ‘1’

```
if (Previous->right == Current)
        If(Current->right!=NULL)
                Previous->right= Current->right;
        else
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        If(Current->right!=NULL)
                Previous->left= Current->right;
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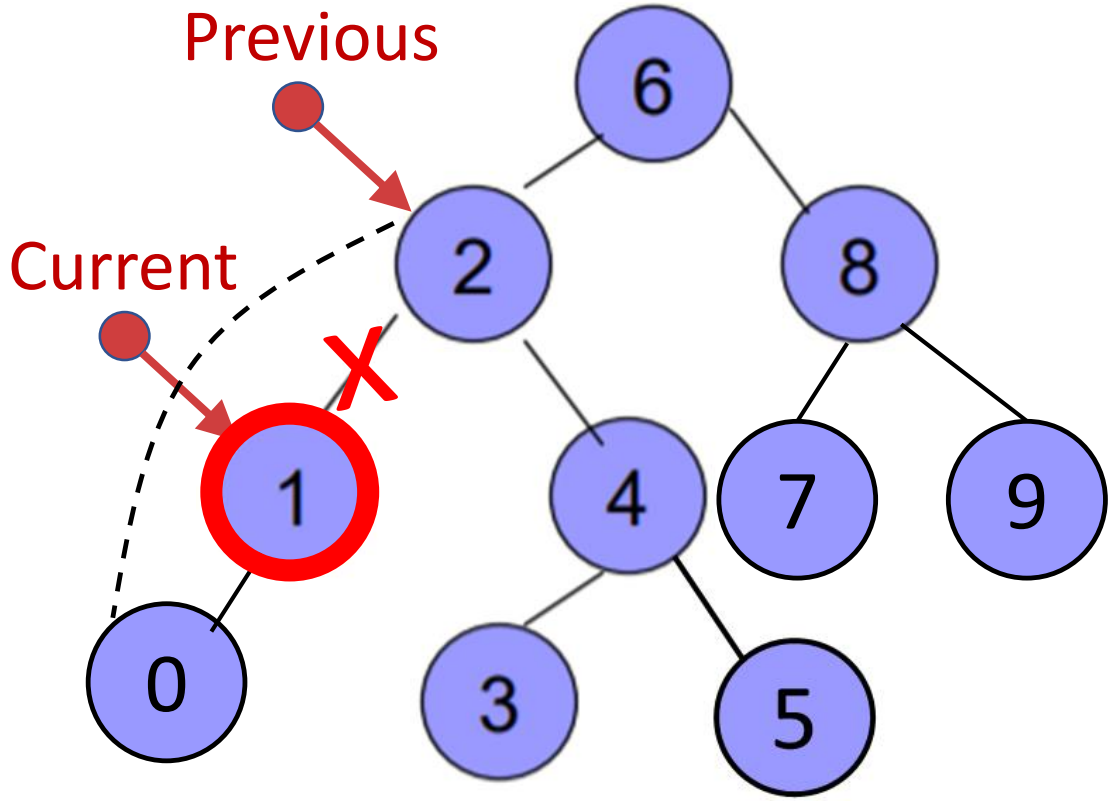

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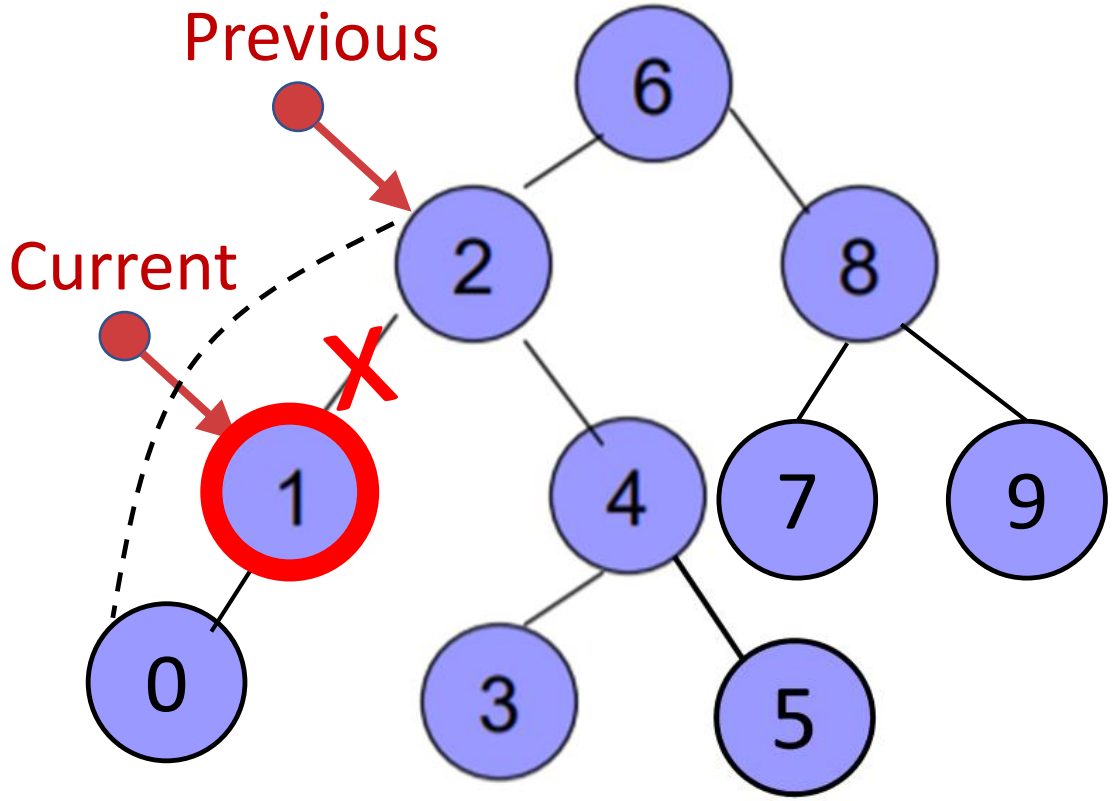

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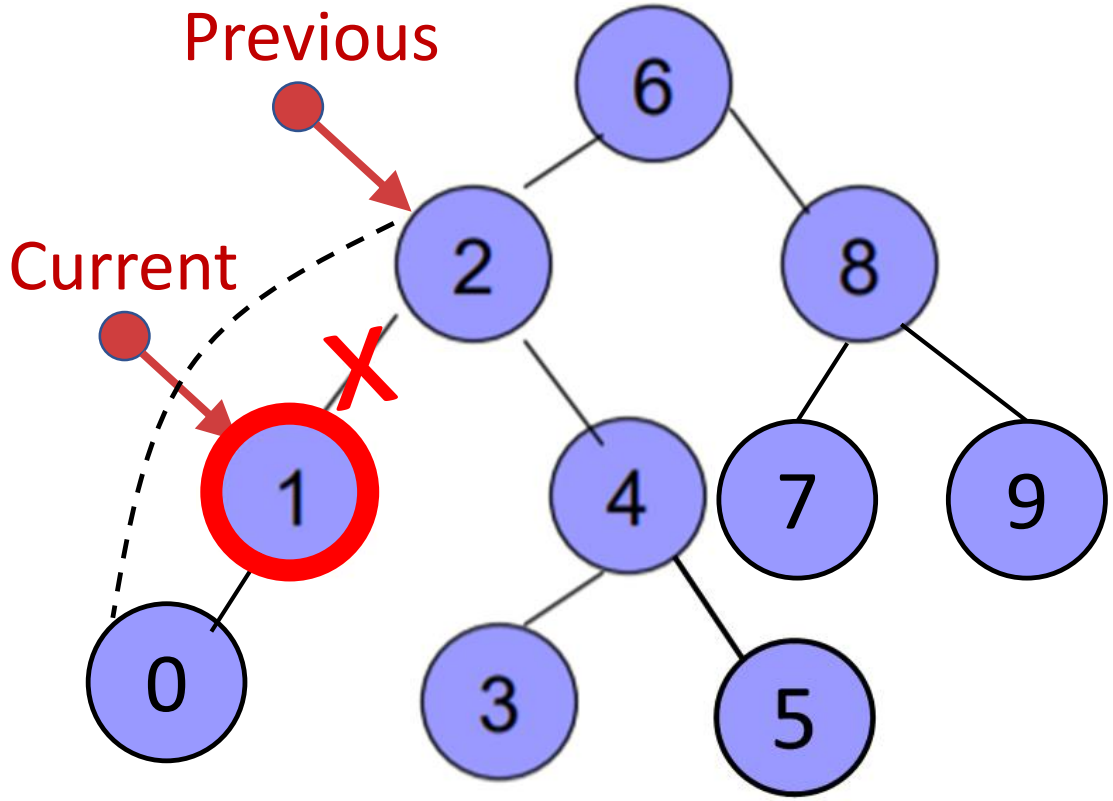

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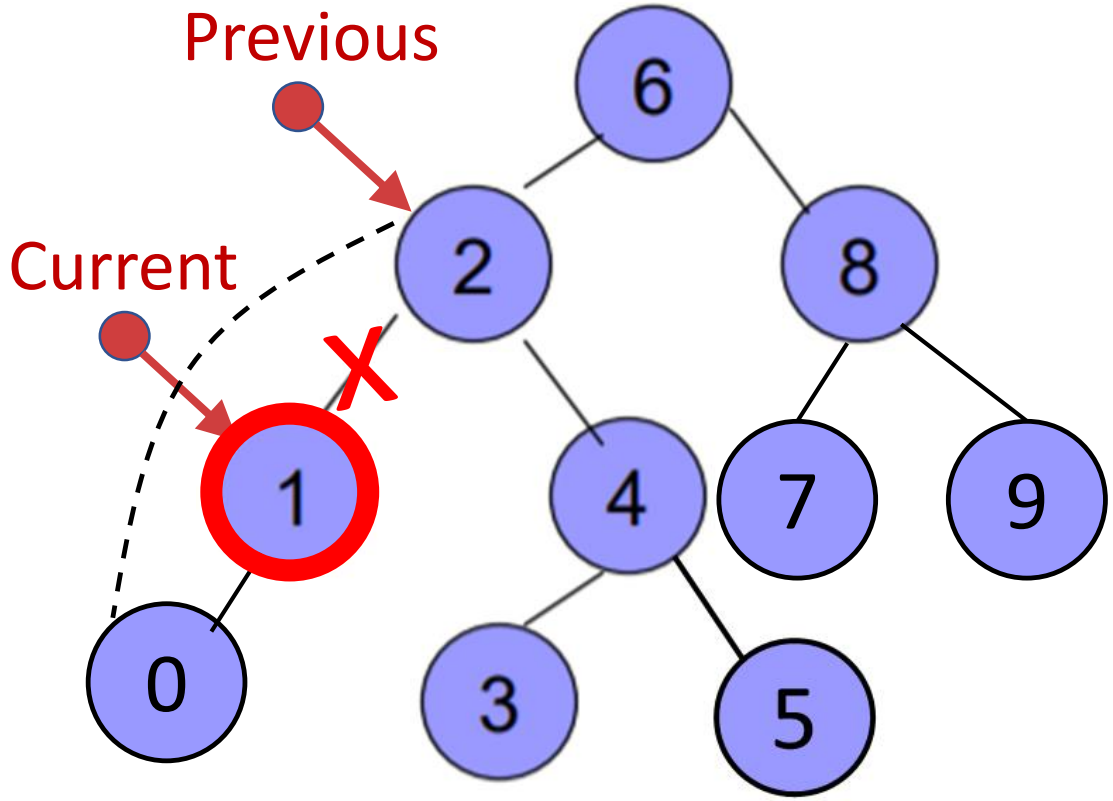

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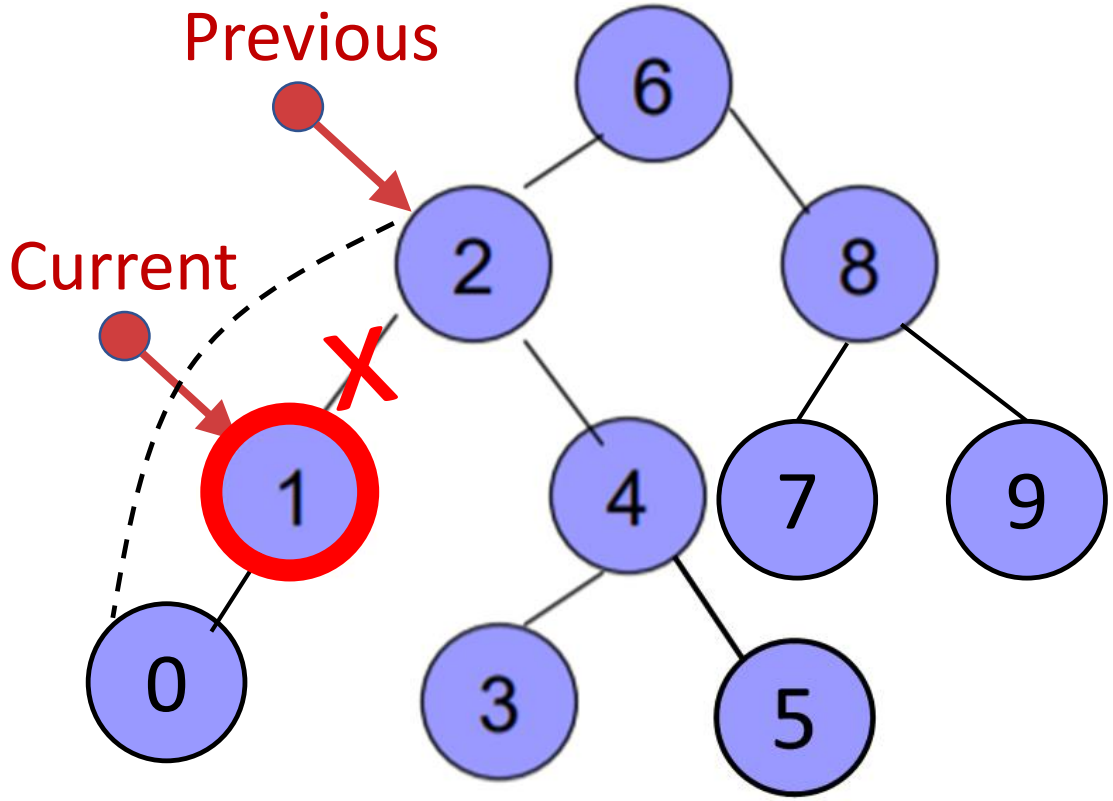
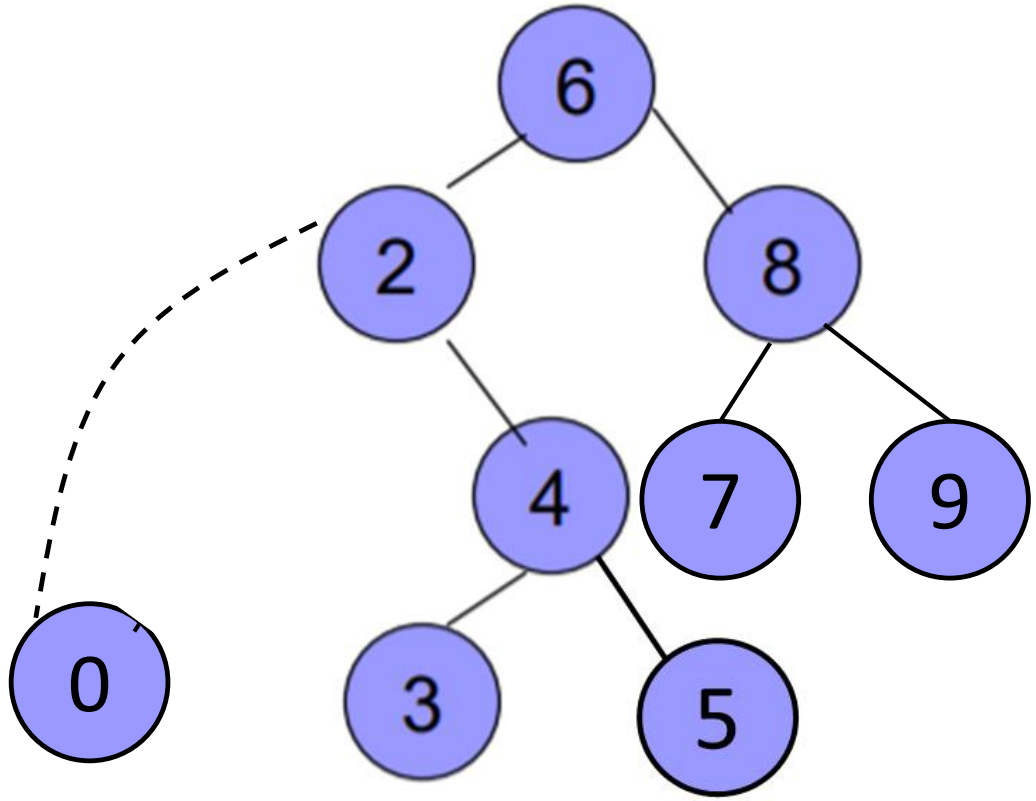


BST – Deletion

Case 2: One child

Delete ‘1’

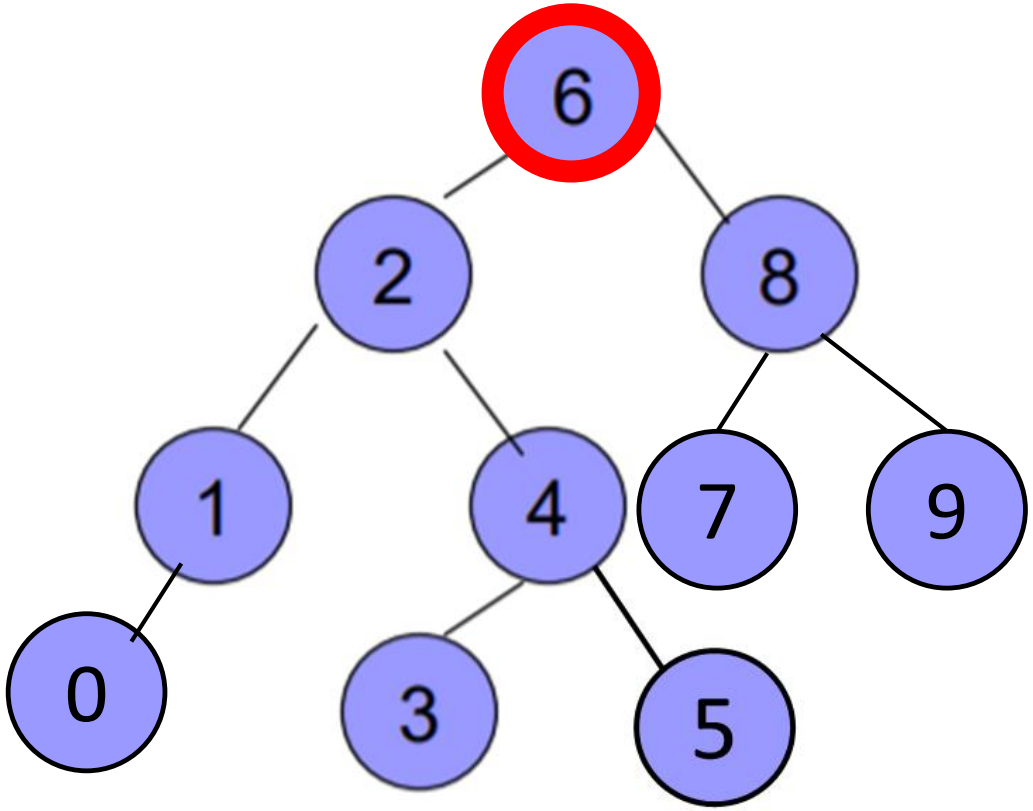
Delete Current



BST – Deletion

Case 3: Two Children

Delete ‘6’

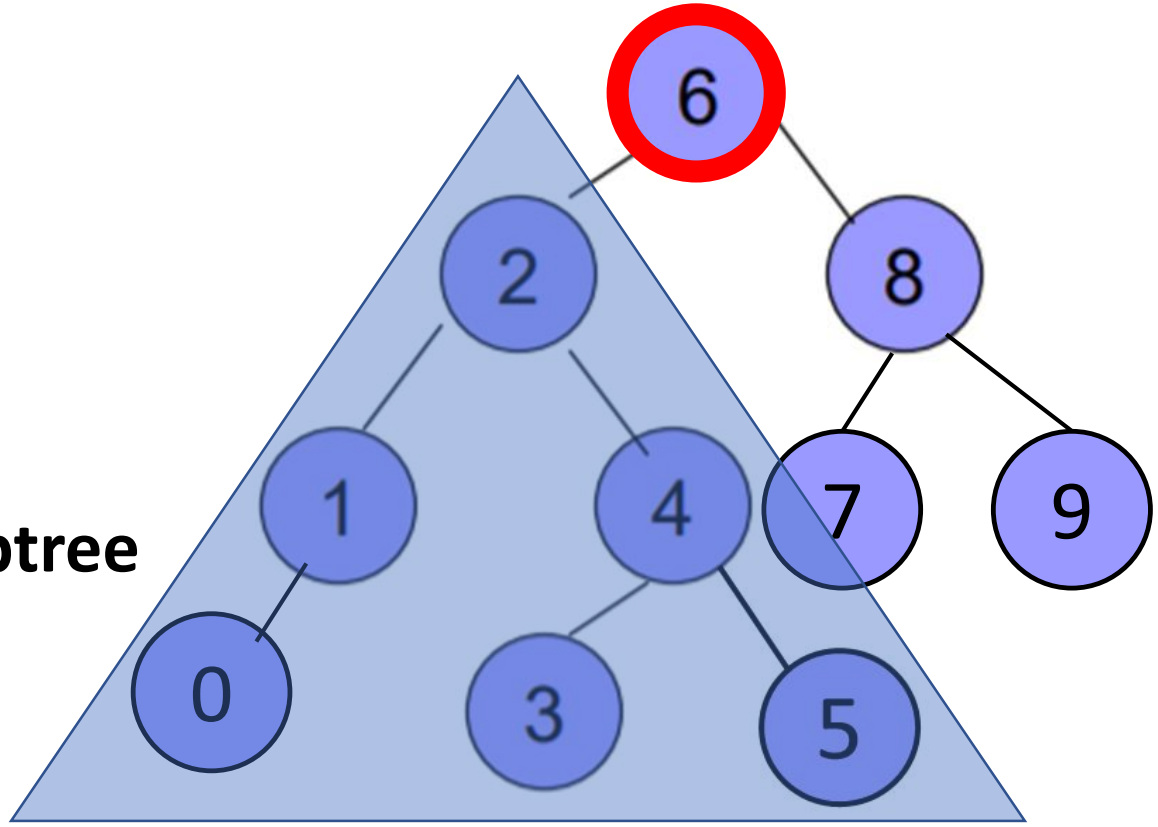


BST – Deletion

Case 3: Two Children

Delete ‘6’

Find maximum in left subtree



BST – Deletion

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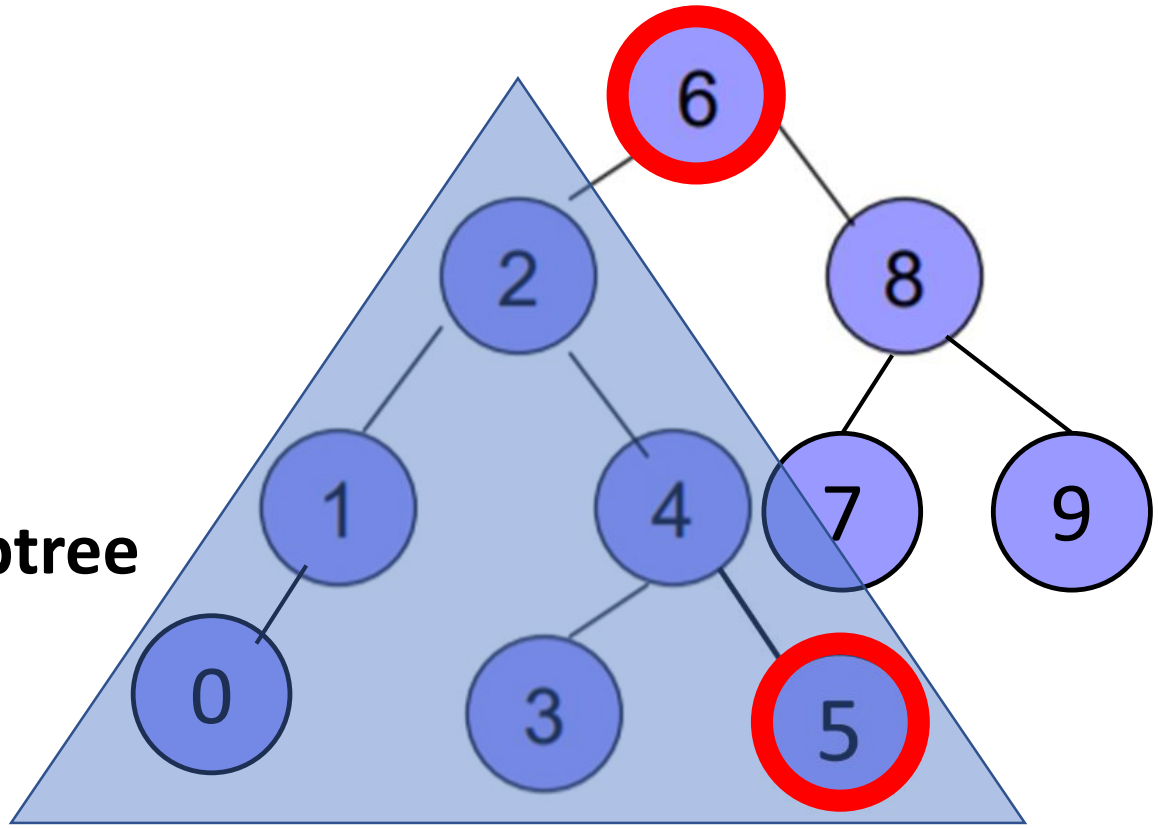
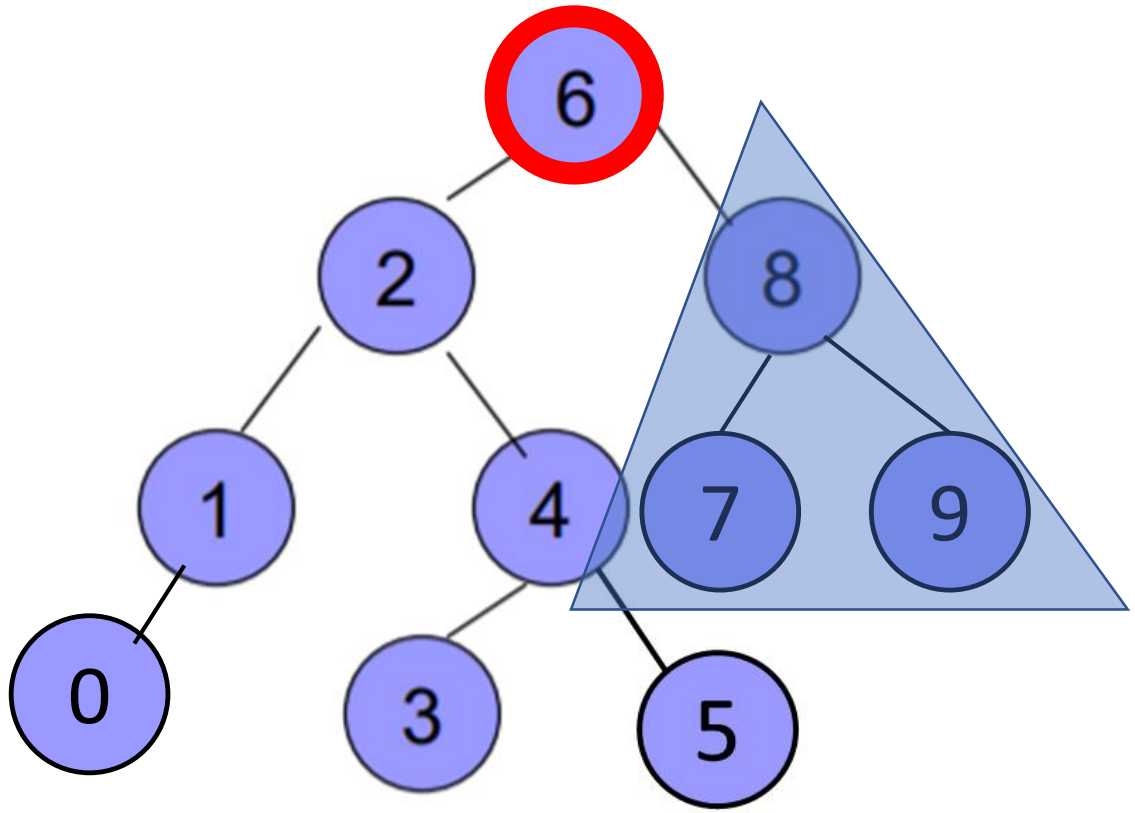


BST – Deletion

Case 3: Two Children

Delete ‘6’

Find minimum in left subtree



BST – Deletion

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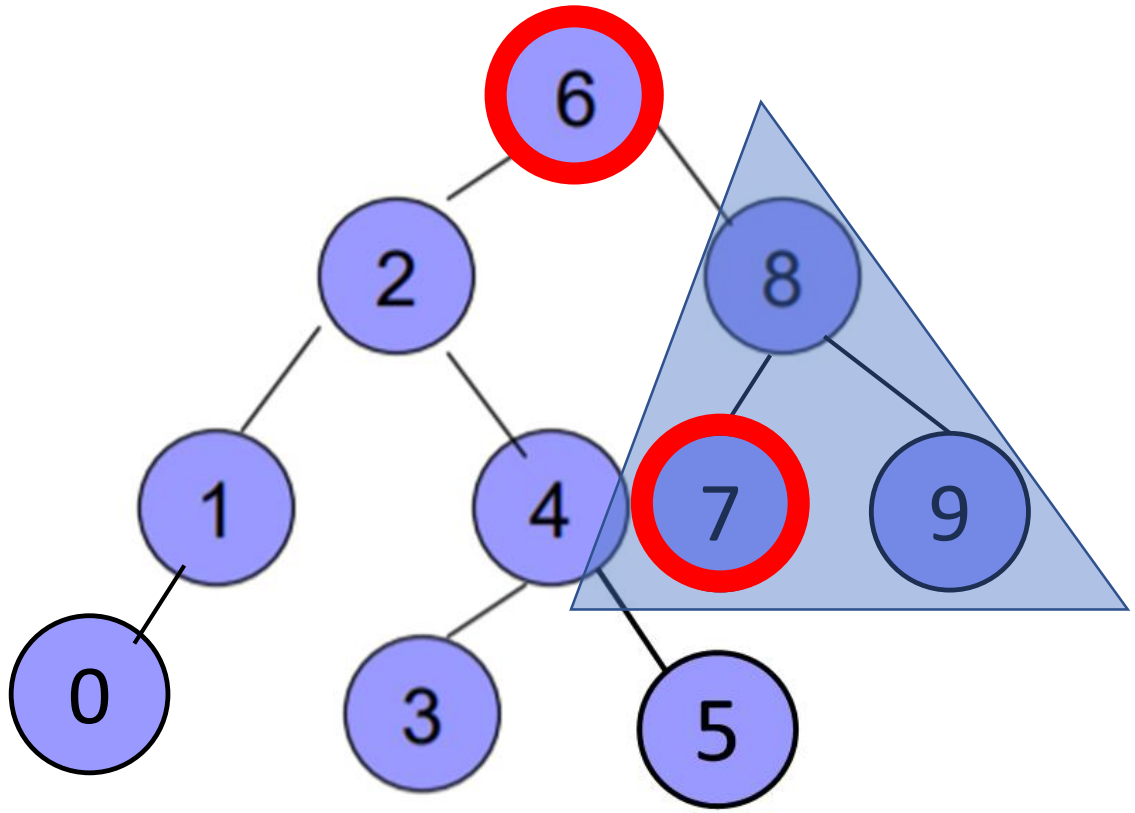
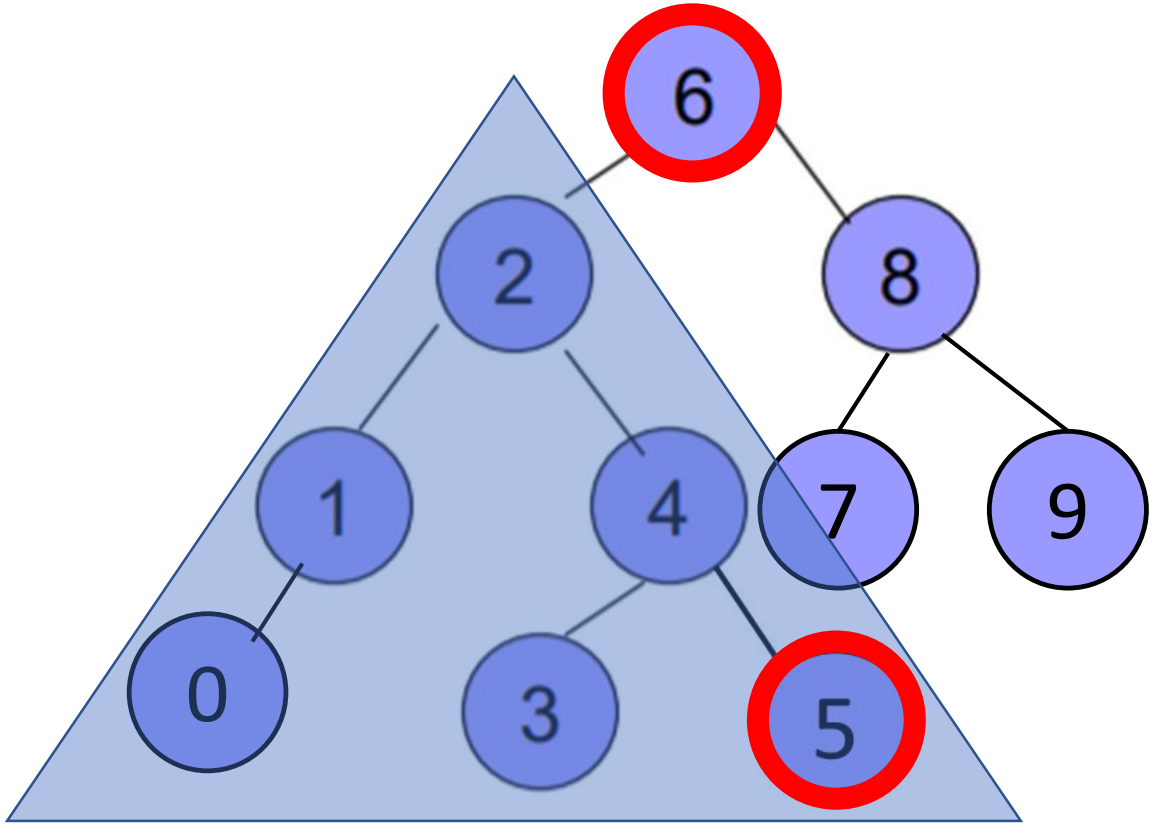


BST – Deletion

Case 3: Two Children

Delete ‘6’

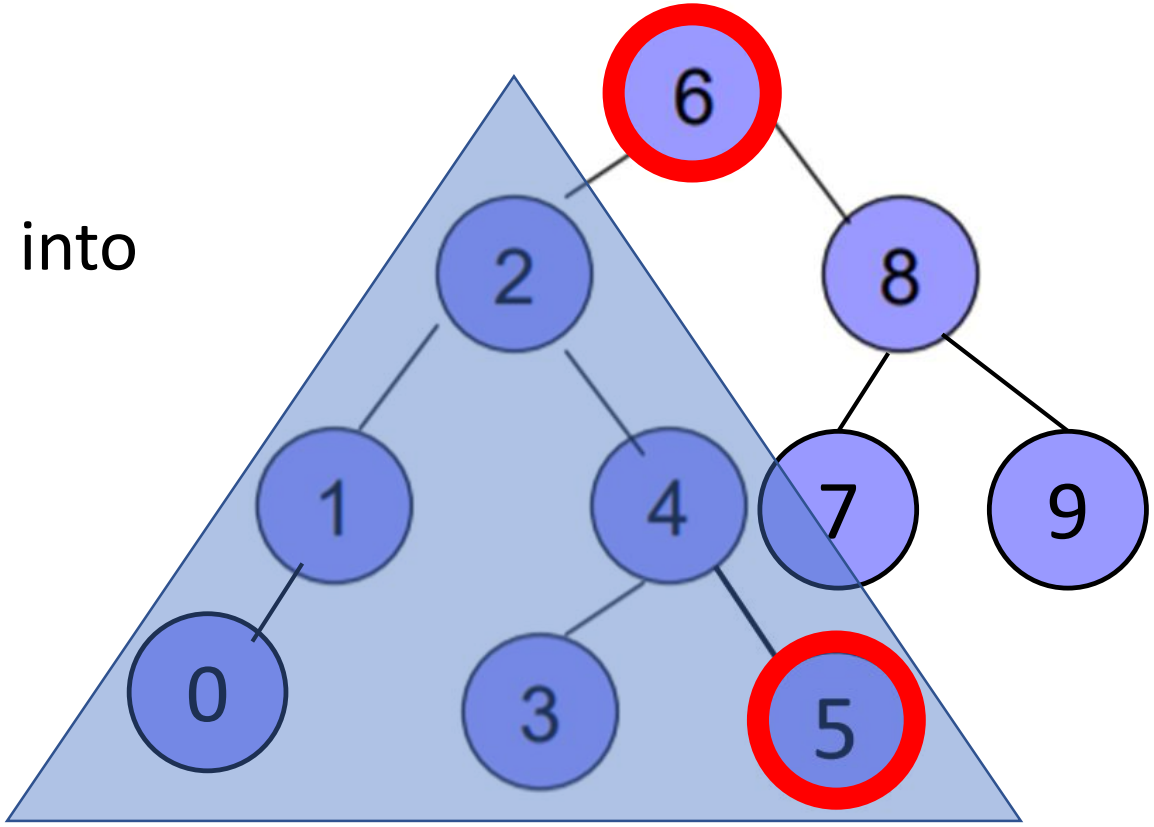


BST – Deletion

Case 3: Two Children

Delete ‘6’

- Simply copy the contents of ‘**5**’ into ‘**6**’ including key



BST – Deletion

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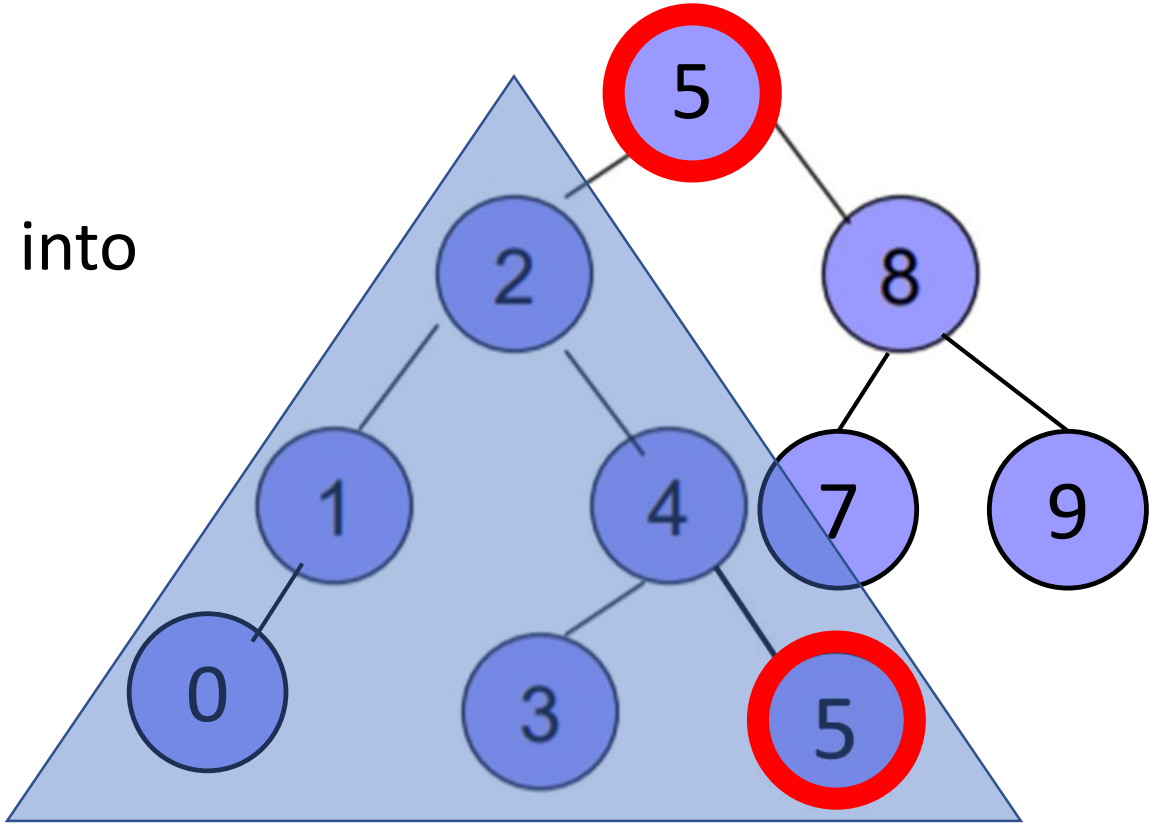
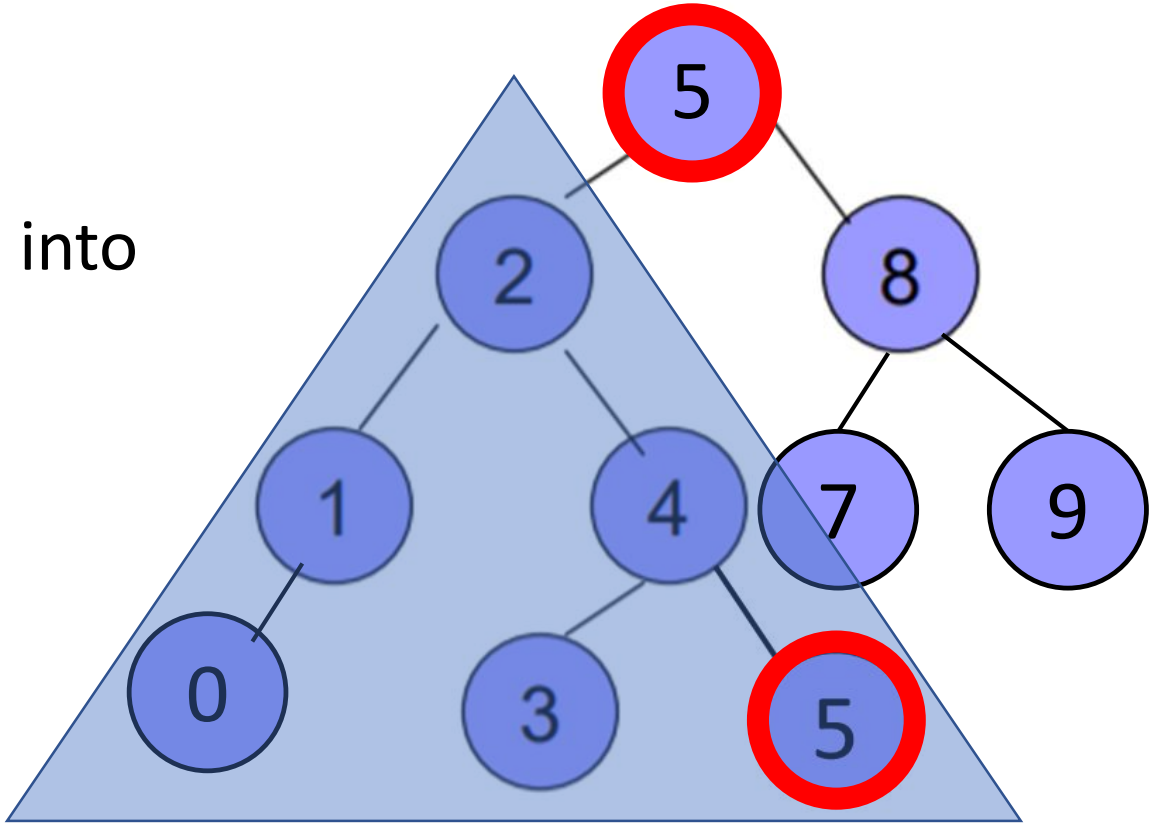


BST – Deletion

Case 3: Two Children

Delete ‘6’

- Simply copy the contents of ‘**5**’ into ‘**6**’ including key
- Delete ‘5’ in left subtree



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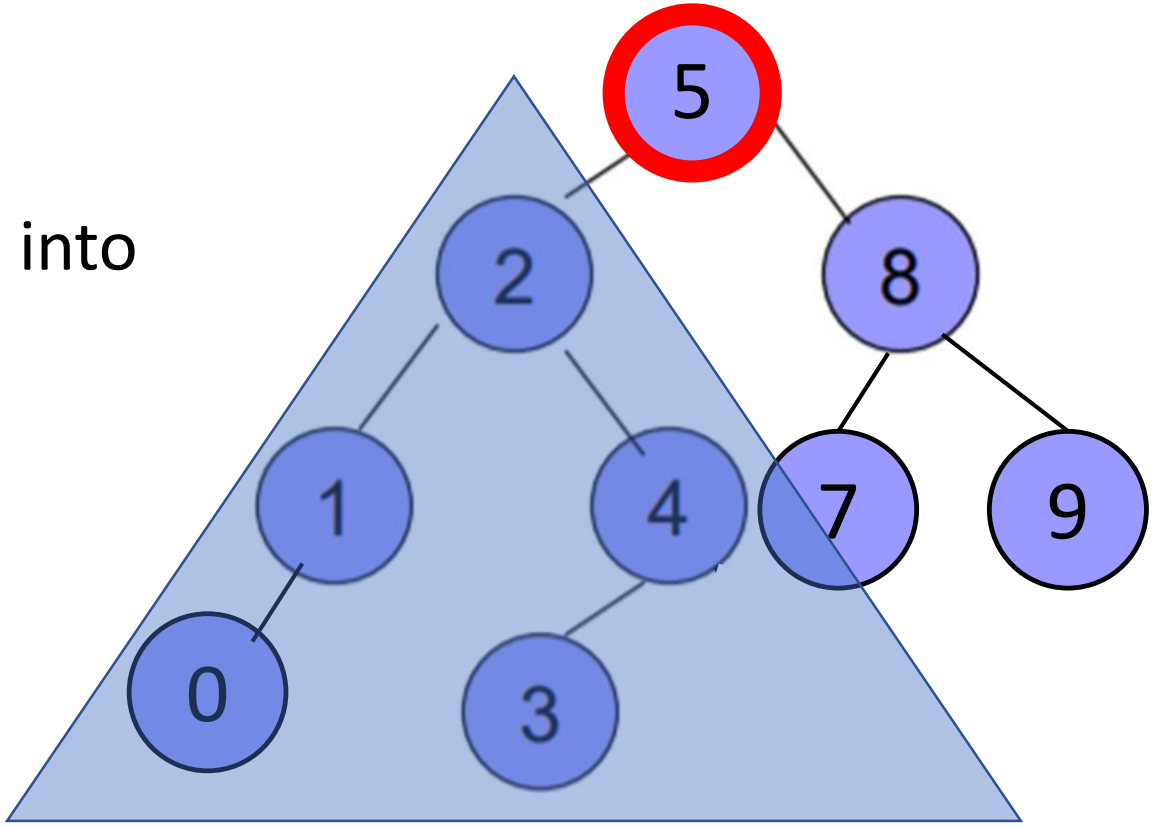

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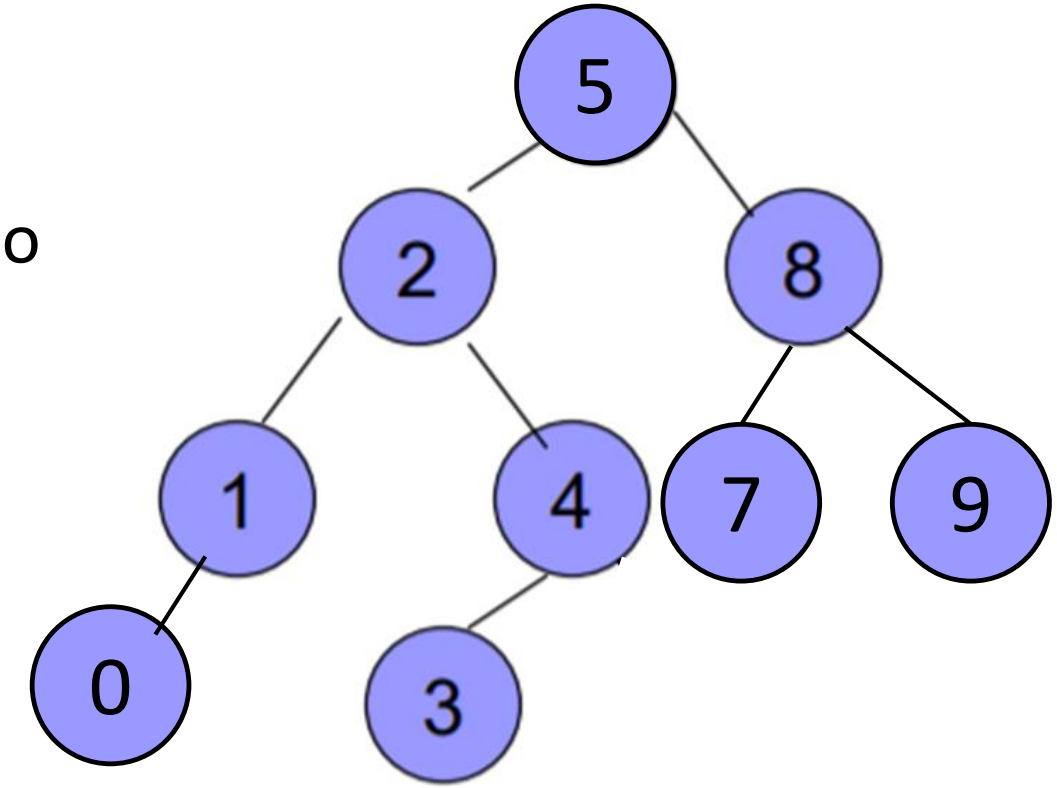

Thanks a lot

If you are taking a Nap, **wake up**.....Lecture Over