Data Structures
Tree Traversals

COMP128 Data Structures

Tree Traversals

“Traversal” means to visit every node in the tree in a prescribed order, usually to perform some action on each node;

There are three kinds of traversals characterized by when they visit a node in relation to its subtrees:

- **Pre-order:** visit root node, traverse left subtree, traverse right subtree
- **In-order:** traverse left subtree, visit root node, traverse right subtree
- **Post-order:** traverse left subtree, traverse right subtree, visit root node

Preorder Traversal

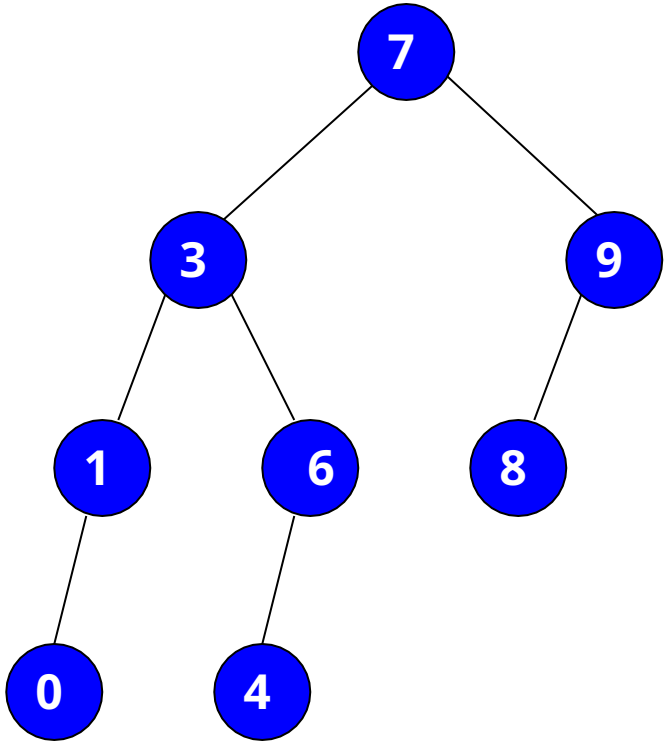
Algorithm for Preorder:

If the tree is empty

- Return;

Else

- Visit the root node;
- Preorder traverse the left subtree;
- Preorder traverse the right subtree;



Preorder Traversal

Algorithm for Preorder:

If the tree is empty
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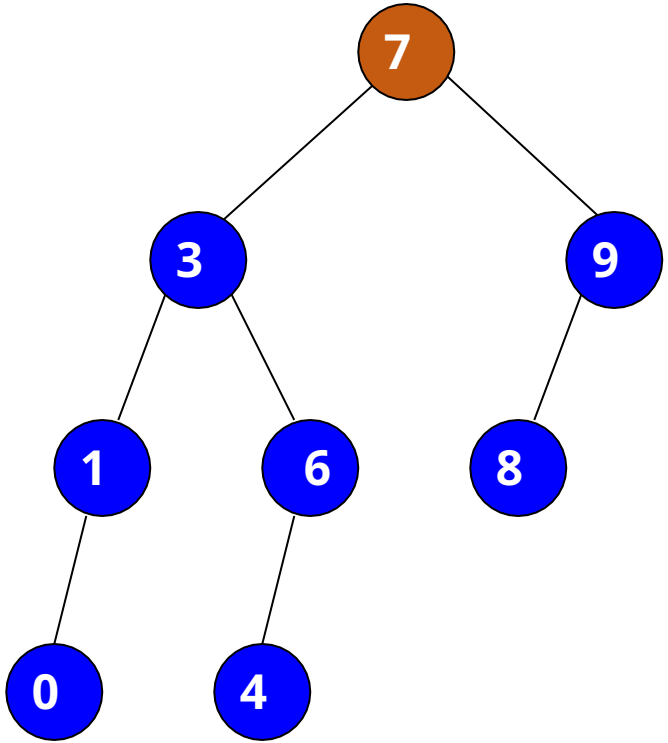
Order: 7



Preorder Traversal

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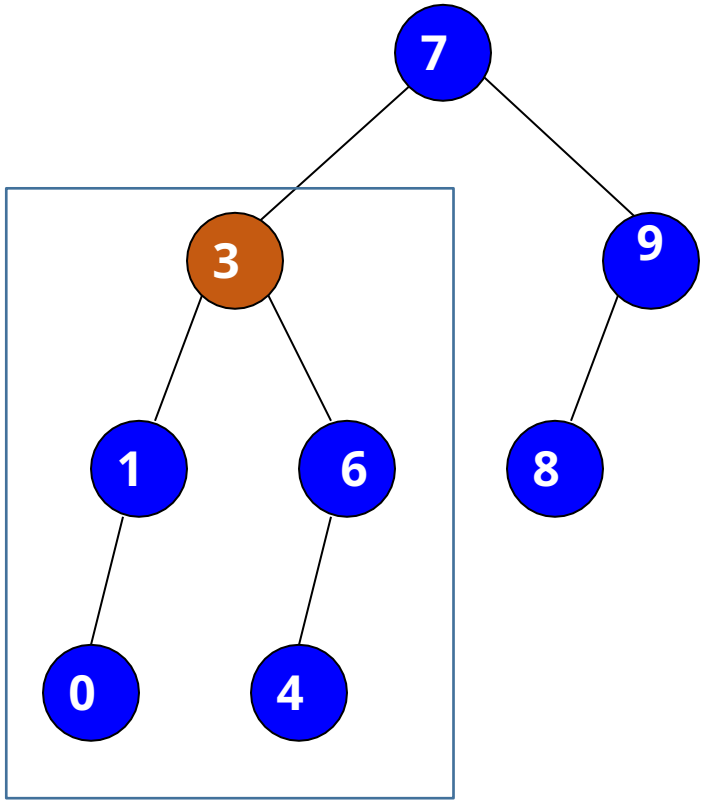
Order: 7, 3



Preorder Traversal

Algorithm for Preorder:

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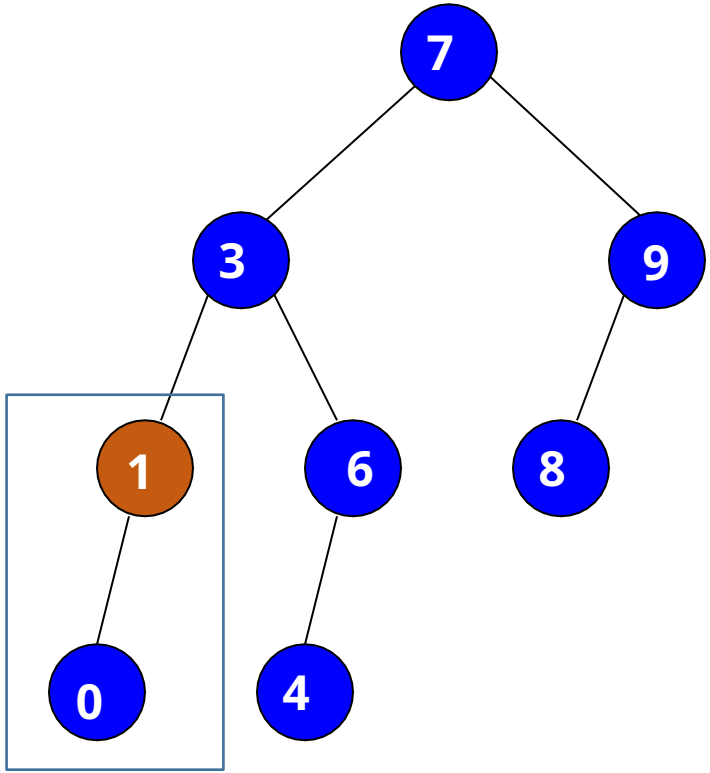
Order: 7, 3, 1



Preorder Traversal

Algorithm for Preorder:

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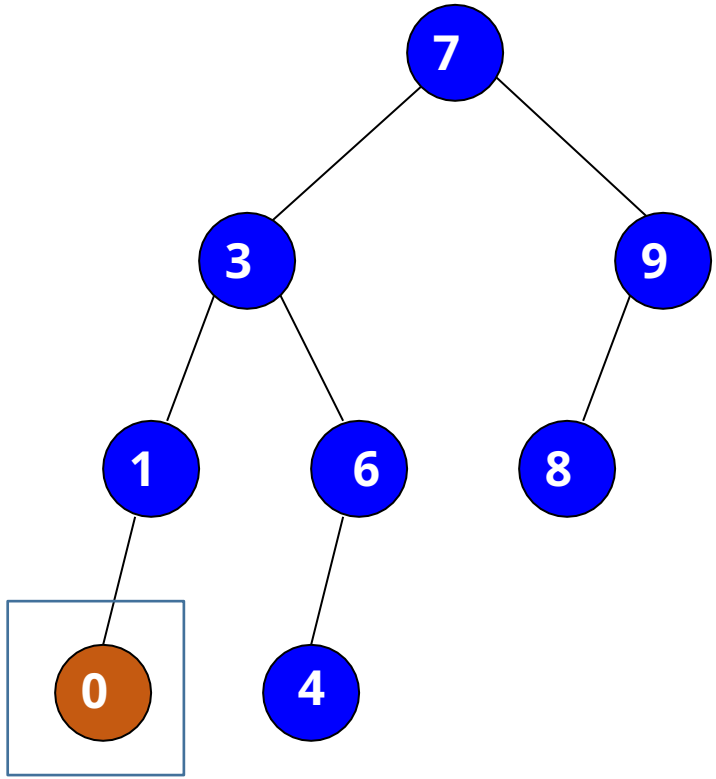
Order: 7, 3, 1, 0



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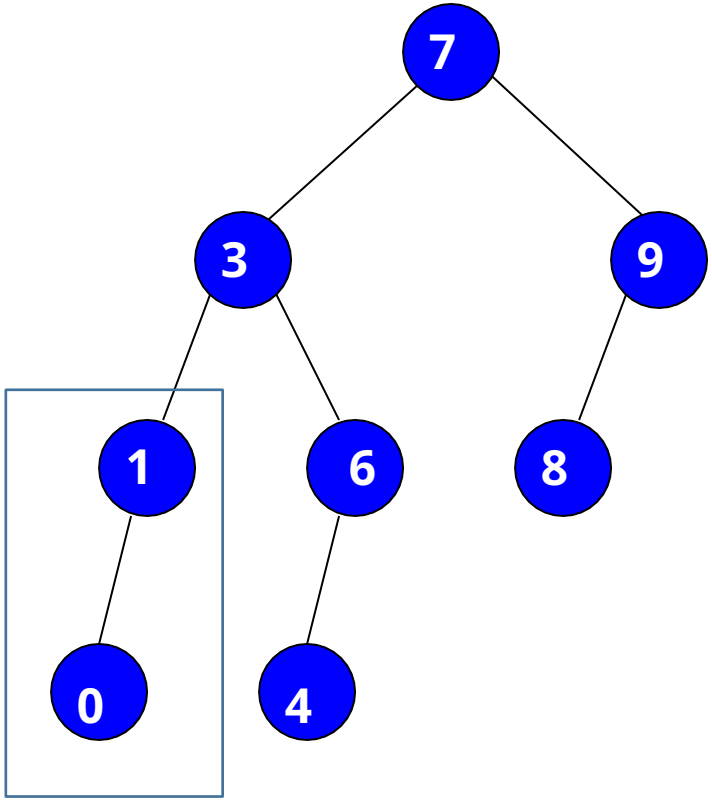
Order: 7, 3, 1, 0



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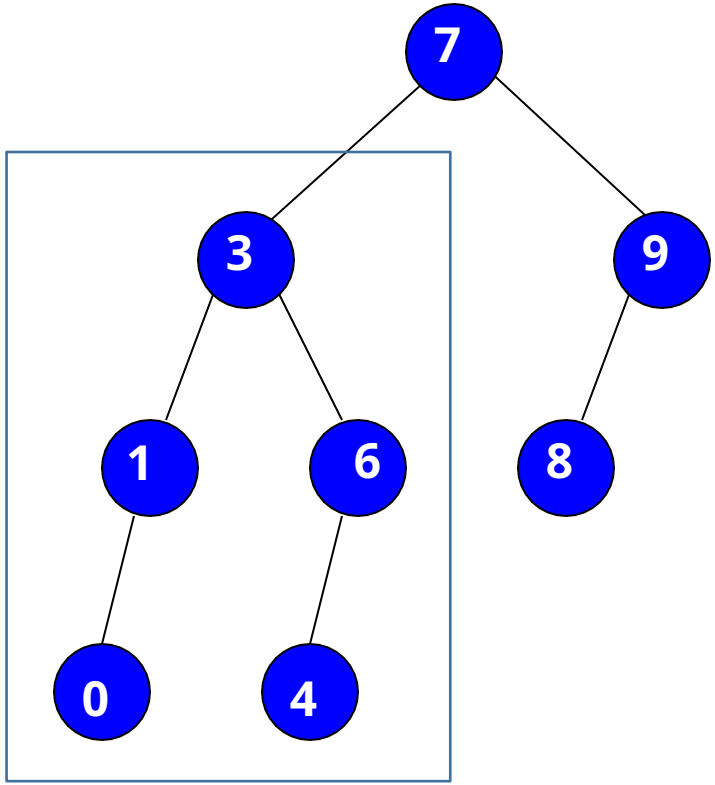

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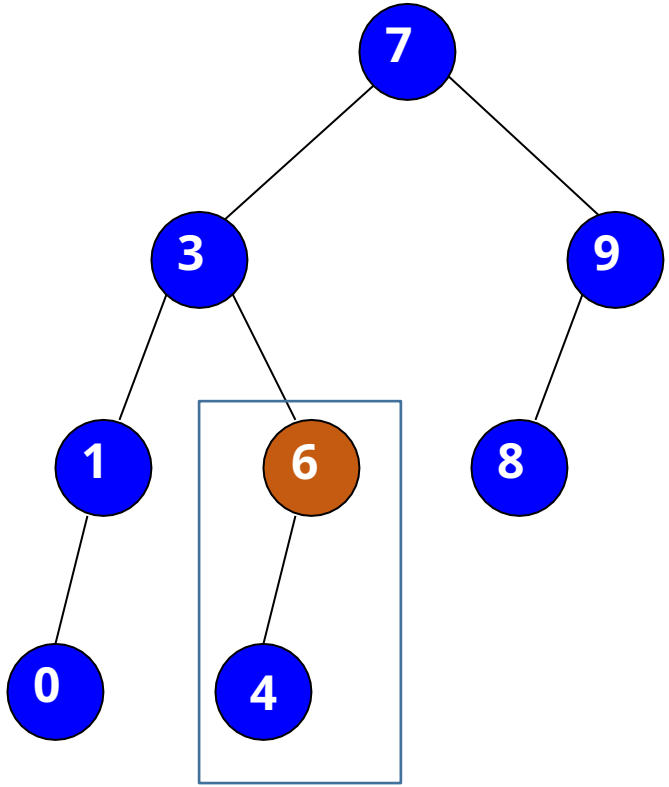
Order: 7, 3, 1, 0



Preorder Traversal

Algorithm for Preorder:

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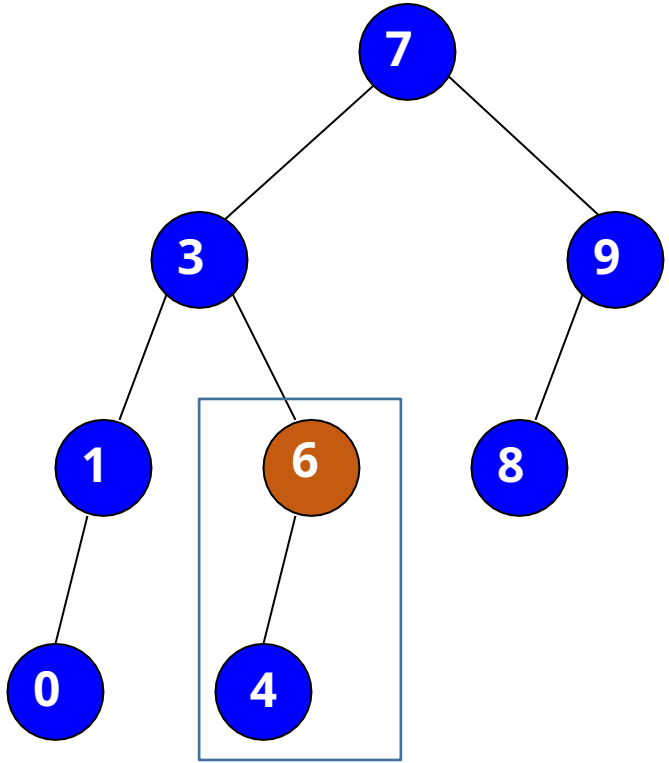
Order: 7, 3, 1, 0, 6



Preorder Traversal

Algorithm for Preorder:

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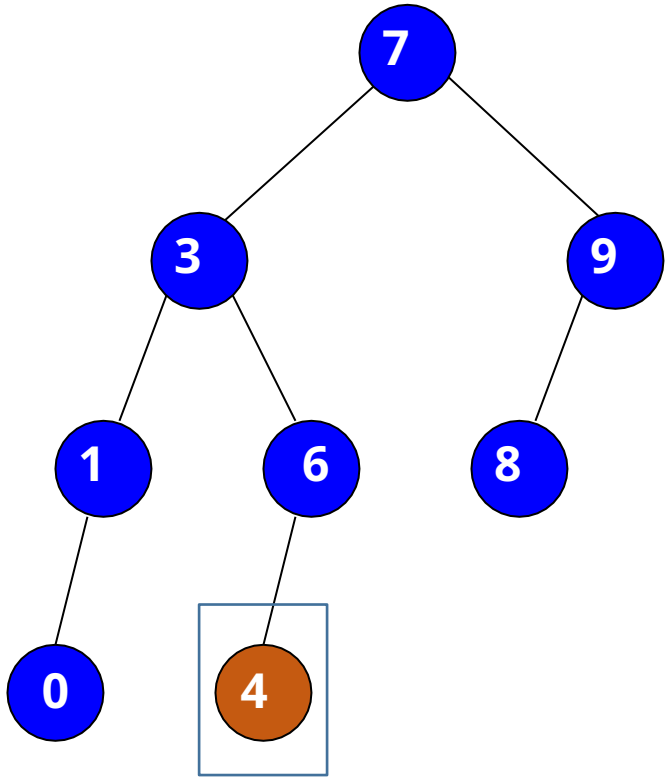
Order: 7, 3, 1, 0, 6, 4



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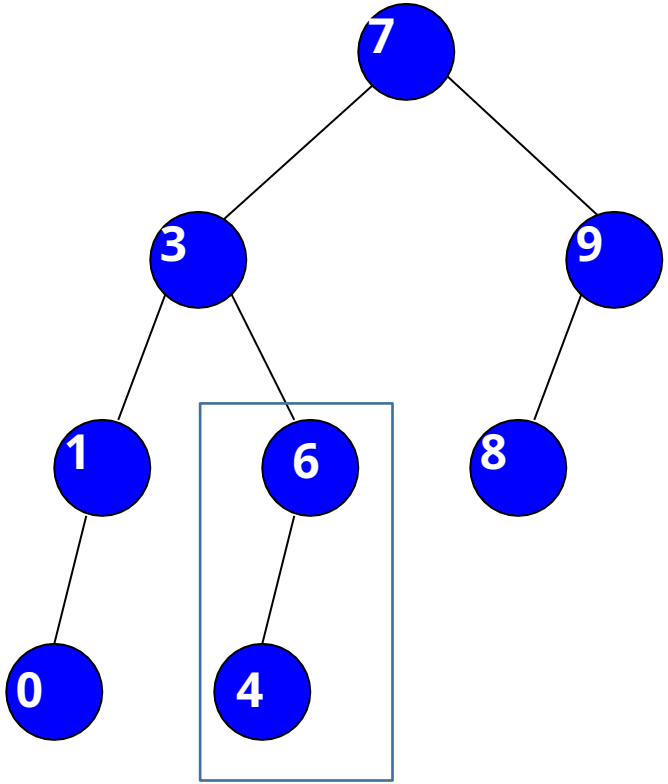
Order: 7, 3, 1, 0, 6, 4



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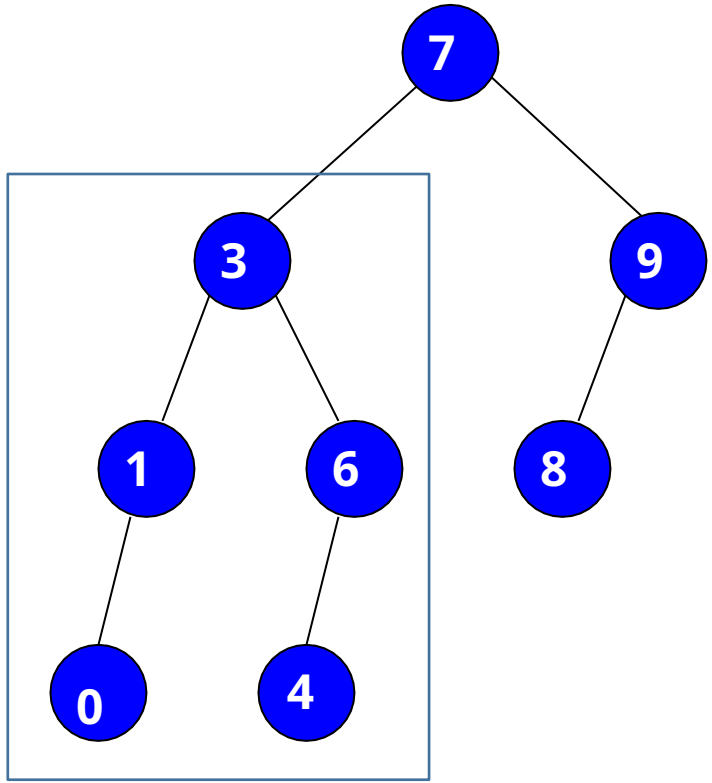
Order: 7, 3, 1, 0, 6, 4



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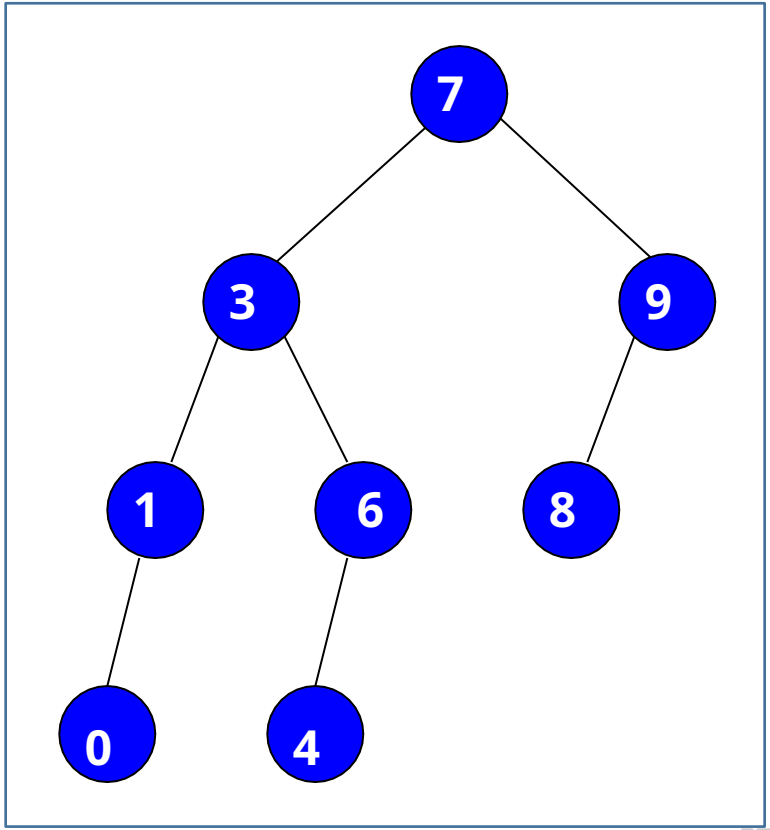

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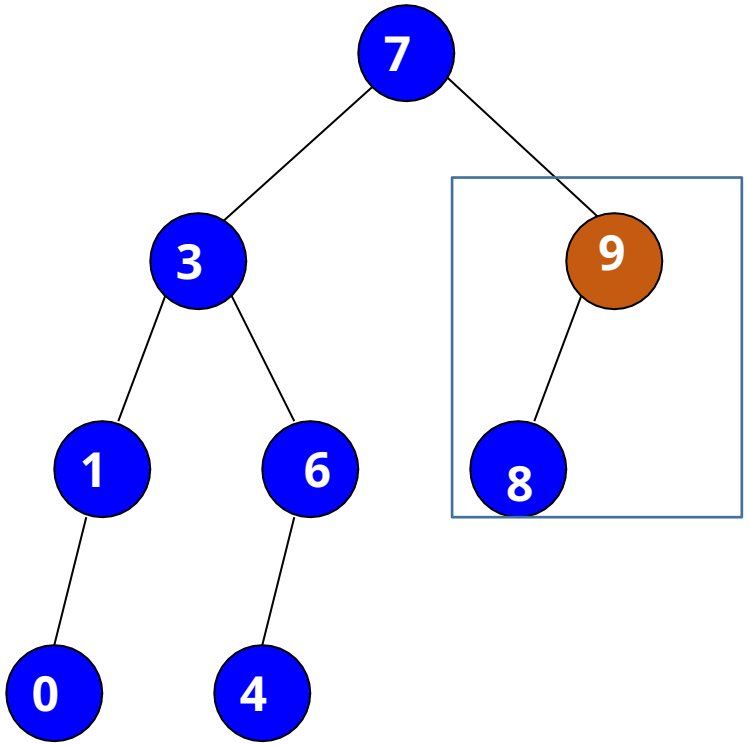
Order: 7, 3, 1, 0, 6, 4, 9



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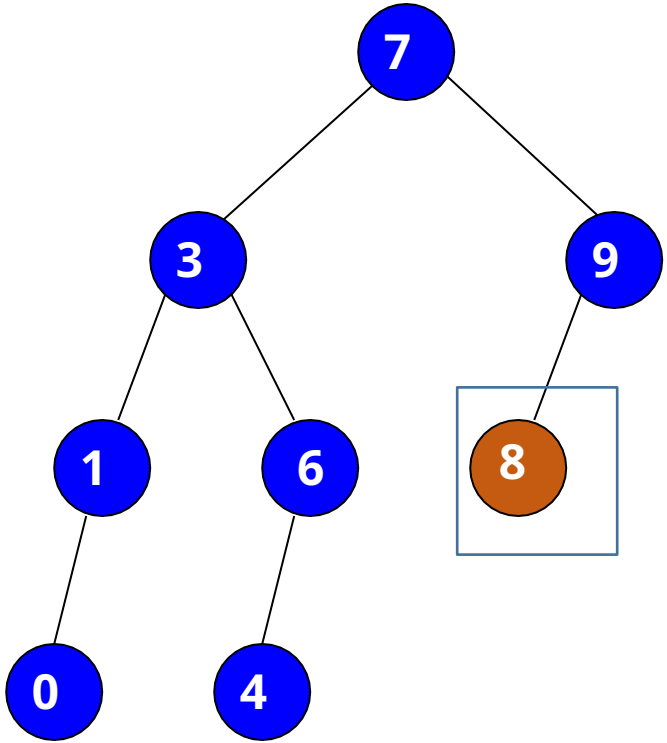
Order: 7, 3, 1, 0, 6, 4, 9, 8



Inorder Traversal

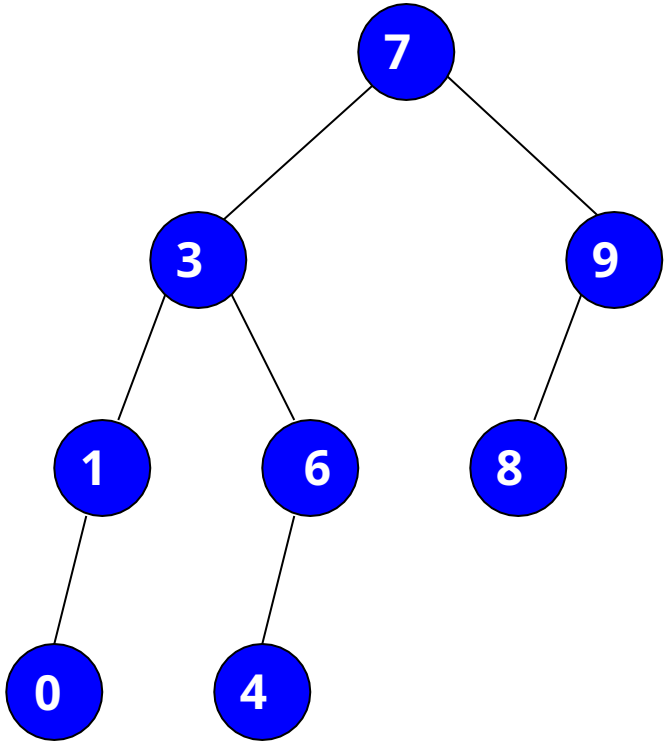
Algorithm for Inorder:

If the tree is empty

- Return;

Else

- Inorder traverse the left subtree;
- Visit the root;
- Inorder traverse the right subtree;



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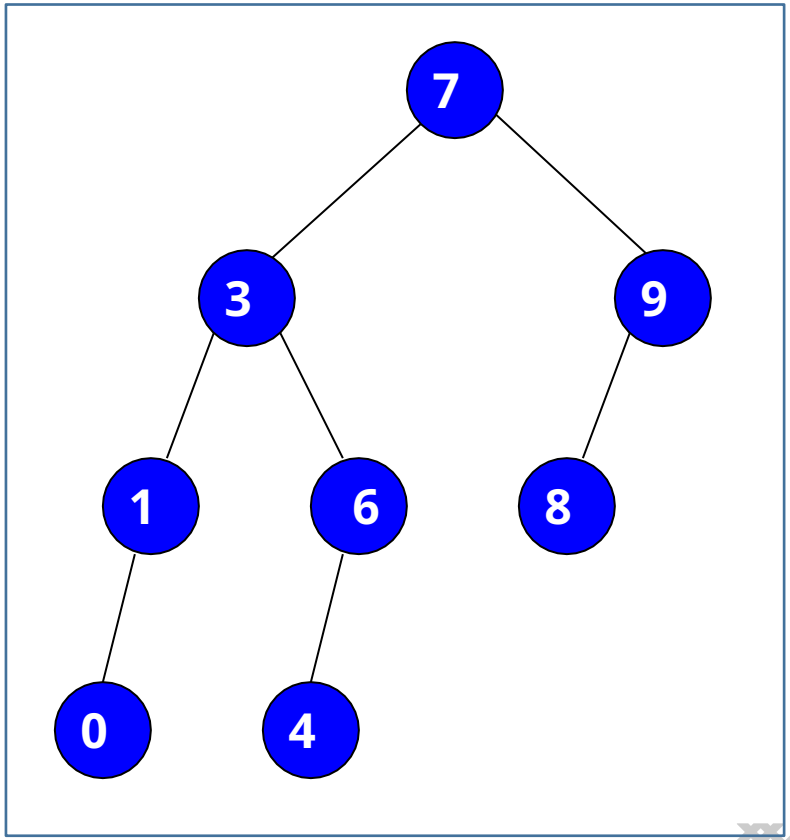

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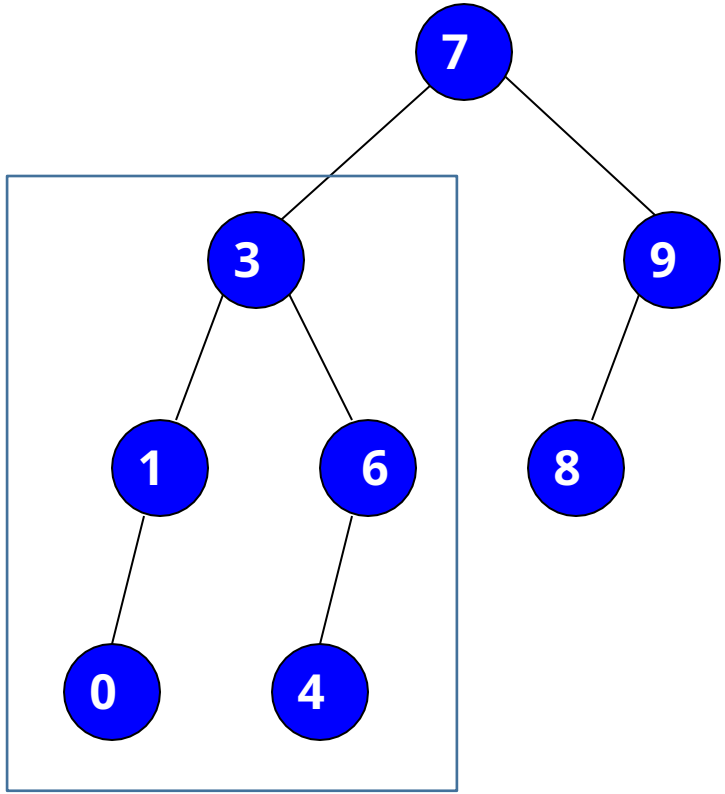

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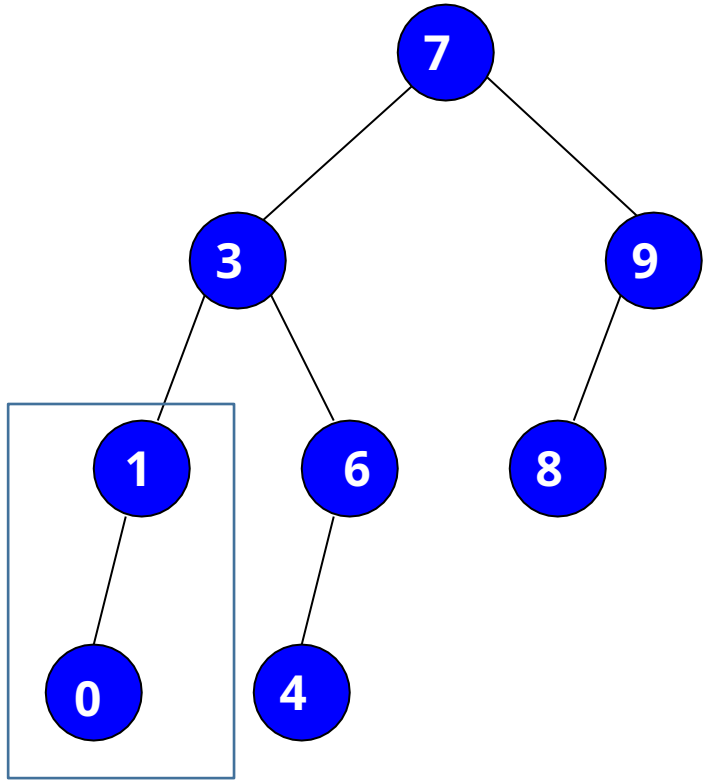

Inorder Traversal

Algorithm for Inorder:

If the tree is empty
- Return;

Else
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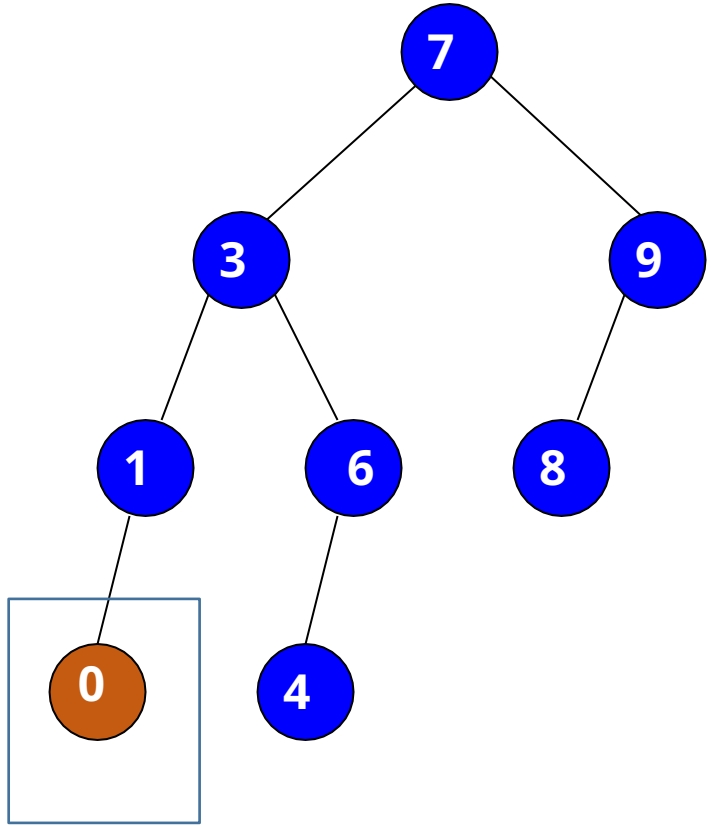
Order: 0



Inorder Traversal

Algorithm for Inorder:

If the tree is empty
- Return;

Else
- Inorder traverse the left subtree;
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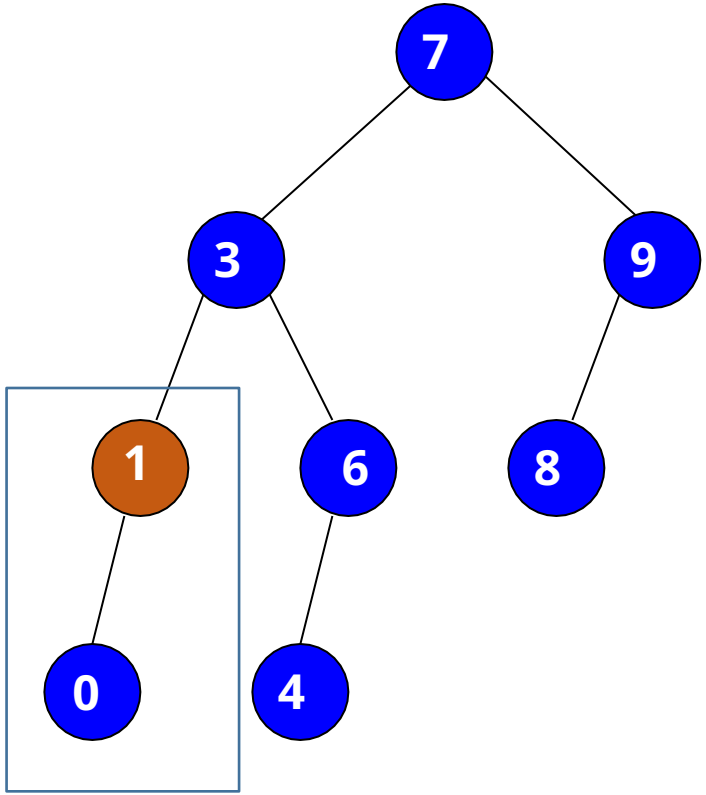
Order: 0, 1



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If the tree is empty
- Return;

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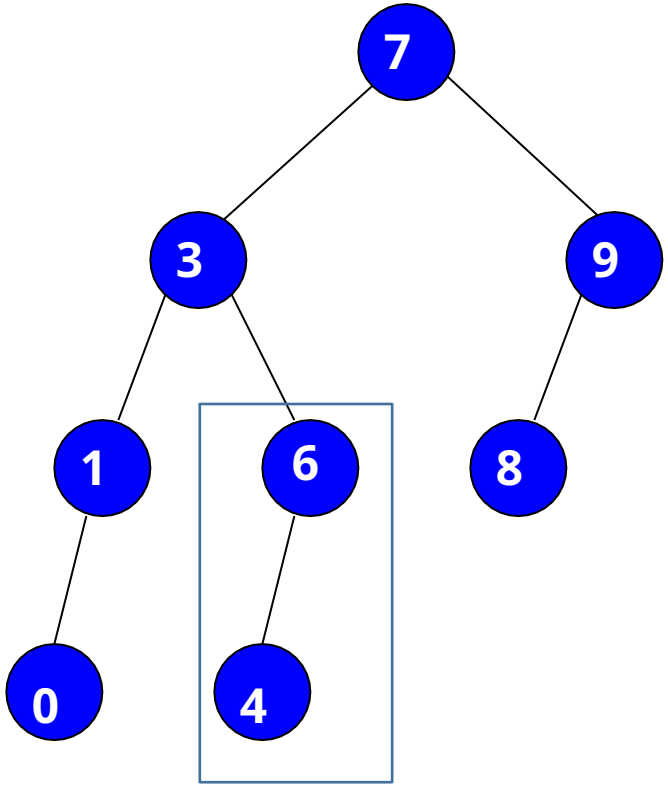
Order: 0, 1, 3



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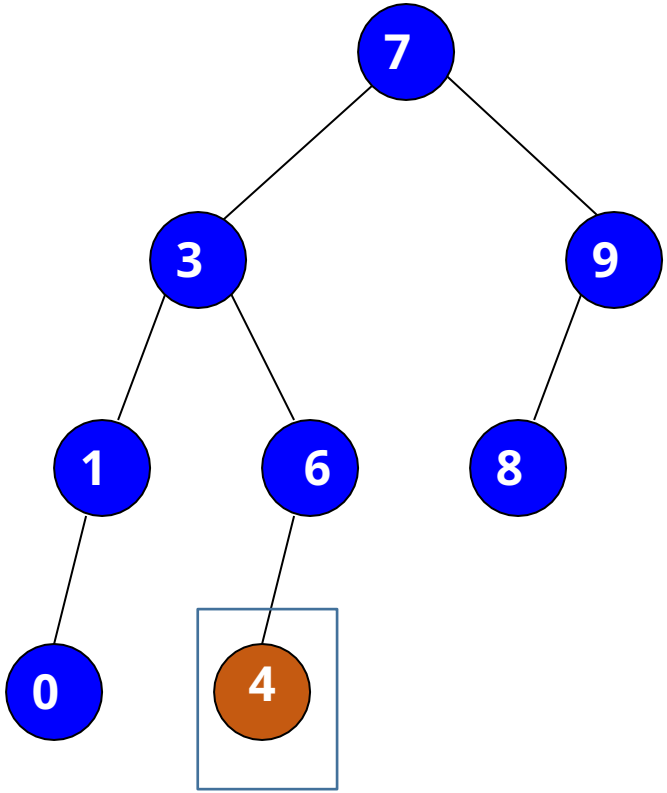
Order: 0, 1, 3, 4



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If the tree is empty
- Return;

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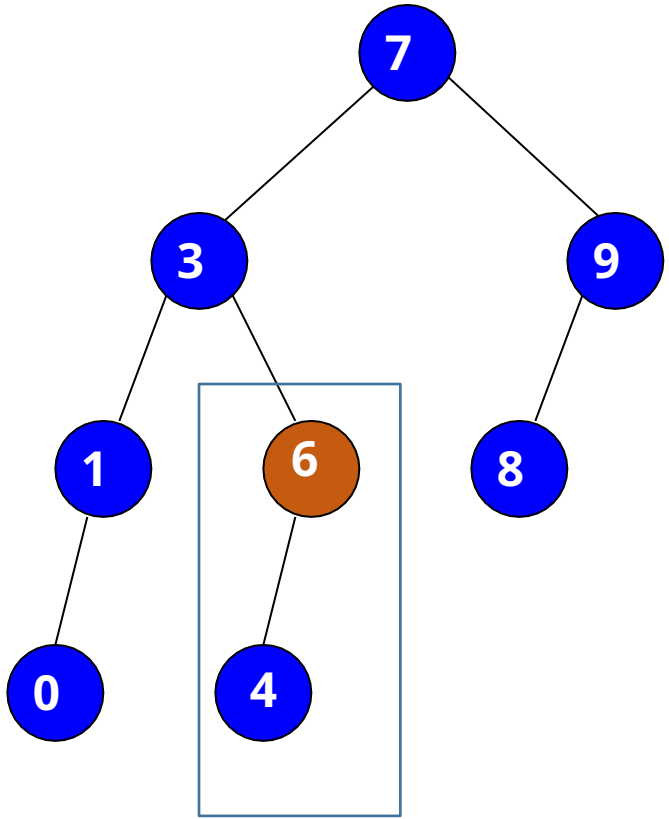
Order: 0, 1, 3, 4, 6



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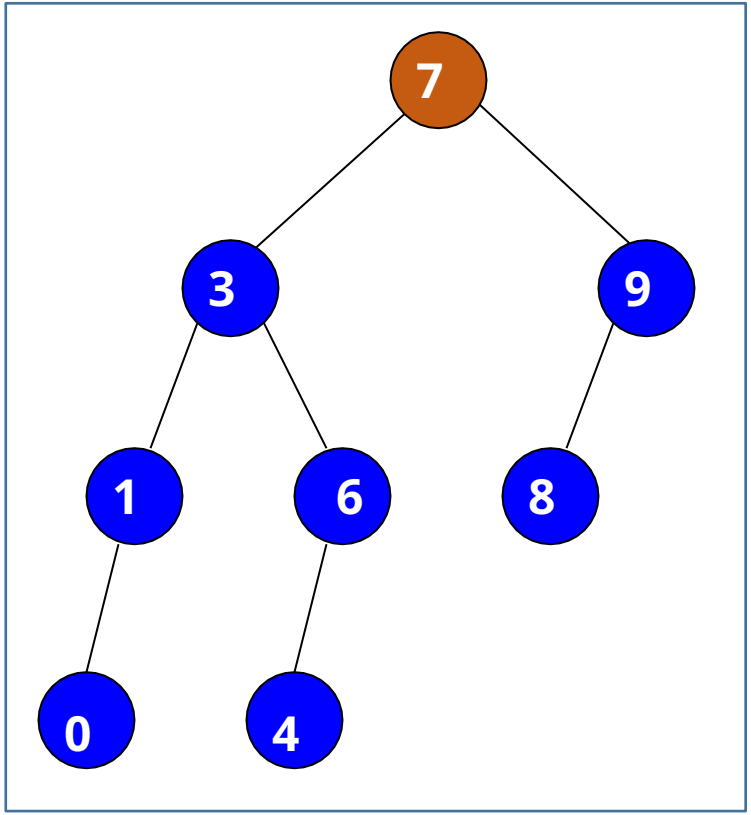
Order: 0, 1, 3, 4, 6, 7



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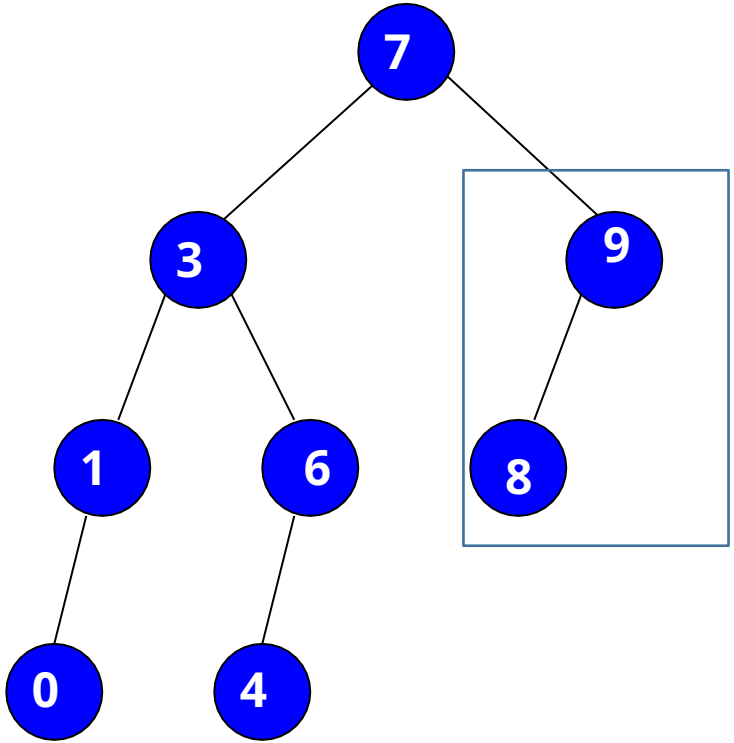

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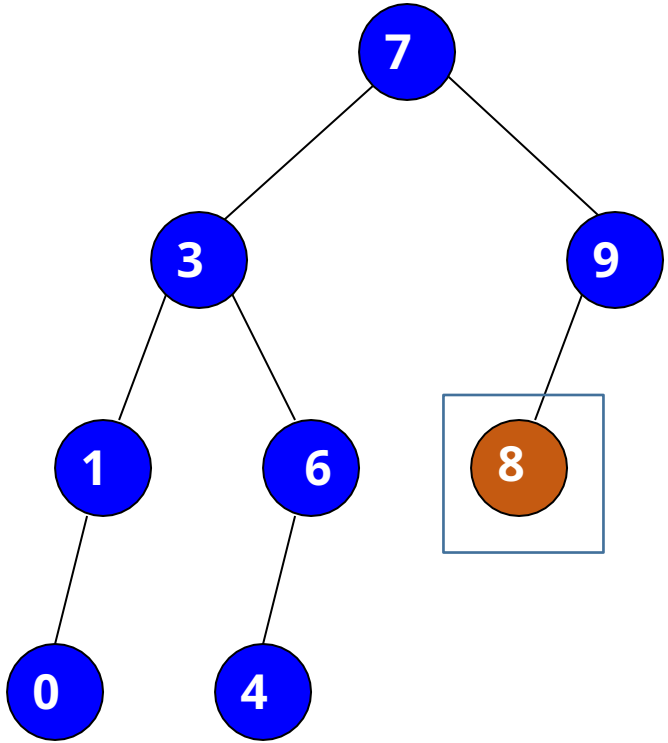
Order: 0, 1, 3, 4, 6, 7, 8



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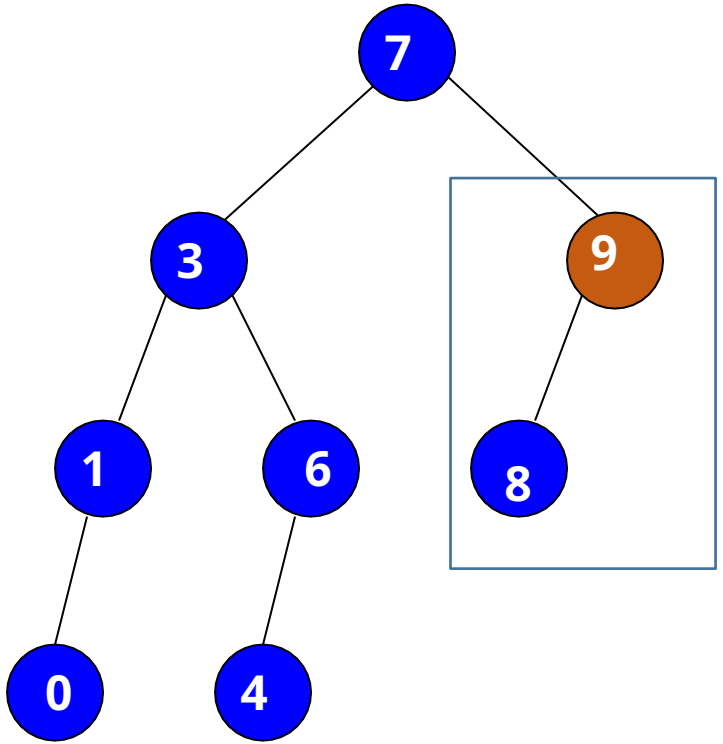
Order: 0, 1, 3, 4, 6, 7, 8, 9



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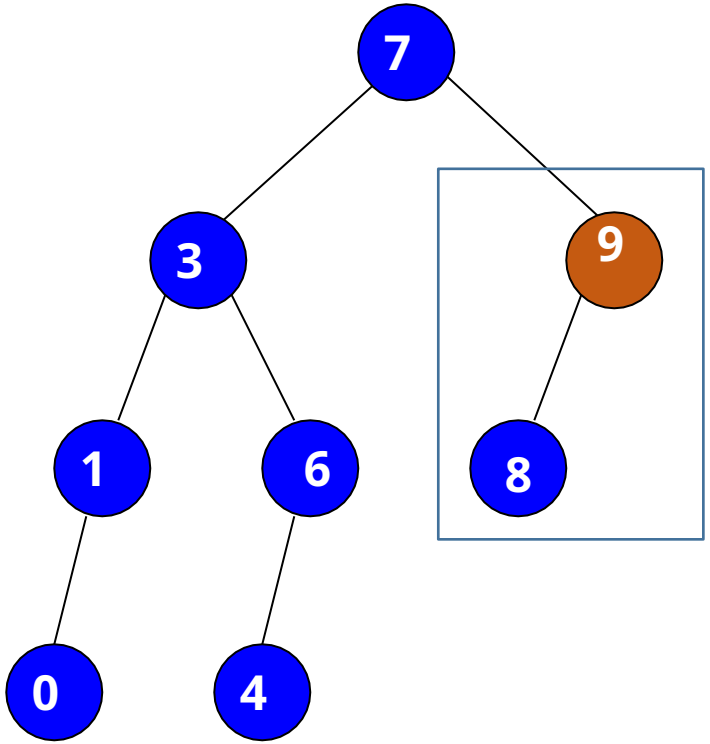

Postorder Traversal

Algorithm for Postorder:

If the tree is empty

- Return;

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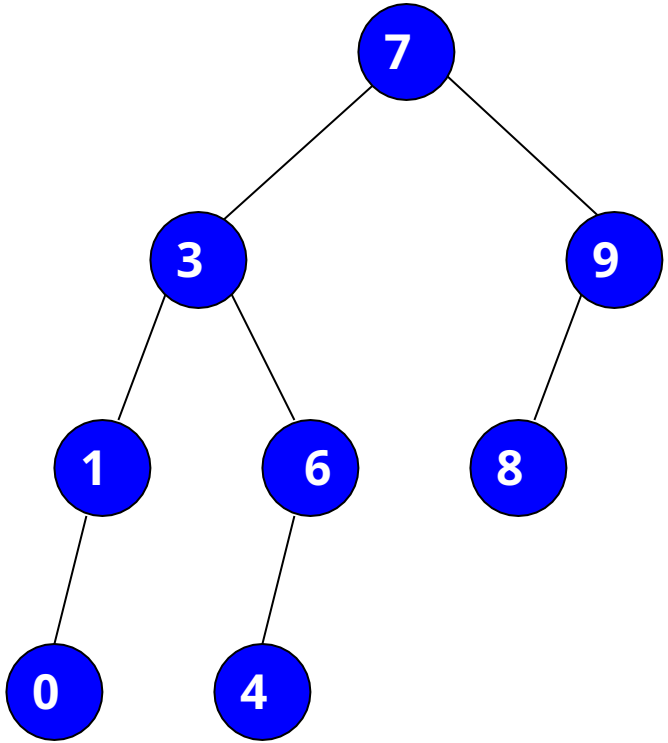

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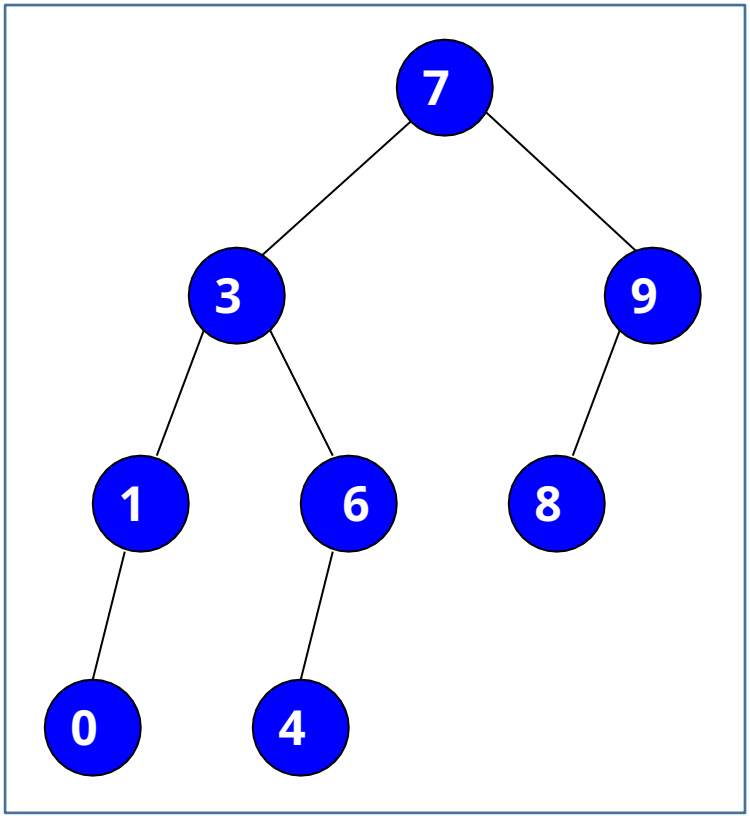

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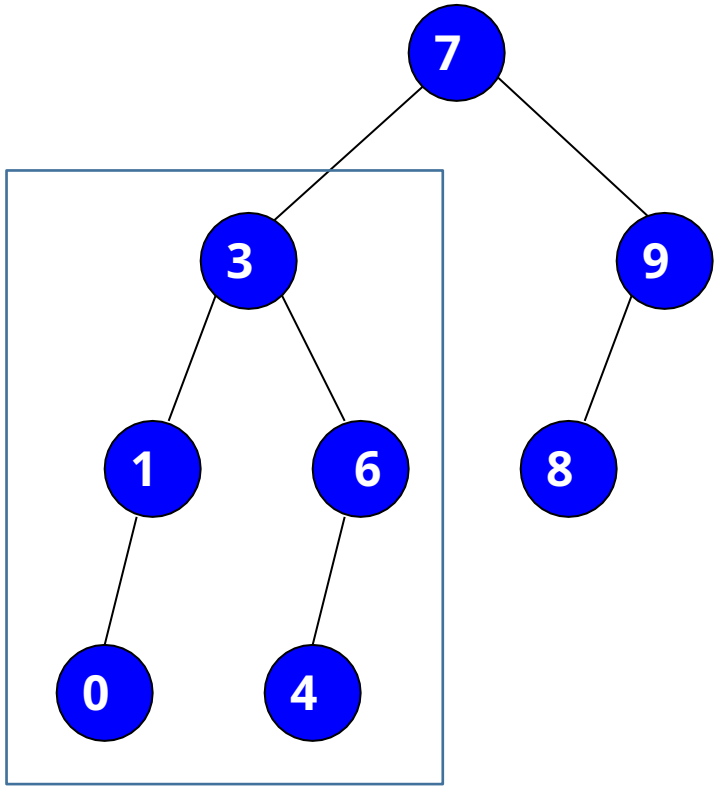

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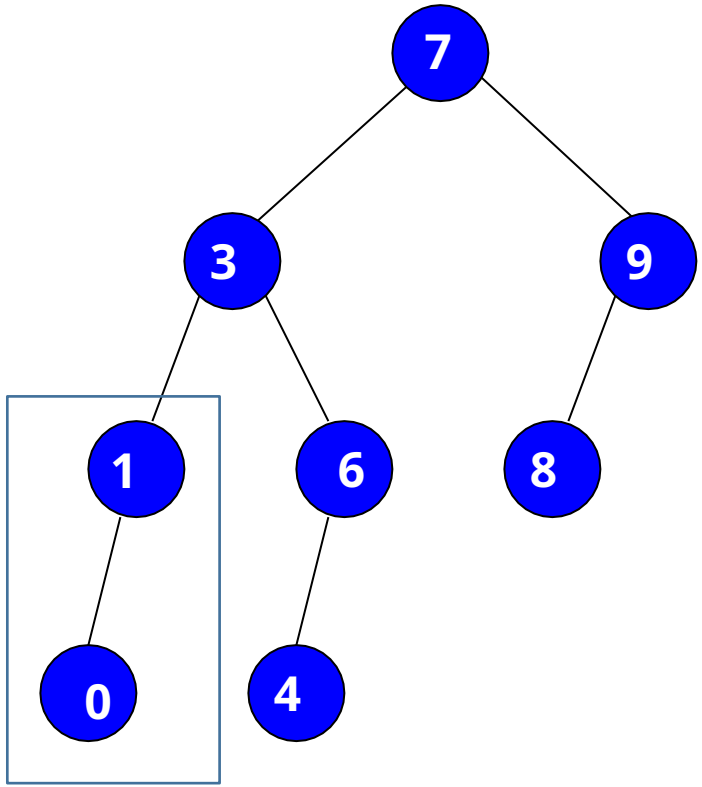

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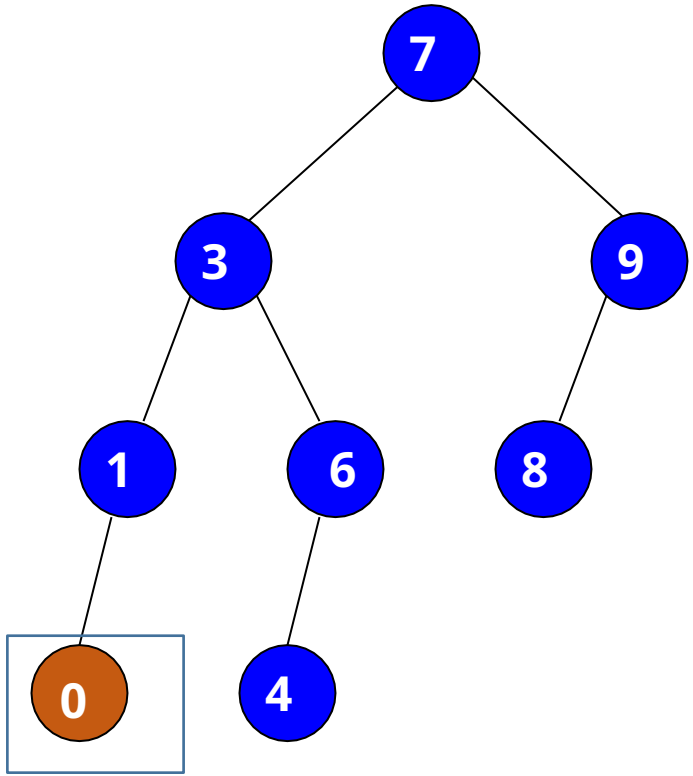
Order: 0



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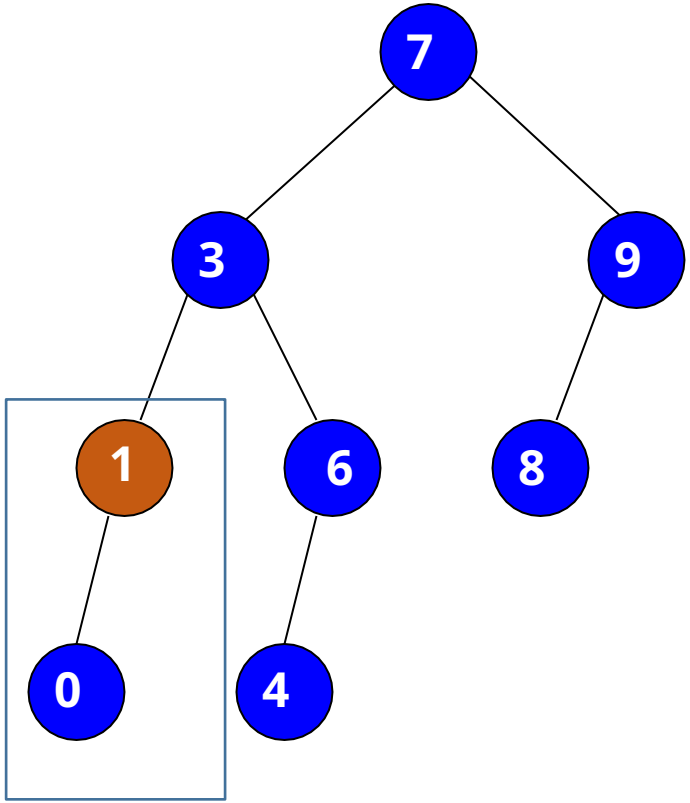

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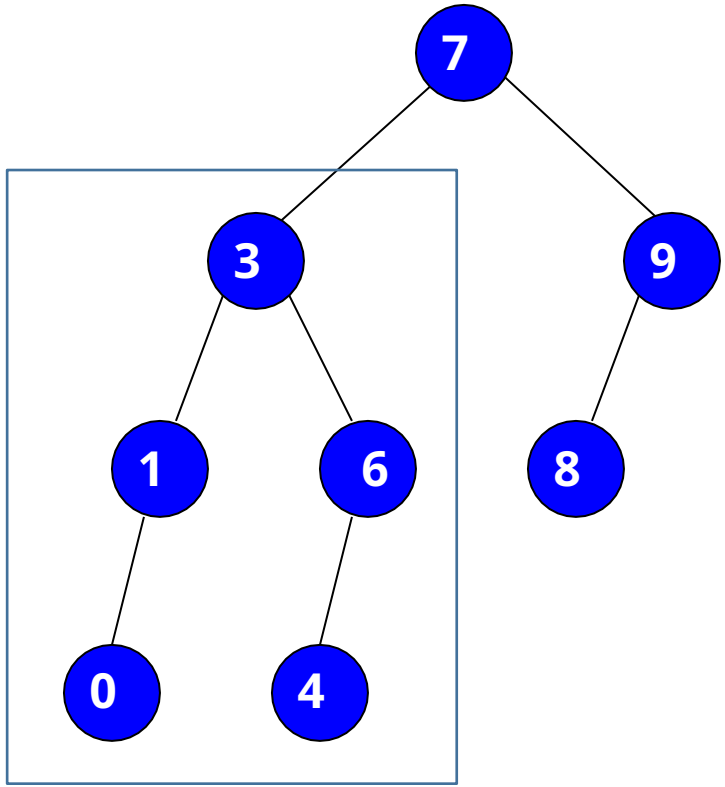

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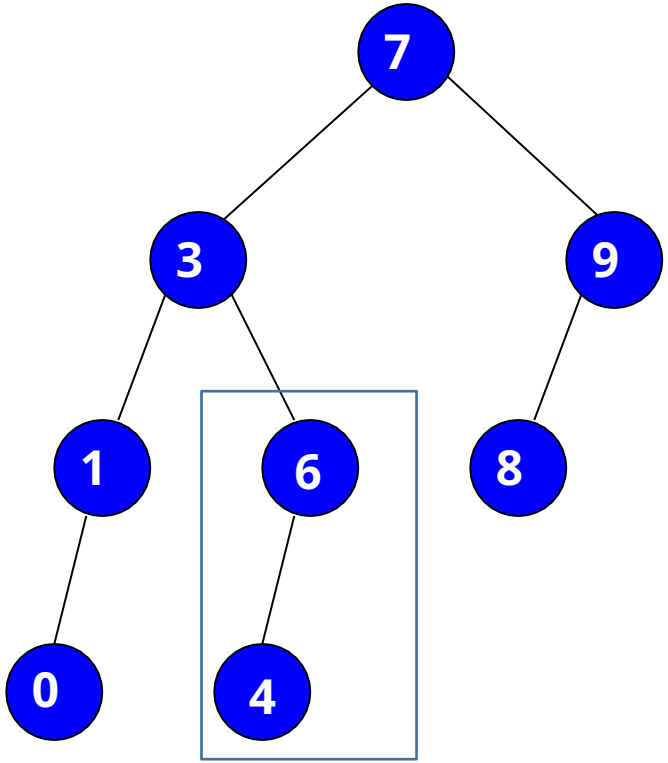

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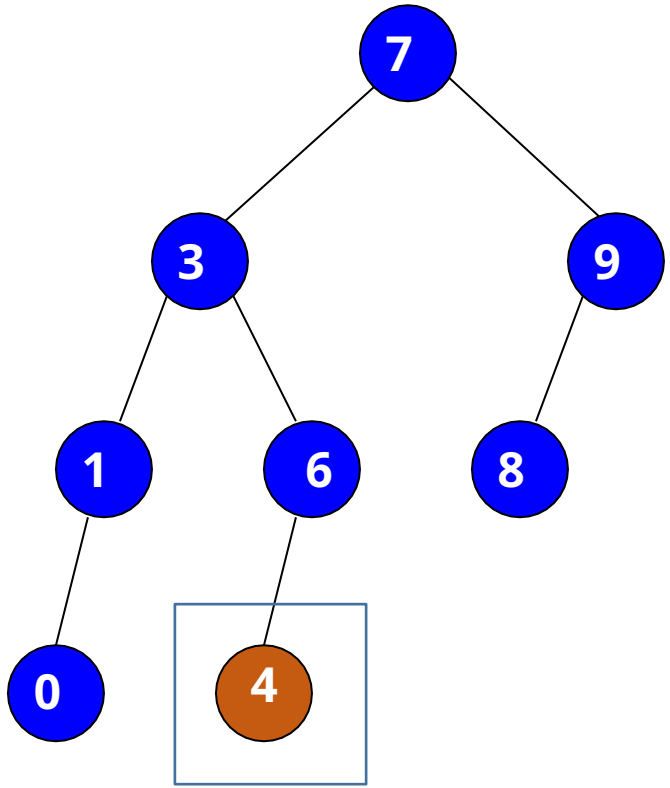
Order: 0, 1, 4, 6



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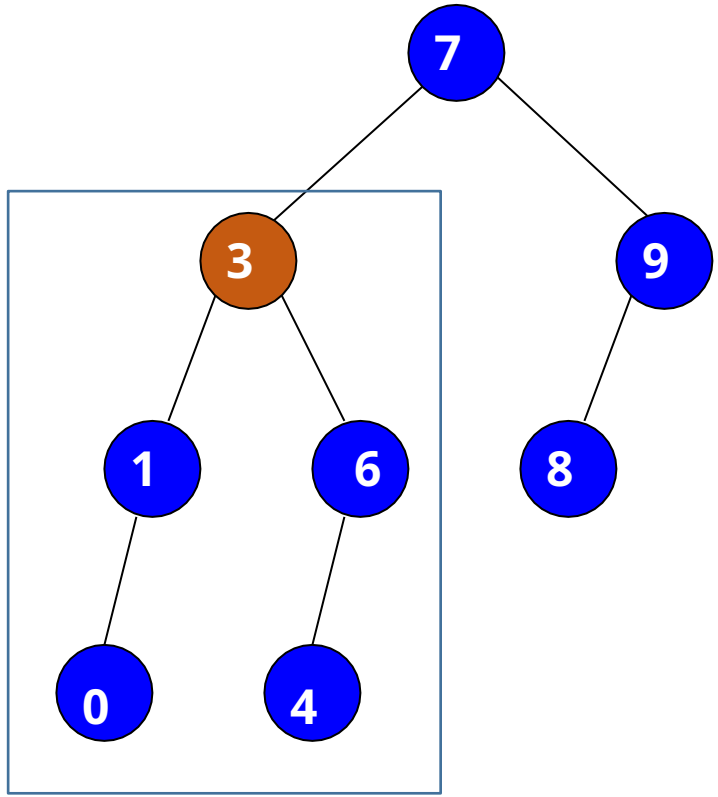
Order: 0, 1, 4, 6, 3



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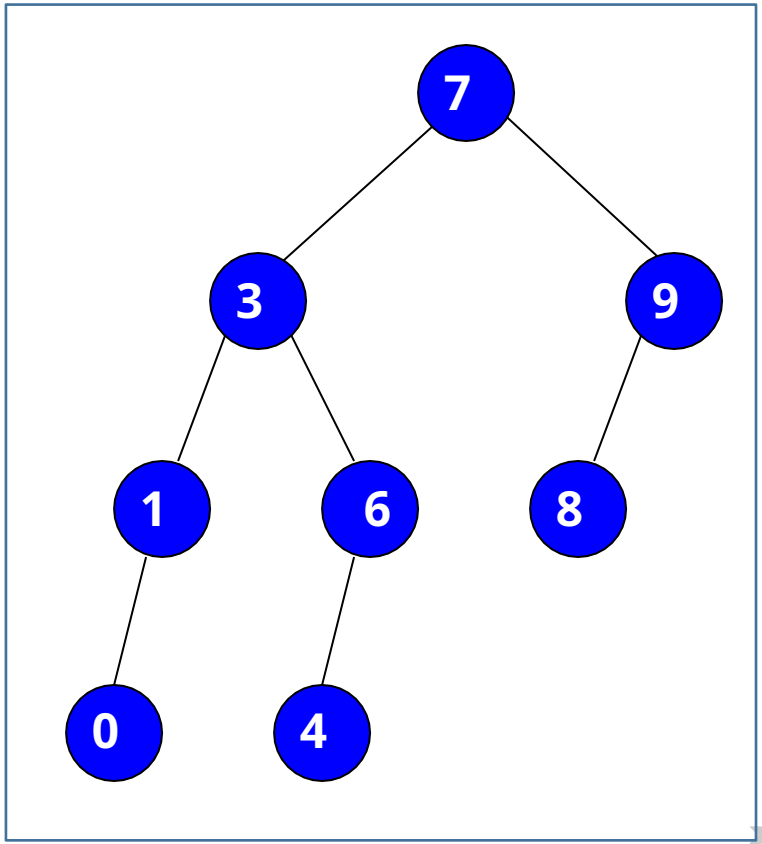

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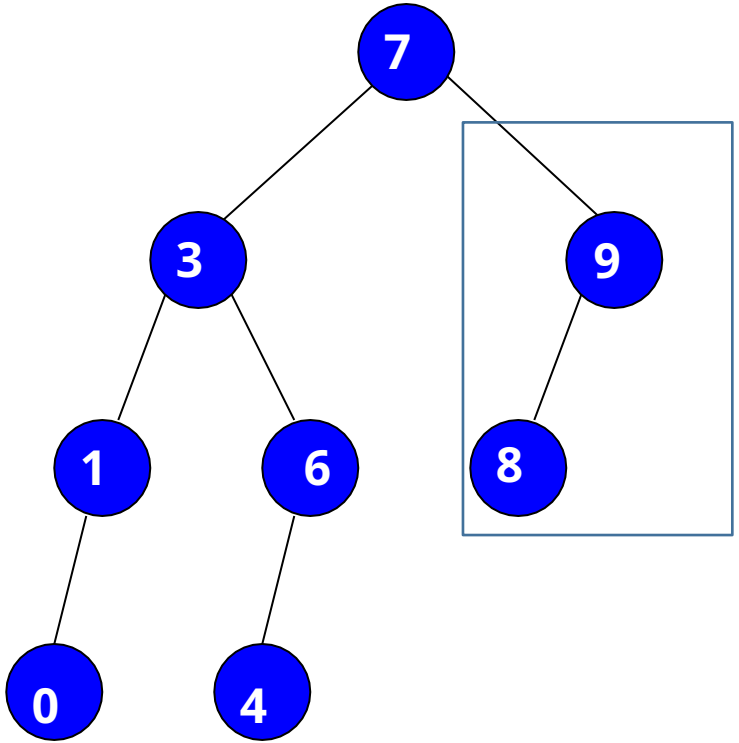

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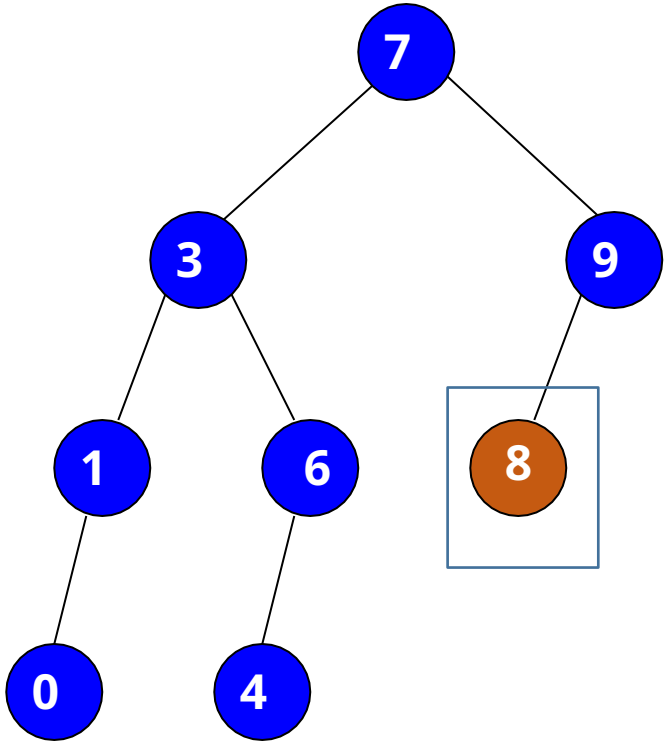
- Return;

Else
- Postorder traverse the left subtree;
- Postorder traverse the right subtree;
- Visit the root;

Order: 0, 1, 4, 6, 3, 8



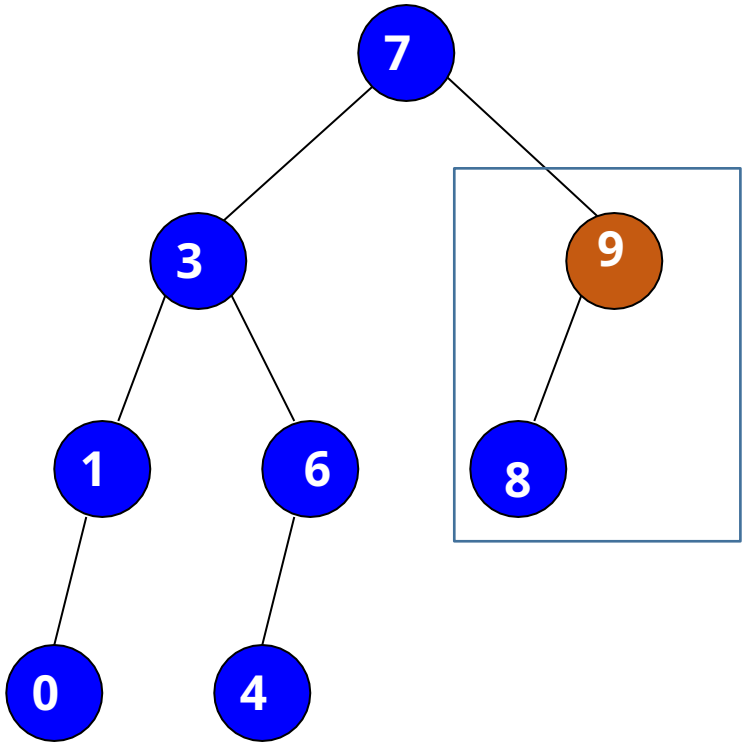
Postorder Traversal

Algorithm for Postorder:

If the tree is empty
- Return;

Else
- Postorder traverse the left subtree;
- Postorder traverse the right subtree;
- Visit the root;

Order: 0, 1, 4, 6, 3, 8, 9



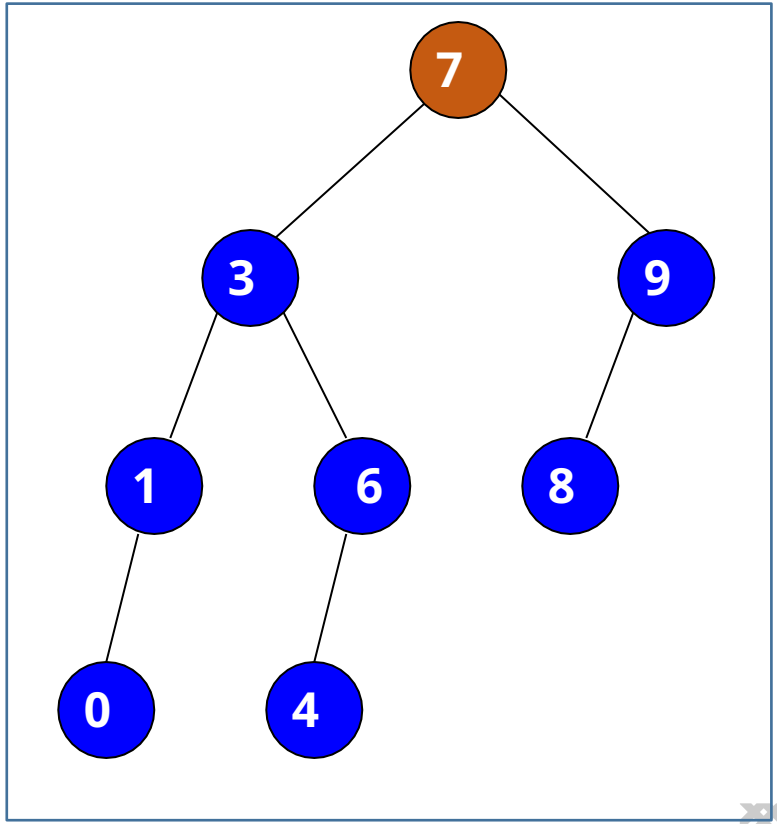
Postorder Traversal

Algorithm for Postorder:

If the tree is empty
- Return;

Else
- Postorder traverse the left subtree;
- Postorder traverse the right subtree;
- Visit the root;

Order: 0, 1, 4, 6, 3, 8, 9, 7



In-class Activity

Tree Traversal Activity