Data Structures and Algorithms: Binary Tree Traversal & BST Deletion

Course: Data Structures and Algorithms

Topic: Binary Tree Traversal and BST Node Deletion

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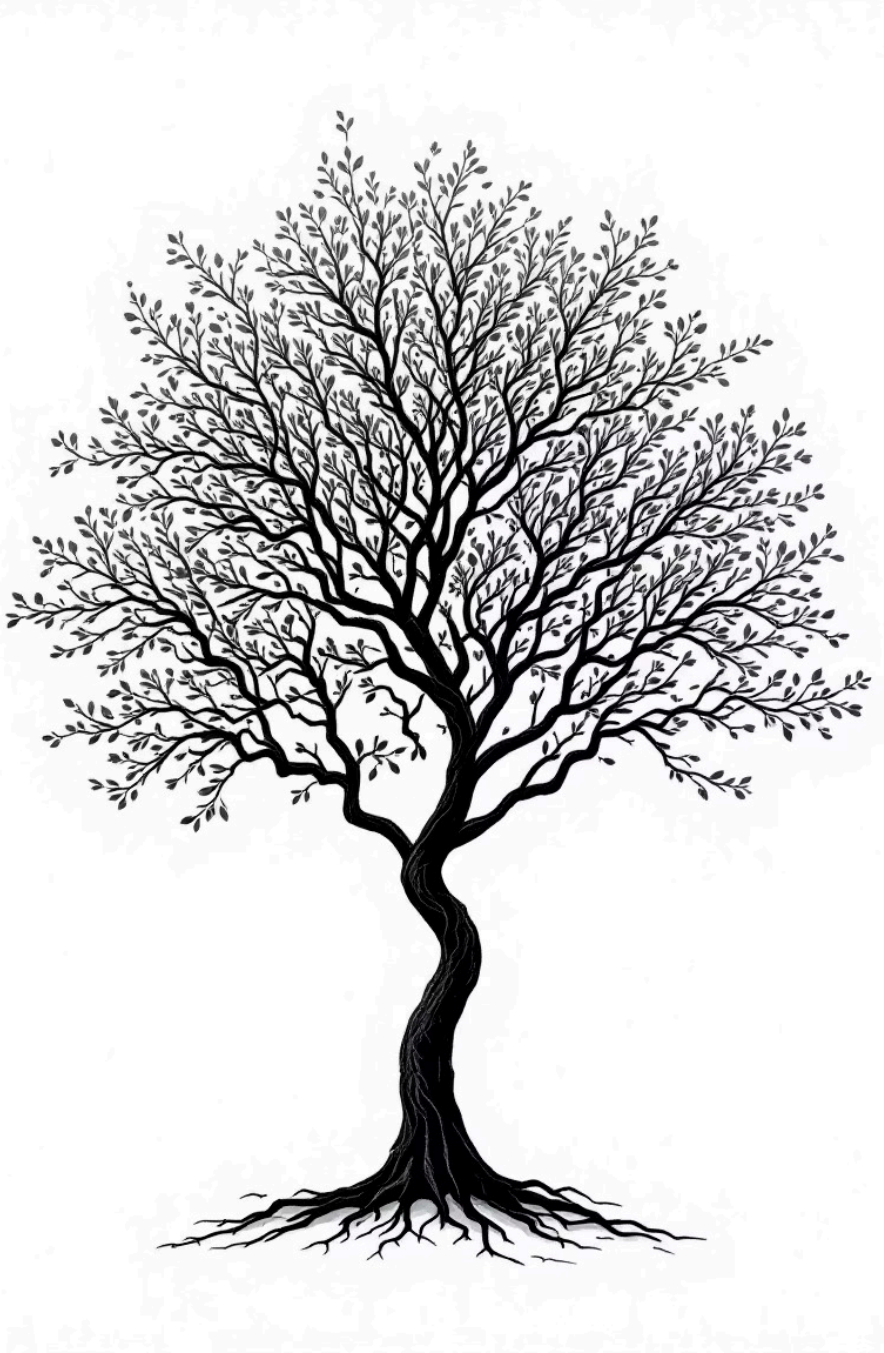


Binary Tree Traversal: Introduction

What is Tree Traversal?

Visiting each node in a tree exactly once in a systematic order.

Importance

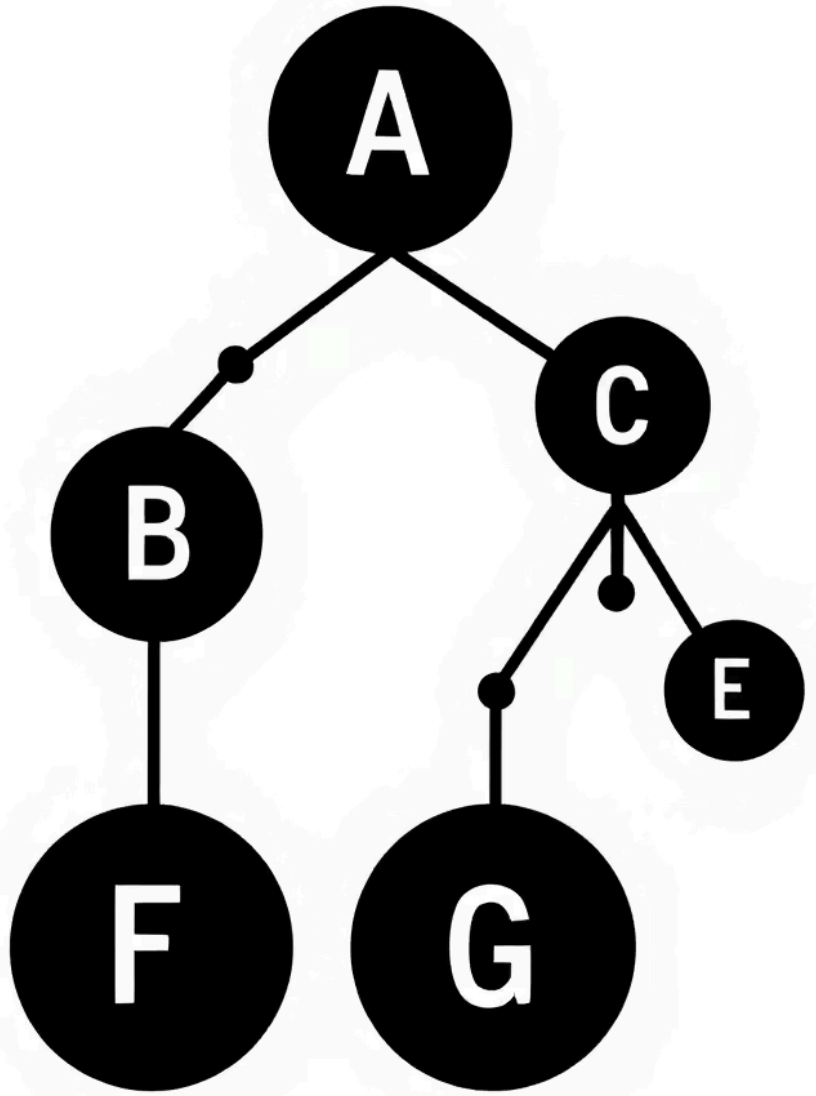
It's the foundation for many tree-related algorithms and operations.

Traversal Types

- Depth-First Search (DFS)
- Breadth-First Search (BFS)

Focus Today

DFS: Pre-order, In-order, and Post-order traversal methods.



Pre-order Traversal (DFS)

Algorithm Steps

1. Process current node
2. Traverse left subtree recursively
3. Traverse right subtree recursively

Summary

Visit root first, process nodes top-down from left to right.

In-order Traversal (DFS)

Algorithm Steps

1. Traverse left subtree recursively
2. Process current node
3. Traverse right subtree recursively

Key Point

Processes nodes in sorted order for binary search trees.

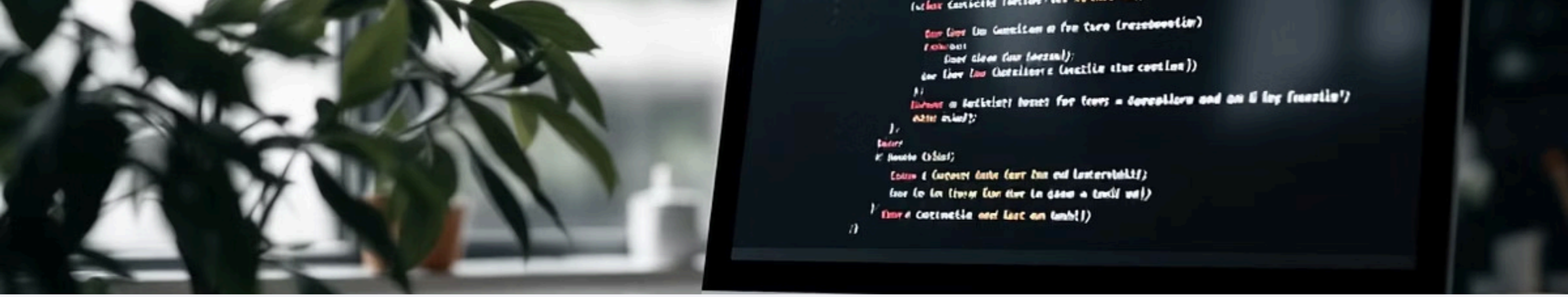
Post-order Traversal (DFS)

Algorithm Steps

1. Traverse left subtree recursively
2. Traverse right subtree recursively
3. Process current node

Use Cases

Useful in deleting trees and evaluating expression trees.



Code Examples: Tree Traversal (Python)

Pre-order Code

Visit root, recurse left and right subtrees.

In-order Code

Recurse left, visit root, recurse right.

Post-order Code

Recurse left and right, then visit root.

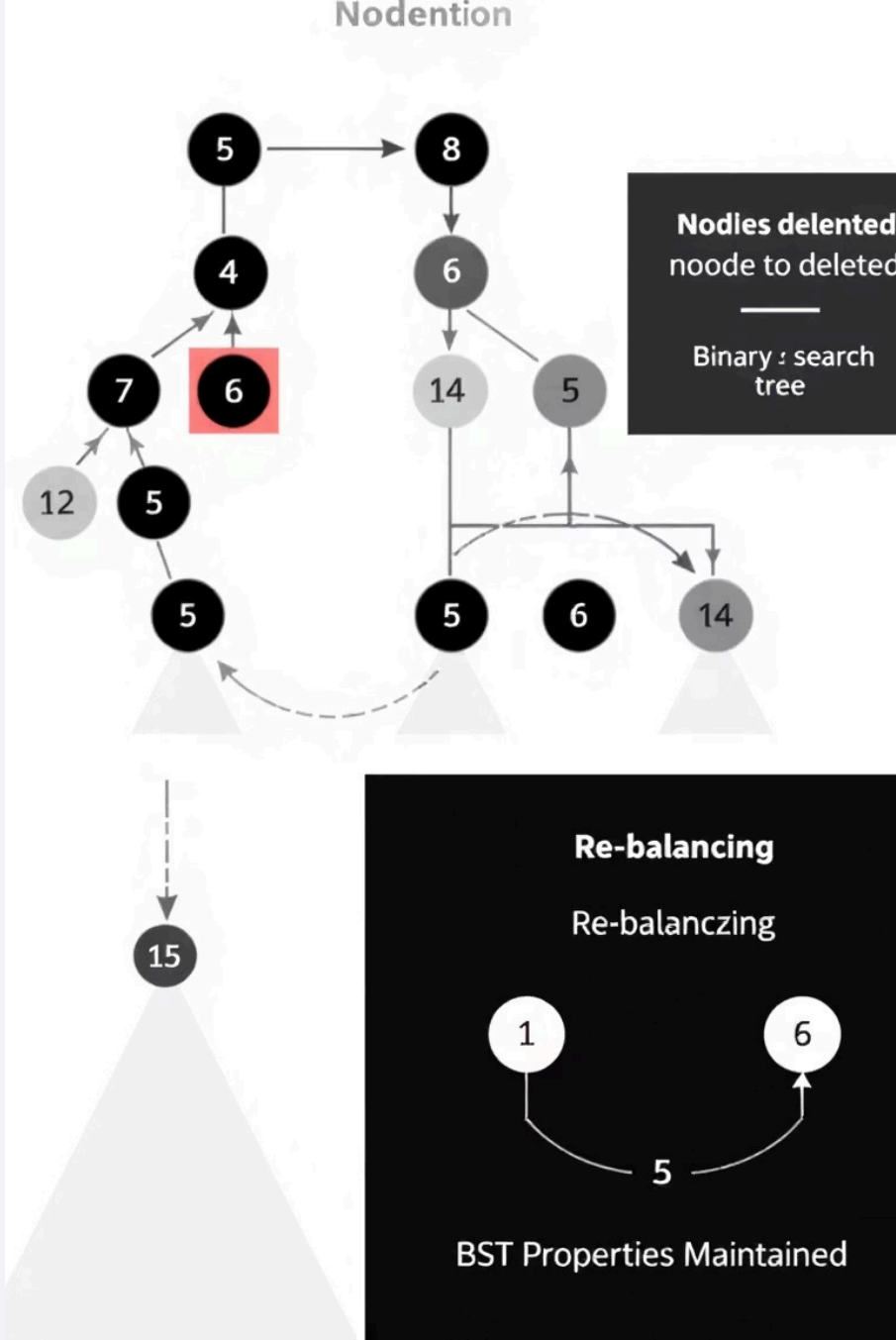
Deleting a Node in BST: Introduction

Goal

Remove a node without breaking the BST order property.

Cases to Handle

- Leaf node deletion
- Node with one child
- Node with two children



Deletion Cases: Leaf & One Child

Leaf Node

Simply remove the node with no children.

One Child

Replace node with its single child node.

Deletion Cases: Two Children

1

Step 1

Find inorder successor: minimum in right subtree.

2

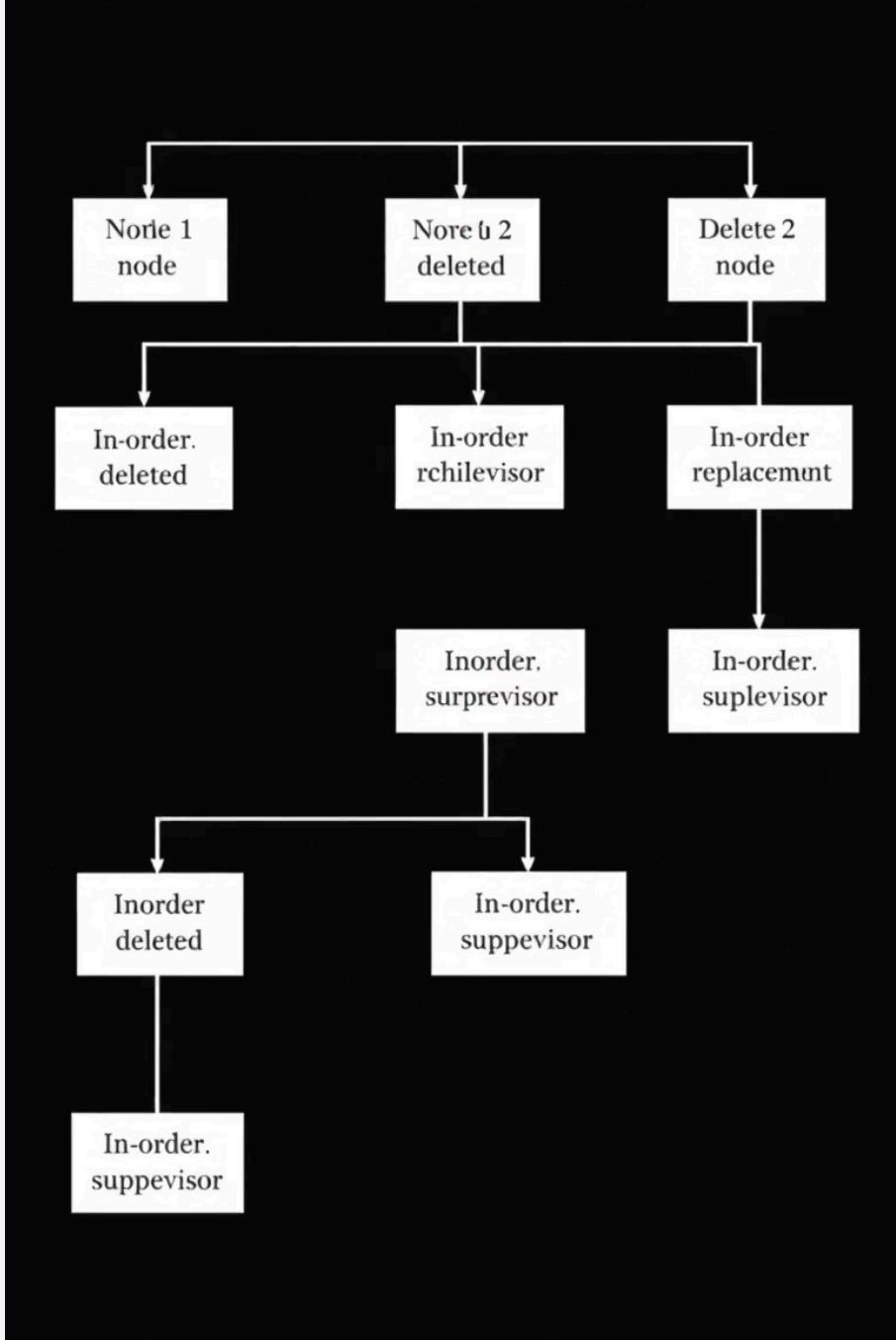
Step 2

Replace node to delete with inorder successor.

3

Step 3

Delete inorder successor from original position.



Conclusion & Further Learning

Key Recap

Pre-order, In-order, Post-order traversals and BST deletion basics.

Importance

Maintaining BST properties ensures fast search and updates.

Next Steps

Explore advanced trees: AVL, Red-Black, and balancing techniques.

Q&A

Open for your questions and clarifications.