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🔄 Traversing

- Traversing means visiting each node of a tree exactly once in a systematic order.
- It is used to access, search, or update data in a tree.
- Visiting every folder and file in a computer's file system.

DFS
(Depth First Search)⚡

- DFS explores a tree by going as deep as possible along one branch before backtracking.
- It uses recursion or stack.
- More memory efficient for deep trees.
- Exploring folder structures on a computer (go into subfolder → sub-subfolder → then come back).
- Best used when you need to explore all paths completely, e.g., solving mazes or puzzles.

BFS

(Breadth First Search) 🌐

- BFS explores the tree level by level (all nodes at depth 1, then depth 2, and so on).
- It uses a queue.
- Good for finding the shortest path in an unweighted graph/tree.
- Searching the shortest route in Google Maps.
- Best used when you want minimum steps/path solutions.

Inorder Traversal (DFS type) 📘

- Rule: Left → Root → Right.
- Produces nodes in sorted order if tree is a Binary Search Tree (BST).
- Printing sorted student roll numbers stored in a BST.
- Mostly used when sorted output is required.

Preorder Traversal (DFS type) 📗

- Rule: Root → Left → Right.
- Visits the parent before children.
- Copying a folder structure (first copy folder name, then its subfolders).
- Best used when you want to create a copy of the tree or need prefix expressions in compilers.

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Postorder Traversal

(DFS type) 📙

- Rule: Left → Right → Root.
- Visits children before parent.
- Deleting a folder structure (delete subfolders first, then parent folder).
- Best used when you want to delete/free nodes or evaluate postfix expressions in compilers.

Level Order Traversal (BFS type) ⭐

- Visits nodes level by level from top to bottom, left to right.
- It is exactly BFS when applied to a tree.
- Uses a queue internally.
- Printing an organization chart (CEO → Managers → Employees).
- Best used when we want to process nodes in hierarchical order, like printing family trees or scheduling tasks in priority levels.

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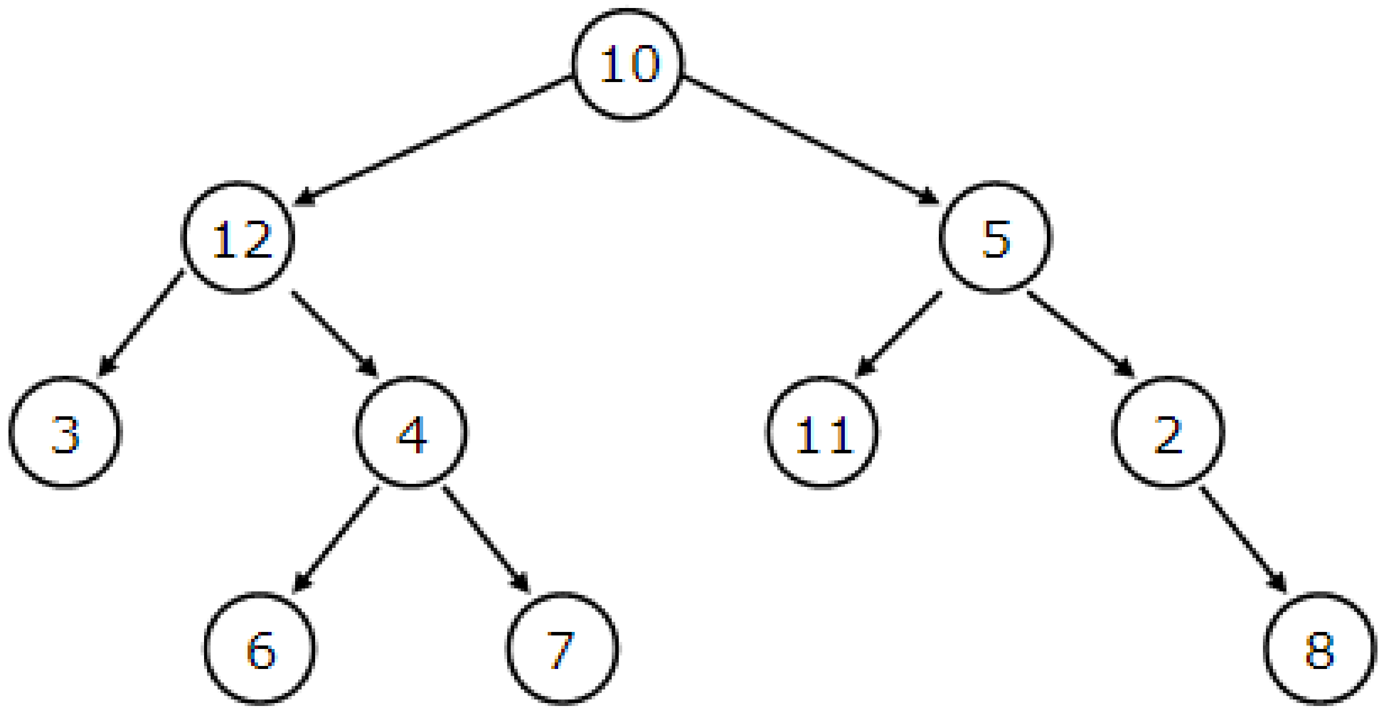

Levelorder tree traversal
10, 12, 5, 3, 4, 11, 2, 6, 7, 8

Inorder tree traversal
3, 12, 6, 4, 7, 10, 11, 5, 2, 8

Preorder tree traversal
10, 12, 3, 4, 6, 7, 5, 11, 2, 8

Postorder tree traversal
3, 6, 7, 4, 12, 11, 8, 2, 5, 10