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الاستعجال والاعتماد عليه فقط سوف يجعلك تخسر كميه معلومات
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Data Structures Level 2
Binary Tree
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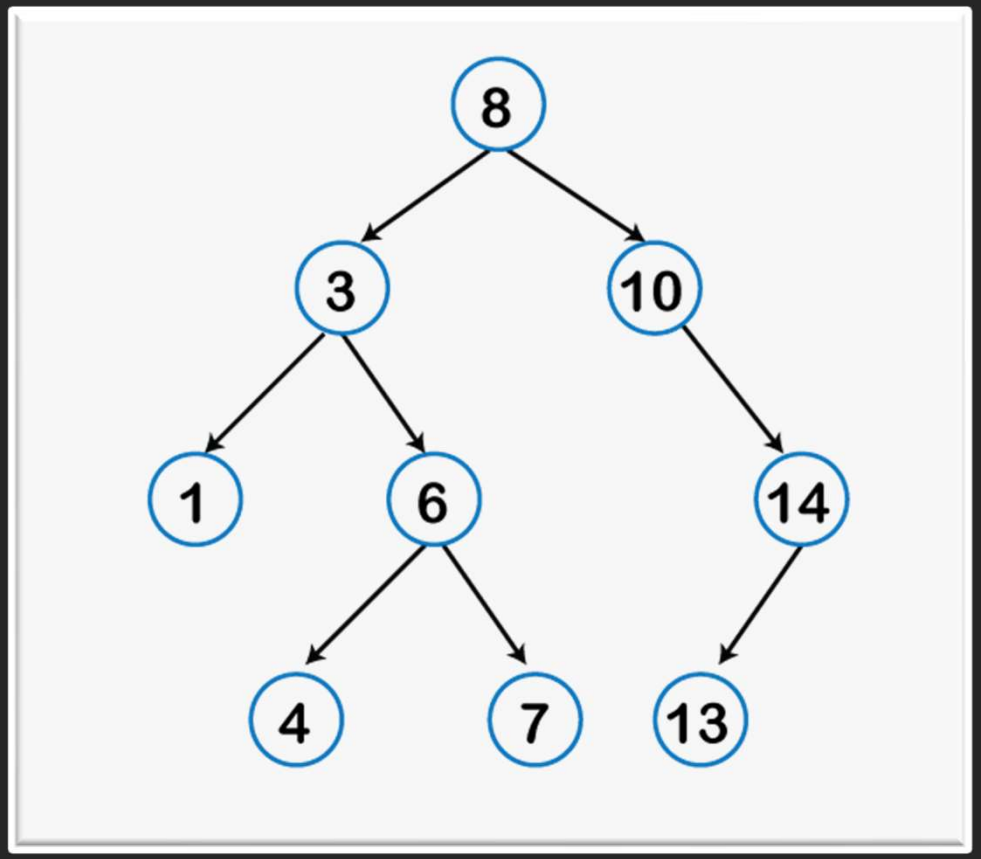
What is Binary Tree?



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What is Binary Tree?

- Binary trees are hierarchical data structures that consist of nodes, where each node has at most two children, referred to as the left child and the right child.
- It is a specialized form of a tree where every node or vertex has zero, one, or at most two children.

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Properties of Binary Tree:

- Binary Tree Can Be Empty: 0 nodes is possible.
- Nodes Have 0, 1, or 2 Children Max: No more than two children per node.

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Uses of a Binary Tree:

- A binary tree is a fundamental data structure in computer science, which has a variety of applications.
- Binary trees are the foundation for many other data structures and algorithms such as:
  - Expression parsing
  - Search algorithms
  - Binary search trees (BSTs),AVL trees, and red-black trees, which have more specific applications and offer better performance for certain operations.

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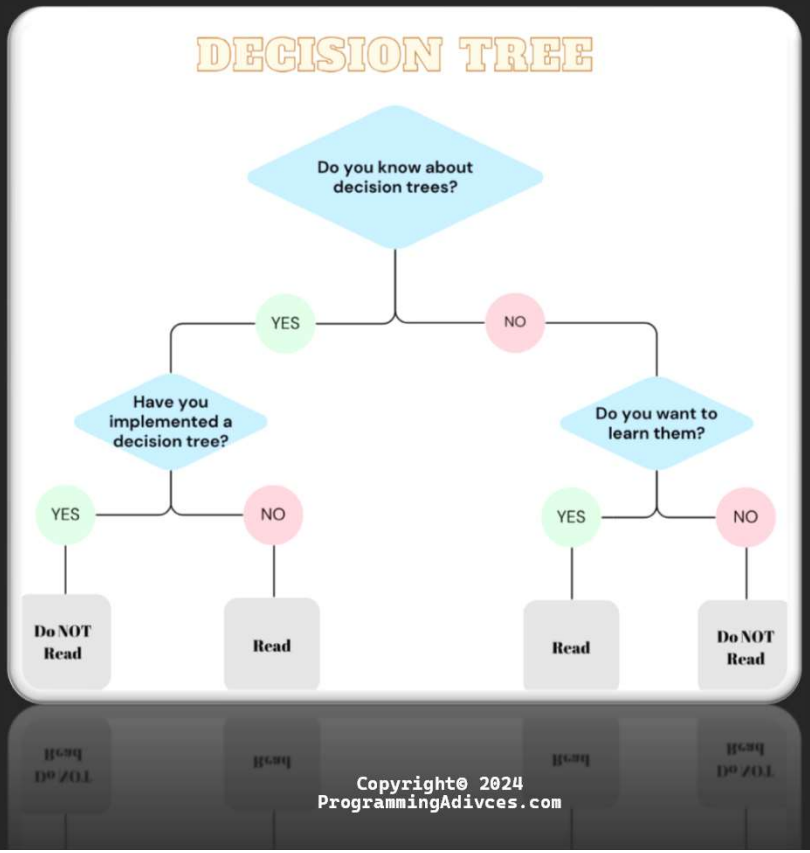
Uses of a Binary Tree:

- Decision Trees: Used in decision-making processes and algorithms, Employed in machine learning algorithms for making decisions based on previous data.



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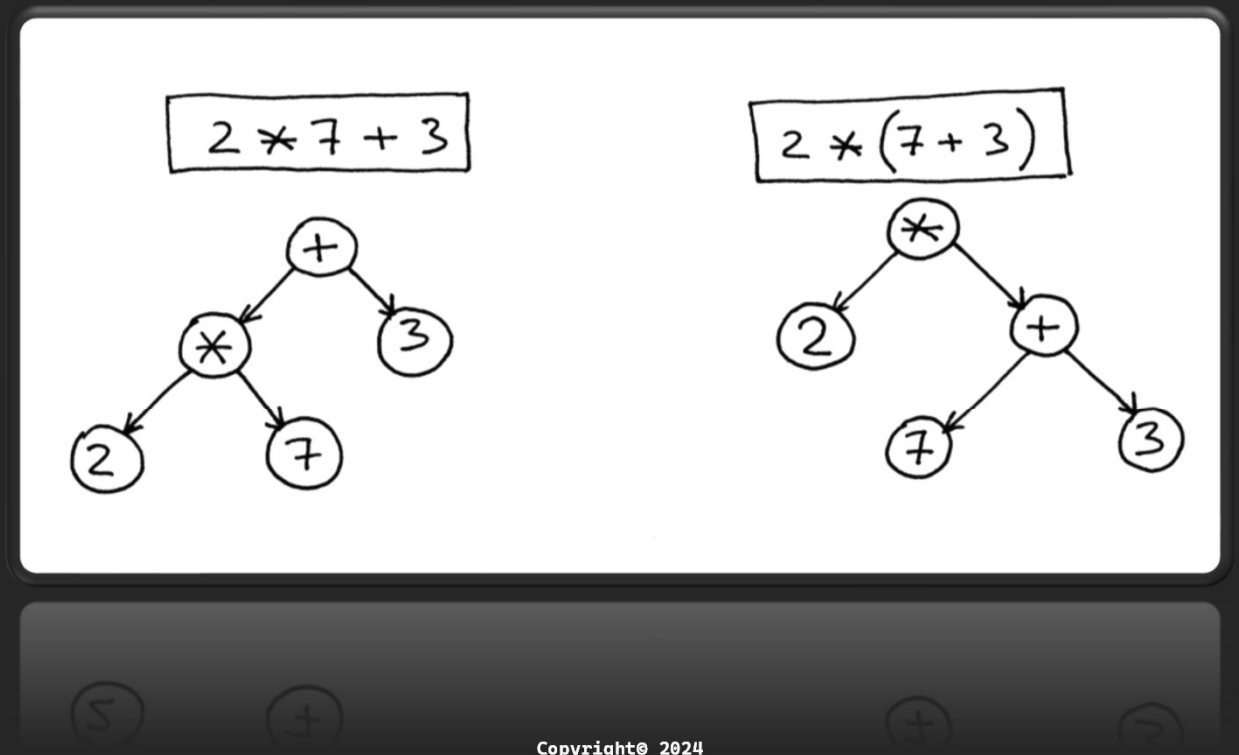
Uses of a Binary Tree:

- Expression Trees: Used to represent and evaluate expressions in computer algebra systems.



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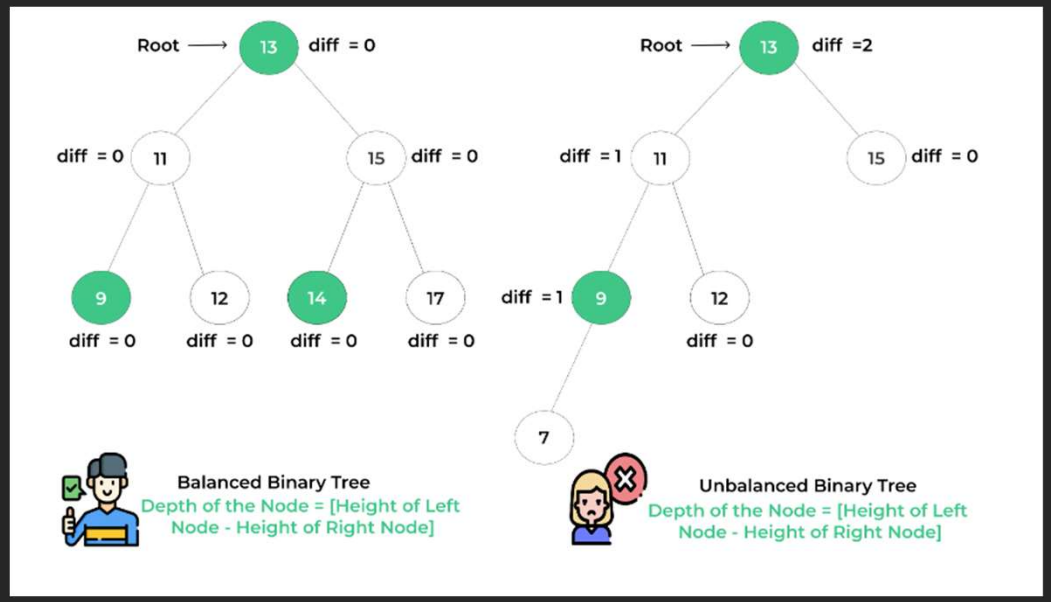
Uses of a Binary Tree:

- Balanced Trees: Such as AVL or Red-Black trees, to ensure that the tree remains balanced for operations to be performed in logarithmic time.



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Uses of a Binary Tree:

- Routing Algorithms: Binary trees are used in various network routing algorithms.
- Graphical Rendering: Binary Space Partitioning (BSP) trees are used in computer graphics to determine the rendering order of objects in three-dimensional space.
- Syntax Trees: Used in compilers to represent the syntax of programmed instructions.
- Binary Search Trees (BST): This is a special kind of binary tree that allows for fast lookup, insertion, and deletion operations. BSTs maintain their nodes in a sorted order, so that for every node, all elements in its left subtree are less than the node and all elements in its right subtree are greater.
- And much more: These are just a few examples; binary trees are a versatile and fundamental structure used throughout computer science and programming.

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