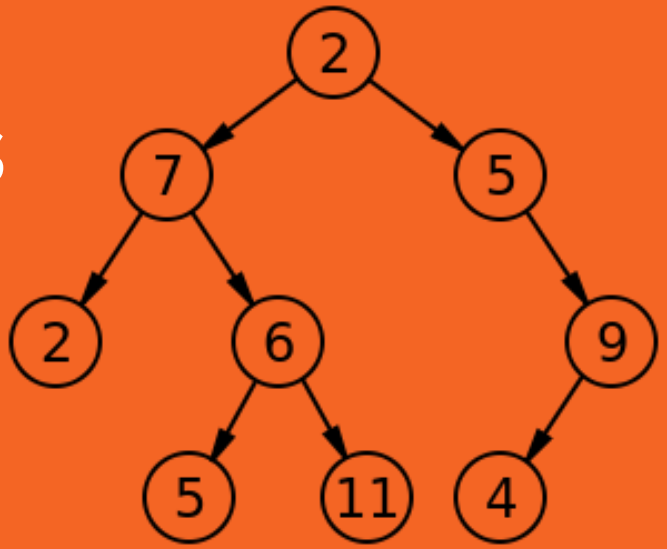
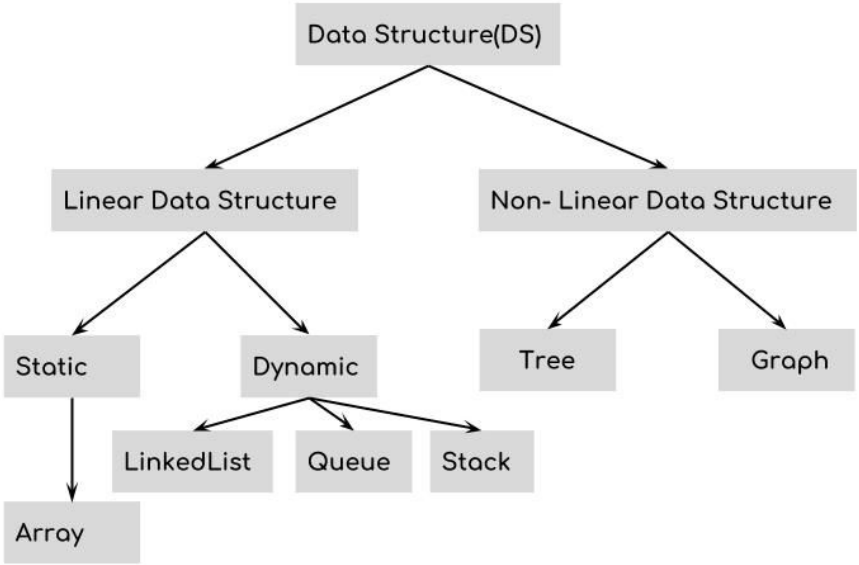
[...Knowledge]:

Trees &
Binary Trees



What is a data structure?

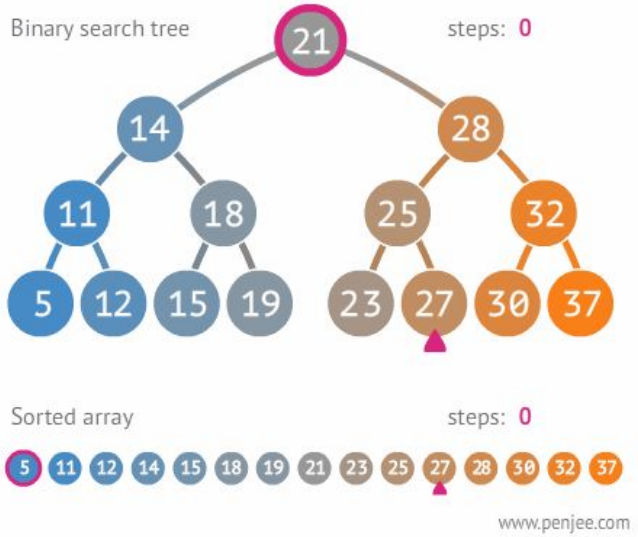
A particular way of organizing data.



What is Tree 🎄?

A hierarchical / recursive data structure.

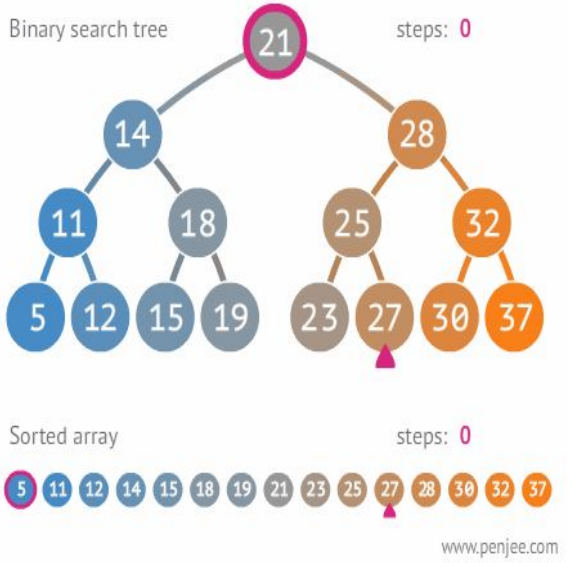
- **Binary Trees** ✅
- **Binary Search Trees** ✅
- **AVL Tree**
- **Red-Black Tree**
- **and more**



What are Binary Trees🌲🌲?

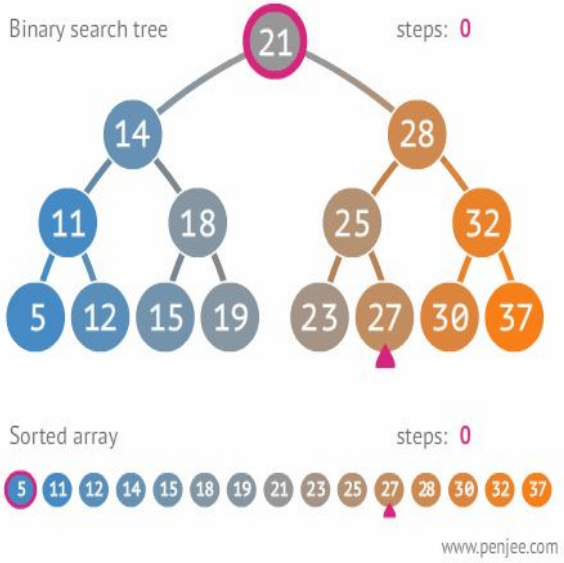
- It’s a type of tree.

- Binary Trees can have at most 2 children or none.



What are Binary Search Trees 🔎🌲🌲?

- It’s a particular application of Binary Tree.
- Binary Search Trees can have at most 2 children or none.
- Left < Node > Right.



Why do they matter?

- Allows to organize hierarchical data
- Allows faster search
- Allows ordering

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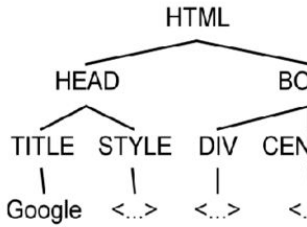

Real-life implementations

- XML, HTML
- Sort
- Network Routing
- Search
- Decision making applications
- Databases
- Compilers

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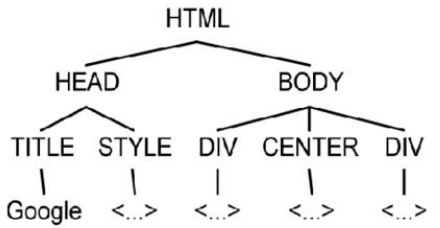


Live Code
Traversing a Tree

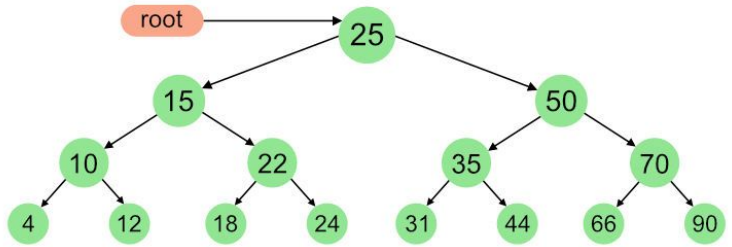
Traversing a BST

- **InOrder (left, root, right)**
- **PreOrder (root, left, right)**
- **PostOrder (left, right, root)**

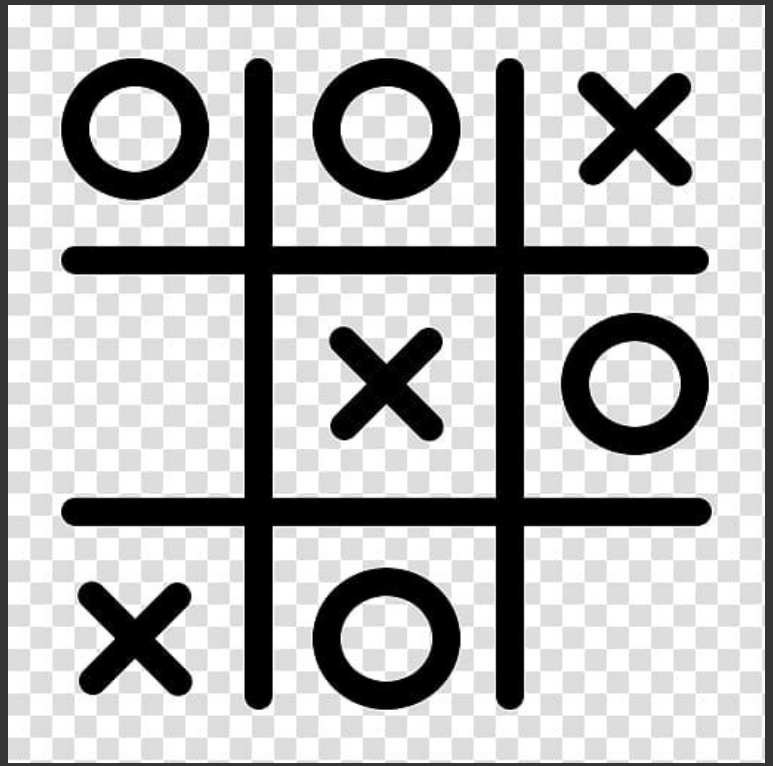
InOrder(root) visits nodes in the following order:
4, 10, 12, 15, 18, 22, 24, 25, 31, 35, 44, 50, 66, 70, 90

A Pre-order traversal visits nodes in the following order:
25, 15, 10, 4, 12, 22, 18, 24, 50, 35, 31, 44, 70, 66, 90

A Post-order traversal visits nodes in the following order:
4, 12, 10, 18, 24, 22, 15, 31, 44, 35, 66, 90, 70, 50, 25



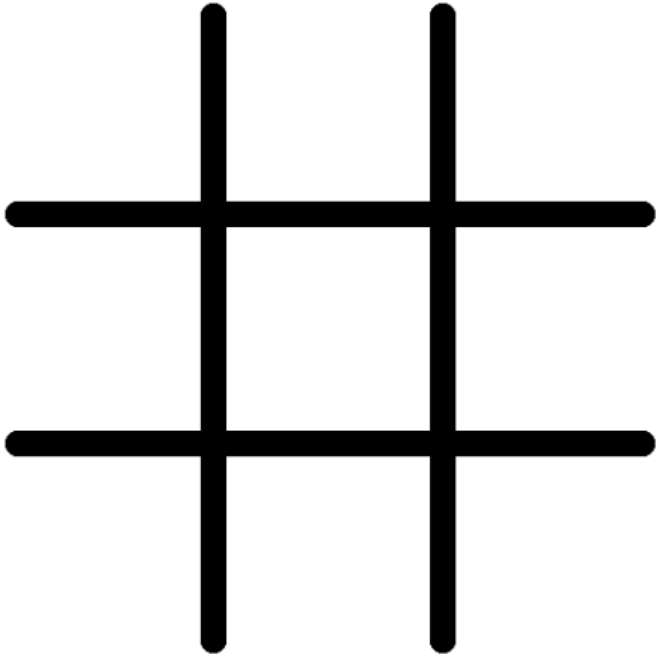
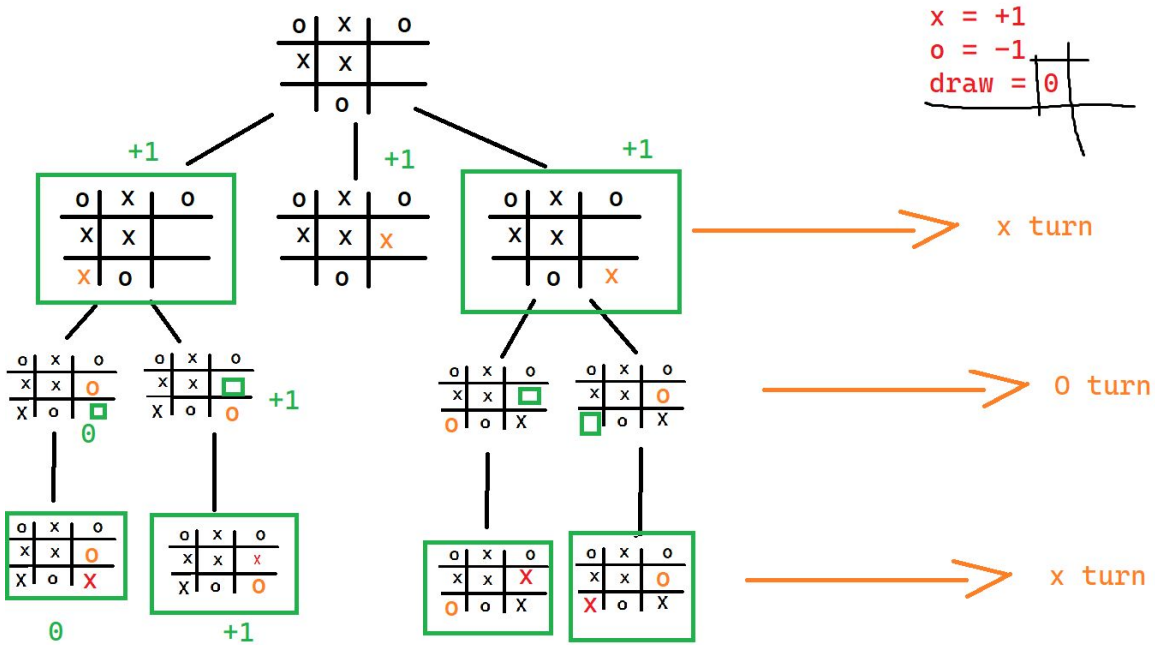
Live Code
Tic Tac Toe



Tic Tac Toe: Rules

- Each player has its turn.

- In order to win, player must place its mark in a horizontal, vertical or diagonal row.



Tic Tac Toe: As a Tree