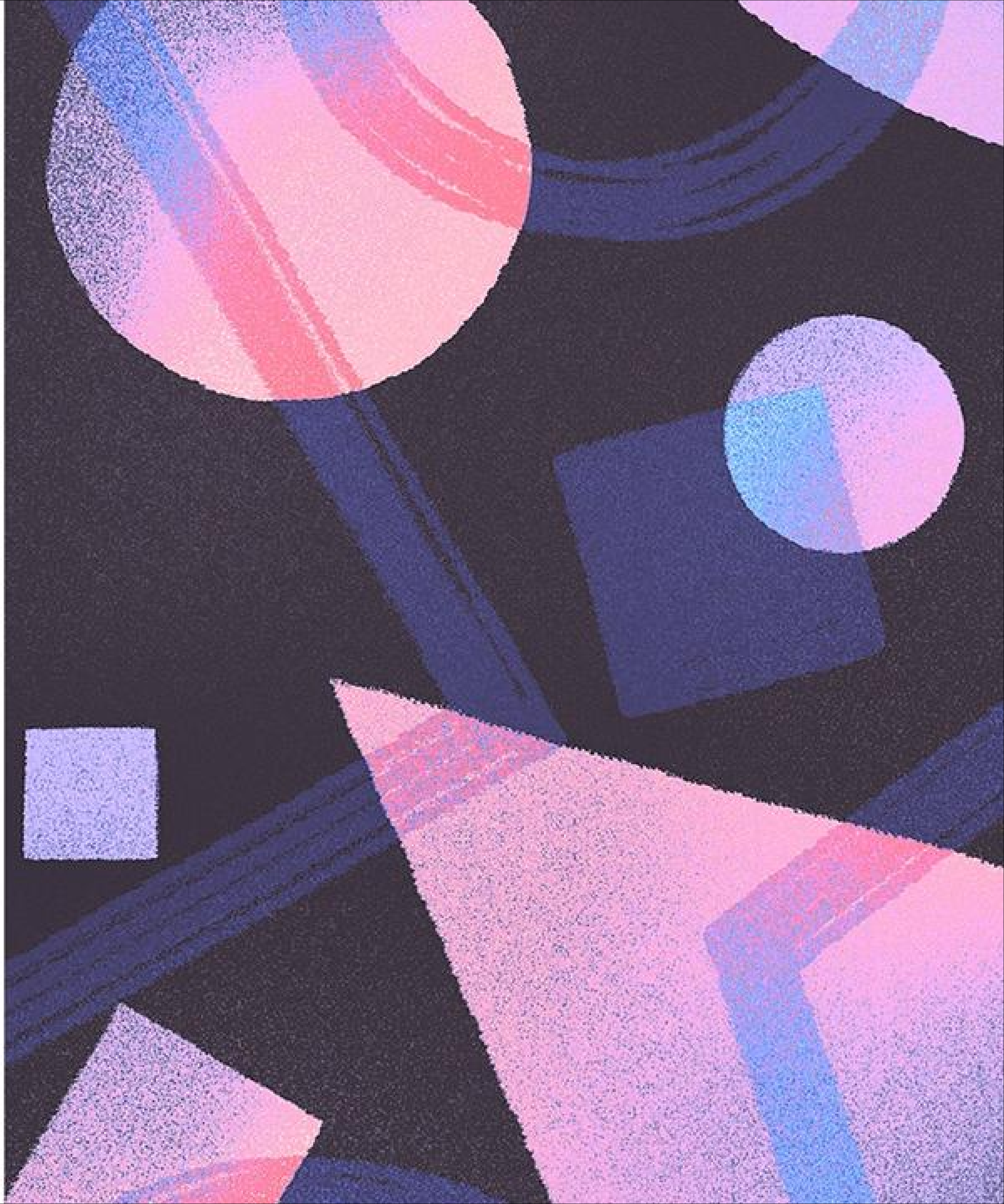
Data Structures Lab
Lecture 7

Binary Search Tree (BST)



Maryam Skaik, Dec-2025

Recall: Binary Tree

What is a Binary Tree?

A Binary Tree is a hierarchical data structure where:

- Each node has at most two children
- Children are called left and right
- No restriction on how values are arranged

Motivation: Why Do We Need BST?

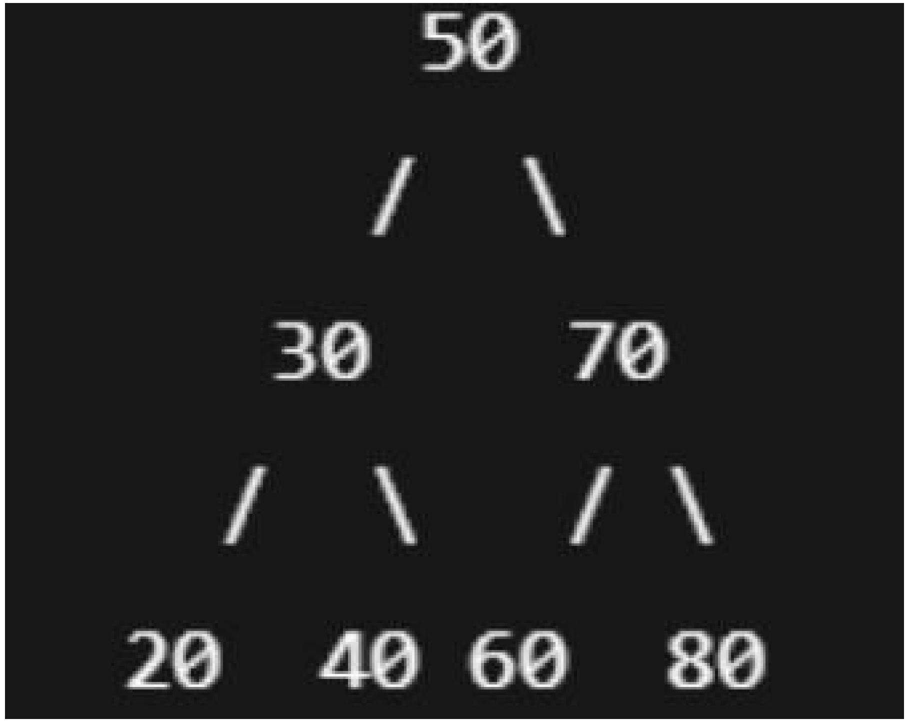
Problem with Binary Trees

- Searching for a value may require visiting all nodes
- Worst-case time: O(n)

Binary Search Tree

A Binary Search Tree (BST) is a binary tree where:

- All values in the left subtree are less than the node
- All values in the right subtree are greater than the node
- This rule applies recursively to all subtrees
- left < root < right

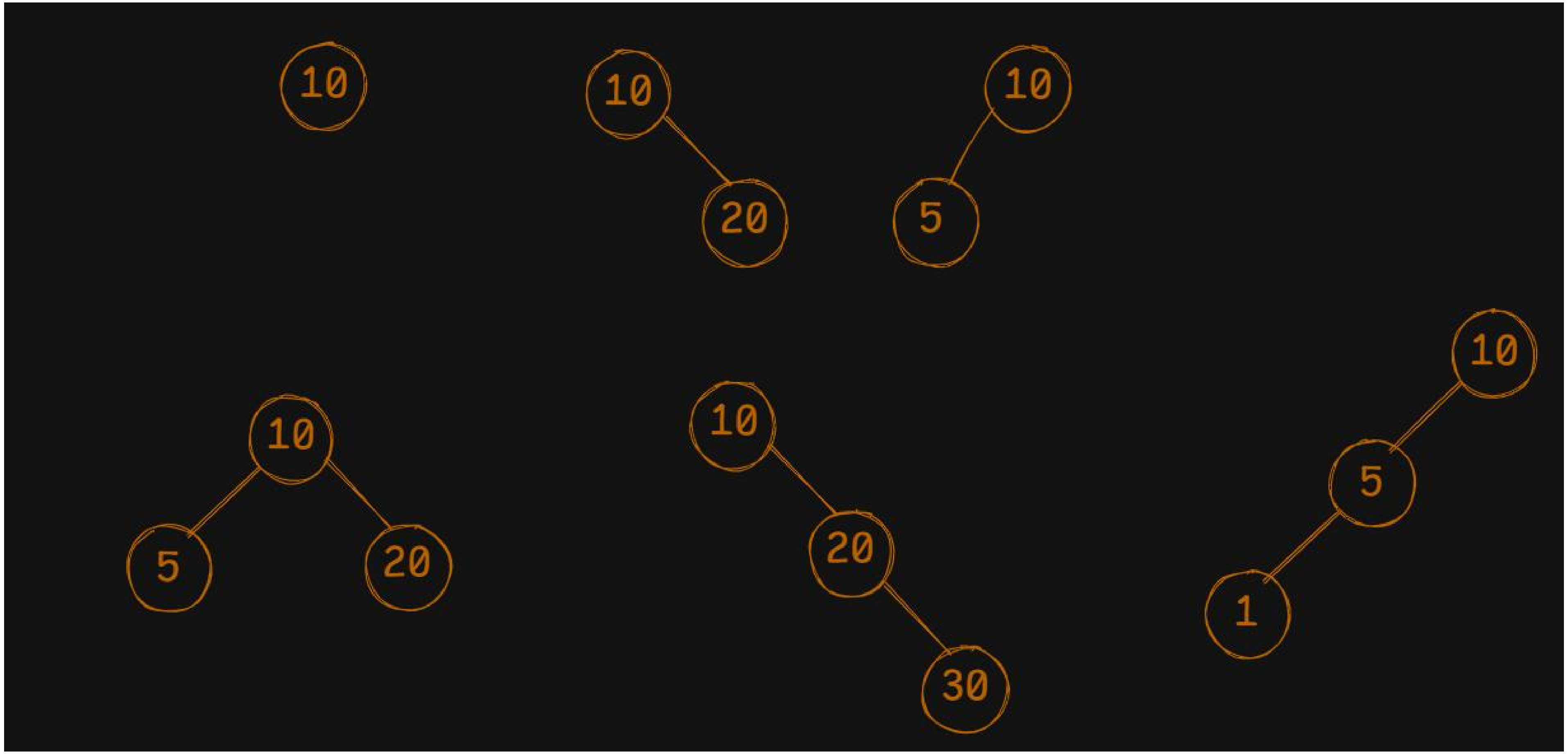


```
        50
       /  \
     30    70
    /  \   / \
  20  40 60  80
```

Binary Tree vs BST

Feature	Binary Tree	Binary Search Tree
Children limit	Max 2	Max 2
Ordering	No	Yes
Searching	O(n)	O(log n) average
Inorder traversal	Random	Sorted
Usage	General structure	Fast search & sorting

Types of BST (By Shape)



BST Implementation

- Insert Operation
- Search Operation
- Delete Operation

Summary

✓ BST = Binary Tree + Ordering

✓ Fast search, insert, delete (average)

✓ Inorder traversal = sorted data

✓ Used heavily in real systems

✓ Foundation for advanced trees

THANK YOU