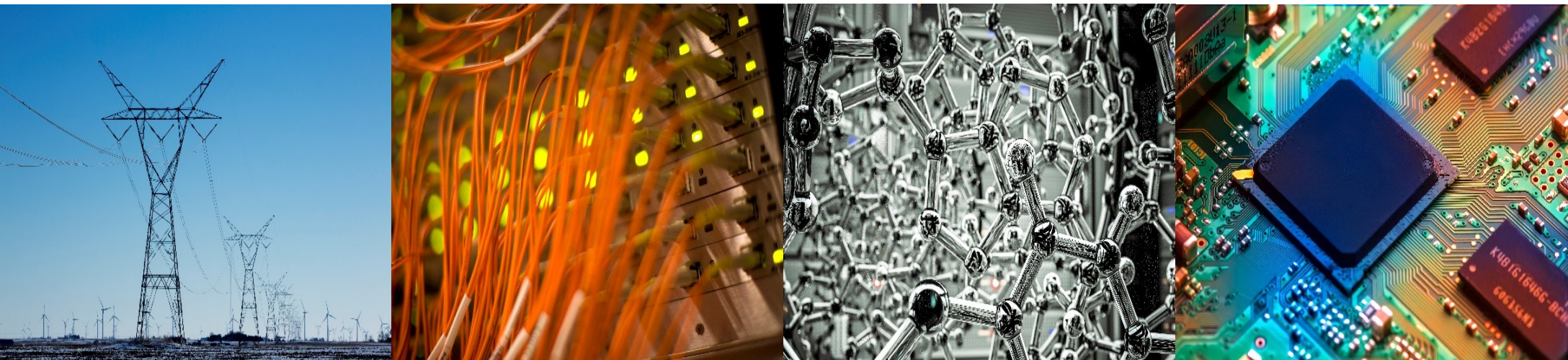


ECE 220 Computer Systems & Programming

Lecture 23 – Trees: traversal and search

April 21, 2026



- Quiz5 should be taken @ CBTF this week
- Final exam conflict request is due on 5/6

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Tree Data Structure

Array, linked list (stack, queue) – linear data structures

Tree: a collection of nodes connected by edges. It's a **nonlinear** data structure.

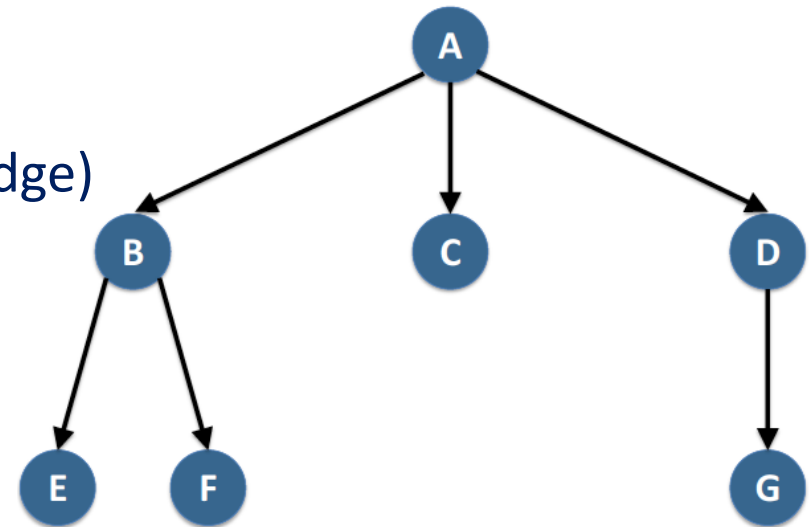
Tree Terminology:

parent, child, sibling

root, external node (leaf), internal node, branch (edge)

height, depth, level

- Elements are stored hierarchically
- A tree has at most _____ root
- Besides the root, each element has _____ parent
- Each element has _____ children



Binary Tree

- Each node has *at most 2* children – left child and right child

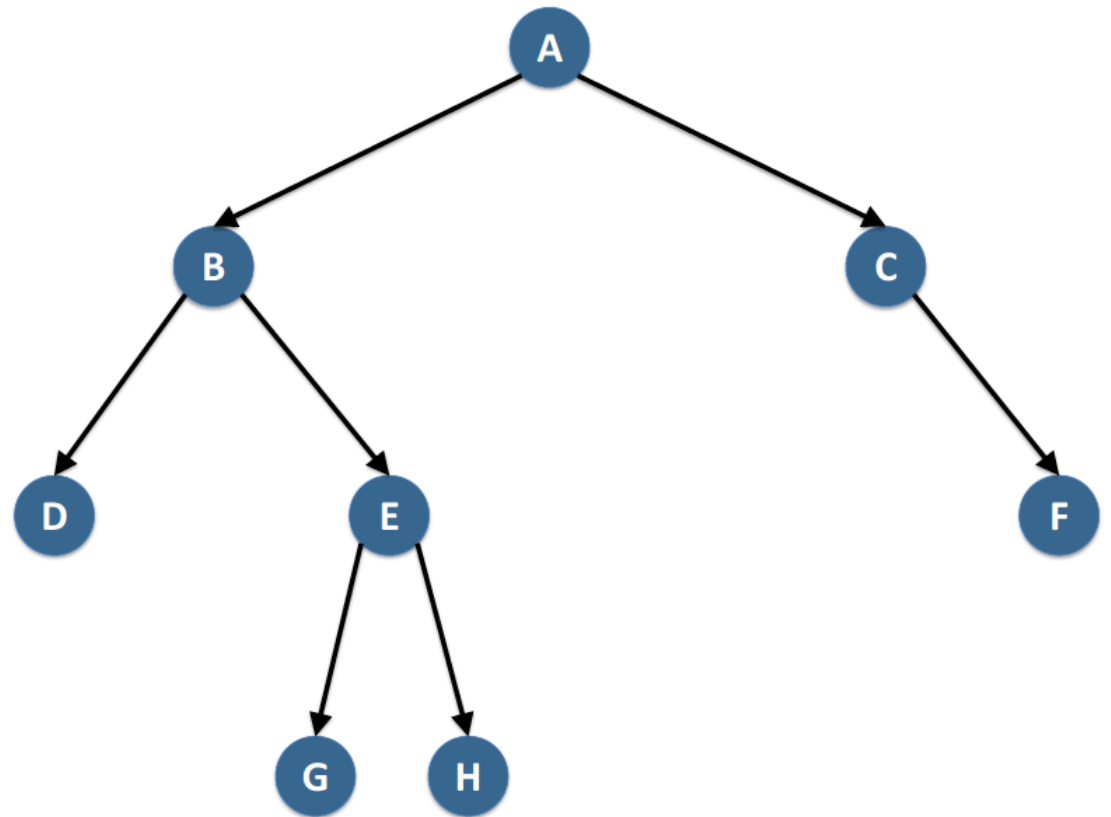
What is the height of the tree?

What is the depth of node E?

What is the height of node E?

Which nodes are internal nodes?

Which nodes are leaves?

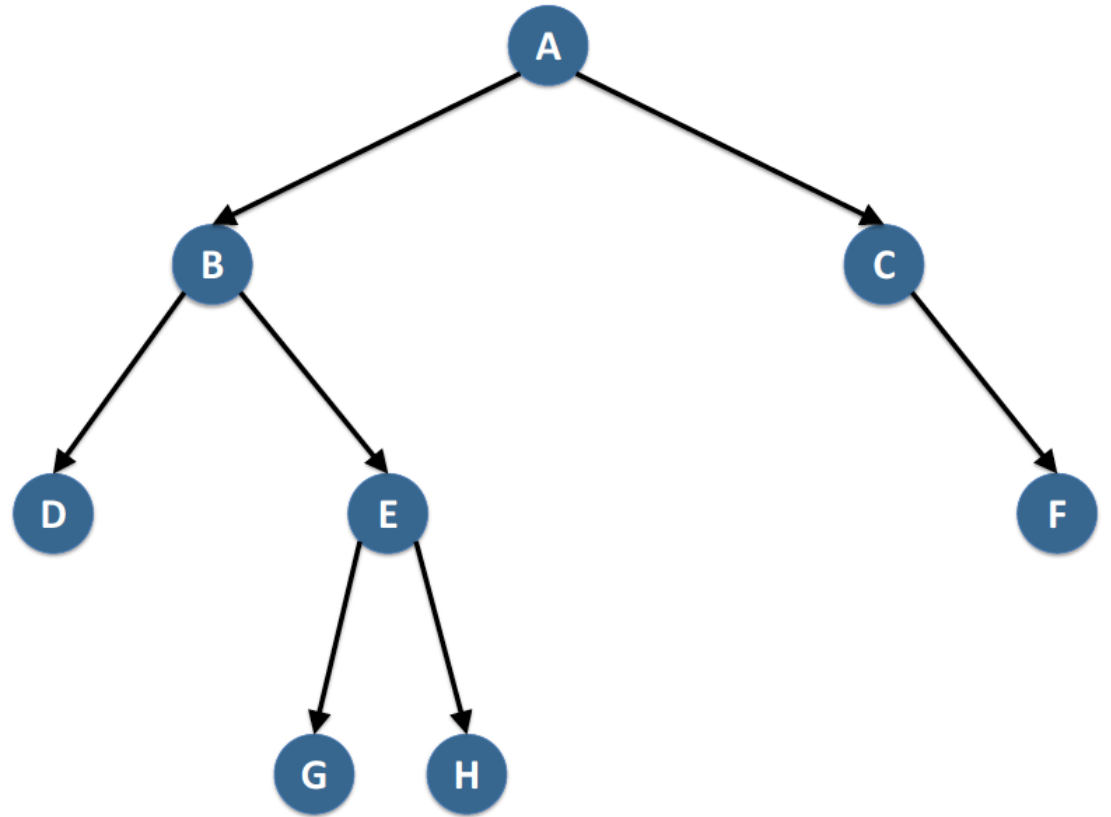


Tree Traversal – BFS & DFS

Breadth-First Search (level-order)

Depth-First Search

1. Pre-order: root, left, right
2. In-order: left, root, right
3. Post-order: left, right, root



Binary Search Tree

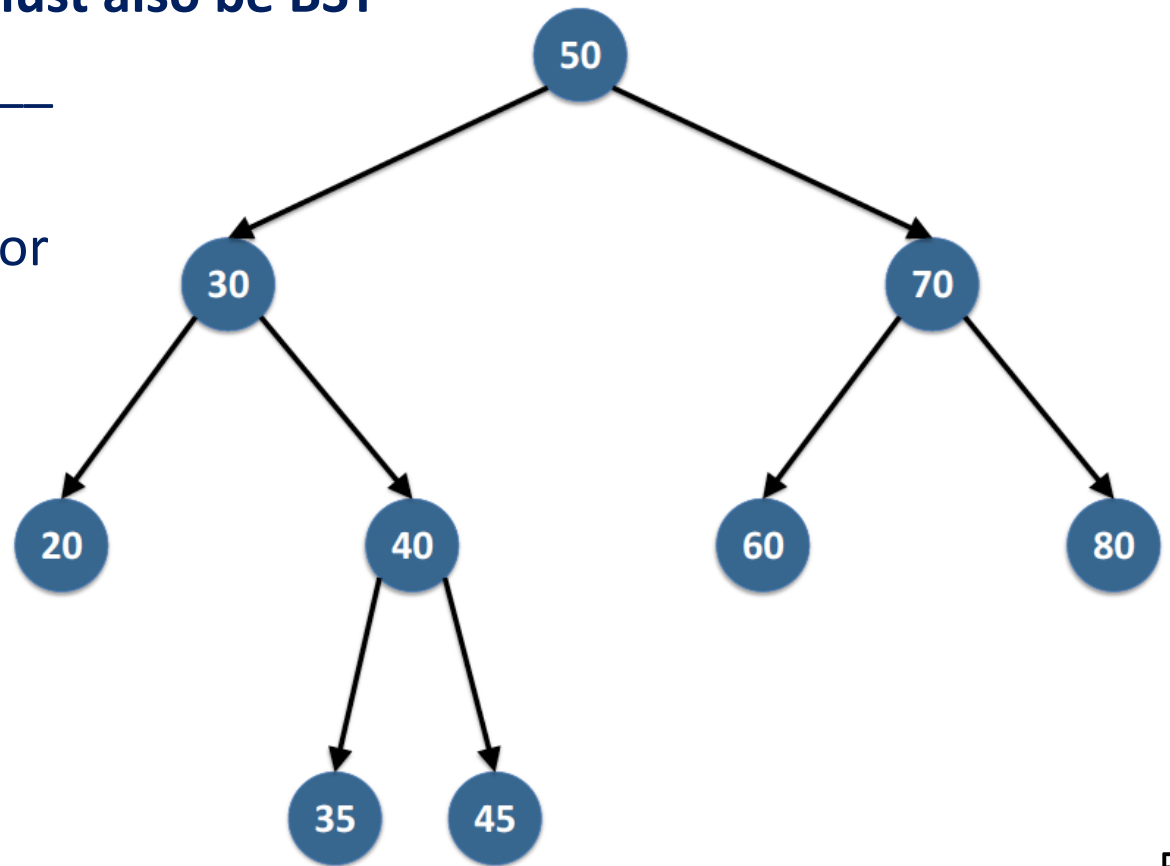
- Data of nodes on the **left** subtree is _____ than the data of parent node
- Data of nodes on the **right** subtree is _____ than the data of parent node
- Both left and right **subtrees must also be BST**
- Data in each node is _____

What is the sequence of access for

1. pre-order traversal?

2. in-order traversal?

3. post-order traversal?



<http://visualgo.net/bst.html>

Traverse a BST

```
void preorder(node *root) {
```

```
}
```

```
void inorder(node *root) {
```

```
}
```

```
void postorder(node *root) {
```

```
}
```

go.illinois.edu/ECE220tree

```
typedef struct btNode node;  
struct btNode{  
    int data;  
    node *left;  
    node *right;  
};
```