

CSC 212: Data Structures and Abstractions

Trees

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[credit Marco Alvarez]

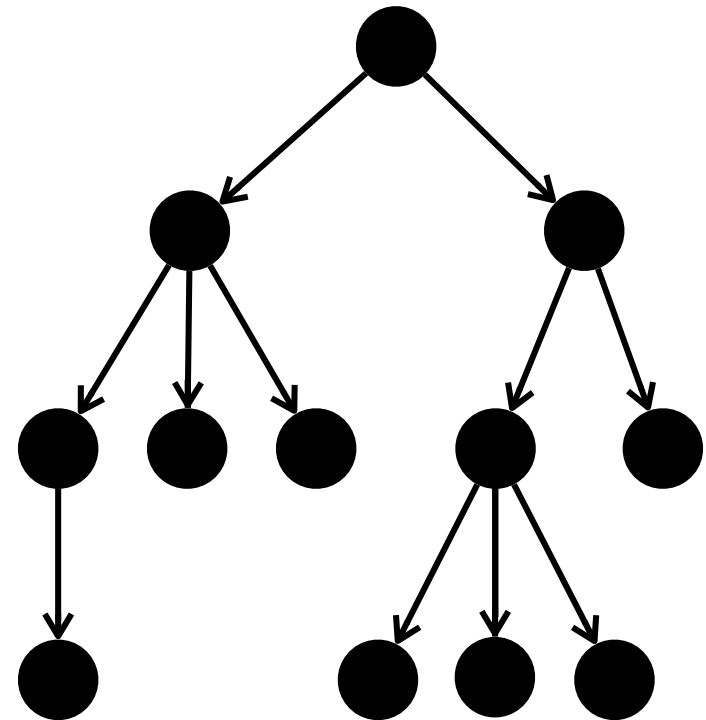
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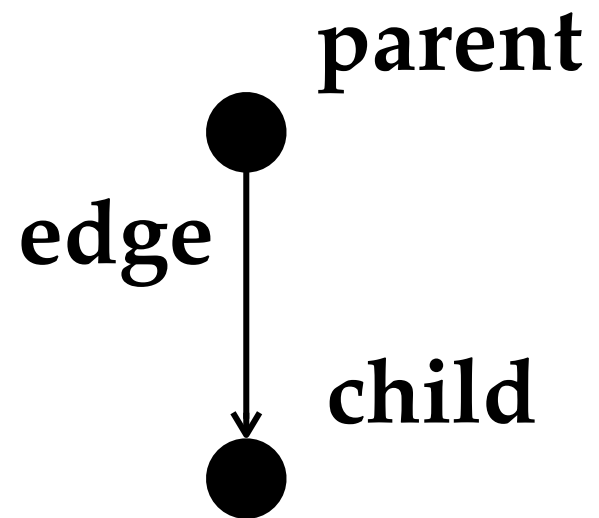
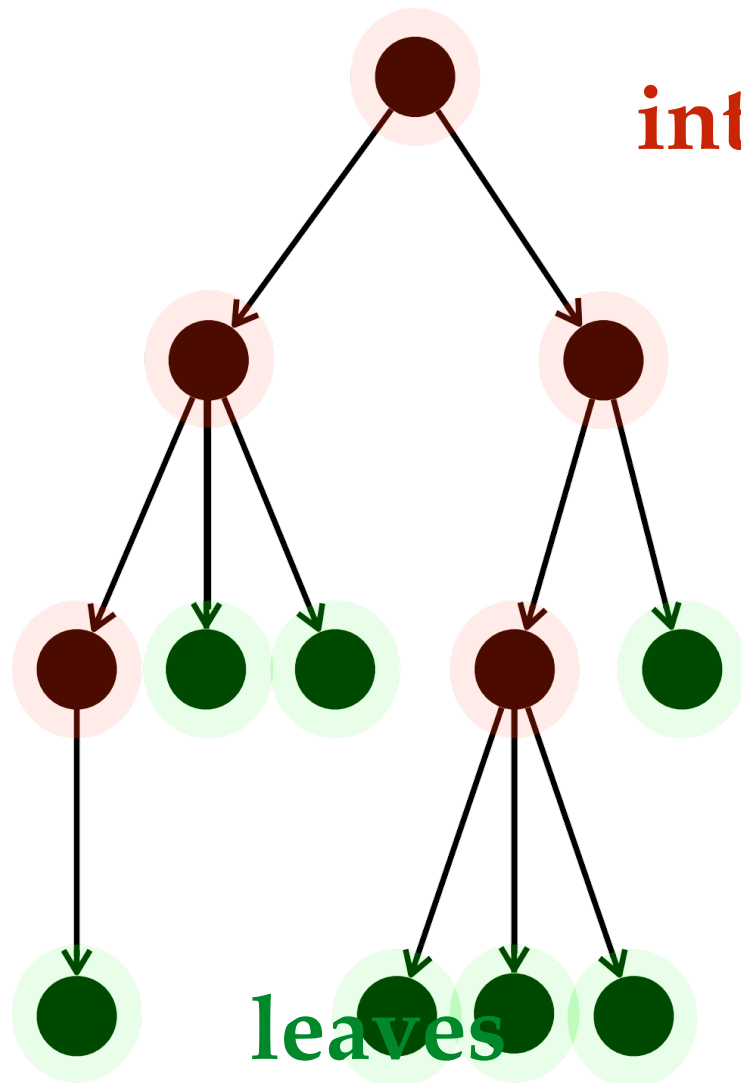


Trees

- Lists, Stacks, Queues are **linear data structures**
- Trees allow for **hierarchical** relationships
 - ✓ nodes have **parent-child** relation

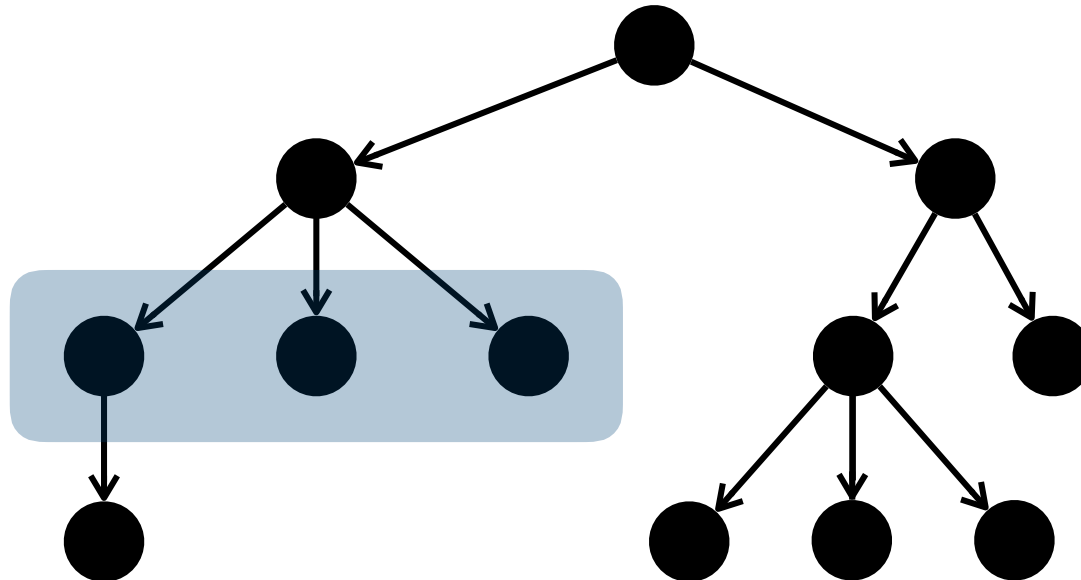


Trees (jargon)

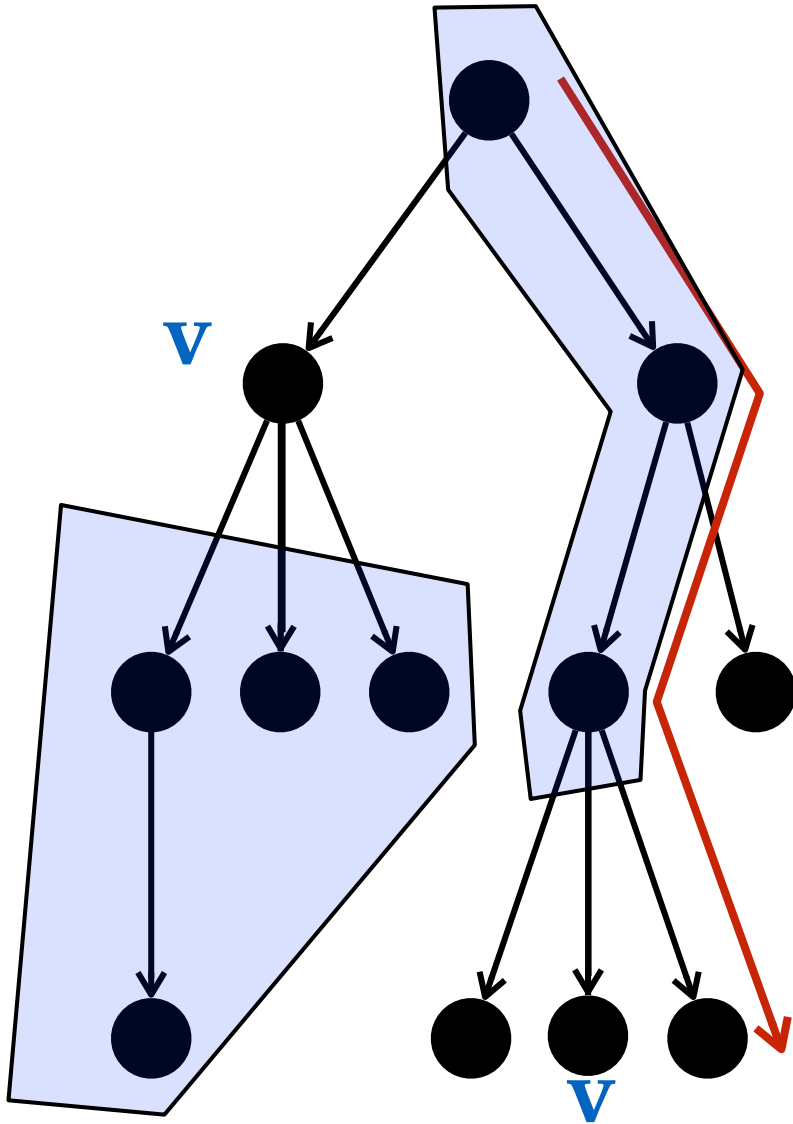


Trees (jargon)

- Each node is either a **leaf** or an **internal node**
 - an internal node has one or more children
 - a leaf node (external node) has no children
- Nodes with the same parent are **siblings**



Paths

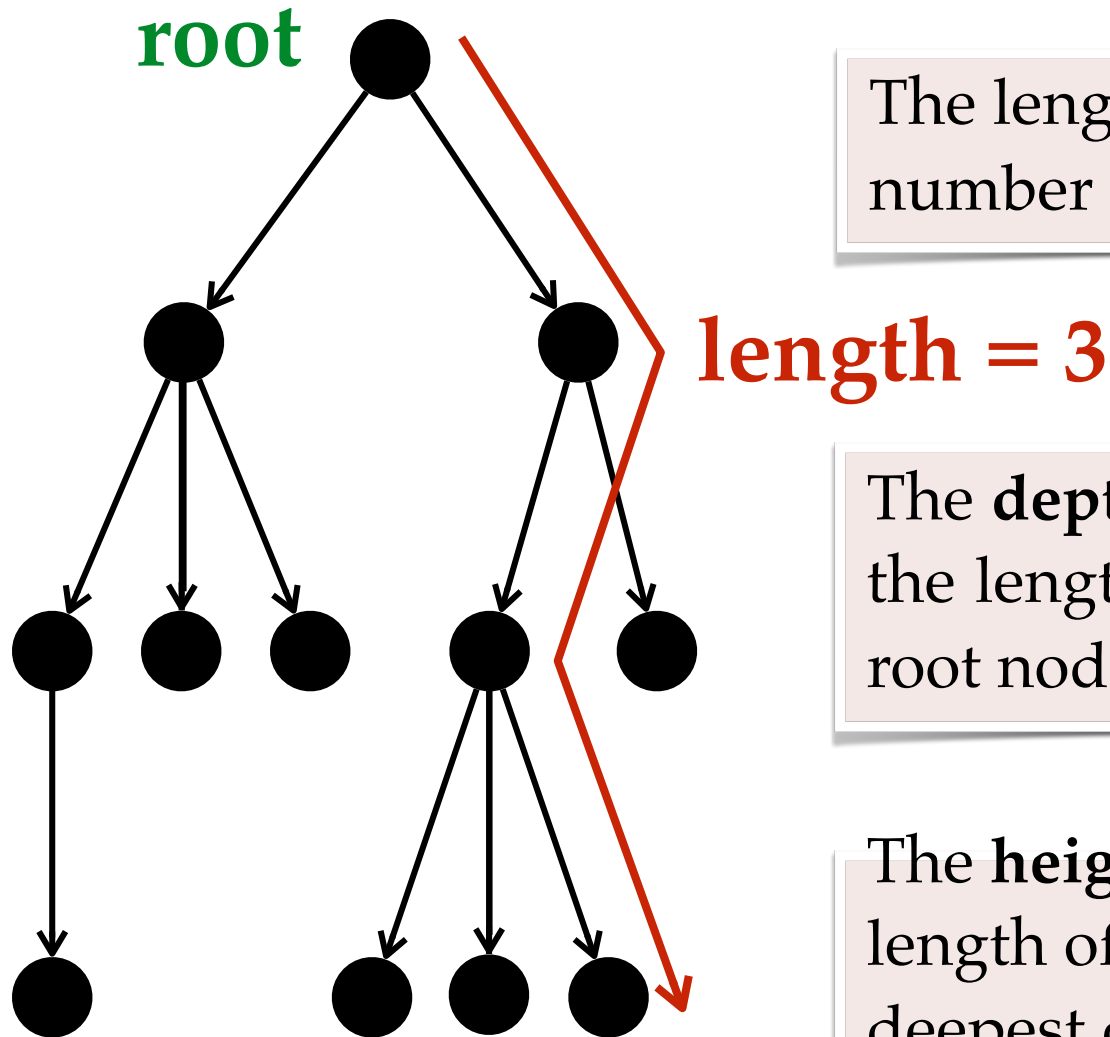


A **path** from node v_0 to v_n is a sequence of nodes $v_0, v_1, v_2, \dots, v_n$, where there is an edge from one node to the next

The **descendants** of a node v are all nodes reached by a path from node v to the leaf nodes

The **ancestors** of a node v are all nodes found on the path from the root to node v

Depth and Height

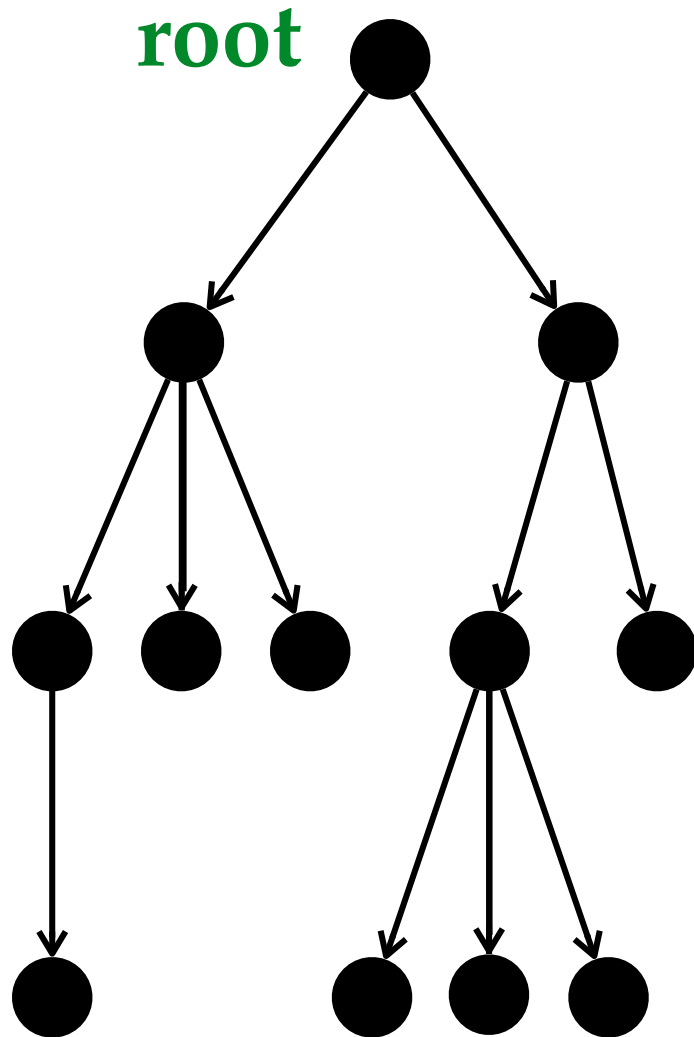


The length of a **path** is the number of edges in the path

The **depth** (level) of a node v is the length of the path from the root node to v

The **height** of a node v is the length of the path from v to its deepest descendant

Tree Properties



The **depth of the tree** is the depth of deepest node

The **height of the tree** is the height of the root