SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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23ITT101-PROGRAMMING IN C AND DATA STRUCTURES

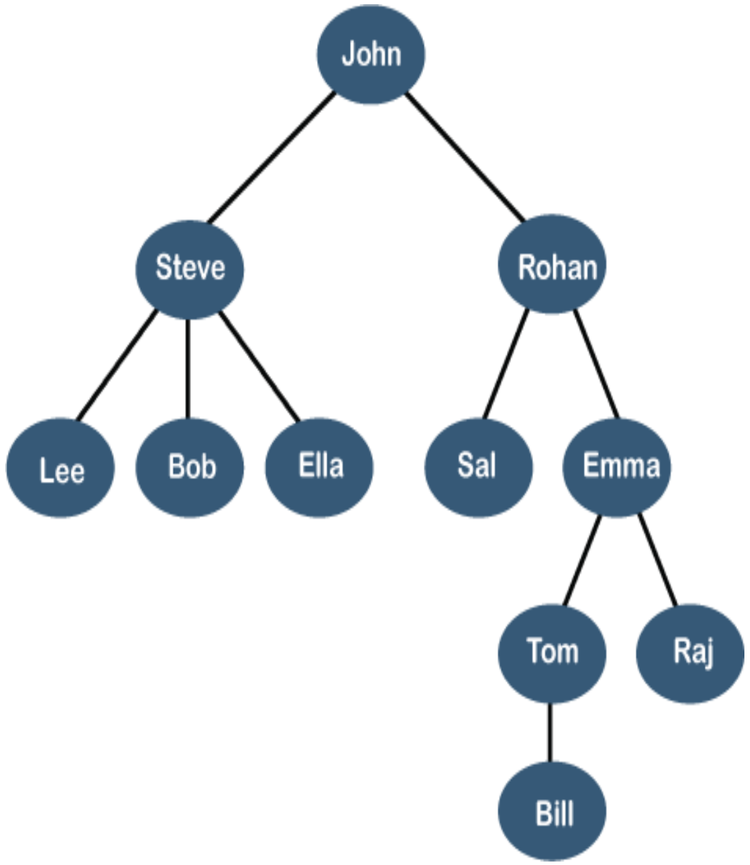
I YEAR - II SEM

UNIT 5 – Trees

TOPIC 1 – Trees

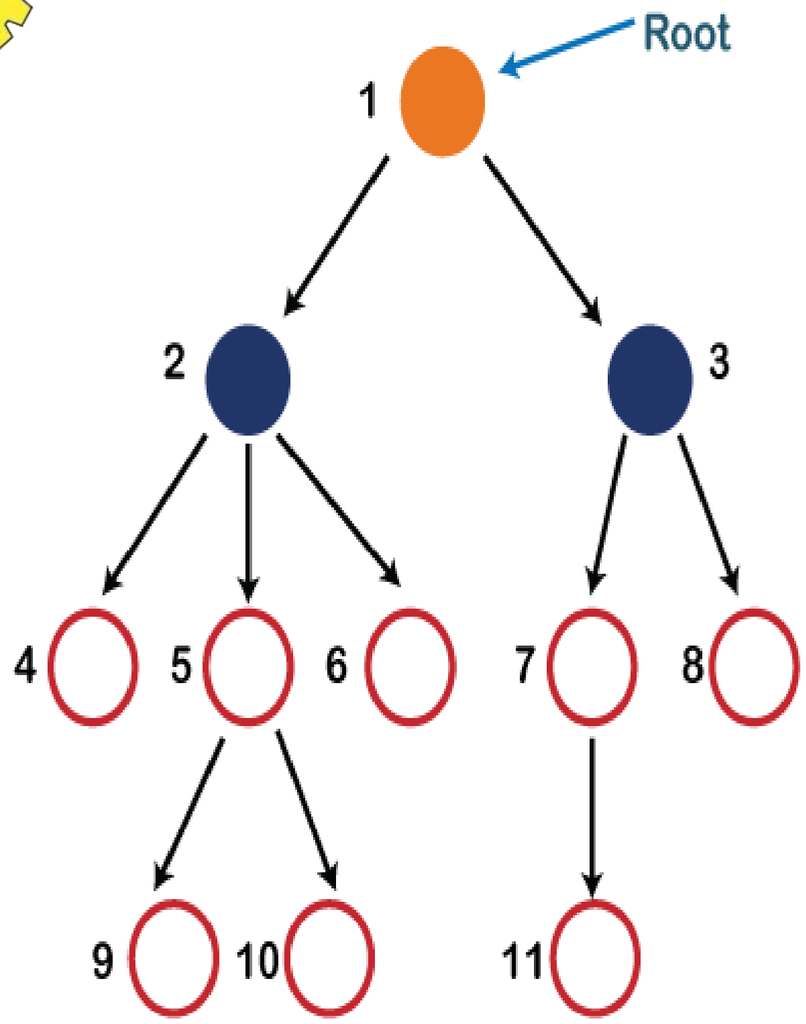
Trees

A tree is also one of the data structures that represent hierarchical data.



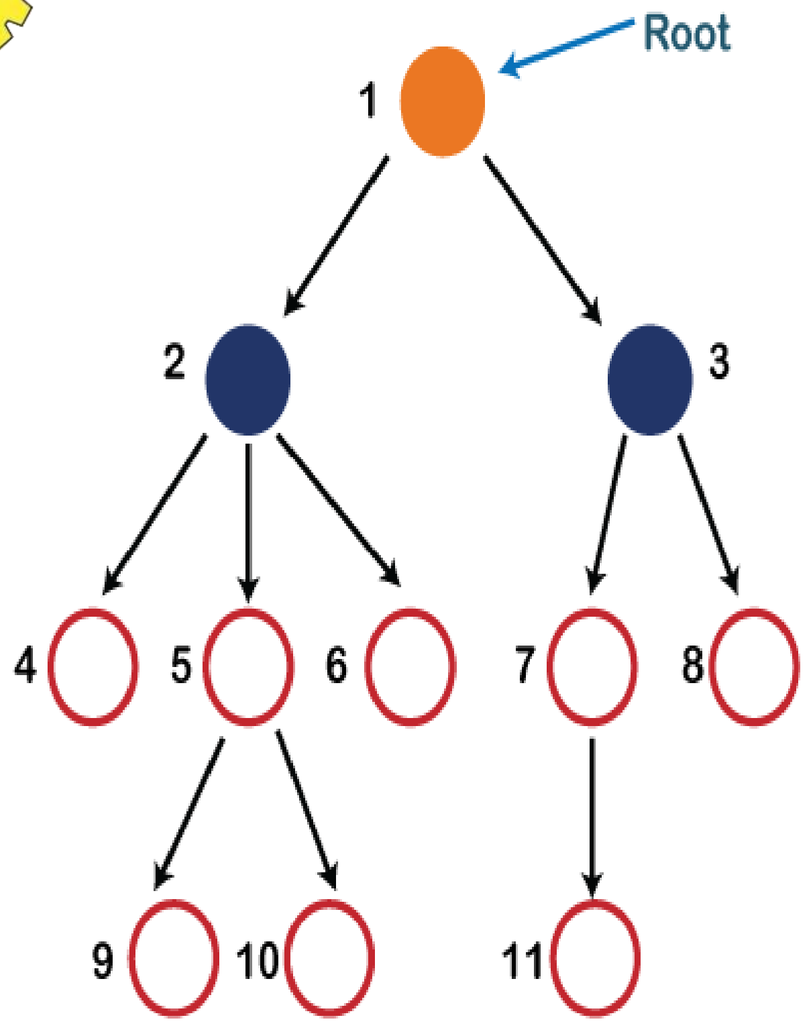
- john is the CEO of the company, and John has two direct reports named as Steve and Rohan.
- Steve has three direct reports named Lee, Bob, Ella where Steve is a manager.
- Emma has two direct reports named Tom and Raj. Tom has one direct report named Bill.
- This particular logical structure is known as a Tree. Its structure is similar to the real tree, so it is named a Tree.
- In this structure, the root is at the top, and its branches are moving in a downward direction.
- Therefore, we can say that the Tree data structure is an efficient way of storing the data in a hierarchical way.

Introduction to Trees



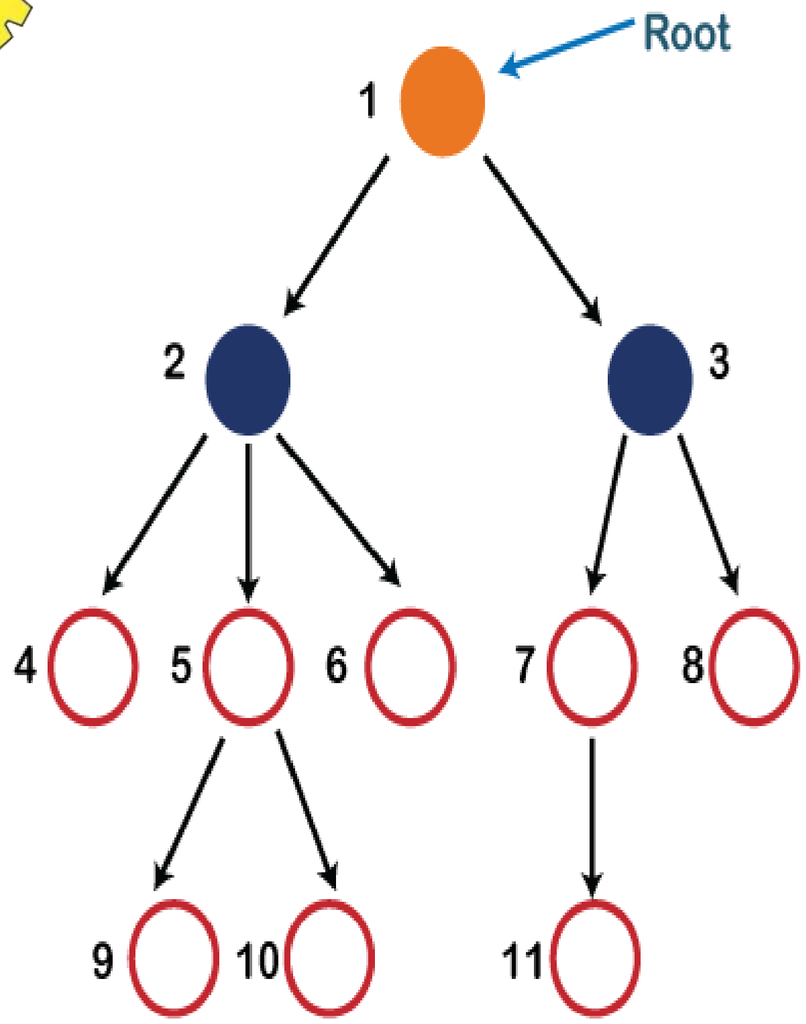
- **Root:** The root node is the topmost node in the tree hierarchy. In other words, the root node is the one that doesn't have any parent.
- In the structure, node numbered 1 is the root node of the tree. If a node is directly linked to some other node, it would be called a parent-child relationship.

Introduction to Trees



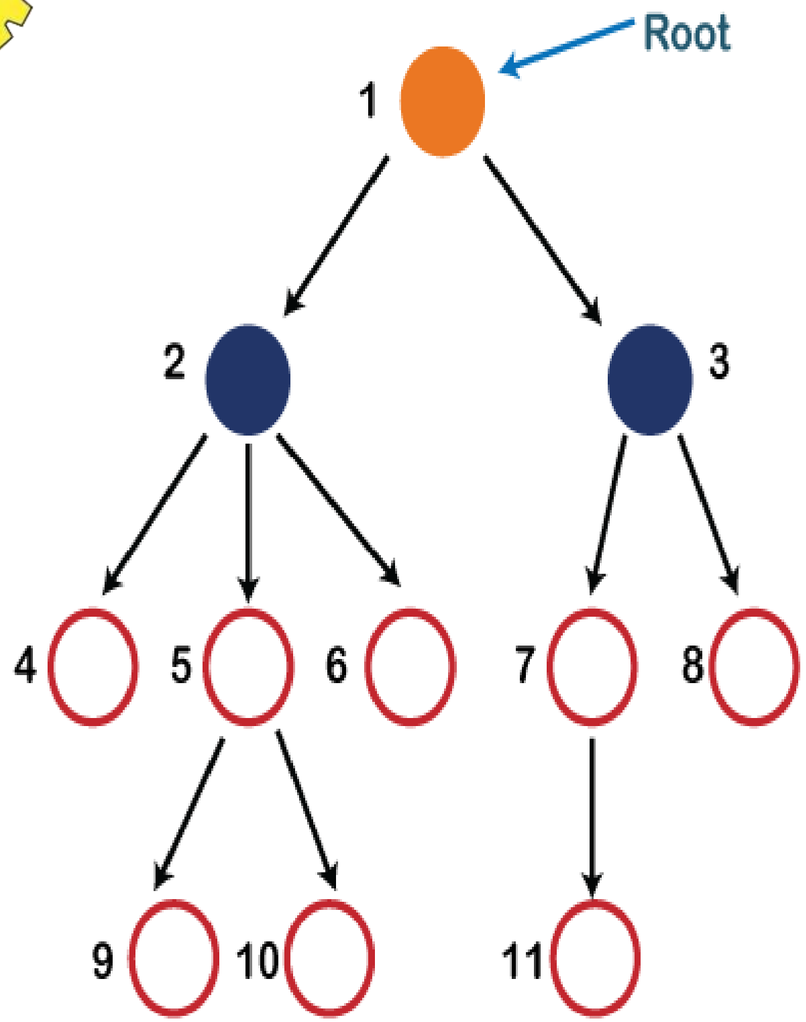
- **Child node**: If the node is a descendant of any node, then the node is known as a child node.
- **Parent:** If the node contains any sub-node, then that node is said to be the parent of that sub-node.
- **Sibling:** The nodes that have the same parent are known as siblings.
- **Internal nodes:** A node has atleast one child node known as an internal

Introduction to Trees



- **Leaf Node**:- The node of the tree, which doesn't have any child node, is called a leaf node.
- A leaf node is the bottom-most node of the tree.
- There can be any number of leaf nodes present in a general tree.
- Leaf nodes can also be called external nodes.

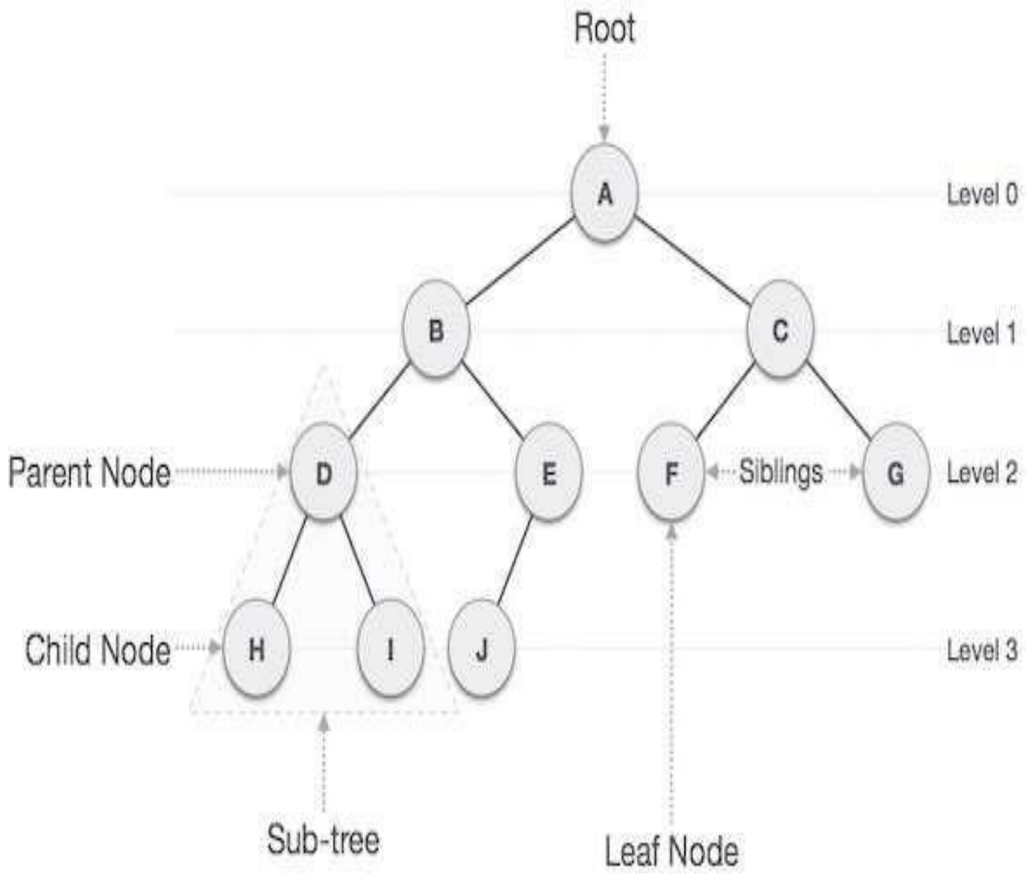
Introduction to Trees



- **Ancestor node**:- An ancestor of a node is any predecessor node on a path from the root to that node.
- The root node doesn't have any ancestors.
- In the tree shown in the image, nodes 1, 2, and 5 are the ancestors of node 10.

- **Descendant:** The immediate successor of the given node is known as a descendant of a node.
- In the above figure, 10 is the descendant of node 5.

Binary Trees



- Binary Tree is a special data structure used for data storage purposes.
- A binary tree has a special condition that each node can have a maximum of two children.
- A binary tree has the benefits of both an ordered array and a linked list as search is as quick as in a sorted array and insertion or deletion operation are as fast as in linked list.