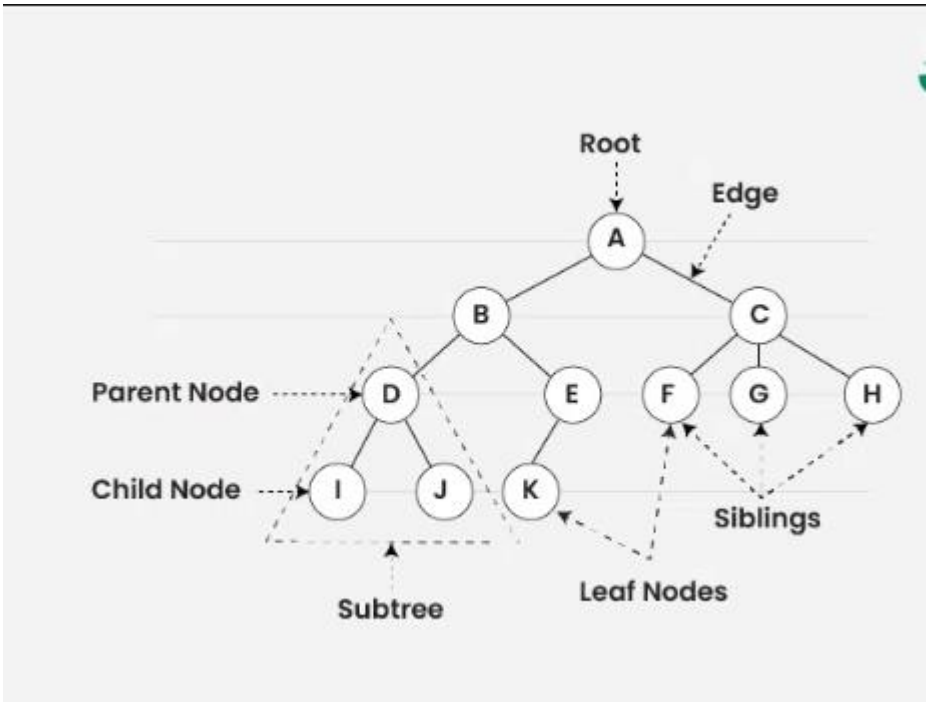
Trees

Tree data structure is a specialized data structure to store data in hierarchical manner. It is used to organize and store data to be used more effectively.



Basic Terminologies In Tree Data Structure:

- Parent Node: The node which is a predecessor of a node is called the parent node of that node. {B} is the parent node of {D, E}.
- Child Node: The node which is the immediate successor of a node is called the child node of that node. Examples: {D, E} are the child nodes of {B}.
- Root Node: The topmost node of a tree or the node which does not have any parent node is called the root node. {A} is the root node of the tree. A non-empty tree must contain exactly one root node and exactly one path from the root to all other nodes of the tree.

- Leaf Node or External Node: The nodes which do not have any child nodes are called leaf nodes. {K, L, M, N, O, P, G} are the leaf nodes of the tree.
- Ancestor of a Node: Any predecessor nodes on the path of the root to that node are called Ancestors of that node. {A,B} are the ancestor nodes of the node {E}
- Sibling: Children of the same parent node are called siblings. {D,E} are called siblings.
- Level of a node: The count of edges on the path from the root node to that node. The root node has level 0.
- Internal node: A node with at least one child is called Internal Node.
- Neighbour of a Node: Parent or child nodes of that node are called neighbors of that node.
- Subtree: Any node of the tree along with its descendant.

Properties of Tree Data Structure:

- Number of edges: An edge can be defined as the connection between two nodes. If a tree has N nodes then it will have (N-1) edges. There is only one path from each node to any other node of the tree.
- Depth of a node: The depth of a node is defined as the length of the path from the root to that node. Each edge adds 1 unit of length to the path. So, it can also be defined as the number of edges in the path from the root of the tree to the node.
- Height of a node: The height of a node can be defined as the length of the longest path from the node to a leaf node of the tree.
- Height of the Tree: The height of a tree is the length of the longest path from the root of the tree to a leaf node of the tree.
- Degree of a Node: The total count of subtrees attached to that node is called the degree of the node. The degree of a leaf node must be 0. The degree of a tree is the maximum degree of a node among all the nodes in the tree.