TREE

INTRODUCTION TO TREE AND IT’S TERMINOLOGIES

TREE DATA STRUCTURE

A tree is a nonlinear hierarchical data structure that consists of nodes connected by edges.

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TOPIC COVERED

- Tree Introduction
- Important Terminologies
    - Root
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    - Child Node
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    - Leaves
    - Level Number
    - Height of the Tree
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    - Generation
    - Branch
    - Internal and External nodes/vertices
    - Predecessor
    - Successor

TREE

DEFINITION:

Any connected graph with n vertices and n-1 edges and they don't contain circuit.

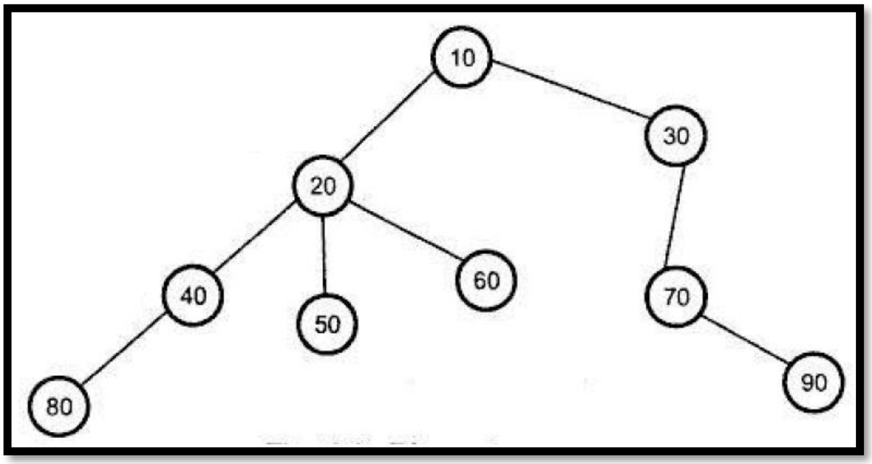
OR

A graph is a tree if and only if there is a unique path between any two of its vertices.

IMP Point:

- All the Trees are the Graph, but not all the graph are trees.
- A tree is a hierarchical data structure and there is a special node called the root of the tree.

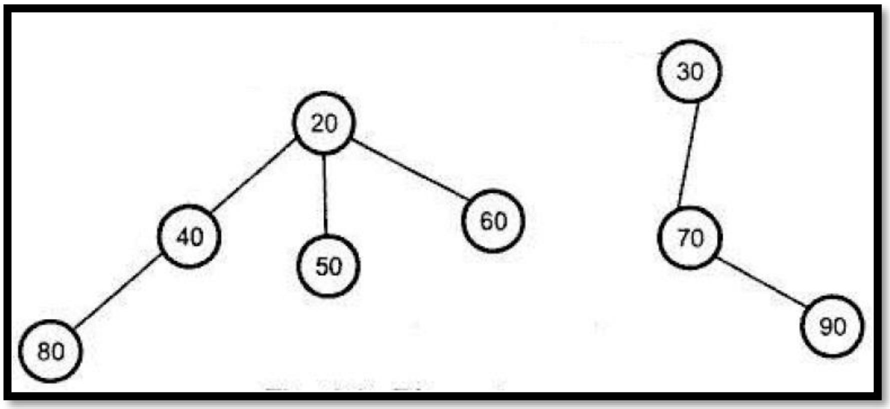
Example: Here 10 is the Root Node.



SOME SPECIAL TREE.

1. **Trivial Tree/ Degenerate Tree:** A graph that consist a single vertex.
2. **Empty Tree:** Doesn't have any vertices or edges.
3. **Forest Tree:** Forest is a collection of disjoint trees. If we delete the root node of tree then we get forest.

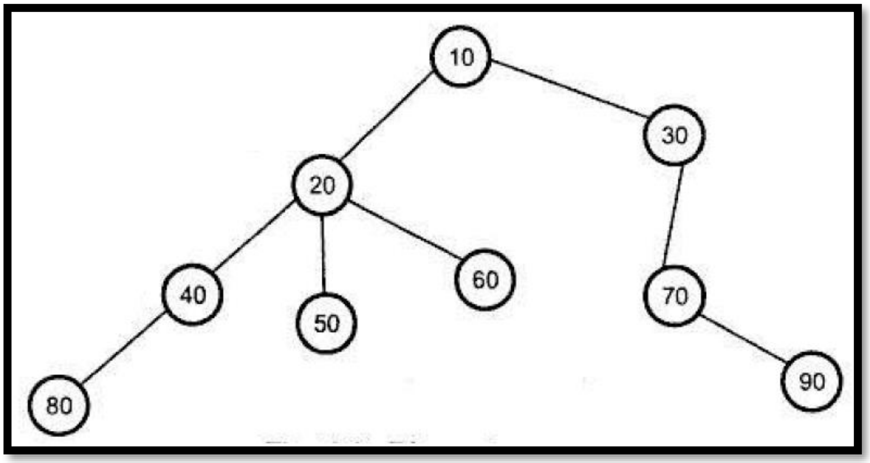
Example:



TERMINLOGIES

ROOT:

Root is a unique in the tree to which further subtrees are attached.

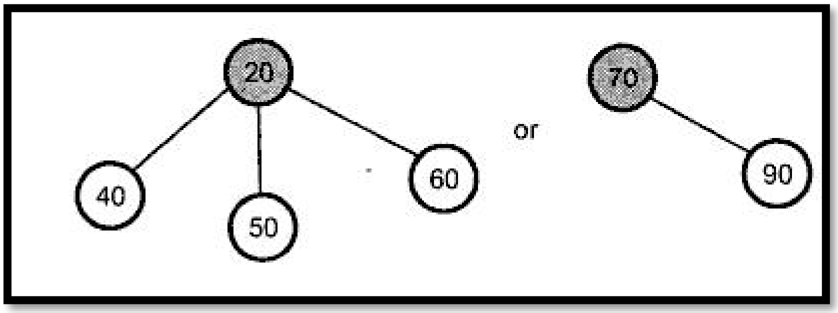


Here 10 is the root node of given tree.

PARENT NODE:

The node having further sub- branches is called parent node.

Example:

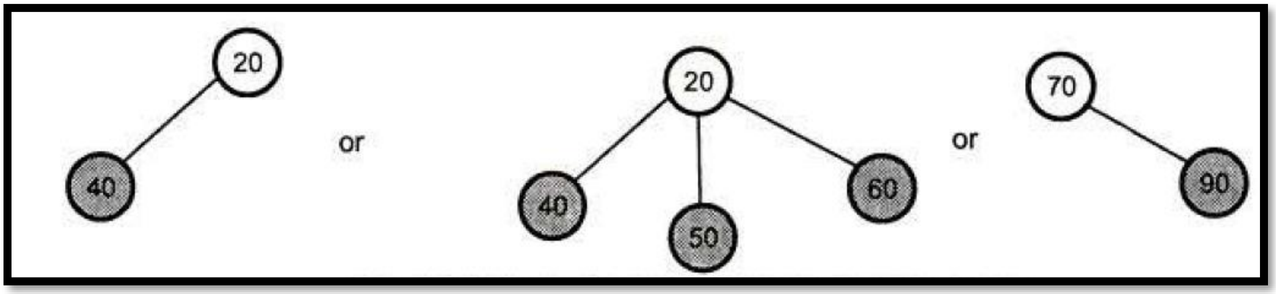


20 is Parent node of 40, 50 and 60.

70 is Parent node of 90.

CHILD NODES:

The child nodes in below given tree are mark as shown below:



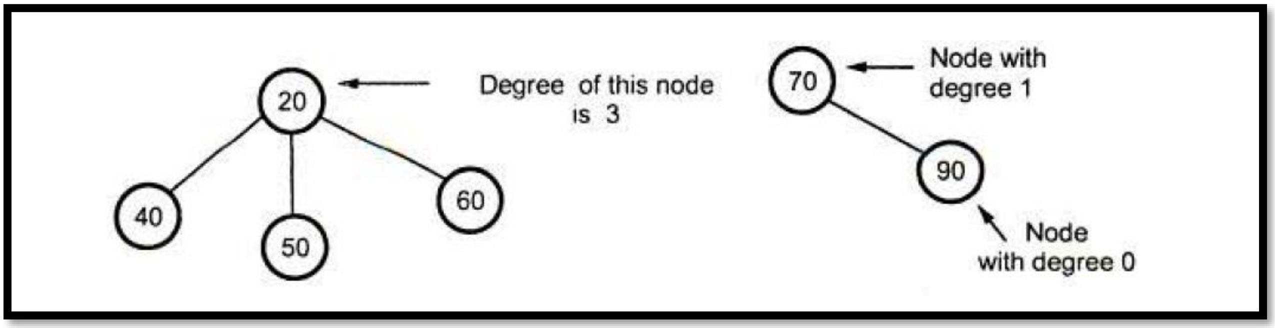
40 is Child Node of 20.

40, 50 and 60 are Child node of 20.

90 is child node of 70.

DEGREE OF THE NODE:

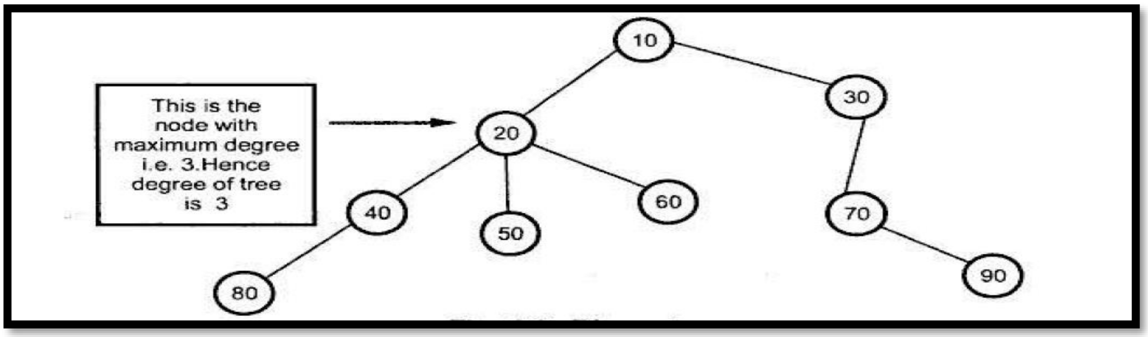
The number of subtrees of a node is called its degree.



DEGREE OF TREE:

The Degree of the tree is maximum degree of the nodes in the tree.

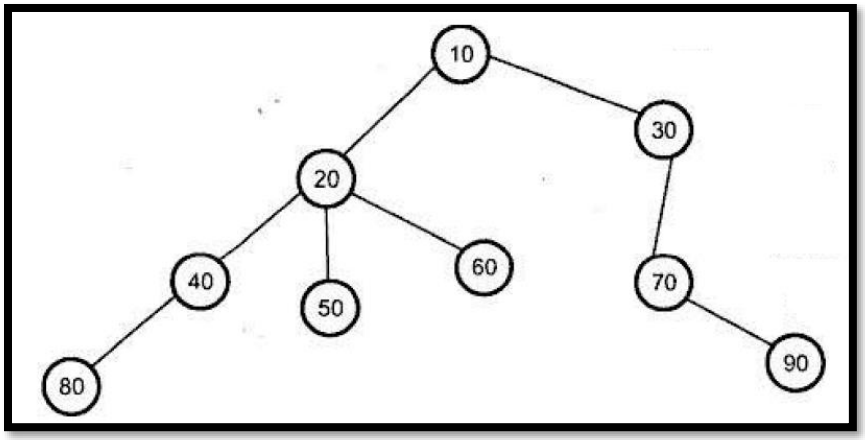
For Example


This is the node with maximum degree i.e. 3.Hence degree of tree is 3
10
20
30
40
50
60
70
80
90

LEAVES:

These are the terminal nodes of the trees. Or A node with degree zero is called leaf.

For Example:

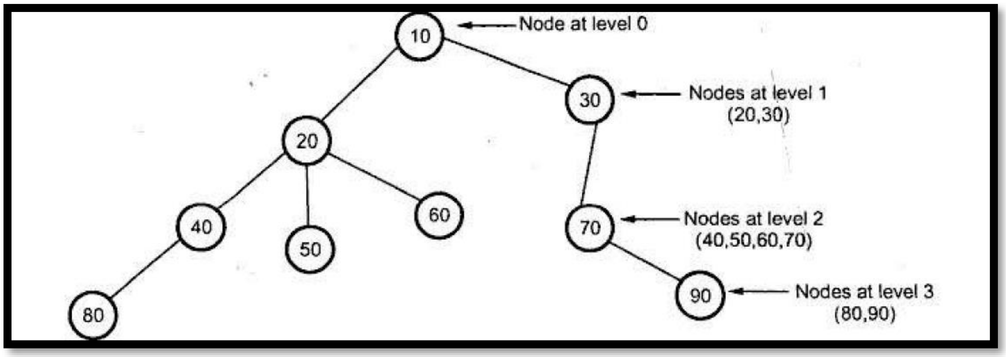


Here 80,50,60,90, are the Leaf nodes of the given tree.

LEVEL NUMBER:

Each node is assigned a level number. The root node of the tree is assigned a level number 0. Every other node assigns a number which is 1 more than the level number of its parent.

Example:



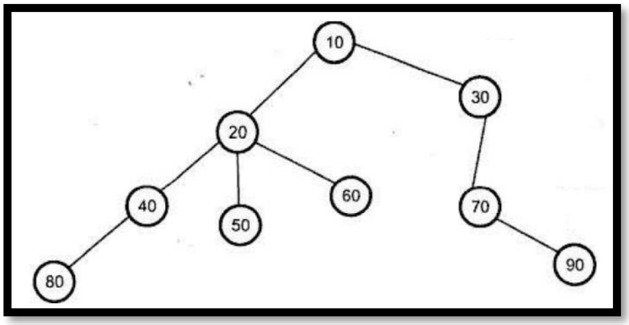
HEIGHT OF THE TREE:

The maximum level is the height of the tree. Sometime height of the tree is also called depth of tree. In above figure no. 6 the height of the tree is 3.

ANCESTORS:

The ancestors of a node are all the nodes along the path from the root to that node.

Example:

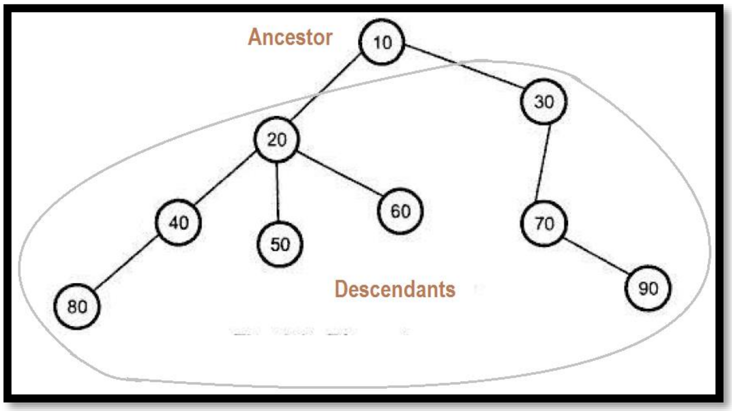


Here 10, 20,40 are the ancestor of 80 But 50 and 60 are not. Same 10,30,70 are the ancestor of 90.

DESCENDANTS:

The descendants of a node are all the nodes along the path from node to terminal node.

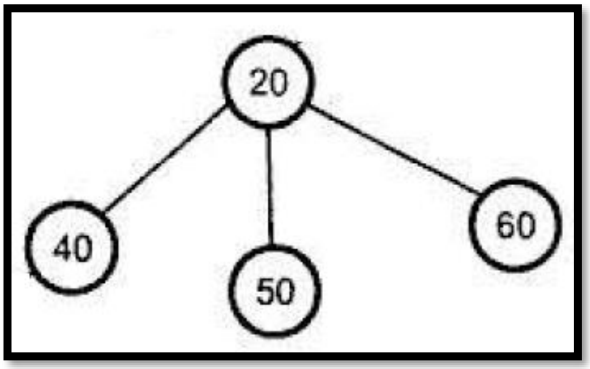
Example:



SIBLING:

The nodes with common parent are called sibling or brothers.

Example:



Here the nodes 40, 50, 60 are sibling of each other.

GENERATION:

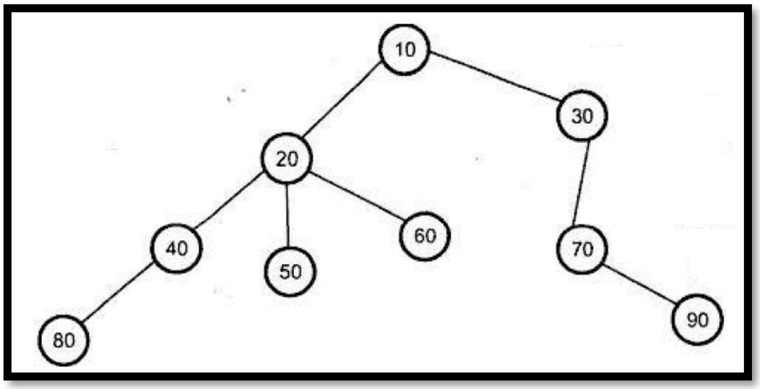
Nodes with the same level number are said to belong to the same generation.

Path: Sequence of consecutive edges is called path.

BRANCH:

Path ending in a leaf is called branch.

For Example:



10, 30, 70, 90 is a Branch.

10, 20, 40, 80 also a Branch.

10, 20, 50 is branch.

10, 20, 60 is Branch.

INTERNAL AND EXTERNAL NODES/ VERTICES:

Leaf nodes means a node having no child node. A leaf node is not having further links, we call leaf nodes are called external node. And non-leaf nodes are called internal nodes.

Here 80,50,60,90 are the external nodes and 10,20,30,40,70, are the internal nodes.

Note: Vertices that have children are called internal vertices.

PREDECESSOR:

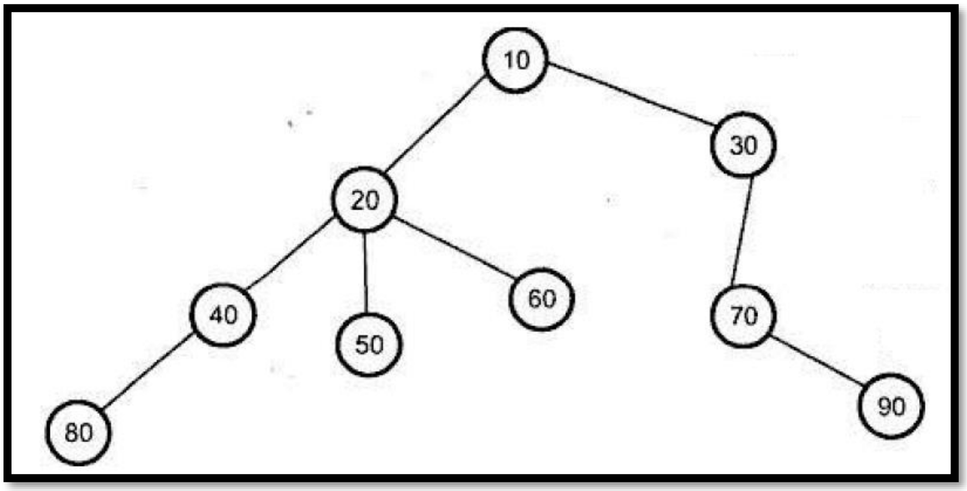
While displaying the tree, if some particular node occurs previous to some other node then that node is called predecessor of the other node.

For example: While displaying the tree below if we read node 20 first and then if we read node 40, then 20 is a predecessor of 40.

SUCCESSOR

Successor is a node which occurs next to some node.

For example: While displaying below tree if we read node 60 after reading node 20 then 60 is called successor of 20.



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