

DSA through C++

Tree



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Agenda

- ① Tree
- ② Real world Analogy
- ③ Degree, leaf, parent-child
- ④ Siblings, Ancestors and descendants
- ⑤ Level number, height, Generation

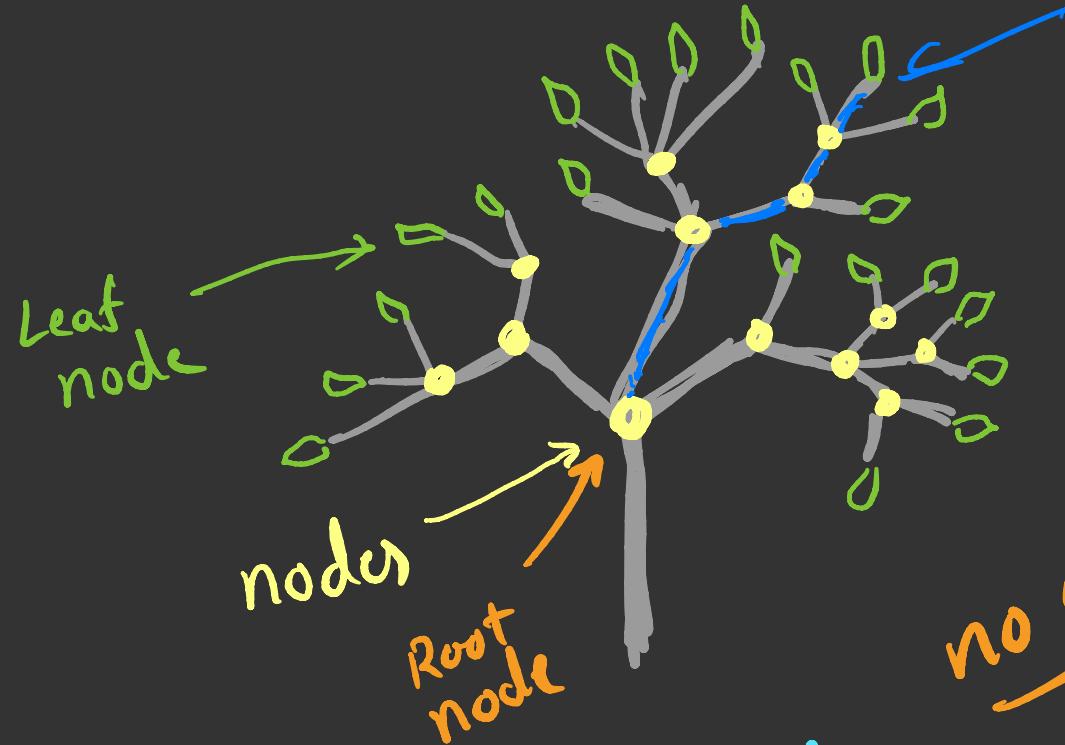
Tree

A tree is defined as a finite set of one or more data items (nodes), such that :

There is a special node called the root node of the tree.

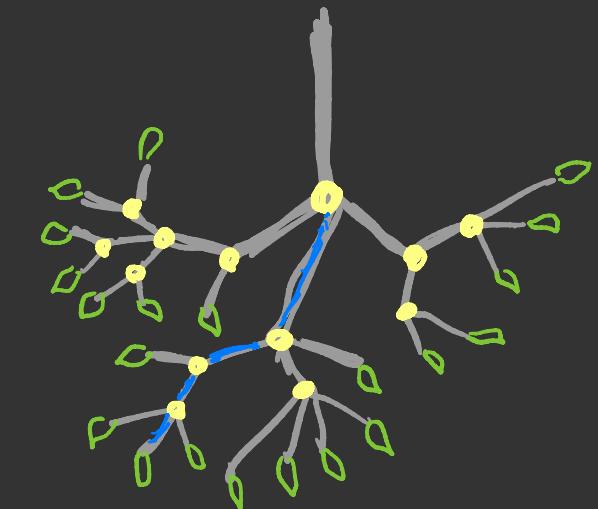
The remaining nodes are partitioned into $n \geq 0$ disjoint subsets, each of which is itself a tree, and they are called subtrees.

What is a Tree in Real world?



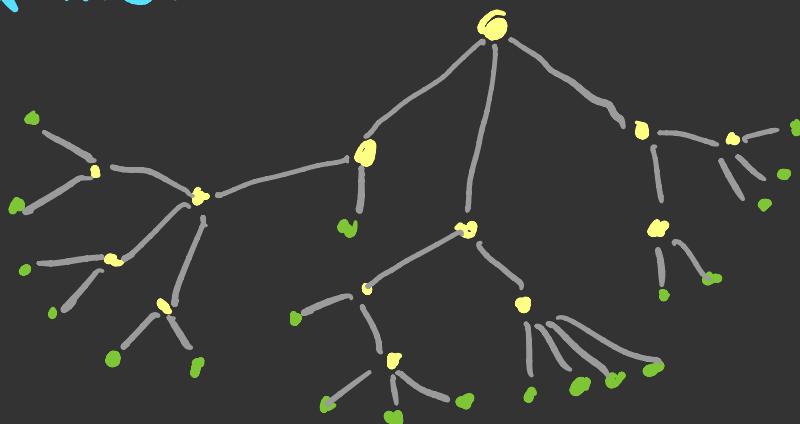
Branch (= path which ends at leaf)

no cycle in tree



Starting node

Tree is a hierarchical data structure

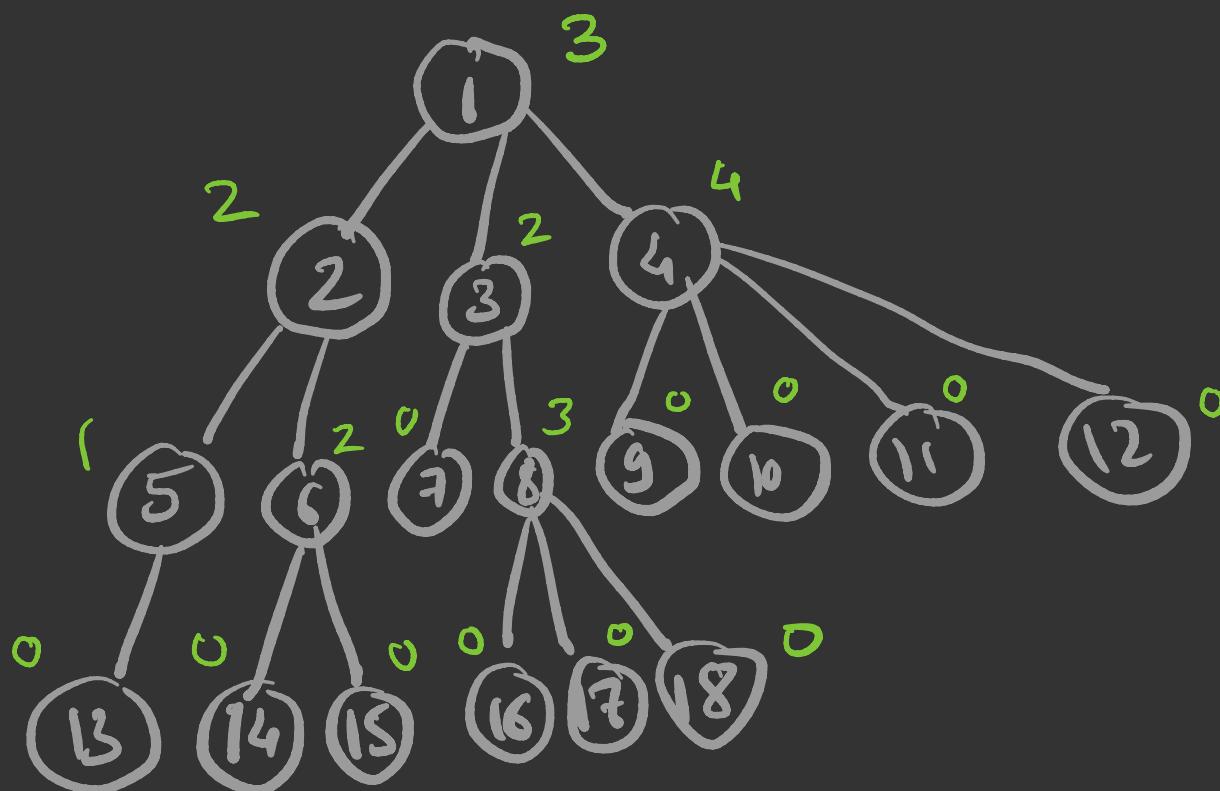


Linked List

A tree is a non-linear data structure, which is used to represent hierarchical relationship existing among several data items.

Degree

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



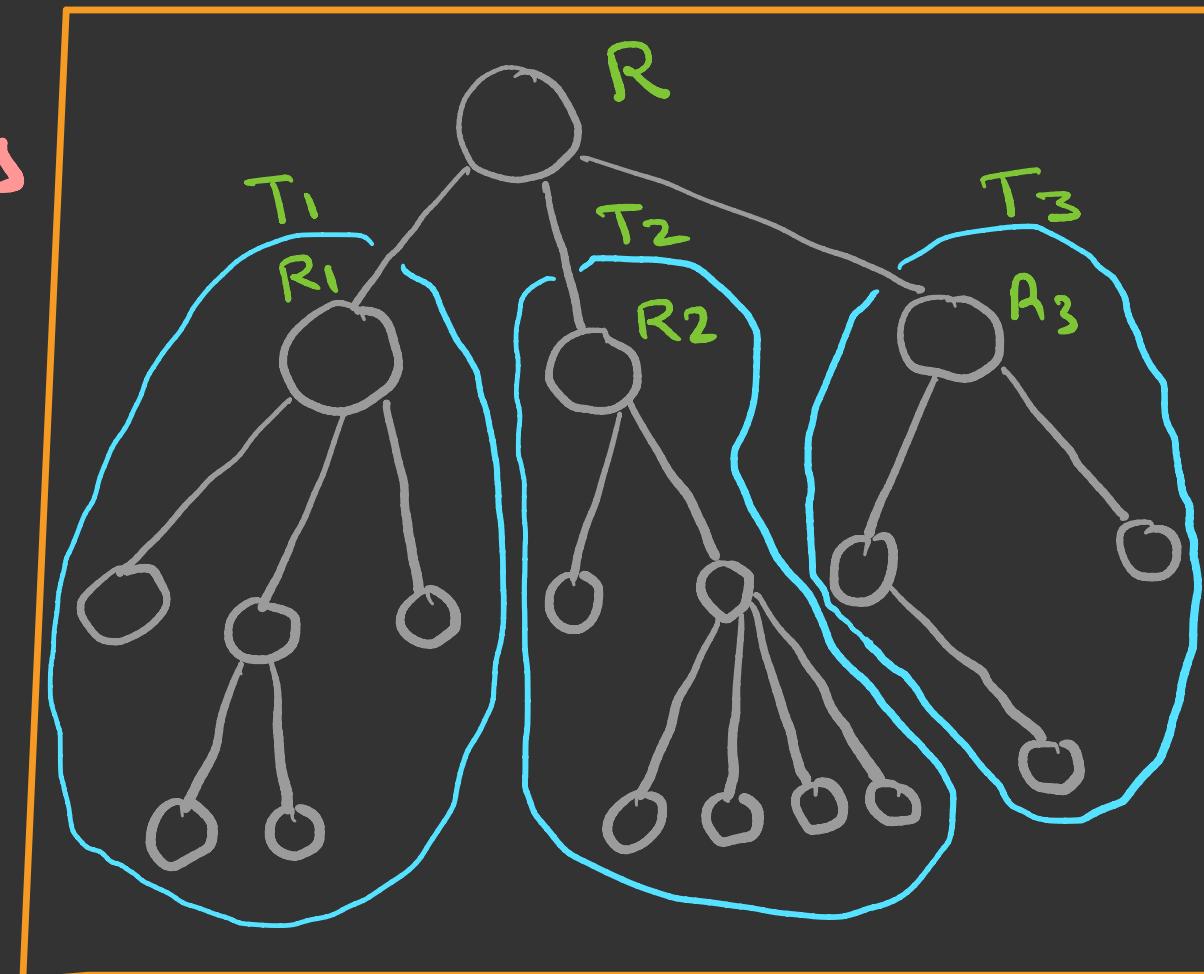
Leaf node

A node with degree zero is called leaf.

The leaf nodes are also called terminal nodes.

Parent - Children

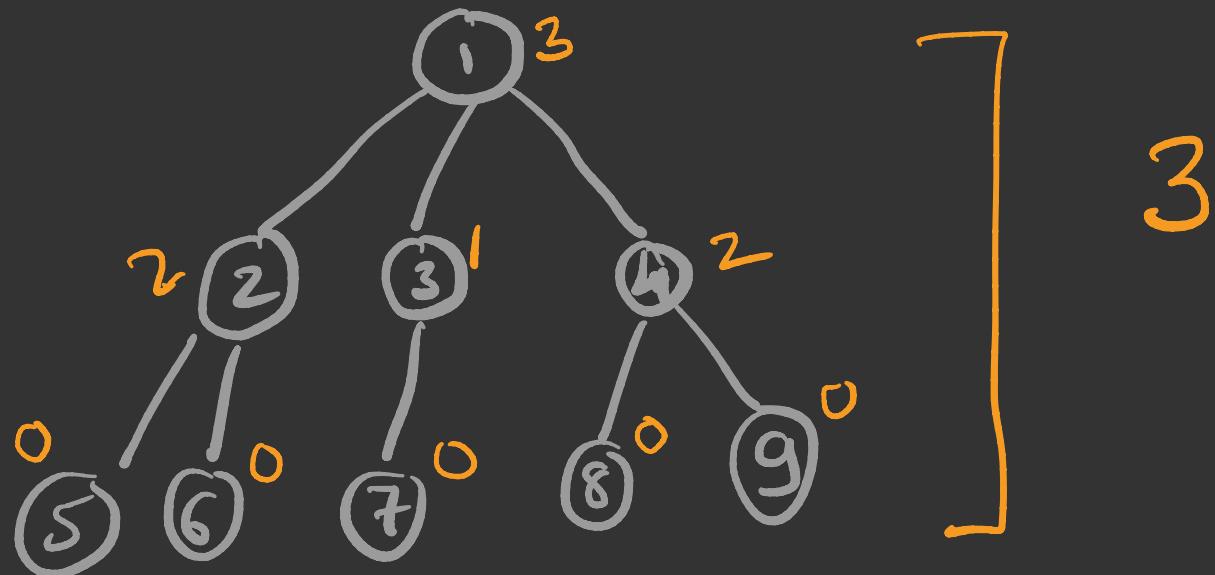
If R is a root node and its subtrees are T_1, T_2, T_3 and root of the subtrees are R_1, R_2, R_3 , then R_1, R_2, R_3 are called children of R and R is called parent of R_1, R_2, R_3



Siblings & Degree of tree

Children of the same parent are called *Siblings*

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



Ancestors and Descendants

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

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

Level Number

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

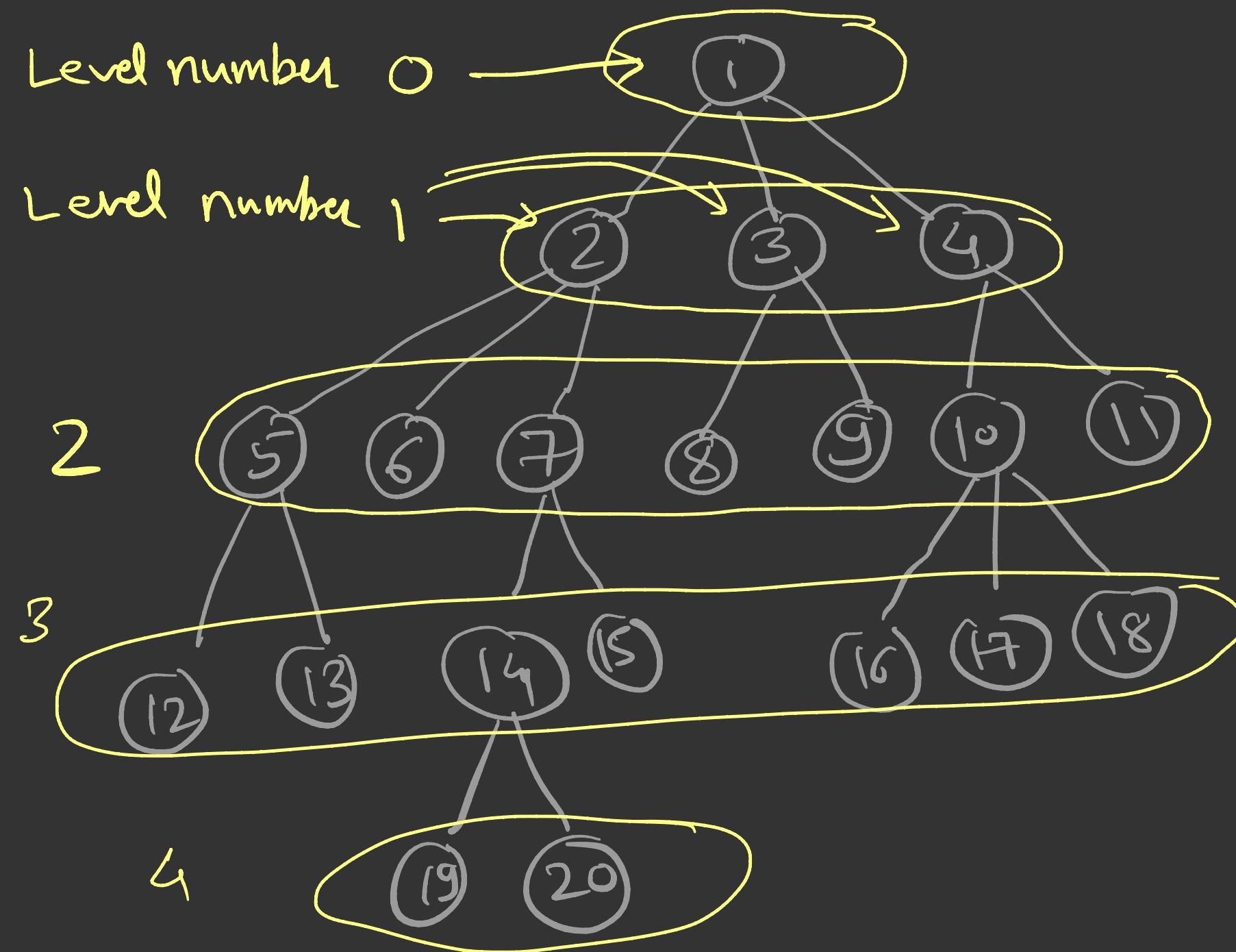
Level number 0

Level number 1

2

3

4



Generation

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

Height or Depth

- The height or depth of a tree is the maximum number of nodes in a branch
- A line drawn from a node to its children is called an edge.
- Sequence of consecutive edges is called path
- Path ending in a leaf is called a branch.

