

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

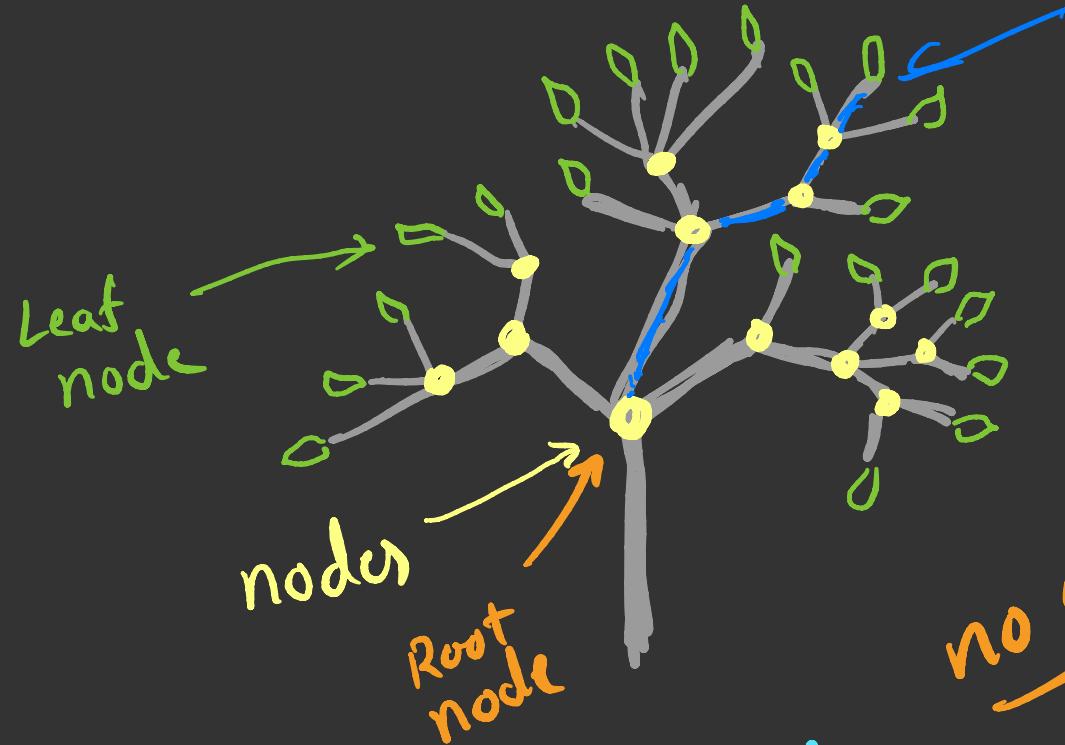
Tree

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.

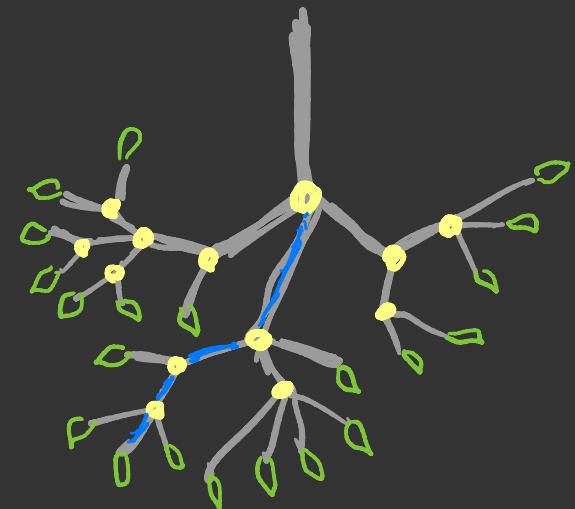
The remaining nodes are partitioned into $n \geq 0$ disjoint subsets, each of which is itself a tree, and they are called subtrees.

What is a Tree in Real world?



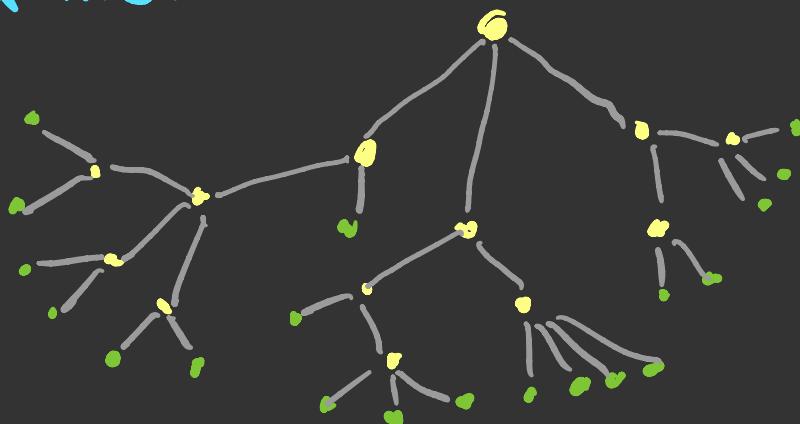
no cycle in tree

Branch (= path which ends at leaf)



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.



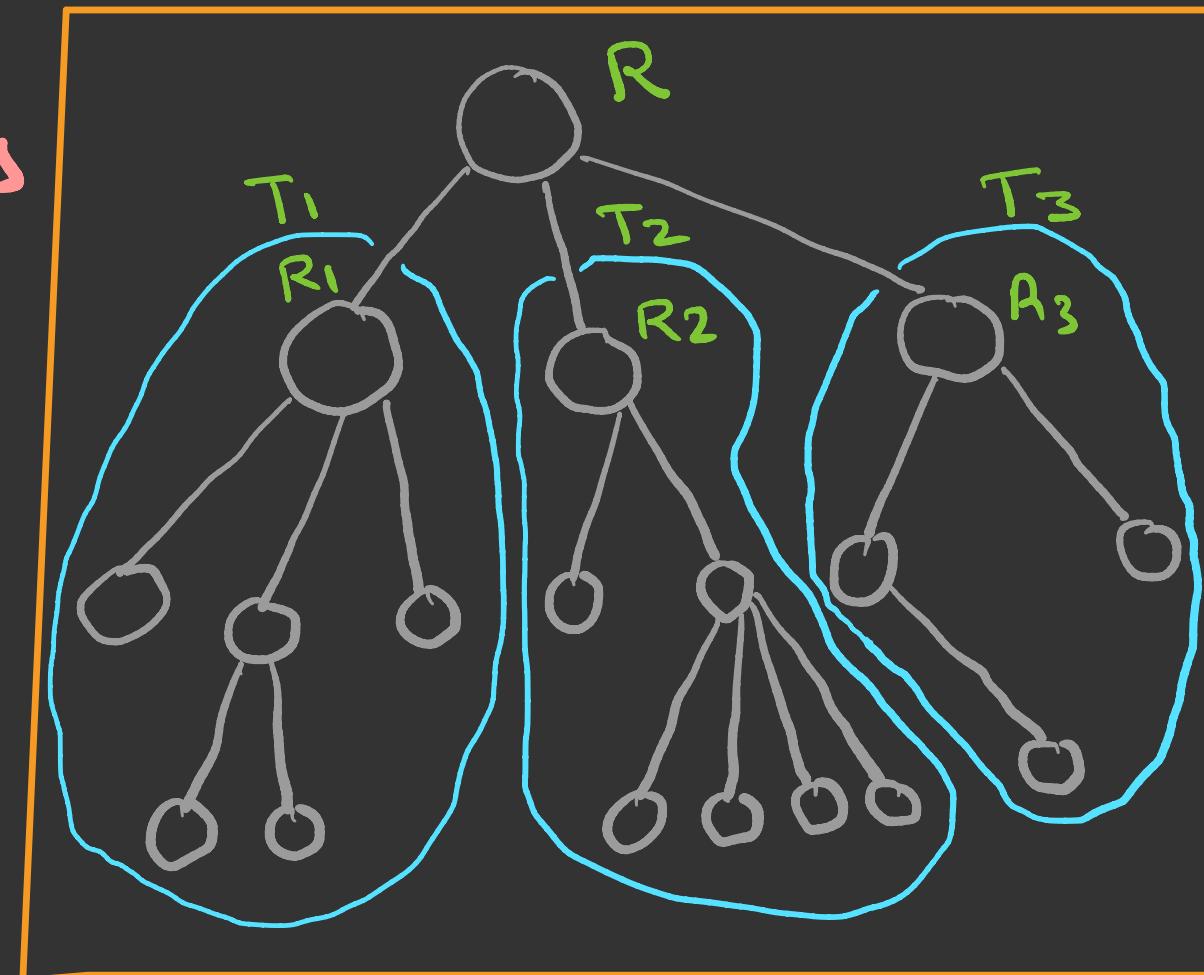
Leaf node

A node with degree zero is called leaf.

The leaf nodes are also called terminal nodes.

Parent - Children

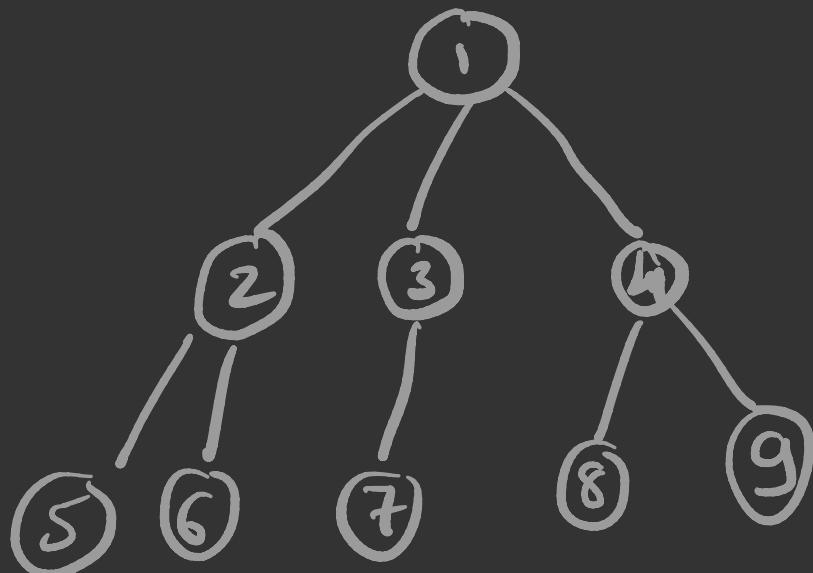
If R is a root node and its subtrees are T_1, T_2, T_3 and root of the subtrees are R_1, R_2, R_3 , then R_1, R_2, R_3 are called children of R and R is called parent of R_1, R_2, R_3



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.



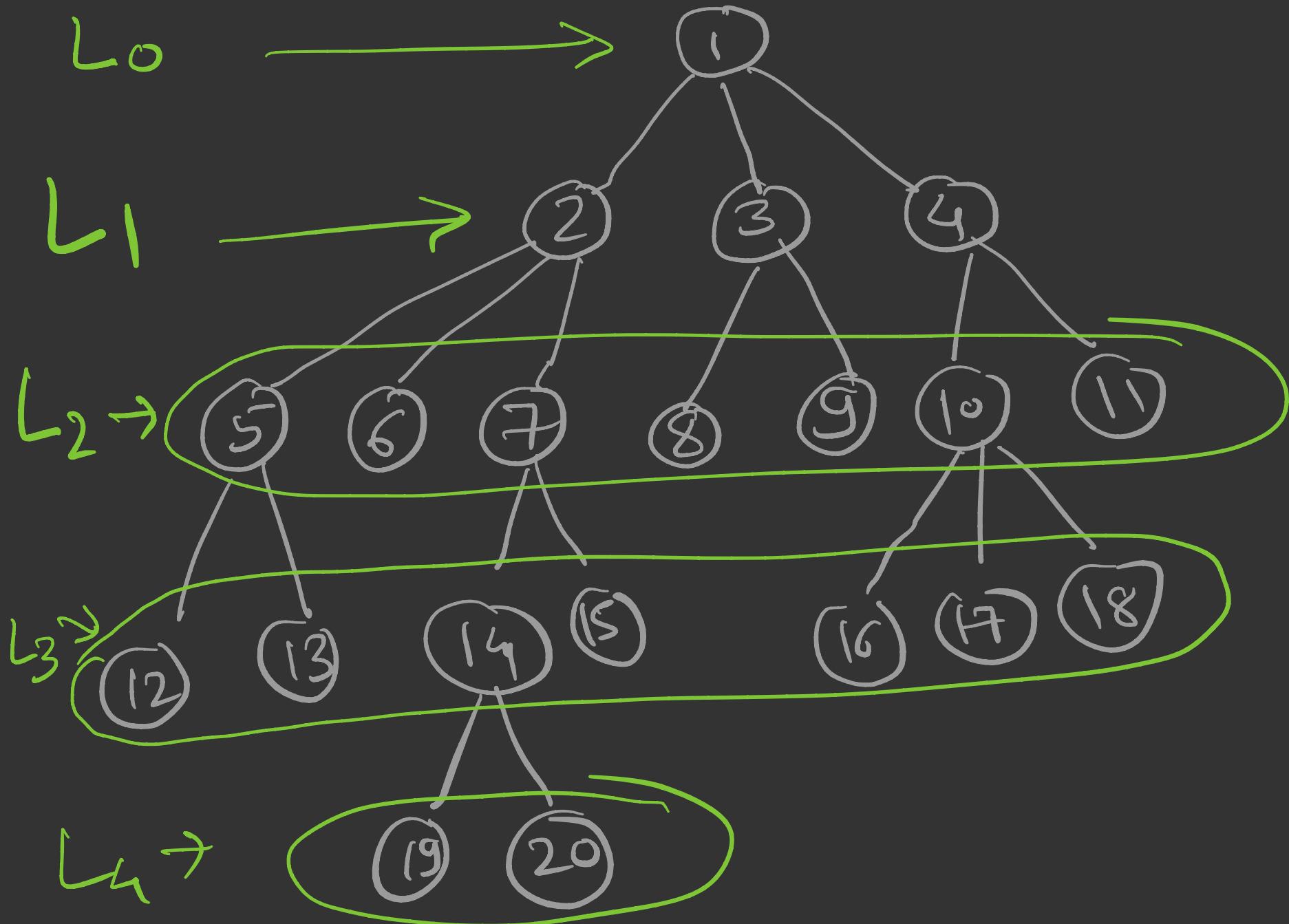
Ancestors and Descendants

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.



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.

