DSA through C++

Introduction to Tree

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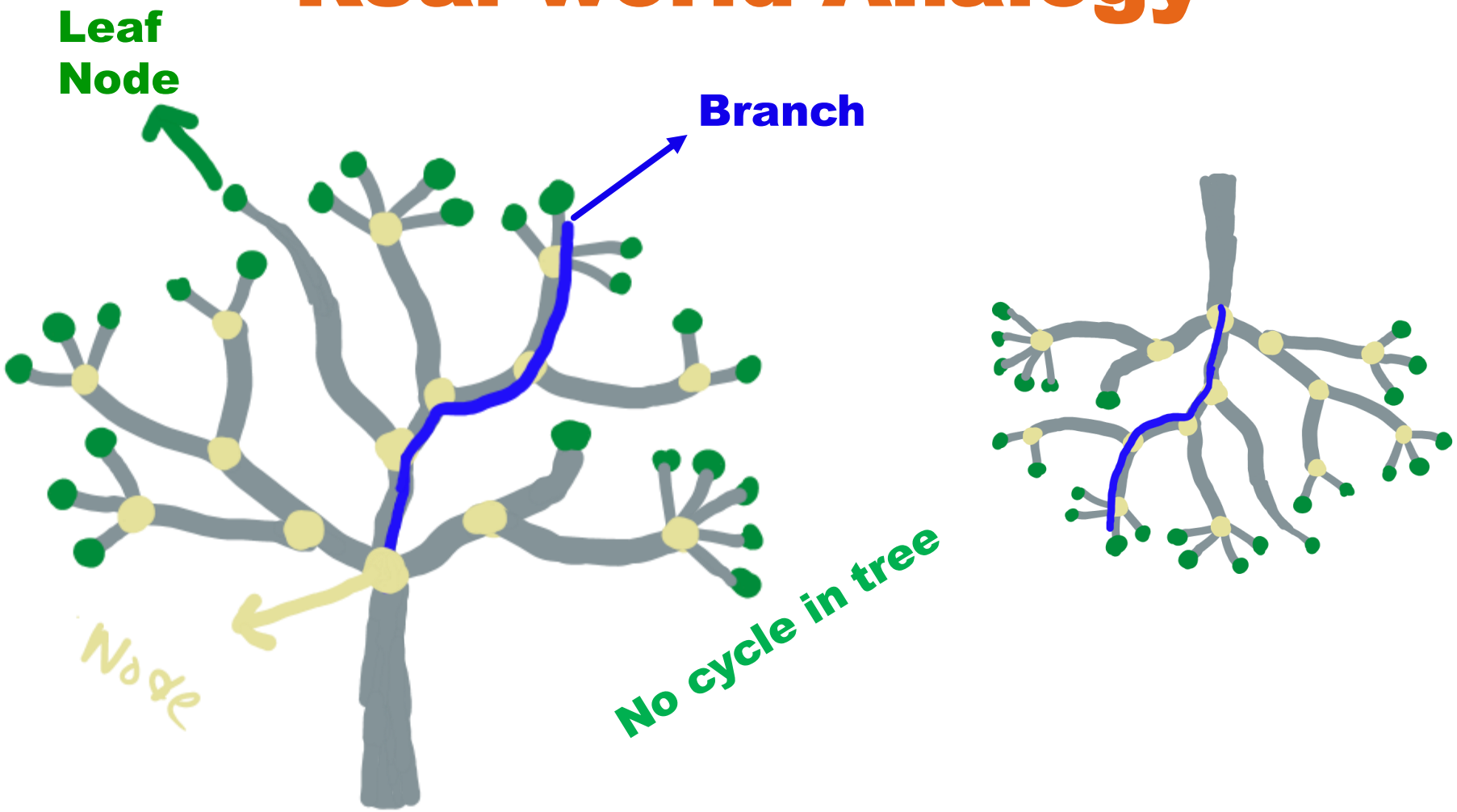
Agenda

- Tree
- Real world Analogy
- Degree, leaf, parent-child
- Siblings
- Ancestors and descendants
- 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>=0 disjoint subsets, each of which is itself a tree, and they are called subtrees.

Real world Analogy



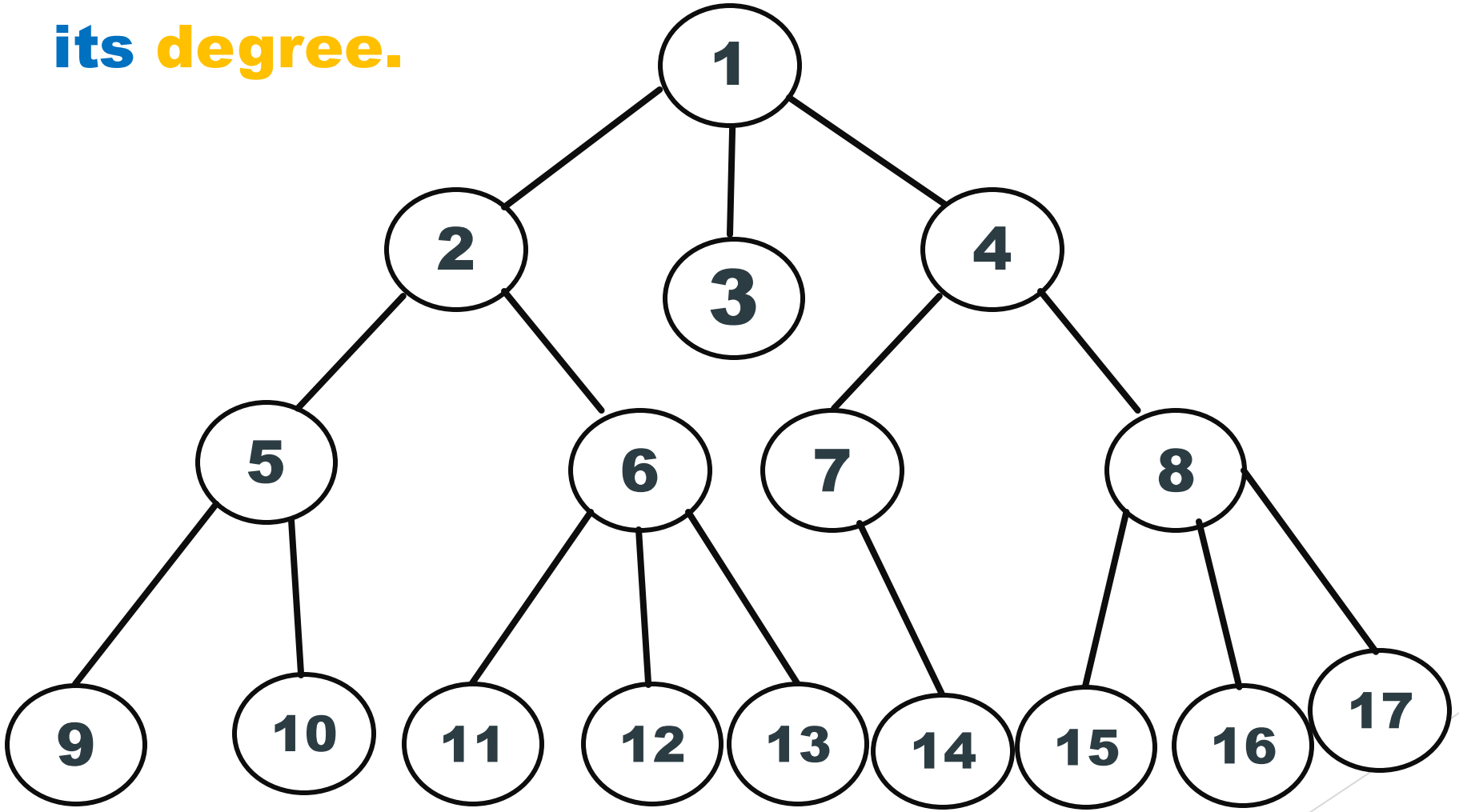
No cycle in tree

Linked list

- Tree is a hierarchical data structure

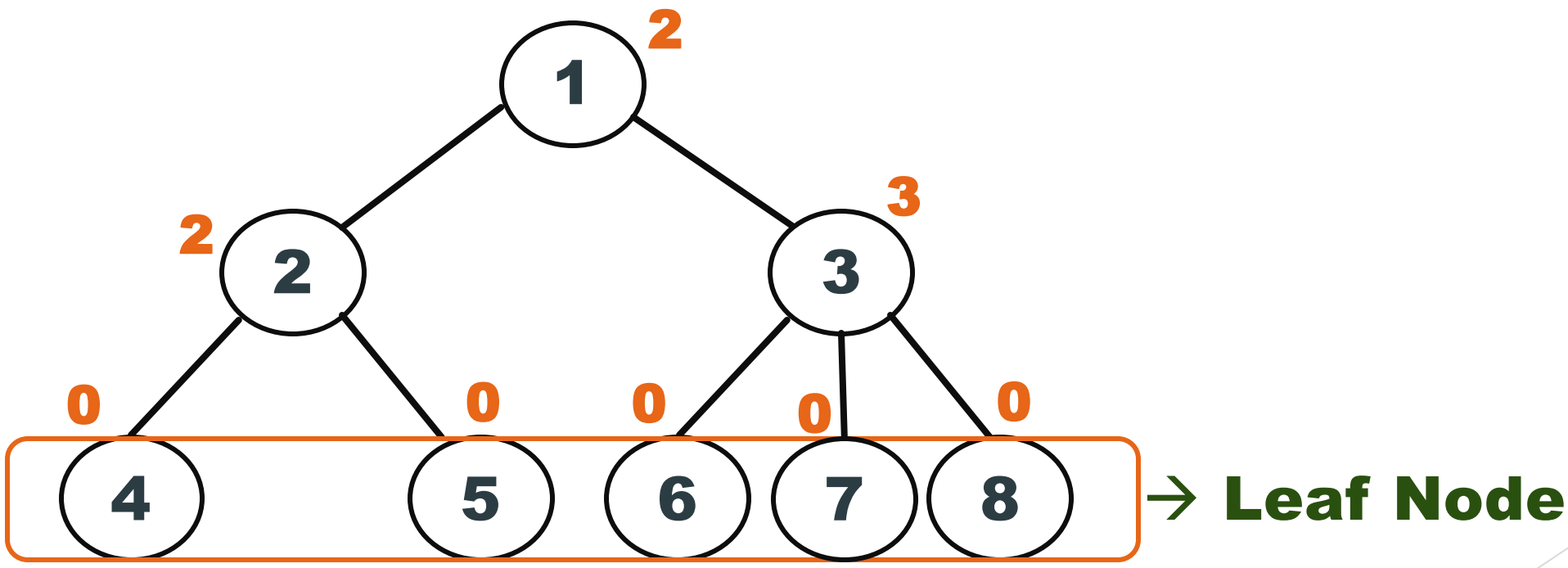
What is Degree ?

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

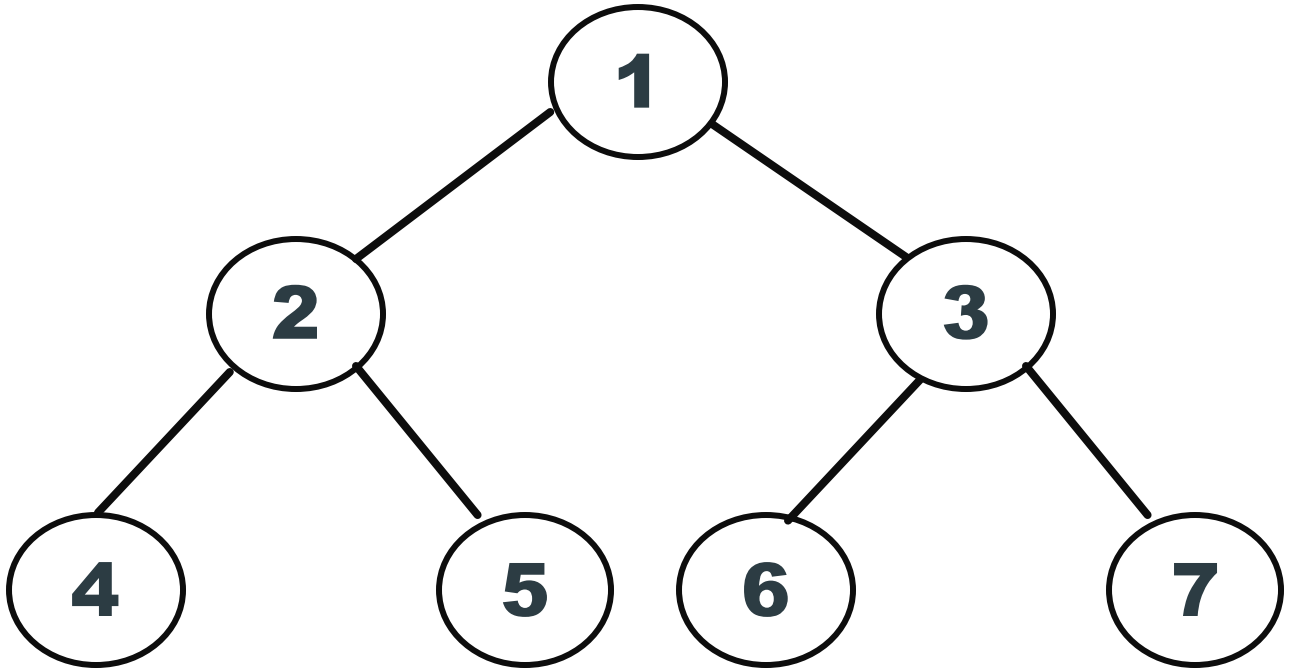


Leaf Node

- A node with degree zero is called Leaf Node.
- The leaf nodes are also called terminal nodes

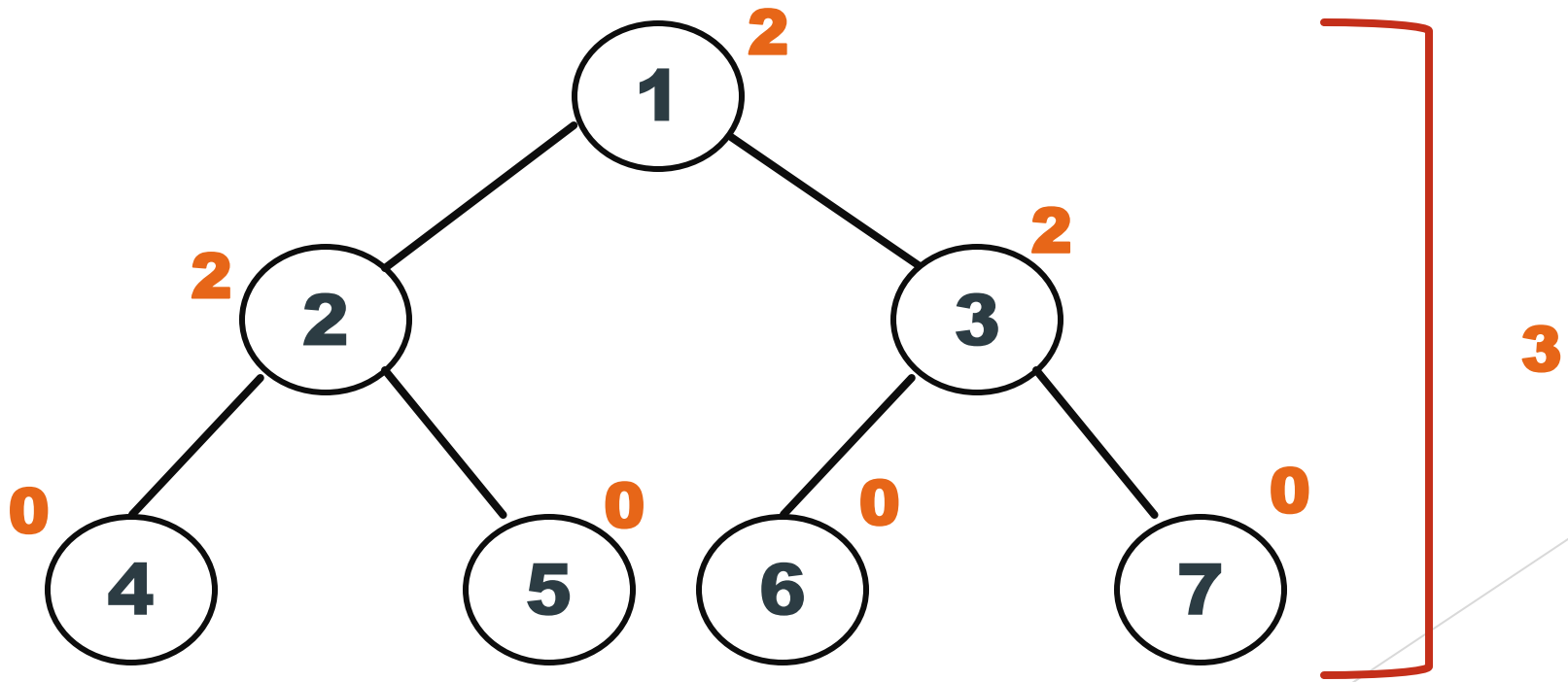


Parent - Child



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.



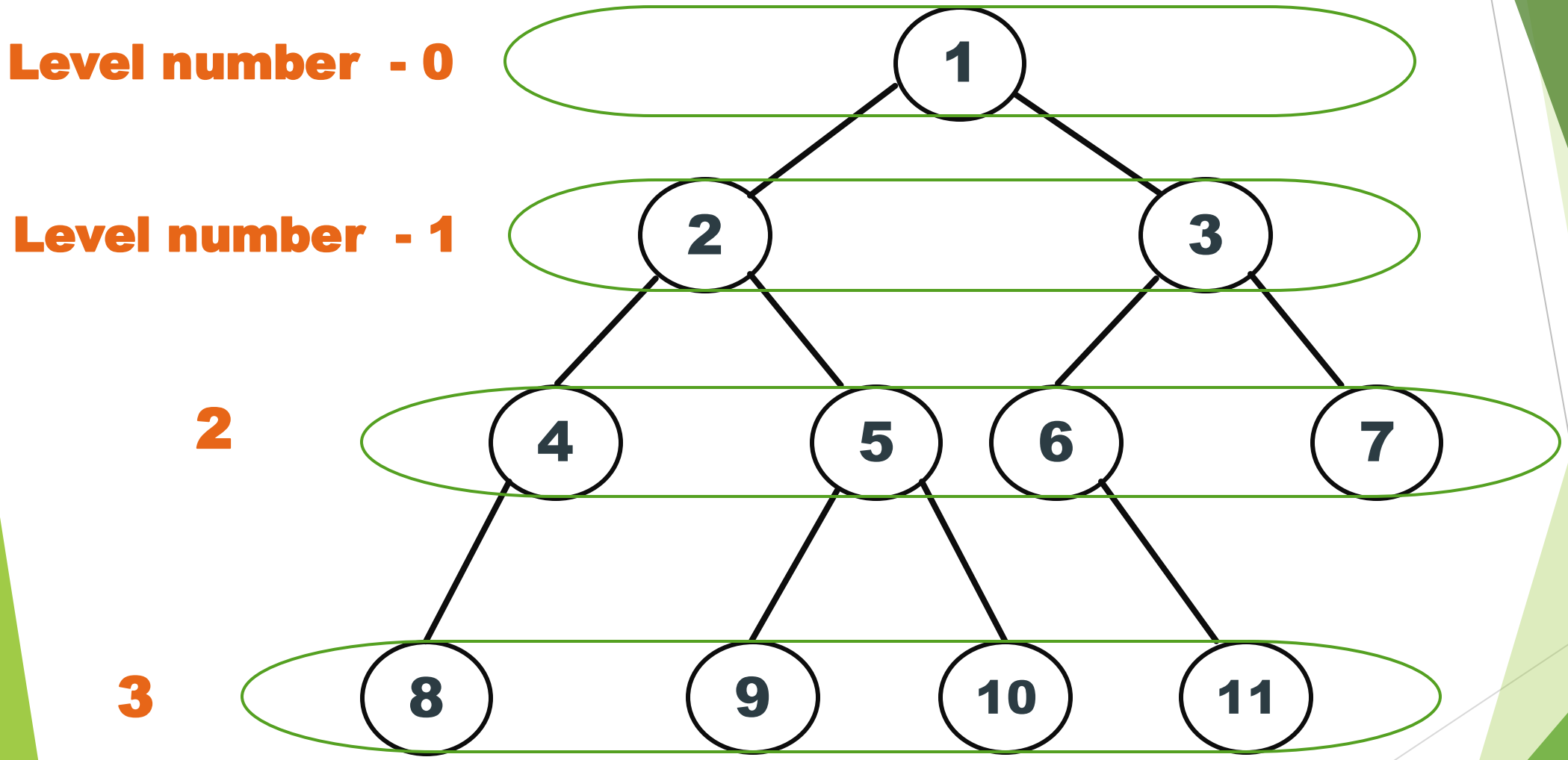
Ancestors and descendants

- 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
1
2
3
4
5
6
7
8
9
10
11

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.

Generation

- Nodes with the same level number are said to belong to the same **Generation.**