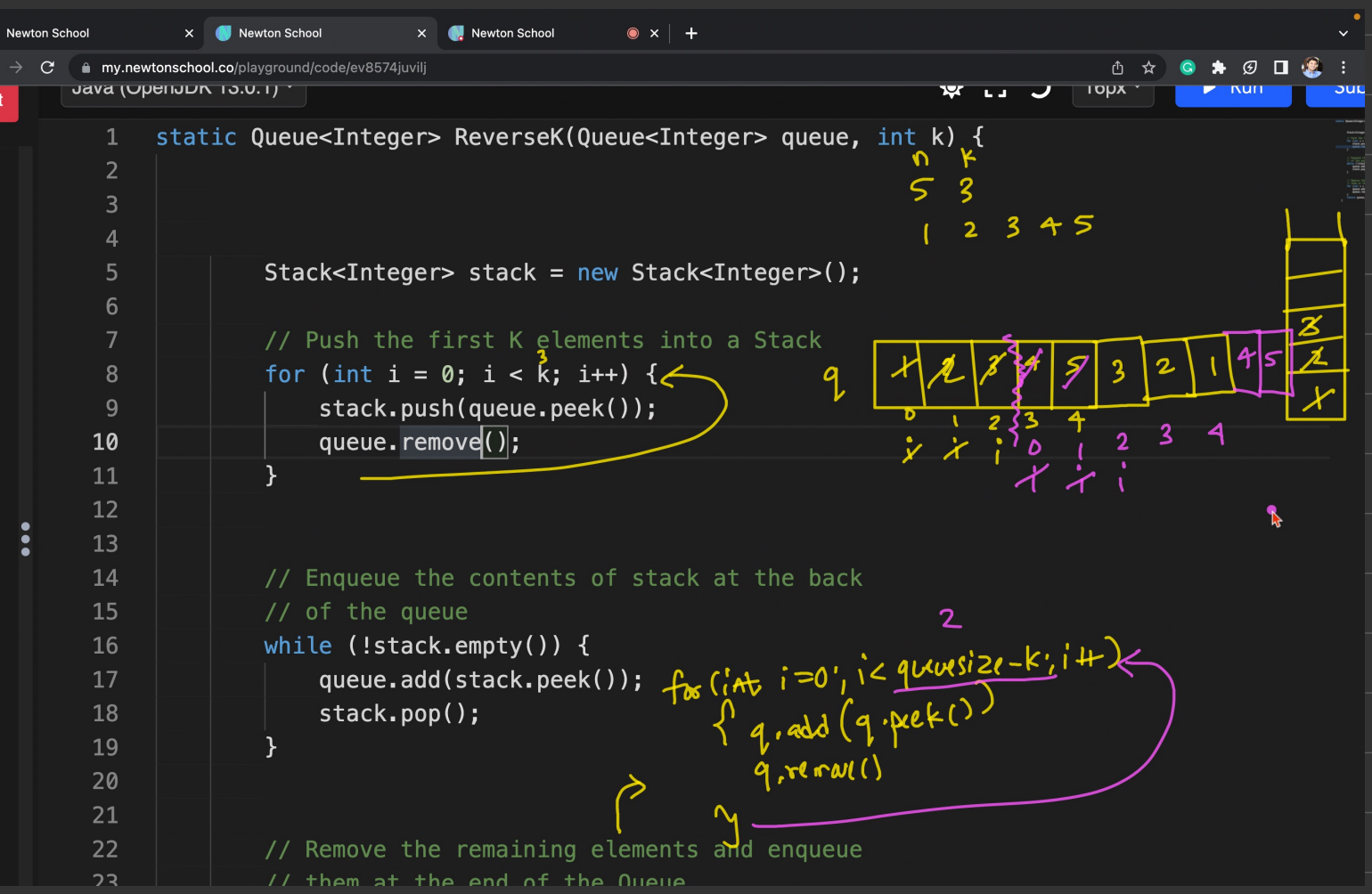
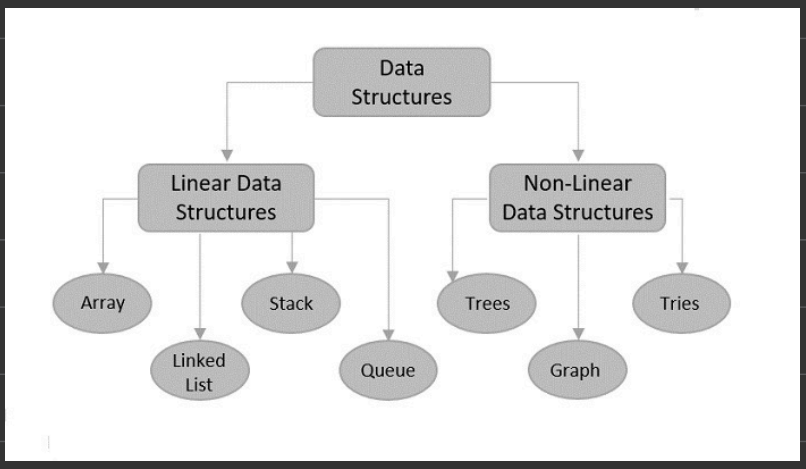
# 2 July 2023

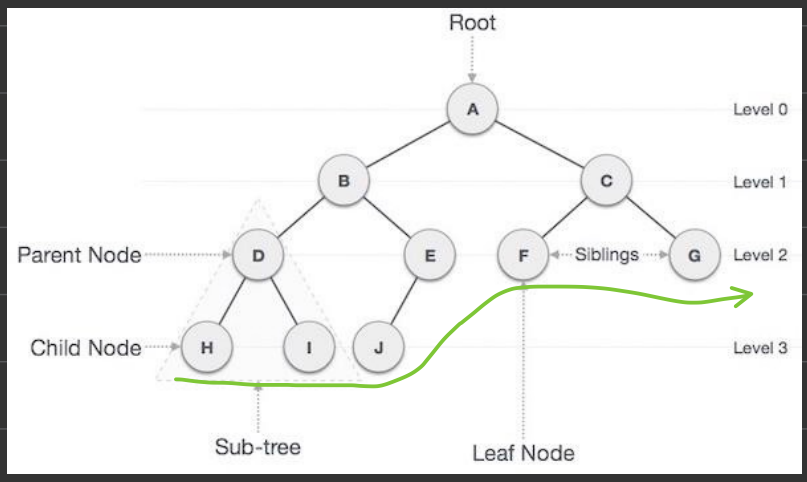
https://my.newtonschool.co/playground/code/ev8574juvilj

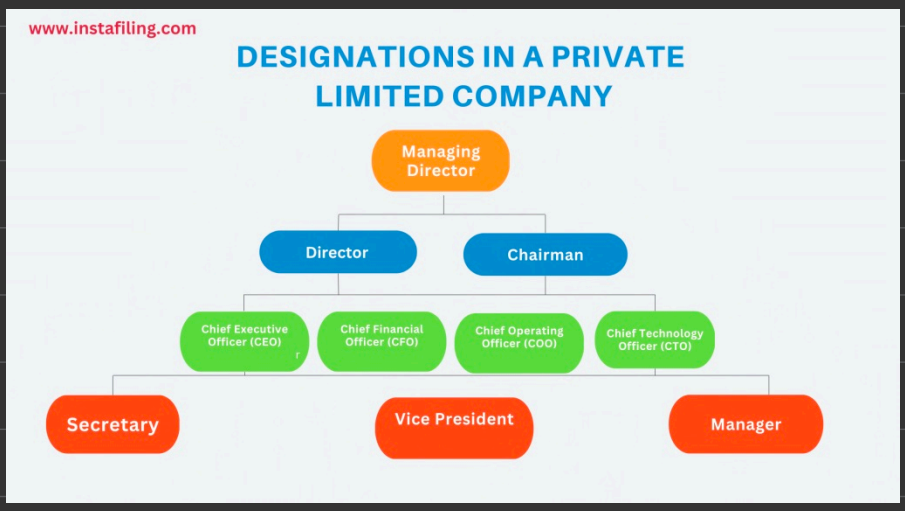


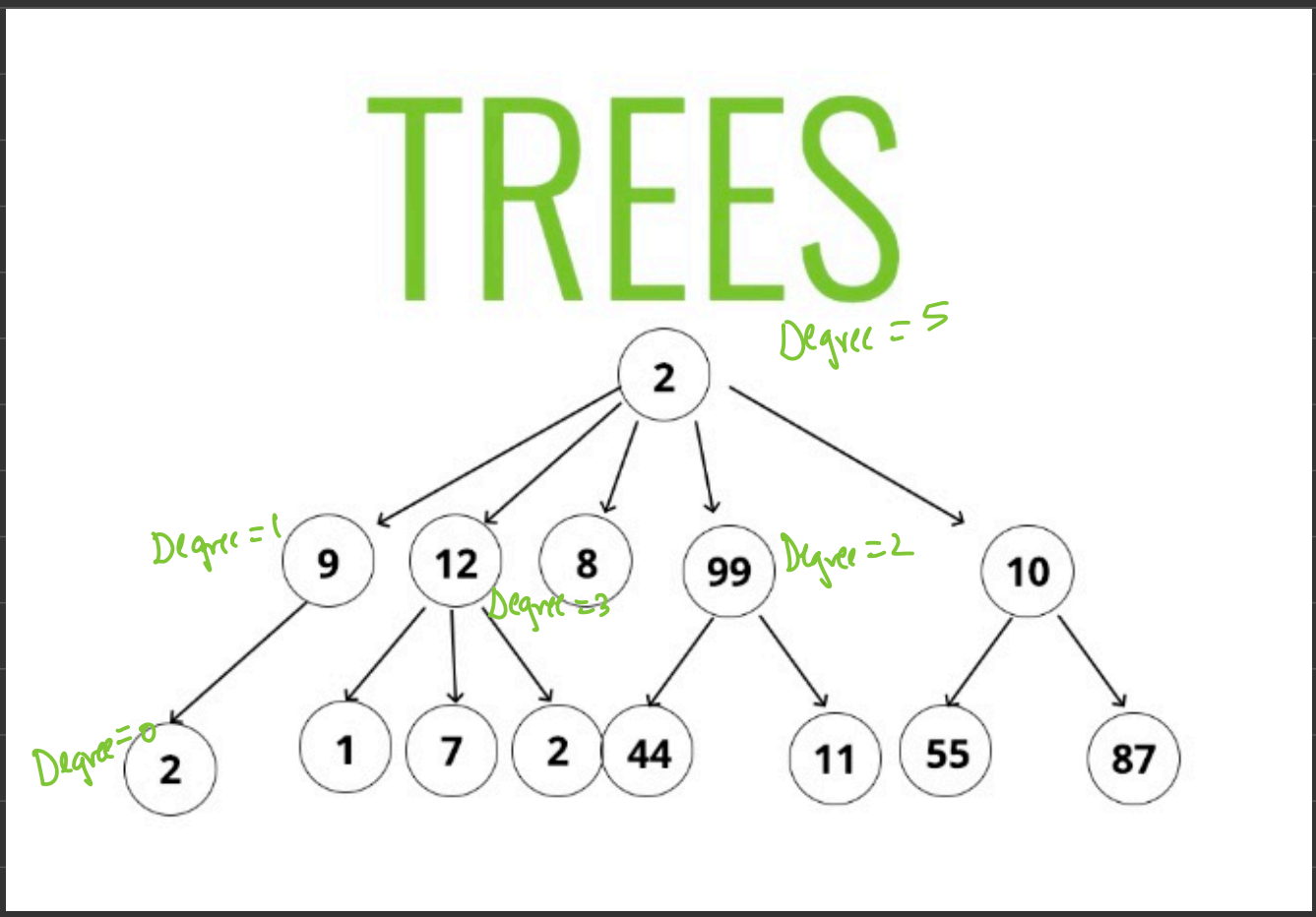
Trees: Binary Trees

-non linear data structure





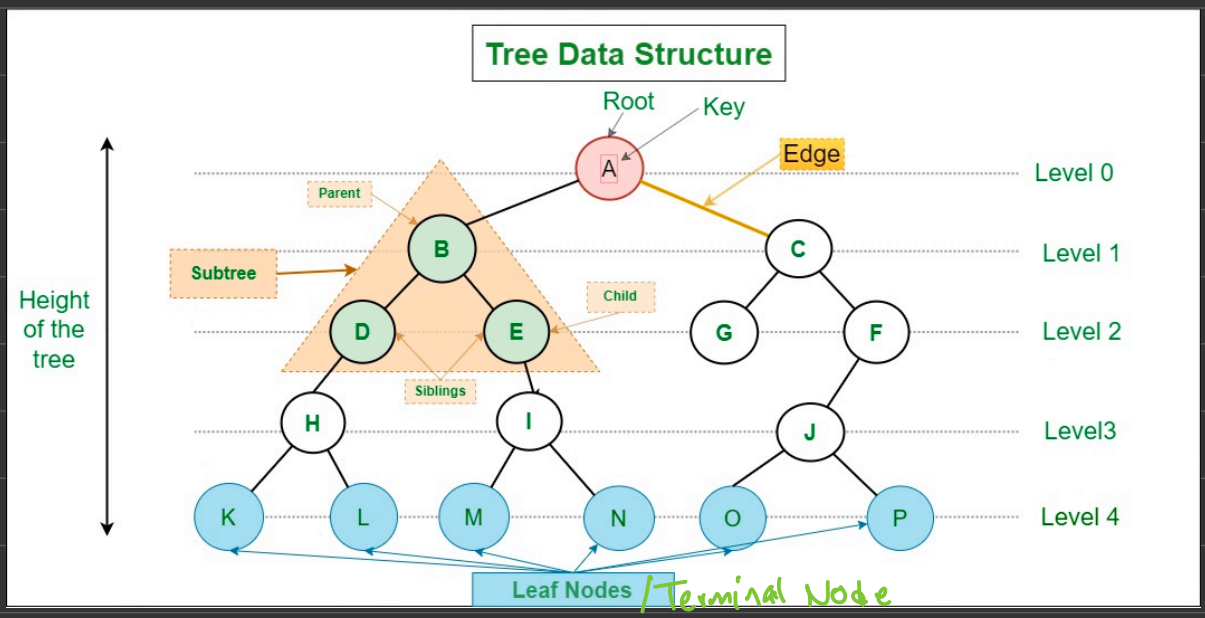

Degree = 0 | 1 | 3 | 5 | etc.

https://medium.com/codestorm/linear-and-non-linear-data-structure-7f10dc9e9a9f

https://www.youtube.com/watch?v=sOUtHG7O_2g

https://www.youtube.com/watch?v=03DErzKxoX0

# Binary Tree: Degree = 0 or 1 or 2.

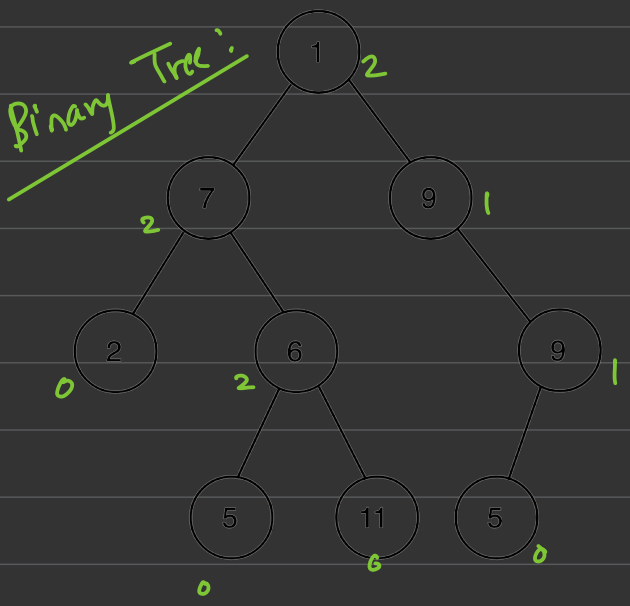


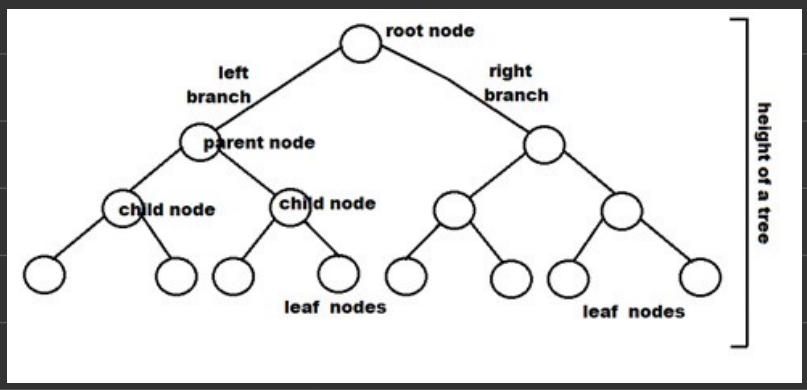

○ – Vertices

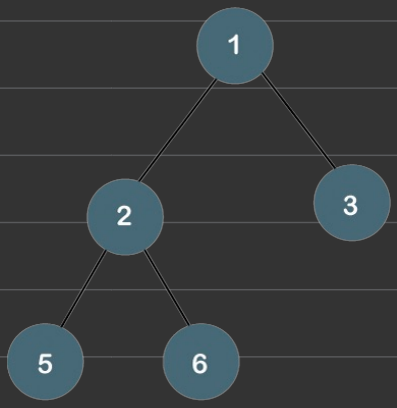
/ – Edges

Height of Tree: The length of the longest path from that node to the terminal node

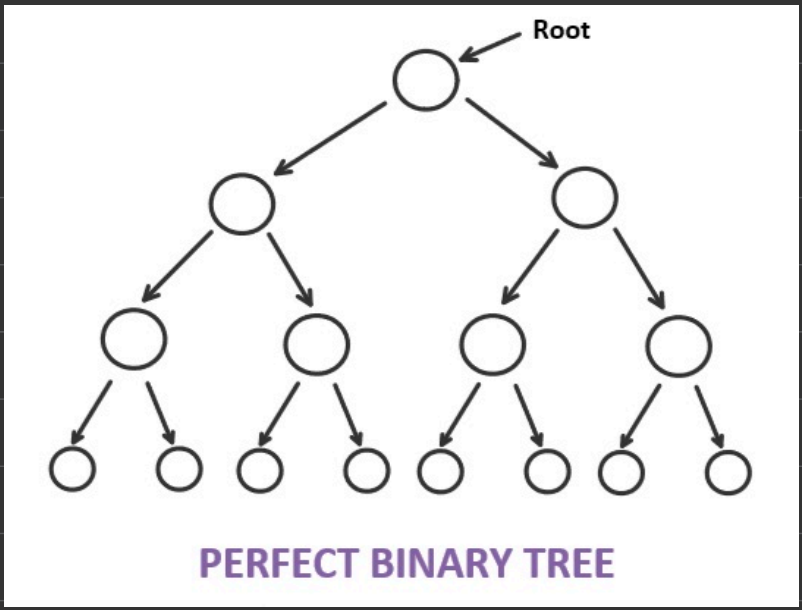
Degree: Degree of a node is the number of child node it has.



Complete Binary Tree: A binary tree is called as a complete binary tree if it contains maximum number of nodes it can have.




Properties of Binary Tree:

>A binary tree with 'n' nodes has exactly 'n-1' edges.

>In a binary tree, every node except the root node has exactly one parent.

>In a binary tree, there is exactly one path connecting any two nodes in a tree.

>The minimum number of nodes in a binary tree of height 'h' is 'h+1'.

>The maximum number of nodes in a binary tree of height 'h' is $2^{h+1}-1$

eg: height = 4, #nodes = $2^{4+1}-1 = 2^5-1 = 32-1 = 31$.

>Number of leaf nodes in a complete binary tree is $\frac{n+1}{2}$

>In a complete binary tree,
Number of external nodes = Number of internal nodes + 1

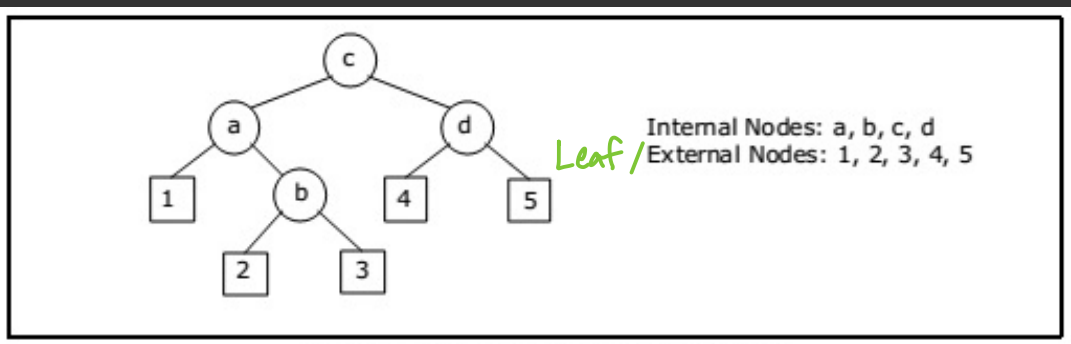



Figure 5.2.6. Internal and external nodes