Different Types of Tree and operations

- 1. Binary Tree
- 2. Threaded Binary Tree
- 3. Binary Search Tree
- 4. AVL Tree

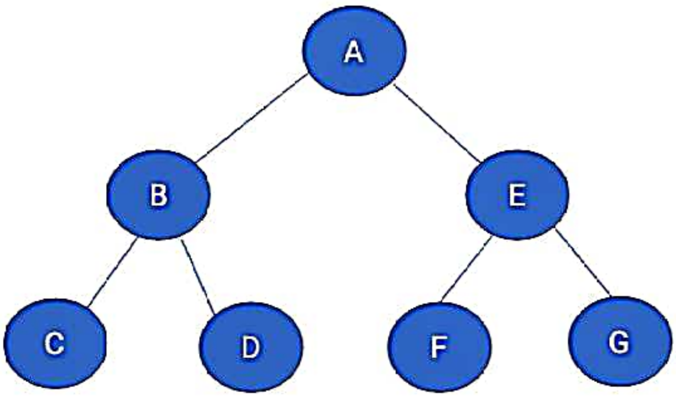
Each Tree operations

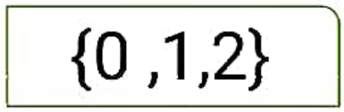
- Application of Binary Trees , B tree , B+ tree

1. Binary Tree(cont.)

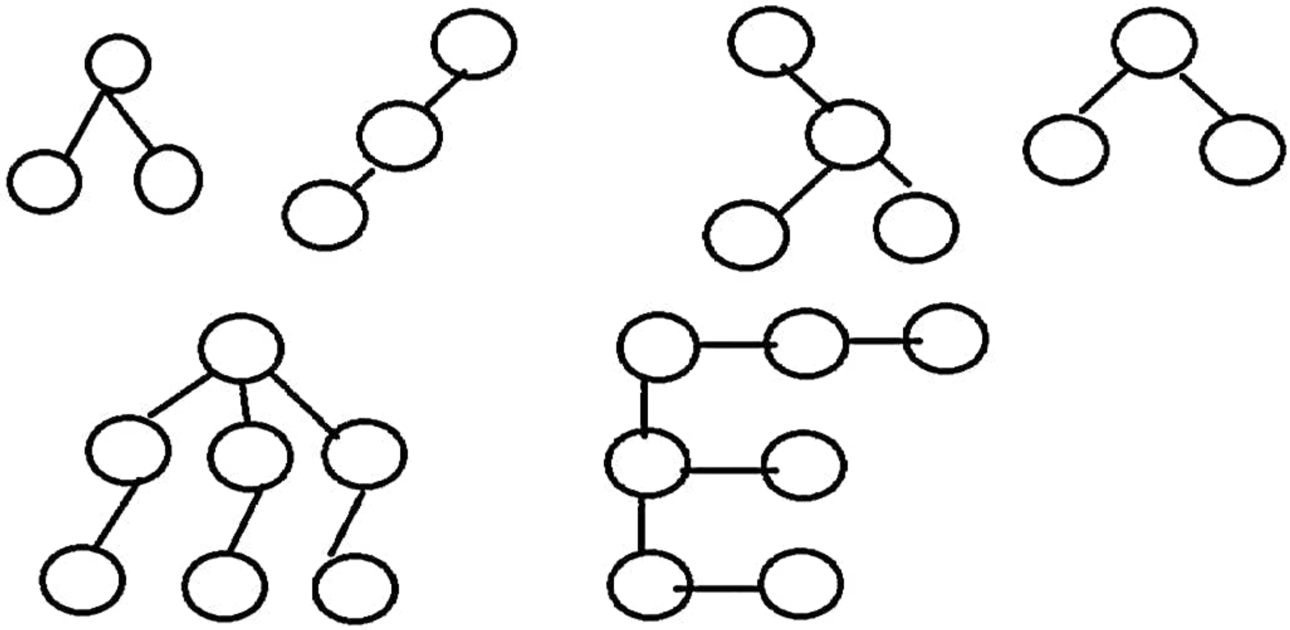
➤In a binary tree, every node can have either 0 children or 1 child or 2 children but not more than 2 children

➤One is known as a left child and the other is known as right child.





Example of Binary Tree (unlabelled node)

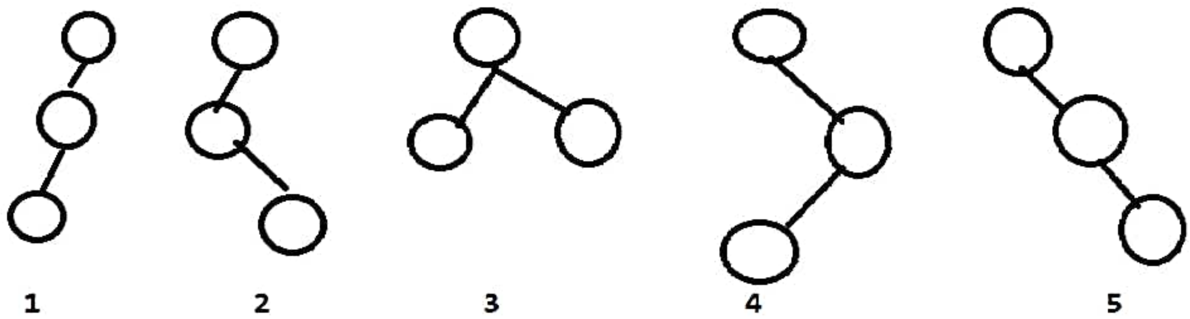


1 2 3 4 5 → valid 5→invalid

Construction of Number of Binary Tree(unlabelled) using set of Nodes

Qn 1: If number of nodes n=3 then how many Binary Tree we can construct ?

Ans :



T(3)=5

Construction of Number of Binary Tree(unlabelled) using set of Nodes(cont.)

Qn 1: If number of nodes n=4 then how many Binary Tree we can construct ?

Ans :

$T(4)=14$

Construction of Number of Binary Tree(unlabelled) using set of Nodes(cont.)

Qn 1: If number of nodes n=5 then how many Binary Tree we can construct ?

Ans :

$\boxed{T(5)=42}$

Construction of Number of Binary Tree(unlabelled) using set of Nodes(cont.) Formula

n=5

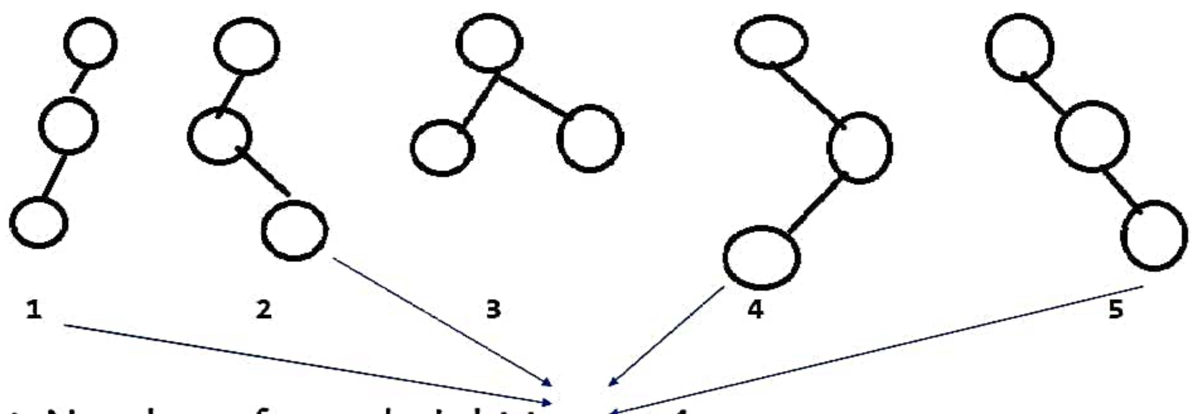
$$T(n) = \frac{{}^{2n}C_{n}}{n + 1}$$

catalan number formula

$T(5)=42$

How to know how many Trees are Present with Maximum Nodes

n=3



n=3 → Number of max height trees= 4

n=4 → Number of max height trees= 8

n=6 → Number of max height trees = 32

Formula ⇨ $\boxed{2^{n-1}}$

One more formula To find Number of Binary Tree from set of Nodes (Catalan different method)

n=5

n	0	1	2	3	4	5
$T(n) = \frac{{}^{2n}C_{n}}{n+1}$	1	1	2	5	14	?

t(5) =

New Catalan method Formula

n=5

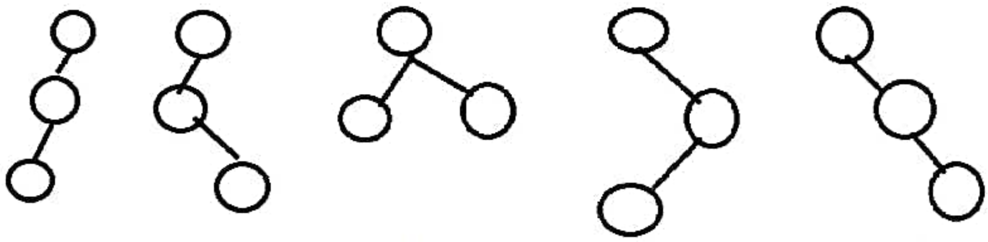
t(5) =

$$\sum_{i=1}^{n} \underbrace{T(i-1)}_{\text{Increasing part}} * \underbrace{T(n-i)}_{\text{Decreasing part}}$$

Construction of Number of Binary Tree(Labelled) using set of Nodes

Qn 1: If number of nodes n=3 then how many Binary labelled Tree we can construct ?

Ans :



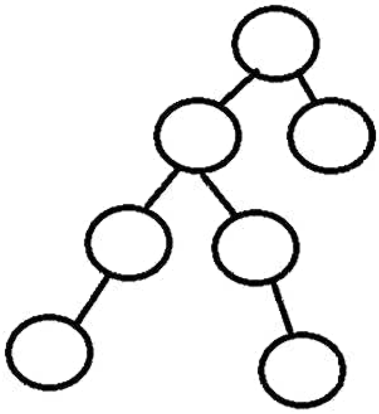
1 2 3 4 5

formula

$$T(n) = \frac{{}^{2n}C_{n}}{n+1} * n!$$

T(3)=5*6

Do you know what is the relationship between Internal Node vs External Node



Number of Node with Deg 2 --> deg(2) = 2

Number of Node with Deg 1 --> deg(1) = 2

Number of Node with Deg 0 --> deg(2) = 3

$$\boxed{deg(0)=deg(2)+1}$$

This Formula is always True in Binary Tree