Trees (Non Linear Data Struct)

- Non linear Data Structure
- Hierarchical representation — Grant parent - parent - child
  - College structure

- Tree Canbe represented by
  - Arrays (static allocation)
  - Doubly link list (Dynamic allocation)

Definitation

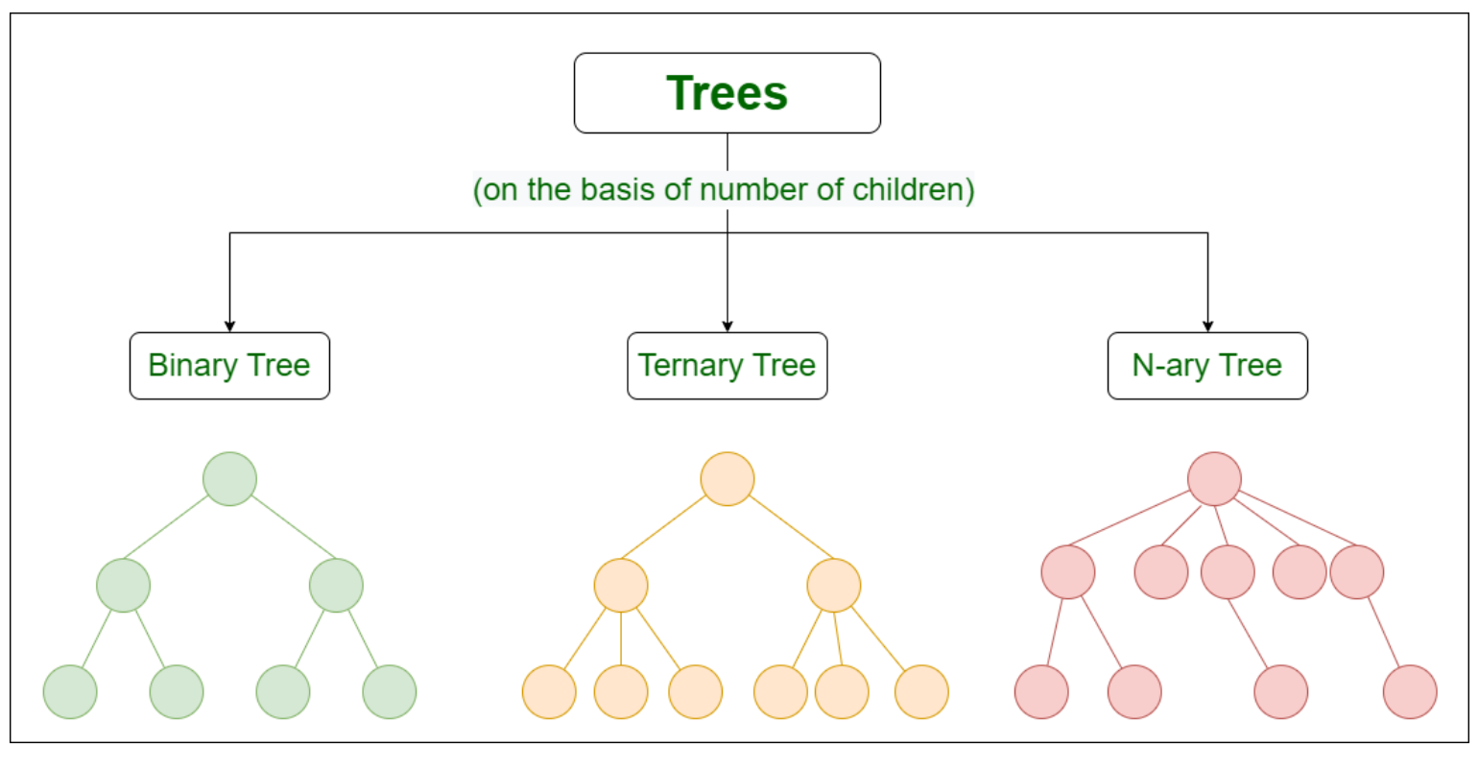
① Tree is a data structure in which one node is connected to several other nodes & in turn these node are connected to several other nodes.

A tree data structure is a hierarchical structure that is used to represent and organize data in a way that is easy to navigate and search. It is a collection of nodes that are connected by edges and has a hierarchical relationship between the nodes.

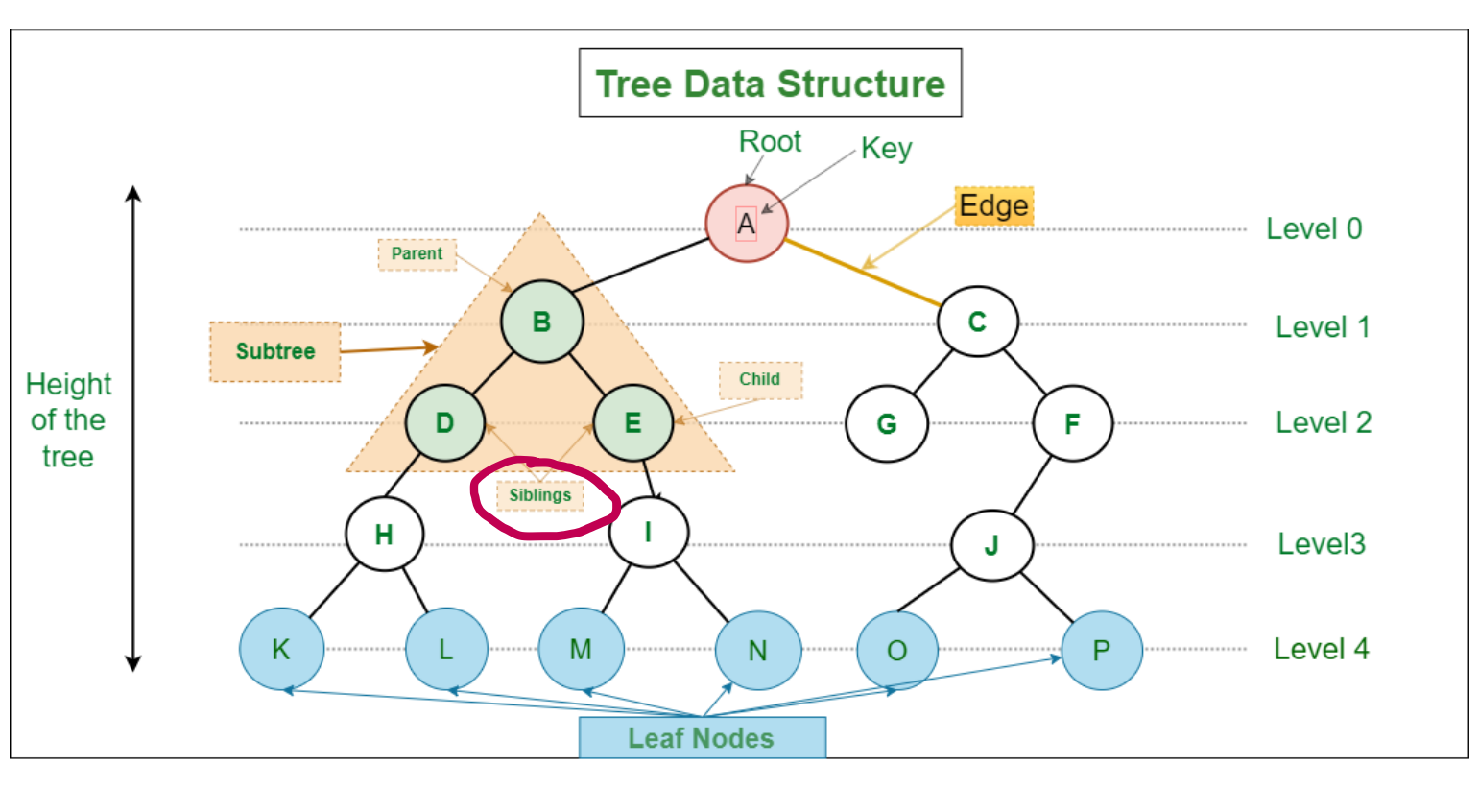
A tree is a non-linear abstract data type with a hierarchy-based structure. It consists of nodes (where the data is stored) that are connected via links. The tree data structure stems from a single node called a root node and has subtrees connected to the root.

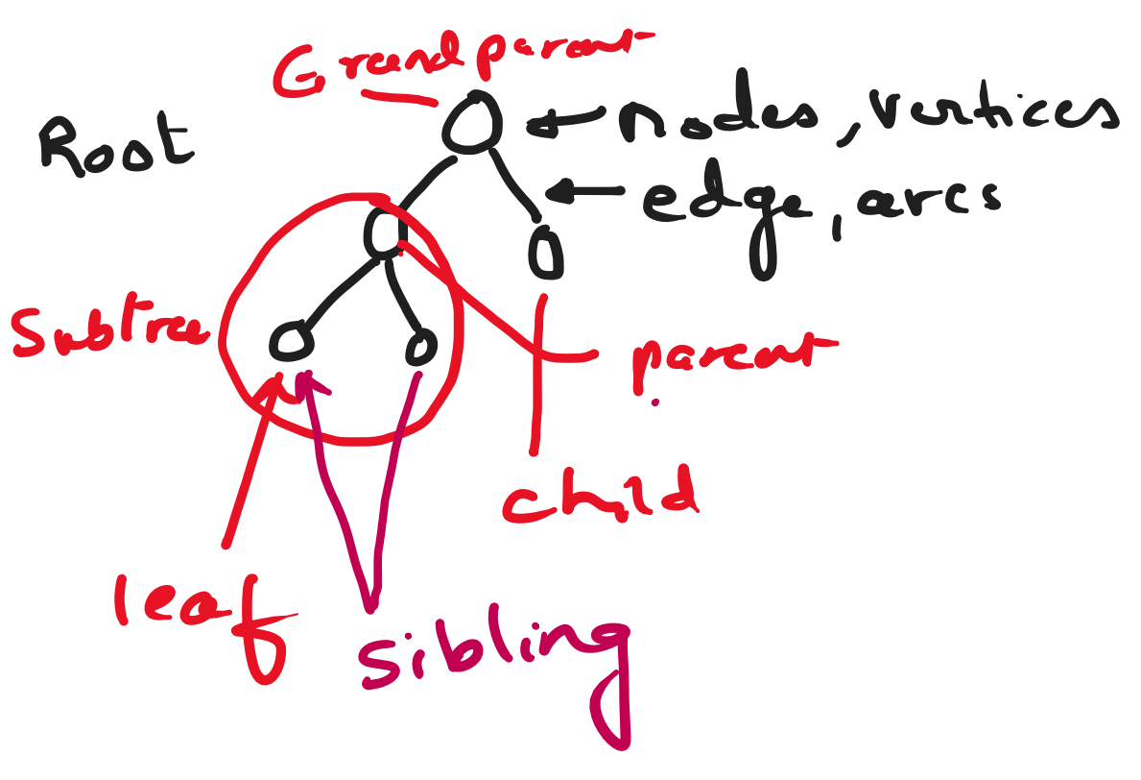
A Tree is a non-linear data structure and a hierarchy consisting of a collection of nodes such that each node of the tree stores a value and a list of references to other nodes (the "children").

Types of Trees



Terminologies





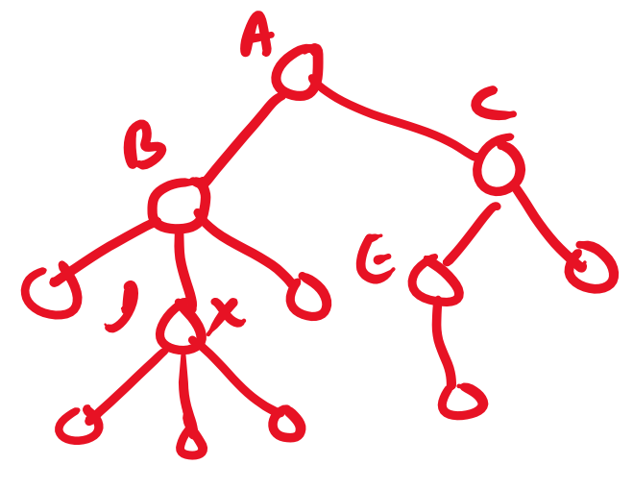
Root, node, leaf, sibling, Ancestor, Descendent, path, Sub Tree
Edge, child

Depth/Height = level + 1
4 + 1 = 5

Level - generation   root = level = 0

Degree of node - no of child a node has   A-2 K-0
C-2

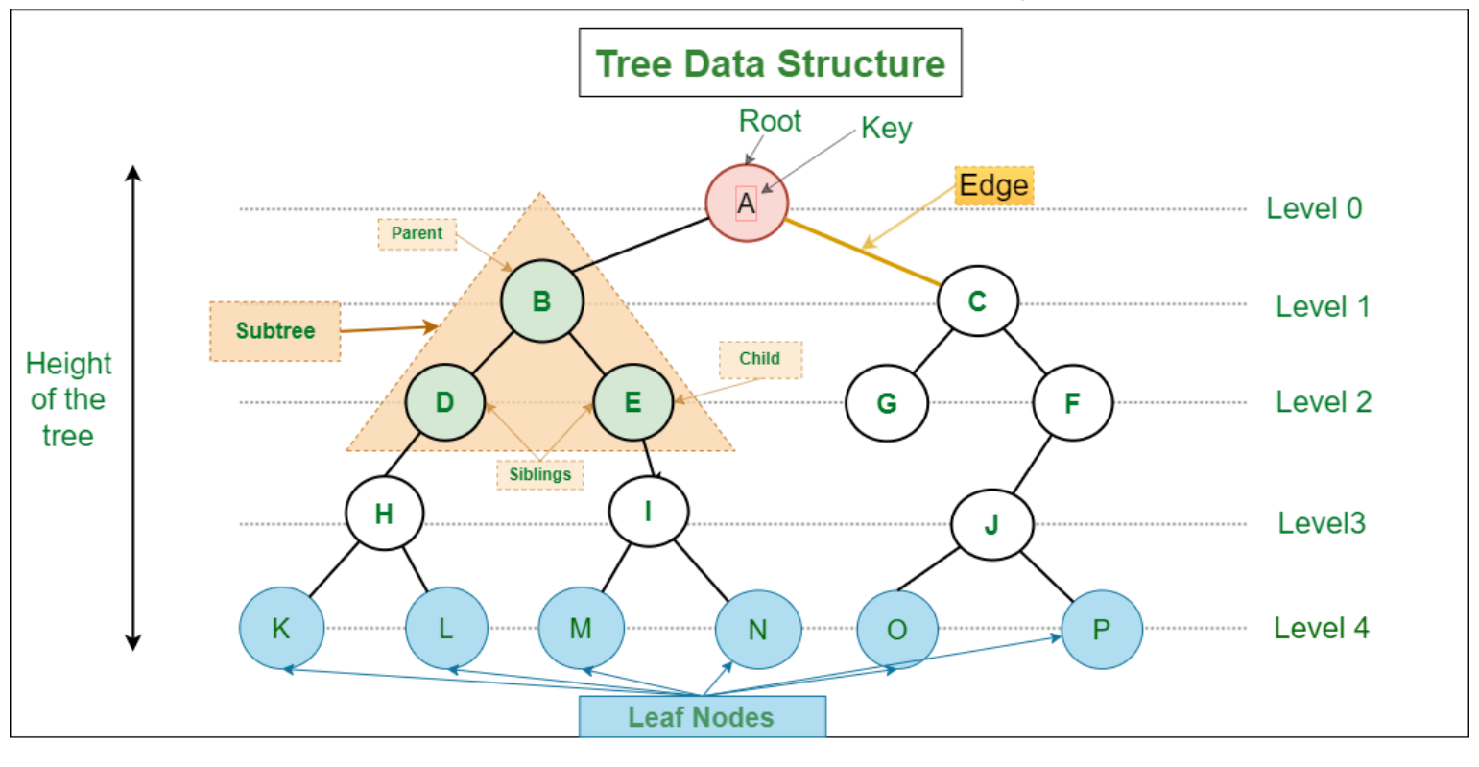
Degree of tree -



degree of B = 3

degree of node/nodes in a tree having max degree

path - Sequence of edges from one node to another node
path from A-L



Ancestor ←

A → B → D → H → L

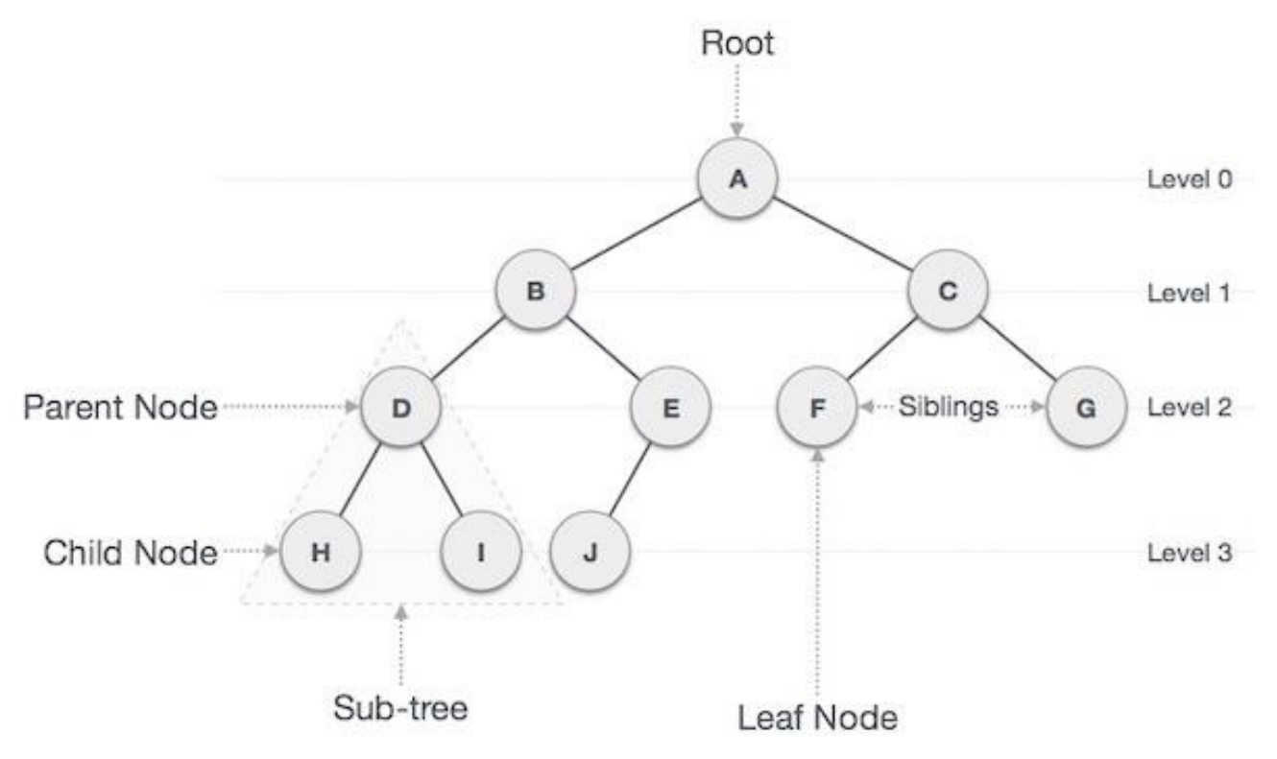
→ Descendents

A - P

A → C → F → J → P

parent - Node having child node

child -



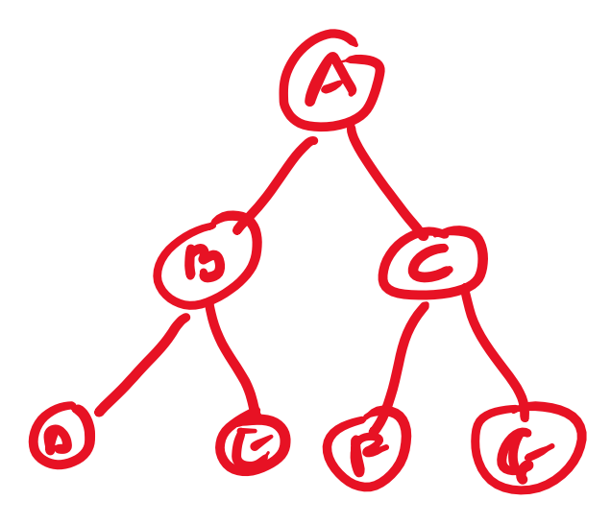
A-I

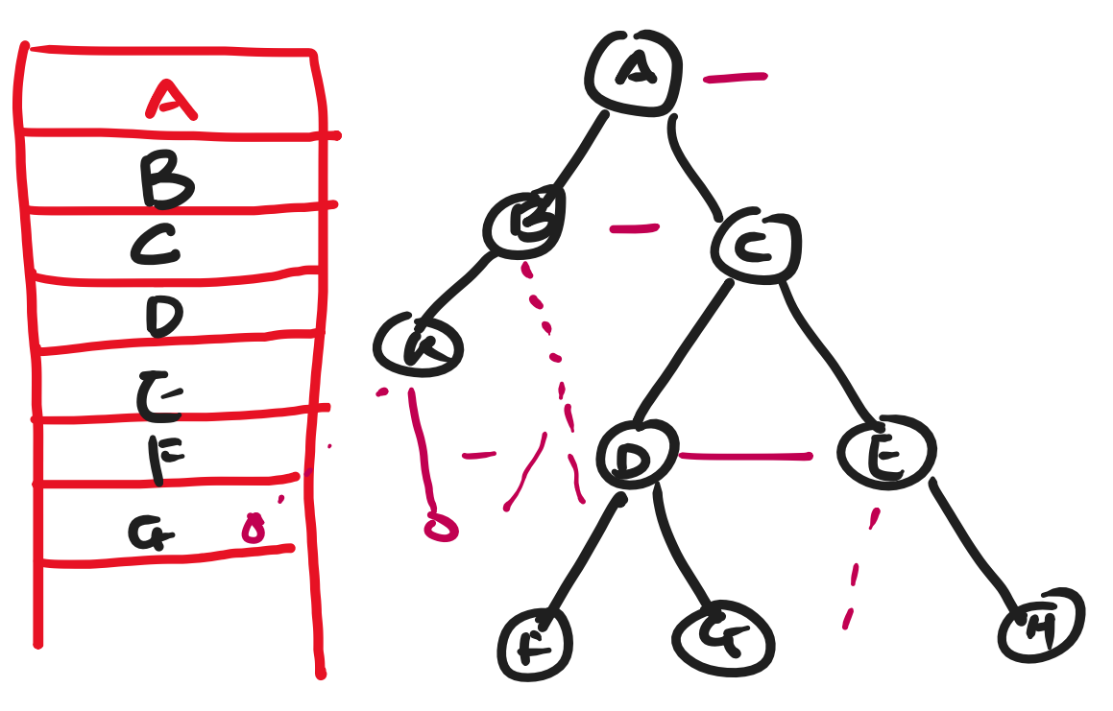
A → B → D → I

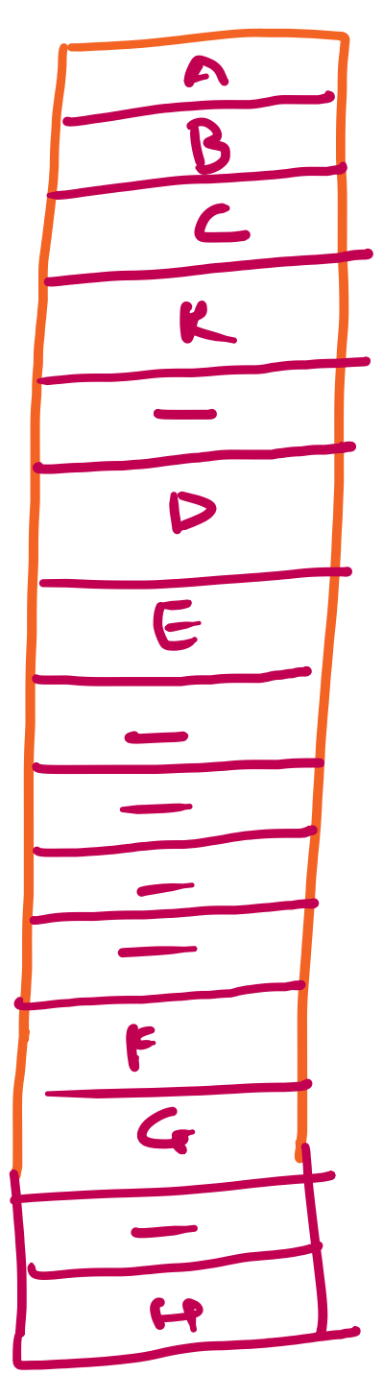
← Ancestor

→ Decendents

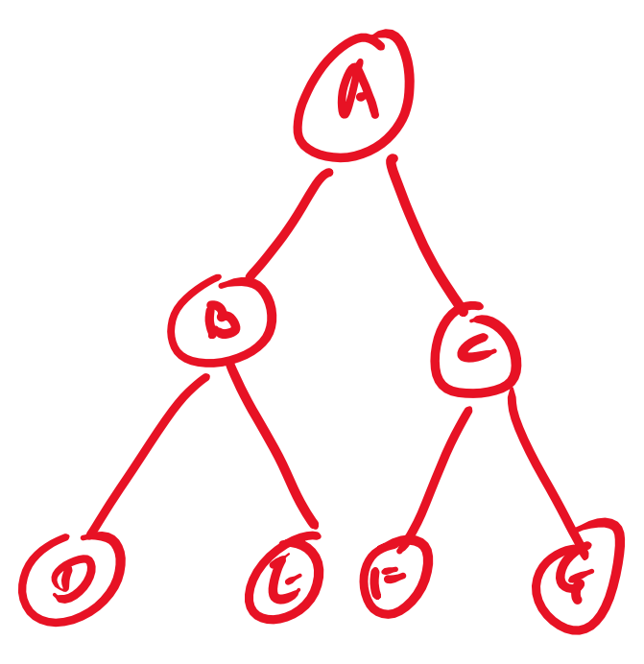
Representation [Array - single dimension — static allocation.

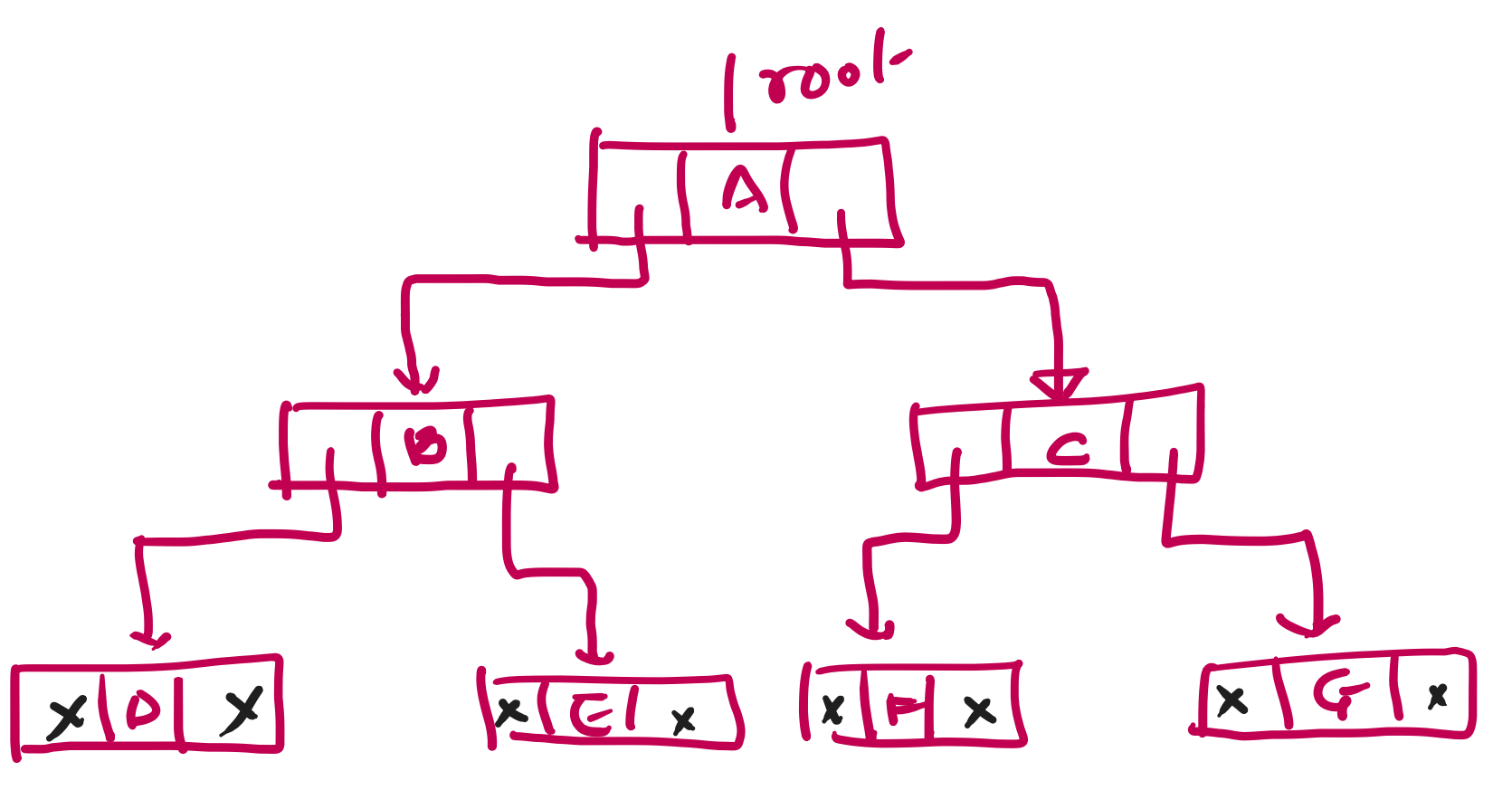


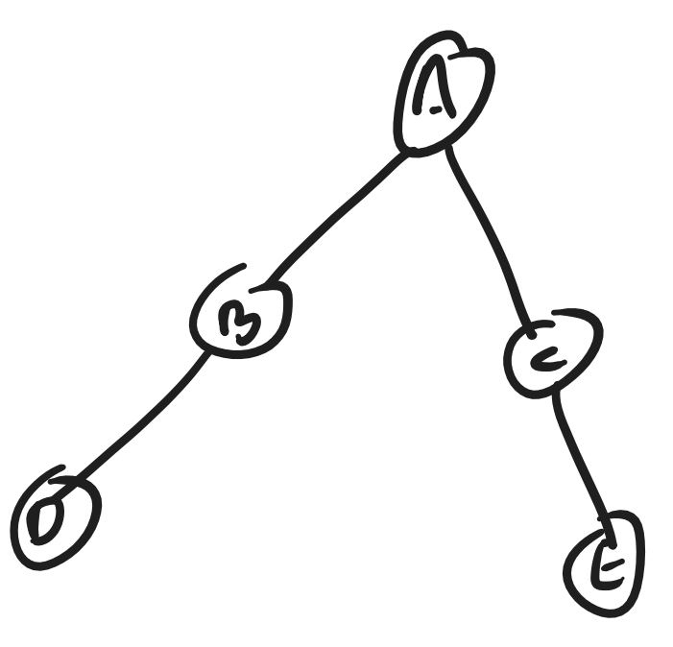


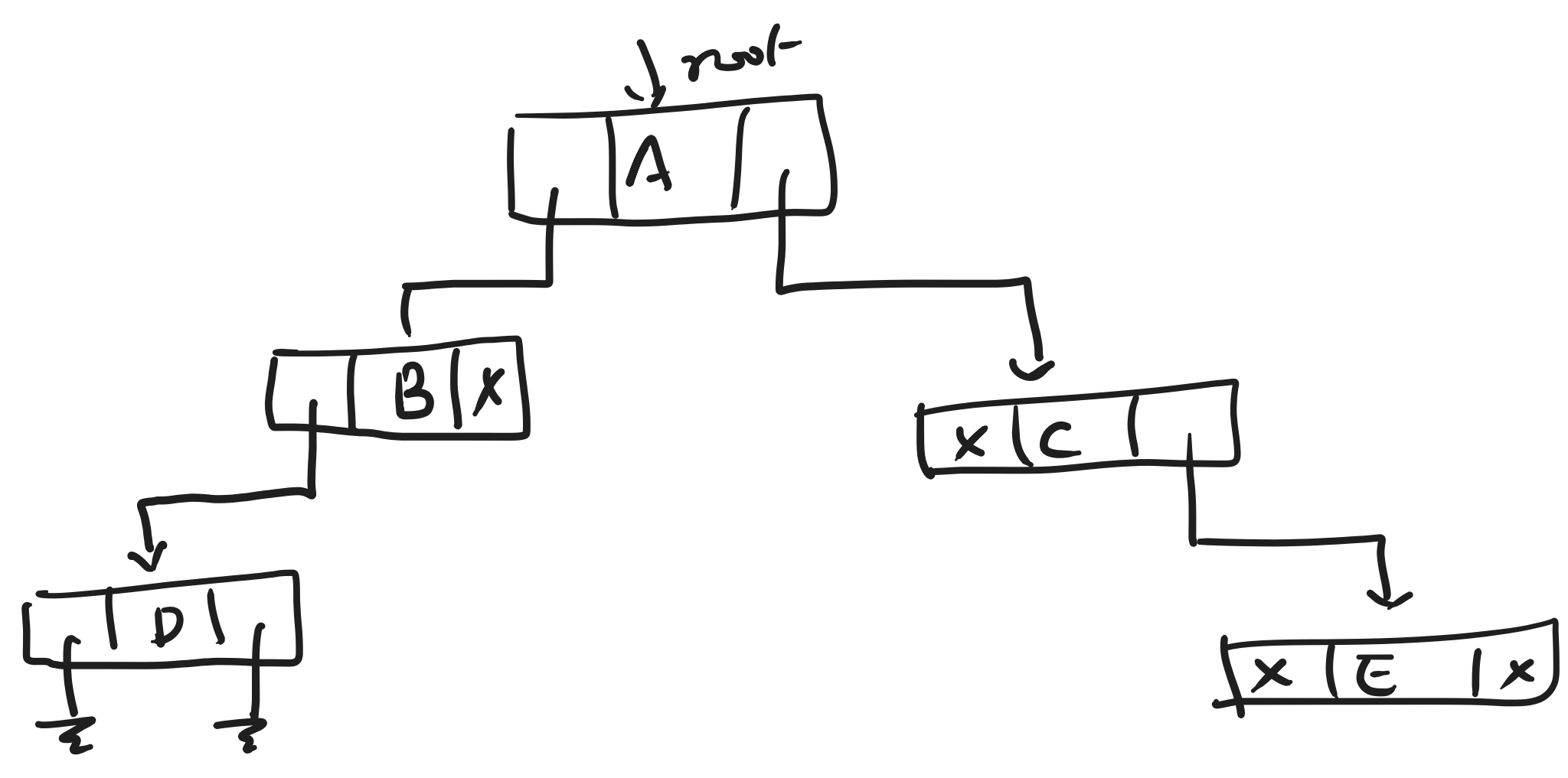


Link list

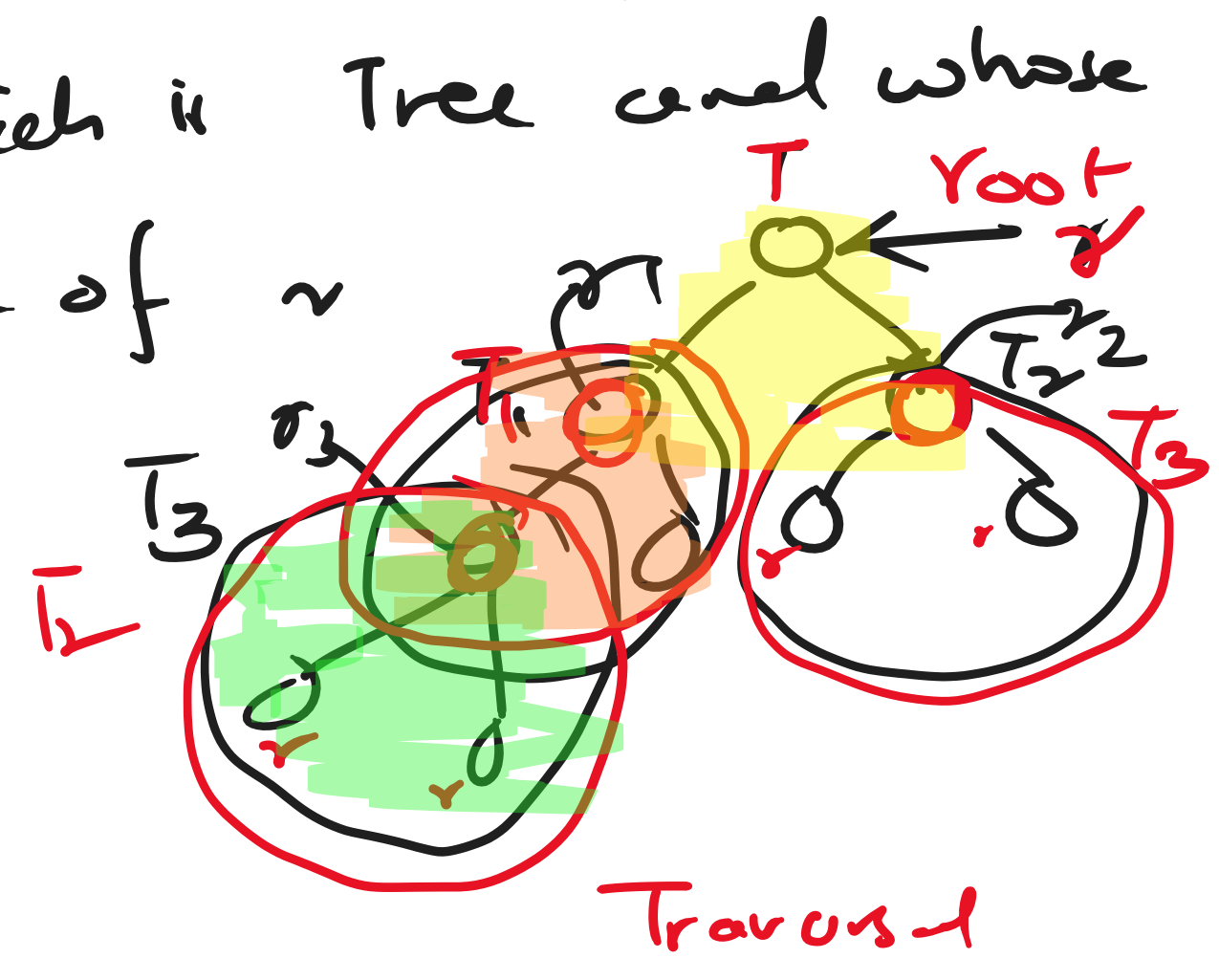








A general Tree T is a finite set of one or more node such that there is one designated node (r) called as root of T and remaining nodes are partitioned into n ≥ 0 disjoint subsets $T_1, T_2, T_3 \ldots T_n$ each of which is Tree and whose roots $r_1, r_2 \ldots r_n$ are children of r



Types
- General
- Binary tree
  - Strict
  - Complete
  - Almost Complete
  - Skewed
  - Extended
- Binary Search Tree

Traversal
- Inorder
- Preorder
- Post