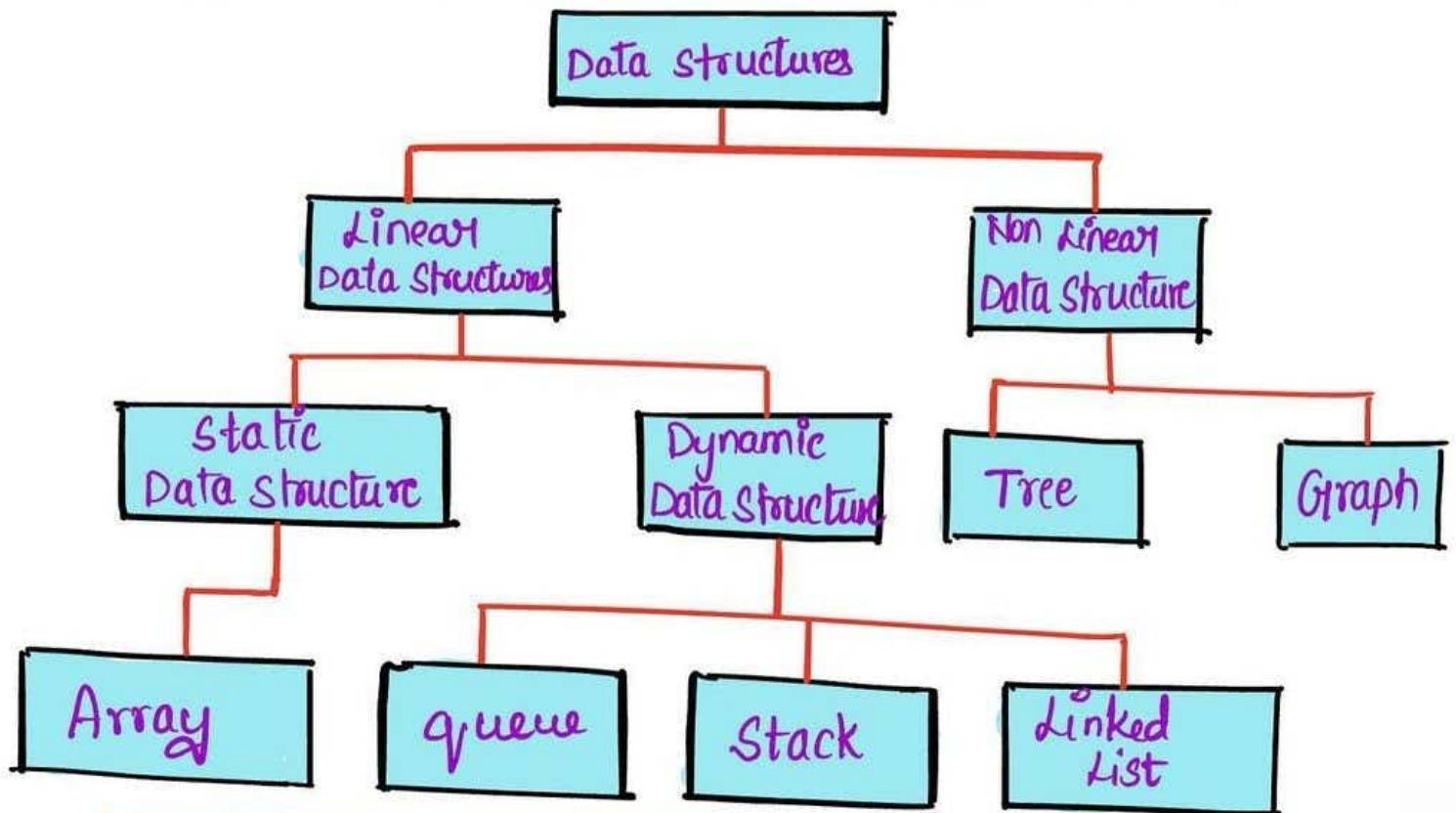


Data Structures!

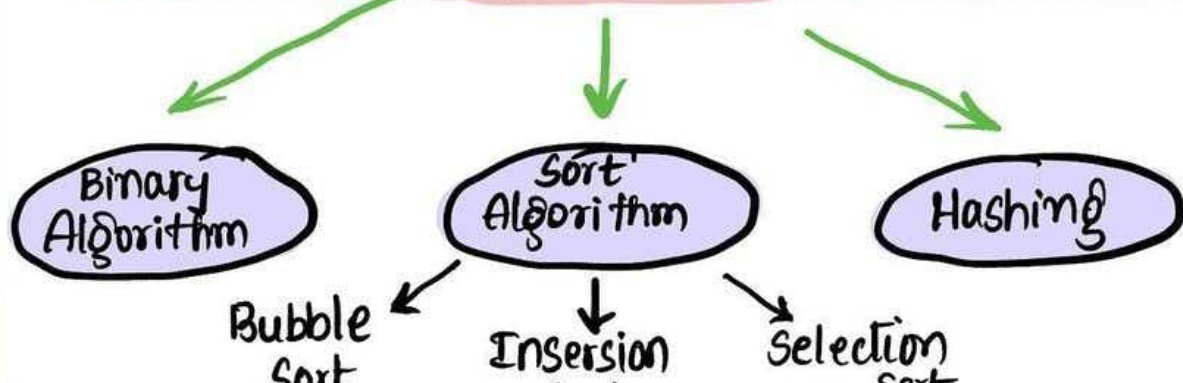
What is Data Structures?

A Data structure is a storage that is used to store and organize data. It is a way of arranging data on a computer so that it can be accessed and updated efficiently.

CLASSIFICATION OF DATA STRUCTURES



TYPES OF ALGORITHMS IN DATA STRUCTURE



Linear Data Structure:

Data structure in which data elements are arranged sequentially or linearly, where each element is attached to its previous and next adjacent element, is called a linear data structure.

→ **Static Data Structure:** Static data structure has a fixed memory size. It is easier to access the elements in a static data structure.

→ **Dynamic Data Structure:** In this, the size is not fixed.

Non Linear Data Structure:

Data structures where data elements are not placed sequentially or linearly are called non linear data structures.

Popular types of Data Structures.

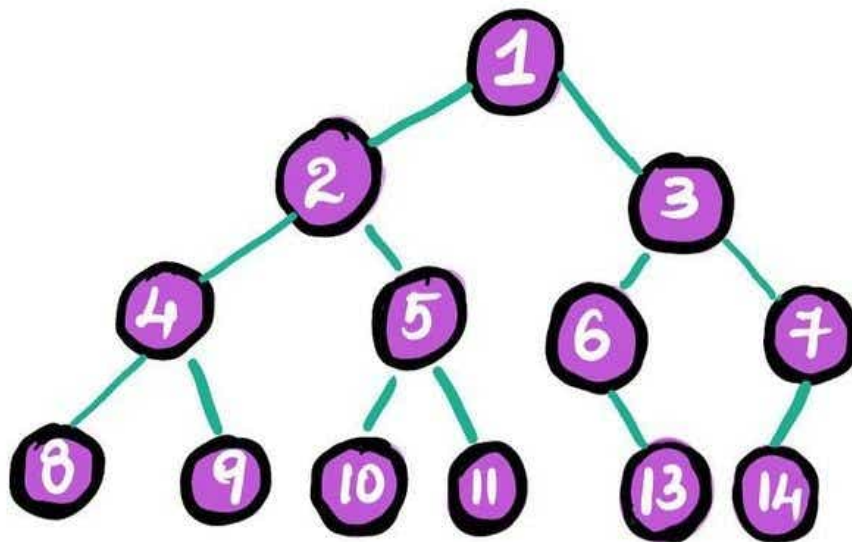
* Array Data Structure:

An array is a collection of items stored at contiguous memory locations. The idea is to store multiple items of the same type together. This makes it easier to calculate the position of each element by simply adding an offset to a base value i.e., the memory location of the first element of the array.

200	201	202	203	204	205	206	.	.	.
U	B	F	D	A	E	C	.	.	.
0	1	2	3	4	5	6	.	.	.

* Binary Tree Data Structure:

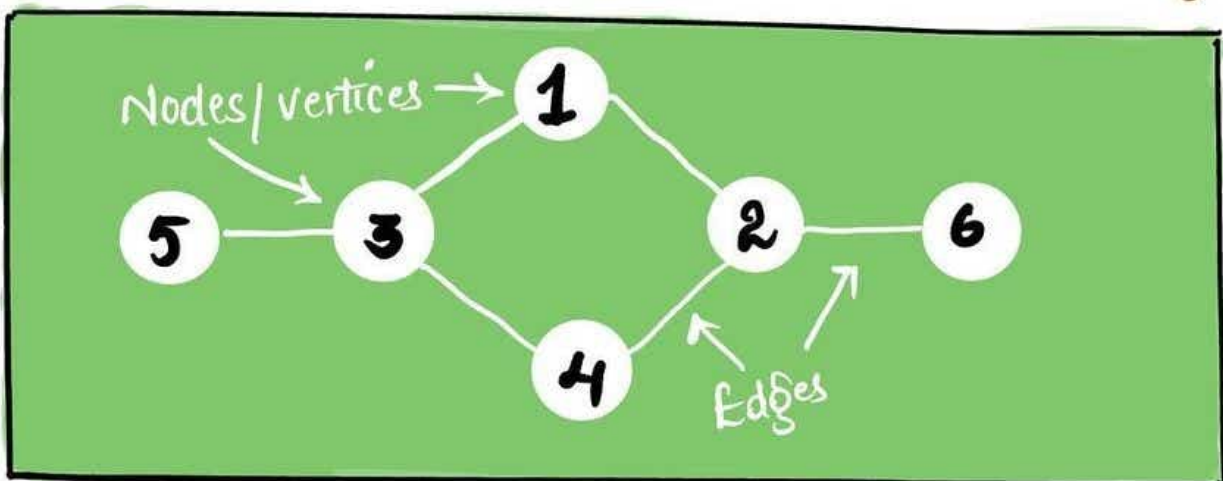
Binary tree is defined a tree data structure with atmost 2 children. Since each element in a binary tree can have only 2 children, We typically name them the left and Right child.



Binary Tree

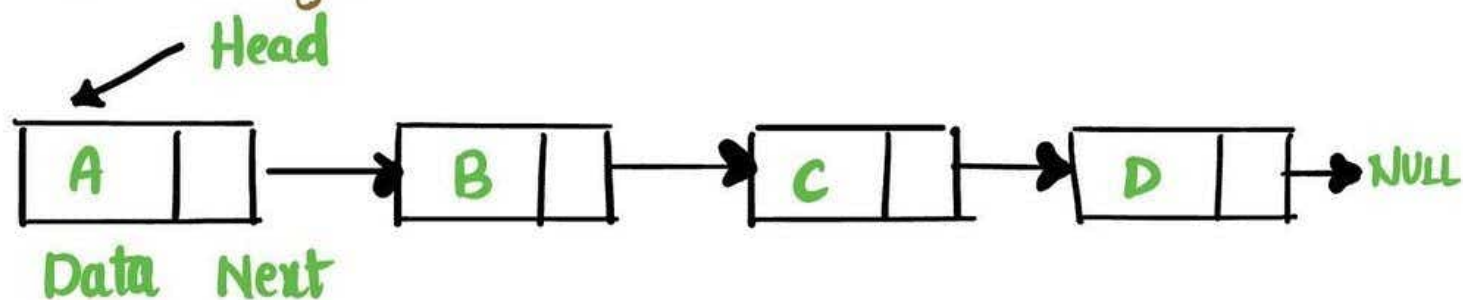
* Graph Data Structure:

A graph is a nonlinear data structure consisting of vertices and edges. the vertices are sometimes also referred to as nodes and the edges are linear or arcs that connect any two nodes in the graph. more formally a graph is composed of a set of vertices (V) and a set of edges (E).



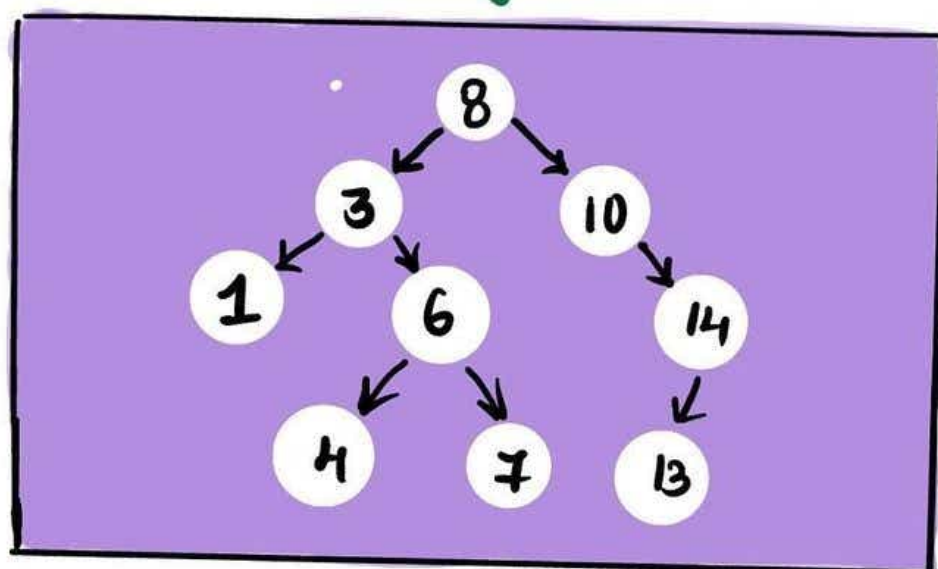
* Linked List Data Structure:

A linked list is a Linear data structure, in which the remains are not stored at contiguous memory locations, the elements in a linked list are linked using pointers as shown in the below image.



* Binary Search Tree:

This is a node-based binary tree data structure which has the following properties ① The left subtree of a node contains only nodes with keys lesser than the node's key ② The right subtree of a node contains only nodes with keys greater than the node's key ③ The left and Right Subtree each must also be a binary search tree.



* Matrix Data Structure:

A matrix represents a collection of numbers arranged in an order of rows and columns. It is necessary to enclose the elements of a matrix in paranthesis or brackets

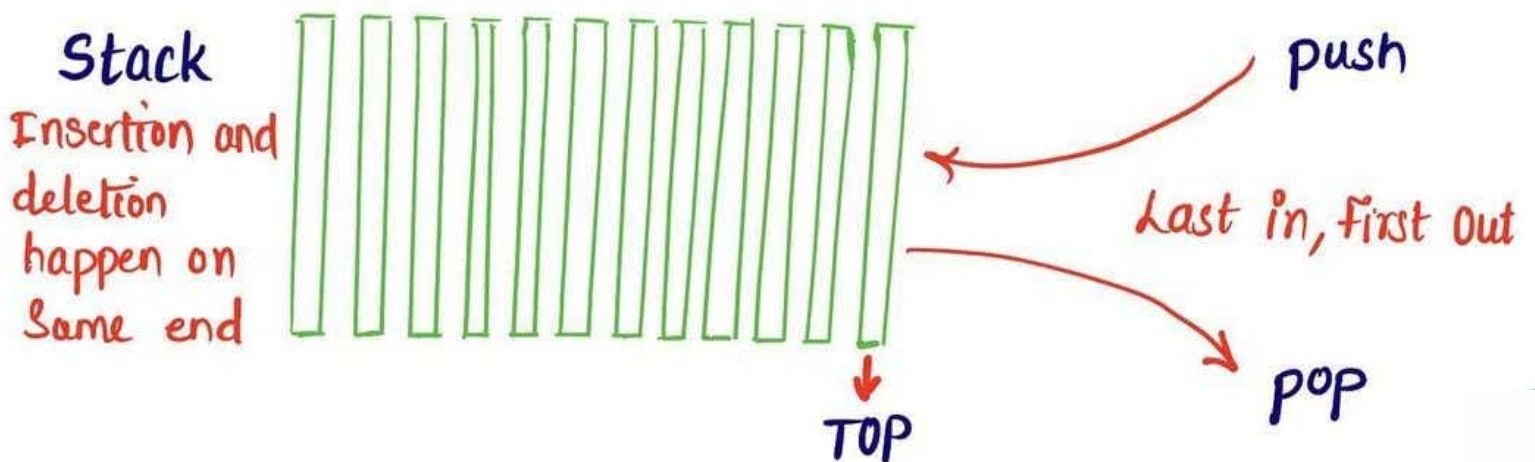
Example

A matrix with 9 elements is shown below.

1	2	3
4	5	6
7	8	9

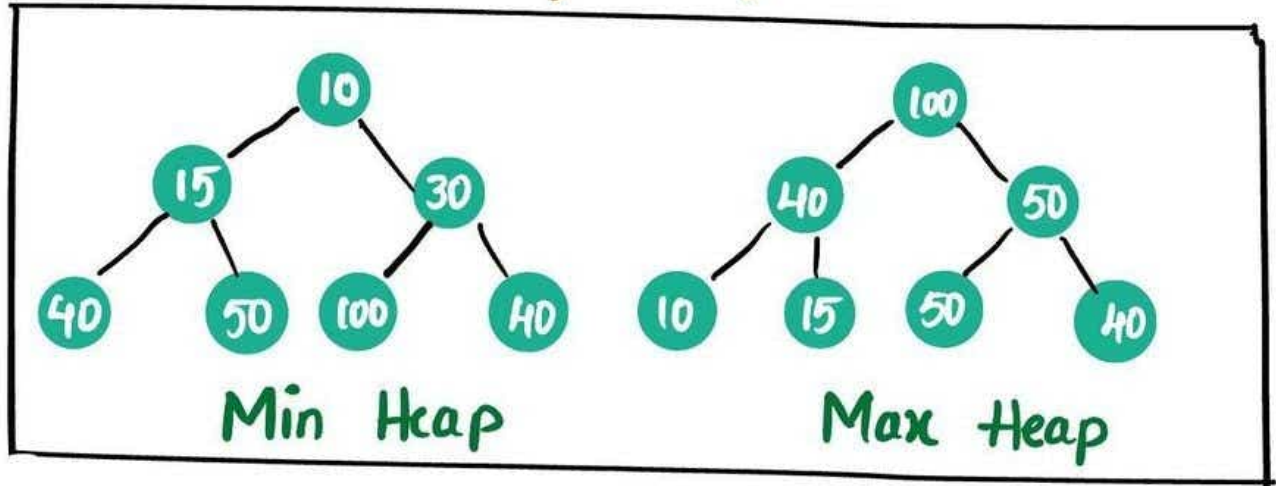
* Stack Data Structure:

Stack is a linear data structure which follows a particular order in which the operations are performed. the order may be LIFO (Last In First Out) or FILO (First In Last Out)

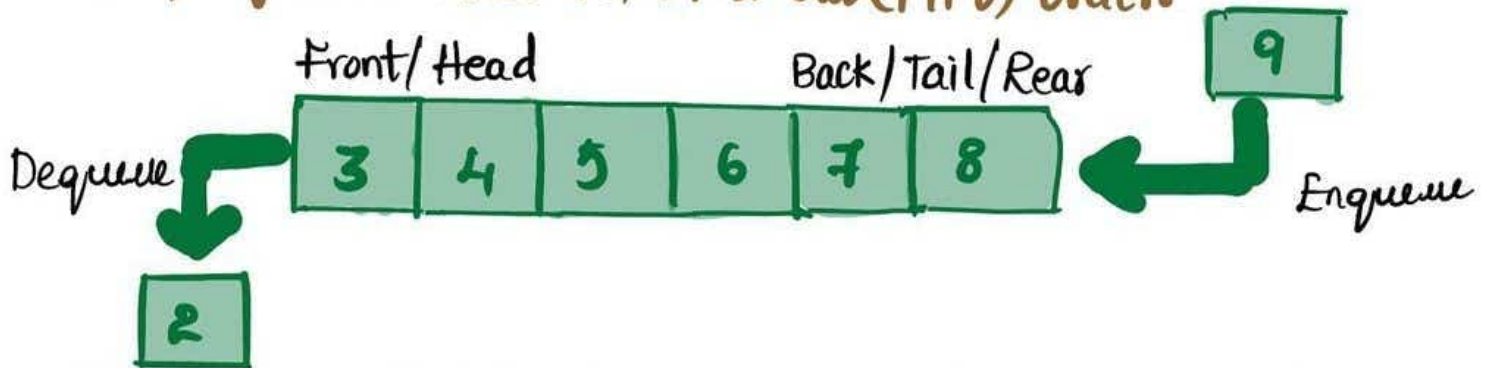


* Heap Data structure.

A heap is a special tree-based data structure in which the tree is a completely binary tree.



* **Queue Data structure:** A queue is defined as a linear data structure that is open at both ends and the operations are performed First in First out (FIFO) order.



* **Hashing Data Structure:** Is a technique of mapping keys, and values into the hash table by using a hash function.

