Introduction to Data structures

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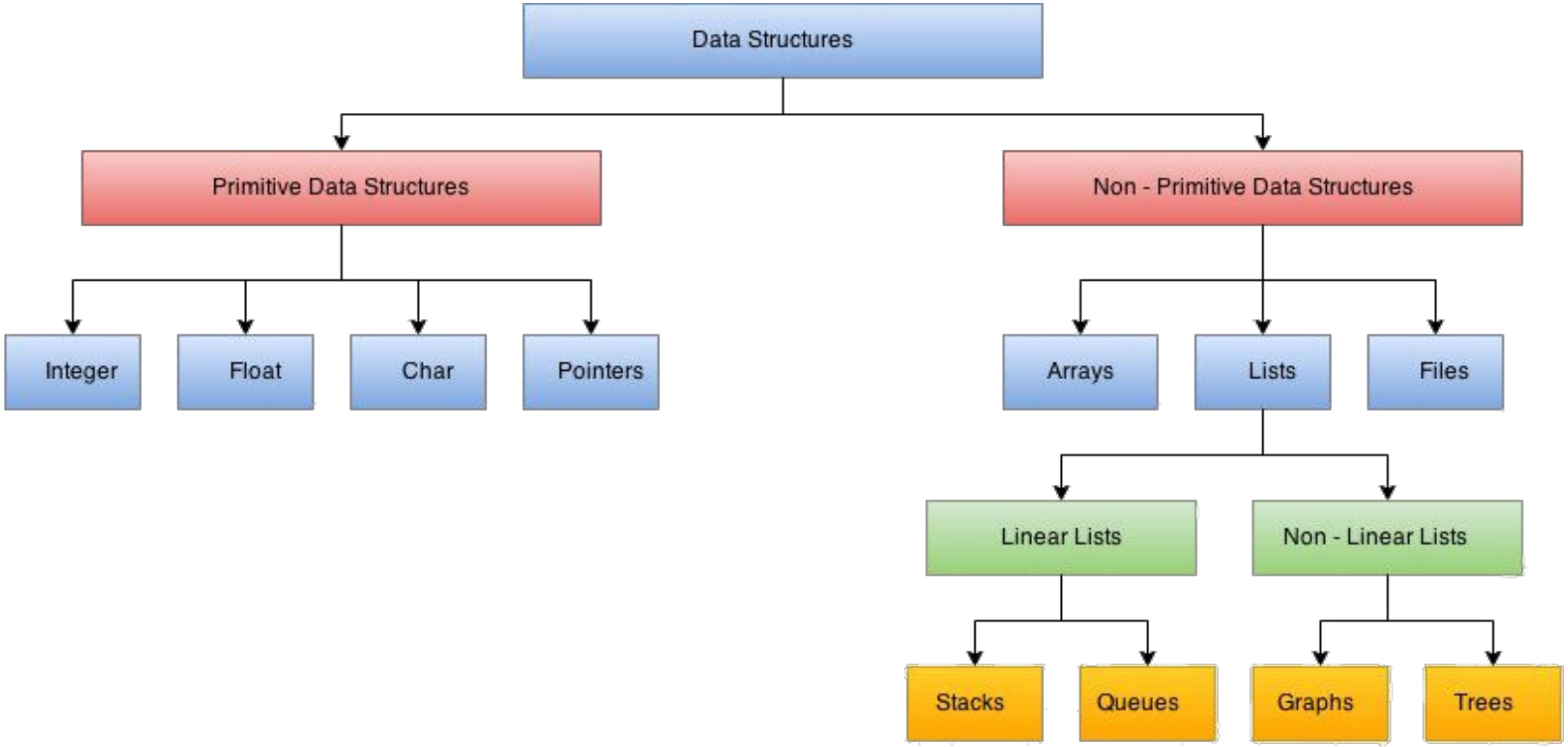
Introduction

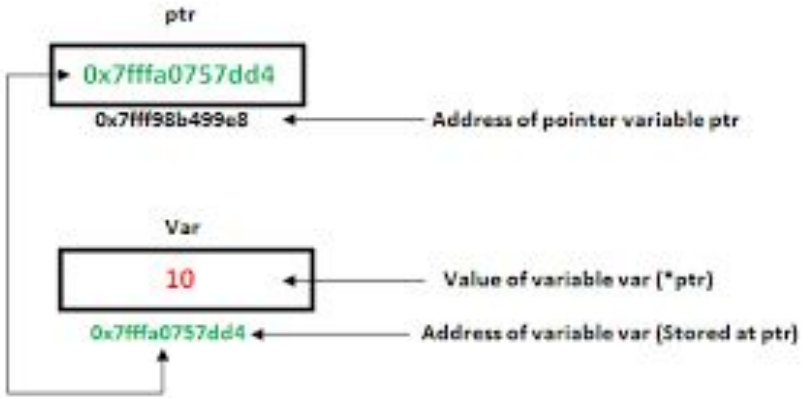
Data structures?

Types

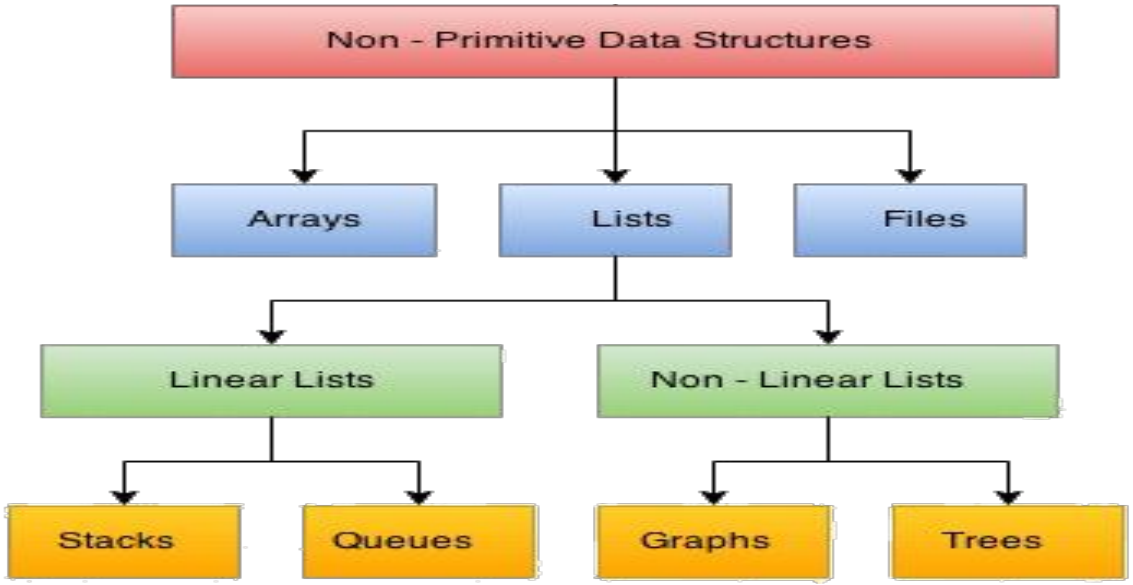

Data Structures
Primitive Data Structures
Non - Primitive Data Structures
Integer
Float
Char
Pointers
Arrays
Lists
Files
Linear Lists
Non - Linear Lists
Stacks
Queues
Graphs
Trees

Primitive data structures

- **Integer** - signed or unsigned whole numbers . Eg: int Variable_name;
- **Float -**Float refers to floating point or real number.
- **Character-** It can store any member of the basic character set.
- **Pointer -** variable that represents a storage location in memory (RAM).

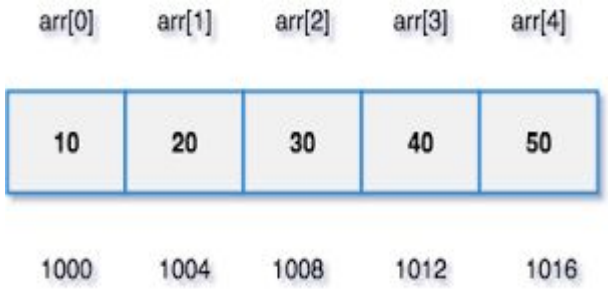


Non primitive Data structures



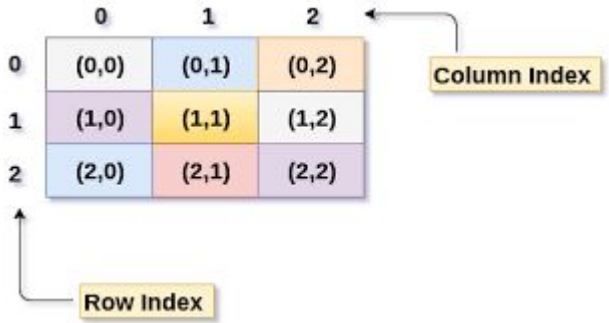
- **Arrays-** It can be linear or multi dimensional

Linear Array



data_type varname[size];
Eg:
int student[5] = {10, 20, 30,40, 50};
int student[] = {**10, 20, 30,40, 50**};

Two dimensional Array

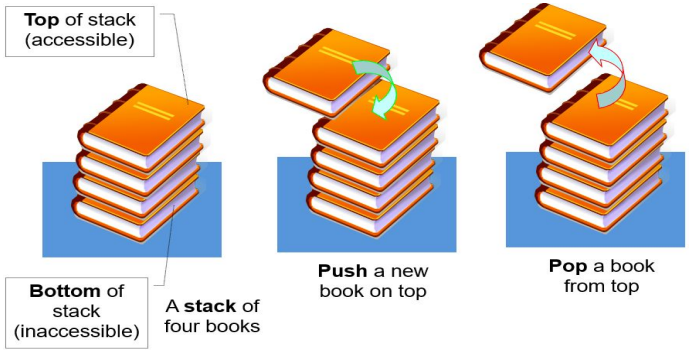


int two_d[3][3];

Lists

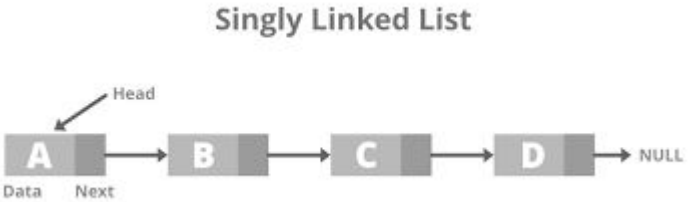
- Linear
  Stack and queue
- Non-Linear
  Graph and Tree- It represents a hierarchical relationship between individual data elements.

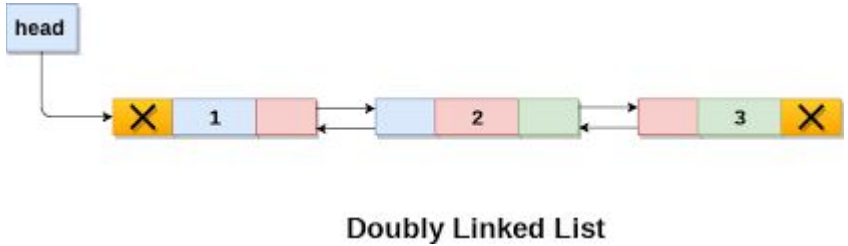
Stack - LIFO



Queue - FIFO

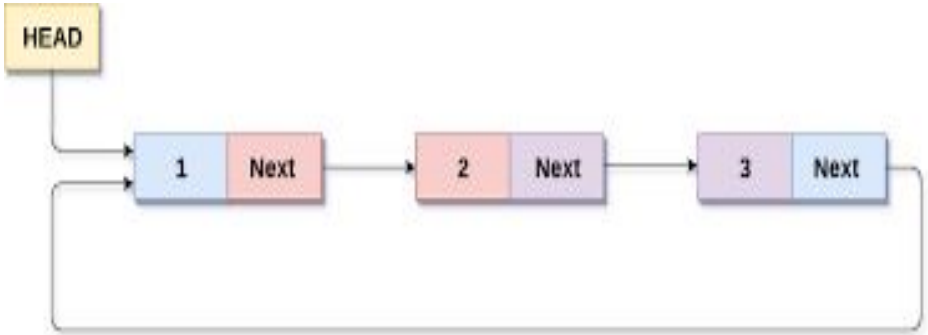
Linked lists



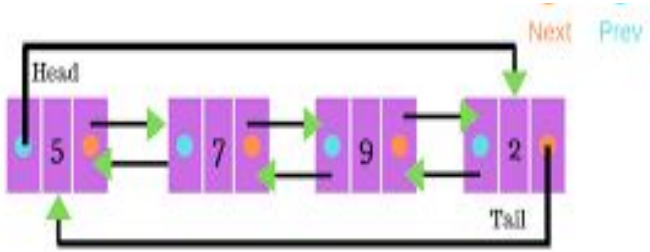



```
struct LinkedList{
    int data;
    struct LinkedList *next;
 };
```

```
struct Node {
   int data;
   struct Node* next;
node in DLL
   struct Node* prev;
};
```



Circular Singly Linked List



Circular Doubly linked list

Operations

Node Creation:

(Singly Linked List)

```
struct node{
        int data;
        struct node *next;};
struct node *head;
```

//Doubly Linked list

```
struct node{
        struct node *prev;
        int data;
        struct node *next;};
struct node *head;
```

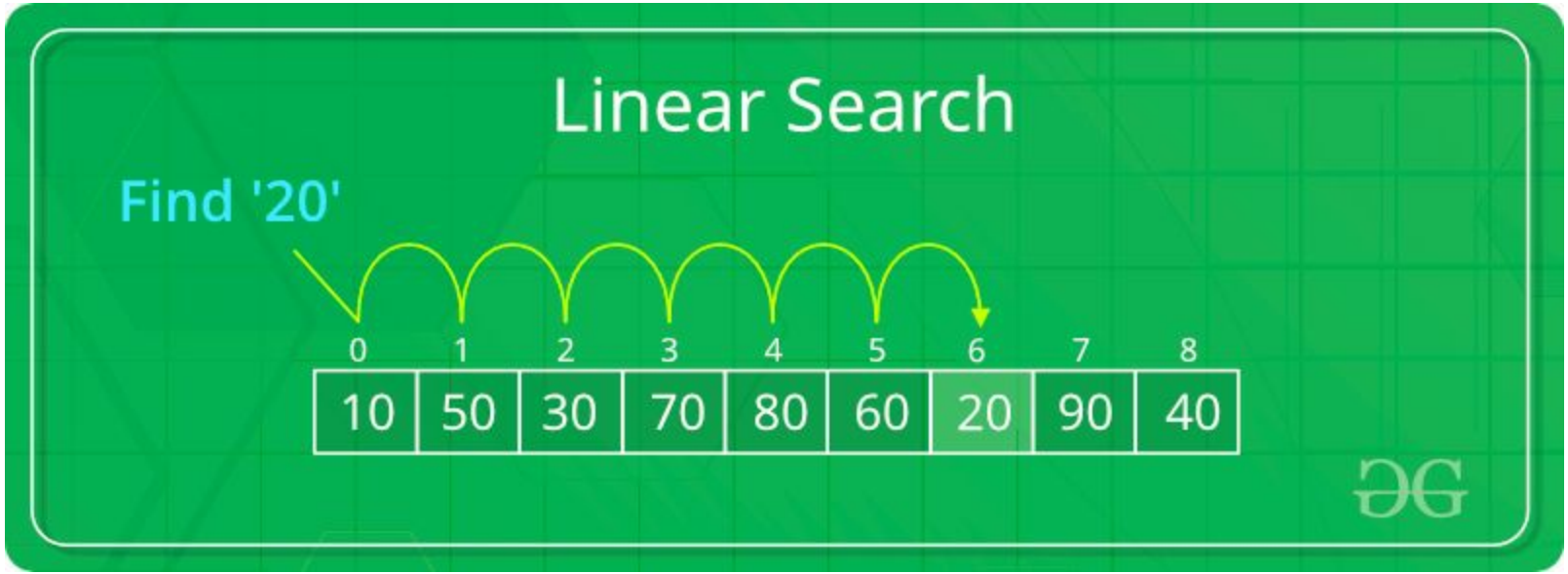
S.No	Operation	Description
1	Insertion at the beginning	Adding the node into the linked list at the beginning.
2	Insertion at the end	Adding the node into the linked list to the end
3	Insertion after specified node	Adding the node into the linked list after the specified node.
4	Deletion at the beginning	Removing the node from beginning of the list
5	Deletion at the end	Removing the node from the end of the list.
6	Deletion at the specified position	Removing the node which is present just after the node containing the given data.
7	Searching	Comparing each node data with the item to be searched and return the location of the item in the list if the item found else return null.
8	Traversing	Visiting each node of the list at least once in order to perform some specific operation like searching, sorting, display, etc

Files

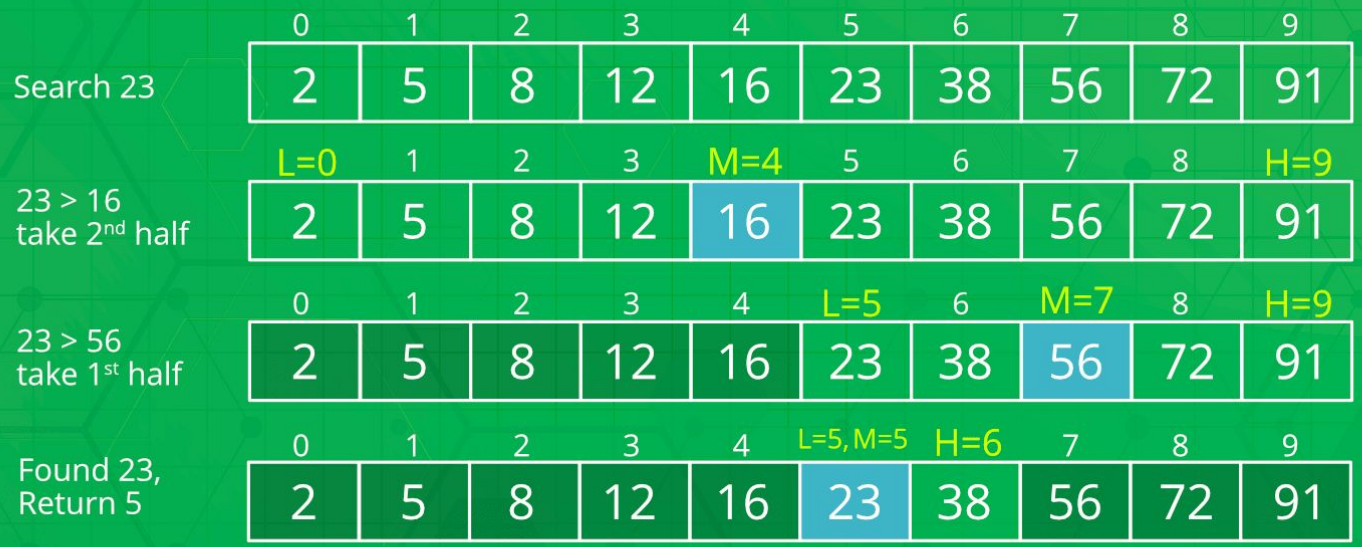
Permanently stored data or information

Search Algorithms

- Sequential search
- Interval search


Linear Search
Find '20'
0 1 2 3 4 5 6 7 8
10 50 30 70 80 60 20 90 40

Binary Search



Problem statement

The health authority needs to know the status (Vaccinated or not vaccinated) of people registered for covid vaccination.

THANK YOU