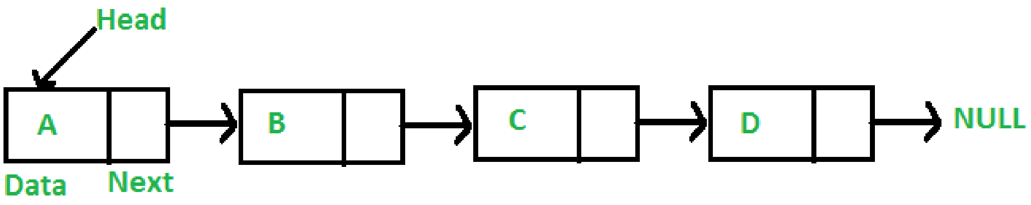
Linked Lists

A linked list is a **linear *dynamic* data structure** used to store elements of similar data type. In case of Linked List elements are **not stored at contiguous memory locations**.

Linked list is a collection of Nodes where nodes linked with each other using pointers. The entry point into a Linked List is called the **head** of the linked list.

Each node is made up of two items:-

1. **Data part :-** is used to store data of any type.
2. **Pointer part :-** is used to store address of next node.

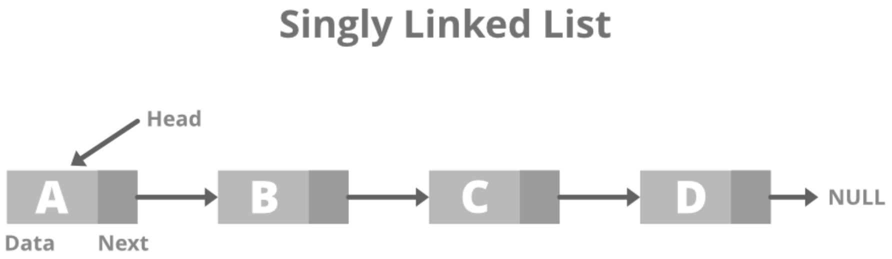


Properties of LL:

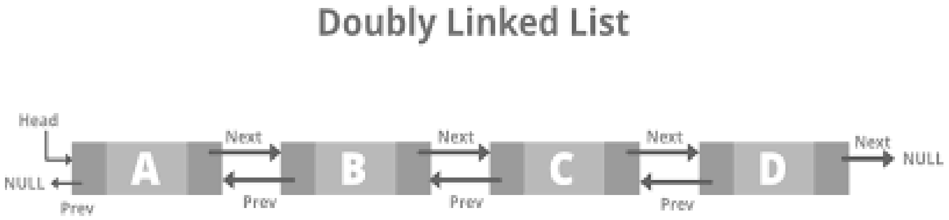
1. Elements are connected by pointers.
2. You can add and remove elements at runtime.
3. Length is not fixed; you can add as much elements as required.
4. ***Nodes in LL takes some extra space for storing pointers to next node.***

Types Of Linked List:

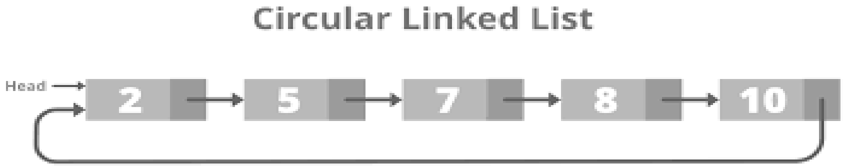
1. **Singly Linked List:-** only move in forward direction and last node points to NULL.



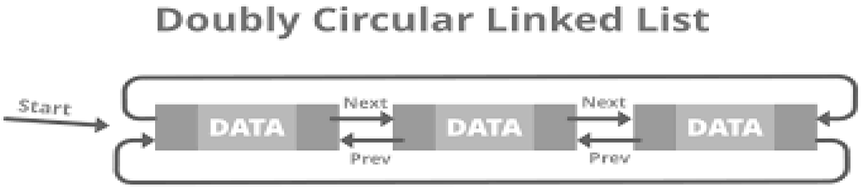
2. **Doubly Linked List:-** it contains two pointer **1st is pointer to next node and 2nd is pointer to previous node**, you can move in both directions forward and backward. And tail -> next and head -> prev points to NULL.



3. **Circular Linked list:-** last node points to head node.



4. **Circular Doubly Linked List:-** same as doubly Linked list but it is circular so last node points to head node, means tail -> next = head and head -> prev = tail.



Now we'll discuss advantages and disadvantages of LL but only important one.

Advantages of LL:-

1. They can expand in constant time, you can insert elements in constant time.

Disadvantages of LL:-

1. Access time of Individual element. There is no random access in case of Linked List because elements are not stored at contiguous memory location. So, if you want to access the elements of Linked list you need to travers the whole linked list which take O(n) time complexity in the worst case.
2. Extra space to store pointers.