Data Structures

lecture 10

12-10-2022

Last Session Quick Revision

Dynamic Memory Allocation

- Refers to allocating memory on heap
- C uses special functions for it
  - malloc( )
  - calloc( )
- Heap Memory mgmt is not automatic:
  - if you allocate memory on heap manually (malloc/calloc)
  - You must de allocate it manually (free)

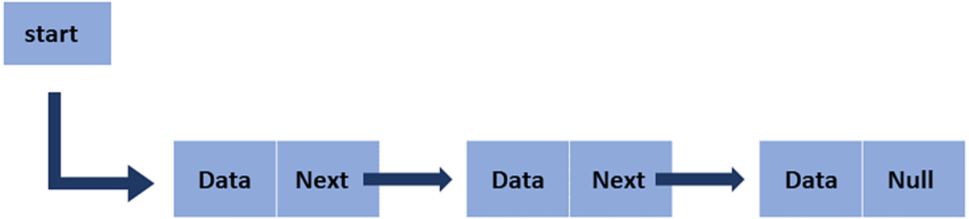
malloc

- Allocates the specified size of memory on heap.
- Starting address of allocated memory will be stored on stack in pointer
- ptr = (castType*) malloc(size in bytes);

Unit 2: Linked List

What is Linked List

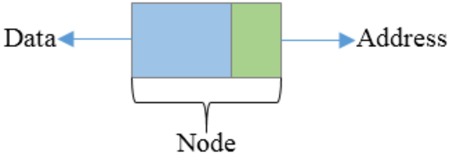
- Linear Data Structure
- consists series of connected elements called nodes.

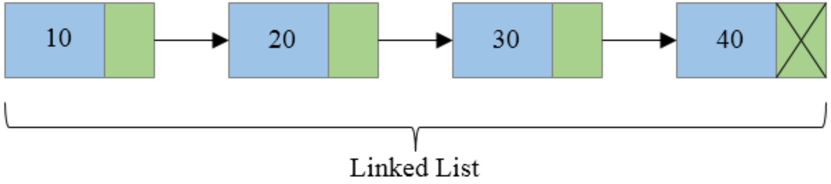


Node in the linked List

- Consists two parts

1. Data part: stores actual info on that node
2. Next Part: contains address of next node





General Observation of Linked List

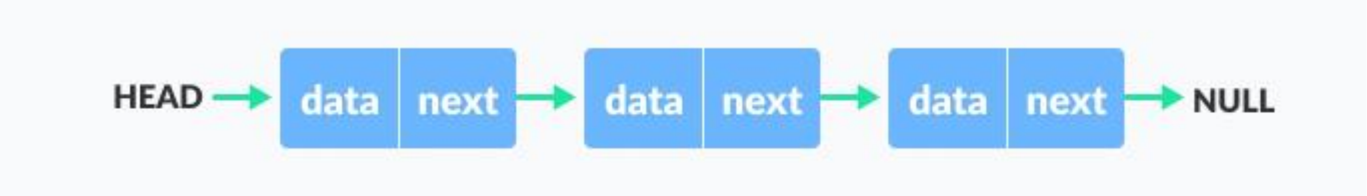
- Contains pointer to first node called start/head
- Each Node carries a data field and a link field called next.
- Each Node is linked with its next link using its next link.
- Last Node carries a link as NULL to mark the end of the list.

Linked List Types

- Simple Linked List (Singly Linked List)
- Doubly Linked List
- Circular Linked List
  - Singly circular
  - Doubly circular

Singly Linked List

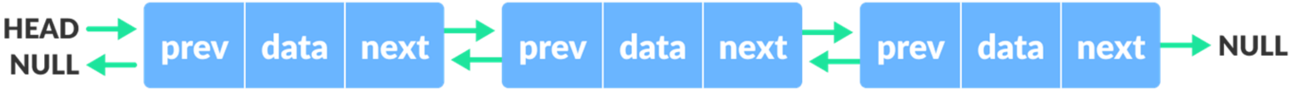
- Simple Linked List (Singly Linked List)
  - One data and One next



  - Item navigation is forward only.

Doubly Linked List

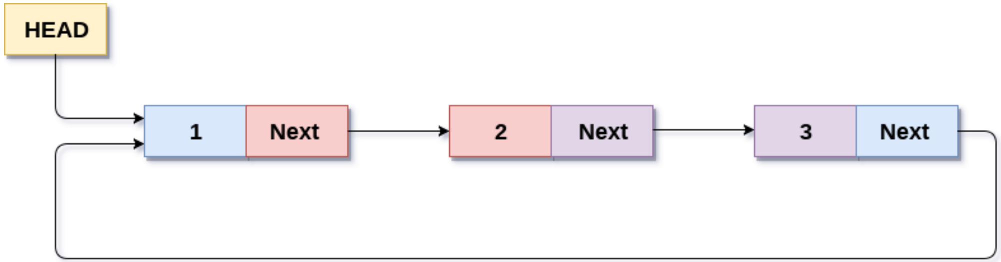
- Doubly Linked List
  - One data one previous and one next



  - can be navigated forward and backward.

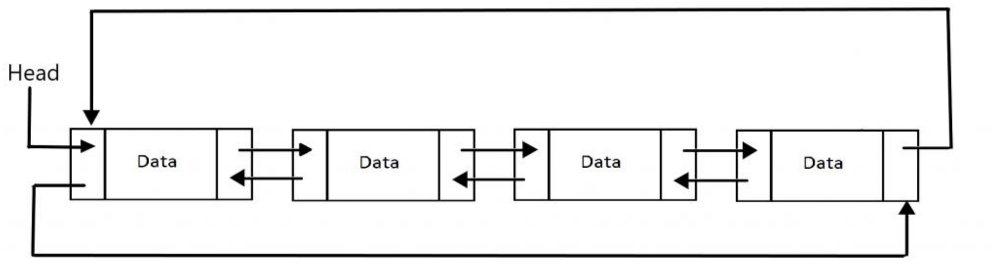
Singly Circular Linked List

- Last node contains address of first node.



Doubly Circular Linked List

- Last node contains address of first node and vice versa.



Basic Operations on the Linked List

- **Insertion** – Adds an element in the list.
- **Traverse /Display** – visit every element **and display the complete list.**
- Retrieval / Search – Searches an element using the given key.
- Delete – Deletes an element

Insert Operation: Insert at the end