Linked List (C++)

Linked Lists:

- Like arrays, Linked List is **a linear data structure**.
- Unlike arrays, linked list elements are not stored at a contiguous location;
- the elements are l**inked using pointer**s

How does linked list represented?

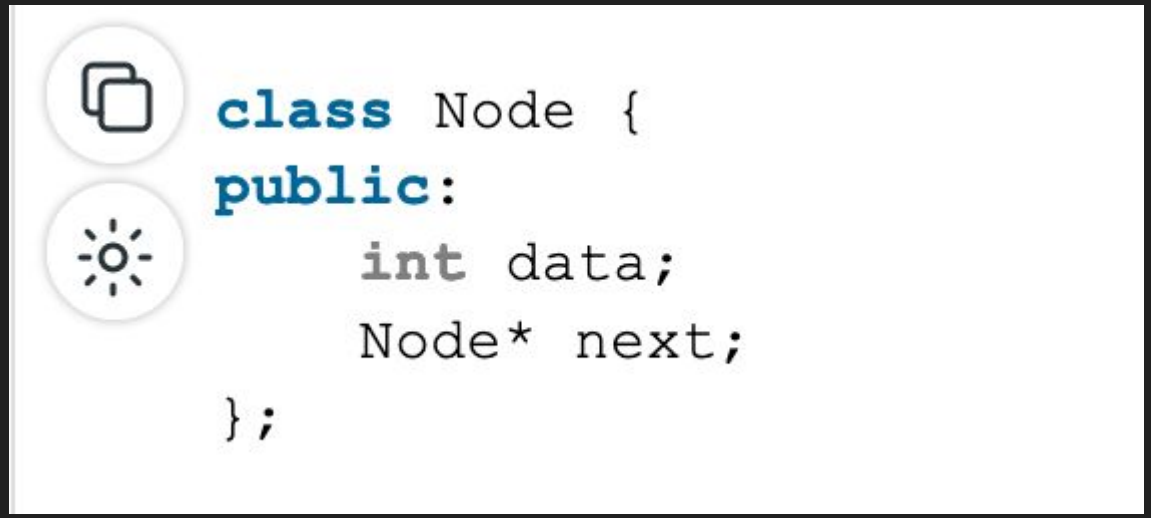
A linked list is represented by a pointer to the first node of the linked list. The first node is called the head. If the linked list is empty, then the value of the head is NULL.

Each node in a list consists of at least two parts:

1) data

2) Pointer (Or Reference) to the next node

Example of node in the linked list



```
#include <bits/stdc++.h>
using namespace std;

class Node {
public:
    int data;
    Node* next;
};

// Program to create a simple linked
// list with 3 nodes
int main()
{
    Node* head = NULL;
    Node* second = NULL;
    Node* third = NULL;

    // allocate 3 nodes in the heap
    head = new Node();
    second = new Node();
    third = new Node();
```

```
  head->data = 1; // assign data in first node
  head->next = second; // Link first node with
  // the second node

// assign data to second node
second->data = 2;

// Link second node with the third node
second->next = third;

/* data has been assigned to the data part of
block (block pointed by second). And next
pointer of the second block points to the thir
block. So all three blocks are linked.

head          second          third
    |             |             |
    |             |             |
+---+---+     +---+---+     +----+----+
| 1 | o-----> | 2 | o-----> | # | # |
+---+---+     +---+---+     +----+----+     */

third->data = 3; // assign data to third node
third->next = NULL;

    return 0;
}
```

Simple Linked List example

Traversing Linked List

```cpp
// A simple C++ program for traversal of a linked list
#include <bits/stdc++.h>
using namespace std;

class Node {
public:
    int data;
    Node* next;
};

// This function prints contents of linked list
// starting from the given node
void printList(Node* n)
{
    while (n != NULL) {
        cout << n->data << " ";
        n = n->next;
    }
}
```

```cpp
int main()
{
    Node* head = NULL;
    Node* second = NULL;
    Node* third = NULL;

    // allocate 3 nodes in the heap
    head = new Node();
    second = new Node();
    third = new Node();

    head->data = 1; // assign data in first node
    head->next = second; // Link first node with second

    second->data = 2; // assign data to second node
    second->next = third;

    third->data = 3; // assign data to third node
    third->next = NULL;

    printList(head);

    return 0;
}
```