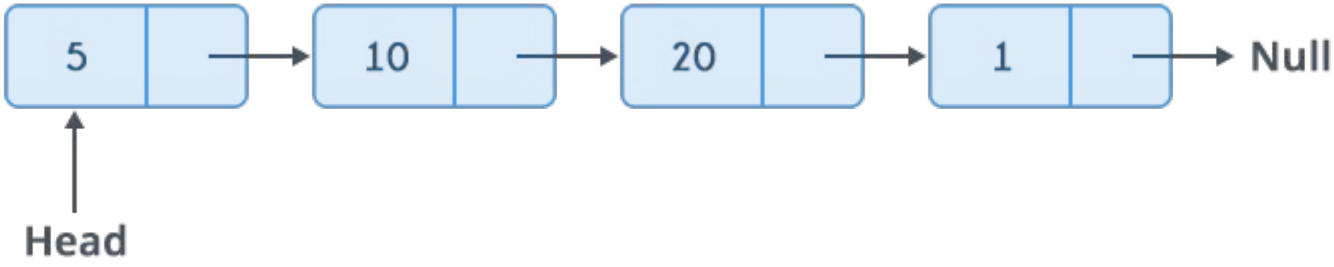
Competitive Programming

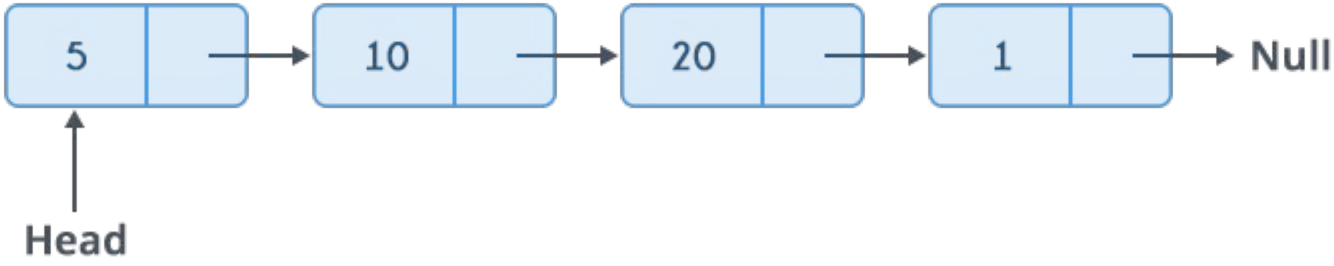
Lec 6
Linked List



Linked List

- Each element is a separate object
- elements are not stored at contiguous location; the elements are linked using pointers.

- Two items,
- 1. Data
- 2. Reference to next Data item



Click here for more information

Linked List C++ Implementation

```cpp
struct Node {
    int data;
    Node* next;            // reference to Next Node

    // This is constructor
    // this will be called when you declare
    // Node object first time
    Node(int x){
        data = x;
        next = NULL;
    }
};
```

Linked List java Implementation

```
class Node {
        int data;
        Node next;

         Node(int d) { // Constructor
            data = d;
            next = null;
        }
}
```

This Implementation will also work in c++.

Linked List python Implementation

```python
class ListNode:
    def __init__(self, x): #constructor
        self.val = x
        self.next = None
```

Finding middle element in a linked list

Given a singly linked list of N nodes.
The task is to find middle of the linked list.
For example,
if given linked list is

1 -> 2 -> 3 -> 4 -> 5

then output should be 3.

Reverse Linked List

Reverse a linked list. Do it in-place and in one-pass.

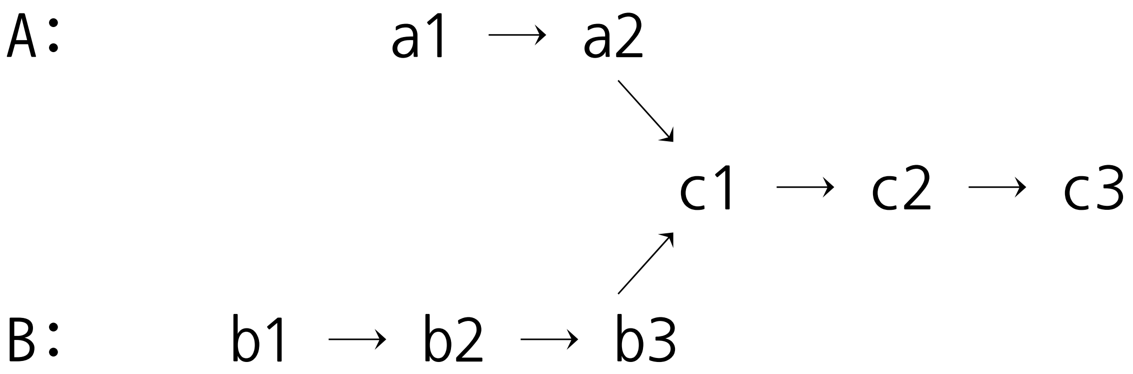
For example:
Given 1->2->3->4->5->NULL,

return 5->4->3->2->1->NULL.

Intersection of Linked Lists

Write a program to find the node at which the intersection of two singly linked lists begins.

For example, the following two linked lists:



A: a1 → a2

c1 → c2 → c3

B: b1 → b2 → b3

begin to intersect at node c1.

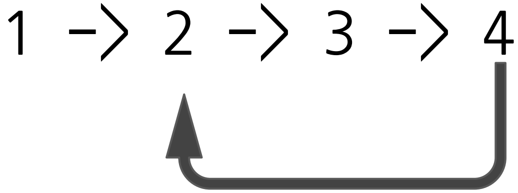
List Cycle

Given a linked list, return the node where the cycle begins. If there is no cycle, return null.

Try solving it using constant additional space.

Example :

Input :



1 -> 2 -> 3 -> 4

Return the node corresponding to node 2.

List Cycle

Two methods,

1. Hash Map

2. Slow & Fast pointer

Homework

Problem Name	Difficulty Level
Rotate a Linked List	Easy
Palindrome List	Easy
Flattening a Linked List	Medium
Add Two Numbers as Lists	Easy
Merge Two Sorted Lists	Medium