

LeetCode

A project dedicated to DS&A

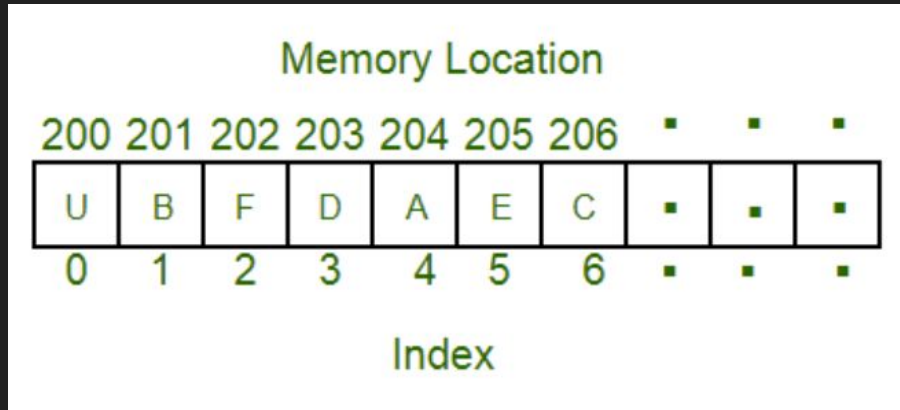
Agenda

1. Linked Lists
2. Example Problems
3. Group Problems!

Linked List

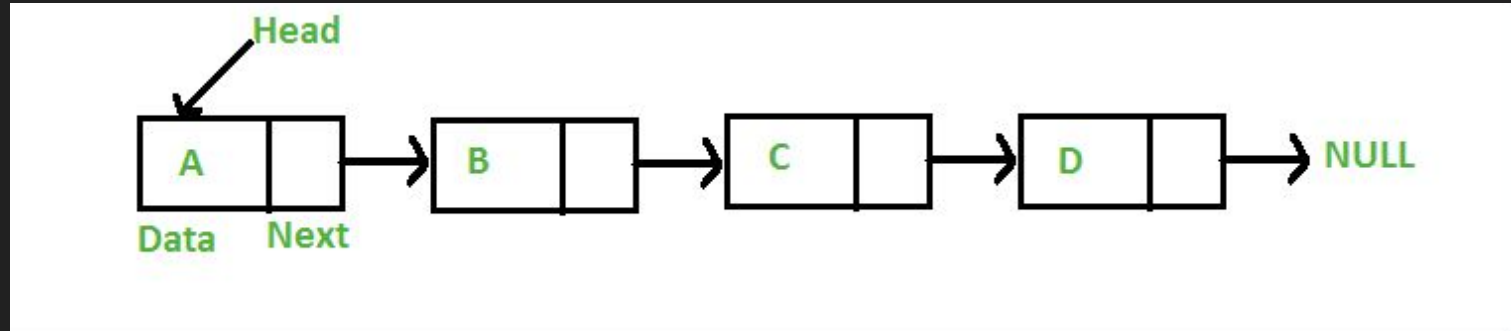
What is an array?

- A collection of items stored contiguously in memory
- Each element in an array can be accessed using its index **because the elements are stored contiguously**
- The memory must be allocated, so the size is fixed
- Insertion and deletion is expensive



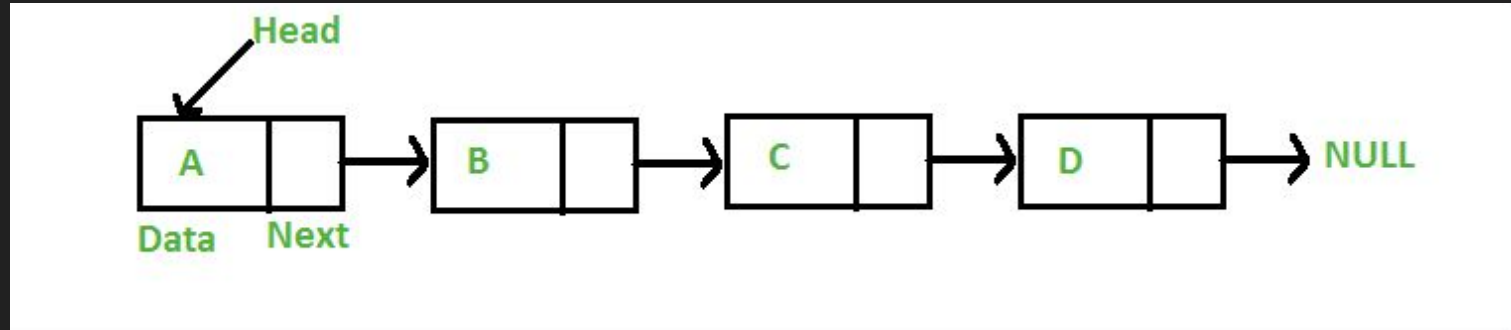
What is a Linked List?

- A linked list is a linear data structure that is not stored contiguously
 - i.e. the elements in the list are not stored next to each other in memory



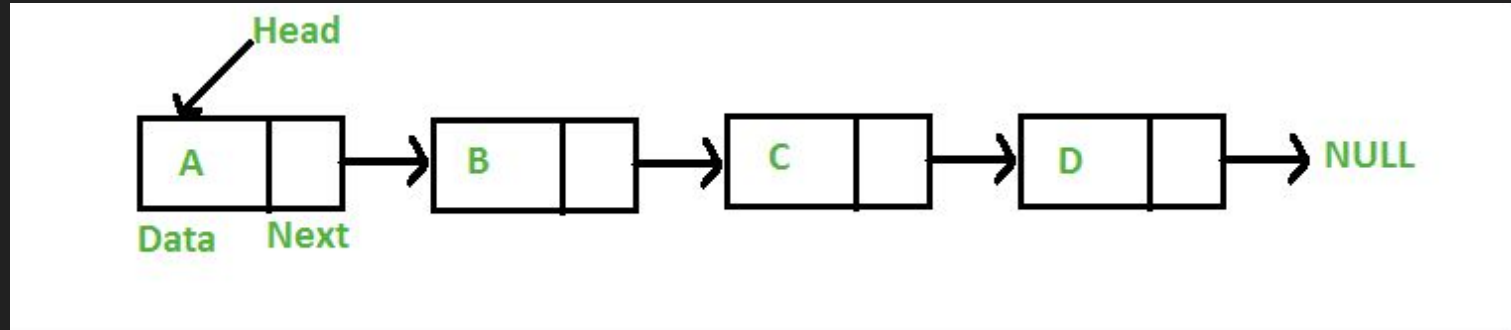
Advantages of Linked Lists

- The size of a linked list is not fixed
- Insertion and deletion is cheap



Drawbacks of Linked Lists

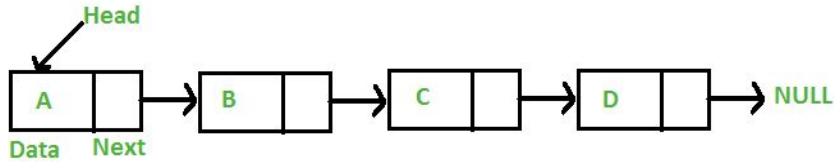
- Random access is **not** allowed
- Extra space is allocated with each element because it has to point to the next node



Basic Operations

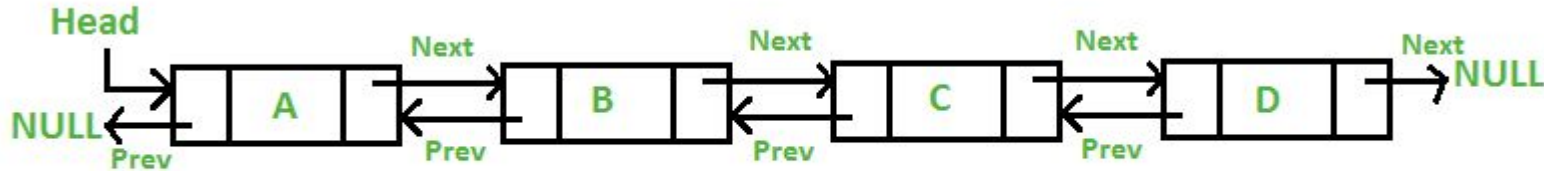
- Insertion
 - Beginning
 - At an insertion point
 - Push element to end of list
- Deletion
- Search
- Print

Types of Linked Lists



Single Linked Lists

Circular Linked Lists



Doubly Linked Lists

Example Problems

Simple Linked List - Step 1

- Create a linked list that can:
 - Append a node to the end of the list
 - Remove a node from the end of the list

Simple Linked List - Step 2

- Add functionality to:
 - Print the linked list
 - Search for a target

Example Code: Node Class

- Node Template:

```
class Node:
    def __init__(self, val=0, next=None, prev=None) -> None:
        self.val = val
        self.next = next
        self.prev = prev # For doubly-linked lists
```

Group Problems!!!

Example Problem #1 - LeetCode 21

- Merge two sorted linked lists
 - Non-decreasing order
 - Lists may not be the same length
 - Lists could be empty
- <https://leetcode.com/problems/merge-two-sorted-lists/>

Example Problem #2 - LeetCode 206

- Reverse a linked list
 - Return the head (the original tail)
- <https://leetcode.com/problems/reverse-linked-list/>

Until next time...

Keep practicing

Practice Problems

- <https://neetcode.io/practice>

- Try working on the
Linked List questions in the
“NeetCode ALL” tab

Linked List (2 / 22)				
Status	Problem	Difficulty	Video Solution	Code
<input checked="" type="checkbox"/>	Reverse Linked List	Easy		Python
<input checked="" type="checkbox"/>	Merge Two Sorted Lists	Easy		Python
<input type="checkbox"/>	Palindrome Linked List	Easy		
<input type="checkbox"/>	Remove Linked List Elements	Easy		
<input type="checkbox"/>	Remove Duplicates From Sorted List	Easy		
<input type="checkbox"/>	Intersection of Two Linked Lists	Easy		
<input type="checkbox"/>	Reorder List	Medium		Python
<input type="checkbox"/>	Remove Nth Node From End of List	Medium		Python
<input type="checkbox"/>	Copy List With Random Pointer	Medium		Python
<input type="checkbox"/>	Add Two Numbers	Medium		Python
<input type="checkbox"/>	Linked List Cycle	Easy		Python
<input type="checkbox"/>	Find The Duplicate Number	Medium		Python
<input type="checkbox"/>	Swap Nodes In Pairs	Medium		
<input type="checkbox"/>	Sort List	Medium		
<input type="checkbox"/>	Partition List	Medium		
<input type="checkbox"/>	Rotate List	Medium		
<input type="checkbox"/>	Reverse Linked List II	Medium		
<input type="checkbox"/>	Design Circular Queue	Medium		
<input type="checkbox"/>	Insertion Sort List	Medium		
<input type="checkbox"/>	LRU Cache	Medium		Python
<input type="checkbox"/>	Merge K Sorted Lists	Hard		Python

Try 2-3 of these!

If easy is TOO easy,
try 2-3 of these!

More Problems

Easy (supposedly):

- <https://leetcode.com/problems/palindrome-linked-list/>

Easier (but still hard):

- <https://leetcode.com/problems/linked-list-cycle/> (One of Andrew's favorite problems)

Harder (will take more time and probably Googling):

- <https://leetcode.com/problems/lru-cache/>
 - Not actually that hard, but is something that is actually used at a low level (CPU cache)

Q&A Time?