LeetCamp

A project dedicated to DS&A

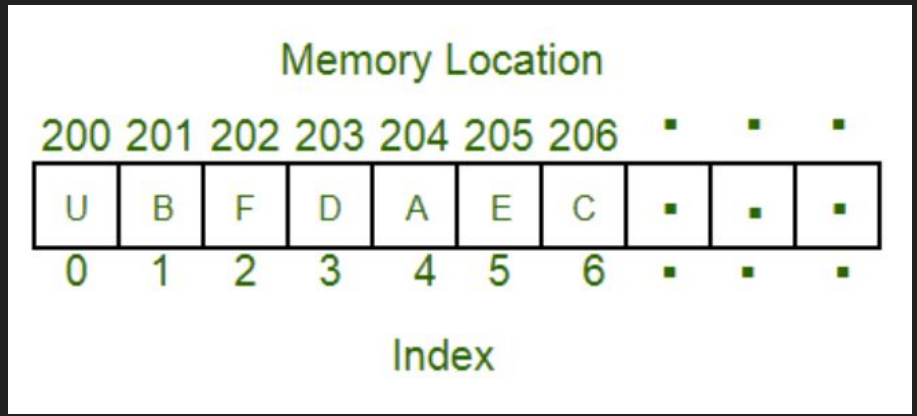
Agenda

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

Linked List

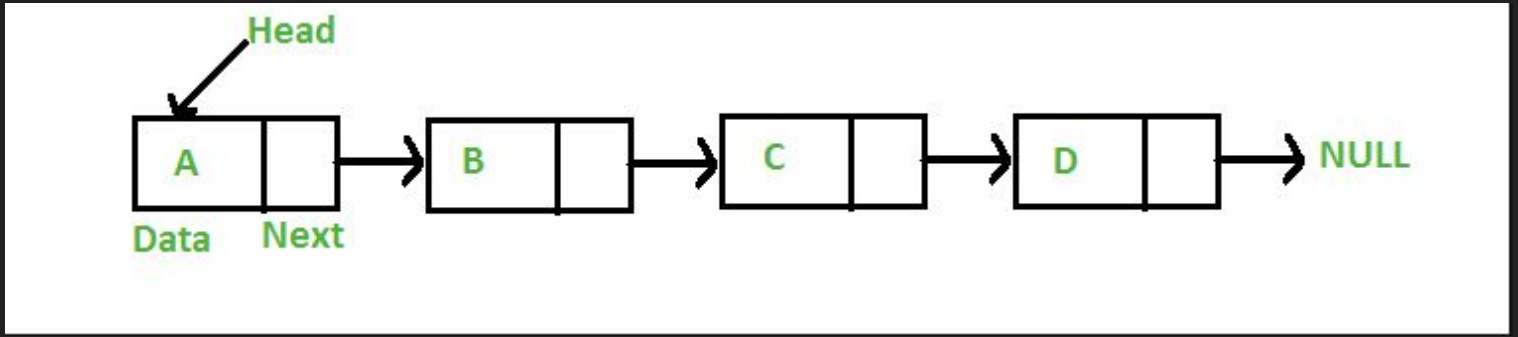
What is an array?

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



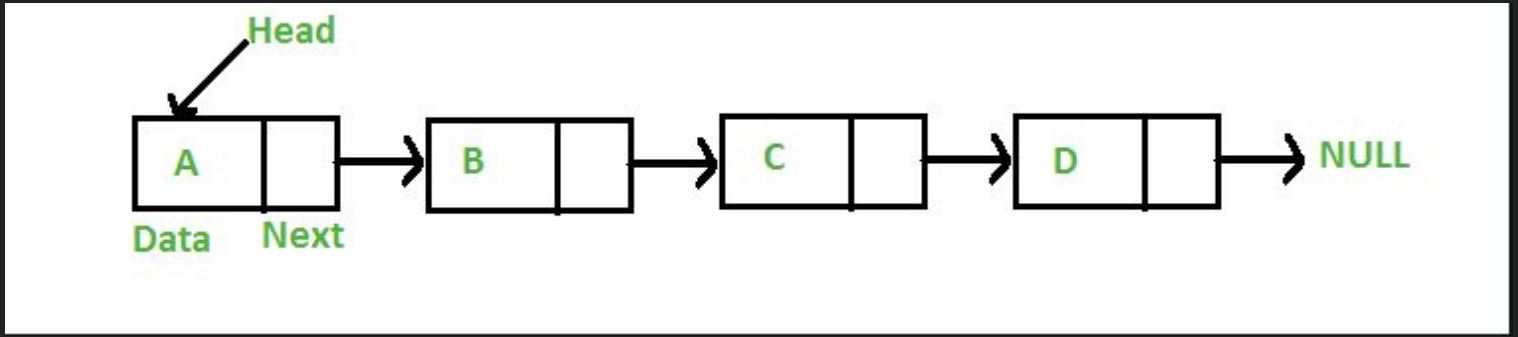
What is a Linked List?

- 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



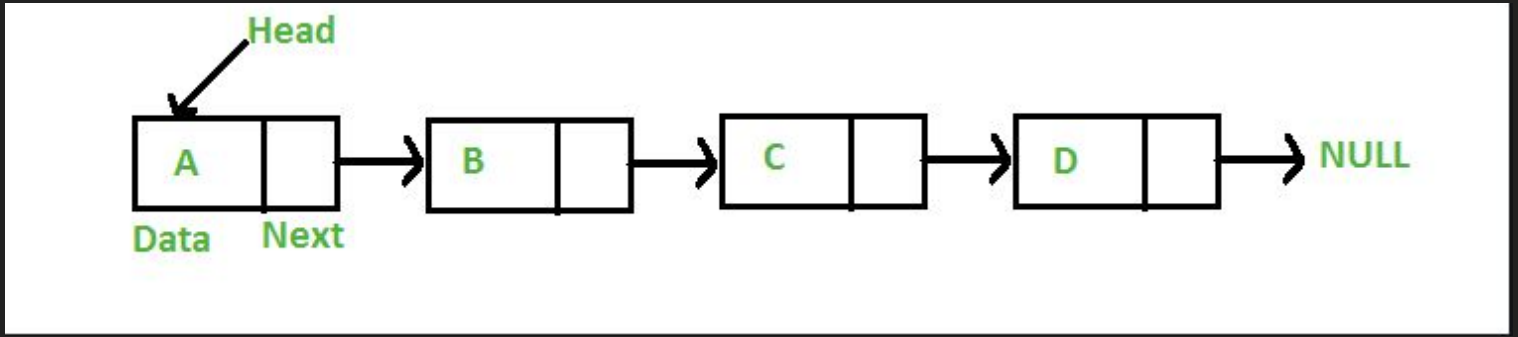
Advantages of Linked Lists

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



Drawbacks of Linked Lists

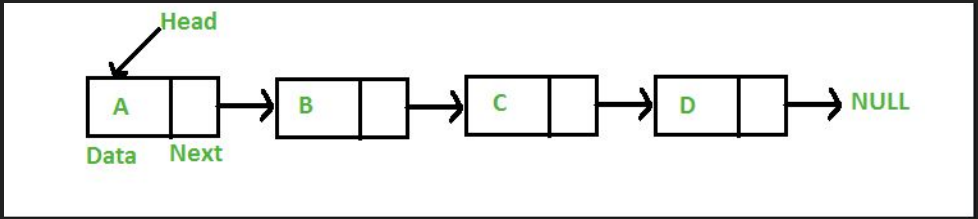
- Random access is **not** allowed
- Extra space is allocated with each element because it has to point to the next node



Basic Operations

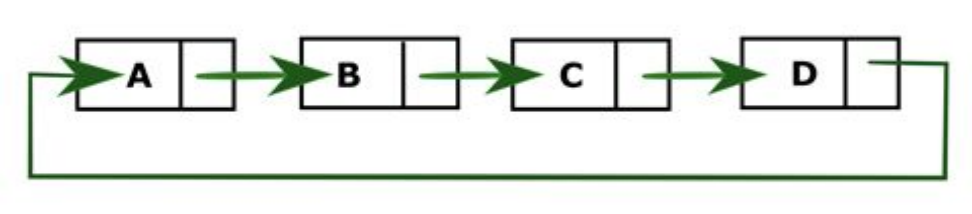
- Insertion
  - Beginning
  - At an insertion point
  - Push element to end of list
- Deletion
- Search
- Print

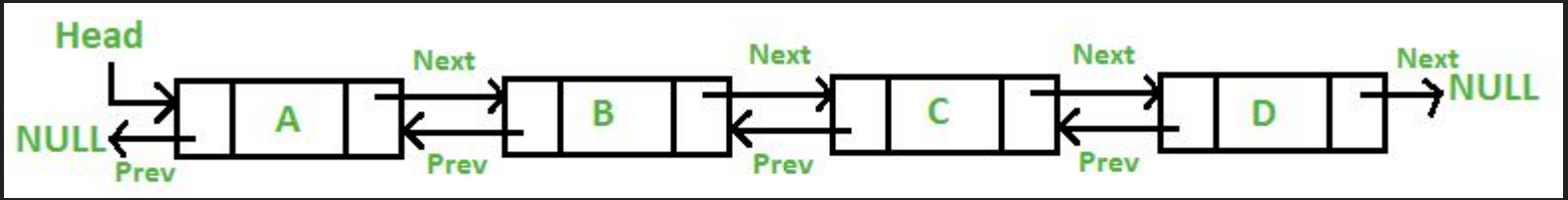
Types of Linked Lists



Single Linked Lists

Circular Linked Lists





Doubly Linked Lists

Example Problems

/home/afennell
/projects/leetca
mp4/LL.py

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

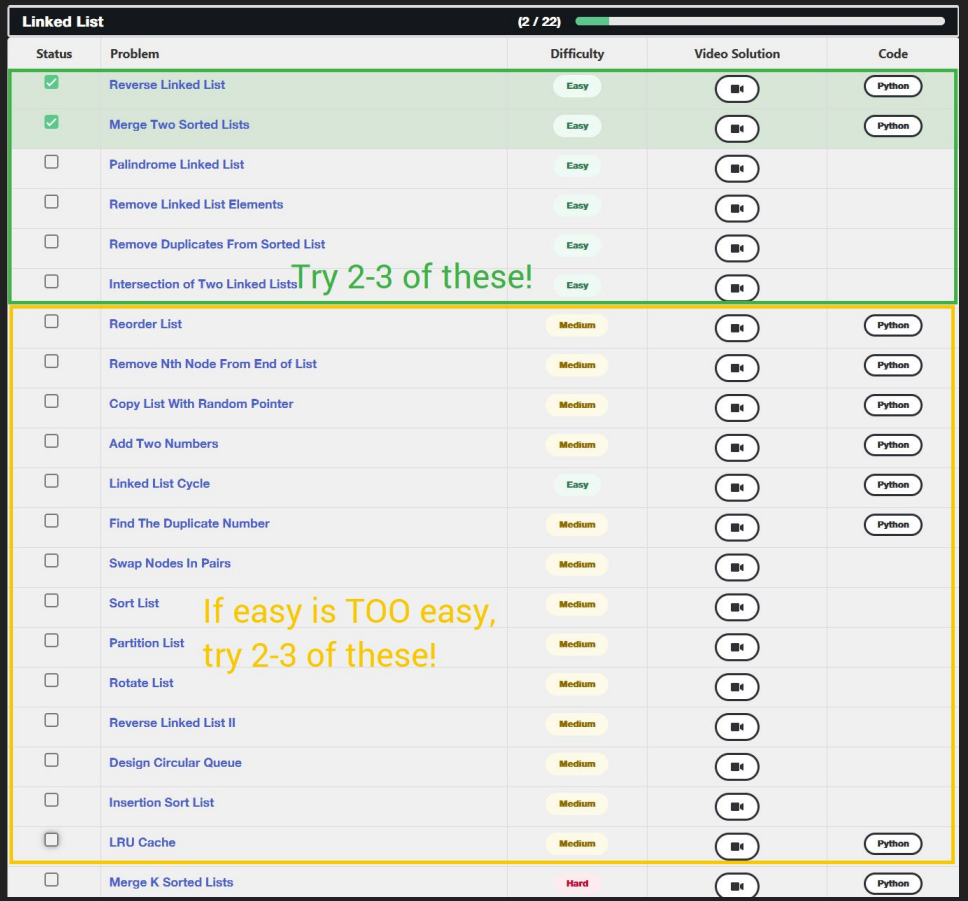
- Reverse a linked list
  - Return the head (the original tail)
- https://leetcode.com/problems/reverse-linked-list/

Until next time...
Keep practicing

Practice Problems

- https://neetcode.io/practice

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



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?