Jgi cb Jgqrq

Data Structures
Week #2

Practice

- Go over Geeks or Geeks Singly Linked Lists

  https://www.geeksforgeeks.org/data-structures/linked-list/singly-linked-list/

- Practice implementing a Singly Linked List on Leet Code

  https://leetcode.com/problems/design-linked-list/

What is a Linked List?

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Individual elements (nodes) that each hold two pieces of information:

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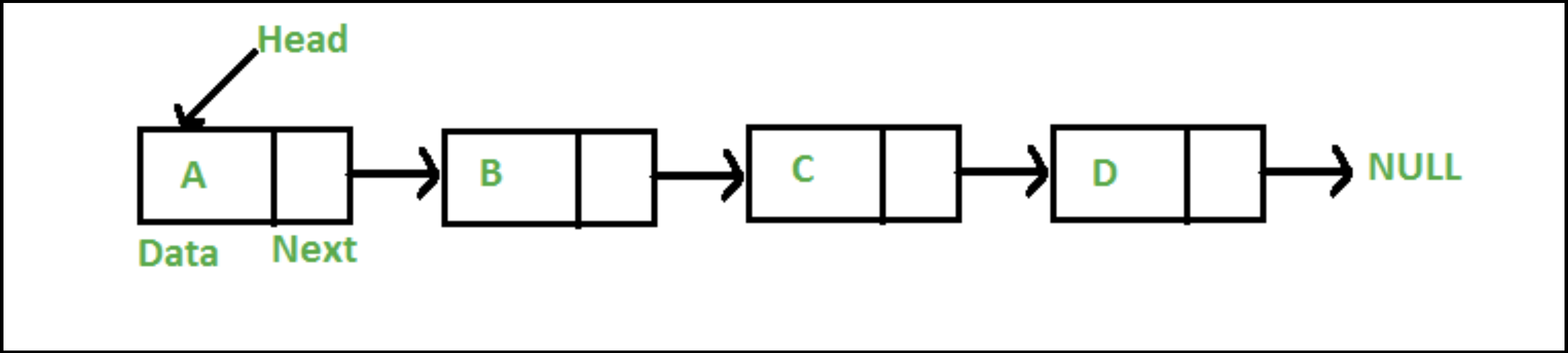
Individual elements (nodes) that each hold two pieces of information:

1) data (integer, string, anything!)

2) reference to the next node


Head
A
B
C
D
NULL
Data
Next

```java
class LinkedListNode {
    String data;
    LinkedListNode next;

    LinkedListNode(String data) {
        this.data = data;
    }
}
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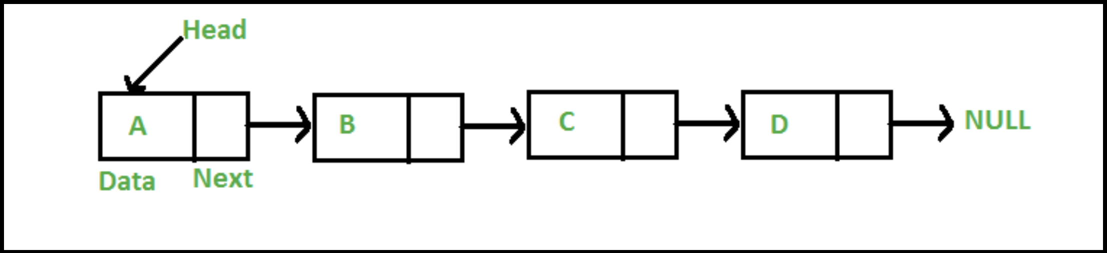

```java
LinkedListNode head = new LinkedListNode("a");
```

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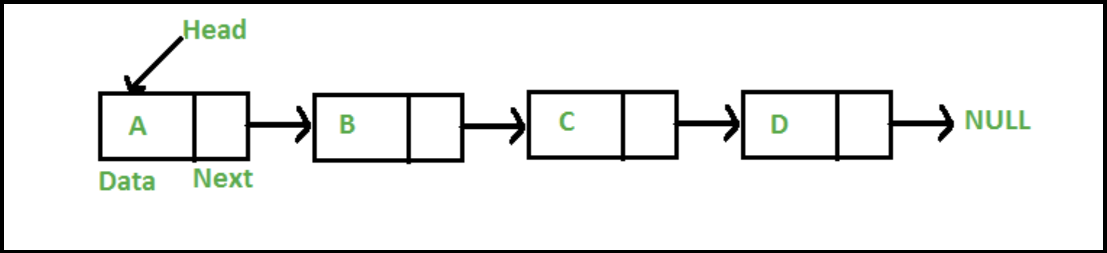

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LinkedListNode n2 = new LinkedListNode("c");
LinkedListNode n3 = new LinkedListNode("d");
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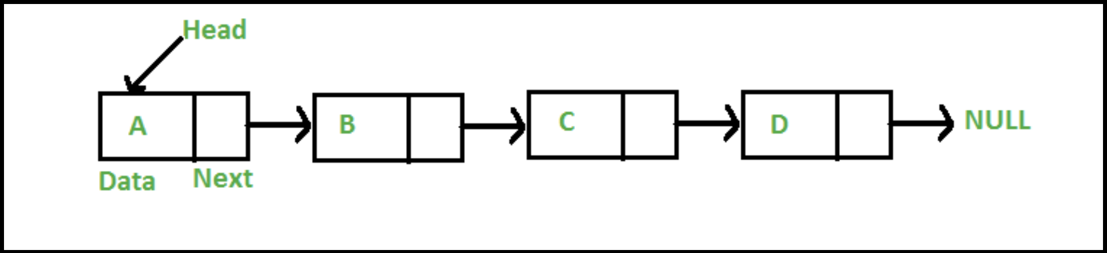

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head.next  = n1;
n1.next = n2;
n2.next = n3;
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Web browser’s history (previous / next page)

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Memory management (blocks of memories)

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Memory management (blocks of memories)

Hash tables (resolving collisions)

Types of Linked Lists

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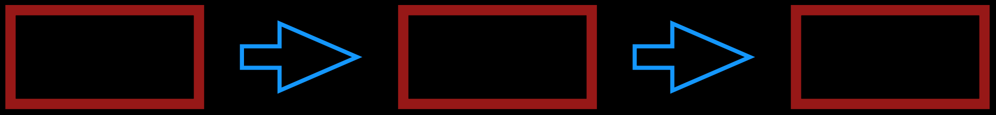
Singly linked



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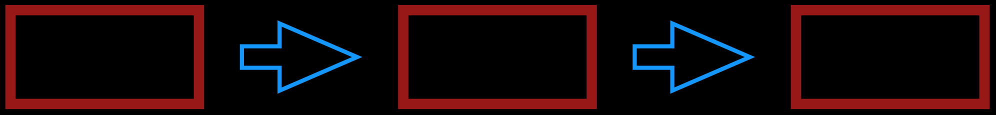
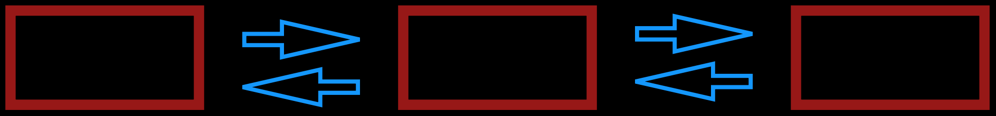


Doubly linked



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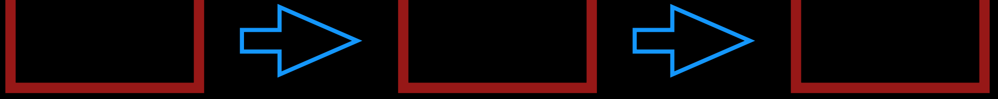

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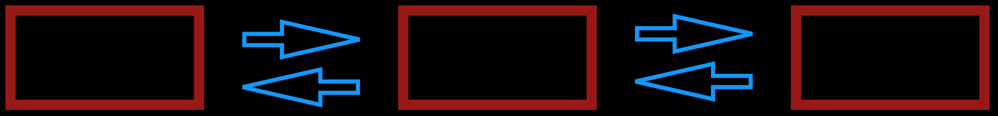
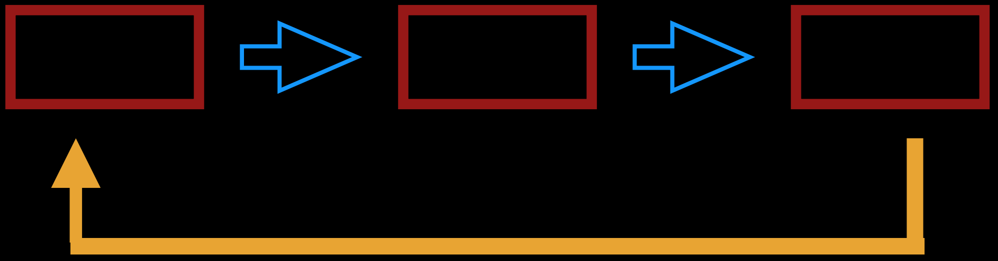


Circularly linked



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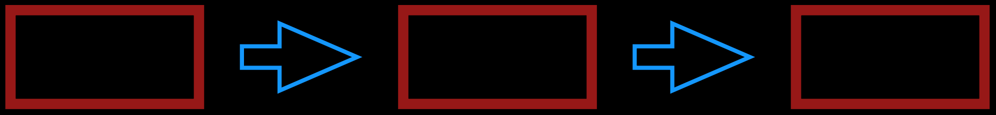

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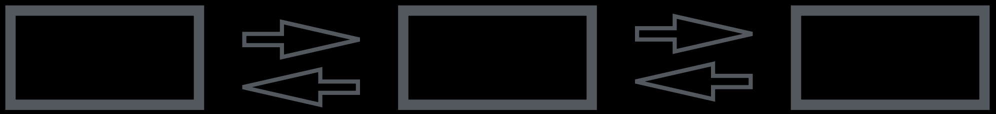

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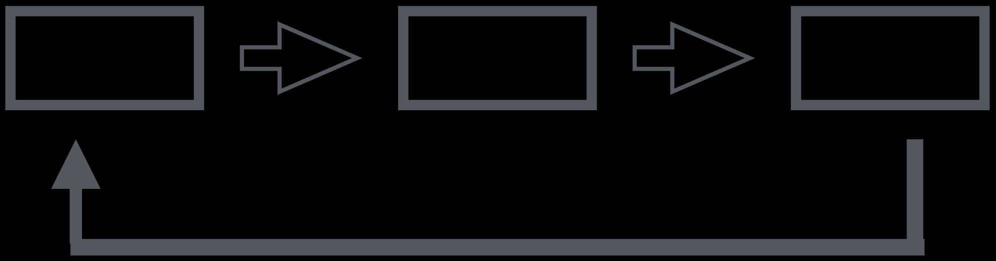

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https://www.geeksforgeeks.org/linked-list-set-1-introduction/

Linked List Tips and Tricks

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Take multiple passes through the linked list

- get length
- save other information about contents

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Two pointers
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Dummy node
- helpful for preventing errors when returning ‘head’

Understand

Match

Pseudocode / Plan

Implement

Review

Evaluate

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If you don’t understand the problem completely, you can’t solve it correctly

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You are often given vague questions to test your ability to gather requirements

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Asking clarifying questions

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Asking clarifying questions

- is `x` input possible?
- will the input always be sorted?
- are there any space and time constraints?
- given `x` input, is the expected output `y`?

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Think about what data structures might be helpful for the problem (hash map, queue, binary search, …)

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Think about what data structures might be helpful for the problem (hash map, queue, binary search, …)

See if there are any specific techniques that you can apply (ie : using a dummy node, or taking multiple passes)

Plan / Pseudocode

Start to figure out how you would solve the problem

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Can you create any ‘magic’ helper methods that would simplify the solution? (ie : getLength(), reverse())

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Can you create any ‘magic’ helper methods that would simplify the solution? (ie : getLength(), reverse())

Talk through different approaches you can take, and their tradeoffs

Be able to verbally describe your approach and explain how an example input would produce the desired output

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Try to spent ~15 minutes on a problem

Implement

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Goal for each problem is to have it pass a simple test case

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Run through your solution with test cases

- catch edge cases
- fix potential bugs

Evaluate

Evaluate

Analyze the time / space complexity of your final solution

Evaluate

Analyze the time / space complexity of your final solution

If applicable, discuss any ‘shortcuts’ or tradeoffs that you made

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Let’s discuss the problems together!

Questions?