SINGLY LINKED LISTS

IN JAVASCRIPT

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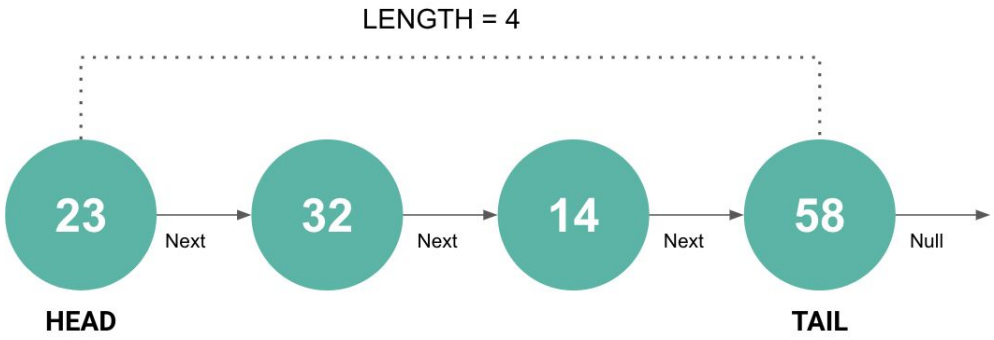
Micro Publications Collection

Singly Linked List



Linked List is a sequence of nodes, where each node links to the next node and then to the next node and so on, then the last node links to null.

Github example in JavaScript
https://github.com/maxcabrera/data-structures/blob/master/src/data-structures/singly-linked-list/

Visualgo
https://visualgo.net/en/list

Highlights

- The first node in the list is called Head
- The last node in the list is called Tail
- The head and the tail are the same when there is only one node in the list
- List contain a length property to know how many nodes are in it.
- There is no index, like in the arrays.
- They can hold any type of data, like strings, numbers, objects.
- Data in the list can be sorted or unsorted
- Data can hold unique or duplicate values

Downsides

- Since there is no index, random access is not allowed. Therefore to access a node we need to start from the head and follow the links to the next nodes until we find the one we want. Making the access process slow (Time complexity: O(N))
- Each node contains a pointer field.This means that some space is used just for pointers, not data.

Why is it important to understand Linked Lists
Linked List and its variations are used as underlying data structure to implement List, Stack, Queue, and Deque ADTs

Methods

- Push: Adds a node to the end of the list
- Pop: Removes a node from the end of the list
- Shift: Removes a node from the beginning of the list
- Unshift: Adds a node at the beginning of the list
- Get: Retrieves a node by its position in the list
- Set: Changes the value of a node based on its position on the list
- Insert: Adds a new node in the specified position
- Remove: Removes a node from the list, based on its position
- Reverse: Reverses the order of the list

Time complexity for Linked List

- Insertion: O(1)
- Removal: It depends... From the beginning O(1) or O(N)
- Searching: O(N)
- Access: O(N)

Real life application

Developing a game of cards we want to have a way to have all cards linked when they are in the deck. We would be able to shift() to get the next card on top of the pile.

Summary

- Singly Linked Lists are an excellent alternative to arrays when insertion and deletion at the beginning are frequently required.
- The idea of a list data structure that consist of nodes is the foundation for other data structures like Stacks and Queues.