Unit 4 – LinkedList

CS 201 - Data Structures II

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Habib University

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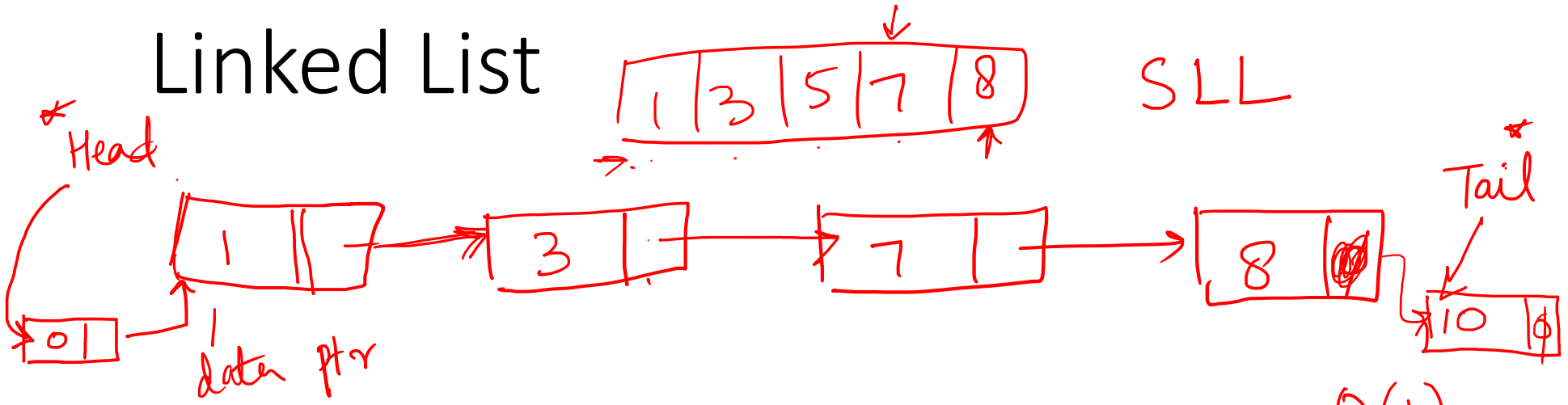
Linked List



O(n) — linear

O(1) — constt

O(1)

O(100)

Array	LinkedList
Search O(1)	O(n) — O(i) — linear
add(i) O(n)	O(1) [from current location]
addFirst	O(1)
addLast	O(1)
Remove(i) O(n)	O(1) [from current location]

n — size of your list

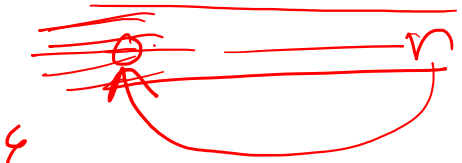
n

n^2

n^3

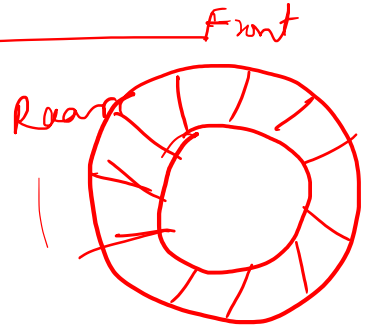
log(n)

Time Complexity



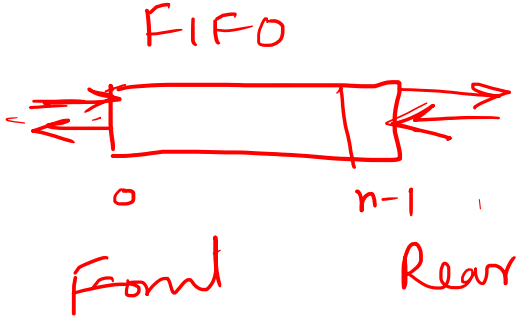
List , Stack , Queue , DEQUE

Implementation using LL



Stack:
- Push — addFirst — O(1)
- Pop — RemoveFirst — O(1)

Queue
- Enqueu — addLast() — O(1)
- Deque — RemoveFirst() — O(1)



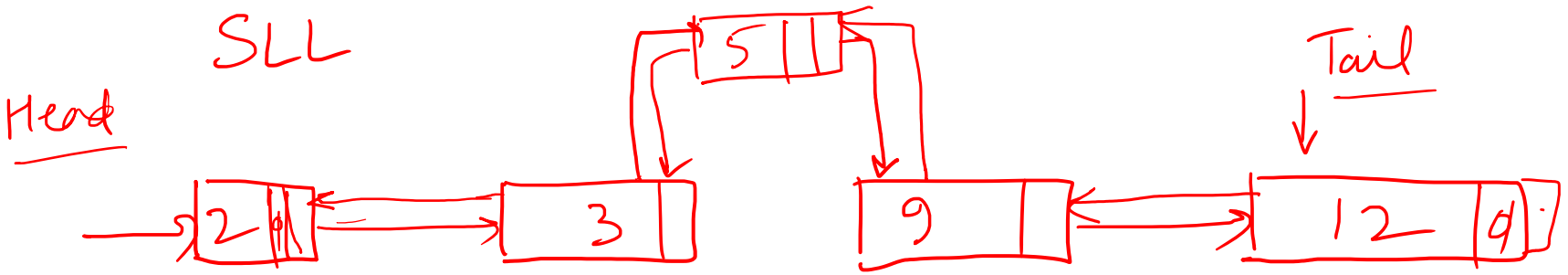
DEQUE

addFirst — O(1) RemoveFirst — O(1)

addLast — O(1) RemoveLast — O(n) SLL

O(1) DLL

Doubly Linked List



Node
{
data
*next
*~~last~~prev
}

remove (800)

min (i, size - i)

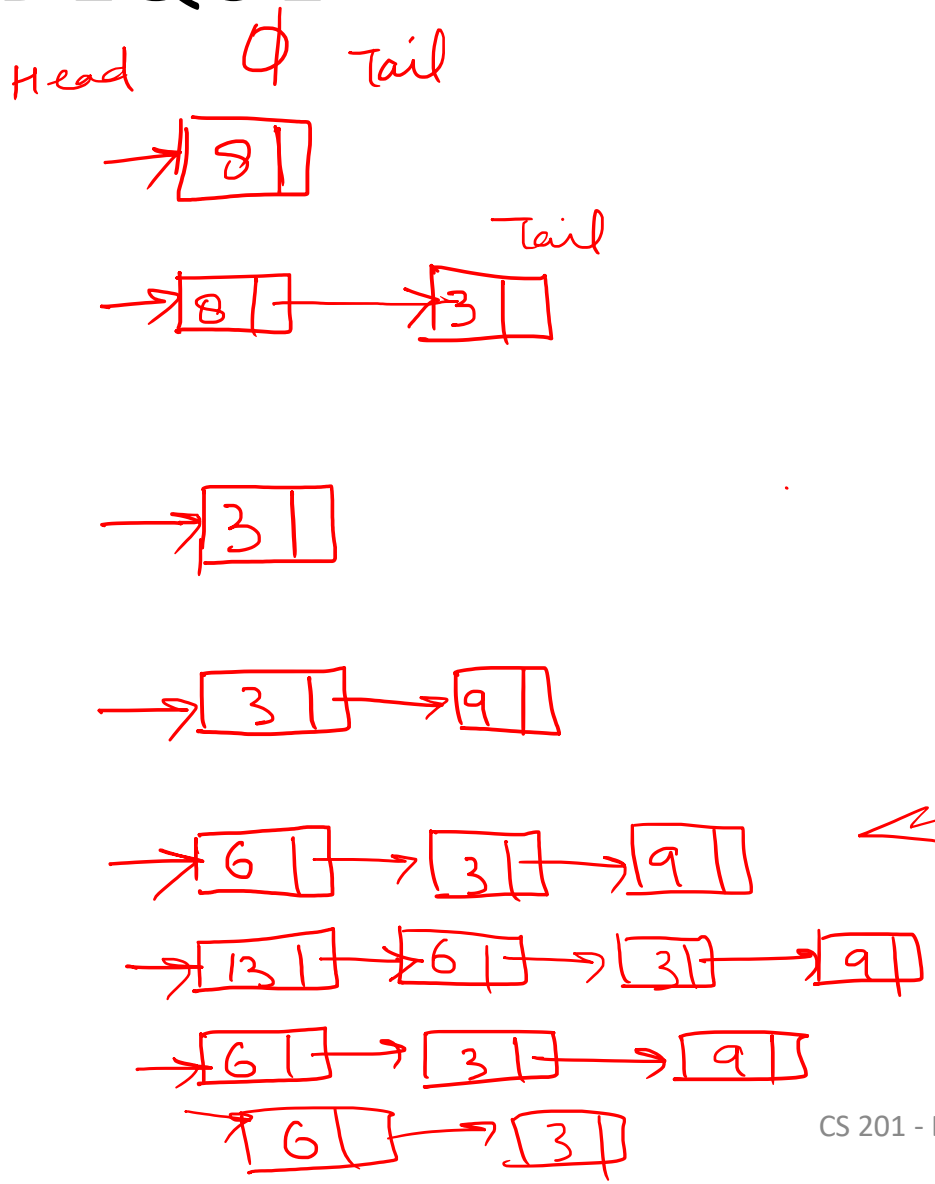
min (100, 900)

min (800, 200)

min(i, n-i)

n/2 → O(n)

DEQUE



DEQUE

addFirst(8)

addLast(3)

removeFirst()

addLast(9)

addFirst(6)

addFirst(13)

removeFirst()

removeLast()

Resources

- Open Data Structures (pseudocode edition), by Pat Morin. Available online at http://opendatastructures.org
- Data Structures and Algorithms in Python, by Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser. 2013. (1st. ed.). Wiley Publishing
- https://www.khanacademy.org/computing/computer-science/algorithms/asymptotic-notation/a/asymptotic-notation

Thanks