Saturday, 25 June 2016

Crux
Lecture -11
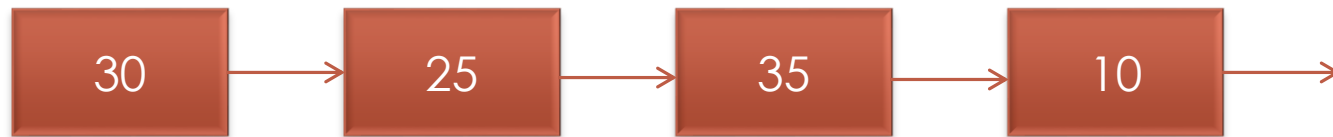
Data Structures -1

Linked Lists

Sumeet Malik

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What are Data Structures?

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What are Linked Lists?

Lets define our own Linked List

```
public class Node<T> {
        T data;
        Node<T> next;
}
```

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Head and Tail nodes

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Lets Try

```
class LinkedList{
    int size();
    boolean isEmpty();
    T getFirst();
    T getLast();
    T getAt(int idx);
    }
```

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Your turn

```
class LinkedList{
    Void addFirst(T data);
    Void addLast(T data);
    Void addAt(T data, int idx);
    T removeFirst();
    T removeLast();
    T removeAt(int idx);
    Void display();
    }
```

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Benefits of Arrays over Linked List

1. Random access to elements
2. Fast iteration through the elements
3. Very compact way to store data

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Benefits of Linked List over Array

1. Constant time insertion and deletion of elements
2. Don't need to know the number of elements
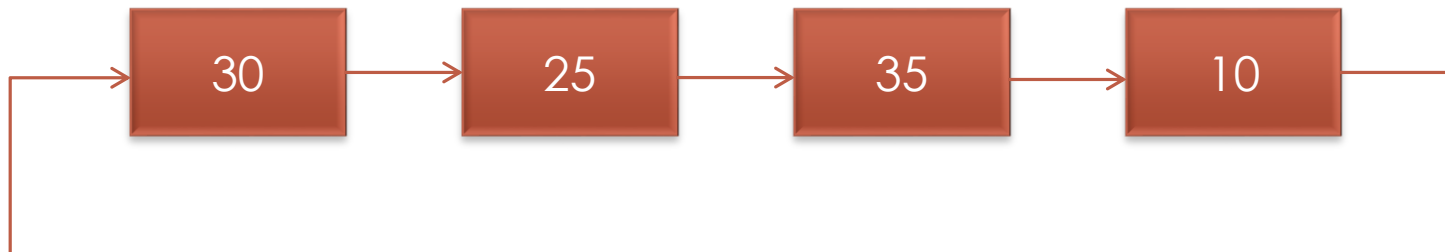3. Insert elements in the middle of the list

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Doubly Linked Lists
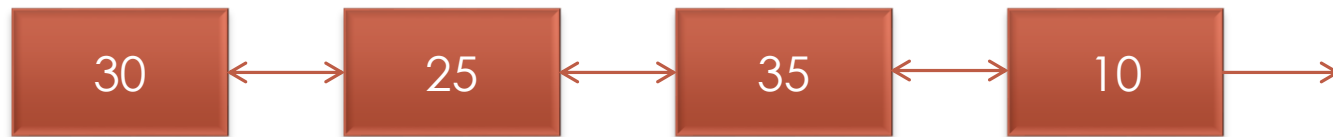
Implementation?

```
public class Node<T> {
        T data;
        Node<T> next;
        Node<T> prev;
}
```

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Doubly LL vs Singly LL

1. Faster to go back in the linked list
2. Uses more memory

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Circular Linked Lists

Lets try

- Find mid point of a linked list
- Find 5th element from end without calculating length of Linked List

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Lets try

- Recursive – find
- Reverse – Iterative, Recursive
- Reverse – Pointers, data

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Lets Try

- Implement Bubble sort
- Given two sorted linked lists merge them into a sorted linked list
- Implement merge sort

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Thank You !! ☺

Sumeet Malik
Sumeet.malik1188@gmail.com