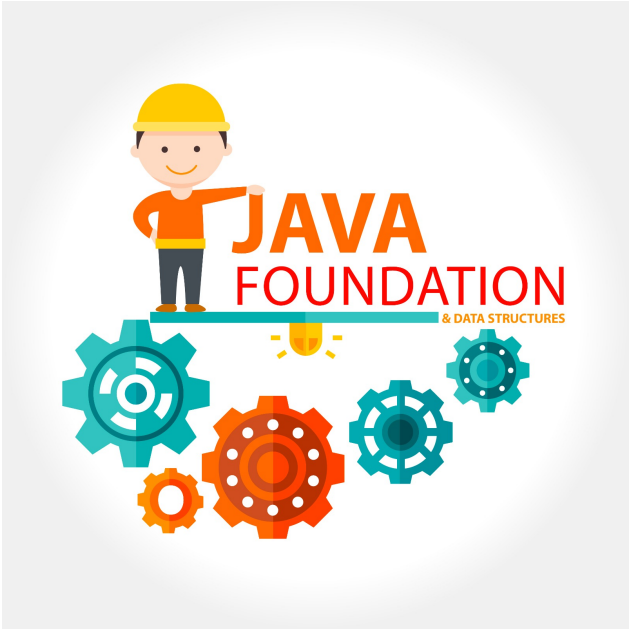
Nucleus

Java Foundation & Data Structures

Lecture 15 : Linked List



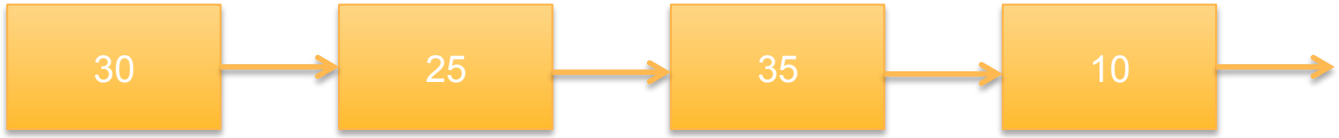
Wednesday, 28 June 17

Doubts from Last Class ?

Any doubts on assignment ?

What are Data Structures?

What are Linked Lists?



Lets define our own Linked List

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

Head and Tail nodes

Basic operations over Linked List

- Taking Linked List as input from user
- Accessing next element
- Looping over Linked List
- Inserting into Linked List
- Deleting from Linked List

Lets do some problems

- Taking Linked List as input from user
- Print a Linked List

Your Turn

- Print ith element of Linked List

Insertion at ith Position

Your Turn

- Find length of Linked List
    - Iteratively
    - Recursively
- Delete the element at ith Position
- Implement Insertion/Deletion using Recursion

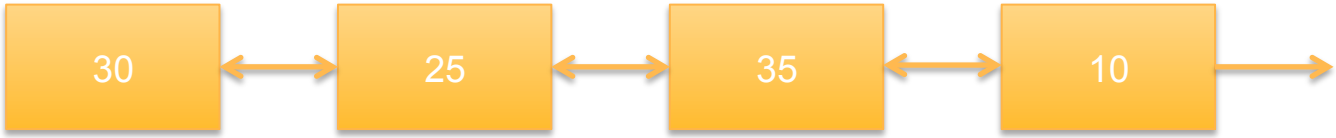
Benefits of Arrays over Linked List

- Random access to elements
- Fast iteration through the elements
- Very compact way to store data

Benefits of Linked List over Array

- Constant time insertion and deletion of elements
- Don’t need to know the number of elements
- Insert elements in the middle of the list

Doubly Linked Lists



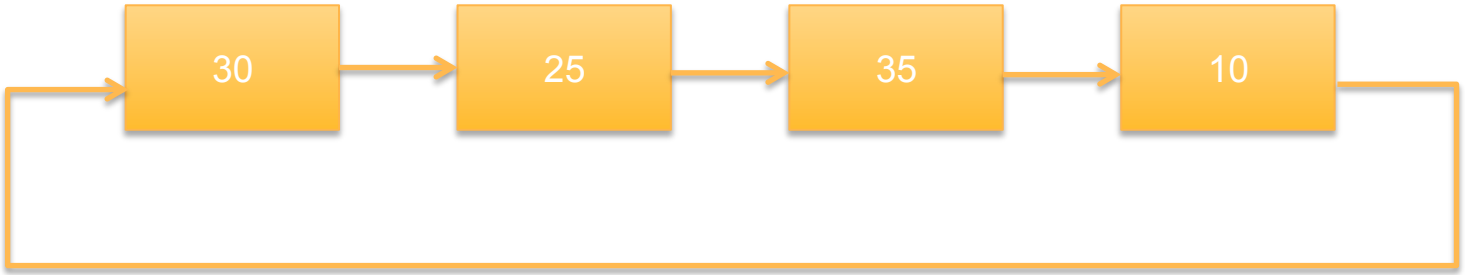
Implementation?

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

Doubly LL vs Singly LL

- Faster to go back in the linked list
- Uses more memory

Circular Linked Lists



Lets try some problems

- Find an element iteratively and recursively
- Find mid point of a linked list
- Implement Bubble Sort

Your Turn

- Find 5th element from end without calculating length of Linked List
- Given two sorted linked lists merge them into a sorted linked list
- Implement merge sort

BT : Card Game

A casino offers a card game using a normal deck of 52 cards. The rule is that you turn over two cards each time. For each pair, if both are black, they go to the dealer's pile; if both are red, they go to your pile; if one black and one red, they are discarded. The process is repeated until you two go through all 52 cards. If you have more cards in your pile, you win $100; otherwise (including ties) you get nothing. The casino allows you to negotiate the price you want to pay for the game. How much would you be willing to pay to play this game?

Thank you

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