

# Introduction to Linked List

## Java

### Linked List

#### LinkedList class Implementation (Collection Framework)

```
import java.util.*;

class LL {
    public static void main(String args[]) {
        LinkedList<String> list = new LinkedList<String>();
        list.add("is");
        list.add("a");
        list.addLast("list");
        list.addFirst("this");
        list.add(3, "linked");
        System.out.println(list);

        System.out.println(list.get(0));
        System.out.println(list.size());
        list.remove(3);
        list.removeFirst();
        list.removeLast();

        System.out.println(list);
    }
}
```

## Scratch Implementation (Important for BEGINNERS)

```
class LL {

    Node head;

    private int size;

    LL () {

        size = 0;

    }

    public class Node {

        String data;

        Node next;

        Node(String data) {

            this.data = data;

            this.next = null;

            size++;

        }

    }

    public void addFirst(String data) {

        Node newNode = new Node(data);

        newNode.next = head;

        head = newNode;

    }

}
```

```
public void addLast(String data) {  
  
    Node newNode = new Node(data);  
  
    if(head == null) {  
  
        head = newNode;  
  
        return;  
    }  
  
    Node lastNode = head;  
  
    while(lastNode.next != null) {  
  
        lastNode = lastNode.next;  
    }  
  
    lastNode.next = newNode;  
}  
  
public void printList() {  
  
    Node currNode = head;  
  
    while(currNode != null) {  
  
        System.out.print(currNode.data+" -> ");  
  
        currNode = currNode.next;  
    }  
  
    System.out.println("null");  
}
```

```

}

public void removeFirst() {

    if(head == null) {

        System.out.println("Empty List, nothing to delete");

        return;

    }

    head = this.head.next;

    size--;

}

```

```

public void removeLast() {

    if(head == null) {

        System.out.println("Empty List, nothing to delete");

        return;

    }

    size--;

    if(head.next == null) {

        head = null;

        return;

    }

    Node currNode = head;

    Node lastNode = head.next;

```

```

        while(lastNode.next != null) {

            currNode = currNode.next;

            lastNode = lastNode.next;

        }

        currNode.next = null;

    }

    public int getSize() {

        return size;

    }

}

public static void main(String args[]) {

    LL list = new LL();

    list.addLast("is");

    list.addLast("a");

    list.addLast("list");

    list.printList();

    list.addFirst("this");

    list.printList();

    System.out.println(list.getSize());

    list.removeFirst();

```

```
list.printList();

list.removeLast();

list.printList();

}

}
```

How to insert in the middle of a Linked List (at a specified index 'i') ?

Scratch

```
public void addInMiddle(int index, String data) {

    if(index > size || index < 0) {

        System.out.println("Invalid Index value");

        return;

    }

    size++;

    Node newNode = new Node(data);

    if(head == null || index == 0) {

        newNode.next = head;

        head = newNode;

        return;

    }

    Node currNode = head;

    for(int i=1; i<size; i++) {

        if(i == index) {
```

```

        Node nextNode = currNode.next;

        currNode.next = newNode;

        newNode.next = nextNode;

        break;
    }

    currNode = currNode.next;
}
}

```

## LinkedList class

```

import java.util.*;

class LL {

    public static void main(String args[]) {

        LinkedList<String> list = new LinkedList<String>();

        list.addFirst("shradha");

        list.addFirst("name");

        list.addFirst("my");

        System.out.println(list);

        list.add(2, "is");

        System.out.println(list);

    }
}

```

## Homework Problems

1. Make a Linked List & add the following elements to it : (1, 5, 7, 3 , 8, 2, 3).  
Search for the number 7 & display its index.
2. Take elements(numbers in the range of 1-50) of a Linked List as input from the user. Delete all nodes which have values greater than 25.