

# CSE 2001: Data Structure & Algorithms

## Programming Assignment-IV

### (Singly Linked List)

1. Write a menu driven Java Program using class, methods and reference variables, to construct a **singly linked list** consisting of the following information in each node: student regd\_no (int), mark secured in a subject (float).

The class definition should be as follows.

```
class Node
{
    protected int regd_no;
    protected float mark;
    protected Node next;
}
```

The prototype of the create method should be as follows.

```
public static void create(Node start)
```

Define the methods for each of the following operations to be supported by the above linked list are:

- a) The insertion operation

- i. At the beginning of the list

Method Prototype: `public static Node InsBeg(Node start)`

- ii. At the end of the list

Method Prototype: `public static Node InsEnd(Node start)`

- iii. At any position in the list

Method Prototype: `public static Node InsAny(Node start)`

b) The deletion operation

- i. From the beginning of the list

Method Prototype: **public static** Node DelBeg(Node start)

- ii. From the end of the list

Method Prototype: **public static** Node DelEnd(Node start)

- iii. From any position in the list

Method Prototype: **public static** Node DelAny(Node start)

- iv. Deleting a node based on student regd\_no. If the specified node is not present in the list an error message should be displayed. Both the option should be demonstrated.

c) Search a node based on student regd\_no and update the mark of the student. If the specified node is not present in the list an error message should be displayed.

Method Prototype: **public static void** search(Node start)

d) Sort the nodes of the linked list according to the mark secured by the student from higher to lower.

Method Prototype: **public static void** sort(Node start)

e) Count the number of nodes present in the linked list

Method Prototype: **public static int** count(Node start)

f) Reverse the linked list

Method Prototype: **public static** Node reverse(Node start)

g) Displaying all the nodes in the list

The prototype of the display function should be as follows.

**public static void** display(Node start)

The template for menu driven java program to use the above list and invoke the required methods to perform different operations is given below.

```
public class LinkedList
{
    public static void create(Node start)
    {
        -----
        -----
    }

    public static void display(Node start)
    {
        -----
        -----
    }

    /* Code for the remaining user defined methods*/

    public static void main(String[] args) {
        -----
        -----
        while(true)
        {
            System.out.println("****MENU****");
            System.out.println("0:Exit");
            System.out.println("1:Creation");
            System.out.println("2:Display");
            -----
            -----
            System.out.println("Enter the choice");
            choice=sc.nextInt();
            switch(choice)
            {
                case 0:
                    System.exit(0);
                case 1:
                    create(start);
                    break;
                case 2:
                    display(start);
                    break;
                -----
                default:
                    System.out.println("Wrong choice");
            }
        }
    }
}
```

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