18wh1a05a3 – Amulya Chandhana
Date : 14/06/2021

Linked List Problems

Problem 1:

```
import java.util.*;
public class LinkedList_1 {
    static Scanner sc = new Scanner(System.in);
    static node head;

    static class node{
        int data;
        node next;
        node(int data){
            this.data=data;
            next =null;
        }
    }
    private void add(int x) {
        node toAdd = new node(x);
        if(head == null) {
            head = toAdd;
            return;
        }
        node temp = head;
        while(temp.next !=null) {
            temp = temp.next;
        }
        temp.next = toAdd;
    }
    void printll(node head) {
        node temp = head;
        while(temp!=null) {
            System.out.print(temp.data+ "--> ");
            temp = temp.next;
        }
    }

static node reverse(node head) {
        node prev = null;
        node curr = head;
        node next = null;
        while(curr!=null) {
            next = curr.next;
            curr.next = prev;
            prev = curr;
            curr = next;
        }
        head = prev;
        return head;
    }
    public static void main(String[] args) {
        System.out.println("Number of elements in the linked list ?
");
        int  n = sc.nextInt();
        LinkedList_1 list1 = new LinkedList_1();
        System.out.println("Enter the  elements of the linked list
:");
        int x;
        while(n-->0) {
            x = sc.nextInt();
            list1.add(x);
        }
        head = list1.reverse(head);
        System.out.println("At which position from the end ?");
        int p = sc.nextInt();
        node temp = head;
        int q = p-1;
        while(q-->0) {
            temp = temp.next;
            if(temp==null) {
                break;}
        }
        System.out.println("Element at "+p+" from the end is
"+temp.data);

    }
}
```

Output:-

```
Number of elements in the linked list ?
8
Enter the  elements of the linked list :
11 22 33 44 55 66 77 88
At which position from the end ?
3
Element at 3 from the end is 66
```

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Problem 2 :

```
package LinkedList;
import java.util.*;
public class LinkedList_2 {
    static Scanner sc = new Scanner(System.in);
    static node head;

    static class node {
        int data ;
        node next;
        node(int data){
            this.data = data;
            next = null;
        }
    }
    static void printll(node head) {
        node temp = head;
        while(temp!=null) {
            System.out.print(temp.data+" --> ");
        }
        System.out.print("null");
    }

    static void add(int data) {
        node toAdd = new node(data);
        if(head == null) {
            head = toAdd;
            return;
        }
        node temp = head;
        while(temp.next!=null) {
            temp=temp.next;
        }
        temp.next = toAdd;
    }
    static boolean detectLoop(node head) {
        HashSet<node> set = new HashSet<>();
        node temp = head;
        while(temp!=null) {
            if(set.contains(temp)) {
                return true;
            }
            set.add(temp);
            temp = temp.next;
        }
        return false;

    }

    public static void main(String[] args) {
        System.out.println("Number of elements in the linked list ?
(=4) ");
        int  n = sc.nextInt();
        LinkedList_2 list = new LinkedList_2();
        System.out.println("Enter the  elements of the linked list
:");
        int x;
        while(n-->0) {
            x = sc.nextInt();
            list.add(x);
        }
        // creating a loop
        list.head.next.next.next.next = list.head;
        if(detectLoop(head)) {
            System.out.println(true);
        }
        else {
            System.out.println(false);
        }

    }

}
```

Output 1:-

```
Number of elements in the linked list ? (=4)
4
Enter the  elements of the linked list :
12 65 73 98
True
```

Output 2:-

```
Number of elements in the linked list ? (=4)
5
Enter the  elements of the linked list :
67 12 34 56 87
true
```

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Problem 3:

```
package LinkedList;

import java.util.*;

public class LinkedList_3 {

    static Scanner sc = new Scanner(System.in);

    static node head;

    static class node{
        int data;
        node next;
        node(int data){
            this.data=data;
            next = null;
        }
    }

    static void add(int data) {
        node toAdd = new node(data);
        if(head == null) {
            head = toAdd;
            return;
        }
        node temp = head;
        while(temp.next!=null) {
            temp = temp.next;
        }
        temp.next = toAdd;
    }

    static void printll(node head) {
        node temp = head;
        while(temp!=null) {
            System.out.print(temp.data+" --> ");
            temp = temp.next;
        }
        System.out.print(" null ");
    }

static void modularNode(node head,int nn,int kk) {
        node temp = head;
        int prev = head.data;
        int i=1;
        while(temp != null) {
            if(i % kk == 0) {
                prev = temp.data;
            }
            temp = temp.next;
            i++;
        }
        System.out.println("Answer: "+prev);
    }

    public static void main(String[] args) {
        LinkedList_3 list = new LinkedList_3();
        System.out.println("Number of elements in the linked list ? 
");
        int  n = sc.nextInt();
        System.out.println("Enter the  elements of the linked list 
:");
        int x;
        while(n-->0) {
            x = sc.nextInt();
            list.add(x);
        }
        System.out.println("value of k ?");
        int k;
        k = sc.nextInt();
        modularNode(head,n,k);
    }
}
```

Output:-

```
Number of elements in the linked list ?
11
Enter the  elements of the linked list :
11 2 33 55 76 28 98 207 31 45 576
value of k ?
3
Answer: 31
```

Problem 4:

```java
package LinkedList;

import java.util.*;

public class LinkedList_2 {

    static Scanner sc = new Scanner(System.in);
    static node head;

    static class node{
        int data;
        node next;
        node(int data){
            this.data=data;
            next = null;
        }
    }

    static void add(int data) {
        node toAdd = new node(data);
        if(head == null) {
            head = toAdd;
            return;
        }
        node temp = head;
        while(temp.next!=null) {
            temp = temp.next;
        }
        temp.next = toAdd;
    }

    static void printll(node head) {
        node temp = head;
        while(temp!=null) {
            System.out.print(temp.data+" --> ");
            temp = temp.next;
        }
        System.out.print(" null ");
    }
    static node duplicate(node head ) {
        node prev = head;
        node curr = head.next;
        while(prev != null && curr != null) {
            if(prev.data == curr.data) {
                prev.next = curr.next;
            }
            prev = curr;
            curr = curr.next;
        }
        return head;
    }

    public static void main(String[] args) {
        LinkedList_2 list = new LinkedList_2();
        System.out.println("Number of elements in the linked list ?
");
        int  n = sc.nextInt();
        System.out.println("Enter the  elements of the linked list
:");
        int x;
        while(n-->0) {
            x = sc.nextInt();
            list.add(x);
        }
        head = list.duplicate(head);
        list.printll(head);
    }

}
```

Output:-

```
Number of elements in the linked list ?
10
Enter the  elements of the linked list :
1 2 2 3 5 6 6 89 89 100
1 --> 2 --> 3 --> 5 --> 6 --> 89 --> 100 -->  null
```

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Problem 5:

```
package LinkedList;
import java.util.*;
public class LinkedList_5 {
    static Scanner sc = new Scanner(System.in);
    static node head1,head2;

    static class node{
        int data;
        node next;
        node(int data){
            this.data=data;
            next=null;
        }
    }
    static int getCount(node head) {
        node temp = head;
        int count=0;
        while(temp!=null) {
            count++;
            temp = temp.next;
        }
        return count;
    }

    static int getNode(node head1,node head2) {
        int c1 = getCount(head1);
        int c2 = getCount(head2);
        int d=0;
        if(c1>c2) {
            d = c1-c2;
            return getNodeVal(d,head1,head2);
        }
        else {
            d = c2-c1;
            return getNodeVal(d,head2,head1);
        }
    }
private static int getNodeVal(int d, node head1, node head2) {
        node temp1 = head1;
        node temp2 = head2;
        if(head1 == null || head2==null) {
            return -1;
        }
        while(d-->0) {
            temp1 = temp1.next;
        }
        while(temp1 != null && temp2 != null) {
            if(temp1.data == temp2.data) {
                return temp1.data;
            }
            temp1 = temp1.next;
            temp2 = temp2.next;
        }
        return -1;
    }

    public static void main(String[] args) {
        LinkedList_5 list = new LinkedList_5();
        list.head1 = new node(17);
        list.head1.next = new node(28);
        list.head1.next.next = new node(43);
        list.head1.next.next.next = new node(94);
        list.head1.next.next.next.next = new node(106);
        list.head1.next.next.next.next.next = new node(108);
        list.head1.next.next.next.next.next.next = new node(137);

        list.head2 = new node(57);
        list.head2.next = new node(104);
        list.head2.next.next = new node(106);
        list.head2.next.next.next = new node(108);
        list.head2.next.next.next.next = new node(137);
        System.out.println("Merging Point : " +
getNode(head1,head2));

    }

}
```

Output:-

```
Merging Point : 106
```