**JOBSHEET 11**
**LINKED LIST**

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KELAS : TI – 1F
TANGGAL PRAKTIKUM 16 APRIL 2020

PRAKTIKUM

| No | Node.java |
|---|---|

```
package Minggu10;

public class Node<T> {
    int data;
    Node next;

    public Node(int data, Node next) {
        this.data = data;
        this.next = next;
    }
}
```

| No | LinkedList.java |
|---|---|

```
package Minggu10;
public class LinkedList {
    Node head;
    int size;

    LinkedList(){
    head = null;
    size = 0;
    }

    boolean isEmpty(){
        return head == null;
    }

    void addFirst(int item){
    head = new Node(item, head);
    size++;
    }

    void add(int item, int index) throws Exception{ if (index < 0 || index > size)
        throw new Exception("Nilai index di luar batas");
        if (isEmpty() || index == 0){ addFirst(item);
        }else{
```

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```
    Node tmp = head;
    for (int i=1; i<index; i++){ tmp = tmp.next;
    }
    Node next = (tmp == null) ? null :tmp.next;
    tmp.next = new Node(item, next);
    }
    size++;
  }

  void addLast(int item){ if (isEmpty()){
    Node tmp = head;
    while (tmp.next != null){ tmp = tmp.next;
    }
    tmp.next = new Node(item, null);
    }else{
    size++;
    }
  }

  int getFirst() throws Exception{
    if (isEmpty()) throw new Exception("LinkedList kosong"); return head.data;
    }
    int getLast() throws Exception{
    if (isEmpty()) throw new Exception("LinkedList kosong"); Node tmp = head;
    while (tmp.next != null){ tmp = tmp.next;
    }
    return tmp.data;
  }

  int get(int index) throws Exception{
    if (isEmpty() || index >= size) throw new Exception("Nilai index di luar batas");
    Node tmp = head;
    for (int i=0; i < index; i++){ tmp = tmp.next;
    }
    return tmp.data;
  }

  public void removeFirst() throws Exception{
    head = head.next;
    size--;
  }
```

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```
    void remove(int index) throws Exception{
        if (isEmpty() || index >= size) {throw new Exception("Nilai index di luar batas");}
        Node prev = head;
        Node cur = head.next;
        for (int i=1; i<index; i++){
            prev = cur;
            cur = prev.next;
        }
            prev.next = cur.next;
            size--;

        if (size == 1) {
            removeFirst();

        }
    }
    void clear(){
        head = null;
        size = 0;
    }

    void print(){
        if (!isEmpty()){
        Node tmp = head;
        while (tmp != null){ System.out.println (tmp.data + "\t"); tmp = tmp.next;
        }
        System.out.println();
        }
        else{
        System.out.println("LinkedList kosong");
        }
    }
}
```

| No | MainLinkedLists.java |
|---|---|
| | package Minggu10;<br><br>public class MainLinkedLists { |

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```
    public static void main(String[] args) {
        LinkedList data = new LinkedList();

        try {
            data.addFirst(7);
            data.print();
            data.add(8, 1);
            data.print();
            data.addFirst(1);
            data.print();
            data.remove(1);
            data.print();
            data.clear();
            data.print();
        } catch (Exception e) {
            System.out.println(e.getMessage());
        }

    }
}
```

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| | |
|---|---|
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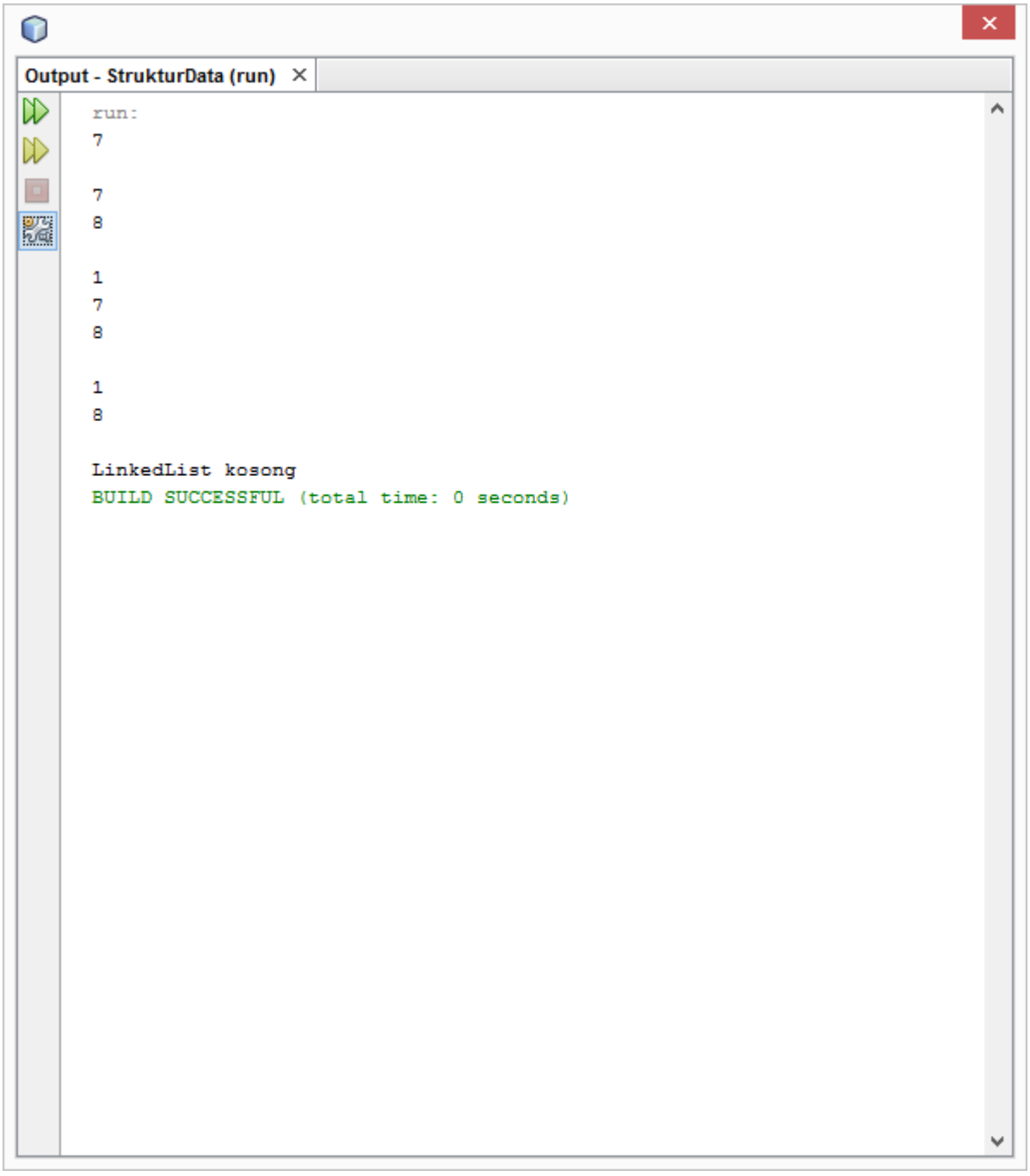
| KELAS | : TI – 1F |
| TANGGAL PRAKTIKUM | 16 APRIL 2020 |



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Pertanyaan Percobaan :

1. Mengapa pada proses traverse nilai head perlu disimpan terlebih dahulu dalam variabel tmp ?

   Jawab :

   Karena jika nilai head tidak di simpan di dalam tmp, maka data akan berubah dikarenakan data inputan selanjutnya.

2. Apa kekurangan implementasi single LinkedLists tanpa penunjuk tail ?

   Jawab :

   Karena tail untuk menunjukkan node terakhir, tanpa adanya tail, maka node terakhir tidak akan terbaca

3. Tambahkan implementasi method addByValue berdasarkan nilai yang dicari! Node baru akan ditambahkan setelah node yang dicari ditemukan.

   Jawab :

| No | addByValue(int item) |
|---|---|
| | public void addByValue(int item) throws Exception{<br>if (isEmpty()) {<br>throw new Exception("Data Kosong");<br>}<br>Node tmp = head;<br>while (tmp != null) {<br>if (item == tmp.data) {<br>while (tmp.next != null) {<br>tmp = tmp.next;<br>}<br>tmp.next = new Node(item,null);<br>size++;<br>break;<br>}<br>tmp=tmp.next;<br>}<br>} |

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4. Tambahkan implementasi method removeByValue berdasarkan nilai yang dicari!

   Jawab :

| No | removeByValue(int item) |
|---|---|
| | void removeByValue(int item) throws Exception{<br>int index = -1, i = 0;<br>Node tmp=head;<br>while(tmp!=null){<br>if (item == tmp.data){ index = i;<br>}<br>tmp = tmp.next; i++;<br>}<br>Node prev = head;<br>Node cur = head.next;<br>for(int j = 1; j < index; j++){<br>prev = cur;<br>cur = prev.next;<br>}<br>prev.next = cur.next;<br>size--;<br>} |

5. Tambahkan menu serta submenu dan inputan dinamis (semua tipe data) pada program percobaan tersebut !

   Jawab :

| No | MainLinkedLists.java |
|---|---|
| | package Minggu10;<br><br>import java.util.Scanner;<br><br>public class MainLinkedLists {<br><br>public static void Menu() {<br><br>System.out.println("==========");<br>System.out.println(" MENU ");<br>System.out.println("1. Tambah");<br>System.out.println("2. Hapus"); |

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```
            System.out.println("3. Cari");
            System.out.println("4. Keluar");

        System.out.println("====================================");
        }
        public static void MenuAdd() {

        System.out.println("====================================");
            System.out.println(" MENU ");
            System.out.println("1. Tambah (First)");
            System.out.println("2. Tambah (Index)");
            System.out.println("3. Tambah (Last)");

        System.out.println("====================================");
        }

        public static void MenuHapus() {

        System.out.println("====================================");
            System.out.println(" MENU ");
            System.out.println("1. Hapus (Index)");
            System.out.println("2. Hapus (Key)");
            System.out.println("3.. Clear");

        System.out.println("====================================");
        }
        public static void MenuCari() {

        System.out.println("====================================");
            System.out.println(" MENU ");
            System.out.println("1. Cari (Index)");
            System.out.println("2. Cari (Key)");

        System.out.println("====================================");
        }

        public static void main(String[] args) {
            Scanner sc = new Scanner (System.in);
            int pilih,sub;
            int dt,idx;
            LinkedList data = new LinkedList();
```

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```
try {
   do{
      Menu();
      System.out.println("Masukkan Pilihan Anda : ");
      pilih = sc.nextInt();
     switch(pilih){
       case 1:
         do{MenuAdd();
         System.out.println("Masukkan Pilihan Anda :");
         sub = sc.nextInt();
         switch (sub){
            case 1 :
               System.out.println("Masukkan Data : ");
               dt = sc.nextInt();
               System.out.println("======================");
               data.addFirst(dt);
               data.print();
               break;
            case 2 :
               System.out.println("Masukkan Data : ");
               dt = sc.nextInt();
               System.out.println("Masukkan Index :  ");
               idx = sc.nextInt();

System.out.println("========================");
               data.add(dt, idx);
               data.print();
               break;
            case 3 :
               System.out.println("Masukkan Data : ");
               dt = sc.nextInt();
               data.addFirst(dt);
               data.print();
               break;
            case 4 :
               System.out.println("Masukkan Data : ");
               dt = sc.nextInt();
               data.addLast(dt);
               data.print();
               break;
```

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```
                    }
                    }
                    while (sub != 0);
                    break;
                    case 3:
                    do{
                    MenuCari();
                    System.out.println("Masukkan Pilihan Anda : ");
                    sub = sc.nextInt();
                    switch(sub){
                     case 1 :
                        System.out.println("Masukkan Index : ");
                        idx = sc.nextInt();
                        data.remove(idx);
                        data.print();
                        break;
                      case 2 :
                        System.out.println("Masukkan Data : ");
                        dt = sc.nextInt();
                        data.removeFirst();
                        data.print();
                        break;
                    }
                    }
                   while (sub != 0 );
                   break;
                   }
                   }while (pilih != 0);

               }catch (Exception e) {
               System.out.println(e.getMessage());

                   }
           }
    }
```

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TUGAS

1. Buatlah program daftar mahasiswa menggunakan LinkedLists! Mahasiswa memiliki atribut NIM, nama, dan alamat tinggal.

   Jawab :

| No | Mahasiswa.java |
|---|---|
| | package Minggu10.TUGAS1;<br><br>public class Mahasiswa {<br>String nim;<br>String nama;<br><br>Mahasiswa(String nim, String nama){<br>this.nim = nim;<br>this.nama = nama;<br>}<br>} |

| No | Mahasiswa.java |
|---|---|
| | package Minggu10.TUGAS1;<br><br>public class Mahasiswa {<br>String nim;<br>String nama;<br><br>Mahasiswa(String nim, String nama){<br>this.nim = nim;<br>this.nama = nama;<br>}<br><br>} |

| No | LinkedListMahasiswa.java |
|---|---|
| | package Minggu10.TUGAS1;<br><br>public class LinkedListMahasiswa { |

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```
    NodeMahasiswa head;
    int size;
    Mahasiswa mhs;

    LinkedListMahasiswa() {
        head = null;
        size = 0;
    }

    boolean isEmpty() {
        return head == null;
    }

    public void addFirst(String nim, String nama) {
        mhs = new Mahasiswa(nim, nama);
        head = new NodeMahasiswa(mhs, head);
        size++;
    }

    public void add(String nim, String nama, int index) throws Exception
{
        mhs = new Mahasiswa(nim, nama);
        if (index < 0 || index > size) {
            throw new Exception("Nilai index di luar batas");
        }
        if (isEmpty() || index == 0) {
            addFirst(nim, nama);
        } else {
            NodeMahasiswa tmp = head;
            for (int i = 1; i < index; i++) {
                tmp = tmp.next;
            }
            NodeMahasiswa next = (tmp == null) ? null : tmp.next;
            tmp.next = new NodeMahasiswa(mhs, next);
            size++;
        }
    }

    public void addLast(String nim, String nama) {
        mhs = new Mahasiswa(nim, nama);
```

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```
        if (isEmpty()) {
            addFirst(nim, nama);
        } else {
            NodeMahasiswa tmp = head;
            while (tmp.next != null) {
                tmp = tmp.next;
            }
            tmp.next = new NodeMahasiswa(mhs, null);
            size++;
        }
    }

    public Mahasiswa getFirst() throws Exception {
        if (isEmpty()) {
            throw new Exception("LinkedList kosong");
        }
        return head.data;
    }

    public Mahasiswa getLast() throws Exception {
        if (isEmpty()) {
            throw new Exception("LinkedList kosong");
        }
        NodeMahasiswa tmp = head;
        while (tmp.next != null) {
            tmp = tmp.next;
        }
        return tmp.data;
    }

    public Mahasiswa get(int index) throws Exception {
        if (isEmpty() || index >= size) {
            throw new Exception("Nilai index di luar batas");
        }
        NodeMahasiswa tmp = head;
        for (int i = 0; i < index; i++) {
            tmp = tmp.next;
        }
        return tmp.data;
    }
```

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```
public void addKey(String nim) throws Exception {
    NodeMahasiswa tmp = head;
    String nama = "";
    for (int i = 0; i < size; i++) {

        if (tmp.data.nim.equalsIgnoreCase(nim)) {
            nama = tmp.data.nama;
            mhs = new Mahasiswa(nim, nama);
            add(nim, nama, i + 1);
            break;
        }
        tmp = tmp.next;
    }
}

public int getKey(String nim) throws Exception {
    NodeMahasiswa tmp = head;
    int simpan = -1;
    for (int i = 0; i < size; i++) {

        if (tmp.data.nim.equalsIgnoreCase(nim)) {
            simpan = i;
            break;
        }
        tmp = tmp.next;
    }
    return simpan;
}

public void removeKey(String nim) throws Exception {
    NodeMahasiswa tmp = head;
    for (int i = 0; i < size; i++) {

        if (tmp.data.nim.equalsIgnoreCase(nim)) {
            remove(i);
            break;
        }
        tmp = tmp.next;
    }
}
```

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```
public void remove(int index) throws Exception {
    if (isEmpty() || index >= size) {
        throw new Exception("Nilai index di luar batas");
    }
    if (isEmpty() || index == 0) {
        removeFirst();
    } else {
        NodeMahasiswa prev = head;
        NodeMahasiswa cur = head.next;
        for (int i = 1; i < index; i++) {
            prev = cur;
            cur = prev.next;
        }
        prev.next = cur.next;
        size--;
    }
}

public void removeFirst() throws Exception {
    Mahasiswa tmp = getFirst();
    head = head.next;
    size--;
}

public void clear() {
    head = null;
    size = 0;
}

public void print() {
    if (!isEmpty()) {
        NodeMahasiswa tmp = head;
        while (tmp != null) {
            System.out.println("Nim : " + tmp.data.nim);
            System.out.println("Nama : " + tmp.data.nama);
            tmp = tmp.next;
        }
        System.out.println("");
    } else {
        System.out.println("LinkedList kosong");
    }
```

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```
    }
}
```

| No | MhsMain.java |
|---|---|

```
package Minggu10.TUGAS1;

import java.util.Scanner;

public class MhsMain {

    static void menu() {
        System.out.println("+     +");
        System.out.println("1. Tambah");
        System.out.println("2. Hapus");
        System.out.println("3. Cari");
        System.out.println("4. Print");
        System.out.println("5. Keluar");
        System.out.println("+     +");
        System.out.print("Masukkan pilihan : ");
    }

    static void menuTambah() {
        System.out.println("+     +");
        System.out.println("1. Add First");
        System.out.println("2. Add Index");
        System.out.println("3. Add Key");
        System.out.println("4. Add Last");
        System.out.println("+     +");
        System.out.print("Masukkan pilihan : ");
    }

    static void menuHapus() {
        System.out.println("+     +");
        System.out.println("1. Hapus Index");
        System.out.println("2. Hapus Key");
        System.out.println("3. Hapus First");
        System.out.println("4. Clear");
        System.out.println("+     +");
        System.out.print("Masukkan pilihan : ");
    }
```

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```
    static void menuCari() {
        System.out.println("+     +");
        System.out.println("1. Cari Index");
        System.out.println("2. Cari Key");
        System.out.println("3. Get First");
        System.out.println("4. Get Last");
        System.out.println("+     +");
        System.out.print("Masukkan pilihan : ");
    }

    public static void main(String[] args) {
        LinkedListMahasiswa data = new LinkedListMahasiswa();
        Scanner scan = new Scanner(System.in);
        Scanner scanStr = new Scanner(System.in);
        int pil1 = 0;
        int pil2 = 0;
        String nim = "";
        String nama = "";
        int nilaiIndex = 0;
        try {
            do {
                menu();
                pil1 = scan.nextInt();
                switch (pil1) {
                    case 1:
                        menuTambah();
                        pil2 = scan.nextInt();
                        switch (pil2) {
                            case 1:
                                System.out.print("Masukkan NIM :");
                                nim = scanStr.nextLine();
                                System.out.print("Masukkan nama : ");
                                nama = scanStr.nextLine();
                                data.addFirst(nim, nama);
                                break;
                            case 2:
                                System.out.print( "Masukkan NIM: ");
                                nim = scanStr.nextLine();
                                System.out.print("Masukkan nama: ");
                                nama = scanStr.nextLine();
                                System.out.print("Masukkan index : ");
```

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```
                    nilaiIndex = scan.nextInt();
                    data.add(nim, nama, nilaiIndex);
                    break;
                case 3:
                    System.out.print( "Cari dan Masukkan nim : ");
                    nim = scanStr.nextLine();
                    data.addKey(nim);
                    break;
                case 4:
                    System.out.print( "Masukkan NIM: ");
                    nim = scanStr.nextLine();
                    System.out.print( "Masukkan nama : ");
                    nama = scanStr.nextLine();
                    data.addLast(nim, nama);
                    break;
                default:
                    System.out.println("Pilihan tidak tersedia ");
            }
            break;
        case 2:
            menuHapus();
            pil2 = scan.nextInt();
            switch (pil2) {
                case 1:
                    System.out.print("Masukkan index : ");
                    nilaiIndex = scan.nextInt();
                    data.remove(nilaiIndex);
                    break;
                case 2:
                    System.out.print("Cari dan Dihapus NIM : ");
                    nim = scanStr.nextLine();
                    data.removeKey(nim);
                    break;
                case 3:
                    data.removeFirst();
                    break;
                case 4:
                    data.clear();
                    break;
                default:
                    System.out.println("Pilihan tidak tersedia ");
```

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```
                    }
                    break;
                case 3:
                    menuCari();
                    pil2 = scan.nextInt();
                    switch (pil2) {
                        case 1:
                            System.out.print( "Masukkan index : ");
                            nilaiIndex = scan.nextInt();
                            data.get(nilaiIndex);
                            System.out.println("Data : ");
                            System.out.println(                "NIM                :
"+data.get(nilaiIndex).nim);
                            System.out.println("Nama                :
"+data.get(nilaiIndex).nama);
                        break;
                        case 2:
                            System.out.print("Cari NIM : ");
                            nim = scanStr.nextLine();
                            int hasil = data.getKey(nim);
                            if (hasil != -1) {
                                System.out.println( "Data ditemukan di index ke-
"+hasil);
                            }
                            else{
                                System.out.println("Tidak ditemukan ");
                            }
                            break;
                        case 3:
                            System.out.println("Data : ");
                            System.out.println("NIM : " + data.getFirst().nim);
                            System.out.println("Nama                :
"+data.getFirst().nama);
                            break;
                        case 4:
                            System.out.println("Data : ");
                            System.out.println("NIM : "+data.getFirst().nim);
                            System.out.println("Nama                :
"+data.getFirst().nama);
                            break;
                        default:
```

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```
                                System.out.println("Pilihan tidak tersedia ");
                            }
                            break;
                        case 4:
                            data.print();
                            break;
                    }

                } while (pil1 != 5);
            } catch (Exception e) {
                System.out.println(e.getMessage());
            }
        }
}
```

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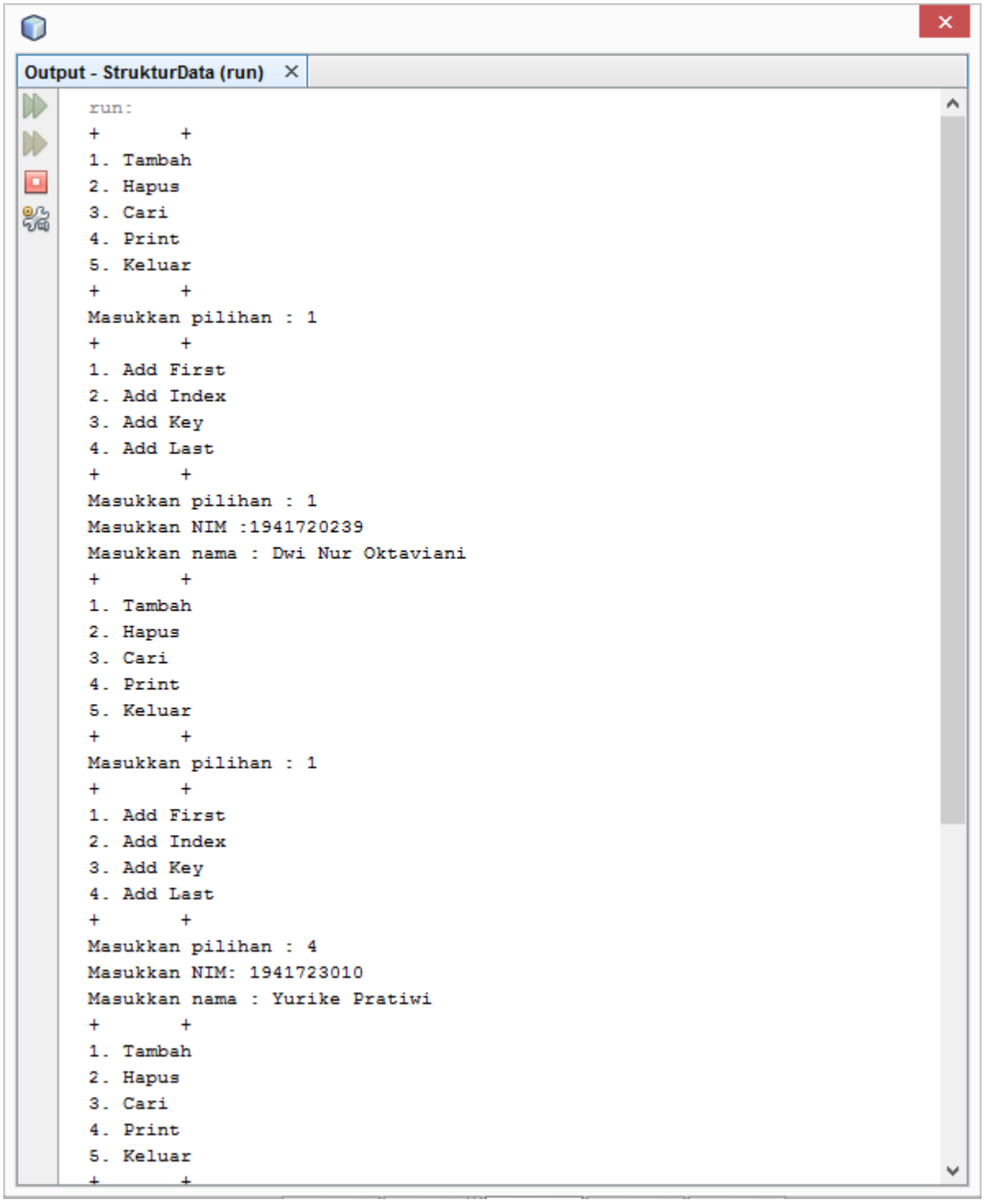

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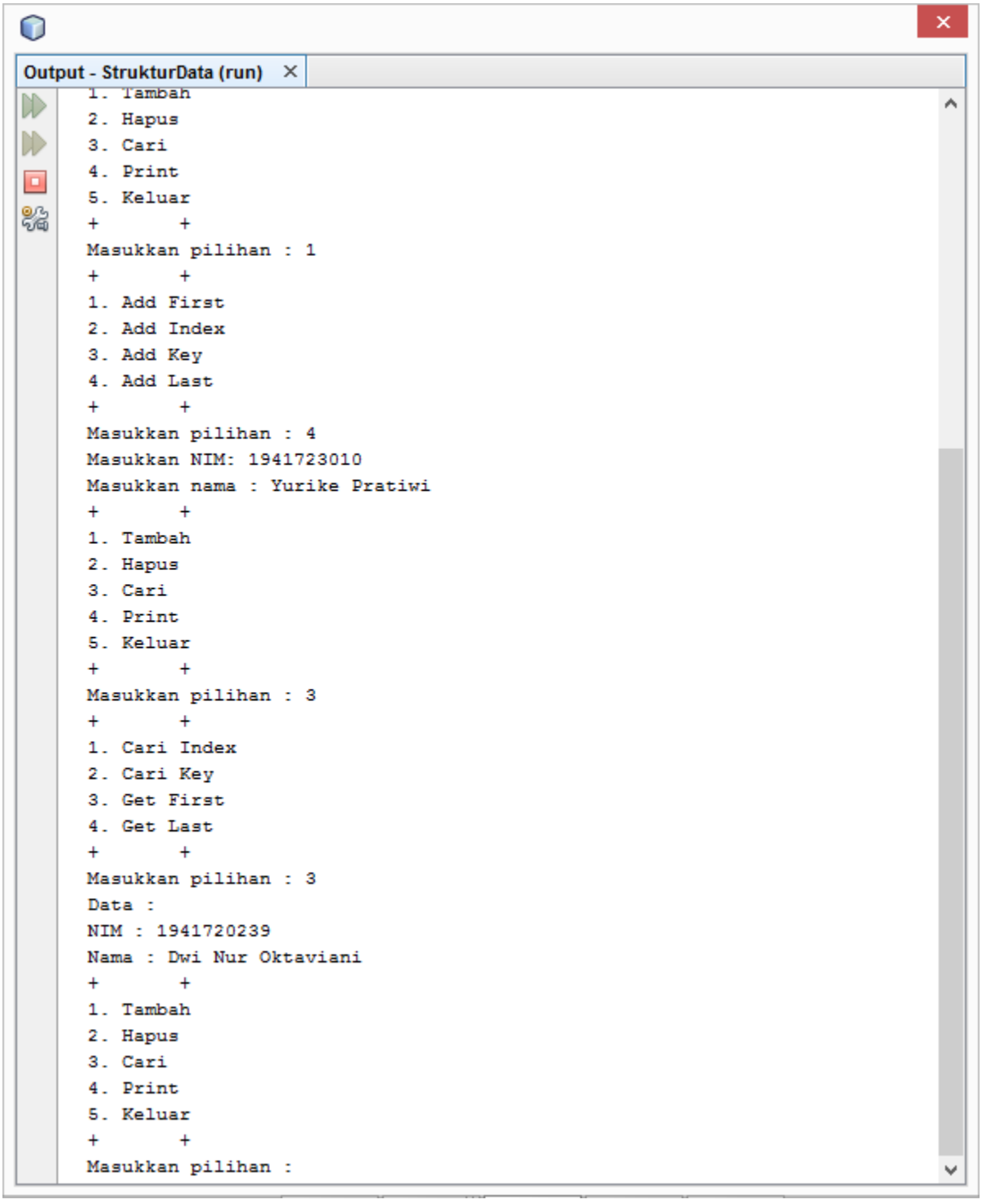

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2. Carilah studi kasus lain yang memanfaatkan Stack atau Queue (pilih salah satu) lalu buat program menggunakan konsep LinkedLists!

   Jawab :

| No | NodeS.java |
|---|---|

```
package Minggu10.Tugas2;

public class NodeS {
    public int data;
    public NodeS next;
    public NodeS prev;

    public NodeS(int id) {
        this.data = id;
    }

    public void tampil(){
        System.out.println("{" + data + "}");
    }

}
```

| No | SList.java |
|---|---|

```
package Minggu10.Tugas2;

public class SList {
    private NodeS top;
    private NodeS bottom;

    public SList() {
        top = bottom = null;
    }

    public boolean isEmpty(){
        return (top ==null);
    }

    public void push(int id){
```

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```
            NodeS st = new NodeS(id);
            if (top == null) {
                top = bottom = st;
            }
            else{
                top.next = st;
                st.prev = top;
                top = st;
            }
        }

        public NodeS pop(){
            NodeS tmp = null;
            if (top == null) {
                System.out.println("Stack Kosong");
            }
            else if(top == bottom){
                tmp = top;
                top = bottom = null;
            }
            else{
                tmp = top;
                top = top.prev;
                top.next = null;
            }
            return tmp;
        }

        public void print(){
            NodeS current = bottom;
            while (current != null) {
                current.tampil();
                current = current.next;
            }
            System.out.println("");
        }

}
```

**JOBSHEET 11**
**LINKED LIST**

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| No | MainStack.java |
|---|---|

```
package Minggu10.Tugas2;

public class MainStack {
   public static void main(String[] args) {
   SList data = new SList();
      System.out.println("Inisialisasi Stack...");
      data.push(27);
      data.push(18);
      data.push(36);
      System.out.println("Tampilkan");
      data.print();
      System.out.println("Hapus Stack dari Top");
      while (!data.isEmpty()) {
         NodeS ns = data.pop();
         System.out.print("Hapus");
         ns.tampil();
         System.out.println("");
      }
      data.print();
   }
}
```

Output :