LAPORAN PRAKTIKUM
Modul 06
“Double Linked List Bagian Pertama”

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PROGRAM STUDI S1 REKAYASA PERANGKAT LUNAK

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Tugas Pendahuluan

1. Menambahkan Elemen di Awal dan Akhir DLL
   Deskripsi Soal: Buatlah program yang mengizinkan pengguna menambahkan elemen ke dalam Doubly Linked List di awal dan di akhir list.
   Jawab :

soal1.cpp

```cpp
#include <iostream>
using namespace std;

struct Node {
    int data;
    Node* prev;
    Node* next;
};

struct DoublyLinkedList {
    Node* head;
    Node* tail;
};


Node* createNode(int data) {
    Node* newNode = new Node();
    newNode->data = data;
    newNode->prev = newNode->next = nullptr;
    return newNode;
}

void initList(DoublyLinkedList &dll) {
    dll.head = dll.tail = nullptr;
}


void insertFirst(DoublyLinkedList &dll, int data) {
    Node* newNode = createNode(data);
    if (dll.head == nullptr) {
        dll.head = dll.tail = newNode;
    } else {
        newNode->next = dll.head;
        dll.head->prev = newNode;
        dll.head = newNode;
    }
}

void insertLast(DoublyLinkedList &dll, int data) {
    Node* newNode = createNode(data);
    if (dll.tail == nullptr) {
        dll.head = dll.tail = newNode;
    } else {
        newNode->prev = dll.tail;
        dll.tail->next = newNode;
        dll.tail = newNode;
    }
}


void displayForward(DoublyLinkedList dll) {
    Node* temp = dll.head;
    while (temp != nullptr) {
        cout << temp->data;
        if (temp->next != nullptr) {
            cout << " <-> ";
        }
        temp = temp->next;
    }
    cout << endl;
}

int main() {
    DoublyLinkedList dll;
    initList(dll);


    insertFirst(dll, 10);
    insertFirst(dll, 5);
    insertLast(dll, 20);

    cout << "DAFTAR ANGGOTA LIST: ";
    displayForward(dll);

    return 0;
}
```

Output :

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

cd "/Users/macairm1/STD_YOGA_EKA_PRATAMA_2311104023/06_Double_Linked_List_Bagian_1 /TP/output"
./"soal1"
macairm1@MacBook-Air-MacAirM1 TP % cd "/Users/macairm1/STD_YOGA_EKA_PRATAMA_2311104023/06_Double_Linked_List_Bagian_1 /TP/output"
macairm1@MacBook-Air-MacAirM1 output % ./"soal1"
DAFTAR ANGGOTA LIST: 5 <-> 10 <-> 20
macairm1@MacBook-Air-MacAirM1 output %
```

2. Menghapus Elemen di Awal dan Akhir DLL

Deskripsi Soal: Buatlah program yang memungkinkan pengguna untuk menghapus elemen pertama dan elemen terakhir dalam Doubly Linked List.

Jawab :

soal2.cpp

soal2.cpp > createNode(int)

```cpp
#include <iostream>
using namespace std;

struct Node {
    int data;
    Node* prev;
    Node* next;
};

struct DoublyLinkedList {
    Node* head;
    Node* tail;
};

Node* createNode(int data) {
    Node* newNode = new Node();
    newNode->data = data;
    newNode->prev = newNode->next = nullptr;
    return newNode;
}


void initList(DoublyLinkedList &dll) {
    dll.head = dll.tail = nullptr;
}


void insertLast(DoublyLinkedList &dll, int data) {
    Node* newNode = createNode(data);
    if (dll.tail == nullptr) {
        dll.head = dll.tail = newNode;
    } else {
        newNode->prev = dll.tail;
        dll.tail->next = newNode;
        dll.tail = newNode;
    }
}
```

```cpp
void deleteFirst(DoublyLinkedList &dll) {
    if (dll.head == nullptr) {
        return;
    }
    Node* temp = dll.head;
    if (dll.head == dll.tail) {
        dll.head = dll.tail = nullptr;
    } else {
        dll.head = dll.head->next;
        dll.head->prev = nullptr;
    }
    delete temp;
}


void deleteLast(DoublyLinkedList &dll) {
    if (dll.tail == nullptr) {
        return;
    }
    Node* temp = dll.tail;
    if (dll.head == dll.tail) {
        dll.head = dll.tail = nullptr;
    } else {
        dll.tail = dll.tail->prev;
        dll.tail->next = nullptr;
    }
    delete temp;
}


void displayForward(DoublyLinkedList dll) {
    Node* temp = dll.head;
    while (temp != nullptr) {
        cout << temp->data;
        if (temp->next != nullptr) {
            cout << " <-> ";
        }
        temp = temp->next;
    }
    cout << endl;
}
```

```cpp
int main() {
    DoublyLinkedList dll;
    initList(dll);


    insertLast(dll, 10);
    insertLast(dll, 15);
    insertLast(dll, 20);


    deleteFirst(dll);
    deleteLast(dll);


    cout << "DAFTAR ANGGOTA LIST SETELAH PENGHAPUSAN: ";
    displayForward(dll);

    return 0;
}
```

Output :

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

macairm1@MacBook-Air-MacAirM1 output % cd "/Users/macairm1/STD_YOGA_EKA_PRATAMA_2311104023/06_Double_Linked_List_Bagian_1 /TP/output"
./"soal2"
macairm1@MacBook-Air-MacAirM1 output % ./"soal2"
DAFTAR ANGGOTA LIST SETELAH PENGHAPUSAN: 15
macairm1@MacBook-Air-MacAirM1 output %
```

3. Menampilkan Elemen dari depan ke belakang dan sebaliknya

Deskripsi Soal : Buatlah program yang memungkinkan pengguna memasukan beberapa elemen ke dalam Doubly Linked List. Setelah elemen dimasukan, tampilkan seluruh elemen dalam list dari depan ke belakang, kemudian dari belakang ke depan

Jawab :

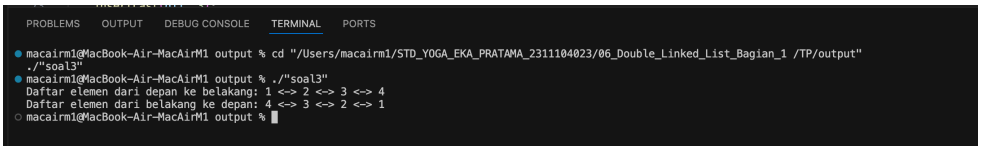
soal3.cpp

```cpp
#include <iostream>
using namespace std;

struct Node {
    int data;
    Node* prev;
    Node* next;
};

struct DoublyLinkedList {
    Node* head;
    Node* tail;
};


Node* createNode(int data) {
    Node* newNode = new Node();
    newNode->data = data;
    newNode->prev = newNode->next = nullptr;
    return newNode;
}


void initList(DoublyLinkedList &dll) {
    dll.head = dll.tail = nullptr;
}


void insertLast(DoublyLinkedList &dll, int data) {
    Node* newNode = createNode(data);
    if (dll.tail == nullptr) {
        dll.head = dll.tail = newNode;
    } else {
        newNode->prev = dll.tail;
        dll.tail->next = newNode;
        dll.tail = newNode;
    }
}
```

```cpp
void displayForward(DoublyLinkedList dll) {
    Node* temp = dll.head;
    while (temp != nullptr) {
        cout << temp->data;
        if (temp->next != nullptr) {
            cout << " <-> ";
        }
        temp = temp->next;
    }
    cout << endl;
}


void displayBackward(DoublyLinkedList dll) {
    Node* temp = dll.tail;
    while (temp != nullptr) {
        cout << temp->data;
        if (temp->prev != nullptr) {
            cout << " <-> ";
        }
        temp = temp->prev;
    }
    cout << endl;
}
```

```cpp
int main() {
    DoublyLinkedList dll;
    initList(dll);


    insertLast(dll, 1);
    insertLast(dll, 2);
    insertLast(dll, 3);
    insertLast(dll, 4);


    cout << "Daftar elemen dari depan ke belakang: ";
    displayForward(dll);


    cout << "Daftar elemen dari belakang ke depan: ";
    displayBackward(dll);

    return 0;
}
```

Output :


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
macairm1@MacBook-Air-MacAirM1 output % cd "/Users/macairm1/STD_YOGA_EKA_PRATAMA_231104023/06_Double_Linked_List_Bagian_1 /TP/output"
./"soal3"
macairm1@MacBook-Air-MacAirM1 output % ./"soal3"
Daftar elemen dari depan ke belakang: 1 <-> 2 <-> 3 <-> 4
Daftar elemen dari belakang ke depan: 4 <-> 3 <-> 2 <-> 1
macairm1@MacBook-Air-MacAirM1 output %