PRAKTIKUM STRUKTUR DATA

TUGAS PENDAHULUAN 06

Double Linked List bagian 01

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PROGRAM STUDI S1 REKAYASA PERANGKAT LUNAK

FAKULTAS INFORMATIKA

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SOAL TP

Soal 1: Menambahkan Elemen di Awal dan Akhir DLL

Contoh Program:

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

class Node {
public:
    int data;
    Node* next;
    Node* prev;

    Node(int value) {
        data = value;
        next = nullptr;
        prev = nullptr;
    }
};

class DoubleLinkedList {
private:
    Node* head;

public:
    DoubleLinkedList() {
        head = nullptr;
    }

    void insertFirst_2311104020(int value) {
        Node* newNode = new Node(value);
        if (head == nullptr) {
            head = newNode;
        } else {
            newNode->next = head;
            head->prev = newNode;
            head = newNode;
        }
    }

    void insertLast_2311104020(int value) {
        Node* newNode = new Node(value);
        if (head == nullptr) {
            head = newNode;
        } else {
            Node* temp = head;
            while (temp->next != nullptr) {
                temp = temp->next;
            }
            temp->next = newNode;
            newNode->prev = temp;
        }
    }

    void display_2311104020() {
        Node* temp = head;
        while (temp != nullptr) {
            cout << temp->data;
            if (temp->next != nullptr) cout << " <-> ";
            temp = temp->next;
        }
        cout << endl;
    }
};

int main() {
    DoubleLinkedList dll;

    dll.insertFirst_2311104020(10);
    dll.insertFirst_2311104020(5);
    dll.insertLast_2311104020(20);

    cout << "DAFTAR ANGGOTA LIST: ";
    dll.display_2311104020();

    return 0;
}
```

Output:

```
Raihan Sastra W@MSI MINGW64 ~/Documents/Institut Teknologi Telkom Pur
wokerto/Semester 3/Struktur Data/STD_Raihan_Sastra_Wibyanto_231110402
0/06_Double_Linked_List_Bagian1/TP/output (main)
$ ./"DLL.exe"
DAFTAR ANGGOTA LIST: 5 <-> 10 <-> 20
```

Soal 2: Menghapus Elemen di Awal dan Akhir DLL

Contoh Program:

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

class Node {
public:
    int data;
    Node* next;
    Node* prev;

    Node(int value) {
        data = value;
        next = nullptr;
        prev = nullptr;
    }
};

class DoubleLinkedList {
private:
    Node* head;

public:
    DoubleLinkedList() {
        head = nullptr;
    }

    void insertFirst_2311104020(int value) {
        Node* newNode = new Node(value);
        if (head == nullptr) {
            head = newNode;
        } else {
            newNode->next = head;
            head->prev = newNode;
            head = newNode;
        }
    }

    void insertLast_2311104020(int value) {
        Node* newNode = new Node(value);
        if (head == nullptr) {
            head = newNode;
        } else {
            Node* temp = head;
            while (temp->next != nullptr) {
                temp = temp->next;
            }
            temp->next = newNode;
            newNode->prev = temp;
        }
    }

    void deleteFirst_2311104020() {
        if (head == nullptr) {
            cout << "List is empty, nothing to delete." << endl;
            return;
        }
        Node* temp = head;
        if (head->next == nullptr) {
            head = nullptr;
        } else {
            head = head->next;
            head->prev = nullptr;
        }
        delete temp;
    }

    void deleteLast_2311104020() {
        if (head == nullptr) {
            cout << "List is empty, nothing to delete." << endl;
            return;
        }
        Node* temp = head;
        if (head->next == nullptr) {
            head = nullptr;
        } else {
            while (temp->next != nullptr) {
                temp = temp->next;
            }
            temp->prev->next = nullptr;
        }
        delete temp;
    }

    void display_2311104020() {
        Node* temp = head;
        if (temp == nullptr) {
            cout << "List is empty" << endl;
            return;
        }
        while (temp != nullptr) {
            cout << temp->data;
            if (temp->next != nullptr) cout << " <-> ";
            temp = temp->next;
        }
        cout << endl;
    }
};

int main() {
    DoubleLinkedList dll;

    dll.insertFirst_2311104020(15);
    dll.insertFirst_2311104020(10);
    dll.insertLast_2311104020(20);

    cout << "DAFTAR ANGGOTA LIST: ";
    dll.display_2311104020();

    dll.deleteFirst_2311104020();
    dll.deleteLast_2311104020();

    cout << "DAFTAR ANGGOTA LIST SETELAH PENGHAPUSAN: ";
    dll.display_2311104020();

    return 0;
}
```

Output:

```
Raihan Sastra W@MSI MINGW64 ~/Documents/Institut Teknologi Telkom Pur
wokerto/Semester 3/Struktur Data/STD_Raihan_Sastra_Wibyanto_231110402
0/06_Double_Linked_List_Bagian1/TP/output (main)
$ ./"DLL2.exe"
DAFTAR ANGGOTA LIST: 10 <-> 15 <-> 20
DAFTAR ANGGOTA LIST SETELAH PENGHAPUSAN: 15
```

Soal 3: Menampilkan Elemen dari Depan ke Belakang dan sebaliknya

Contoh Program:

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

class Node {
public:
    int data;
    Node* next;
    Node* prev;

    Node(int value) {
        data = value;
        next = nullptr;
        prev = nullptr;
    }
};

class DoubleLinkedList {
private:
    Node* head;
    Node* tail;

public:
    DoubleLinkedList() {
        head = nullptr;
        tail = nullptr;
    }

    void insertLast_2311104020(int value) {
        Node* newNode = new Node(value);
        if (head == nullptr) {
            head = tail = newNode;
        } else {
            tail->next = newNode;
            newNode->prev = tail;
            tail = newNode;
        }
    }

    void displayForward_2311104020() {
        Node* temp = head;
        while (temp != nullptr) {
            cout << temp->data;
            if (temp->next != nullptr) cout << " <-> ";
            temp = temp->next;
        }
        cout << endl;
    }

    void displayBackward_2311104020() {
        Node* temp = tail;
        while (temp != nullptr) {
            cout << temp->data;
            if (temp->prev != nullptr) cout << " <-> ";
            temp = temp->prev;
        }
        cout << endl;
    }
};

int main() {
    DoubleLinkedList dll;

    dll.insertLast_2311104020(1);
    dll.insertLast_2311104020(2);
    dll.insertLast_2311104020(3);
    dll.insertLast_2311104020(4);

    cout << "Daftar elemen dari depan ke belakang: ";
    dll.displayForward_2311104020();

    cout << "Daftar elemen dari belakang ke depan: ";
    dll.displayBackward_2311104020();

    return 0;
}
```

Output:

```
Raihan Sastra W@MSI MINGW64 ~/Documents/Institut Teknologi Telkom Pur
wokerto/Semester 3/Struktur Data/STD_Raihan_Sastra_Wibyanto_231110402
0/06_Double_Linked_List_Bagian1/TP/output (main)
$ ./"DLL3.exe"
Daftar elemen dari depan ke belakang: 1 <-> 2 <-> 3 <-> 4
Daftar elemen dari belakang ke depan: 4 <-> 3 <-> 2 <-> 1
```