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Code Program :

```
1 //Dimas Abhipraya Ramansyah
2 //2311104069
3
4 #include <iostream>
5 #include <string>
6
7 using namespace std;
8
9 struct Node {
10     string nama;
11     string NIM;
12     string kelas;
13     float nilaiAsesmen;
14     float nilaiPraktikum;
15     Node* next;
16 };
17
18 Node* newElement(string nama, string NIM, string kelas, float nilaiAsesmen, float nilaiPraktikum) {
19     Node* newNode = new Node();
20     newNode->nama = nama;
21     newNode->NIM = NIM;
22     newNode->kelas = kelas;
23     newNode->nilaiAsesmen = nilaiAsesmen;
24     newNode->nilaiPraktikum = nilaiPraktikum;
25     newNode->next = nullptr;
26     return newNode;
27 }
28
29 Node* createNewList() {
30     return nullptr;
31 }
32
33 bool isEmpty(Node* head) {
34     return head == nullptr;
35 }
36
37 void insertFirst(Node* head, Node* newNode) {
38     if (isEmpty(head)) {
39         head = newNode;
40     } else {
41         newNode->next = head;
42         head = newNode;
43     }
44 }
45
46 void insertLast(Node* head, Node* newNode) {
47     if (isEmpty(head)) {
48         head = newNode;
49     } else {
50         Node* temp = head;
51         while (temp->next != nullptr) {
52             temp = temp->next;
53         }
54         temp->next = newNode;
55     }
56 }
57
58 void deleteFirst(Node* head) {
59     if (isEmpty(head)) {
60         Node* temp = head;
61         head = head->next;
62         delete temp;
63     }
64 }
65
66 void deleteLast(Node* head) {
67     if (isEmpty(head)) {
68         if (head->next == nullptr) {
69             delete head;
70             head = nullptr;
71         } else {
72             Node* temp = head;
73             while (temp->next->next != nullptr) {
74                 temp = temp->next;
75             }
76             delete temp->next;
77             temp->next = nullptr;
78         }
79     }
80 }
81
82 Node* findElement(Node* head, string NIM) {
83     Node* current = head;
84     while (current != nullptr) {
85         if (current->NIM == NIM) {
86             return current;
87         }
88         current = current->next;
89     }
90     return nullptr;
91 }
92
93 int length(Node* head) {
94     int count = 0;
95     Node* current = head;
96     while (current != nullptr) {
97         count++;
98         current = current->next;
99     }
100     return count;
101 }
102
103 void printList(Node* head) {
104     Node* current = head;
105     while (current != nullptr) {
106         cout << "Nama: " << current->nama << ", NIM: " << current->NIM
107             << ", Kelas: " << current->kelas
108             << ", Nilai Asesmen: " << current->nilaiAsesmen
109             << ", Nilai Praktikum: " << current->nilaiPraktikum << endl;
110         current = current->next;
111     }
112 }
113
114 int main() {
115     Node* head = createNewList();
116
117     insertLast(head, newElement("Daniel", "44320", "SE-2", 75, 80));
118     insertLast(head, newElement("Kriting", "44301", "IF-1", 77, 84));
119     insertFirst(head, newElement("Udin", "44319", "IF-2", 72, 79));
120
121     cout << "Data Mahasiswa:" << endl;
122     printList(head);
123
124     string carNIM = "44320";
125     Node* found = findElement(head, carNIM);
126     if (found != nullptr) {
127         cout << "Data ditemukan: " << found->nama << " dengan NIM " << found->NIM << endl;
128     } else {
129         cout << "Data dengan NIM " << carNIM << " tidak ditemukan." << endl;
130     }
131
132     deleteFirst(head);
133     deleteLast(head);
134
135     cout << "Data Mahasiswa setelah penghapusan:" << endl;
136     printList(head);
137
138     return 0;
139 }
```

Output :

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

cd "/Users/apple/Documents/PraktikumSD/output"
./"Ujian1"
● apple@Abiww PraktikumSD % cd "/Users/apple/Documents/PraktikumSD/output"
● apple@Abiww output % ./"Ujian1"
Data Mahasiswa:
Nama: Udin, NIM: 44319, Kelas: IF-2, Nilai Asesmen: 72, Nilai Praktikum: 79
Nama: Daniel, NIM: 44326, Kelas: SE-2, Nilai Asesmen: 75, Nilai Praktikum: 80
Nama: Kriting, NIM: 44301, Kelas: IF-1, Nilai Asesmen: 77, Nilai Praktikum: 84
Data ditemukan: Daniel dengan NIM 44326
Data Mahasiswa setelah penghapusan:
Nama: Daniel, NIM: 44326, Kelas: SE-2, Nilai Asesmen: 75, Nilai Praktikum: 80
○ apple@Abiww output % █
```