

LAPORAN PRAKTIKUM
PERTEMUAN 4
SINGLE LINKED LIST (BAGIAN PERTAMA)



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I. TP

Kode:

list.h

```
1  #include <iostream>
2  #include "list.h"
3  using namespace std;
4
5  Codeium: Refactor | Explain | Generate Function Comment | X
6  void createList(List &L) {
7      first(L) = NULL;
8  }
9
10 Codeium: Refactor | Explain | Generate Function Comment | X
11 address allocate(infotype x) {
12     address P = new elmlist;
13     info(P) = x;
14     next(P) = NULL;
15     return P;
16 }
17
18 Codeium: Refactor | Explain | Generate Function Comment | X
19 void insertFirst(List &L, address P) {
20     next(P) = first(L);
21     first(L) = P;
22 }
23
24 Codeium: Refactor | Explain | Generate Function Comment | X
25 void insertLast(List &L, address P) {
26     if (first(L) == NULL) {
27         first(L) = P;
28     } else {
29         address Q = first(L);
30         while (next(Q) != NULL) {
31             Q = next(Q);
32         }
33         next(Q) = P;
34     }
35 }
```

```

36 }
37
38 Codeium: Refactor | Explain | Generate Function Comment | X
39 void insertAfter(address Prec, address P) {
40     if (Prec != NULL) {
41         next(P) = next(Prec);
42         next(Prec) = P;
43     }
44 }
45
46 Codeium: Refactor | Explain | Generate Function Comment | X
47 void deleteLast(List &L, address &P) {
48     if (first(L) == NULL) {
49         P = NULL;
50     } else if (next(first(L)) == NULL) {
51         P = first(L);
52         first(L) = NULL;
53     } else {
54         address Q = first(L);
55         while (next(next(Q)) != NULL) {
56             Q = next(Q);
57         }
58         P = next(Q);
59         next(Q) = NULL;
60     }
61 }
62
63 Codeium: Refactor | Explain | Generate Function Comment | X
64 void deleteAfter(address Prec, address &P) {
65     if (Prec != NULL && next(Prec) != NULL) {
66         P = next(Prec);
67         next(Prec) = next(P);
68         next(P) = NULL;
69     }
70 }
```

```

62 }
63
Codeium: Refactor | Explain | Generate Function Comment | X
64 address searchInfo(List L, infotype x) {
65     address P = first(L);
66     while (P != NULL && info(P) != x) {
67         P = next(P);
68     }
69     return P;
70 }
71
Codeium: Refactor | Explain | Generate Function Comment | X
72 void printInfo(List L) {
73     address P = first(L);
74     while (P != NULL) {
75         cout << info(P);
76         P = next(P);
77     }
78     cout << endl;
79 }
80

```

Penjelasan:

a. lish.h

- first(L) : mengambil elemen pertama dari list L, next(P): mengambil elemen dari node P, dan info(P): mengambil informasi dari node P
- infotype digunakan untuk informasi yang disimpan dalam list.
- address digunakan untuk menunjuk ke elemen-elemen list.
- elmlist: node linked list yang memiliki dua elemen
- List : linked list itu sendiri yang hanya berisi satu elemen first.

list.cpp

```

TP > C listh > ...
1  #ifndef LIST_H
2  #define LIST_H
3
4  #include <iostream>
5
6  #define first(L) L.first
7  #define next(P) P->next
8  #define info(P) P->info
9
10 using namespace std;
11
12 typedef int infotype;
13 typedef struct elmlist *address;
14
Codeium: Refactor | Explain
15 struct elmlist {
16     infotype info;
17     address next;
18 };
19
Codeium: Refactor | Explain
20 struct List {
21     address first;
22 };
23
24 // Primitif fungsi dan prosedur
Codeium: Refactor | Explain | X
25 void createList(List &L);
26 address allocate(infotype x);
27 void insertFirst(List &L, address P);
28 void insertLast(List &L, address P);
29 void insertAfter(address Prec, address P);
30 void deleteLast(List &L, address &P);
31 void deleteAfter(address Prec, address &P);

```

Penjelasan: Berisi implementasi dari fungsi-fungsi yang digunakan untuk manipulasi

Single Linked List, seperti membuat list, menambah node, menghapus node, mencari node, dan mencetak isi list.

main.cpp

```
TP > main.cpp > ...
1  #include <iostream>
2  #include "list.h"
3  using namespace std;
4
5  Codeium: Refactor | Explain | Generate Function Comment | X
6  int main() {
7      List L;
8      createlist(L);
9
10     int nimDigit;
11     cout << "Masukkan NIM per digit\n";
12     for (int i = 1; i <= 10; i++) {
13         cout << "Digit " << i << " : ";
14         cin >> nimDigit;
15         address P = allocate(nimDigit);
16         insertLast(L, P); // Menggunakan insertLast agar urutan sesuai input
17     }
18
19     cout << "Isi list : ";
20     printInfo(L);
21
22     return 0;
23 }
```

Penjelasan: fungsi utama dari program yaitu menginisialisasi list, menerima input dari pengguna (digit NIM), menambahkan digit ke dalam list, dan kemudian mencetak isi dari list.

Output:

```
Masukkan NIM per digit
Digit 1 : 2
Digit 2 : 3
Digit 3 : 1
Digit 4 : 1
Digit 5 : 1
Digit 6 : 0
Digit 7 : 4
Digit 8 : 0
Digit 9 : 3
Digit 10 : 7
Isi list : 2311104037
```

Penjelasan: Ketika sudah memasukan NIM perdigit maka program akan menghasilkan output seperti diatas.

II. UNGUIDED

1. Kode:

```

1  #include <iostream>
2  using namespace std;
3
4  struct Node {
5      int data;
6      Node* next;
7  };
8
9  class SingleLinkedList {
10 private:
11     Node* head;
12
13 public:
14     SingleLinkedList() : head(nullptr) {}
15
16     void insertAtFront(int value) {
17         Node* newNode = new Node();
18         newNode->data = value;
19         newNode->next = head;
20         head = newNode;
21     }
22
23     void insertAtBack(int value) {
24         Node* newNode = new Node();
25         newNode->data = value;
26         newNode->next = nullptr;
27         if (head == nullptr) {
28             head = newNode;
29         } else {
30             Node* temp = head;
31             while (temp->next != nullptr) {
32                 temp = temp->next;
33             }
34             temp->next = newNode;
35         }
36     }
37
38     void printList() {
39         Node* temp = head;
40         while (temp != nullptr) {
41             cout << temp->data;
42             if (temp->next != nullptr) {
43                 cout << "-> ";
44             }
45             temp = temp->next;
46         }
47         cout << endl;
48     }
49 };
50
51 int main() {
52     SingleLinkedList list;
53     list.insertAtFront(10);
54     list.insertAtBack(20);
55     list.insertAtFront(5);
56     list.printList(); // Output: 5->10->20
57
58     return 0;
59 }

```

Output:

5-> 10-> 20

Penjelasan: Kode mengimplementasikan Single Linked List yang mendukung operasi dasar:

- Menambahkan node di awal (front) dan akhir (back).
- Mencetak semua elemen dalam list. Output yang dihasilkan adalah

representasi elemen-elemen dalam linked list sesuai urutan input yang diberikan.

2. Kode:

```
1  #include <iostream>
2  using namespace std;
3
4  struct Node {
5      int data;
6      Node* next;
7  };
8
9  class SingleLinkedList {
10 private:
11     Node* head;
12
13 public:
14     SingleLinkedList() : head(nullptr) {}
15
16     void insertAtFront(int value) {
17         Node* newNode = new Node();
18         newNode->data = value;
19         newNode->next = head;
20         head = newNode;
21     }
22
23     void insertAtBack(int value) {
24         Node* newNode = new Node();
25         newNode->data = value;
26         newNode->next = nullptr;
27         if (head == nullptr) {
28             head = newNode;
29         } else {
30             Node* temp = head;
31
32             while (temp->next != nullptr) {
33                 temp = temp->next;
34             }
35             temp->next = newNode;
36         }
37     }
38
39     void deleteNode(int value) {
40         if (head == nullptr) return;
41
42         // Handle deletion of head node
43         if (head->data == value) {
44             Node* temp = head;
45             head = head->next;
46             delete temp;
47             return;
48         }
49
50         Node* current = head;
51         Node* previous = nullptr;
52         while (current != nullptr && current->data != value) {
53             previous = current;
54             current = current->next;
55         }
56
57         if (current == nullptr) return; // Value not found
58
59         previous->next = current->next;
60         delete current;
```

```

59     delete current;
60 }
61
62 Codeium: Refactor | Explain | Generate Function Comment | X
63 void printList() {
64     Node* temp = head;
65     while (temp != nullptr) {
66         cout << temp->data;
67         if (temp->next != nullptr) {
68             cout << "-> ";
69         }
70         temp = temp->next;
71     }
72     cout << endl;
73 }
74
75 Codeium: Refactor | Explain | Generate Function Comment | X
76 int main() {
77     SingleLinkedList list;
78     list.insertAtFront(10);
79     list.insertAtBack(20);
80     list.insertAtFront(5);
81     list.deleteNode(10);
82     list.printList(); // Output: 5->20
83
84     return 0;
85 }

```

Output:

5-> 20

Penjelasan: Kode menunjukkan cara mengelola linked list dengan operasi menambah node di depan, dibelakang, menghapus node tertentu, dan mencetak elemen list. Output akhirnya adalah 5->20.

3. Kode:

```

1  #include <iostream>
2  using namespace std;
3
4  Codeium: Refactor | Explain
5  struct Node {
6      int data;
7      Node* next;
8  };
9
10 Codeium: Refactor | Explain
11 class SingleLinkedList {
12 private:
13     Node* head;
14 public:
15     SingleLinkedList() : head(nullptr) {}
16
17 Codeium: Refactor | Explain | Generate Function Comment | X
18 void insertAtFront(int value) {
19     Node* newNode = new Node();
20     newNode->data = value;
21     newNode->next = head;
22     head = newNode;
23 }
24
25 Codeium: Refactor | Explain | Generate Function Comment | X
26 void insertAtBack(int value) {
27     Node* newNode = new Node();
28     newNode->data = value;
29     newNode->next = nullptr;
30     if (head == nullptr) {
31         head = newNode;
32     } else {
33         Node* temp = head;

```



```

31         while (temp->next != nullptr) {
32             temp = temp->next;
33         }
34         temp->next = newNode;
35     }
36 }
37
Codeium: Refactor | Explain | Generate Function Comment | X
38 bool searchNode(int value) {
39     Node* temp = head;
40     while (temp != nullptr) {
41         if (temp->data == value) {
42             return true; // Node found
43         }
44         temp = temp->next;
45     }
46     return false; // Node not found
47 }
48
Codeium: Refactor | Explain | Generate Function Comment | X
49 int countLength() {
50     int count = 0;
51     Node* temp = head;
52     while (temp != nullptr) {
53         count++;
54         temp = temp->next;
55     }
56     return count;
57 }

```

```

59 void printList() {
60     Node* temp = head;
61     while (temp != nullptr) {
62         cout << temp->data;
63         if (temp->next != nullptr) {
64             cout << "-> ";
65         }
66         temp = temp->next;
67     }
68     cout << endl;
69 }
70 };
71
Codeium: Refactor | Explain | Generate Function Comment | X
72 int main() {
73     SingleLinkedList list;
74     list.insertAtFront(10);
75     list.insertAtBack(20);
76     list.insertAtFront(5);
77
78     int valueToSearch = 20;
79     if (list.searchNode(valueToSearch)) {
80         cout << "Node dengan nilai " << valueToSearch << " ditemukan." << endl;
81     } else {
82         cout << "Node dengan nilai " << valueToSearch << " tidak ditemukan." << endl;
83     }
84
85     int length = list.countLength();
86     cout << "Panjang linked list: " << length << endl; // Output: Panjang Linked List: 3
87
88     return 0;
89 }

```

Output:

```

Node dengan nilai 20 ditemukan.
Panjang linked list: 3

```

Penjelasan: Kode mendemonstrasikan operasi dasar pada single linked list, dengan menambah elemen di depan dan belakang, mencari elemen, menghitung panjang, dan mencetak isi list. Outputnya adalah informasi apakah nilai yang dicari ditemukan dan panjang list (3).