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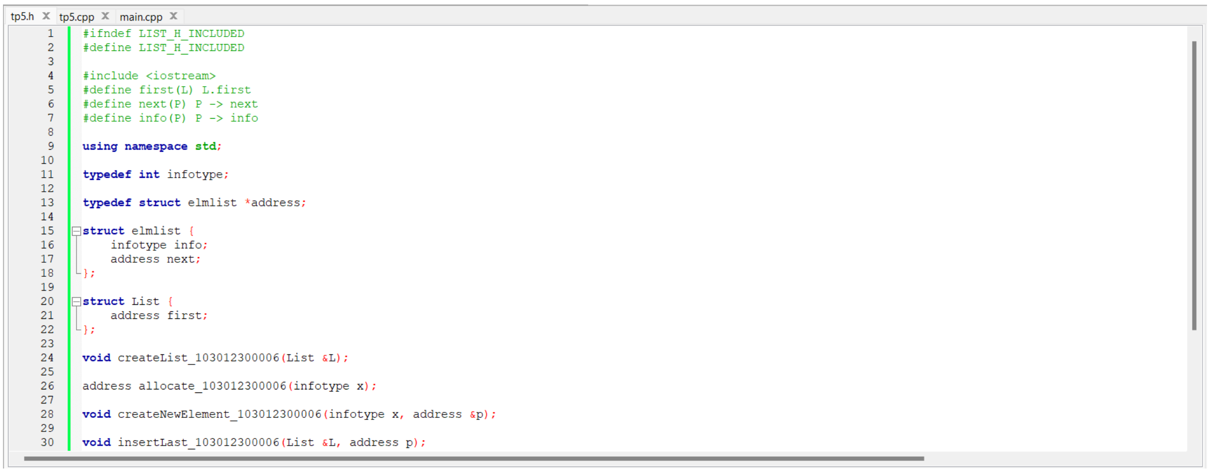
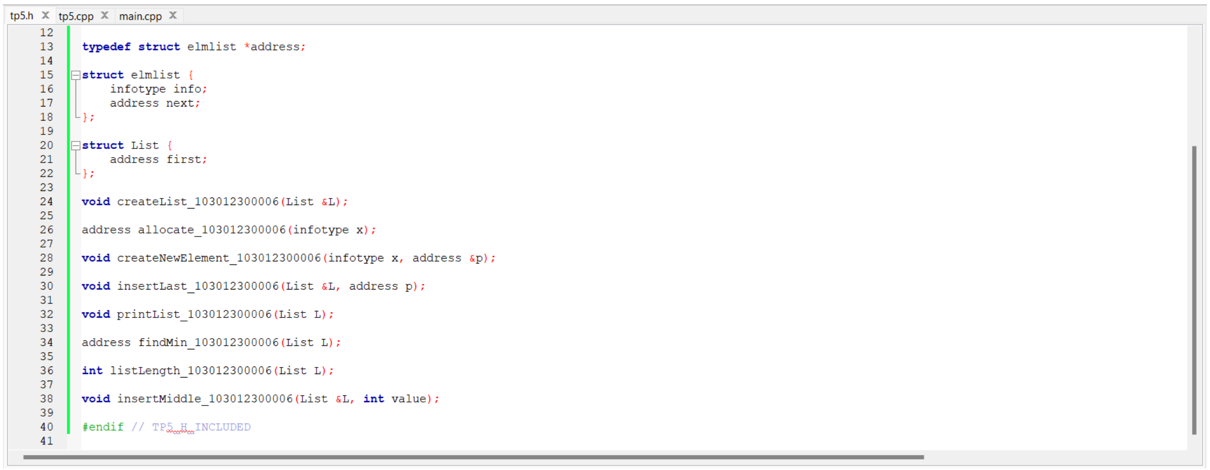
Kelas : IF 47 05

Header :

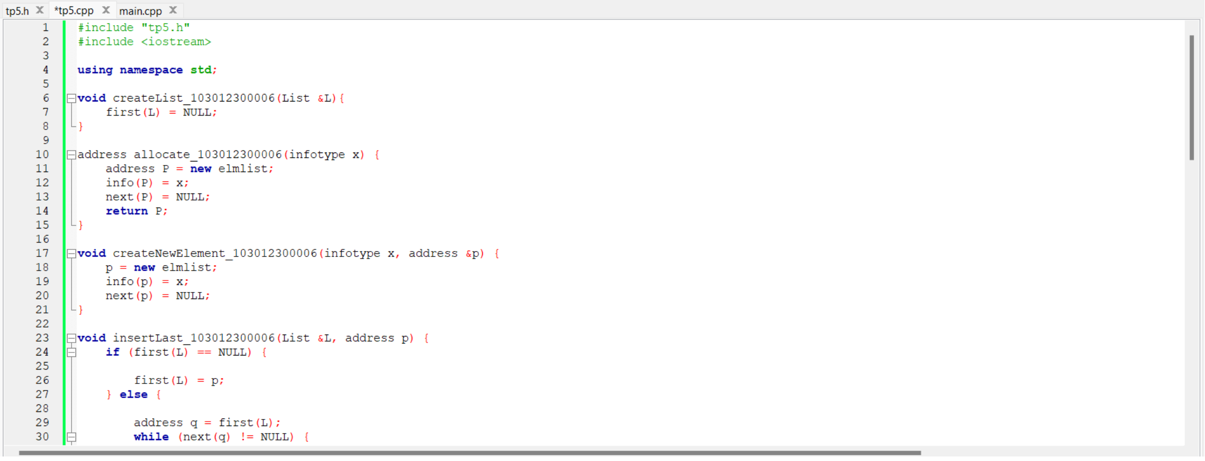


```
#ifndef LIST_H_INCLUDED
#define LIST_H_INCLUDED

#include <iostream>
#define first(L) L.first
#define next(P) P -> next
#define info(P) P -> info

using namespace std;

typedef int infotype;

typedef struct elmlist *address;

struct elmlist {
    infotype info;
    address next;
};

struct List {
    address first;
};

void createList_103012300006(List &L);

address allocate_103012300006(infotype x);

void createNewElement_103012300006(infotype x, address &p);

void insertLast_103012300006(List &L, address p);
```

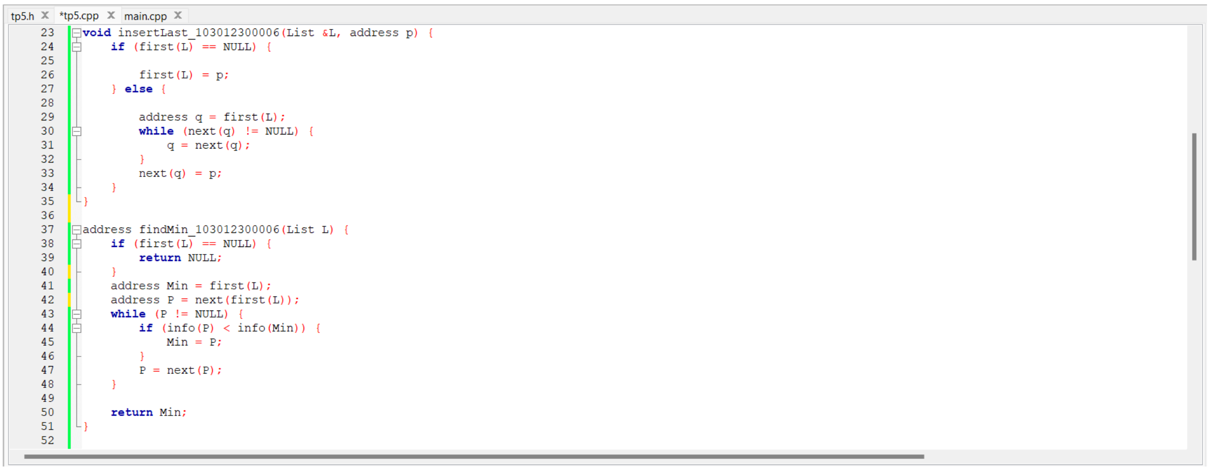


```

typedef struct elmlist *address;

struct elmlist {
    infotype info;
    address next;
};

struct List {
    address first;
};

void createList_103012300006(List &L);

address allocate_103012300006(infotype x);

void createNewElement_103012300006(infotype x, address &p);

void insertLast_103012300006(List &L, address p);

void printList_103012300006(List L);

address findMin_103012300006(List L);

int listLength_103012300006(List L);

void insertMiddle_103012300006(List &L, int value);

#endif // TP5_H_INCLUDED

```

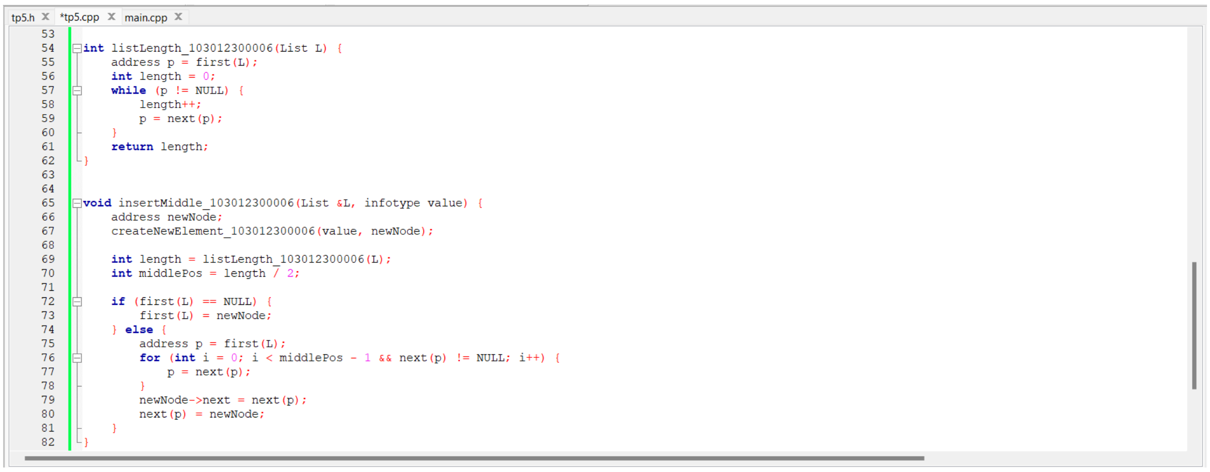
Cpp :



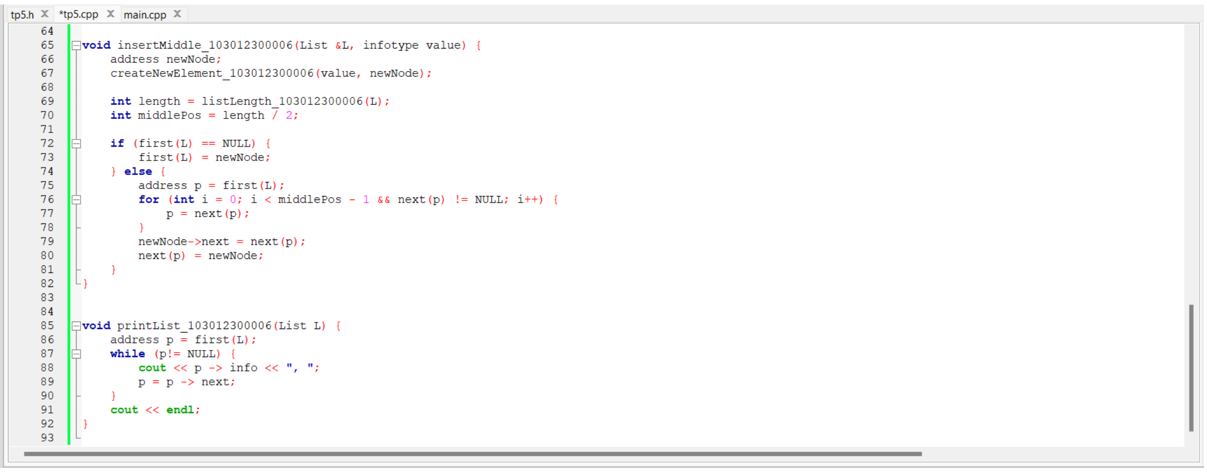
```cpp
#include "tp5.h"
#include <iostream>

using namespace std;

void createList_103012300006(List &L){
    first(L) = NULL;
}

address allocate_103012300006(infotype x) {
    address P = new elmlist;
    info(P) = x;
    next(P) = NULL;
    return P;
}

void createNewElement_103012300006(infotype x, address &p) {
    p = new elmlist;
    info(p) = x;
    next(p) = NULL;
}

void insertLast_103012300006(List &L, address p) {
    if (first(L) == NULL) {

        first(L) = p;
    } else {

        address q = first(L);
        while (next(q) != NULL) {
```



```cpp
void insertLast_103012300006(List &L, address p) {
    if (first(L) == NULL) {

        first(L) = p;
    } else {

        address q = first(L);
        while (next(q) != NULL) {
            q = next(q);
        }
        next(q) = p;
    }
}

address findMin_103012300006(List L) {
    if (first(L) == NULL) {
        return NULL;
    }
    address Min = first(L);
    address P = next(first(L));
    while (P != NULL) {
        if (info(P) < info(Min)) {
            Min = P;
        }
        P = next(P);
    }

    return Min;
}

```

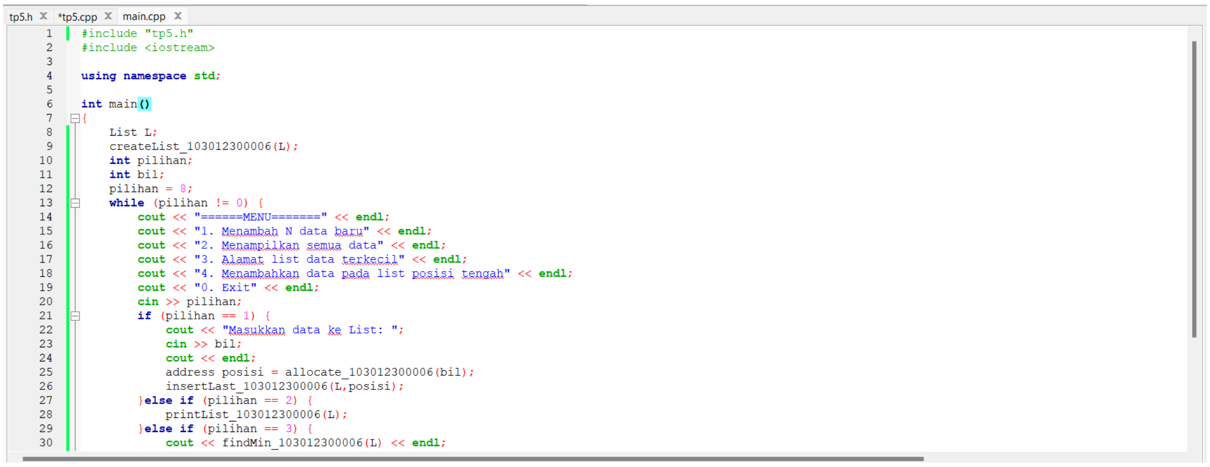


```cpp

int listLength_103012300006(List L) {
    address p = first(L);
    int length = 0;
    while (p != NULL) {
        length++;
        p = next(p);
    }
    return length;
}


void insertMiddle_103012300006(List &L, infotype value) {
    address newNode;
    createNewElement_103012300006(value, newNode);

    int length = listLength_103012300006(L);
    int middlePos = length / 2;

    if (first(L) == NULL) {
        first(L) = newNode;
    } else {
        address p = first(L);
        for (int i = 0; i < middlePos - 1 && next(p) != NULL; i++) {
            p = next(p);
        }
        newNode->next = next(p);
        next(p) = newNode;
    }
}
```

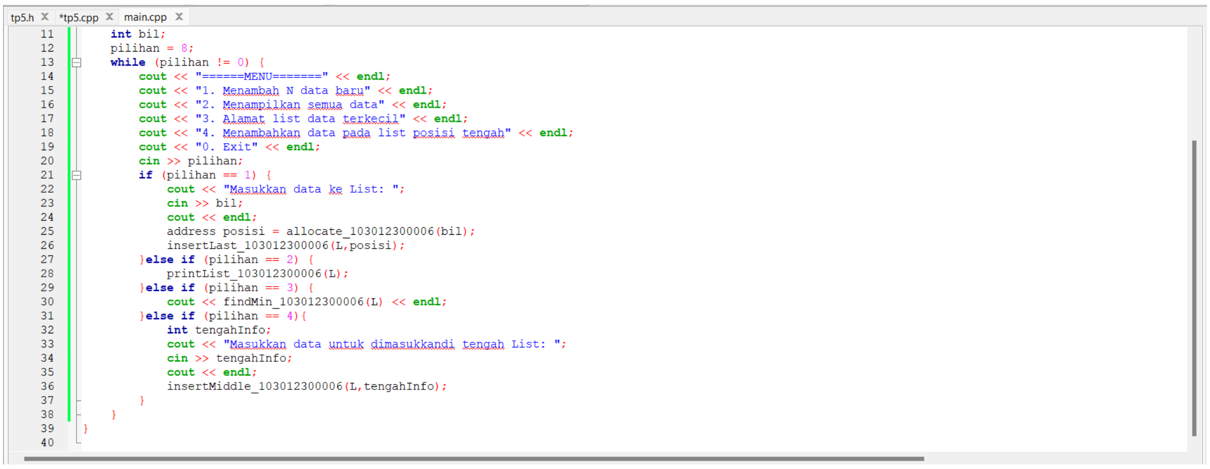


```cpp

void insertMiddle_103012300006(List &L, infotype value) {
    address newNode;
    createNewElement_103012300006(value, newNode);

    int length = listLength_103012300006(L);
    int middlePos = length / 2;

    if (first(L) == NULL) {
        first(L) = newNode;
    } else {
        address p = first(L);
        for (int i = 0; i < middlePos - 1 && next(p) != NULL; i++) {
            p = next(p);
        }
        newNode->next = next(p);
        next(p) = newNode;
    }
}


void printList_103012300006(List L) {
    address p = first(L);
    while (p!= NULL) {
        cout << p -> info << ", ";
        p = p -> next;
    }
    cout << endl;
}

```

Main:

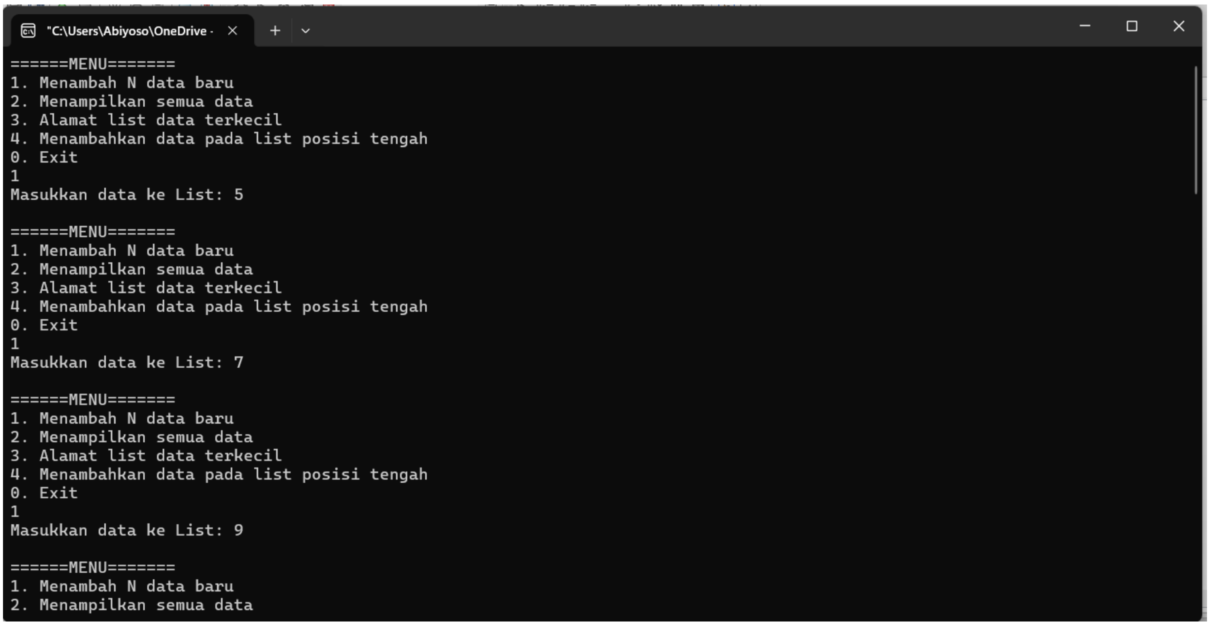


```cpp
#include "tp5.h"
#include <iostream>

using namespace std;

int main()
{
    List L;
    createList_103012300006(L);
    int pilihan;
    int bil;
    pilihan = 8;
    while (pilihan != 0) {
        cout << "======MENU=======" << endl;
        cout << "1. Menambah N data baru" << endl;
        cout << "2. Menampilkan semua data" << endl;
        cout << "3. Alamat list data terkecil" << endl;
        cout << "4. Menambahkan data pada list posisi tengah" << endl;
        cout << "0. Exit" << endl;
        cin >> pilihan;
        if (pilihan == 1) {
            cout << "Masukkan data ke List: ";
            cin >> bil;
            cout << endl;
            address posisi = allocate_103012300006(bil);
            insertLast_103012300006(L,posisi);
        }else if (pilihan == 2) {
            printList_103012300006(L);
        }else if (pilihan == 3) {
            cout << findMin_103012300006(L) << endl;
```

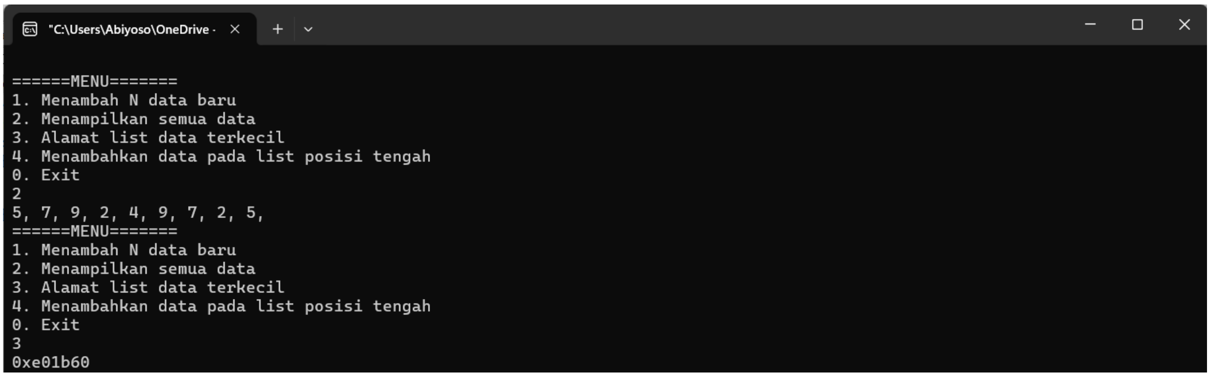


```
    int bil;
    pilihan = 8;
    while (pilihan != 0) {
        cout << "======MENU=======" << endl;
        cout << "1. Menambah N data baru" << endl;
        cout << "2. Menampilkan semua data" << endl;
        cout << "3. Alamat list data terkecil" << endl;
        cout << "4. Menambahkan data pada list posisi tengah" << endl;
        cout << "0. Exit" << endl;
        cin >> pilihan;
        if (pilihan == 1) {
            cout << "Masukkan data ke List: ";
            cin >> bil;
            cout << endl;
            address posisi = allocate_103012300006(bil);
            insertLast_103012300006(L,posisi);
        }else if (pilihan == 2) {
            printList_103012300006(L);
        }else if (pilihan == 3) {
            cout << findMin_103012300006(L) << endl;
        }else if (pilihan == 4){
            int tengahInfo;
            cout << "Masukkan data untuk dimasukkandi tengah List: ";
            cin >> tengahInfo;
            cout << endl;
            insertMiddle_103012300006(L,tengahInfo);
        }
    }
}
```

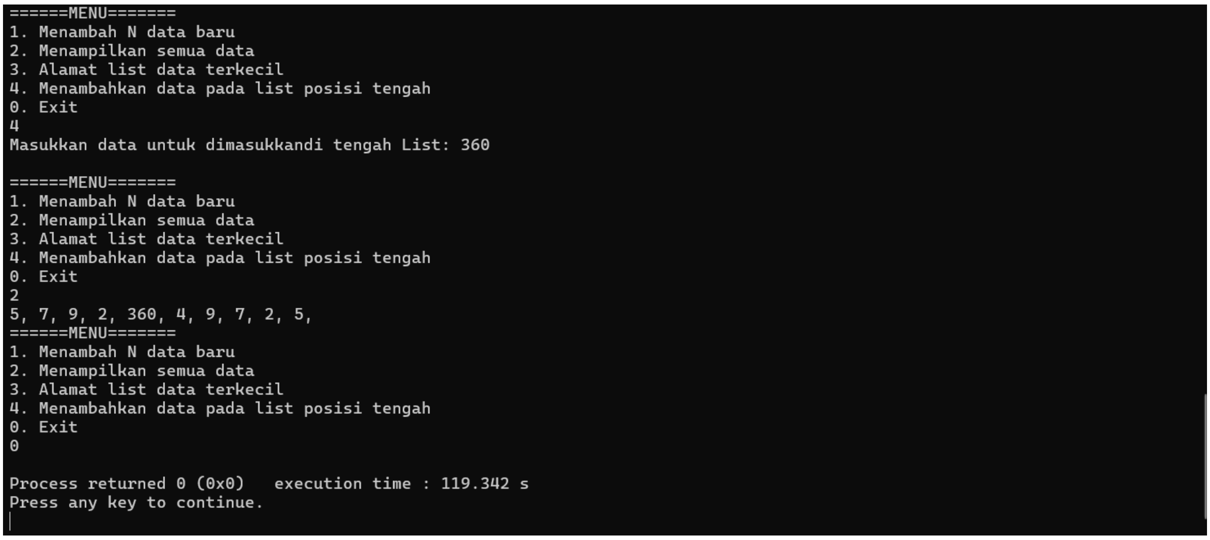
Output:



```
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
1
Masukkan data ke List: 5

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
1
Masukkan data ke List: 7

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
1
Masukkan data ke List: 9

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
```



```
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
2
5, 7, 9, 2, 4, 9, 7, 2, 5,
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
3
0xe01b60
```



```
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
4
Masukkan data untuk dimasukkandi tengah List: 360

======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
2
5, 7, 9, 2, 360, 4, 9, 7, 2, 5,
======MENU=======
1. Menambah N data baru
2. Menampilkan semua data
3. Alamat list data terkecil
4. Menambahkan data pada list posisi tengah
0. Exit
0

Process returned 0 (0x0)   execution time : 119.342 s
Press any key to continue.
```