吴老师，骆学长和孙学长好，以下是我的作业。

–教材

P.186 题 15：链表实现集合运算。**要求：不使用辅助表元**，实现功能函数 1. void **unionSet**(struct List *s1, struct List *s2, struct List *result); 2. void **differenceSet**(struct List *s1, struct List *s2, struct List *result); 3. void **intersectionSet**(struct List *s1, struct List *s2, struct List *result)。**测试要求：** S1 = {2, 3, 5, 6}， S2 = {3, 4, 6, 8}。

– 上机指导书

实验七 6 思考题：理论题。

– 补充题：

创建链表，链表中的结点值依次为“10 20 30 40 50”，**Delete 函数**用于删除链表中所有值大于 min 且小于 max 的结点(表元)，**同时释放被删结点空间**。如设定 min=10 和 max=35，Delete 函数将使得链表中结点值被删为"10 40 50“。

Chi-Shan0707/Homework-in-CS10004-Programming-by-yhchi
代码仓库↑

T1.

核心思想：不断比较，不厌其烦地比较

```
#include <stdio.h>
#include <stdlib.h>

// 单向链表节点
struct Node
{
    int val;
    struct Node* next;
};
typedef struct Node Node;
struct List
{
    Node* lsthead;
};
typedef struct List List;
void convert(List* lst, int arr[], int n)
{
    lst->lsthead = NULL;
    if (n <= 0) return;
    Node *head = ( Node *) malloc ( sizeof (Node) ) ;
    head->val = arr[0];
    head->next = NULL;
    lst->lsthead = head;
```

```
    Node* tail = head;
    for (int i = 1; i < n; ++i)
    {
        Node* cur = (Node*)malloc(sizeof(Node));
        cur->val = arr[i];
        cur->next = NULL;
        tail->next = cur;
        tail = cur;
    }
}
void free_list(List* lst)
{
//记得整体清空

    Node* head = lst->lsthead;
    while(head)
    {
        Node *tmp = head;
        head = head->next;
        free(tmp);
    }
    lst->lsthead = NULL;
    //记得置空
}
void print_list(const char* name, List* lst)
{
    printf("set %s  =    {", name);
    Node* head = lst->lsthead;
    int is_firstitem = 1;
    while (head)
    {
        if (!is_firstitem) printf(" , ");
        printf("%d", head->val);
        is_firstitem = 0;
        head = head -> next;
    }
    printf("}\n");
}
void append(List *lst, Node **tail_ptr,int val)
{
    Node* new_node = (Node*)malloc(sizeof(Node));
    new_node->val = val;
    new_node->next = NULL;
    if (lst->lsthead == NULL)
    {
        lst->lsthead=new_node;
    }
    else
    {
```

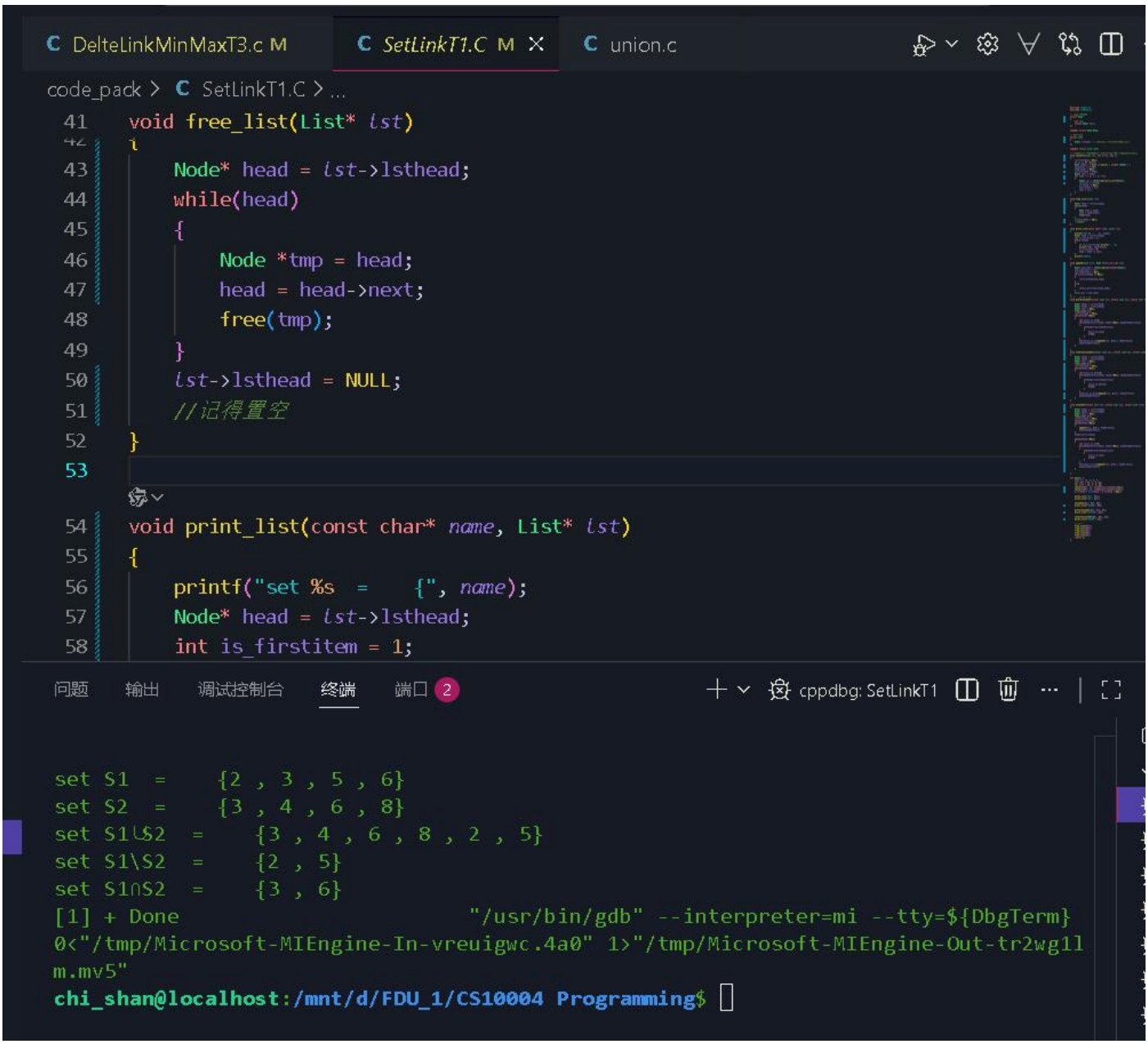
```
        (*tail_ptr)->next=new_node;
    }
    *tail_ptr = new_node;
}
// 2. 差集 S1 \ S2
void differenceSet(struct List *s1, struct List *s2, struct List *res) {

    Node* head1 = s1->lsthead;
    Node* head2 = s2->lsthead;
    Node* tail = NULL;
    free_list(res);
    res->lsthead = NULL;
    while(head1!=NULL)
    {
        int exist_in_s2=0;
        for(head2=s2->lsthead; head2!=NULL; head2=head2->next)
        {
            if(head2->val==head1->val)
            {
                exist_in_s2=1;
                break;
            }
        }
        if(!exist_in_s2)append(res, &tail, head1->val);
        head1=head1->next;
    }

}
void intersectionSet(struct List *s1, struct List *s2, struct List *res)
{
    Node* head1 = s1->lsthead;
    Node* head2 = s2->lsthead;
    Node* tail = NULL;
    free_list(res);
    res->lsthead = NULL;
    while(head1!=NULL)
    {
        int exist_in_both=0;
        for(head2=s2->lsthead; head2!=NULL; head2=head2->next)
        {
            if(head2->val==head1->val)
            {
                exist_in_both=1;
                break;
            }
        }
        if(exist_in_both)append(res, &tail, head1->val);
        head1=head1->next;
    }
```

```
}

void unionSet(struct List *s1, struct List *s2, struct List *res)
{
    Node* head1 = s1->lsthead;
    Node* head2 = s2->lsthead;
    Node* tail = NULL;
    free_list(res);
    res->lsthead = NULL;
    head2=s2->lsthead;
    while(head2!=NULL)
    {
        append(res, &tail, head2->val);
        head2=head2->next;
    }
    head2=s2->lsthead;

    while(head1!=NULL)
    {
        int exist_in_s2=0;
        for(head2=s2->lsthead; head2!=NULL; head2=head2->next)
        {
            if(head2->val==head1->val)
            {
                exist_in_s2=1;
                break;
            }
        }
        if(!exist_in_s2)append(res, &tail, head1->val);
        head1=head1->next;
    }

}

int main() {
    List S1, S2, U, D, I;
    int a1[] = {2, 3, 5, 6};
    int a2[] = {3, 4, 6, 8};
    convert(&S1, a1, sizeof(a1)/sizeof(a1[0]));
    convert(&S2, a2, sizeof(a2)/sizeof(a2[0]));
    U.lsthead = D.lsthead = I.lsthead = NULL;

    print_list("S1", &S1);
    print_list("S2", &S2);

    unionSet(&S1, &S2, &U);
    print_list("S1∪S2", &U);

    differenceSet(&S1, &S2, &D);
```

```
    print_list("S1\\S2", &D);
```

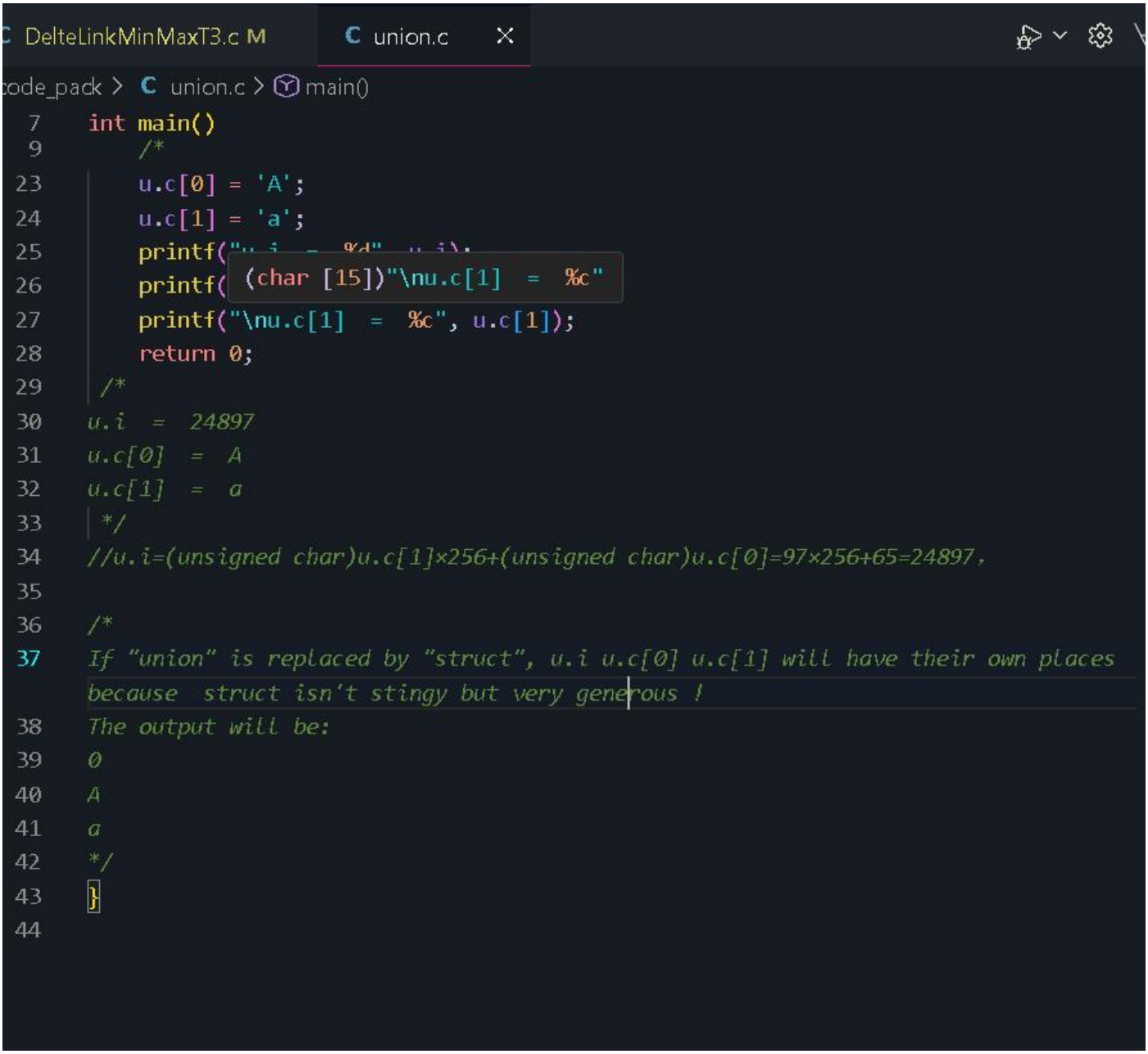
```
    intersectionSet(&S1, &S2, &I);
    print_list("S1∩S2", &I);
```

```
    // 释放
    free_list(&S1);
    free_list(&S2);
    free_list(&U);
    free_list(&D);
    free_list(&I);
    return 0;
}
```



T2

简而言之，就是union会造成“冲突”但struct更大方，不会 所以u.i值由于是全球变量为0
剩下两个一样



T3

```c
#include <stdio.h>
#include <stdlib.h>
struct Node
 {
    int val;
    struct Node* next;
};
typedef struct Node Node;
Node* convert(int arr[], int n)
{
    int i;
    Node* head = (Node*)malloc(sizeof(Node));
    Node   *tail=head;
    if(n == 0)return NULL;
    head->val = arr[0];
```

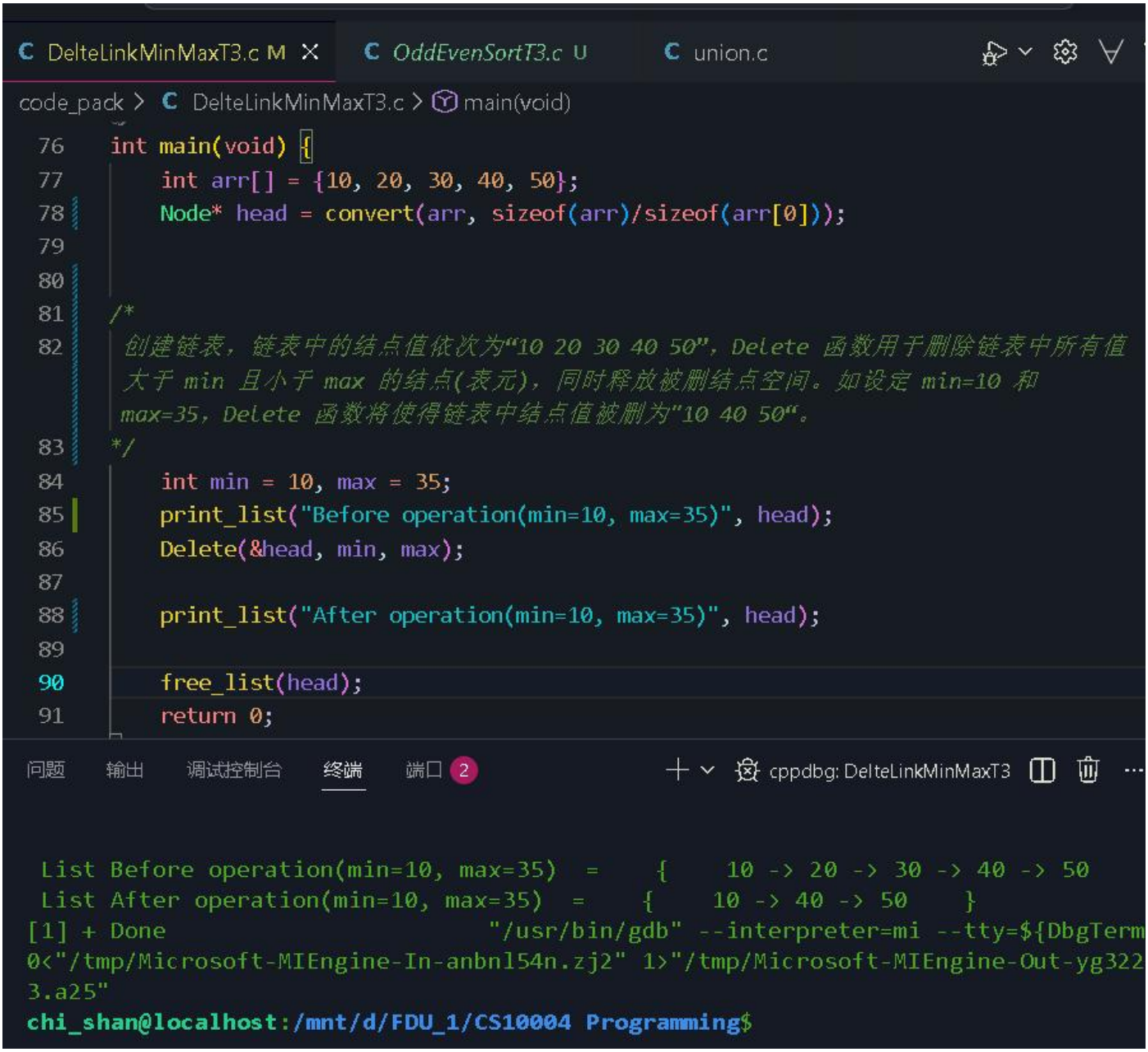
```
    head->next = NULL;
    for(i=1;i<n;++i)
    {
        Node* cur = (Node*)malloc(sizeof(Node));
        cur->val = arr[i];
        cur->next = NULL;
        tail->next = cur;
        tail = cur;
    }
    return head;
}
void print_list(const char* name, Node* head)
{
    printf(" List %s  =    {    ", name);
    int is_firstitem = 1;
    while (head)
    {
        if (!is_firstitem) printf(" -> ");
        printf("%d", head->val);
        is_firstitem = 0;
        head = head -> next;
    }
    printf("    }\n");
}
void free_list(Node* head) {
    while (head)
    {
        Node* tmp = head;
        head = head->next;
        free(tmp);
    }
}
// Delete: 删除值大于 min 且小于 max 的结点，同时释放空间
void Delete(Node** head_ptr, int min, int max) {
    if (head_ptr == NULL) return;
    Node* cur = *head_ptr;
    Node* prev = NULL;
    while (cur) {
        if (cur->val > min && cur->val < max) {
            Node* to_del=cur;
            if (prev == NULL) {
                // 删除头结点,比较麻烦
                *head_ptr=cur->next;//将问题留给下一个人
                cur = *head_ptr;
            }
            else
            {
                prev->next=cur->next;
                cur = prev->next;
```

```
            }
            free(to_del);
        }
        else
        {
            prev=cur;
            cur=cur->next;
        }
    }
}

int main(void) {
    int arr[] = {10, 20, 30, 40, 50};
    Node* head = convert(arr, sizeof(arr)/sizeof(arr[0]));
```

```
/*
 创建链表，链表中的结点值依次为“10 20 30 40 50”，Delete 函数用于删除链表中所有值大于 min 且小于 max 的结点(表元)，同时释放被删结点空间。如设定 min=10 和 max=35，Delete 函数将使得链表中结点值被删为"10 40 50“。
*/
    int min = 10, max = 35;
    print_list("Before operation(min=10, max=35)", head);
    Delete(&head, min, max);
```

```
    print_list("After operation(min=10, max=35)", head);
```

```
    free_list(head);
    return 0;
}
```


DelteLinkMinMaxT3.c M
OddEvenSortT3.c U
union.c
code_pack > DelteLinkMinMaxT3.c > main(void)
int main(void) {
int arr[] = {10, 20, 30, 40, 50};
Node* head = convert(arr, sizeof(arr)/sizeof(arr[0]));
/*
创建链表，链表中的结点值依次为"10 20 30 40 50"，Delete 函数用于删除链表中所有值
大于 min 且小于 max 的结点(表元)，同时释放被删结点空间。如设定 min=10 和
max=35，Delete 函数将使得链表中结点值被删为"10 40 50"。
*/
int min = 10, max = 35;
print_list("Before operation(min=10, max=35)", head);
Delete(&head, min, max);
print_list("After operation(min=10, max=35)", head);
free_list(head);
return 0;
问题
输出
调试控制台
终端
端口 2
cppdbg: DelteLinkMinMaxT3
List Before operation(min=10, max=35) = { 10 -> 20 -> 30 -> 40 -> 50
List After operation(min=10, max=35) = { 10 -> 40 -> 50 }
[1] + Done "/usr/bin/gdb" --interpreter=mi --tty=${DbgTerm
0<"/tmp/Microsoft-MIEngine-In-anbnl54n.zj2" 1>"/tmp/Microsoft-MIEngine-Out-yg322
3.a25"
chi_shan@localhost:/mnt/d/FDU_1/CS10004 Programming$