吴老师，骆学长和孙学长好，以下是我的作业。

上机随堂作业

– 教材

P. 186 题 7: 合并有序链表 struct Node* mergeSortedLists(struct Node* list1, struct Node* list2)。要求：不允许创建新节点，必须使用原有节点；分别打印两个子链表与合并后的链表。测试样例：list1 = [1,3,5], list2 = [2,4,6]

– 上机指导书

实验七 5 思考题：删除链表的最值表元。要求：从键盘输入表元，在无序链表找到最值并删除；分别打印原链表与处理后的链表。测试样例：list = [2, 4, 6, 1, 3, 5]

– 附加题(该题不计入现有分数体系，不要求所有同学完成，学有余力、进阶提升的同学可以进行尝试完成。特别说明：在最终成绩出现平分时，优先考虑该类题目完成的数量和质量较好的同学)

拆分链表：给定一个单链表，链表中的每个节点包含一个整数值，按照以下要求对链表进行拆分和重组：

1. 将所有小于给定值 x 的节点放到链表前面
2. 将所有大于或等于给定值 x 的节点放到链表后面
3. 保持节点的相对顺序不变
4. 必须在原链表的基础上进行操作，不能创建新节点

测试样例：输入：链表节点数 n=6，链表中的值 1, 4, 3, 2, 5, 2，分割值 x=3；输出：1, 2, 2, 4, 3, 5。

输入：链表节点数 n=5，链表中的值 2, 1, 2, 2, 1，分割值 x=2；输出：1, 1, 2, 2, 2。

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

1.

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

struct Node
{
    int val;
    struct Node* next;
};
```

```
// 打印链表
typedef struct Node Node;
void printList(Node* head)
{
    Node* p = head;
    printf("********************************\n");
    while(p!=NULL)
    {
```

```
        printf("%d ", p->val);
        p = p->next;
    }
    printf("\n");
}
Node* mergeSortedLists(Node* head1, Node* head2)
{
    Node *head;
    Node *tail;
    if(head1==NULL)return head2;
    if(head2==NULL)return head1;
    //竟然莫名的像fhq_treap
    if(head1->val<head2->val)
    {

        head1->next=mergeSortedLists(head1->next, head2);
        return head1;
    }
    else
    {
        head2->next=mergeSortedLists(head1, head2->next);
        return head2;
    }
    //这里也像fhq_treap 的merge
```

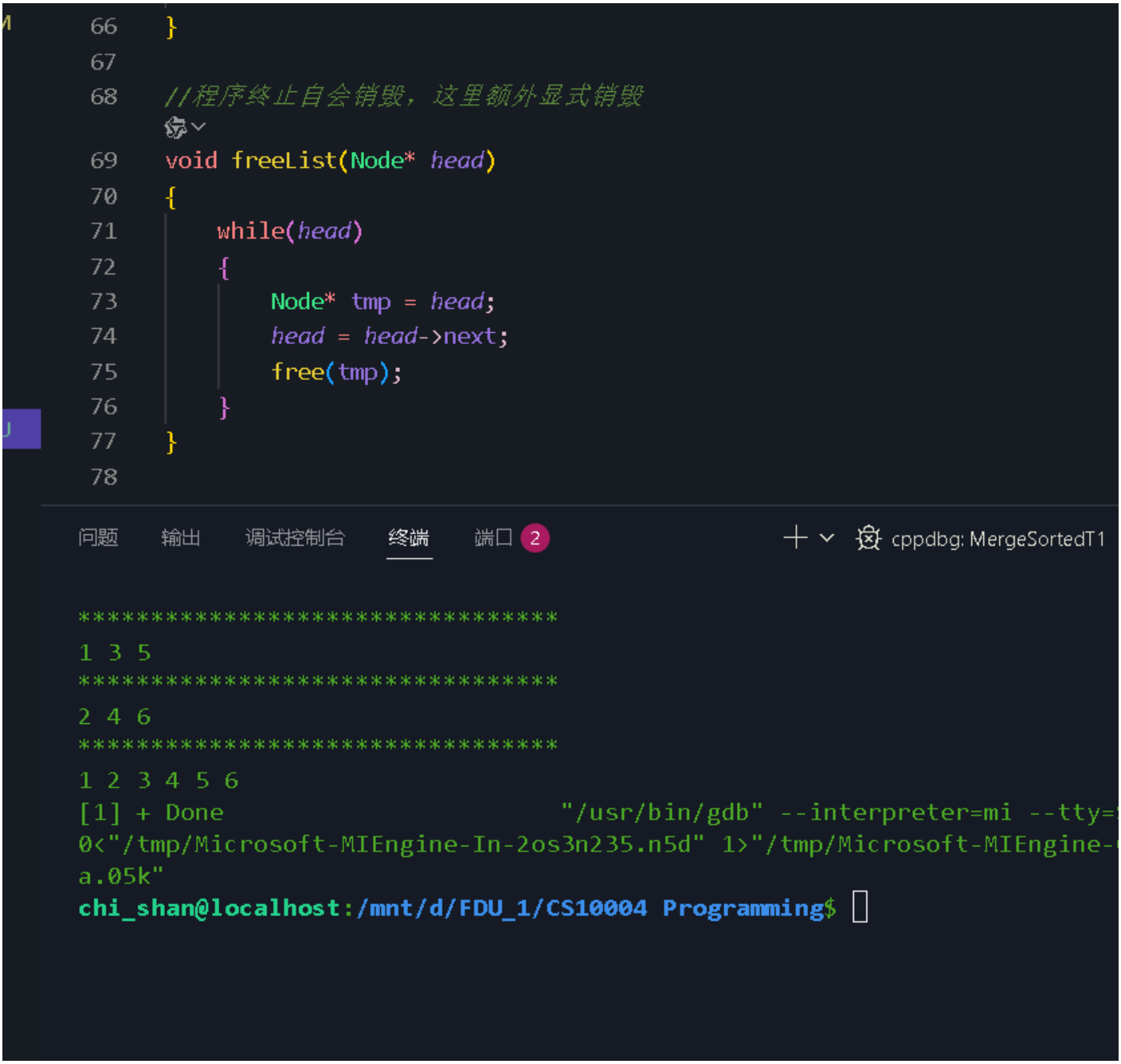
```
}
```

```
Node* array_to_list(int* arr, int n)
{

    int i;
    Node* head = (Node*)malloc(sizeof(Node));
    Node* tail;
    Node* cur;
    if(n==0)return head=NULL;
    head->val=arr[0];
    head->next=NULL;
    tail=head;
    for(i=1;i<n;++i)
    {
        cur=(Node*)malloc(sizeof(Node));
        cur->val=arr[i];
        cur->next=NULL;
        tail->next=cur;
        tail=cur;

    }
    return head;
}
```

```
//程序终止自会销毁，这里额外显式销毁
void freeList(Node* head)
{
    while(head)
    {
        Node* tmp = head;
        head = head->next;
        free(tmp);
    }
}
```

```
int main() {
    int arr1[]={1,3,5};
    int arr2[]={2,4,6};
    Node* list1=array_to_list(arr1, 3);
    printList(list1);
    Node* list2=array_to_list(arr2, 3);
    printList(list2);
    Node* merged = mergeSortedLists(list1, list2);
```

```

    printList(merged);
    freeList(merged);
    return 0;
}
```



模仿平衡树合并，递归地去做

2.

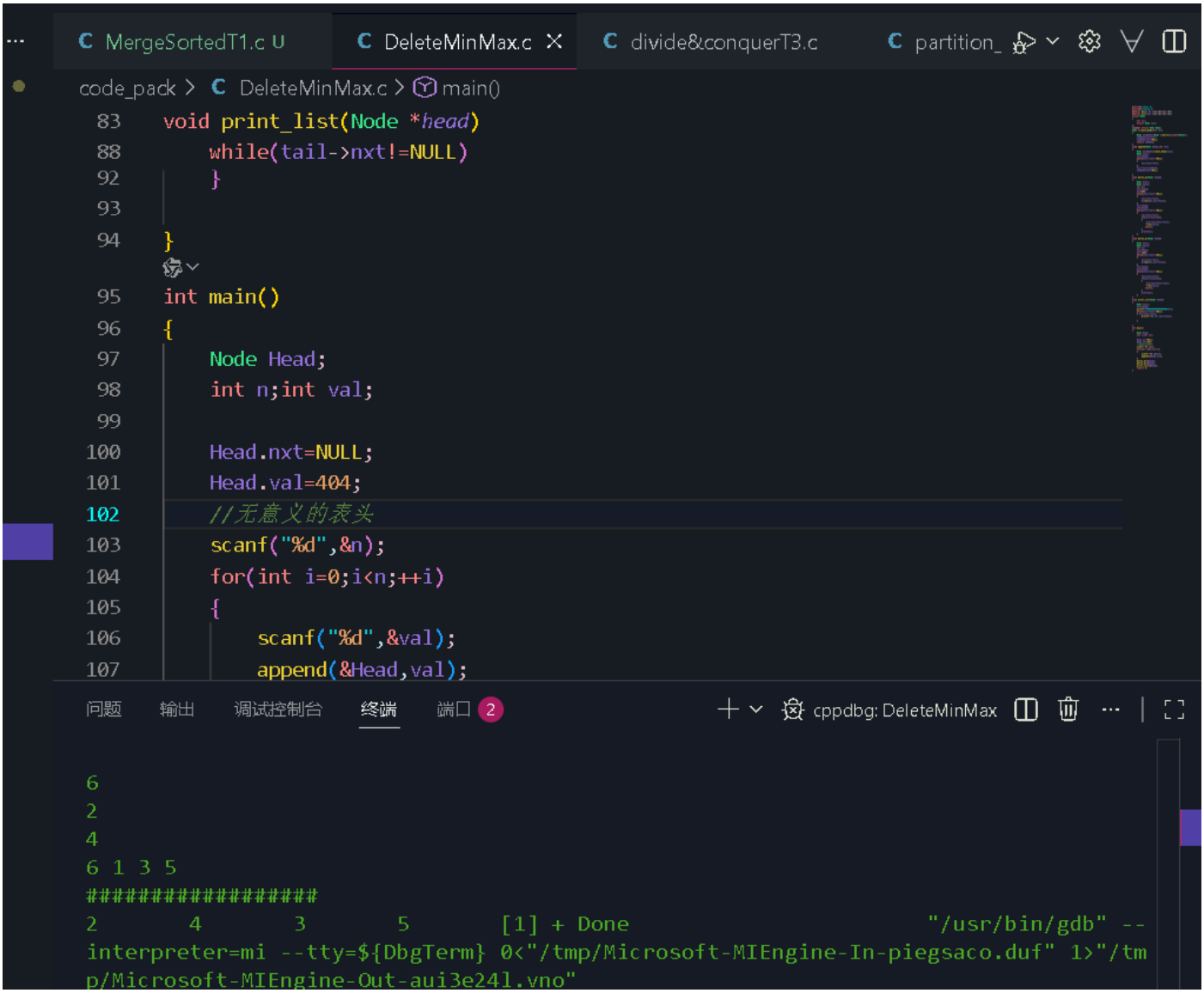
```
#include<stdio.h>
#include<stdlib.h>
#define max(a,b) ((a)>(b)?(a):(b))
#define min(a,b) ((a)<(b)?(a):(b))
struct Node
{
    int val;
    struct Node *nxt;
};
typedef struct Node Node;
Node *create_Node(int val)
{
```

```
    Node *newNode=(Node *)malloc(sizeof(Node));
    newNode->val=val;
    newNode->nxt=NULL;
    return newNode;
}
void append(Node *head,int val)
{
    Node *newNode=create_Node(val);
    Node *tail;
    tail=head;
    while(tail->nxt!=NULL)
    {
        tail=tail->nxt;
    }
    tail->nxt=newNode;
    newNode->nxt=NULL;

}
void delte_mn(Node *head)
{
    Node *tail;
    Node *prev;
    int mn;
    tail=head;
    mn=1000;
    while(tail->nxt!=NULL)
    {
        tail=tail->nxt;
        mn=min(mn,tail->val);
    }
    tail=head;
    prev=head;
    while(tail->nxt!=NULL)
    {
        tail=tail->nxt;
        if(tail->val==mn)
        {
            prev->nxt=tail->nxt;
            free(tail);
           return;
        }
        prev=tail;
    }
}
void delte_mx(Node *head)
{
    Node *tail;
    Node *prev;
    int mx;
```

```
    tail=head;
    mx=-1000;
    while(tail->nxt!=NULL)
    {
        tail=tail->nxt;
        mx=max(mx,tail->val);
    }
    tail=head;
    prev=head;
    while(tail->nxt!=NULL)
    {
        tail=tail->nxt;
        if(tail->val==mx)
        {
            prev->nxt=tail->nxt;
            free(tail);
           return;
        }
        prev=tail;
    }
}
void print_list(Node *head)
{
    Node *tail;
    tail=head;
    printf("##################\n");
    while(tail->nxt!=NULL)
    { tail=tail->nxt;
        printf("%d \t",tail->val);

    }

}
int main()
{
    Node Head;
    int n;int val;
```

```
    Head.nxt=NULL;
    Head.val=404;
    //无意义的表头
    scanf("%d",&n);
    for(int i=0;i<n;++i)
    {
        scanf("%d",&val);
        append(&Head,val);
    }
    delte_mn(&Head);
    delte_mx(&Head);
```

```
    print_list(&Head);
    return 0;
}
```



简单地分步开始写

3 .

```
#include<stdio.h>
#include<stdlib.h>
#define max(a,b) ((a)>(b)?(a):(b))
#define min(a,b) ((a)<(b)?(a):(b))
struct Node
{
    int val;
    struct Node *pre;
    struct Node *nxt;
};
typedef  struct Node Node;

void printList(Node* head,Node *tail)
```

```
{
    Node* p = head;
    printf("********************************\n");
    while(p!=tail)
    {
        printf("%d,", p->val);
        p = p->nxt;
    }

    printf("%d\n",tail->val);
}
void array_to_list(Node *head,Node *tail,int* arr, int n)
{
    Node *last,*cur;
    int i;

    head->nxt=tail;
    tail->pre=head;

    head->pre=NULL;
    tail->nxt=NULL;

    last=head;
    for(i=0;i<n;++i)
    {
        cur=(Node*)malloc(sizeof(Node));
        //
        cur->val=arr[i];
        cur->nxt=NULL;
        cur->pre=last;

        //更新
        last->nxt=cur;
        last=cur;
    }
    last->nxt = tail;
    tail->pre=last;
}
/*
有必要分治嘛
*/
Node * merge(Node *head1,Node *tail1,Node *head2,Node *tail2,int key)
{

    Node *cur1 = NULL; Node *cur2 =NULL;
    Node *cur3 = NULL; Node *cur4 =NULL;
     Node *p, *next;

    // 遍历第一段 [head1..tail1]
```

```
    p = head1;
    while (1) {
        next = p->nxt;
        p->nxt = p->pre = NULL;
        if (p->val < key) {
            if (!cur1) cur1 = cur2 = p;
            else { cur2->nxt = p; p->pre = cur2; cur2 = p; }
        } else {
            if (!cur3) cur3 = cur4 = p;
            else { cur4->nxt = p; p->pre = cur4; cur4 = p; }
        }
        if (p == tail1) break;
        p = next;
    }
```

```
    // 遍历第二段 [head2..tail2]
    p = head2;
    while (1) {
        next = p->nxt;
        p->nxt = p->pre = NULL;
        if (p->val < key) {
            if (!cur1) cur1 = cur2 = p;
            else { cur2->nxt = p; p->pre = cur2; cur2 = p; }
        } else {
            if (!cur3) cur3 = cur4 = p;
            else { cur4->nxt = p; p->pre = cur4; cur4 = p; }
        }
        if (p == tail2) break;
        p = next;
    }
```

```
    // 拼接
    if (!cur1) {
        if (cur4) cur4->nxt = NULL;
        return cur3;
    }
    cur2->nxt = cur3;
    if (cur3) cur3->pre = cur2;
    if (cur4) cur4->nxt = NULL;
    return cur1;
```

```
}
Node* solve(Node *head,Node *tail,int len,int key)
{

    Node *cur1 = NULL;
    Node *cur2 = NULL;
```

```
    Node *cur3 = NULL;
    Node *cur4 = NULL;
    Node *p = head;
    Node *next;
    if (Len <= 0 ) return head;
    if(head==NULL)return head;
    while (1) {
        next = p->nxt;
        p->nxt = p->pre = NULL;
        if(p->val<key)
        {
            if(!cur1)cur1=cur2=p;
            else
            {
                cur2->nxt=p;
                p->pre=cur2;
                cur2=p;
            }
        }
        else
        {
            if (!cur3) cur3 = cur4 = p;
            else
            {
                cur4->nxt = p;
                p->pre =cur4;
                cur4 = p;
            }
        }
        if(p==tail)break;
        p=next;
    }
    if(!cur1)
    {
        if (cur4)cur4->nxt=NULL;
        return cur3;
    }
    cur2->nxt=cur3;
    if(cur3)cur3->pre=cur2;
    if(cur4)cur4->nxt=NULL;
    return cur1;
}
int main()
{
    int arr[10],n,key;
    Node Head,Tail;
    /*
    : 输入：链表节点数n=6，链表中的值1, 4, 3, 2, 5, 2，分割值x=3；输出：1, 2, 2, 4, 3, 5。
```

```
                        输入：链表节点数n=5，链表中的值2, 1, 2, 2, 1，分割值x=2；输出：1, 1, 2, 2, 2。
    */
    arr[0]=1,arr[1]=4,arr[2]=3,arr[3]=2,arr[4]=5,arr[5]=2;
    n=6;
    key=3;
    array_to_list(&Head,&Tail,arr,n);

    printList(Head.nxt,Tail.pre);


    Node *new_head = solve(Head.nxt, Tail.pre, n, key);
    Head.nxt = new_head;

    Node *t = Head.nxt;
    if(t)
    {
        while (t->nxt)t=t->nxt;
        t->nxt=&Tail;
        Tail.pre = t;
    }
    else
    {
        Head.nxt = &Tail;
        Tail.pre = &Head;
    }
    printList(Head.nxt,Tail.pre);


    arr[0]=2,arr[1]=1,arr[2]=2,arr[3]=2,arr[4]=1;
    n=5;
    return 0;
}
```


12
void printList(Node* head,Node *tail)
{
Node* p = head;
printf("**********\n");
while(p!=tail)
{
printf("%d,", p->val);
p = p->nxt;
}
printf("%d\n",tail->val);
}
void array_to_list(Node *head,Node *tail,int* arr, int n)
{
问题
输出
调试控制台
终端
端口 2
cpp
****
1,4,3,2,5,2
****
1,2,2,4,3,5
[1] + Done "/usr/bin/gdb" --interpreter=mi --tty=${DbgTerm} 0<"/tmp/Micr
.4qx" 1>"/tmp/Microsoft-MIEngine-Out-0xezfsd3.yj3"
chi_shan@localhost:/mnt/d/FDU_1/CS10004 Programming$