2018920065 루안리치

컴퓨터알고리즘 과제#1

```
// 2018920065 luan lichi
// algorithms hw 1-1

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

typedef struct ListNode{
	int data;
	struct ListNode* link;
}ListNode;

typedef struct{
	ListNode* head;
}LinkedListType;

void init(LinkedListType* L){
	L->head = NULL;
}

void addFirst(LinkedListType* L, int item){
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	node->data = item;
	node->link = L->head;
	L->head = node;
}
```

```
void add(LinkedListType* L, int pos, int item){
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	ListNode* before = L->head;
	for(int i=0; i<pos-1; i++){
		before = before->link;
	}
	node->data = item;
	node->link = before->link;
	before->link = node;
}
```

//addLast function

```
void addLast(LinkedListType* L, int item){
	ListNode* node = (ListNode*)malloc(sizeof(ListNode));
	ListNode* last = L->head;
	for(ListNode* p = L->head; p != NULL; p = p->link){
		last = p;
	}
	node->data = item;
	node->link = NULL;
	last->link = node;
}
```

//removeNode fuction

```
void removeNode(LinkedListType* L, int pos){
	ListNode* before = L->head;
	ListNode* target = before->link;
	if(pos==1){ //remove head
		L->head = target;
		free(before);
	}
	else{
		for(int i=1; i<pos-1; i++){
			before = before->link;
		}
		target = before->link;
		if(target->link==NULL){ //remove tail
			before->link = NULL;
```

```
                free(target);
            }
            else{
                before->link = target->link;
                free(target);
            }
        }
}

int get(LinkedListType* L, int pos){
        ListNode* p = L->head;
        for(int i=1; i<pos; i++){
            p = p->link;
        }
        return p->data;
}

void set(LinkedListType* L, int pos, int item){
        ListNode* p = L->head;
        for(int i=1; i<pos; i++){
            p = p->link;
        }
        p->data = item;
}

void printlist(LinkedListType* L){
        for(ListNode* p = L->head; p != NULL; p = p->link){
            printf("[%d] -> ", p->data);
        }
        printf("NULL\n");
}

void main(){

        LinkedListType list;
        init(&list);

        addFirst(&list, 10); printlist(&list);
```

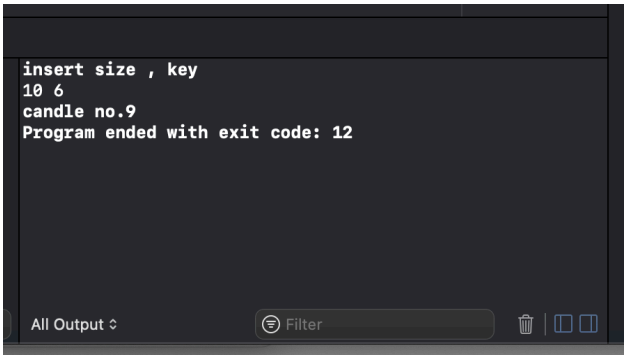
```
    addFirst(&list, 20); printlist(&list);
    addFirst(&list, 30); printlist(&list);
    add(&list, 2, 40); printlist(&list);
    add(&list, 4, 50); printlist(&list);
    addLast(&list, 60); printlist(&list);
    addLast(&list, 70); printlist(&list);
    /*int pos;
    printf("\nNumber?\n");
    scanf("%d",&pos);
    printf("no. %d is %d\n", pos, get(&list, pos));*/

    removeNode(&list, 3); printlist(&list);
    removeNode(&list, 1); printlist(&list);
    removeNode(&list, 5); printlist(&list);

}
```

Simulation result :

```
// 2018920065 luan lichi
// algorithms hw 1-2

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

void buildList(int S[], int n){
	for(int i=0;i<n;i++){
		S[i] = i+1;
	}
}

int runSimulation1(int S[], int n, int k){
	int r=0;
	int size = n;
	int i;

	while(n>1){
		i=0;
		while(i<k){
			r = (r+1)%size;
			if(S[r] != 0){
				i = i+1;
			}
		}
		S[r]=0;
		n--;
		while(S[r]==0){
			r = (r+1)%size;
		}
	}
	return S[r];
}

void main(){
	int size, k;
	printf("insert size , key\n");
	scanf("%d %d",&size,&k);
```

```
    int candle[size];

    buildList(candle, size);

    printf("candle no.%d\n",runSimulation1(candle, size, k));

}
```

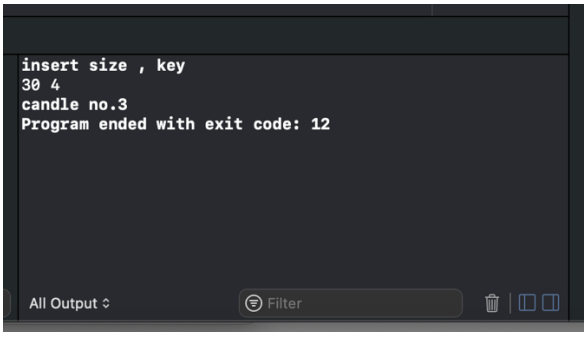
Simulation results :



```
// 2018920065 luan lichi
// algorithms hw 1-3

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

void buildList(int S[], int n){
	for(int i=0;i<n;i++){
		S[i] = i+1;
	}
}

void removeCandle(int S[], int r, int size){
	for(int i=r;i<size;i++){
		S[i]=S[i+1];
	}
}

int runSimulation1(int S[], int n, int k){
	int r=0;
	while(n>1){
		r=(r+k)%n;
		removeCandle(S,r,n);
		n--;
	}
	/*for(int j=0;j<n;j++){
		printf("%d -> ",S[j]);}*/
	return S[0];
}

void main(){
	int size, k;
	printf("insert size , key\n");
	scanf("%d %d",&size,&k);
	int candle[size];

	buildList(candle, size);
```

```
    printf("candle no.%d\n",runSimulation1(candle, size, k));

}
```

Simulation results :



```
// 2018920065 luan lichi
// algorithms hw 1-4

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

typedef struct ListNode{
	int data;
	struct ListNode* link;
}ListNode;

typedef struct{
	ListNode* head;
}LinkedListType;

void init(LinkedListType* L){
	L->head = NULL;
}

void buildList(LinkedListType* L, int size){
	//head
	ListNode* head = (ListNode*)malloc(sizeof(ListNode));
	head->data = 1;
	L->head = head;
	ListNode* before = head;

	//body
	for(int i=2;i<=size;i++){
		ListNode* node = (ListNode*)malloc(sizeof(ListNode));
		node->data = i;
		before->link = node;
		before = node;
	}

	//tail points to head
	before->link = L->head;

}
```

```
/*void printList(LinkedListType* L, int size){
	ListNode* p = L->head;
	for(int i=0; i<size; i++){
		printf("[%d] -> ", p->data);
		p = p->link;
	}
	printf("\n");
}*/
//for checking the function buildlist

int runSimulation1(LinkedListType* L, int n, int k){
	ListNode* p = L->head;
	ListNode* pnext;
	while(p != p->link){
		for(int i=1;i<k;i++){
			p = p->link;
		}
		pnext = p->link;
		p->link = p->link->link;
		free(pnext);
		p = p->link;
	}
	return p->data;
}

void main(){

	int size, k;
	printf("insert size , key\n");
	scanf("%d %d",&size,&k);

	LinkedListType list;
	init(&list);
	buildList(&list, size);
	/*printList(&list, size);*/

	printf("candle no.%d\n",runSimulation1(&list, size, k));
```

}

Simulation results :