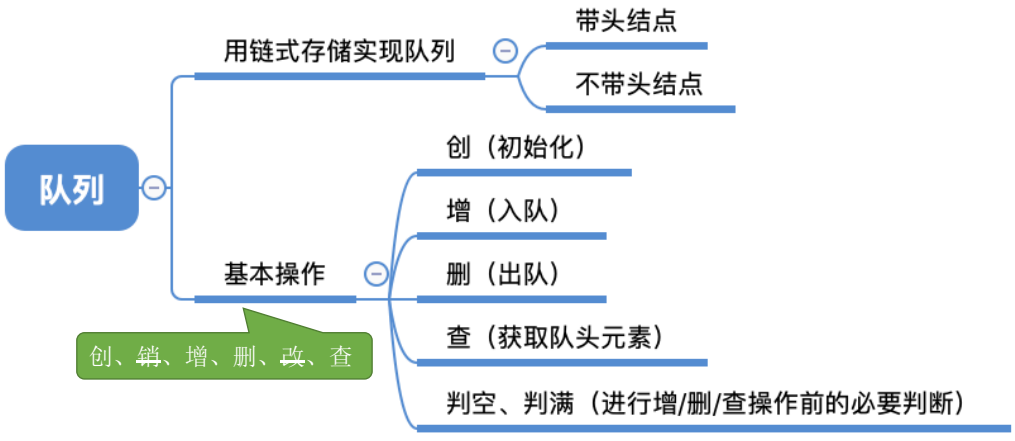
本节内容

队列

链式实现

1

知识总览

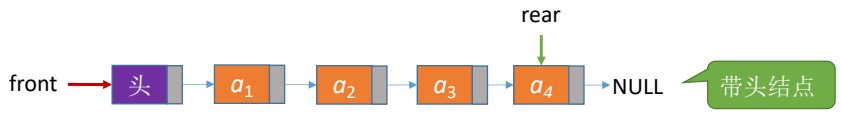


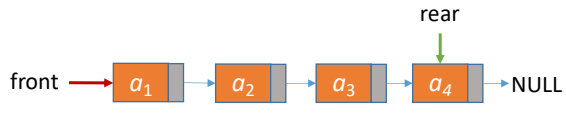
2

队列的链式实现

```
typedef struct LinkNode{     //链式队列结点
    ElemType data;
    struct LinkNode *next;
}LinkNode;

typedef struct{              //链式队列
    LinkNode *front,*rear;   //队列的队头和队尾指针
}LinkQueue;
```





链队列——链式存储实现的队列

3

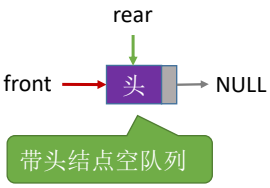
初始化（带头结点）

```
typedef struct LinkNode{
    ElemType data;
    struct LinkNode *next;
}LinkNode;
```

```
typedef struct{
    LinkNode *front,*rear;
}LinkQueue;
```

```
//初始化队列(带头结点)
void InitQueue(LinkQueue &Q){
    //初始时 front、rear 都指向头结点
    Q.front=Q.rear=(LinkNode*)malloc(sizeof(LinkNode));
    Q.front->next=NULL;
}

void testLinkQueue(){
    LinkQueue Q;     //声明一个队列
    InitQueue(Q);    //初始化队列
    //...后续操作...
}
```




```
//判断队列是否为空
bool IsEmpty(LinkQueue Q){
    if(Q.front==Q.rear)
        return true;
    else
        return false;
}
```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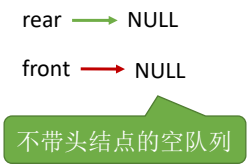
初始化（不带头结点）

```
//初始化队列(不带头结点)
void InitQueue(LinkQueue &Q){
    //初始时 front、rear 都指向NULL
    Q.front=NULL;
    Q.rear=NULL;
}

//判断队列是否为空（不带头结点）
bool IsEmpty(LinkQueue Q){
    if(Q.front==NULL)
        return true;
    else
        return false;
}
```



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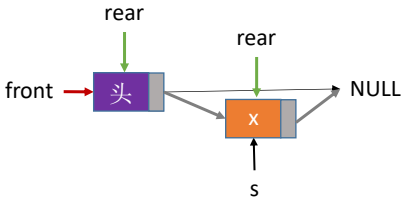
入队（带头结点）

```
//新元素入队（带头结点）
void EnQueue(LinkQueue &Q,ElemType x){
    LinkNode *s=(LinkNode *)malloc(sizeof(LinkNode));
    s->data=x;
    s->next=NULL;
    Q.rear->next=s;     //新结点插入到rear之后
    Q.rear=s;           //修改表尾指针
}
```



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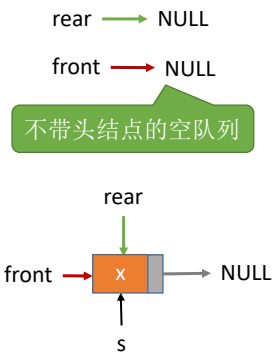
入队（不带头结点）

```
//新元素入队（不带头结点）
void EnQueue(LinkQueue &Q,ElemType x){
    LinkNode *s=(LinkNode *)malloc(sizeof(LinkNode));
    s->data=x;
    s->next=NULL;
    if (Q.front == NULL){          //在空队列中插入第一个元素
        Q.front = s;               //修改队头队尾指针
        Q.rear=s;
    } else {
        Q.rear->next=s;            //新结点插入到 rear 结点之后
        Q.rear=s;                  //修改 rear 指针
    }
}
```

不带头结点的队列，第一个元素入队时需要特别处理



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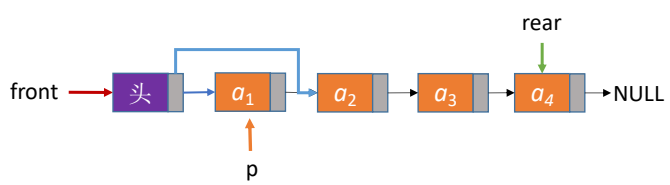
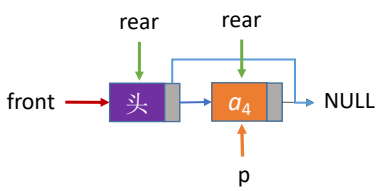
出队（带头结点）

```
//队头元素出队（不带头结点）
bool DeQueue(LinkQueue &Q,ElemType &x){
    if(Q.front==Q.rear)
        return false;          //空队
    LinkNode *p=Q.front->next;
    x=p->data;                 //用变量x返回队头元素
    Q.front->next=p->next;     //修改头结点的 next 指针
    if(Q.rear==p)              //此次是最后一个结点出队
        Q.rear=Q.front;        //修改 rear 指针
    free(p);                   //释放结点空间
    return true;
}
```





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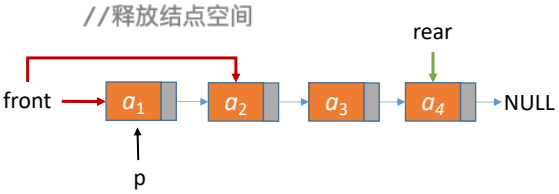
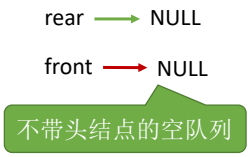
出队（不带头结点）

```
//队头元素出队（不带头结点）
bool DeQueue(LinkQueue &Q,ElemType &x){
    if(Q.front==NULL)
        return false;          //空队
    LinkNode *p=Q.front;       //p指向此次出队的结点
    x=p->data;                 //用变量x返回队头元素
    Q.front=p->next;           //修改 front 指针
    if(Q.rear==p){             //此次是最后一个结点出队
        Q.front = NULL;        //front 指向 NULL
        Q.rear = NULL;         //rear 指向 NULL
    }
    free(p);                   //释放结点空间
    return true;
}
```





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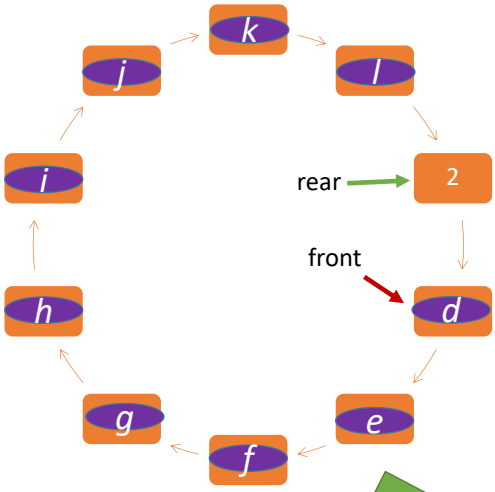
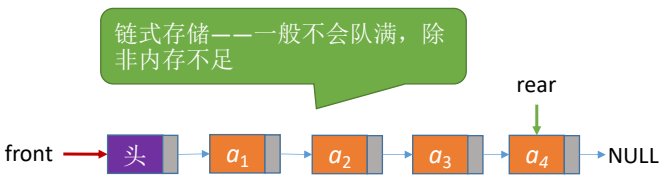
队列满的条件





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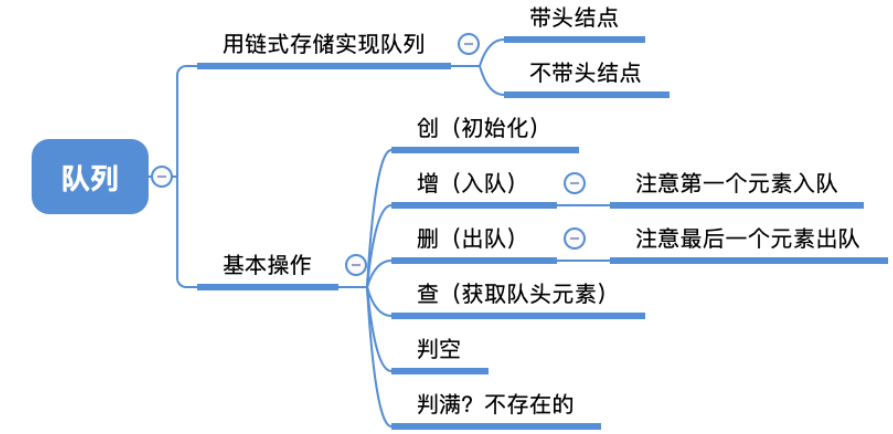
知识回顾与重要考点




```
typedef struct LinkNode{
    ElemType data;
    struct LinkNode *next;
}LinkNode;
```

```
typedef struct{
    LinkNode *front,*rear;
}LinkQueue;
```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