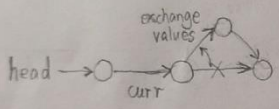
1: Insert Before

This operation has been discussed in detail. Given a new data and the target node, create a new node using the new data and insert the new node before the target node. You should implement this function with $O(1)$ time complexity.

- Assume the target node is neither `head` nor `tail`.

```
void InsertBefore (Node *curr, int data)
{
    Node *newNode = new Node( curr->data, curr->next );
    newNode = curr->next;
    curr->data = data;
}
```

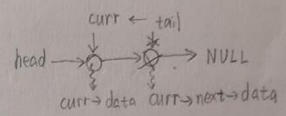


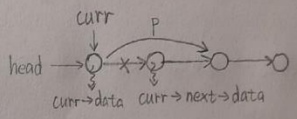
2: Remove Duplication

Given a linked list in ascending order, you should remove all the nodes with duplicate data. Traverse the list for at most once. For example:

```
Before:
list:  1 -> 2 -> 2 -> 3 -> 3 -> NULL

After:
list:  1 -> 2 -> 3 -> NULL
```



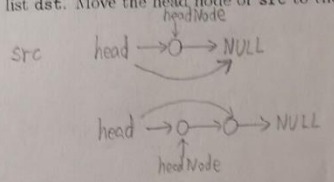



```
void RemoveDuplication (List *list)
{
    Node *curr = list->head;
    if (curr == NULL)
    {
        return;
    }

    while (curr->next != NULL)
    {
        if (curr->data == curr->next->data)
        {
            Node *p = curr->next->next;
            if (curr->next == list->tail)
            {
                list->tail = curr;
            }
            delete curr->next;
            curr->next = p;
        }
        else
        {
            curr = curr->next;
        }
    }
}
```

3: Move Head

Given a non-empty linked list `src` and a linked list `dst`. Move the head node of `src` to the tail of `dst`. For example:




```
Before:
src:  1 -> 2 -> 3 -> NULL
dst:  4 -> 5 -> 6 -> NULL

After:
src:  2 -> 3 -> NULL
dst:  4 -> 5 -> 6 -> 1 -> NULL
```

```
void MoveHead (List *src, List *dst)
{
    Node *headNode = src->head;
    assert(headNode);

    src -> head = src->head -> next;

    if ( headNode -> next == NULL )
    {
        src->tail = NULL;
    }
    headNode -> next = NULL;

    if (dst->head == NULL)
    {
        dst -> head = headNode;
    }
    else
    {
        dst -> tail -> next = headNode;
    }
    dst -> tail = dst -> tail -> next;

}
```

4: Alternate Split

Given a linked list `src`, split it to two linked list `a` and `b` in alternating order. For example:

```
Before:
src:  1 -> 2 -> 3 -> 4 -> 5 -> NULL
a:  NULL
b:  NULL

After:
src:  NULL
a:  1 -> 3 -> 5 -> NULL
b:  2 -> 4 -> NULL
```

- You may assume `src` has more than 4 elements, i.e. after this function, `head` and `tail` of `a` and `b` point to different nodes.
- `a` and `b` are initially empty.
- Use `MoveHead` to implement this function.

```
void AlternateSplit (List *src, List *a, List *b)
{
    assert (a == NULL && b == NULL);

    while ( src -> head != NULL )
    {
        MoveHead ( src , a) ;

        if ( src -> head != NULL )
        {
            MoveHead (src, b) ;
        }
    }
}
```

```
void SortedMerge (List *a, List *b, List *dst)
{
    assert(dst->head == NULL);
    assert(a->head != NULL && b->head != NULL);

    while (true)
    {
        if (a->head == NULL)
        {
            if ( b-> next != NULL )
            {
                Movehead ( b, dst) ;
                SortedMerge ( a, b, dst) ;
                b->head = b->tail = NULL;
            }
            break ;
        }

        if (b->head == NULL)
        {
            // similar to above, ignore it
            ... ...
        }

        if (a->head->data < b->head->data)
        {
            Movehead ( a, dst) ;
        }
        else
        {
            Move ( b, dst) ;
        }
    }
}
```

a head→NULL
b head→O
dst head→O

a head→O→
b head→O→
dst head→O→O→