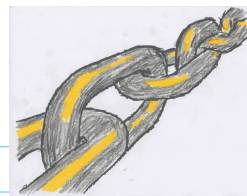


Topics - Basic class & Objects

- Create list
- Count list
- insert in list

## Linked List



Object ref

```
class Emp { ... }
```

```
Emp Amir;
```

self ref

```
Node { int v;  
       Node next;
```

define link class

```
Node n1 = new Node();
```

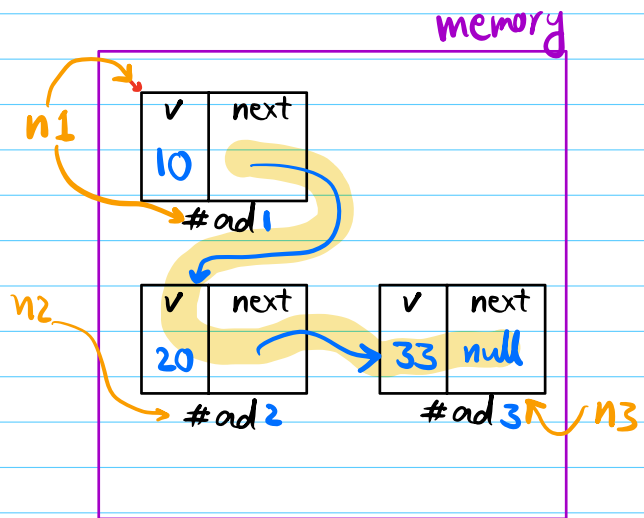
```
n1.v = 10
```

```
Node n2 = new Node();
```

```
n2.v = 20
```

```
n1.next = n2
```

```
print(n1.next.v); // 20
```



```
n1.next.next = null
```

```
n2.next = new Node()
```

```
n2.next.v = 33
```

```
n3 = n2.next
```

head node first

```
Node ✓  
{  
-h  
-head  
-first
```

~~10 20 33 9 -1 99 43 75~~

← -5

10 20 33 9 -5 -1 99 43 75

Array extend & insert

⊗ LL is dynamic size

vs Array is Fixed size

⊗ insertion TC | Arr  $O(1)$   $O(n)$

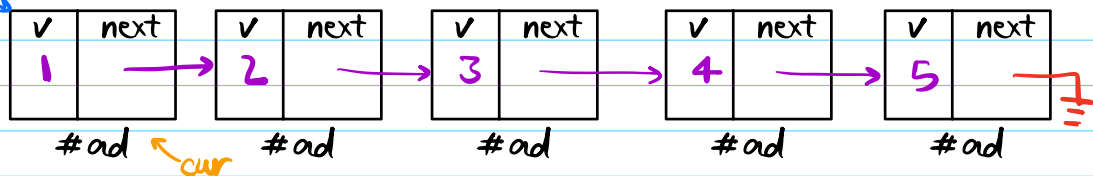
interview tips

- be aware of null pointer
- do not lose pointer of a node

P1 Create a linked list with  $n$  nodes, with data 1 to  $n$ , return head node  $1 \leq n$

#ad1  
head

ex  
 $n=5$



Quiz

Quiz

TC:  $O(n)$

SC:  $O(1)$

```
class Node{
    int v;
    Node next;
    // Constructor:
    Node(int v){
        this.v = v;
        next = null;
    }
}
```

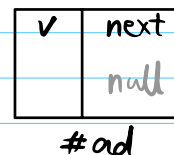
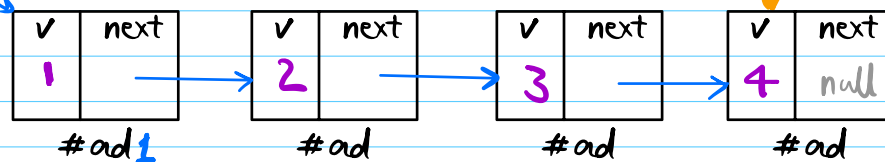
head

```
Node createList(int n){
    h = new Node(1);
    cur = h;
    for(i = 2; i <= n; i++){
        cur.next = new Node(i);
        cur = cur.next;
    }
    return h;
}
```

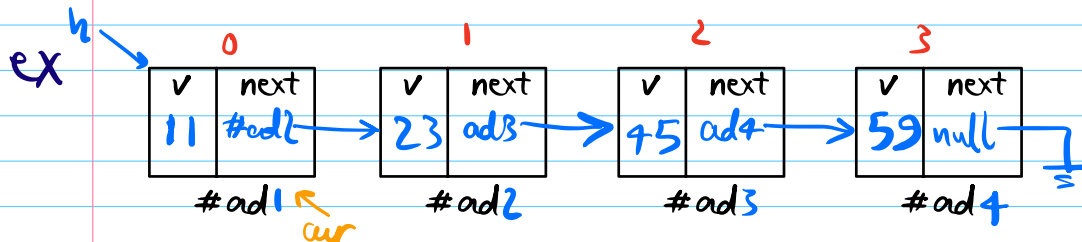
#ad1

dry run

$N=4$



P2 Given head node of a link list return size



correct

bug Alert

Quiz  
TC:  $O(N)$   
SC:  $O(1)$

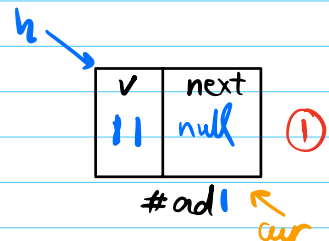
```

int llsz(Node h){
    Node cur=h
    int size=0
    while(cur!=null){
        size++;
        cur=cur.next
    }
    ret size
}
h->null
  
```

wrong

```

int llsz(Node h){
    Node cur=h
    int size=0
    while(cur.next!=null){
        size++;
        cur=cur.next
    }
    ret size
}
  
```

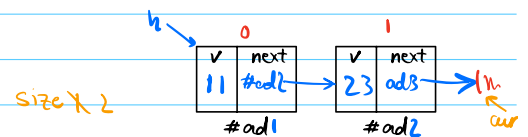


wrong

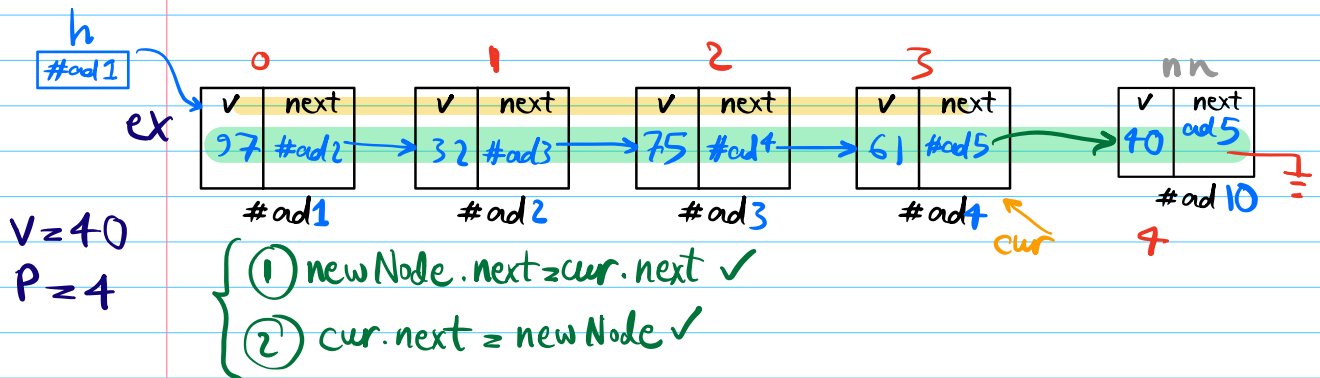
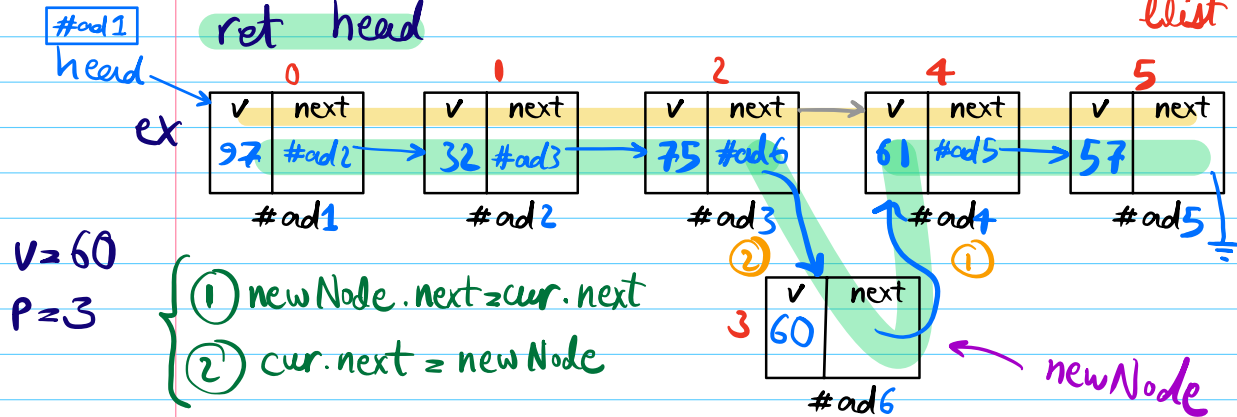
```

int llsz(Node h){
    Node cur=h
    int size=1
    while(cur.next!=null){
        size++;
        cur=cur.next
    }
    ret size
}
  
```

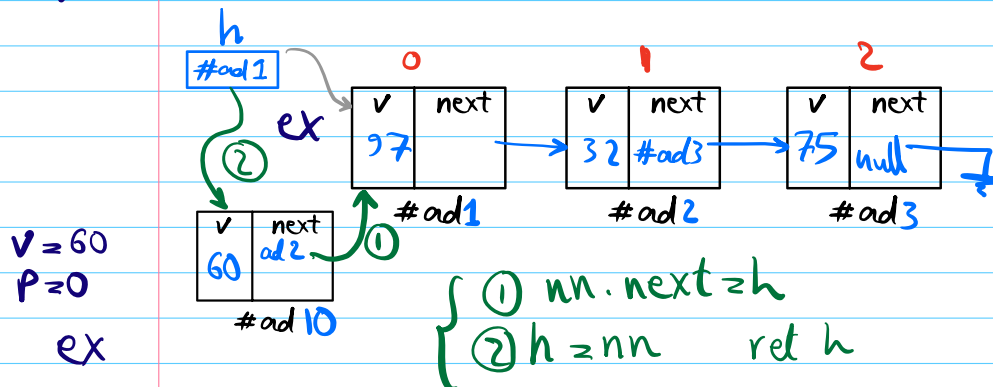
when  $h == null$   
empty list with size 0



P3 Given a linked list head, insert a new node with data  $V$  at Position  $P$   $0 \leq P < N \rightarrow$  size of list  
ret head



insert  
2 step :



Quiz

TC:  $O(n)$

SC:  $O(1)$

Node InsertNode(Node h, int v, int P){

Node nn = new Node(v)

if(P == 0){

nn.next = h

h = nn

ret h

}

cur = h

for(i = 0; i < P-1; i++){

cur = cur.next

}

① nn.next = cur.next

② cur.next = nn

ret h

}

$i = 2$   $P-1 = 2$

