

CSCI 204: Data Structures & Algorithms

Doubly Linked List

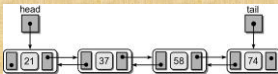
Advanced Linked lists

Doubly Linked and Circular Lists

Revised based on textbook author's notes.

Doubly linked lists

- A linked list in which each node contains a data component(s) and two links:
 - one pointing the next node and
 - one pointing to the preceding node.



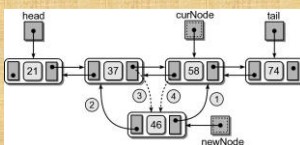
In Python's term ...

- The node storage class is similar to that of a singly linked list.

```
class DListNode :
    def __init__( self, data ) :
        self.data = data
        self.next = None
        self.prev = None
```

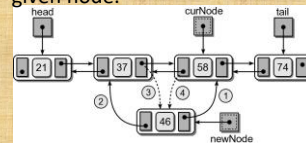
Doubly Linked: Insert

- (1) Insert in the middle before a given node.



Doubly Linked: Insert

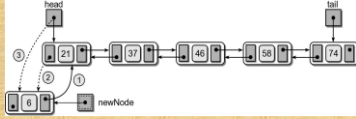
- (1) Insert in the middle before a given node.



```
node.next = cur
node.prev = cur.prev
node.prev.next = node
cur.prev = node
```

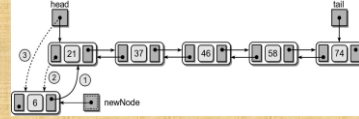
Doubly Linked: Insert

- (2) Insert at the front before the **head**.



Doubly Linked: Insert

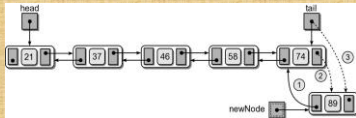
- (2) Insert at the front before the **head**.



```
node.next = self.head
self.head.prev = node
self.head = node
```

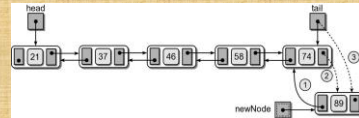
Doubly Linked: Insert

- (3) Insert at the end after the **tail**.



Doubly Linked: Insert

- (3) Insert at the end after the **tail**.



```
node.prev = self.tail
self.tail.next = node
self.tail = node
```

Exercise

- Implement `insert_before()`
- Implement `insert_after()`
- Implement `insert_sorted()`