

LAB 07: Linked List

CS211 – Data Structures and Algorithms

Usman Institute of Technology

Fall 2019

- **How to submit:**

- Create an account on <http://www.turnitin.com/> as a Student (if you don't have already)
- Use following information at time of sign-up

- CS Section A**

- Class ID: 22664649
 - Enrollment Key: DSFALL19CSA

- CS Section B**

- Class ID: 22664651
 - Enrollment Key: DSFALL19CSB

A. Create a class Node to initialize the next node pointer in the constructor.

Add a constructor of the class that takes one argument value in order to set the elements for the List. The constructor should also initialize next node pointer

```
class Node:
    def __init__(self, value):
        // your code goes here
```

B. Create a class LinkedList and implement the singly Linked List operations in the following order.

1. Add a constructor of the class that initializes head and tail node pointers

```
class LinkedList:
    def __init__(self):
        // your code goes here
```

2. Add a function **InsertatFirst()** that inserts a value at the beginning of the List.

```
def InsertatFirst(self, value):
    // your code goes here
```

Example:

```
L1 = LinkedList()
L1.InsertatFirst(2)
L1.InsertatFirst(3)

# The items will be inserted like this:
3
2
```

3. Add a function **InsertatEnd()** that inserts a value at the end of the List.

```
def InsertatEnd(self, value):
    // your code goes here
```

```
Example:
L1 = LinkedList()
L1.InsertatFirst(2)
L1.InsertatFirst(3)
L1.InsertatEnd(4)

# The items will be inserted like this:
3
2
4
```

4. Add a function **Insertafter()** that inserts a value after a given item in the List.

```
def Insertafter(self, item, value):
    // your code goes here
```

```
Example:
L1 = LinkedList()
L1.InsertatFirst(2)
L1.InsertatFirst(3)
L1.InsertatEnd(4)
L1.Insertafter(2, 5)

# The items will be inserted like this:
3
2
5
4
```

5. Add a function **DeleteatFirst()** which deletes an element from start of the list.

```
def DeleteatFirst(self):  
    // your code goes here
```

Example:

```
L1 = LinkedList()  
L1.InsertatFirst(2)  
L1.InsertatFirst(3)  
L1.InsertatEnd(4)  
L1.Insertafter(2,5)  
L1.DeleteatFirst()  
  
# The List will look like this:  
  
2  
5  
4
```

6. Add a function **DeleteatEnd()** which deletes an element at the end of the list.

```
def DeleteatEnd():  
    // your code goes here
```

Example:

```
L1 = LinkedList()  
L1.InsertatFirst(2)  
L1.InsertatFirst(3)  
L1.InsertatEnd(4)  
L1.Insertafter(2,5)  
L1.DeleteatFirst()  
L1.DeleteatEnd()  
  
# The List will look like this:  
  
2  
5
```

7. Add a function **DeletebyValue()** which deletes a node from the list by passing a value.

```
def DeletebyValue(self,value):  
    // your code goes here
```

Example:

```
L1 = LinkedList()
L1.InsertatFirst(2)
L1.InsertatFirst(3)
L1.InsertatEnd(4)
L1.Insertafter(2,5)
L1.DeletebyValue(3)

# The List will look like this:
2
5
4
```

C. Create a class Stack and implement the Stack operations using Linked List.

```
class Stack:
    def __init__(self):
        // your code goes here
```

D. Create a class Queue and implement the Queue operations using Linked List.

```
class Queue:
    def __init__(self):
        // your code goes here
```

Home Assignment

Modify the Singly Linked List program to implement the operations of doubly linked list.