

LAB 06: Linked List

CS211 – Data Structures and Algorithms

Usman Institute of Technology

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- **How to submit:**

- Online: Submit on your respective MS Teams.

A. Create a class Node that stores the information of the node of Singly Linked List.

1. 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):
        self.value = value
        self.next = None
```

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 pointers.

```
class LinkedList:
    def __init__(self):
        self.head = None
        self.tail = None
```

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
```

8. Add a function **Print()** which prints the values of the Linked List.

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

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.