

National University of Computer and Emerging Sciences



Lab Manual
for
Data Structure

Course Instructor	Ms. Arooj Khalil
Lab Instructor(s)	Ms. Mamoona Akbar Ms. Sonia Anum
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Department of Computer Science
FAST-NU, Lahore, Pakistan

Lab Manual 04

Objectives:

After performing this lab, students shall be able to revise:

- ✓ iterator
- ✓ Circular doubly link list
- ✓ Circular single link list

Problem 1

1. Implement a Struct 'Node' that contains two data members: A template variable 'data', Node pointer 'next'.
2. Now implement a circular doubly linked list class having two private data members Node pointer 'tail' and Node pointer 'head'.
3. Now make an iterator class having one private data member Node pointer current. Please note that iterator class is a nested class of circular double linked list class. **(Note that iterator class is defined inside the List class)**
4. Now implement the following operations for iterator class:
 - a. default constructor
 - b. dereference operator
 - c. post increment operator
 - d. pre increment operator
 - e. not equal operator
 - f. equal operator
 - g. assignment operator
 - h. array subscript operator
5. Now implement the following operations for linked list class:
 - a. begin `iterator begin() const;`
 - b. end `iterator end() const;`
 - c. Insert at tail `void insertAtTail (T const element);`
 - d. remove all nodes from the CLL which contain element whose digit sum is even and find sum and product of remaining element

input: 9-> 11-> 34-> 6 -> 13 -> 21

output: 9->34->21

sum : 64

product : 6426

- e. Move all occurrence of an element to end of CLL
`void MoveOccurence(T keyvalue);`

Input: 1 -> 2 -> 2 -> 3

KEY VALUE = 2

Output: 1 -> 3 -> 2 -> 2

- f. Return size of circular link list. `int size()const;`
- g. Return true if TAIL is pointing to NULL otherwise false. `bool IsEmpty();`
- h. Copy Constructor
- i. Destructor

Create a suitable main function to test the above functions.

Problem 2

You are the owner of a unique hotel that has its rooms arranged in a circle. There are several types of rooms in the order and each have different capacity of guests it can accommodate. Each node of a link list represent a room. You are required to make a single circular link list that contains the following data members:

Type: room type (single, double, triplet, quad, family, suite)

Capacity: no. of guests a room can accommodate (1, 2, 3, 4, 6, 10)

Guests: no. of guests currently living in the room

Filled: if a room is filled or not (Yes/No)

You are assigned the task of the hotel receptionist and are supposed to allocate rooms to the guests according to their requirements. Using iterator class as the inner class of circular list you are to traverse the hotel rooms for perfect match. If a room is filled then you are required to skip it during every traversal.

Starting with the list given below:



Accommodate the following guest:

2 guests for Quad
2 guests for family
1 guest for triplet

5 guests for suite
1 guest for single

Note: After assigning rooms to guests don't forget to change no of the guests in the rooms and its filled status.