National University of Computer and Emerging Sciences

Lab Manual

for

Data Structures

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Lab Manual 02

Objectives:

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

- ✓ Link list
- ✓ template

Problem 1

1. Implement a Struct 'Node' that contains two data members: A template variable 'data' and Node pointer 'next'.
2. Now implement a singly linked list class having two private data members Node pointer 'head' and Node pointer 'tail'.
3. Now make an iterator class having one private data member Node pointer current. Please note that iterator class is a nested class of 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
5. Now implement the following operations for linked list class:
    a. begin `iterator begin() const;`
    b. end `iterator end() const;`
    c. Insert at start `void insertAtHead(T const element);`
    d. Insert at end `void insertAtTail (T const element);`
    e. Print `void print() const;`
    f. Delete at Start `void eraseAtHead ();`
    g. Delete at End `void eraseAtTail();`
    h. Destructor

6. Now create a main function which has the following instructions:
    a. Define a linked list object of type int.
    b. Insert 2, 6, 7 at start
    c. Insert 3, 8, 1 at End
    d. Delete at Start
    e. Delete at End
    f. Now print the linked list. (**Sample answer 6->2->3->8)**

Problem 2

1. Make a link list **A** that has 5 elements. (**e.g 4->1->5->8->3**)
2. Make a link list **B** that have 10 elements(**e.g 4->6->1->8->5->10->2->7->3->9**)
3. Make a function Union that takes two arguments link list **A** and link list **B** and return a new link list **C** that is union of link list **A** and **B**
4. Make a function Intersection that takes two argument link list **A** and link list **B** and return a new link list **C** that is intersection of link list **A** and **B**
5. Make a function sortedlinklist that insert elements in link list in sorted order.