RIPHAH INTERNATIONAL UNIVERSITY, LAHORE CAMPUS.

RIPHAH SCHOOL OF COMPUTING & INNOVATION (RSCI)

COMPLEX PROBLEM SOLVING

ASSIGNMENT 03

Issue Date: 29-10-2022
Due Date: 04-11-2022
Semester: FALL 2022
Class: BSCS (7A)
Total Marks: 100

Objectives:

- Practice of problem solving on *Linked Lists*

Instructions:

- Assignment type is individual, so no sharing is allowed.
- You can use internet and books as helping resources but sharing content with peers is strictly prohibited.
- **Plagiarized assignments will get zero and may fail the course.**
- I am available for your help/guidance.
- **Start early!**

Submission Method:

- Write everything in word file. You can also solve on paper and attach pictures in word file.
- Submit only MS Word or PDF file at **this link**.

Design algorithms for following given problems.

It is recommended to write code in any programming language of your choice.

Problem A3-1

Given a singly linked list, find **kth** last element from linked list. Value of **'k'** is given by user. For example, if k=3, it means you need to get 3rd last element.

Example1:

Input: (k=3)

4 → 5 → 6 → 7 → 8 → Ø

Output:

6

Example 2:

Input: (k=4)

4 → 5 → 6 → 7 → 8 → Ø

Output:

5

Problem A3-2

Given a linked list represented by binary digits. Convert this binary numbers to respective integer.

For Example:

Input:

A binary number 10110 is represented in linked list as shown below:

1 → 0 → 1 → 1 → 0 → Ø

Output:

22

Explanation:

Binary number 10110 corresponds to 22.

$= 1\times2^4 + 0\times2^3 + 1\times2^2 + 1\times2^1 + 0\times2^0$
$= 16 + 0 + 4 + 2 + 0$
$= 22$

Problem A3-3

Given a linked list, delete the middle element from linked list.
If the linked list has odd number of elements, delete the middle one.
If the linked list has even number of elements, delete two middle nodes.

Example 1:

Input:

4 → 5 → 6 → 7 → 8 → Ø

Output:

4 → 5 → 7 → 8 → Ø

Example 2:

Input:

4 → 5 → 6 → 7 → 8 → 9 → Ø

Output:

4 → 5 → 8 → 9 → Ø

Problem A3-4

Given a linked list, split a linked list into two different linked lists containing alternate elements.

Example 1:

Input:

17 → 45 → 38 → 77 → 8 → 50 → 65 → 98 → 43 → 89 → Ø

Output:

Linked List 1: 17 → 38 → 8 → 65 → 43 → Ø

Linked List 2: 45 → 77 →50 → 98 → 89 → Ø

SELF STUDY

1. Read about XOR Linked List and understand how it works?
2. Read about Circular Linked List and Doubly Linked List.
3. Study about which sorting technique is best for singly linked list and how it works?

*Self-study is highly recommended for you before coming to the next class. Anyhow, it is optional in submission.

Good Luck 😊