**COLLEGE OF COMPUTING AND INFORMATICS**

**CSEB3213 DATA STRUCTURES AND ALGORITHMS**

**SEM 2 2024/2025**

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# LAB 4: SINGLY LINKED LIST (EXTENDED) AND DOUBLY LINKED LIST IMPLEMENTATION

## Objectives

Introduction on Singly Linked List (additional operations) and Doubly Linked List concept and operations using C++ programming language.

## Instruction

1. This is an individual lab exercise.
2. You are compulsory to complete **ALL QUESTIONS for Level Easy and Moderate** except Level Challenging (Self-Lab Revision Exercise).
3. You are given only 90 minutes to complete the program.
4. Compile and submit your complete cpp programs via Brighten.
5. Do attach this code segment in all files:

```
/*Subject code : CSEB3213 Data Structures and Algorithms
  Section      : 01A
  Student name : XXX
  Student ID no: XXX
  Question no  : XXX */
```

## LEVEL: EASY

**Question 1 (5 marks)**

Based on your solution for **Lab 3 - Question 2**, modify the program to use a tail pointer implementation without altering the overall program flow.

## LEVEL: MODERATE

**Question 2 (10 marks)**

Based on your solution for **Lab 3 - Question 3**, modify the program to include a **deleteSubject()** function. This function should display a list of all subjects and delete the subject selected by the user based on the subject code entered.

**Question 3 (15 marks)**

*Source: Sem 2 2021/2022 Lab Test Set 4*

Referring to the Doubly Linked List program and output sample as shown below, complete the following questions:

1. Complete the **main()**. This function should be able to invoke all functions in the program.
2. Write a function named **insert()**. This function should be able to copy data from all arrays and store it into a doubly linked list.
3. Write a function named **update()**. This function should be able to update an employee's salary based on input name from user.
4. Write a function named **display()**. This function should be able to **swap positions of 1st and 2nd record** and **display the updated details of employees**.

**Sample of Program**

```
#include <iostream>
using namespace std;

//Question (2)
//Question (3)
//Question (4)

int main() {
    string name [] = {"Ahmad","Siew May","Ravi","John","Mohammad","Jennifer"};
    float salary [] = {12000.0, 4800.0,6000.0, 5500.0, 14000.0, 11000.0};
    int service [] = {10,4,12,7,6,5};

    //Question (1)

    cout<<"\n # Menu : Update Salary # "<<endl;
    cout<<" Enter name : ";getline(cin, Name);
    update(/*suitable argument*/);
    display(/*suitable argument*/);
    cout<<"\nEnd of program";
    return 0;
}
```

**Sample of Output**

```
# Menu : Update Salary #
Enter name : John
Enter new salary : RM8000
Swap position of Ahmad's and Siew May's record

Updated List of Employee
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1. Staff Name : Siew May, Salary : RM 4800, Year of Service : 4
2. Staff Name : Ahmad, Salary : RM 12000, Year of Service : 10
3. Staff Name : Ravi, Salary : RM 6000, Year of Service : 12
4. Staff Name : John, Salary : RM 8000, Year of Service : 7
5. Staff Name : Mohammad, Salary : RM 14000, Year of Service : 6
6. Staff Name : Jennifer, Salary : RM 11000, Year of Service : 5
```

**LEVEL: CHALLENGING**

**SELF-LAB REVISION EXERCISE**

**Question 4**

Modify the program for Question 3 by adding a **deleteStaff()** function. This function should display a list of all staff details and delete the specific staff record based on the staff name entered by the user.