# University of Central Punjab Faculty of Information Technology

**Data Structures and Algorithms Spring 2024**

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| **Lab 11** | |  |
| **Topic** | * Recursion |
| **Objective** | The basic purpose of this lab is to implement recursion and test its Applications |

**Instructions:**

* Indent your code.
* Use meaningful variable names.
* Plan your code carefully on a piece of paper before you implement it.
* Name of the program should be same as the task name. i.e. the first program should be Task\_1.cpp

# void main() is not allowed. Use int main()

* **You have to work in multiple files. i.e separate .h and .cpp files**
* **You are not allowed to use any built-in functions**

# You are required to follow the naming conventions as follow:

* + **Variables:** firstName; (no underscores allowed)
  + **Function:** getName(); (no underscores allowed)
  + **ClassName:** BankAccount (no underscores allowed)

# Students are required to complete the following tasks in lab timings.

**Task 1**

Write a C++ program to add values Recursively in a Linked List

**Description:**

Implement a singly linked list in C++. Write a recursive function to add a new value at the end of the linked list.

**Requirements:**

1. Define a Node struct with Type value and a pointer to the next Node.

2. Define a LinkedList class with a head pointer.

3. Implement a recursive function addValue that adds a new value to the end of the linked list.

**void addValue(int value);**

4. Include a function to display the linked list for testing purposes.

**Task 2**

Write a C++ program for the Deletion of Tail Value Recursively

**Description:**

Implement a singly linked list in C++. Write a recursive function to delete the last value (tail) of the linked list.

**Requirements:**

1. Define a Node struct with a Type value and a pointer to the next Node.

2. Define a LinkedList class with a head pointer.

3. Implement a recursive function deleteTail that deletes the last value of the linked list.

**void deleteTail();**

4. Include a function to display the linked list for testing purposes.

**Task 3**

Write a C++ program to display LinkedList Recursively

**Description:**

Implement a singly linked list in C++. Write a recursive function to display linked list.

**Requirements:**

1. Define a Node struct with a Type value and a pointer to the next Node.

2. Define a LinkedList class with a head pointer.

3. Implement a recursive function printLinkedList that display the values of the linked list.