

LAB 2

CSE225L



Dynamic Memory Allocation

In this lab, we will:

- Explore the concepts of dynamic memory allocation using the **new** and **delete** operators in C++.
- Learn how to allocate and deallocate memory for both single variables and arrays (1D and 2D).

To perform dynamic memory allocation, we use the **new** and **delete** operators:

- **new operator**: Allocates memory on the heap.
- **delete operator**: Deallocates memory previously allocated by new.

Example 1: Allocating and deallocating a single integer

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

int main() {
    int* ptr = new int;    // Dynamically allocate memory for one integer
    *ptr = 10;             // Assign a value to the allocated memory
    cout << "Value at ptr: " << *ptr << endl;
    delete ptr;            // Deallocate memory
    return 0;
}
```

Value at ptr: 10

Example 2: Allocating and deallocating a dynamic array

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

int main() {
    int size = 5;
    int* arr = new int[size]; // Dynamically allocate an array of 5 integers
    for (int i = 0; i < size; i++) {
        arr[i] = i * 2;        // Initialize array elements
    }

    // Printing the array elements
    cout << "Array elements: ";
    for (int i = 0; i < size; i++) {
        cout << arr[i] << " ";
    }
    cout << endl;

    delete[] arr;             // Deallocate the entire array

    return 0;
}
```

Array elements: 0 2 4 6 8

TASKS:

Task 1: Dynamic Array Allocation (1D)

- Use the **new** operator to allocate an integer array of user-specified size.
- Prompt the user to input values for each array element.
- Print the values of the array.
- Finally, use the **delete[]** operator to deallocate the array.

Task 2: Dynamic Array Allocation (2D) with Equal Rows

- Use the **new** operator to allocate a two-dimensional character array, where the number of rows and columns is provided by the user.
- Ask the user to input a string for each row of the array.
- Print all the strings stored in the 2D array.
- Use the **delete[]** operator to deallocate the memory.

Task 3: Dynamic Array Allocation (2D) with Uneven Rows

- Use the **new** operator to allocate a two-dimensional integer array where the number of rows and columns are provided by the user. In this case, each row will have a different number of columns.
- Prompt the user for the number of elements in each row and then input values for each element.
- Print the elements of the entire 2D array.
- Finally, deallocate the memory using the **delete[]** operator.