

# EXPERIMENT NO 14

## Open Ended Lab

### Objectives:

- Practice and demonstrate understanding of dynamic memory allocation concepts.
- Develop efficient memory management skills using dynamic memory allocation techniques.
- Foster creativity and innovation in designing optimal memory allocation solutions.
- Enhance problem-solving abilities by tackling complex programming challenges related to memory allocation.

### Equipment required:

- Dev-C++/Eclipse/Visual Studio installed in PC/Windows

## DISCUSSION

### 1. Pre-Lab

#### Dynamic Memory Allocation

Dynamic memory allocation is a fundamental concept in C++ programming that allows for the allocation and deallocation of memory at runtime. Unlike static memory allocation, where memory is allocated at compile time, dynamic memory allocation enables programs to dynamically request memory as needed during program execution.

One key aspect of dynamic memory allocation is efficient memory management. Students are encouraged to design and implement algorithms that make effective use of memory, considering factors such as memory requirements, trade-offs, and error handling. They learn to analyze the problem at hand, determine the appropriate amount of memory to allocate, and deallocate it when it is no longer needed, preventing memory leaks and optimizing resource utilization.

The open-ended nature of the lab allows students to explore different approaches to dynamic memory allocation and encourages creativity and innovation. They can experiment with various memory allocation strategies, compare their performance, and refine their coding skills. This fosters critical thinking as they evaluate different options and make informed decisions regarding memory allocation based on the specific requirements and constraints of the problem.

Furthermore, the lab setting promotes collaboration and teamwork. Students can discuss and share their insights, exchange ideas, and learn from each other's approaches to dynamic memory allocation. This collaborative environment encourages peer learning and the development of effective memory management strategies.

By participating in open-ended labs on dynamic memory allocation, students not only strengthen their technical skills but also gain a deeper understanding of the practical applications of memory management in real-world programming scenarios. They acquire problem-solving abilities, enhance their ability to analyze and tackle complex programming

challenges, and develop a sense of ownership and responsibility in managing memory dynamically.

## **2. Post-Lab (Lab Tasks)**

1. Design a C++ program that allows the user to dynamically create 1D and 2D arrays at runtime based on the size provided by the user through the console.

The program should prompt the user to enter the desired size of the 1D array. Once the size is entered, dynamically allocate memory to create the 1D array with the specified size. Prompt the user to enter the elements of the array and display the final array on the console.

Next, the program should ask the user to input the number of rows and columns for the 2D array. Using the provided dimensions, dynamically allocate memory to create a 2D array. Prompt the user to enter the elements of the array row by row and display the final 2D array on the console.

Ensure appropriate error handling for invalid input, such as non-positive sizes or incorrect array dimensions.

END