FAST School of Computing

Object Oriented Programming – Spring 2023

Cyber Security Department

LAB 03

Pointers in C++

Learning Outcomes

In this lab you are expected to learn the following:

- Dynamic Memory Allocation.
- 2D and 3D Pointers.

Note: No subscript operator" [ ]" will be used during this task only pointer arithmetic is allowed e.g. *(ptr+1).

Run the testcases for first 3 problems

Problem 1:

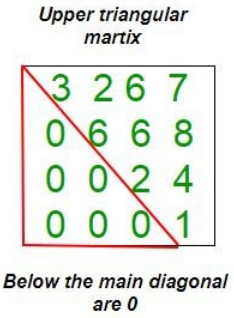
Take two numbers **m (rows) and n (cols)** as input from the user. Declare a 2D Dynamic Array having **m rows and n columns.** Initialize the values of this array randomly using for loop. Now pass this dynamic array to a function. The function will calculate the sum of all rows and return an array containing the sum of each row.

int* CalculateSum(int **p1, int m,int n)

Problem 2:

Write a program that declares a 2D dynamic matrix in the main, pass this matrix to the function and check whether it is upper diagonal or not. If its upper diagonal return **upper** else return **notupper**

string Diagonal(int matrix ,rows,columns)**



Problem 3:

In this question you will create and compute sum of two **nrows X ncols** matrices, where nrows and ncols will be passed as arguments to the function.

First define **two 2D pointers** call them **matrixA** and **matrixB**. Fill them with some random numbers. Pass these matrices in the fucntion then store the sum of these two matrices in new created **matrixC**. Finally, deallocate the memory of matrixA and

matrixB return the matrixC from the function.

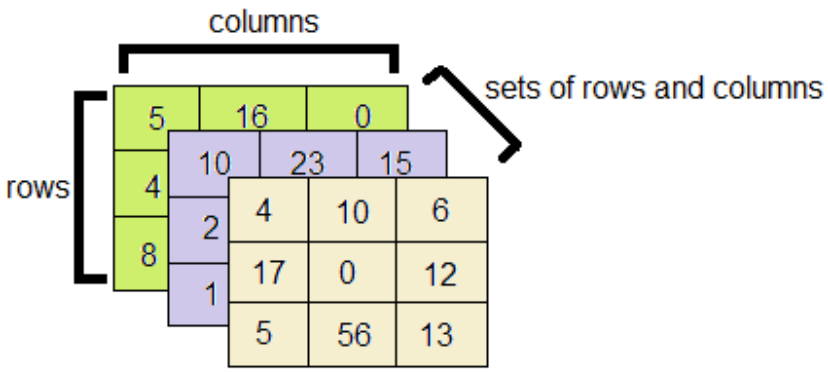
int MatrixSum(int** MatrixA, int** MatrixB)**

Problem 4:

Now you are quite comfortable with 2D pointers. Here your goal is to define and allocate memory for 3D pointers.

Now your goal is to write a function that receives four arguments: (i) an alias to a 3D pointer; (ii) number of pages (or number of matrices); (iii) number of rows; and (iv) number of columns. Now your goal is to first allocate the memory for pages, rows and then for columns dynamically using new operator.

void ThreeD (int* ptr, int pages, int rows, int columns)**



Problem 5:

Write a program that declares a 3D dynamic array in the main, initialize it with some values. Pass this matrix to the function and calculate the square of each value in the array. Return the squared array.

int* Square(int ***, int pages, int rows, int columns)**

Submission Details:

1. Save single .cpp file with your roll no and lab number e.g. i22-XXXX_Lab3.cpp
2. Take screen shot of running test cases of tasks.
3. Zip the .cpp file and screen shots (Do not create .rar file) with roll no and lab no. e.g. i22-XXXX_Lab3.zip.
4. Submit the zip file on google class room.