



# Operations on 2D Arrays

**ELEC1006: ENGINEERING COMPUTING**

# 2D Array Initialisation

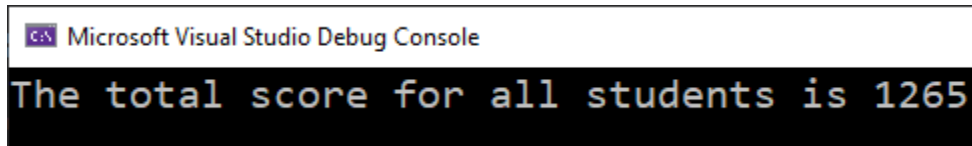
- Given the following definitions:

```
const int NUM_STUDENTS = 3;
const int NUM_SCORES = 5;
double total = 0.0;    // Accumulator
double average; // To hold average scores
double scores[NUM_STUDENTS][NUM_SCORES] =
    {{88, 97, 79, 86, 94},
     {86, 91, 78, 79, 84},
     {82, 73, 77, 82, 89}};
```

# Example 1: Summing all Elements in a 2D Array

```
// Sum the array elements.
for (int row = 0; row < NUM_STUDENTS; row++)
{
    for (int col = 0; col < NUM_SCORES; col++)
        total += scores[row][col];
}

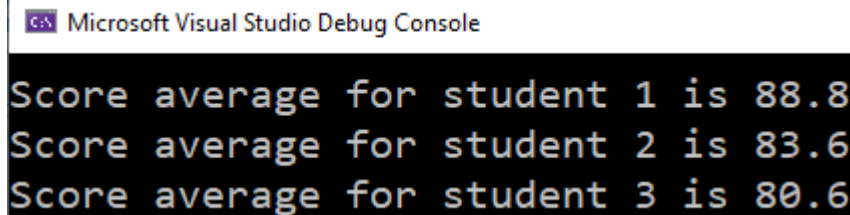
// Display the sum.
cout << "The total score for all students is " <<
total << endl;
```



```
Microsoft Visual Studio Debug Console
The total score for all students is 1265
```

# Example 2: Summing the columns of the 2D Array

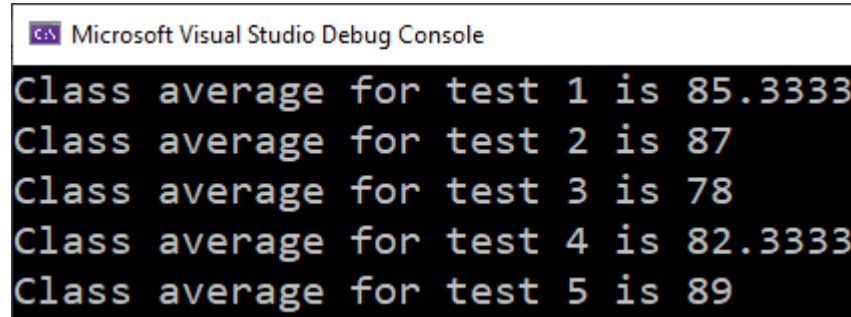
```
// Get each student's average score.
for (int row = 0; row < NUM_STUDENTS; row++)
{
    // Set the accumulator.
    total = 0;
    // Sum a row.
    for (int col = 0; col < NUM_SCORES; col++)
        total += scores[row][col];
    // Get the average
    average = total / NUM_SCORES;
    // Display the average.
    cout << "Score average for student "
         << (row + 1) << " is " << average << endl;
}
```



```
Microsoft Visual Studio Debug Console
Score average for student 1 is 88.8
Score average for student 2 is 83.6
Score average for student 3 is 80.6
```

# Example 3: Summing the rows of the 2D Array

```
// Get the class average for each score.
for (int col = 0; col < NUM_SCORES; col++)
{
    // Reset the accumulator.
    total = 0;
    // Sum a column
    for (int row = 0; row < NUM_STUDENTS; row++)
        total += scores[row][col];
    // Get the average
    average = total / NUM_STUDENTS;
    // Display the class average.
    cout << "Class average for test " << (col + 1)
        << " is " << average << endl;
}
```



```
Microsoft Visual Studio Debug Console
Class average for test 1 is 85.3333
Class average for test 2 is 87
Class average for test 3 is 78
Class average for test 4 is 82.3333
Class average for test 5 is 89
```

# More info

- [1] cplusplus.com: Arrays  
<https://www.cplusplus.com/doc/tutorial/arrays/>
- [2] learncpp.com: 6.1 – Arrays (Part I)  
<https://www.learncpp.com/cpp-tutorial/61-arrays-part-i/>
- [3] learncpp.com: 6.2 – Arrays (Part II)  
<https://www.learncpp.com/cpp-tutorial/62-arrays-part-ii/>
- [4] learncpp.com: 6.3 – Arrays and loops  
<https://www.learncpp.com/cpp-tutorial/63-arrays-and-loops/>