CPSC 121

Week 02
Multidimensional Arrays

Lab 01 - 2D Array

Two dimensional arrays are useful data structures that we can use to simulate lists of associated objects. One example of this would be a list of students, and for each student they have their own list of attributed grades. One dimension of the array holds a list of students while the other dimension of the array holds a list of grades for that student.

Here is a visual example:

Grades

Stu1 Test1	**Stu1 Test 2**	**Stu1 Test 3**
Stu2 Test1	**Stu2 Test 2**	**Stu2 Test 3**
Stu3 Test1	**Stu3 Test 2**	**Stu3 Test 3**

In this example we can see a simulation of a table using a 2D array. Every Student (represented by rows) has their own list of test scores (represented by columns).

Another use of 2D arrays is to simulate a grid or map. We can use our 2D array to simulate coordinates on the map and use those coordinates by indexing the array.

Here is a visual example:

Grid

0,0	**0,1**	**0,2**
1,0	**1,1**	**1,2**
2,0	**2,1**	**2,2**

In this example we can index the coordinates in the grid by referencing the array. For example if we wanted to access the middle point of the graph we could say grid[1][1].

CPSC 121 Week 2

For this lab you are tasked to make a grade book application. The application will track 3 exam scores across 3 students using user input. You must implement a 2-dimensional array in your solution.

Expected Output:

```
====Grade Book Application====
Enter Student 1's Exam 1 score.
78
Enter Student 1's Exam 2 score.
74
Enter Student 1's Exam 3 score.
88
Enter Student 2's Exam 1 score.
90
Enter Student 2's Exam 2 score.
100
Enter Student 2's Exam 3 score.
65
Enter Student 3's Exam 1 score.
40
Enter Student 3's Exam 2 score.
10
Enter Student 3's Exam 3 score.
60
Student 1's Exam 1 score is: 78
Student 1's Exam 2 score is: 74
Student 1's Exam 3 score is: 88

Student 2's Exam 1 score is: 90
Student 2's Exam 2 score is: 100
Student 2's Exam 3 score is: 65

Student 3's Exam 1 score is: 40
Student 3's Exam 2 score is: 10
Student 3's Exam 3 score is: 60

The Average Score for Student 1 is 80
The Average Score for Student 2 is 85
The Average Score for Student 3 is 36.6667
```

```
Would you like to change the grade for a student Y/N ?
Y
Enter a student's number (1-3):
2
Enter An exam number (1-3):
2
Enter a new value for Student 2's Exam 2 :
80
Student 2's Exam 2 score is: 80
Would you like to change the grade for a student Y/N ?
N
The Average Score for Student 1 is 80
The Average Score for Student 2 is 78.3333
The Average Score for Student 3 is 36.6667
Press any key to continue . . .
```

```
====Grade Book Application====
Enter Student 1's Exam 1 score.
78
Enter Student 1's Exam 2 score.
74
Enter Student 1's Exam 3 score.
88
Enter Student 2's Exam 1 score.
90
Enter Student 2's Exam 2 score.
100
Enter Student 2's Exam 3 score.
65
Enter Student 3's Exam 1 score.
40
Enter Student 3's Exam 2 score.
10
Enter Student 3's Exam 3 score.
60
Student 0's Exam 1 score is: 78
Student 0's Exam 2 score is: 74
Student 0's Exam 3 score is: 88

Student 1's Exam 1 score is: 90
Student 1's Exam 2 score is: 100
Student 1's Exam 3 score is: 65

Student 2's Exam 1 score is: 40
Student 2's Exam 2 score is: 10
Student 2's Exam 3 score is: 60

The Average Score for Student 1 is 80
The Average Score for Student 2 is 85
The Average Score for Student 3 is 36.6667
Would you like to update an exam score Y/N ?
Y
Enter a student's number (1-3):
2
Enter An exam number (1-3):
2
Enter a new value for Student 2's Exam 2 :
80
Student 2's Exam 2 score is: 80
Would you like to change the grade for a student Y/N ?
N
The Average Score for Student 1 is 80
The Average Score for Student 2 is 78.3333
The Average Score for Student 3 is 36.6667
Press any key to continue . . .
```