Hyperion Development

Task: Data Structures II

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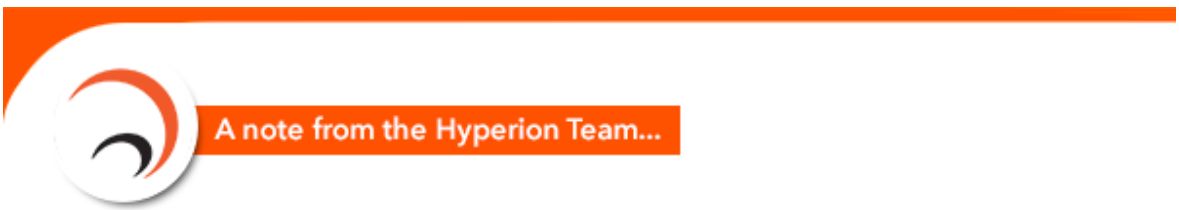
Introduction

Overview:

In this task, you will learn about two-dimensional arrays which can form the base for manipulating particles in linear algebra subjects.

A two-dimensional array can also be seen as a table, being capable of placing data into tabular form within a program. Please read the instructions below for more information.

-The Hyperion Team



Instructions

- Open the Data_II.sln file in the folder Data_II and read its contents. Make sure you read all of the comments and try your best to understand them.

- You may run the project to see the output. The instructions on how to do this are inside the file. Feel free to write and run your own example code before doing the tasks to become more comfortable with C#.

- Instructions on how to complete your compulsory tasks are below.

Compulsory Task 1

Follow these steps:

NOTE: Make a copy of this folder on your computer. Submit the required files when you are done.

The compulsory task is to write a program to transpose an M X N matrix.

Transposition is a matrix operation. It is a fairly simple operation to understand. All that happens is the rows of the matrix are transformed (swapped) into columns.

Given the following matrix A.

```
             ------------
        [0] |1  2  7  6|
  row   [1] |3  4  1  4|
  index [2] |6  8  9  0|
        [3] |4  5  2  1|
             ------------
```

The transposition of A would result in the following matrix.

column index

```
[0][1][2][3]
------------
|1  3  6  4|
|2  4  8  5|
|7  1  9  2|
|6  4  0  1|
------------
```

As you can see, the items of the rows in the first first matrix have become the items of the columns of the second matrix and the items of the columns in the first matrix have become items of the rows of the second matrix.

The above matrix is known as a square matrix because it has an equal number of rows and columns. The same result can be achieved for matrices of any size (HINT: think about the constant initialisation before your function!).

- Create a new Project called ***transpose*** in your **Task** folder.
- Transpose that matrix and store it in another two-dimensional array.
- Print the original matrix and the transposed matrix - print the matrices out so that the rows and columns can easily be seen and the original and transposed matrices can be easily identified.
- You may use whatever size matrix that you wish, as long as it is greater than a 4 X 4 matrix.

Compulsory Task 2

Follow these steps:

Create a new Project called ***Rainfall*** in your **Task** folder.

- Write a program that stores rainfall for each month of the years 2000 to 2005 in a two-dimensional array.
- The program must use this data to calculate and display the following:
    - The average annual rainfall over the period 2000 to 2005.
    - The average monthly rainfall over this period.
    - The month from January 2000 to December 2005 with the highest rainfall.

Use your own values.
The values should be of type double.

Still need help?

Just write your queries in your comments.txt file and your tutor will respond. Alternatively you can email us on help@hyperiondev.com.

Task Statistics

Last update to task: 16/02/2016.
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Task Feedback link: Hyperion Development Feedback.