

Classwork No.2

Read the following 2 pages and answer the question in the 3ed page.

A multi-dimensional array is an array of arrays.

To declare a multi-dimensional array, define the variable type, specify the name of the array followed by square brackets which specify how many elements the main array has, followed by another set of square brackets which indicates how many elements the sub-arrays have:

```
string letters[2][4];
```

As with ordinary arrays, you can insert values with an array literal - a comma-separated list inside curly braces. In a multi-dimensional array, each element in an array literal is another array literal.

```
string letters[2][4] = {  
    { "A", "B", "C", "D" },  
    { "E", "F", "G", "H" }  
};
```

Each set of square brackets in an array declaration adds another **dimension** to an array. An array like the one above is said to have two dimensions.

Access the Elements of a Multi-Dimensional Array

To access an element of a multi-dimensional array, specify an index number in each of the array's dimensions.

This statement accesses the value of the element in the **first row (0)** and **third column (2)** of the **letters** array.

Example ([Copy and paste it here](#))

```
#include <iostream>  
  
using namespace std;  
  
int main()  
{  
    string letters[2][4] = {  
        { "A", "B", "C", "D" },  
        { "E", "F", "G", "H" }  
    };  
};
```

```
cout << letters[0][2];  
}
```

Loop Through a Multi-Dimensional Array

To loop through a multi-dimensional array, you need one loop for each of the array's dimensions.

The following example outputs all elements in the **letters** array:

Copy the program below and paste it [here](#):

```
#include <iostream>  
  
using namespace std;  
  
int main()  
{  
  
string letters[2][4] = {  
    { "A", "B", "C", "D" },  
    { "E", "F", "G", "H" }  
};  
  
for (int i = 0; i < 2; i=i+1) {  
    for (int j = 0; j < 4; j=j+1) {  
        cout << letters[i][j] << "\n";  
    }  
}  
}
```

The following program is the ship hit/miss game using a multiple dimensional arrays.

Copy the program below (next page) and paste it [here](#) to run it:

Write a line by line explanation for each statement.

Explain how the program works.

```
#include <iostream>
using namespace std;
int row, column, hits=0 , numberOfTurns = 0;
int main()
{

bool ships[4][4] = {
    { 0, 1, 1, 0 },
    { 0, 0, 0, 0 },
    { 0, 0, 1, 0 },
    { 0, 0, 1, 0 }
};

while (hits < 4) {

    cout << "Selecting coordinates\n";
    cout << "Choose a row number between 0 and 3: ";
    cin >> row;
    cout << "Choose a column number between 0 and 3: ";
    cin >> column;
    if (ships[row][column]) {
        ships[row][column] = 0;

        hits = hits +1;
        cout << "Hit! " << (4-hits) << " left.\n\n";
    } else {
        cout << "Miss\n\n";
    }
    numberOfTurns= numberOfTurns + 1;
}
cout << "Victory!\n";
cout << "You won in " << numberOfTurns << " turns";

    return 0;
}
```

GOOD LUCK!