

First Arrays Manipulations

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September 19, 2023 (05:10:38 PM)

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This lab serves multiple goals:

- To introduce you to arrays of different datatypes,
- To introduce you to the different ways of declaring, assigning and initializing arrays,
- To iterate over arrays,
- To use the `Length` property of array,

1 Declaration, Assignment & Initialization of an Array

1.1 Warm-up

Write a program that implements the following steps:

1. declares an array `myArray` of `int` of size 5,
2. initializes `myArray` with the values 1, 2, 3, 4 and 5,
3. displays the content of `myArray` on the screen.

Questions

- What values are stored in this array after declaring it *but before initializing it*?
- There are a few different ways you can declare and initialize an array of size 5 holding values 1, 2, 3, 4 and 5. Can you think of two different ways of doing this?

Answer:

- All the values in the array are set to 0,
- Two possible ways are `int[] myArray = new int[] {1, 2, 3, 4, 5};` and `int[] myArray = {1, 2, 3, 4, 5};`.

1.2 Going wrong

Now, let us write *incorrect* statements. For each of the programs below, compile them and make sure you understand the error messages that are displayed.

1.2.1 Trying to set all the values at once after declaring

```
int[] myArrayA = new int[5];  
myArrayA = {1, 2, 3, 4, 5};
```

1.2.2 Out of bound error (read)

```
int[] myArrayB = new int[5];  
Console.WriteLine(myArrayB[5]);
```

1.2.3 Out of bound error (write)

```
int[] myArrayC = new int[5];  
myArrayC[5] = 12;
```

1.2.4 Reading the array as a whole (technically not an error)

```
int[] myArrayD = new int[5];  
Console.WriteLine(myArrayD);
```

This last statement is not “incorrect” in the sense that it will not prevent your program from executing, but it is not doing what you could or would have expected.

2 Second Array Manipulation

Write a program that

1. declares an array `myArray` of `int` of size 10,
2. initializes `myArray` with the values 1, 2, 3, ..., 9 and 10,
3. displays the content of `myArray`.
4. sums the values stored in `myArray` and displays the result.
5. computes the product of the values stored in `myArray` and displays the result.

If you are unsure how to get started, you can use the following code.

Getting started:

```
int[] myArray = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};  
int i = 0;  
int sum = 0;  
int product = 1;  
while(i < myArray.Length){  
    // Fill this!  
    i++;  
}  
Console.WriteLine("The sum of the values in the array is " + sum + ".");
```

```
Console.WriteLine("The product of the values in the array is " + product + ".");
```

3 Exploring Arrays

For this part, create a new array:

1. declare a `char` array of length 6, name it `letters`
2. initialize the first 4 indices of `letters` with the following values: `'a'`, `'b'`, `'c'`, `'d'`
3. initialize *index 5* of `letters` with the value `'f'`

Now, write the following statements:

1. Write a statement to display the last `char` value in `letters` (should display `f`).
2. Write a statement to display the value stored at index 4. What is that value? Why?
3. Write a statement to display the characters in the *first half* of the array (`'a'`, `'b'`, `'c'` but no others).

Execute your program to ensure you are seeing the expected output before proceeding.

Next, update the part of the program where `letters` is declared and change the length of `letters` to 8. Do not modify any other parts of the program. Then execute the program again.

Answer the following questions:

1. What is the last `char` of the `letters` array now, after changing its length?
2. Does your program still output *the last char* value in `letters` array?
3. When displaying the first half of the array, does your program still display *the first half*? (After changing the length, the first half contains the values `'a'`, `'b'`, `'c'`, `'d'`)
4. If you did not get the last value or the first half you expected, can you think of a way to perform these array operations in a way that can accommodate arrays of different lengths?