

# 1D and 2D arrays arrays



# Цель обучения (Learning objectives):

write program code using 1D and 2D arrays for different data types



## Критерии успеха (Successful criteria):

- Knows and understands the purpose of the data type array
- Knows the concepts of array name, array dimension, element index, array elements, array element types
- Can declare the data type of an array in a variable section
- Can perform input / output of array elements
- Can use array data types when solving problems



# Questions for discussion

- What are arrays?
- How to determine the name of the array, the dimension of the array, the index of the element, the elements of the array, the types of elements of the array.
- How to declare an array data type in a variable section



An **array** is similar to a table of objects or primitive types, keyed by index.

0	1	2	3	4
Diana	Abai	Malika	Zhanna	Maya

1D Array: Students

0	1	2	3	4
31	30	34	33	37

1D Array: Marks



An **array** is a named set of the same type of data that is stored in memory consecutively one after the other.

Access to the elements of the array is carried out by the **index** (number) of the element.

An array can contain elements of any data type (integer, real, character, string).

The number of elements in an array is called the **size** of the array.



# Declaration of an array in the variable section

<type of array> [] <name of array>;

Examples:

```
int[] a1;
```

```
char[] ch1;
```

```
double[] db1;
```

Indexing arrays starts from zero, so the index of the first element of the array is 0.

The array element is accessed via square brackets [].

For example:  $A[0] = 5$



# Initializing array elements

## 1 variant

```
int [] k; //k — array
```

```
k= new int [3]; //Define an array of 3 integers
```

```
k[0]=-5; k[1]=4; k[2]=55; // Set array elements
```

## 2 variant

```
int[] a = {0, 2, 4, 6, 8};
```

## 3 variant

```
int[] a = new int [] {0, 2, 4, 6, 8};
```

## 4 variant

```
int[] a=new int[5];
```

```
a[0] = 0; a[1] = 2; a[2] = 4; a[3] = 6; a[4] = 8;
```





**Task:** One-dimensional array is given. You need to calculate the sum of the elements of this array

```
public partial class Form1 : Form
```

```
    { int [] mas = new int [] { 1, 3, 5, 7, 9, 4, 8, 2, 6, 10 }; //Creating an array with values  
    private void button1_Click(object sender, EventArgs e)
```

```
    {  
        listBox1.Items.Clear(); // clear  
        for (int i = 0; i < 10; i++)  
        {  
            listBox1.Items.Add(mas[i]);  
        }  
    }
```

```
    private void button2_Click_1(object sender, EventArgs e)  
    {  
        listBox1.Items.Clear();  
        int s=0;  
        for (int i = 0; i < 10; i++)  
        {  
            s=s+mas[i];  
        }  
        listBox1.Items.Add(s);  
    }
```



**Tasks** One-dimensional array is given. You need to calculate the sum of the elements of this array. The value of the elements is set randomly.

```
private void button1_Click(object sender, EventArgs e)
{
    Random rd = new Random();
    int[] mass = new int[5];
    int i, s = 0;
    for (i = 0; i < mass.Length; i++)
    {
        mass[i] = rd.Next(5);
        s = s + mass[i];
        listBox1.Items.Add(mass[i]);
    }
    label1.Text = Convert.ToString(s);
}
```



# Exercise #1

0	1	2	3	4
Diana	Abai	Malika	Zhanna	Maya

1D Array: Students

0	1	2	3	4
31	30	34	33	37

1D Array: Marks

Call me value of:

Marks[3]

Students[0]

Students[1]+'

+'Marks[1]



## Exercise #2

Explain every part of next line:

```
{ int [] mas = new int [] { 1, 3, 5, 7, 9, 4, 8, 2, 6, 10 };
```



1      2      3



# Exercise #2

**1– data type of array elements**

**2– name of array**

**3 – array element values**



# Exercise #3

Describe list (Pen, Pencil, Copybook, Eraser) in C# using type array.



# Exercise #4

Fill ten array elements random numbers [-20; 20]



# Exercise #5

Output ten array elements in line in a space.

Write fragment of code.





# QQQ

What is the output of the following code:

```
array primes = (2,3,5,7,11,13,17,19,23)
```

```
count = 8
```

```
While count >= 0
```

```
write(primes[count] , “ , “ )
```

```
count = count - 1
```

```
end while
```



# One dimensional array on Wikibooks

[https://en.wikibooks.org/wiki/A-level\\_Computing/AQA/Paper\\_1/Fundamentals\\_of\\_data\\_structures/Arrays](https://en.wikibooks.org/wiki/A-level_Computing/AQA/Paper_1/Fundamentals_of_data_structures/Arrays)



# Two dimensional array (Matrix)

Most major programming languages allow you to use **two-dimensional arrays**. They work in much the same way as a one-dimensional array but allow you to specify a **column index** and a **row index**.

	0	1	2	3	4
0					
1					
2				2,3	
3					
4					

A **two-dimensional array** is used to create a table of data in rows and columns with the same data type.



# Declaration

```
int [,] mas = new int[5,5];
```

```
int[,] mas = new int[3, 3] { { 4, 7, 3 }, { 3, 6, 9 },  
{ 0, 1, 4 } };
```

```
int[,] mas = { { 4, 7, 3 }, { 3, 6, 9 }, { 0, 1, 4 } };
```



# Assign Values to Two Dimension

$a[0,0] = 76;$

$a[0,1] = ?$

$a[1,0] = ?$

$a[1,1] = ?$

$a[2,0] = ?$

$a[2,2] = ?$

76	55
44	88
95	37



# Two dimensional arrays on wikibooks

- [https://en.wikibooks.org/wiki/A-level\\_Computing/AQA/Problem\\_Solving,\\_Programming,\\_Data\\_Representation\\_and\\_Practical\\_Exercise/Fundamentals\\_of\\_Programming/Two-Dimensional\\_Arrays](https://en.wikibooks.org/wiki/A-level_Computing/AQA/Problem_Solving,_Programming,_Data_Representation_and_Practical_Exercise/Fundamentals_of_Programming/Two-Dimensional_Arrays)



# Reflection

- What knows?
- What remained unclear
- What is necessary to work on

