# Arrays
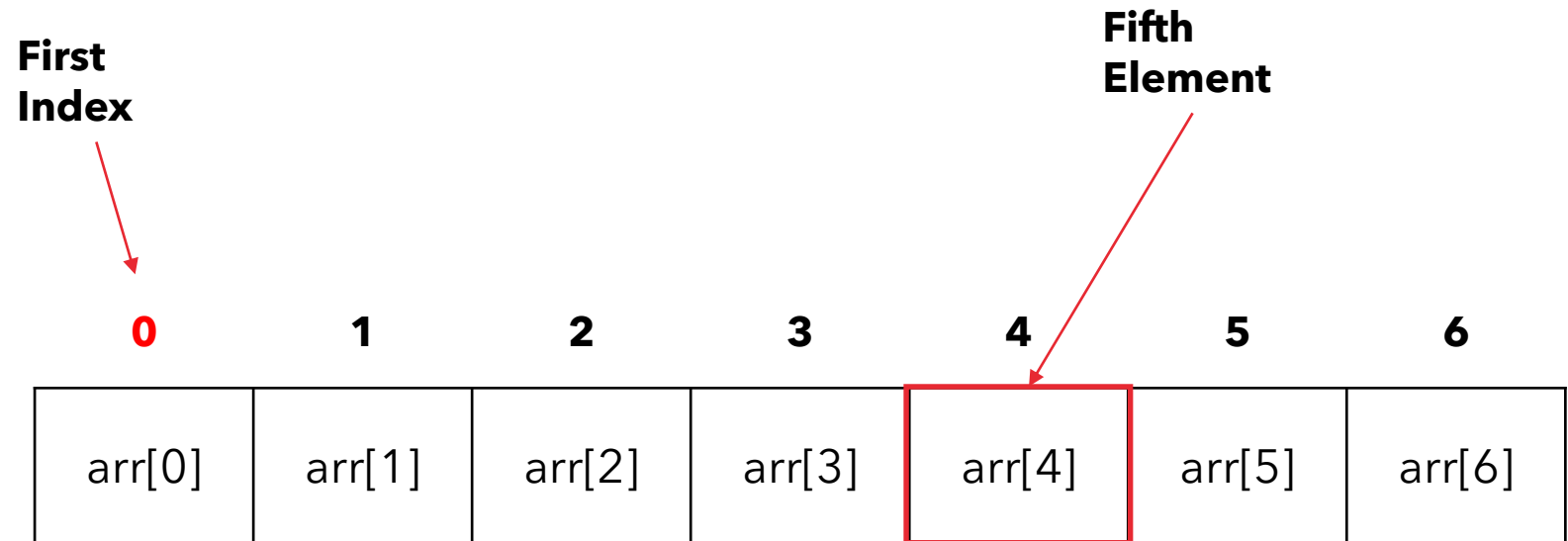
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# Arrays

An array is a *collection of elements* of the same data type

**First Index**

**Fifth Element**

| | | | | | | |
|---|---|---|---|---|---|---|
| **0** | **1** | **2** | **3** | **4** | **5** | **6** |
| arr[0] | arr[1] | arr[2] | arr[3] | arr[4] | arr[5] | arr[6] |

**Example of an array 'arr', with a length of 7**

# Declaration and Initialization

```cpp
//Arrays
#include <iostream>

using std::cin;
using std::cout;
using std::endl;

int main(){

    //Declaration
    float randValues[6]; // an array that holds 6 values of type float

    //Declaration and Initialization
    // compiler can determine that array is of size 5
    int evenVal[] = {2,4,8,10,12};
    char vowels[] = {'a','e','i','o','u'};

    return 0;
}
```

# Operations on Arrays

```cpp
int evenVal[] = {2,4,8,10,12};
char vowels[] = {'a','e','i','o','u'};

cout<<"The fourth element in  evenVal array is: "<<evenVal[3]<<endl;

// updating a value in an array
evenVal[4] = evenVal[4]*2;
cout<<"The fifth value in evenVal array is now: "<<evenVal[4]<<endl;
evenVal[4] *=2;
cout<<"The fifth value in evenVal array is now: "<<evenVal[4]<<endl;

//Printing every value in vowels array
cout<<vowels[0]<<" ";
cout<<vowels[1]<<" ";
cout<<vowels[2]<<" ";
cout<<vowels[3]<<" ";
cout<<vowels[4]<<" ";
```

# 2D Arrays

A two-dimensional array is an array of one-dimensional arrays

| | Column **0** | Column **1** | Column **2** | Column **3** |
|---|---|---|---|---|
| Row **0** | arr[0][0] | arr[0][1] | arr[0][2] | arr[0][3] |
| Row **1** | arr[1][0] | arr[1][1] | arr[1][2] | arr[1][3] |
| Row **2** | arr[2][0] | arr[2][1] | arr[2][2] | arr[2][3] |

**Example of a (3x4) two-dimensional array 'arr'**

# Declaration and Initialization of a **2D** array

```cpp
//2D Arrays
#include <iostream>

using std::cin;
using std::cout;
using std::endl;

int main(){

    //Declaration
    float monthTempValues[4][7]; // an array of 4 one-dimension arrays of type float

    //Declaration and Initialization
    // all array sizes must be specified with the exception of the first one
    int timesTables[][] = {{1,2,3,4,5,6,7,8,9,10,11,12},
                           {2,4,6,8,10,12,14,16,18,20,22,24},
                           {3,6,9,12,15,18,21,24,27,30,33,36}};

    return 0;
}
```

# Food for thought

- Use a for or while loop to initialize an array and then print the values in the array using another loop

# That's All