

Arrays

Yung-Hsiang Lu

Array = List of Data

```
int data[] = {3, 7, 8, 2, 0, 9, 11};
```

index	0	1	2	3	4	5	6
element	3	7	8	2	0	9	11

```
data[2] = -41; /* modify an element */
```

index	0	1	2	3	4	5	6
element	3	7	-41	2	0	9	11

The screenshot shows the Eclipse IDE interface with a C/C++ project. The main editor window displays the source code for `array.c`. The code defines two arrays: an integer array `iarray` and a character array `carray`. It uses `sizeof` to determine the number of elements in each array and prints them out. The console window on the right shows the output of the program, confirming that the integer array has 9 elements and the character array has 5 elements.

```
#include <stdio.h>
int main(int argc, char * argv[])
{
    int iarray[] = {3, 9, -7, 11, 8, 6, 5, 2, 1};
    iarray[3] = 1059; /* change an element */
    int isize = sizeof(iarray) / sizeof(int);
    printf("int array has %d elements\n", isize);
    int index;
    for (index = 0; index < isize; index++)
    {
        printf("iarray[%d] = %d\n", index, iarray[index]);
    }
    char carray[] = {'b', 'e', 'x', 'H', 'U'};
    carray[1] = 'Y';
    int csize = sizeof(carray) / sizeof(char);
    printf("char array has %d elements\n", csize);
    for (index = 0; index < csize; index++)
    {
        printf("carray[%d] = %c\n", index, carray[index]);
    }
    return 0;
}
```

Console Output:

```
<terminated> Array [C/C++ Loca
int array has 9 elements
iarray[0] = 3
iarray[1] = 9
iarray[2] = -7
iarray[3] = 1059
iarray[4] = 8
iarray[5] = 6
iarray[6] = 5
iarray[7] = 2
iarray[8] = 1
char array has 5 elements
carray[0] = b
carray[1] = Y
carray[2] = x
carray[3] = H
carray[4] = U
```

```
C/C++ - array.c - Eclipse SDK
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array.c
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int main(int argc, char * argv[])
{
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    carray[1] = 'Y';
    int csize = sizeof(carray) / sizeof(char);
    printf("char array has %d elements\n", csize);
    for (index = 0; index < csize; index++)
    {
        printf("carray[%d] = %c\n", index, carray[index]);
    }
    return 0;
}
```

← create an array of integers

← create an array of characters

```
C/C++ - array.c - Eclipse SDK
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    printf("char array has %d elements\n", csize);
    for (index = 0; index < csize; index++)
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```

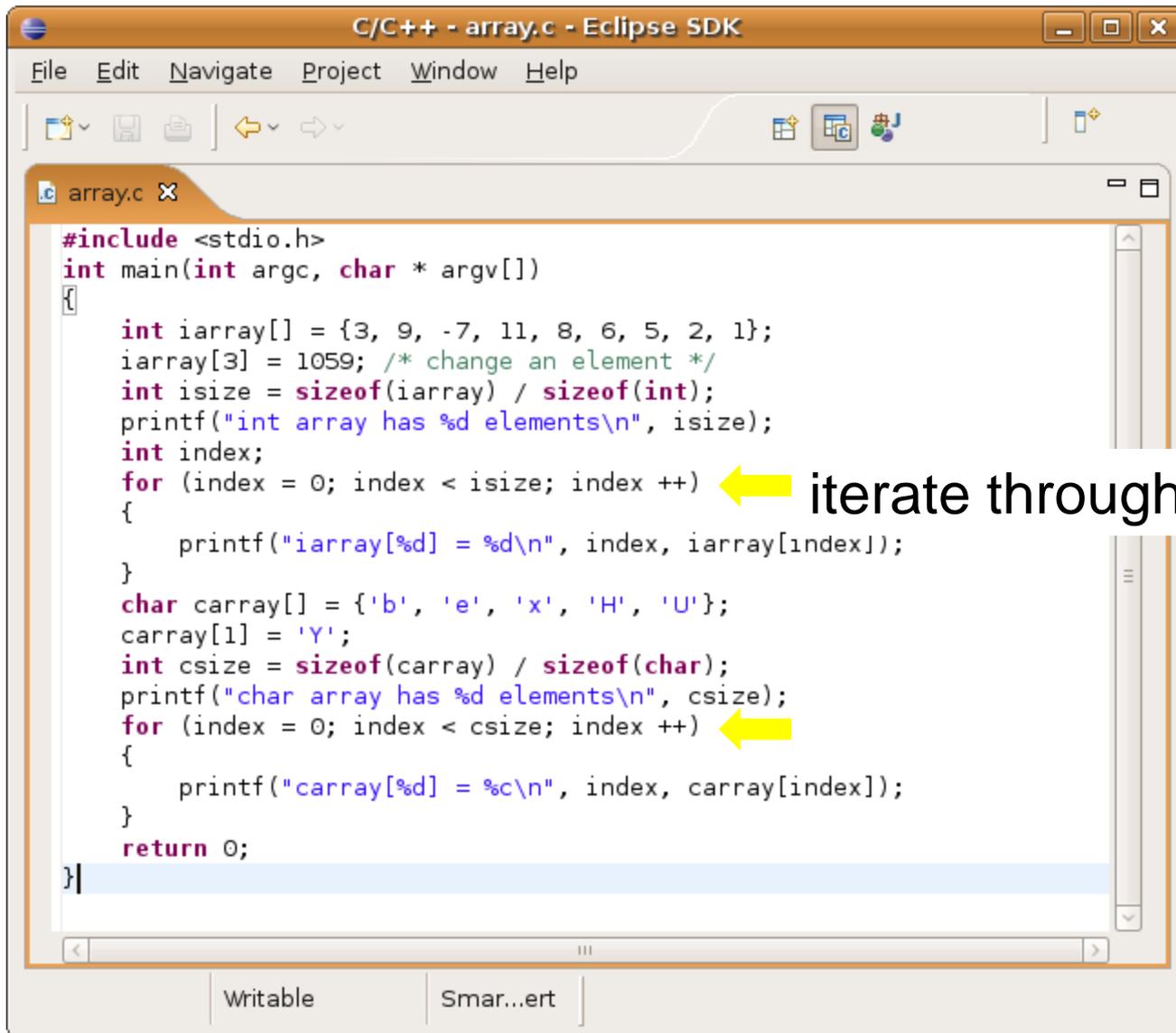
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```

find the size (number of elements) of the array

```
C/C++ - array.c - Eclipse SDK
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array.c
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    int csize = sizeof(carray) / sizeof(char);
    printf("char array has %d elements\n", csize);
    for (index = 0; index < csize; index++)
    {
        printf("carray[%d] = %c\n", index, carray[index]);
    }
    return 0;
}
```

print the size

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```
C/C++ - array.c - Eclipse SDK
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    iarray[3] = 1059; /* change an element */
    int isize = sizeof(iarray) / sizeof(int);
    printf("int array has %d elements\n", isize);
    int index;
    for (index = 0; index < isize; index++) ← iterate through all elements
    {
        printf("iarray[%d] = %d\n", index, iarray[index]);
    }
    char carray[] = {'b', 'e', 'x', 'H', 'U'};
    carray[1] = 'Y';
    int csize = sizeof(carray) / sizeof(char);
    printf("char array has %d elements\n", csize);
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C/C++ - array.c - Eclipse SDK
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    for (index = 0; index < csize; index++)
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    }
    return 0;
}
```

← print an element

←

C/C++ - array.c - Eclipse SDK

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results

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Console

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```

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Common Mistakes

An array's indexes start **from 0, not 1**. You **cannot** change that.

- An array of n elements has indexes 0, 1, 2, ..., n - 1.

- for (index = 0; index < n; index ++)

0, not 1 ↑ **<, not <=** ↑

- Indexes outside this range usually (you might be lucky occasionally) cause a program to **crash** (“segmentation fault”).
- `int iarray[] = {3, 9, -7, 11, 8, 6, 5, 2, 1};`
 - gcc automatically computes the size and allocates memory.
 - The size of the array cannot be changed. We will handle this problem later when we discuss dynamic memory allocation.