

COMP26020 -- Programming Languages and Paradigms

Arrays, Strings, Command Line Arguments

Arrays

```
int array[4];    // declaration

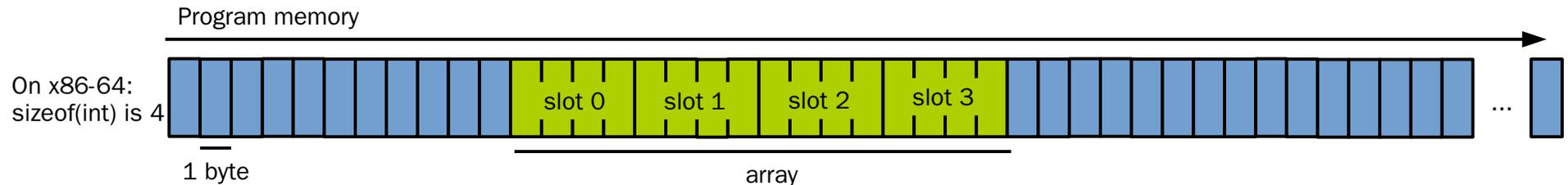
array[0] = 10;  // write a slot
array[1] = 20;
array[2] = 30;
array[3] = 40;

int x = array[3]; // read a slot
```

```
printf("array[%d] contains %d\n", 0, array[0]);
printf("array[%d] contains %d\n", 1, array[1]);
printf("array[%d] contains %d\n", 2, array[2]);
printf("array[%d] contains %d\n", 3, array[3]);
```

```
// 05-c-arrays-strings-cmdline/array.c
```

Arrays are stored contiguously in memory:



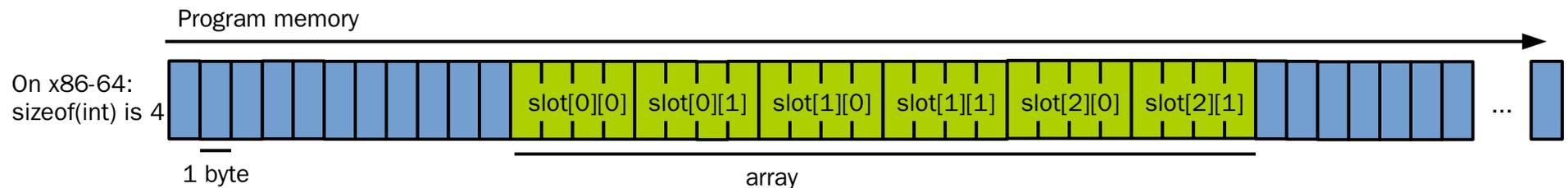
Multi-Dimensional Arrays

```
int my_2d_array[3][2];
```

```
my_2d_array[0][0] = 0;  
my_2d_array[0][1] = 1;  
my_2d_array[1][0] = 2;  
my_2d_array[1][1] = 3;  
my_2d_array[2][0] = 4;  
my_2d_array[2][1] = 5;
```

```
printf("my_2d_array[%d][%d] = %d\n", 0, 0, my_2d_array[0][0]);  
printf("my_2d_array[%d][%d] = %d\n", 0, 1, my_2d_array[0][1]);  
printf("my_2d_array[%d][%d] = %d\n", 1, 0, my_2d_array[1][0]);  
printf("my_2d_array[%d][%d] = %d\n", 1, 1, my_2d_array[1][1]);  
printf("my_2d_array[%d][%d] = %d\n", 2, 0, my_2d_array[2][0]);  
printf("my_2d_array[%d][%d] = %d\n", 2, 1, my_2d_array[2][1]);
```

[05-c-arrays-strings-cmdline/array-2d.c](#)



Arrays

- Static initialisation allows to omit the size (of the first dimension)

```
int array[] = {1, 2, 3, 4, 5};  
int array_2d[][2] = { {1, 2}, {3, 4}, {5, 6} };  
  
printf("array[4] = %d\n", array[4]);  
printf("array_2d[2][0] = %d\n", array_2d[2][0]);
```

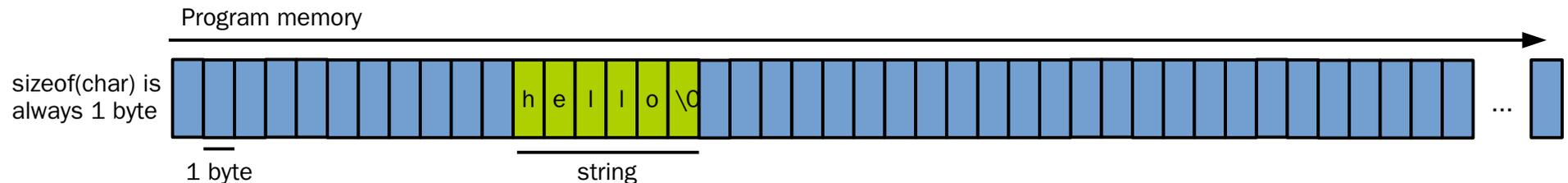
[05-c-arrays-strings-cmdline/array-init-static.c](#) 

Character arrays, i.e. Strings

- String in C: **array of characters** that ends with the special `\0` end of string character marker

```
char string1[6] = "hello";  
char string2[] = "hello";  
char string3[6];  
  
string3[0] = 'h';  
string3[1] = 'e';  
string3[2] = 'l';  
string3[3] = 'l';  
string3[4] = 'o';  
string3[5] = '\0'; // Important here
```

```
printf("%s\n", string1);  
printf("%s\n", string2);  
printf("%s\n", string3);  
// 05-c-arrays-string-cmdline/array-init-static.c
```



Command Line Arguments

gcc test.c -o program
program arguments

Command Line Arguments

- `main` parameters:
 - `argc`
 - `argv`: array containing the command line arguments

```
int main(int argc, char **argv) { // 'char ** argv' means 'char argv[][]'  
  
    printf("Number of command line arguments: %d\n", argc);  
  
    // This is a bit dangerous...  
    printf("argument 0: %s\n", argv[0]);  
    printf("argument 1: %s\n", argv[1]);  
    printf("argument 2: %s\n", argv[2]);  
  
    return 0;  
}
```

[05-c-arrays-string-cmdline/cmdline-args.c](#) 

Command Line Arguments

- Arguments are strings, to convert to integer use `atoi`:

```
#include <stdio.h>
#include <stdlib.h> // needed for atoi

/* Sum the two integers passed as command line integers */
int main(int argc, char **argv) {
    int a, b;

    // Once again, dangerous!
    // We'll fix that in the next lecture regarding control flow
    a = atoi(argv[1]);
    b = atoi(argv[2]);

    printf("%d + %d = %d\n", a, b, a+b);

    return 0;
}
```

[05-c-arrays-string-cmdline/atoi.c](#)

- To convert a string to a `double` use `atof`

Summary

- Arrays
 - Strings
 - Command line arguments
-

Feedback form: <https://bit.ly/3xrfCAt>

