

# Lightning Talk: Using `std::span`

Edwin Kofler

El Camino College Computer Science Club

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# Problem Statement

How to pass a “raw” array to a function in C++?

```
1  #include <iostream>
2
3  void print_array(/* ? */) {
4      // ?
5  }
6
7  int main() {
8      int my_arr[] = {94, 20, 0, 17};
9
10     print_array(/* ? */);
11 }
```

# Problem Statement

By passing in a pointer and length...

```
1  #include <iostream>
2
3  void print_array(int *arr, int arr_len) {
4      for (int i = 0; i < arr_len; ++i) {
5          int item = arr[i];
6          std::cout << item << '\n';
7      }
8  }
9
10 int main() {
11     int my_arr[] = {94, 20, 0, 17, 8};
12     int my_arr_len = sizeof(my_arr) / sizeof(my_arr[0]);
13
14     print_array(my_arr, my_arr_len);
15 }
```

## Is there a better way?

It's annoying to pass in a pointer *and* its length...

- ▶ Need to pass in pointer *and* length: `(int *arr, int arr_len)`
- ▶ Need to do the `sizeof` thing:  
`(sizeof(my_arr)/sizeof(my_arr[0]))`

Is there a better way?

# Is there a better way?

It's annoying to pass in a pointer *and* its length...

- ▶ Need to pass in pointer *and* length: `(int *arr, int arr_len)`
- ▶ Need to do the `sizeof` thing:  
`(sizeof(my_arr)/sizeof(my_arr[0]))`

Is there a better way?

- ▶ `std::vector` (not array)
- ▶ `std::array`
- ▶ `std::span`  $\Leftarrow$

## Using `std::span`

```
1  #include <iostream>
2  #include <span> // 1. include span
3
4  // 2. use std::span
5  void print_array(std::span<int> arr) {
6
7      // 'arr' is a class - to get the size, call `.size()`
8      for (int i = 0; i < arr.size(); ++i) {
9          // You can index your array as you usually do
10         int item = arr[i];
11         std::cout << item << '\n';
12     }
13 }
14
15 int main() {
16     int my_arr[] = {94, 20, 0, 17, 8};
17
18     print_array(my_arr);
```

## Considerations: `std::span` requires C++20

C++ *standards* are released every 3 years.

C++20 is the version of C++ released in 2020.

You must configure your IDE or compiler to use to use C++20:

- ▶ Visual Studio: **Configure to use C++20**
- ▶ Visual Studio Code: **Configure to use C++20**
- ▶ Xcode: C++20 is already used by default since Xcode 14
- ▶ GCC: `g++ -std=c++20 ./main.cpp && ./a.out`

If you do not properly configure your IDE, you will get errors:

```
./main.cpp:4:23: error: 'span' is not a member of 'std'
  4 | void print_array(std::span<int> arr) {
    |                      ^~~~~
```