

# Class 18

Arrays

# Review

- An array is like a row of boxes, all of which contain data of a uniform type
- Arrays must be declared before use
- An array has a fixed capacity

# Review

- Individual elements in an array are referenced by an index number and the array name
- Index numbers begin at 0 and end at (capacity – 1)
- An individual element of an array can be treated just as if it is a single variable of the base type of the array

# Notation

- Declaration
  - `data_type array_name[capacity]`
- Initialization
  - `data_type array_name[capacity] = {element_1, element_2, ..., element_n}`
- Reference an individual array element
  - `array_name[index]`

# Array elements as function arguments

- An element of an array can be passed as an argument to a function exactly as if it is an individual variable of the array base type

# Example 1

```
int f(int x, int &y) {  
    x = x + 1;  
    y = x - 1;  
    return x + y;  
}  
int main() {  
    int x[4] = {4, 3, 2, 1};  
    int y[6] = {2, 3, 5, 7, 11, 13};  
    cout<< y[3] % 7 << endl;    // line (a)  
    cout<< y[x[1]] << endl;     // line (b)  
    cout<< f(x[0], y[0]) << endl; // line (c)  
    cout<< y[0] << endl;       // line (d)  
}
```

# Example 2

- Goal: Find the largest element in a given array of integers
- Plan:
  - Declare and initialize array to random integers between 1 and 100 (inclusive)
  - Declare max variable and initialize it to first element in array.
  - Iterate through array, comparing max to each successive element and updating max as needed

# Example 3

- Goal:
  - Read five quiz scores
  - Compute the average
  - Print all scores that are above average
- Plan:
  - Declare array of size 5
  - Read in values from user
  - Declare sum variable and add up all elements in array
  - Compute average
  - Iterate through array and print only scores greater than the average



# Example 4

- Goal: Given:
  - array of names and array of scores
  - name at index  $i$  corresponds to score at index  $i$
  - print name and score on single line for each index value
- Plan:
  - Declare and initialize array of names
  - Declare and initialize array of scores
  - Print name and score for index  $i$  in the two arrays

# Exam Topics

- Everything through class 19, including:
  - Functions
  - Title lines
  - Reference parameters (pass by reference v. pass by value)
  - Recursion (look at examples I gave in class)
  - Arrays
  - Array elements as function arguments

# Exam Outline

- Title line question
  - Code tracing question
  - Write a complete C++ program
  - Write a function
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- Exam will be in RO-230
  - April 19, 2023 at 6:30 pm