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

```c++
int f(int x, int &y) {
    x = x + 1;
    y = x - 1;
    return x + y;
}

int main() {
    int x[4] = {4, 3, 2, 1};
    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

• Exam will be in RO-230
• April 19, 2023 at 6:30 pm