

CS150 - Computer Science II

Lab Assignment #1

Spring 2022

The purpose of this assignment is to give you practice writing some typical array operations in C++. The assignment will also give you more experience using files.

Arrays are used for a variety of applications where a group of values need to be accessed, perhaps several times, within the program. This is rather difficult to do with the program organization we have used so far, where the input of a new data item causes the old value to be replaced with the new value - the old value cannot be reused, since it is erased with the new input. Arrays allow us to save all of the values, each in a separate element of the array.

You are to write a program that will prompt the user for the name of a file containing a set of floating point values. These values are to be input into an array. You can assume that there will be no more than 100 values in the file, although the exact number is not known.

Once input, you should determine the following concerning the elements in this array:

- the largest value in the array
- the smallest value in the array
- the sum of the elements in the array
- the average of the elements in the array
- the standard deviation of the elements in the array

The standard deviation can be computed, once the average is known, by the following formula:

$$SD = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$$

Where x is the array name, n is the number of elements in the array, and \bar{x} is the average of the elements in the array.

For output, you should first output the array, five values per line. Then you should output all of the statistics that you calculated concerning the array. A sample output is shown on the back of this page.

\$./a.out

Please enter a file name: arrfile

The array contains 26 values:

```
xx.x xx.x xx.x xx.x xx.x
xx.x xx.x xx.x xx.x xx.x
xx.x xx.x xx.x xx.x xx.x
xx.x xx.x xx.x xx.x xx.x
xx.x xx.x xx.x xx.x xx.x
xx.x
```

The largest element is: xx.x

The smallest element is: xx.x

The sum of the elements is: xxxx.x

The average of the elements is: xx.x

The standard deviation of the elements is: x.x

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