



1-D Arrays

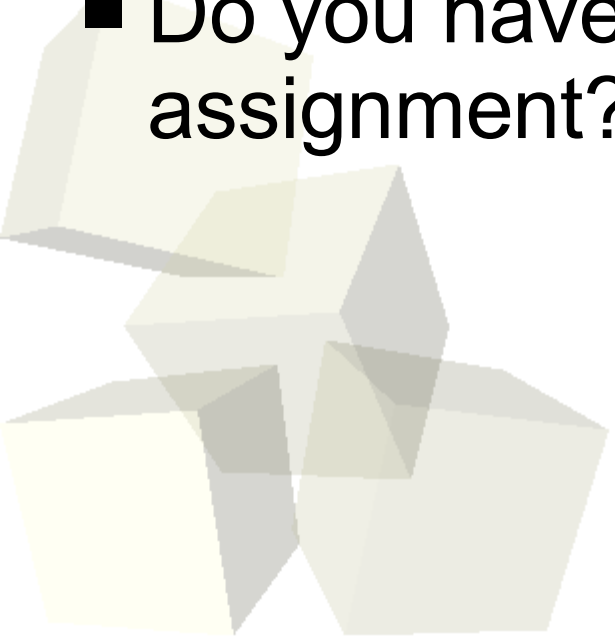
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Opening Discussion

- Let's look at solutions to the interclass problem.
- Minute essay responses
 - ◆ Doing derivatives
 - ◆ Strings
 - ◆ String tokenization
 - ◆ GUIs
 - ◆ Text adventure
 - ◆ Arrays!!
- Do you have any questions about the assignment?





Midterm Results

- You should ACE questions that basically come off of quizzes.





Motivating Arrays

- Imagine if I gave you the following assignment. I want you to read a file and count how often each letter occurs in it. Given what we have covered, what would you do?
- What happens if I said count the occurrences of all ASCII characters?
- The problem is that right now we declare variables that represent one memory location and must give each a name.
- Arrays allow us to declare a variable linked to many memory locations and index into the array with an integer. This allows us to get at the pieces using a loop.



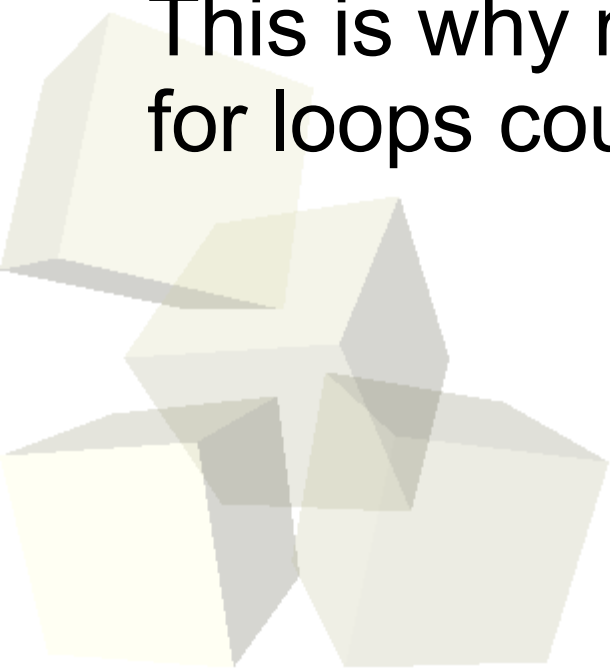
Declaring Arrays

- The syntax for declaring arrays is fairly simple. After the variable name you put square brackets with a size in it.
 - `type name[number];`
- Old style C only allows constants for the number. Normally literals or defines.
- Apparently the newer standard allows variable sized arrays where the size can be any variable already in scope.
- The declaration sets aside the number of elements you ask for with each one the size of the type. So an array of ten doubles gets a block of 80 bytes.



Accessing Arrays

- When we access the array we put square brackets after the name again. The square brackets are an operator. The index we want goes inside the brackets.
- This can be used in any expression that accepts the type of the array.
- The index should be between 0 and number-1. This is why most programmers always start their for loops counting at 0.





Range Checking

- C does not do range checking on arrays. This means if you declare an array with 10 elements and do something with the 15th, C doesn't mind. It's an error, but C doesn't care.
- If you go too far, the operating system will care and throw a segmentation fault.
- Accessing out of bounds indexes is a very common bug. Writing to them can be particularly devastating
- These bugs are **VERY** hard to find so try hard to not go out of bounds on your arrays.



Passing Arrays

- You can pass arrays into functions.
- Typically you simply leave out the size of the array when you do this and have empty square brackets. The variable sized arrays in the new standard have a different syntax for passing arrays.
- Arrays do not know their size so when you pass them to a function you must almost always pass the number of elements as well.
- Arrays are passed by reference. Unlike normal values, changing an array in a function does mess with the original.



const Arguments

- If a function should not mess with an array that is passed to it, you should declare the array to be `const`.
- This is a good software engineering practice to get into as it allows the compiler to double check what you are doing.





- What are some things you might want to use arrays for in your programming?
- Remember that there is no class next week. That means you have lots of time to work on your assignment.
- Interclass Problem – This one is for the Monday after I get back. Write functions that will find the minimum and maximum value in arrays of doubles.

