Reading from Files in C

CMSC 104 Section 102
May 6, 2024

Administrative Notes

Quiz 5 is on Wednesday

- There is a practice quiz on Blackboard; we'll go through it today
  - There will probably? Be one question from today's lecture on the quiz; there's one on the practice quiz

Classwork 9 due today; Homework 9 due Wednesday

- You don't *have* to submit part 2 of Classwork 9 since we covered it in lecture last week, but you can for completeness

Classwork 10 assigned today; due next Monday - May 13

Homework 10 assigned Wednesday; due May 15

Reading Data into your program

To date, all data has been typed into the program by the user

- That gets impractical for large datasets
  - You annoy the users by asking them to type that much data
  - It's very likely there will be data entry errors from typing everything in all the time
- You want to enter the data once, store it in a file on the computer, and then read it into your program when you need it

Advantages/disadvantages

Advantages of entering data into files and reading it:

- You only enter the data once
- You make sure it's right - correct any errors during data entry and you're done
- You don't have to prompt for the data
  - No "printf" statements everywhere
  - Just "scanf" to read

Disadvantages of entering data into files and reading it:

- You have to know ahead of time what the data look like
  - Numbers; chars; etc.
  - Everything on a line; one item to a line; etc.
- It's very difficult to do error-correction on the fly
  - If a negative number is read in as a grade, your program has to deal with it or crash

Reading and writing files

As with everything else, there are many different ways to read data from files and write data to files in C

- We’re just going to do it “the easy way”
- This does not give us the full capabilities associated with data files, but it gets the job done

Let’s look at classwork 10

We give you one data file, with 21 entries. But your code doesn’t know that

There is also a second data file, with 999 entries

Each line of the file contains two integers, separated by a tab. The first integer is the entry number and the second entry is the value.

Starter Code (pt. 1)

```c
#include <stdio.h>
#define MAX_SCORE 20
#define MAX_SIZE 1000
int main() {
   int i = 0; // used as index into array
   int n = 0; // number of items in array
   int r; // used to ensure user enters an integer
   float average; // average of numbers entered by
user
   float num; // total number of items in array
   int A[MAX_SIZE]; // will hold the scores
   n = 0;
   i = 0;
```

Initializing the program

```c
// read in the scores into array A[]
while(1) {
   r = scanf("%d", &A[i] );
   // end of input?
   if ( r <= 0 ) {  //remember how this works: the
return value of scanf is the number of items read
   break ;
   }
   i = i + 1;
   // exceeded array size?
   if (i >= MAX_SIZE) {
       break;
   }
}
```

Reading in the data file

Starter code (part 2)

```
// Make n the number of items stored in A[]

n = i;

// compute the average

int sum = 0;

for (i = 0 ; i < n ; i++) {

   sum = sum + A[i];

}

num = n; // num is float

average = sum / num;

printf("The average score is: %f\n", average);
```

Computing the average

```
// *****
   // ***** TODO
   // *****
   // Declare a new count[] array.
   // Initialize each element of count[] to 0. (Use a for
loop.)
   // Iterate through the elements of the A[] array and
update count[] in
   // each iteration.
   // Iterate through the count[] array and print out the
number of times
   // that each score appeared.
   // Iterate through the elements of the count[] array to
find the maximum
   // count and the score with the maximum count.
   // Print out the score that has the highest count and the
number of
   // times that score appeared.
   return 0;
}
```

What you have to do

Reading in the file

We’re going to do this by just redirecting the input, like this:

```
[arsenaul@linux1 cw10]$ ./a.out < fileToReadFrom.txt
```

Replace this with the name of the executable file from compiling your program

Replace this with the name of the data file - cw10test1.txt or cw10test2.txt

If you want to get started with Homework 10

It’s essentially the same problem. You just add code the calculates the median of the numbers you read in.

- Keep the code you wrote in Classwork 10; add to it.

There are two new data files to use with this homework assignment -

`hw10test1.txt` and `hw10test2.txt`