COP 3223 Program #12: Stock Sorting

Objective
To give students practice designing and using their own struct to solve a problem.

The Problem: Sorting Stocks
In this program you will read in stock data for the S&P 500 Stocks from the input file "stockdata.txt" and you'll ask the user how they would like the data sorted, providing the following options:

1) By value of change from the first day of the interval to the last, with largest positive change coming first.

2) By average value over the interval (from highest to lowest)

3) Volatility from lowest to highest

Then, your program should prompt the user for the name of the file the user would like to store the output.

You must create a stock struct for your solution and write appropriate functions. (Points will be taken off for correct programs that don't use a struct or reasonable functions.)

Defintion of Change
Given a list of prices for a share of a stock: s_1, s_2, s_3, …, s_n for days 1 through n, we define the change of the value of the stock over the interval to simply be $Delta(S) = s_n - s_1$.

Definition of Average Price
Given a list of prices for a share of a stock: s_1, s_2, s_3, …, s_n for days 1 through n, we define the average price of the stock to be $Avg(S) = \frac{\sum_{i=1}^{n} s_i}{n}$. (This is just the sum of each stock price in the interval divided by the number of prices.)

Definition of Volatility
Given a list of prices for a share of a stock: s_1, s_2, s_3, …, s_n for days 1 through n, we define the volatility of the stock to be $\frac{100 \sum_{i=1}^{n-1} |s_{i+1} - s_i|}{Avg(S)}$. (This is just the sum the change in the stock price between each consecutive day times 100 divided by the average of the stock prices.)

Input File Format
The first line of the input file will contain a single integer, n, representing the number of different stocks for which there are data. Each stock record follows, one per line. Each of these lines begins with a string of 5 or fewer characters known as the stock ticker, representing the stock. This is followed by a space and another 20 space separated floating point numbers, representing the price of that stock on 20 consecutive days.

Output File Format

For each of the different queries, follow the same output format. On the first line, output a single integer, *n*, representing the number of stocks in the file. On the following *n* lines, list the stocks in the desired order, listing the stock ticker, followed by a space, followed by the appropriate measure (change, average or volatility) printed to 2 decimal places. If there are ties, you may print tied items in any order. (So, there may be more than 1 possible correct output.)

Sample Program Run

```
The stock data has been loaded.
How would you like to sort the data?
1) change (highest positive change first)
2) average value (highest average first)
3) volatility (lowest volatility first)
3
What file would you like the output to be stored?
volatile.txt
```

Sample Data

This will be provided online soon.

Implementation Requirements (for full credit)

1) Must use a struct.
2) Must write several functions besides main.
3) Code must be follow good style and be well-commented.
4) Output must be correct.

Restrictions

Although you may use other compilers, your program must compile and run using gcc in Code::Blocks. Your program should include a header comment with the following information: your name, course number, section number, assignment title, and date. You should also include comments throughout your code, when appropriate. If you have any questions about this, please see a TA. **Your program must read its input from stockdata.txt.**

Deliverables

A single source file named *stocks.c* turned in through WebCourses.