

CS 109 – C/C ++ Programming for Engineers w. MatLab– Fall 2009

Homework Assignment 3

Maximum Nitrox Concentrations Using File I/O

Due: Wednesday 14 October. The electronic copy is due by 11:59 p.m. Hard copy is due in lab.

Overall Assignment

For this assignment you are to type up, compile, and debug your solution to part III of the first mid-term exam, and then modify it to write results into a file **in addition to** the results reported to the screen. You are also to write a second short program that reads in the data file written by the first program, and calculates the averages of each of the three columns of numbers.

Program Details

- The first thing you are to do is to take the answer that you wrote for part III of the first midterm, and type it in **without any changes** into the C++ development environment, and try to compile it.
- Starting from there, edit the program appropriately to create a “correct” solution to the problem on the exam. You may use the notes that you took when the problem was discussed in class, but you should **think about it**, and not just blindly copy the code from your notes.
- Next modify the program so that it asks the user for the name of an output file, and write **just the table of data** into that output file. The file should just contain three columns of numbers, with no messages, no table headings, and no warning messages.
- Now write a second program, which asks the user for the name of an **input** file, matching the format of the file written above. (Three columns of floating-point numbers.) This program is to read the data from the file, and calculate the averages of each of the three columns of numbers. (Three averages should be calculated and reported, one for each column.) You should use the end-of-file termination condition, and not rely on any knowledge of the number of rows of data in the file.
- When working with files, don’t forget to check for error conditions, such as failure to open the requested file.

What to Hand In:

1. Your code, **including a readme file and a project file if requested by the TA**, should be handed in electronically using Blackboard.
2. The purpose of the readme file is to make it as easy as possible for the grader to understand your program. If the readme file is too terse, then (s)he can’t understand your code; If it is overly verbose, then it is extra work to read the readme file. It is up to you to provide the most effective level of documentation.
3. If there are problems that you know your program cannot handle, it is best to document them in the readme file, rather than have the TA wonder what is wrong with your program.

4. Hard copy printouts are to be handed in at the beginning of class. If you have hand-drawn sketches or other hard copy that is necessary to fully understand your program, that may be included. **For this assignment, please include a copy of your answer from the exam.**
5. Make sure that your **name and your ACCC account name** appear at the beginning of each of your files. Your program should also print this information when it runs.

Optional Enhancements:

It is course policy that students may go above and beyond what is called for in the base assignment if they wish. These optional enhancements will not raise any student's score above 100 for any given assignment, but they may make up for points lost due to other reasons.

- Allow the user to put lots of rows of data into the output data file, but to only print some of them to the screen. (For example, generate 1001 lines for the data file, but only print every 25th line to the screen.) The user should be able to specify what frequency to print to the screen, with some value indicating to print every line to the screen.
- Instead of asking the user for the input data, create a data file that contains the user input, and ask the user for the name of this input file. In this case the file should have three numbers per line (separated by spaces, and as many rows as the user would like tables. Multiple tables then get printed to the screen, and the output file just has the concatenation of all the different tables.
- Other enhancements that you think of – Check with TA for acceptability.