CS 162 LAB #2 – File I/O

In order to get credit for the lab, you need to be checked off by the end of lab. You can earn a maximum of 5 points for lab work completed outside of lab time, but you must finish the lab before the next lab. For extenuating circumstances, contact your lab TAs and the instructor.

This lab is worth 10 points total. Here's the breakdown:

- 4 point: Design for the problem
- 6 points: Implement your design

(4 pt) Step 1: Design

In this lab, you will practice reading and writing to a file, a.k.a. File I/O. You can copy and paste or download this example file:

http://classes.engr.oregonstate.edu/eecs/summer2020/cs162-001/labs/input.txt

The input file provides details for a student database in the following format:

Number_of_students
ID_Number Student_First_Name Student_Last_Name Major
…<Repeats n number of times>…
ID_Number Student_First_Name Student_Last_Name Major

Your program will read specific information from the file and continue reading the contents of the body from the file until the EOF (end of file) character. You will write the following information to an output file:

- Sort students by ID number
- Sort students by last name
- The number of unique majors

Each section of information should be labeled in the output file in all capital letters. A struct should be used to store and manipulate the file information between reading and writing the file. You must include the follow three functions with the exact prototypes:

- `student * create_student_db(int);`
  This function will create the array of student based on the number of students in the file

- `void populate_student_db_info(student *, int, ifstream &);`
  This function should do the work of actually reading through the `ifstream` that represents your opened file and storing the information in a pre-allocated array of student that's passed in

- `void delete_student_db_info(student **, int);`
  This function will delete all dynamic memory created in your program

Your **main function needs to check to make sure the file you open exists** before moving forward. If the file doesn't exist, then you need to provide an error message and get a file name that does exist.

- Write a **design** for the main function in the driver file, `driver.cpp`.
- Write a **design** for the `create_student_db(), populate_student_db_info(), and delete_student_db_info()` **as well as the functions needed to satisfy the above bulleted output** functions in the implementation file, student_db.cpp

Here's some documentation that will help you get going with File I/O:

- C++ Basic file I/O: http://www.learncpp.com/cpp-tutorial/186-basic-file-io/
- ifstream: http://www.cplusplus.com/reference/fstream/ifstream/
- ofstream: http://www.cplusplus.com/reference/fstream/ofstream/
- fstream: http://www.cplusplus.com/reference/fstream/fstream/

(6 pts) Step 2: Implementation

Now, implement the `driver.cpp, student_db.cpp`, and `student_db.h` files. Create a `Makefile` to manage the compilation of all these files. You can adapt the Makefile that was posted on the Calendar page in Canvas.

Remember, you will not receive lab credit if you do not get checked off before leaving each lab. Once you have a zero on a lab, then it cannot be changed because we have no way of knowing if you were there or not.

Show your completed work and answers to the TAs for credit. You will not get points if you do not get checked off!

Submit your work to TEACH for our records **(Note: you will not get points if you don't get checked off with a TA!!!)**

1. Create a **tar archive** that contains all files you've created in this lab:

```
tar –cvf lab2.tar student_db.h student_db.cpp driver.cpp makefile
```

2. Transfer the tar file from the ENGR server to your local laptop.
3. Go to TEACH.
4. In the menu on the right side, go to **Class Tools → Submit Assignment**.
5. Select **CS162 Lab2** from the list of assignments and click "**SUBMIT NOW**"
6. Select your files and click the Submit button.