CS 161B: Programming and Problem Solving II

Final Project

Academic Integrity

You may NOT, under any circumstances, begin a programming assignment by looking for completed code on StackOverflow or Chegg or any such website, which you can claim as your own. Please check out the Student Code of Conduct at PCC.

The only way to learn to code is to do it yourself. This project must be your original idea. If you start with code from another source and just change the variable names or other content to make it look original, you will receive a zero on the assignment.

I may ask you to explain your assignment verbally. If you cannot satisfactorily explain what your code does, and answer questions about why you wrote it in a particular way, then you should also expect a zero.

This Final Project is a menu-driven program using your own ideas. A menu-driven program is a program that gets input from a user by showing a list of options, known as the menu, from which the user chooses their option. One of the options is to quit and end the program execution. The objective of this project is to demonstrate mastery of the outcomes of this course. The scope of this project is larger than your individual assignments and typically requires more planning and preparation.

Purpose

The purpose of this project is to assess mastery of all outcomes of this course.

After completing this assignment you will be able to:

- Create small computer programs to implement algorithms that solve problems.
- Apply ethical software engineering practices as determined by the Association for Computing Machinery.
- Apply iterative and modular constructs using arrays, structs and multiple files.
- Assess algorithmic design, software reusability, and user interfaces.
- Effectively use software development tools.

Task

- ❏ This is a project of your own idea. You can implement any idea but it must follow the below requirements:
- ❏ **Before you get started:**
  - ❏ **Sample - Check out Sample PGE Data Final Project Write up**
  - ❏ **Check out the Sample Final Project Code files:**
    - ❏ **Final-project-PGE (uses structs and .h and .cpp files)**
- ❏ Requirements for the data:
  - ❏ Do not use any of the data files used in zybooks or my examples (like the cereal data, videos, songs, items and quantities).
  - ❏ Here are some examples of data you can use. Choose the columns you want - don't have more than 5 columns. Have at least 2 text columns for char arrays.
    - ❏ Transportation statistics
    - ❏ Pet Ownership statistics
    - ❏ Video games sales statistics
    - ❏ COVID-19 Dataset
    - ❏ Space Mission Launches
    - ❏ Box Office Secrets
    - ❏ Breast Cancer Survival statistics
  - ❏ Must have at least 10 lines of data in your text file. Can have more, but add more lines after testing your code.
  - ❏ If you use any other dataset please get it checked out by your instructor.
- ❏ Requirements for the write up:
  - ❏ The write up is the design part of your project where you explain your project in words (no code).
  - ❏ Must start with the Sample Run - see the samples above.
  - ❏ You can use the Algorithm Planning document if you choose or write it out using any Word Processing application.
  - ❏ The write up must be discussed with the instructor during a zoom session and be approved before writing the code. You can set up a zoom session or this can be done during class time for Remote and In-Person class.
  - ❏ Your write up must have a description of your project - what input does it take from the user, what output does it produce and what is the process to transform the input to the output.
  - ❏ The write-up must have details about the different parts of the project. For example, do you do input validation? Are you checking for negative numbers, or is any of your input restricted to **y/n**? Give details about how the input is transformed to output. What is the job of each function? What do you anticipate

the different functions to do? It does not have to be perfect, but you must have a good idea of how your program will flow. Please use my samples as a guide.

- ❏ Your write up must be at least 500 words long, not including the Sample Run.

- ❏ Requirements for the code:
  - ❏ Name the file containing the `main()` function `finprj.cpp`.
  - ❏ Menu driven program.
  - ❏ The program must loop until the user enters QUIT to end the program.
  - ❏ **No breaks or returns inside loops.**
  - ❏ **No while(true) loops in your program.**
  - ❏ **No global variables.**
  - ❏ Must use structs. Refer to zyBooks Chapters 13 and 14: Structs Part I and II.
  - ❏ You must use multiple files in your project. Refer to zyBooks, Chapter 14 for more information on how to create multiple files.
  - ❏ You must have a Remove option in your menu. You must be able to shift and remove an item from your list.
  - ❏ Must have functions and function prototypes. All functions must be written after main().
  - ❏ Must have an array of struct and c-strings (no String class, vectors or anything not covered in this class).
  - ❏ Must do data validation for input read from the user. Users must not be allowed to enter invalid or negative numbers. All options must be validated.
  - ❏ Must read data from a file. Refer to zyBooks Chapter 12: File Input/Output for more information on how to read data from a file and what kind of data you need to have.
  - ❏ Must follow the C++ Style guidelines just like your other assignments.

- ❏ **There is a Linux Lab component to this assignment that must be completed as well. Instructions to this can be found in the Linux Lab 4 document. Watch this Lab 4 video and follow along. The files to be submitted for this Lab 4 are `lab4.txt` and `nestedBug.cpp`.**

Criteria for Success

Sample Run

The below sample run is an example - your output will depend on your data set and your project specifications. You may not use this example!

```
Welcome!
This program gives statistical information about energy consumed by
the different buildings at PCC. You can Add to the dataset, Print
```

```
the dataset, Find the building with the most Energy Consumption, or
quit the program.

Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

A
Enter the Building name (30 characters or less): TCB
Enter the annual Use (KWhr) : 34100
Enter the annual charge $ : 4000

Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

P

Building Name;Annual Use;Annual Charge
SOCIAL SCIENCE;116560;12310
AUTOMOTIVE METALS;141440;19800
LIB - LIBRARY;277120;28276
BUILDING 2;456000;54570
TCB;34100;4000


Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT
```

```
F
Enter the Building Name: LIB

Here is the information:
LIB - LIBRARY               277120     $28276


Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

a
Enter the Building name (30 characters or less): BOOKSTORE
Enter the annual Use (KWhr) : a
Invalid number! Please enter a valid whole number.
Enter the annual Use (KWhr) : 354290
Enter the annual charge $ : 37890

Pick an option from below:

(A)DD
(P)RINT
(F)IND
(M)AX
(Q)UIT

g
Invalid option!
Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

p
```

```
Building Name;Annual Use;Annual Charge
SOCIAL SCIENCE;116560;12310
AUTOMOTIVE METALS;141440;19800
LIB - LIBRARY;277120;28276
BUILDING 2;456000;54570
TCB;34100;4000
BOOKSTORE;354290;37890

Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

M

The Building with the maximum consumption is

BUILDING 2             456000     $54570

Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

R
Building Name;Annual Use;Annual Charge
   1. SOCIAL SCIENCE;116560;12310
   2. AUTOMOTIVE METALS;141440;19800
   3. LIB - LIBRARY;277120;28276
   4. BUILDING 2;456000;54570
   5. TCB;34100;4000
   6. BOOKSTORE;354290;37890

Enter the index of the building to remove: 1

Building removed. Here is your new list:
```

```
Building Name;Annual Use;Annual Charge
AUTOMOTIVE METALS;141440;19800
LIB - LIBRARY;277120;28276
BUILDING 2;456000;54570
TCB;34100;4000
BOOKSTORE;354290;37890

Pick an option from below:

(A)DD
(R)EMOVE
(P)RINT
(F)IND
(M)AX
(Q)UIT

Q

Thank you for using my program!
```

- ❏ Complete zyBooks section **16. CS 161B: Debugging** activities and add screenshots in your design document (watch the videos and do zyLab 16.5).
- ❏ Start Early!!! Start planning your project as early as Week 2. Remember, you don't need to know all the concepts to start planning.
- ❏ Follow all the requirements above, and start by looking at the example.
- ❏ Keep it simple - the project must be completed by the end of Week 10 to allow time for instructors to grade and give feedback.
- ❏ The write up must be discussed with the instructor during a zoom session and be approved before writing the code. You can set up a zoom session or this can be done during class time for Remote and In-Person class.
- ❏ The project must be your own original idea - if it is similar to another student, you can expect a 0 for the project.
- ❏ If you get data from somewhere cite your Sources in the header comments.
- ❏ Check with your instructor often to make sure your project is headed in the right direction.
- ❏ Please open and compare your work with the grading rubric before submitting.
- ❏ Remember to follow all style guidelines.
- ❏ Download your Write up Document as a PDF (File -> Download -> PDF), rename it to `finprj.pdf`.

- ❏ When you are ready to submit your work for grading, upload the following files as attachments to your Final Project dropbox in D2L by **Sunday** evening. If you have multiple files, submit all files needed including data files.
  - ❏ Project Write-Up Document `(finprj.pdf)`
  - ❏ Project C++ file `(finprj.cpp)`
  - ❏ The Linux Lab 4 component `lab4.txt` and `nestedBug.cpp` files
- ❏ Do your own work. Consult the syllabus for more information about academic integrity.

Additional Support

- ❏ Post a question for the instructor in the Ask Questions! area of the Course Lobby.
- ❏ **Check out Sample Final Project Write up**
- ❏ **Check out Sample Final Project Code files:**
  - ❏ **finalprj.zip (uses structs and multiple files)**