HW #14: Multiple Files

Due dates: Friday Apr 29th, 11:59 pm through Handin (https://secure.cse.msu.edu/handin)

Lab Assignment

Getting started

Change into the cse220 directory. Create a new directory called lab14.
Change into the new directory. Implement the program below in your lab14 directory.

C Structs and Enums

Struct variables

Create a header file capacitor.h.
Protect your header using #ifndef directive.
Define a struct with tag Capacitor that holds the following information about a capacitor:
Model number (e.g. 11-123U), capacitance (e.g. 1000 uf), voltage (e.g. 2.5 V), cost ($6.50)

Create your main program file capacitorsInfo.c that uses the header file you just declared.
Declare two variables of type struct Capacitor and populate them with the following values:
First variable: model is 11-123U, capacitance is 100, voltage is 25 and cost is $6.00
Second variable: model is 65T91a, capacitance is 22000, voltage is 20 and cost is $25.00

Print the the model number of the first capacitor and the voltage of the second.
Create a makefile to build your program. Make sure it compiles and runs without errors.
Remove your print statements.

Struct Array

Add a third Capacitor variable and initialize it from values entered by the user. Use fgets when reading the model number to make sure you don't exceed the size of your model number array.
Print to the standard output the members of the third capacitor and to make sure the capacitor is populated correctly.
Declare an array of Capacitors of size 4 and copy the three capacitors you created to the array.
Populate the fourth element of the array from user input.

Manipulation with Functions

Add to capacitor.h the prototype of function displayCapacitorInfo that takes a capacitor as input parameter and prints its details in the following format:

    Capacitor 11-123U:
            * Capacitance 100 uF
            * Voltage: 25 V
            * Cost: $25.00

Add the function definition in a corresponding C file capacitor.c. Call your function in the main file on all

members of the array.

Using typedef
Change the struct definition from using tag name to using typedef.
Modify your program to work properly with the new definition.

Add (to capacitor.h/capacitor.c) a function largestCapacitance that takes as input an array of Capacitors and returns a pointer to the Capacitor with the largest capacitance.
Call largestCapacitance on your array and add statements to print the cost of the capacitor returned by the function.

Using Enum
In the header file capacitor.h, define an enumeration CapType with the following values:
Ceramic, Aluminum, Film, Supercapacitor
Add a new member, capacitor type, to your struct Capacitor.
Update the capacitor type member of all elements of the array to a type of your choice.
Update the displayCapacitorInfo function to print the capacitor type as well.

Saving/Loading from a File
Add (to capacitor.h/capacitor.c) the following functions:
- saveCapacitor: takes as parameters a capacitor and a filename and saves its member variables into the file given
- saveCapacitors: takes as parameters an array of capacitors and a filename and saves all capacitors into the file given, each capacitor on a separate line
- loadCapacitor: takes as parameter a filename and returns a capacitor. The function should populate the capacitor data from the given file.

Test your functions in your main program by:
- Saving the first capacitor into the file cap1.txt
- Saving the capacitor array into the file allCaps.txt
- Loading data from cap1.txt into a new capacitor variable
- Printing the values of the newly created capacitor to the screen

Handin

Submit through the handin system the following files: capacitorsInfo.c, capacitor.h, capacitor.c, makefile

The "handin" system has options to allow you to review your files online and to download them. You Should always verify that you submitted the correct files and they were received by the handin system. You can submit files as many times as you like for a particular assignment. Handin will only keep the last version of each file. Remember to submit your files prior to the deadline as you won't be able to use handin if the deadline has passed.