Program Design & Testing Document for Program 1
Lyell C Read

Problem Statement

This problem/assignment is asking me to construct a C++ program that:
- Takes one CLI arg
- Interpret (read) from a file that has economic data in it
- Interprets the format of that file and correctly allocates an array of structs (state) with subarrays of structs part of the state array that contains data for counties.
- Deallocates the memory accurately.
- Prints out specific sets of data by state, or shows the data for all the counties of a state.
- Ask the user to repeat or what operation to do
- Exit with an error if the CLI args are wrong (nonexistent, too many, none ...)
- Works and looks clean doing so.

I assume that:
- The data file contains valid data in the valid format

Everything else will be checked within the program. I will do this by:
- Taking input from the user as to where the text file is
- Turning that input into an array
- Asking the user what they want to do, and doing that until they want to quit
- Deallocate memory!

Understanding the Problem

As described in the requirements, the problem asks me to create a program that can load and let the user explore economic data. To achieve this, I will use the code version of the pseudocode below to achieve this goal.

Pseudo Code (Simplified)

Function: read_data:
    First gather the first line
    Dynamically allocate an array of that size, made of structs (see guidelines document) using arr_alloc_state
    For each state:
        Read line for that state
        Add that data to the struct for a state
        Gather the last integer on that line (the # of counties)

Arr_alloc_county an array of that length
Call county_add with the number of counties and the pointer to that array
Return the pointer to the array of states

Function: county_add
For number of counties
Read line, and save in appropriate instance of the county struct

Function: Input_check
Seek input
If input on acceptable range:
Return input
Else
Return Input_check

Function: arr_alloc_state
Create a new array of size specified, and of type state struct
Return pointer

Function: arr_alloc_county
Create a new array of size specified, and of type county struct
Return pointer

Function: cli_check (argc, argv)
Check that:
- Right amount of params are there
- The file exists

Function: print_data (array pointer, len)

Print the max income
Print min income
Print highest unemployment 2015
Print lowest unemployment 2015

Print the array, sorted by delta of unemployment
Print array sorted on income

Function: Mem_free
Read data from text file and free array as such (using the same heuristic that was applied to make these arrays, simply deleting them)

Function: Main

User input using read_data
While the user wants to !quit
  Print out list of options, ask for input with input_check
  If they want to view the data for all counties, ask which state by printing the array
    Call print_data with the pointer to the counties array
  If they want to view county data for all states
    Call print_data with the pointer to the state array
  Play again? Use input_check
Print goodbye message

Data Verification Tables

Value passed as an arg	What Should Happen	Does This Happen
""	Error - nothing entered	
"2"	Error - no file by such name in dir	
"Oasdj fasone"	Error - too many arguments	
"test_data.txt"	Success - normal functioning	

Play again (1 or 0)? answer	What Should Happen	Does This Happen
yes	Error - please enter again	
19	Error - out of range	
9ks0 2-	Error	
1	Play again	
0	Break and quit	
""	Error - nothing entered	