

Programming Assignment #5

Analyze Historical Climate Data

CS 1428.003, Fall 2019

Instructor: Jill Seaman

Due: before class **Wednesday, 10/30/2019** (upload electronic copy by 9:30am)

Problem:

You will write a program to compute some statistics based on monthly average temperatures for a given month in each of the years 1901 to 2016. The data for the average **August** temperatures in the US has been downloaded from the [Climate Change Knowledge Portal](#), and placed in a file named "tempAugData.txt", available on the class website.

The file contains a sequence of 116 values. The temperatures are in order, so that the first one is for 1901, the second is for 1902, and so on through 2016.

The statistics you should compute in your program are:

- The average of the monthly average temperatures for the entire time period.
- The number of years that the monthly average reached at least X degrees where X is a value input from the user. These years should also be displayed to the screen.
- The maximum monthly average temperature for the time period **and in what year it occurred**.
- The minimum monthly average temperature for the time period **and in what year it occurred**.

Input:

Your program should ask the user for the name of the file, and then open that file for input. It should then ask the user for a boundary temperature (the X in the second bullet above) that is used to calculate some of the statistics.

Processing: Compute the statistics requested above.

Output: Display the statistics, labeled, and with the temperatures formatted to 1 decimal place. Also output the count of the years above X **before** outputting the list of the years. Sample output (continued onto page 2):

```
Please enter the name of the temperature data file: tempAugData.txt
Please enter the boundary temperature: 68.0
```

Climate Data statistics:

Average temperature: 66.2

Years that averaged at least 68.0 degrees: 7

1936

1995

2003

2007

2010

2011

2016

Maximum average temperature: 68.9 occurred in 2007

Minimum average temperature: 63.9 occurred in 1927

Additional Requirements:

- Your program **must compile** and run, otherwise you will receive a 0.
- Your program should test for file open errors.
- I recommend temporarily echoing the input from the file to the screen (using cout) to be sure you are reading the input correctly into your array.
- You should have many separate loops in your program. Do not try to compute everything in one single loop.
- For partial credit, implement some subset of the features completely. This will probably lead to a better score than implementing every feature poorly.

Style:

See the Style Guidelines document on the course website. The grader will deduct points if your program violates the style guidelines. Make sure it is indented neatly.

Logistics:

Name your file **assign5_XXXXX.cpp** where XXXXX is your TX State NetID (your txstate.edu email id). The file name should look something like this: assign5_js236.cpp

There are two steps to the turn-in process:

1. Submit an **electronic copy** using the Assignments tool on the TRACS website for this class (tracs.txstate.edu). Submit the .cpp file only.

2. Submit a **printout** of the .cpp file (only!) at the beginning of class on the day the assignment is due. Please print your name on the front page. Print the .cpp file only. Do **not** submit a printout of the output.

See the assignment turn-in policy on the course website (cs.txstate.edu/~js236/cs1428) for more details, including deadlines, penalties, and where to submit printouts after class.