

## Homework #2

**Due to:** 22 December 2020

Note that you must follow the rules posted on Teams for naming, indenting, documenting, etc.

**Objective:** to be more familiar with arrays, files and structures in C/C++.

Q1 - Given any two-dimensional array A with n-rows and m-columns, where the values of n and m are specified by the user at run-time. The entries in A are integers between 1 and 95. Arrange the entries in array A according to the following policy:

- the small values must appear in the first  $(n / 2)$  rows in ascending order. (notice that this is an integer division)
- the remaining values must appear in the remaining rows in descending order.

The following example shows how values in a 5 rows and 6 columns array are ordered.  $(5 / 2) = 2$ , so the first two rows contain the small values in ascending order and the remaining 3 rows contain the remaining values in descending order.

2	4	5	7	8	1
15	3	29	78	11	10
34	26	37	17	16	68
24	19	31	83	54	50
72	14	47	41	93	81

1	2	3	4	5	7
8	10	11	14	15	16
93	83	81	78	72	68
54	50	47	41	37	34
31	29	26	24	19	17

Get the size of the array rows and columns in the main function. Make sure these values are larger than 5. Be careful to use appropriate call by value or call by reference in each of the following functions. Call all of these functions inside main.

1. write a function to read the data into a file
2. Read the values from the file into the array
3. write a function to sort in ascending order
4. write a function to sort in descending order
5. write a function to print any part of an array from row a to row b and from column r to column s. You must check and enforce that  $a \leq b$  and  $r \leq s$  and within the given range of the array.

**Q2.** Define a **patient** structure to keep the **name**, a constant **ID**, and the **doctor(s)** treating the patient. *Notice that you need to keep the number of doctors for each patient.* Define the **doctor** as another structure where you keep **name**, **specialty**, **office number** and **age**.

Write the following functions:

- 1) A function to read information about patients.
  - 2) A function to display (print) the values related to an existing patient.
  - 3) A function to check the equality of two doctors. Two doctors are equal if they have the same name (use strcmp) and same office.
  - 4) A function to read the information related to a given doctor.
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- 2) A function to decide whether one patient should be treated before another patient. The check holds true only if the ID of the first patient is greater than the second, and the number of doctors for the second patient is less than the number of doctors for the first patient.
  - 3) A function to display (print) the values of the variables in an existing doctor.

Add any other functions you find necessary.

Define a text file for input and use a text editor to write inside the file information related to 7 doctors and 3 patients.

Write a function to open the text file and read the values into an array of 7 doctors and another array of 3 patients. Write them in two different random access files one for doctors and the other for patients.

Inside the main,

- 1) call the function, which reads the values from the text file.
- 2) call and test the other functions defined above.