CSE 102 Spring 2024 – Computer Programming Assignment 8

Due on April 29, 2024 at 23:59

First part

Your first task is to write a C program that reads a text file named "input1.txt," which contains name, surname, age, and branches of some famous scientists. You should create a menu like the following

```
******Menu******************
1. Sort and display all individuals by age
2. Sort and display individuals in the branch by age
3. Show individuals with the branch 'SCIENCE'
4. Show computer scientists who are not mathematicians
5. Exit
Choice:
```

Columns in the input1.txt file are separated by ','. If there is no information in the relevant column, it is left blank.

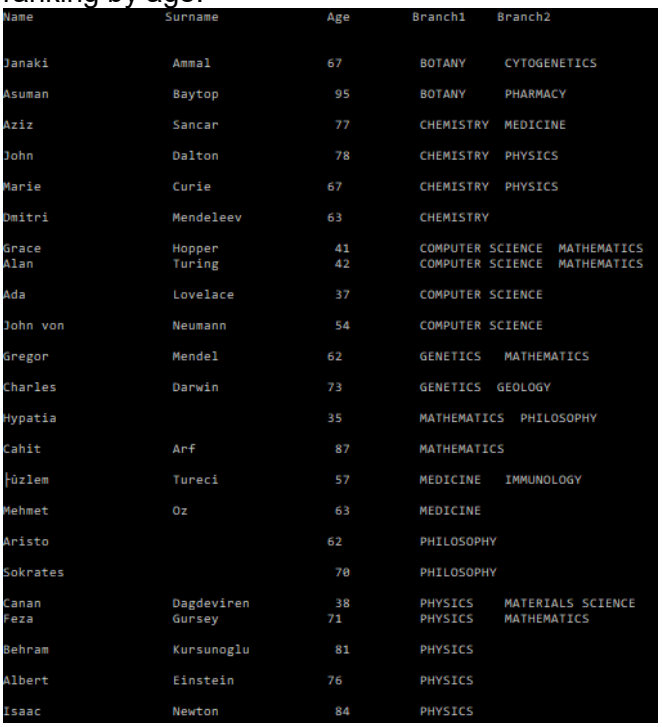
You should store the data from the txt file in a multi-dimensional array of strings.

When we select ;

- 1 from the menu, the sort_people_by_age() method is called and its output looks like this

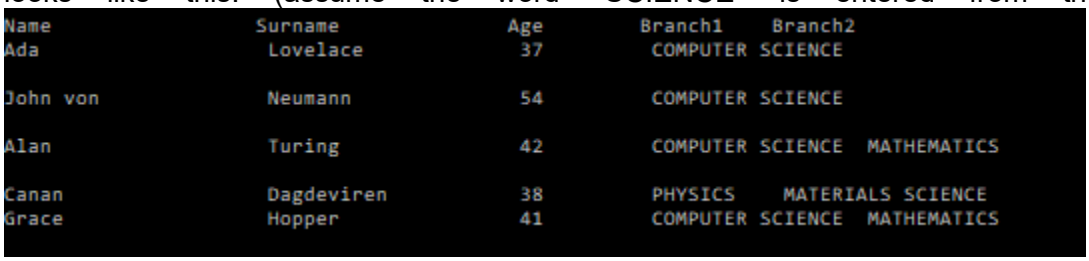
```
Name            Surname          Age     Branch1     Branch2

Hypatia                          35      MATHEMATICS  PHILOSOPHY
Ada             Lovelace         37      COMPUTER SCIENCE
Canan           Dagdeviren       38      PHYSICS     MATERIALS SCIENCE
Grace           Hopper           41      COMPUTER SCIENCE  MATHEMATICS
Alan            Turing           42      COMPUTER SCIENCE  MATHEMATICS
John von        Neumann          54      COMPUTER SCIENCE
Özlem           Tureci           57      MEDICINE    IMMUNOLOGY
Gregor          Mendel           62      GENETICS    MATHEMATICS
Aristo                           62      PHILOSOPHY
Dmitri          Mendeleev        63      CHEMISTRY
Mehmet          Oz               63      MEDICINE
Janaki          Ammal            67      BOTANY      CYTOGENETICS
Marie           Curie            67      CHEMISTRY   PHYSICS
Sokrates                         70      PHILOSOPHY
Feza            Gursey           71      PHYSICS     MATHEMATICS
Charles         Darwin           73      GENETICS    GEOLOGY
Albert          Einstein         76      PHYSICS
Aziz            Sancar           77      CHEMISTRY   MEDICINE
John            Dalton           78      CHEMISTRY   PHYSICS
Behram          Kursunoglu       81      PHYSICS
Isaac           Newton           84      PHYSICS
Cahit           Arf              87      MATHEMATICS
Asuman          Baytop           95      BOTANY      PHARMACY
```

- 2 from the menu, the sort_people_by_branch () method is called and its output looks like this. First, there will be a ranking by branch, and within the same branch, there will be a ranking by age.



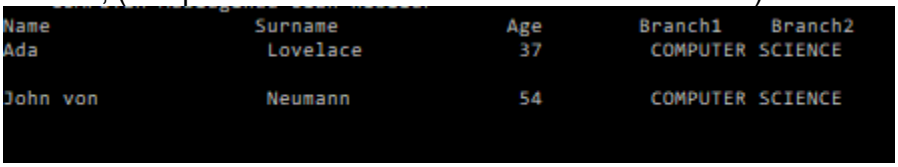
Name	Surname	Age	Branch1	Branch2
Janaki	Ammal	67	BOTANY	CYTOGENETICS
Asuman	Baytop	95	BOTANY	PHARMACY
Aziz	Sancar	77	CHEMISTRY	MEDICINE
John	Dalton	78	CHEMISTRY	PHYSICS
Marie	Curie	67	CHEMISTRY	PHYSICS
Dmitri	Mendeleev	63	CHEMISTRY	
Grace	Hopper	41	COMPUTER SCIENCE	MATHEMATICS
Alan	Turing	42	COMPUTER SCIENCE	MATHEMATICS
Ada	Lovelace	37	COMPUTER SCIENCE	
John von	Neumann	54	COMPUTER SCIENCE	
Gregor	Mendel	62	GENETICS	MATHEMATICS
Charles	Darwin	73	GENETICS	GEOLOGY
Hypatia		35	MATHEMATICS	PHILOSOPHY
Cahit	Arf	87	MATHEMATICS	
Hüzlem	Tureci	57	MEDICINE	IMMUNOLOGY
Mehmet	Oz	63	MEDICINE	
Aristo		62	PHILOSOPHY	
Sokrates		70	PHILOSOPHY	
Canan	Dagdeviren	38	PHYSICS	MATERIALS SCIENCE
Feza	Gursey	71	PHYSICS	MATHEMATICS
Behram	Kursunoglu	81	PHYSICS	
Albert	Einstein	76	PHYSICS	
Isaac	Newton	84	PHYSICS	

- 3 from the menu, the filter_people_by_branch () method is called and its output looks like this. (assume the word "SCIENCE" is entered from the user)



Name	Surname	Age	Branch1	Branch2
Ada	Lovelace	37	COMPUTER SCIENCE	
John von	Neumann	54	COMPUTER SCIENCE	
Alan	Turing	42	COMPUTER SCIENCE	MATHEMATICS
Canan	Dagdeviren	38	PHYSICS	MATERIALS SCIENCE
Grace	Hopper	41	COMPUTER SCIENCE	MATHEMATICS

- 4 from the menu, the filter_people_by_profession () method is called and its output looks like this, (computer scientists who are not mathematicians)



Name	Surname	Age	Branch1	Branch2
Ada	Lovelace	37	COMPUTER SCIENCE	
John von	Neumann	54	COMPUTER SCIENCE	

Your menu should continuously prompt the user to choose an option until they select the "Exit" option. Ensure error handling for invalid inputs and appropriate messages for each menu option.

Second Part

Read a text file (input2.txt) containing patterns formed by '*' and '+' signs. Your program will print out the location of all the sought after patterns such that:

- P1: Row pattern "***++++***++++***". For this you are expected to write and use a function that takes an array of strings as input and returns the locations of all the occurrences of the pattern in an integer array of dimensions Nx2. You can assume a reasonable value for N. The prototype of the function is given below.

  ```
  void search_p1(char strs[][MAX_COL_COUNT], int num_rows,
        int matches[][2], int * num_matches)
  ```

- P2: Column pattern "+*+*+". Again, write and use a function taking the entire input as an array of strings, returning the locations of the pattern in Nx2 integer with the following prototype:

  ```
  void search_p2(char strs[][MAX_COL_COUNT], int num_rows,
        int matches[][2], int * num_matches)
  ```

- P3: A diagonal pattern "+**+++****+++**+". Implement and use a function similar to P1 and P2 with the following prototype:

  ```
  void search_p3(char strs[][MAX_COL_COUNT], int num_rows,
        int matches[][2], int * num_matches)
  ```

PS: No where in the pattern matching process you can convert the input to a two-dimensional character array. The input from the file should be read into an array of strings (assuming a maximum number of characters per row and a maximum number of rows). And this array of strings SHOULD NOT be COPIED or CONVERTED into any other form.

An example input file is:

```
*****************************+***
*********+++++++++++++++**********
++***++++***++++*************+***
*******************************
++++++++++++++++++++++++++++++++++
```

Running your program on this file should print:

```
P1 @ (3,3)
P2 @ (1,30)
```

IMPORTANT NOTES:

- Submit your homework as a zip file named as your name_surname (name_surname.zip) and this file should include:

  - Name_surname.c file
  - A pdf file named " Name_surname.pdf" including a YouTube link and screenshots of your program outputs. In the video, you are expected to provide a demo of your assignment. For each requested functionality, you must explicitly explain your solution approach and also execute and display the outputs. The video should not exceed 4 minutes. Please ensure that your camera is turned on during the recording.
  - Do not use any library other than stdio.h, string.h
- The output format must be as given, do not change it.
- Compile your work with given command “gcc --ansi your_program.c -o your_program”.
- Your work will be evaluated using gcc version 11.4.0.
- For any questions and problems, you can always contact me **via email** (ferdaabbasoglu@gtu.edu.tr), or you can find me in Room 119 during scheduled office hours on April 16 and April 23, 2024, between 13:30 and 14:30.