MIDDLE EAST TECHNICAL UNIVERSITY, NORTHERN CYPRUS CAMPUS
CNG140 C Programming – Programming Assignment 4

Date handed out: **09 June, 2021, Wednesday**
Date submission due: **23 June, 2021, Wednesday, 23:55 (Cyprus Time)**

Programming Assignment 4: Coronavirus Meter

Purpose:

The main purpose of this programming assignment is to revise the topics that we have covered in CNG140 including fundamentals of C programming, conditional statements, repetitive statements, functions, arrays, pointers, dynamic memory allocation, files, strings, etc. This is a comprehensive assignment that covers all the topics you have seen in CNG140.

Description:

You will write a program to computerize Coronavirus records and calculate certain statistics. The computerization of coronavirus records can make it easier for people to closely monitor the pandemic situation and take necessary individual care. In this programming assignment, you will write a program that reads Coronavirus records from a file and allows the user to process these records.

As usual don't try to compile your entire program in one "big bang". Compile it piece by piece. Test each piece that you have compiled to make sure it works correctly before you add the next piece.

Programming Requirements

You will read the Coronavirus records from a file which includes a table of records as follows:

Table 1: Coronavirus records

Country	Deaths	Recovered	Active Cases	Population
Zimbabwe	1,582	36,329	649	15,051,170
Zambia	1,260	90,816	360	18,829,768
Yemen	1,289	3,023	2,231	30,395,998
Vietnam	37	2,668	1,537	98,101,977
Venezuela	2,396	199,202	13,703	28,365,471
Uzbekistan	670	92,303	3,920	33,891,238
Malta	417	29,905	158	442,570
Maldives	97	28,459	15,967	548,818
Malaysia	1,902	426,319	41,889	32,727,008
Malawi	1,153	32,210	851	19,558,322
Madagascar	763	37,823	1,555	28,307,945

From this table, you can compute the total cases information for these countries:
Total Cases = Deaths + Recovered + Active Cases

Define a **structure** type to represent one row of this Coronavirus record table. The structure will include string to represent the name of countries and integers to represents deaths, recovered, active cases, total cases and population of these countries.

Write a program to implement the following steps to process such Coronavirus records as follows. Before you start, copy the data in Table 1 into a file called "corona.txt".

a. Read the name of this data file from the command line which is called "corona.txt". Then check the file, if file is not an existing, your program needs to ask user for entering a correct file name.

b. Load "corona.txt" into an array of structures called CoronavirusTable. Here, you also need to compute the Total Cases (see above given formula) and included that into an array of structures called CoronavirusTable.

c. Define and call the following functions.

Load_CoronavirusTable -- Takes as parameters the name of the input file and the CoronavirusTable array. Function opens the file, fills the CoronavirusTable array, and closes the file. Then it returns the actual array size as the function result. Please note that you cannot make an assumption about the number of rows in the given table. When you load the data from the file, you also need to compute and add the Total Cases to the CoronavirusTable array.

Display_CoronavirusTable – Takes as parameters the the CoronavirusTable array and its actual size. Then, displays the table on the screen. If the table has not been loaded then appropriate error message should be displayed to the user.

Search -- Takes as parameters the CoronavirusTable array, its actual size, and a string representing the name of the country. If the entered name is found then this function returns the position of this record in the array otherwise it returns -1 if that country is not found. (Details of the searched country will be displayed in the main function according to the returned value from this search function)

Sort– Takes as parameters the CoronavirusTable array, its actual size. It then asks user to enter a sorting option and depending on the input from the user reorders the records of the countries. The user can sort the data based on the total cases and active cases.

A sample run will be as follows:

```
>CoronavirusMeter test.txt
This file does not exist, please enter again: coron.txt
This file does not exist, please enter again: corono.txt
This file does not exist, please enter again: corona.txt
Coronavirus records file (corona.txt) has been successully loaded!
Following records have been loaded:

Country      Deaths   Recovered    Active Cases   Population    Total Cases
Zimbabwe     1,582    36,329       649            15,051,170    38,560
Zambia       1,260    90,816       360            18,829,768    92,436
Yemen        1,289    3,023        2,231          30,395,998    6,543
Vietnam      37       2,668        1,537          98,101,977    4,242
Venezuela    2,396    199,202      13,703         28,365,471    215,301
Uzbekistan   670      92,303       3,920          33,891,238    96,893
Malta        417      29,905       158            442,570       30,480
Maldives     97       28,459       15,967         548,818       44,523
Malaysia     1,902    426,319      41,889         32,727,008    470,110
Malawi       1,153    32,210       851            19,558,322    34,214
Madagascar   763      37,823       1,555          28,307,945    40,141

Press 1 for search, 2 for sort and 3 for exit: 1

Enter the name of the country: Malt
That country is unknown! Please try again!
Enter the name of the country: Malta
```

```
Malta with 442,570 population has 30,480 total cases (417 deaths, 29,905
recovered and 158 active cases)

Press 1 for search, 2 for sort and 3 for exit: 2
Sort by (T: total cases, A: active cases): T

Country      Deaths  Recovered  Active Cases  Population  Total Cases
Malaysia     1,902   426,319    41,889        32,727,008  470,110
Venezuela    2,396   199,202    13,703        28,365,471  215,301
Uzbekistan   670     92,303     3,920         33,891,238  96,893
Zambia       1,260   90,816     360           18,829,768  92,436
Maldives     97      28,459     15,967        548,818     44,523
Madagascar   763     37,823     1,555         28,307,945  40,141
Zimbabwe     1,582   36,329     649           15,051,170  38,560
Malawi       1,153   32,210     851           19,558,322  34,214
Malta        417     29,905     158           442,570     30,480
Yemen        1,289   3,023      2,231         30,395,998  6,543
Vietnam      37      2,668      1,537         98,101,977  4,242


Press 1 for search, 2 for sort and 3 for exit: 2
Sort by (T: total cases, A: active cases): A

Country      Deaths  Recovered  Active Cases  Population  Total Cases
Malaysia     1,902   426,319    41,889        32,727,008  470,110
Maldives     97      28,459     15,967        548,818     44,523
Venezuela    2,396   199,202    13,703        28,365,471  215,301
Uzbekistan   670     92,303     3,920         33,891,238  96,893
Yemen        1,289   3,023      2,231         30,395,998  6,543
Madagascar   763     37,823     1,555         28,307,945  40,141
Vietnam      37      2,668      1,537         98,101,977  4,242
Malawi       1,153   32,210     851           19,558,322  34,214
Zimbabwe     1,582   36,329     649           15,051,170  38,560
Zambia       1,260   90,816     360           18,829,768  92,436
Malta        417     29,905     158           442,570     30,480


Press 1 for search, 2 for sort and 3 for exit: 3

Bye!
```

Grading:
If your code does not compile, you will automatically get zero. If your code compiles, you will then be graded based the following scheme:

Grading Point	**Mark (100)**
Load_CoronavirusTable function that reads the file and dynamically populates the data from the file and the computed Total Cases to the array. You should not make any assumption about the size of the data.	40 points
Display_ CoronavirusTable function that displays the array to the user with appropriate messages.	10 points
Search function that searchs and looks up for a specific string in the array and display appropriate messages.	20 points
Sort function that sorts the data in the array by the value given by the user.	20 point
Main function that coordinates these functions and extra functions needed.	10 point

Please note that the functions prototype descriptions are provided in Programming Requirements part

Rules:

Please make sure that you follow the restrictions for the assignment as follows:

- Strictly obey the input output format. Do not print extra things.
- **You are not allowed to use global variables.**
- Add your name/surname and ID at the top of your code as comments and name your source file "Name-Surname-StudentID.c"
- Submit your solution as C and PDF to odtuclass. Do not compress it (zip, rar, …).

If you fail to obey any of the above rules, you will automatically get zero.