ASSIGNMENT 4

PROGRAMMING TECHNIQUE 1

SEM 1, 2020/2021

INSTRUCTIONS TO THE STUDENTS

- *This assignment must be done **in pairs** (a group consisting of 2 members).*
- *Please refer to the group list to find out your group members.*
- *Your programs must follow the input and output as required in the text and shown in the examples. You must test the programs with (but not limited to) all the input given in the examples.*
- *Any form of plagiarisms is **NOT ALLOWED**. Students who copied other student's programs/assignments will get **ZERO** mark (both parties, students who copied and students that share their work).*
- *Please insert your **name and partner's name, matrics number, and date** as a comment in your program.*

SUBMISSION PROCEDURE

- *Please submit this assignment no later than **January 31, 2021, Sunday (00:00 MYT)**.*
- *Only one submission per pairs (group) that includes two files are required for the submission which is the source codes (the file with the extension .cpp).*
- *Submit the assignment via the UTM's e-learning system.*

QUESTION 1

The Malaysian Meteorological Department (MetMalaysia) is an agency under the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC) which is responsible for providing various meteorological, climate and geophysical services to meet the needs of the nation in meteorological, climate and geophysical.

Assumed that you are a UTM practical student currently attached to this agency. You have been asked to write a C++ program to facilitate the agency to keep track the weather data for each month of a year. The program uses a structure below to store the weather data for a particular month:

- Total Rainfall
- Number of rain days per month
- High Temperature
- Low Temperature
- Month Name

There are four tasks already listed to write the program. You are given a data file (**`data.txt`**). Write the program according to the tasks given as follows;

TASK 1:
Read the weather data for each month from the provided input text file named **`data.txt`**. Calculate the average temperature for each month while reading the data file. ***Note:*** Please make sure that the program will only continue reading the file if it is successfully opened, otherwise print the error message and exit the program.

TASK 2:
Calculate the total rainfall for the year, the average of monthly rainfall and the average temperature of the year.

TASK 3:
Find the month with the highest and lowest temperatures for the year.

TASK 4:
Print a weather report which contains all the results from Task 1, Task 2 and Task 3 to the screen as shown in **Figure 2**. ***Note:*** Please use proper output formatting.

```
Total Rainfall: 2165.90
Average Monthly Rain: 180.49
Highest Temperature: 32.30  (Month 4: April)
Lowest Temperature: 23.90  (Month 1: January)

Month      Rain   Rain days Hi TEMP Lo TEMP Avg TEMP
=========  ====== ========= ======= ======= ========
January    234.60 13        30.40   23.90   27.15
February   112.80 8         31.70   24.30   28.00
March      170.30 13        32.00   24.60   28.30
April      154.80 14        32.30   25.00   28.65
May        171.20 14        32.20   25.40   28.80
June       130.70 12        32.00   25.40   28.70
July       154.40 14        31.30   25.00   28.15
August     148.90 14        31.40   25.00   28.20
September  156.50 13        31.40   24.80   28.10
October    154.60 15        31.70   24.70   28.20
November   258.50 18        31.10   24.30   27.70
December   318.60 18        30.20   24.00   27.10
```

Figure 2: Sample output

QUESTION 2

Malaysian tourism department issues each year a report "Annual Malaysian Tourism Report" with main facts about holidays spent by foreign tourists in Malaysia. **Figure 2** contains the main tourist attractions in the Malaysia and the number of visitors (in thousands) for each attraction registered in 2007 for every quarter.

```
Tasik Kenyir, 937, 456, 900, 879
Pulau Tioman, 810, 80, 589, 456
Bukit Tinggi, 2500, 900, 6789, 459
Genting Highland, 1338, 809, 2340, 568
Cameron Highland, 720, 678, 890, 357
Pulau Langkawi, 720, 890, 579, 258
Pulau Sipadan, 1500, 1200, 356, 7089
National Zoo, 1515, 900, 768, 289
National Museum, 880, 906, 689, 589
```

Figure 2

At the end of each year, the Ministry of Tourism wants to see this report in the following format:

```
----------------------Annual Malaysian Tourism Report----------------------
Attraction         QT1('09)      QT2('09)       QT3('09)       QT4('09)    Total
Tasik Kenyir         XXXX          XXXX           XXXX           XXXX       XXXX
Pulau Tioman         XXXX          XXXX           XXXX           XXXX       XXXX
Bukit Tinggi         XXXX          XXXX           XXXX           XXXX       XXXX
Genting Highland     XXXX          XXXX           XXXX           XXXX       XXXX
Cameron Highland     XXXX          XXXX           XXXX           XXXX       XXXX
Pulau Langkawi       XXXX          XXXX           XXXX           XXXX       XXXX
Pulau Sipadan        XXXX          XXXX           XXXX           XXXX       XXXX
National Zoo         XXXX          XXXX           XXXX           XXXX       XXXX
National Museum      XXXX          XXXX           XXXX           XXXX       XXXX
Total                XXXX          XXXX           XXXX           XXXX       XXXX

Max Number of Visitor by Attraction: Name = XXXX, Number of Visitor = XXXX
Max Number of Visitor by Quarter: Quarter = XXXX, Number of Visitor = XXXX
--------------------------------------------------------------------------------
```

Figure 3

Develop a program that uses an array of structures that store the following information:

- `attractionName` of the type string
- `totalVisitors` of the type long integer
- `visitorsByQuarter` an array to store the total number of visitors for each quarter.

Your program must contain at least the following functions:

a) Function `getData`: This function loads the data into the array.

b) Function `visitorByQuarter`: This function finds the attraction's total visitors for each quarter.

c) Function `totalVisitorByAttraction`: This function finds each attraction's yearly number of visitors.

d) Function `printReport`: This function prints the annual report in the format specified in the **Figure 3**.