Question

From 2004 to 2015, the Malaysian Ministry of Health published data on the proportion of infants immunised against measles, MMR (Mumps, Measles, and Rubella), DPT, hepatitis B, and polio. Write a complete C++ program to accomplish the following tasks:

Task 1: Declare a structure that includes the following members:
  a) The year.
  b) The percentage of infants immunised against five diseases (measles, MMR, DPT, hepatitis B, and polio). To store the percentage of infants immunised against five diseases, you should use a **one-dimensional array**.

Task 2: Write a function named "`readInput`".
  a) It receives an array of the structure defined in Task 1.
  b) The function should read data from the input text file named "`input.txt`". The file includes the year as well as the percentage of infants immunised against measles, MMR, DPT, hepatitis B, and polio during that year. **Figure 1** depicts an input data set that can be used to test the program. Please ensure that the program only continues reading the file if it is successfully opened; otherwise, print the error message and exit the program.

```
2004 71.2 33.2 94.2 93.8 95.2
2005 16 89.9 95.3 91.5 94.3
2006 11.4 65.4 96.4 87.4 96.2
2007 12.9 87.5 96.16 96.21 98.48
2008 11.73 94.3 95.75 94.9 96.29
2009 11.89 96.88 97.44 85.37 98.39
2010 11.77 96.1 94.28 82.57 94.13
2011 12.95 95.24 99.54 97.14 99.53
2012 13.47 95.47 99.71 98.07 99.71
2013 13.11 95.25 96.92 96.32 96.87
2014 12.64 92.06 96.77 96.29 96.77
2015 12.69 93.07 99.04 99.27 99.04
```

Figure 1: Data set in the file "`input.txt`"

Task 3: Write a function named "`calculateAverage`".
  a) This is a non-returning function.
  b) It receives as input parameters an array of the structure defined in Task 1 and an array of the average of percentage of infants immunised against five different diseases.
  c) Calculate the average of percentage of infants immunised against each disease. The results of the average calculation will be stored in the array of the average received in (b).

Task 4: Write a function named "`displayAnalysis`".
  a) This is a non-returning function.

1

b) It receives as input parameters an array of the structure defined in Task 1 and an array of disease names.

c) Determine the lowest and highest percentages of infants immunised against five diseases.

d) The function should display the lowest and highest percentages of infants immunised against the five diseases determined in (c), as well as the name of the disease and the year for the lowest and highest percentages.

e) **Figure 2** shows an example of the output for (d) that will be displayed on the screen based on the data in the input file "`input.txt`" shown in **Figure 1**.

```
The lowest level of immunisation: Measles (11.4%) in year 2006
The highest level of immunization: DPT (99.7%) in year 2012
```

Figure 2: Expected output for Task 4

Task 5: Write a function named "`displayOutput`".

a) This is a non-returning function.

b) It takes as input parameters an array of the structure defined in Task 1, an array of disease names, and an array of the average percentage of infants immunised against each disease.

c) It must invoke the functions defined in Task 3 and Task 4.

d) The function should display the percentages of infants immunised against five diseases from 2004 to 2015, as well as the average percentage of infants immunised against each disease and the lowest and highest percentages of infants immunised against five diseases.

e) **Figure 3** shows the output for (d) that will be displayed on the screen based on the data in the input file "`input.txt`" shown in **Figure 1**.

Task 6: Write a **main** function to perform the following tasks:

a) Declare one-dimensional array variables for the structure defined in Task 1 and the average percentage of infants immunised against each disease.

b) Declare a one-dimensional array variable for disease names and initialise it with the following values: measles, MMR, DPT, hepatitis B, and polio.

c) The function must invoke the functions defined in Task 2 and Task 5 in order to produce the output shown in **Figure 3**. Please use proper output formatting.

Task 7: You must ensure that your program meets the following criteria:

a) The program can be executed.

b) Use proper output formatting.

c) All required header files are included.

```
The Percentage of Infants who have been Immunised against Measles,
MMR, DPT, Hepatitis B, and Polio (2004-2015)
---------------------------------------------------------------------
Year      Measles     MMR          DPT        Hepatitis B  Polio
---------------------------------------------------------------------
2004      71.2        33.2         94.2       93.8         95.2
2005      16.0        89.9         95.3       91.5         94.3
2006      11.4        65.4         96.4       87.4         96.2
2007      12.9        87.5         96.2       96.2         98.5
2008      11.7        94.3         95.8       94.9         96.3
2009      11.9        96.9         97.4       85.4         98.4
2010      11.8        96.1         94.3       82.6         94.1
2011      12.9        95.2         99.5       97.1         99.5
2012      13.5        95.5         99.7       98.1         99.7
2013      13.1        95.2         96.9       96.3         96.9
2014      12.6        92.1         96.8       96.3         96.8
2015      12.7        93.1         99.0       99.3         99.0
---------------------------------------------------------------------
Average   17.6        86.2         96.8       93.2         97.1
---------------------------------------------------------------------
The lowest level of immunisation: Measles (11.4%) in year 2006
The highest level of immunization: DPT (99.7%) in year 2012
---------------------------------------------------------------------
```

Figure 3: Output of the program