

ASSIGNMENT IV

Ministry of Transport Malaysia is required to prepare a report of the total road accidents by states in Malaysia from the year, 2006 to 2015.

INSTRUCTIONS:

Write a C++ program to calculate the average number of road accidents for each state and find the highest number of road accidents from 2006 to 2015. Your program should be able to do the following tasks:

- (a) The program should use the following **struct** definition:

```
struct dataAcc
{
    int numAcc[10]; //number of road accidents from 2006-2015
    string state; //states in Malaysia
    float avg; //average number of road accidents for 2006-2015
}
```

- (b) The program should use an array of **struct** defined in (a) to store the total road accidents by states in Malaysia from 2006 to 2015.

- (c) The program will read input data from an input file named “input.txt” into the array of **struct** declared in (b). Example of input data in “input.txt” is shown in **Figure 2**.

- (d) The program should have two (2) global constants and one (1) global variable as follows:

Global constants:

NUM_STATE = 14 ⇒ Number of states

NUM_YEAR = 10 ⇒ Number of years

Global variable:

out ⇒ Variable to point to output file named “output.txt”

- (e) Besides the function **main()**, the program has three (3) other functions as described in **Table 2**. One of the functions is given below:

```
void displayLine()
{
    for (int i = 0; i < 98; i++)
```

```

        out << "-";
        out << endl;
    }

```

Based on the description given in **Table 2**, the program needs to define two (2) more functions. You should use appropriate argument(s) (if necessary) for each function.

Table 2: Description of functions

Function	Description
displayLine()	To display lines using 98 characters of '-' in the output file using a loop.
cal_Avg()	To calculate the average number of road accidents for each state. The function should accept a 1D array of the number of road accidents for 10 years for each state as its argument. The function should return the average number of road accidents for each state.
find_HighLow()	To find and display the highest number of road accidents from 2006 to 2015. The function should accept a 1D array of structures as its argument.

- (f) The program needs to display the following information. **Figure 3** shows the output of the successful program.
- Name of state.
 - Number of road accidents for 2006-2015 in each state.
 - Average number of road accidents for 10 years in each state.
 - The highest number of road accidents for 10 years with the name of state and year.

The assessment criteria are shown in **Table 3**.

1160	1364	1417	1633	1548	1791	1881	1895	1888	1861	PERLIS
15505	16172	16520	17701	17966	19699	19935	20228	20159	22016	KEDAH
32573	33881	34049	33719	34306	37158	37851	39361	38747	39856	PULAU PINANG
27432	29203	30539	32327	32072	33506	34714	35408	35131	36736	PERAK
92632	99157	100380	107429	115565	128876	129106	135024	137809	140957	SELANGOR
46254	49454	48671	51942	53493	58795	61872	64527	63535	64664	KUALA LUMPUR
15197	16079	17362	18369	19407	21157	22146	23066	23748	22939	NEGERI SEMBILAN
10707	11720	12105	13275	14110	14720	15195	16083	16375	17069	MELAKA
43757	46584	48667	51747	55381	59501	62316	64600	64473	67112	JOHOR
13242	13982	15629	17068	17315	19001	20554	20130	19071	19635	PAHANG
7337	8116	8842	9549	9707	9603	9968	9748	10326	9960	KELANTAN
7098	8155	8814	10118	10106	10684	10861	10996	9383	10381	TERENGGANU
13550	14256	14588	15798	16192	16585	17446	17438	17858	17290	SABAH
14808	15196	15488	16655	17253	17964	18578	18700	17693	19130	SARAWAK

Figure 2: Input file named “**input.txt**”

STATE	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	AVERAGE
PERLIS	1160	1364	1417	1633	1548	1791	1881	1895	1888	1861	1643.8
KEDAH	15505	16172	16520	17701	17966	19699	19935	20228	20159	22016	18590.1
PULAU PINANG	32573	33881	34049	33719	34306	37158	37851	39361	38747	39856	36150.1
PERAK	27432	29203	30539	32327	32072	33506	34714	35408	35131	36736	32706.8
SELANGOR	92632	99157	100380	107429	115565	128876	129106	135024	137809	140957	118693.5
KUALA LUMPUR	46254	49454	48671	51942	53493	58795	61872	64527	63535	64664	56320.7
NEGERI SEMBILAN	15197	16079	17362	18369	19407	21157	22146	23066	23748	22939	19947.0
MELAKA	10707	11720	12105	13275	14110	14720	15195	16083	16375	17069	14135.9
JOHOR	43757	46584	48667	51747	55381	59501	62316	64600	64473	67112	56413.8
PAHANG	13242	13982	15629	17068	17315	19001	20554	20130	19071	19635	17562.7
KELANTAN	7337	8116	8842	9549	9707	9603	9968	9748	10326	9960	9315.6
TERENGGANU	7098	8155	8814	10118	10106	10684	10861	10996	9383	10381	9659.6
SABAH	13550	14256	14588	15798	16192	16585	17446	17438	17858	17290	16100.1
SARAWAK	14808	15196	15488	16655	17253	17964	18578	18700	17693	19130	17146.5
The highest number of road accidents = 140957 at SELANGOR on 2015											

Figure 3: Example output in output file named “**output.txt**”

Table 3: Assessment criteria

Item	Criteria	Marks
A	Using an appropriate structure for the program (<i>e.g.</i> all required header files are included, the function main is properly written, <i>etc.</i>).	3
B	Define a global constants, global variable and array of structures	2
	Reading the input data from input file.	4
C	Definition of function cal_Avg() .	4
	Definition of function find_HighLow() .	7
D	Printing the output as requested in (f), Figure 3 and in a proper format.	10
Total		30