

Question

[65 Marks]

Write a complete C++ program. The program uses various types of structured data developed to calculate the profit of each item, the total amount of profit, and the highest profit. The program should perform the following tasks:

Task 1: Declare a structure named **Item**, with the following members: **(3 marks)**

- a) Code
- b) Name
- c) Cost
- d) Sale price
- e) Number of items sold
- f) Profit

Task 2: Write a function named **readInput**. **(10 marks)**

- a) It receives an array of **Item** of type **struct**.
- b) The function should read data from the given input text file named **input.txt**. The file contains items' codes and the number of items sold. **Figure 1** shows an example of data that can be used to test the program.
- c) Assuming you do not know, the number of items. Calculate the number of items sold based on the number of item records found in the input file.
- d) The function should return the number of items calculated in (c).

```
M101 12
B202 21
C303 15
F404 9
F404 27
C303 25
B202 16
M101 9
M101 14
C303 26
B202 31
F404 13
M101 9
C303 38
B202 33
```

Figure 1: Sample data in the input file "**input.txt**"

Task 3: Write a function named **calculateSalePrice**. **(10.5 marks)**

- a) This is a non-returning function.
- b) It takes an array of **Item** of type **struct** and the number of items calculated in Task 2 as input parameters.
- c) The function should determine the items' names and cost based on the information given in **Table 1**.

Table 1

Code	Name	Cost (RM)
M101	Double Mushroom	11.5
B202	Double BBQ Beef	10.0
C303	Grilled Chicken	12.5
F404	Fish'n Crisp	15.0

- d) The function should also calculate the sale price for each item by **adding 30%** (markup percentage) to the cost of the item. Example, if an item costs RM50 to produce, and you want to apply a mark-up of 25%, you need to multiply 50 by 1.25. The sale price would be RM62.50.

Task 4: Write a function named **displayOutput**. **(10.5 marks)**

- This is a non-returning function.
- It takes an array of **Item** of type **struct** and the number of items calculated in Task 2 as input parameters.
- The function should display items' code, name, cost, sale price, number of items sold, and profit. The formula for calculating item profit is as follows:

$$\text{Item profit} = \text{Number of items sold} \times (\text{Sale price} - \text{Cost})$$

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

CODE	ITEM NAME	COST (RM)	SALE (RM)	QUANTITY	PROFIT (RM)
M101	Double Mushroom	11.50	14.95	12	41.40
B202	Double BBQ Beef	10.20	13.26	21	64.26
C303	Grilled Chicken	7.00	9.10	15	31.50
F404	Fish'n Crisp	6.25	8.12	9	16.88
F404	Fish'n Crisp	6.25	8.12	27	50.62
C303	Grilled Chicken	7.00	9.10	25	52.50
B202	Double BBQ Beef	10.20	13.26	16	48.96
M101	Double Mushroom	11.50	14.95	9	31.05
M101	Double Mushroom	11.50	14.95	14	48.30
C303	Grilled Chicken	7.00	9.10	26	54.60
B202	Double BBQ Beef	10.20	13.26	31	94.86
F404	Fish'n Crisp	6.25	8.12	13	24.38
M101	Double Mushroom	11.50	14.95	9	31.05
C303	Grilled Chicken	7.00	9.10	38	79.80
B202	Double BBQ Beef	10.20	13.26	33	100.98

Figure 2: Expected output for Task 4

Task 5: Write a function named **displayAnalysis**. **(17 marks)**

- This is a non-returning function.
- It takes an array of **Item** of type **struct** and the number of items calculated in Task 2 as input parameters.
- The function should display items' names and total profit for each item.

- d) The function should also calculate and display the total amount of profit for all items and the highest profit.
- e) **Figure 3** shows an example of the output that will be displayed on the screen based on the data in the input file "**input.txt**" shown in **Figure 1**.

ITEM NAME	TOTAL PROFIT (RM)
Double Mushroom	151.80
Double BBQ Beef	309.06
Grilled Chicken	218.40
Fish'n Crisp	91.88

The total amount of profit = RM 527.46	
Highest profit = RM 309.06	

Figure 3: Expected output for Task 5

Task 6: Write a **main** function to perform the following tasks: **(5 marks)**

- Declare one-dimensional array variable with 50 elements for a structure type **Item**.
- The function may need to call the functions that are defined in the previous task to produce the output as shown in **Figure 4**. **Note:** Please use proper output formatting.
- Figure 4** shows the complete output that will be displayed on the screen based on the data in the input file "**input.txt**" shown in **Figure 1**.

CODE	ITEM NAME	COST (RM)	SALE (RM)	QUANTITY	PROFIT (RM)
M101	Double Mushroom	11.50	14.95	12	41.40
B202	Double BBQ Beef	10.20	13.26	21	64.26
C303	Grilled Chicken	7.00	9.10	15	31.50
F404	Fish'n Crisp	6.25	8.12	9	16.88
F404	Fish'n Crisp	6.25	8.12	27	50.62
C303	Grilled Chicken	7.00	9.10	25	52.50
B202	Double BBQ Beef	10.20	13.26	16	48.96
M101	Double Mushroom	11.50	14.95	9	31.05
M101	Double Mushroom	11.50	14.95	14	48.30
C303	Grilled Chicken	7.00	9.10	26	54.60
B202	Double BBQ Beef	10.20	13.26	31	94.86
F404	Fish'n Crisp	6.25	8.12	13	24.38
M101	Double Mushroom	11.50	14.95	9	31.05
C303	Grilled Chicken	7.00	9.10	38	79.80
B202	Double BBQ Beef	10.20	13.26	33	100.98
ITEM NAME			TOTAL PROFIT (RM)		
Double Mushroom			151.80		
Double BBQ Beef			309.06		
Grilled Chicken			218.40		
Fish'n Crisp			91.88		
The total amount of profit = RM 527.46					
Highest profit = RM 309.06					

Figure 4: Complete output for the data from the input file "**input.txt**"

Task 7: List all function prototypes.

(4 marks)

Task 8: You must ensure your program fulfill the following criteria:

(5 marks)

- a) The program is able to run.
- b) All required header files are included.