



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA

ASSIGNMENT 2

SECJ 1013 - PROGRAMMING TECHNIQUE I

INSTRUCTIONS TO THE STUDENTS

- *Read the instructions carefully*
- *The assignment must be done in pair.*
- *Use the tool Dev C++ for writing your program.*
- *Your program must follow the input and output as required in the text and shown in the examples. You must test the program with (but not limited to) all the input given in the examples.*
- *Please insert your name, matric no, section of your class and date as a comment in your program.*

SUBMISSION PROCEDURE

- *Please submit this assignment no later than **23 December 2020, Wednesday (5 pm).***
- *Only the source code (i.e. the file with the extension .cpp) are required for the submission.*
- *Submit the source codes via the UTM's e-learning system.*

Problem**30 marks**

Floods are the most common natural disaster and occur almost everywhere in the world, resulting in widespread damage and even death especially people who live near the water sources such as coasts and rivers. As we know every year Malaysia will face raining season at the end of the year. Malaysian Meteorological Department (MetMalaysia); an agency under Ministry of Science Technology and Innovation (MOSTI) for Malaysia Government is in the process of developing a National Flood Forecasting and Warning System. The system is to measure water level and rainfall in order to warn people if the water level is at risk. A hydrostatic level sensor is used in each river for water level monitoring by measuring the hydrostatic water pressure.

Write a complete C++ program that helps the department to compute the flood warning information. The program should perform the following steps:

1. Provide a menu driven screen for user to select forecast choice. The forecast choices should display the following menu:

```
National Flood Forecasting and Warning System:
```

```
1. River Water Level Advisory
2. Rainfall Advisory
3. Exit
```

```
Enter your choice either 1, 2 or 3 =>
```

2. If the user enters 1,
 - a. The program should ask the user for location and the hydrostatic water pressure value.
 - b. Calculate the water level value by using the formula given.

$$h = p / (d * g)$$

where;

h : water level in meter

p : water pressure in psi

d : water density

g : specific gravity

** Assume d = 1000 and g = 9.80665*

- c. Based on the water level calculated and Table 1; determine the river water level status, classification of flood possibility and the relevant response.
- d. Display the following information as the output of the program.
 - i. The location
 - ii. The calculated river water level value
 - iii. The corresponding river water level status
 - iv. The classification of flood possibility
 - v. The response suggested

Table 1: River Water Level Advisory

Water Level Value (meters)	Water Level Status	Flood Possibility	Response
Less than 18.94	Normal	Flood is impossible	No restricted outdoor activities
18.95 – 19.34	Alert	Flooding is possible	Awareness
19.35 – 19.53	Warning	Flooding is threatening	Preparedness
More than 19.53	Danger	Serious flooding expected in low lying areas	Evacuation

3. If the user enters 2,
 - a. The program should ask the user for location and the rainfall value. The rainfall value is for every hour for 3 hours.
 - b. Calculate the average rainfall value.
 - c. Based on the average rainfall calculated and Table 2; determine the rainfall level status, classification of flood possibility and the relevant response.
 - d. Display the following information as the output of the program.
 - i. The location
 - ii. The average rainfall value
 - iii. The corresponding rainfall status
 - iv. The classification of flood possibility
 - v. The response suggested
4. If the user enters 3, the program should end.

Input Validation: Display an error message if the user enters a number outside the range of 1 through 3 when selecting an item from the menu.

Table 2: Rainfall Advisory

Rainfall Value (mm)	Rainfall Status	Flood Possibility	Response
Less than 7.5	Light	Flood is impossible	No restricted outdoor activities
Less than 15	Heavy	Flooding is possible	Awareness
Less than 30	Intense	Flooding is threatening	Preparedness
30 and above	Torrential	Serious flooding expected in low lying areas	Evacuation

The assessment criteria and example runs of the program are shown in **Table 3** and **Figure 1(a)** until **(c)**, respectively. *Note: Figure 1 (a) until (c) of Example of Run 1 until 3. The bold texts indicate input from the user.*

Table 3: Assessment Criteria

Item	Criteria	Marks
A	The program is able to run	2
	Applying proper styles, <i>e.g.</i> indentation and comments	2
	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>)	2
B	Provide a menu driven screen for user to make choice of forecast choices	2
	Reading the location and water pressure value from the user with proper prompts.	2
	Reading the location and rainfall value from the user with proper prompts.	2
C	Calculating the water level value	3
	Calculating the average rainfall value	3
D	Determine the water level status, flood possibility and response	3
	Determine the rainfall status, flood possibility and response	3
	Determine the invalid input	2
E	Printing the output	4
Total		30

National Flood Forecasting and Warning System:

1. River Water Level Advisory
2. Rainfall Advisory
3. Exit

Enter your choice either 1, 2 or 3 => **3**

You have decided to exit.

Thank you for using this system.

Figure 1 (a) : Example Run 1

National Flood Forecasting and Warning System:

1. River Water Level Advisory
2. Rainfall Advisory
3. Exit

Enter your choice either 1, 2 or 3 => **1**

Enter the area of location => **Muar**

Enter the water pressure value in psi => **190254.23**

Flood Forecasting and Warning Information

a. Location	: Muar
b. Water level value	: 19.40
c. Status	: Warning
d. Flood possibility	: Flood is threatening
e. Response	: Preparedness

Figure 1 (b) : Example Run 2

National Flood Forecasting and Warning System:

1. River Water Level Advisory
2. Rainfall Advisory
3. Exit

Enter your choice either 1, 2 or 3 => **2**

Enter the area of location => **Segamat**

Enter the rainfall value (in mm) => **35**

Enter the rainfall value (in mm) => **42**

Enter the rainfall value (in mm) => **23**

Flood Forecasting and Warning Information

a. Location	: Segamat
b. Average Rainfall	: 33.33
c. Status	: Torrential
d. Flood possibility	: Serious flooding expected in low lying areas.
e. Response	: Evacuation

Figure 1 (c) : Example Run 3