Faculty of Engineering, University Of Jaffna
Department Of Computer Engineering
EC2010 – Computer Programming
Lab 02

Date: 28 September 2020   **Duration: 3 Hours**

Instructions:

- Any plagiarized work will be given 0 marks.
- Submit your lab work as a zip file named **_Lab02_20YYEXXX_** (20YYEXXX – _Your Registration Number_) **on/before the given deadline** via teams.
- The zip file should contain all ".cpp" code files and your report.
- Prepare your lab report with the snippets of the **COMPLETE code** and the corresponding outputs. The code **must** be in text format not screen shots.
- Failure to adhere to any of the above instructions may also result in zero marks.
- The .cpp file **MUST** be named 'Q1', 'Q2' and 'Q3' appropriately. Do not modify these names in any manner. **Do not** even annex your index number to the file name. **Do not** change case.

Q1) Given two Cartesian coordinates (a, b) and (c, d). Length in between them and midpoint defined as follows.

$$Length = \sqrt{(a-c)^2 - (b-d)^2}$$
$$Midpoint = \left(\frac{a+c}{2}, \frac{b+d}{2}\right)$$

Write a program in C++ to input 2 pairs of Cartesian coordinates, input "x" and "y" components separately. Then request the user for an operator; depending on this input preform the corresponding mathematical operation as shown in the table below.

Table 1: Operator and its operation

Operator	Operation
L	Length
M	Midpoint

- If the operator is incorrect display an error.

```
Input first coordinate
x component    :0
y component    :0
Input second coordinate
x component    :3
y component    :4
Input opperator :L
Answer   :5
```

```
Input first coordinate
x component    :3
y component    :4
Input second coordinate
x component    :2
y component    :6
Input opperator :M
Answer   :(2.5,5)
```

```
Input first coordinate
x component    :2
y component    :5
Input second coordinate
x component    :1
y component    :9
Input opperator :x
Incorrect opperator process terminated
```

Figure 1: Sample outputs for (Q1)

Q2) Below is a table showing ingredients for a vegan sponge cake save the filling.

Table 2: Ingredients for vegan sponge cake (Reference: https://www.bbcgoodfood.com/recipes/vegan-sponge)

Ingredient	Quantity
Dairy-free spread	150g
Dairy-free milk	300ml
Self-raising flour	300g
Golden caster sugar	200g
Vanilla pod	1 numbers
Cider vinegar	1 teaspoon
Bicarbonate of soda	1 teaspoon

The first four quantities are limited but assume the rest are always sufficient. Write a program in C++ to input the quantities of the limited items (dairy-free spread, dairy-free milk, self-rising flour and golden caster sugar) available then use that to determine the maximum number of vegan sponge cakes that can be made. Also the quantity of each item which will be used to make that number of cakes and the remaining quantity of each item. Also find what and how much more ingredients will be needed to make 1 more cake.

```
Input amount of dairy-free spread availabe in grams      :1400
Input amount of dairy-free milk availabe in milliliters :1000
Input amount of self-raising flour availabe in grams     :900.23
Input amount of golden caster sugar availabe in grams    :800
Number of cakes that can be made: 3
It will need 450 grams of dairy-free spread and 950 grams will remain
It will need 900 milliliters of dairy-free milk and 100 milliliters will remain
It will need 900 grams of self-raising flour and 0.23 grams will remain
It will need 600 grams of golden caster sugar and 200 grams will remain

The following items will be required if one more cake is to be made:
200 milliliters of dairy-free milk
299.77 grams of self-raising flour
```

Figure 2: Sample output for Q2)

Q3) A particular service provider charges Rs. 0.15 per MB for day time data (8 AM to 12 AM) and it charges Rs. 0.022 per MB on night time data. A file is to be downloaded via this service provider. Write a program in C++ to determine the total cost and the data used on each plan given the file size and the time the download is started. Note an additional 5% of data of the original file size will be necessary to compensate for failed packets and other loses.

- *Assume the time is provided to the nearest hour in the 24 hour format.*
- *Assume the total file size is less than 9 GB.*
- *Assume the data price rate remains constant.*
- *Assume the internet speed is at constant at 1 Mbps. That is takes 8192s to download 1 GB.*

```
What is the size of your download file in GigaBytes?
8.5
When did the download begin in 24 hour format?
23
Day time data usage is            : 5.40938 GigaBytes
Night time data usage is          : 3.51563 GigaBytes
Total cost is                     : 910.08 rupees
```

Figure 3: Sample output for Q3)