



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

FINAL EXAMINATION
SEMESTER 2, SESSION 2019 / 2020
PART B (PRACTICAL)

SUBJECT CODE : SECJ/ SCSJ 1023

SUBJECT NAME : PROGRAMMING TECHNIQUE II

SECTION : 1 (SECB/SECJ /SECP/SECR/SECV)
2 (SCSR/SCSV)

DATE/DAY : 9th JULY 2020 (THURSDAY)

TIME : 10.00 AM - 12.45 PM

INSTRUCTIONS:

- You are given ONE HOUR 15 MINUTES to complete the exam inclusive the submission of your answers.
 - ✓ Download the question: 10.00 – 10.15 am (15 minutes)
 - ✓ Answer the question & Interim submission: 10.15 – 12.30 pm (2 hours 15 minutes)
 - ✓ Final answer submission: 12.30 – 12.45 pm (15 minutes)
- A candidate who is suspected of cheating in examinations is liable to disciplinary action including (but not limited to) suspension or expulsion from the University. All materials and or devices which are found in violation of any examination rules and regulation will be confiscated.

IMPORTANT NOTES:

- All the **COMMENT STATEMENTS** in the submitted program **WILL NOT BE EVALUATED**.

SUBMISSION PROCEDURE:

- Only the source code is required for the submission and the source code's file shall be named as follows: *InterimSECJ1023_Name_matricesNo_section.cpp* (for interim submission) and *FinalAnsSECJ1023_Name_matricesNo_section.cpp* (for final submission).

Name	
I/C No.	
Year / Course	
Section	
Lecturer Name	

PROBLEM SOLVING

(70 Marks)

You are given an incomplete C++ program source code named **tempFinal.cpp**. Complete the program based on the UML class diagram given in **Figure 1**. Your program should be able to produce the output shown in **Figure 2**.

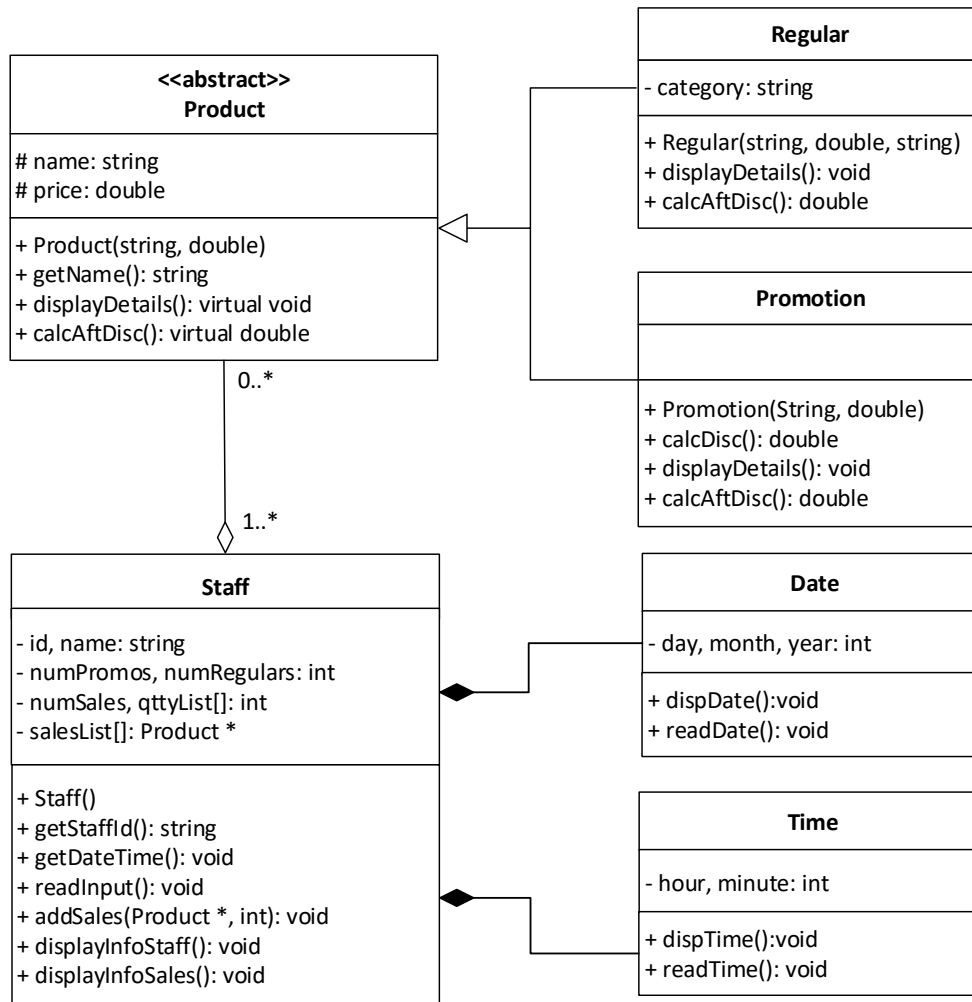


Figure 1: UML class diagram

Implement all the classes (except the **Date** and **Time** classes) with the member data (attributes) and member functions (methods) specified in the diagram. Note that, the definition for the **Date** and **Time** classes are fully given, whereas as for the other classes their definitions are partially given. The purpose of each function is as the name implies and some of them are further explained below. Complete the program based on the following tasks. Note that, the tasks are also stated in the program. **IMPORTANT NOTE: Do not modify existing code** in the template given.

Task 1:

(2.5 Marks)

In **Product** class, define two more member functions and allow them to be polymorphic. The functions and their description are as follows:

- a) **displayDetails**: to display a product's name and price onto the screen in the following format (please refer to the sample output given in **Figure 2**):

```
????? ??????   ##.##
```

- b) **calcAftDisc**: is a pure **virtual** function.

Task 2:

(8 Marks)

- a) Specify the **Promotion** class as a child of the **Product** class.

The **Promotion** class has three member functions:

- b) Constructor with arguments: to initialize all the parent's attributes.
- c) **calcDisc**: to return discounted price. The discount rate of promotion product is 15%.
- d) **calcAftDisc**: to return price after discount. It needs to invoke the **calcDisc** function.
- e) **displayDetails**: to display a product's name, price and discounted price onto the screen in the following format (please refer to the sample output given in **Figure 2**):

```
?????? ??????   ##.##      #.##
```

It needs to invoke the parent's **displayDetails** function.

Task 3:

(6 Marks)

- a) Specify the **Regular** class as a child of the **Product** class.

The **Regular** class has three member functions:

- b) Constructor with arguments: to initialize all the member attributes for the class, including the parent's attributes.
- c) **calcAftDisc**: to return the price.
- d) **displayDetails**: to display a product's name, price and whitespace onto the screen. in the following format (please refer to the sample output given in **Figure 2**):

```
?????? ??????   ##.##      (whitespace)
```

It needs to invoke the parent's **displayDetails** function.

Task 4:

(20.5 Marks)

In **Staff** class, do the following tasks:

- Define all the member variables of the class.
- Complete the **readInput** function definition. The function reads the values from the keyboard for id, name, date and time check in of the staff. It needs to invoke the **readDate** and **readTime** functions.
- Complete the **addSales** function definition. The function assigns the element in the array of **Product** pointers and the element in the integers array with the passed arguments. It also updates the number of promotion, regular and all sales.
- Complete the **displayInfoStaff** function definition. The function displays the id, name, date, and time check in of the staff in the following format (please refer to the sample output given in **Figure 2**):

```

Id      : ?????
Name    : ????? ?????
Date    : ##-##-####
Time    : ##:## ??

```

- Complete the **displayInfoSales** function definition. The function displays the information of all the sales in the following format (please refer to the sample output given in **Figure 2**):

```

1.  ????? ?????  ##.##  #.##  #  ##.##
2.  ????? ?????  ##.##  #.##  #  ##.##
3.  ????? ?????  ##.##          #  ##.##
4.      :      :      :      :      :      :

```

Task 5:

(26 Marks)

In **main** function, do the following tasks:

- Enter the task chosen.
- In **case 1**:
 - Enter the details of staff.
 - Add the **Staff** object into the **Staff** array.
- In **case 2**:
 - Enter the details of product: the type, name, and price of the product.
 - For the regular product, enter the category of the product and then update the name of the product by appending it with category (please refer to the sample output given in **Figure 2**).

- Dynamically allocates a new product (a promotion or regular) object based on the product type. *Hint:* Use a polymorphic concept.
 - Add the **Product** pointer into the **Product** pointers array.
- d) In **case 3**:
- Display the list of staffs' id.
 - Display the list of products' name.
 - Add sales of product to the selected **Staff** object.
- e) In **case 4**, display the list of sales' details based on the staff.
- f) Enter the task chosen.

Task 6:

(7 Marks)

- a) Use an appropriate structure for the program:
- Use a proper C++ statements.
 - Use a proper input and output formatting.
 - The code is properly indented.
- b) The program is able to run, work, and display the output as required.

Figure 2 shows a sample screen output that your program should produce. Note that, all the interactions shown in **Figure 2** are continuous in a single run. Note also that, the **bold** texts indicate input entered by the user.

```

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 3
Sorry!! No staff or product, please add staff or product first...

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 4
Sorry!! No staff, please add staff first...

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit

```

```

=====
Select task: 1

<<< Add Staff >>>
Id : S1111
Name: Alina Amin
Date [dd-mm-yyyy]: 2-6-2020
Time [hour:min] using 24-hour format: 14:00

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Promotion
Name: Casio FX-570MS
Price: RM40

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Regular
Name: Stabilo Swans 12 Colours
Price: RM10.40
Category: Colour Pencil

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Promotion
Name: Artline Whiteboard Marker 500A
Price: RM19.90

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Regular
Name: UHU All Purpose Adhesive Glue 20ml
Price: RM19.90
Category: Glue

```

```

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Promotion
Name: Smiggle Pencil Case
Price: RM45.90

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 3

<<< Add Sales >>>

Staff list
1) S1111

Select staff: 1

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

Select product: 2
Quantity: 3

Press 'Y' to continue >> y

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

Select product: 5
Quantity: 2

Press 'Y' to continue >> n

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 1

<<< Add Staff >>>
Id : S2233
Name: Alias Zakaria
Date [dd-mm-yyyy]: 3-6-2020
Time [hour:min] using 24-hour format: 08:30

```

```

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 4

<<< Staff(s) and Sales Info >>>

Number of Staffs: 2

Staff #1
Id   : S1111
Name : Alina Amin
Date : 02-06-2020
Time : 02:00 pm

Number of All Sales   : 2
Number of Promo Sales : 1
Number of Regular Sales: 1

No  Description                               Unit Price(RM)  Discount(RM)  Quantity  Total(RM)
1.  Stabilo Swans 12 Colours (Colour Pencil)    10.40
2.  Smiggle Pencil Case                        45.90          6.88          2         78.03

Total sales = RM109.23

Staff #2
Id   : S2233
Name : Alias Zakaria
Date : 03-06-2020
Time : 08:30 am

No sales data!

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 3

<<< Add Sales >>>

Staff list
1) S1111
2) S2233

Select staff: 2

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

Select product: 3
Quantity: 2

Press 'Y' to continue >> y

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

```



```

Select product: 4
Quantity: 1

Press 'Y' to continue >> n

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 3

<<< Add Sales >>>

Staff list
1) S1111
2) S2233

Select staff: 1

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

Select product: 3
Quantity: 1

Press 'Y' to continue >> y

--- Enter Sale Info ---
1) Casio FX-570MS
2) Stabilo Swans 12 Colours (Colour Pencil)
3) Artline Whiteboard Marker 500A
4) UHU All Purpose Adhesive Glue 20ml (Glue)
5) Smiggle Pencil Case

Select product: 5
Quantity: 3

Press 'Y' to continue >> n

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 4

<<< Staff(s) and Sales Info >>>

Number of Staffs: 2

Staff #1
Id   : S1111
Name : Alina Amin
Date : 02-06-2020
Time : 02:00 am

Number of All Sales   : 4
Number of Promo Sales : 3
Number of Regular Sales: 1

No  Description                                Unit Price (RM)  Discount (RM)  Quantity  Total (RM)
1.  Stabilo Swans 12 Colours (Colour Pencil)  10.40           6.88           3         31.20
2.  Smiggle Pencil Case                       45.90           6.88           2         78.03

```

```

3. Artline Whiteboard Marker 500A          19.90      2.98      1      16.91
4. Smiggle Pencil Case                     45.90      6.88      3     117.05

Total sales = RM243.19

Staff #2
Id   : S2233
Name : Alias Zakaria
Date : 03-06-2020
Time : 08:30 am

Number of All Sales   : 2
Number of Promo Sales : 1
Number of Regular Sales: 1

No  Description                                Unit Price(RM)  Discount(RM)  Quantity  Total(RM)
1.  Artline Whiteboard Marker 500A             19.90          2.98          2        33.83
2.  UHU All Purpose Adhesive Glue 20ml (Glue)   19.90          0.00          1        19.90

Total sales = RM53.73

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 5
Thank you! :)

```

(a) Example output of the first run

```

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 1

<<< Add Staff >>>
Id   : S1111
Name: Alina Hasan
Date [dd-mm-yyyy]: 2-6-2020
Time [hour:min] using 24-hour format: 14:20

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Promotion
Name: Casio AS-120
Price: RM25.60

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

```

```

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Regular
Name: Faber-Castell 0.5mm Blue
Price: RM27
Category: Ball Pen

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 2

<<< Add Product >>>
Type (Promotion/ Regular): Promotion
Name: Swarovski Ballpoint Pen
Price: RM159

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 3

<<< Add Sales >>>

Staff list
1) S1111

Select staff: 1

--- Enter Sale Info ---
1) Casio AS-120
2) Faber-Castell 0.5mm Blue (Ball Pen)
3) Swarovski Ballpoint Pen

Select product: 1
Quantity: 2

Press 'Y' to continue >> y

--- Enter Sale Info ---
1) Casio AS-120
2) Faber-Castell 0.5mm Blue (Ball Pen)
3) Swarovski Ballpoint Pen

Select product: 2
Quantity: 3

Press 'Y' to continue >> y

--- Enter Sale Info ---
1) Casio AS-120
2) Faber-Castell 0.5mm Blue (Ball Pen)
3) Swarovski Ballpoint Pen

Select product: 3
Quantity: 1

Press 'Y' to continue >> n

===== Menu =====
[1] Add Staff

```

```

[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 4

<<< Staff(s) and Sales Info >>>

Number of Staffs: 1

Staff #1
Id   : S1111
Name : Alina Hasan
Date : 02-06-2020
Time : 02:20 pm

Number of All Sales      : 3
Number of Promo Sales    : 2
Number of Regular Sales: 1

No  Description                                Unit Price (RM)  Discount (RM)  Quantity  Total (RM)
1.  Casio AS-120                                25.60           3.84           2         43.52
2.  Faber-Castell 0.5mm Blue (Ball Pen)          27.00                                3         81.00
3.  Swarovski Ballpoint Pen                     159.00          23.85           1        135.15

Total sales = RM259.67

===== Menu =====
[1] Add Staff
[2] Add Product
[3] Add Sales
[4] Display Sales
[5] Exit
=====

Select task: 5
Thank you! :)

```

(b) Example output of the second run

Figure 2: Example runs of program