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_ matricsNo_section.cpp*** (for interim submission) and ***FinalAnsSECJ1023_Name_ matricsNo_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**.

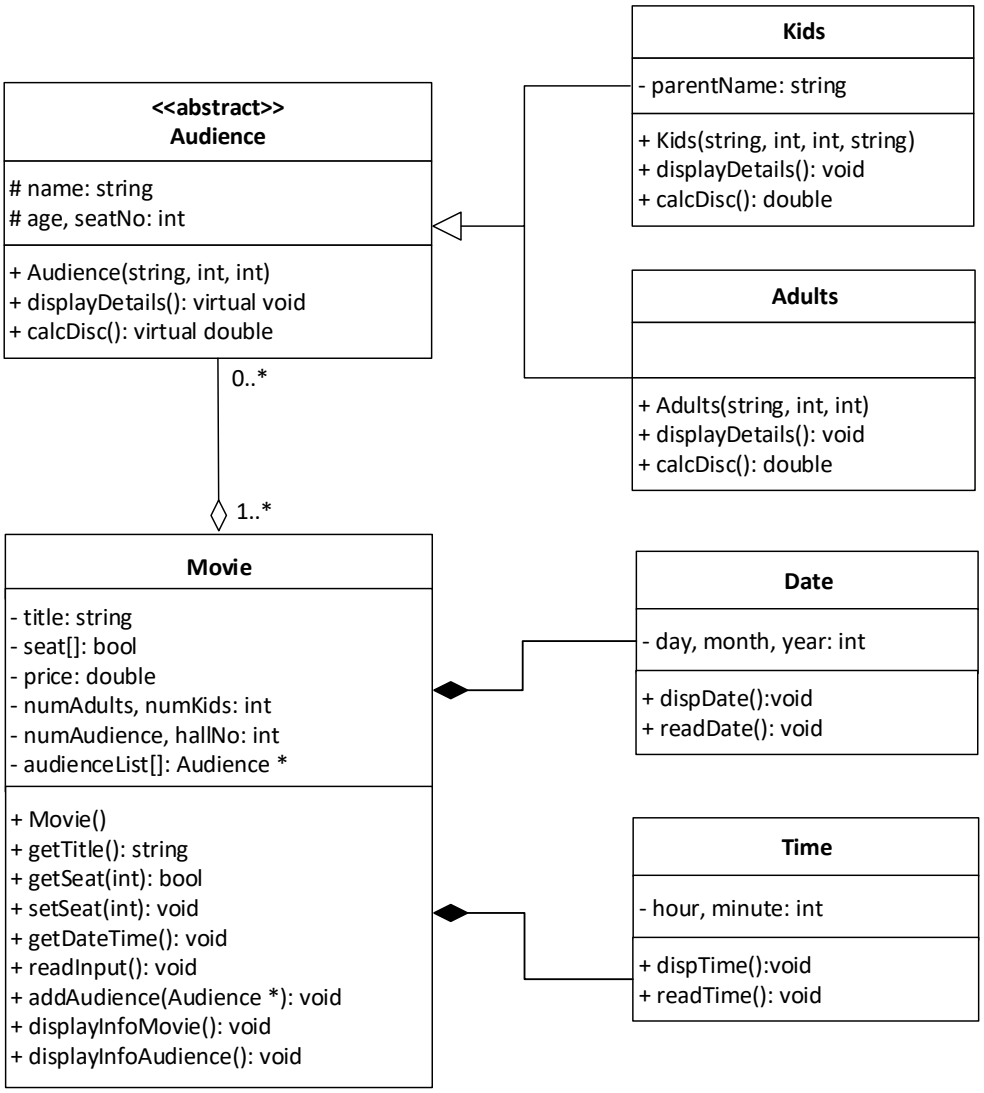

Figure 1: UML class diagram

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

a) **`displayDetails`**: to display an audience's name and age onto the screen in the following format (please refer to the sample output given in **Figure 2**):

```
????? ?????    ##
```

b) **`calcDisc`**: is a pure **`virtual`** function.

Task 2: (7.5 Marks)

a) Specify the **`Adults`** class as a child of the **`Audience`** class.

The **`Adults`** class has three member functions:

b) Constructor with arguments: to initialize all the parent's attributes.

c) **`calcDisc`**: to return 20% discount received by a senior citizen. The age of senior citizen is 60 years or higher.

d) **`displayDetails`**: to display an audience's name, age, hyphen symbol (-) and seat number 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: (8 Marks)

a) Specify the **`Kids`** class as a child of the **`Audience`** class.

The **`Kids`** class has three member functions:

b) Constructor with arguments: to initialize all the member attributes for the class, including the parent's attributes.

c) **`calcDisc`**: to return 100% discount received by an infant. The age of infant is 2 years or less. It is also return 20% discount received by a kid. The kid is the audience 12 years of age or less.

d) **`displayDetails`**: to display an audience's name, age, parent name and seat number 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 4: (19.5 Marks)

In **`Movie`** class, do the following tasks:

a) Define all the member variables of the class.

b) Complete the **`readInput`** function definition. The function reads the values from the keyboard for title, hall number, ticket price, date and time of the movie. It needs to invoke the **`readDate`** and **`readTime`** functions.

c) Complete the **`addAudience`** function definition. The function assigns the element in the array of **`Audience`** pointers with the passed argument. It also updates the number of adults, kids and all audiences.

d) Complete the **`displayInfoMovie`** function definition. The function displays the title, hall number, date, time and ticket price of the movie in the following format (please refer to the sample output given in **Figure 2**):

```
Title: ????? ?????
Hall : #
Date : ##-##-####
Time : ##:## ??
Price: RM##.##
```

e) Complete the **`displayInfoAudience`** function definition. The function displays the information of all the audiences in the following format (please refer to the sample output given in **Figure 2**):

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

Task 5: (25.5 Marks)

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

a) Enter the task chosen.

b) In **`case 1`**:

- Enter the details of movie.
- Add the **`Movie`** object into the **`Movie`** array.

c) In **`case 2`**:

- Display the list of movies' title along with its date and time.
- Check the seat availability for the audience more than 2 years old. If the seat is available, update the status of the seat.

- Dynamically allocates a new audience (an adult or a kid) object. The kid is the audience 12 years of age or less. ***Hint:*** Use a polymorphic concept.
- Add the audience to the selected **`Movie`** object.

d) In **`case 3`**, display the list of movies' details.

e) In **`case 4`**, display the list of audiences' details based on the movie.

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 Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 3
Sorry!! No movie data to display...

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

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

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 1

<<< Add Movie >>>
Title: Jumanji 2
```

```
Hall : 3
Ticket Price: RM28
Date [dd-mm-yyyy]: 30-5-2020
Time [hour:min] using 24-hour format: 11:30

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 2

<<< Add Audience >>>

Movie list
1) Jumanji 2 (30-05-2020, 11:30 am)

Select movie: 1

--- Enter Audience Info ---
Name   : Afiqah Salim
Age    : 28
Seat No: 4

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Auni Nazri
Age    : 2
Parent Name: Afiqah Salim

Press 'Y' to continue >> n

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 4

<<< Movie(s) and Audience(s) Info >>>

Number of Movies: 1

Movie #1
Title: Jumanji 2
Hall : 3
Date : 30-05-2020
Time : 11:30 am
Price: RM28.00

Number of Audience: 2
Number of Adults  : 1
Number of Kids    : 1

No  Name                    Age    Parent Name             Seat No  Ticket (RM)
1.  Afiqah Salim            28     -                       4        28.00
2.  Auni Nazri              2      Afiqah Salim            4        0.00

Total ticket price = RM28.00

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
```

```
==========================

Select task: 1

<<< Add Movie >>>
Title: Frozen 2
Hall : 4
Ticket Price: RM24
Date [dd-mm-yyyy]: 30-5-2020
Time [hour:min] using 24-hour format: 16:05

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 1

<<< Add Movie >>>
Title: Jumanji 2
Hall : 5
Ticket Price: RM30
Date [dd-mm-yyyy]: 31-5-2020
Time [hour:min] using 24-hour format: 22:15

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 3

<<< Movie Info >>>

Number of Movies: 3

Movie #1
Title: Jumanji 2
Hall : 3
Date : 30-05-2020
Time : 11:30 am
Price: RM28.00

Movie #2
Title: Frozen 2
Hall : 4
Date : 30-05-2020
Time : 04:05 pm
Price: RM24.00

Movie #3
Title: Jumanji 2
Hall : 5
Date : 31-05-2020
Time : 10:15 pm
Price: RM30.00

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 2
```

```
<<< Add Audience >>>

Movie list
1) Jumanji 2 (30-05-2020, 11:30 am)
2) Frozen 2 (30-05-2020, 04:05 am)
3) Jumanji 2 (31-05-2020, 10:15 am)

Select movie: 3

--- Enter Audience Info ---
Name   : Arif Irfan
Age    : 15
Seat No: 6

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Hakim Irfan
Age    : 20
Seat No: 6
Seat unavailable, choose others!

Seat No: 7

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Irfan Hanif
Age    : 60
Seat No: 8

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Haikal Irfan
Age    : 2
Parent Name: Irfan Hanif

Press 'Y' to continue >> n

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audiences
[5] Exit
==========================

Select task: 2

<<< Add Audience >>>

Movie list
1) Jumanji 2 (30-05-2020, 11:30 am)
2) Frozen 2 (30-05-2020, 04:05 am)
3) Jumanji 2 (31-05-2020, 10:15 am)

Select movie: 1

--- Enter Audience Info ---
Name   : Lisa Amin
Age    : 24
Seat No: 5

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Hanif Ayob
Age    : 26
Seat No: 4
```

```
Seat unavailable, choose others!

Seat No: 6

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Latif Hanif
Age    : 1
Parent Name: Hanif Ayob

Press 'Y' to continue >> n

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 4

<<< Movie(s) and Audience(s) Info >>>

Number of Movies: 3

Movie #1
Title: Jumanji 2
Hall : 3
Date : 30-05-2020
Time : 11:30 am
Price: RM28.00

Number of Audience: 5
Number of Adults  : 3
Number of Kids    : 2

No  Name                    Age    Parent Name             Seat No  Ticket (RM)
1.  Afiqah Salim            28     -                       4        28.00
2.  Auni Nazri              2      Afiqah Salim            4        0.00
3.  Lisa Amin               24     -                       5        28.00
4.  Hanif Ayob              26     -                       6        28.00
5.  Latif Hanif             1      Hanif Ayob              6        0.00

Total ticket price = RM84.00


Movie #2
Title: Frozen 2
Hall : 4
Date : 30-05-2020
Time : 04:05 am
Price: RM24.00

No audience!

Movie #3
Title: Jumanji 2
Hall : 5
Date : 31-05-2020
Time : 10:15 am
Price: RM30.00

Number of Audience: 4
Number of Adults  : 3
Number of Kids    : 1

No  Name                    Age    Parent Name             Seat No  Ticket (RM)
1.  Arif Irfan              15     -                       6        30.00
2.  Hakim Irfan             20     -                       7        30.00
3.  Irfan Hanif             60     -                       8        24.00
4.  Haikal Irfan            2      Irfan Hanif             8        0.00

Total ticket price = RM84.00
```

```
========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 5
Thank you! :)
```

(a) Example output of the first run

```
========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 1

<<< Add Movie >>>
Title: Jumanji
Hall : 3
Ticket Price: RM28
Date [dd-mm-yyyy]: 30-5-2020
Time [hour:min] using 24-hour format: 16:05

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 2

<<< Add Audience >>>

Movie list
1) Jumanji (30-05-2020, 04:05 pm)

Select movie: 1

--- Enter Audience Info ---
Name   : Abu Ali
Age    : 25
Seat No: 6

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Ani Ali
Age    : 23
Seat No: 5

Press 'Y' to continue >> y

--- Enter Audience Info ---
Name   : Aydin Abu
Age    : 2
Parent Name: Abu Ali

Press 'Y' to continue >> n

========== Menu ==========
```

```
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 3

<<< Movie Info >>>

Number of Movies: 1

Movie #1
Title: Jumanji
Hall : 3
Date : 30-05-2020
Time : 04:05 am
Price: RM28.00

========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 4

<<< Movie(s) and Audience Info >>>

Number of Movies: 1

Movie #1
Title: Jumanji
Hall : 3
Date : 30-05-2020
Time : 04:05 am
Price: RM28.00

Number of Audience: 3
Number of Adults  : 2
Number of Kids    : 1

No  Name                    Age    Parent Name             Seat No  Ticket (RM)
1.  Abu Ali                 25     -                       6        28.00
2.  Ani Ali                 23     -                       5        28.00
3.  Aydin Abu               2      Abu Ali                 5        0.00

Total ticket price = RM56.00


========== Menu ==========
[1] Add Movie
[2] Add Audience
[3] Display Movies
[4] Display Audience
[5] Exit
==========================

Select task: 5
Thank you! :)
```

(b) Example output of the second run

Figure 2: Example runs of program