Tutorial Letter 103/1/2019

Introduction to Programming I
COS1511

Semester 1

School of Computing

This tutorial letter contains Assignment 2 for Semester 1.

BARCODE

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1 INTRODUCTION

Dear student,

Because this is a blended online module, you need to go online to see your study materials and read what to do for the module. Go to the *myUnisa* website here: https://my.unisa.ac.za and login with your student number and password. You will see **COS1511-18-S1** (for the first semester) or **COS1511-18-S2** (for the second semester) in the row of modules in the orange blocks across the top of the webpage. Click on the module you want to open.

2 Due dates of assignments

The table below gives the due dates of the assignments for this module.

1st semester			
Assignment	**Due Date**	**Unique number**	**Weight**
1	**25 March 2019**	**893614**	**50%**
2	**26 April 2019**	**888984**	**50%**

3 Submission of assignments

To submit an assignment through *myUnisa*:

- go to *myUnisa*
- log in with your student number and password
- select the module
- click on assignments in the menu on the left-hand side of the screen
- click on the assignment number that you wish to submit
- follow the instructions

PLEASE NOTE: Assignments can be tracked (e.g. whether or not the University has received your assignment or the date on which an assignment was returned to you) on *myUnisa*.

Please note that You must submit at least 1 assignment ON TIME in order to gain examination admission. It will be to your own advantage to check after a few days whether the assignment has been registered on the system. If you have not completed the assignment by the due date, submit whatever you have completed – you will get marks for everything that you have done.

If you want to submit the assignment electronically and *myUnisa* is off-line during that time, you need not contact us, because we will be aware of it. Simply submit it as soon as *myUnisa* is available again.
Note the assignment unique number below – if you submit through *myUnisa* you will be asked to enter it. If you submit by post, please fill it in where it is requested on the mark reading sheet.

4 Assignment 2: 1st semester

SUBMISSION: **PDF document** electronically via *myUnisa*.

DUE DATE	**26 April 2019**
UNIQUE NUMBER	**888984**
EXTENSION	**There is NO extension for this assignment.**
TUTORIAL MATTER	**Study Guide, Lessons 1 – 29**
CONTRIBUTION WEIGHT TO SEMESTER MARK	**50%**

Assignment 2 Question	**(100)**

Introduction

You are required to write a program that simulates a flight booking system.

A sample program execution is provided at the end of the document, to help you visualize and understand what the program should do. You should use the same input as the sample program, for the screenshots that you submit with your assignment. The flight route is from **Johannesburg** to **Cape Town** with the travel duration **fixed** at **2 ½ hours**.

- Departure and arrival locations remain the same.
- Departure is always from Johannesburg and destination is always Cape Town.

The departure and arrival times are:

Option	Departure Time	Arrival Time
1	7:00	9:30
2	9:00	11:30
3	11:00	13:30
4	13:00	15:30
5	15:00	17:30

The seating arrangement is six seats in a row, three on the left side and three on the right side of the plane with a walkway (passage) in between. See the image of the setup below.

(image source: http://travelgurureviews.com/kulula-com-reviews/airline-reviews/)

- The total number of seats in the flight is 50.

- There are two classes of travel: **First Class** and **Economy** class.
- The **front four rows** are considered as **'First Class'** and all other rows to the back are 'Economy Class'.
- The cost for economy class is fixed at **R 1 600.00**.
- The first class travel ticket is **20% more** costly than the economy class.

Questions

You are required to do the following. (See the sample output screenshots for clarification).
Write a program that will do the following:

1. Prompt (ask) the user to enter his/her full name.

```
Welcome to COS1511 Flight Booking system

Enter full name
Hannah George
```

2. Then display a menu showing the available times for the flight.
   - The user can choose a preferred departure time (option 1 -5).
   - The option selected should be validated for 1-5.

```
Welcome to COS1511 Flight Booking system

Enter full name
Hannah George

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
9
Incorrect option! Please choose from  1-5.
```

Validation for time option chosen

3. If the user has entered a valid option, the **seating arrangement** for that particular flight time should be displayed to the user for the user to choose a seat.

```
The available seats for 7.00 are as follows:
First Class(1920.00)
|A1|A2|A3|----  |A4|A5|A6|
|B1|B2|B3|----  |B4|B5|B6|
|C1|C2|C3|----  |C4|C5|C6|
|D1|D2|D3|----  |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|----  |E4|E5|E6|
|F1|F2|F3|----  |F4|F5|F6|
|G1|G2|G3|----  |G4|G5|G6|
|H1|H2|H3|----  |H4|H5|H6|
|I1|I2|
Please key in a seat number to choose a seat(eg:A2)
A1
```

If any seats have **already been booked** for that time, the booked seats should be indicated and displayed using **"**"**.

- The user can then choose a suitable seat number **that is available**.
- The seat number should be **validated** to see if it **has already been booked**.
- In other words, if the user enters a seat number that is already booked, display a user-friendly message and give the option to enter the seat number again.

```
The available seats for 7.00 are as follows:
First Class(1920.00)
|**|A2|A3|---- |A4|A5|A6|
|B1|B2|B3|---- |B4|B5|B6|
|C1|C2|C3|---- |C4|C5|C6|
|D1|D2|D3|---- |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|---- |E4|E5|E6|
|F1|F2|F3|---- |F4|F5|F6|
|G1|G2|G3|---- |G4|G5|G6|
|H1|H2|H3|---- |H4|H5|H6|
|I1|I2|

Seats that are already taken are indicated with an asterisk
Please key in a seat number to choose a seat(eg:A2)
G3
```

Booked seats indicated with **"**"**

4. Once the user has **successfully chosen** an available seat, a **Flight booking ticket** should be displayed on the screen.
   - Check the sample screenshot for the details that need to be displayed on the ticket.

```
************************
Travel ticket for FLIGHT
************************
Name            :  Hannah George       Travel Ticket class :  First class
                                       Seat No             :  A1
Departure       :  Johannesburg        Departure Time      :  7.00
Destination     :  Cape Town           Arrival Time        :  9.30
**********************
Amount:R1920.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
**********************
```

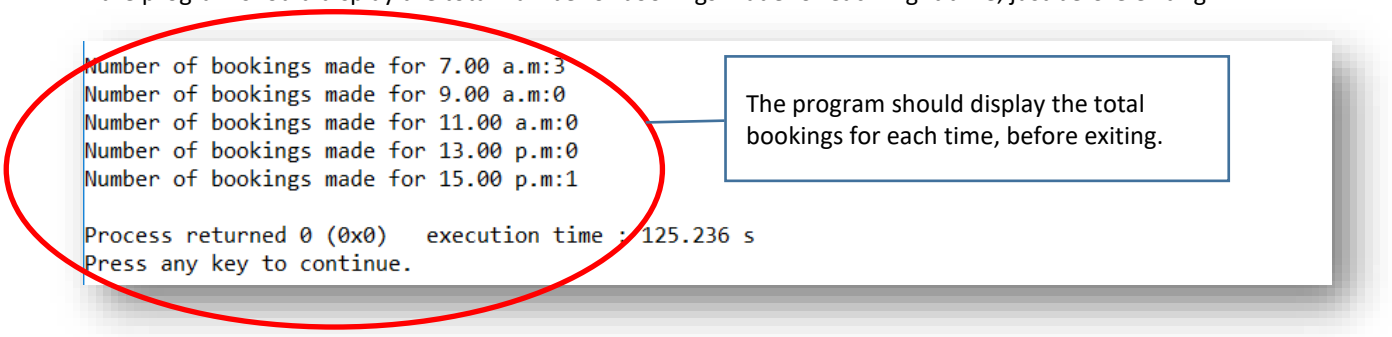
5. The program should prompt (ask) the user if they would like to make additional bookings?
   - Then the program should be able to repeat for more than one booking with various flight times.
   - The check for 'y' or 'n' at the "Do you want to continue(Y/N)?" prompt should be case-insensitive. In other words, both 'Y' and 'y' should be accepted or both 'N' and 'n' should be accepted.

```
************************
Travel ticket for FLIGHT
************************
Name            :  Hannah George       Travel Ticket class :  First class
                                       Seat No             :  A1
Departure       :  Johannesburg        Departure Time      :  7.00
Destination     :  Cape Town           Arrival Time        :  9.30
**********************
Amount:R1920.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
**********************
Do you want to make another booking(Y/N)?
Y
Welcome to COS1511 Flight Booking system

Enter full name
Deon Pieters

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
1
```

6. When the user has finished all the booking and chosen 'N' or 'n' at the "Do you want to continue(Y/N)?" prompt, the program should display the total number of bookings made for each flight time, just before exiting.



Submit the full program code and output screenshots. Include screenshots in your submission showing:

- **the program repeating;**
- **input validations;**
- **booking for different flight times.**

You are required to define and use functions to do the following:

- Display the **menu for flight times**, accept the user option and validate the user option.
  - Call the function to **validate the menu option** from here.
- **Validate the menu option** for flight times.
- Display the **seating arrangement** (You might have to use two different functions for seat display).
  - ie. before any booking has been made, you have one seating arrangement with all the seats available. After seats are booked, you have to display the booked seats with "**").
- **Validate** the availability of the chosen seat (to check if the seat has been already booked or not).
  - You DO NOT have to do validation for an invalid entry like Z3. We assume that the user enters a valid seat number that is displayed on the screen. You only need to check if it has been already booked or not.
- **Calculate the ticket price**.(You are allowed to use a global named constant for the price of economy class, however, wherever you have to display the cost of ticket, you need to use this function to determine the price of the ticket.
  - For instance, when you show the amount in the ticket that is displayed as output for each booking made.
- **Display the ticket**, as shown in the sample output, for each booking. The function used to calculate ticket price can be called from this function.

DO NOT use global variables. Except that you are only allowed to use global named constants for the following:

- Cost of economy class ticket.
- An array for storing departure times and arrival times.
- For the size of any other arrays you might use.

DO NOT use classes to write this program (you should be able to write this program with the help of other data structures that you have learnt).

Additional information/ Hints:

- You need to store the details of a particular booking, because you have to display the booked seats in the seating arrangement with "**", when the program repeats.
- Therefore, you need to think in the direction of storing the details of one booking which are of different data types, in one place.
- Again, if you are making more than one booking, then you have to store the details of various bookings in an array. Apply what you have learnt and use appropriate data types and data structures.

- If you want to display the seat number as a combination of letter and number as in A1, A2 etc, then you can use the `to_string()` function to convert the integer to string and concatenate. For example:

```
char row = 'A';
int col = 1;
string sNo = "";
sNo += row;
sNo += to_string(col);
```

Sample Program output (from one execution of the program without exiting):

```
Welcome to COS1511 Flight Booking system

Enter full name
Hannah George

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
9
Incorrect option! Please choose from  1-5.
1

The available seats for 7.00 are as follows:
First Class(1920.00)
|A1|A2|A3|----  |A4|A5|A6|
|B1|B2|B3|----  |B4|B5|B6|
|C1|C2|C3|----  |C4|C5|C6|
|D1|D2|D3|----  |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|----  |E4|E5|E6|
|F1|F2|F3|----  |F4|F5|F6|
|G1|G2|G3|----  |G4|G5|G6|
|H1|H2|H3|----  |H4|H5|H6|
|I1|I2|
Please key in a seat number to choose a seat(eg:A2)
A1
```

Validation for time option chosen

```
************************
Travel ticket for FLIGHT
************************
Name           :  Hannah George       Travel Ticket class :  First class
                                      Seat No             :  A1
Departure      :  Johannesburg        Departure Time      :  7.00
Destination    :  Cape Town           Arrival Time        :  9.30
**********************
Amount:R1920.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
**********************
Do you want to make another booking(Y/N)?
Y
Welcome to COS1511 Flight Booking system

Enter full name
Deon Pieters

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
1

The available seats for 7.00 are as follows:
First Class(1920.00)
|**|A2|A3|---- |A4|A5|A6|
|B1|B2|B3|---- |B4|B5|B6|
|C1|C2|C3|---- |C4|C5|C6|
|D1|D2|D3|---- |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|---- |E4|E5|E6|
|F1|F2|F3|---- |F4|F5|F6|
|G1|G2|G3|---- |G4|G5|G6|
|H1|H2|H3|---- |H4|H5|H6|
|I1|I2|

Seats that are already taken are indicated with an asterisk
Please key in a seat number to choose a seat(eg:A2)
G3
************************
Travel ticket for FLIGHT
************************
Name           :  Deon Pieters        Travel Ticket class :  Economy class
                                      Seat No             :  G3
Departure      :  Johannesburg        Departure Time      :  7.00
Destination    :  Cape Town           Arrival Time        :  9.30
**********************
Amount:R1600.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
**********************
Do you want to make another booking(Y/N)?
Y
```

Ticket display for a booking

Seats booked should be indicated with "**"

```
Welcome to COS1511 Flight Booking system

Enter full name
Jim Baker

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
1

The available seats for 7.00 are as follows:
First Class(1920.00)
|**|A2|A3|----  |A4|A5|A6|
|B1|B2|B3|----  |B4|B5|B6|
|C1|C2|C3|----  |C4|C5|C6|
|D1|D2|D3|----  |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|----  |E4|E5|E6|
|F1|F2|F3|----  |F4|F5|F6|
|G1|G2|**|----  |G4|G5|G6|
|H1|H2|H3|----  |H4|H5|H6|
|I1|I2|

Seats that are already taken are indicated with an asterisk
Please key in a seat number to choose a seat(eg:A2)
A1
Sorry, the seat is taken. Please choose a seat that is available
D6
************************
Travel ticket for FLIGHT
************************
Name           :  Jim Baker          Travel Ticket class :  First class
                                     Seat No             :  D6
Departure      :  Johannesburg       Departure Time      :  7.00
Destination    :  Cape Town          Arrival Time        :  9.30
**********************
Amount:R1920.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
**********************
Do you want to make another booking(Y/N)?
Y
Welcome to COS1511 Flight Booking system

Enter full name
Fiona Bruce

The available travel times for flights are:
    Depart      Arrive
1.  7.00        9.30
2.  9.00        11.30
3.  11.00       13.30
4.  13.00       15.30
5.  15.00       17.30
Choose the time by entering the option number from the displayed list:
5
```

Two seats booked for 7:00 am flight

A1 was already booked for 7:00 am flight. So display an appropriate message that the seat has already been taken.

```
The available seats for 15.00 are as follows:
First Class(1920.00)
|A1|A2|A3|---- |A4|A5|A6|
|B1|B2|B3|---- |B4|B5|B6|
|C1|C2|C3|---- |C4|C5|C6|
|D1|D2|D3|---- |D4|D5|D6|
|Economy class(1600.00)
|E1|E2|E3|---- |E4|E5|E6|
|F1|F2|F3|---- |F4|F5|F6|
|G1|G2|G3|---- |G4|G5|G6|
|H1|H2|H3|---- |H4|H5|H6|
|I1|I2|
Please key in a seat number to choose a seat(eg:A2)
I2
************************
Travel ticket for FLIGHT
************************
Name           :  Fiona Bruce         Travel Ticket class :  Economy class
                                      Seat No             :  I2
Departure      :  Johannesburg        Departure Time      :  15.00
Destination    :  Cape Town           Arrival Time        :  17.30
************************
Amount:R1600.00 Thank you for booking with COS1511. Your travel agent for queries is Annie Mathew
************************
Do you want to make another booking(Y/N)?
n

Number of bookings made for 7.00 a.m:3
Number of bookings made for 9.00 a.m:0
Number of bookings made for 11.00 a.m:0
Number of bookings made for 13.00 p.m:0
Number of bookings made for 15.00 p.m:1

Process returned 0 (0x0)   execution time : 125.236 s
Press any key to continue.
```

A different flight time chosen, and a corresponding display. No bookings were made for this time, so all seats available.

The program should display the total bookings for each time, before exiting.

[TOTAL: 100 Marks]

Assignment 2 - Evaluation rubric:

Program features	**Marks (Total 100)**
Use of appropriate header files	2
Demonstration of the use of named constants	2
Use of an appropriate data structure (this might vary depending on the logic)	5
Function to validate flight time option chosen by the user	4
Function to validate booked seats - (2 marks for the header, 4 for the logic)	6
Function to display time options. This function displays the menu for flight times, reads the time option from the user and validates the option within this function.	9

- 2 marks for header - 4 marks for using a loop on the two-dimensional array for flight times and displaying the menu. If the menu is displayed without the use of a loop, **reduce 2 marks** - 2 marks for the validation loop, to validate the option entered by the user - 1 mark for a user friendly message , if the option is wrong **Note:- the function to validate flight time option should be called from this function to validate the option entered by the user.**	
Function to display seats for any flight time for the first time(ie., with all seats available) - 2 marks for showing the headings for 'First Class' and 'Economy Class' correctly in the seat display - 2 marks for showing the ticket price against the headings of the travel class - 6 marks for a concise, sensible logic that **uses control structures** to display a neat seating arrangement. In other words, we do not expect to see numerous `cout` statements repeated for the seat display.	10
Function to display seats for any flight time after some bookings have been made (ie., seats booked should be indicated with "**") - 2 marks for the display - 3 marks for calling the validation function to validate seats - 5 marks for the logic to display the seating arrangement, with seats booked marked with ** **Note:- the function to validate seat can be called here on each seat to check if it has been already booked or not. If a seat is booked mark it with "**" otherwise display the seat no.**	10
Function to determine ticket cost based on the class of travel(first class or economy class) - The price of first class ticket should be calculated as 20 % more than the economy class. Note that you are allowed to store the price of the economy class as a global constant. - If a static value of R1920(ie., without showing the calculation) is used for first class ticket, then **reduce 2 marks**	5
Function to display ticket - 1 mark for the function header - 2 marks for the logic to get the travel class(first or economy) correct based on the seat chosen - 2 marks for calling the function to calculate ticket price. - 3 marks for displaying all the information on the ticket	8
The main() - For valid variable declarations – 2 marks - For reading full name – 1 mark - For the validation loop to check if a seat no. entered by the user is already taken or not, and if taken display an appropriate message – 2 marks **(Note:- the function to validate seat should be called here).** - For repeating the program for various bookings, acceptance of case-insensitive response at the 'continue' prompt – 3 marks - Logic for displaying the counts at the end, once the program exits – 3 marks - For the various function calls and rest of the logic – 5 marks	16
Output formatting (for eg: neat display of the travel ticket, seat arrangement etc)	3
YOU WILL GET THE FOLLOWING MARKS FOR THE CORRECT USE OF AT LEAST ONE OF EACH:	
- two-dimensional array – 2 marks - one-dimensional array – 2 marks - void function with reference parameter(s) – 2 marks	20

- value-returning function – 2 marks - void function with value parameter(s) – 2 marks - 'if' construct for decision-making – 2 marks - switch construct for decision-making – 2 marks - while loop construct – 1 mark - do…while loop construct – 2 marks - for loop construct – 2 marks - use of array as function argument - 1	