



FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE & SOFTWARE ENGINEERING

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| MODULE | IFM01A1 / IFM1A10 INTRODUCTION TO ALGORITHM DEVELOPMENT (VB) |
| CAMPUS | APK |
| EXAM | JULY 2014 (SSA) – PAPER C |

DATE July 2014

SESSION

ASSESSORS

DR WS LEUNG
MR M CILLIERS

INTERNAL MODERATOR

MR D COTTERRELL

DURATION 3 HOURS

MARKS 100

- This question paper consists of 4 pages (including this cover page).
- Ensure that you are seated at the computer that has been assigned to you.
- Your Visual Basic solution should follow the format CXXX_YYYYYYYY where X represents your computer number and Y represents your student number (e.g. student 201400001 sitting at computer number 10 will name his/her project C010_201400001).
- The first 20 minutes are reserved for design.
- Answer ALL questions (a-h)
- Read through and complete your details in both the Student Declaration below as well as the marksheet on page 4 when you are ready to submit your solution.

STUDENT DECLARATION – TO BE COMPLETED UPON SUBMISSION OF SOLUTION

I, the student whose details appear below, declare that:

1. A **verified** zip file containing the full and final version of my Visual Basic 2012 solution that I intend to submit for marking has been uploaded to Eve;
2. The abovementioned Visual Basic 2012 solution has also been saved to CD / USB memory stick (*delete whichever is not applicable*) as backup;
3. I acknowledge that failure to properly verify that the solution submitted is the full and final solution I intend to submit can result in the forfeiture of marks; and
4. I am aware that non-compiling solutions will be capped at 40%.

| | | | | | | | | | | | | | |
|-------------------|--|--|--|--|--------------|--|--|--|------------------|-------|------|--|--|
| Student #: | | | | | | | | | | | | | |
| Signature: | | | | | PC #: | | | | Class: | Alpha | Beta | | |
| ID #: | | | | | | | | | | | | | |
| or | | | | | | | | | | | | | |
| Surname: | | | | | | | | | Initials: | | | | |

REMEMBER TO SAVE REGULARLY
SAVE ONLY TO THE T:\ DRIVE
USE ONLY THE SAVE ALL BUTTON TO AVOID SAVING TO OTHER LOCATIONS
THE MARK SHEET ON PAGE 4 FORMS PART OF THIS QUESTION

Will Shakespeare is the creative director of the Globe Theatre and is therefore responsible for producing amazing Plays that puts “bums on seats” throughout the different Theatre Seasons. He has been asked by the Executive Board of the Globe Theatre to present a report detailing how well he has fared for the past few Seasons. As his apprentice, you have been tasked with the important job of designing and developing a Visual Basic (while adhering to the principles of quality software known to you) application that will assist him in generating the necessary figures required for Director Shakespeare’s report to the Board.

Unless indicated otherwise, all output must be displayed using a single UJGrid control.

- a) The following data must be stored for each Theatre Season (and their Plays) in the form of records:

| Field | Example Data |
|--|----------------|
| 1. Season Name | "Winter 2014" |
| 2. Number of Performances | 35 |
| 3. The following information for each of the Season’s Plays: | |
| i. Play Name | "Richard III" |
| ii. Tickets Sold for each the 3 (three) Ticket Categories | 100, 90, 28 |
| iii. Total Ticket Income | See Question f |
| 4. Index of Best Play of Season | See Question g |

- b) Allow the user to input the application’s initial values. These are:

- Number of Theatre Seasons
- Number of Plays per Season
- Base Price of a Ticket (e.g. 125.50)

The initial values are to ensure that the application can handle any number of Theatre Seasons, and any number of Plays per Theatre Season. You may assume that:

- i. Each Theatre Season has the same number of Plays; and
- ii. Each Play has three (3) Ticket Categories, namely Category A, Category B, and Category C.

- c) Ask the user to input the necessary input data for each Theatre Season (and their Plays) into records. **DO NOT ATTEMPT TO DISPLAY record fields 3ii.**

- d) Write a **subroutine** called CalcAdjustPrice that will be used to calculate the Adjusted Ticket Price based on the Base Price. It accepts parameters in the order of BasePrice (Double), and CatATickets (Integer), “returning” a Double value calculated using a Select Case structure as follows:

| CatA Tickets Is... | Value To Return |
|--------------------|---|
| More than 120 | BasePrice x 1.5 (Multiply the BasePrice by 1.5) |
| 75 to 120 | BasePrice x 1.2 (Multiply the BasePrice by 1.2) |
| 0 to less than 75 | BasePrice (Return the BasePrice as is) |

- e) Write a **function** called CalcTotalTicketIncome that accepts four parameters in the order of Price (Double), CatA (Integer), CatB (Integer), and CatC (Integer) and returns a Double value that is calculated as follows:

$$+ \begin{array}{l} \text{CatA} \times \text{Price} \\ \text{CatB} \times (\text{Price} \times 2) \\ \text{CatC} \times (\text{Price} \times 3) \end{array}$$

- f) For each Season, calculate, store (in record field 3iii), and display the Total Ticket Income of each Play. The Total Ticket Income is determined by summing the incomes from each of the 3 Ticket Category as follows:

| Ticket | Number of Tickets Sold | Price of Single Ticket |
|------------|-------------------------------|---------------------------------------|
| Category A | Element 1 of record field 3ii | Adjusted Ticket Price |
| Category B | Element 2 of record field 3ii | Twice the Adjusted Ticket Price |
| Category C | Element 3 of record field 3ii | Three times the Adjusted Ticket Price |

Hint: The CalcAdjustPrice subroutine (which is dependent on the base ticket price (input by user) and number of Category A tickets sold), must be used to obtain the Adjusted Ticket Price before using the CalcTotalTicketIncome function to obtain the Total Ticket Income.

- g) For each Season, calculate and store (in record field 4) the index of the Best Play. This is the Play that had the highest Total Ticket Income of that Season. Display the best plays' names.
- h) An additional nice touch for Director Shakespeare would be to show that the income from ticket sales have been on the increase. Determine if this is the case i.e. determine if the Total Ticket Income (record field 3iv) of each Season's best Play (record field 4) is increasing from Season to Season. Display the answer in a textbox.

Please note that no further marks will be awarded for Correct Execution from the point a program terminates unexpectedly – a program that is able to execute up to Question d) may qualify (subject to correctness of code) for Correct Execution marks up to Question d).

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| Student #: | | | | | | | | | | PC #: | | | |
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--- SECTION BELOW TO BE COMPLETED BY THE EXAMINER ONLY ---

| Mark Allocation | | E | M | Total |
|---|---|---|---|------------|
| 0.1 | Design Input, Output, Events, Actions, Variables, Record structures, Interface, Algorithms | | | 5 |
| 0.2 | Implementation of Interface | | | 2 |
| 0.3 | Option Statements | | | 1 |
| 0.4 | Effective use of subroutines | | | 1 |
| 0.5 | Commenting | | | 1 |
| A.1 | Definition of Play record structure | | | 4 |
| A.2 | Definition of Season record structure | | | 6 |
| B.1 | Input of number of Seasons, Plays, and the Base Ticket Price | | | 3 |
| B.2 | Set up of dynamic arrays | | | 5 |
| B.3 | Set up UJGrid control | | | 2 |
| B.4 | Labelling of UJGrid control | | | 3 |
| C.1 | Input of data for each Season (including info for each Play) | | | 7 |
| D.1 | CalcAdjustPrice subroutine | | | 5 |
| E.1 | CalculateTotalTicketIncome function | | | 5 |
| F.1 | Calculation of Total Ticket Income Per Play Per Season | | | 5 |
| F.2 | Display of Total Ticket Income Per Play Per Season | | | 3 |
| F.3 | Correct | | | 8 |
| G.1 | Calculation of Name of Best Play Per Season | | | 8 |
| G.2 | Display of Name of Best Play Per Season | | | 1 |
| G.3 | Correct | | | 9 |
| H.1 | Calculation of Increasing Ticket Income | | | 7 |
| H.2 | Display of Outcome of Increasing Ticket Income Evaluation | | | 1 |
| H.3 | Correct | | | 8 |
| TOTAL | | | | 100 |
| Cap Mark at 40%? (Solution does not Compile) | | | | |

| | | | | | |
|------------------------|-------------------------------|-----------------------------------|--------------------|---------------------|--|
| Status: | Reference Modification Req | Previous Compile Execution Req | Normal termination | Crashes at Question | |
| Other Comments: | | | | | |
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| (E) Examiner: | | (M) Moderator: | |
| Name in print: | | | D Cotterrell |