BIT502 Fundamentals of Programming

Assignment 3

Due date: Please refer to your study plan.

Weight: 40%.

This tutor-marked assignment covers topics in Modules 1, 2, 3, 4, 5 and 6.

Weighting

This assignment is worth 40% of your total course mark.

Assignment	Learning outcomes	Contribution to total course mark	Weighting of assignment part	Learning outcome per question
Tutor-marked assignment 1	LO1: Identify and select techniques for problem solving and will develop critical thinking, abstract reasoning and systems thinking LO2: Explain the concepts of programming and apply the fundamental constructs and principles to create simple programmes LO3: Describe the principles of interaction design and human computer interaction (HCI) LO4: Develop applications utilizing an industry standard integrated development environment (IDE)	20%	See Tutor-marked assignment 1	

Assignment	Learning outcomes	Contribution to total course mark	Weighting of assignment part	Learning outcome per question
Tutor-marked assignment 2	LO1: Identify and apply techniques for problem solving and will develop critical thinking, abstract reasoning and systems thinking LO2: Explain the concepts of programming and apply the fundamental constructs and principles to create simple programs LO4: Develop applications utilizing an industry standard integrated development environment (IDE) LO5: Describe the principles of software implementation, including user testing and deployment	40%	See Tutor-marked assignment 2	

Assignment	Learning outcomes	Contribution to total course mark	Weighting of assignment part	Learning outcome per question
Tutor-marked assignment 3	LO1: Identify and select techniques for problem solving and will develop critical thinking, abstract reasoning and systems thinking LO2: Explain the concepts of programming and apply the fundamental constructs and principles to create simple programmes LO3: Describe the principles of interaction design and human computer interaction (HCI) LO4: Identify a range of software tools, such as text editors and/or integrated development environments (IDEs) LO5: Describe the principles of software implementation, including user testing and deployment LO6: Demonstrate an awareness of procedural and object oriented programming methodologies	40%	Question 1: 100 marks	1, 2, 3, 4 5 and 6
		Total: 100%		

Instructions

The work you submit should include your own code as a complete C# project that can be opened in Visual Studio 2017.

Your code should be written in simple and readable style, applying the concepts and principles you learned in Modules 1, 2, 3 and 4.

All the variable names should be meaningful/self-descriptive (not like x or y), and all code should be aligned and neatly formatted. Where necessary you should add comments to the code, as in the sample programs in the course material.

Please refer to the marking schedule for detailed evaluation points.

Assignment guidelines

In this assignment you will create a C# project for grading students' performance using their 10 marks.

You will need an Access Database file, named 'students.mdb', to complete the tasks. It has been included as a download with the assignment. Use only this database to develop your project.

Place the database file in your C# project folder before connecting to it.

You need to create this application with multiple C# Windows forms. You are expected to use the functions available in the Data Sources window to connect your application to the Access Database file given.

Read the question carefully and implement all functions as required. When finished submit your full C# project and the database file (in the project folder) you used for marking.

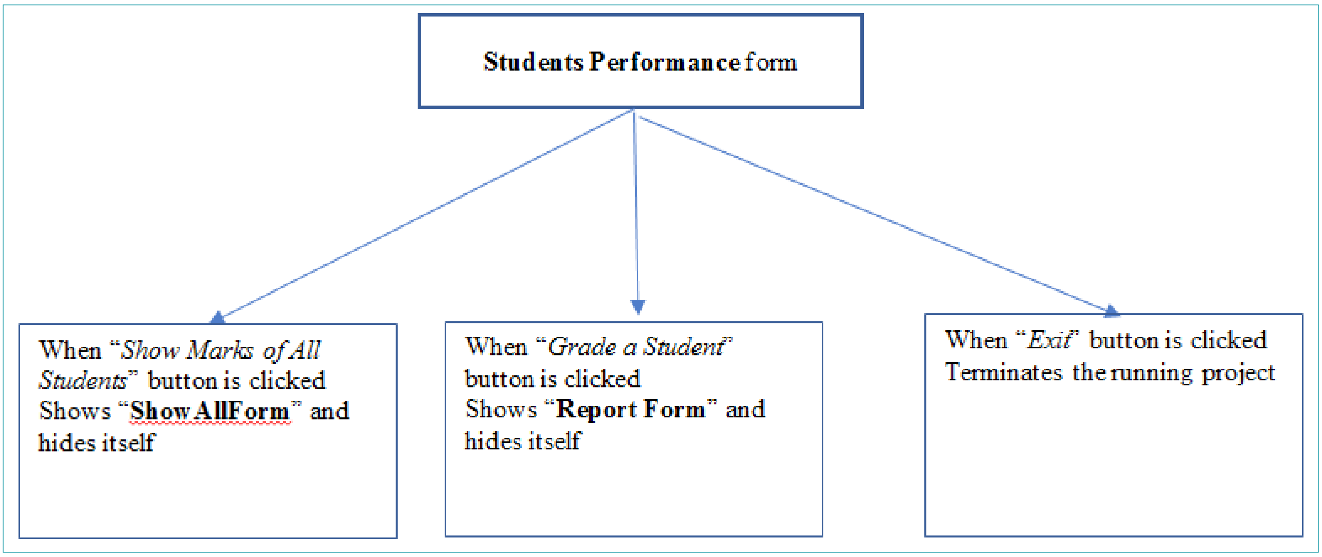
Assignment 3

Question 1

In this assignment you are going to develop a C# project/application to read the Access database given to populate some data values on C# forms.

The purpose of this project is to view all records in the database provided and to display the report of a given student. The report should be prepared using the logic/rules outlined in the following section.

There are three Windows forms in this project. Each form is explained in detail in the following sections.


Students Performance form
When "*Show Marks of All Students*" button is clicked Shows "**ShowAllForm**" and hides itself
When "*Grade a Student*" button is clicked Shows "**Report Form**" and hides itself
When "*Exit*" button is clicked Terminates the running project

Students' Performance form

This is the main form of this project. When the project is run this window should be shown to the user first. It has three buttons on it. This form acts as a menu for the program.

The first button with the display text 'Show Marks of All Students', when clicked, should show another form titled 'ShowAllForm'. While 'ShowAllForm' is being displayed, 'Students Performance' should be hidden.

Similarly, the second button 'Grade a Student', when clicked, should show 'Report Form', and hides the main form 'Students Performance'.

The third button, 'Exit', should terminate the application when clicked.

We will now look into the contents of the other two forms.

ShowAllForm form

On this form all data that is contained in the Access database should be shown in a tabular format. There should be vertical and horizontal scroll bars to view the hidden data entries. The columns should be in the same order as in the Access file.

There should also be two buttons, namely 'Main Form' and 'Exit', in the bottom right corner to return to the main form (that is, Students' Performance) and terminate the running project respectively.

Report form

This form contains the key functions of the project.

There should be two group boxes titled 'Search by ID' and 'Details Found', one below the other in the same order.

In the 'Search by ID' group box there should be a label 'Search ID', a text box to enter search keys, and a 'Search' button.

Under the 'Details Found' group box the following labels should be added to the form in the same order.

- Firstname
- Lastname
- Marks
- Average
- Highest mark
- Lowest mark
- Overall level.

Next to each of the labels there should be a text box. The textbox next to the 'Marks' label should be set to contain multiline.

All of these textboxes should be made read only to prevent the user editing these values on the form.

You also need to have two buttons at the bottom right corner as 'ShowAllForm' with the same functions.

Note: As with the 'ShowAllForm' you must attach the database to this form; this will allow you to read from the database. Once you have attached the database to this form, you can delete the unnecessary controls.

Application usage criteria for report form

First a user will enter a Student ID (such as the ones in the column 'ID1' in the Access file) in the search ID text box and click the 'Search' button.

There are two possible scenarios as the result of this search.

In the first scenario a student is found in the database with the search ID value given. In the second scenario no student is found with the search ID value entered by the user.

We will look into each of the scenarios in detail.

1. A student is found.

   When the student with the search key is found in the database, the form has to show all of the following details of that student.

   - First name and last name are shown next to the 'Firstname' and 'Lastname' labels.
   - As you can see in the Access database, there are marks for 10 courses for each student. All marks should be shown as a concatenated string in the following format.

```
<course> <course ID> : <mark>

<course> <course ID> : <mark>

.

.

.

<course> <course ID> : <mark>
```

Example:

```
Course 1 : 60

Course 2 : 80

...

Course 9 : 98
```

- You are advised to use an integer array to store all 10 marks retrieved from the database for the calculations below. You may also use the values of this array to create the output for the 'marks' label in the previous point. (Hint: Consider using an integer array and a loop, preferably a for loop). Furthermore, since the number of courses (10) is a constant, you are expected to declare a constant, at the right place, to store this value to refer to it in your code instead of explicitly using the value '10' thereafter.
- The average, highest and lowest marks of the student (based on the marks for all 10 courses) should be calculated and shown next to the corresponding labels. You are expected to write separate methods (one for each) with suitable access modifiers to calculate these three measures. You may need to use appropriate method parameters (if necessary as per your program logic) to assist all three calculations. You should not use the built-in array methods, instead calculating these values using your own code.
- At the end this form should show the overall level of this student.

Overall level is decided by a simple logic applied on the average of the student.

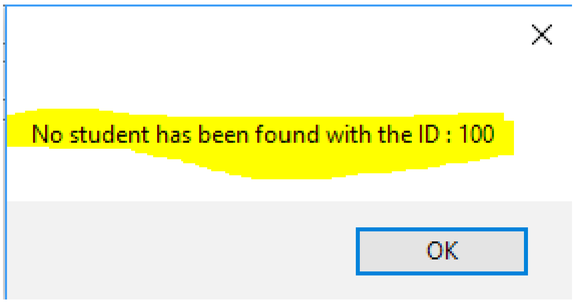
```
If the average is > 80, the level is "Excellent",
if it is <=80 and > 60, the level is "Good",
if it is <= 60 and > 40, the level is "Simple Pass"
Otherwise, it should be "Fail". (hint: you may use "if,
else if or a switch statement to write the logic.
```

You are expected to implement a method to do this operation. This method should take the average as the parameter and return level as 'Excellent', 'Good', 'Simple Pass', or 'Fail'.

2. A student is not found.

   When no students have been found in the database for the search ID entered, a message box should be shown with the text 'No student has been found with the ID : <ID>'.

   Example:



No student has been found with the ID : 100

You are required to produce the following as the deliverables.

1. A concept breakdown diagram/document of the application (follow the format in your course notes under the topic 'Concept breakdown').
2. A wireframe showing all three forms and the connectivity among them. A paper-based sketch is sufficient.
3. The implementation of the assignment question in C#.

Look at the marking schedule for the detailed marks breakdown and answer accordingly.

Marking schedule

Your tutor will use this marking schedule to provide you with a grade. They may also provide qualitative feedback (comments) about your work.

Assessment against criteria

Criteria	**Marks**	**Score/ 100**
1. Concept breakdown diagram/document	5	
2. Wireframes showing all forms and connectivity among them	5	
3. Creation and GUI for the three forms (Students Performance, ShowAllForm, and Report)	15	
4. GUI is appropriately designed and follows good practice (i.e. properly aligned, read-only where necessary, logical positioning)	5	
5. Implementation of button functionality to move between the forms	5	
6. Displaying the database data in the ShowAllForm	5	
7. Search function (Report form) obtains student information from database	10	
8. Display student name and marks in the report form (after obtaining student information) using the format specified	10	
9. Calculate and display average mark as specified	5	
10. Calculate and display highest mark as specified	5	
11. Calculate and display lowest mark as specified	5	
12. Calculate and display overall level as specified	5	
13. Code written follows good programming practices	10	
14. Program performs correctly and has an appropriate level of quality	10	