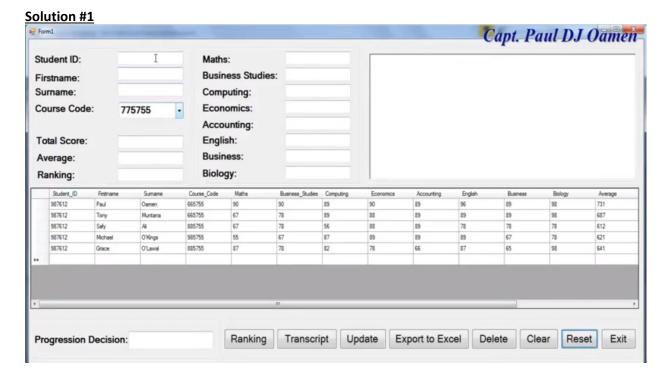**M2. Assess consistently at least two adequately researched solutions to an IT problem on a given theme and recommend a preferred solution.**

D2. Evaluate consistently and comprehensively at least two researched and realistic solutions to an IT problem on a given theme and justify using logical chains of reasoning a preferred solution.

During my research I found two useful solutions which had relevancy to the theme and with features I could implement. Each solution consists of different language VB & C#; both are sourced off YouTube. YouTube is a great source with well explained videos and tutorials. The solutions used the software Visual Studio 2015 which the software I am considering using for my project. I will talk about the two-researched solution in-depth as well as features I could implement into my own solution. Then I will choose a preferred solution explaining the reasons why.

Solution #1

Review:
This program is based on a student grading system where teachers enter details of students including number of marks they scored at exams. This program can help save students result in a safe and secure area. Furthermore, the results are stored in an organized manner. This makes the teachers job more simple and quick, if they were to access the student results they will ea sily find it using query. Compare to traditional method of using paper, the student's result could be lost and it takes time to search for the data since you will have to search all the papers until you find the correct one.

To begin with, the program starts off with a 'Student ID' which is unique to each student and this makes sure no results are overwritten. This field is autoincremented so when the user creates a new record it will generate a new number. 'Firstname' and 'Surname' field is used to input the name of the students. This is the basic information every form should have; these fields help recognize which student performed good in certain subjects.

This program also includes course code, which defines which course the student is taking, so the teacher knows they are doing the correct course and getting the correct qualifications. 'Total Score' field is used to display the total of all the exam marks. While 'Average' field is used to display the average mark of the all the student's exam and 'Ranking' field ranks the student by comparing the results to other students.

Finally, those subject fields are for teacher to input the student's marks gained from the exam. Once all the marks are entered the value at 'Total Score', 'Average' and 'Ranking' fields will be generated automatically. This will make the teachers jobs a lot easier as they won't require to calculate manually. Furthermore, if teacher manually calculated the total they might make a mistake compare to computer calculations which are more accurate. It also has a data grid which will show all the registered students and their records.

There is 'Progression Decision' field which is used to show if the students have completed the course or not. This can help the teacher focus on students that haven't completed courses and input their details. This program contains various of buttons which performs certain task and action. For example, the button 'Ranking' will rank all the students by the total score they gained from the exams.

While 'Transcripts' button will write a report using the exam statistic which computer generated as well. 'Update' button will update the add or modify students, as there is always chances of mistakes that could occur or even possible omission of student. 'Export to excel' button exports the data to Microsoft Excel which will be easy to view and create various of graphs through using the fields like total scores. 'Delete' button will delete data that is incorrect or not required, it's a basic button that ever form should include. Teachers wouldn't want wrong data to appear if they input wrong details. 'Clear' button will clear all the details that is currently being inputted. It's easy for the teacher because they are not required to clear each inputs field by field. Just a click on the button will automatically clear the information.

There is also a 'Reset' button which will delete all the records that saved within the program. This button is quite dangerous because if there was an accidental click it will remove all the data. It cannot be retrieved unless there is a backup. Last of all there is an Exit button which exits the program. This button isn't necessarily required since you can always click on the close button on the top right-hand side of the bar. That's all for solution #1, now I will talk about possible implementation I could do if I were this were my preferred solution.

Implementation:
Student ID will be kept because this field could be used for registering individual participants while for team participants I will have to create a separate form with the field Team ID. ID are autoincremented making them unique to each participant; it will be used as primary key to search for records later while using queries and this also prevents overwriting data of participants. First name and Surname fields will remain because these fields are what defines the participants and makes them recognized.

Furthermore, if participants were just given IDs they may forget which could cause operational problem at the event. In addition, First name and Surname would be suitable as the criteria for queries. Event organizers are more likely to know the name of the participants than the ID so when they want to search a participant they can easily enter participant's name and the program will list all the result. I could replace Course Code which is used define type of course the student is studying.

I could rename it to Type of Event, which the combo box could have two choices, Individual and Team. This help differentiates what type of event the participant is competing to. Given by the assignment brief the college wants the participants to enter as Individual or Team.

The fields Total Score, Average and Ranking could be implemented in my program as well. Total Score field will be used to display the total points gained from the events. Average field will find the average points from all the events the participant has taken part in. Ranking field will be used to see who performed the best in the event and this can help college deliver the prizes best participants.

I could replace all those subject fields. with points gained from events where the event organizer can just input the number of points the participant gained from the event. However, given by the assignment brief, there are 5 events and it should be split equally. I chose to go with 3:2 ratio for events, 3 events for individual and 2 events. So, whenever the user selects Type of Event to Individual it will only show 3 fields which the user can input the points and when the user selects Team it will only show 2 events to input the points. The data grid will also remain because the event organizer would want to see the results of the participants so far.

I could delete Progression Decision because it's not required. All the records the been registered is same as referring it as complete. I will keep the Ranking button because it will help the college see who earned the prizes. The button will also sort out the total points highest to lowest, this saves time for the event organizer as they don't require to sort the results continuously. Update, Clear & Delete buttons are important to implement as they carry out the basic function modifying the data of participants.

I personally think Reset button shouldn't be included in my program because there is a possibility that data could be accidently all removed. However, there is also another possibility that once the event is finished they might want to reuse the program but the college would like to delete all the data in one click rather than having to manually delete records one by one.
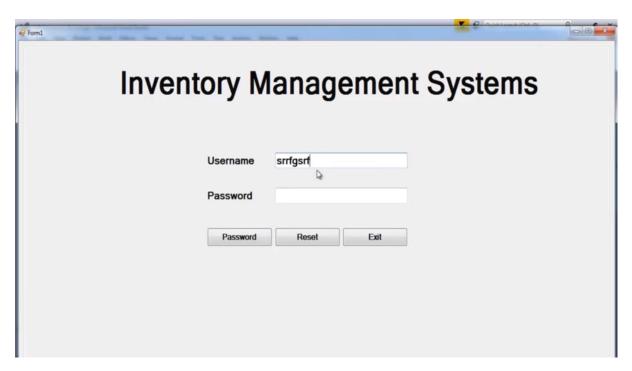
On the other hand, college did say there are only 20 individual participants and 4 teams of 5. So, it wouldn't really take long to delete records of participants. Last of all, an exit button will also remain as the users can just click it quick without having to move the cursor up. Plus, it will ask the users if they would like to exit or not before closing the program. This can help prevent any accidental unsaved data loss.
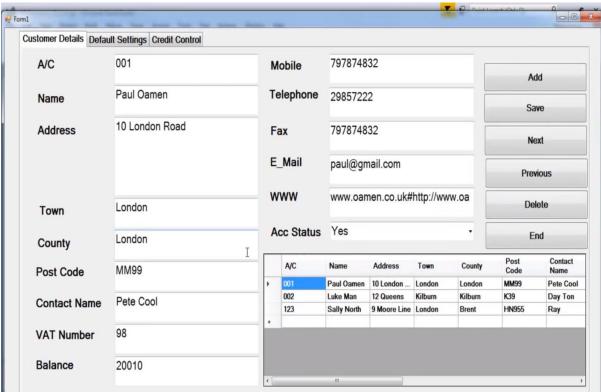
Pros	Cons
Functions- It has various of automatic functions that will makes the teachers job easy. Most calculations and function are carried out through input or clicks.	Simplicity- This program has too many fields and buttons and can create confusion to the users. The positioning of these fields and buttons doesn't look appealing and easy to follow through.
Accessibility features- The fonts are big and clear to see, as there is chance the teacher might have bad eye sight. The colours used are black and white which bring clarity to the program as too much colours creates confusion and it won't be appealing to look at.	Reset button- Like explained early on, accidental click on reset button could result permanent loss of data unless there is back up.

This solution was creating through using the programming language C#. Which is one of the most common language used to create web application, Windows service or a desktop app. C# don't require any special configuration to run all it needs a simple IDE which there are plenty available for Windows only. Furthermore, C# is a compiled language hacker will have troubles trying to gain access to the source code and they will have decompile as well. So that's why the student's data will be secure and safe.

On the other hand, C# isn't memory and CPU efficient as other languages so running this program on old computer will be troubling as the program won't run at optimum condition and will be slow it use. Finally, C# isn't an easy language to understand and learn if you don't have enough experience and knowledge in programming.

Solution #2:

This is the second solution which is based on Inventory Management System. This solution includes login form and the main form with three different tabs Customer Details, Default Setting & Credit Control. Each tab has different information related to the theme. This program was used created using VB with same IDE Visual Studio 2015. Now I will talk about my review about this program and what I could implement from it.

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Review:

Firstly, the program begins with a login form which is a good form of securing data. This will prevent any unauthorised of users of accessing or manipulating data of the inventory sales. The user must have correct username and password to login or you won't gain access to the main program. It also has good clarity as the fonts and text size are big for users to see. It includes three buttons Password, Reset and Exit.

Password button verifies if the login details are correct then if it is correct it will direct the user to the program. If not, it will show an error message. However, I personally think the Password button should be renamed to 'Login'. As some users might get confused with the purpose of button they might possibly mistake it as gaining a new password.

In addition, gaining new password is the purpose Reset button, so if the user forgot their password they can click the button and to create a new password. Again, the naming of the button is quite confusing because the users won't know exactly what the button will reset. Then the login form has an exit button which user will be questioned with a yes or no box to verify if they would want to leave so they accidentally leave and lose their data without saving.

Customer Details	Default Settings	Credit Control

Now I will talk about the main program, which is only accessed once the login information is correct. As you see in the figure above the program is separated into three tabs Customer Details which will include all the details of customers, Default setting which includes discounts the customer receives depending on the currency and finally Credit Control tab which includes the customer's bank details along with how much they own the company (user).

To begin with, Customer Details tab allows the users to register or update customer and their details. 'A/C' field is a autoincremented field which is unique to each customer and it prevents data from getting overwritten. It will warn the users if it does occur. Which is quite beneficial for the users prevents errors and mistakes. 'Name' field defines who the customer and makes sure the user of the program knows the name if they were to make an enquiry.

Then the rest of the fields are all contact details of customers, it's important to include many contact details as possible in a financial field so the user can make enquiries and notices if there were any problems with the customer or the company. 'Address', 'Town', 'County' and 'Post Code' fields are important fields so the user knows where their customers are located. If they were to send any forms or information through mails they will easily know where to post. If there were any legal issues then the user will have no problem knowing where to meet customer. Maybe the customer owes the company and hasn't paid back the debt, then you can get the authority to handle the situation as well.

Furthermore, it also includes contact name which defines how the user should address them when being in contact with the selected customer. It also includes sensitive information fields such as VAT number and Balance which should be protected and secured well or there are possibility hackers could scout this information and possible steal. This also makes sure the user knows how much the customer has and they can send reports to the customer if there were any increase or lose.

Then the program continues with even more contact fields, 'Mobile', 'Telephone', 'FAX', 'Email, 'WWW' and 'ACC status'. These fields are important if there was emergency like loss in sale or the customers balance is too low then the user can contact the customer quickly and to verify their decisions. However, most companies like to use modern ways of delivering messages like through e-mail. Almost every customer will have an email, if the company were to message something about sales they could just email the customer easily because its fast and secure. This also prevents the customer from getting disturbed with their daily lives if you were to call them about almost everything. Surprisingly, it also has 'WWW' field which is used to input customer's website which most customers won't really have unless they are a company themselves. Last of all, there is a field 'ACC Status' which is a combo box with Yes or No verifying if the customer is a valid customer. The customer may have left or their membership may have expired and this makes sure the user can send them a message through any of the contact details about possibility of renewing or a giving them a nice leaving message.

There are six buttons Add, Save, Next, Previous, Delete and End. Add button opens a new account for a new customer then it will allow the user to input all the details. While save button will save those details of the customer in the database keeping it secure and organized. This button will also save any data that has been modified. Next and Previous buttons are used to navigate through saved records of the customers, this can help the user monitor the customers. Delete button will delete selected record, as there are chances the customer may leave the company and you will have to remove the record since they won't be relevant to your sales. End button exits the program with a message verifying if the user would really like to leave, it also prevents accidental closing of the program. Finally, below the program there is data grid box which will show all the records of the registered customers. Rather than navigating through each customer using 'Next' and 'Previous' buttons the users can quickly view the details in the data grid box.

Next, I will be explaining about the tab 'Default Setting' which is next to Customer 'Details'. This tab includes fields like discounts for the customers which varies depending on type of currency, since currency have different values and rates. It can be altered any time and this will also influence inventories and sales. While 'Credit Control' tab will include all the details about what customers owe to the company. It will display if they are in debt or not and it will include the dates they are to pay within and if the debt customers fail to pay within the period they are to be punished. It includes various of check box and buttons, a click on them can change values.

Implementations:
First, I will implement the login system which I believe is a good method of securing data of participants for the college. This also unauthorised users from modifying with the data. Without login system, a student might secretly get an access when the teachers are paying least attention. I will also rename the title to 'Point System' to relate to the context as well as the button names. 'Password' button will be replaced to 'Login' so the users know what the button does. While 'Reset' button will be renamed to 'Forgot Password' so the teacher knows what to do if they forgot their passwords, they can just click the button and enter some details and gain a new password. Exit button will remain.

Moving on to the main program. The main program will have two tabs separated. One tab is for Individual and the other tab is for Team. Each tab will have relevant fields and details respectively. Furthermore, the contact details will be all removed because it is not required as college already have all the contact details if some emergency did occur. Instead it will all be replaced with fields that are relevant to the theme. For example, fields to input points gained from individual events then have a field which has total points from all the events the participant attended to.

'A/C' will be replaced to 'Student ID' and it'll autoincrement integer to make sure the record is unique and cannot be overwritten easily. The fields and features that will remain is 'Name', since it will be used to define the student and the college will know who to award the prizes if they perform well. This will also help achieve recognition throughout the school. The buttons will remain as well however it will be renamed to bring clarity to the users. Since the original program's buttons names weren't appealing and easy to understand. In addition, the data grid box will be kept checking the results of individual participants so far.

The next tab will be Team tab which will include all details and fields for team participants. This tab will be like the Individual tab. Only changes will be the naming and some fields. For example, the Student ID will be renamed to Team ID as this is a team event point system. Furthermore, there will be more than just one field for names. Since the assignment brief said each team has maximum 5 members, there will 5 fields for the teacher to input the names of the team members.

Pros	Cons
Secure Login System- The login system is the best feature this program must offer. It protects all the customer data and information. It even offers password reset if the user forgets the password.	Naming conventions- The buttons and fields are renamed horrible and it most likely cause the users to get confused and have wrong thoughts about their function and purpose.
Appearance- The appearance is simple and easy follow through. Black and white colour may look dull but the user understands its simplicity. Furthermore, the text sizes are big and clear for users to look at.	Lack of security- I personally think the program lacks security due to its purpose which was related to finance. Most of its data is sensitive information and it should be secured with better security features.

This program was created using VB which is a pretty old popular language with simple functions. It's easy to learn since its syntax is similar a full English sentence making the code easy to write. Additionally, there are plenty of support online with so many similar solutions since a lot of programmers used visual basics at first. However, VB does require quite an amount of memory so it won't be efficient if programs like games were created.

Conclusion:
Overall, I prefer solution #2 despite having no relevancy to the project. There are various of reasons for my choice. Firstly, I have no knowledge on C# nor VB however VB is much easy to learn due to its understandable syntax plus I will be also looking for support online and VB is perfect choice. In addition, the login system is a great security features which solution #1 didn't include. Security features will make sure the college's participant data aren't stolen or modified. It will also improve the reliability of the program, as it's important that college has full trust in you. On the other hand, solution #2 had the worst naming conventions and there were barely any fields related to the project so lots of fields will be renamed or removed. Last of all, solution #2 tab features will help me separate the program between Individual and Team this helps prevent mixing data.

Sources:

Solution #1:
https://www.youtube.com/watch?v=ktpF2Y0V0yI

Solution #2:
https://www.youtube.com/watch?v=68o6PVFtOQs