Database Project

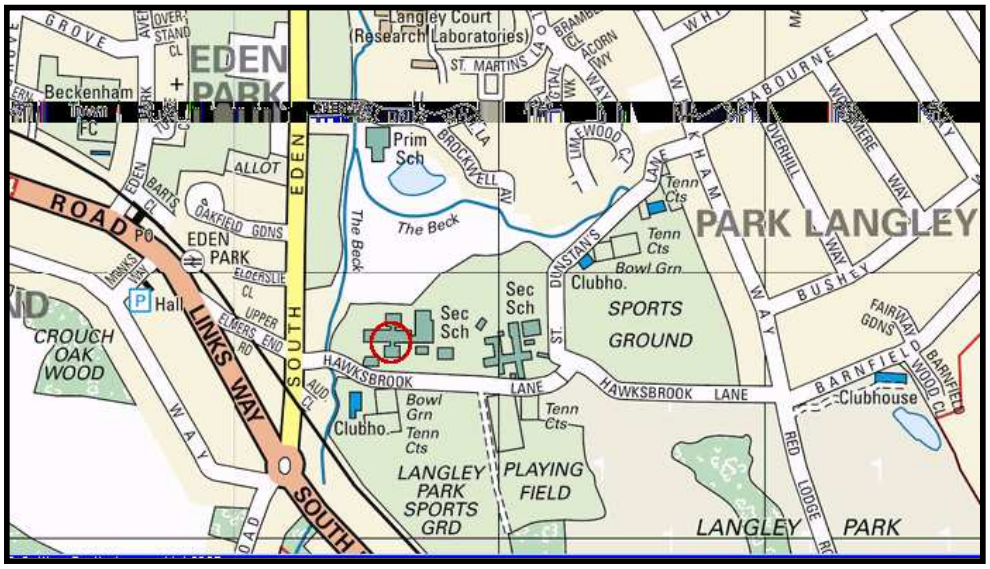
By Mitesh Patel

Identify

Introduction

Langley Park School for Boys (also known as Langley Park Boys' School) is a boys' comprehensive secondary school in Beckenham in the London Borough of Bromley, with a mixed-sex sixth form. The school currently has about 1450 pupils. The headmaster is R W Northcott.

The school's motto is Mores et studia which literally translates as 'morals and study'. The school's code of conduct is courtesy; common-sense & co-operation. The school uniform consists of a maroon blazer and tie, both with the school crest on, and dark trousers. Students are allowed to wear suits or, if female, smart clothes, in the sixth form.



The Problems

The library department has requested an ICT system to keep track of the textbooks that are loaned out to the 6th formers. The librarian needs a more reliable way of record books, which are out on loan and on the shelf. At p resent the ICT department keep paper-based records, this process is described below:

The Current Situation

When the school buys new books for each class, the books are individually marked and the condition of them is marked. When a student is given a boo k the teacher makes a manual record of the student and books' reference. Teacher also records student's details & the condition of the book. After this, the teacher puts the students' initials in the book so that it can be returned if it's lost. If the condition is the same as when it was checked out, a tick is put to the students' name.

The problems with manual solutions

There are problems with keeping paper based records because, say if there was a fire in the office, all of those records have now been burnt down. It takes so long to find some ones file if your filing cabinet is not filed properly. Paper documents take up a lot of room up. You have no back up. You can't share the records because you only have one copy.

The strengths of the manual solutions are that there isn't any cost for it. Another advantage is that you don't have to employ any staff with computer skills. Also there is the minimal training required for the staff so it would be a lot easier to find someone for the job.

Alternative Solution

The alternative to using ICT to solve this problem is the manual record system that ICT department is already using. They are finding this method difficult and time consuming. They are finding it hard to keep track of the condition of each book and are therefore loosing money no charges due. The ICT department believe that the use of IT will help them dramatically and have asked me to design and produce a suitable system.

The advantages and disadvantages of using both of these methods have been shown in tables underneath to help me decide whether to do the design by hand or computer.

Using ICT	Advantages	Disadvantages
	It easy to save data as it will not get lost unless I forget where I saved the file. The data will not be altered if I leave the file alone for a while.	If you don't know how to use the database it can be useless and therefore pointless in producing the database at first.
	It is quicker to input information about books, staff, students, and the students' form.	Making the database can be time consuming on the computer, as it takes longer to input all the students and books names.
	The computer is very quick when you're looking to find a particular book.	If the system crashes, then I could lose all my data.
	Finding whether a book is on the shelf or not is much quicker to find out.	

Using a manual Solution	Advantages	Disadvantages
	It is cheaper because computers will not be necessary.	It will take longer to look though the records.
	I don't need to know how to use a computer or the software.	If there is accidental damage such as a fire, the library could lose all records and there won't be any back up files.

Why is the ICT solution the ideal solution?

The ICT solution is the ideal solution because if you wanted to edit th e database interface for the different person using it, it can be done easily and quickly without any cost. Another reason of which the ICT solution is the ideal solution is because when you upload the database on to the local school network, everyone has access to this but not able to edit it. This way saves money as you don't have to re produce the database and also saves time. An efficient way to change the interface of the database to correspond to the user needs can be done with very little hassle. This is why I have chosen the ICT solution rather than the manual solution.

Quantitative objectives

- The database should take up maximum of 5mb of dick space.
- Database should be able to easily edit student/ book/ loan details.
- Database should be able to easily store student/ book/ loan details.
- Searches should not take longer than 15 seconds.
- Data should be able to be transferred from the school Sims system.
- It should have commonly used reports readily available.
- It should have a user-friendly interface.

Software

The software that we are making must store data well due to the large database of books. To sort the data we can use Microsoft Word or Excel Also, it must relate this data about students and the books lent out next to each other. The software has to have the "search", "sort" and "query" functions. To query, we can use the Microsoft Excel program. To make the software look good, it must display the results in a professional manner. To make it easy for everyone to use, it has to have an exceptional user interface.

The only way I can get the best of both programs is by using Microsoft Access. This program has all the features need for me to use. I will justify why I am using Microsoft Access.

Alternative Software Solutions

Microsoft Access

The database software allows me to use and change field names, which are up to 15 characters long. It offers a range of data types, such as text (for most fields), whole numbers, currency, etc.) or dates (e.g. 01/01/07, 01 Jan 2001, etc.) the field length can be changed. It is easy to change data in a field, which I will need when I reuse the data. I can set it to a default value for every field. I can customise the field layout. I can set up a validation rule to make sure data is entered, as I want.

I can carry out simple searches (e.g. Library books, student and their forms) or more complex ones.

Sorts are easy to do in the database e.g. sort every book out when it needs to be returned and when it was lent out.

I can create a report, which chooses only certain fields, presented in a different order to the original set-up.

Word

Using Microsoft Word is a poor choice because you can't make a database on it and it is hard to relate the information about who has taken a book out and who hasn't.

But even though that Word can't do some things, it can store data very well and easily.

Excel

Excel is a reasonable choice as you can query criteria, store data, search and sort data. But you can't display results in a professional manner.

Hardware

For this project we will need a computer with Windows XP, a mouse and a computer, which are the minimum requirements. The keyboard is used for typing information e.g. the tagline. The mouse is used for experimenting editing with the user interface of the database. I will need a memory stick to save the work that I have completed and yet still to do.

I will be buying a printer from Pc World, which is a photo printer, scanner and copier with fax and integrated WiFi technology. It is important that I have a good printer because when I print my work, I need the quality of the pictures to be exceptional. It will cost me £249.00. This is because I will need to scan the front cover of the books.
I will also buy a monitor with high resolution imaging so that it can show me the pictures without loosing any of the picture quality. I'm going to buy a monitor from Pc World; this will cost me £149.00.

Here is a table showing the advantages and disadvantages of different hardware solutions that I may consider using for my database.

Item	Advantage	Disadvantage
Vilgen 1.4 GHz	Fast mid range machine.	Not portable
RM 1.1GHz laptop	Portable	Slow and will not have long life span.
HP PSC 950 Colour	Large range of features, with colour printing and copying.	Uses lots of ink cartridges.
HP LaserJet 6P	Fast budget priced laser.	Only mono printing possible.

I have chosen the Vilgen machine, as it is more upgradeable than a laptop and is within the price range. The HP LaserJet 6P is also the best choice, as colour printing is not required and there will be sufficient volume for cartridges to be constantly running out. Office XP will provide for all the needs of the veterinary surgery at a reasonable cost.

Alternative hardware

There is a possibility of purchasing an RM laptop with a Celeron 1.1Ghz processor for the same price as the Vilgen. It has the same RAM (256Mb), but a smaller disk of 3 GB. Another alternative would be to buy the dell Optiplex 1.7 GHz machine with 512Mb of RAM and 60 GB disk.

Security

In access it's possible to allow privileges to different user groups. The groups can be "Users" and "Admin".
This is very complicated process .For the purpose of this database it's acceptable to simply hide the design options from the users.

In order to stop the users making accidental changes to the database we can stop them from looking at the database in design view.
In access it's possible to allow privileges to different user groups. The groups can be "Users" and "Admin".
This is very complicated process .For the purpose of this database it's acceptable to simply hide the design options from the users. I will protect the sheet with a password so that there will not be any unauthorized changes to the document. This is also a security factor as students may want

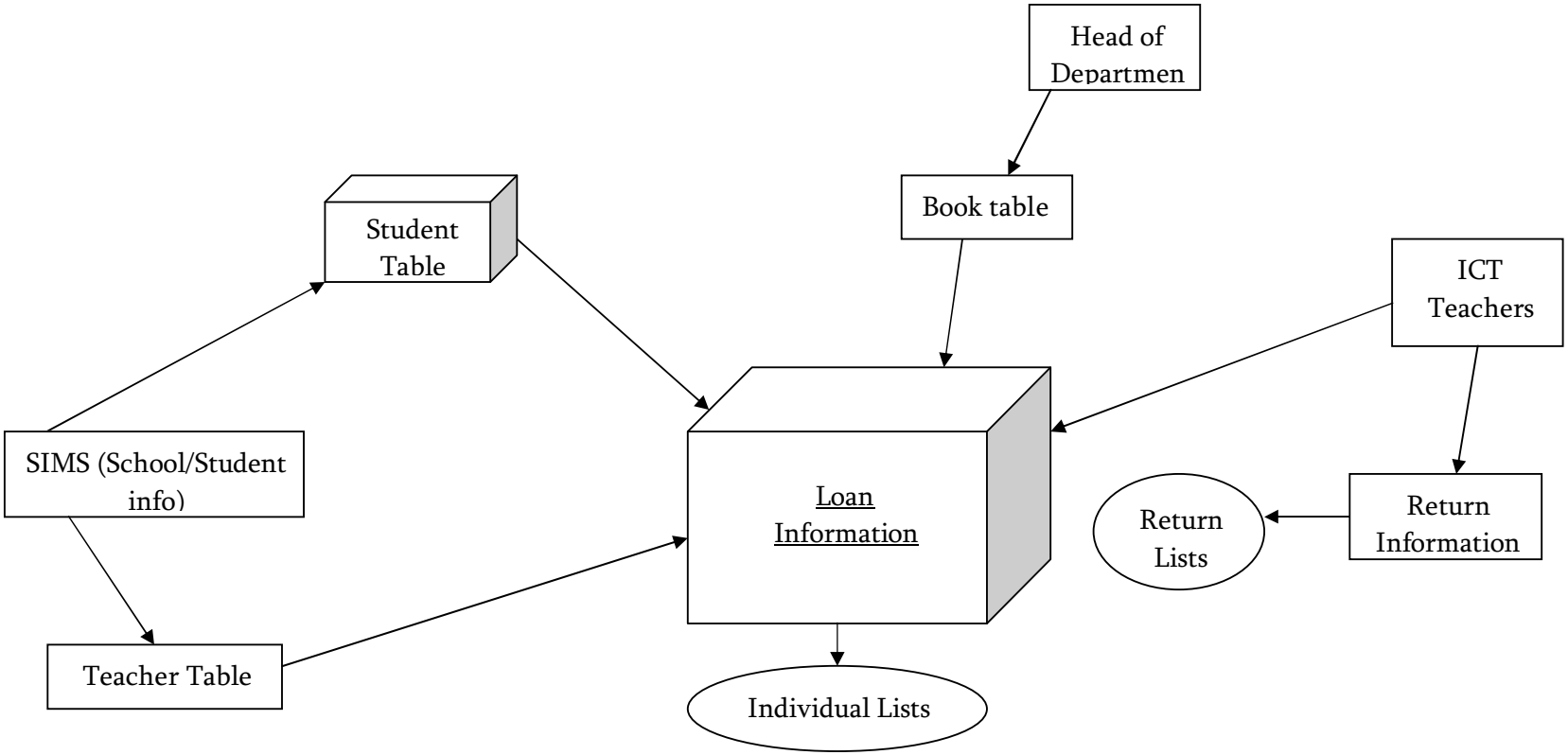
Backup Strategy

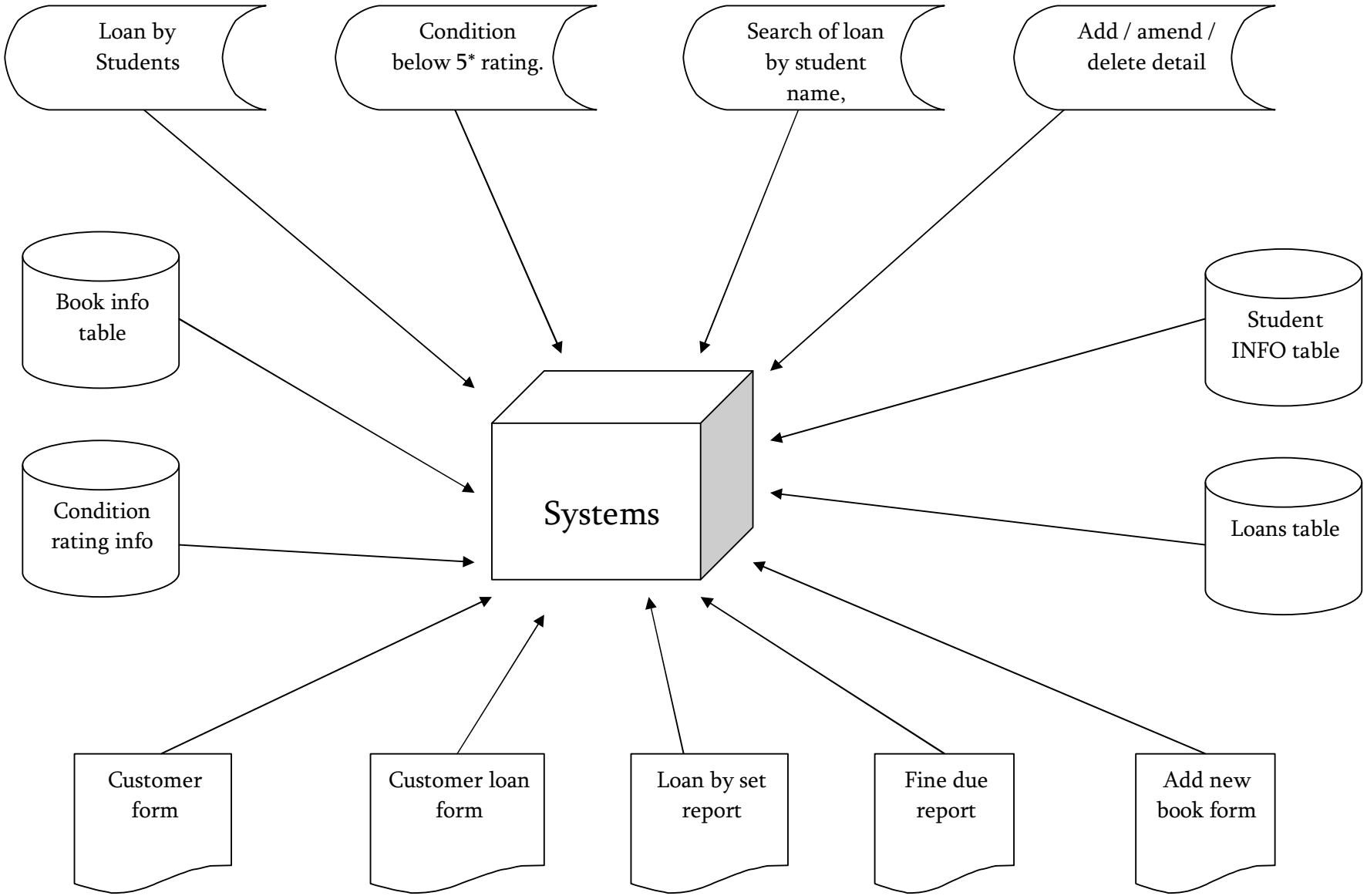
I am going to purchase a memory stick because the school doesn't have a very reliable network; I have lost my work many times on this network. So now I will be saving my work on to a memory stick. I will purchase a 128mb memory stick as it is cheaper than the others and I don't need much memory to hold the work. The one I'm going to purchase is underneath. It costs £6.70 this is a cheap reliable alternative to saving work apart from using the unreliable school network. I have chosen to use a memory stick because almost every computer has a USB port but not all of them have CD-ROM drives so this would mean that I be potentially limited to the amount of computers I can open my work up from a USB pen. I will be using the memory stick often as I can, this will lower the chances of me losing my work.

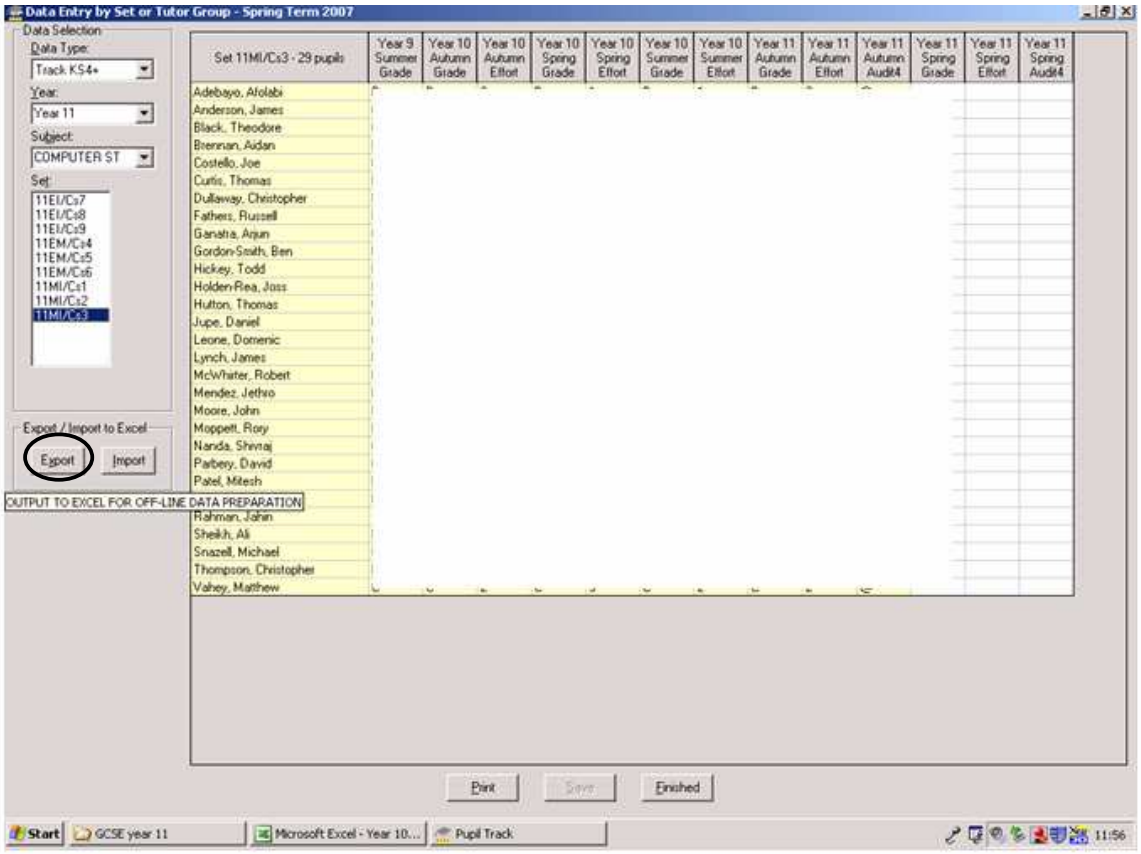
Another strategy I will be using is to send my work to my own email address through email. This would mean that even if I were to forget to bring my memory stick, I can access my work anyway because most computers now days have Internet access.

There are many risks of not backing up your work, for example, the school might catch fire, the system might go down, and there might be a virus on the school system, floods. If you do not back up your work you will regret it because you will have to do all your work again, this might take time.
To save everything that has been done on floppy disks, CD ROMs, USB pens, USB memory sticks.

Data flow Diagrams




Loan by Students
Condition below 5* rating.
Search of loan by student name,
Add / amend / delete detail
Book info table
Condition rating info
Systems
Student INFO table
Loans table
Customer form
Customer loan form
Loan by set report
Fine due report
Add new book form



The school has a system called SIMS that has all the student data stored on to it. This can b exported into a CSV file (comma separated file) and then imported straight into the pupil table of the database. This will make sure that no spelling mistakes are made and will save me time, as I will not have to type it out.

For the book information I will use www.amazon.co.uk. This will allow me to gather the correct book details and also provide an image of the book.

Data requirements for the ICT books loan database

Student info table

Field name	Data base	Primary Key?	Field Length	Validation rule?	Validation method	Field description
Student _ ID	Auto number	Yes	Long Integer	Must be unique	Automatic	A 'unique identifier' given to each student.
Students first name	Text	No	20	None		The first name of student
Student last name	Text	No	20	None		The surname of student.
Form ID	Text	No	3	None		This field relates to the student record to the "form" table.
Loan ID	Number	No	Long Integer	None		This field relates to the student record to the "loan" table.

Staff Info

Staff field Name	Data Type	Field Length	Primary Key	Validation	Validation method	Field description
Staff initials	Text	5	Yes	Must be unique	Unique check on primary key.	This shows the initials of the staff member.
Staff name	Text	No	30	----------	----------	This shows the name of the staff member.

Form Info

Staff field Name	Data Type	Field Length	Primary Key	Validation	Validation method	Field description
Form ID	Auto number	Long Integer	Yes	Unique field	Primary key	This gives each record a unique identifier.
Form name	Text	5	No	----------	----------	The name of the form.
Form Room	Text	5	No	----------	----------	The form room number.

Book field Name

Staff field Name	Data Type	Field Length	Primary Key	Validation	Validation method	Field description
Book ID	Auto number	Long Integer	Yes	Unique Check	Primary Key	Individual field given to each book.
Book name	Text	50	No	None	None	The name of the book.
Author	Text	50	No	None	None	The author's name.
Book Active	OLE Object	N/A	No	None	None	Image of the book cover.
ISBN no.	Text	13	No	Must conform to ISBN format 0-000-0000-0	Validation mask	The ISBN no. is given to each book.

Copy Info

Staff field Name	Data Type	Field Length	Primary Key	Validation	Validation method	Field description
Copy ID	Auto number	Long Integer	Yes	Unique check	Primary Key	Unique number given to each copy
Book ID	Number	Long Integer	Yes	Must have a related field in "Book" table.	Referential integrity	This field allows a relationship top be made with the "book" table.

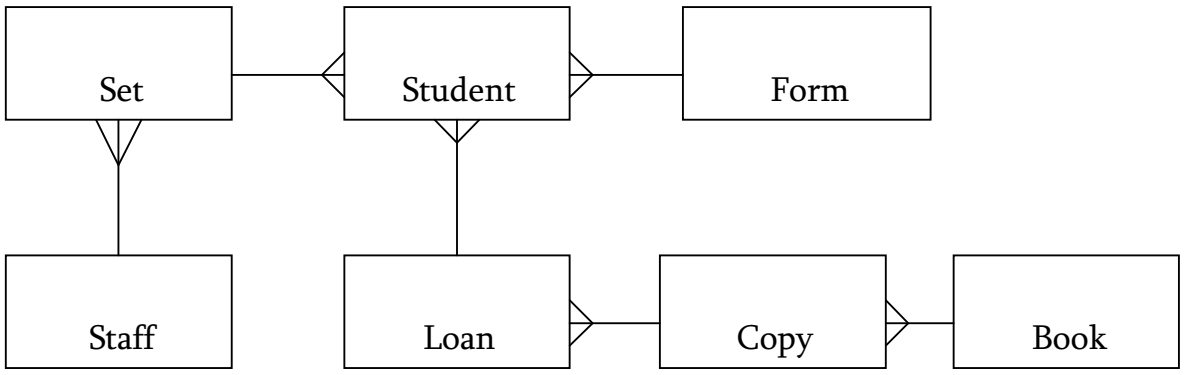
Loan Info

Staff field Name	Data Type	Field Length	Primary Key	Validation	Validation method	Field description
Copy Id	Auto number	Long Integer	Yes	Must have a related field in "Book" table.	Referential integrity	Unique number given to each copy
Student Id	Number	Long Integer	Yes	Must have a related field in "Student" table.	Referential integrity	This field allows a relationship top be made with the "Student" table.
Date out	Date	Short date	No	----------	----------	The date the loan was made.
Return Date	Date	Short date	No	Must be greater than date out		The date book is returned/
Condition out	Number	1	No	Must be between 1-5	Lookup list	Rating of condition when taken out.
Condition in	Number	1	No	Must be between 1-5 and not be more than condition out	Lookup list	Rating of condition when handed in.

ERD

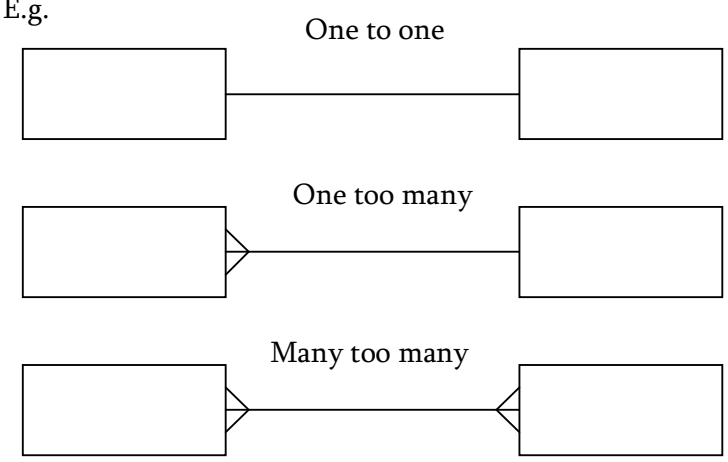
Definition or ERD:

In computer science, an entity-relationship model (ERM) is a model providing a high-level description of a conceptual data model. Data modelling provides a graphical notation for representing such data models in the form of entity-relationship diagrams (ERD).



The arrows show the types of relationships between the tables

E.g.

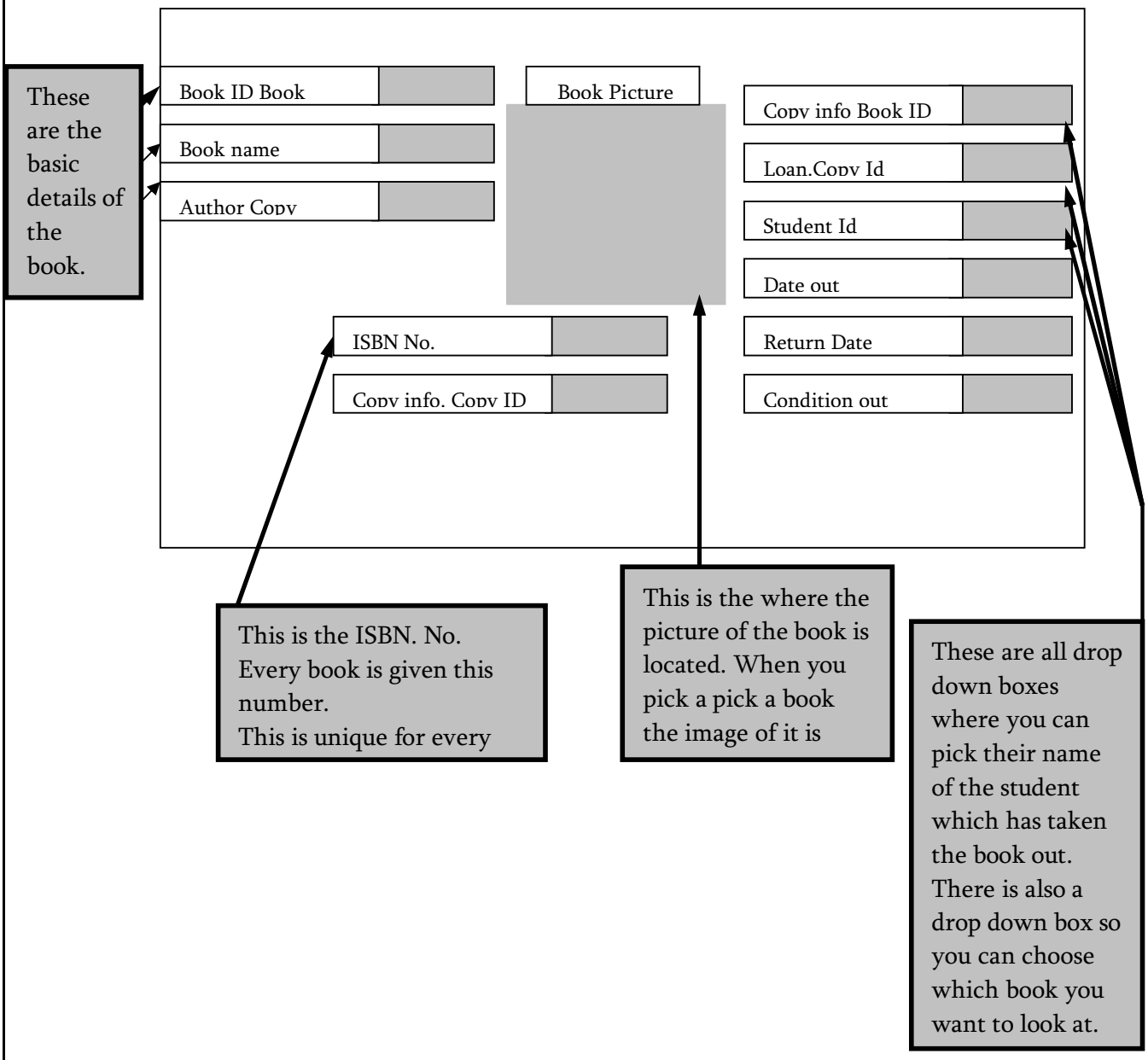


Design Tasks

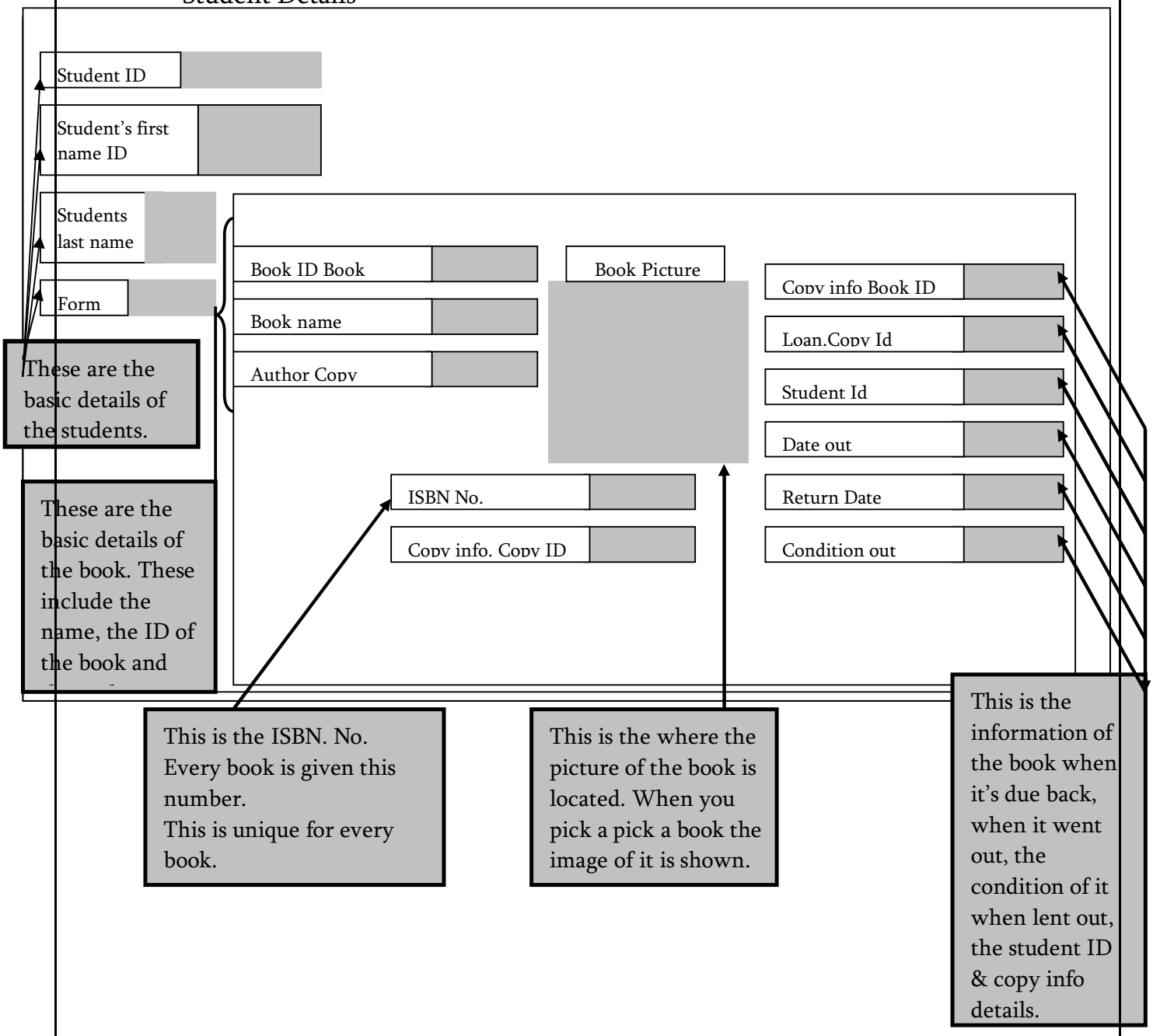
In order to complete my project I have split the implementation up into a number of stages. This will help me to check that created all of the features that will lead to a successful project. They must be done in this order as letter stages may rely on previous tasks being completed.

1. Create all tables as set out in the "Data Requirements"
2. Create all relationships as set out in ERD. – Entity Relationship diagrams.
3. Create forms as shown in form design.
4. Insert dummy data into all tables using the forms.
5. Create Queries.
6. Create reports to display all queries in a professional way.
7. Create menu to access all forms / reports using command buttons.
8. Test the system.
9. Correct any errors.
10. Evaluate.

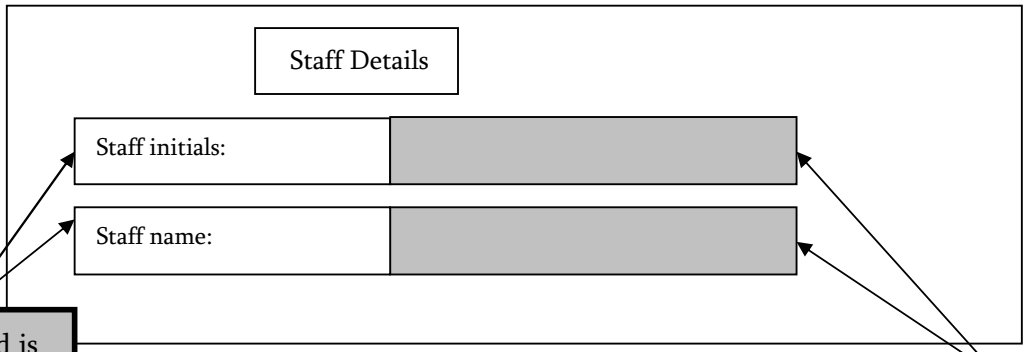
Hand Drawn Design-Loan Form



Student Details

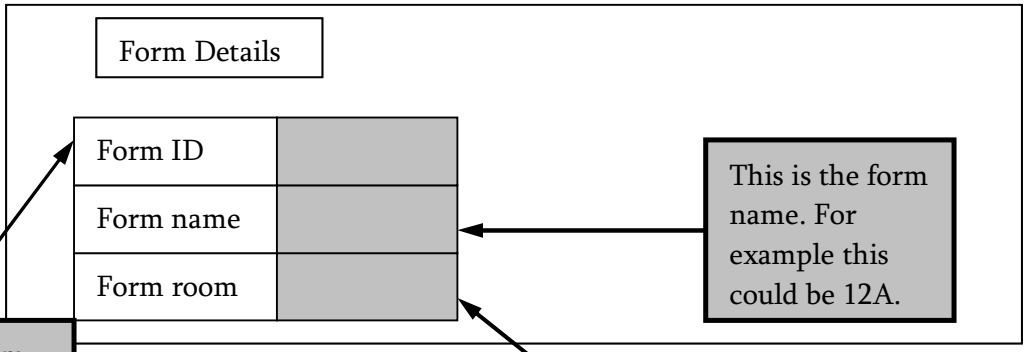


Staff details



The top field is where the staff's initials go and the name of the teacher located in the staff initial field underneath.

These are the fields in which the text is shown.



This is the form name. For example this could be 12A.

This is the form ID. This number can range from 1-8. Each form room has an individual number.

This is the number of the room the form is located in.

User Comments

70 Courts Road
Croydon
CR3 3NR

80 Gait Road
Beckenham
Kent
BR4 4HR

Dear Mr Mitesh Patel,

We have received your database for the new library book proposal. We have evaluated it and have made our own comments about it.

There were many good points about your design. Firstly the interface is very user friendly and simple. It had all the relevant information about the books and the students.

If you were to design another database of this kind, you should consider about making the writing on some of the menus of the interfaces clearer as it is quite hard to read. You should have a menu system so that it will be easy to navigate around the forms. This can save a lot of time when searching. Lastly I was thinking that you should try to present this information more professionally that it already is. It could also benefit from including a query to show all outstanding loans of books and the students that have them.

If these improvements are carried out accordingly, then I believe that this database will be perfect for the library's use from the start of next term.

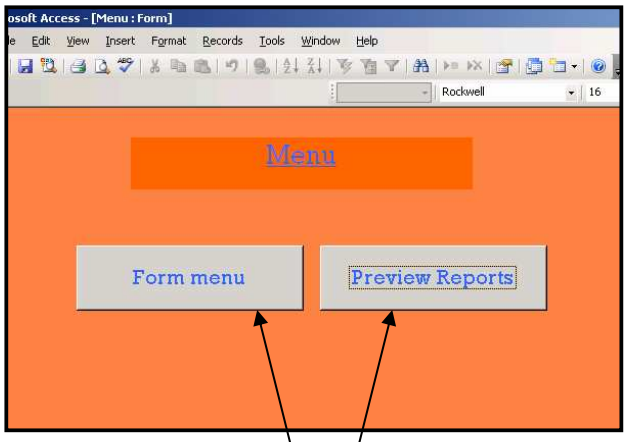
Yours sincerely
Mr Bob Harley

Response to the user feedback realised that the system required:

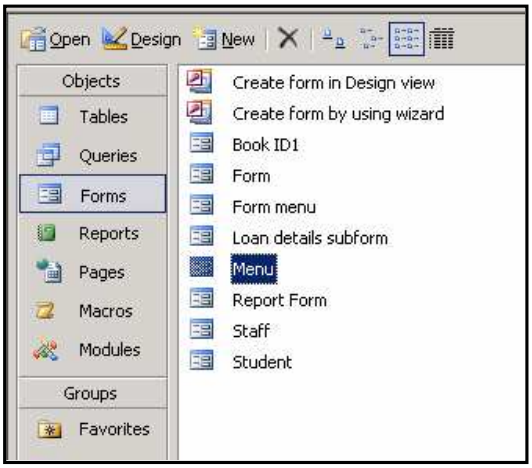
1. A way to present queries in a professional way.
2. A menu system to help navigate through the system.

Final Designs

Forms

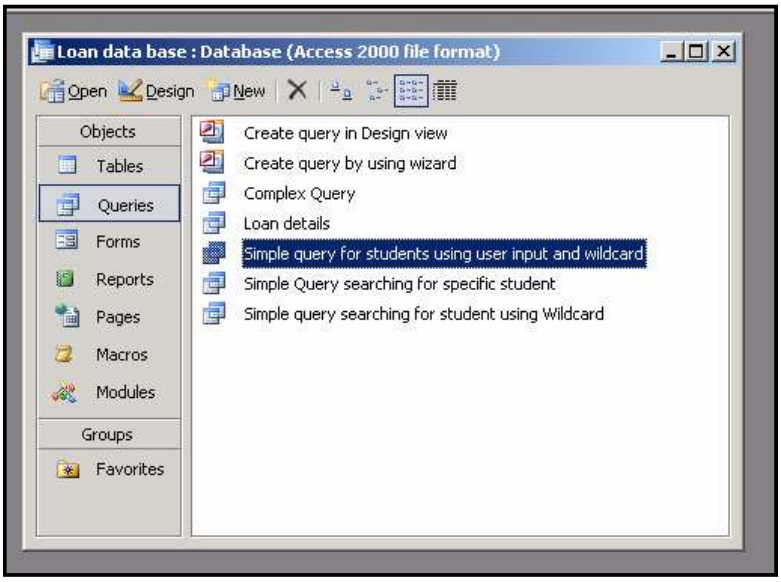


Presenting this form menu in this format means that it is easier for the user to use, than if it was in the format below. This interface is simple and straight forward for anybody to use.



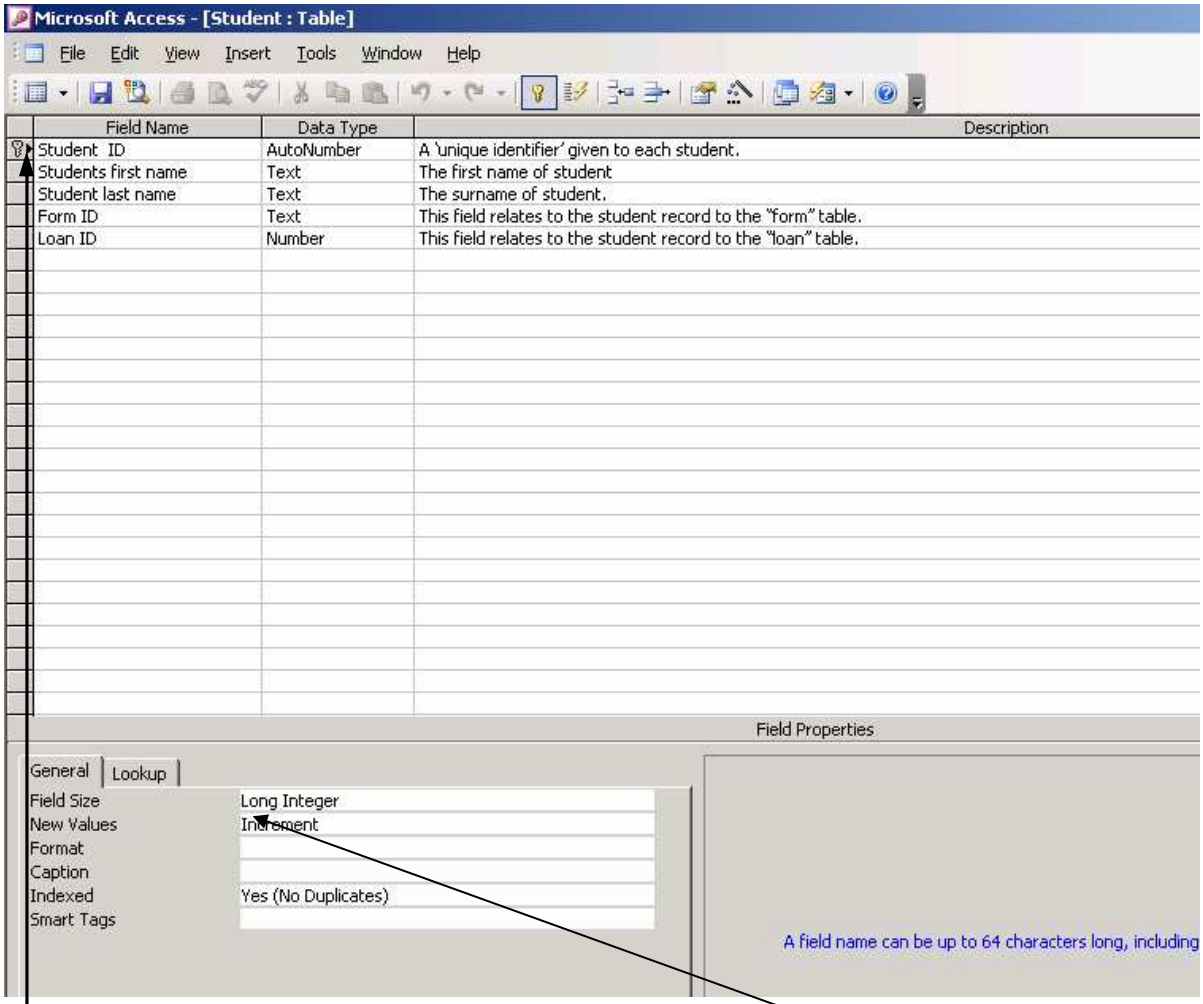
This interface is harder to use as there many forms and the user may get confused. There are eight forms which may make the user unable to use.

Queries



I have made the most popular searches that the user would use here so that it is quicker, and there for less time consuming. This also allows users who do not have the ability or skill to search manually to find what their looking for promptly.

Creating Tables

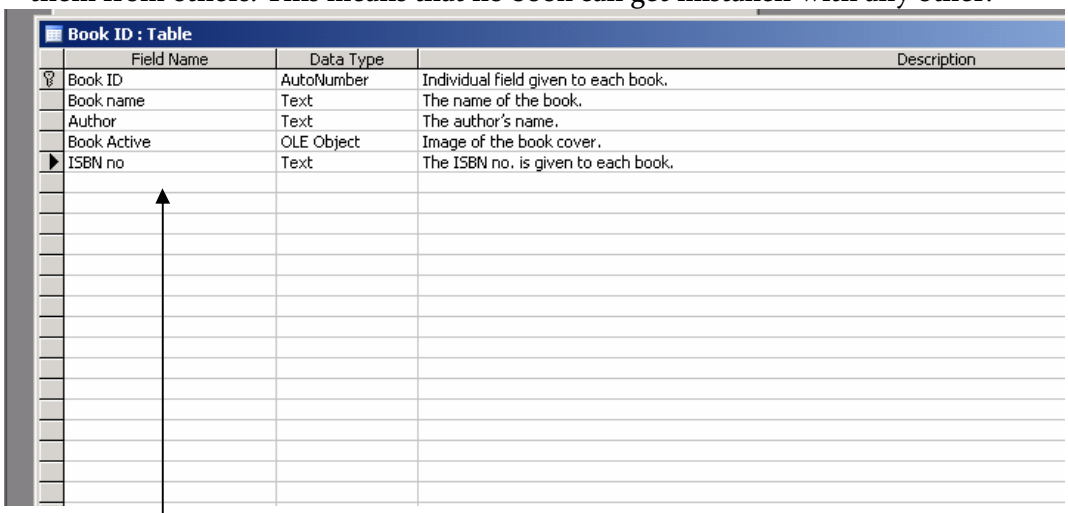


A Primary key allows you to have a unique record of everyone so that it won't mix up, e.g. if you had two people who had the same name, they wouldn't get mixed up.

MS Access automatically allocates 50 characters for each entry into a text field by reducing this size I will reduce the overall size of the database.

Validation of Data

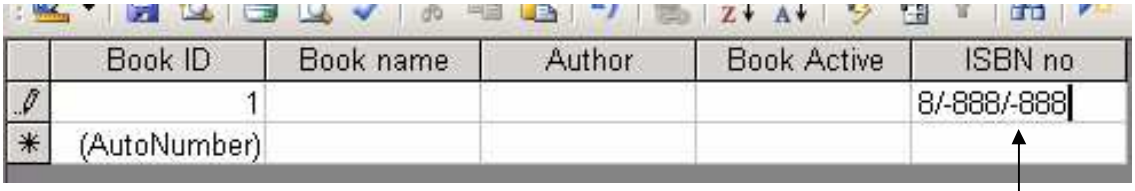
Validation is a number that is given to an individual book; this is to differentiate them from others. This means that no book can get mistaken with any other.



Book ID : Table

Field Name	Data Type	Description
Book ID	AutoNumber	Individual field given to each book.
Book name	Text	The name of the book.
Author	Text	The author's name.
Book Active	OLE Object	Image of the book cover.
ISBN no	Text	The ISBN no. is given to each book.

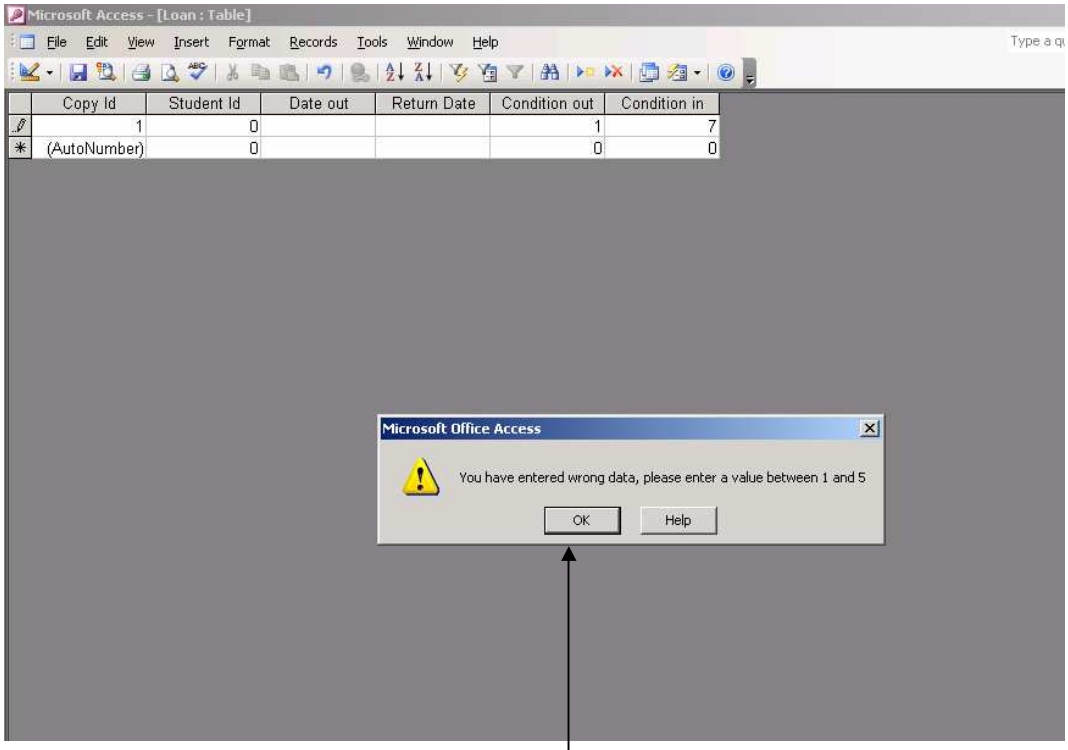
The reason we are validating data is because this way there will be less chances of the ISBN No. typed in in a wrong format this will therefore narrower the chances of a wrong ISBN No. being typed in.



Book ID	Book name	Author	Book Active	ISBN no
1				8/-888/-888
(AutoNumber)				

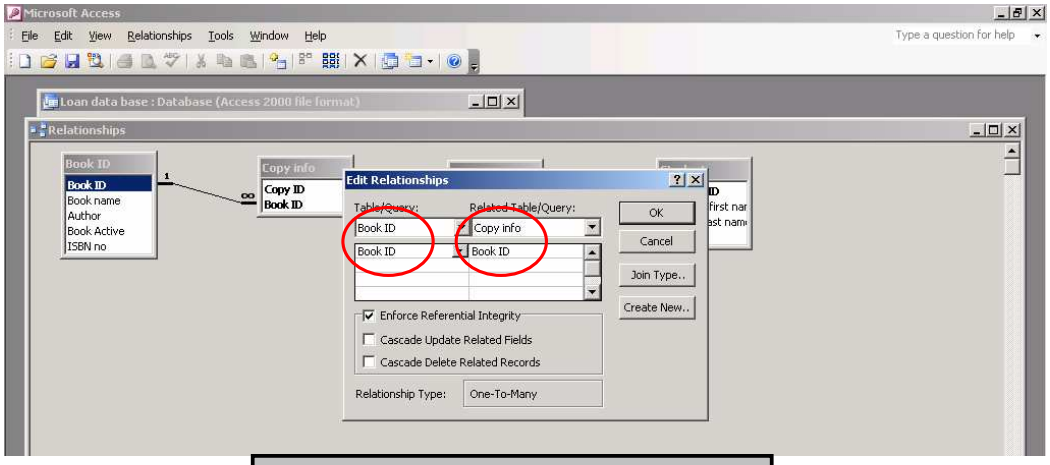
As you can see, the database now only allows you to have a certain format of numbers. This can reduce the amount of mistakes. This is known as validating data.

Range Check



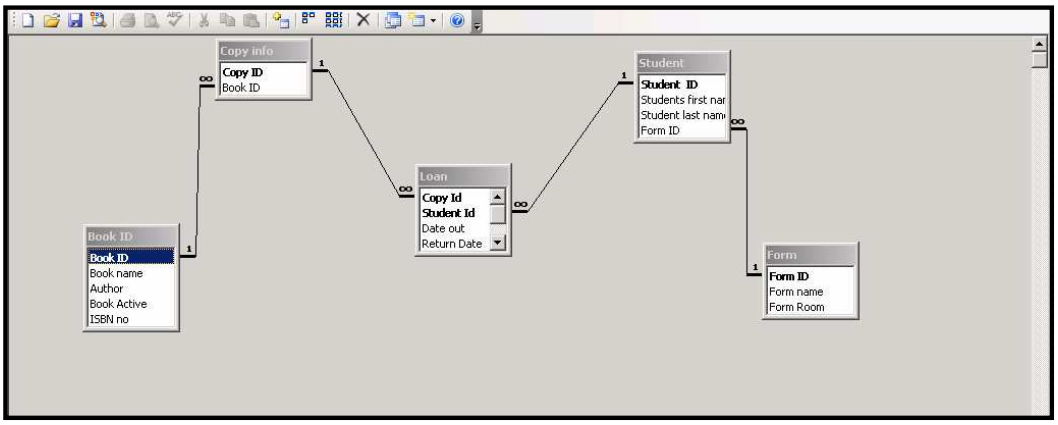
Here you can see that the computer has recognised the mistake that has occurred during the input of the values.

Creating a relationship

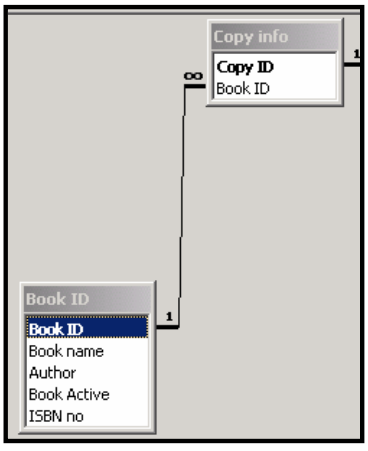


To make a relationship between the two tables there needs to be a common query field. Above you can see that there is a 'Book ID in both of these tables. You pick which table you would like to link and then choose which query you would like to link them to.

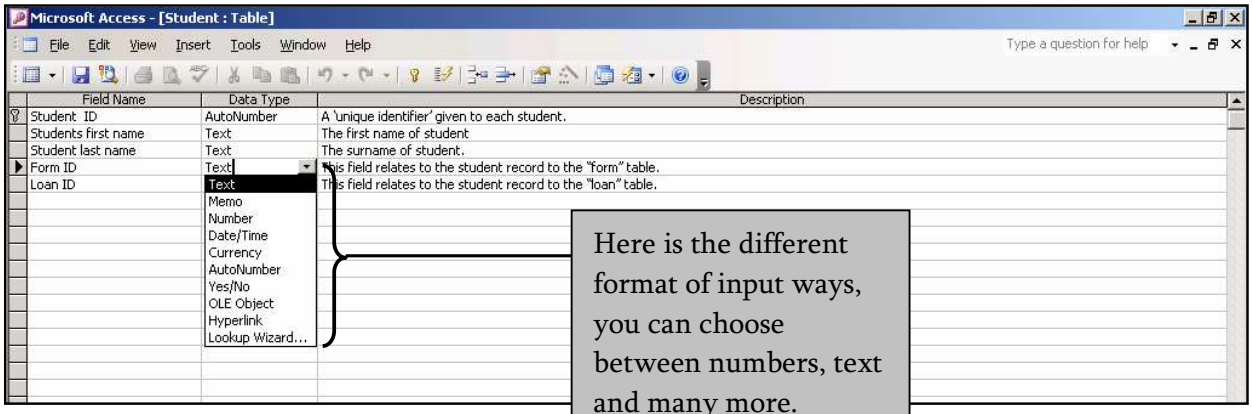
Creating a relationships (cont.)



The above diagrams show how I have related the tables in my database. Now I have created the structure of the database, I will now enter same data. I have more than 1 table so it will prevent my data from being entered more than once. It will reduce the amount the chance of making mistakes. As shown above you can see that my tables are linked together to enable me to view details from both tables or print them. To link the tables together each of the tables must have a common field. For example:



Here are two tables. The common field is 'Book ID'. Both of the tables have the field 'Book ID'. This means that I can link both of these tables together. This is what I have done for the other tables involved in this database.


Microsoft Access - [Student : Table]
File Edit View Insert Tools Window Help
Type a question for help
Field Name
Data Type
Description
Student ID
AutoNumber
A 'unique identifier' given to each student.
Students first name
Text
The first name of student
Student last name
Text
The surname of student.
Form ID
Text
This field relates to the student record to the "form" table.
Loan ID
This field relates to the student record to the "loan" table.
Text
Memo
Number
Date/Time
Currency
AutoNumber
Yes/No
OLE Object
Hyperlink
Lookup Wizard...
Here is the different format of input ways, you can choose between numbers, text and many more.

Creating relationships

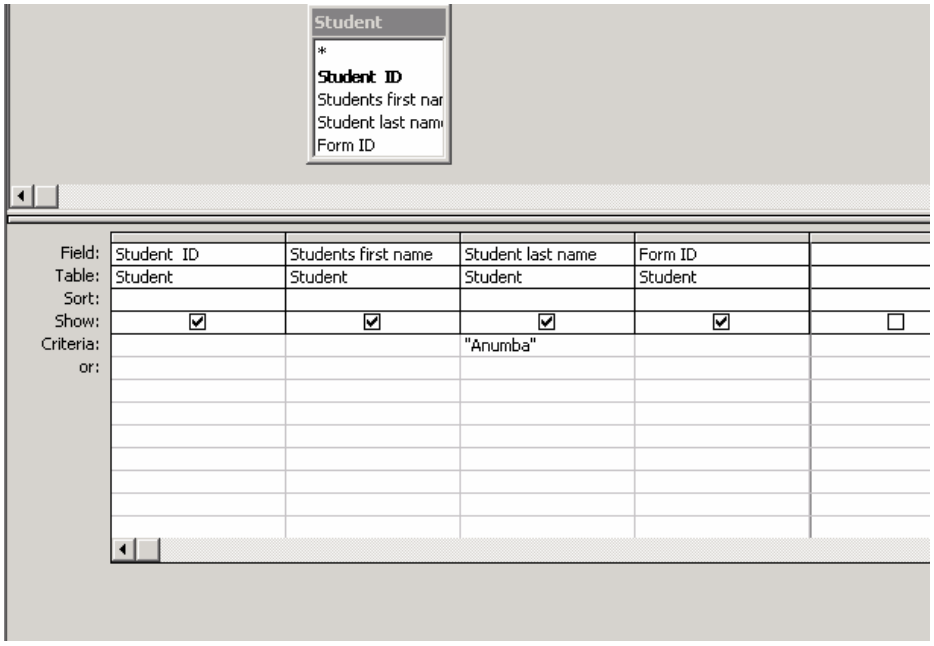
"Referential integrity" is chosen to ensure that there is a matching record in the related table. This is a form of validation, as incorrect entries will not be allowed to be entered.

The above diagrams show how I have related the tables in my database. Now I have created the structure of the database, I will now enter same data.

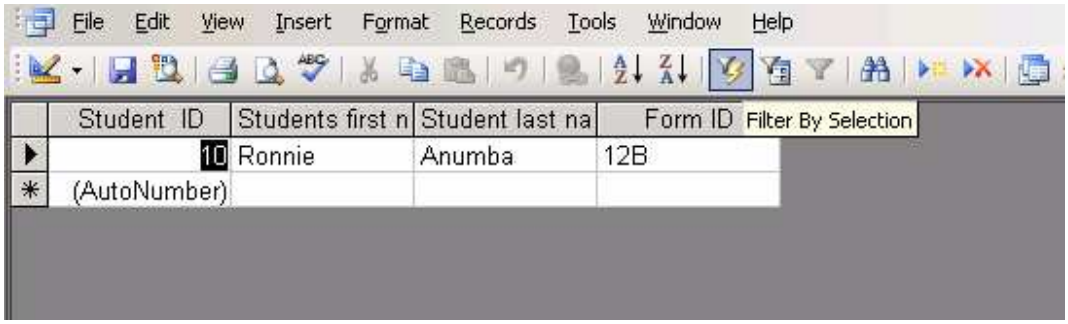
Creating Queries

The name for a search in MS access is a query. Popular searches can be designed and saved in the database and used when required by the user. This means that users without knowledge of Access can still perform searches.

Simple Query searching for specific Student

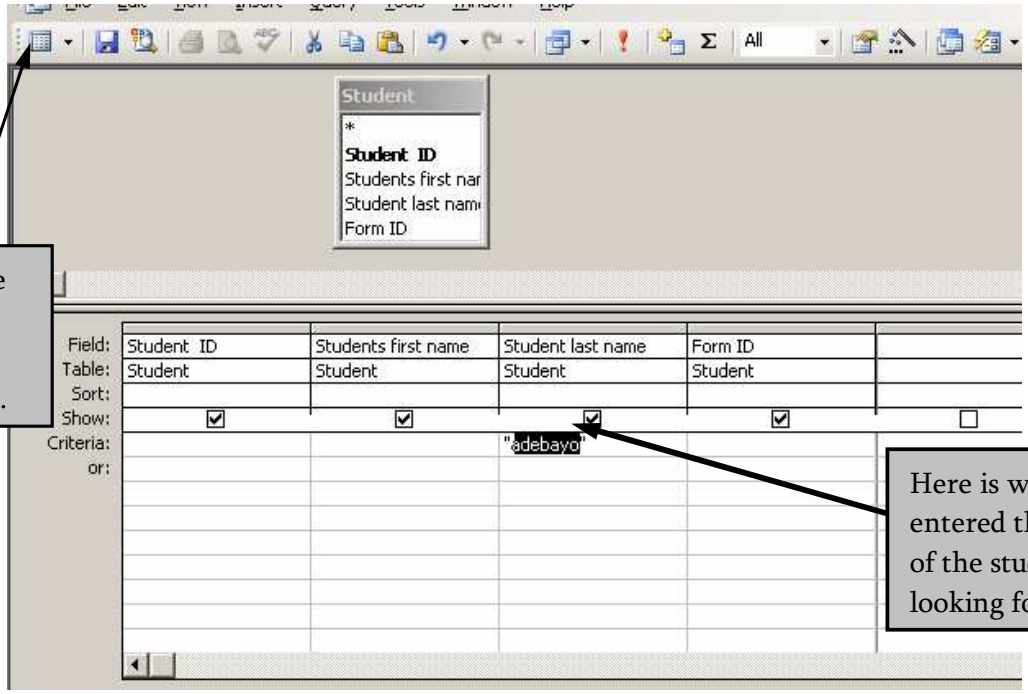


This is the student query. It typed in "Anumba" in the student last name field so when I look in the student table. I will only people with the surname "Anumba".



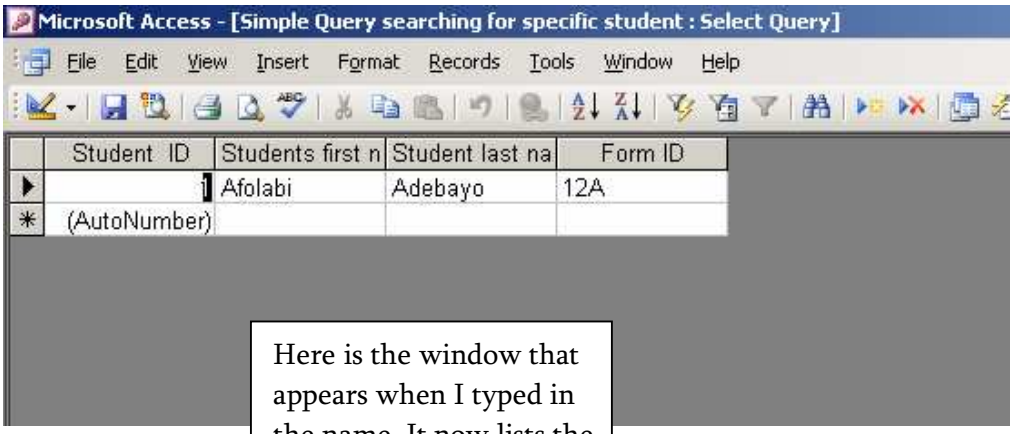
Testing

T1.



To run the wildcard you must press here.

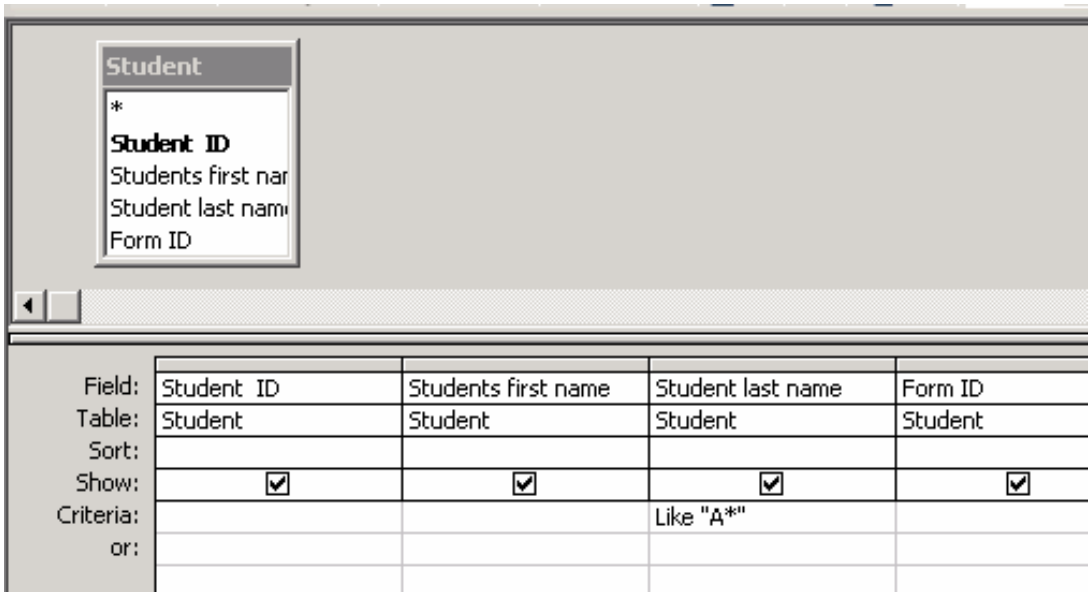
Here is where I entered the surname of the student I was looking for.

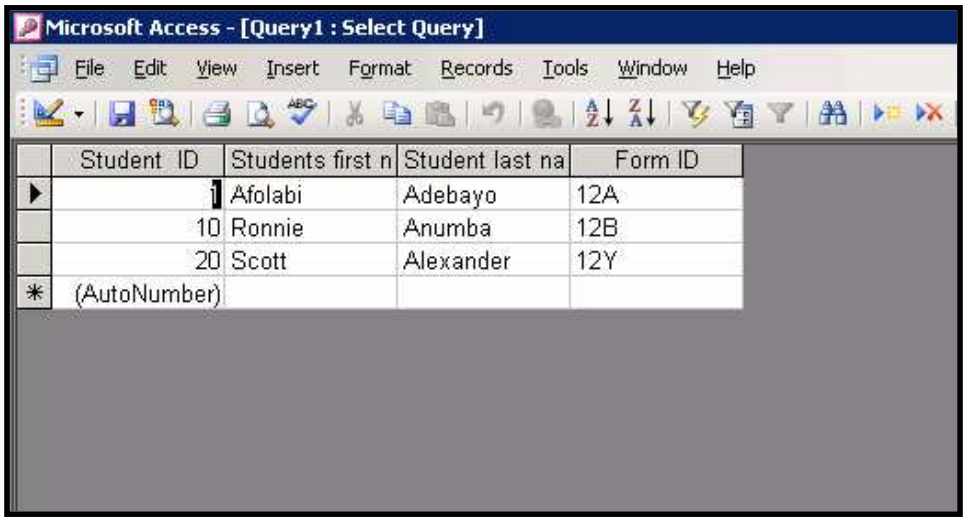


Here is the window that appears when I typed in the name. It now lists the students which have the surname 'Adebayo'.

T2. (1)

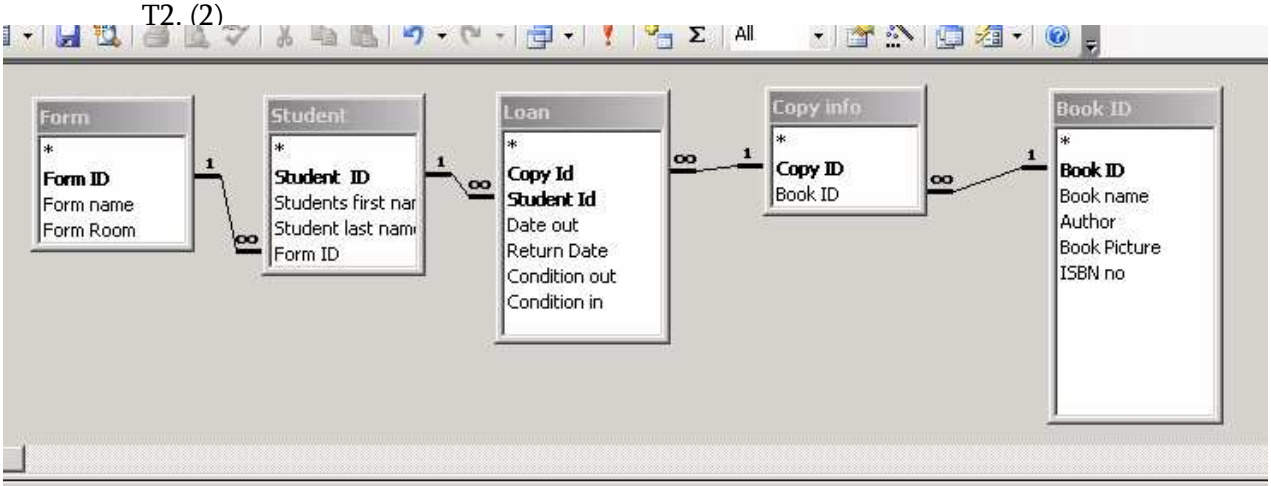
Complex query search





I typed "A*" in the student last name field so when I click on the student table, I will see only the students name which start with the letter "A*". The "*" acts as the wildcard.

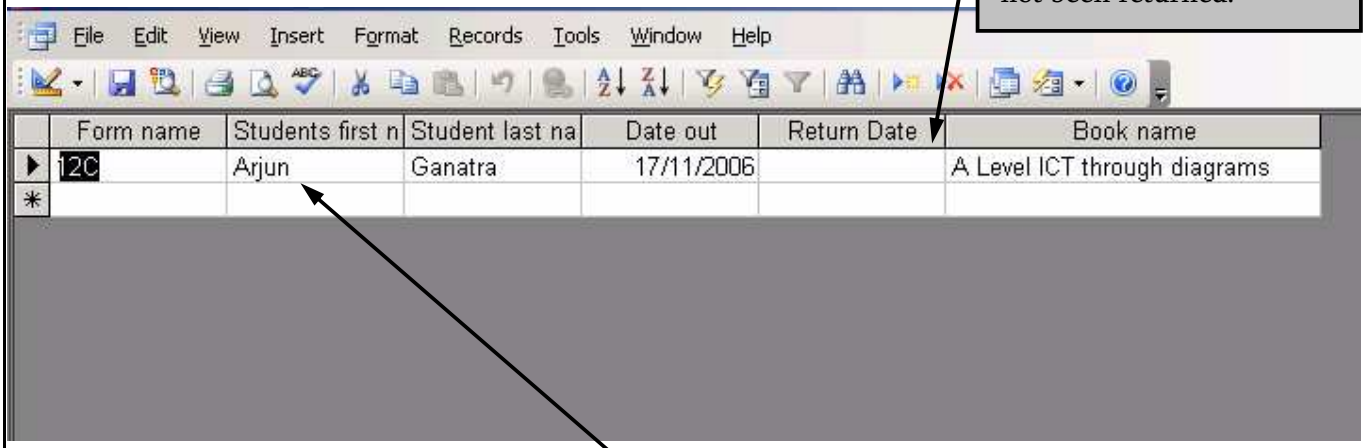
T2. (2)



Field:	Form name	Students first name	Student last name	Date out	Return Date	Book name
Table:	Form	Student	Student	Loan	Loan	Book ID
Sort:						
Show:	☑	☑	☑	☑	☑	☑
Criteria:	"12C"				Is Null	
or:						

Search for students in 12C

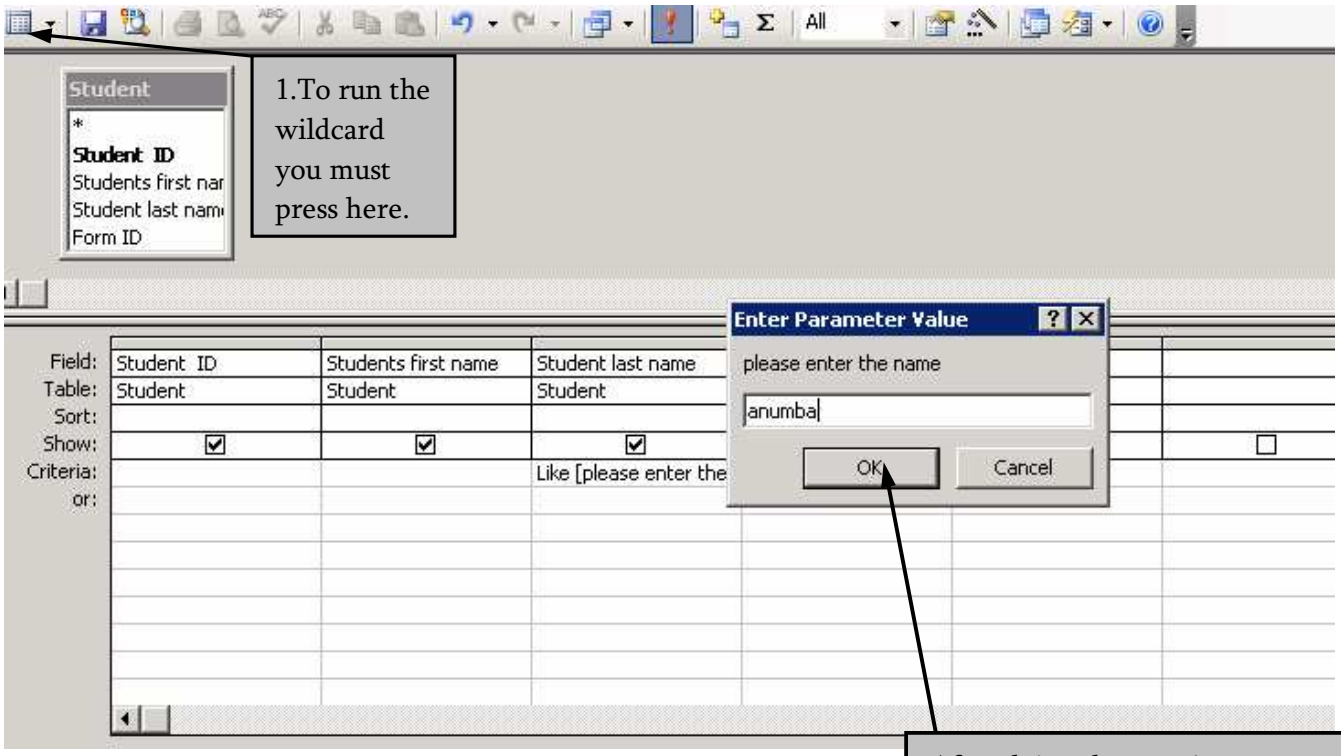
"Is Null" means that no data has been entered here. The fact that there is no data for date returned means that the book has not been returned.



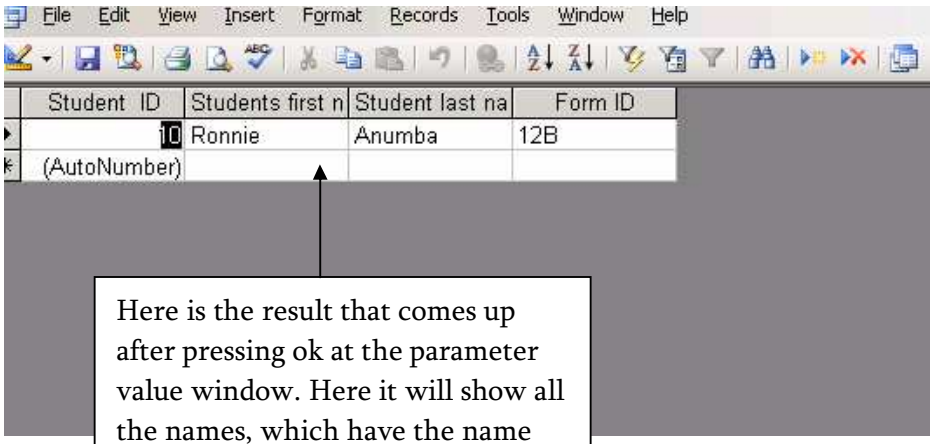
Form name	Students first n	Student last na	Date out	Return Date	Book name
12C	Arjun	Ganatra	17/11/2006		A Level ICT through diagrams

Here a name has come up. This person above hasn't given the book in yet and he is in 12C. The search has worked.

T3.



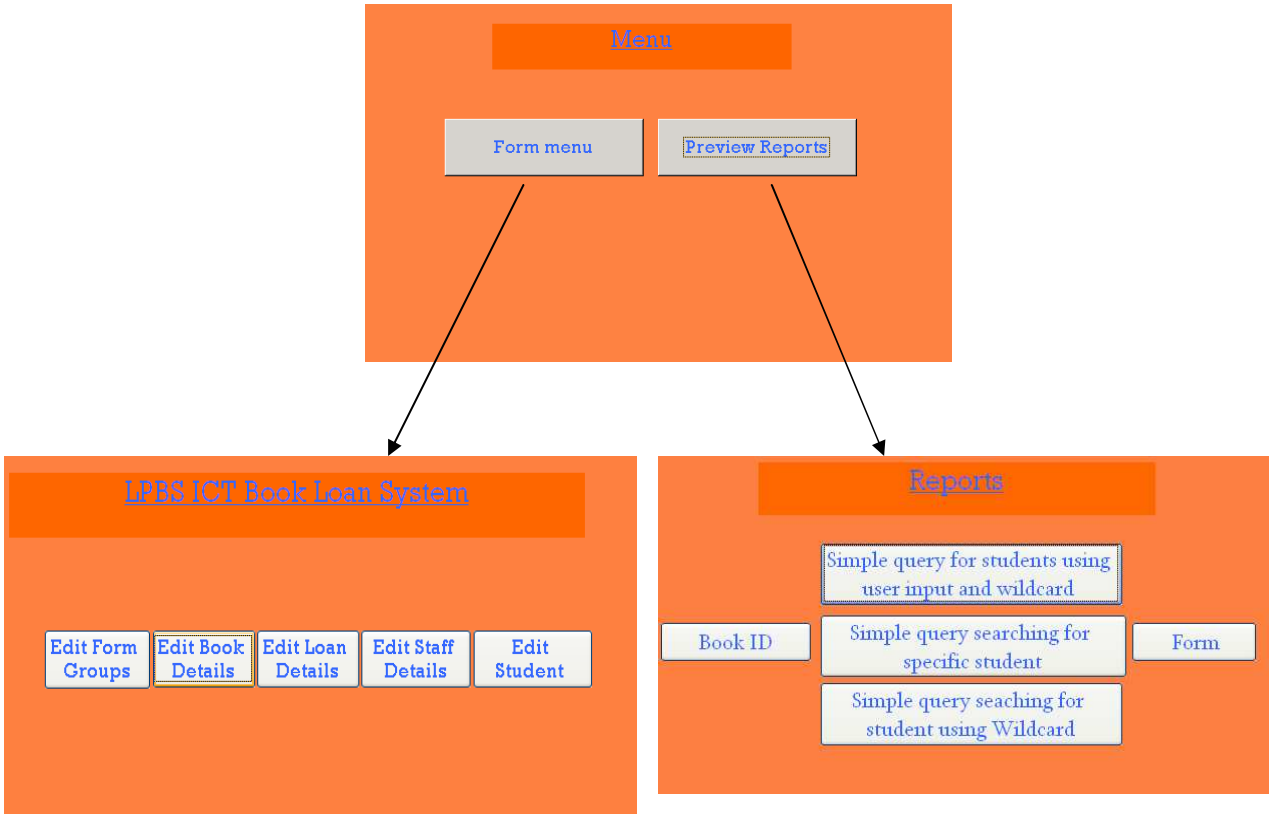
After doing the step 1. you can enter the name the name of the student you want to look for on the parameter value window that appears. Here I have typed in the name 'Anumba'.



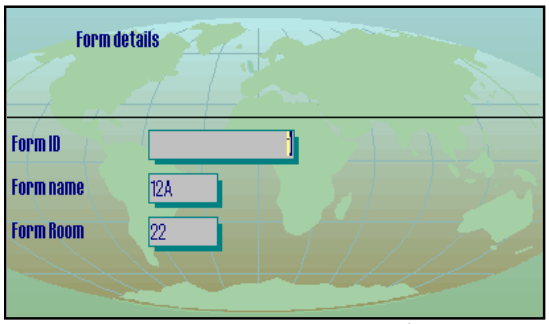
Here is the result that comes up after pressing ok at the parameter value window. Here it will show all the names, which have the name 'Anumba' in it.

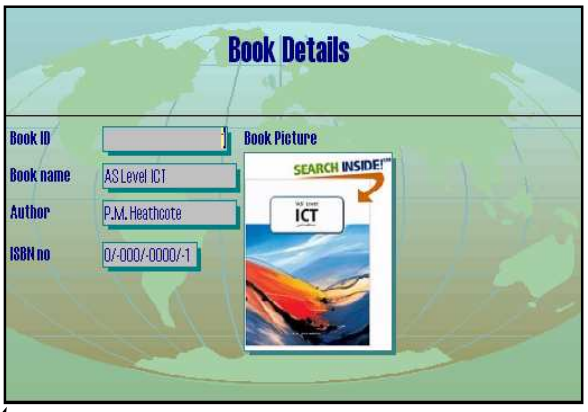
T4.

This is the main menu of the system. Here I am checking whether all the buttons on the forms work. At the main menu there is a button called 'Form menu' & 'Preview Reports'; both of these buttons have further menus to help keep options easy to find and precise.

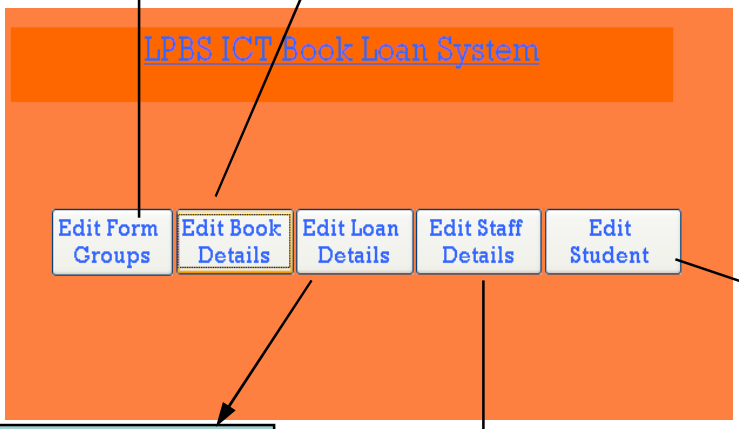


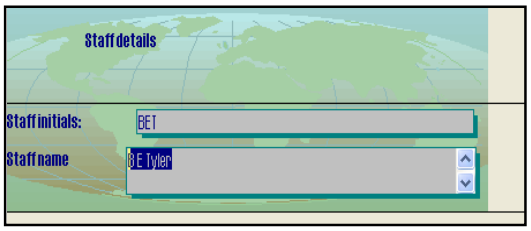
Both of these sub forms have opened when I pressed on the correct button. On these two sub forms there are further buttons here, which I must also test. The testing of this has been shown below.

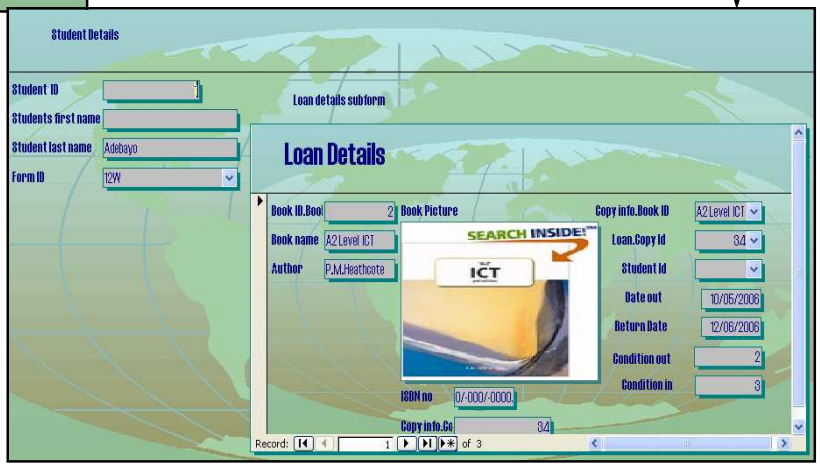


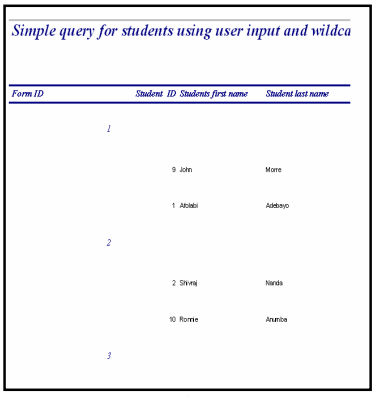


As you can see all of these five buttons have seemed to work. The buttons have navigated me to the correct location in which I intended them to be linked to.

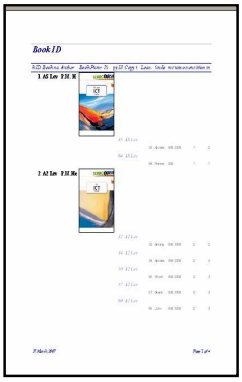


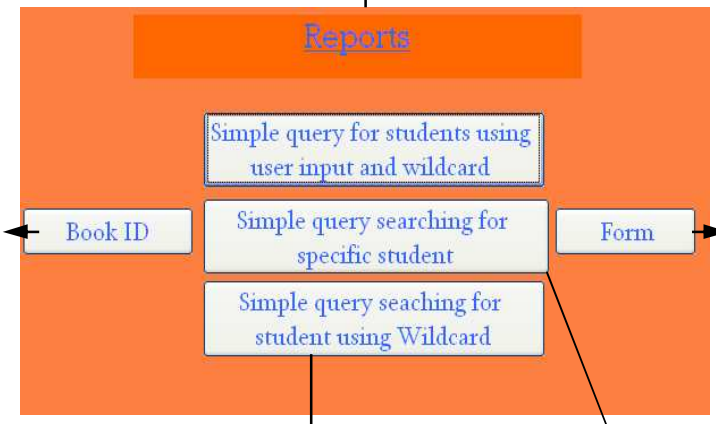


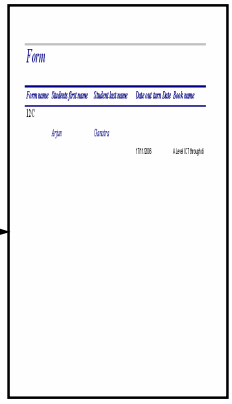


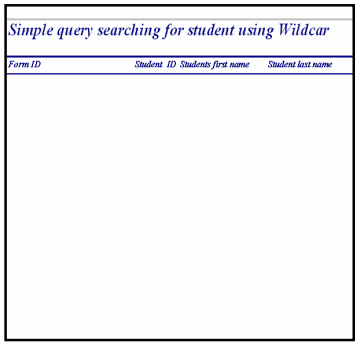


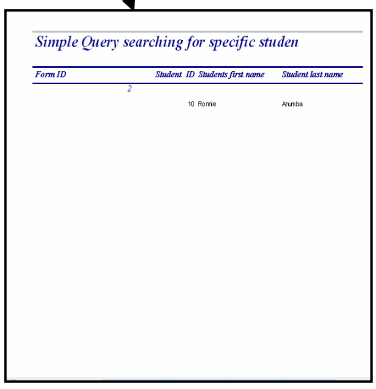
As you can see all of these five buttons have seemed to work. The buttons have navigated me to the correct location in which I intended them to be linked to.



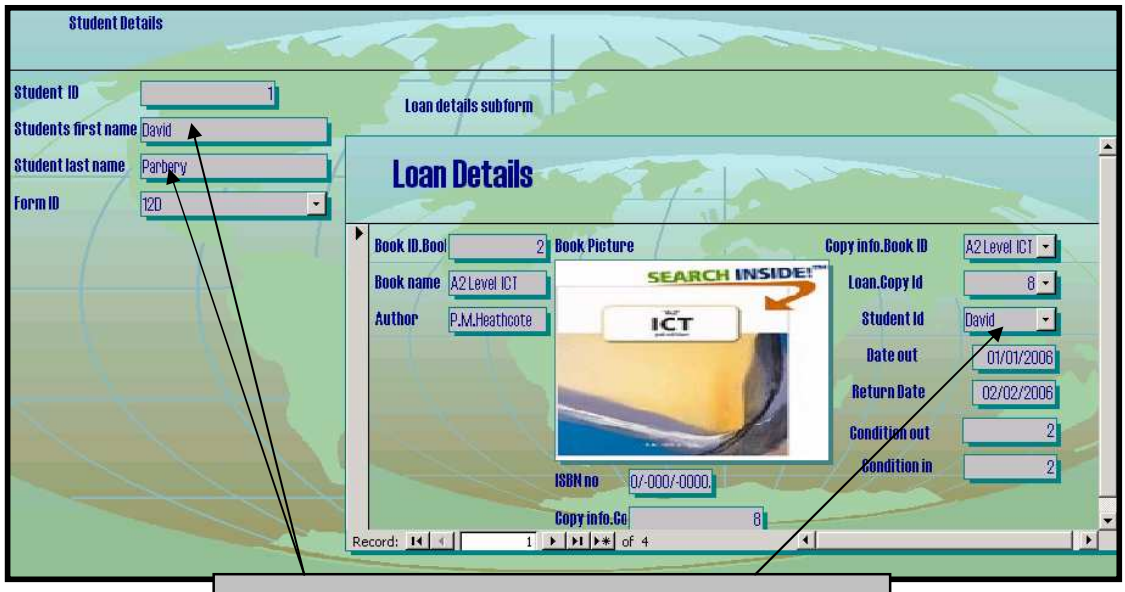






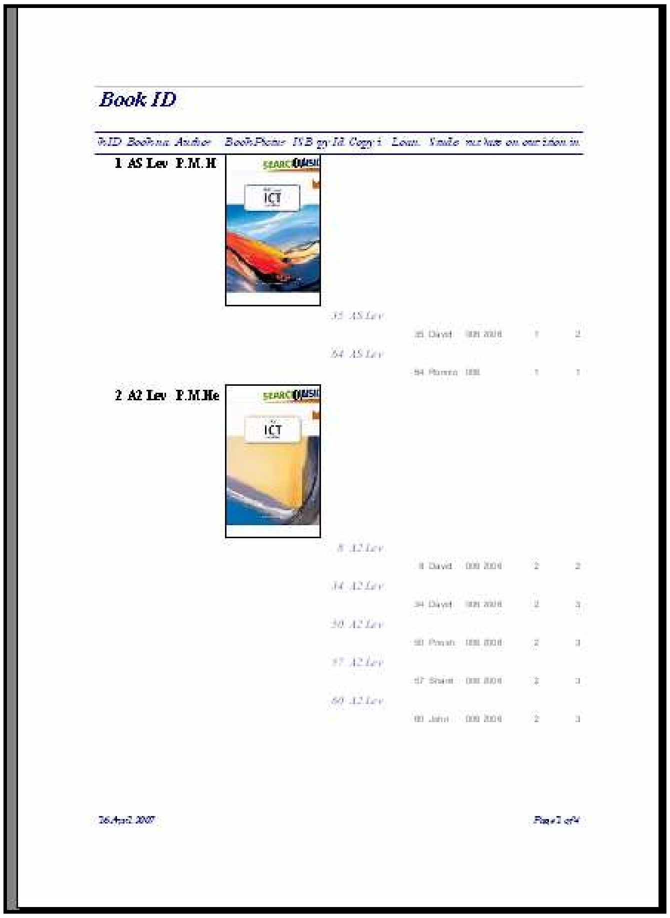


T5.

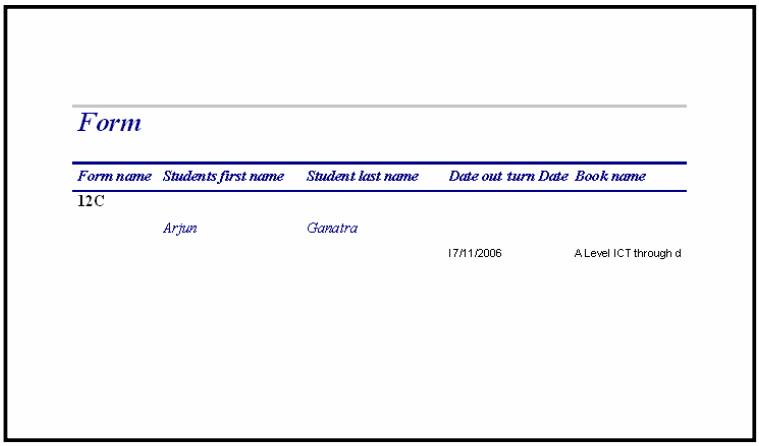


Here is where I typed in the name of the student I wanted to add. After this I can chose the name from the loan details in the drop down box.

All Reports



This book ID form shows all the books that are on the system which have not been returned yet and the condition that they went out in and the condition of the book when it was returned.

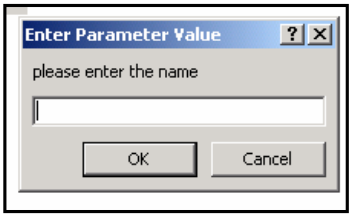


Form

Form name	Students first name	Student last name	Date out turn Date	Book name
12C				
	Arjun	Ganatra		
			17/11/2006	A Level ICT through d

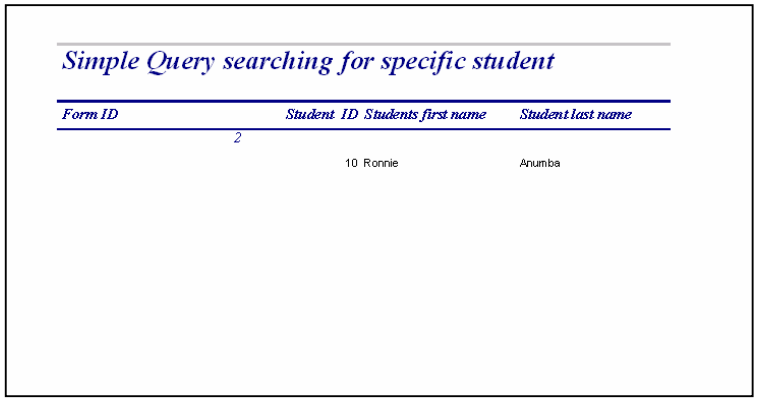
This is the form which tells you if the student has returned the book, which book/books they are and what form they are in.

Simple query for students using user input and wildcard



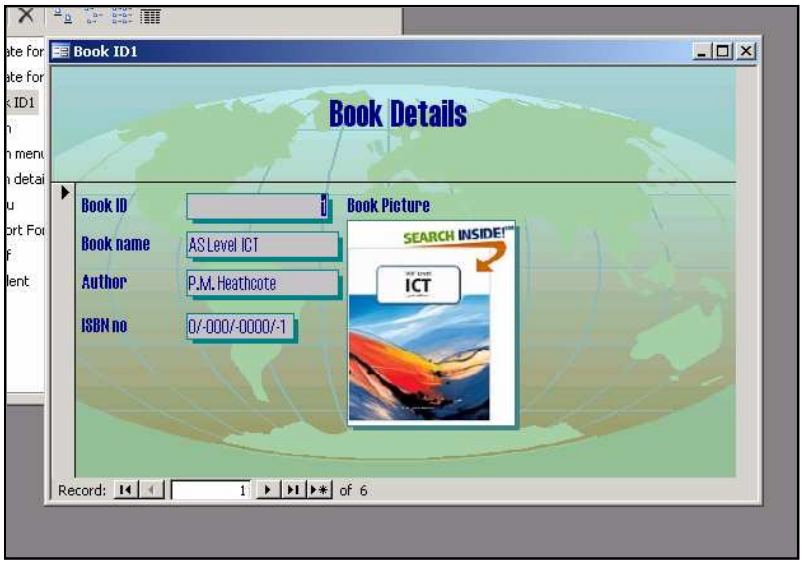
This Simple query for students using user input and wildcard report will allow me to add a student to the database.

Simple Query searching for specific student

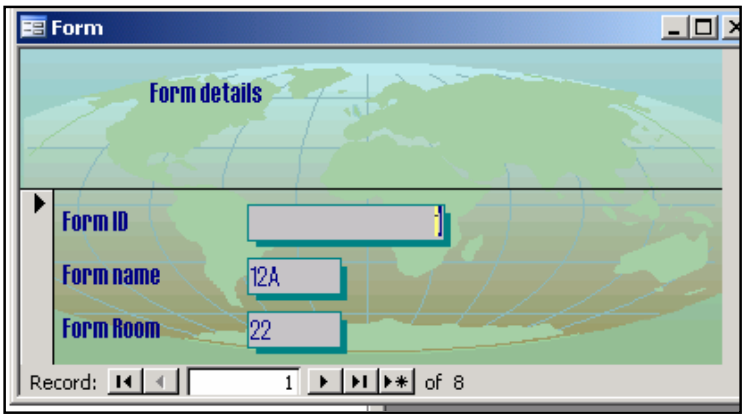


This form shows me a specific student that I have searched.

All Forms

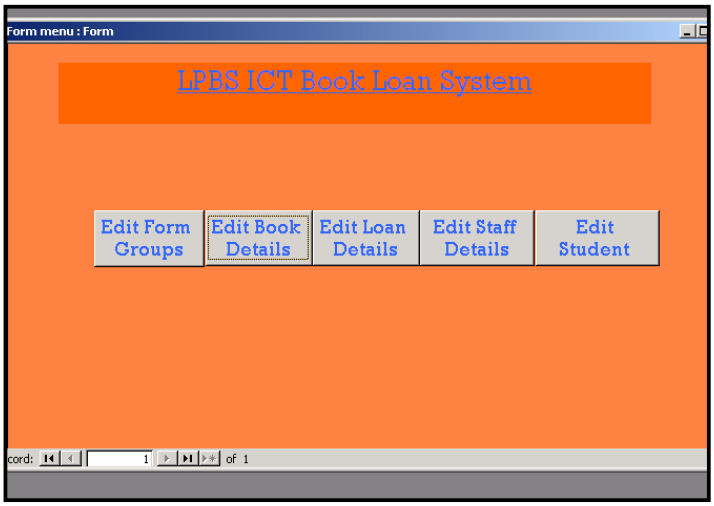


This is the book details. This shows me the details of the book. This includes the ISBN no, author and book name.



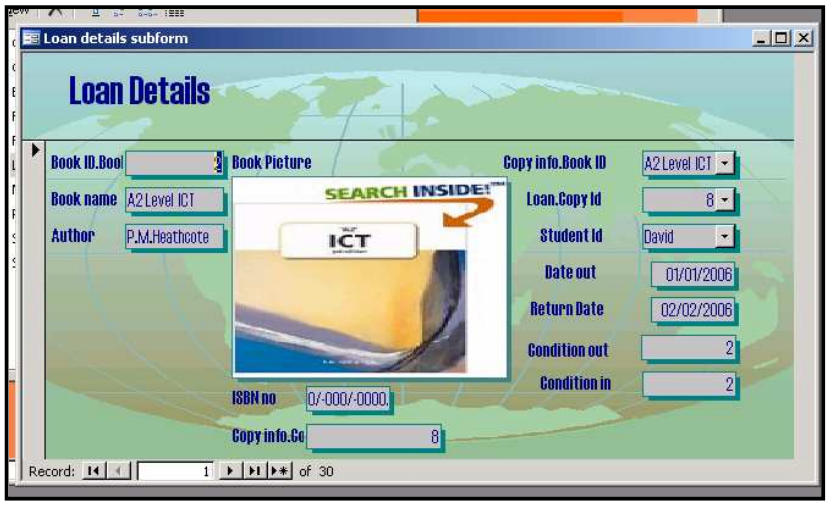
This is the Form's details. This has the name of the form and the room number as well.

Menu form for loan

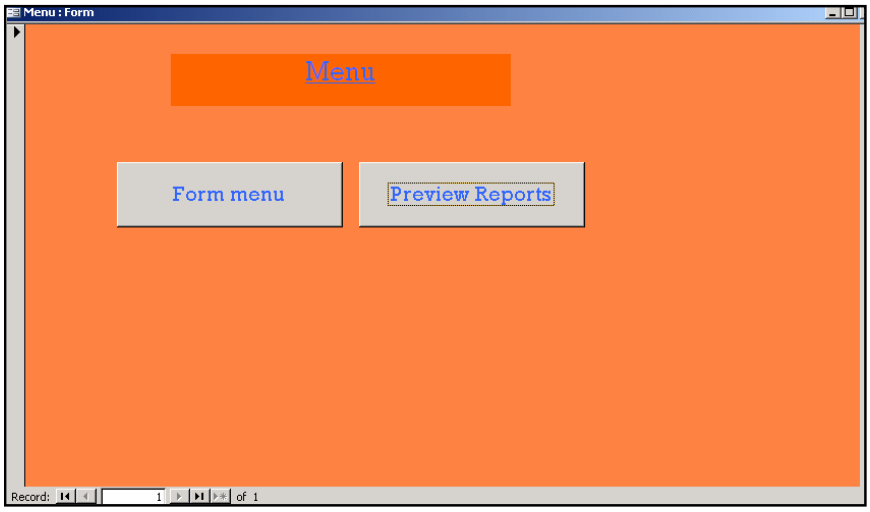


This is the main menu of the database system. It has easy links to edit form groups, edit book details, edit loan details, edit staff details and edit student.

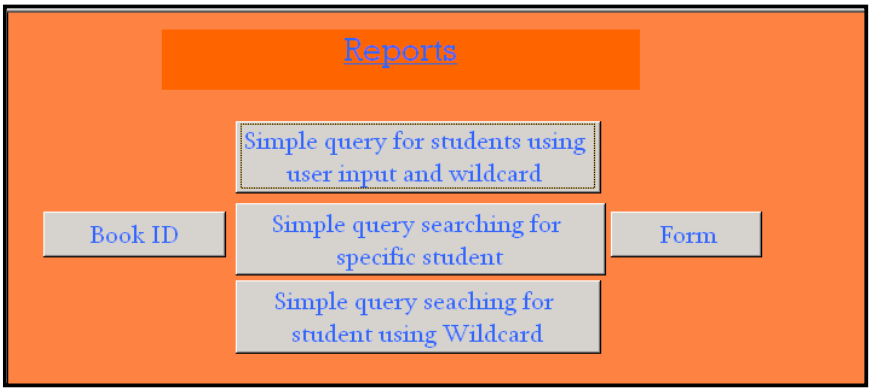
Loan Details form



This Form allows me to change the loan details. This is used when a student is loaning out a book.



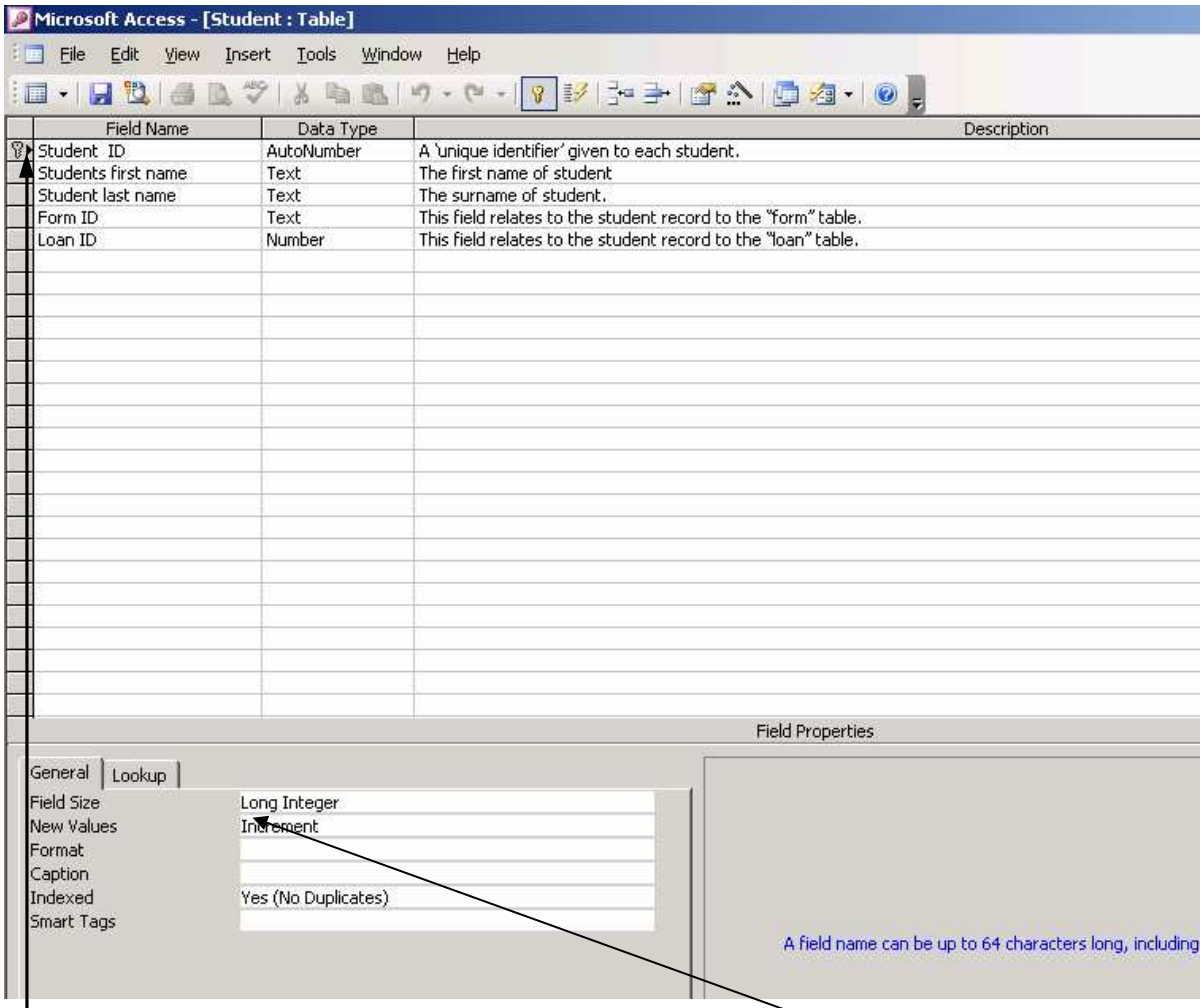
This is the main menu where I can chose if I want to edit or preview forms or a menu.



These are all the reports from which I can chose from to edit or view.

Implementation

Creating Tables

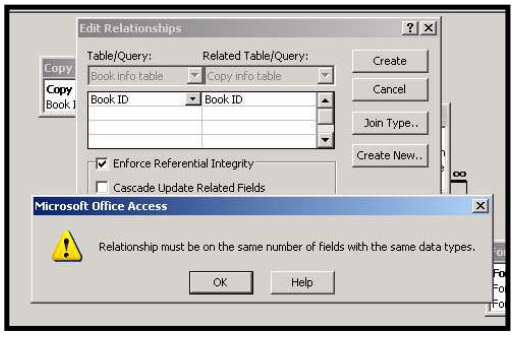


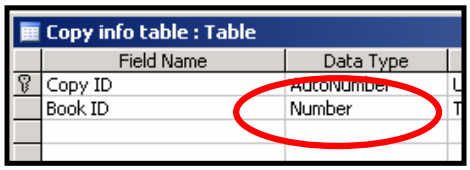
A Primary key allows you to have a unique record of everyone so that it won't mix up, e.g. if you had two people who had the same name, they wouldn't get mixed up.

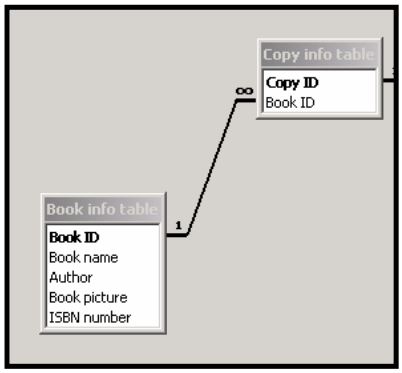
MS Access automatically allocates 50 characters for each entry into a text field by reducing this size I will reduce the overall size of the database.

Errors

Errors with database types.

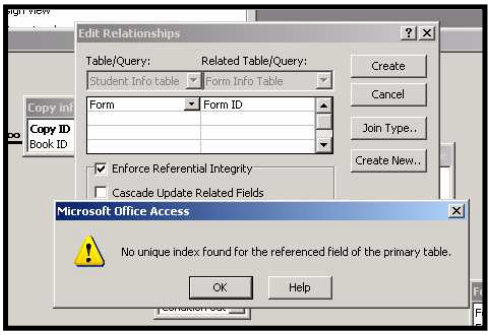






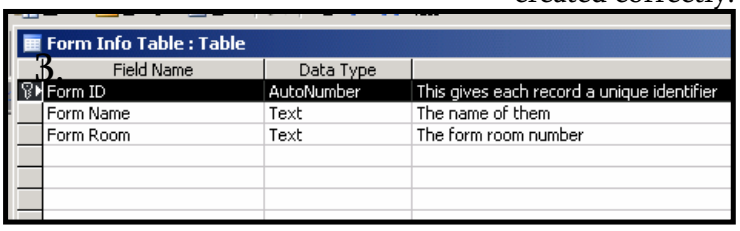
1. When I tried to create a relationship it said that they must be matching data types. I also noticed that the book ID was a text field and not a number field. After I changed this the relationship was easily created properly.

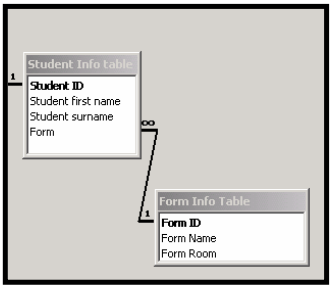
Errors with no primary key



2. When I tried to create a relationship it said that no "unique identifier" was present. This means that no primary key in the table.

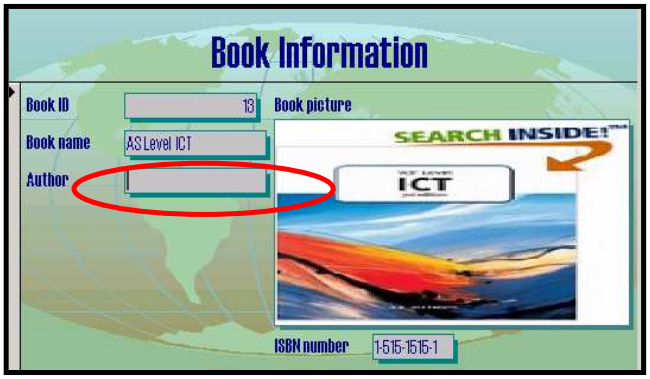
I then realised that the table had no primary key. I made the "form ID" a primary key. The relationship was then created correctly.

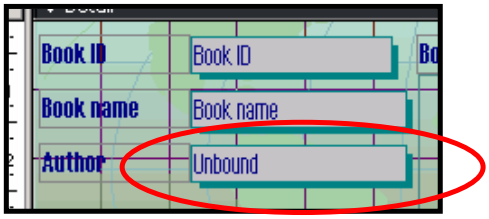


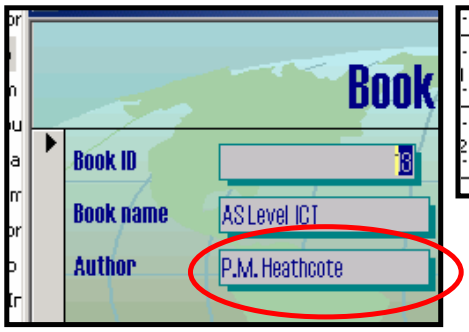


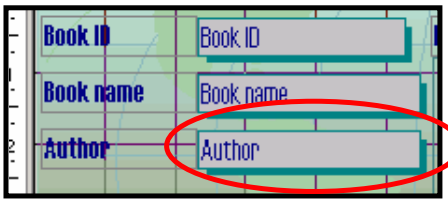
3. Errors with fields on forms

When I looked the book form up, it didn't display the author name. I looked at the form in design view and noticed the field was "Unbound". I recreated the field so that the field was linked to the "author name" in the book table. This made the authors name be correctly displayed for each book.



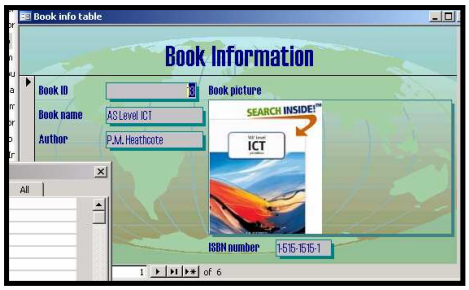


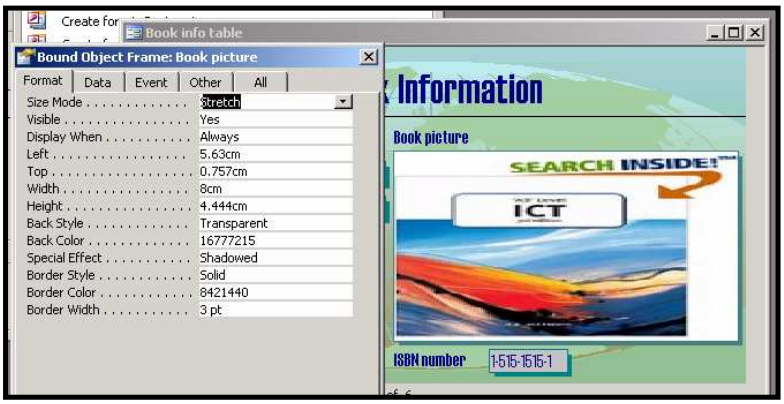




4. Errors with images

When the book form is loaded the image of the book does not fill the box. To change this I changed the box's properties from "Clip" to "Stretch". This stretches or shrinks the image to fill the box.





Test Plan

Test	How will you test it?	What do you expect?	Test reference
Simple search for a student.	I will test this by inputting the surname of one of the students from my database.	I expect the when I type in the surname of a student; it should appear on the screen.	T1
Complex query	I can test this by searching for something specific, E.g. a student's form class.	When I search for this I expect that I should end up with the results of the students that are in a specific form class.	T2
Test if the wildcard works	I would enter a student's surname in the parameter value input box.	I expect that there should be a list of student's names that appear in a query.	T3
Test if the buttons on the form work.	I can click on the buttons. If they go to the correct place, then I know that they are working correctly.	I expect that they should all work because I have used the forms generally a lot and they have worked correctly so far.	T4
To test if I can enter a new student.	I will enter a new student to the database system.	It should work and the new student will be added on to the system.	T5

Evaluation

Questionnaire

	Yes	No
Is the interface easy to use?		
Is the system fast?		
Is the database easy to navigate between		

Is it easy to find what you want?

Did all the buttons work properly?

Are the report formats as you expected? Do they need any changes?

_____

_____

Is all the relevant information available? If not please state the missing below

_____

_____

Could there be any improvements you think could be done? If so please state below.

_____

_____

_____

_____

_____

_____

_____

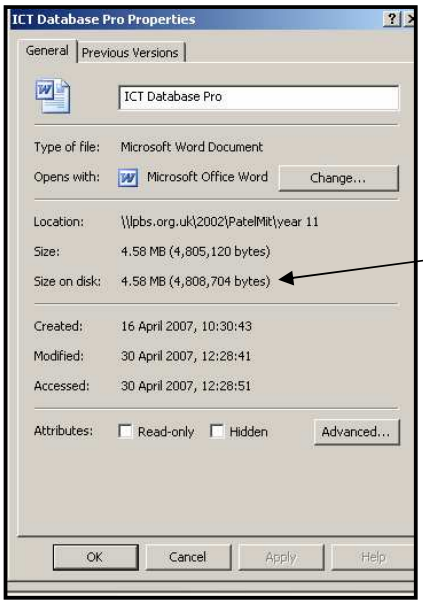
Quantitative objectives evaluation

I think that I have completed the objectives that I had set out at the beginning of the project. Although I have finished it, there is always room for improvement and I think I could do a little bit better. These consist of adding new features such as making the database enabled for the use of other subjects.

While working through the objectives I had made for myself, I did find it quite challenging but there was nothing that I couldn't complete. Overall I think that I have done quite well to complete the objectives.
The objectives I had were :-

- The database should take up maximum of 5mb of dick space.
- Database should be able to easily edit student/ book/ loan details.
- Database should be able to easily store student/ book/ loan details.
- Searches should not take longer than 15 seconds.
- Data should be able to be transferred from the school Sims system.
- It should have commonly used reports readily available.
- It should have a user-friendly interface.

Evaluation of Objective 1.



The database only takes up 4.48mb. This means that my first objective is completed.

Evaluation of Objective 2.

From my user feedback I was clearly told that the database was easy to edit student/ book/ loan details. This means that I have completed this particular objective.

Evaluation of Objective 3

From my user feedback I was clearly told that the database was easy to edit the database and it was easily store student/ book/ loan details. This means that I have completed this particular objective.

Evaluation of Objective 4

The user feedback suggested to me that the searches took less than 15 seconds and very quick. This means that I have completed this objective.

Evaluation of Objective 5

From my testing I have shown that the access of commonly used forms are readily available for the use convenient use of the librarian.

Evaluation of Objective 6

The user interface of the database is very user friendly , this has been proved when I was told from the user feedback that the interface was easy to read and understand.

User Response and possible improvements

Subsequent to giving the questionnaire to some of the users I had a response. The majority of the users agreed to saying they thought that the interface was very straight forward to use and found that when searching for a particular search, it was very quick.

All but one user thought that the database was easy to navigate between as I have made a menu linking all the appropriate forms together saving time and effort. In my testing I had checked whether all the buttons had worked correctly and navigated you to the correct form or reports. This was proved by the users as they had no problems with the links in between the forms and reports.

The report format was as they expected because they have used databases which were very similar but several of the users had said they liked the picture feature in the reports so that they know which book has been loaned out. They didn't think that it needs any changes as it has more than the average database of this kind.

All the relevant information that the users needed was there and they didn't have any problem retrieving it.

Even though the users did think the database was good they suggested to me that they thought that I should expand the database so that it would allow them to use this database for other subjects. This would be very easy to do as all I have to do is add the system is the staffs that teach the subject, the sets and the books.