GCSE ICT Coursework:

The Creation and Manipulation of Databases

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Identification

Mr. Amir Khan has begun his own weekend tuition along with his partner Mrs. Cassie Williams. The tuition is called Amir's Saturday Tuition and is for GCSE students between the ages of 14-16 of all abilities who wish to learn Mathematics, Sciences, English Literature and English Language. The tuition will run between 11am to 6pm on Saturdays. Approximately 60 students have currently enrolled and they will begin from September 2007. There are approximately 10 teachers who will teach the above stated subjects to small groups of 6 to students of different levels. Classes will be conducted in different rooms belonging to the teacher.

The Problem

There is no current registering system or database to file the student's details. In an emergency, student's details need to be found immediately. Mrs. Cassie Williams is very firm about students keeping a good attendance. Therefore, it is her wish that a register be included in the database. Details of all students have been requested and these details need to be put into the database. The details include their full name, date of birth, address, telephone number, mobile number and emergency contact information. Two registers need to be created for both the Mathematics teacher, Mr. Juelz Santana and the Science teacher, Mr. Chris Brown. Mr. Amir Khan has asked me to assist him in creating these two databases. He wishes for the database to include:

- The student's full name, address, date of birth, telephone number and emergency contact information to be present in the database
- An attendance record for all students for every week in each term.
- A database with teacher's details
- Search tool
- Password protection

Alternative Solutions

An alternative solution to database is word processor or spreadsheet. Tables could be created to store the details of students. The logo could be placed on the document too. Searches could be performed and the document could also be password protected. However, mistakes can be made since there are no validation rules.

Database is ideal to make the registers on for many reasons. Firstly, validation checks like presence checks, length checks and character type checks limit the users' mistakes. Queries can be made to search for data meeting a certain criteria. Forms and reports can be prepared almost instantly. Files can be linked together so that if one file is updated the other files dependant on that file will also automatically be updated. The addition, deletion and editing of data is simple. The database can be password protected to allow certain people to access the database tables.

Why ICT is a sensible way of solving this problem

ICT is a sensible way of solving this problem for many reasons.
Instead of a computerised filing system, filing cabinets would have to be used. This wastes space and delays time since searching can take time. Duplicates of
Mistakes on a hand written system are likely and the system would have to be rewritten, which will waste time or correction fluid will be have to used making the system look messy and unprofessional. This is not a problem on a computerised system, since things can simply be deleted. A computerised system would save time, would look far more presentable than a paper based one and be more accurate. Saving a computerised system is fast and easy. However, a paper based system would need to be filed away safely. Changes would be easier on a computerised system instead of using correction fluid on the paper based one. Illegible handwriting would be hard to read and could create errors and confusion.

Quantitative Objectives

My objectives of this task are the following.

1. To create a database, which stores student's details
2. To create a database, which also acts as an attendance record.
3. To make the database password protected
4. To enable the user to create reports
5. To enable the user to run forms
6. To enable the user to create queries
7. To link tables so that if changes are made in one table, the changes are clear in the other too.
8. To make the system easy to read and clear
9. To save the database on the appropriate backing storage.
10. To include the tuition logo in the system
11. Searching on the system should be easy
12. To make the forms include buttons linking from one record to another.

Analysis

Input

I will create data capture forms to require the following information:

- ✓ Student's first name
- ✓ Student's last name
- ✓ Student's address
- ✓ Student's postcode
- ✓ Student's home telephone number
- ✓ Student's mobile number
- ✓ Student's email address
- ✓ Student's predicted results
- ✓ Student's current results
- ✓ Teacher's first name
- ✓ Teacher's surname
- ✓ Teacher's telephone number
- ✓ Teacher's email address
- ✓ Teacher's subject

These forms will be handed to all the students enrolled for the tuition and the teachers too. Once completed, the information will be typed in the database using a keyboard. To save memory, codes will be used when entering the data into the database to shorten long words. For example 'Rd' will be used instead of Road and 'St' instead of Street. The information will be verified by the person who typed in these details by checking the data entered against the forms.

Process

The database would validate the information by using range, format and presence checks. These checks would make sure that the right type of information is entered, that it is in the right format and that it is even entered. However, it will not check the accuracy of the data and this can only be done by proof reading the data entered against the forms. The computer will process the information in design view by changing it to the database view. It will also set up relationships between the tables, create forms, queries and also create reports.

Output

The output of the database would be viewing the tables, forms, query results and reports on the monitor. Also, the student reports will be printed off and read as a hard copy. These will be printed on A4 white paper in landscape view. After printing off the student's reports and creating the database, I will create another data capture form to highlight any mistakes I have made or any improvements I could make to the database. This form would be sent to the management and teachers as a means of feedback.

Backup

The user of the database should save the database as soon changes are made to avoid the loss of data. The database would need to be saved on the hard disk of the computer. Apart from saving on internal memory, it should be saved on external memory like USB memory stick and CD-RW's. USB memory sticks come with a range of memories like 512MB or 1GB. I would recommend for the user to make use of the 1 GB memory stick since there is more memory on it and therefore more data can be saved on it. A CD-RW is preferable to use because it can save 700MB of data and this data can be deleted and changed unlike a CD-R. The USB memory stick and CD-RW should be kept safely and away from the original system. As soon updates are available, the database should be saved on both the internal and the external memory. The updated database should also be emailed to the company's email address as soon as possible as a means of backup.

Security

The users should be asked for their usernames and passwords when accessing the computers. These passwords and usernames should be changed after every three months to avoid hackers. The database should be password protected too. Hard copies of reports on students should be kept in a locked filing cabinet away from the computers. The rooms with the computers and filing cabinet should have a security and fire alarm in it. The doors should be kept locked when there is no teacher present there. The hardware should have security labels on them in case of a theft. An antivirus software should be installed in the computer to prevent viruses from entering the computer system. A network monitoring system should be installed to protect the network.

Software

To create and use the database, the following software will be required:

1. Microsoft Access
   Access is the preferred software over other types of software because of its capability to create complex searches called queries, produce reports, and convenient data entry forms. The database created on Access can also be made relational to link files together and further improve it. Mistakes are limited because of the many and useful validation checks like presence checks, length checks and character type or format checks. The database can also be made password protected to ensure its security.
2. Symantec Norton Antivirus Software and Firewall 2007
   This software helps prevent viruses which can corrupt data from coming on to the computer system.
3. The Multi Router Traffic Grapher
   This software monitors the traffic load on network links

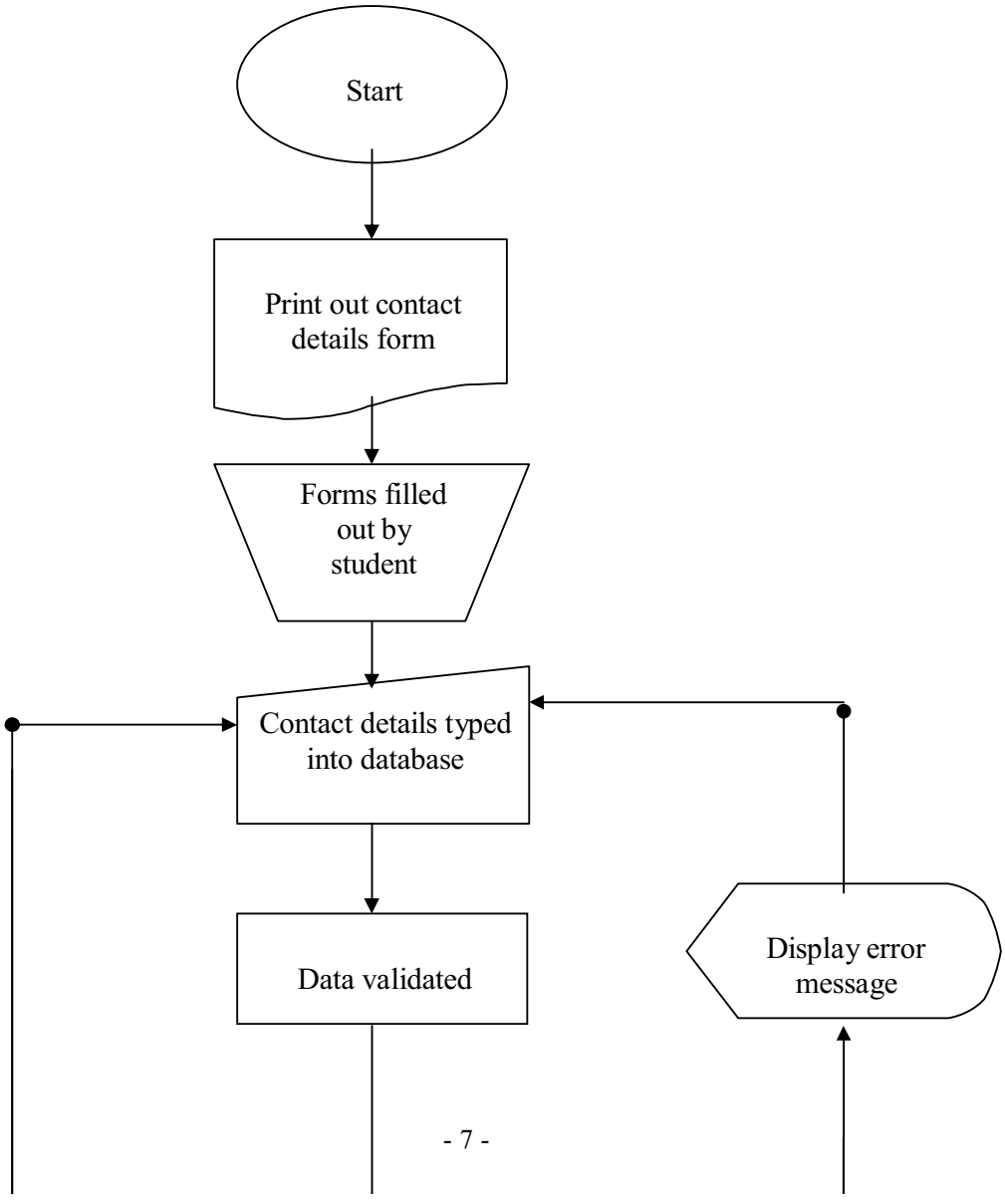
Hardware

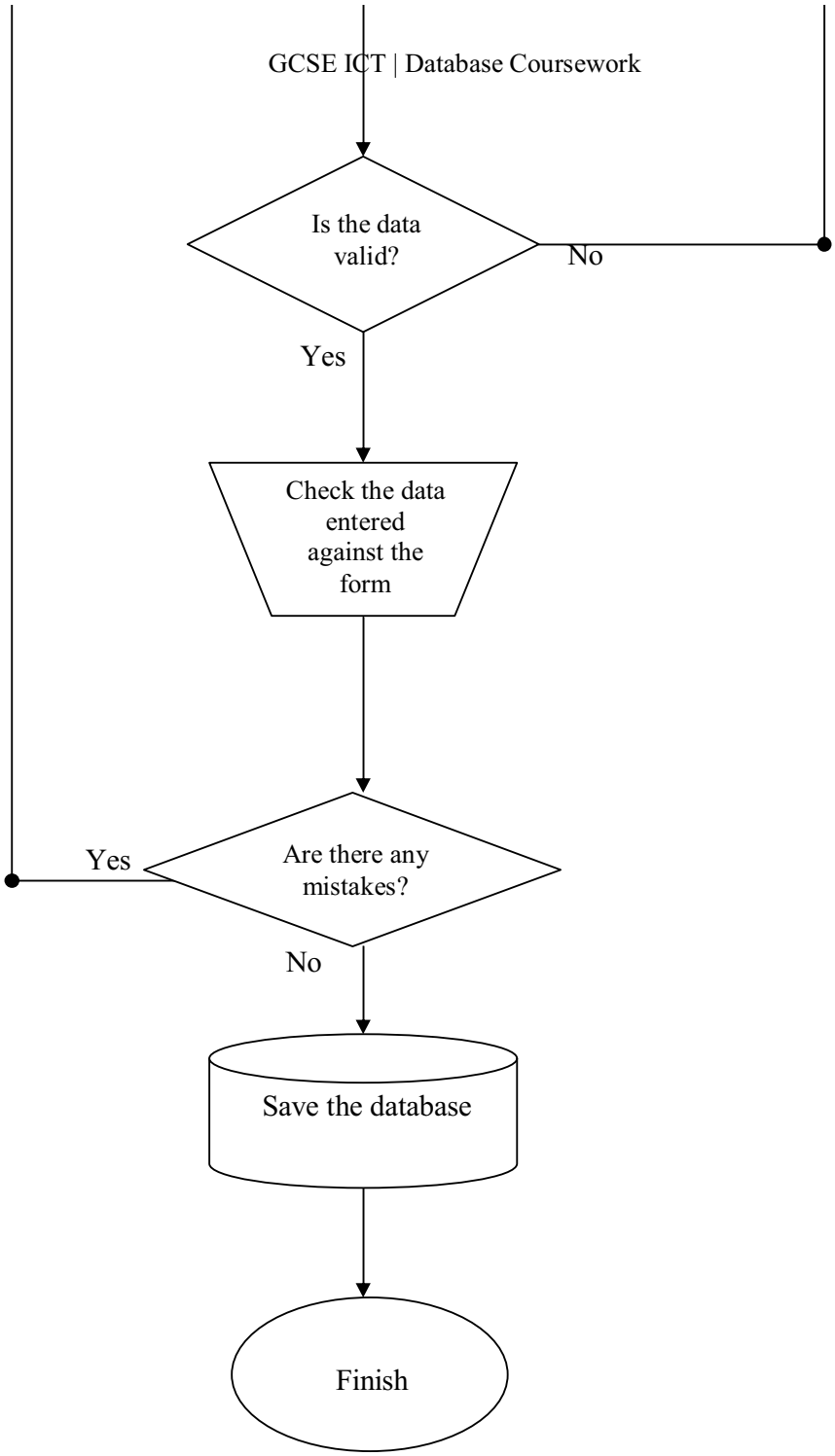
To create and use the database, the following hardware will be required:

1. 3 Packard Bell Istart 1360 desktop PC - AMD Athlon 64 3200+ processor (with Microsoft Windows XP Home Edition, 512MB DDR RAM, 80GB hard disk drive)
2. 3 17" Sony Flat Panel Monitor
3. 3 keyboards
4. 3 mice
5. Inkjet printer
6. Hub
7. Cables

A large memory of the computer is needed to save the database. Three computers will be needed for both teachers and receptionist or network manager and will be networked together. To network the computers, a hub and cables are needed. Since all the computers will be networked, only one printer is needed. This printer should be an inkjet one because it produces decent quality printouts at a reasonable price.

Flow Chart




Is the data valid?
No
Yes
Check the data entered against the form
Are there any mistakes?
Yes
No
Save the database
Finish

Design

Subtasks

Below is a list of subtasks together with the estimated duration and start dates.

Tasks	Start Date	Duration
Interview manager and real users, the teachers	1/12/2006	1day
Create forms for students to fill in with their details	2/12/2006	2 days
Disperse forms to those enrolled	4/12/2006	1 day
Design reports and forms	5/12/2006	5 days
Create logo	10/12/2006	1 day
Discuss designs with manager	11/12/2006	1 day
Using user's feedback, change the design as asked	12/12/2006	3 days
Collect forms from students	15/12/2006	1 day
Create database	16/12/2006	10 days
Discuss the database creation with manager	26/12/2006	1 day
Using user's feedback, change the database as asked	27/12/2006	2 days
Show the final version of database and discuss any areas that could be improved with manager and real user	29/12/2006	1 day

The database should have 3 tables. One table should store the student's details. The other, the teacher's details and the last should act as an attendance record.

This is the design for the Student Details table.

Field Name	Field Type	Field Length	Notes/Validation
Pupil ID Number	AutoNumber		Primary Key
First Name	Text	25	To allow long, foreign names
Last Name	Text	25	To allow long, foreign surnames and double-barreled surnames
Date of Birth	Date/Time		Short date
Address	Text	35	
Town	Text	20	
Postcode	Text	8	8 characters in a postcode including space
Telephone Number	Text	11	Phone Number; 11 characters in a telephone number
Mobile Number	Text	11	Phone Number; 11 characters in a telephone number
Mother's Name	Text	25	To allow long, foreign names
Father's Name	Text	25	To allow long, foreign names

The field length of a field is valuable since it is a waste of memory even if not used. Validation helps to ensure fewer mistakes are made in the database.

Below is the design of the Teacher Details table.

Field Name	Field Type	Field Length	Notes/Validation
Teacher ID Number	AutoNumber		Primary Key
Title			Dropdown menu displaying titles
First Name	Text	25	To allow long, foreign names
Last Name	Text	25	To allow long, foreign surnames and double-barrelled surnames
Classroom Name			Dropdown menu displaying classroom names
Subject			Dropdown menu displaying subjects

The field length of a field is valuable since it is a waste of memory even if not used. Validation helps to ensure fewer mistakes are made in the database. Dropdown menus save the user time for typing data over again. It also ensures fewer mistakes are made.

This is the design of the Attendance Record (Term 1).

Field Name	Field Type	Field Length	Notes/Validation
Pupil ID Number	AutoNumber		
First Name	Text	25	
Last Name	Text	25	
03 09	Yes/No		Attendance record
10 09	Yes/No		Attendance record
17 09	Yes/No		Attendance record
24 09	Yes/No		Attendance record
01 10	Yes/No		Attendance record
08 10	Yes/No		Attendance record
15 10	Yes/No		Attendance record
22 10	Yes/No		Attendance record
29 10	Yes/No		Attendance record
05 11	Yes/No		Attendance record
12 11	Yes/No		Attendance record
19 11	Yes/No		Attendance record
26 11	Yes/No		Attendance record
03 12	Yes/No		Attendance record
10 12	Yes/No		Attendance record
17 12	Yes/No		Attendance record
24 12	Yes/No		Attendance record
31 12	Yes/No		Attendance record

The field type ‘Yes/No’ creates a tick box, where the teacher can tick the box to indicate the pupil is present in class and can leave it blank if absent.

Student Details Form:

Teacher Details Form:

Student Details Report:

Teacher Details Report:

Relationship Diagram:

User Comments

This is what Mr. Amir Khan thought of the initial design of the database.

Amir's Saturday Tuition

234 Kent Close
Pollards Hill
London
SW16 7VX

123 Yell Road
Streatham
London
SW16 9KA

12/12/06

Dear,

I would like to firstly thank you for your effort and time to help create this database. The design of the database seems very good to me. The forms' design seems well thought out and well structured too. The use of control buttons was a good idea since it makes the database easier to use. The reports seem presentable and well structured. The relationships diagram was easily understood.

However, I would like to see some improvements to the database design. I think that on the Student Details form, the telephone and mobile number should be situated above mother and father's name. On both forms, the font size should be changed to 12 instead of 10. The logo of the company should be at the top in the centre of the page and the title should remain below it. The title font size should change from 16 to 20. For both reports, the logo of the company should be at the top in the centre of the page and the title should remain below it. Also, the font size should change for the data from 8 to 9 and for the subtitles, from 9 to 10. The footer, where the date is present, has a font size of 9 and should be changed to 10. I would be grateful in seeing these changes made to the database design.

Thank You,

Mr. Amir Khan

The changes made to the initial design were made in green pen to make it the final design.

Test Plan

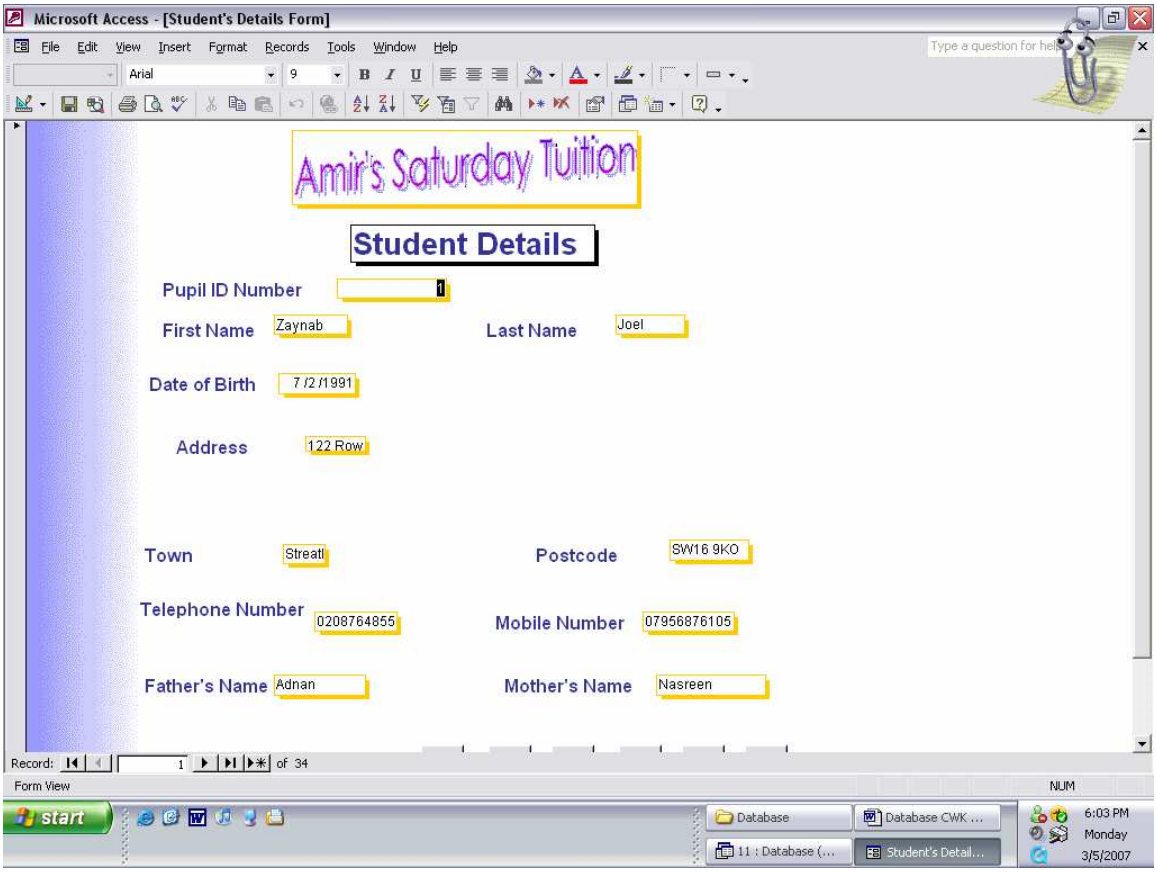
A test plan was designed. Once the database is created, these tests need to be carried out to ensure the database works correctly.

Test Number	Test Description	Reason for Test	Expected Outcome
1	Enter more than 25 characters in first name	Check if this is allowed	Inability to type more than 25 characters
2	Enter more than 25 characters in last name	Check if this is allowed	Inability to type more than 25 characters
3	Enter letters in 'Telephone Number'/'Mobile Number' field	Check input mask working correctly	Inability to type letters
4	Enter letters in 'Date of Birth' field	Check input mask working correctly	Inability to type letters
5	Open database	Check password protection	Asks for password to be entered
6	Check form opens with correct layout i.e. logo at the top and control buttons below	Check design of form is correct	Form with correct layout
7	Click on the control button - next record	Check control buttons are working	Next record should open
8	Change made in form - type address '212 Rowan Road' for Pupil ID number 1	Check if changes made in form effect tables	Address changed '212 Rowan Road' for Pupil ID Number 1
9	Select subject from list in subject field on form	Check if dropdown menu opens	Dropdown menu appear and subject can be chosen
10	Changes made in Student's Details table to Attendance Record	Check if relationships work	Changes appear in Attendance Record as well as the Student Details Form
11	Print Student Details Report	Check if reports print on A4 paper presentably	Hardcopy of report created on A4 paper
12	Run query - last name: "ali"	Check if queries work	All students with the last name of "ali" to appear

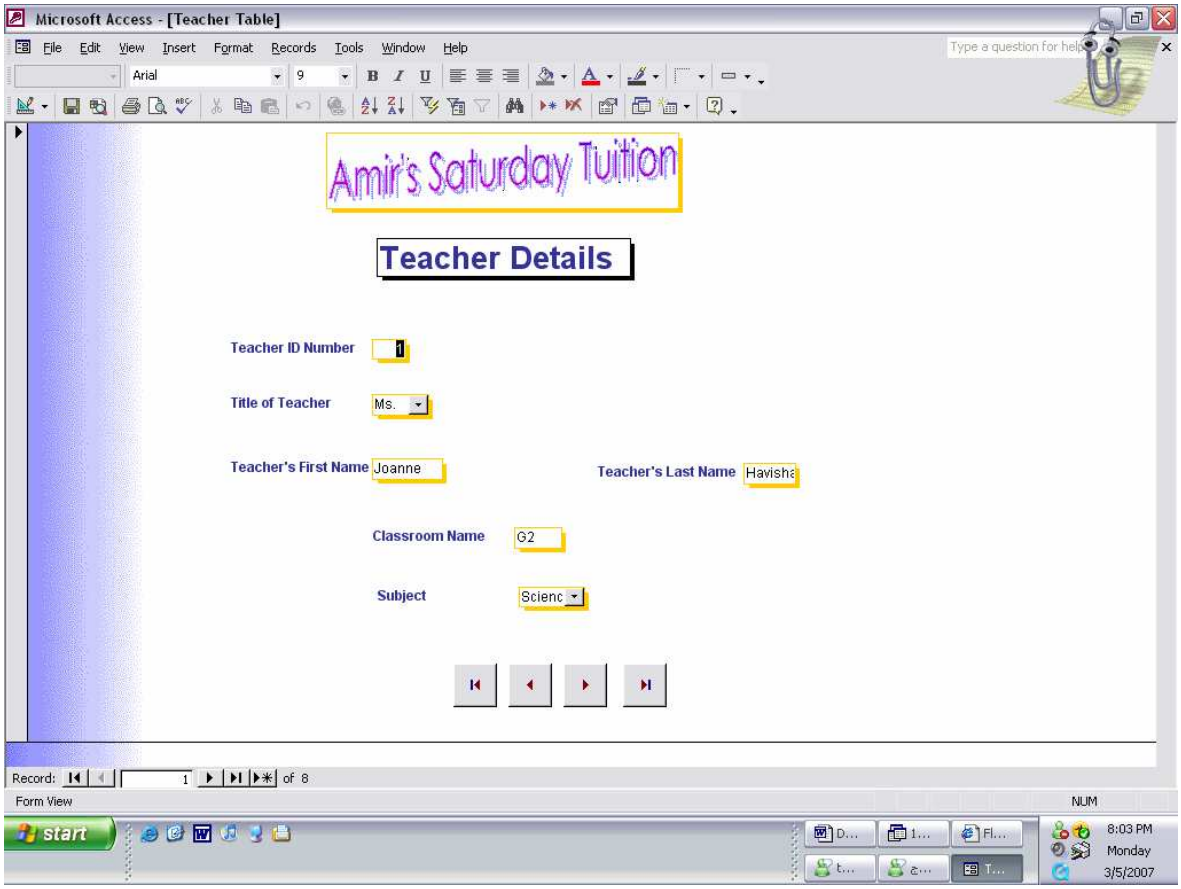
Implementation

Evidence of Error Correction

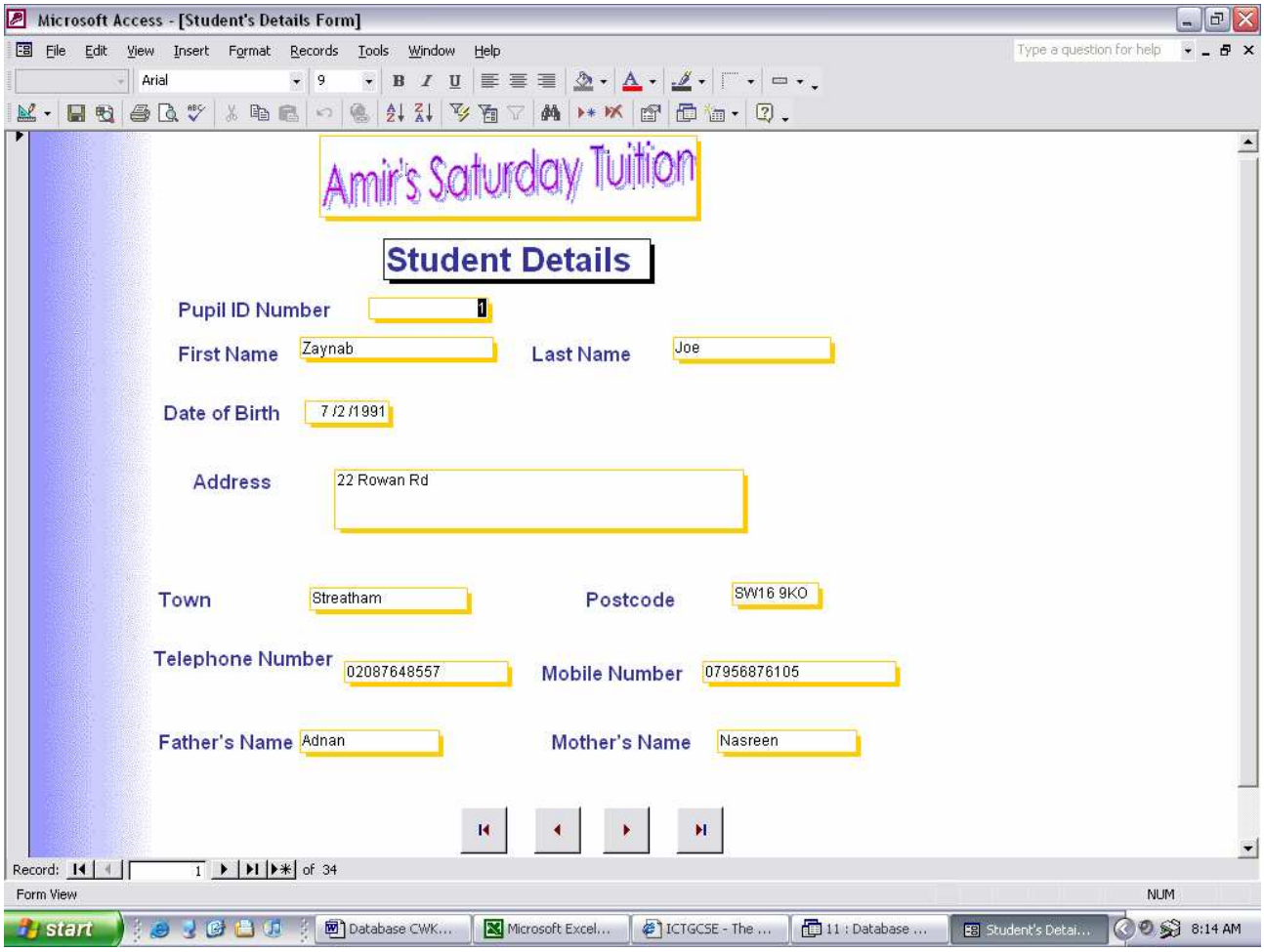
The screenshot below is of the 'Student Details" form. The error I found on it was that the text boxes were too small to fit the text into. For this reason, I made all the text boxes larger so that the text would be able to fit into them.



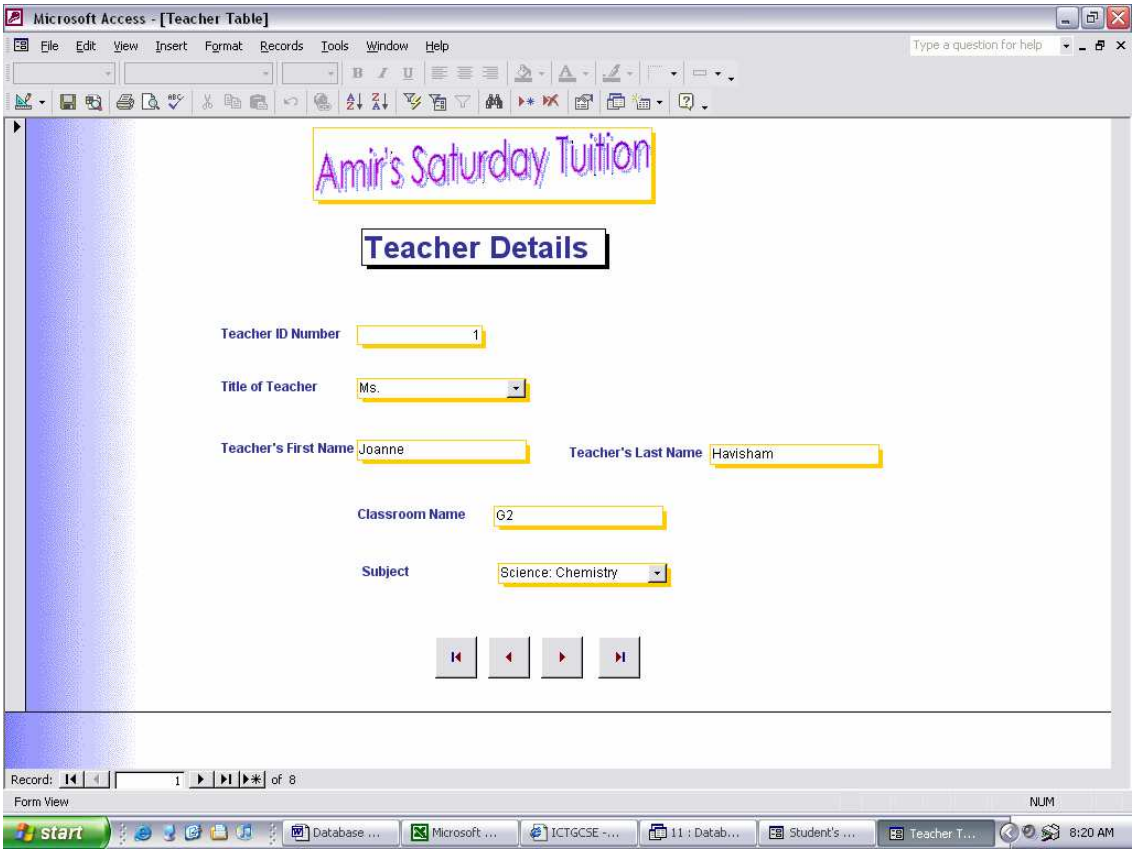
This screenshot shows the Teacher Details form. The same mistakes were found on it. The text boxes were all too small for text to be read in.



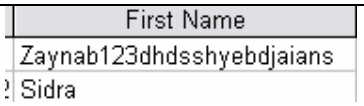
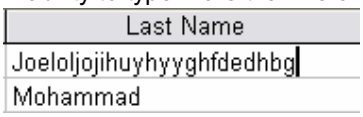
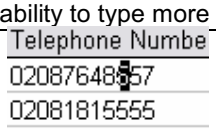
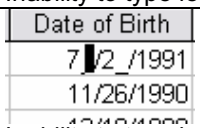
This screenshot shows the layout of the Student Details form after I made the changes to it. I made all the text boxes larger so that the data can fit within it. The name box was made extra large so that long, foreign names will also be able to fit within it.

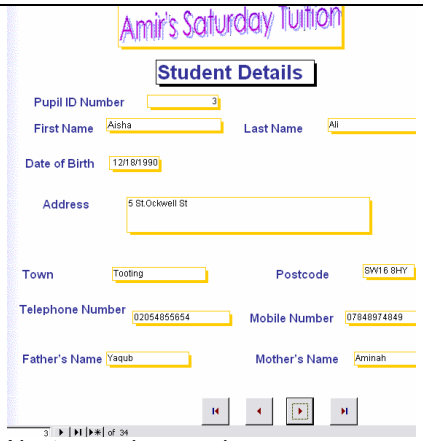
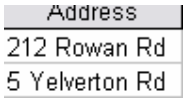
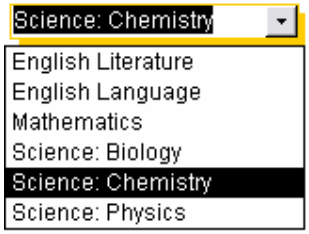
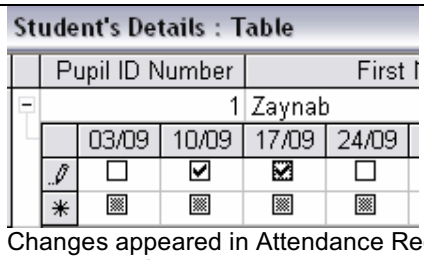
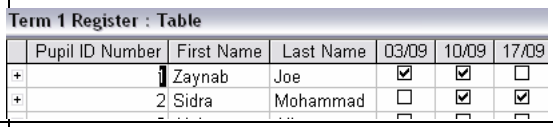


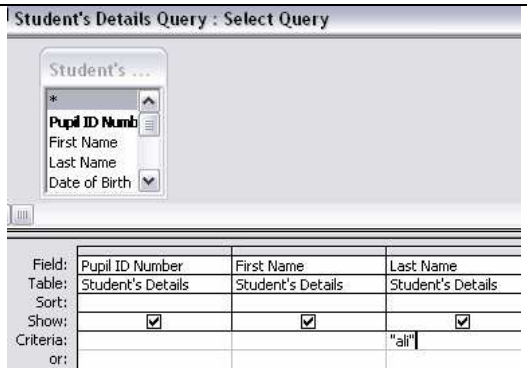
I also corrected the Teacher Details form because it had the same mistakes.



Test Plan

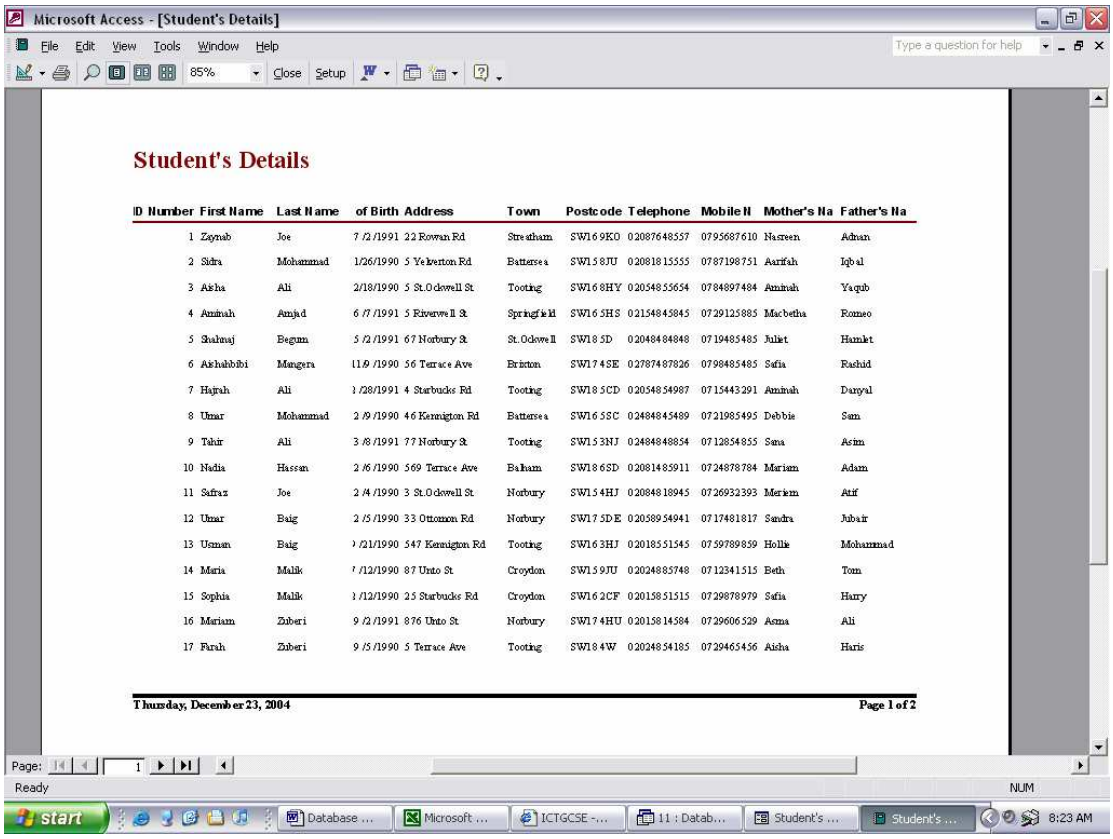
Test Number	Test Description	Reason for Test	Expected Outcome	Evidence
1	Enter more than 25 characters in first name	Check if this is allowed	Inability to type more than 25 characters	 Inability to type more than 25 characters
2	Enter more than 25 characters in last name	Check if this is allowed	Inability to type more than 25 characters	 Inability to type more than 25 characters
3	Enter letters in 'Telephone Number'/'Mobile Number' field	Check input mask working correctly	Inability to type letters	 Inability to type letters
4	Enter letters in 'Date of Birth' field	Check input mask working correctly	Inability to type letters	 Inability to type letters
5	Open database	Check password protection	Asks for password to be entered	Asks for password to be entered
6	Check form opens with correct layout i.e. logo at the top and control buttons below	Check design of form is correct	Form with correct layout	Form with correct layout

7	Click on the control button - next record	Check control buttons are working	Next record should open	 Next record opened
8	Change made in form - type address '212 Rowan Road' for Pupil ID number 1	Check if changes made in form effect tables	Address changed '212 Rowan Road' for Pupil ID Number 1 in table	 Address changed to '212 Rowan Road' for Pupil ID Number 1 in table
9	Select subject from list in subject field on form	Check lookup wizard works	Dropdown menu appear and subject can be chosen	 Dropdown menu appeared and subject can be chosen
10	Changes made in Student's Details table to Attendance Record	Check if relationships work	Changes appear in Attendance Record as well as the Student Details Form	 Changes appeared in Attendance Record as well as the Student Details Form 
11	Print Student Details Report	Check if reports print on A4 paper presentably	Hardcopy of report created on A4 paper	Hardcopy of report created on A4 paper

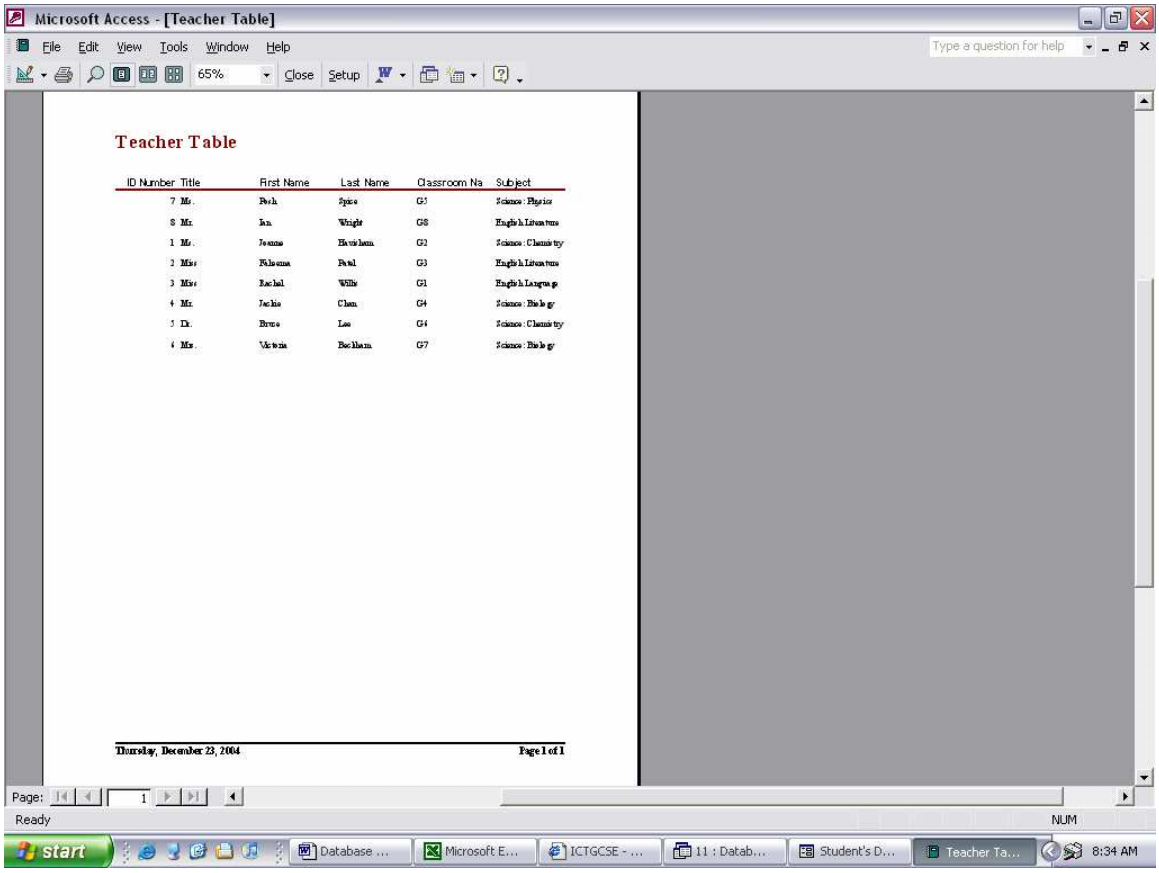
12	Run query - last name: "ali"	Check if queries work	All students with the last name of “ali” to appear.	 All students with the last name of "ali" appeared

Evidence of Problem Solutions

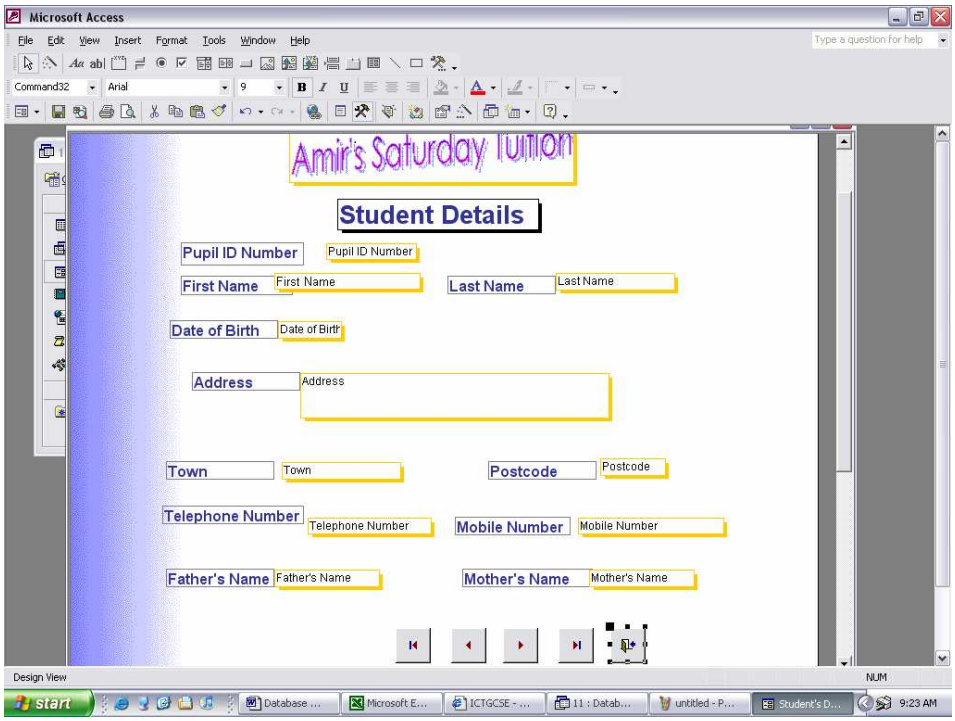
This screenshot shows the Student Details Report.



This screenshot shows the Teacher Details form.



The user found that there was no 'Exit Form' control button and thought this was necessary. Below is a screenshot of the Student Details form including this 'Exit Form' control button.



Evaluation

The objectives set for this task were:

1. To create a database, which stores student's details
2. To create a database, which also acts as an attendance record.
3. To make the database password protected
4. To enable the user to create reports
5. To enable the user to create forms
6. To enable the user to create queries
7. To link tables so that if changes are made in one table, the changes are clear in the other too.
8. To make the system easy to read and clear
9. To save the database on the appropriate backing storage.
10. To include the tuition logo in the system
11. Searching on the system should be easy
12. To make the forms include buttons linking from one record to another.

I was able to achieve the first two objectives which were to create the database to store student details and act as an attendance record or register. The database was password protected, as shown above. The user could easily make reports, forms and run queries. I have also made and given examples of each. I had linked tables by making relationships so that when a change was made on one table, the change would be apparent on the other too. This was shown above. The system was easy to read and clear, in my opinion. The database was saved on the user's email account, USB device, CD-RW and internal memory too. Computers in the tuition centre are all connected via a hub and router. This way if one computer fails, the other computers and other external memory still hold the database system. The tuition logo was put on the forms and reports presentably. Searching can be easy through running queries. Lastly, the forms did include buttons so that the records linked to one another.

User Comments:

Amir's Saturday Tuition

243 Jungle Lane
London
SW17 4PO

120 Hydrant Street
London
SW13 7JQ

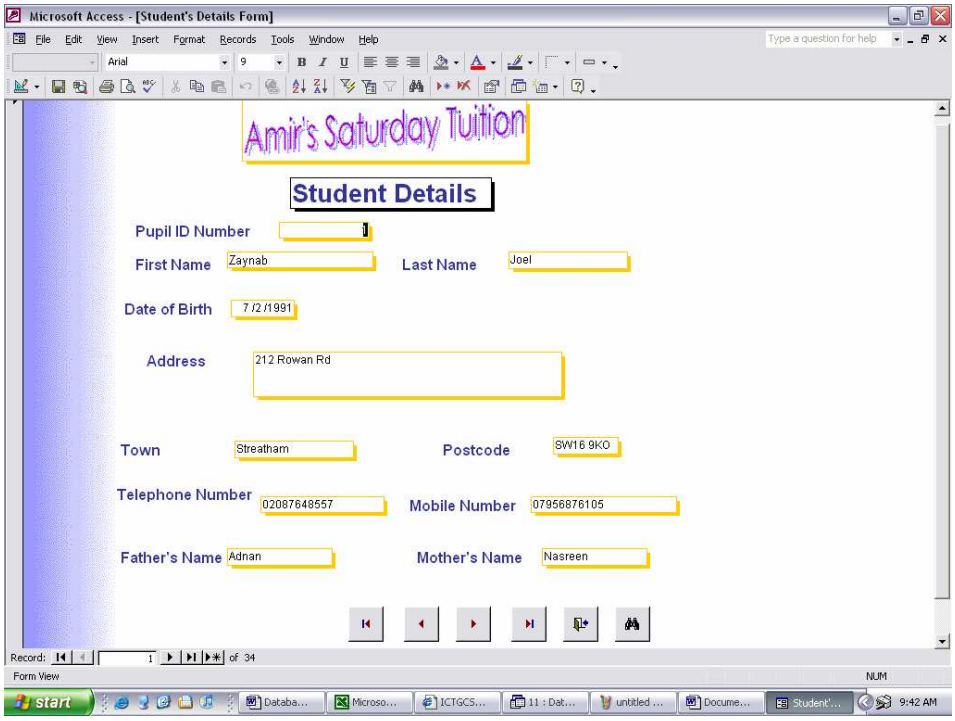
12/12/06

Dear Ms Baig,

I would like to firstly thank you for your effort and time to help create this database. The database is just as I expected. It is very easy to use and presentable too. Teachers and pupils are now able to enter their details in forms and this can immediately be stored. The use of control buttons and queries is very helpful and I am very glad that there is password protection on the database.

I would just like to add that to further improve the system; a control button which likes to queries should be included on the forms. This would assist many of the teachers and myself and will save time.

Thank You

Mr.Amir Khan.

I then created a control button which would link the forms to queries. Evidence of this is shown below.